



GE Fanuc Automation

PowerMotion™ Products

Power Mate H Motion Controller

Maintenance Manual

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Warnings, Cautions, and Notes as Used in this Publication

Warning

Warning notices are used in this publication to emphasize that hazardous voltages, currents, temperatures, or other conditions that could cause personal injury exist in this equipment or may be associated with its use.

In situations where inattention could cause either personal injury or damage to equipment, a Warning notice is used.

Caution

Caution notices are used where equipment might be damaged if care is not taken.

Note

Notes merely call attention to information that is especially significant to understanding and operating the equipment.

This document is based on information available at the time of its publication. While efforts have been made to be accurate, the information contained herein does not purport to cover all details or variations in hardware or software, nor to provide for every possible contingency in connection with installation, operation, or maintenance. Features may be described herein which are not present in all hardware and software systems. GE Fanuc Automation assumes no obligation of notice to holders of this document with respect to changes subsequently made.

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DEFINITION OF WARNING, CAUTION, AND NOTE

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

WARNING

Applied when there is a danger of the user being injured or when there is a damage 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

The Note is used to indicate supplementary information other than Warning and Caution.

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

PREFACE

Description of this manual

1.DISPLAY AND OPERATION

This chapter covers those items, displayed on the CRT, that are related to maintenance. A list of all supported operations (CRT and DPL) is also provided at the end of this chapter.

2.HARDWARE

This chapter covers hardware-related items, including the hardware configuration, connection, and Power Mate status indicated on printed circuit boards. A list of all units is also provided as well as an explanation of how to replace each unit.

3.INPUT AND OUTPUT OF DATA

This chapter describes the input/output of data, including programs, parameters, and tool compensation data, as well as the input/output procedures.

4.INTERFACE BETWEEN NC AND PMC

This chapter describes the PMC specifications, the system configuration, and the signals used by the PMC.

5.DIGITAL SERVO

This chapter describes the servo tuning screen and how to adjust the reference position return position.

6.TROUBLE SHOOTING

This chapter describes the procedures to be followed in the event of certain problems occurring, for example, if the power cannot be turned on or if automatic operation cannot be performed. Countermeasures to be applied in the event of alarms being output are also described.

APPENDIX

The appendix consists of a list of all alarms, as well as a list of maintenance parts. The I/O Unit-MODEL A is also described.

This manual does not provide a parameter list. If necessary, refer to the Connection Manual (B-62683EN).

This manual describes all optional functions. Refer to the manual provided by the machine tool builder for details of any options with which the installed machine tool is provided.

This manual describes following function.

The models covered by this manual, and their abbreviations, are :

Product Name	Abbreviations
Power Mate-MODEL H	Power Mate-H
	Power Mate

Related manuals

The table below lists manuals related to the Power Mate-H.
In the table, this manual is marked with an asterisk(*).

Table 1 Manuals related to the Power Mate-H

Manual name	Specification Number	
FANUC Power Mate-MODEL H DESCRIPTIONS	B-62682EN	
FANUC Power Mate-MODEL H CONNECTION MANUAL	B-62683EN	
FANUC Power Mate-MODEL H OPERATOR'S MANUAL	B-62684EN	
FANUC Power Mate-MODEL H MAINTENANCE MANUAL	B-62685EN	*

For specifications and maintenance of FANUC SERVO MOTOR α series and β series, refer to the following manuals:

Document name	Document number	Major contents	Major usage	
FANUC AC SERVO MOTOR α series DESCRIPTIONS	B-65142E	<ul style="list-style-type: none"> • Specification • Characteristics • External dimensions • Connections 	<ul style="list-style-type: none"> • Selection of motor • Connection of motor 	
FANUC CONTROL MOTOR AMPLIFIER α series DESCRIPTIONS	B-65162E	<ul style="list-style-type: none"> • Specifications and functions • Installation • External dimensions and maintenance area • Connections 	<ul style="list-style-type: none"> • Selection of amplifier • Connection of amplifier 	
FANUC CONTROL MOTOR α series MAINTENANCE MANUAL	B-65165E	<ul style="list-style-type: none"> • Start up procedure • Troubleshooting • Maintenance of motor 	<ul style="list-style-type: none"> • Start up the system (Hardware) • Troubleshooting • Maintenance of motor 	
FANUC AC SERVO MOTOR α series PARAMETER MANUAL	B-65150E	<ul style="list-style-type: none"> • Initial setting • Setting parameters • Description of parameters 	<ul style="list-style-type: none"> • Start up the system (Software) • Turning the system (Parameters) 	
FANUC SERVO MOTOR β series DESCRIPTIONS	B-65232EN	<ul style="list-style-type: none"> • Specification • Characteristics • External dimensions • Connections 	<ul style="list-style-type: none"> • Selection of motor • Connection of motor 	

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1

DISPLAY AND OPERATION

This chapter describes how to display various screens by the function keys. The screens used for maintenance are respectively displayed.

- 1.1 FUNCTION KEYS AND SOFT KEYS**
- 1.2 CONFIGURATION DISPLAY OF SOFTWARE**
- 1.3 SYSTEM CONFIGURATION SCREEN**
- 1.4 ALARM HISTORY SCREEN**
- 1.5 HELP FUNCTION**
- 1.6 DISPLAYING DIAGNOSTIC PAGE**
- 1.7 POWER MATE STATUS DISPLAY**
- 1.8 OPERATION HISTORY**
- 1.9 LIST OF OPERATIONS (CRT/MDI)**
- 1.10 LIST OF OPERATIONS (DPL/MDI)**

1.1 FUNCTION KEYS AND SOFT KEYS

Operations and soft key display statuses for each function key are described below:

1.1.1 Soft Keys

To display a more detailed screen of CRT, PDP, LCD, handy operator's panel, press a function key followed by a soft key. Soft keys are also used for actual operations.

The following illustrates how soft key displays are changed by pressing each function key.

The symbols in the following figures mean as shown below :



:

Indicates screens



:

Indicates a screen that can be displayed by pressing a function key(*1)



:

Indicates a soft key(*2)



:

Indicates input from the MDI panel.



:

Indicates the continuous menu key (rightmost soft key).

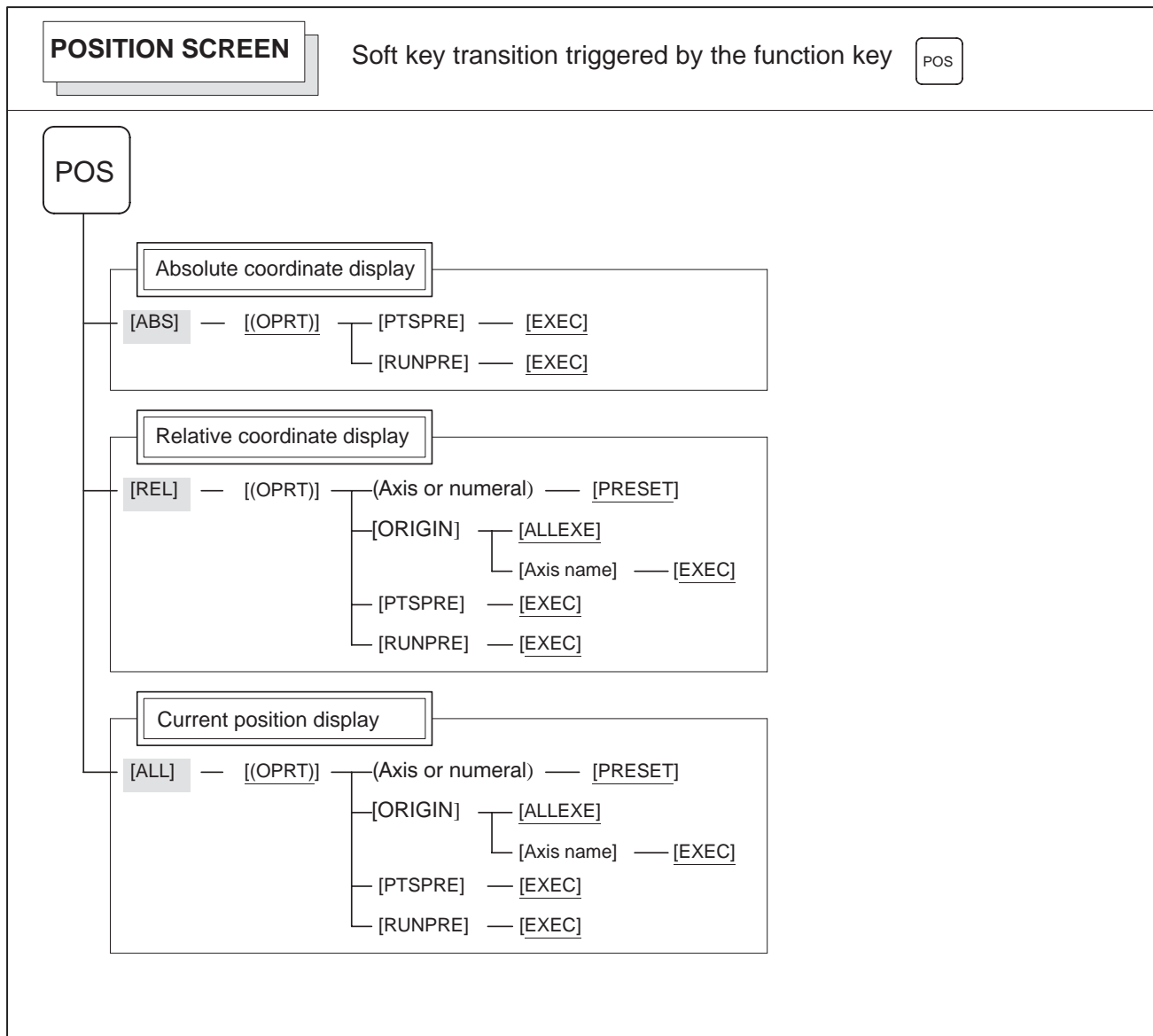
*1) Press function keys to switch between screens that are used frequently.

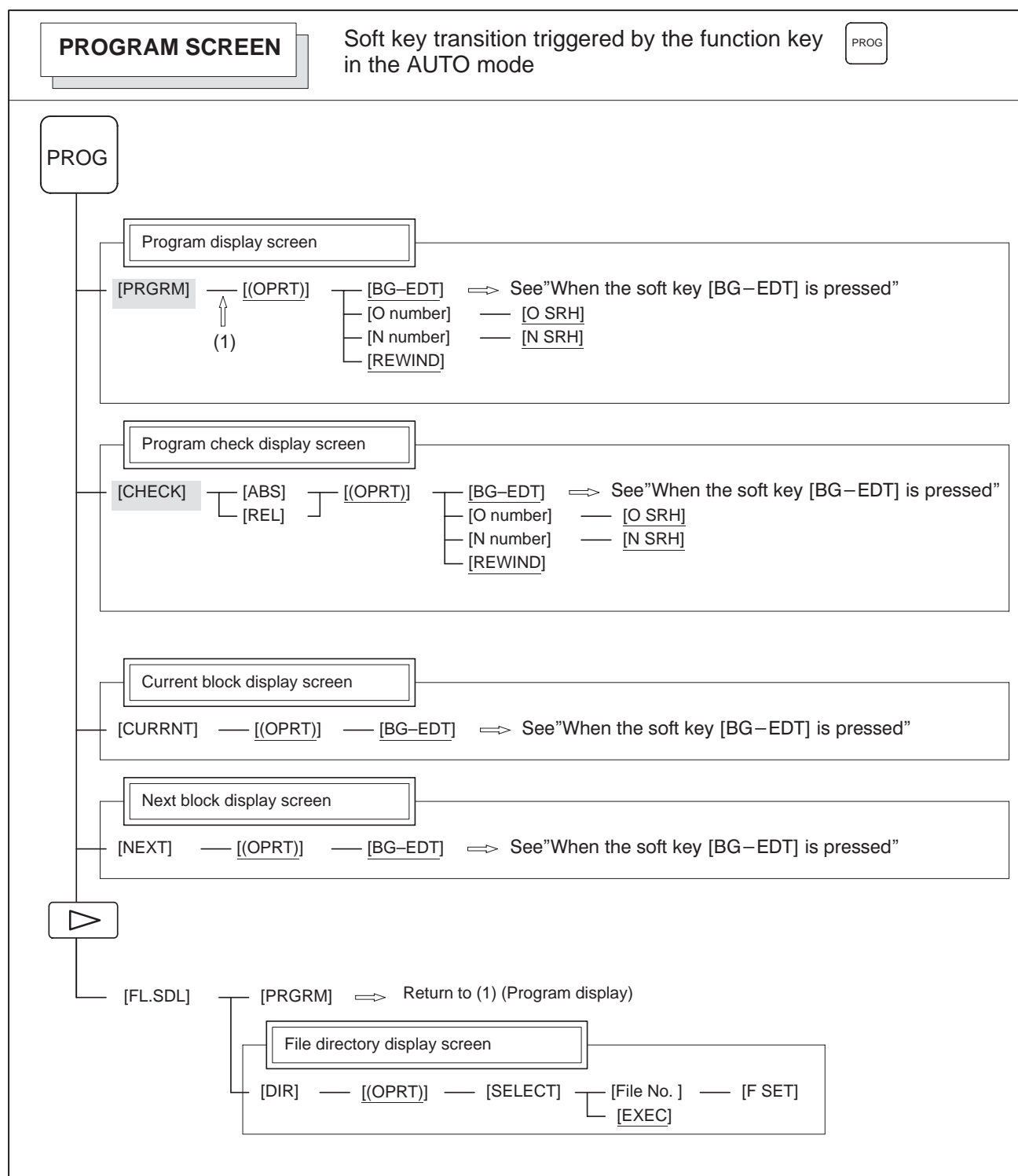
*2) Some soft keys are not displayed depending on the option configuration.

*3) Japanese display function is not used in the handy operator's panel.

NOTE

When the DPL/MDI panel is connected, the keys on the CRT, PDP, LCD and handy operator's panels are disabled, and their screens are restricted to those for position display.





PROGRAM SCREEN

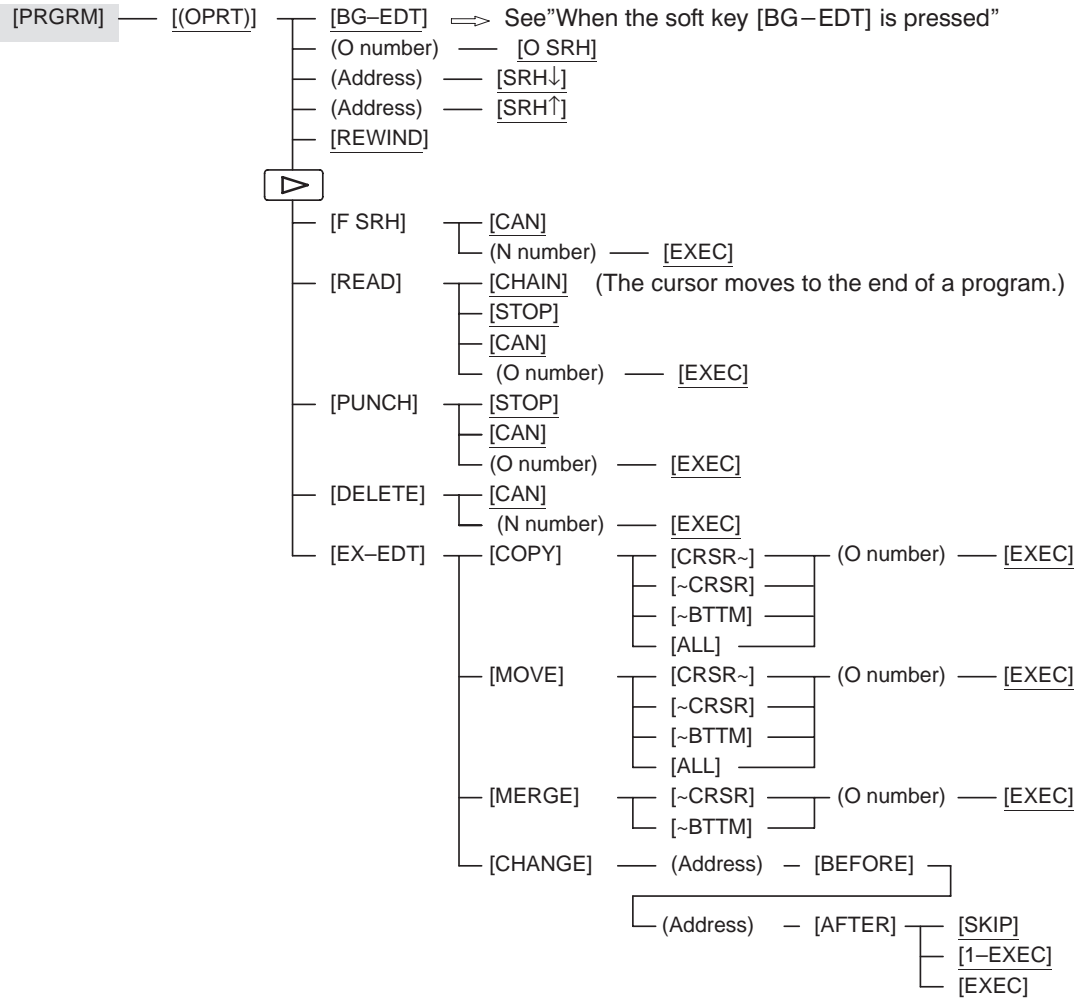
Soft key transition triggered by the function key
in the EDIT mode

PROG

1/2

PROG

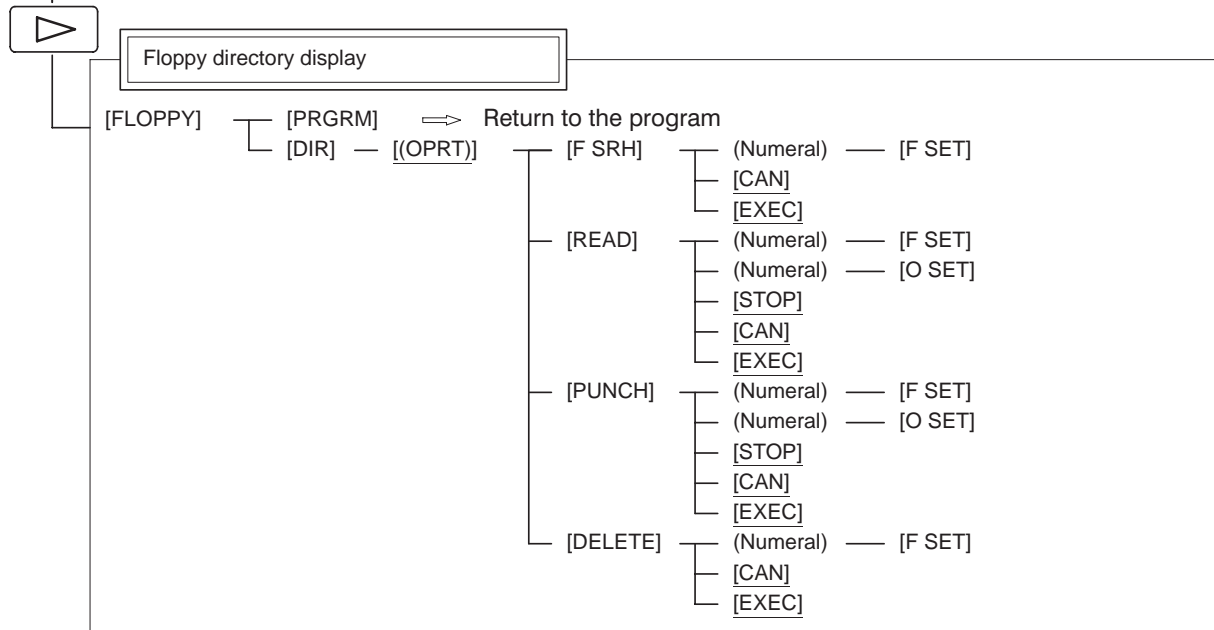
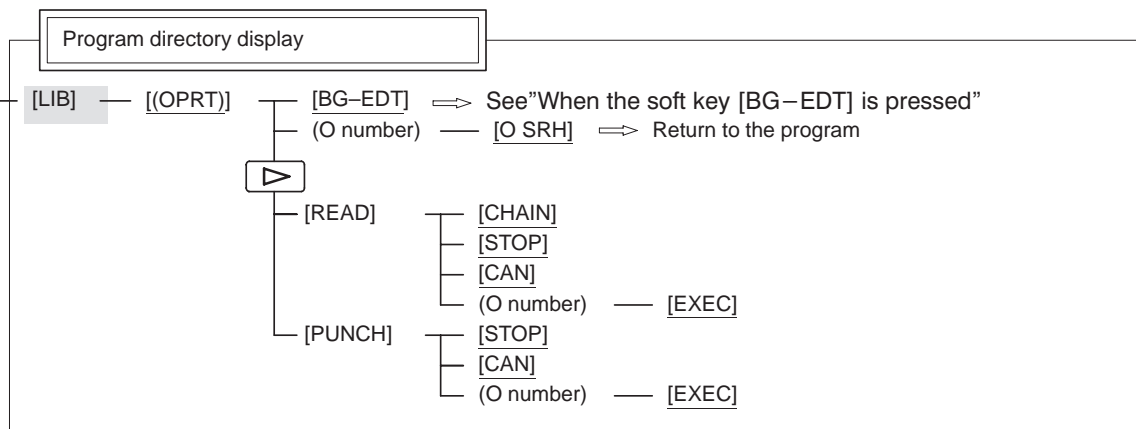
Program display



(1) (Continued on the next page)

2/2

(1)



PROGRAM SCREEN

Soft key transition triggered by the function key in the MDI mode

PROG

PROG

Program display

[PRGRM] — [(OPRT)] — [BG-EDT] ⇒ See "When the soft key [BG-EDT] is pressed"

Program input screen

[MDI] — [(OPRT)] — [BG-EDT] ⇒ See "When the soft key [BG-EDT] is pressed"

[START] — [CAN] — [EXEC]

(Address) — [SRH↓]

(Address) — [SRH↑]

[REWIND]

Current block display screen

[CURRNT] — [(OPRT)] — [BG-EDT] ⇒ See "When the soft key [BG-EDT] is pressed"

Next block display screen

[NEXT] — [(OPRT)] — [BG-EDT] ⇒ See "When the soft key [BG-EDT] is pressed"

PROGRAM SCREEN

Soft key transition triggered by the function key in the STEP, JOG, or ZRN mode

PROG

PROG

Program display

[PRGRM] — [(OPRT)] — [BG-EDT] ⇒ See "When the soft key [BG-EDT] is pressed"

Current block display screen

[CURRNT] — [(OPRT)] — [BG-EDT] ⇒ See "When the soft key [BG-EDT] is pressed"

Next block display screen

[NEXT] — [(OPRT)] — [BG-EDT] ⇒ See "When the soft key [BG-EDT] is pressed"

PROGRAM SCREEN

Soft key transition triggered by the function key
in the TJOG or TSTP mode

PROG

PROG

Program display

[PRGRM] — [(OPRT)] — [BG-EDT] ⇒ See "When the soft key [BG-EDT] is pressed"

Program input screen

[MDI] — [(OPRT)] — [BG-EDT] ⇒ See "When the soft key [BG-EDT] is pressed"
 (O number) — [O SRH] ⇒ Return to the program
 (Address) — [SRH↓]
 (Address) — [SRH↑]
 [REWIND]

Program directory display

[LIB] — [(OPRT)] — [BG-EDT] ⇒ See "When the soft key [BG-EDT] is pressed"
 (O number) — [O SRH] ⇒ Return to the program

PROGRAM SCREEN

Soft key transition triggered by the function key
(When the soft key [BG-EDT] is pressed in all modes)

PROG

1/2

PROG

Program display

[PRGRM]

[(OPRT)]

[BG-END]

(O number)

[O SRH]

(Address)

[SRH↓]

(Address)

[SRH↑]

[REWIND]



[F SRH]

[CAN]

(N number)

[EXEC]

[READ]

[CHAIN]

(The cursor moves to the end of a program.)

[STOP]

[CAN]

(O number)

[EXEC]

[PUNCH]

[STOP]

[CAN]

(O number)

[EXEC]

[DELETE]

[CAN]

(N number)

[EXEC]

[EX-EDT]

[COPY]

[CRSR~]

(O number)

[EXEC]

[~CRSR]

[~BTM]

[ALL]

[MOVE]

[CRSR~]

(O number)

[EXEC]

[~CRSR]

[~BTM]

[ALL]

[MERGE]

[~CRSR]

(O number)

[EXEC]

[~BTM]

[CHANGE]

(Address)

[BEFORE]

(Address)

[AFTER]

[SKIP]

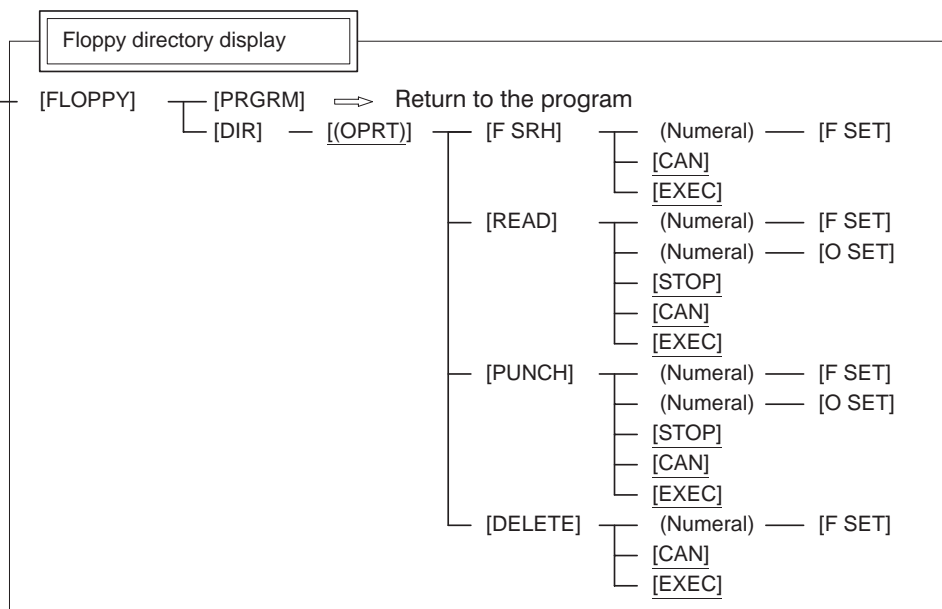
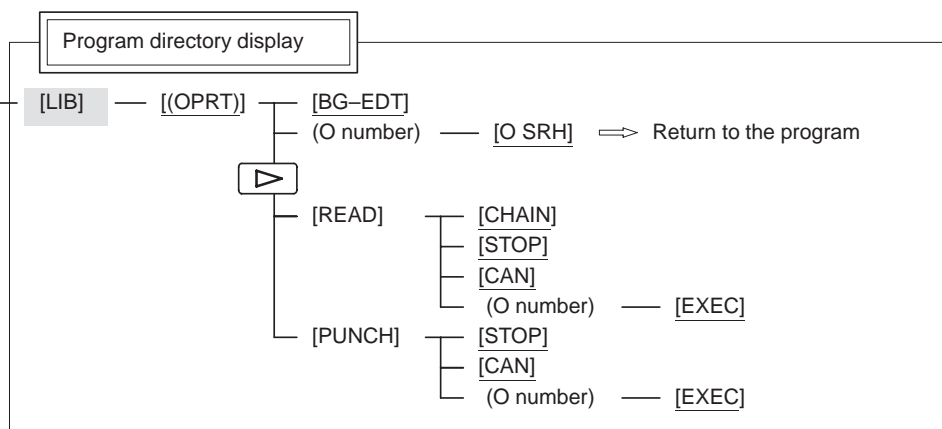
[1-EXEC]

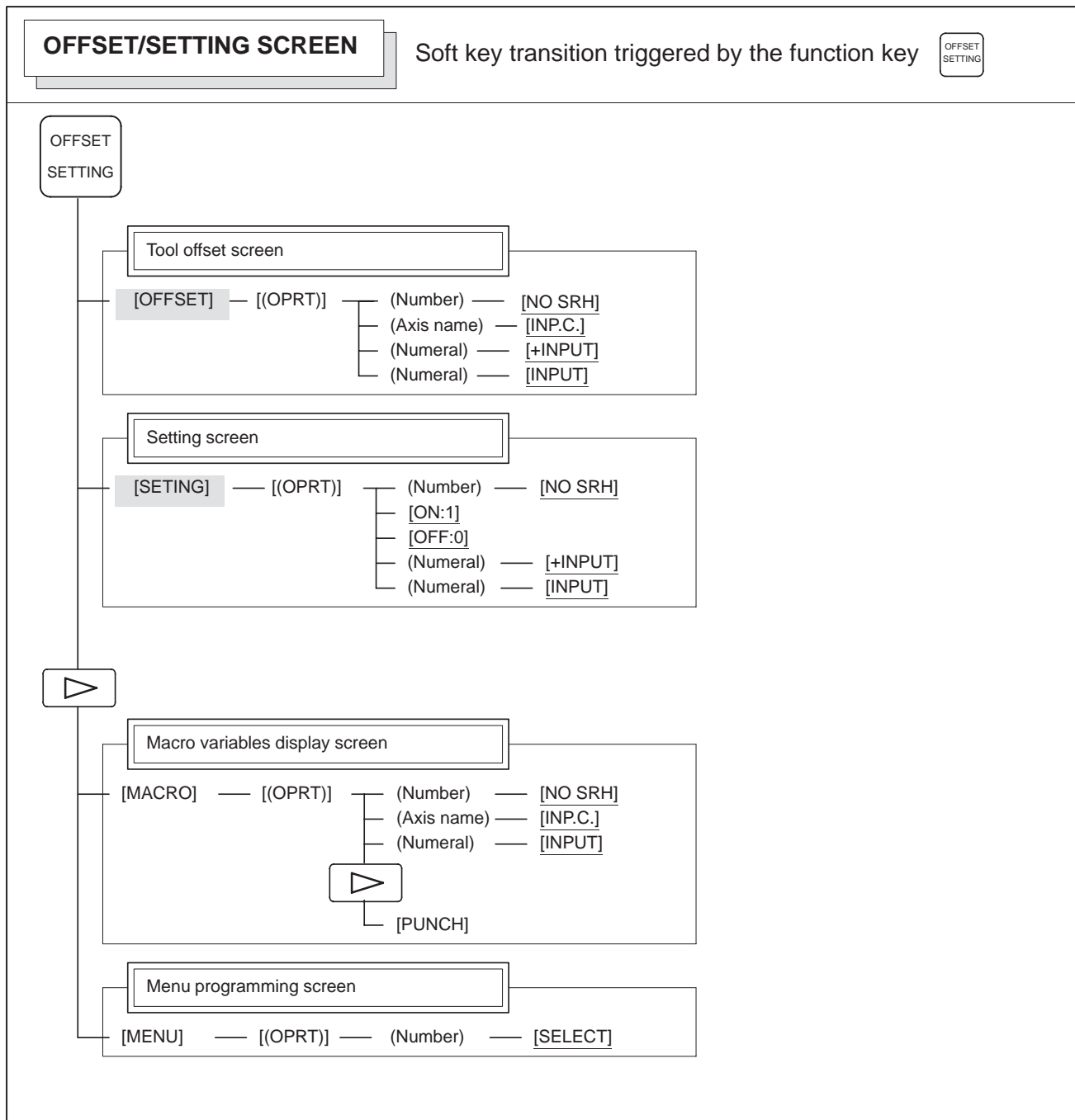
[EXEC]

(1) (Continued on the next page)

2/2

(1)





SYSTEM SCREEN

Soft key transition triggered by the function key

SYSTEM

1/2

SYSTEM

Parameter screen

[PARAM] — [(OPRT)]

- (Number) — [NO SRH]
- [ON:1]
- [OFF:0]
- (Numeral) — [+INPUT]
- (Numeral) — [INPUT]



[READ] — [CAN]
[EXEC]

[PUNCH] — [CAN]
[EXEC]

To enter a file number: Press **[N]**, enter a file number, then press **[▶]**, [F-SRCH], and [EXEC] on the PRGRM screen

Diagnosis screen

[DGNOS] — [(OPRT)] — (Number) — [NO SRH]

PMC screen

[PMC] — [PMCLAD] — [SEARCH]

- [TOP]
- [BOTTOM]
- [SRCH]
- [W-SRCH]
- [N-SRCH]

[▶]

[F-SRCH]

[ADRESS]/[SYMBOL]

[TRIGER]

- [TRGON]
- [TRGOFF]
- [START]

[▶]

[DUMP] — [SEARCH]

[D PARA]/[ND PARA]

[TRGSRC]

[INIT]

[WINDOW]

- [DIVIDE]
- [CANCEL]
- [DELETE]
- [SELECT]
- [WIDTH]

[▶]

[BYTE]

[WORD]

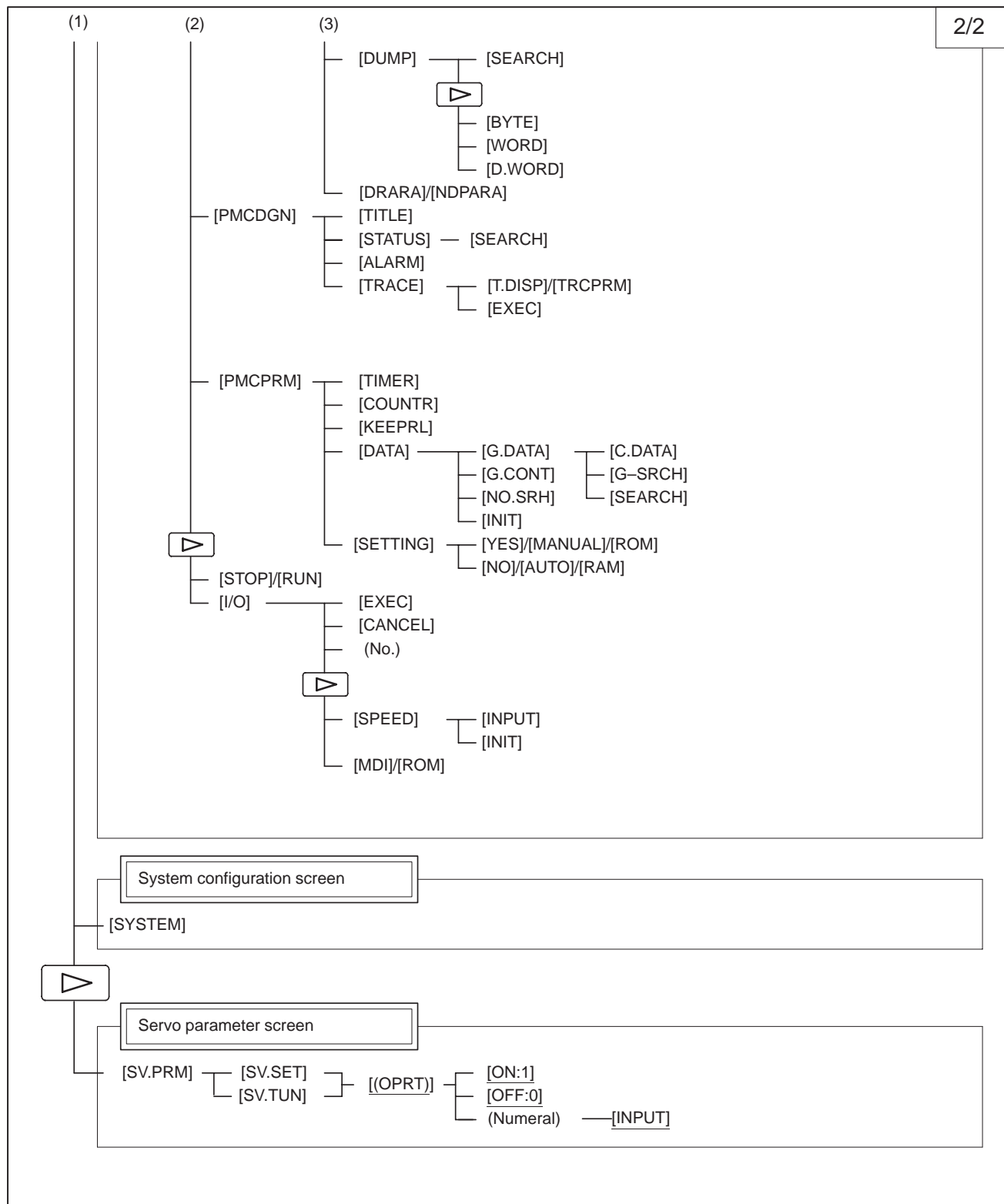
[D.WORD]

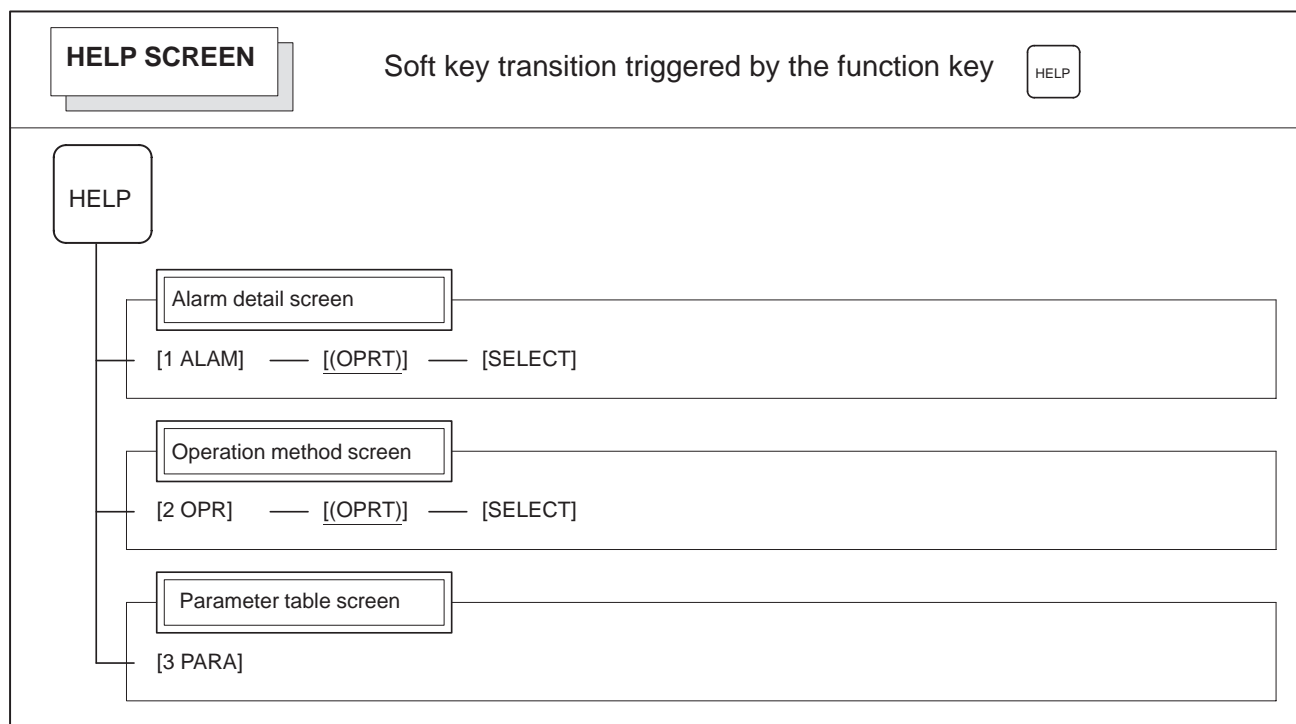
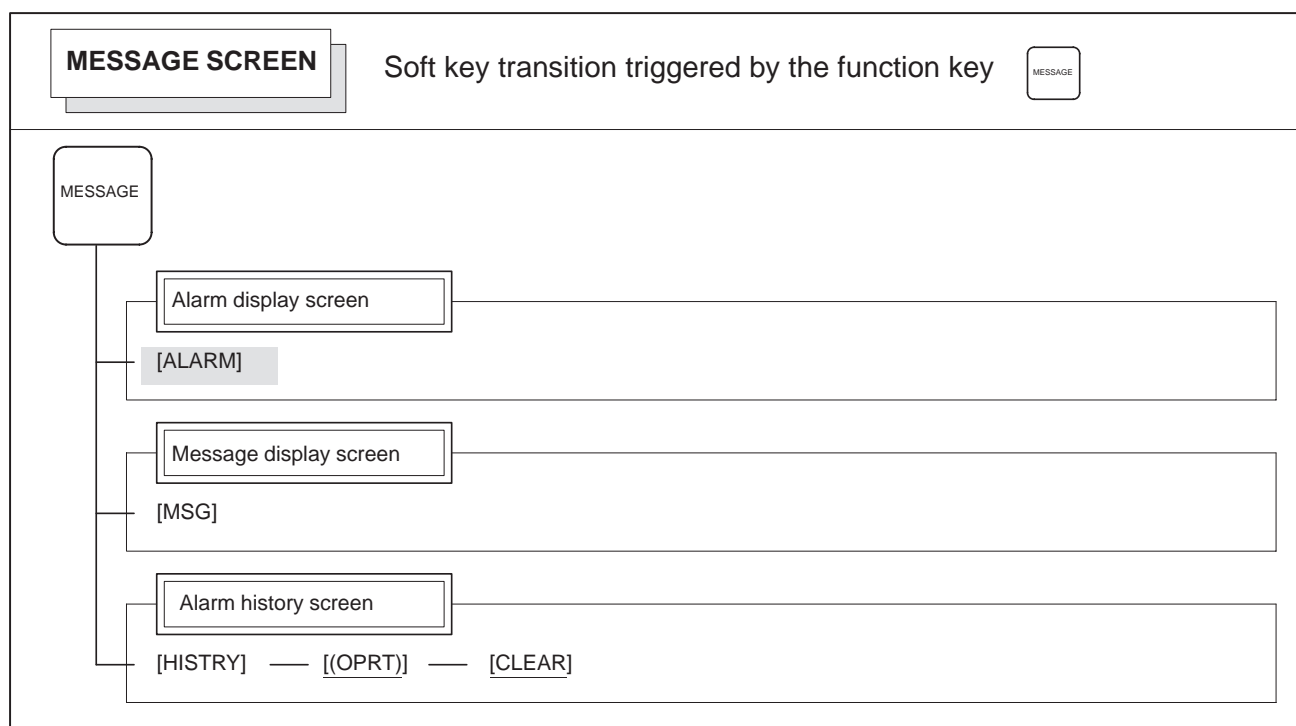
(1)

(2)

(3)

(Continued on the next page)





1.1.2 DPL/MDI

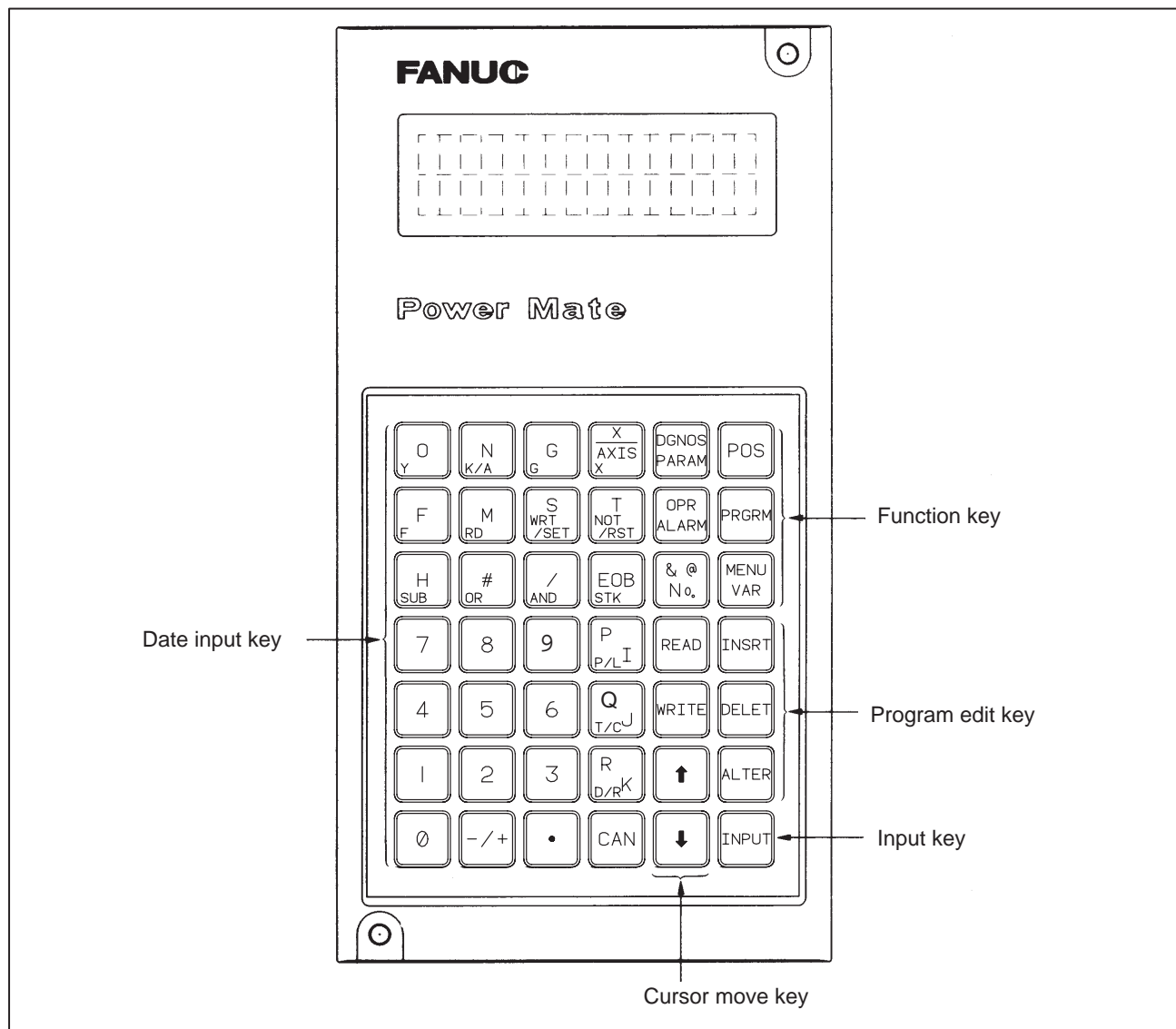


Fig.1.1.2 DPL/MDI Panel

(1) Function keys

Function keys indicate large items like chapters in a document.



Indicates the current position.



Conducts the following:

In EDIT mode ...edits and displays the program in the memory

In automatic operation ...displays command value.



Used to display offset settings and to set and display macro variables.



Used to set and display parameter, diagnostic, and PMC parameter.



Display of Alarm number and external message.

(2) Keyboard functions

Table 1.1.2 MDI Keyboard functions

Key	Functions
Address /numerical key	Press these keys to input alphabetic, numeric, and other characters.
INPUT () key	When an address or a numerical key is pressed, the letter or the numeral is input once to the key input buffer, and it is displayed on the DPL. To input the data, press the INPUT key.
Cancel () key	Press this key to cancel character or sign input to the key input buffer. (Example) When the key input buffer displays N0001, N0001 is cancelled with this key. When an alarm is displayed, depressing CAN will reset the alarm message.
Cursor shift keys	There are two kinds of cursor shift key described below. : This key is used to shift the cursor a short distance in the forward direction. : This key is used to shift the cursor a short distance in the reverse direction.
READ () key	Press this key to start I/O operation with an I/O device or memory card. Pressing a key activates the corresponding I/O device. Be careful not to press the wrong key.
WRITE () key	

CAUTION

Pressing the READ or WRITE key activates the corresponding function.
Be careful to press the correct key.
If the wrong key is pressed, data may be transferred in the direction opposite to the desired direction.



Power Mate ← I/O device or memory card



Power Mate → I/O device or memory card

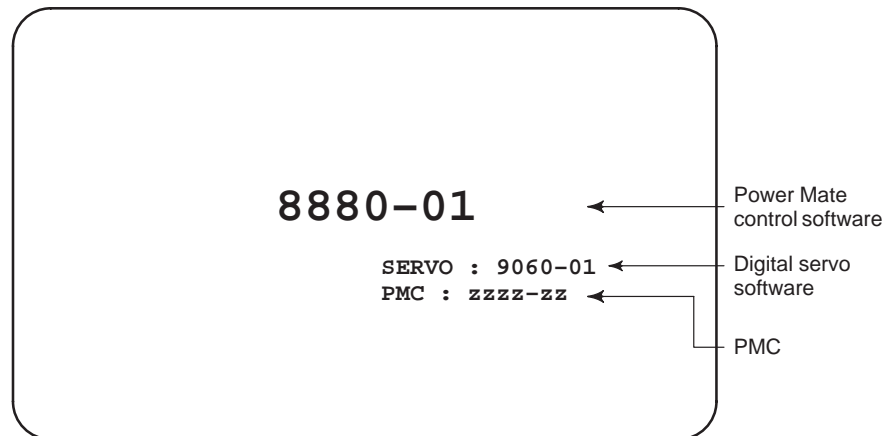
(3) Caution on using the DPL/MDI

If the DPL/MDI, CRT (PDP, LCD)/MDI, and handy operator's panel are connected at the same time, the DPL/MDI takes precedence. The CRT (PDP, LCD)/MDI and handy operator's panel are disabled, and their functions are restricted to position display.

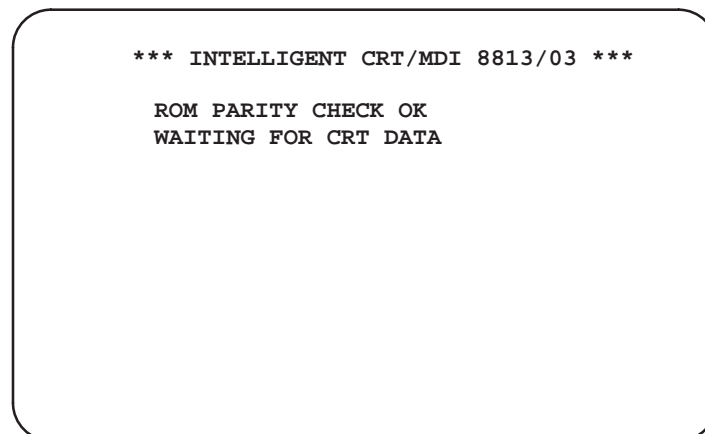
1.2 CONFIGURATION DISPLAY OF SOFTWARE

1.2.1 CRT/MDI

1) Upon normal start



2) When the CRT/MDI has started normally, but cannot communicate with the controller



NOTE

If nothing appears on the screen, it indicates that the CRT/MDI has failed to start.

1.2.2 DPL/MDI

1) Upon normal start

Power Mate-H

8880-01 ←

Power Mate
control software

2) When the DPL/MDI has started normally, but cannot communicate with the controller

ROM PARI. OK

RAM CHECK OK




NOTE

If nothing appears on the screen, it indicates that the DPL/MDI has failed to start.

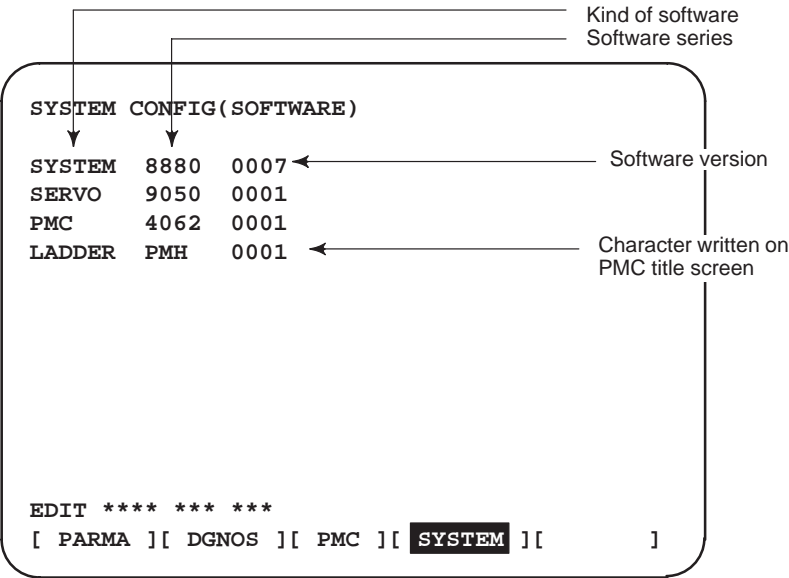
1.3
SYSTEM
CONFIGURATION
SCREEN

After the system has been installed correctly, you can not display the system configuration screen. However, you can find the PCBs installed and the softwares integrated on the system configuration screen.

1.3.1
Display Method

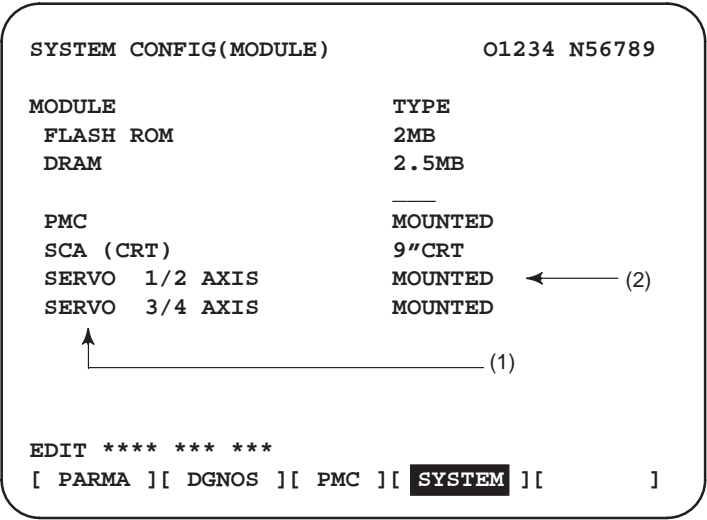
- (1) Press  key.
- (2) Press soft key **[system]**, then the system configuration screen is displayed.
- (3) The system configuration screen is composed of two screens and each of them can be selected by the page key  .

1.3.2
Software Configuration
Screen



1.3.3
Module Configuration
Screen

Configuration of the modules displayed on PCB.



Contents of display

- (1) Type of mounted module unit or hardware
- (2) Mounted or not, or type of module unit

Pressing the page keys   displays the system configuration screen of other PCBs.

*Refer to “2.4.7 Location of Modules and Internal PC Boards” for correspondence with each module and display.

1.4 ALARM HISTORY SCREEN

1.4.1 General

Alarms generated in the Power Mate are recorded. The latest 25 alarms generated are recorded. The 26th and former alarms are deleted.

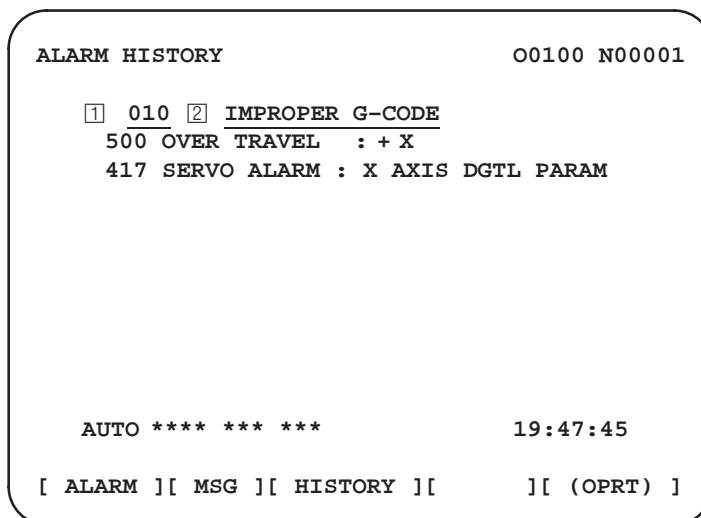
DPL/MDI can not display the alarm history screen.

1.4.2 Screen Display

(1) Press  key .

(2) Press soft key [**HISTORY**] and an alarm history screen is displayed.

(3) Other pages are displayed by  or  key.



[1] Alarm No.

[2] Alarm message (some contains no message)

1.4.3 Clearing Alarm History

(1) Press soft key [(**OPRT**)].

(2) Press soft key [(**CLEAR**), then the alarm history is cleared.

1.4.4 Display of Special Alarms

- Alarms generated by custom macro
- Alarms generated by DISP or DISPB instruction of PMC.

Alarm numbers are 3000s and the messages are all "MACRO ALARM".
(Ex) #3000=1(ERROR)⇒"3001 MACRO ALARM".

Alarms of 1000s and the message is all "EXTERNAL ALARM".
(Ex) DISP instruction A000.0 1000 ERROR1⇒"1000 EXTERNAL ALARM"


1.5 HELP FUNCTION

1.5.1 General

The help function displays alarm information, operation method and a table of contents for parameters. This function is used as a handbook. DPL/MDI and handy operator's panel can not use the help function.

1.5.2 Display Method

- Display of help screen

Press  key on any screen other than PMC screen, then a help screen appears. (However, it is not available when PMC screen is displaying)

```

HELP (INITIAL MENU)                                O1234 N12345

          ***** HELP *****
          1. ALARM DETAIL
          2. OPERATION METHOD
          3. PARAMETER TABLE

EDIT *****
[1 ALAM] [2 OPE] [3 PARA] [   ] [   ]

```

- Help for alarm

(1) When an alarm is generated, press soft key **[1 ALAM]**, then a help message of the alarm is displayed.

```

HELP (INITIAL MENU)                                O1234 N12345

NUMBER      : 010
M'SAGE      : IMPROPER G CODE
FUNCTION     :
ALARM       :
  A G CODE NOT LISTED IN G-CODE TABLE
  IS BEING COMMANDED
  ALSO G-CODE FOR FUNCTION NOT ADDED
  IS BEING COMMANDED

>_
EDIT *****
[1 ALAM] [2 OPE] [3 PARA] [   ] [ OPRT ]

```


(2) Pressing soft key [OPRT], (alarm No.), and soft key [SELECT] in this order, a help message corresponding to the input alarm number is displayed.

● Help for operation

(1) Press [2 OPR], then a menu for operation method is displayed.

```

HELP (OPERATION METHOD)                                O1234 N12345

1. PROGRAM EDIT
2. SEARCH
3. RESET
4. DATA INPUT WITH MDI
5. DATA INPUT WITH TAPE
6. OUTPUT
7. INPUT WITH FANUC CASSETTE
8. OUTPUT WITH FANUC CASSETTE
9. MEMORY CLEAR

>_
EDIT **** *
[1 ALARM] [2 OPR] [3 PARA] [ OPRT ]

```

(2) Press [OPRT], (an item number) and soft key [SELECT], then an operation method of the item is displayed.

Pressing PAGE key  or  displays another pages.

```

HELP (OPERATION METHOD)                                O1234 N12345
<<1.PROGRAM EDIT>>                                     1/4 ← Current
DELETE ALL PROGRAMS                                     page/ Total
MODE : EDIT                                              page
SCREEN : PROGRAM
OPR  :(0-9999) - (DELETE)

DELETE ONE PROGRAM
MODE : EDIT
SCREEN : PROGRAM
OPR  :(0+PROGRAM NUMBER) - <DELETE>

>_
EDIT **** *
[      ] [      ] [      ] [      ] [SELECT]

```

● Parameter table

Press soft key [3 PARA], then a parameter table is displayed.

HELP (PARAMETER TABLE)

O1234 N12345

1 / 4 ← Current page/ Total page

•SETTING	(NO.0000~)
•READER/PUNCHER INTERFACE	(NO.0100~)
•AXIS CONTROL/SETTING UNIT	(NO.1000~)
•COORDINATE SYSTEM	(NO.1200~)
•STROKE LIMIT	(NO.1300~)
•FEED RATE	(NO.1400~)
•ACCEL/DECELERATION CTRL	(NO.1600~)
•SERVO RELATED	(NO.1800~)
•DI/DO	(NO.3000~)

EDIT **** * * * *


[1 ALAM] [2 OPR] [3 PARA] [][SELECT]

Another screen can be selected by the PAGE key  or .

1.6

DISPLAYING DIAGNOSTIC PAGE

1.6.1 Displaying of CRT/MDI

- (1) Press  key on the CRT/MDI.
- (2) Press soft key [DGN], then a diagnostic screen is displayed.

1.6.2 Displaying of DPL/MDI

- (1) Press the  key to select the diagnosis screen.

When PMC data is displayed, operate  →

Number →  in turn.

> @0001	0
@0002	1

Following are display methods in the diagnostic screen of PMC data.


- (2) Press the key of the PMC address to be displayed.
(Use the bottom left address of the key.)

> @0001	0
D_	0



Example: Display the address data for D0100

- (3) Enter the number of the PMC address to be displayed.

> @0001	0
D0100	

- (4) Press the  key.

> D0100	000000000
D0101	000001010

By pressing the  and  keys, the cursor can be moved within the PMC address being displayed.

1.6.3 Contents Displayed (Common)

- Causes when the machine does not travel in spite of giving a command

000 WAITING FOR FIN SIGNAL

001 MOTION

002 DWELL

003 IN-POSITION CHECK

An auxiliary function is being executed.

Travel command of cycle operation is being executed.

Dwell is being executed.

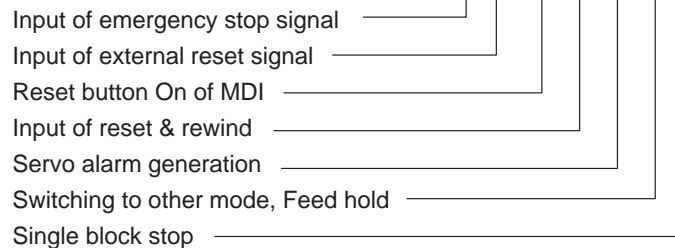
In-position check is being done.

004 FEEDRATE OVERRIDE 0%	Feedrate override is 0%.
005 INTERLOCK/START LOCK	Interlock or start lock is input.
010 PUNCHING	Data is being output through reader/puncher interface.
011 READING	Data is being input through reader/puncher interface.
013 JOG FEEDRATE OVERRIDE 0%	Jog override is 0%.
014 WAITING FOR RESET, ESP,RRW OFF	Power Mate is in reset state.
015 EXTERNAL PROGRAM NUMBER SEARCH	External Program Number Search

- Cause of the cycle start LED turned off

020 CUT SPEED UP/DOWN
 021 RESET BUTTON ON
 022 RESET AND REWIND ON
 023 EMERGENCY STOP ON
 024 RESET ON
 025 STOP MOTION OR DWELL

1	0	0	0	1	0	0
0	0	1	0	0	0	0
0	0	0	1	0	0	0
1	0	0	0	0	0	0
1	1	1	1	0	0	0
1	1	1	1	1	1	0



- State of TH alarm

030 CHARACTER NUMBER TH ALARM	Position of the character that caused TH alarm. The position is counted from the head.
031 TH DATA	Data of the character that caused TH alarm.

- Details of digital servo alarm 414

Address	#7	#6	#5	#4	#3	#2	#1	#0
DGN 0200	OVL	LV	OVC	HCA	HVA	DCA	FBA	OFA

#7(OVL): Overload alarm (See DGN No. 201.)

#6(LV) : Insufficient voltage alarm

#5(OVC): Over current alarm

#4(HCA): Abnormal current alarm

#3(HVA): Overvoltage alarm

#2(DCA): Regenerative discharge alarm

#1(FBA): Disconnection alarm (See DGN No. 201.)

#0(OFA): Overflow alarm

Address	#7	#6	#5	#4	#3	#2	#1	#0
DGN 0201	ALD							

Overload alarm	0	Motor overheat
	1	Amplifier overheat
Disconnection alarm	1	Built-in pulse coder (hand)
	0	Disconnection of pulse coder (software)

	Address	#7	#6	#5	#4	#3	#2	#1	#0
DGN	0204		OFS	MCC	LDA	PMS			

#6(OFS): Abnormal current value result of A/D conversion of digital

#5(MCC): Contacts of MCC of servo amplifier is melted.

#4(LDA): Serial pulse coder LED is abnormal

#3(PMS): Feedback is not correct due to faulty serial pulse coder C or feedback cable.

- **Detail of Alarm 350 of serial pulse coder**

	Address	#7	#6	#5	#4	#3	#2	#1	#0
DGN	0202		CSA	BLA	PHA	RCA	BZA	CKA	SPH

#6(CSA): Hardware of serial pulse coder is abnormal

#5(BLA): Battery voltage is low (warning)

#4(PHA): Serial pulse coder or feedback cable is erroneous.

#3(RCA): Serial pulse coder is faulty.

Counting of feedback cable is erroneous.

#2(BZA): Battery voltage became 0.

Replace the battery and set the reference position.

#1(CKA): Serial pulse coder is faulty.

Internal clock stopped.

#0(SPH): Serial pulse coder or feedback cable is faulty.

Counting of feedback cable is erroneous.

- **Detail of Alarm 351 of serial pulse coder**

	Address	#7	#6	#5	#4	#3	#2	#1	#0
DGN	0203	DTE	CRC	STB					

#7(DTE): Communication failure of serial pulse coder. (Data error)

There is no response for communication.

#6(CRC): Communication failure of serial pulse coder. (CRC error)

Transferred data is erroneous.

#5(STB): Communication failure of serial pulse coder. (Stop bit error)

Transferred data is erroneous.

- **Position error amount**

	Address	
DGN	0300	Position error of an axis in detection unit

$$\text{Position error} = \frac{\text{Feed rate [mm/min]}}{60 \times \text{servo loop gain [1/sec]}} - \frac{1}{\text{Detection unit}}$$

- **Machine position**

	Address	
DGN	0301	Distance from reference position of an axis in detection unit

1.6.4 Contents Displayed (DPL/MDI)

The system configuration screen and the state display etc. are not prepared on the DPL/MDI.

Therefore, see the following diagnostic number.

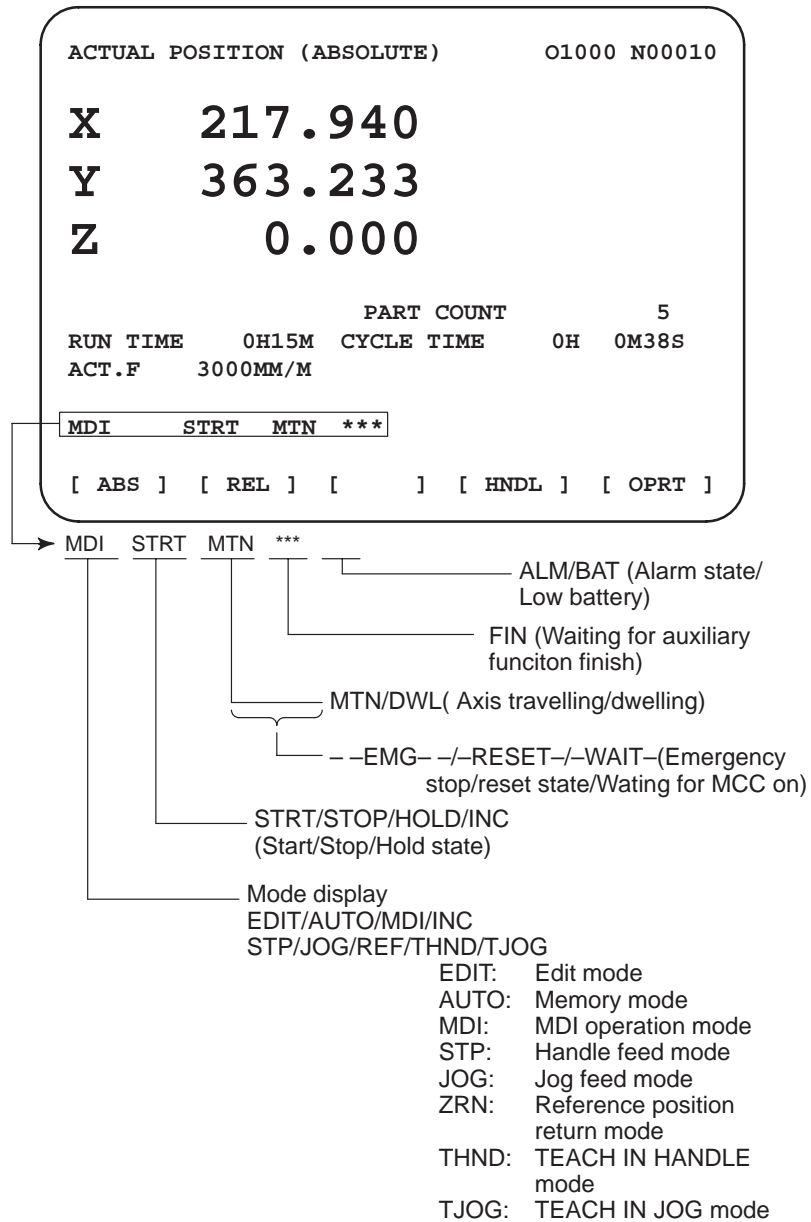
Diagnostic No.	Unit
800 Relative coordinates	Least input increment
801 Skip position	Least input increment
802 Remaining travel	(Least input increment)/2

803	Acceleration/deceleration accumulation	Detection unit
804	Ending position of previous block	(Least input increment)/2
810	Number of program being executed	
811	Number of sequence being executed	
820	Group 01 G-code	
821	Group 02 G-code	
822	Group 03 G-code	
823	Group 05 G-code	
824	Group 06 G-code	
825	Group 08 G-code	
830	F-code being executed	Unit: 0.001 mm/min or 0.00001 inch/m (When no decimal point is entered, units are 1 mm/min or 0.01 inch/min.)
831	Actual feedrate	Unit: mm/min, deg/min, or 0.01 inch/min
832	Actual spindle speed	Unit: rpm
840	Number of registered blocks	Unit: Blocks
841	Amount of memory used by program	Unit: Characters
850	ROM series No. of NC system (Example) 8880	
851	ROM version No. of NC system (Example) 01, 02, etc.	
852	Operation mode (Example) AUTO, JOG, STEP, EDIT, etc.	
853	Servo system series No. (Example) 9060	
854	Servo system version No. (Example) 09, 10, etc.	
855	PMC system series No. (Example) 4075	
856	PMC system version No. (Example) 01, 02, etc.	
857	Ladder program No. (Example) FL01	
858	Ladder program version No. (Example) 01, 02, etc.	
859	System RAM size (Example) 256K	
860	PMC module (Example) PMP (PMC-PA3 compatible)	
861	Sub-PCB (Example) BIN (built-in I/O card)	

1.7

Power Mate STATUS
DISPLAY

See the diagnostic screen for the DPL/MDI.



1.8 OPERATION HISTORY

This function displays the key and signal operations performed by the NC operator upon the occurrence of a fault or the output of an NC alarm, together with the corresponding NC alarms.

Operation history information cannot be displayed on the DPL/MDI.


This function records the following data:

- (1) MDI key operations performed by the NC operator
- (2) Status changes (ON/OFF) of input and output signals (selected signals only)
- (3) Details of NC alarms

1.8.1

Screen Display

- **Displaying the operation history**

- (1) Press the  function key.
- (2) Press the continue menu key [▷]. The **[OPEHIS]** (operation history) soft key are displayed.
- (3) Press the **[OPEHIS]** soft key twice. The operation history screen is displayed.

```

OPERATION HISTORY                                O1234 N12345
                                                Page : 123


No. DATA      No. DATA      No. DATA
01 [SF0]        11 F0000.7↑    21 F0001.0↓
02 [SF1]        12 F0000.5↑    22 <POS>
03 <DELETE>     13 F0001.0↑    23 <PROG>
04 F0000.6↑     14 F0000.5↓    24 <RESET>
05 MEM          15 P/S0010     25 EDIT
06 G0009.0↑     16 <POS>       26 O
07 G0009.1↑     17 [SF1]      27 1
08 G0009.2↑     18 <PROG>      28 2
09 ST↑          19 <RESET>   29 3
10 ST↓          20 F0000.7↓   30 4



EDIT ****      ***      ***
[ TOP ][ BOTTOM ][           ][ PG.SRH ]

```

On the operation history screen, the soft keys are configured as shown below:

$$\begin{array}{ccccccc}
\Rightarrow [\triangleright] & [\text{PARAM}] & [\text{DGNOS}] & [\text{PMC}] & [\text{SYSTEM}] & [(\text{OPRT})] & [\triangleright] \\
& & & & & \downarrow \text{push} & \\
[\triangleleft] & [] & [] & [] & [\text{OPEHIS}] & [(\text{OPRT})] & [\triangleright] \\
& & & & \downarrow \text{push} & & \\
[\triangleleft] & [\text{OPEHIS}] & [\text{SG-SEL}] & [] & [] & [(\text{OPRT})] & [\triangleright] \\
& & & & & \downarrow \text{push} & \\
[\triangleleft] & [\text{TOP}] & [\text{BOTTOM}] & [] & [] & [\text{PG.SRH}] & [\triangleright]
\end{array}$$

- (4) To display the next part of the operation history, press the page down key . The next page is displayed.

To display the interface between two pages, press cursor key  or . The screen is scrolled by one row.

These soft keys can also be used:

- 1) Pressing the **[TOP]** soft key displays the first page (oldest data).
- 2) Pressing the **[BOTTOM]** soft key displays the last page (latest data).
- 3) Pressing the **[PG.SRH]** soft key displays a specified page.

Example) By entering 50 then pressing the **[PG.SRH]** key, page 50 is displayed.

Data displayed on the operation history screen

(1) MDI keys

Address and numeric keys are displayed after a single space.

Soft keys are displayed in square brackets ([]).

Other keys (RESET/INPUT, for example) are displayed in angle brackets (< >).

A key pressed at power-on is displayed in reverse video.

- 1) Function key: <POS>, <PROG>, <OFFSET>, etc.
- 2) Address/numeric key: A to Z, 0 to 9, ; (EOB), +, -, (, etc.
- 3) Page/cursor key: <PAGE ↑>, <CUR ↓>, <CUR ←>
- 4) Soft key: [SF1], [SF2], etc.
- 5) Other key: <RESET>, <CAN>, etc.
- 6) Key pressed at power-on: **<RESET>**

(2) Input and output signals

General signals are displayed in the following format:

G 0 0 0 0 . 7 ↑

The ↑ mark indicates that the signal is turned on.
 The ↓ mark indicates that the signal is turned off.
 Indicates the bit.
 Indicates the address.

Some signals are indicated by their symbol names.

SBK ↑ (Indicates that the single block switch is turned on.)

Mode selection signals and rapid traverse override signals are displayed as indicated below:

Input signal				Name displayed
MD1	ND2	MD4	ZRN	
0	0	0	0	MDI
1	0	0	0	AUTO
0	1	0	0	NOMODE
1	1	0	0	EDIT
0	0	1	0	H/STEP
1	0	1	0	JOG
1	0	1	1	ZRN
0	1	1	0	TJOG
1	1	1	0	THND

Input signal		Name displayed
RV1	RV2	
0	0	R 100%
1	0	R 50%
0	1	R 25%
1	1	R F0%

(3) NC alarms



NC alarms are displayed in reverse video.

P/S alarms, system alarms, and external alarms are displayed together with their numbers.

For other types of alarms, only the alarm type is displayed. (No details are displayed.)

Example) **P/S0050, SV_ALM**

- Input signal or output signal to be recorded in the operation history

- (1) Press the  function key.
- (2) Press the continue menu key . The [OPEHIS] (operation history) soft key is displayed.
- (3) Press the [OPEHIS] soft key, then press the [SG-SEL] soft key. The operation history signal selection screen is displayed.

```

OP_HIS SIGNAL SELECT                                O1000 N02000

  No.  ADDRESS  SIGNAL  No.  ADDRESS  SIGNAL
  01   X0000   00001000  11   G0000   00000001
  02   X0004   10000000  12   G0004   00000011
  03   X0008   00001100  13   G0008   00000111
  04   X0009   00111000  14   G0003   00001111
  05   X0012   00001111  15   G0043   01100000
  06   Y0000   01000000  16                   *****
  07   Y0004   00110000  17                   *****
  08   Y0007   00011100  18                   *****
  09   Y0008   00011100  19                   *****
  10   Y0010   00011100  20                   *****
>
  EDIT  **** * * * *
[OPEHIS] [SG-SEL] [      ] [      ] [ (OPRT) ]

```

1.8.2

Setting the Input Signal or Output Signal to be Recorded in the Operation History

- (1) On the operation history signal selection screen, press the [(OPRT)] soft key.


```

OP_HIS SIGNAL SELECT                                O1000 N02000

  No.  ADDRESS  SIGNAL  No.  ADDRESS  SIGNAL
  01   G0004   00000000  11                   *****
  02                   *****  12                   *****
  03                   *****  13                   *****
  04                   *****  14                   *****
  05                   *****  15                   *****
  06                   *****  16                   *****
  07                   *****  17                   *****
  08                   *****  18                   *****
  09                   *****  19                   *****
  10                   *****  20                   *****
>
  EDIT  **** * * * *
[ ALLDEL ] [ DELETE ] [ ON:1 ] [ OFF:0 ] [      ]




```

- (2) Press the cursor key  or  to position the cursor to a desired position.

- (3) Key in a signal type (X, G, F, or Y) and an address, then press the  key.

Example) G0004 

Signal address G0004 is set in the ADDRESS column. The corresponding position in the SIGNAL column is initialized to 000000000.

- (4) Select the bit to be recorded.
To select all bits of the specified signal address, press the [ON:1] soft key while the cursor is positioned to **000000000**.
To select a particular bit, position the cursor to that bit by pressing the cursor key  or , then press the [ON:1] soft key. To cancel a selection made by pressing the [ON:1] soft key or to cancel a previously selected signal, press the [OFF:0] soft key.
- (5) Up to 20 addresses can be specified by means of this signal selection. These addresses need not always be specified at consecutive positions, starting from No.1.
- (6) Pressing the [ALLDEL] and [EXEC] soft keys deletes all data. If the [ALLDEL] key is pressed by mistake, it can be cancelled by pressing the [CAN] key.
- (7) To delete a selected signal address, position the cursor to the corresponding position then press the [DELETE] and [EXEC] soft keys. In the SIGNAL column, asterisks ***** are displayed in place of the deleted data. In the ADDRESS column, the corresponding position is cleared.
If the [DELET] key is pressed by mistake, it can be cancelled by pressing the [CAN] key.
- (8) Pressing the return menu key  causes the [OPEHIS] (operation history) soft key to be displayed again.

- **Input signals and output signals to be recorded in the history**

NOTE

- 1 A cross (×) indicates that a signal will not be recorded. Also, any signal for which an address is not specified will not be recorded, either.
- 2 A circle (○) indicates that a signal can be recorded.
- 3 A signal indicated by its symbol name will also be displayed by its symbol name.

1. M/T addresses

MT→PMC

	#7	#6	#5	#4	#3	#2	#1	#0
X000	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
to								
X127	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

PMC→CNC

	#7	#6	#5	#4	#3	#2	#1	#0
G000	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
to								
G003	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G004	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	FIN	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G005	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	TFIN	<input type="radio"/>	<input type="radio"/>	MFIN
G006	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	*ABS	<input type="radio"/>	<input type="radio"/>
G007	RLSOT	<input type="radio"/>	*FLUP	<input type="radio"/>	<input type="radio"/>	ST	<input type="radio"/>	<input type="radio"/>
G008	ERS	RRW	*SP	*ESP	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	*IT
G009	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
to								
G018	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G019	RT	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G020	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
to								
G042	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G043	<input type="radio"/>	×	<input type="radio"/>	×	×	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G044	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	MLK	BDT1
G045	BDT9	BDT8	BDT7	BDT6	BDT5	BDT4	BDT3	BDT2
G046	DRN	KEY4	KEY3	KEY2	KEY1	<input type="radio"/>	SBK	<input type="radio"/>
G047	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
to								
G060	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G061	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G062	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
to								
G099	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G100	<input type="radio"/>	<input type="radio"/>	+J6	+J5	+J4	+J3	+J2	+J1

	#7	#6	#5	#4	#3	#2	#1	#0
G101	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G102	<input type="radio"/>	<input type="radio"/>	–J6	–J5	–J4	–J3	–J2	–J1
G103	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
to								
G105	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G106	<input type="radio"/>	<input type="radio"/>	MI6	MI5	MI4	MI3	MI2	MI1
G107	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G108	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G109	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G110	<input type="radio"/>	<input type="radio"/>	+LM6	+LM5	+LM4	+LM3	+LM2	+LM1
G111	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G112	<input type="radio"/>	<input type="radio"/>	–LM6	–LM5	–LM4	–LM3	–LM2	–LM1
G113	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
to								
G125	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G126	<input type="radio"/>	<input type="radio"/>	SVF6	SVF5	SVF4	SVF3	SVF2	SVF1
G127	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
to								
G129	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G130	<input type="radio"/>	<input type="radio"/>	*IT6	*IT5	*IT4	*IT3	*IT2	*IT1
G131	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G132	<input type="radio"/>	<input type="radio"/>	+MIT6	+MIT5	+MIT4	+MIT3	+MIT2	+MIT1
G133	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
G134	<input type="radio"/>	<input type="radio"/>	–MIT6	–MIT5	–MIT4	–MIT3	–MIT2	–MIT1
G135	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
to								
G255	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

PMC→MT

	#7	#6	#5	#4	#3	#2	#1	#0
Y000	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
to								
Y127	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

CNC→PMC

	#7	#6	#5	#4	#3	#2	#1	#0
F000	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
to								
F255	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

1.8.3**Notes**

- (1) While the operation history screen is displayed, no information can be recorded to the history.
- (2) An input signal having an on/off width of up to 16 msec is not recorded in the history. Some signals are not recorded in the history.
- (3) Once the storage becomes full, old data is deleted, starting from the oldest record. Up to about 500 key information items can be recorded.
- (4) The recorded data is retained even after the power is turned off. A memory all clear operation, however, erases the recorded data.

1.9 LIST OF OPERATIONS (CRT/MDI)

Reset

Function	Data protection key	Parameter write=1	Mode	Function button	Operation
Resetting run hour			–	POS	[(OPRT)] [RUNPRE]→[EXEC]
Resetting no. of machined parts			–	POS	[(OPRT)] [PTSPRE]→[EXEC]
Resetting OT alarm			At Power ON	–	<P> and <CAN>
Resetting alarm 100			–	–	<CAN> and <RESET>

Registration from MDI

Function	Data protection key	Parameter write=1	Mode	Function button	Operation
Inputting parameters		Yes	MDI or E.Stop	SYSTEM (PARAM)	Parameter no.→[NO.SRH]→Data→<INPUT> → PWE =0 →<RESET>
Inputting offset values	OFF		–	OFFSET	Offset number→[NO.SRH]→Offset value→<INPUT>
Inputting setting data	OFF		MDI	SETTING	Setting no.→[NO.SRH]Data→<INPUT>
Input of PMC parameters, counter and data table	OFF		MDI or E.Stop	SYSTEM (PMC)	[PMCPRM]→[COUNTR] or [DATA]→Data→<INPUT>
Inputting PMC parameters (Timer, keep relay)		○			[PMCPRM]→[TIMER] or [KEEPRL]→Data→<INPUT>

Input/Output with External I/O

Function	Data protection key	Parameter write=1	Mode	Function button	Operation
Heading a file			EDIT	PROG	<N>→File no.→[▶]→[F SRH]→[EXEC]
Deleting a file	OFF		EDIT	PROG	<N>→File no.→[▶]→[DELETE]→[EXEC]
Collating a program			EDIT	PROG	Heading a file→<O>→Program number→[(OPRT)]→[▶]→[READ]→[EXEC]

Inputting From External I/O

Function	Data protection key	Parameter write=1	Mode	Function button	Operation
Inputting parameters		○	E.Stop	SYSTEM (PARAM)	[(OPRT)]→[▶]→[READ]→[EXEC]
Inputting PMC parameters and ladder programs		○	E.Stop	SYSTEM (PMC)	[▶]→[I/O]→(CHANNEL NO)<1> <INPUT>→(DEVICE NAME) [FDCAS]→(KIND OF DATA) [PARAM]→[READ]→(FILE NO) File no.<INPUT>→[EXEC]
Inputting offset values	OFF		EDIT	OFFSET	(Heading a file no.)→[(OPRT)]→[▶]→[READ]→[EXEC]

Function	Data protection key	Parameter write=1	Mode	Function button	Operation
Registering a program	OFF		EDIT	PROG	<N>→File no.→<INPUT>→[▶]→[READ]→[EXEC]
Inputting macro variables	OFF		EDIT	PROG	<N>→File no.→<INPUT>→[▶]→<O>→Program no. →[READ]→[EXEC]
			AUTO	PROG	<START>

Output to External I/O

Function	Data protection key	Parameter write=1	Mode	Function button	Operation
Output of parameter			EDIT	SYSTEM (PARAM)	[(OPRT)]→[▶]→[PUNCH]→[EXEC]
Output of PMC parameter			EDIT	SYSTEM (PMC)	[▶]→[I/O]→(CANNEL NO)<1> <INPUT>→(DEVICE NAME) [FDCAS] →(KIND OF DATA) [PARAM] → [WRITE] → (FILE NO) <-> <1> <INPUT>→[EXEC]
Output of ladder programs			EDIT	SYSTEM (PMC)	[▶]→[I/O]→(CANNEL NO)<1> <INPUT>→(DEVICE NAME) [FDCAS] →(KIND OF DATA) [PARAM] → [WRITE] → (FILE NO) <-> <1> <INPUT>→[EXEC]
Output of offset			EDIT	OFFSET	[(OPRT)]→[▶]→[PUNCH]→[EXEC]
Output of all programs			EDIT	PROG	<O>→-9999→[▶]→[PUNCH]→[EXEC]
Output of one program			EDIT	PROG	<O>→Program no.→[▶]→[PUNCH]→[EXEC]
Output of macro variables			EDIT	OFFSET	[▶]→[MACRO]→[(OPRT)]→[▶]→[PUNCH]→[EXEC]

Search

Function	Data protection key	Parameter write=1	Mode	Function button	Operation
Searching a program number			AUTO or EDIT	PROG	<O>→Program no.→[O SRH]
Searching a sequence number			AUTO	PROG	Program no. search→<N>→Sequence number→[NSRH]
Searching an address word			EDIT	PROG	Data to be searched→[SRH↑] or [SRH↓] or <↑> <↓> (cursor key)
Searching an address only			EDIT	PROG	Address to be searched [SRH↑] or [SRH↓] or <↑> <↓> (Cursor key)
Searching an offset number			–	OFFSET	Offset no.→[NO.SRH]
Searching a diagnostic number			–	SYSTEM (DGNOS)	Diagnostic number→[NO.SRH]
Searching a parameter number			–	SYSTEM (PARAM)	Parameter no.→[NO.SRH]

Edit

Function	Data protection key	Parameter write=1	Mode	Function button	Operation
Display of memory capacity used			EDIT	PROG	[LIB]
Deleting all programs	OFF		EDIT	PROG	<O>→-9999→<DELETE>

Function	Data protection key	Parameter write=1	Mode	Function button	Operation
Deleting a program	OFF		EDIT	PROG	<O>→Program no.→<DELETE>
Deleting several blocks	OFF		EDIT	PROG	<N>→Sequence no.→<DELETE> (Deleted up to a block with a specified sequence no.)
Deleting a block	OFF		EDIT	PROG	<EOB>→<DELETE>
Deleting a word	OFF		EDIT	PROG	Searching a word to be deleted→<DELETE>
Changing a word	OFF		EDIT	PROG	Searching a word to be changed→New Data→<ALTER >
Inserting a word	OFF		EDIT	PROG	Searching a word immediately before a word to be searched→New Data→<INSERT>

Collation

Function	Data protection key	Parameter write=1	Mode	Function button	Operation
Collating programs	ON		EDIT	PROG	[(OPRT)]→[▶]→[READ]→[EXEC]

Playback

Function	Data protection key	Parameter write=1	Mode	Function button	Operation
Input of NC data			TEACH-IN JOG/HANDLE	PROG	Jog the machine→<X>,<Y> or <Z>→<INSERT> → NC data → <INSERT> → <EOB> → <INSERT>

Clear

Function	Data protection key	Parameter write=1	Mode	Function key	Operation
Memory all clear			At power ON		<RESET>AND<DELETE> or <7> and <9>
Parameter/offset clear		○	At Power ON		<RESET>
Clearing a program		○	At Power ON		<DELETE>
Alarm No. PS101 clear			—		<PROG>AND<RESET>
Parameter clear			At Power ON		<X>AND<O>

NOTE

- 1 After completion of ladder program input the power must be turned on again because the Ladder program is in halt state.
- 2 The above operating procedure also applies to the LCD, PDP, detachable LCD/MDI, and handy operator's panel. Note, however, that the handy operator's panel does not support some functions.

1.10

LIST OF OPERATIONS (DPL/MDI)

Classifi- cation	Function	KEY SW	SETTING PWE=1	Mode	Function key	Operation
Clear	All memory clear			Power ON	—	<7>AND<9>
	Parameter clear		○	Power ON	—	<PARAM>
	Program clear		○	Power ON	—	<DELETE>
	Alarm clear			—		<CAN> or Power OFF/ON
	Alarm No. P/S101 clear			—	—	<CAN>AND<ALARM>
	PMC parameter clear			Power ON	—	<O>AND<X>
Reset	OT alarm reset			Power ON	—	<P>AND<CAN>
Registra- tion from MDI	Parameter input		○	—	DGNOS/ PARAM	PARAM screen— [No.]→Number →<INPUT>→Data→<INPUT>→ PWE=0→<CAN>
	PMC parameter input		SETTING DWE=1	—	DGNOS/ PARAM	DGNOS screen→ [PMC address]→Number→ <INPUT>Data→<INPUT>
	Setting data input			—	VAR	Setting data screen→Cursor movement→Data→<INPUT>
	Offset data input	○		—	VAR	Offset data screen – [No.]→Data number→<INPUT>Data→ <INPUT>
	Macro variable data input	○		—	VAR	Macro variable scree – [No.]→ Data number <INPUT>Data→ <INPUT>
Search	Program number search			EDIT/ AUTO	PRGRM	<O>→Program number→[↓]
	Sequence number search			AUTO	PRGRM	After program number search; <N>→Sequence number→[↓]
	Address word search			EDIT	PRGRM	Word to be searched for→[↓]
	Search address only			EDIT	PRGRM	Address to be searched for→[↓]
	Parameter search			—	DGNOS/ PARAM	PARAM screen→[No.]→ Number→<INPUT>
	PMC parameter search			—	DGNOS/ PARAM	DGNOS screen→[PMC address] →Number→<INPUT>
	Offset data search			—	VAR	Offset screen→[No.]→ Data number→<INPUT>
	Macro variable data search			—	VAR	Macro variable screen→[No.]→ Data number→<INPUT>
	Diagnosis search			—	DGNOS/ PARAM	DGNOS screen – [No.]→ Number→<INPUT>

Classifi- cation	Function	KEY SW	SETTING PWE=1	Mode	Function key	Operation
Editing	All program delete	○		EDIT	PRGRM	<O>→-9999→<DELETE>
	One program delete	○		EDIT	PRGRM	<O>→Program number→<DELETE>
	Multiple block delete	○		EDIT	PRGRM	<N>→Sequence number→<DELETE>
	One block delete	○		EDIT	PRGRM	<EOB>→<DELETE>
	Word delete	○		EDIT	PRGRM	Search for word to be deleted→<DELETE>
	Word change	○		EDIT	PRGRM	After searching for word be deleted; New data→<ALTER>
	Word insertion	○		EDIT	PRGRM	After searching for word after which word is to be inserted; New data→<INSERT>
Collation	Program collation			EDIT	PRGRM	<READ>
Registra- tion from external I/O	Parameter input		○	EDIT or emergency stop	DGNOS/ PARAM	PARAM screen→<READ>
	Program input	○		EDIT	PRGRM	<READ>
	Offset data input	○		EDIT	VAR	Offset data screen→<READ>
	Macro variable data input	○		EDIT	PRGRM	<READ>→Mode AUTO→Execute the loaded program.
Output to external I/O	Parameter output			EDIT	DGNOS/ PARAM	PARAM screen→<WRITE>
	All program output			EDIT	PRGRM	<O>→-9999→<WRITE>
	One program output			EDIT	PRGRM	<O>→Program number→<WRITE>
	Offset data output			EDIT	VAR	Offset screen→<WRITE>
	Macro variable data output			EDIT	VAR	Macro variable screen→<WRITE>
Input/ output to and from P-G and PG-mate	Ladder program input/ output			-	DGNOS/ PARAM	DGNOS screen→<READ> or <WRITE>→Operation on host Input/output is automatically identified with operation on host. (The baud rate is fixed to 9600 bps.)

Classifi- cation	Function	KEY SW	SETTING PWE=1	Mode	Function key	Operation
Input/ out- put to and from FANUC cassette	Program registration	○		EDIT	PRGRM	<N>→File number – <READ>→ <READ>
	All program output			EDIT	PRGRM	<O>→9999→<WRITE>
	One program output			EDIT	PRGRM	<O>→Program number→ <WRITE>
	Search for beginning of file			EDIT	PRGRM	<N>→Program number, –9999, or –9998→<READ>
	File delete	○		EDIT	PRGRM	<N>→File number→<WRITE>
	Program collation			EDIT	PRGRM	<N>→File number→<READ>→ <READ>
	PMC parameter Ladder program input		○ (Only when PMC parameter is input)	Emergency stop	DGNOS/ PARAM	DGNOS screen→<No.> File number→<READ> Data type is automatically identi- fied. (The baud rate is fixed to 4800 bps.)
	PMC parameter output			EDIT	DGNOS/ PARAM	PMC parameter display→<No.> File number→<WRITE>
	Ladder program output			–	DGNOS/ PARAM	DGNOS screen→<No.> File number→<WRITE>

NOTE

After completion of ladder program input, the power must be turned on again because the ladder program is in halt state.

2

HARDWARE

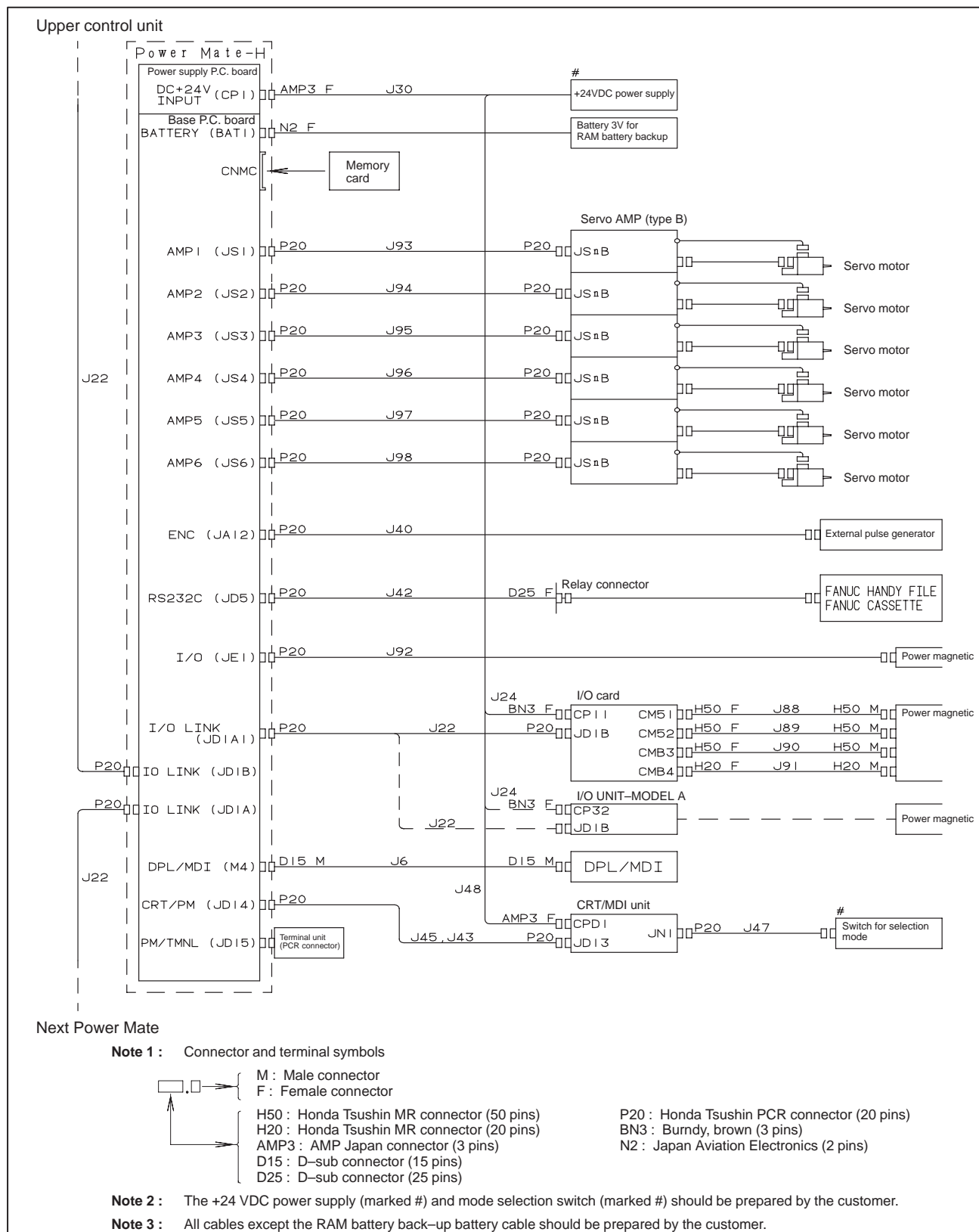


This chapter describes structure of CNC control section, connection of units and the functions of PCBs and modules mounted on PCBs.

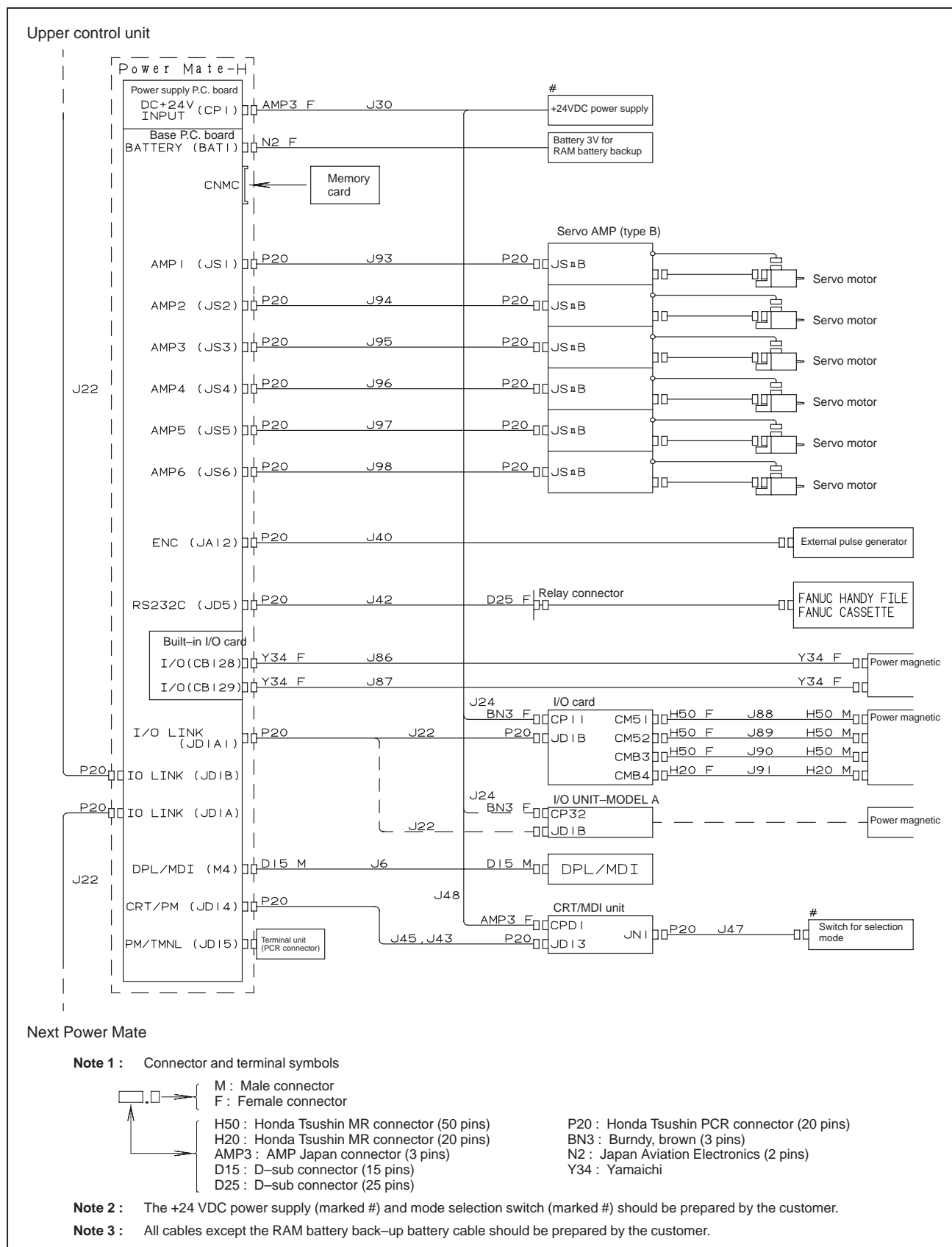
- 2.1 TOTAL CONNECTION DIAGRAM**
- 2.2 INSTALLATION**
- 2.3 INTER-MACHINE CONNECTION**
- 2.4 LED DISPLAY/SETTING AND MODULE CONFIGURATION OF UNIT**
- 2.5 LIST OF PC BOARD AND UNIT**
- 2.6 HOW TO REPLACE THE BATTERIES**
- 2.7 HOW TO REPLACE THE MODULES**
- 2.8 REPLACING P.C.BOARD AND UNIT**
- 2.9 MAINTENANCE OF HEAT PIPE TYPE HEAT EXCHANGER**
- 2.10 REPLACING THE FUSE**
- 2.11 ADJUSTING THE PLASMA DISPLAY**
- 2.12 7.2-INCH MONOCHROME LCD ADJUSTMENT**
- 2.13 REPLACING THE LCD BACKLIGHT**

2.1 TOTAL CONNECTION DIAGRAM

(a) At using internal I/O



(b) At using integrated I/O



2.2 INSTALLATION

2.2.1 Environmental Requirement

The peripheral units, such as the control unit and CRT/MDI, have been designed on the assumption that they are housed in closed cabinets. In this manual "cabinet" refers to the following:

- Cabinet manufactured by the machine tool builder for housing the control unit or peripheral units;
- Cabinet for housing the flexible turnkey system provided by FANUC ;
- Operation pendant, manufactured by the machine tool builder, for housing the CRT/MDI unit or operator's panel.
- Equivalent to the above.

The environmental conditions when inside of cabinets shall conform to the following table.

Room temperature	In operation	Unit : 0°C to 55°C
	In store or transportation	-20°C to 60°C
Change in temperature	1.1°C/minute max.	
Relative humidity	30% to 95% (no condensation)	
Vibration	In operation: 0.5G or less	
Environment	Each unit should be placed in a cabinet to keep it from pollutants (such as dust, coolant, organic solvents, acid, corrosive gas, and salt). Heat sink of outer of cabinet: The heat sinks should be protected from direct exposure to coolant, lubricant, and metal chips.	
Radiation (ionizing or nonionizing)	If a unit is to be used in an environment where it is likely to be exposed to radiations (such as microwave, ultraviolet rays, laser beams, and X-rays), a shielding provision should be available for it.	
Height above sea level	Up to 1,000 m	

2.2.2 Power Capacity

The units listed below require an external regulated supply voltage of 24 VDC \pm 10% (including an instantaneous value).

Table 2.2.2 Power supply capacity

Unit	Power supply capacity
Power Mate–H control unit	1.8A (another 1 A required for the RS–232–C interface) (*)
CRT/MDI unit Picture display CRT/MDI unit	1.0A
Separate type CRT unit	0.8A
Separate type MDI unit Picture display separate type MDI unit	0.2A
Separate type PDP unit	2.0A
Separate type LCD unit	0.8A
Detachable LCD/MDI unit	1.0A
Handy operator's panel	0.2A
External I/O card	500 + 7.3 x n (mA) where n is the number of input points that are turned on simultaneously (*)
I/O Unit–A	The required current varies depending on the number of modules. Refer to the I/O Unit–MODEL A Connection and Maintenance Manual (B-61813E).
I/O Link connection unit	0.2A
DPL/MDI switching circuit	0.2A

NOTE

The Power Mate–H requires an additional 24–V power supply for DOs.

2.2.3 Action Against Noise

The Power Mate has been steadily reduced in size using surface–mount and custom LSI technologies for electronic components. The Power Mate also is designed to be protected from external noise. However, it is difficult to measure the level and frequency of noise quantitatively, and noise has many uncertain factors. It is important to prevent both noise from being generated and generated noise from being introduced into the Power Mate. This precaution improves the stability of the Power Mate machine tool system.

The Power Mate component units are often installed close to the parts generating noise in the power magnetics cabinet. Possible noise sources into the Power Mate are capacitive coupling, electromagnetic induction, and ground loops.

When designing the power magnetics cabinet, guard against noise in the machine as described in the following section.

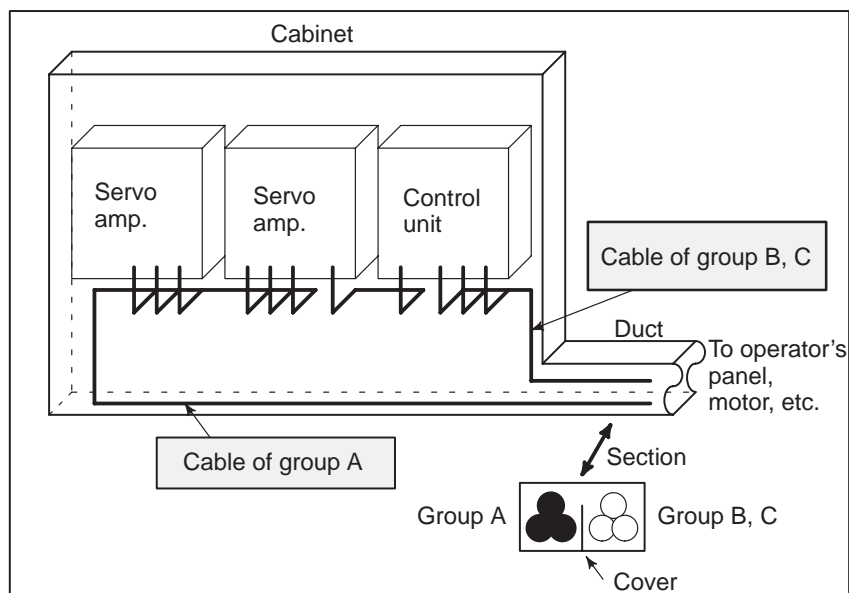
• Separating signal lines

The cables used for the machine are classified as listed in the following table: Process the cables in each group as described in the action column.

Group	Signal line	Action
A	Primary AC power line	Bind the cables in group A separately (Note 1) from groups B and C, or cover group A with an electromagnetic shield (Note 2). Connect spark killers or diodes with the solenoid and relay.
	Secondary AC power line	
	AC/DC power lines (containing the power lines for the servo motors)	
	AC/DC solenoid	
	AC/DC relay	
B	DC solenoid (24VDC)	Connect diodes with DC solenoid and relay. Bind the cables in group B separately from group A, or cover group B with an electromagnetic shield. Separate group B as far from Group C as possible. It is more desirable to cover group B with the shield.
	DC relay (24VDC)	
	DC power line	
	DI/DO cable between the Power Mate and power magnetics cabinet	
	DI/DO cable between the Power Mate and machine	
C	Cable between the Power Mate and servo amplifier	Bind the cables in group C separately from group A, or cover group C with an electromagnetic shield. Separate group C as far from Group B as possible. Be sure to perform shield processing.
	Cable for position and velocity feedback	
	External pulse input	
	Cable between the Power Mate and the CRT/MDI	
	RS-232-C interface cable	
	Other cables to be covered with the shield	

NOTE

- 1 The groups must be 100mm or more apart from one another when binding the cables in each group.
- 2 The electromagnetic shield refers to shielding between groups with grounded steel plates.



- **Ground**

The following ground systems are provided for the CNC machine tool:

- **Signal ground system (SG)**

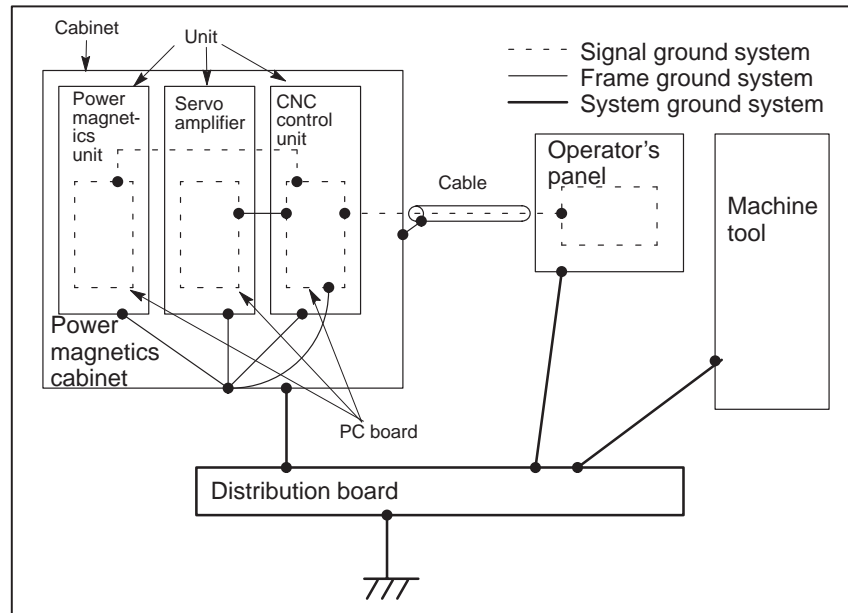
The signal ground (SG) supplies the reference voltage (0V) of the electrical signal system.

- **Frame ground system (FG)**

The frame ground system (FG) is used for safety, and suppressing external and internal noises. In the frame ground system, the frames, cases of the units, panels, and shields for the interface cables between the units are connected.

- **System ground system**

The system ground system is used to connect the frame ground systems connected between devices or units with the ground.

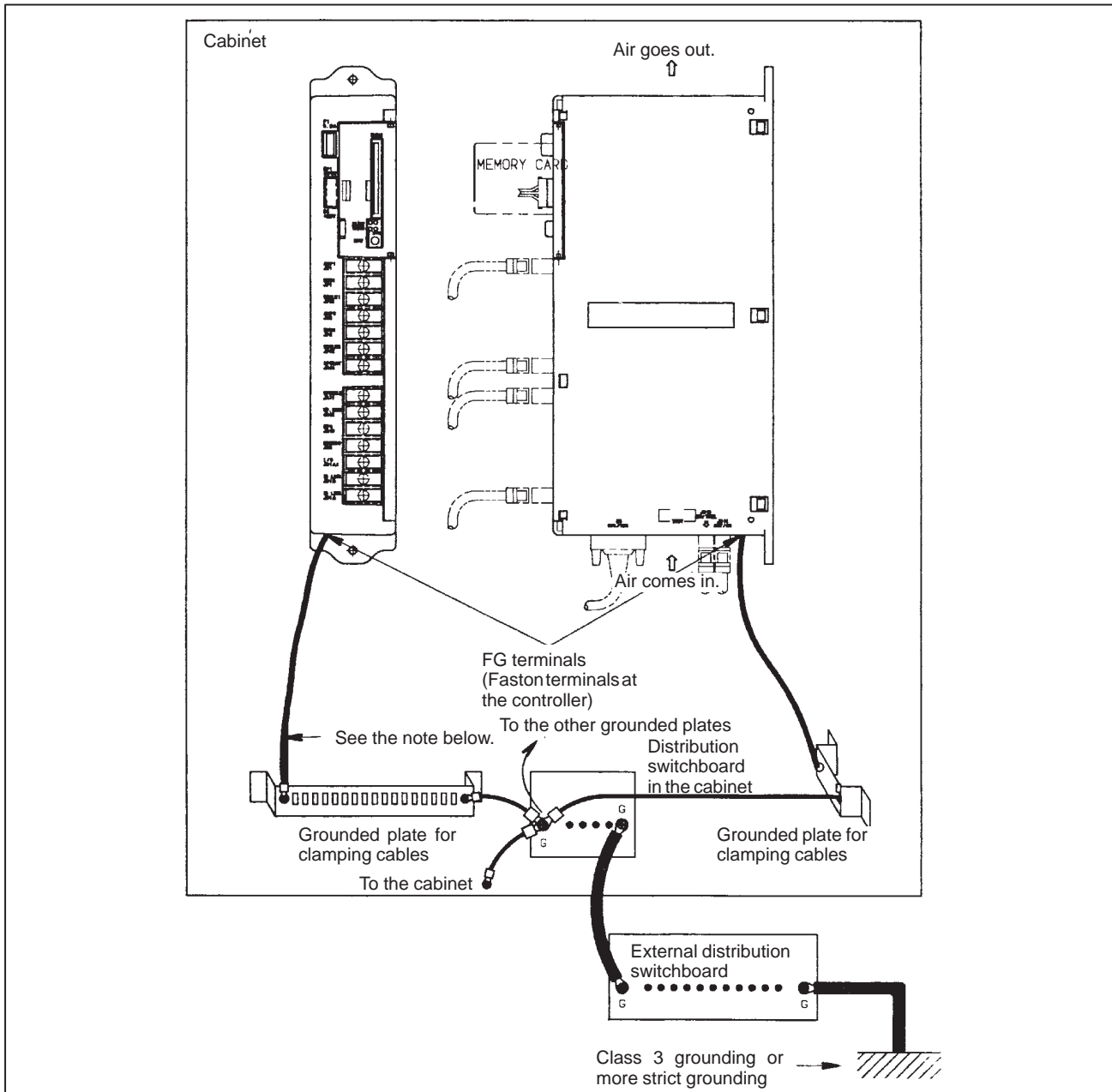


Notes on connecting the ground systems

- Connect the signal ground with the frame ground (FG) at only one place in the power motion controller control unit.
- The grounding resistance of the system ground shall be 100 ohms or less (class 3 grounding).
- The system ground cable must have enough cross-sectional area to safely carry the accidental current flow into the system ground when an accident such as a short circuit occurs.
(Generally, it must have the cross-sectional area of the AC power cable or more.)
- Use the cable containing the AC power wire and the system ground wire so that power is supplied with the ground wire connected.

- **Connecting the Frame Ground (FG) of the Control Unit**

Connect the 0 V line of the electronic circuit in the control unit with the ground plate of the cabinet via the frame ground (FG) terminal. The SG terminal is located on the printed circuit board at the rear of the control unit.



- **Most important matter**

Use the Faston terminals (A65L-0001-0148/2) for the frame ground. Also use 100 to 300 mm stranded wire with a cross-section of 2 mm² or more. Otherwise, the Power Mate will be susceptible to noise. Ensure that the FG terminals of the Power Mate are connected to the grounded plates of the cabinet.

• Noise Suppressor

The AC/DC solenoid and relay are used in the power magnetism cabinet. A high pulse voltage is caused by coil inductance when these devices are turned on or off.

This pulse voltage induced through the cable causes the electronic circuits to be disturbed.

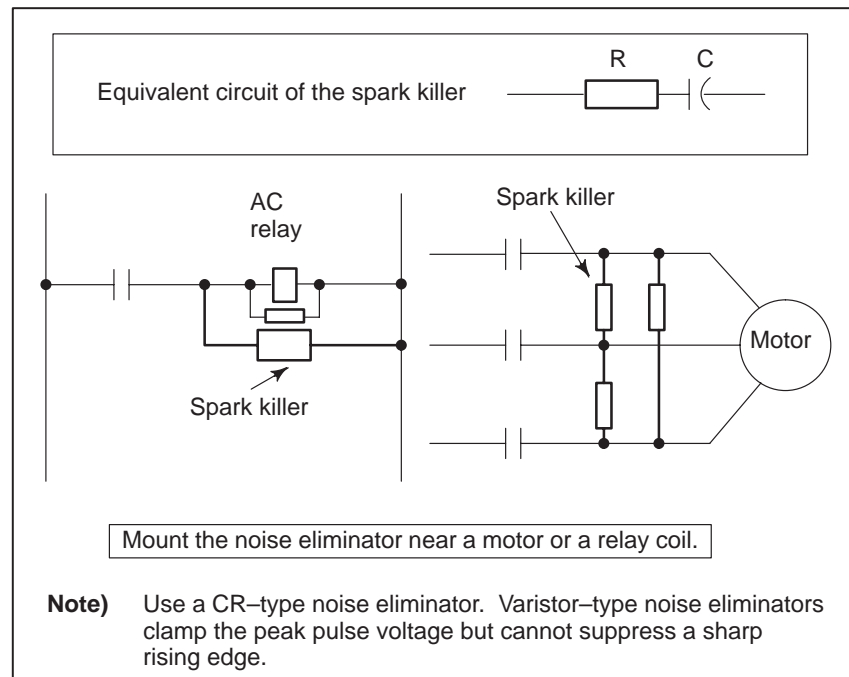
Notes on selecting the spark killer

- Use a spark killer consisting of a resistor and capacitor in series. This type of spark killer is called a CR spark killer. (Use it under AC) (A varistor is useful in clamping the peak voltage of the pulse voltage, but cannot suppress the sudden rise of the pulse voltage. FANUC therefore recommends a CR spark killer.)
- The reference capacitance and resistance of the spark killer shall conform to the following based on the current (I (A)) and DC resistance of the stationary coil:

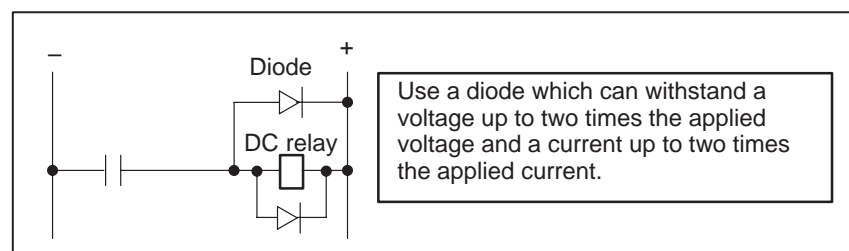
1) Resistance (R) : Equivalent DC resistance of the coil

2) Capacitance (C) : $\frac{I^2}{10}$ to $\frac{I^2}{20}$ (μF)

I : Current at stationary state of the coil



- Diode is used for direct-current circuits



● Cable Clamp and Shield Processing

The power motion controller cables that require shielding should be clamped by the method shown below. This cable clamp treatment is for both cable support and proper grounding of the shield. To insure stable CNC system operation, follow this cable clamp method.

Partially peel out the sheath and expose the shield. Push and clamp by the plate metal fittings for clamp at the part. The ground plate must be made by the machine tool builder, and set as follows :

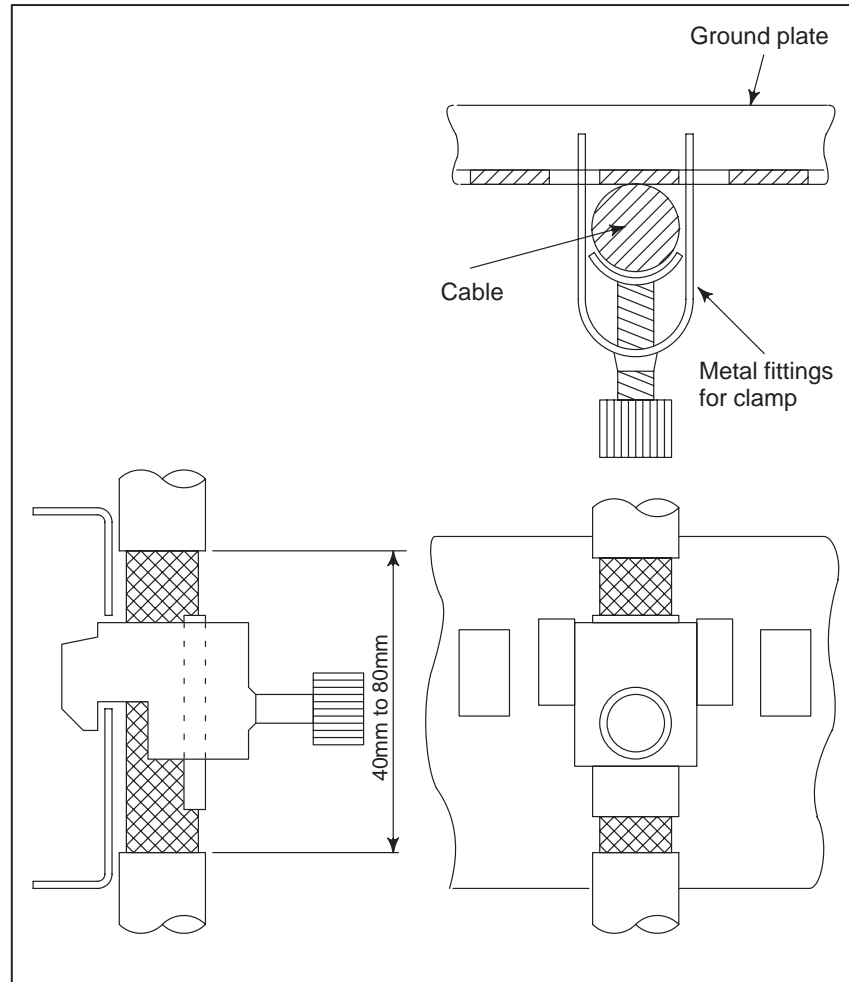
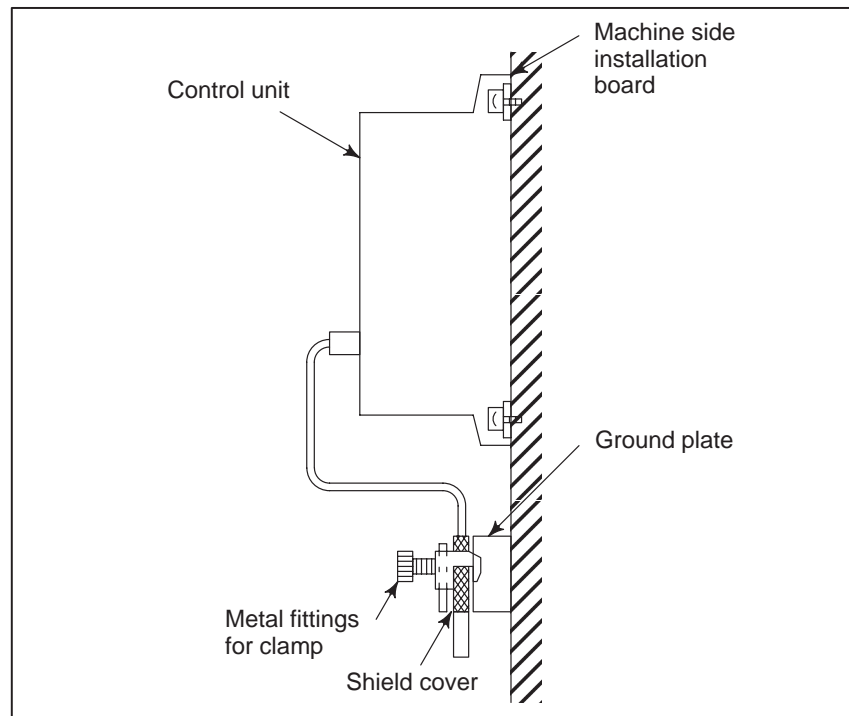


Fig.2.2.3 (a) Cable clamp (1)

**Fig.2.2.3 (b) Cable clamp (2)**

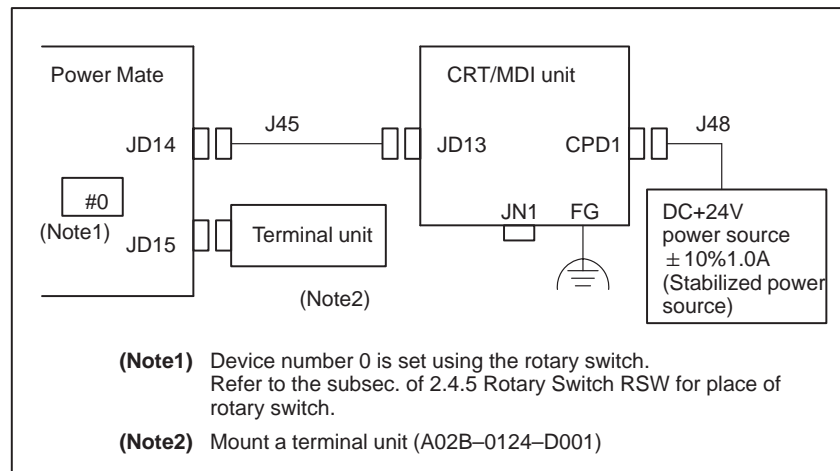
2.3 INTER-MACHINE CONNECTION

2.3.1 CRT/MDI Unit

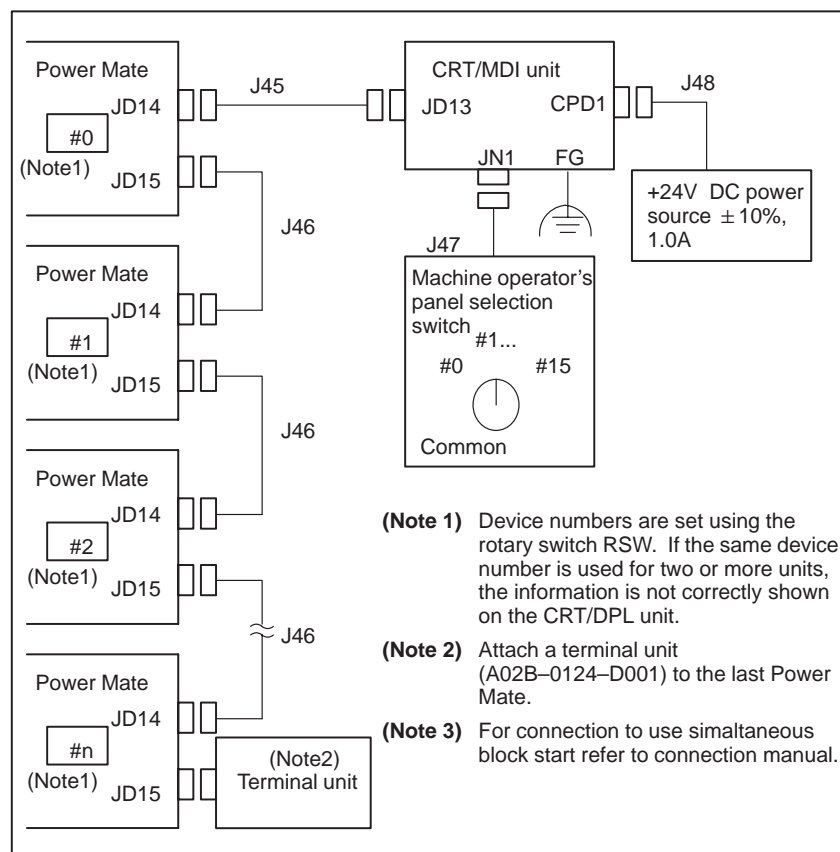
The following description also applies when the separate type MDI unit is combined with the separate type CRT unit, separate type PDP unit, or separate type LCD unit.

• Connection of Power Mate

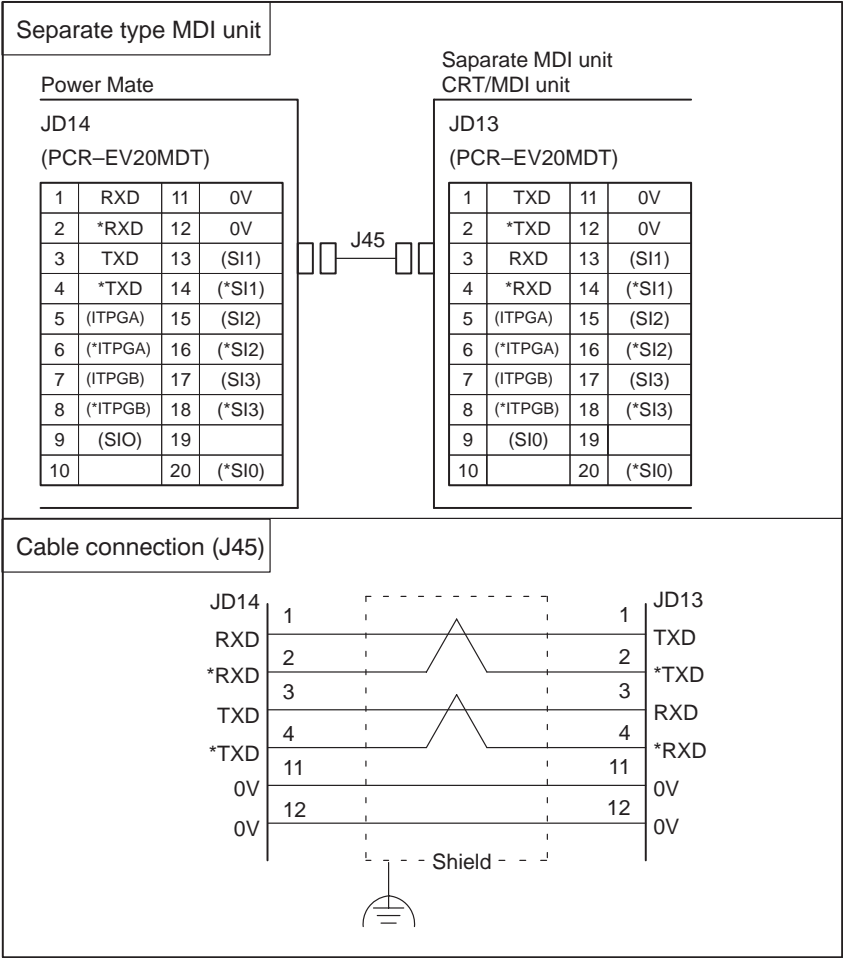
(1) When there is only one unit of Power Mate—MODEL



(2) When multiple power Mates share one CRT/MDI Max.16 Power Mates



● Cable connection



Cable connection (J45)

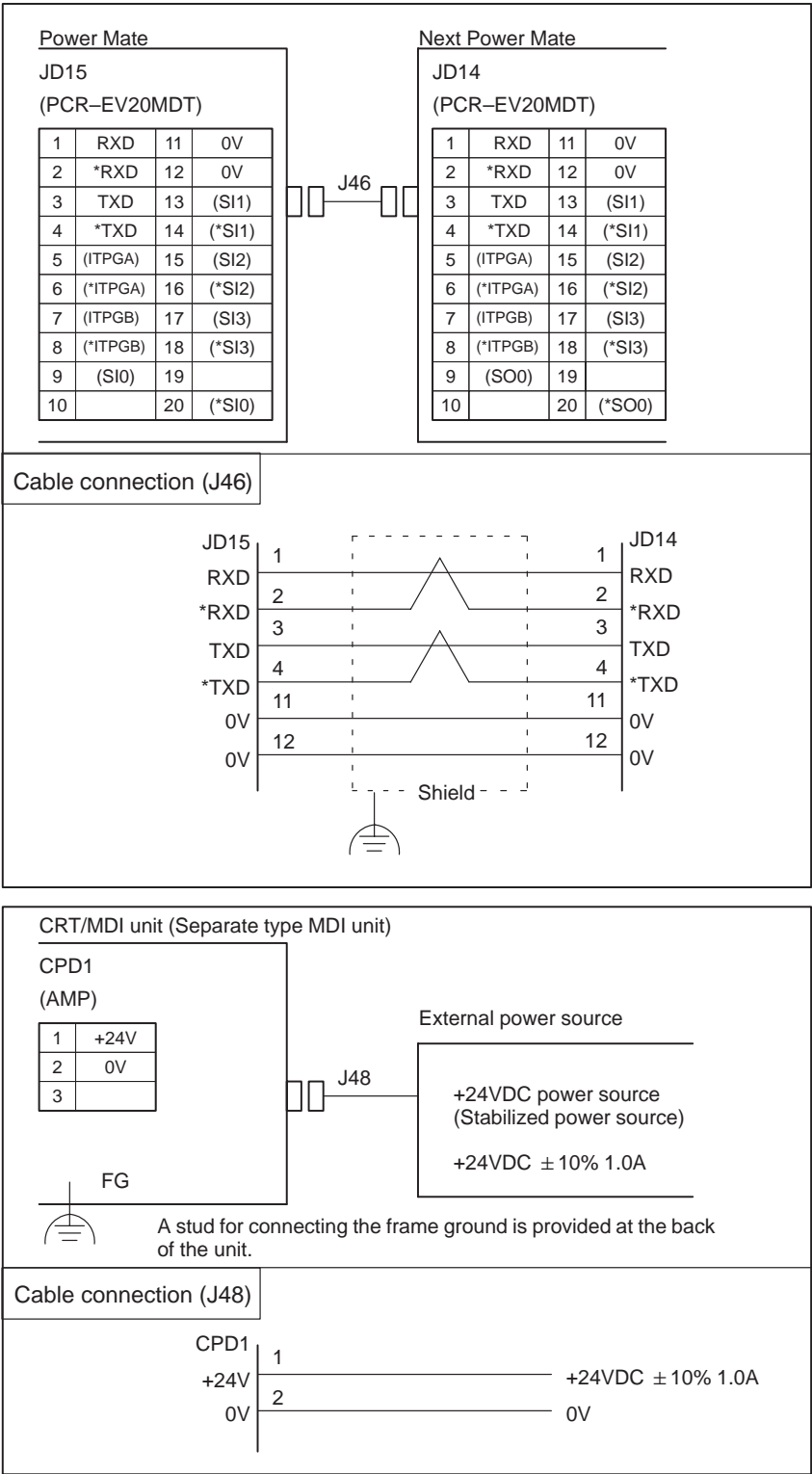
JD14

1
RXD
*RXD
TXD
*TXD
11
0V
0V

JD13

1
TXD
*TXD
RXD
*RXD
11
0V
0V

Shield

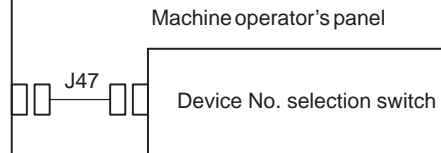


Separate type MDI unit

CRT/MDI unit

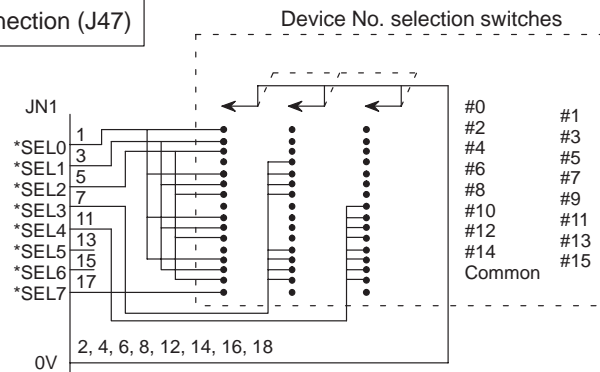
JN1
(PCR-EV20MDT)

1	*SEL0	11	*SEL4
2	0V	12	0V
3	*SEL1	13	*SEL5
4	0V	14	0V
5	*SEL2	15	*SEL6
6	0V	16	0V
7	*SEL3	17	*SEL7
8	0V	18	0V
9		19	
10		20	



- Separate type LCD unit
→ Connect *SEL6 (15) to 0V (16).
- CRT link longer than 50 m
→ Connect *SEL5 (13) to 0V (14).

Cable connection (J47)



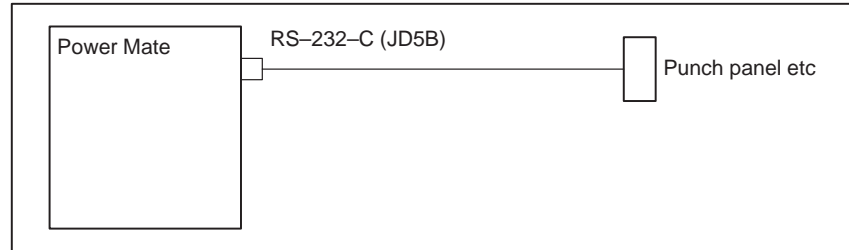
Relationship between selection switches and device numbers

Device No.	*SEL7	*SEL4	*SEL3	*SEL2	*SEL1	*SEL0
#0	×	×	×	×	×	×
#1	×	×	×	×	×	○
#2	×	×	×	×	○	×
#3	×	×	×	○	×	×
#4	×	×	○	×	×	×
#5	×	×	○	×	×	○
#6	×	×	○	×	○	×
#7	×	×	○	○	×	×
#8	×	○	×	×	×	×
#9	×	○	×	×	×	○
#10	×	○	×	×	○	×
#11	×	○	×	○	×	×
#12	×	○	○	×	×	×
#13	×	○	○	×	×	○
#14	×	○	○	×	○	×
#15	×	○	○	○	×	×
Common display	○	—	—	—	—	—

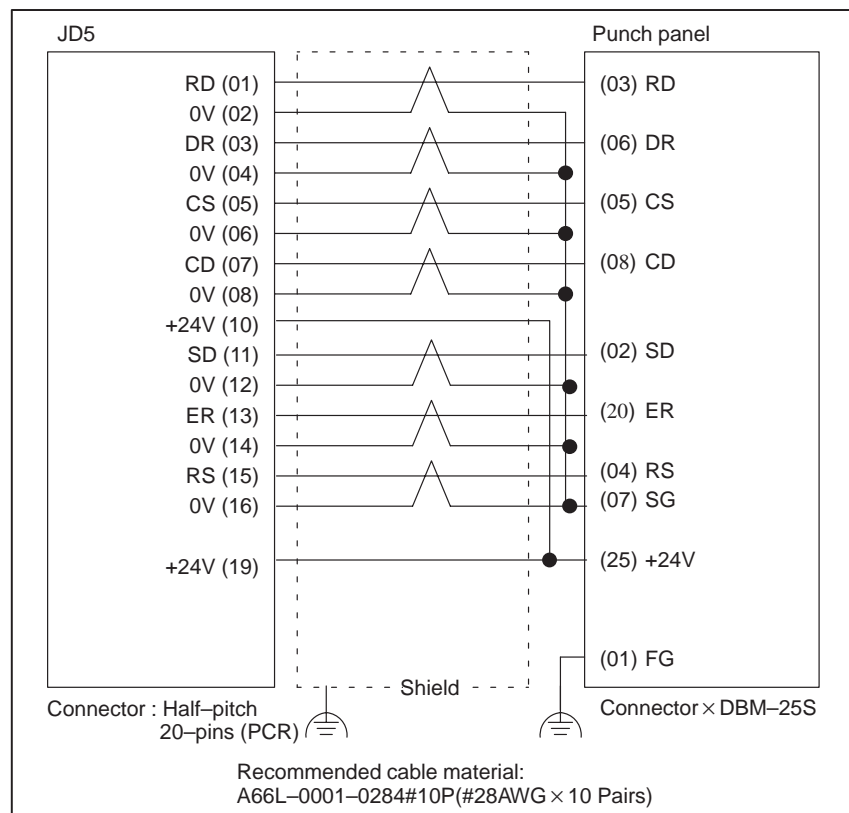
× : Switch open
○ : Switch closed
— : Either will do

2.3.2 Reader/Puncher Interface

- Connection



- Cable connection

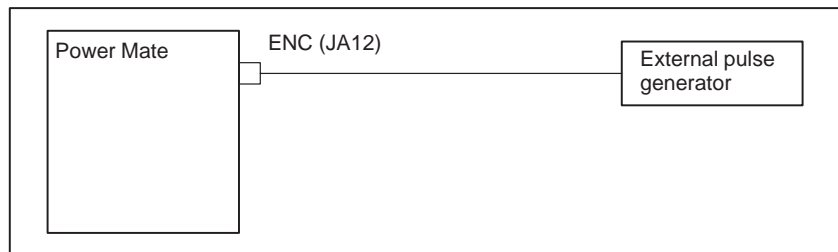


NOTE

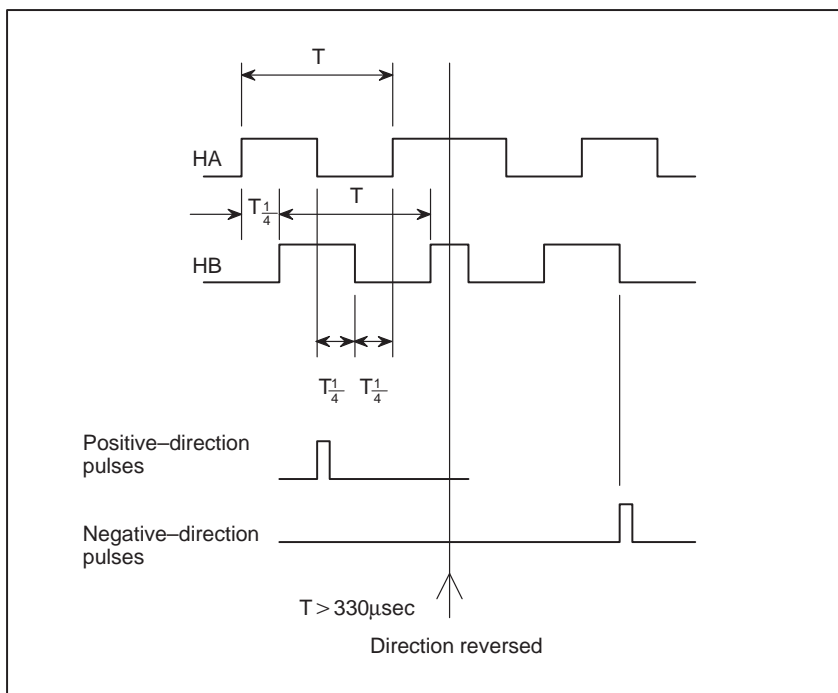
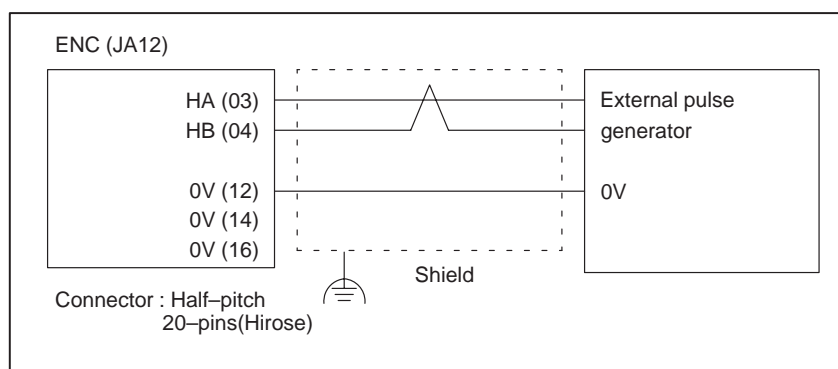
When the +24 V power is not to be supplied from the Power Mate itself, leave JD5 (10) and JD5 (19) open.

2.3.3 External Pulse Input Interface

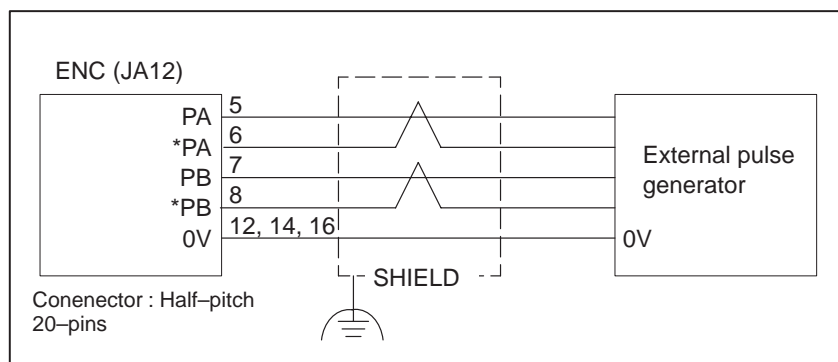
- Connection



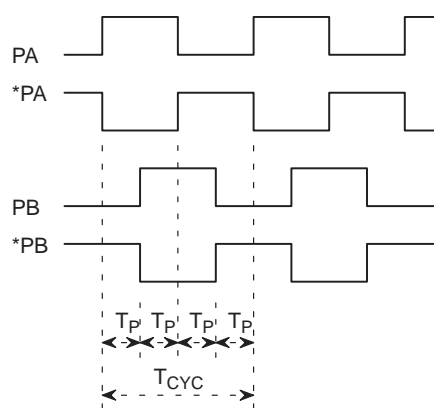
- Cable connection
(Single phase input type)



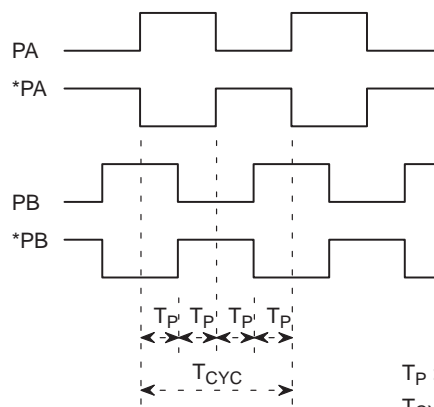
● Cable wiring



1 Pulses for positive-direction move command



2 Pulses for negative-direction move command



T_P : 1.2 μ s or longer
 T_{CYC} : 10 μ s or longer

The maximum allowable frequency is 100 kHz. (Note that the frequency is increased fourfold within the CNC.)

● Power supply

For a device having power requirements not exceeding 5 V, 0.35 A, the power for the device can be supplied from the Power Mate itself. In such a case be careful to the supply voltage drop.

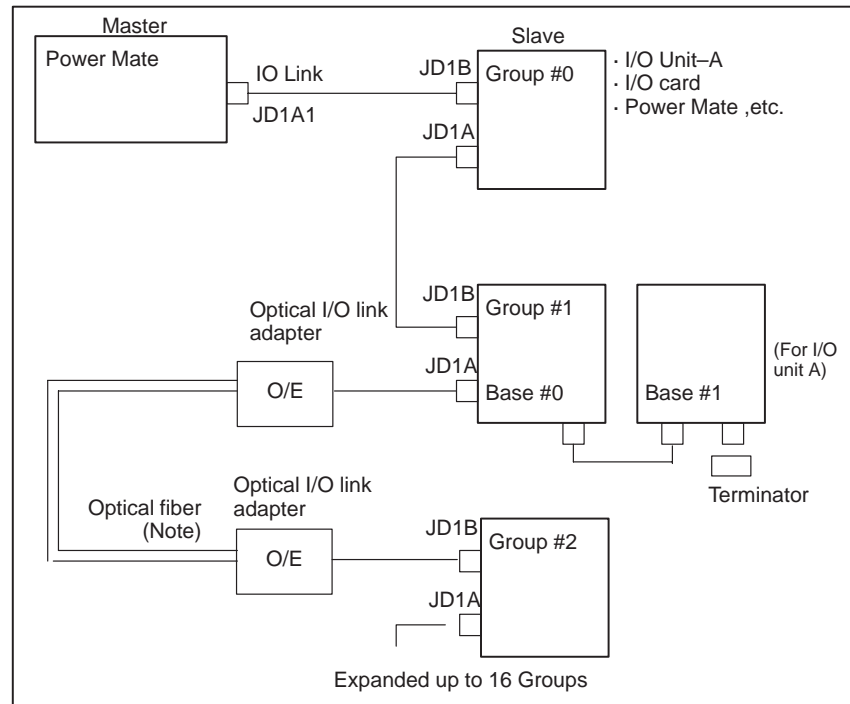
JA12 (9, 18, 20) : +5 V

JA12 (12, 14, 16): 0 V

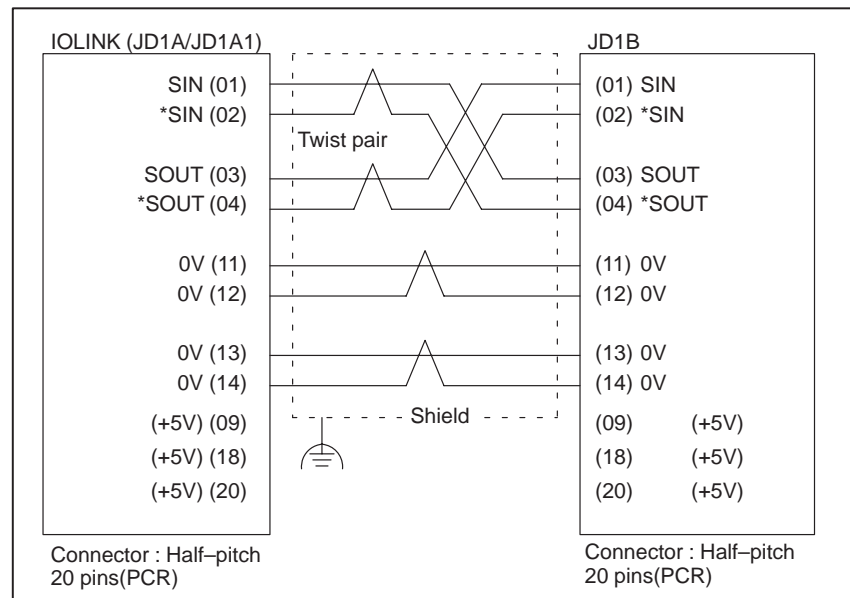
Use 4.95 as +5V is used for Power Mate.

2.3.4 I/O Link

• Connection



• Cable connection within group



CAUTION

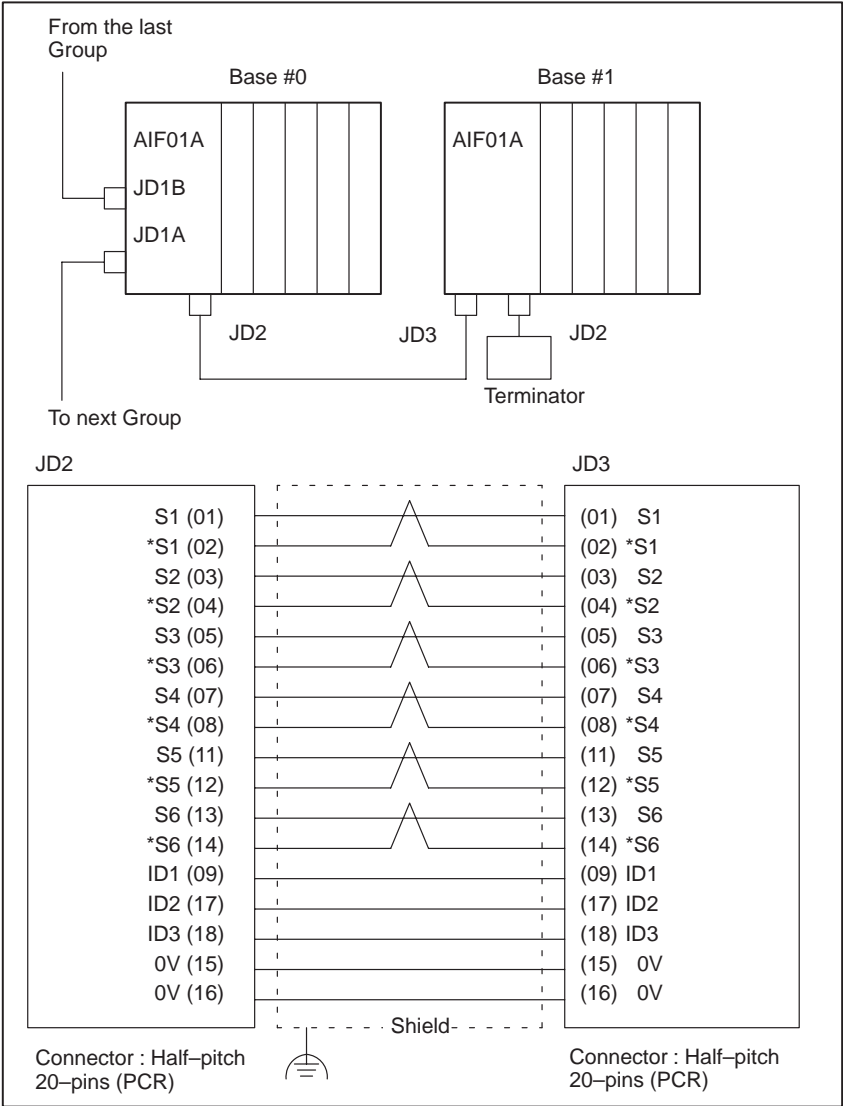
Connect +5V when optical I/O link adapter is used. Do not connect when metal cable is used. Otherwise, the +5V connectors will be short circuited, causing damage to the unit.

NOTE

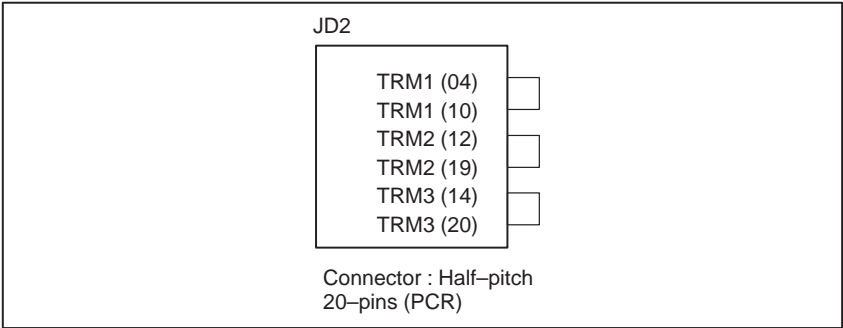
When metal cable is used, cable length between units is extended by 10 m.

When optical I/O link adapter is used, cable length between units is extended by 200m.

● **Connection between bases (with I/O unit-A)**



● **Cable connection in the terminator**



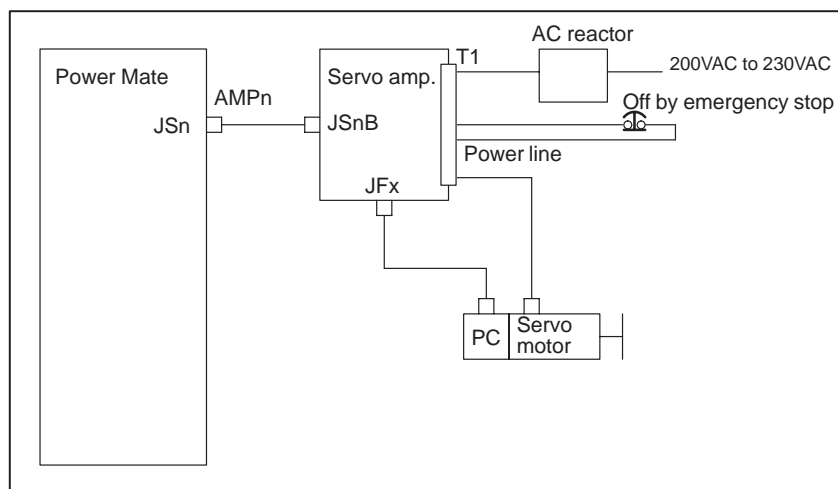
NOTE

For multiple AIF01Bs within a group with I/O Unit-A, connect the terminator to connector JP2 of the last AIF01B. For connector JD1A of the last unit on the I/O link line, no terminal is required.

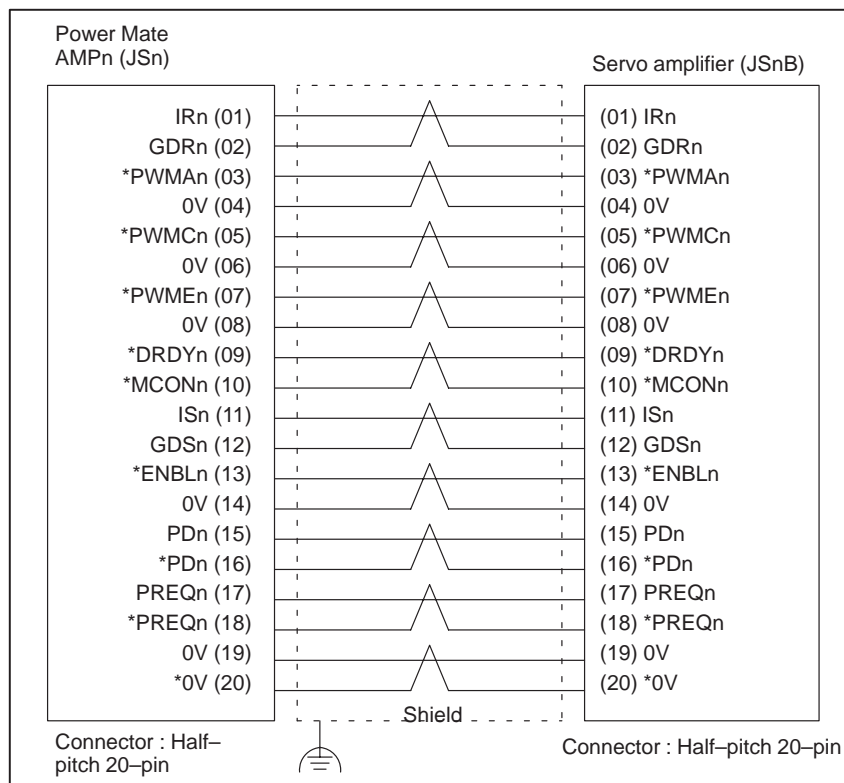
2.3.5 Servo Interface

The servo interface for the Power Mate-H is type B.

- Connection



- Connection to α series servo amplifier



NOTE
Suffix n in signal name is an axis number 1 to 6.

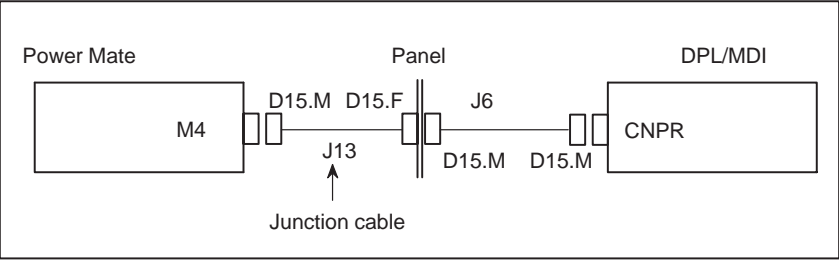
2.3.6
DPL/MDI Interface

• Connection

(1) Connection using no junction cable

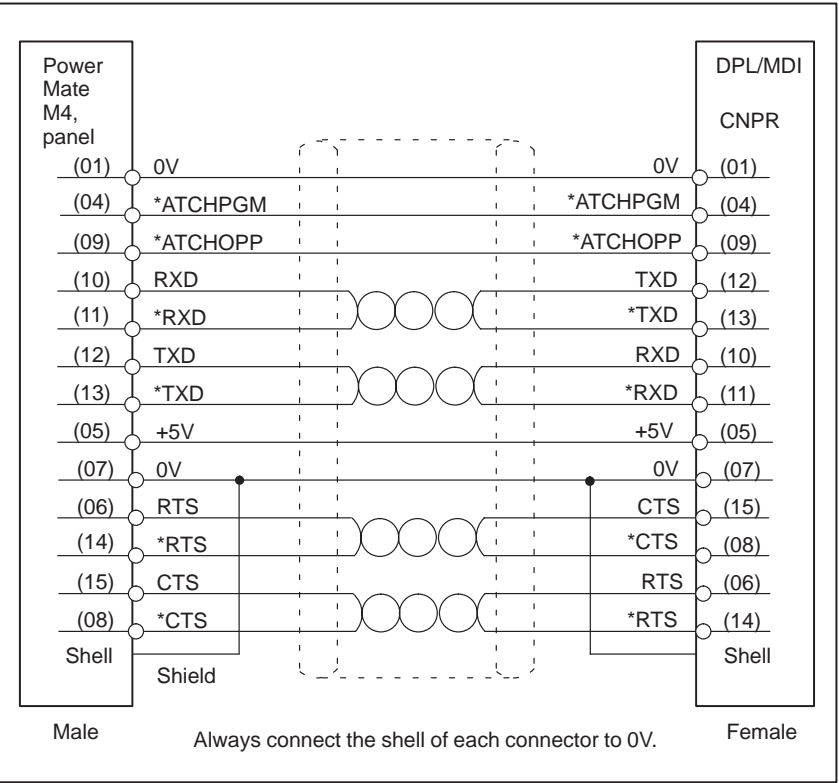


(2) Connection using junction cable J13

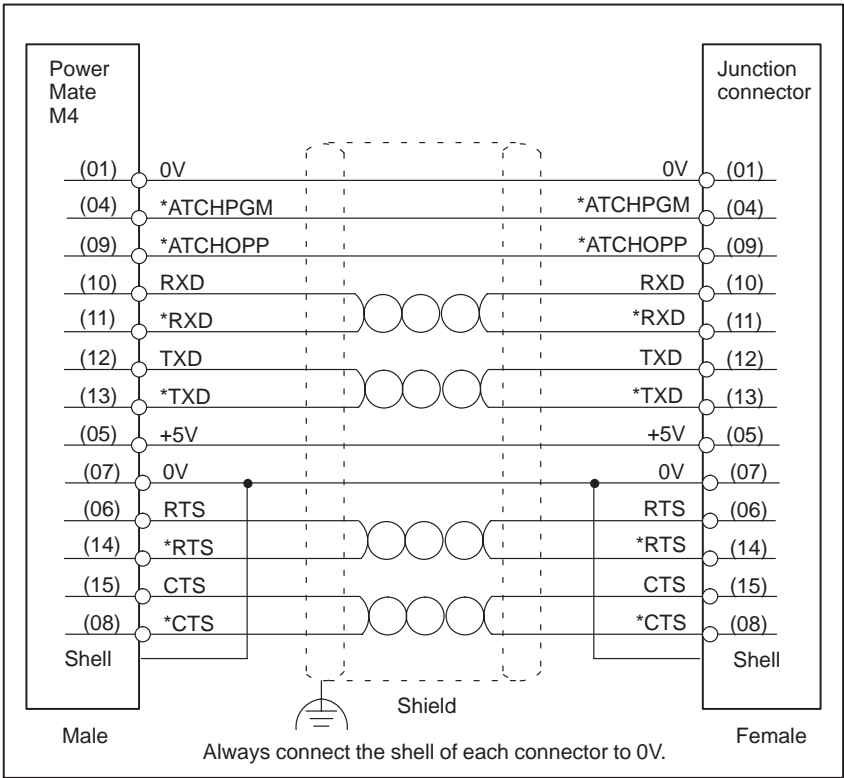


• Cable connection

Details of cable J6



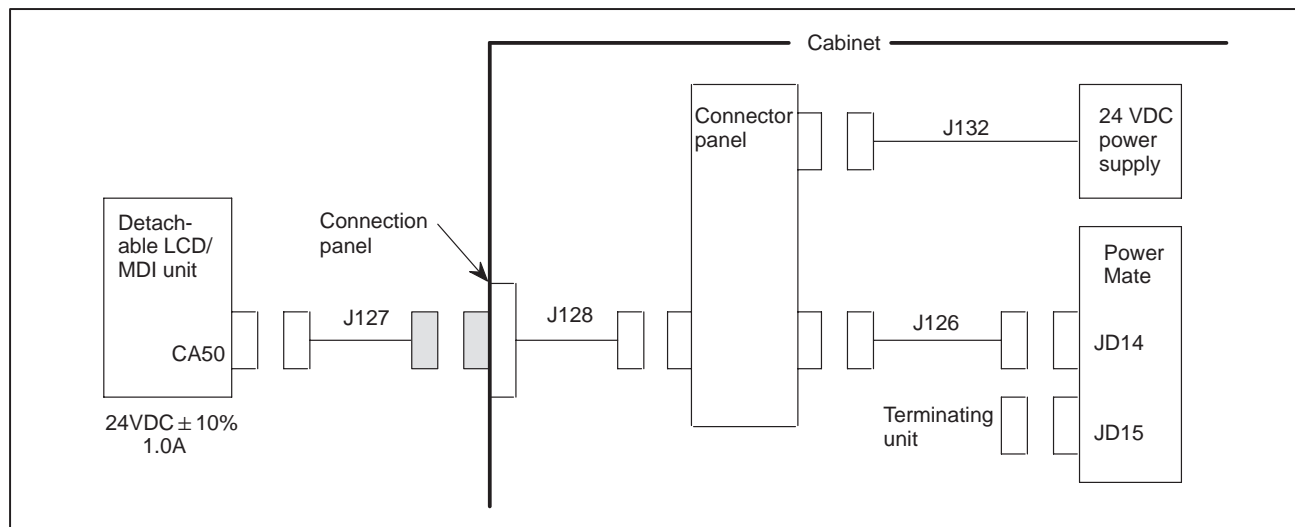
Details of cable J13



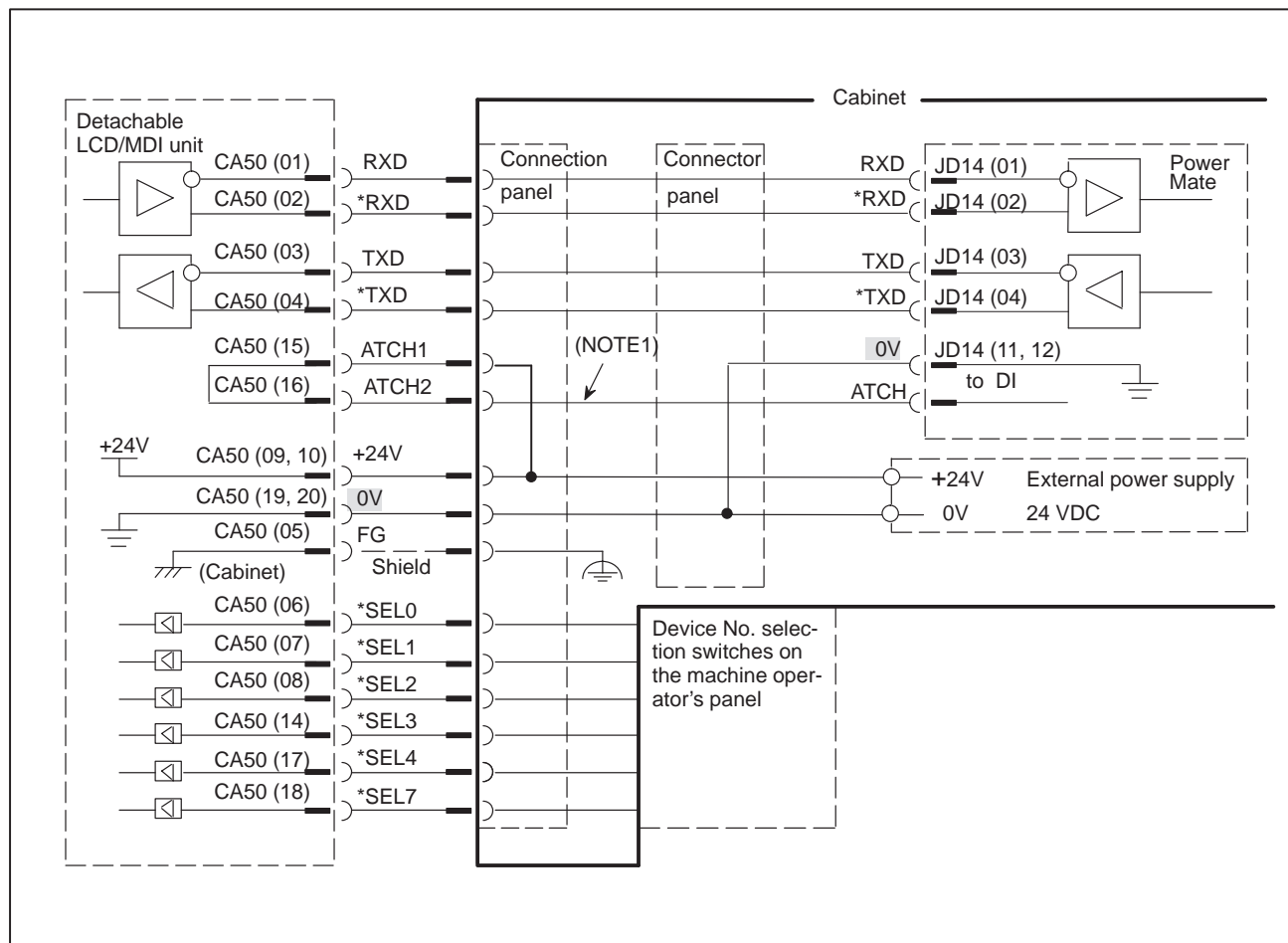
2.3.7 Detachable LCD/MDI Interface

See Connection Manual (B-62683EN) for details.

• Connection



• Cable connection



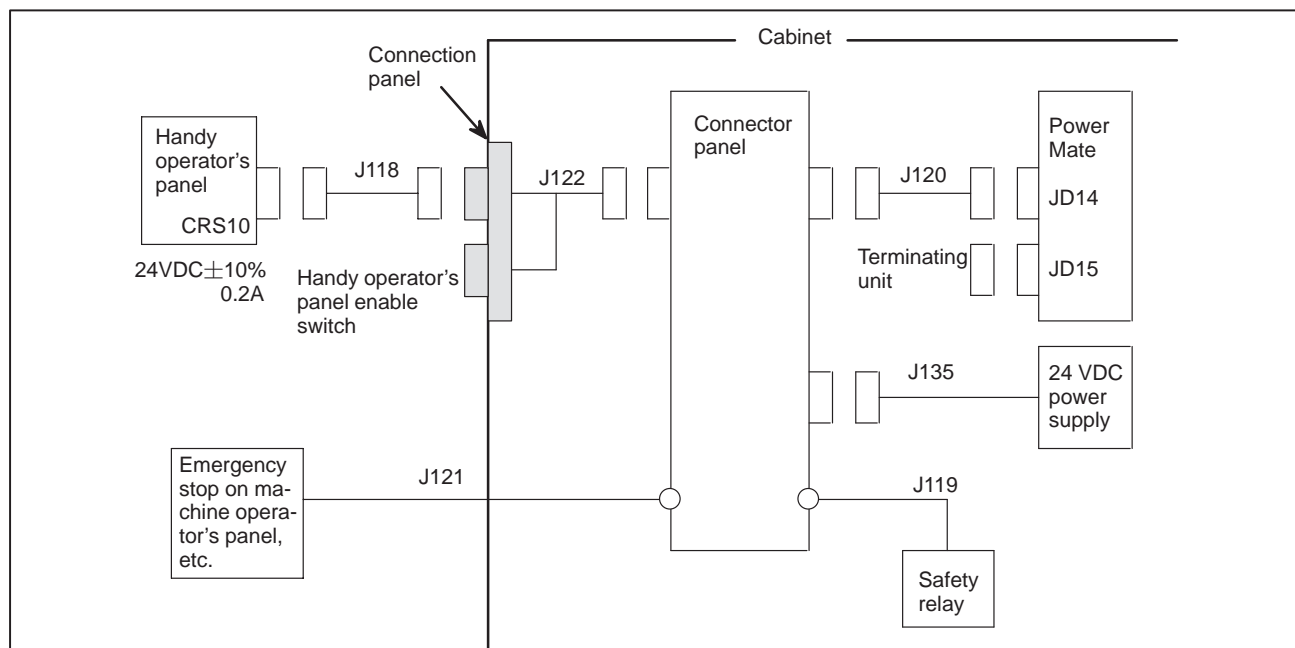
2.3.8 Handy Operator's Panel Interface

NOTE

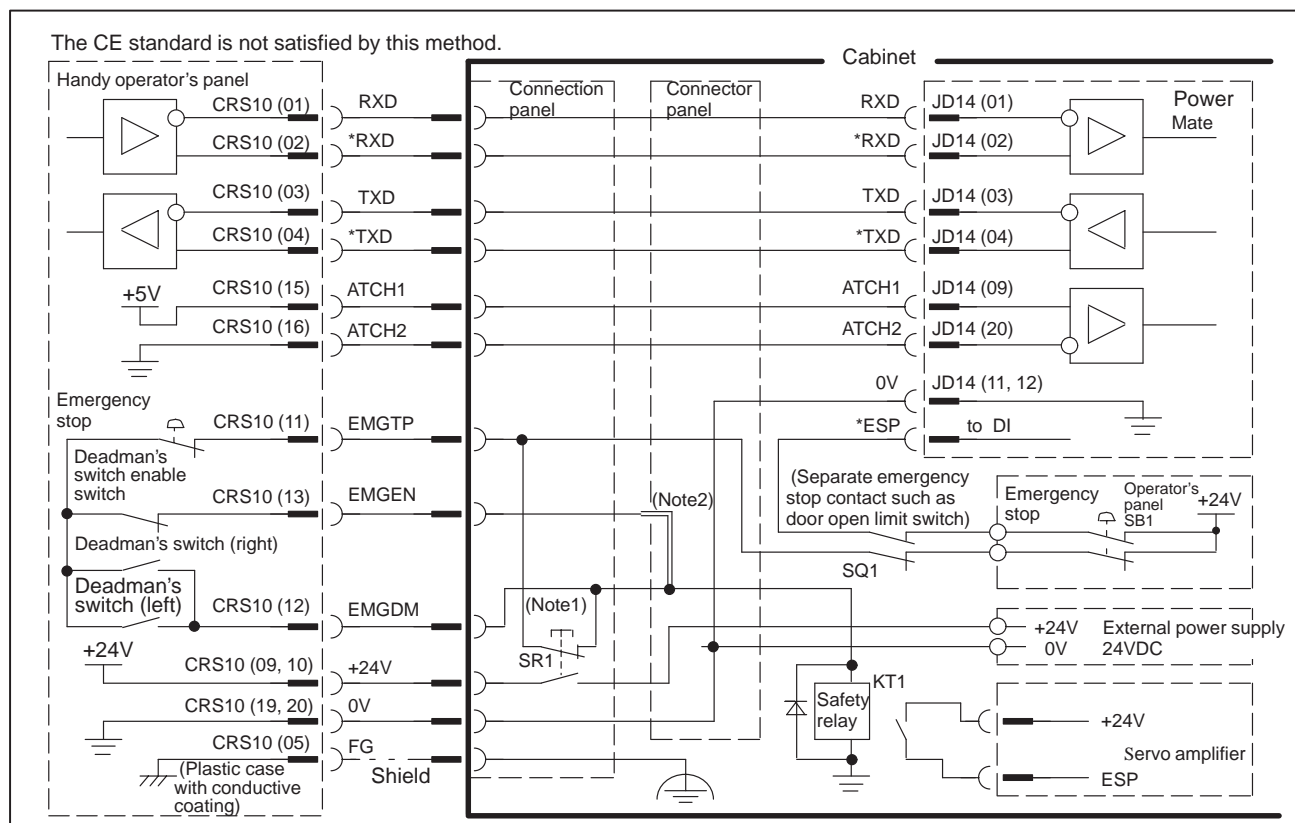
- 1 If 24 V is not applied to emergency stop input EMGTP (CRS10–11) of the handy operator's panel, the handy operator's panel enters the emergency stop state.
- 2 The terminating unit connected to the JD15 connector of the Power Mate is not a CRT link terminating unit. This is the same as the touch panel terminating unit (2.3.9).
- 3 Set rotary switch MTSW of the Power Mate main unit to 3.

Connection Allowing the Handy Operator's Panel to be Detached

- **Connection**

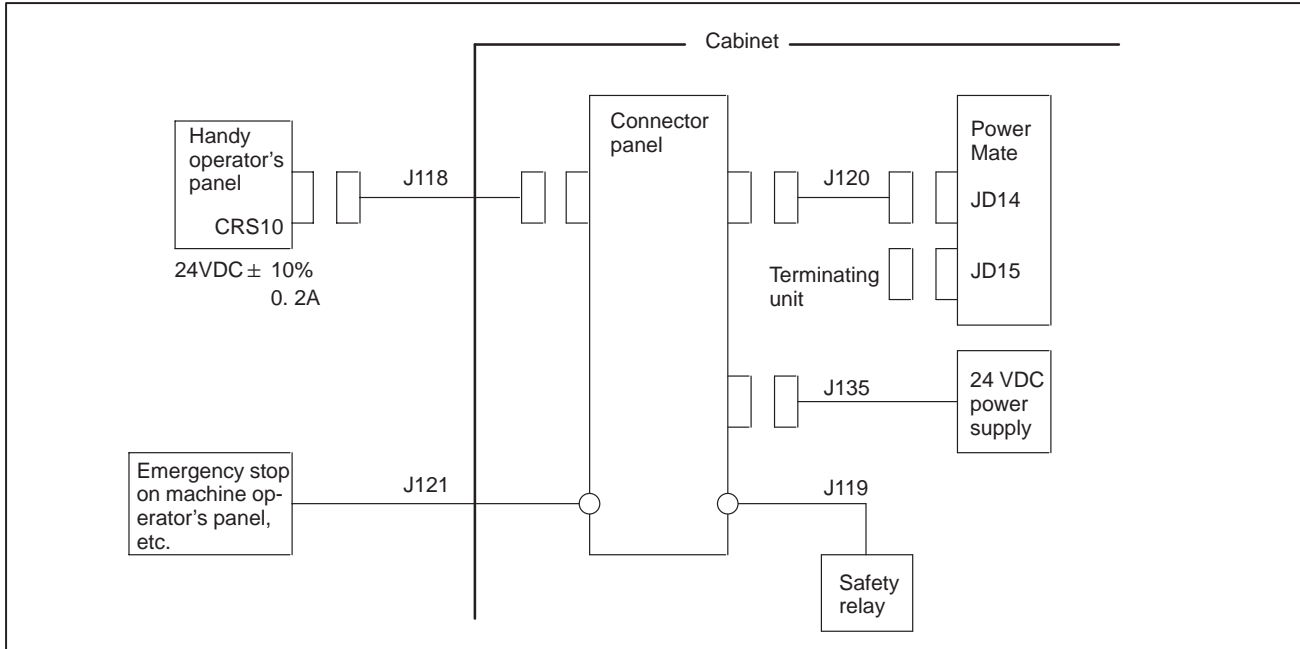


- **Cable connection**

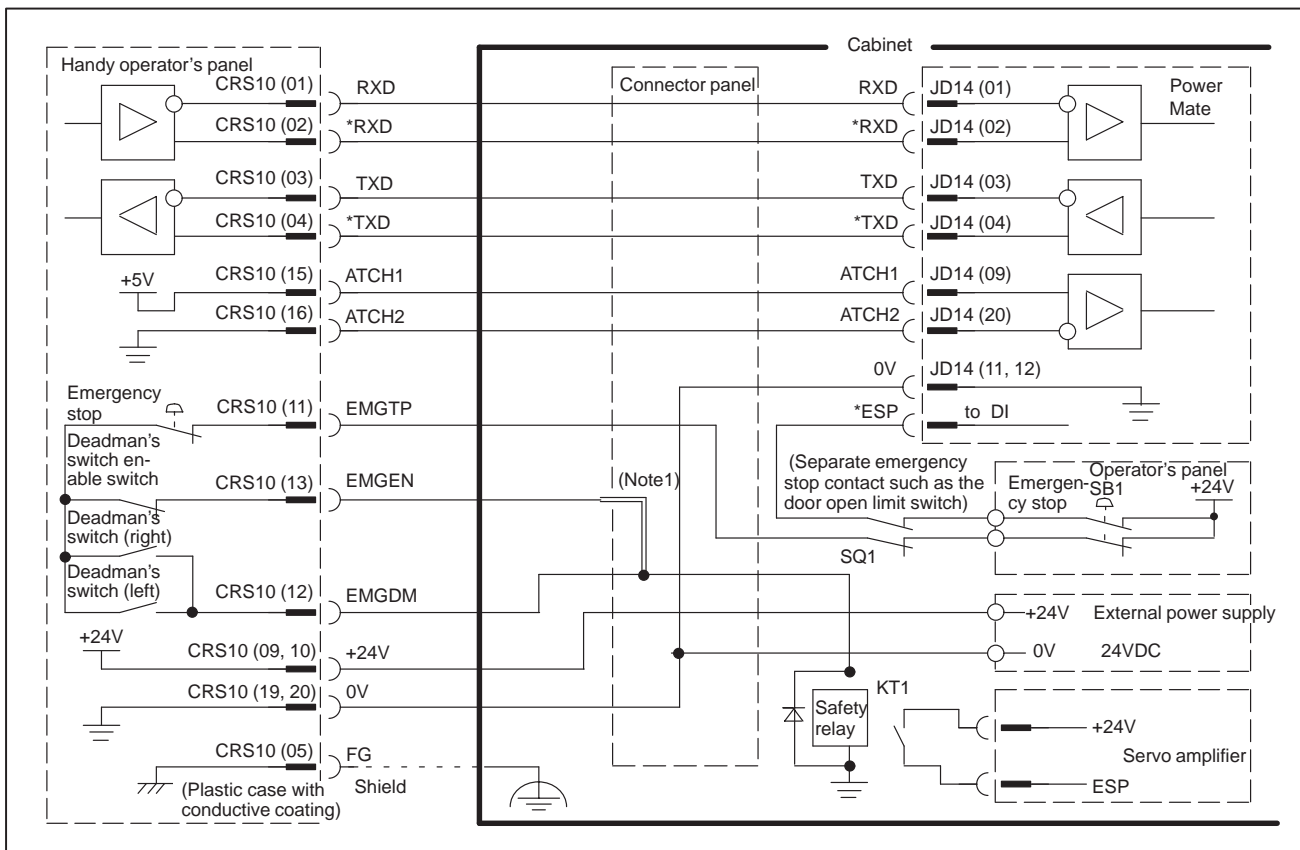


Keeping the Handy Operator's Panel Connected at All Times

• Connection

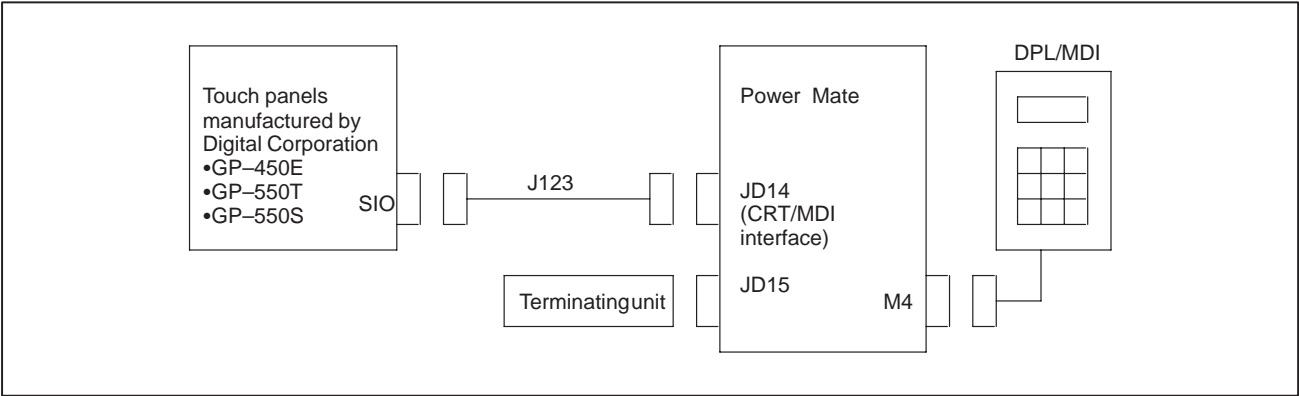


• Cable connection

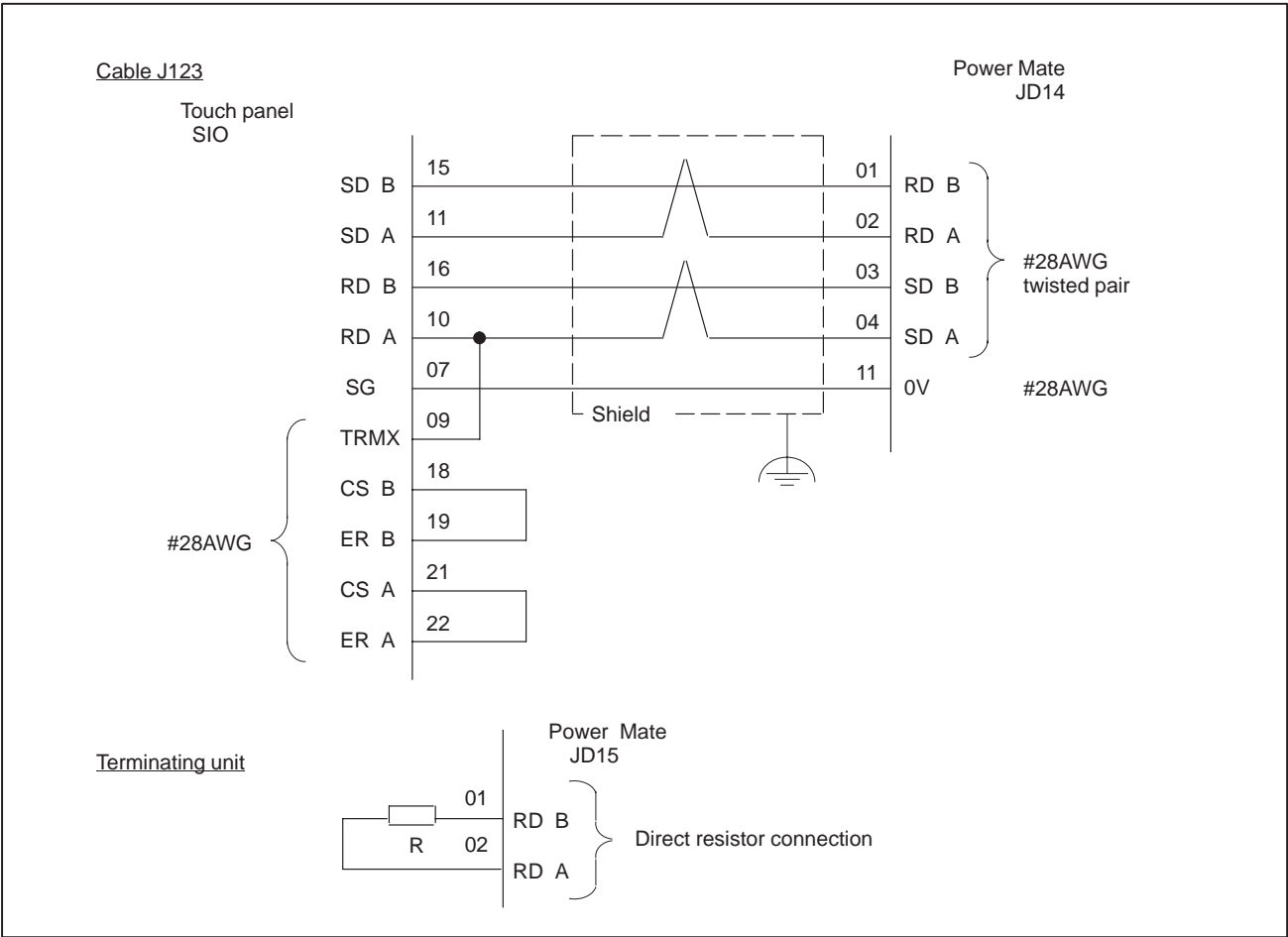


2.3.9 Touch Panel Interface

● Connection



● Cable connection



2.4 LED DISPLAY/ SETTING AND MODULE CONFIGURATION OF UNIT

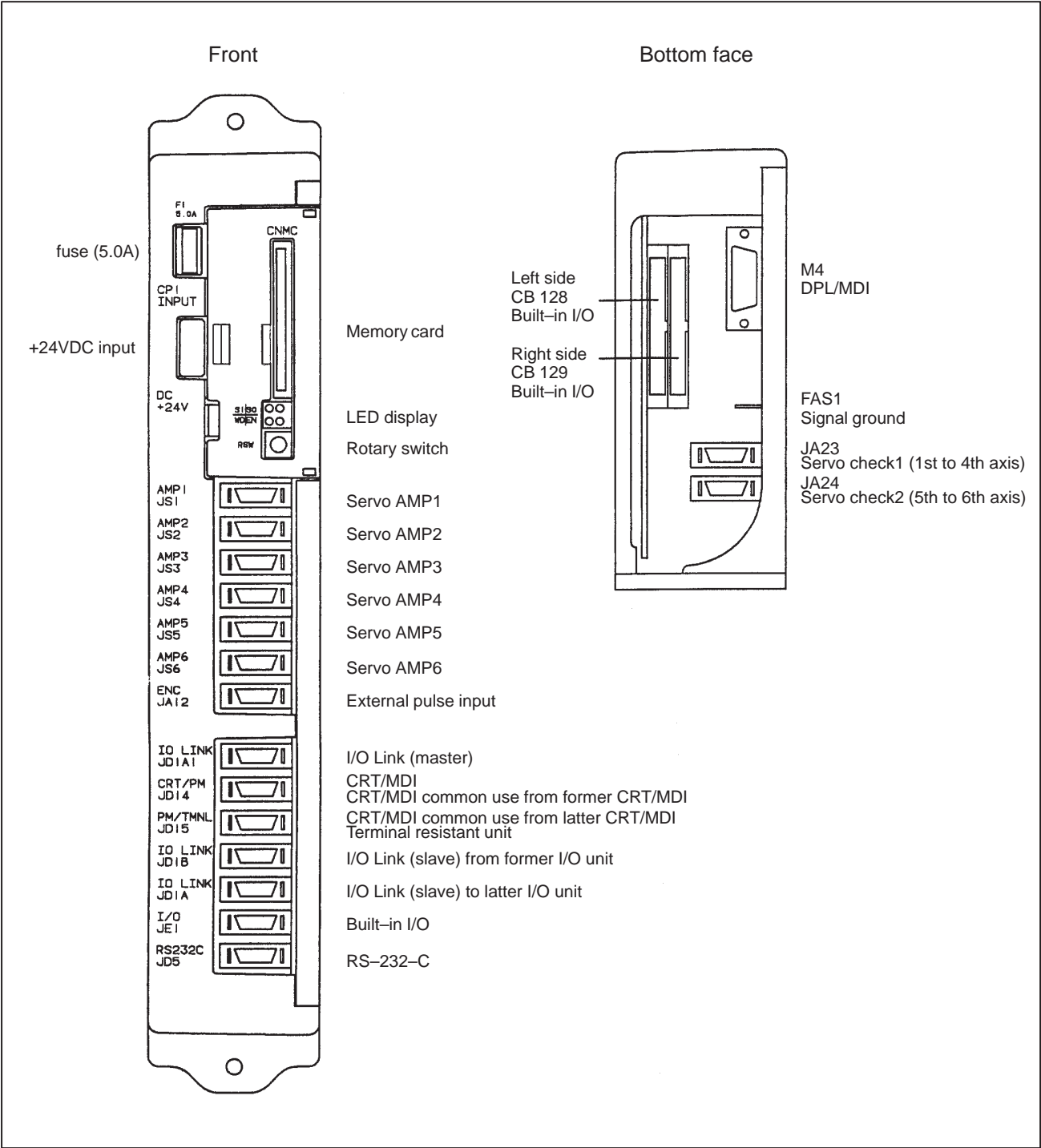
2.4.1 LED Display of Control Unit

If an alarm occurred, an alarm message is usually displayed on the DPL, CRT, PDP, LCD, or handy operator's panel screen. However, it is possible that no alarm appears, if the display function is in trouble.

In such a case, the alarm occurrence are displayed by LED on the Controller.

LED		Contents	Countermeasures
No.	Color		
S0	Green	No alarm Blinks during automatic operation. Remains on or off while automatic operation is not being performed.	
S1	Red	Lights with all alarms	An alarm No. is displayed in the DPL/MDI or CRT/MDI at the same time. Make a corrective measure by the alarm No.
EN	Green	This show to turn on power.	
WD	Red	Watch dog alarm	When display unit is connected at alarm is occurred, it may be displayed the alarm number. Do some disposal of the alarm. If the all-clear operation does not release the alarm, replace the base PCB

2.4.2
Connector and Signal
Name



2.4.3
Fuse of Controller

Fuse list

Ordering code	Symbol	Rating	Individual code
A02B-0124-K101	F1	5.0A	A60L-0001-0046#5.0 or A60L-0001-0046#5.0R

2.4.4 Battery of Controller

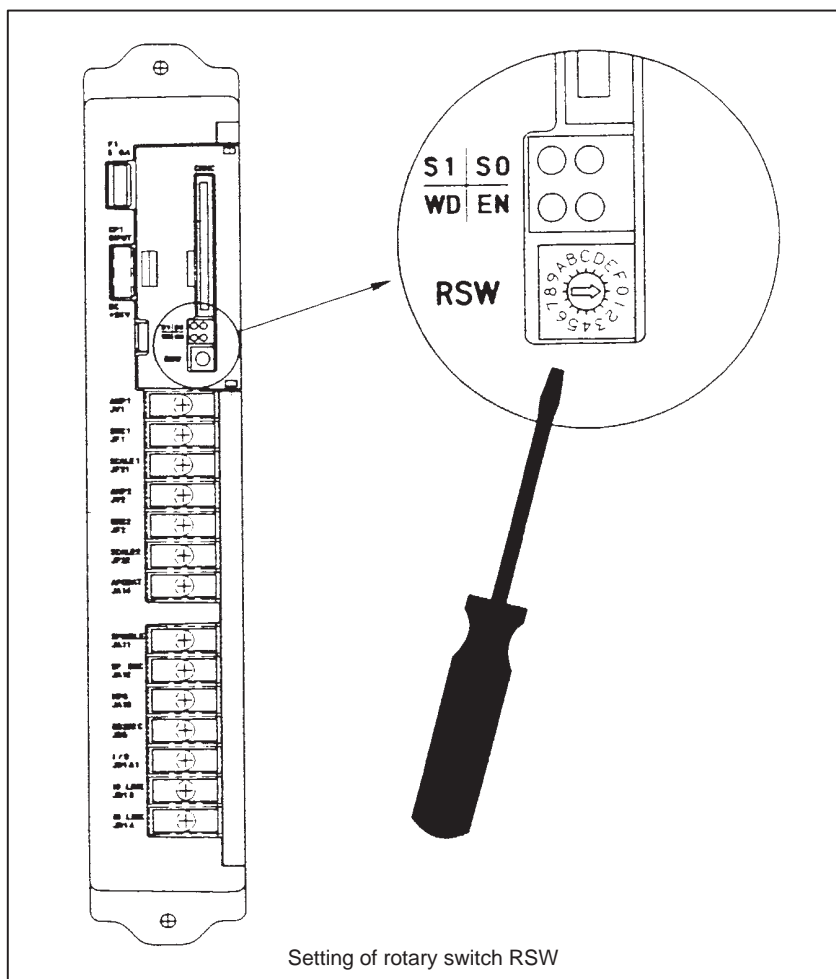
Lithium battery code : A20B-0118-K111

2.4.5 Rotary Switch RSW

When CRT/MDI common functions and RSW simultaneous block start are used, set device numbers from 0 to 15 with the rotary switch (RSW). Assign the number from the first Power Mate in order.

Device No.	RSW setting
0	0
1	1
2	2
3	3

When CRT/MDI common functions and RSW simultaneous block start are not used, set device number to 0.

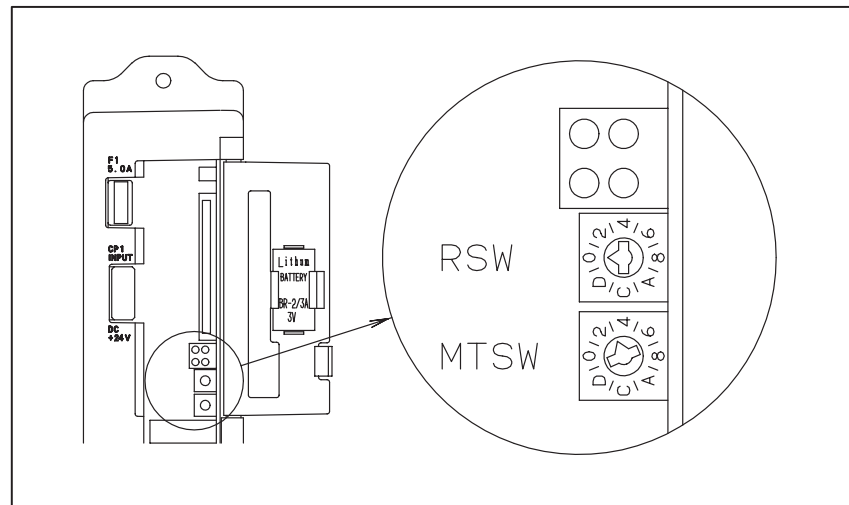


2.4.6 Rotary Switch MTSW

Set MTSW to 0 for general use.

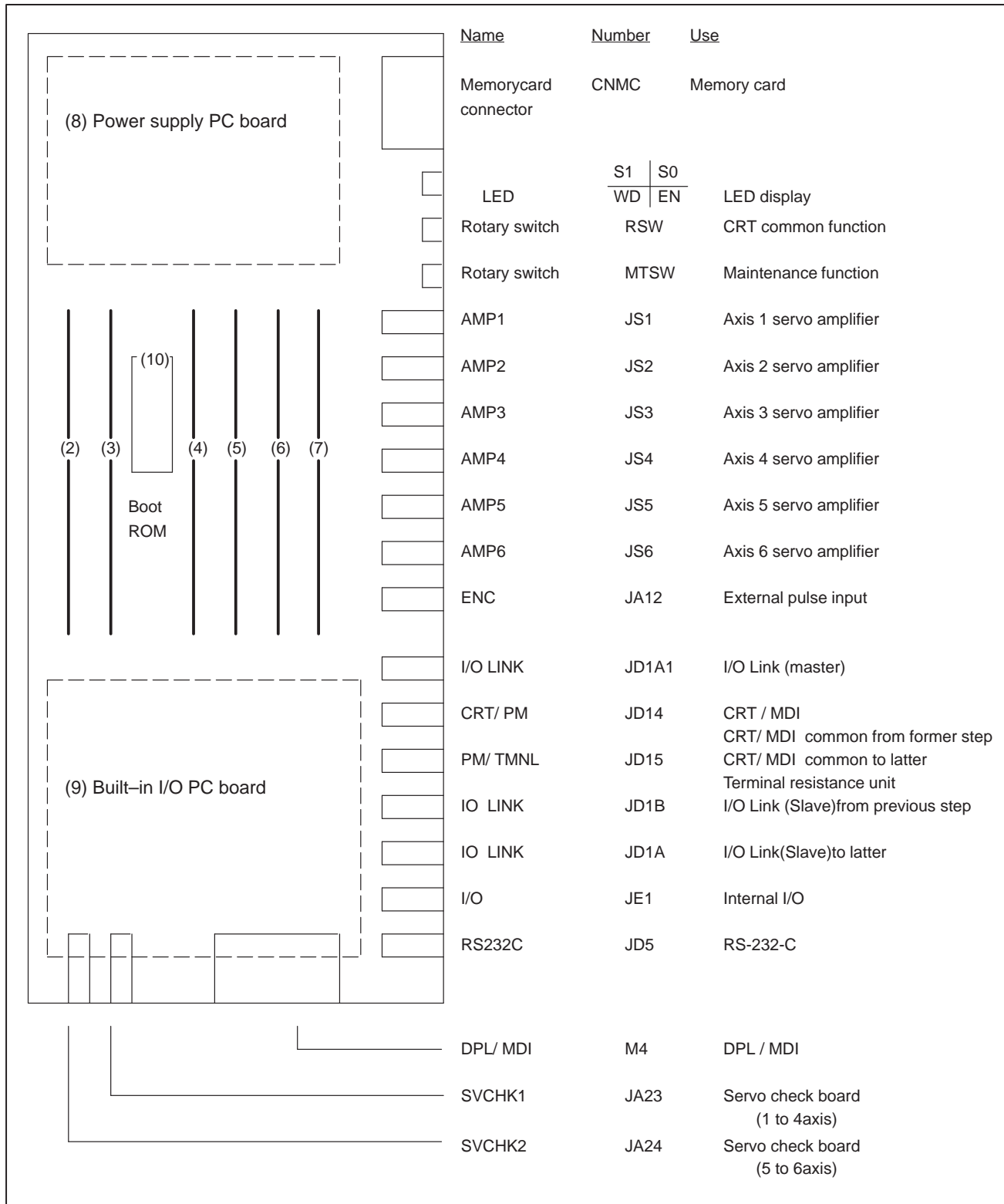
When handy operator's panel is used, set MTSW to 3.

Normally, do not set other number except [0] and [3].



2.4.7

Location of Modules and Internal PC Boards



No.	Name		Specifications	Function	Display of system configuration screen
(1)	Basic PC board	A	A20B-2100-0020	Max.4 axes can be increased.	
		B	A20B-2100-0021	Max.6 axes can be increased, or Macro executor/C language executor can be used.	
(2)	PMC module		A20B-2901-0660	With PMC	PMP+SLC
(3)	Memory module	A	A20B-2902-0301		RAM 256KB
		B	A20B-2902-0300	For external pulse input For high-speed DI	RAM 256KB POS LSI
		C	A20B-2902-0450	For C language executor With external pulse input	RAM 1MB POS LSI
(4)	CRT module		A20B-2901-0480	For CRT, LCD, PDP, Handy operator's panel	SCA (CRT)
			A20B-2902-0470	For touch panel	_____ Note
			A20B-2902-0540	For HSSB	_____ Note
(5)	Servo module		A20B-2902-0290	For 5th and 6th axis (Digital)	SERVO 5/6
			A20B-2902-0510	For 5th and 6th axis (Analog)	
(6)	Servo module		A20B-2902-0290	For 3rd and 4th axis (Digital)	SERVO 3/4
			A20B-2902-0510	For 3rd and 4th axis (Analog)	
(7)	Servo module		A20B-2902-0290	For 1st and 2nd axis (Digital)	SERVO 1/2
(8)	Power supply PC board		A20B-1004-0960	Power supply	_____
(9)	SubPC board		A20B-2001-0902	Built-in I/O card	BLT I/O SRC
			A20B-2100-0120 +A20B-8001-0500	Profibus card	PROFIBUS
			A20B-8100-0060	Genius card	GENIUS
			A20B-2100-0040	I/O Link-II	I/O LINK-2
(10)	Boot ROM		A02B-0211-H500#881A		

NOTE

When touch panel and HSSB function are used, system configuration can not be displayed.

2.4.8
LED display of I/O Link
Connection Unit

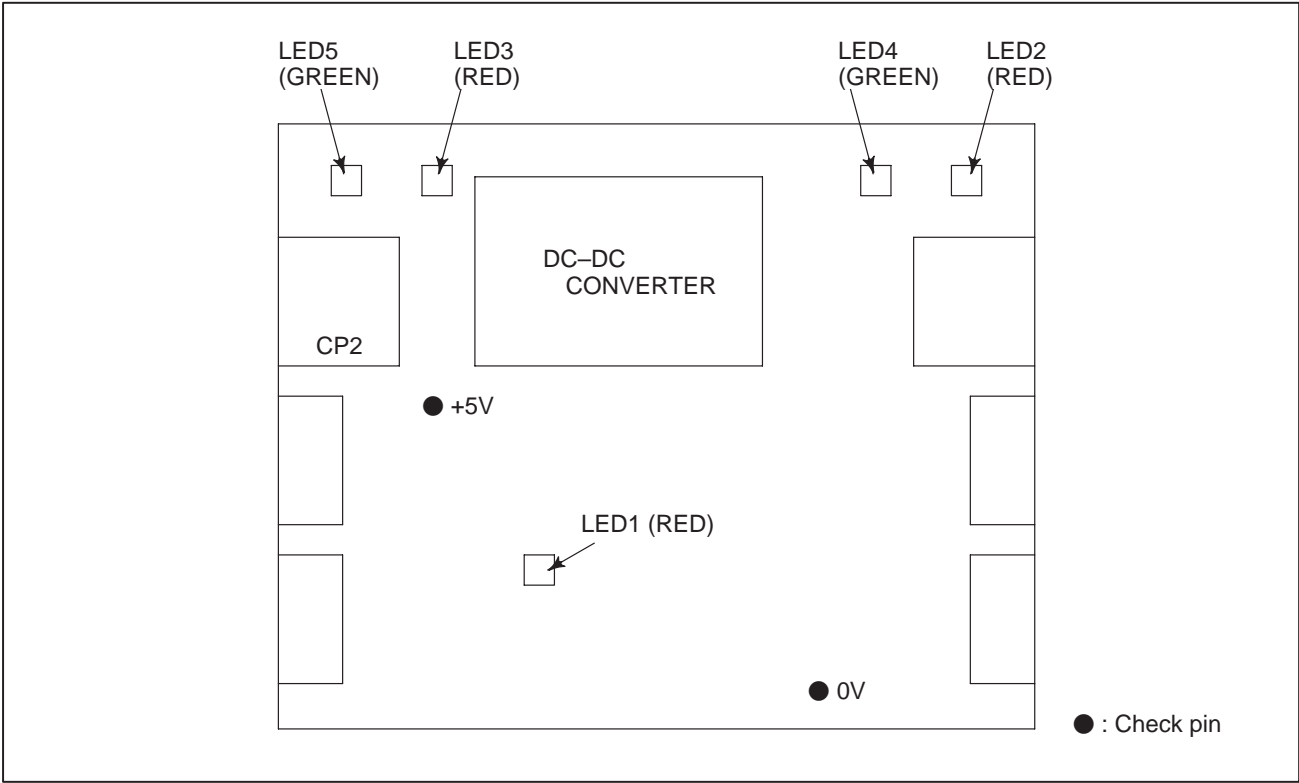


Fig.2.4.8 LED Installation Positions

	LED status		Description
1	LED1 □		Normal
	LED1 ■		A RAM parity error occurred. The hardware is out of order.
2	LED4 ■	LRD2 □	Normal
	LED4 □	LRD2 ■	No voltage is applied to CP1. The voltage applied to CP1 is insufficient.
	LED4 ■	LRD2 ■	A communication error occurred in a channel connected to CP1.
3	LED5 ■	LRD3 □	Normal
	LED5 □	LRD3 ■	No voltage is applied to CP2. The voltage applied to CP2 is insufficient.
	LED5 ■	LRD3 ■	A communication error occurred in a channel connected to CP2.

■ : Lit □ : Not lit

2.5

LIST OF PC BOARD AND UNIT

2.5.1

Basic Unit

Name	Specifications	Remarks
Basic unit A	A02B-0211-B511	Up to 4 axes/4 paths, when using the 3/4-axis servo module
Basic unit B	A02B-0211-B501	Up to 6 axes/6 paths, when using the 3/4-axis and 5/6-axis servo modules. The macro executor and C language executor can also be used.
Basic unit C	A02B-0211-B541	With I/O Link II for transformer

2.5.2

Control Unit PC Board

Name	Specifications	Remarks
Base PC board A	A20B-2100-0020	Up to 4 axes/4 paths, when using the 3/4-axis servo module
Base PC board B	A20B-2100-0021	Up to 6 axes/6 paths, when using the 3/4-axis and 5/6-axis servo modules. The macro executor and C language executor can also be used.
Power supply PC board	A20B-1004-0960	
Built-in I/O card	A20B-2001-0902	DI:32 DO:24 (source type)
I/O Link-II card	A20B-2100-0040 A20B-2100-0041	FANUC I/O Link-II
Profibus card	A20B-2100-0120 A20B-8001-0500	
Genius card	A20B-8100-0060	
I/O card D	A16B-2202-0733	DI:48 DO:32 (source type)
I/O card E	A16B-2202-0732	DI:96 DO:64 (source type)

2.5.3

Module

Name	Specifications	Remarks
PMC module	A20B-2901-0660	With PMC
Memory module	A20B-2902-0301	
	A20B-2902-0300	For external pulse input, for following control
	A20B-2902-0302	For external pulse input
	A20B-2902-0450	For C language executor with external pulse input
CRT module	A20B-2901-0480	For CRT, LCD, PDP, handy operator's panel
	A20B-2902-0470	For touch panel
	A20B-2902-0540	For HSSB

Name	Specifications	Remarks
Servo module	A20B-2902-0290	Digital
	A20B-2902-0510	Analog

2.5.4

CRT/MDI, DPL/MDI Unit

Name	Specifications	Remarks	
CRT/MDI unit	A02B-0166-C001	English key	
	A02B-0166-C201#R	English key	
	A02B-0166-C201#S	Symbol key	
LCD/MDI unit	A02B-0166-C271#R	English key	
	A02B-0166-C271#S	Symbol key	
Separate type MDI unit	A02B-0166-C010	English key	
	A02B-0166-C210#R	English key	
	A02B-0166-C210#S	Symbol key	
Picture display CRT/MDI unit	A02B-0166-C221#R	English key For 32 screen	
	A02B-0166-C221#S	Symbol key For 32 screen	
	A02B-0166-C222#R	English key For 64 screen	
	A02B-0166-C222#S	Symbol key For 64 screen	
Picture display separate type MDI unit	A02B-0166-C231#R	English key For 32 screen	
	A02B-0166-C231#S	Symbol key For 32 screen	
	A02B-0166-C232#R	English key For 64 screen	
	A02B-0166-C232#S	Symbol key For 64 screen	
Separate type CRT unit	A02B-0120-C111		
Separate type PDP unit	A02B-0120-C113	200V AC input	
	A02B-0200-C100	24V DC input	
Separate type LCD unit	A02B-0166-C251		
Detachable LCD/MDI unit	A02B-0166-C271#R	English key	
	A02B-0166-C271#S	Symbol key	
DPL/MDI unit	A02B-0168-K010	Table mount/FANUC	English key
	A02B-0168-K011	Wall mount/FANUC	English key
	A02B-0168-K012	Table mount/GE Fanuc	English key
	A02B-0168-K013	Wall mount/GE Fanuc	English key
Long distance type DPL/MDI unit	A02B-0118-C030	Table mount/FANUC	English key
	A02B-0118-C031	Wall mount/FANUC	English key
	A02B-0118-C032	Table mount/GE Fanuc	English key
	A02B-0118-C033	Wall mount/GE Fanuc	English key
Dust protected type DPL/MDI unit	A02B-0118-C130#R	Table mount/FANUC	English key
	A02B-0118-C130#S		Symbol key
	A02B-0118-C131#R	Wall mount/FANUC	English key
	A02B-0118-C131#S		Symbol key
	A02B-0118-C132#R	Table mount/GE Fanuc	English key
	A02B-0118-C132#S		Symbol key
	A02B-0118-C133#R	Wall mount/GE Fanuc	English key
	A02B-0118-C133#S		Symbol key
DPL/MDI switch circuit	A16B-2600-0080		
CRT link terminal unit	A02B-0124-D001	For CRT, PDP, LCD	
Handy operator's panel	A02B-0211-C020#R	English key	
	A02B-0211-C020#S	Symbol key	

Name	Specifications	Remarks
Touch panel end terminal unit	A02B-0166-D003	For touch panel and handy operator's panel
HSSB adaptor	A02B-0211-C220	
I/O Link-II relay terminal board	A08B-0048-C331	

2.5.5 CRT/MDI, DPL/MDI PC Board


Name	Specifications	Remarks
CRT Control PC board	A20B-2000-0840	
	A20B-2100-0061	For picture display 32 screen
	A20B-2100-0060	For picture display 64 screen
DPL/MDI PC board	A20B-8000-0141	
DPI/MDI for Long distance PC board	A20B-8000-0490	
Dust protected DPL/MDI P.C.B	A20B-8001-0310	
DPL/MDI switch board	A16B-2600-0080	
Handy operator's panel	A20B-2002-0200	
HSSB adaptor	A20B-8001-0510	

2.6


HOW TO REPLACE THE BATTERIES

WARNING

1 Memory backup battery replacement

When replacing the memory backup batteries, keep the power to the machine (CNC) switched on, and hold the machine at an emergency stop. Because this work must be carried out while the power is kept switched on and the cabinet is open, only the personnel who have been trained for safety are allowed to engage in the work. When replacing the batteries, be careful not to touch the high-voltage circuit section (marked  and shielded with a shock hazard prevention cover). If you touch the high-voltage circuit section when it is uncovered, you will get an electric shock.

2 Absolute pulse coder battery replacement

When replacing the memory backup batteries, keep the power to the machine (CNC) switched on, and hold the machine at an emergency stop. Because this work must be carried out while the power is kept switched on and the cabinet is open, only the personnel who have been trained for safety are allowed to engage in the work. When replacing the batteries, be careful not to touch the high-voltage circuit section (marked  and shielded with a shock hazard prevention cover). If you touch the high-voltage circuit section when it is uncovered, you will get an electric shock.

2.6.1

Replace the Battery for Memory Back Up

1. Lithium battery (Order number is *A02B-0118-K111) is required.
2. Replace battery in the status that Power Mate power supply is ON.
3. The battery used for memory back up is located in the front door.
4. Open the door of controller and remove the battery from folder.
5. Pinch and remove the connector in the side of battery towards you.
6. Connect the connector of new battery to the connector.
7. Mount a battery to folder and close the cover in side of cable.

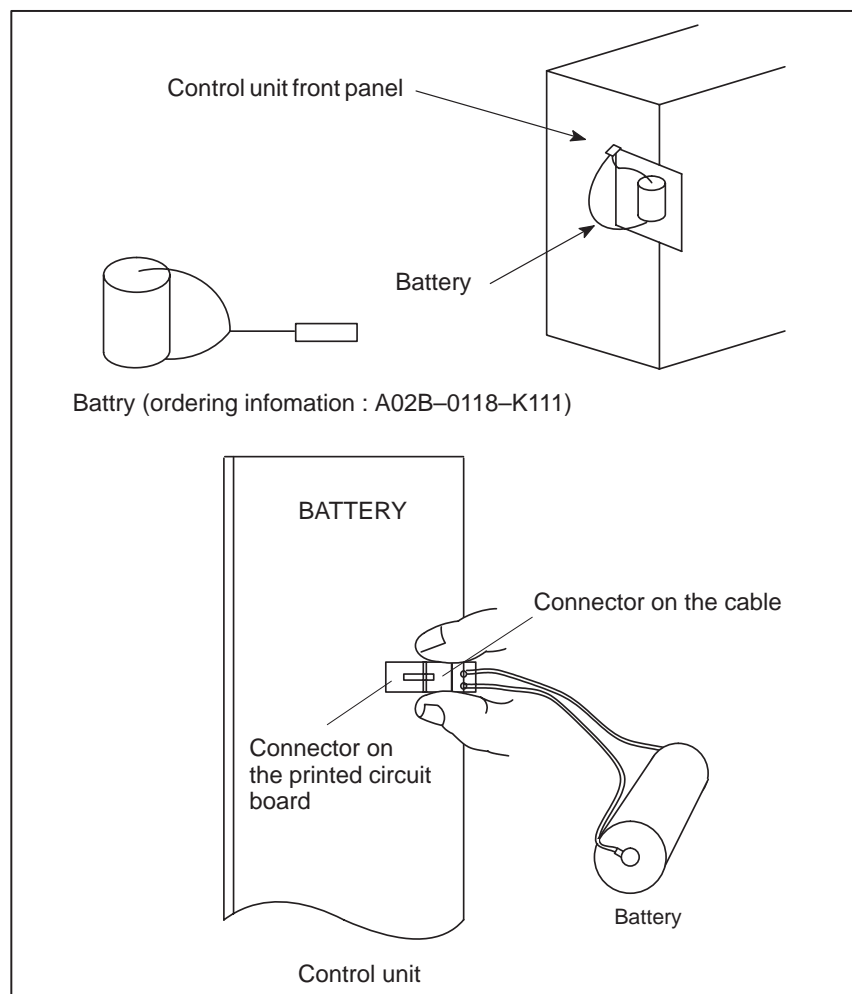
WARNING

Using other than the recommended battery may result in the battery exploding.

Replace the battery only with the specified type (A02B-0118-K111).

CAUTION

Ensure that the power to the CNC is turned on before attempting to replace the battery. Replacing the battery while the power is turned off will result in the loss of stored data such as programs and parameters.



2.6.2

Replacing Batteries for Absolute Pulse Coder (Servo Amplifier Built-in Type Battery/Servo Amplifier α Series)

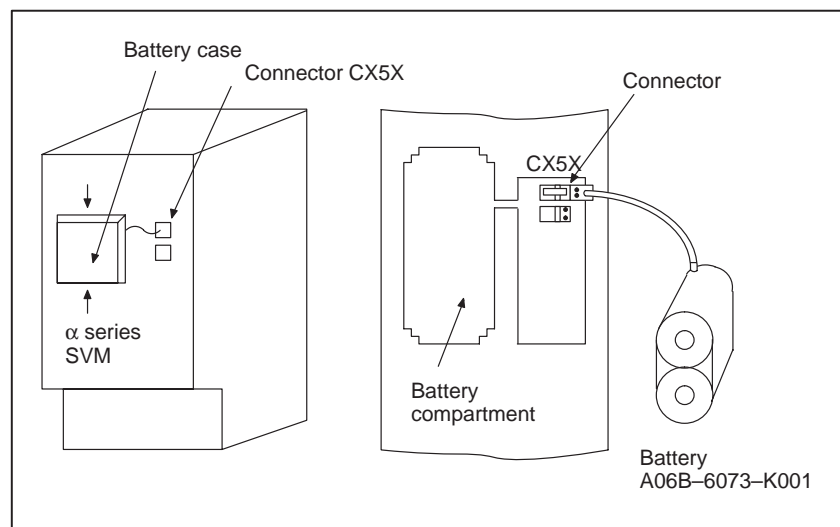
Prepare lithium battery A06B-6073-K001(*) in advance.

(*) FANUC specification: A98L-0001-0902

Procedure for replacing batteries for absolute pulse coder

Procedure

- (1) Turn machine (CNC) power ON.
- (2) Remove the battery case on the front panel of α series Servo Amp Module (SVM).
The battery case can be removed by holding the top of the case and pulling the case towards you.



- (3) Remove the connector the battery.
- (4) Replace the battery, and connect the connector.
- (5) Attach the battery case.
- (6) Turn machine (CNC) power OFF.

WARNING

Using other than the recommended battery may result in the battery exploding.
Replace the battery only with the specified type (A06B-0073-K001).

CAUTION

- 1 Replace the batteries for absolute pulse coder when NC power is ON.
Replacing the batteries with power OFF causes the absolute position stored in memory to be lost.
- 2 If your machine is equipped with a separate battery case, follow the instructions in 2.6.4.

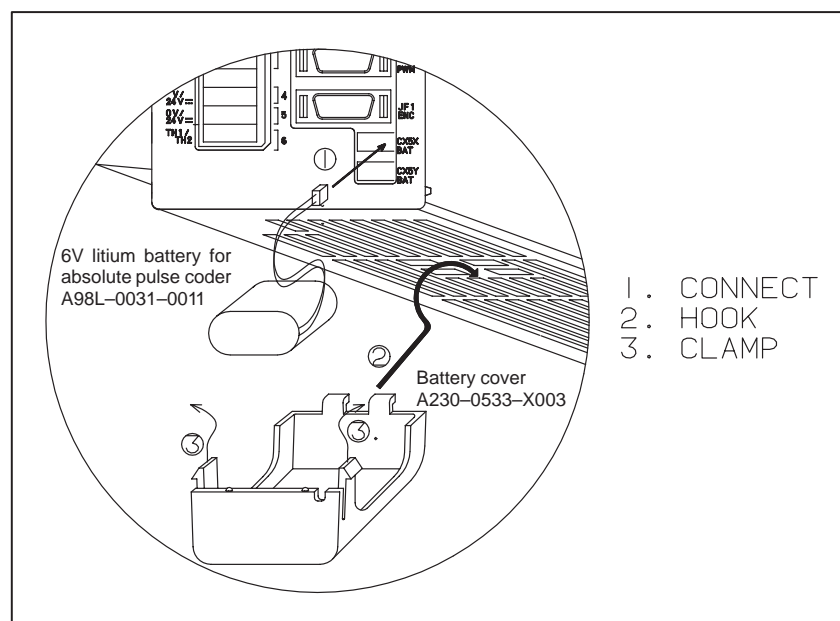
2.6.3
**Replacing Batteries for
Absolute Pulse Coder
(β Series Servo Amp
Module/Built-in Type
Battery)**

Prepare lithium battery A02B-0168-K111(*) in advance.

(*) FANUC specification: A98L-0031-0011

Procedure for replacing batteries for absolute pulse coder
Procedure

- 1 Turn machine (CNC) power ON.
- 2 Remove the battery case from under the β series servo amplifier module by holding the case at both sides and pulling downwards.



- 3 Remove the connector the battery.
- 4 Replace the battery, and connect the connector.
- 5 Attach the battery case.
- 6 Turn machine (CNC) power OFF.

WARNING

Using other than the recommended battery may result in the battery exploding.

Replace the battery only with the specified type (A02B-0168-K111).

CAUTION

- 1 Replace the batteries for absolute pulse coder when NC power is ON.

Replacing the batteries with power OFF causes the absolute position stored in memory to be lost.

- 2 If your machine is equipped with a separate battery case, follow the instructions in 2.6.4.

2.6.4

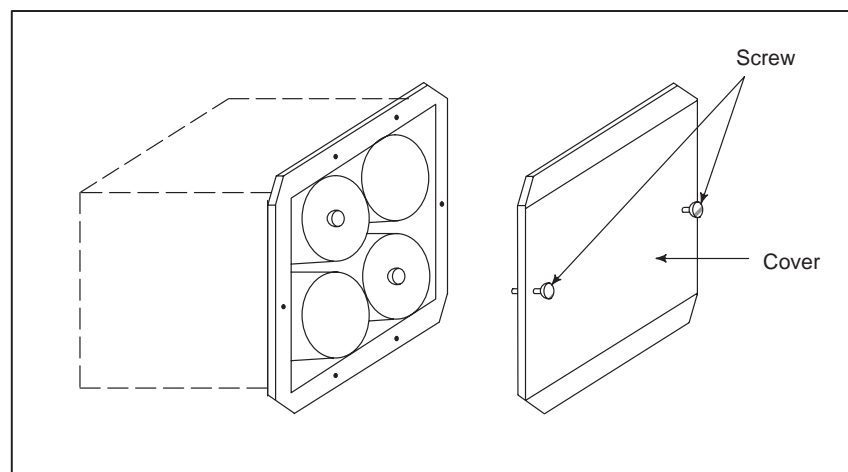
Replacing Batteries for Absolute Pulse Coder (Separate Battery Case)

Prepare 4 alkaline batteries (UM-1type) commercially available in advance.

Procedure for replacing batteries for absolute pulse coder

Procedure

- (1) Turn machine (CNC) power ON.
- (2) Loosen screws on the battery case to remove the cover. For placement of the battery case, refer to the machine tool builder's manual.
- (3) Replace the batteries in the case. Insert 2 batteries each in the opposite direction as illustrated below.



- (4) After replacement, install the cover.
- (5) Turn machine (CNC) power OFF

WARNING

Using other than the recommended battery may result in the battery exploding.
Replace the battery only with the specified type (UM-1 type alkaline battery).

CAUTION

Replace the batteries for absolute pulse coder when NC power is ON.
Replacing the batteries with power OFF causes the absolute position stored in memory to be lost.

2.7

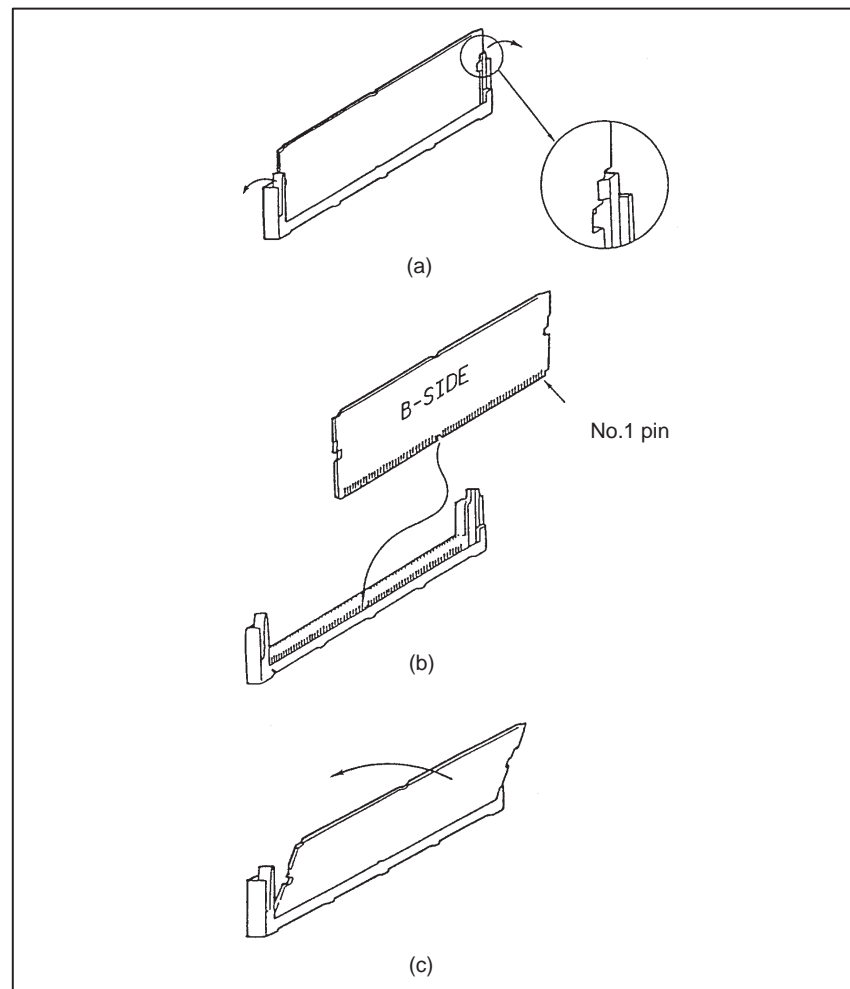
HOW TO REPLACE THE MODULES

2.7.1 Removing

- (1) Check that the power supply is not off.
- (2) Pull the latches of the module socket outwards. (Fig.(a))
- (3) Pull out the module upward. (Fig.(b))

2.7.2 Insertion

- (1) Check that the power supply is off.
- (2) Insert the new module board diagonally with B-SIDE outward (Fig.(b))
- (3) Hold both ends of the module with both hands, and raise it up until it locks. (Fig.(c))



CAUTION

- 1 Replacing the memory module results in the loss of stored data such as programs and parameters. Before attempting to replace the memory module, therefore, make a backup copy of the stored data.
- 2 Once the memory module has been replaced, any ladder programs must be reloaded.
- 3 Make sure that the latches on the both sides of the socket are securely hooked onto the module.
Otherwise, the electrical contacts may fail to connect correctly, causing the NC unit to malfunction.

2.8 REPLACING PRINTED CIRCUIT BOARD AND UNIT

2.8.1 The Base Printed Circuit Boards

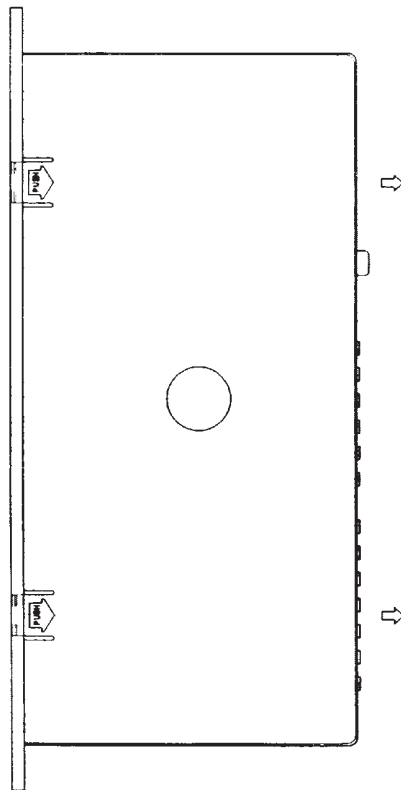
- (1) Make sure that the power supply unit is turned off.
- (2) Disconnect all cables connected to the printed circuit board in the control unit. Pinch the 20-pin half-pitch connector to release the latch. Draw out the connector.
- (3) Remove the control unit from the wall.
- (4) Place the control unit with its left face upward, and press the two points shown in Fig. 2.8.1 (a) to remove the cover of the case.
- (5) Remove the battery.
- (6) Release the three latches shown in Fig. 2.8.1 (b), and remove the PC board.
- (7) Mount a new base PC board by following the steps above in reverse order.
- (8) Reconnect the cables to their original positions.

CAUTION

Replacing the base printed circuit board results in the loss of stored data such as programs and parameters. Before attempting to replace the memory module, therefore, make a backup copy of the stored data.

How to remove the plastic cover at the left side of the case

- Pull the cover in the direction of arrows as shown below while holding down two portions marked with PUSH.
- When mounting the cover, insert the cover in the direction opposite to that of the arrows while holding down the two portions marked with PUSH.

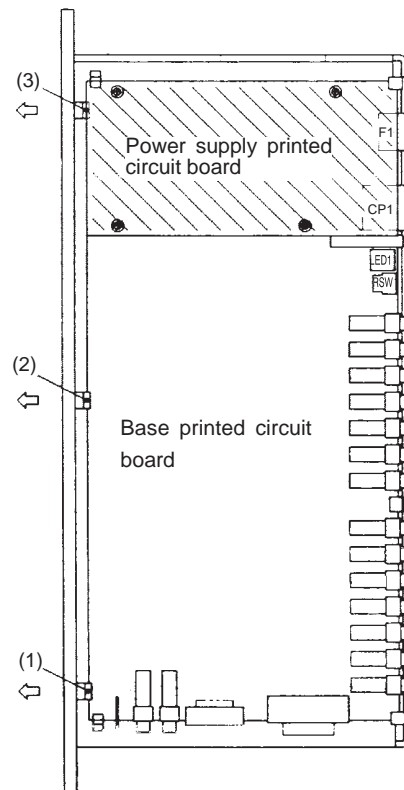


(Left side view)

Fig.2.8.1 (a)

How to remove the base printed circuit board

- Remove the 3 V dry cell for backing up the RAM battery.
- There are three claws which hold the base printed circuit board. While moving one at a time to the left (in the direction of arrows shown below) in the order of (1), (2), and (3), pull the left side of the board to release the hold. When releasing the claws, be careful not to bend the pins of components on modules adjacent to the base printed-circuit board.
- Move the board to the left to remove it from the case.



(Left side view)

Fig.2.8.1 (b)

2.8.2

The Power Supply Printed Circuit Boards and Sub PC Board

- (1) Make sure that the power supply unit is turned off.
- (2) As in 2.8.1 above, remove the base PC board.
- (3) Remove the screws from the base PC board or sub PC board that are securing the power PC board, and replace the power PC board.
- (4) Put the base PC board in the case, and return it to the original position.
- (5) Reconnect the cables to their original positions.

2.8.3

The Fan Motor

- (1) Remove the power PC board as in 2.8.2 above.
- (2) Remove the two screws from the fan motor on the power PC board, and replace the fan motor with a new one.
- (3) Mount the power PC board on the base PC board as in 2.8.2 above, and return the base PC board to the case.
- (4) Reconnect the cables.

2.8.4

The CRT Control Printed Circuit Board

- (1) Turn off the power to the CRT/MDI, separated type CRT/MDI unit and controller.
- (2) The CRT control PC board is located behind the MDI. Remove all cables connected to the PC board.
- (3) Remove the square screws from the CRT control PC board, and replace the PC board.
- (4) Reconnect the cables.

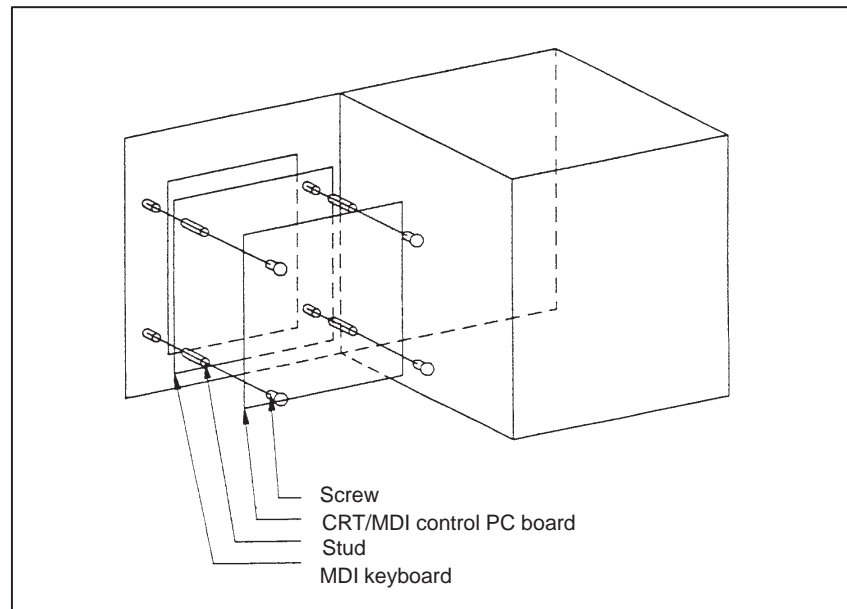
CAUTION

When the picture display CRT/MDI unit or separate picture display MDI unit is being used, reload the picture screen data.

2.8.5

The MDI Keyboard

- (1) The CRT control PC board that is behind the MDI keyboard can be seen from the rear of the CRT/MDI unit and separate type MDI unit. Remove the CRT control PC board as in 2.8.4 above.
- (2) Remove the two connectors from the back of the keyboard.
- (3) Remove the four studs from the back of the keyboard.
- (4) Since the MDI keyboard has no setscrews, the keyboard can be removed at this point.
- (5) Mount a new keyboard, and secure it with four studs.
- (6) Reconnect the two cables of the CRT control PC board.



2.8.6 The CRT Display

- (1) Check that the power supply is off.
- (2) Disconnect the CRT unit power cable and the video signal cable.
- (3) Remove the chloridized veneer cover and the four screws from the front of the CRT unit.
- (4) Install the new CRT unit.
- (5) Reconnect the CRT power supply cable and video signal cable to their original positions.

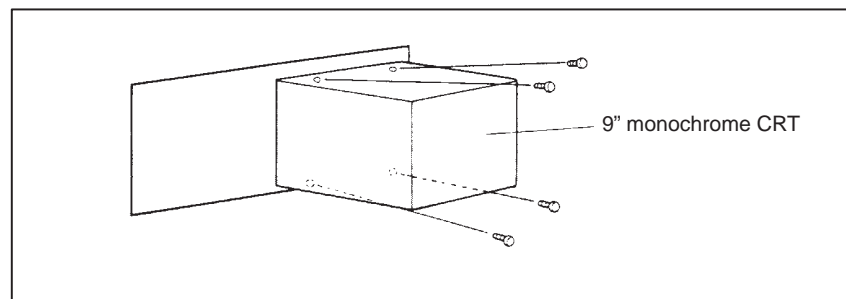


Fig.2.8.6 Replacing the CRT Display

2.9 MAINTENANCE OF HEAT PIPE TYPE HEAT EXCHANGER


Air filter cleaning and replacement

It is necessary to regularly clean the heat transformer, because the heat transformation ability will be reduced by the accumulation of dust. The frequency of the cleaning needed differs according to the installation environment and therefore should be determined by your own judgment according to the degree of dirt.

WARNING

The heat pipe-based heat exchanger section is applied with a high voltage.

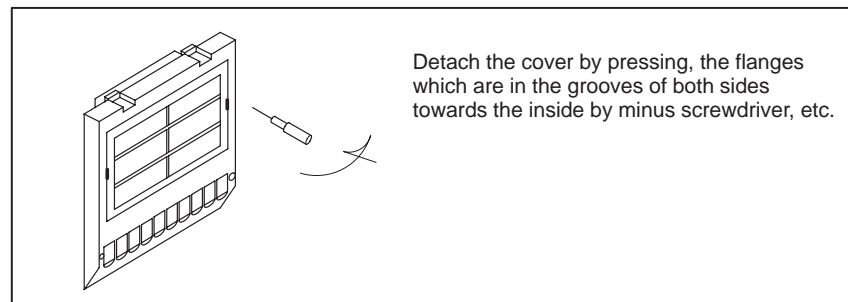
When maintaining the heat pipe-based heat exchanger, keep the power to the machine (CNC) switched off.

When replacing the heat pipe-based heat exchanger with the cabinet open, be careful not to touch the high-voltage circuit section (marked  and shielded with a shock hazard prevention cover).

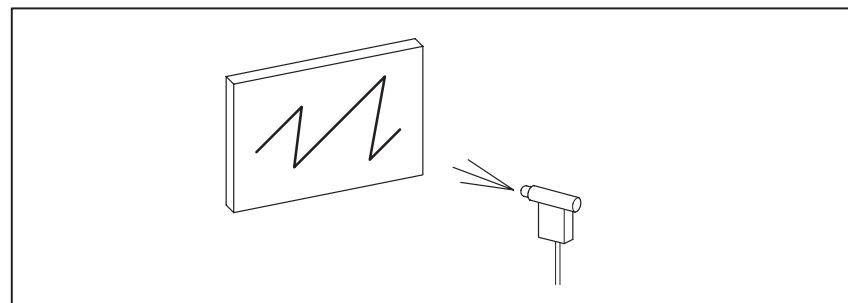
If you touch the high-voltage circuit section when it is uncovered, you will get an electric shock.

Air filter cleaning and replacement method

- 1 When cleaning and replacing the filter, be sure to cut off the fan's electric power source.
- 2 Detach the filter cover and take out the filter inside.



- 3 Protect the filter from silting due to dust by blowing air on both sides.

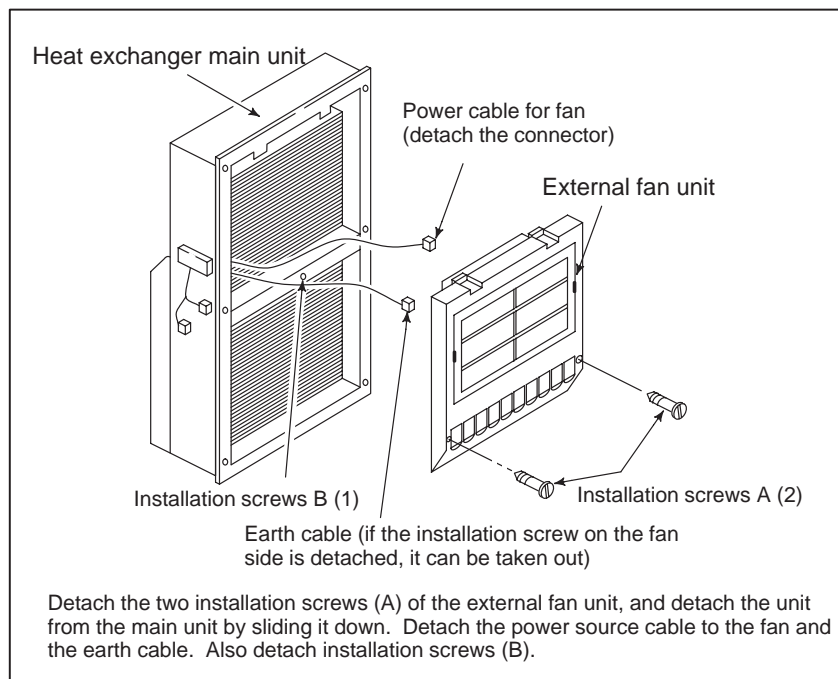


- 4 When dirt is conspicuous, press wash with a neutral detergent, rinse with fresh water, and the washing, allow to dry naturally. When replacing with the same product.
- 5 Insert the filter in the cover, align the flange in the groove, and install by pressing. Confirm that the cover will not come loose even if it is pulled.

Cleaning heat exchanger

Cleaning heat exchanger

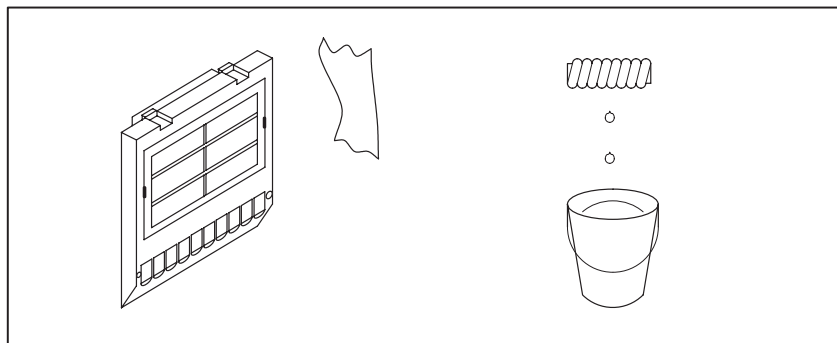
- 1 When cleaning, be sure to cut off the fan power source.
- 2 Take out the external fan unit from the heat exchanger main unit.



● Cleaning fan unit

Method of cleaning fan unit

- 1 Wipe the dirt, condensation, etc., which has accumulated on the fan motor and fan installation case with a dry cloth, etc. When the condensation, etc. has accumulated and the dirt is difficult to remove, soak a cloth in neutral detergent, lightly squeeze it and wipe away the dirt. However, take care not to allow the detergent to enter the electrical sections such as the internal rotor of the fan motor.



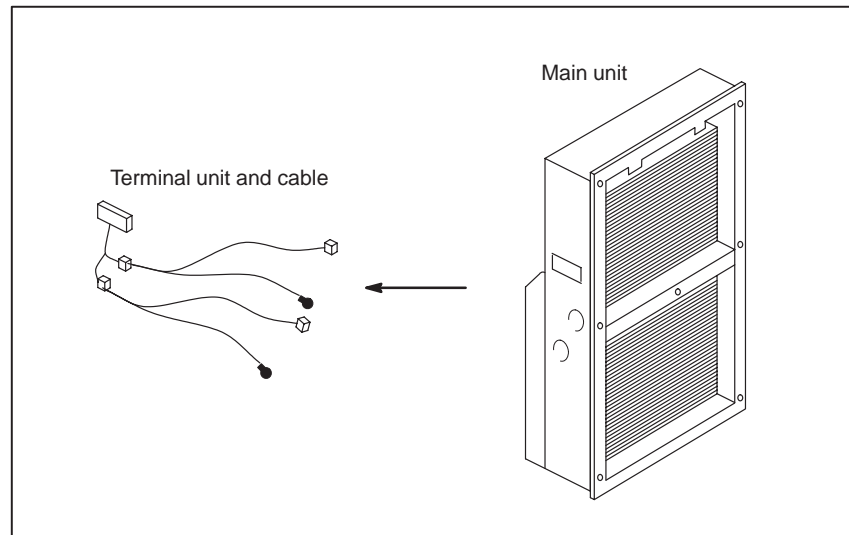
● Cleaning heat exchanger fan

Method of cleaning heat exchanger fan

- 1 Detach the heat exchanger from the unit and either blow off with air, wipe off with a dry cloth, or brush the accumulated dirt, condensation, etc.

When the dirt is especially severe

- 1 Detach the internal fan unit, the terminal unit, and the cable from the main unit.



- 2 Using a neutral detergent, remove the dirt from the main unit fan section by brushing. At this time, take care not to bend the fin of the element.
- 3 After cleaning, dry well.

● Installation

Method of installation after cleaning


After completing cleaning of the fan unit and heat transformer.

- 1 Install the terminal unit and cable in the original position.
- 2 Install the fan unit in the original position. At this time, do not forget to connect the fan power cable and the earth cable.

2.10

REPLACING THE FUSE

WARNING

Before replacing a blown fuse, it is necessary to remove the cause of the blown fuse. For this reason, only the personnel who have a working knowledge of maintenance and safety are allowed to carry out this work. When replacing a fuse with the cabinet open, be careful not to touch the high-voltage circuit section (marked  and shielded with a shock hazard prevention cover). If you touch the high-voltage circuit section when it is uncovered, you will get an electric shock.

2.10.1

The Power Mate Controller Fuse

This section describes the replacement of the Power Mate controller fuse. The controller contains a +24 V power input fuse, F1. If LED EN does not light when +24 V power is supplied, fuse F1 may have blown. In such a case, remove the fuse from its socket, then check its continuity using a multimeter (or visually check whether it has blown). If the fuse has blown, investigate the cause, take appropriate action, then replace the fuse. The capacity, part number, and location of the fuse are as follows:

Table 2.10.1 Capacity and part number of Power Mate controller fuse

Name	Capacity	Part number
F1	5.0A	A60L-0001-0046#5.0R or A60L-0001-0046#5.0

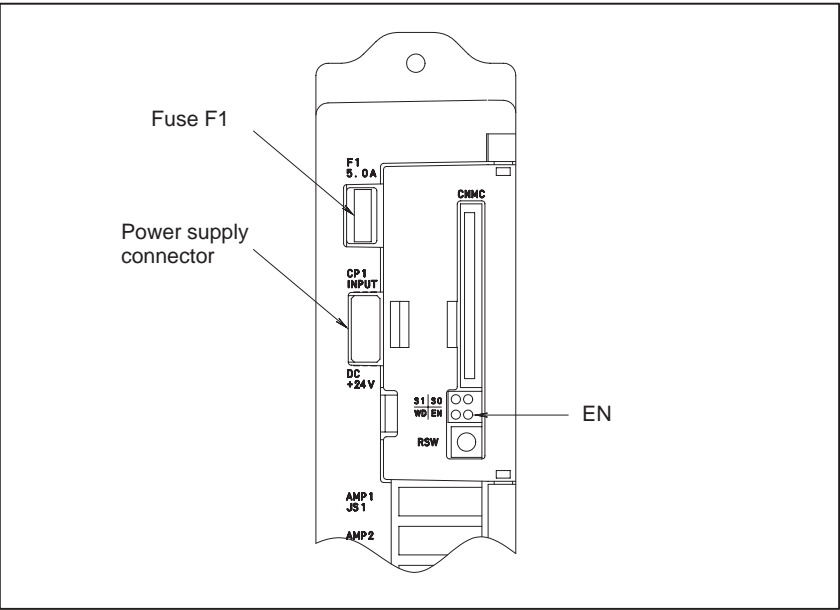


Fig.2.10.1 Location of Power Mate controller fuse

2.10.2
The CRT/MDI Control
PCB Fuse

This section describes the replacement of the CRT/MDI controller PCB fuse of the Power Mate. The table below lists the drawing number of the CRT/MDI control PCB. The CRT/MDI control PCB is mounted on the back of the CRT/MDI unit or separate MDI unit.

Table 2.10.2 (a) CRT/MDI control PCB drawing number

Name	Drawing number
CRT/MDI control PCB	A20B-2000-0840
	A20B-2100-0061
	A20B-2100-0060

The CRT/MDI control PCB contains a +24 V power input fuse, FU1. If nothing appears on the screen when +24 V power is supplied to the CRT/MDI control PCB, fuse FU1 may have blown. In such a case, remove the fuse from its socket, then check its continuity using a multimeter (or visually check whether it has blown). If the fuse has blown, investigate the cause, take appropriate action, then replace the fuse. The capacity, part number, and location of the fuse are as follows:

Table 2.10.2 (b) Capacity and part number of CRT/MDI control PCB fuse

Name	Capacity	Part number
FU1	3.2A	A60L-0001-0175#3.2A

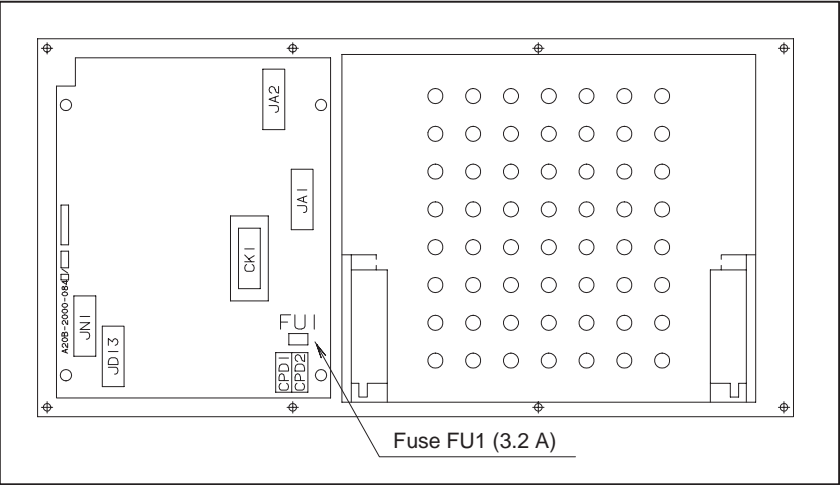


Fig.2.10.2 (a) Location of CRT/MDI fuse

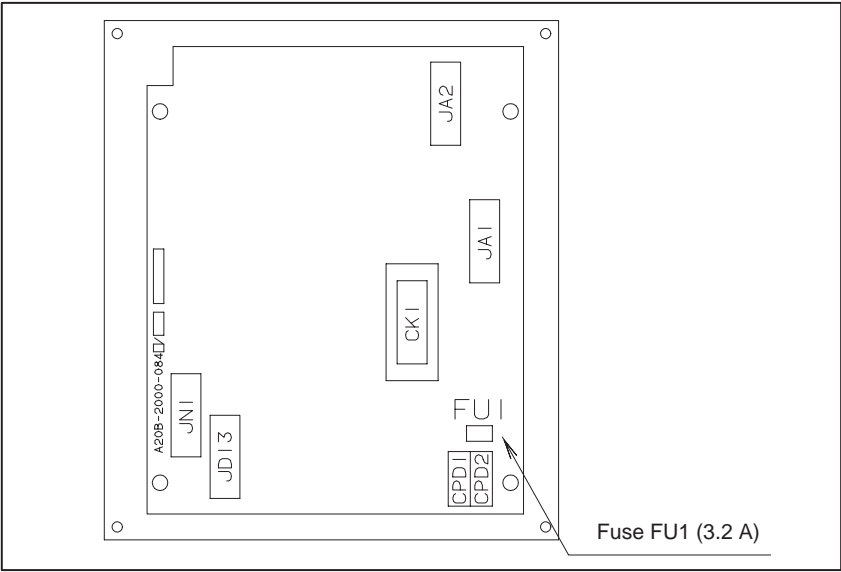


Fig.2.10.2 (b) Location of separate MDI unit fuse

2.10.3
The I/O Card Fuses

This section describes the replacement of the Power Mate external I/O card fuses. The table below lists the names and drawing numbers of the I/O cards.

Table 2.10.3 (a) I/O card drawing numbers

Name	Drawing number
I/O card D DI: 48 points, DO: 32 points	A16B-2202-0733
I/O card E DI: 96 points, DO: 64 points	A16B-2202-0732

The I/O card contains a +24 V power input fuse, FU1, and +5 V power output fuse, FU2. If +5 V is not output, fuse FU1 or FU2 may have blown. In such a case, remove the fuses from their sockets, then check their continuity using a multimeter (or visually check whether they have blown). If a fuse has blown, investigate the cause, take appropriate action, then replace the fuse. The capacity, part number, and location of the fuses are as follows:

Table 2.10.3 (b) Capacity and part number of I/O card fuses

Name	Capacity	Ordering specification
FU1	3.2A	A60L-0001-0175#3.2A
FU2	5.0A	A60L-0001-0290#LM50

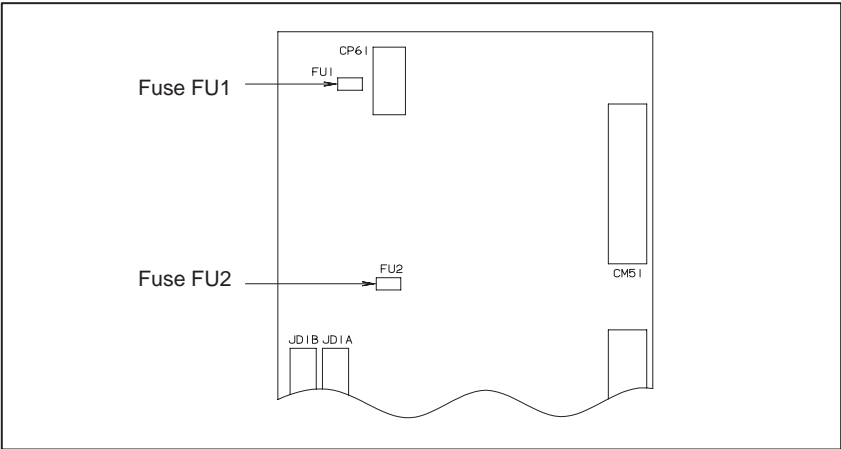


Fig.2.10.3 Location of I/O card fuses

2.10.4
The I/O Unit–MODEL A
Fuses

Each of the following modules contains a fuse. If the fuse has blown, eliminate the cause, then replace the fuse.

Module		Indication of blown fuse	Capacity	Part number
Interface module	AIF01A	PWR does not light.	3.2A	A60L-0001-0290#LM32
Interface module	AIF01B	PWR does not light.	3.2A	A60L-0001-0290#LM32
Output module (DC, 8 points)	OD08C	F lights.	5A	A60L-0001-0260#5R00
Output module (DC, 8 points)	OD08D	F lights.	5A	A60L-0001-0260#5R00
Output module (AC, 5 points)	AOA05E	F lights.	3.15A	A60L-0001-0276#3.15
Output module (AC, 8 points)	AOA08E	F lights.	3.15A	A60L-0001-0276#3.15
Output module (AC, 12 points)	AOA12F	F lights.	3.15A	A60L-0001-0276#3.15

The fuse is mounted on the internal PCB of each module. For details, refer to the I/O Unit–MODEL A Connection and Maintenance Manual.

2.10.5

Replacing the DPL/MDI Switcher Fuses

This section describes the replacement of the DPL/MDI switcher fuses of the Power Mate. The table below lists the drawing number of the DPL/MDI switcher.

Table 2.10.5 (a) Drawing number of DPL/MDI switcher

Name	Drawing number
DPL/MDI switcher	A16B-2600-0080

The DPL/MDI switcher contains a +24 V power input fuse, F2, and +5 V power output fuse, F1. If the +5 V pilot lamp (green LED) does not light when +24 V power is supplied to the DPL/MDI switcher, fuse F1 or F2 may have blown. In such a case, remove the fuses from their sockets, check their continuity using a multimeter (or visually check whether they have blown). If a fuse has blown, investigate the cause, take appropriate action, then replace the fuse. The capacity, part number, and location of the fuses are as follows:

Table 2.10.5 (b) Capacity and part number of the DPL/MDI switcher fuses

Name	Capacity	Ordering specification
F1	2.0A	A60L-0001-0175#2.0A
F2	2.0A	A60L-0001-0175#2.0A

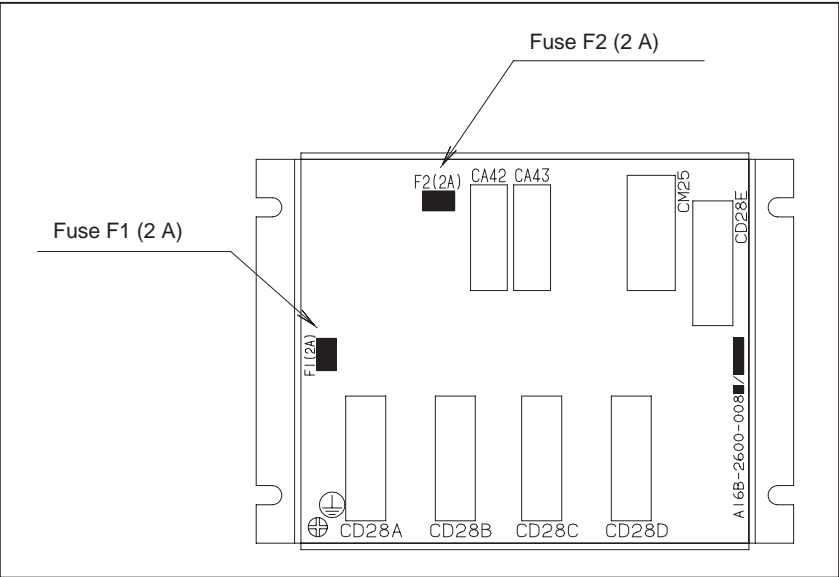



Fig.2.10.5 Location of DPL/MDI switcher fuses

2.10.6

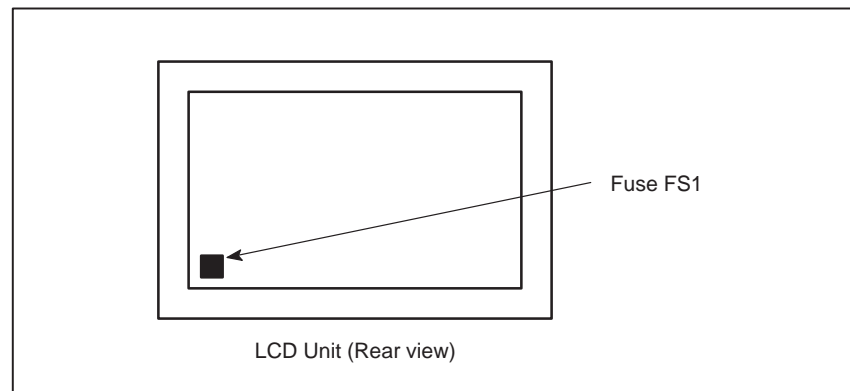
Replacing the LCD Fuse

This section describes the location and replacement of the LCD fuse.

WARNING

Before replacing a blown fuse, it is necessary to remove the cause of the blown fuse. For this reason, only the personnel who have a working knowledge of maintenance and safety are allowed to carry out this work. When replacing a fuse with the cabinet open, be careful not to touch the high-voltage circuit section (marked  and shielded with a shock hazard prevention cover). If you touch the high-voltage circuit section when it is uncovered, you will get an electric shock.

• Location of the LCD fuse



• Replacing the fuse

- (1) If the fuse blows, first find and eliminate the cause. Then, replace the fuse.
- (2) Pull the old fuse up.
- (3) Push a new fuse into the fuse holder.

• Ordering information

Ordering code : A02B-0200-K104*

Rating : 1.0 A

*In-house code: A60L-0001-0290#LM10

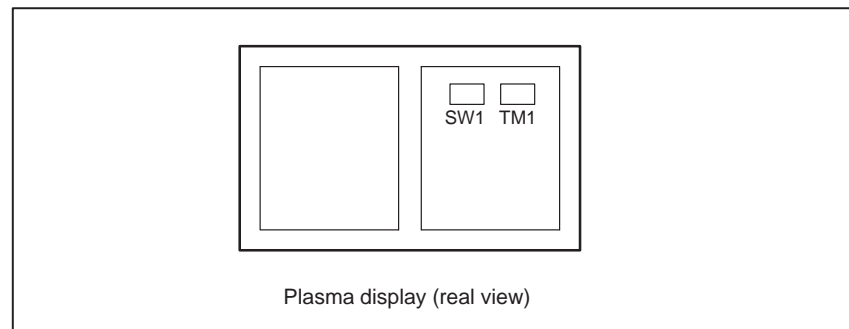
2.11 ADJUSTING THE PLASMA DISPLAY

2.11.1 Adjusting the Color Liquid Crystal Display and Plasma Display

Locations of switches and jumper pins

Fine adjustment of the video signal is supported to enable its use with plasma displays. This adjustment is necessary to compensate for errors resulting from the combination of NC devices and cables.

Adjustment of the video signal is necessary if you have replaced the display unit, cable, or a hardware component of the display circuit in the NC, either as part of regular field maintenance or the correct a failure.



Adjustment

Eliminating flicker

Switch TM1

If flicker occurs, change the TM1 setting to another setting.

Normally one of these settings will eliminate flicker.

Adjusting the horizontal position

Switch SW1

(1) The screen can be shifted horizontally in units of dots.

(2) Adjust the horizontal position such that the entire screen is visible. Only one setting can successfully realize this positioning.

CAUTION

1 Do not attempt to change any controls or settings other than those described above.

If any controls or settings other than those described above are changed, the appearance of the display will be abnormal.

2 The plasma display unit cannot be switched between the Power Mate and other NC units, because its cable length requires careful adjustment.

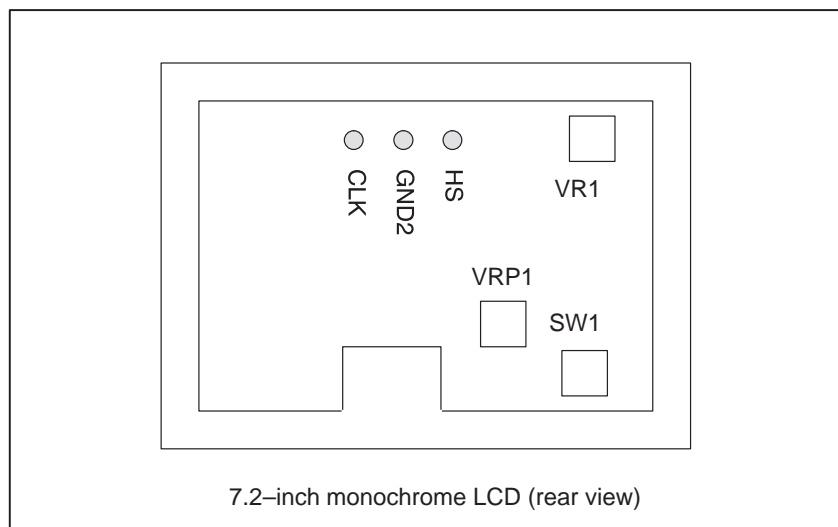
2.12

7.2-INCH MONOCHROME LCD ADJUSTMENT

The 7.2-inch monochrome LCD is provided with a contrast adjustment potentiometer and video signal adjustment switches.

The contrast is adjusted when the LCD adapter or panel is replaced. Otherwise, it should not be necessary to use the adjustment switches.

Adjustment points



Adjustment procedure

(1) Contrast adjustment

Potentiometer VRP1

This adjustment is made to compensate for variations between, individual LCD adapters and LCD panels. When an LCD adapter or panel is replaced, the following adjustment must be made. If the entire LCD unit is replaced, however, no adjustment is needed.

- First, adjust potentiometer VRP1 until the displayed characters (all black areas) appear white.
- Rotate the potentiometer in the opposite direction until the characters appear clear and black.

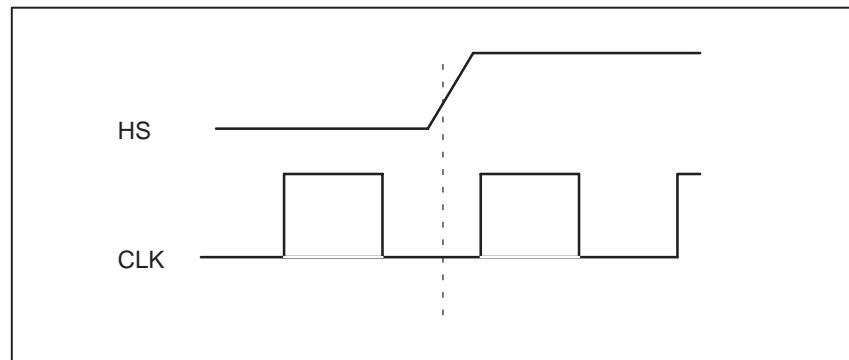
(2) Flicker adjustment

Potentiometer VR1

This potentiometer is factory-set and normally need not be adjusted by the user. If the setting is changed by mistake, re-adjust it according to the following procedure. Note that some versions of this printed-circuit board do not have this potentiometer; adjustment is performed automatically.

- Using the check pins, observe HS and CLK on an oscilloscope.
- Over part of the range of potentiometer VR1, the positive-going edge of HS will be almost in phase with the positive-going edge of the CLK. Rotating the potentiometer a little does not change the phase difference. Set the potentiometer to the midpoint of this range.

- (c) After completing the adjustment, confirm that the display does not flicker.



(3) Horizontal position adjustment

Switch SW1

This switch is factory-set and normally need not be adjusted by the user. If the setting is changed by mistake, re-adjust it according to the following procedure.

- (a) Switch SW1 is used to move the display horizontally in units of dots.
- (b) Set the switch to the point between 8 and B where the entire display is visible.
- (c) The default setting is 9.

2.13 REPLACING THE LCD BACKLIGHT

The LCD backlight must be replaced periodically. Replace the unit in which the LCD backlight is mounted.

The LCD backlight has a life of about 10,000 hours (54 hours guaranteed). (During its lifetime, the backlight should maintain a brightness exceeding 50% of that when new.)

Upon reaching the end of its service life, the LCD backlight unit must be replaced. The unit can be replaced either by the user or by a FANUC service engineer.

3

INPUT AND OUTPUT OF DATA



Data must be re-set if the base printed-circuit board is replaced or the memory module is replaced (or removed then mounted again).





This chapter describes the procedures to input and output the parameters, the part programs and the tool offset values.

3.1 SETTING PARAMETERS FOR INPUT/OUTPUT

3.2 INPUTTING/OUTPUTTING DATA

3.1 SETTING PARAMETERS FOR INPUT/OUTPUT



- Setting procedure of parameters (CRT/MDI)


1. Set to MDI mode or emergency stop state.
2. Press  key several times or press soft key [SETTING] to display **SETTING (HANDY)** screen.
3. Set the cursor to **PARAMETER WRITE** and, press  and  keys in this order. Here alarm 100 will be displayed.
4. Press  key several times to display the following screen.

PARAMETER (SETTING)						O1234N12345		
0000	SEQ					INI	ISO	TVC
	0	0	0	0	0	0	0	0
0001								
	0	0	0	0	0	0	0	0
0012								MIR
X	0	0	0	0	0	0	0	0
Y	0	0	0	0	0	0	0	0
Z	0	0	0	0	0	0	0	0
B	0	0	0	0	0	0	0	0
0020	I/O CHANNEL							




MDI *****

[F SRH][READ][][DELETE][]

To make the cursor display in bit unit,
press the cursor key  or .

5. Press soft key [(OPRT)] and the following operation menu is displayed.
 - 1) Soft key [NO. SRH] : Searched by number.
Examination Parameter number → [NO. SRH].
 - 2) Soft key [ON : 1] : Item with cursor position is set to 1 (bit parameter)
 - 3) Soft key [OFF : 0] : Item with cursor position is set to 0 (bit parameter)
 - 4) Soft key [+INPUT] : Input value is added to the value at cursor (word type)
 - 5) Soft key [INPUT] : Input value is replaced with the value at cursor (word type)
 - 6) Soft key [READ] : Parameters are input from reader/puncher interface.
 - 7) Soft key [PUNCH] : Parameters are output to reader/puncher interface.
6. After the parameters have been input, set PARAMETER WRITE on the SETTING screen to 0. Press  to release alarm 100.

7. Convenient method

- 1) To change parameters in bit unit, press cursor key  or , then the cursor becomes bit length and you can set parameters bit by bit (Bit parameter only).
- 2) To set data consecutively, use  key.

(Ex.1)

1234	EOB	4567	EOB	9999	INPUT
------	-----	------	-----	------	-------

```

  0
0 ⇒ 1234
0    4567
0    9999
0    0
  
```

(Ex.2)

1234	EOB	EOB	9999	INPUT
------	-----	-----	------	-------

```

  0
0 ⇒ 1234
0    0
0    9999
0    0
  
```

- 3) To set the same data use .

(Ex.)

1234	EOB	=	EOB	=	INPUT
------	-----	---	-----	---	-------

```

  0
0⇒ 1234
0  1234
0  1234
0  0
  
```

- 4) For bit parameters,

(Ex.)





1	1	EOB	=	EOB	=	INPUT
---	---	-----	---	-----	---	-------

```

00000000 00011000
00000000 ⇒ 00011000
00000000 00011000
00000000 00000000
  
```

8. After the required parameters are set, set **PARAMETER WRITE** to 0.

● **Setting parameters
procedare (DPL/MDI)**

1. Set MDI mode or emergency stop.
2. Press the  key to display the settings screen.
3. Use the cursor keys to position the cursor at PWE, then press the  key and the  key, in that order, to enable parameters to be written. The Power Mate will generate P/S alarm 100.
4. Press the  key several time to display the parameter screen.

> &0001	00000000
&0002	00000000

5. Move the cursor to the number of the parameter to change.



Method 1

Use the cursor keys. The cursor will continue to move while a cursor key is being pressed.

Method 2

Press the following keys and enter data in the order shown :

 [(parameter No.)] 

6. Enter a parameter value with the data input keys.
7. Press the  key. The parameter value is input and displayed.
8. After all parameters have been set and confirmed, return to the settings screen and set PWE to 0.
9. Normally, in order to release the alarm state, press the  key.
However, in order to release alarm No. 000, the power needs to be turned off and then on again.

3.2 INPUTTING/ OUTPUTTING DATA

Power Mate memorized the following data.

Outputting the newest data I/O device while the CNC is running normally

- (1) CNC parameter
- (2) PMC parameter
- (3) Custom macro variable values
- (4) Tool compensation amount (offset data)
- (5) Part program
- (6) Ladder program

3.2.1 Confirming the Parameters Required for Data input/Output

Be sure that data output cannot be done in an alarm status.

Parameters required for output are as follows :

(To change parameters, set MDI mode or emergency stop status)

Address	#7	#6	#5	#4	#3	#2	#1	#0
0000							ISO	

- #1 (ISO)** 0 : Output with EIA code
1 : Output with ISO code (FANUC cassette)

Address	
0020	Selection of I/O channel

- 0 : Channel 1 (Connector JD5)
1 : Channel 1 (Connector JD5)

- 1) I/O channel=0

Both I/O CHANNEL = 0 and I/O CHANNEL = 1 indicate channel 1. Separate parameters are, however, provided for each I/O CHANNEL, for setting the baud rate, stop bit, etc.

Address	#7	#6	#5	#4	#3	#2	#1	#0
0101	NFD				ASI			SB2

- #7 (NFD)** 0 : Feed is output when data is output.
1 : Feed is not output when data is output.
#3 (ASI)☆0 : EIA or ISO code is used for input data.
1 : ASCII code is used.
#0 (SB2) 0 : No. of stop bits is 1.
☆1 : No. of stop bits is 2.

☆ : Standard setting

Address	
0102	Specification number of input/output device

0	RS-232-C (for other than the following)
1	Not used
2	FANUC Floppy cassette adapter F1
3	PROGRAM FILE Mate. FANUC Handy File ,FANUC Floppy cassette adapter, FSP-H
4	Not used
5	Not used
6	FSP-G, FSP-H

Address	Baud Rate		
0103			
	7: 600	9: 2400	11:9600
	8: 1200	☆10: 4800	12:19200 [BPS]

2) I/O channel=1



Set parameters to 0111, 0112, 0113.

Setting contents are same as 0101, 0102, 0103.



3.2.2

Outputting Parameters

● Procedure (CRT/MDI)

1. Select **EDIT** mode.
2. Press  key and soft key [**PARAM**] to display parameter screen.
3. Press soft key [(**OPRT**)] ,and soft key .
4. Press soft key [**PUNCH**] and [**EXEC**],and the parameters are started to be output.

● Procedure (DPL/MDI)

1. Select **EDIT** mode.
2. Select the parameter display screen by  key.
3. Press the  key.
4. Execute file heading when required.
For which file the parameter is output to refer to Explanations (Output to a floppy).
5. While parameter, is being output, the display appears as below.

>&0001	0000 0000
	WRITE

6. In order to stop output of data from a tape before it has finished, turn on external reset signal ERS (bit 7 of G008).
Once data output from a tape has been stopped, it cannot be restarted.

Explanations (Output to a floppy)

● File output location

When output is conducted to the floppy, the program is output as the new file after the files existing in the floppy. New files are to be written from the beginning with making the old files invalid, use the above output operation after the N0 head searching.

● An alarm while a program is output

When P/S alarm (No.086) occurs during program output, the floppy is restored to the condition before the output.

● Outputting a program after file heading

When program output is conducted after N1 to N9999 head searching, the new file is output as the designated n-th position. In this case, 1 to n-1 files are effective, but the files after the old n-th one are deleted. If an alarm occurs during output, only the 1 to n-1 files are restored.

● Efficient use of memory

To efficiently use the memory in the cassette or card, output the program by setting parameter NFD (No.0101#7 or, No.0111#7) to 1. This parameter makes the feed is not output, utilizing the memory efficiently.











- **On the memo record**

Head searching with a file No. is necessary when a file output from the CNC to the floppy is again input to the CNC memory or compared with the content of the CNC memory. Therefore, immediately after a file is output from the CNC to the floppy, record the file No. on the memo.









3.2.3

Outputting PMC Parameters

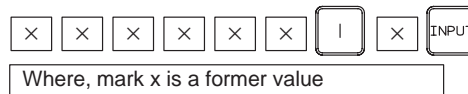
- **Procedure (CRT/MDI)**

1. Select **EDIT** mode.
2. Press  key then soft key [**SETTING**] to select a setting screen.
3. Set the cursor to **PARAMETER WRITE** and input  and .
At this time, alarm 100 will be generated.
4. Press  key and soft key [**PMC**].
5. Press soft key [**PMCPRM**] and soft key [**KEEPRL**]
6. Set the cursor to K17 and set the first bit to 1.

Where, mark x is a former value
Thus, data input/output screen has been selected.
7. Press soft key  then key .
8. Press soft key [**I/O**] and set the parameters on I/O.
Item selection cursor moves to the following item after data of an item is set.
9. In CHANNEL NO item, input   to select I/O channel 1.
10. In DEVICE item, press soft key [**FDCAS**] to select the floppy cassette.
It is also [**FDCAS**] for Handy File.
11. In KIND DATA item, press soft key [**PARAM**].
12. In FUNCTION item, press soft key [**WRITE**].
13. Press soft key [**EXEC**]. Then PMC parameters are started to be output.
14. After the PMC parameters have been output, set PARAMETER WRITE to 0.
15. Press  to release alarm 100.

- **Procedure (DPL/MDI)**

1. Select **EDIT** mode.
2. Press  key several time then select a setting screen.
3. Set the cursor to PWE and input  and . At this time, alarm 100 will be generated.
4. Press  key several time to select diagnosis screen.
5. Press    and  key.

6. Set the first bit to 1.




7. Display the PMC parameter press key then set file number.
8. Press . Then PMC parameters are started to be output.
9. After the PMC parameters have been output, set PWE to 0.
10. Reset Power Mate to release alarm 100.

3.2.4 Outputting Custom Macro Variable Values

● Procedure (CRT/MDI)

1. Select **EDIT** mode.
2. Press key.
3. Press key and soft key **[MACRO]** to select custom macro variable screen.
4. Press soft key **[(OPRT)]** and then key .
5. Press soft key **[PUNCH]** and **[EXEC]**, then custom macro variable values are output.

● Procedure (DPL/MDI)



1. Select **EDIT** mode.
2. Select the tool offset data display screen by pressing key.
3. Press the key.
4. While common variable is being output, the display appears as below.

5. In order to stop output of data from a tape before it has finished, turn on external reset signal ERS (bit 7 of G008).
Once data output from a tape has been stopped, it cannot be restarted.

3.2.5 Outputting Tool Compensation Amount

● Procedure (CRT/MDI)

1. Select **EDIT** mode.
2. Press key and soft key **[OFFSET]** to display the tool compensation amount screen.
3. Press **[(OPRT)]** key and soft key .
4. Press soft key **[PUNCH]** and **[EXEC]** key, and the tool compensation amount is started to be output.

● Procedure (DPL/MDI)

1. Select **EDIT** mode.
2. Select the offset data display screen by pressing  key.
3. Press the  key.
4. While offset, is being output, the display appears as below.

>H001=	0.000
	WRITE

5. In order to stop output of data from a tape before it has finished, turn on external reset signal ERS (bit 7 of G008).
Once data output from a tape has been stopped, it cannot be restarted.

3.2.6 Outputting Part Program

● Procedure (CRT/MDI)

1. Confirm the following parameters. If 1 is set, set to the EDIT mode and set it to 0.









Address	#7	#6	#5	#4	#3	#2	#1	#0
3202				NE9				NE8

#4(NE9)☆0 : Programs of 9000s are edited.

1 : Programs of 9000s can be protected.








#0(NE8)☆0 : Programs of 8000s are edited.

1 : Programs of 8000s can be protected.

2. Select EDIT mode.
3. Press  key and press soft key [**PRGRM**] to display program text.
4. Press [(**OPRT**)] key and press soft key .
5. Input a program number to be output. To output all programs input as:
     
6. Press [**PUNCH**] and [**EXEC**] key, then program output is started.






● Procedure (DPL/MDI)

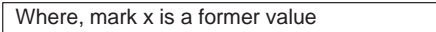
A program registered in memory can be punched using the procedure below.






1. Confirm parameter as like above 1.
2. Select **EDIT** mode.
3. Press  to display the program screen.
4. Key in address O.
5. Key in a desired program number.
Entering      causes all programs in memory to be output.
6. The number of input program is punched with pushing .

3.2.7 Outputting Ladder Programs




● Procedure (CRT/MDI)

1. Select **EDIT** mode.
2. Press  key then soft key [**SETTING**] to select a setting screen.
3. Set the cursor to **PARAMETER WRITE** and input  and .
At this time, alarm 100 will be generated.
4. Press  key and soft key [**PMC**].
5. Press soft key [**PMCPRM**] and soft key [**KEEPRL**]
6. Set the cursor to K17 and set the first bit to 1.




 Thus, data input/output screen has been selected.
7. Press soft key  then key .
8. Press soft key [**I/O**] and set the parameters on I/O.
Item selection cursor moves to the following item after data of an item is set.
9. In CHANNEL NO item, input   to select I/O channel 1.
10. In DEVICE item, press soft key [**FDCAS**] to select the floppy cassette.
It is also [**FDCAS**] for Handy File.
11. In KIND DATA item, press soft key [**PARAM**].
12. In FUNCTION item, press soft key [**WRITE**].
13. Press soft key [**EXEC**]. Then ladder programs are started to be output.
14. After the ladder programs have been output, set PARAMETER WRITE to 0.
15. Press  to release alarm 100.

● Procedure (DPL/MDI)

1. Select **EDIT** mode.
2. Press  key several time to select diagnosis screen.
3. Press  key in the diagnosis screen then set file number.
4. Press , then ladder programs are started to be output.

3.2.8

Inputting CNC Parameters

CAUTION

For a system using an absolute pulse coder, zero point setting is required once all parameters have been input.

● Procedure (CRT/MDI)

1. Set to the emergency stop state.
2. Confirm that the parameters required to input data is correct.
 - 1) Press OFFSET/SETTING key several times, and press [SETTING] to display SETTING screen.
 - 2) Parameters can be rewritten when PARAMETER WRITE ENABLE is 1.
 - 3) Press SYSTEM key to select the parameter screen.

4)

Address

0020	Selection of I/O channel
------	--------------------------

☆0 : Channel 1 (Connector JD5)

1 : Channel 1 (Connector JD5)

I/O channel=0 Set parameters 0101, 0102, 0103

I/O channel=1 Set parameters 0111, 0112, 0113.

5)

Address

	#7	#6	#5	#4	#3	#2	#1	#0
0101	NFD				ASI			SB2

#7(NFD) 0: Feed is output when punching out.

1 : Feed is not output when punching out.

#3(ASI) 0 : EIA or ISO code is used.

1 : ASCII code is used.

#0(SB2) 0 : No. of stop bits is 1.

☆ 1 : No. of stop bits is 2.

6)

Address

0102	Specification number of I/O device
------	------------------------------------

0	RS-232-C (for other than the following)
1	Not used
2	FANUC Floppy cassette F1
3	PROGRAM FILE Mate, Handy File FANUC Floppy cassette adapter, FSP-H
4	Not used
5	Not used
6	FANUC FSP-G, FSP-H

7)

Address

0103	Baud rate
------	-----------


7: 600 9: 2400 11: 9600

8: 1200 ☆10: 4800 12: 19200 [BPS]

3. Press soft key [(OPRT)] and soft key 

















4. Press soft key **[READ]** and **[EXEC]**. Then input of parameters are started.
5. After the parameters have been input, turn off the power once then turn it on because P/S alarm 000 is occurred.
6. For a system using an absolute pulse coder, alarm 300 is issued. Perform zero point setting.

● **Procedure (DPL/MDI)**





1. Press the EMERGENCY STOP button on the machine side.
2. The parameter screen is selected by pressing the  key.
3. Set PWE on the setting screen to 1. Alarm PS100 is displayed at this time.
4. Perform the same operation as for program input.
5. NC parameters are input to the memory by this operation. Normally, alarm PS000 will activate after completion of parameter reading. Normally, P/S alarm 000 is generated after parameters have finished being read in.
6. Set PWE on the setting parameter to 0.
7. Turn on the Power Mate power again.
8. For a system using an absolute pulse coder, alarm 300 is issued. Perform zero point setting.

3.2.9 Inputting PMC Parameters

● Procedure (CRT/MDI)

1. Set the emergency stop state.
2. Press  key and soft key [SETTING] to select the SETTING screen.
3. Confirm that PARAMETER WRITE=1.
4. Press  key and soft key [PMC].
5. Press soft key [PMCPRM] and soft key [KEEPRL].
6. Set the cursor to K17 and set bit 1 to 1.
         .
 means the setting value which is before input.
7. Press  key and  key.
8. Press soft key [I/O] and set the parameters required for I/O.
Item selection cursor displays the next item after an item is set.
9. In CHANNEL item, press   to select channel 1.
10. In DEVICE item, press [FDCAS] key to select the floppy cassette.
11. In FUNCTION item, press soft key [READ] to input data
12. Press soft key [EXEC] and the PMC parameters are started to be input.
13. After data has been read, turn off power and turn it on.









● Procedure (DPL/MDI)

1. Set the emergency stop state.
2. Press  key several times and soft key to select the SETTING screen.
3. Confirm that DWE=1.
4. Press  key several times and set diagnosis screen (@).
5. Press  then set the file number.
6. Press  and the PMC parameters are started to be input.
7. After data has been read, turn off power and turn it on.

3.2.10

Inputting Custom Macro Variable Values

• Procedure (CRT/MDI)

1. Confirm that EDIT mode is selected.
2. Turn off the program protect key (KEY2=1).
3. Press  key then soft key [**PRGRM**] to display program contents.
4. Press soft key [(**OPRT**)] and key .
5. Press address , a program number (0001 for example), soft key [**READ**] and [**EXEC**] key, then custom macro variable values are started to be input.
Input a program number that is not used.
6. Select AUTO mode on the machine operator's panel and press cycle start button.
When the program is executed, macro variables are set.
7. Press  key,  key and soft key [**MACRO**] to select the custom macro variable screen.
8. Press 500 and soft key [**NO SRH**] to display variable number 500 and confirm the custom macro variables are set correctly.
Of the data displayed, 0 and vacant differ in meaning.
Vacant is an undefined variable. To set vacant, press soft key [**INPUT**].
9. Select EDIT mode again.
10. Press  key to select the program display screen.
11. Press address  and a program number (0001 for example), then press  to delete the program.




• Procedure (DPL/MDI)

1. Select **EDIT** mode.
2. Perform the same operation as for program input and read in the custom macro statements like a program.
3. After reading is finished, select AUTO mode. By executing the program that was read in, the values of the common variables will be stored in memory.


3.2.11

Inputting Tool Compensation Amount

- **Procedure (CRT/MDI)**

1. Select the EDIT mode.
2. Turn off the program protect (KEY=1).
3. Press  key, and press soft key [PRGRM] to display the program contents screen.
4. Press  key, and soft key [OFFSET] to display the tool compensation amount screen.
5. Press soft key [(OPRT)] and  key.
6. Press [READ] key and [EXEC] key and data input is started.

- **Procedure (DPL/MDI)**

1. Select the **EDIT** mode.
2. Display the data display screen by pressing  key.
3. Perform the same operation as for program input.
4. The input offset data will be displayed on the screen after completion of input operation.

3.2.12 Inputting Part Programs

Confirm the following parameters. If 1 is set, set it to 0.
(Change it in Emergency stop or MDI mode).

Address	#7	#6	#5	#4	#3	#2	#1	#0
3201		NPE					RAL	

#6 (NPE) When programs are registered in part program storage area, M02,M30 and M99 are:

0 : regarded as the end of program.

☆ 1 : not regarded as the end of program.

#1 (RAL) When programs are registered:

☆ 0 : All programs are registered.

1 : Only one program is registered.

Address	#7	#6	#5	#4	#3	#2	#1	#0
3202				NE9				NE8




#4 (NE9)☆0 : Programs of 9000s can be edited.

1 : Programs of 9000s are protected.




#0 (NE8)☆0 : Programs of 8000s can be edited.

1 : Programs of 8000s are protected.

● Procedure (CRT/MDI)

1. Confirm that mode is **EDIT** mode.
2. Turn off the program protect (KEY3=1).
3. Press  key and press soft key **[PRGRM]** to select a part program file.
4. Press soft  key ,**[(OPRT)]** and  key.
5. Press soft key **[READ]** and **[EXEC]**, then data input is started.

















● Procedure (DPL/MDI)

1. Select EDIT mode.
2. Press  to display the program screen.
3. When the controller tape does not have a program number or a program number is to be changed, enter a desired program number. (When the controller tape has a program number and a program number is not changed, this operation is not necessary.)
 - i) Key in address .
 - ii) Key in a desired program number.
4. Press the  key.





3.2.13

Inputting PMC Ladder

● Procedure (CRT/MDI)

1. Set the emergency stop state.
2. Press  key and soft key **[SETTING]** to select the SETTING screen.
3. Confirm that PARAMETER WRITE=1.
4. Press  key and soft key **[PMC]**.
5. Press soft key **[PMCPRM]** and soft key **[KEEPRL]**.
6. Set the cursor to K17 and set bit 1 to 1.
         .
 means the setting value which is before input.
7. Press  key and  key.
8. Press soft key **[I/O]** and set the parameters required for I/O.
Item selection cursor displays the next item after an item is set.
9. In CHANNEL item, press   to select channel 1.
10. In DEVICE item, press **[FDCAS]** key to select the floppy cassette.
11. In FUNCTION item, press soft key **[READ]** to input data. In DATA KIND item, not set the data.
12. Press soft key **[EXEC]** and the PMC ladder are started to be input.
13. Store the input ladder into flash EEPROM. (On the screen displayed by pressing the **[PMC]** key, then the **[I/O]** key, set FROM for DEVICE and press the **[WRITE]** key, in the same way as in steps 8 to 11.)
14. Turn off power and turn it on.

● Procedure (DPL/MDI)

1. Set the emergency stop state.
2. Press  key several times and soft key to select the SETTING screen.
3. Confirm that PWE=1.
4. Press  key several times and set diagnosis screen (@).
5. Press  then set the file number.
6. Press  and the PMC ladder are started to be input.
7. Store the ladder into flash EEPROM. For an explanation of how to store data into flash EEPROM, refer to Subsection 4.4.7.
8. Turn off power and turn it on.

4

INTERFACE BETWEEN NC AND PMC

This chapter describes the signals between the machine operator's panel, magnetics cabinet and the PMC, connection of the signals between PMC and Power Mate, and confirmation method of on/off state of these signals. The chapter also describes how to display the PMC system configuration, parameters, and ladders on the CRT or DPL.

It also describes a method of inputting/outputting PMC parameters to an external device.

4.1 GENERAL OF INTERFACE

4.2 SPECIFICATION OF PMC

4.3 OPERATION ON THE CRT/MDI

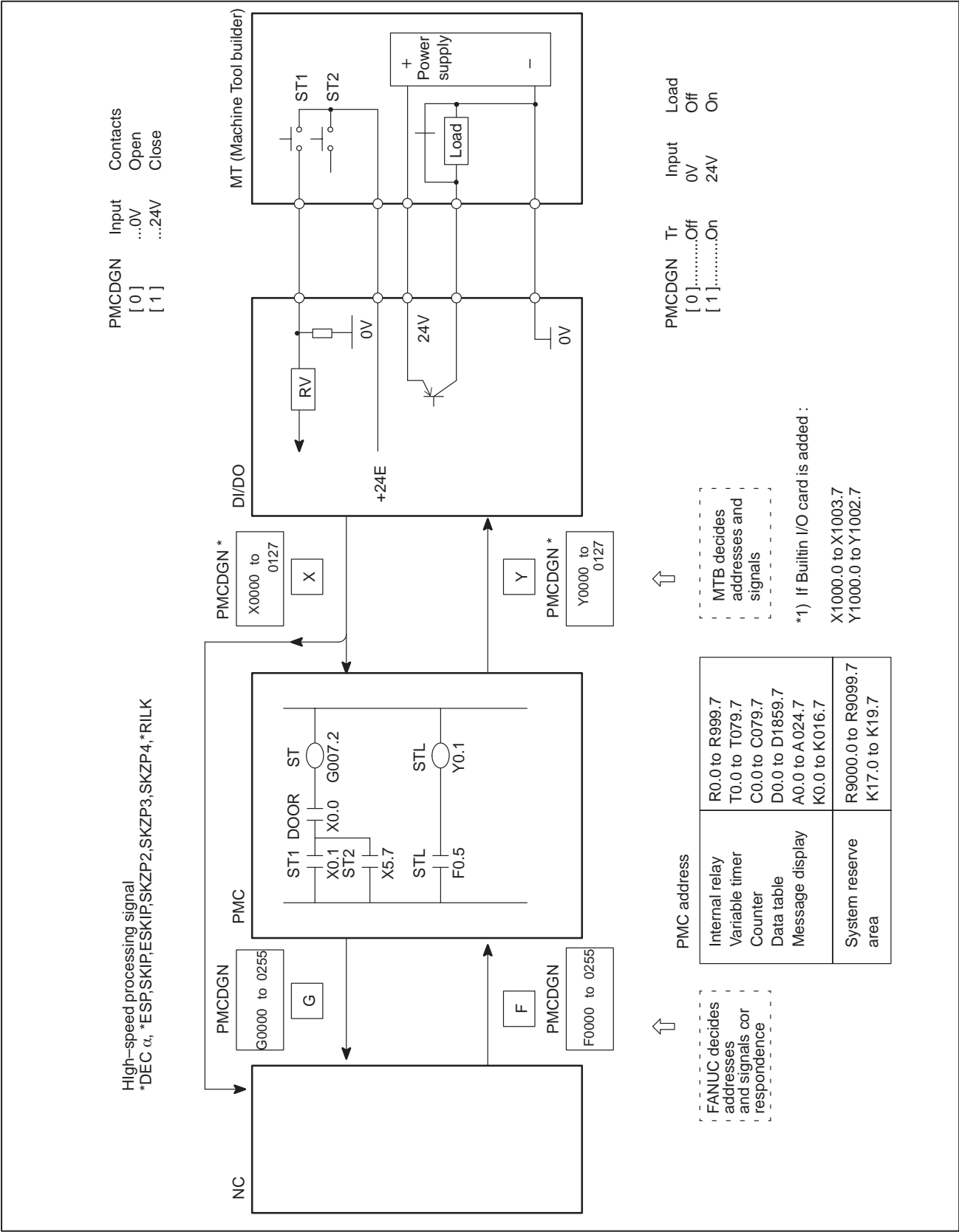
4.4 OPERATION ON THE DPL/MDI

4.5 LIST OF SIGNALS BY EACH MODE

4.6 ADDRESS LIST

4.7 SIGNAL AND SYMBOL CORRESPONDENCE TABLE

4.1
GENERAL OF
INTERFACE



4.2 SPECIFICATION OF PMC

4.2.1 Specification

Model	PMC-RA3
Programming method language	Ladder
Number of ladder level	2
Level-1 Cycle Time	8 ms
Basic Instruction Execution Time	0.15 (μ s/step)
Program capacity	
• Ladder (step)	Approx. 5,000 (Basic) Approx. 12,000 (Option)
• Symbol/comment (Note)	1 to 128KB
• Message	0.1 to 64KB
• Language only	
Instruction (Basic) (Function)	14 kinds 64 kinds
Internal relay (R)	1118 byte
Message request (A)	25 byte
Non-volatile	
• Var. Timer (T)	80 byte
• Counter (C)	80 byte
• Keep relay (K)	20 byte
• Data table (D)	1860 byte
Fixed timer	Timer No. 100 devices specified
Input/output	
• I/O Link (I) (master) (O)	1024 points max. 1024 points max.
• I/O Link (I) (slave) (O)	256 points max. 256 points max.
• Built-in I/O card (I) (O)	32 point max. 24 point max.
Sequence program storage media	Flash memory

NOTE

- 1 To enable use of the PMC, the PMC module must be installed.
- 2 Normal size of a symbol, a comment, and a message are 1KB, and 0.1KB, respectively. Max. size of a symbol and a comment are each 64KB.

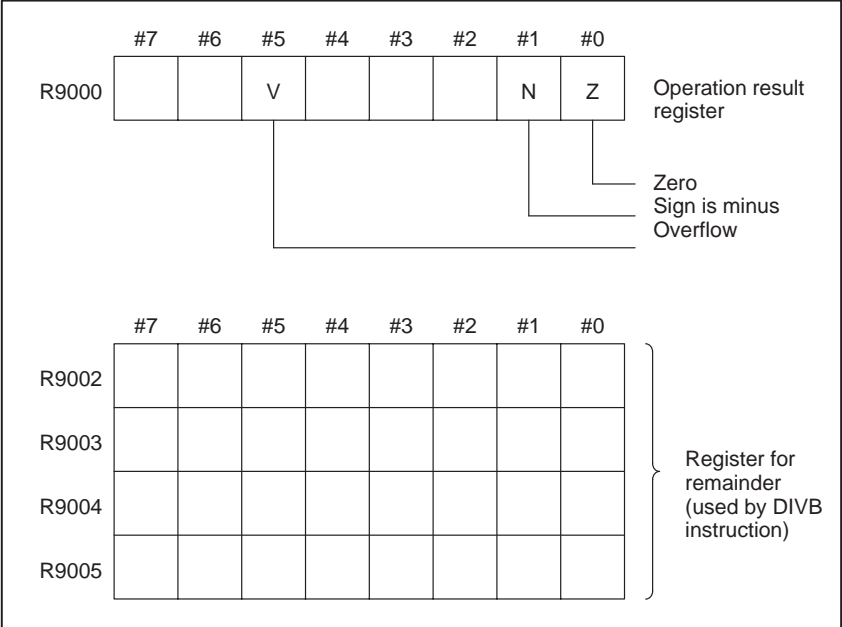
4.2.2 Address

	Type	Byte	Address	Explanation
G	PMC⇒CNC	256	G000.0 to G255.7	
F	CNC⇒PMC	256	F000.0 to F255.7	
Y	PMC⇒MT	168	Y000.0 to Y127.7	FANUC I/O Link (master)
			Y1000.0 to Y1002.7	Built-in I/O card
			Y1020.0 to Y1051.7	FANUC I/O Link (slave)
X	MT⇒PMC	167	X000.0 to X127.7	FANUC I/O Link (master)
			X1000.0 to X1003.7	Built-in I/O card
			X1020.0 to X1051.7	FANUC I/O Link (slave)
A	Massege display	25	A000.0 to A024.7	
R	Internal relay	1100	R000.0 to R999.7	
			R9000.0 to R9117.7	Operation result, system reserve area
T	Variable timer	80	T000.0 to T079.7	
K	Keep relay	20	K000.0 to K016.7	
			K017.0 to K019.7	System reserve area
C	Counter	80	C000.0 to C079.7	
D	Data table	1860	D0000.0 to D1859.7	

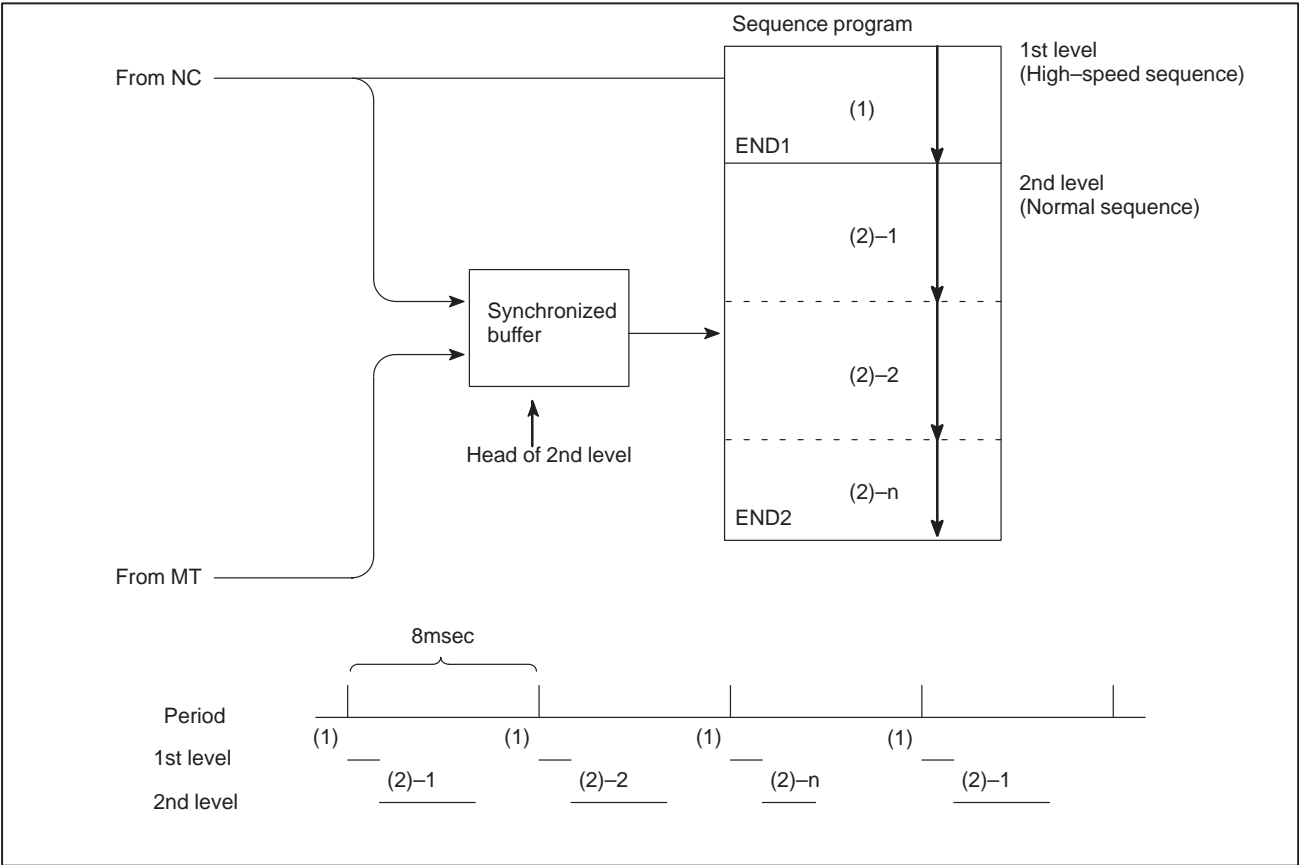
4.2.3 Built-in Debug Function

Function	Contents
Display of sequence program	Dynamic display of ladder diagram * This function is not provided by the handy operator's panel or DPL/MDI.
Diagnostic function	<ul style="list-style-type: none"> Title data display Signal status (symbol can be displayed) PMC alarm display
Setting and displaying data	<ul style="list-style-type: none"> Timer Counter Keep relay Data table
Sequence program edit function	Ladder diagram editing (A ladder edit module for memory card is required) * Ladder charts are edited using mnemonics on the DPL/MDI. * Ladder chart editing and mnemonic editing are not supported by the handy operator's panel.

4.2.4
System Reserve Area
of Internal Relay



4.2.5
Execution Period of
PMC



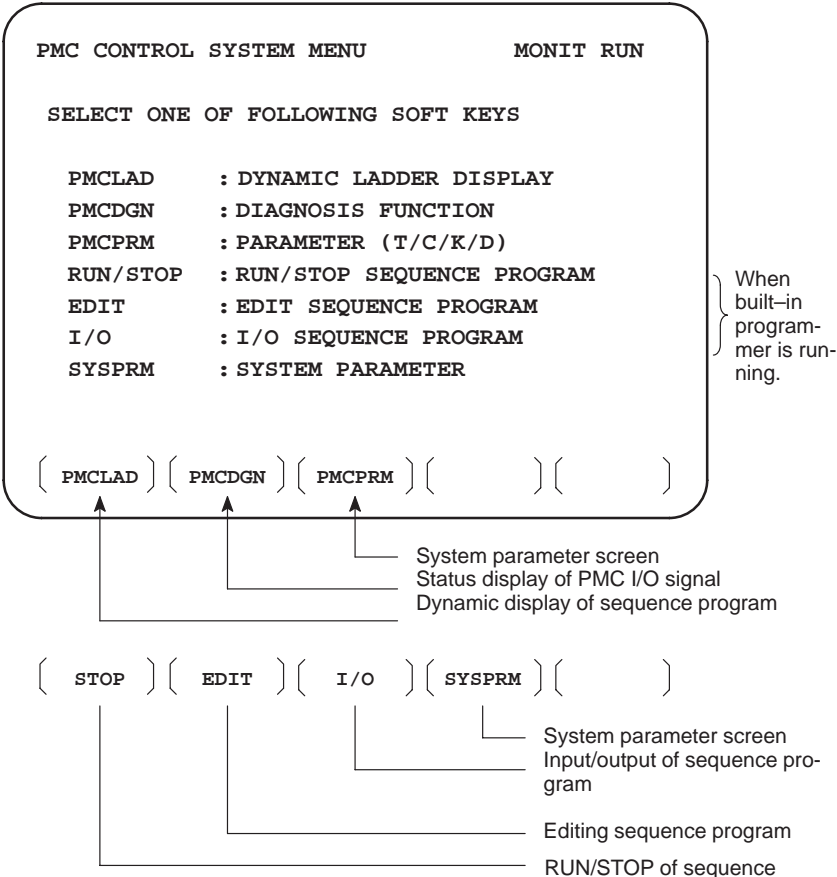
4.3

OPERATION ON THE CRT/MDI

4.3.1

Display Method

1. Press SYSTEM .
2. Press soft key **[PMC]**, then PMC screen is displayed and the following soft keys are displayed:



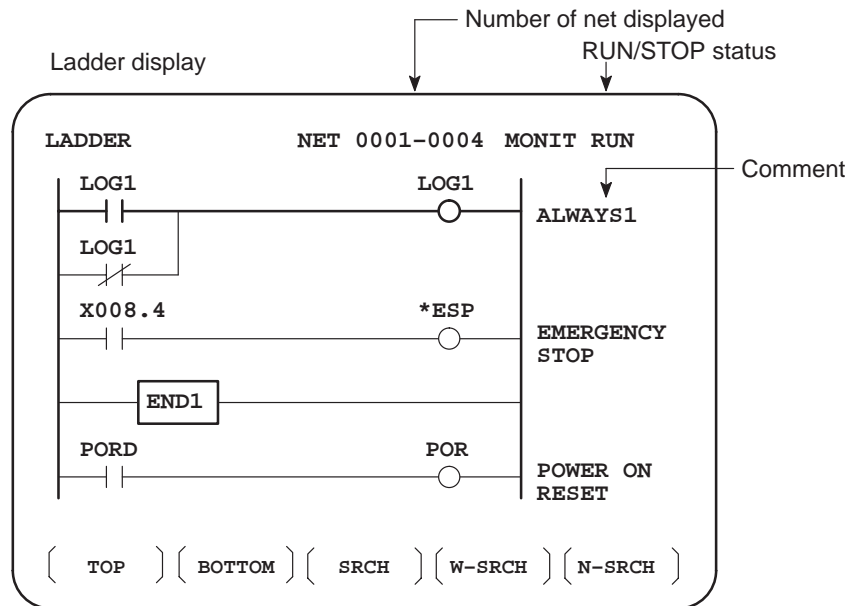
The no. of menus to be displayed changes depending on presence/absence of built-in programmer.

	PMC-PA3 (Without memory card for editing)	PMC-PA3 (With memory card for editing)
RUN/STOP	○	○
EDIT	×	○
I/O	○	○
SYSPRM	×	○

× : Cannot be displayed nor used.

4.3.2 PMCLAD SCREEN

Press soft key **[PMCLAD]**, and a sequence program is displayed dynamically and operation monitoring can be confirmed :



Other soft keys

(F-SRCH) () () (ADDRESS)
 ↓ ↑
 (SYMBOL) Switched each time pressed

- **Contents displayed**

- **Search method**

1. Low brightness display Contacts : open Relay : off
2. High brightness display Contacts : closed Relay : on
1. Use the cursor keys or page keys to change display positions.
2. **[TOP]**:Searches top of ladder.
3. **[BOTTOM]**:Search bottom of ladder.
4. Address.bit,**[SRCH]** or Signal name, **[SRCH]**
5. Address.bit,**[W-SRCH]** or Signal name ,**[W-SRCH]**
6. Net no.**[N-SRCH]**:Ladder is displayed from the specified net.
7. Functional instruction no. **[F-SRCH]** or Functional instruction name**[F-SRCH]**
8. **[ADDRESS]**:Signal is displayed by address and bit no.
9. **[SYMBOL]**:Signal is displayed by signal name (symbol).
(If symbol is not registered at program preparation time, the address of the signal is displayed).

[Remarks]

- The search function searches a signal in the forward direction and displays the ladder with the searched signal at its head. Because there may exist plural contacts, repeat the search operation to find plural locations, repeat the search operation to find plural locations with the specified signal.
- If a specified signal is not found up to the end of the program (ladder), execution returns to the head of a program and search continues.

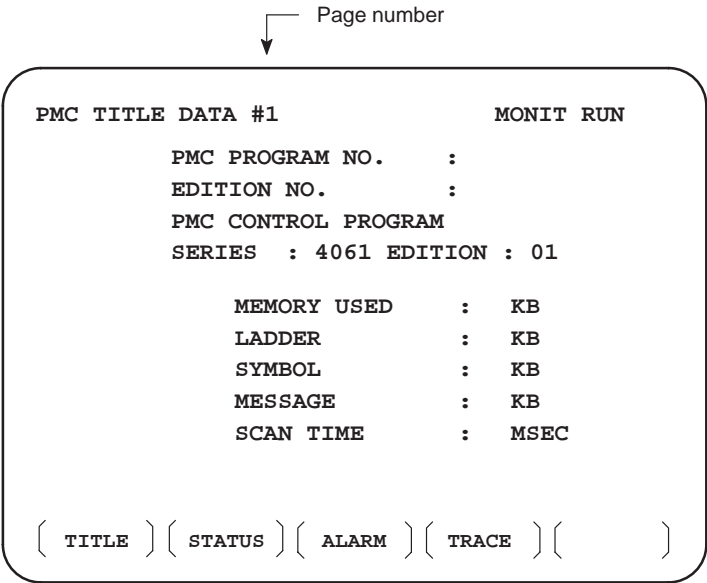
4.3.3

PMCDGN SCREEN

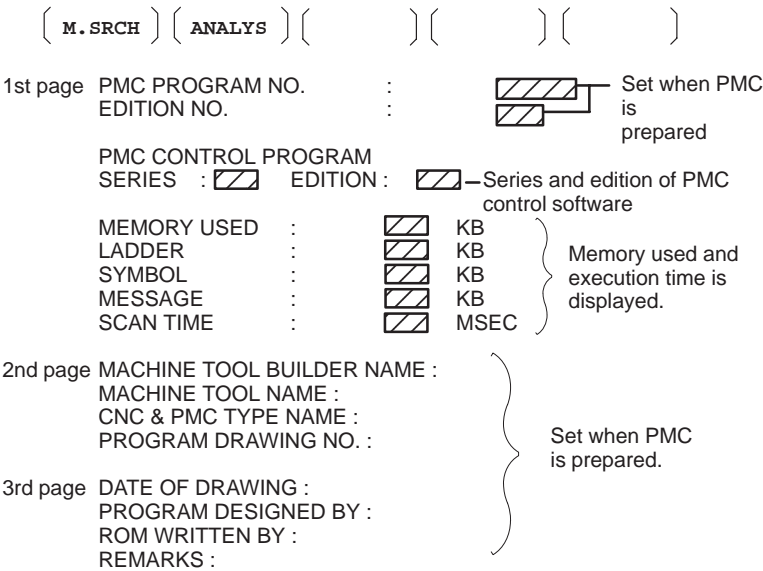
Press soft key [PMCDGN] then PMC’s diagnostic screen is displayed.

● TITLE screen

The title data registered when a ladder program is prepared is displayed.



Other soft keys



- **STATUS screen**

On/Off state of input/output signals and internal relay is displayed.
[Search Method]

- Page key :Forward and Backward by screen
- Cursor key :Forward and Backward by diagnostic number
- To search a specified address or signal name, input an address number or signal name and press **[SEARCH]**.

PMC SIGNAL STATUS				MONIT RUN					
ADDRESS	7	6	5	4	3	2	1	0	
	ED7	ED6	ED5	ED4	ED3	ED2	ED1	ED0	← Signal name
G0000	0	0	0	0	1	0	1	0	← Signal state 0: Off 1: On
	ED15	ED14	ED13	ED12	ED11	ED10	ED9	ED8	
G0001	0	0	0	0	0	0	0	0	
	ESTB	EA6	EA5	EA4	EA3	EA2	EA1	EA0	
G0002	0	0	0	0	0	0	0	0	
G0003	0	0	0	0	0	0	0	0	Signal state reverses for signals with *.
					FIN				
G0004	0	0	0	0	0	0	0	0	0: On 1: Off

(SEARCH) () () () ()

- **Alarm screen**

Displays an alarm generated in PMC.

PMC ALARM MESSAGE

MONIT RUN

ER32 NO I/O DEVICE

ALM

(TITLE) (STATUS) (ALARM) (TRACE) ()

Alarm display

For details of alarms, refer to Appendix B List of Alarms.

Blinked

● TRACE screen

Every time a specified signal changes, the signal status is memorized in the trace memory. This function is useful for identifying intermittent troubles.

(1) Trace parameter screen

PMC SIGNAL TRACE			MONIT RUN
TRACE MODE			:
(0:1BYTE/1:2BYTE/2:WORD)			
1ST TRACE	ADDRESS	CONDITION	
	ADDRESS TYPE	: (0:PMC/1:PHY)	
	ADDRESS	:	
	MASK DATA	:	
2ND TRACE	ADDRESS	CONDITION	
	ADDRESS TYPE	: (0:PMC/1:PHY)	
	ADDRESS	:	
	MASK DATA	:	
<div style="display: flex; justify-content: space-between; padding: 0 10px;"> { T.DISP } { EXEC } { } { } { } </div>			

↑ Changes to a trace memory display screen (Screen on the next page)

Select each item by cursor key

- a. TRACE MODE: Select the trace mode
 0=Records changes of 1-byte signals
 1=Records changes of independent 2-byte signals
 2=Records changes of consecutive 2-byte signals
- b. ADDRESS TYPE:
 0=PMC address is used for tracing address.
 1=Physical address is used for tracing address.
 (Mainly used for C-language program)
- c. ADDRESS:Set a tracing address.
- d. MASK DATA: The bits to be traced are specified by a hexadecimal number (2 digits).
 For example, to trace the signals at bit 7,6,5 and 0, set E1 (hexadecimal) to MASK DATA.

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

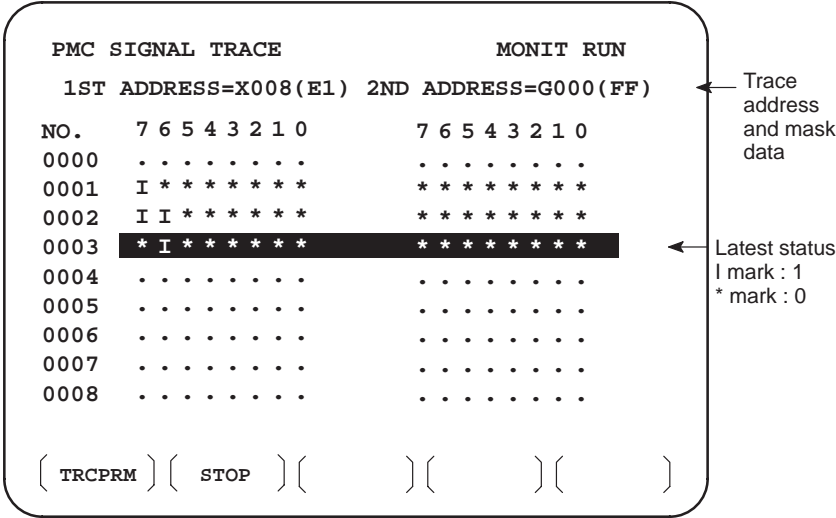
E1% 1 1 1 0 0 0 0 1

However, even if bit 4,3,2 and 1 changes, tracing (memory registration) cannot be done but signal status is memorized when a tracing is executed.

[Correspondence of binary and hexadecimal number]

0000 ₂ : 0 ₁₆	0001 ₂ : 1 ₁₆	0010 ₂ : 2 ₁₆	0011 ₂ : 3 ₁₆
0100 ₂ : 4 ₁₆	0101 ₂ : 5 ₁₆	0110 ₂ : 6 ₁₆	0111 ₂ : 7 ₁₆
1000 ₂ : 8 ₁₆	1001 ₂ : 9 ₁₆	1010 ₂ : A ₁₆	1011 ₂ : B ₁₆
1100 ₂ : C ₁₆	1101 ₂ : D ₁₆	1110 ₂ : E ₁₆	1111 ₂ : F ₁₆

(2) Trace memory contents display screen



10"LCD/14"CRT is displayed by 1 and 0.

- a. Soft key [TRCPRM]: Return to the trace parameter setting screen (screen of previous page)
- b. Soft key [EXEC]: Starts tracing.
Trace memory is cleared and each time a specified signal changes, its status is recorded. Trace memory is 256 bytes and if tracing is executed 128 times by 2-byte tracing, tracing is executed again from the head of memory.
- c. Soft key [STOP]: Ends the tracing.

*The tracing parameters are held even if the power is turned off.

Address	#7	#6	#5	#4	#3	#2	#1	#0
K017								

- #5 0 : Tracing starts by [EXEC].
- 1 : Tracing starts automatically after power on

4.3.4 PMCRAM Screen

• Inputting PMC parameters from the MDI

- (1) Set to MDI mode or emergency stop state.
- (2) Set PARAMETER WRITE (on setting screen) to 1 or set the program protect signal (KEY4) to 1.

	PWE	KEY4	
Timer	<input type="radio"/>	—	Either one
counter	<input type="radio"/>	<input type="radio"/>	
Keep relay	<input type="radio"/>	—	Either one
Data table	<input type="radio"/>	<input type="radio"/>	

- (3) Press a soft key and select a required screen.
[TIMER] :Timer screen
[COUNTR] :Counter screen
[KEEPRL] :Keep relay screen
[DATA] :Data table screen
- (4) Press cursor key and move the cursor to a desired number.
- (5) Input a numeric key and press key and data is input.
- (6) After the data is input, set PARAMETER WRITE or KEY4 on setting screen to 0.

• TIMER screen

This screen is used for setting timer time of the functional instruction (SUB 3).

Page No. (screen is scrolled by page key)

Timer No. specified by functional instruction

Address specified by ladder

PMC PARAMETER (TIMER) #001			MONIT RUN		
NO.	ADDRESS	DATA	NO.	ADDRESS	DATA
01	T00	480	11	T20	0
02	T02	960	12	T22	0
03	T04	0	13	T24	0
04	T06	0	14	T26	0
05	T08	0	15	T28	0
06	T10	0	16	T30	0
07	T12	0	17	T32	0
08	T14	0	18	T34	0
09	T16	0	19	T36	0
10	T18	0	20	T38	0

← Timer delay time (msec)

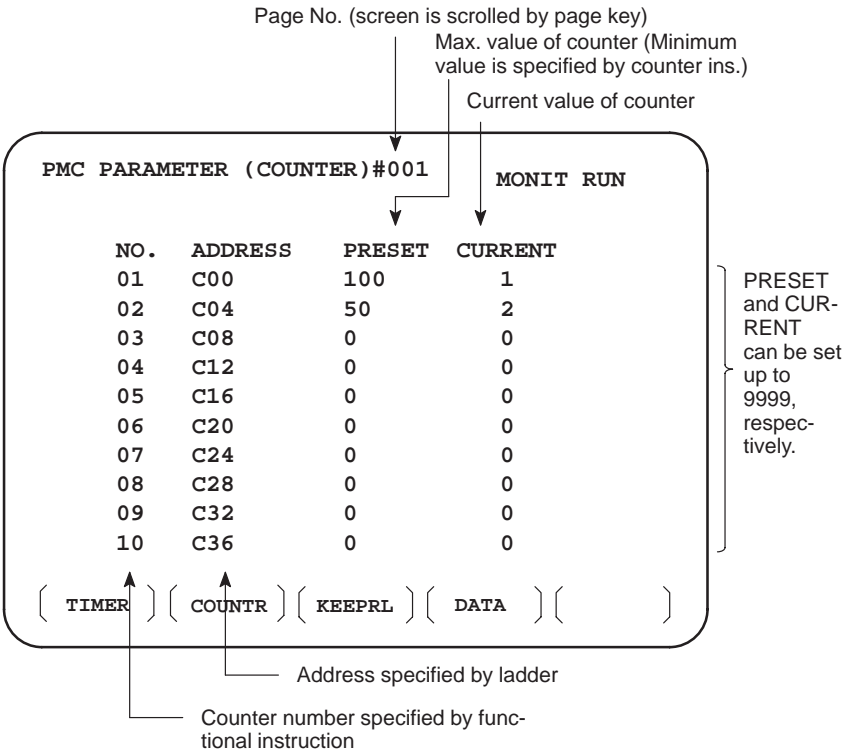
[TIMER] [COUNTR] [KEEPRL] [DATA] []

Timer set time : Timer no. 1–8 is max. 1572.8 sec and its accuracy is 48ms.

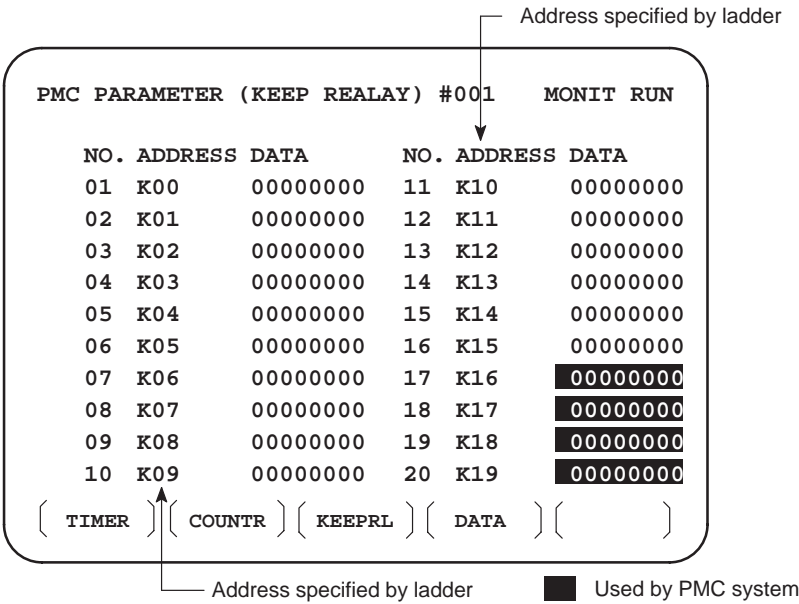
Timer no. 9–40 is max. 262.1 sec and its accuracy is 8ms.

● COUNTER screen

This screen sets and displays max. value of counter and current value of the counter instruction (SUB 4).



● KEEP RELAY screen



(1) Nonvolatile memory control

Address	#7	#6	#5	#4	#3	#2	#1	#0
K016								

#7(MWRTF2): For checking the writing status in nonvolatile memory

#6(MWRTF1): Writing status in nonvolatile memory

(2) PMC system parameter

The following keep relays are used by the system, therefore they cannot be used in the sequence program.

Address	#7	#6	#5	#4	#3	#2	#1	#0
K017								

#5 TRCSTAT

0 : Signal tracing starts by soft key [EXEC] in signal trace function.

1 : Signal tracing starts automatically by power on in signal trace function.

#4 MEMINP

0 : Data input cannot be done in memory contents display function.

1 : Data input can be done in memory contents display function.

#2 AUTORUN

0 : Ladder is executed on the RAM operation after the power is turned on.

1 : Ladder is not executed on the RAM operation after the power is turned on.

#1 PRGRAM

0 : Built-in programmer is not used.

1 : Built-in programmer is used.

#0 LADMASK

0 : Dynamic display of ladder is executed.

1 : Dynamic display of ladder is not executed.

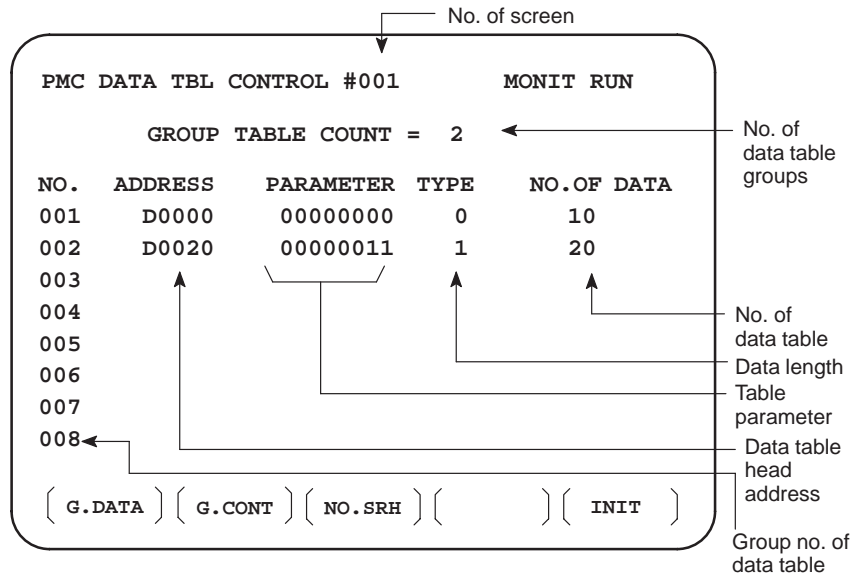
Address	#7	#6	#5	#4	#3	#2	#1	#0
K018								

Address	#7	#6	#5	#4	#3	#2	#1	#0
K019								

These bits are used by system. Do not change the values.
Usually all the bits are 0.

• DATA TABLE screen

(1) Data table setting screen



- Soft key [G.DATA] : Select data display screen of data table. (Next screen)
- [G.CONT] : Set the no. of groups of data table.
- [NO.SRH]: Move the cursor to a specified group.
- Soft key [INIT]: Initializes the setting of data table.
No. of groups is 1, ADDRESS is D0000, PARAMETER is 0000000, TYPE is 0, NO. OF DATA is 1860.

This operation is done usually when a sequence program is prepared. When PMC parameters are set, internal parameters are not affected.

PARAMETER

Address	#7	#6	#5	#4	#3	#2	#1	#0
k019								

0 : Binary format
1 : BCD format

0 : Without protection for input
1 : With protection for input

TYPE

0 : 1-byte length 1 : 2-byte length 2 : 4-byte length

- Using the page key, next screen/previous screen can be selected. (If the number of screens item is blank, screen switching cannot be performed.)

(2) Data display screen

Group number
Page number

PMC PRM (DATA) 001/001			MONIT RUN
NO.	ADDRESS	DATA	
000	D0000	0	
001	D0001	0	
002	D0002	0	
003	D0003	0	
004	D0004	0	
005	D0005	0	
006	D0006	0	
007	D0007	0	
008	D0008	0	
009	D0009	0	

(C.DATA) (G-SRCH) (SEARCH) () ()


- a. Soft key **[C.DATA]** : Returns to the data table setting screen.
(Previous screen)
- b. Group No. **[G-SRCH]** : Head of the specified group is selected.
- c. Address **[SEARCH]** : Searches an address in a group currently selected.


4.4 OPERATION ON THE DPL/MDI

The DPL/MDI panel is used to set PMC system parameters and create and execute the sequence program.

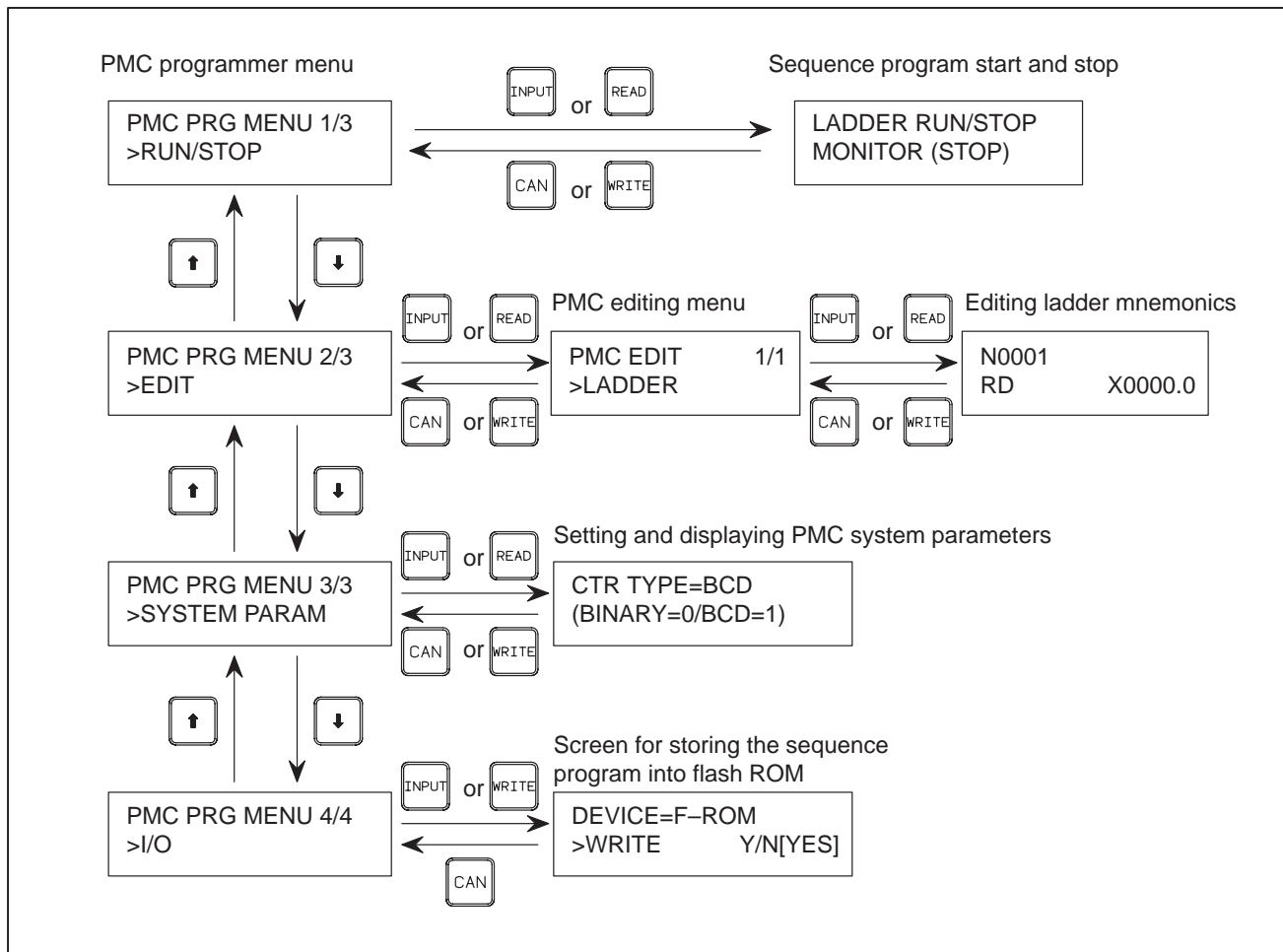
- (1) Setting and displaying PMC system parameters (SYSTEM PARAM)
 - The type of counter data (BCD or binary) can be selected.
- (2) Editing the sequence program (EDIT)
 - The sequence program can be edited (input, addition, search, and deletion) by using the ladder mnemonics display.
- (3) Executing the sequence program (RUN/STOP)
 - The execution of the sequence program can be started and stopped.
- (4) Storing the sequence program into flash ROM (I/O)
 - The sequence program can be stored into flash ROM.

NOTE



- 1 The indication at the bottom left of each key applies to the PMC programmer (DPL/MDI) function.
- 2 For keys such as the  key, the indication on the left applies when the key is pressed once and that on the right applies when the key is pressed twice.

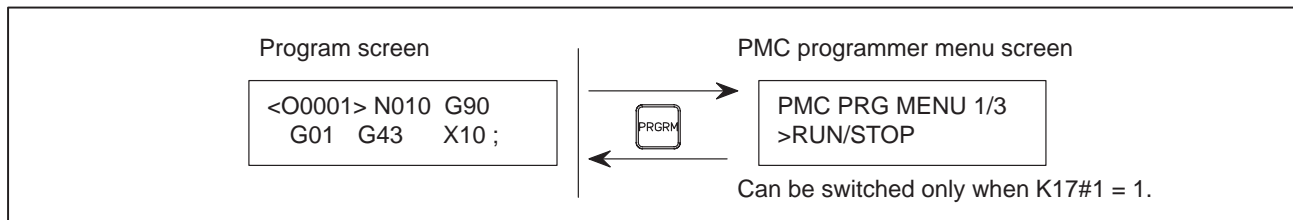
(Example) Pressing the  key once enters "D" and pressing it twice enters "R."
However, only the indication on the left applies when the password is cleared.

The screen configuration for the PMC programmer (DPL/MDI) function is as follows:

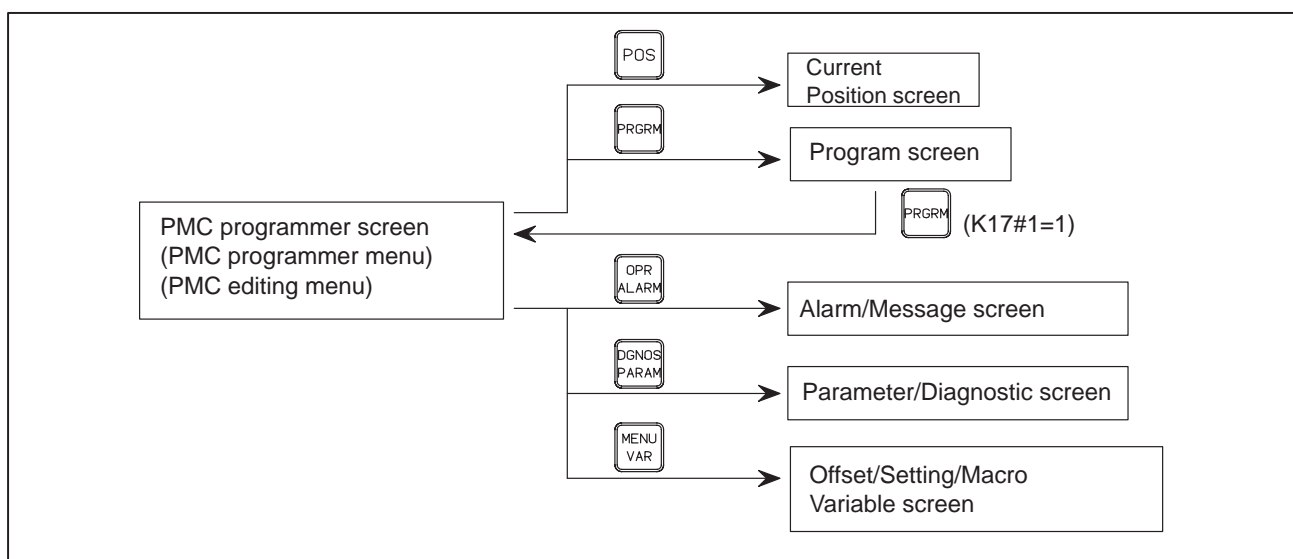


4.4.1 Selecting the PMC Programmer Menu

To operate the PMC programmer, set K17#1 of the keep relay area for PMC parameters to 1, then press the  key two times on the DPL/MDI (press the  key further when the program screen is selected), thus causing the PMC programmer menu to be displayed.





To return to the CNC screen, press the , , , , or  key.



4.4.2 Setting and Displaying System Parameters (SYSTEM PARAM)



Selecting SYSTEM PARAM on the PMC programmer menu displays the system parameter screen. If the sequence program is running, selecting this function automatically stops the program.

- 1 Display the PMC programmer menu.
- 2 Display the SYSTEM PARAM item by pressing the  or  key.

PMC PRG MENU 3/3
>SYSTEM PARAM

- 3 Press the  or  key. The system parameter screen appears.

CTR TYPE = BIN
(BINARY=0/BCD=1)

- 4 The current counter data type is displayed on the screen.
 - (a) Specify the type of the counter value to be used for the CTR functional instruction, as binary or BCD (enter  for binary or  for BCD).

(b) Press the  key.

The counter data type is set.

5 Pressing the  or  key displays the PMC programmer menu.

NOTE



When K19#0 of the keep relay area for PMC parameter is set to 1, the screen for storing the sequence program into flash EEPROM is displayed after ladder editing.

DEVICE=F-ROM
 >WRITE Y/N[YES]

Please refer to the Subsec. 4.4.7 and storing the sequence program into flash EEPROM.

4.4.3 Editing the Sequence Program (Edit)

Selecting EDIT on the PMC programmer menu displays the editing menu.

- 1 Display the PMC programmer menu.
- 2 Display the EDIT item by pressing the  or  key.

PMC PRG MENU 2/3
 >EDIT

- 3 Press the  or  key. The PMC editing menu appears.



PMC EDIT 1/1
 >LADDER

To end editing and display the PMC programmer menu, press the  or  key.

4.4.4 Editing Ladder Mnemonics

- (1) Starting ladder mnemonics editing

Selecting LADDER on the PMC programmer menu displays the ladder mnemonics editing screen. If the sequence program is running, selecting this function automatically stops the program.

- 1 Display the PMC programmer menu.
- 2 Display the LADDER item by pressing the  or  key.

PMC EDIT 1/1
 >LADDER

- 3 Press the  or  key.

When the ladder password protection is performed → go to 4

When the ladder password protection is not performed → go to 6

- 4 When the password protection is performed, message requiring the release of password is displayed.

PASSWORD (R/W)

NOTE

A ladder program for which the password has been specified cannot be edited by ladder mnemonics editing until correct password is entered. Once password protection is released, the protection remains released until the power is turned off then on again.


- 5 Enter the password and press the  key.


NOTE

The entered password is not displayed. (Echo back is not performed.)

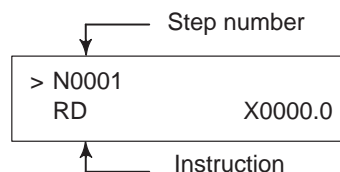
When the password is not correctly specified, the error message is displayed.

FALSE PASSWORD

At this time, the display returns to the release requirement of password by pressing the  key.



Moreover, the display returns to the PMC editing menu by pressing the  key. When the password is correctly specified, the protection is released.

- 6 The sequence program is displayed.







- (2) Confirming the ladder mnemonics

- 1 Cursor scroll (scroll per step)

Pressing the  cursor key displays the instruction one step before that currently displayed. Pressing the  cursor key displays the instruction one step after that currently displayed.

- 2 Specifying the step number


Entering , <step number>, then  displays the instruction having the entered step number.






(The  cursor key can be used instead of the  key.)

(Example) , , , , 

N0123
SUB 50 PSGNL



3 Relay search









Entering <address number> then  searches for the relay including the entered address.

(Example)     , 

N0105
AND X0000.2



4 Relay coil search





Entering , <address number>, then  searches for the relay coil including the entered address.

(Example)  ,       , 

N0187
WRT. NOT Y0033.5

5 Functional instruction search

Entering , <functional instruction number>, then  searches for the entered functional instruction.

(Example)  ,   , 

N0123
SUB 50 PSGNL

NOTE

1 Relay search, relay coil search, and functional instruction search are started from the current screen. If the relay, relay coil, or instruction is not found by the end of the ladder program, search is performed from the beginning of the ladder program to the step at which search was started. If still not found, "NOT FOUND" is displayed.

N0105 NOT FOUND
AND X0000.2


2 Display of some instructions may differ from that for FAPT LADDER.

P-G, personal-computer FAPT LADDER	Ladder mnemonics editing
(a) RD.NOT.STK	RD.N.STK
(b) TMR timer-number	SUB 03 TMR P001 timer-number
(c) DEC code-signal-address (PRM) decode-instruction	SUB 04 DEC P001 code-signal-address P002 decode-instruction

The above also applies when modifying the ladder mnemonics.

(3) Modifying the ladder mnemonics

1 Changing an instruction

- (a) Display the instruction to be changed.
- (b) Enter a new instruction.
- (c) Press the  key.

(Example) , , , , , , 


N1234	
AND	R0123.4

Before change


N1234	
OR	Y0032.4

After change

NOTE


If changing the instruction causes the memory capacity to be exceeded, the  key is ignored without changing the instruction.

2 Deleting an instruction

- (a) Display the instruction to be deleted.
- (b) Press the  key.

The instruction is deleted and the next instruction is displayed.

3 Inserting an instruction

- (a) Display the instruction after which an instruction is to be inserted.
- (b) Enter the instruction to be inserted.
- (c) Press the  key.

(Example) , , 


N1234	
AND	R0123.4

Before insertion

N1234	
AND.STK	

After insertion

NOTE

If inserting the instruction causes the memory capacity to be exceeded, the  key is ignored without inserting the instruction.

4 Deleting the ladder program

- (a) Enter , , , ,  .
- (b) Press the  key.

The whole ladder program is deleted.

(4) Ending ladder mnemonics editing

- 1 Press the  or  key.
- 2 "EXECUTING" is displayed.

N0001
EXECUTING

- 3 The PMC editing menu appears.

NOTE

- 1 When K19#0 of the keep relay area for PMC parameter is set to 1, the screen for storing the sequence program into flash EEPROM is displayed after ladder editing.



DEVICE=F-ROM
>WRITE Y/N[YES]

Please refer to the Subsec. 4.4.7 and storing the sequence program into flash EEPROM.

- 2 If the sequence program contains an error, the PMC editing menu is not displayed but an error message appears on the screen.

(Example) Error message



END FUNCTION
MISSING

Pressing the  or  cursor key displays the ladder mnemonics editing screen.



- 3 Pressing the , , , , or  key during the editing of the sequence program displays the CNC screen by forcibly terminating editing even if the program contains an error.

4.4.5 Starting and Stopping the Sequence Program (Run/Stop)

Selecting RUN/STOP on the PMC programmer menu displays the sequence program start/stop screen.


- 1 Display the PMC programmer menu.
- 2 Display the RUN/STOP item by pressing the  or  key.

PMC PRG MENU 1/3
>RUN/STOP

- 3 Press the  or  key. The sequence program start/stop screen appears.

LADDER RUN/STOP
MONITOR [RUN]

- 4 The current execution state of the sequence program is displayed on the screen.

Pressing the  or  key switches the state between running and stopped.

- 5 Pressing the  or  key displays the PMC programmer menu.

NOTE

When the sequence program cannot be started (RUN), the alarm of PMC occurred. Please confirm the alarm status referring to “4.4.10 Error List”.

4.4.6 Error Messages (for Ladder Mnemonics Editing)



	Displayed error message	Error description (operator action)
1	COIL NOTHING	No coil is specified for a functional instruction using a coil.
2	COM FUNCTION MISSING	The use of the COM (SUB9) functional instruction is incorrect.
3	END FUNCTION MISSING	The END1 or END2 functional instruction is missing (or ERROR NET).
4	JUMP FUNCTION MISSING	The use of the JMP (SUB10) functional instruction is incorrect.
5	LADDER BROKEN	The ladder program is corrupted.
6	OBJECT BUFFER OVER	The user program RAM is full. (Note) (Perform condensation or reduce the size of the ladder program.)
7	PLEASE CLEAR ALL	The sequence program has become unrecoverable due to power-off during editing.
8	1ST LEVEL EXEC TIME OVER	The ladder first level is too great.

NOTE





Use a memory card for ladder diagram editing or the CONDENSE function of FAPT LADDER (for personal computers). These methods may, however, not be effective.

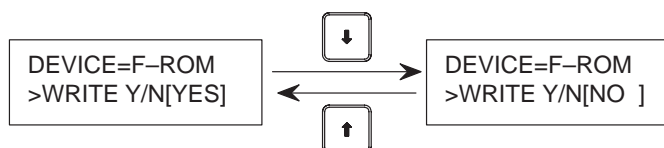
4.4.7 Storing the Sequence Program into Flash Eeprom (I/O)



Selecting I/O on the PMC programmer menu displays the screen for storing the sequence program into flash EEPROM. Before attempting to store the sequence program into flash EEPROM, place the CNC in the emergency stop state.

- (1) Display the PMC programmer menu.
- (2) Display the I/O item by pressing the  or  key.

PMC PRG MENU 4/4
 >I/O

- (3) Press the  or  key. The sequence program storage screen appears. Pressing the  or  key switches display between [YES] and [NO].



- (4) When [NO] is displayed, pressing the  key displays the sequence program storage screen. When [YES] is displayed, pressing the  key starts writing the sequence program into flash EEPROM. "EXECUTING" is displayed during writing.

WRITE TO F-ROM
EXECUTING

"EXECUTING" BLINKS.

Once the sequence program has been written normally, "COMPLETE" is displayed.

WRITE TO F-ROM
COMPLETE



NOTE

If an error occurs, an error message appears on the screen.

Example

Example error message

NOT EMG STOP

To return to the sequence program storage screen, press the  or  key.

- (1) Pressing the  key displays the PMC programmer menu.

Error details




The table below lists the details of the errors which may occur during storage into F-ROM using the DPL/MDI.

Error message	Description
PROGRAM DATA ERROR	The ladder data in RAM is invalid. Alternatively, there is no RAM or ROM.
SIZE ERROR	The program exceeds the maximum size which can be written into F-ROM.
NOT EMG STOP	The CNC is not in the emergency stop state.
OPEN ERROR	The OPEN processing has failed (IOCS library).
ERASE ERROR	The ERASE processing has failed (IOCS library). The F-ROM cannot be erased. Alternatively, the F-ROM is defective.
WRITE ERROR	The WRITE processing has failed (IOCS library). The F-ROM cannot be written. Alternatively, the F-ROM is defective.

4.4.8 Input/Output Ladder/PMC- parameter by DPL/MDI




Input/Output method to office programmer (P-G Mate/Mark II) (Fixed 9600bit/sec.)

- Method of Inputting/Outputting Ladder

- (1) Select "Diagnose screen" by key in  key.
- (2) Key in  key or  key.
- (3) Turn on <F8> key from the office programmer menu screen, and key in menu number "5<NL>" or "3<NL>".

Input/Output method to FANUC FLOPPY CASSETTE (Fixed 4800bit/sec.)

- Method of Inputting Ladder and PMC-Parameter.




- (1) Select "Diagnose screen" by key in  key.
- (2) Key in  key and optionally key in [File No.].
- (3) Key in  key.

NOTE

In case of input PMC-Parameter, it is necessary to set following conditions.

- (a) Emergency stop condition, and NC-Parameter PWE=1.
- (b) Stop condition the Ladder program.


- Method of Outoutting Ladder.

- (1) Select "Diagnose screen" by key in  key.
- (2) Key in  key and optionally key in [Files No.].
- (3) Key in .

● Method of Outputting PMC-Parameter.

(1) Select "PMC STATUS screen" by key in  key.

(2) Key in  key and optionally key in [File No.].

(3) Key in .

NOTE

In case of output PMC-Parameter, it is necessary to set following condition.

(a) Edit mode.

(b) Stop condition the Ladder program.

4.4.9 On-line Debugging Function

The on-line debugging function enables the monitoring and modification of ladder programs and signal status on personal computer's screen using a personal computer connected to the Power Mate through an RS-232-C cable.

FANUC FAPT LADDER-II is necessary to use the on-line debugging function. (This software is a programming system for developing FANUC PMC sequence programs which operate on IBM PC/AT and compatible computers.)

Software name	Specification	Personal computer
FAPT LADDER-II	A08B-9201-J503	IBM PC/AT and compatible

In this section, only the parameter of on-line monitor driver for Power Mate-H and attention in use is described. Other points(connection of cable with personal computer, details of the operation, etc.) are described in the following manual.

Name of Manual	Spec.No.	Reference Items
FAPT LADDER-II OPERATOR'S MANUAL	B-66184EN	On-line function

Starting and stopping the on-line debugging function

When using the on-line debugging function to connect a personal computer to the PMC, first start the driver that provides the communication function of the PMC.

When starting or stopping the driver, it is necessary to set either of the following parameters.

● Parameter screen for on-line monitor([PARAMETERS FOR ONLINE MONITOR])

Pressing the [MONIT] then [ONLINE] soft keys on the PMC menu screen causes the on-line monitor parameter screen to appear.

Parameter[RS-232C] = [USE] : On-line monitor driver is used.

[NOT USE]: On-line monitor driver is not used.

NOTE

The CRT/MDI is necessary when the parameter is set on the "PARAMETERS FOR ONLINE MONITOR" screen.

● Parameter in the Power Mate-H (No.0101#6)

	#7	#6	#5	#4	#3	#2	#1	#0
0101								

#6 = 0 : On-line monitor driver is not used.
 1 : On-line monitor driver is used.

When either of the following conditions consists, the on-line monitor driver is started.

- Parameter "RS-232C" is "USE"
- Bit 6 of parameter No.0101 is "1"

NOTE

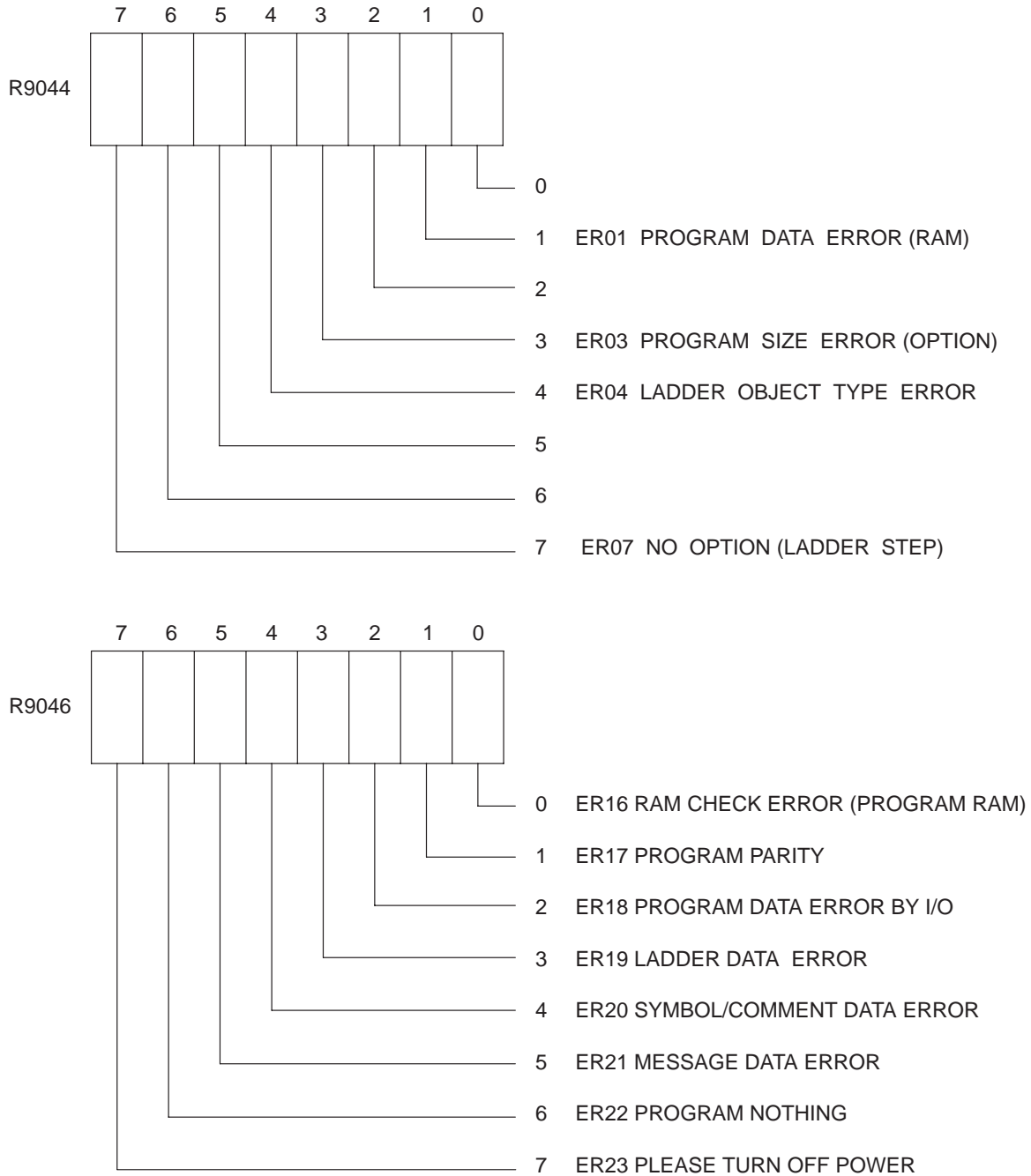
- 1 The on-line monitor driver occupies the line while it is operating.
 In this state, other input/output functions cannot use the line.
 If other input/output functions use the line, it is necessary to display the above-mentioned parameter and stop the on-line monitor driver.
- 2 While the on-line monitor driver is operating, the following functions cannot be used.
 - [PMCLAD], [I/O], [EDIT], [SYSPRM] on CRT/MDI
 - [EDIT], [SYSTEM PARAM], [I/O] on DPL/MDI
- 3 In case of operating NC, the screen display of NC(Position, etc.) might be slow when using input/output functions(Load from PMC, Store to PMC, etc.). There is no problem in the operation of NC. It is recommended to using input/output functions while NC is not operating.
- 4 When the screen made by C language executor is displayed, the communication speed decreases. It is recommended to use input/output functions after moving to other screens(Position, etc.).

4.4.10 Error List

If in alarm is issued in the PMC, the alarm message is displayed on the CRT (PMC ALARM MESSAGE screen). But in case of DPL/MDI, it is displayed only by R-relay status (ON or Off).

Refer to the “APPENDIX B. ALARM LIST” for more information.

(1) Error status at power on or PROGRAM DOWN LOAD.



4.5 LIST OF SIGNALS BY EACH MODE

• Automatic operation

MODE		INPUT/OUTPUT SIGNAL	FEED RATE, ETC
A U T O M A T I C O P E R A T I O N	EDIT	[PMC ⇒ Power Mate] KEY3(Program protect key)	
	AUTO	[PMC ⇒ Power Mate) ST (Cycle start) *SP (Feed hold) SBK (Single block) DRN (Dry run) BDT1 to 9 (Optional block skip) MI α (Mirror image) PN1 to 8 (External program number search) AFL (Auxiliary function neglect) FIN (Auxiliary function complete) MFIN (High speed M/S/T function complete)	[PMC ⇒ Power Mate] *FV0 to 7 (Feed rate override) OVC (Override cancel) ROV1, ROV2 (Rapid traverse over-ride)
	MDI	[Power Mate ⇒ PMC] STL (Cycle start LED) SPL (Feed hold LED) MF, M00 to M31 (Miscellaneous function) DEN (Distribution end) OP (Automatic operating)	

• Manual operation

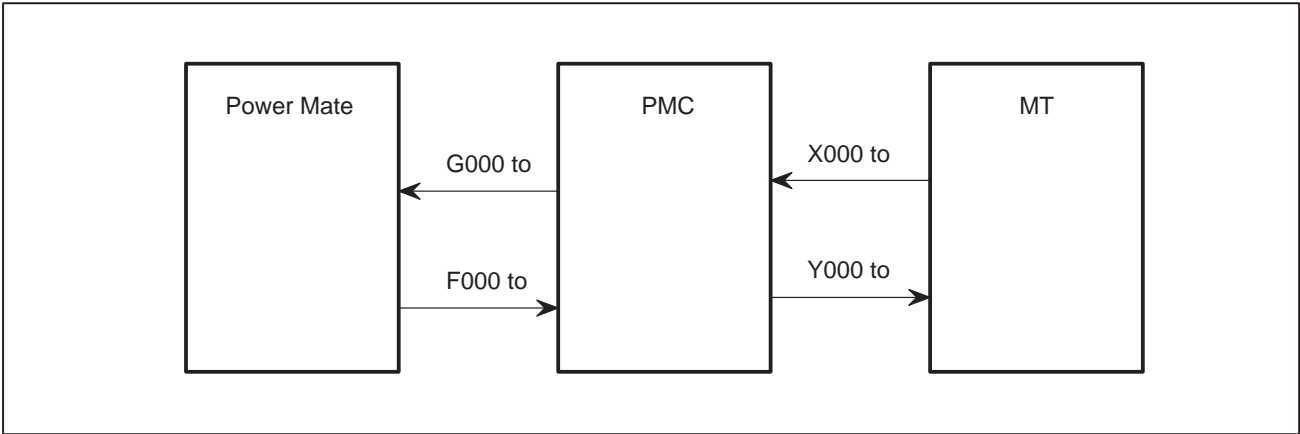
MODE		INPUT/OUTPUT SIGNAL	FEED RATE, ETC
M A N U A L O P E R A T I O N	JOG	[PMC ⇒ Power Mate] RT (Rapid traverse)	[PMC ⇒ Power Mate] *JV0 to 15 (Manual feedrate override)
	ZRN	[PMC ⇒ Power Mate] ZRN(Reference position return mode) [MT ⇒ Power Mate] *DEC α (Reference position deceleration)	+ α , - α (Manual feed move com-mand) ROV1, ROV2 (Rapid traverse over-ride)
		[Power Mate ⇒ PMC] ZP α ZP2 α , ZP3 α (Reference position return completion)	

- Others

Others	[PMC ⇒ Power Mate] MD1 to 4 (Mode selection) *ESP (Emergency stop) KEY1 to 4 (Memory protection key) MLK (All axes machine lock) *IT,*IT α (All axes/ each axis machine lock) * \pm MIT α (interlock per axis and direction:) *ABSM (Manual absolute) SVF α (Servo off) *FLWP (Follow up) ERS (External reset) RRW (Reset & Rewind) \pm LM α , RLSOT (Software limit external setting)
	[Power Mate ⇒ PMC] MA (Ready) SA (Servo ready) AL (Alarm) RST (Resetting) BAL (Battery alarm) INP α (In-position) IPL α (Distribution signal)

4.6
ADDRESS LIST

Address of interface signal between Power Mate and PMC.



MT → PMC
(I/O card, I/O unit)

		Bit No.							
Address		#7	#6	#5	#4	#3	#2	#1	#0
X000		SKIP	*RILK		*ESP		SKIP4	SKIP3	SKIP2
X002				*DEC6	*DEC5	*DEC4	*DEC3	*DEC2	*DEC1

MT → PMC
(Built-in I/O card)

		Bit No.							
Address		#7	#6	#5	#4	#3	#2	#1	#0
X1000		SKIP	*RILK		*ESP		SKIP4	SKIP3	SKIP2
X1002				*DEC6	*DEC5	*DEC4	*DEC3	*DEC2	DEC1

PMC → CNC

Address	Bit No.							
	#7	#6	#5	#4	#3	#2	#1	#0
G004					FIN			
G005		AFL						MFIN
G006				OVC		*ABSM		
G007	RLSOT		*FLWU			ST		
G008	ERS	RRW	*SP	*ESP				*IT
G009	PN7	PN6	PN5	PN4	PN3	PN2	PN1	PN0
G010	*JV7	*JV6	*JV5	*JV4	*JV3	*JV2	*JV1	*JV0
G011	*JV15	*JV14	*JV13	*JV12	*JV11	*JV10	*JV9	*JV8
G012	*FV7	*FV6	*FV5	*FV4	*FV3	*FV2	*FV1	*FV0
G014							ROV2	ROV1
G018						HS1C	HS1B	HS1A
G019	RT		MP2	MP1				
G043	ZRN					MD4	MD2	MD1
G044							MLK	BDT1
G045	BDT9	BDT8	BDT7	BDT6	BDT5	BDT4	BDT3	BDT2
G046	DRN	KEY4	KEY3	KEY2	KEY1		SBK	
G053					UINT			
G054	UI7	UI6	UI5	UI4	UI3	UI2	UI1	UI0
G055	UI15	UI14	UI13	UI12	UI11	UI10	UI9	UI8
G058					EXWT	EXSTP	EXRD	
G066		EPCON						IGNVRY
G100			+J6	+J5	+J4	+J3	+J2	+J1
G102			-J6	-J5	-J4	-J3	-J2	-J1
G106			MI6	MI5	MI4	MI3	MI2	MI1
G110			+LM6	+LM5	+LM4	+LM3	+LM2	+LM1
G112			-LM6	-LM5	-LM4	-LM3	-LM2	-LM1
G124			DTCH6	DTCH5	DTCH4	DTCH3	DTCH2	DTCH1
G126			SVF6	SVF5	SVF4	SVF3	SVF2	SVF1
G130			*IT6	*IT5	*IT4	*IT3	*IT2	*IT1
G132			+MIT6	+MIT5	+MIT4	+MIT3	+MIT2	+MIT1

PMC → CNC

Address	Bit No.							
	#7	#6	#5	#4	#3	#2	#1	#0
G134			–MIT6	–MIT5	–MIT4	–MIT3	–MIT2	–MIT1
G136			EAX6	EAX5	EAX4	EAX3	EAX2	EAX1
G142	EBUFA	ECLRA	ESTPA	ESOFA	ESBKA			EFINA
G143	EMSBKA	EC6A	EC5A	EC4A	EC3A	EC2A	EC1A	EC0A
G144	EIF7A	EIF6A	EIF5A	EIF4A	EIF3A	EIF2A	EIF1A	EIF0A
G145	EIF15A	EIF14A	EIF13A	EIF12A	EIF11A	EIF10A	EIF9A	EIF8A
G146	EID7A	EID6A	EID5A	EID4A	EID3A	EID2A	EID1A	EID0A
G147	EID15A	EID14A	EID13A	EID12A	EID11A	EID10A	EID9A	EID8A
G148	EID23A	EID22A	EID21A	EID20A	EID19A	EID18A	EID17A	EID16A
G149	EID31A	EID30A	EID29A	EID28A	EID27A	EID26A	EID25A	EID24A
G150	DRNE	RTE	OVCE				ROV2E	ROV1E
G151	*FV7E	*FV6E	*FV5E	*FV4E	*FV3E	*FV2E	*FV1E	*FV0E
G154	EBUFB	ECLRB	ESTPB	ESOFB	ESBKB			EFINB
G155	EMSBKB	EC6B	EC5B	EC4B	EC3B	EC2B	EC1B	EC0B
G156	EIF7B	EIF6B	EIF5B	EIF4B	EIF3B	EIF2B	EIF1B	EIF0B
G157	EIF15B	EIF14B	EIF13B	EIF12B	EIF11B	EIF10B	EIF9B	EIF8B
G158	EID7B	EID6B	EID5B	EID4B	EID3B	EID2B	EID1B	EID0B
G159	EID15B	EID14B	EID13B	EID12B	EID11B	EID10B	EID9B	EID8B
G160	EID23B	EID22B	EID21B	EID20B	EID19B	EID18B	EID17B	EID16B
G161	EID31B	EID30B	EID29B	EID28B	EID27B	EID26B	EID25B	EID24B
G166	EBUFC	ECLRC	ESTPC	ESOFC	ESBKC			EFINC
G167	EMSBKC	EC6C	EC5C	EC4C	EC3C	EC2C	EC1C	EC0C
G168	EIF7C	EIF6C	EIF5C	EIF4C	EIF3C	EIF2C	EIF1C	EIF0C
G169	EIF15C	EIF14C	EIF13C	EIF12C	EIF11C	EIF10C	EIF9C	EIF8C
G170	EID7C	EID6C	EID5C	EID4C	EID3C	EID2C	EID1C	EID0C
G171	EID15C	EID14C	EID13C	EID12C	EID11C	EID10C	EID9C	EID8C
G172	EID23C	EID22C	EID21C	EID20C	EID19C	EID18C	EID17C	EID16C
G173	EID31C	EID30C	EID29C	EID28C	EID27C	EID26C	EID25C	EID24C
G178	EBUFD	ECLRD	ESTPD	ESOFD	ESBKD			EFIND
G179	EMSBKD	EC6D	EC5D	EC4D	EC3D	EC2D	EC1D	EC0D
G180	EIF7D	EIF6D	EIF5D	EIF4D	EIF3D	EIF2D	EIF1D	EIF0D

PMC → CNC

Address	Bit No.							
	#7	#6	#5	#4	#3	#2	#1	#0
G181	EIF15D	EIF14D	EIF13D	EIF12D	EIF11D	EIF10D	EIF9D	EIF8D
G182	EID7D	EID6D	EID5D	EID4D	EID3D	EID2D	EID1D	EID0D
G183	EID15D	EID14D	EID13D	EID12D	EID11D	EID10D	EID9D	EID8D
G184	EID23D	EID22D	EID21D	EID20D	EID19D	EID18D	EID17D	EID16D
G185	EID31D	EID30D	EID29D	EID28D	EID27D	EID26D	EID25D	EID24D
G206		ZPEXT1		ZR1		RTN31	RTN21	RTN11
G207		ZPEXT2		ZR2		RTN32	RTN22	RTN12
G208		ZPEXT3		ZR3		RTN33	RTN23	RTN13
G209		ZPEXT4		ZR4		RTN34	RTN24	RTN14
G210		ZPEXT5		ZR5		RTN35	RTN25	RTN15
G211		ZPEXT6		ZR6		RTN36	RTN26	RTN16
G212	SKIPP							
G213	ACT							
G214					WFN4	WFN3	WFN2	WFN1
G216			TRQ6E	TRQ5E	TRQ4E	TRQ3E	TRQ2E	TRQ1E
G217	TRQ17	TRQ16	TRQ15	TRQ14	TRQ13	TRQ12	TRQ11	TRQ10
G218	TRQ27	TRQ26	TRQ25	TRQ24	TRQ23	TRQ22	TRQ21	TRQ20
G219	TRQ37	TRQ36	TRQ35	TRQ34	TRQ33	TRQ32	TRQ31	TRQ30
G220	TRQ47	TRQ46	TRQ45	TRQ44	TRQ43	TRQ42	TRQ41	TRQ40
G221	TRQ57	TRQ56	TRQ55	TRQ54	TRQ53	TRQ52	TRQ51	TRQ50
G222	TRQ67	TRQ66	TRQ65	TRQ64	TRQ63	TRQ62	TRQ61	TRQ60
G225	PALM	PAL6	PAL5	PAL4	PAL3	PAL2	PAL1	PAL0
G226	EBUFE	ECLRE	ESTPE	ESOFE	ESBKE			EFINE
G227	EMSBKE	EC6E	EC5E	EC4E	EC3E	EC2E	EC1E	EC0E
G228	EIF7E	EIF6E	EIF5E	EIF4E	EIF3E	EIF2E	EIF1E	EIF0E
G229	EIF15E	EIF14E	EIF13E	EIF12E	EIF11E	EIF10E	EIF9E	EIF8E
G230	EID7E	EID6E	EID5E	EID4E	EID3E	EID2E	EID1E	EID0E
G231	EID15E	EID14E	EID13E	EID12E	EID11E	EID10E	EID9E	EID8E
G232	EID23E	EID22E	EID21E	EID20E	EID19E	EID18E	EID17E	EID16E
G233	EID31E	EID30E	EID29E	EID28E	EID27E	EID26E	EID25E	EID24E
G238	EBUFF	ECLRF	ESTPF	ESOFF	ESBKF			EFINF

PMC → CNC

Address	Bit No.							
	#7	#6	#5	#4	#3	#2	#1	#0
G239	EMSBKF	EC6F	EC5F	EC4F	EC3F	EC2F	EC1F	EC0F
G240	EIF7F	EIF6F	EIF5F	EIF4F	EIF3F	EIF2F	EIF1F	EIF0F
G241	EIF15F	EIF14F	EIF13F	EIF12F	EIF11F	EIF10F	EIF9F	EIF8F
G242	EID7F	EID6F	EID5F	EID4F	EID3F	EID2F	EID1F	EID0F
G243	EID15F	EID14F	EID13F	EID12F	EID11F	EID10F	EID9F	EID8F
G244	EID23F	EID22F	EID21F	EID20F	EID19F	EID18F	EID17F	EID16F
G245	EID31F	EID30F	EID29F	EID28F	EID27F	EID26F	EID25F	EID24F
G251	EDGN	EPARM	EVAR	EPRG				
G252	EDG07	EDG06	EDG05	EDG04	EDG03	EDG02	EDG01	EDG00
G253	EDG15	EDG14	EDG13	EDG12	EDG11	EDG10	EDG09	EDG08
G254	EDN07	EDN06	EDN05	EDN04	EDN03	EDN02	EDN01	EDN00
G255	EDN15	EDN14	EDN13	EDN12	EDN11	EDN10	EDN09	EDN08

CNC → PMC

Address	Bit No.							
	#7	#6	#5	#4	#3	#2	#1	#0
F000	OP	SA	STL	SPL				RWD
F001	MA				DEN	BAL	RST	AL
F002		CUT						
F003	MTCHIN	MEDT	MAUT		MMDI	MJ		MSTP
F004			MZRN					
F007								MF
F009	DM00	DM01	DM02	DM30				
F010	M07	M06	M05	M04	M03	M02	M01	M00
F011	M15	M14	M13	M12	M11	M10	M09	M08
F012	M23	M22	M21	M20	M19	M18	M17	M16
F013	M31	M30	M29	M28	M27	M26	M25	M24
F053				BGEACT	RPALM	RPBSY		
F054	UO7	UO6	UO5	UO4	UO3	UO2	UO1	UO0
F055	UO15	UO14	UO13	UO12	UO11	UO10	UO9	UO8
F056	UO107	UO106	UO105	UO104	UO103	UO102	UO101	UO100
F057	UO115	UO114	UO113	UO112	UO111	UO110	UO109	UO108
F058	UO123	UO122	UO121	UO120	UO119	UO118	UO117	UO116
F059	UO131	UO130	UO129	UO128	UO127	UO126	UO125	UO124
F094			ZP6	ZP5	ZP4	ZP3	ZP2	ZP1
F096			ZP26	ZP25	ZP24	ZP23	ZP22	ZP21
F098			ZP36	ZP35	ZP34	ZP33	ZP32	ZP31
F104			INP6	INP5	INP4	INP3	INP2	INP1
F106			MVD6	MVD5	MVD4	MVD3	MVD2	MVD1
F110			MDTCH6	MDTCH5	MDTCH4	MDTCH3	MDTCH2	MDTCH1
F120			ZRF6	ZRF5	ZRF4	ZRF3	ZRF2	ZRF1
F129	*EAXSL		EOV0					
F130	EBSYA	EOTNA	EOTPA	EGENA	EDENA	EIALA	ECKZA	EINPA
F131								EMFA
F132	EM28A	EM24A	EM22A	EM21A	EM18A	EM14A	EM12A	EM11A
F133	EBSYB	EOTNB	EOTPB	EGENB	EDENB	EIALB	ECKZB	EINPB
F134								EMFB

CNC → PMC

Address	Bit No.							
	#7	#6	#5	#4	#3	#2	#1	#0
F135	EM28B	EM24B	EM22B	EM21B	EM18B	EM14B	EM12B	EM11B
F136	EBSYC	EOTNC	EOTPC	EGENC	EDENC	EIALC	ECKZC	EINPC
F137								EMFC
F138	EM28C	EM24C	EM22C	EM21C	EM18C	EM14C	EM12C	EM11C
F139	EBSYD	EOTND	EOTPD	EGEND	EDEND	EIALD	ECKZD	EINPD
F140								EMFD
F141	EM28D	EM24D	EM22D	EM21D	EM18D	EM14D	EM12D	EM11D
F180			CLRCH6	CLRCH5	CLRCH4	CLRCH3	CLRCH2	CLRCH1
F209					WAT4	WAT3	WAT2	WAT1
F210	K7	K6	K5	K4	K3	K2	K1	K0
F211	KCAN	KEOB	KSLH	KNO	KPRD	KMNS	K9	K8
F212		KRED		KWRT	KINP	KDLT	KINS	KALT
F213			KALM		KPRM	KVAR	KPRG	KPOS
F214		KH	KQ	KP			KUP	KDWN
F217				KX	KR	KG	KN	KO
F218	KSHRP	KT	KS	KM	KF			
F220					SVER1	IPL1	SUP1	
F221					SVER2	IPL2	SUP2	
F222					SVER3	IPL3	SUP3	
F223					SVER4	IPL4	SUP4	
F224					SVER5	IPL5	SUP5	
F225					SVER6	IPL6	SUP6	
F228	EBSYE	EOTNE	EOTPE	EGENE	EDENE	EIALE	ECKZE	EINPE
F229								EMFE
F230	EM28E	EM24E	EM22E	EM21E	EM18E	EM14E	EM12E	EM11E
F231	EBSYF	EOTNF	EOTPF	EGENF	EDENF	EIALF	ECKZF	EINPF
F232								EMFF
F233	EM28F	EM24F	EM22F	EM21F	EM18F	EM14F	EM12F	EM11F
F236	APBL1	APBV1	APBZ1	APPS1	APPE1	APFE1	APOV1	APCM1
F237	APBL2	APBV2	APBZ2	APPS2	APPE2	APFE2	APOV2	APCM2
F238	APBL3	APBV3	APBZ3	APPS3	APPE3	APFE3	APOV3	APCM3

CNC → PMC

Address	Bit No.							
	#7	#6	#5	#4	#3	#2	#1	#0
F239	APBL4	APBV4	APBZ4	APPS4	APPE4	APFE4	APOV4	APCM4
F240	APBL5	APBV5	APBZ5	APPS5	APPE5	APFE5	APOV5	APCM5
F241	APBL6	APBV6	APBZ6	APPS6	APPE6	APFE6	APOV6	APCM6
F250		ALSV	ALOH	ALOT	ALPS	ALPS3	ALPS2	ALPS1
F251						ALPS4		ALAPC
F254						DPL2	DPL1	DPL0

4.7

SIGNAL AND SYMBOL CORRESPONDENCE TABLE

Refer to the Connection Manual (B-62683EN) for details.

Symbol	Signal name	PMC address
*ABSM	Manual absolute signal	G006#2
ACT	Temporary interrupt detection signal	G213#7
AFL	Auxiliary function lock signal	G005#6
AL	Alarm signal	F001#0
ALAPC	APC alarm	F251#0
ALOH	Over heat alarm	F250#5
ALOT	Over travel alarm signal (alarm classification signal)	F250#4
ALPS	P/S alarm signal (alarm classification signal)	F250#3
ALPS1	P/S alarm 100 signal (alarm classification signal)	F250#0
ALPS2	P/S alarm 000 signal (alarm classification signal)	F250#1
ALPS3	P/S alarm 101 signal (alarm classification signal)	F250#2
ALPS4	P/S alarm (from 5000 to 5999)	F251#2
ALSV	Servo alarm signal (alarm classification signal)	F250#6
APBL1 to APBL6	APC battery LOW alarm 2 signal (APC alarm type signal)	F236#7 to F241#7
APBV1 to APBV6	APC battery LOW alarm 1 signal (APC alarm type signal)	F236#6 to F241#6
APBZ1 to APBZ6	APC battery zero alarm signal (APC alarm type signal)	F236#5 to F241#5
APCM1 to APCM6	APC communication error signal (APC alarm type signal)	F236#0 to F241#0
APFE1 to APFE6	APC framing error signal (APC alarm type signal)	F236#2 to F241#2
FPOV1 to FPOV6	APC over time error signal (APC alarm type signal)	F236#1 to F241#1
APPE1 to APPE6	APC parity error signal (APC alarm type signal)	F236#3 to F241#3
APPS1 to AAPS6	APC pulse miss error signal (APC alarm type signal)	F236#4 to F241#4
BAL	Battery alarm signal	F001#2
BDT1, BDT2 to BDT9	Optional block skip signal	G044#0, G045
BGEACT	Background editing signal	F053#4
CLRCH 0 to 5	Torque limit condition signal	F180#0 to #5
CUT	Signal under cutting mode	F002#6
*DEC1 to *DEC6	Reference position return deceleration signal	X002#0 to #5 X1002#0 to #5
DEN	Distribution end signal	F001#3
DM00, DM01, DM02, DM30	M decode signals	F009#4 to #7
DPL0 to DPL2	Screen status signal	F254#0 to #2
DRN	Dry run signal	G046#7
DRNE	Dry run signal (Axis control by PMC)	G150#7
DTCH 1 to 6	Control axis detach signal	G124#0 to #5
EAX1 to EAX6	Controlled axis selection signal (Axis control by PMC)	G136# to #5
EAXSL	Control axis selection status signal	F129#7
EBSYA to EBSYF	Axis control command read signal (Axis control by PMC)	F130#7, F133#7, F136#7, F139#7, F228#7, F231#7
EBUFA to EBUFF	Axis control command completed signal (Axis control by PMC)	G142#7, G154#7, G166#7, G178#7, G226#7, G238#7

Symbol	Signal name	PMC address
(EC0A to EC6A) to (EC0F to EC6F)	Axis control command signal (Axis control by PMC)	G143#0 to #6, G155#0 to #6, G167#0 to #6, G179#0 to #6, G227#0 to #6, G239#0 to #6
ECKZA to ECKZF	Error zero checking signal (Axis control by PMC)	F130#1, F133#1, F136#1, F139#1, F228#1, F231#1
ECLRA to ECLRF	Reset signal (Axis control by PMC)	G142#6, G154#6, G166#6, G178#6, G226#6, G238#6
EDENA to EDENF	Miscellaneous function executing signal (Axis control by PMC)	F130#3, F133#3, F136#3, F139#3, F228#3, F231#3
EDG00 to EDG15	External punch start number signal (I/O device external control function)	G252, G253
EDGN	Diagnose selection signal (I/O device external control function)	G251#7
EDN00 to EDM15	Signal of external punch total number (I/O device external control function)	G254, G255
EFINA to EFINF	Miscellaneous function complete signal (Axis control by PMC)	G142#0, G154#0, G166#0, G178#0, G226#0, G238#0
EGENA to EGENF	Axis moving signal (Axis control by PMC)	F130#4, F133#4, F136#4, F139#4, F228#4, F231#4
EIALA to EIALF	Alarm signal (Axis control by PMC)	F130#2, F133#2, F136#2, F139#2, F228#2, F231#2
(EID0A to EID31A) to (EID0F to EID31F)	Axis move distance Dwell time Auxiliary function code (Axis control by PMC)	G146 to G149, G158 to G161, G170 to G173, G182 to G185, G230 to G233, G242 to G245
(EIF0A to EIF15A) to (EIF0F to EIF15F)	Feedrate (Axis control by PMC)	G144, G145, G156, G157, G168, G169, G180, G181, G228, G229, G240, G241
EINPA to EINPF	In-positioning signal (Axis control by PMC)	F130#0, F133#0, F136#0, F139#0, F228#0, F231#0
(EM11A to EM28A) to (EM11F to EM28F)	Miscellaneous BCD code (Axis control by PMC)	F132, F135, F138, F141, F230, F233
EMFA to EMFF	Miscellaneous function read signal (Axis control by PMC)	F131#0, F134#0, F137#0, F140#0, F229#0, F232#0
EMSBKA to EMSBKF	Block stop inhibit signal (Axis control by PMC)	G143#7, G155#7, G167#7, G179#7, G227#7, G239#7
EOTNA to EOTNF	Overtravel in regative direction signal (Axis control by PMC)	F130#6, F133#6, F136#6, F139#6, F228#6, F231#6
EOTPA to EOTPF	Overtravel in positive direction signal (Axis control by PMC)	F130#5, F133#5, F136#5, F139#5, F228#5, F231#5
EOVO	Override 0% signal (Axis control by PMC)	F129#5
EPARM	Parameter selection signal (I/O device external control function)	G251#6
EPCON	External pulse input/output signal	G066#6
ERS	External reset signal	G008#7
ESBKA to ESBKF	Block stop signal (Axis control by PMC)	G142#3, G154#3, G166#3, G178#3, G226#3, G238#3
ESOFA to ESOFF	Servo off signal (Axis control by PMC)	G142#4, G154#4, G166#4, G178#4, G226#4, G238#4

Symbol	Signal name	PMC address
*ESP	Emergency stop signal	X008#4, X000#4 or X1000#4
ESTPA to ESTPF	Axis control stop signal (Axis control by PMC)	G142#5, G154#5, G166#5, G178#5, G226#5, G238#5
EVAR	Variable selection signal (I/O device external control function)	G251#5
EXF1 to EXF5	Speed changing function	X000#0, #1, #2, X011#4, #5, X1000#0, #1, #2
EXPRG	Program selection signal (I/O device external control function)	G251#4
EXRD	External read start signal	G058#1
EXSTP	External read/punch stop signal	G058#2
EXWT	External punch start signal	G058#3
FIN	M,S,T,B function end signal	G004#3
*FLWU	Follow-up signal	G007#5
*FV0 to *FV7	Feedrate override signal	G012
*FV0E to *FV7E	Override signal (Axis control by PMC)	G151
HS1A, HS1B, HS1C	Manual handle feed axis select signal	G018#0, #1, #2
IGNVRY	Speed control servo alarm ignore signal	G066#0
INP1 to INP6	In-position signals	F104#0 to #5
IPL1 to IPL6	Distribution signal (axis status signal)	F220#2 to F225#2
*IT	Interlock signal	G008#0
*IT1 to *IT6	Axis interlock signal	G130#0 to G130#5
+J1 to +J6, J1 to -J6	Feed axis direction select signal	G100#0 to G100#5 G102#0 to G102#5
*JV0 to *JV15	Manual feedrate override signal	G010, G011
K0 to K9, KMNS, KPRD, KNO, KSLH, KEOB, KCAN, KALT, KINS, KDLT, KINP, KWRT, KRED, KPOS, KPRG, KVAR, KPRM, KALM, KDWN, KUP, KP, KQ, KH, KO, KN, KG, KR, KX, KF, KM, KS, KT, KSHRP	Key data reference function by PMC	F210 to F218
KEY1, KEY2, KEY3, KEY4	Memory protection key	G046#3 to #6
+LM1 to +LM6 -LM1 to -LM6	Software limit external setting	G110#0 to G110#5 G112#0 to G112#5
M00 to M31	Miscellaneous function code signal	F010 to F013
MA	Ready signals	F001#7
MAUT	Auto confirmation signal	F003#5
MD1, MD2, MD4	Mode select signal	G043#0 to #2
MDTCH1 to MDTCH6	Controlled axis detach status signal	F110#0 to F110#5
MEDT	Memory edit select check signal (EDIT)	F003#6
MF	M code output complete signal	F007#0
MFIN	M function complete signal	G005#0
MI1 to MI6	Mirror image signal	G106#0 to G106#5
+MIT1 to +MIT6, -MIT1 to -MIT6	Interlock signal for each axis and direction	G132#0 to G132#5 G134#0 to G134#5
MJ	JOG feed select check signal (JOG)	F003#2
MLK	Machine lock signal	G044#1
MMDI	Manual data input select check signal (MDI)	F003#3
MP1, MP2	Incremental feed magnification signal	G019#4, #5
MSTP	Step feed confirmation signal	F003#0

Symbol	Signal name	PMC address
MTCHIN	TECH IN JOG and STEP select check signal	F003#7
MVD1 to MVD6	Moving direction signals	F106#0 to F106#5
MZRN	Manual reference position return confirmation signal	F004#5
OP	Automatic operation signal	F000#7
OVC	Override cancel signal	G006#4
OVCE	Override cancellation signal	G150#5
PAL0 to PAL6	Alarm number specification signal (Display of alarms from PMC)	G225#0 to G225#6
PALM	PMC alarm generation selection signal (Display of alarms from PMC)	G225#7
PN0 to PN7	Workpiece number search signal	G009
*RILK	High-speed interlock signal	X000#6, X1000#6,
RLSOT	Software limit external signal	G007#7
ROV1, ROV2	Rapid traverse override signal	G014#0, #1
ROV1E, ROV2E	Rapid traverse override signal (Axis control by PMC)	G150#0, #1
RPALM	Read/punch alarm signal	F053#3
RPBSY	Reading/punching signal	F053#2
RRW	Reset & rewind signal	G008#6
RST	CNC reset signal	F001#1
RT	Manual rapid traverse select signal	G019#7
RTN 11 to RTN 16	Return signal	G206#0 to G211#0
RWD	Rewinding signal	F000#0
RTE	Manual rapid traverse signal (Axis control by PMC)	G150#6
SA	Servo ready signal	F000#6
SBK	Single block signal	G046#1
SKIP, SKIP2, SKIP3, SKIP4	Skip signal	X000#7, #0, #1, #2 X1000#7, #0, #1, #2
SKIPP	Skip signal from PMC	G212#7
*SP	Feed hold signal	G008#5
SPL	Feed hold lamp signal	F000#4
ST	Cycle start signal	G007#2
STL	Cycle start lamp signal	F000#5
SUP1 to SUP6	Acceleration/deceleration signal (axis motion status signal)	F220#1 to F225#1
SVER1 to SVER6	Servo position deviation monitor signal	F220#3 to F225#3
SVF1 to SVF6	Servo off signal	G126#0 to G126#6
TRQ1E to TRQ6E	Torque limit enable signal	G216#0 to G216#5
TRQ10 to TRQ67	Torque limit signal	G217#0 to G222
UI0 to UI15	Input signal for custom macro	G054, G055
UINT	Interrupt signal for custom macro	G053#3
UO0 to UO15 UO100 to UO131	Output signal for custom macro	F054, F055, F056 to F059
WAT1 to WAT4	Waiting signal (waiting function)	F209#0 to #3
WFN1 to WFN4	Waiting complete signal (waiting function)	G214#0 to #3
WVRDY	Waiting V-READY signal	F209#4
ZP1 to ZP6	Reference position return end signal	F094#0 to F094#5
ZP21 to ZP26	2nd reference position return end signal	F096#0 to F096#5
ZP31 to ZP36	3rd reference position return end signal	F098#0 to F098#5

Symbol	Signal name	PMC address
ZPEXT1 to ZPEXT6	Reference position external setting signal	G206#6 to G211#6
ZR1 to ZR6	Dogless reference position setting signal	G206#4 to G211#4
ZRF1 to ZRF6	Reference position establishment signal	F120#0 to F120#5
ZRN	Manual reference position return selection signal	G043#7

5

DIGITAL SERVO



This chapter describes servo tuning screen required for maintenance of digital servo and adjustment of reference position.

- 5.1 INITIAL SETTING SERVO PARAMETERS**
- 5.2 SERVO TUNING SCREEN**
- 5.3 ADJUSTING REFERENCE POSITION (DOG METHOD)**
- 5.4 DOGLESS REFERENCE POSITION SETTING**

5.1 INITIAL SETTING SERVO PARAMETERS



This section describes how to set initial servo parameters, which is used for field adjustment of tool.

A servo adjustment screen is not provided by the DPL/MDI.

1. Turn on power at the emergency stop condition.
2. Set the parameter to display the servo tuning screen.

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

- #0 (SVS)** 0 : Servo tuning screen is not displayed.
1 : Servo tuning screen is displayed.

3. Turn off the power once then turn it on again.
4. Display the servo parameter setting screen by the following operation:  key  [SV.PARA].
5. Input data required for initial setting using the cursor and page key.

SERVO SETTING			
	X AXIS	Y AXIS	
(1) INITIAL SET BIT	00000000	00000000	⇐ PRM 2000
(2) MOTOR ID NO.	47	47	⇐ PRM 2020
(3) amr	00000000	00000000	⇐ PRM 2001
(4) cmr	2	2	⇐ PRM 1820
(5) FEED GEAR N	1	1	⇐ PRM 2084
(6) (N/M) M	125	125	⇐ PRM 2085
(7) DIRECTION SET	111	111	⇐ PRM 2022
(8) VELOCITY PULSE NO.	8192	8192	⇐ PRM 2023
(9) POSITION PULSE NO.	12500	12500	⇐ PRM 2024
(10) REF.COUNTER	8000	8000	⇐ PRM 1821

(1) INITIAL SET BIT

	#7	#6	#5	#4	#3	#2	#1	#0
2000					PRMCAL		DGPRM	PLC01

- #3 (PRMCAL)** 1 : Turns to 1 when the initial setting is done.
The following parameters are set automatically in accordance with the no. of pulses of pulse coder:
PRM 2043(PK1V), PRM 2044(PK2V),
PRM 2047(POA1), PRM 2053(PPMAX),
PRM 2054(PDDP), PRM 2056(EMFCMP),
PRM 2057(PVPA), PRM 2059(EMFBAS),
PRM 2074(AALPH),PRM 2076(WKAC)
- #1 (DGPRM)☆** 0 : Initial setting of digital servo parameter is done.
1 : Initial setting of digital servo parameter is not done.
- #0 (PLC01)** 0 : Values of parameter 2023 and 2024 are used as they are:
1 : Values of parameter 2023 and 2024 are multiplied by 10.

(2) MOTOR NUMBER

DGN

2020

Motor type no. per axis

Motor type no. that can be set are 3 to 62.

Format number	3	4	5	7	8	9
Model name	α 12HV	α 22HV	α 30HV	α C3/2000	α C6/2000	α C12/2000
Drawing number	0176	0177	0178	0142	0123	0127

Format number	10	13	15	16	17	18
Model name	α C22/1500	α 0.5	α 3/3000	α 6/2000	α 6/3000	α 12/2000
Drawing number	0128	0142	0123	0127	0128	0142

Format number	19	20	21	22	23	24
Model name	α 12/3000	α 22/2000	α 22/3000	α 30/2000	α 30/3000	α M3/3000
Drawing number	0143	0147	0148	0152	0153	0161

Format number	25	26	27	28	29	30
Model name	α M6/3000	α M9/3000	α 22/1500	α 30/1200	α 40/2000 with FAN	α 40/2000 without FAN
Drawing number	0162	0163	0146	0151	0158	0157

Format number	33	34	35	36	46	56
Model name	α E3/2000 β 3/2000	α E6/2000 β 6/2000	α E1/3000 β 1/3000	α E2/3000 β 2/3000	α 2/2000	α L3/2000
Drawing number	0105	0106	0101	0102	0372	0561

Format number	57	58	59	60	61	62
Model name	α L6/3000	α L9/3000	α L25/3000	α L50/2000	α 1/3000	α 2/3000
Drawing number	0562	0564	0571	0572	0371	0373

(3) CMR

DGN	1820	Command multiply ratio
-----	------	------------------------

- 1 When CMR is 1/2 to 1/27 Set value= $\frac{1}{\text{CMR}} + 100$
- 2 When CMR is 1 to 48 Set value= $2 \times \text{CMR}$

(4) Turn off power once, then turn it to on.

(5) Feed gear n/m

PRM	2084	n of flexible feed gear
-----	------	-------------------------

PRM	2085	m of flexible feed gear
-----	------	-------------------------

1) For serial pulse coder A or B, and serial a pulse coder.

$$\frac{n}{m} = \frac{\text{No. of feedback pulses per revolution of motor}}{1000000}$$

For serial pulse coder B, set 250,000 pulses or less to parameter 2084.

Examples of calculation

		1/1000 mm
1 rotation of motor	8mm	n=1/m=125
	10mm	n=1/m=100
	12mm	n=3/m=250

2) For serial pulse coder C

$$\frac{n}{m} = \frac{\text{No. of feedback pulses per revolution of motor}}{40000}$$

Examples of calculation

		1/1000 mm
1 rotation of motor	8mm	n=1/m=5
	10mm	n=1/m=4
	12mm	n=3/m=10

(6) Direction of Travel

PRM	2022	Direction of motor rotation
-----	------	-----------------------------

111 : Positive (CCW) -111 : Reverse (CW)

(7) No. of velocity pulses and position pulses

1) For serial pulse coder A or B and serial α pulse coder

	Parameter no.	Resolution 1/1000mm	
High resolution setting	2000	xxxx xxx 0	
Separate detector	1815	00100010	00100000
Velocity feedback pulses	2023	8192	
Position feedback pulses	2024	12500	

2) For serial pulse coder C

	Parameter no.	Resolution 1/1000mm
High resolution setting	2000	xxxx xxx1
Velocity feedback pulses	2023	4000
Position feedback pulses	2024	4000

For 5-0S to 3-0S motor, since the no. of poles is different, set parameter 2001.

(8) Reference counter

PRM

1821

Reference counter capacity(0 to 99999999)

1. Turn off power then turn on power.

5.2 SERVO TUNING SCREEN



5.2.1 Parameter Setting

Set a parameter to display the servo tuning screen.
A servo adjustment screen is not provided by the DPL/MDI.

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

#0 (SVS) 0 : Servo tuning screen is not displayed.
1 : Servo tuning screen is displayed.

5.2.2 Displaying Servo Tuning Screen

- Press  key  and soft key [SV. PARA] in this order.
- Press soft key [SV.TUN] to select the servo tuning screen.

SERVO TUNING				01234 N12345	
(PARAMETER)				(MONITOR)	
(1) FUN.BIT	00000000	ALARM 1	00000000	(9)	
(2) LOOP GAIN	3000	ALARM 2	00000000	(10)	
(3) TURNING SET.	0	ALARM 3	10000000	(11)	
(4) SET PERIOD	50	ALARM 4	00000000	(12)	
(5) INT.GAIN	113	ALARM 5	00000000	(13)	
(6) PROP.GAIN	-1015	LOOP GAIN	2999	(14)	
(7) FILTER	0	POS ERROR	556	(15)	
(8) VELOC.GAIN	125	CURRENT%	10	(16)	
		SPEED RPM	100	(17)	
<div> <div>[SV SET]</div> <div>[SV TUN]</div> <div>[]</div> <div>[]</div> <div>[OPE]</div> </div>					

- Function bit : PRM 2003
- Loop gain : PRM 1825
- Tuning start : (Used by automatic servo tuning function)
- Set period : (Used by automatic servo tuning function)
- Integral gain : PRM 2043
- Proportional gain : PRM 2044
- Filter : PRM 2067
- Velocity gain : Set value= $\frac{(\text{PRM } 2021)+256}{256} \times 100$
- Alarm 1 : DGN 200 (Details of alarm 400 and 414)
- Alarm 2 : DGN 201 (Details of disconnection alarm, overload)
- Alarm 3 : DGN 202 (Details of alarm 319)
- Alarm 4 : DGN 203 (Details of alarm 319)
- Alarm 5 : DGN 204 (Details of alarm 414)
- Loop gain : Actual loop gain
- Position error : Actual position error(DGN 300)
- Current(%) : Indicate current with % to the rated value.
- Speed RPM : Number of motor actual rotation

	#7	#6	#5	#4	#3	#2	#1	#0
Alarm1	OVL	LV	OVC	HCA	HVA	DCA	FBA	OFA

DGN (200) :

- #7 (OVL) :** Overload alarm
- #6 (LV) :** Insufficient voltage alarm
- #5 (OVC) :** Overcurrent alarm
- #4 (HCA) :** Abnormal current alarm
- #3 (HVA) :** Excessive voltage alarm
- #2 (DCA) :** Discharge alarm
- #1 (FBA) :** Disconnection alarm
- #0 (OFA) :** Overflow alarm

	#7	#6	#5	#4	#3	#2	#1	#0
Alarm2	ALD			EXP				

DGN (201) ↓

↓

Over-load alarm	0	—	—	—	Amplifier overheat			
	1	—	—	—	Motor overheat			
Disconnection alarm	1	—	—	0	Built-in pulse coder disconnection (Hardware)			
	0	—	—	0	Pulse coder disconnection (software)			

	#7	#6	#5	#4	#3	#2	#1	#0
Alarm3		CSA	BLA	PHA	RCA	BZA	CKA	SPH

DGN (202) :

- #6 (CSA) :** Hardware of serial pulse coder is abnormal.
- #5 (BLA) :** Battery voltage is in low (warning).
- #4 (PHA) :** Serial pulse coder or feedback cable is abnormal.
Counting the feedback signal is in error.
- #3 (RCA) :** Serial pulse coder is faulty.
Counting is in error.
If the RCA bit is set to 1 when both the FBA bit (bit 1 of alarm 1) and ALD bit of alarm 2 are set to 1 and the EXP bit of alarm 2 (internal hardware disconnection) is set to 1, a count miss alarm (CMAL) occurs in the α pulse coder.
- #2 (BZA) :** Battery voltage becomes 0.
Replace batteries and set the reference position.
- #1 (CKA) :** Serial pulse coder is faulty.
Internal block has stopped.
- #0 (SPH) :** Serial pulse coder or feedback cable is faulty.
Counting the feedback signal is in error.

	#7	#6	#5	#4	#3	#2	#1	#0
Alarm4	DTE	CRC	STB					

DGN (203) :

#7 (DTE) : Communication error of serial pulse coder.
There is no response.

#6 (CRC) : Communication error of serial pulse coder.
Transmitted data is in error.

#5 (STB) : Communication error of serial pulse coder.
Transmitted data is in error.

	#7	#6	#5	#4	#3	#2	#1	#0
Alarm5		OFS	MCC	LDM	PMS			

DGN (204) :

#6 (OFS) : A/D conversion of current value of digital servo is abnormal.

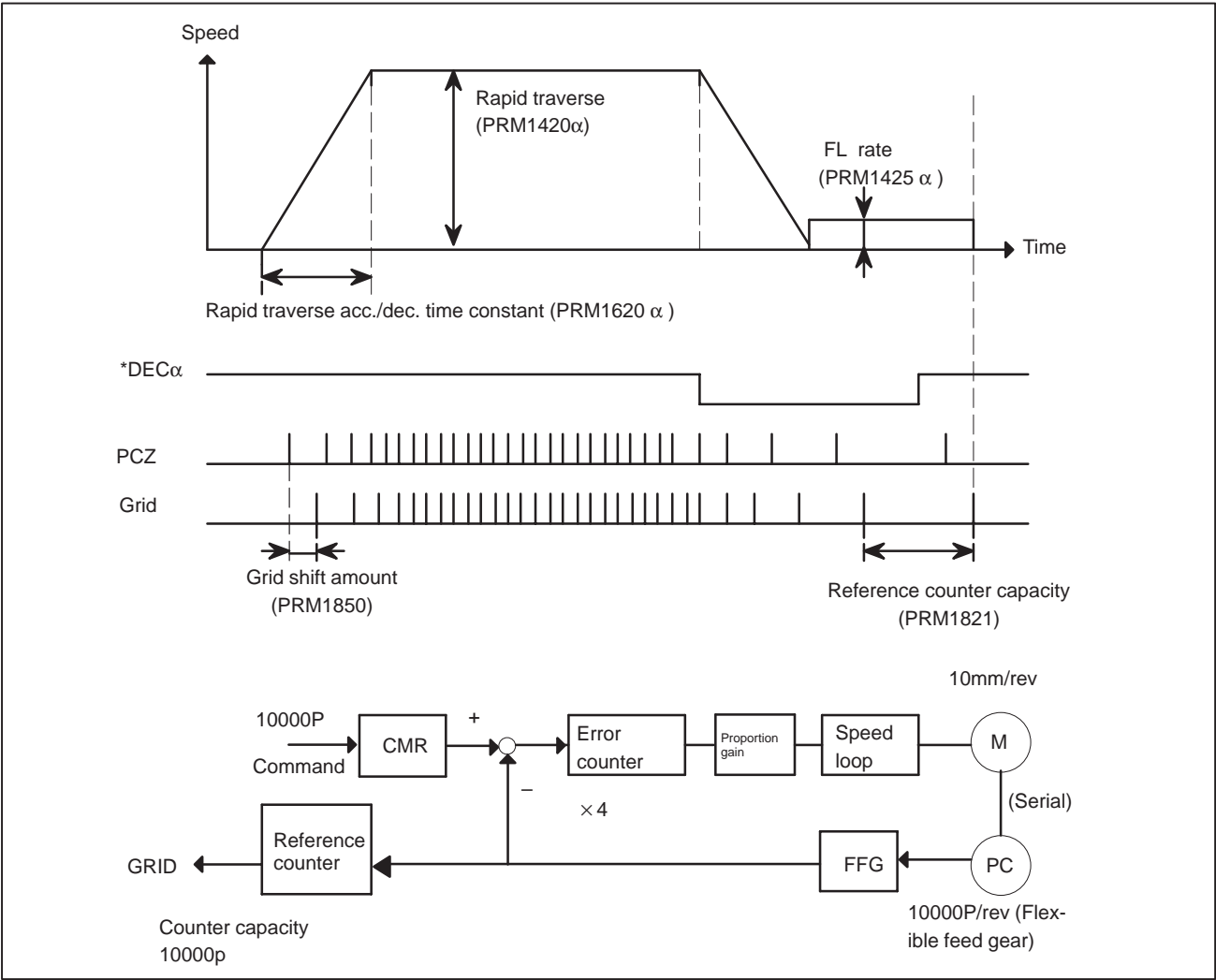
#5 (MCC) : Contacts of electro-magnetic contactor of servo amplifier is blown

#4 (LDM) : LED of serial pulse coder is abnormal.

#3 (PMS) : No. of feedback pulses are in error because serial pulse coder C or feedback cable is faulty.

5.3
ADJUSTING
REFERENCE
POSITION
(DOG METHOD)

5.3.1
General



● Parameter

		#7	#6	#5	#4	#3	#2	#1	#0
PRM	1005							DLZx	

#1(DLZx)☆ 0 : Reference position return method is normal (dog).
1 : Dogless reference position setting is used.

PRM	1821	Reference counter capacity [P]							
-----	------	--------------------------------	--	--	--	--	--	--	--

No. of feedback pulses or its division by an integer is set.

PRM	1850	Grid shift amount per axis [P]
-----	------	--------------------------------

		#7	#6	#5	#4	#3	#2	#1	#0
PRM	1815			APC	APZ				

- #5(APC)

0 : Position detector is other than absolute pulse coder.
1 : Position detector is absolute pulse coder.
- #4(APZ)

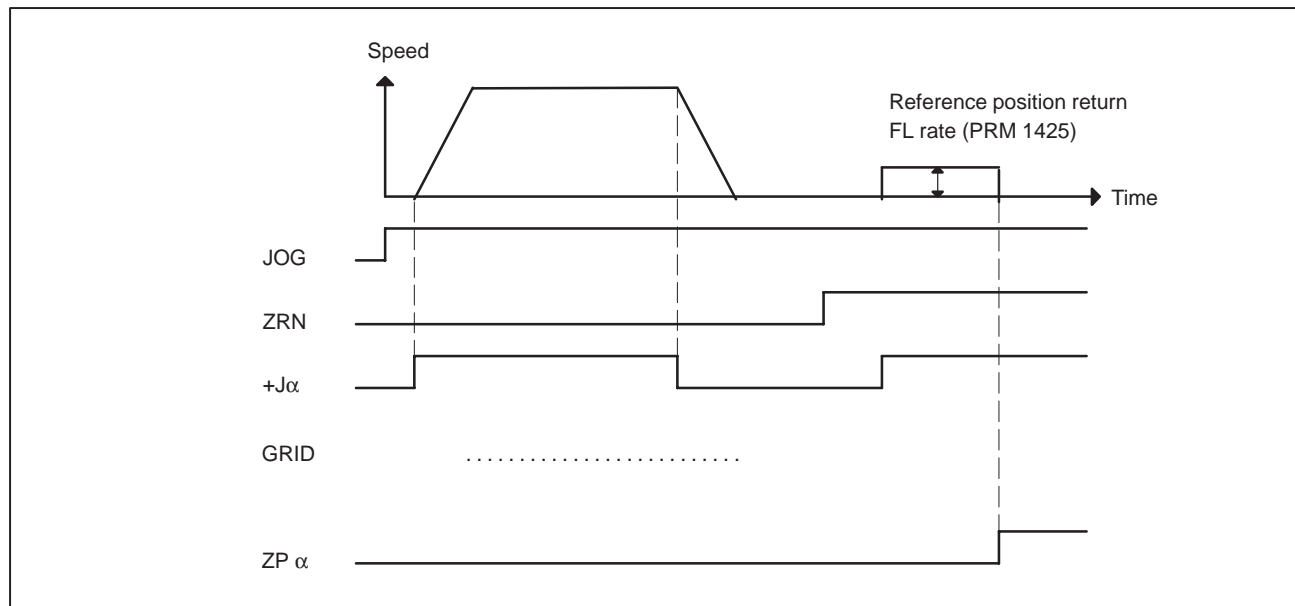
Zero position of absolute pulse coder is:
0 : Not established
1 : Established
(Turns to 1 after establishment)
To manually change the value of the APZ bit from 0 to 1 without first returning to the reference position when using serial pulse coder α , follow this procedure: Back up the data with the battery and give the motor one or more turns.
Turn the power off then on again, then change the APZ bit setting from 0 to 1.

5.4 DOGLESS REFERENCE POSITION SETTING

When there are no dog nor limit switch for reference position return, this function enables the tool to return the reference position that is set by MTB.

When the absolute position detector is used, the reference position once set remains also during power off. When the absolute detector is replaced or absolute position is lost, perform this setting.

5.4.1 General



5.4.2 Operation

- 1 Move the tool near the reference position using a manual operation.
- 2 Select the reference position return mode or switch.
- 3 Press a button for an axis-and-direction-select-signal + or –, and the machine moves to the next grid, then stops.
(This position is set as the reference position).
After the reference position has been set, select the reference position return mode (ZRN signal is 1) and turn on an axis-and-direction-select signal, then the tool returns to the reference position.

5.4.3
Associated Parameters

		#7	#6	#5	#4	#3	#2	#1	#0
PRM	1005							DLZx	

- #1(DLZx) 0 : Dog is used for reference position return
- ☆ 1 : Dogless reference position setting

		#7	#6	#5	#4	#3	#2	#1	#0
PRM	1006			ZMI					

- #5(ZMI) 0 : Reference position return and backlash initial direction is +.
 - 1 : Reference position return and backlash initial direction is -.
- After ZRN signal becomes 1, manual feed direction is always the direction set by this parameter irrespective of an axis selection signal.

6 TROUBLESHOOTING

This chapter describes troubleshooting procedure.

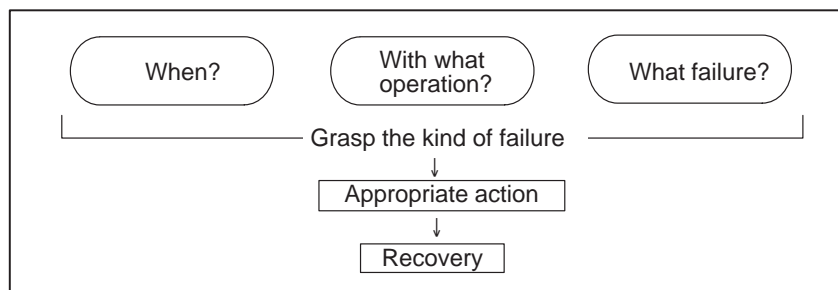
- 6.1 CORRECTIVE ACTION FOR FAILURES**
- 6.2 POWER CANNOT BE TURNED ON**
- 6.3 NO MANUAL OPERATION NOR AUTOMATIC OPERATION CAN BE EXECUTED**
- 6.4 JOG OPERATION CANNOT BE DONE**
- 6.5 EXTERNAL PULSE INPUT FUNCTION (SINGLE PHASE INPUT TYPE) CANNOT BE USED**
- 6.6 AUTOMATIC OPERATION CANNOT BE DONE**
- 6.7 CYCLE START LED SIGNAL HAS TURNED OFF**
- 6.8 WHEN MANIPULATION IS NOT POSSIBLE WITH THE CRT/MDI**
- 6.9 ALARM 85 TO 87 (READER/PUNCHER INTERFACE ALARM)**
- 6.10 REFERENCE POSITION DEVIATES**
- 6.11 ALARM 90 (REFERENCE POSITION RETURN IS ABNORMAL)**
- 6.12 ALARM 300 (REQUEST FOR REFERENCE POSITION RETURN)**
- 6.13 ALARM 301 TO 305 (ABSOLUTE PULSE CODER IS FAULTY)**
- 6.14 ALARM 306 TO 308 (ABSOLUTE PULSE CODER BATTERY IS LOW)**
- 6.15 ALARM 350 (SERIAL PULSE CODER IS ABNORMAL)**
- 6.16 ALARM 351 (SERIAL PULSE CODER COMMUNICATION IS ABNORMAL)**
- 6.17 ALARM 400 (OVERLOAD)**
- 6.18 ALARM 401 (*DRDY SIGNAL TURNED OFF)**
- 6.19 ALARM 404 AND 405 (*DRDY SIGNAL TURNED ON, REFERENCE POSITION RETURN ABNORMAL)**
- 6.20 ALARM 410 (EXCESSIVE POSITION ERROR AMOUNT DURING STOP)**

- 6.21 ALARM 411 (EXCESSIVE POSITION ERROR DURING MOVE)**
- 6.22 ALARM 414 (DIGITAL SERVO SYSTEM IS ABNORMAL)**
- 6.23 ALARM 416 (DISCONNECTION ALARM)**
- 6.24 ALARM 417 (DIGITAL SERVO SYSTEM IS ABNORMAL)**
- 6.25 ALARM 700 (OVERHEAT AT CONTROL SIDE)**
- 6.26 ALARM 900 (ROM PARITY ERROR)**
- 6.27 ALARM 912 TO 913 (RAM PARITY)**
- 6.28 ALARM 920 TO 922 (WATCH DOG OR RAM PARITY)**
- 6.29 ALARM 924 (SERVO MODULE MOUNTING ERROR)**
- 6.30 ALARM 930 (CPU ERROR)**
- 6.31 ALARM 950 (PMC SYSTEM ALARM)**
- 6.32 ALARM 970 (NMI ALARM IN PMC MODULE)**
- 6.33 ALARM 971 (NMI ALARM IN SLC)**
- 6.34 ALARM 973 (NMI ALARM BY UNKNOWN CAUSE)**
- 6.35 NO SIGNAL CHANGE IN FANUC I/O LINK MASTER**

6.1 CORRECTIVE ACTION FOR FAILURES

When a failure occurs, it is important to correctly grasp what kind of failure occurred and take appropriate action, to promptly recover the machine.

Check for the failure according to the following procedure :



6.1.1 Investigating the Conditions under which Failure Occurred

- (1) When and how many times (frequency of occurrences)
- (2) With what operation
- (3) What failure occurred

- 1 When did the failure occur?
 - Date and time?
 - Occurred during operation? (how long was the operation?)
 - Occurred when the power was turned on?
 - Was there any lightening surge, power failure, or other disturbances to the power supply?
How many times has it occurred
 - Only once?
 - Occurred many times ? (How many times per hour, per day, or per month?)
 - 2 With what operation did it occur ?
 - What was the Power Mate mode when the failure occurred?
Jog mode/AUTO operation mode /MDI mode /reference position return mode
 - If during program operation,
 - 1) Where in the program ?
 - 2) Which program No. and sequence No. ?
 - 3) What program ?
 - 4) Occurred during axial movement ?
 - 5) Occurred during the execution of an M code ?
 - 6) Failure specific to the program ?
 - Does the same operation cause the same failure ?
(Check the repeatability of the failure.)
 - Occurred during data input/output ?
- <Feed axes>
- For a failure related to feed axis servo
 - 1) Occurred at both low feedrate and high feedrate ?
 - 2) Occurred only for a certain axis ?

- 3 What failure occurred ?
 - Which alarm was displayed on the alarm display screen on the CRT or DPL?
(Check the axis along which an alarm has occurred for alarms 300 to 599.)
 - For alarm 350 : Examine diagnostic 202
 - For alarm 351 : Examine diagnostic 203
 - For alarm 414 : What does diagnostic display 200,201,204 indicate ?
 - Is the CRT or DPL screen correct ?
 - If machining dimensions are incorrect
 - 1) How large is the error ?
 - 2) Is the position display on the CRT correct ?
 - 3) Are the offsets correct ?
- 4 Other information
 - Is there noise origin around machine?
If the failure has not occurred frequently, the cause may be external noise to the power supply or inductive noise on machinery cables. Operate other machines connected to the same power line and see if noise come from the relays or compressors.
 - Is it taken any countermeasure for noise in machine side?
Refer to subsec. 2.2.3.
 - Check the following for the input power supply voltage :
 - 1) Is there variation in the voltage ?
 - 2) Are the voltages different depending on the phase ?
 - 3) Is the standard voltage supplied ?
 - How high is the ambient temperature of the control unit?
(0°C to 55°C during operation)
Refer to manual about noise.
 - Has excessive vibration been applied to the control unit?
(0.5 G or less during operation)
- 5 When you contact our service center, specify the following items :
 - 1) Name of the unit
 - 2) Name of the machine tool builder and type of machine
 - 3) Software series/version of the Power Mate
 - 4) Specifications of the servo amplifier
 - 5) Name and contact of the person who is most familiar with the failure conditions
(for a failure related to the servo)
 - See the drawing issued by the machine tool builder for the locations of the Power Mate and servo/spindle amplifiers.
 - We use the following specification codes :
 Servo amplifier : A06B-□□□□-H□□□
 Servo motor : A06B-□□□□-B□□□
 (□ represents a number)

The above information is required by FANUC to determine the cause of the failure. The information is used to attempt to reproduce the failure at the service center.

6.2

POWER CANNOT BE TURNED ON

Points

Confirm the green LED EN on the front of controller.

When green LED EN is turned on, power of Power Mate is ON.

Causes and Remedies

- (1) Fuse F1 on the controller front panel is blown.
 - (a) Input power voltage is too high.
 - (b) External 24DCV power supply is faulty.
 - (c) 24-V power line short-circuit (line-to-line or line-to-ground)
- (2) Input voltage is low

Measure voltage at S terminals of 0V and 24V to confirm 24VDC \pm 100 % is supplied.
If it is not normal, check machine side magnetics circuit.
- (3) Power supply PC board in controller is faulty.

When 24 V is found to be input normally in step (2), but 5 V is not output to the 0 V and 5 V terminals, the power PCB in the controller may be defective.
- (4) Power leakage from other units

Disconnect all cables other than the power cable of the Power Mate, then retry. When no defective condition is encountered, connect the cables one by one to determine which one causes a failure.

6.3

NO MANUAL OPERATION NOR AUTOMATIC OPERATION CAN BE EXECUTED

Points

- (1) Execute the following procedure when no manual nor automatic operation is done
- (2) Check whether position display shows correct position
- (3) Check Power Mate status display
- (4) Check Power Mate internal status using diagnostic function

Causes and Countermeasures

1. Position display (relative, absolute, machine coordinate) does not change

- (1) Check CNC status display (Refer to **1.7 Power Mate STATUS DISPLAY FOR DETAIL**)

- (a) Emergency stop status (Emergency stop signal is turned on)

If status display shows **EMG** the emergency stop signal is input. Check the following signal using the PMC's diagnostic function (PMCDGN).

- 1 When emergency stop is input from built-in I/O card internal I/O (Parameter No.3001#3=1).

	#7	#6	#5	#4	#3	#2	#1	#0
X1000				*ESP				
G0008				*ESP				

ESP=0 indicates that emergency stop signal is input.

- 2 When emergency stop is input from I/O card (Parameter No.3001#3=0). (FANUC I/O Link)

	#7	#6	#5	#4	#3	#2	#1	#0
X1000				*ESP				
G0008				*ESP				

ESP=0 indicates that emergency stop signal is input.

- (b) It is a reset status

When RESET is displayed, any of a reset is functioned. Check the following signal using the PMC's diagnostic function (PMCDGN).

- 1 An input signal from the PMC functions

	#7	#6	#5	#4	#3	#2	#1	#0
G0008	ERS	RRW						

When ERS is 1, external reset signal is input.

When RRW is 1, reset & rewinding signal is input.

- 2  key on the MDI keyboard functions

When the signals in 1 are 0,  key may be functioning.

Check the contact of the  key using a tester, or disconnect the CRT/MDI panel etc.

When it is abnormal, change the keyboard.

(c) Confirm the status of modes

Operation mode status is displayed on the lower part of CRT as follows :

If nothing is displayed, mode select signal is not input. Check mode select signal using PMC's diagnostic function (PMCDGN).

For details, refer to section **1.7 Power Mate STATUS DISPLAY**.

(Example of display)

JOG : Manual continuous feed (JOG) mode

STEP : Step feed (STEP)

MDI : Manual data input (MDI) mode

AUTO : Automatic operation (Memory) mode

EDIT : EDIT (Memory edit) mode

<Mode select signal>

	#7	#6	#5	#4	#3	#2	#1	#0
G0043						MD4	MD2	MD1
						↓	↓	↓
Manual continuous (JOG) mode						1	0	1
Step feed (STEP) mode						1	0	0
Manual data input (MDI) mode						0	0	0
Automatic operation (AUTO) mode						0	0	1
EDIT (Memory edit) mode						0	1	1
TEACH IN STEP						1	1	1
TEACH IN JOG						1	1	0

(2) Check diagnostic data 000 to 025 of the CNC Check an item for which 1 is displayed

No.	Message	Display
000	WAITING FOR FIN SIGNAL	: 0
001	MOTION	: 0
002	DWELL	: 0
a.003	IN-POSITION CHECK	: 0
004	FEEDRATE OVERRIDE 0%	: 0
b.005	INTERLOCK	: 1
010	PUNCHING	: 0
011	READING	: 0
012	WAITING FOR (UN) CLAMP	: 0
c.013	JOG FEEDRATE OVERRIDE 0%	: 0
d.014	WAITING FOR RESET, ESP, RRW OFF	: 0
015	EXTERNAL PROGRAM NUMBER SEARCH	: 0

Items with a to d relate with manual and automatic operation and its detail is shown below.

a. In-position check is being done

It shows that positioning is not yet completed. Check the contents of the following diagnostic number. (It is 1 in the following condition)

DGN 0300 Position Error >PARAM 1826 In-position width

- 1 Check the parameters according to the parameter list

1825	Servo loop gain per axis (Normal : 3000)
------	--

- 2 Servo system may be abnormal. Refer to alarm 400, 410, and 411.

b. Interlock signal is input

There are a plural interlock signals. Check at first which interlock signal is used by the machine tool builder at the parameters shown below.

	#7	#6	#5	#4	#3	#2	#1	#0
3003					DIT	ITX	HITL	ITL

#0 ITL=0 shows interlock signal *IT is effective. To 1

#1 HITL = 1 shows interlock signal *RILK is effective. To 2

#2 ITX=0 shows interlock signal *ITn is effective. To 3

#3 DIT=0 shows interlock signal \pm MITn is effective. To 4

Check state of effective interlock signals using the diagnostic function (PMCDGN) of the PMC.

- 1 Interlock signal (*IT) is input

	#7	#6	#5	#4	#3	#2	#1	#0
G0008								*IT

*IT=0 shows that interlock signal is input.

- 2 High-speed interlock signal (*RILK) is input.

	#7	#6	#5	#4	#3	#2	#1	#0
X0000 or X1000		*RILK						

*RILK = 0 shows interlock signal is input.

- 3 Axis interlock signal (*ITn) is input

	#7	#6	#5	#4	#3	#2	#1	#0
G0130			*IT6	*IT5	*IT4	*IT3	*IT2	*IT1

*ITn=0 shows interlock signal is input.

- 4 Interlock signal per axis and direction (\pm MITn) is input

	#7	#6	#5	#4	#3	#2	#1	#0
G0132			+MIT6	+MIT5	+MIT4	+MIT3	+MIT2	+MIT1

G0134			-MIT6	-MIT5	-MIT4	-MIT3	-MIT2	-MIT1
-------	--	--	-------	-------	-------	-------	-------	-------

\pm MITn=1 shows interlock signal per axis and direction is input.

c. Jog feedrate override is 0%

Check the signals using PMC's diagnostic function (PMCDGN)

	#7	#6	#5	#4	#3	#2	#1	#0
G0010	*JV7	*JV6	*JV5	*JV4	*JV3	*JV2	*JV1	*JV0

G0011	*JV15	*JV14	*JV13	*JV12	*JV11	*JV10	*JV9	*JV8
-------	-------	-------	-------	-------	-------	-------	------	------

When the override is 0% all bits of the above address becomes

1111 1111 or 0000 0000.

*JV15 JV0	Override
1111 1111 1111 1111	0.00%
1111 1111 1111 1110	0.01%
⋮	⋮
1101 1000 1110 1111	100.00%
⋮	⋮
0000 0000 0000 0001	655.34%
0000 0000 0000 0000	0.00%

- d. Power Mate is in a reset state
- 2. When machine coordinate value does not update on position display

In this case, RESET is also displayed on the status display. Check it using the procedure of 1 above.

(1) Machine lock signal (MLK) is input.

	#7	#6	#5	#4	#3	#2	#1	#0
G0044							MLK	

MLK : All axes machine lock
When the signal is 1, the corresponding machine lock signal is input.

6.4

JOG OPERATION CANNOT BE DONE

Points

- (1) Check whether position display is operating.
- (2) Check status display
- (3) Check internal status using Diagnostic function

Causes and Remedies

1. Position display (relative, absolute, machine coordinate) does not change

- (1) Check mode selection status (JOG mode is not selected)
When status display shows JOG, it is normal.
When status display does not show JOG, mode select signal is not selected correctly. Confirm the mode select signal using PMC's diagnostic function (PMCDGN).

<Mode select signal>

	#7	#6	#5	#4	#3	#2	#1	#0
G0043						MD4	MD2	MD1
						↓	↓	↓
	Manual operation (JOG) mode					1	0	1

- (2) Feed axis and direction select signal is not input Check the signal using PMC's diagnostic function (PMCDGN).

	#7	#6	#5	#4	#3	#2	#1	#0
G0100			+J6	+J5	+J4	+J3	+J2	+J1
G0102			-J6	-J5	-J4	-J3	-J2	-J1

$\pm Jn=1$ shows feed axis and direction select signal is input.

Example)

When +X button is pressed on the operator's panel, signal+J1 turns to 1.

This signal is effected at its rise. If axis selection signal is input before JOG mode is selected, axis movement does not occur. Turn the signal to off, then on.

- (3) Check CNC's diagnostic function 000 to 015. Check the items for which 1 is displayed at right side.

No.	Message	Display
000	WAITING FOR FIN SIGNAL	: 0
001	MOTION	: 0
002	DWELL	: 0
a. 003	IN-POSITION CHECK	: 0
004	FEEDRATE OVERRIDE 0%	: 0
b. 005	INTERLOCK / START LOCK (Example)	: 1
010	PUNCHING	: 0
011	READING	: 0
012	WAITING FOR (UN) CLAMP	: 0
c. 013	JOG FEEDRATE OVERRIDE 0%	: 0
d. 014	WAITING FOR RESET, ESP, RRW OFF	: 0
015	EXTERNAL PROGRAM NUMBER SEARCH	: 0

Items with a to d relate with manual and automatic operation and its detail is shown below.

a. In-position check is being done

It shows that positioning is not yet completed. Check the contents of the following diagnostic number. (It is 1 in the following condition)

DGN 0300 Position Error >PARAM 1826 In-position width

- 1 Check the parameters according to the parameter list

1825	Servo loop gain per axis (Normal : 3000)
------	--

- 2 Servo system may be abnormal. Refer to alarm 400, 410, and 411.

b. Interlock signal is input

There are a plural interlock signals. Check at first which interlock signal is used by the machine tool builder at the parameters shown below.

	#7	#6	#5	#4	#3	#2	#1	#0
3003					DIT	ITX		ITL

#0 ITL=0 shows interlock signal *IT is effective. To 1

#2 ITX=0 shows interlock signal *ITn is effective. To 3

#3 DIT=0 shows interlock signal \pm MITn is effective. To 4

Check state of effective interlock signals using the diagnostic function (PMCDGN) of the PMC.

- 1 Interlock signal (*IT) is input

	#7	#6	#5	#4	#3	#2	#1	#0
G0008								*IT

*IT=0 shows that interlock signal is input.

- 2 Axis interlock signal (*ITn) is input

	#7	#6	#5	#4	#3	#2	#1	#0
G0130			*IT6	*IT5	*IT4	*IT3	*IT2	+IT1

*ITn=0 shows interlock signal is input.

3 Interlock signal per axis and direction (+/- MITn) is input

	#7	#6	#5	#4	#3	#2	#1	#0
G0132			+MIT6	+MIT5	+MIT4	+MIT3	+MIT2	+MIT1
G0134			-MIT6	-MIT5	-MIT4	-MIT3	-MIT2	-MIT1

\pm MITn=1 shows interlock signal per axis and direction is input.

Check the signals using PMC's diagnostic function (PMCDGN)

c. Jog feedrate override is 0%

	#7	#6	#5	#4	#3	#2	#1	#0
G0010	*JV7	*JV6	*JV5	*JV4	*JV3	*JV2	*JV1	*JV0
G0011	*JV15	*JV14	*JV13	*JV12	*JV11	*JV10	*JV9	*JV8

When the override is 0% all bits of the above address becomes
1111 1111 or 0000 0000.

*JV15 JV0	Override
1111 1111 1111 1111	0.00%
1111 1111 1111 1110	0.01%
⋮	⋮
1101 1000 1110 1111	100.00%
⋮	⋮
0000 0000 0000 0001	655.34%
0000 0000 0000 0000	0.00%

d. NC is in a reset state

In this case, RESET is also displayed on the status display. Check it using the procedure of 1 above.

(4) Jog feed rate setting (Parameter) is not correct

1423	Jog feedrate per axis [mm/min]
------	--------------------------------

(5) Check whether a torque limit is in effect.

6.5

EXTERNAL PULSE INPUT FUNCTION (SINGLE PHASE INPUT TYPE) CANNOT BE USED

Points

- (1) Check another manual operation (JOG) is accepted.
- (2) Check status display

Causes and Countermeasure

1 JOG operation is not acceptable, either

Consult with item 8.3 and 8.4.

2 When only external pulse input function (single phase input type) cannot be done

- (1) Check CNC status display at lower left corner of the CRT
(Refer to **1.7 Power Mate STATUS DISPLAY** for details)
When the status display shows STEP, mode selection is correct.
If it is not STEP, mode select signal is not input correctly. Check the
mode select signal using the PMC's diagnostic function(PMCDGN).

	#7	#6	#5	#4	#3	#2	#1	#0
G0043						MD4	MD2	MD1
						↓	↓	↓
	Step feed mode					1	0	1

- (2) Manual handle feed axis select signal is not input
Check the signals using PMC's diagnostic function (PMCDGN).

	#7	#6	#5	#4	#3	#2	#1	#0
G0018						HS1C	HS1B	HS1A

When axis select switch for manual handle feed is selected on the machine operator's panel, if the signals are input as follows, it is normal.

Selected axis	HS1C	HS1B	HS1A
no selection	0	0	0
1st axis	0	0	1
2nd axis	0	1	0
3rd axis	0	1	1
4th axis	1	0	0
5th axis	1	0	1
6th axis	1	1	0

(3) Incremental feed signal is not correct

Check the following signals using PMC's PCDGN. Also confirm the following parameters based on the parameter list.

	#7	#6	#5	#4	#3	#2	#1	#0
G0019			MP2	MP1				

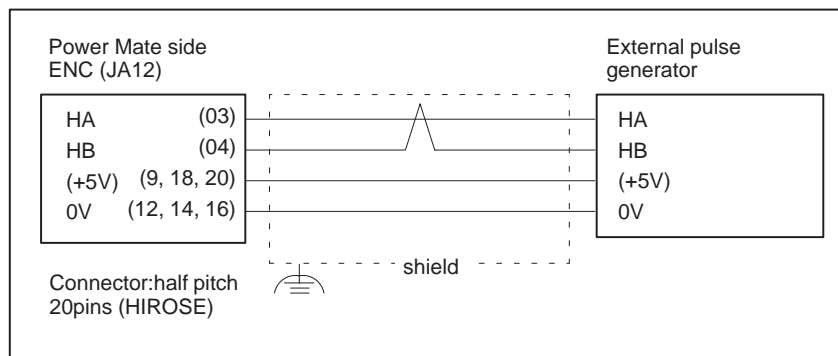
MP1	MP2	Multiplication
0	0	× 1
0	1	× 10
1	0	× m
1	1	× n

7113	Magnification of external pulse input m(1 to 127)
7114	Magnification of external pulse input n(1 to 1000)

(4) Checking external input pulse generator

Check disconnection of cable or short circuit.

(a) Incorrect of cable

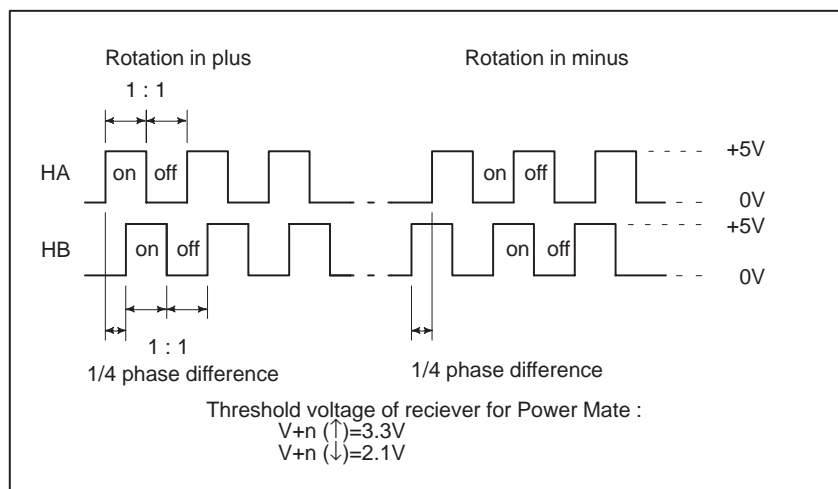


(b) Wave form of external input pulse generator

HA: A phase signal

HB: B phase signal

Confirm wave form of external input pulse.



Check on and off ratio and phase difference of HA and HB.

(5) Check of the torque limit

Check whether a torque limit is in effect.

6.6 AUTOMATIC OPERATION CANNOT BE DONE

Points

- (1) Check manual operation is possible.
- (2) Check the status of cycle start LED on machine operator's manual.
- (3) Check status of Power Mate.

Causes and Remedies

1. When cycle operation is not started (Cycle start LED does not light)

When manual operation is either impossible, perform countermeasure, based on the previous item "Jog operation cannot be done".

Confirm that a correct mode is selected according to the mode select status of Power Mate status display. Also, by confirming the automatic operation status it is possible to identify cycle operation, feed hold and cycle stop state.

"*****" is displayed at status display on CRT.

- (1) Mode select signal is not correct.

When the mode select signal is input correctly, following status display is done.

MDI :Manual data input mode (MDI)

AUTO :Automatic operation mode

If status display does not show a correct status, check the mode signal with following diagnosis function of PMC side (PMCDGN).

	#7	#6	#5	#4	#3	#2	#1	#0
G0043						MD4	MD2	MD1

MD4	MD2	MD1	Mode select
0	0	0	Memory data input mode (MDI)
0	0	1	Automatic operation mode (AUTO)

- (2) Cycle start signal is not input

This signal turns 1 when cycle start button is pressed and turns 0 when it is released. The cycle start actuates when it changes from 1 to 0. Check the state of the signal using PMC's diagnostic function(PMCDGN).

	#7	#6	#5	#4	#3	#2	#1	#0
G0007						ST		

#2 (ST) : Cycle start signal

The cycle is allowed to start by setting of parameter (No. 3001#1) when it changes from 1 to 0.

- (3) Feed hold signal is input

Under normal state, the feed hold signal is 1 when the feed hold button is not pressed.

Check the state of this signal using the PMC's diagnostic function (PMCDGN) .

	#7	#6	#5	#4	#3	#2	#1	#0
G0008			*SP					

#5 (*SP): Feed hold signal

2. When an automatic operation is in progress (Cycle start LED is lit)

Power Mate's status display shows "STRT" on the CRT.

(1) Check the contents of diagnostic nos. 000 to 015.

No.	Message	Display
a. 000	WAITING FOR FIN SIGNAL (Example)	: 1
b. 001	MOTION	: 0
c. 002	DWELL	: 0
d. 003	IN-POSITION CHECK	: 0
e. 004	FEEDRATE OVERRIDE 0%	: 0
f. 005	INTERLOCK / START LOCK	: 0
	010 PUNCHING	: 0
	011 READING	: 0
	012 WAITING FOR (UN) CLAMP	: 0
g. 013	JOG FEEDRATE OVERRIDE 0%	: 0
h. 014	WAITING FOR RESET, ESP, RRW OFF	: 0
	015 EXTERNAL PROGRAM NUMBER SEARCH	: 0

Items with a to h relate with an automatic operation and their details are as follows :

a. An auxiliary function is being executed (waiting for FIN signal)

An auxiliary function (M) specified in a program is not ended.

Check according to the following procedure.

At first, confirm the kind of interface of an auxiliary function.

	#7	#6	#5	#4	#3	#2	#1	#0
3001	MHI							

#7(MHI) 0 : M is of normal interface.

1 : M is of high-speed interface.

1 Normal interface

When the auxiliary function finish signal turns from 1 to 0, the auxiliary function is supposed to be ended and the next block is read for operation. Confirm the status of this signal using PMC's diagnostic function(PMCDGN).

	#7	#6	#5	#4	#3	#2	#1	#0
G0004					FIN			

#3 (FIN) : Auxiliary function finish signal

2 High-speed interface

The auxiliary function is supposed to be ended when the signals are in the following state. Confirm it using PMC's diagnostic function (PMCDGN).

	#7	#6	#5	#4	#3	#2	#1	#0
G0005								MFIN

#0(MFIN): Miscellaneous function finish signal

	#7	#6	#5	#4	#3	#2	#1	#0
F0007								MF

#0(MF) : Miscellaneous function strobe signal

Signal	End state	
Finish signal	0	1
store signal	0	1

b. Travel command is being executed

CNC is reading an axis command (X,Y,Z,...) in a program and giving the command to the axis.

c. A dwell command is being executed

CNC is reading a dwell command (G04) in a program and is executing the dwell command.

d. In-position check (confirming positioning) is being done

Positioning (G00) to a specified position of a specified axis is not completed.

Whether positioning is completed or not is checked as the servo position error amount. Check it CNC's diagnostic function as follows:

DGN no.300 **Position Error** > PARAM 1826 **In-position width**

Position error amount almost becomes 0, when positioning of an axis completes and when the amount becomes within the in-position width, it is assumed that positioning completes and the next block is executed. If position error amount does not become within the in-position width, refer to alarm 400, 4n0 and 4n1.

e. Feedrate override is at 0%

Actual feedrate is overridden by the override signals to a programmed feedrate. Check the override signals using the PMC's diagnostic function (PMCDGN).

<Normal override signal>

	#7	#6	#5	#4	#3	#2	#1	#0
G0012	*FV7	*FV6	*FV5	*FV4	*FV3	*FV2	*FV1	*FV0

***FVn** : Feedrate override

<State of override signal>

*FV7.....*FV0	
1 1 1 1 1 1 1 1	0%
1 1 1 1 1 1 1 0	254%
:	:
1 0 0 1 1 0 1 1	100%
:	:
0 0 0 0 0 0 0 1	1%
0 0 0 0 0 0 0 0	0%

f. Interlock signal or start lock signal is input

There are a plural number of interlock functions. Parameters are set by machine tool builders for which interlock function is used.

Therefore, confirm the following parameters at first:

	#7	#6	#5	#4	#3	#2	#1	#0
3003					DIT	ITX		ITL

#0 (ITL) 0: shows interlock signal *IT is effective. To 1

#2 (ITX) 0: shows interlock signal *ITn is effective. To 3

#3 (DIT) 0: shows interlock signal \pm MITn is effective. To 4

Check state of effective interlock signals using the diagnostic function (PMCDGN) of the PMC.

1 Interlock signal (*IT) is input

	#7	#6	#5	#4	#3	#2	#1	#0
G0008								*IT

#0 (*IT) : When this bit is 0, interlock signal is input.

2 High-speed interlock signal (*RILK) is input.

	#7	#6	#5	#4	#3	#2	#1	#0
X0000 or X1000		*RILK						

***RILK** 0: shows interlock signal is input.

3 Interlock signal per each axis (*ITn) is input

	#7	#6	#5	#4	#3	#2	#1	#0
G0130			*IT6	*IT5	*IT4	*IT3	*IT2	*IT1

***ITn** When the bit is 0, the corresponding axis's interlock signal is input.

4 Interlock signal per axis and direction (\pm MITn) is input

	#7	#6	#5	#4	#3	#2	#1	#0
G0132			+MIT6	+MIT5	+MIT4	+MIT3	+MIT2	+MIT1
G0134			-MIT6	-MIT5	-MIT4	-MIT3	-MIT2	-MIT1

MITn Interlock signal is input to the corresponding axis and direction with the signal being 1.

5 Controlled axis detach function is running. A detached axis is specified for travelling.

*This function is valid when Power Mate parameter RMB No.1005#7=1. For whether this function is running or not, confirm the following signal using PMC's diagnostic function (PMCDGN). Check the axis concerned.

	#7	#6	#5	#4	#3	#2	#1	#0
F0110			MDTCH6	MDTCH5	MDTCH4	MDTCH3	MDTCH2	MDTCH1

When signal MDTHn is "1", the axis detach function is in valid.

The control axis detach function becomes valid by the following signal issued from the PMC or a Power Mate side parameter. Check as in the following procedure :

1) The control axis detach signal (DTCHn) is input.

	#7	#6	#5	#4	#3	#2	#1	#0
G0124			DTCH6	DTCH5	DTCH4	DTCH3	DTCH2	DTCH1

If it is 1, the corresponding axis is detached.

2) The following parameter enables the control axis detach function to the corresponding axis.

	#7	#6	#5	#4	#3	#2	#1	#0
0012	RMVx							

#7(RMVx) 0 : Controlled axis is connected
1 : Controlled axis is detached

g. Manual feedrate override is 0% (dry run)

Normally manual feedrate override function is used for jog feed. But when DRN(dry run) signal turns on during an automatic operation, override values set with these signals become valid to the following speed set by a parameter.

	#7	#6	#5	#4	#3	#2	#1	#0
G0046	DRN							

#7(DRN) : Dry run signal is input with this signal being 1.

1410	Dry run rate [mm/min]
------	-----------------------

The rate when the following override value is 100%.

	#7	#6	#5	#4	#3	#2	#1	#0
G0010	*JV7	*JV6	*JV5	*JV4	+JV3	*JV2	*JV1	*JV0

G0011	*JV15	*JV14	*JV13	*JV12	+JV11	*JV10	*JV9	*JV8
-------	-------	-------	-------	-------	-------	-------	------	------

When override value is 0%, all bits of the above address is [1111 1111] or [0000 0000].

*JV15 JV0	Override
1111 1111 1111 1111	0.00%
1111 1111 1111 1110	0.01%
	,
1101 1000 1110 1111	100.00%
	,
0000 0000 0000 0001	655.34%
0000 0000 0000 0000	0.00%

h. NC is in a reset state

In this case, the CNC's status display shows RESET. Refer to item 1.

(1) Only rapid traverse in positioning (G00) does not function Confirm the following parameter and signals from the PMC.

(a) Setting value of rapid traverse rate

1420	Rapid traverse rate per axis [mm/min]
------	---------------------------------------

(b) Rapid traverse override signals

	#7	#6	#5	#4	#3	#2	#1	#0
G0014							ROV2	ROV1

ROV1	ROV2	Override
0	0	100%
1	0	50%
0	1	25%
1	1	0

1421	Rapid traverse override F0 rate [mm/min]
(2) Only feed (other than G00) does not function	
(a) Maximum feed rate set by parameter is incorrect.	
1422	Maximum feedrate [mm/min]
1430	Maximum feedrate in each axis [mm/min]

Feed rate is clamped at this upper feed rate.

6.7 CYCLE START LED SIGNAL HAS TURNED OFF

Points

- (1) After cycle operation is started, then stopped, check as follows:
- (2) Confirm cycle start LED on machine operator's panel.
- (3) Confirm Power Mate's diagnostic function

Causes and Remedies

The reason why cycle start LED signal (STL) has turned off are displayed on Power Mate's diagnostic numbers 020 to 025 as follows:

020	CUT SPEED UP/DOWN	1	0	0	0	1	0	0
021	RESET BUTTON ON	0	0	1	0	0	0	0
022	RESET AND REWIND ON	0	0	0	1	0	0	0
023	EMERGENCY STOP ON	1	0	0	0	0	0	0
024	RESET ON	1	1	1	1	0	0	0
025	STOP MOTION OR DWELL	1	1	1	1	1	1	0

a.	Emergency stop signal	↑	↑	↑	↑	↑	↑	↑
b.	External reset signal		↑	↑	↑	↑	↑	↑
c.	Reset button on MDI			↑	↑	↑	↑	↑
d.	Reset & rewind signal				↑	↑	↑	↑
e.	Servo alarm					↑	↑	↑
f.	Feed hold by switching mode						↑	↑
g.	Single block stop							↑

Details of signals a to g are as follows:

Confirm the signals concerned using diagnostic function (PMCDGN).

a. Emergency stop is input

- 1 When input from Built-in I/O card internal I/O (Parameter No. 3001#3=0) :

	#7	#6	#5	#4	#3	#2	#1	#0
X1000				*ESP				

	#7	#6	#5	#4	#3	#2	#1	#0
G0008				*ESP				

***ESP=0** : Emergency stop signal is input :

- 2 When input from Built-in I/O card internal I/O (Parameter No. 3001#3=1) :

	#7	#6	#5	#4	#3	#2	#1	#0
X0000				*ESP				

	#7	#6	#5	#4	#3	#2	#1	#0
G0008				*ESP				

***ESP=0** : Emergency stop signal is input :

b. External reset signal is input


	#7	#6	#5	#4	#3	#2	#1	#0
G0008	ERS							

#7(ERS): When the bit is 1, external reset signal is input.

This signal is usually used for a confirmation signal of M02 when an M02 is specified in a program as the end of a program.

Therefore, when M02 is executed, this signal is input.

c. Reset button on the MDI is pressed

An automatic operation is put into a reset status when  key on the MDI panel is pressed.

d. Reset & rewind signal is input

	#7	#6	#5	#4	#3	#2	#1	#0
G0008		RRW						

#6(RRW) : When this signal is 1, the reset & rewind signal is input.

This signal is usually used for a confirmation signal of M30 when an M30 is specified in a program as the end of a program.

Therefore, when M30 is executed, this signal is input.

e. Servo alarm has generated

When any servo alarm has generated, cycle operation is put into the reset state and operation stop.

f. Cycle operation is in a feed hold state

The cycle operation becomes feed hold state in the following cases:

- 1 Modes are switched from an automatic operation mode to a manual operation mode.
- 2 Feed hold signal is input.

<Mode select signal>

	#7	#6	#5	#4	#3	#2	#1	#0
G0043						MD4	MD2	MD1
						↓	↓	↓
Automatic operation	memory edit(EDIT)					0	1	1
	Automatic operation (AUTO)					0	0	1
	Manual data input (MDI)					0	0	0
Manual operation	Jog feed (JOG)					1	0	0
	Step					1	0	1
	TEACH IN STEP					1	1	1
	TEACH IN JOG					1	1	0

<Feed hold signal>

	#7	#6	#5	#4	#3	#2	#1	#0
G0008			*SP					

#5(*SP) : When this signal is 0, the feed hold signal is input.

g. It become single block stop during automatic operation

	#7	#6	#5	#4	#3	#2	#1	#0
G0046							SBK	

#1(SBK) When this signal is 1, the single block signal is input.

6.8

WHEN MANIPULATION IS NOT POSSIBLE WITH THE CRT/MDI

Points

Judgement of the point

Check whether it is a trouble of display or a trouble of the system.

Check the STATUS LED on the controller shows the following state.

EW (green)	ON
WD (red)	OFF
S0.SI	ON or OFF

If the status shows the above state, the system is normal.

Therefore, display system may be faulty.

If you have a DPL/MDI, check whether it can be used to manipulate the system.

If the status shows other state, a hardware other than the display system may be troublesome.

If the message "WAITING FOR CRT DATA" appears on the CRT/MDI unit, it indicates that the CRT/MDI unit has started normally.

Causes and remedies

1. When the display system is in trouble

(1) Confirmation item

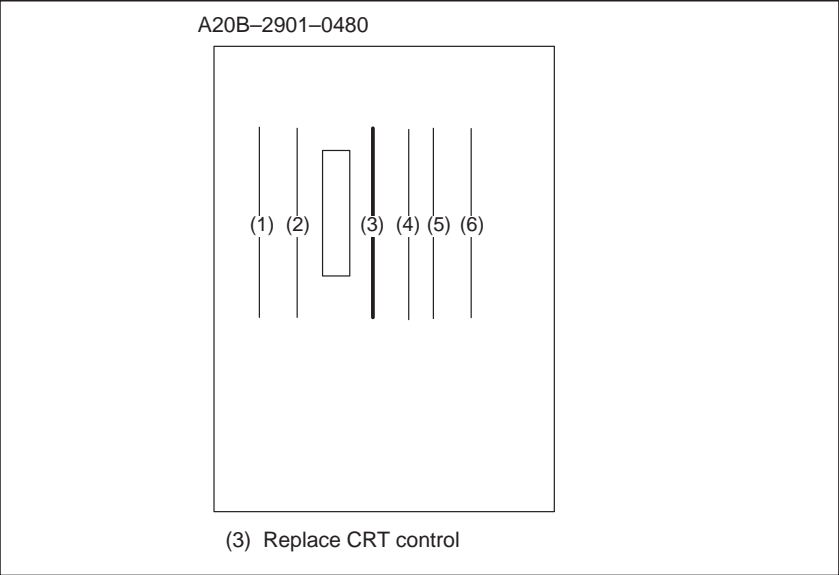
Determine which of the following problems are evident.

1. Nothing is displayed on the CRT/MDI unit.
2. Only the message "WAITING FOR CRT DATA" appears on the CRT/MDI unit.
3. A position display appears on the CRT/MDI unit, and the keys are ineffective.

(2) Causes and remedies

1. If nothing is displayed on the CRT/MDI unit.
 - The power being supplied to the CRT/MDI unit is abnormal (check the power supply).
 - The CRT/MDI unit is defective (replace the CRT/MDI unit).
2. If only the message "WAITING FOR CRT DATA" appears on the CRT/MDI unit.
 - Incorrect cable connection (correct)
 - Defective cable (repair or replace)
 - Defective CRT control module (replace)
 - No CRT control module installed (install)
 - Touch panel connection module or HSSB connection module installed in place of the CRT control module (install the CRT control module)
 - Incorrect setting of rotary switches RSW and MTSW (correct the setting)
3. A position display appears on the CRT/MDI unit, and the keys are ineffective.
 - DPL/MDI left connected (remove)
 - Defective cable (repair or replace)

<CRT control module mounting position>



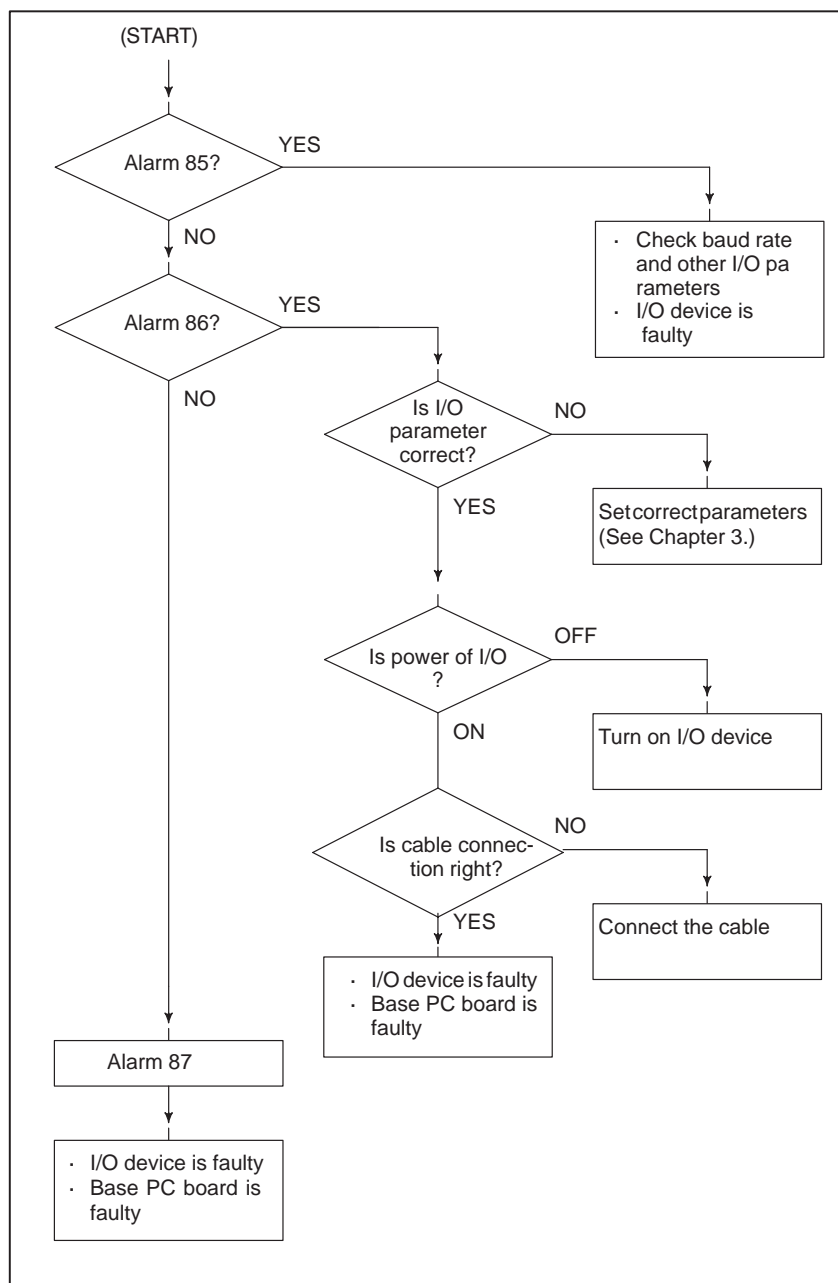
2. When system is in trouble

EN (green)	ON
WD (red)	OFF
S0.S1	ON or OFF

When STATUS LED on the controller is other than above, check identify the trouble and make an appropriate action. See 2.4 for LED display.

6.9

ALARM 85 TO 87 (READER/PUNCHER INTERFACE ALARM)



Causes

- (a) Parameters on reader/puncher interface are not correct.
Check the following setting data and parameters.
- (b) External I/O device or host computer is faulty.
- (c) Cable between Power Mate and I/O device is faulty.
- (d) Base PC board is faulty.

Countermeasures

- (a) Parameters on reader/puncher interface are not correct.
Check the following setting data and parameters:
<Setting>
PUNCH CODE=0 OR 1 (0: EIA, 1: ISO)
Select ISO or EIA according to the type of I/O device.
If punch code does not match, alarm 86 will generate.

<Parameter>

Function \ Value of parameter 0020	0	1
Feed	0101#7	0111#7
Data input code	0101#3	0111#3
Stop bit	0101#0	0111#0
Type of I/O device	102	112
Baud rate	103	113
Communication method	RS-232C	

Numbers in the table indicate parameters and bit numbers.

Example) 101#7:bit7 of parameter 101.

	#7	#6	#5	#4	#3	#2	#1	#0
0101	NFD				ASI			SB2
0111								

#7(NFD) 0 : Feed is output before and after data in data output (FANUC PPR)

1 : Feed is not output (standard).

#3(ASI) 0 : Data input code is EIA or ISO (automatic recognition)

1 : Data input code is ASCII.

#0(SB2) 0 : No. of stop bits is 1.

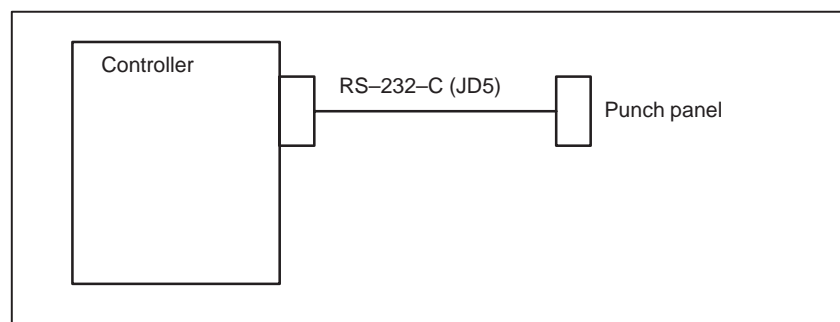
1 : No. of stop bits is 2.

0102	Type of I/O device
0112	

Value	TYPE OF I/O DEVICE
0	RS-232-C (for other than the following)
1	Not used
2	FANUC CASSETTE F1 (Old type FLOPPY CASSETTE ADAPTOR)
3	FANUC PROGRAM FILE Mate, FANUC FLOPPY CASSETTE ADAPTOR, FANUC SYSTEM P-MODEL H, FANUC Handy File
4	Not used
5	Not used
6	FANUC SYSTEM P-MODEL G, FANUC SYSTEM P-MODEL H

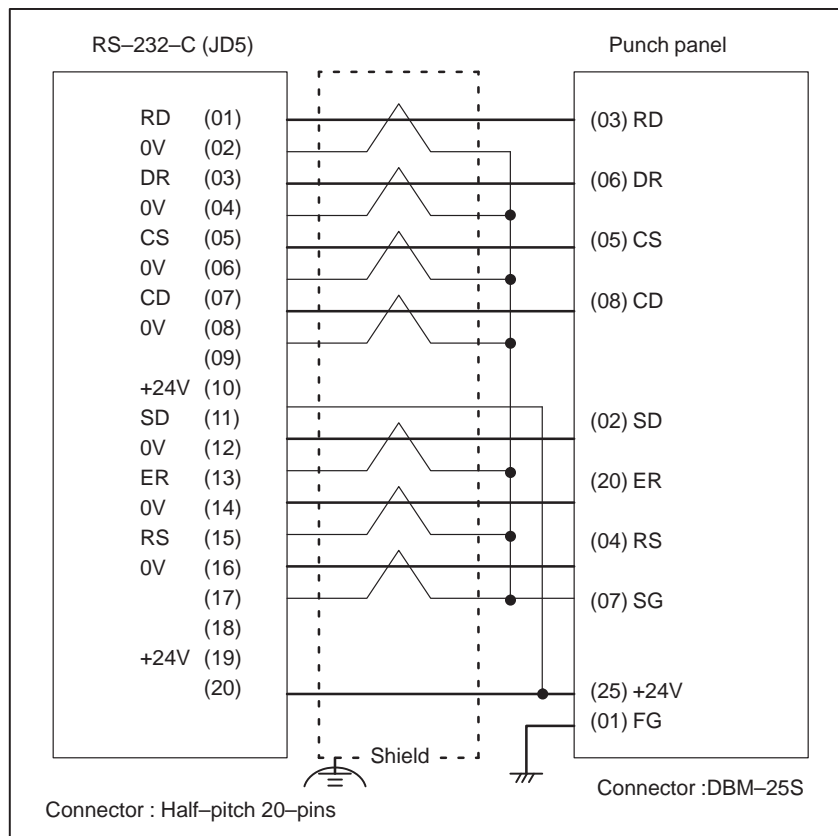
0103	Baud rete	
0113		
	Value	Baud rate
	7	600
	8	1200
	9	2400
	10	4800
	11	9600
	12	19200

- (b) External I/O device or Host computer is in trouble
- (i) Check whether the setting on communication of external I/O device or host computer is the same as that of the Power Mate. (baud rate, stop bits, etc.) If they are not the same, change the setting.
 - (ii) When spare I/O device presents, check whether it is possible to realize communication using the spare I/O device.
- (c) Cable between Power Mate and I/O device is faulty.
Check the cable for disconnection or wrong connection.



- (d) Base PC board of Power Mate is faulty.
Replace the Power Mate unit.

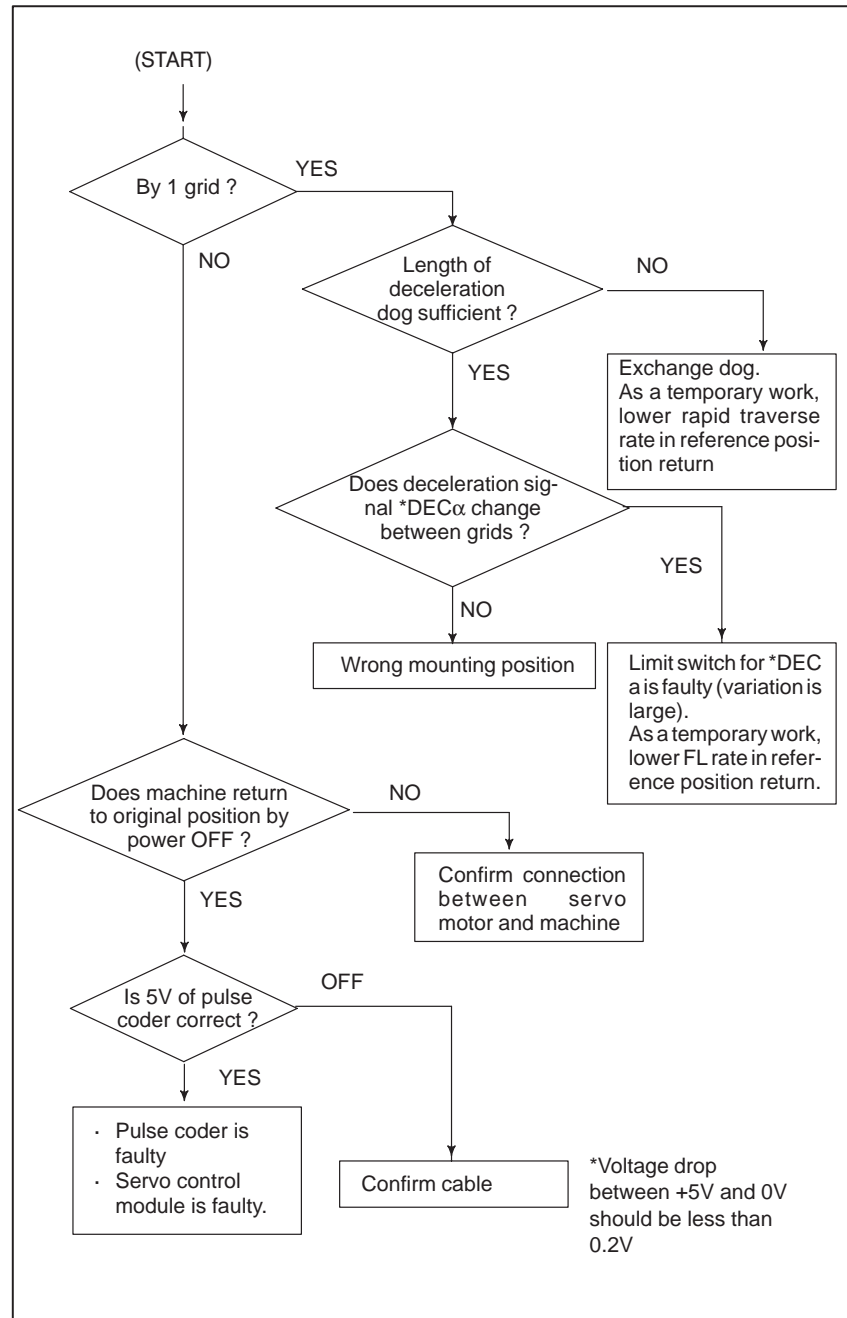
< Cable connection >



NOTE

- 1 When CS is not used, connect it to RS.
- 2 Always use a twisted pair cable.

6.10 REFERENCE POSITION DEVIATES



6.11

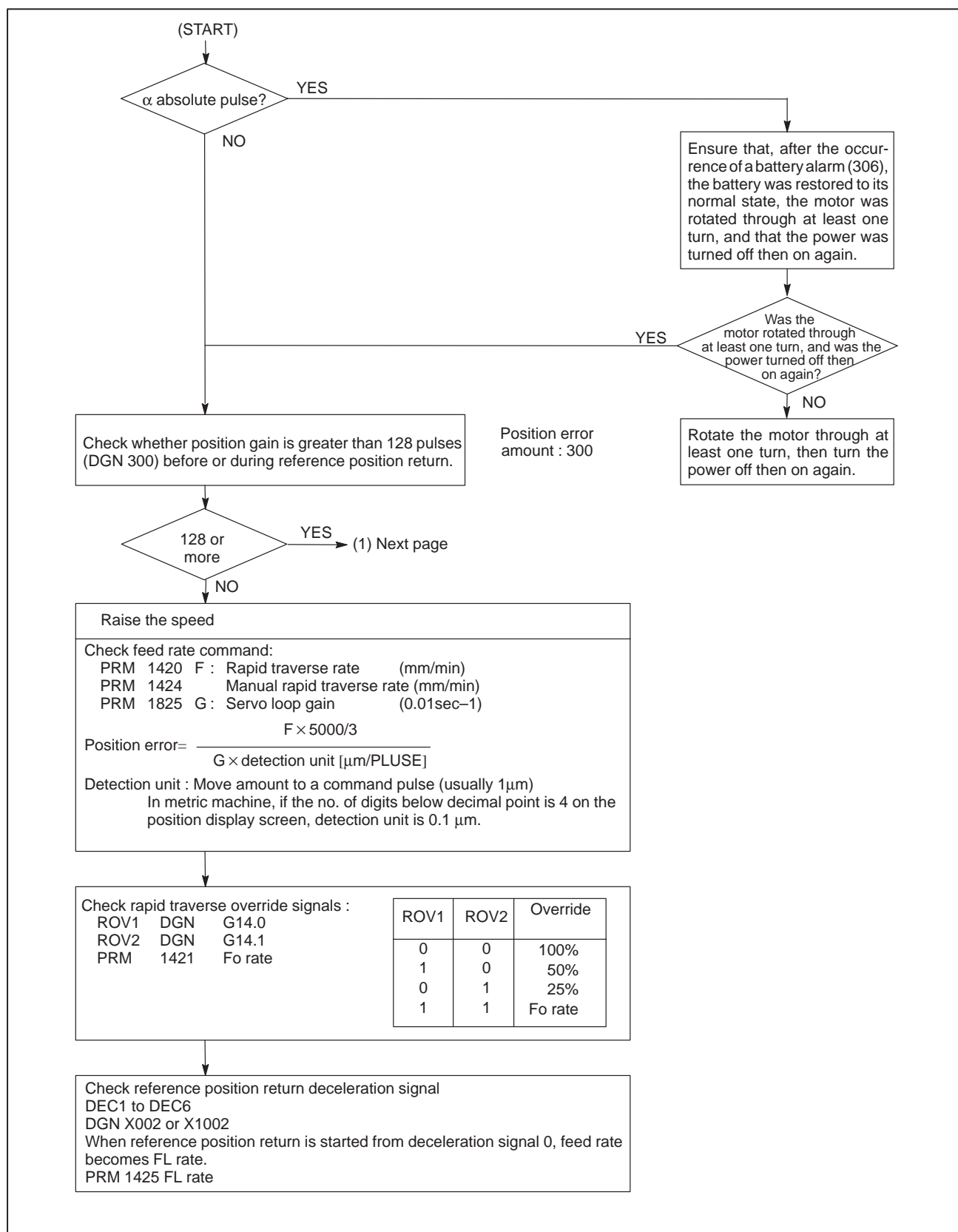
ALARM 90 (REFERENCE POSITION RETURN IS ABNORMAL)

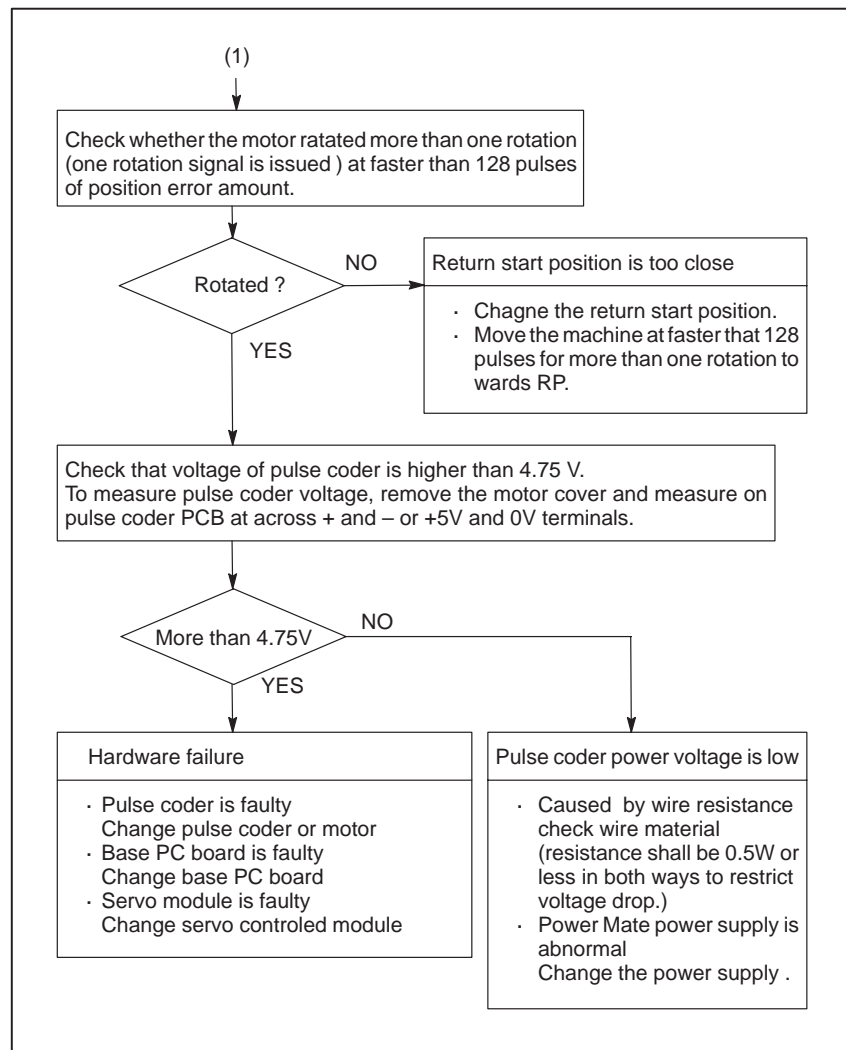
Contents

An attempt was made to return to the reference position without satisfying the condition that, when the tool is moving toward the reference position with a positional deviation (DGN. 300) of 128 or more pulses, at least a one-turn signal is received.

Moreover, for the α absolute pulse coder, a reference position return was attempted without first turning the power off then on again after rotating the motor one turn when the system is started, or when the battery is replaced in response to a battery zero alarm.

Countermeasures



**CAUTION**

- 1 After the pulse coder or motor is exchanged, reference position or machine's standard point may be different from former one. Please set it correctly.
- 2 When the base PC board is exchanged, all the data stored in memory is lost. Reset all the data again, referring to Chapter 3 "INPUT AND OUTPUT OF DATA".
The data includes reference position information. Reference position setting must also be performed, therefore.

- **Reference**

A speed more than 128 pulses is required because if speed is lower than this, one-rotation signal does not function stably, causing improper position detection.

6.12

ALARM 300 (REQUEST FOR REFERENCE POSITION RETURN)

Remedies


- When dog reference position return function is present
- When dog reference position return function is not present
- When serial pulse coder is changed

Absolute position data in the serial pulse coder was lost.

[This alarm occurs if the serial pulse coder is replaced, the position feedback signal line is removed from the serial pulse coder, the battery or its cable is removed, or parameters are loaded into the Power Mate as a batch.]

Machine position must be memorized using the following method:

If a battery alarm (306) occurs in the α pulse coder, recover the normal battery status, rotate the motor through at least one turn, then turn the power off then on again.

- (1) Execute manual reference position return only for an axis for which this alarm was generated.
- (2) Press  key at the end of reference position return to release the alarm.

Execute dogless reference position setting to memorize the reference position.

Since the reference position is different from the former one, change the grid shift value (PRM 1850) to correct the position.

Related parameters

	#7	#6	#5	#4	#3	#2	#1	#0
1815			APC x	APZx				

#5(APCx) 0 : Position detector is incremental pulse coder.

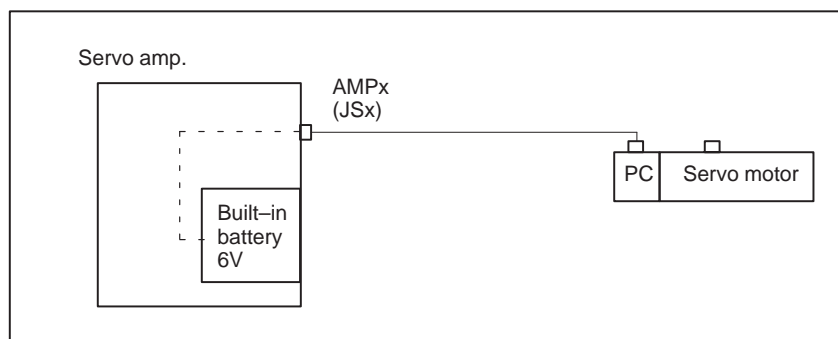
1 : Position detector is absolute pulse coder.

#4(APZx) Reference position of absolute pulse coder is :

0 : not established

1 : established

System configuration



6.13**ALARM 301 TO 305
(ABSOLUTE PULSE
CODER IS FAULTY)****Countermeasures**

Absolute pulse coder, cable or servo module is faulty.

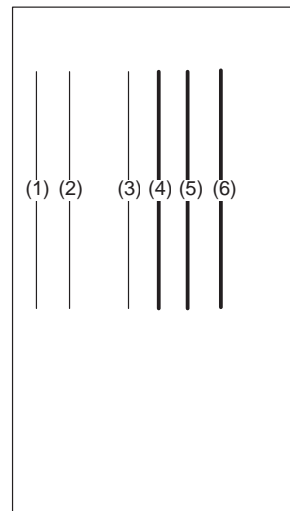
1 Agitate the cable connected to JSn of servo amplifier. If an alarm is issued, replace the cable.

2 Replace the servo module.

Replace the module corresponding to the axis indicated by the alarm, as shown in the figure below.

● Replace following modules of the controller.

<Location of servo module> Base PC board



1st to 2nd axis (6)

3rd to 4th axis (5)

5th to 6th axis (4)

Specifications of (4) to (6) : A20B-2902-0290


6.14

ALARM 306 TO 308 (ABSOLUTE PULSE CODER BATTERY IS LOW)

Absolute pulse coder battery replacement

This alarm is generated when absolute pulse coder battery becomes low. If alarm 306 occurs, the reference position has been lost. After replacing the battery, re-set the reference position.

WARNING

When replacing the memory backup batteries, keep the power to the machine (CNC, servo amplifier) switched on, and hold the machine at an emergency stop. Because this work must be carried out while the power is kept switched on and the cabinet is open, only the personnel who have been trained for safety are allowed to engage in the work. When replacing the batteries, be careful not to touch the high-voltage circuit section (marked  and shielded with a shock hazard prevention cover). If you touch the high-voltage circuit section when it is uncovered, you will get an electric shock.

Procedure

Replace the batteries in the α series servo amplifier module, the β series servo amplifier, or the separate battery box.

CAUTION

- 1 When replacing the built-in batteries for the α series servo amplifier module or β series servo amplifier module, keep the power to the servo amplifier switched on.
- 2 When replacing the batteries in the separate type battery box, keep the power to the NC and servo amplifier switched on.
- 3 Note that we are not supposed to replace the batteries for the control unit (for memory backup).

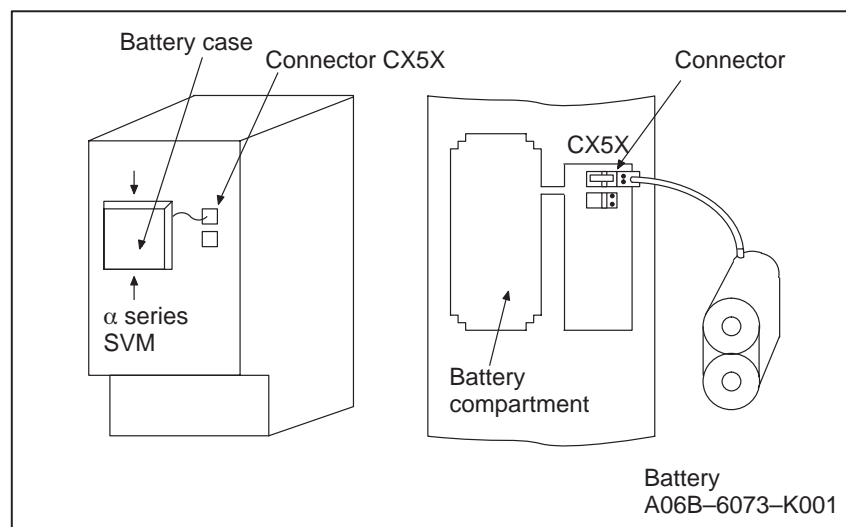
Procedure for replacing batteries for absolute pulse coder (α series servo amplifier module)

- 1 Prepare lithium battery A06B-6073-K001(*) in advance.

(*) FANUC specification : A98L-0001-0902

- 2 Turn machine (servo amplifier) power ON.
- 3 Remove the battery case on the front panel of α series Servo Amp Module (SVM).

The battery case can be removed by holding the top of the case and pulling the case towards you.



- 4 Remove the connector the battery.
- 5 Replace the battery , and connect the connector.
- 6 Attach the battery case.
- 7 Turn machine (servo amplifier) power OFF.

CAUTION

Replace the batteries for absolute pulse coder when machine (servo amplifier) power is ON.
Replacing the batteries with power OFF causes the absolute position stored in memory to be lost.

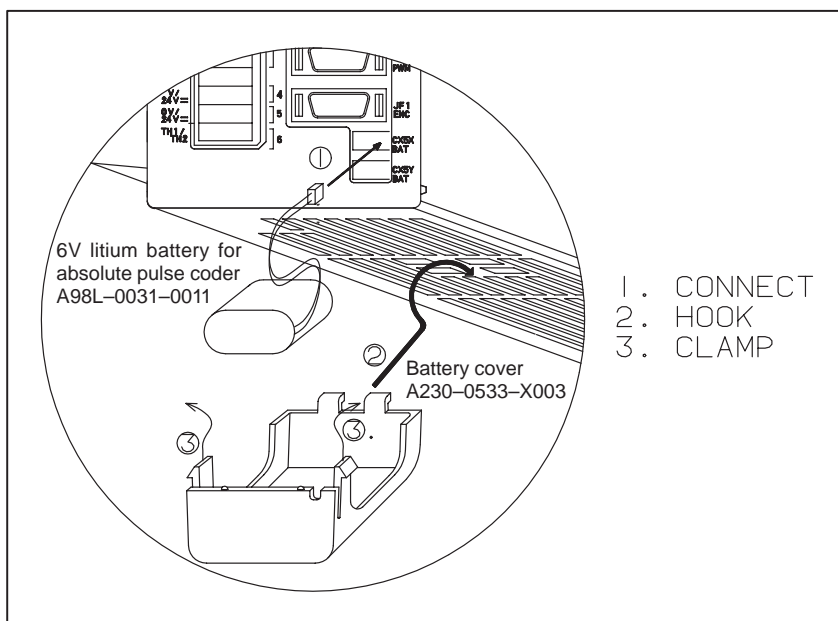
Procedure for replacing batteries for absolute pulse coder (β series servo amplifier)

Prepare lithium battery A02B-0168-K111(*) in advance.

(*) FANUC specification: A98L-0031-0011

Procedure

- 1 Turn machine (servo amplifier) power ON.
- 2 Remove the battery case from under the β series servo amplifier module by holding the case at both sides and pulling downwards.



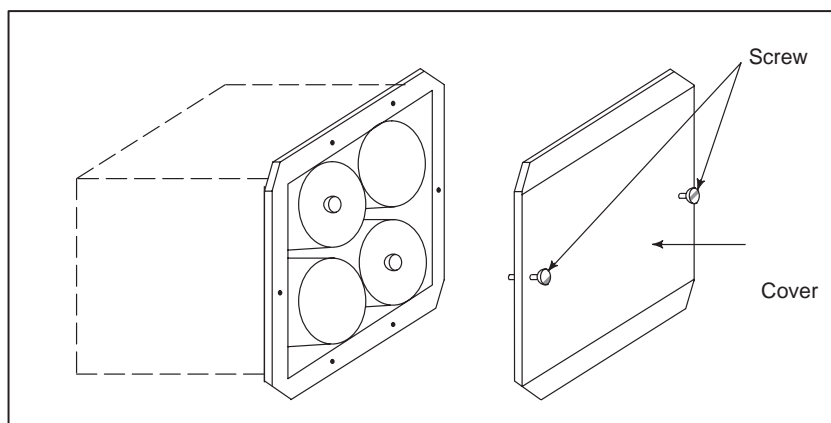
- 3 Remove the connector the battery.
- 4 Replace the battery, and connect the connector.
- 5 Attach the battery case.
- 6 Turn machine (servo amplifier) power OFF.

CAUTION

- 1 Replace the batteries for absolute pulse coder when machine (servo amplifier) power is ON.
Replacing the batteries with power OFF causes the absolute position stored in memory to be lost.
- 2 If your machine is equipped with a separate battery case, follow the instructions in 2.6.4

Procedure for replacing separate type batteries for absolute pulse coder

- 1 Prepare 4 alkaline batteries (UM-1type) commercially available in advance.
- 2 Turn machine (CNC, servo amplifier) power ON.
- 3 Loosen screws on the battery case to remove the cover. For placement of the battery case, refer to the machine tool builder's manual.
- 4 Replace the batteries in the case. Insert 2 batteries each in the opposite direction as illustrated below.



- 5 After replacement, install the cover.
- 6 Turn machine (CNC, servo amplifier) power OFF

CAUTION

Replace the batteries for absolute pulse coder when machine (CNC, servo amplifier) power is ON.
Replacing the batteries with power OFF causes the absolute position stored in memory to be lost.

6.15

ALARM 350 (SERIAL PULSE CODER IS ABNORMAL)

An error is generated in the control section of the serial pulse coder.

Points

- 1 Alarm No. 351 has also generated⇒Refer to alarm 351.
- 2 Only alarm No. 350 has generated⇒Refer to the following Confirm the details by diagnostic number 0202 and 0204.

• When diagnostic number 0202 shows 1

		#7	#6	#5	#4	#3	#2	#1	#0
DGN	0202		CSA		PHA	RCA		CKA	SPH

#6(CSA) Check sum alarm has generated.

#4(PHA) Phase data abnormal alarm has generated.

#3(RCA) Speed count abnormal alarm has generated.

#1(CKA) Clock alarm has generated.

#0(SPH) Soft phase data abnormal alarm has generated.

- 1 Check the contents using the above diagnostic function if the alarm generates repeatedly. If diagnostic data is the same, serial pulse coder may be faulty.⇒Refer to following **Caution**
- 2 When diagnostic result does not the same, or other abnormality is detected, an external noise may be generated.

• When diagnostic number 0204 shows 1

	#7	#6	#5	#4	#3	#2	#1	#0
DGN	0204			LDA	PMS			

#4(LDA) LED of serial pulse coder is abnormal

#3(PMS) Feedback pulses are not issued correctly.

- (1) **#4(LDA):** LED in the serial pulse coder is abnormal.
 - Serial pulse coder is faulty⇒Refer to following **Caution**
 - For an analog servo, this may indicate that the parallel–serial converter has malfunctioned.
- (2) **#3(PMS):** Pulses are not issued correctly by abnormality of feedback cable.
 - 1 Fault of serial pulse coder⇒Refer to following **Caution**
 - 2 Feedback cable is faulty. ⇒Refer to following **Caution**

CAUTION

Reference position and machine's standard position are different from the ones before, adjust and set them correctly.

6.16 ALARM 351 (SERIAL PULSE CODER COMMUNICATION IS ABNORMAL)

An error is generated in communication with serial pulse coder.

Points

Check the details by the diagnostic function of the Power Mate.

		#7	#6	#5	#4	#3	#2	#1	#0
DGN	0202	DTE	CRC	STB					

#7(DTE) Data error has generated.

#6(CRC) Serial communication error has generated. (CRC check error)

#5(STB) Serial communication error has generated. (Stop bit error)

1) #7(DTE):Response from serial pulse coder is absent.

- 1 Signal cable is disconnected
- 2 Serial pulse coder is faulty. ⇒ See Caution 1.
- 3 +5V to the serial pulse coder is lowered.

2) #6(CRC),#5(STB):Serial communication is in faulty

- 1 Signal cable is disconnected.
- 2 Serial pulse coder is faulty ⇒ See Caution 1.
- 3 Base PC board or servo module is faulty ⇒ See Caution 2

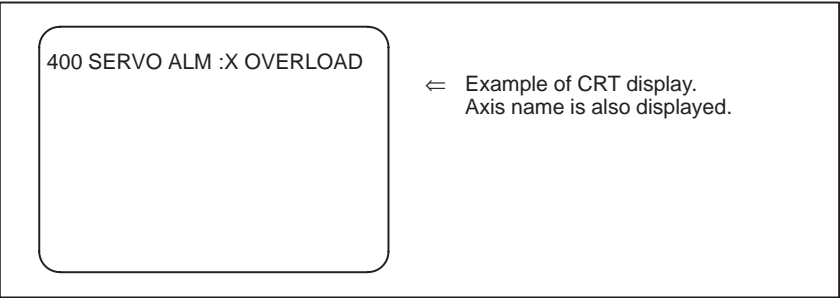
Causes

CAUTION

- 1 After the serial pulse coder is changed, reference position or machine's standard point is different from the one before replacement. Therefore reset and adjust it again.
- 2 All the data stored in memory is lost when the base PC board is changed. Set NC data again, referring to Chapter 3 "INPUT AND OUTPUT OF DATA".
The data includes reference position information. Reference position setting must also be performed, therefore.

6.17
ALARM 400
(OVERLOAD)

Amplifier or overheat of motor is detected.



Points

Confirm the detail by the diagnostic function of Power Mate.

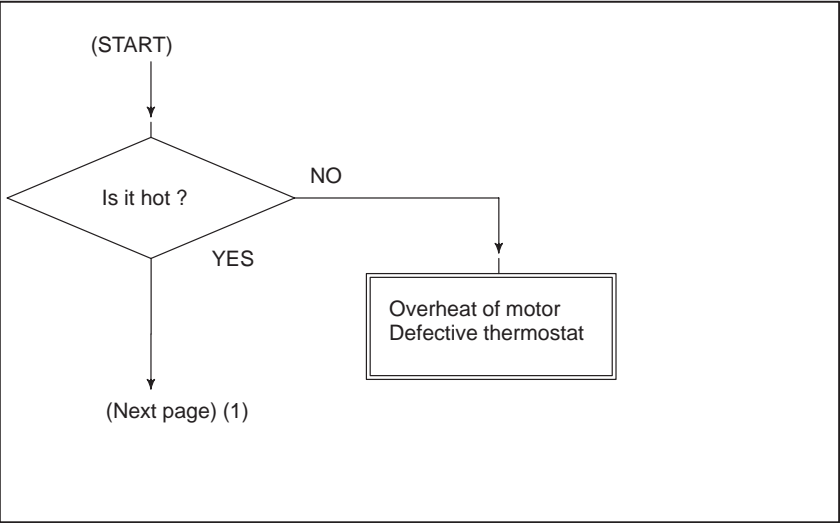
		#7	#6	#5	#4	#3	#2	#1	#0
DGN	0200	OVL							

#7(OVL) : 1 OVERLOAD ALARM is displayed.

Check details of alarms by DGN 201.

		#7	#6	#5	#4	#3	#2	#1	#0
DGN	0201	ALD							
		1	Overheat of servo motor						
		0	Overheat of servo amplifier						

Overheat of servo motor

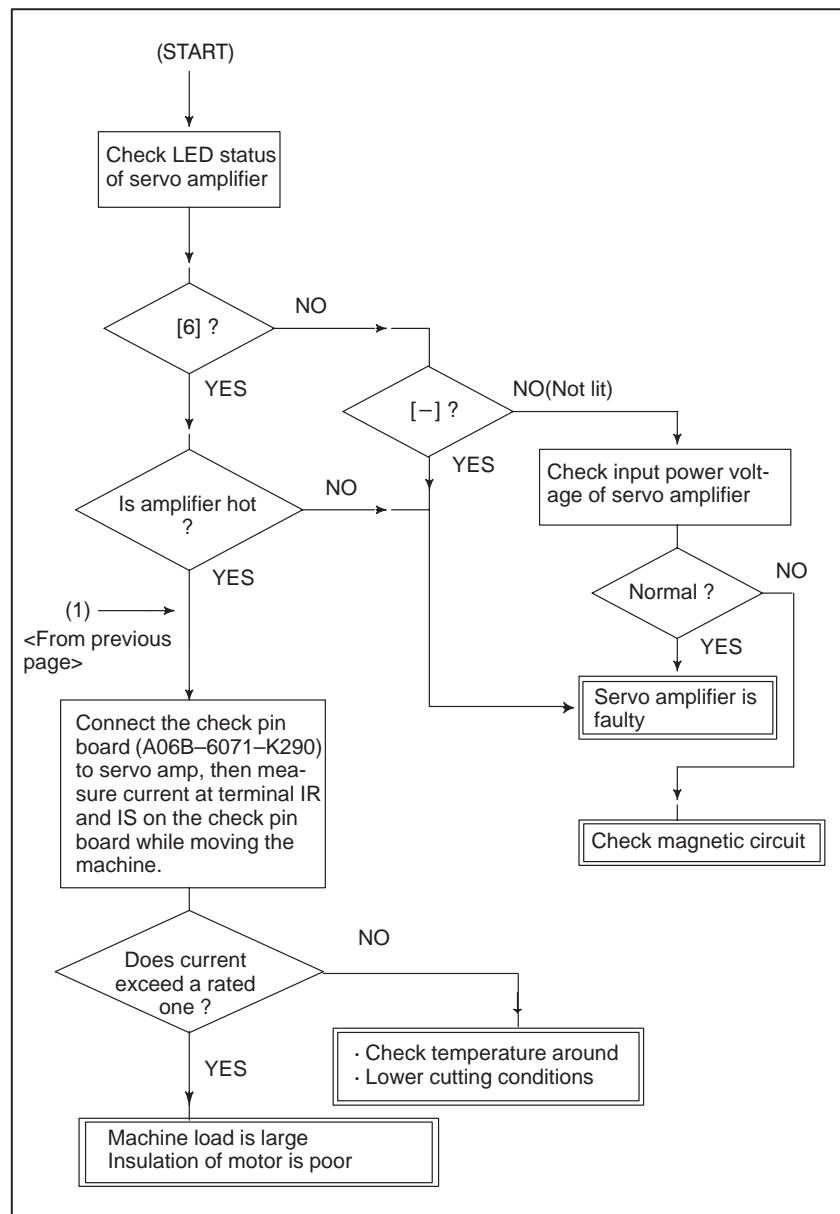


CAUTION

After the motor is changed, reference position or machine's reference point is different from the one before replacement. Set it again.

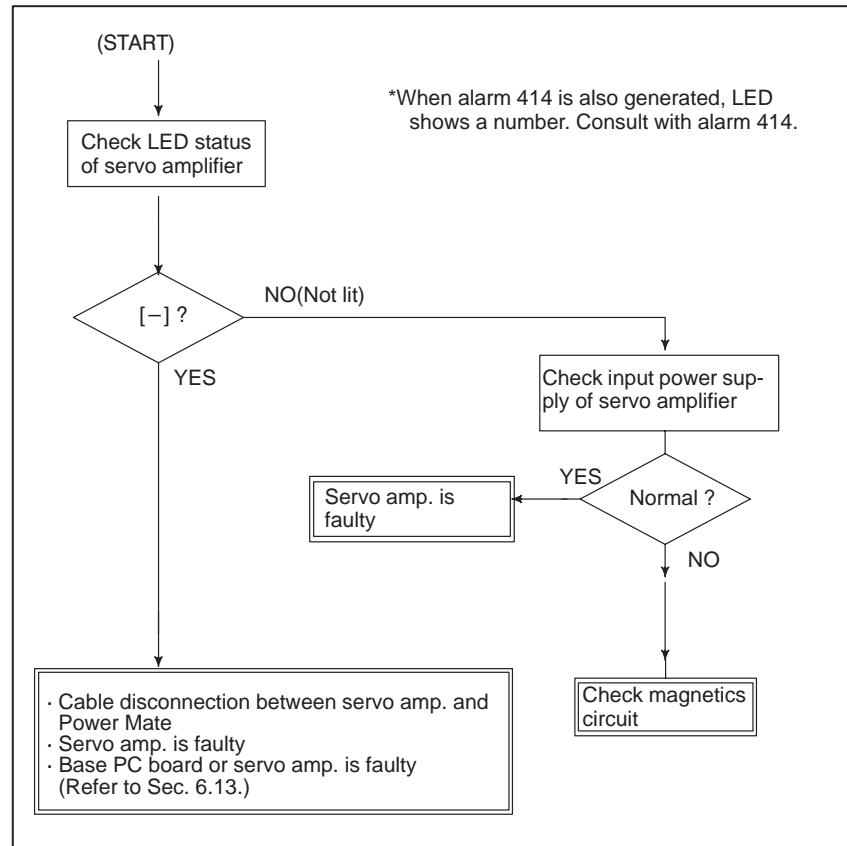
● **Overheat of servo amplifier**

LED 6 of servo amplifier is lit



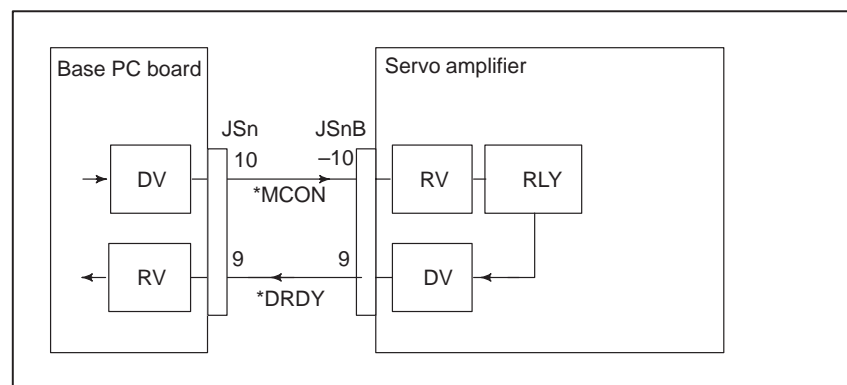
6.18 ALARM 401 (*DRDY SIGNAL TURNED OFF)

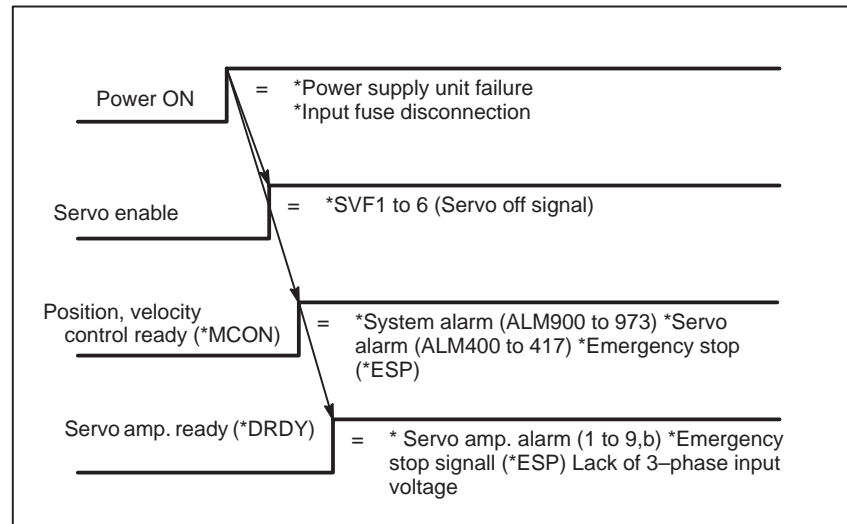
Ready signal (*DRDY) of servo amplifier is not turned on or turned off during operation.



NOTE

When the base PC board is replaced, all the data stored in memory is lost. Set data again, referring to chapter 3. "INPUT AND OUTPUT OF DATA".



Power on sequence (Power Mate \leftrightarrow Servo amplifier)**CAUTION**

This alarm may occur when two or more Power Mates share a single servo amplifier. In such a case, set bit 2 (NOFVY) of parameter No. 1803.

6.19

ALARM 404 AND 405 (*DRDY SIGNAL TURNED ON, REFERENCE POSITION RETURN ABNORMAL)

- **Alarm 404
(* DRDY ON)**

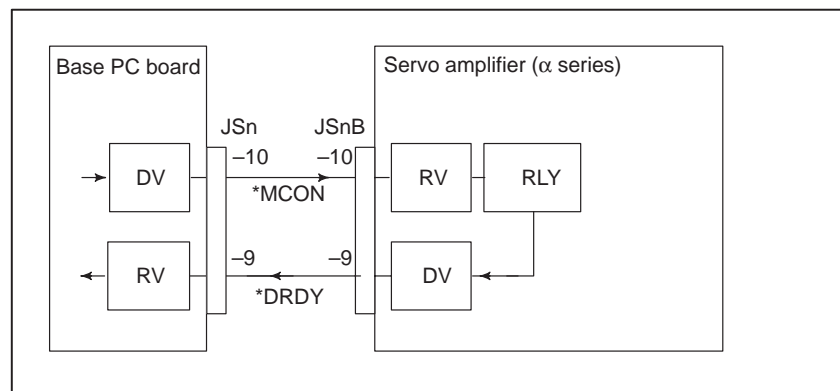
- **Causes**

DRDY signal is turned on before *MCON signal is turned on, or DRDY is not turned off after *MCON signal is turned off.

- 1 Servo amplifier is faulty.
- 2 Between servo amplifier and Power Mate is faulty.
- 3 Base PC board or servo module is faulty. (Refer to Sec. 6.13)

CAUTION

When the base PC board is replaced, all the data stored in memory is lost. Set the NC data again, referring to Chapter 3 "INPUT AND OUTPUT OF DATA".



- **Alarm 405 (Reference
positin return is
abnormal)**

- **Causes**

When automatic reference position return (G28) ended, grid signal is turned on.

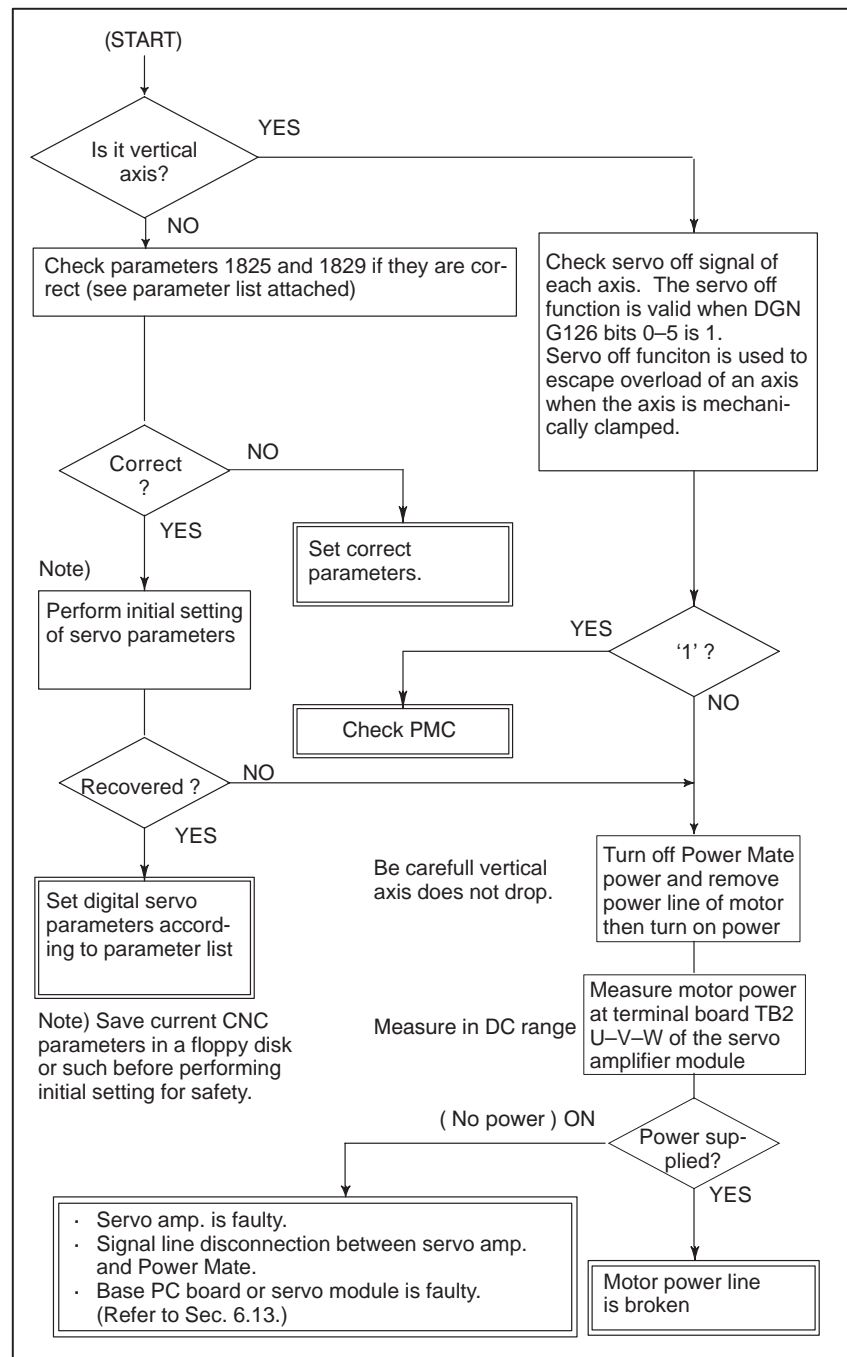
Base PC board or servo module is faulty. (Refer to Sec. 6.13)

CAUTION

When the base PC board is replaced, all the data stored in memory is lost. Set the NC data again, referring to Chapter 3 "INPUT AND OUTPUT OF DATA".

6.20 ALARM 410 (EXCESSIVE POSITION ERROR AMOUNT DURING STOP)

Position error amount at stop (DGN 300) exceeds a value set by parameter No. 1829.



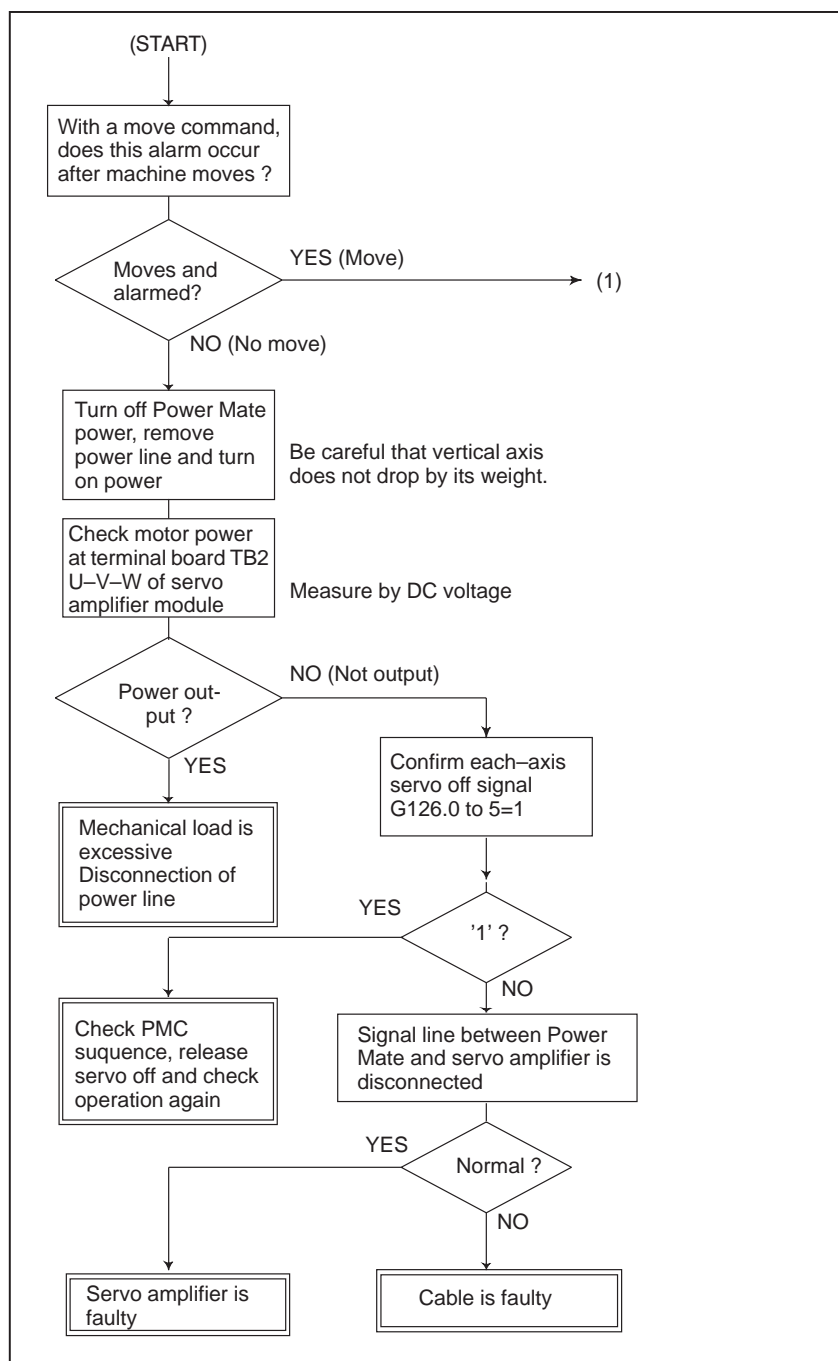
NOTE

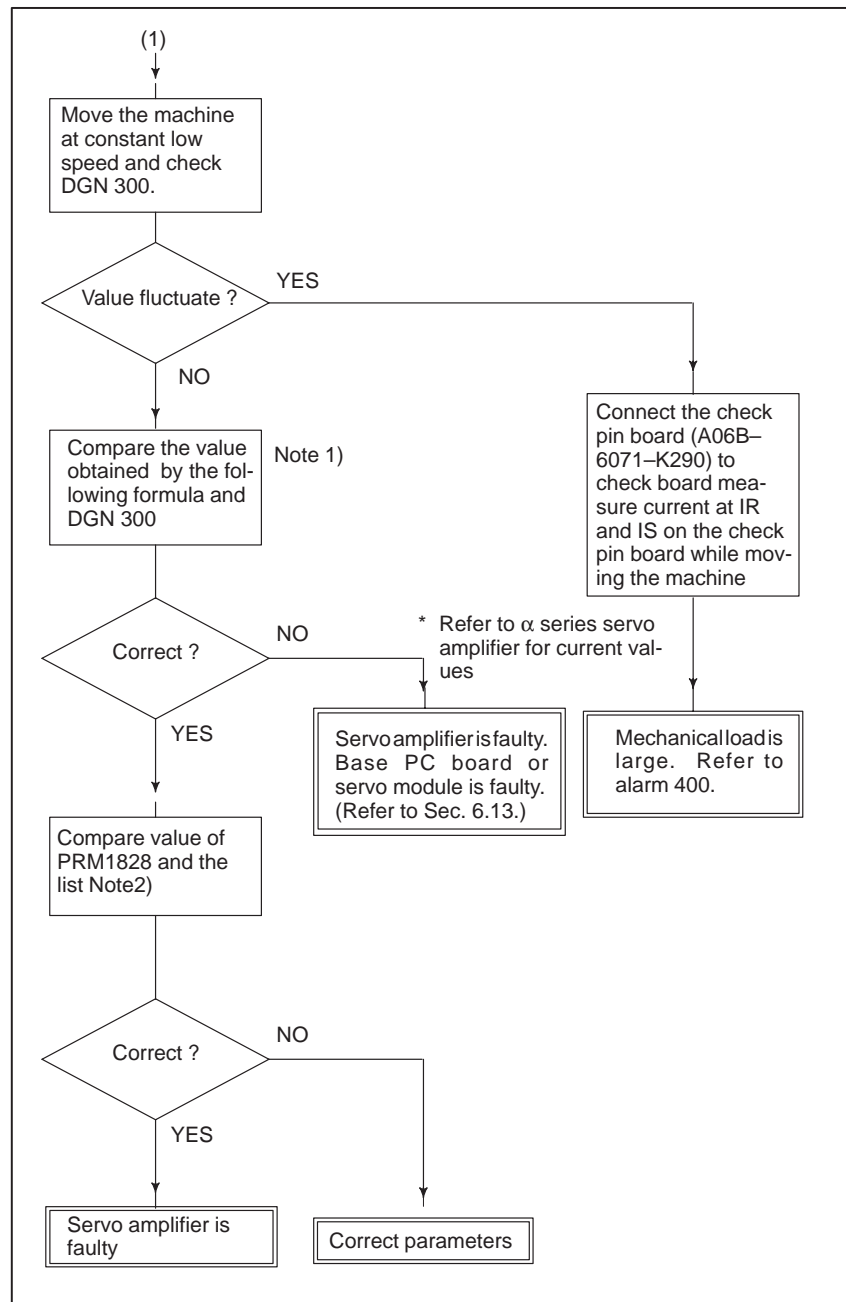
When the base PC board is replaced, all the data stored in memory is lost. Set NC data again, referring to Chapter 3 "INPUT AND OUTPUT OF DATA".

6.21

ALARM 411 (EXCESSIVE POSITION ERROR DURING MOVE)

Position error amount during movement (DGN 300) exceeds a value set by parameter 1828.



**CAUTION**

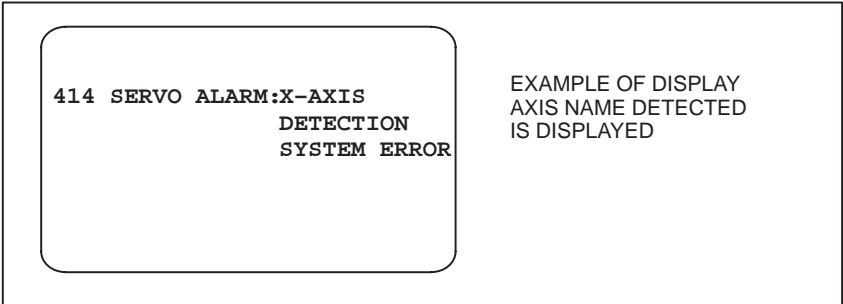
When the base PC board is replaced, all the data in memory is lost. Reset NC data, referring to Chapter 3 "INPUT AND OUTPUT OF DATA".

NOTE

- 1 Position error = $\frac{\text{Feed rate (mm/min)}}{60 \times \text{PRM1825}} \times \frac{1}{\text{Detection unit}}$
- 2 Parameter 1828 \geq Position error at rapid traverse 1.2

6.22

ALARM 414 (DIGITAL
SERVO SYSTEM IS
ABNORMAL)



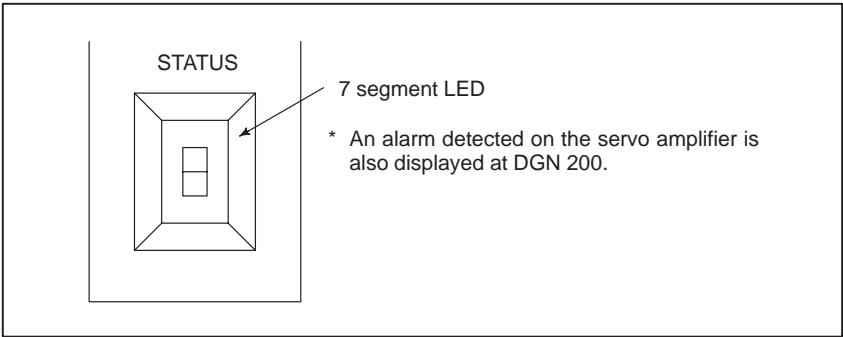
Points

Check details by Power Mate’s diagnostic function and LED display on the servo amplifier.

1

		#7	#6	#5	#4	#3	#2	#1	#0
DGN	0200		LV	OVC	HCA	HVA	DCA	FBA	OFA

2 LED display on the front panel of servo amplifier module and power supply module.



3

	#7	#6	#5	#4	#3	#2	#1	#0
DGN	0204		OFS	MCC				

- When DGN200 shows “1”

		#7	#6	#5	#4	#3	#2	#1	#0
DGN	0200		LV	OVC	HCA	HVA	DCA	FBA	OFA

- #6(LV) : Low voltage alarm → LED : “2” or “3” is lishted.
- #5(OVC) : Over current alarm
- #4(HCA) : Abnormal current alarm → LED : “8” is lishted.
- #3(HVA) : Over current alarm → LED : “1” is lishted.
- #2(DCA) : Discharge alarm → LED : “4” or “5” is lishted.
- #1(FBA) : Disconnection alarm
- #0(OFA) : Overflow alarm

- Action

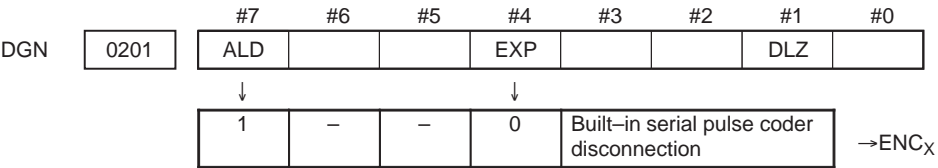
For an explanation of the meaning of each LED indication on the front panels of the servo amplifier and power supply modules, as well as the action to be taken in response to each indication, refer to the relevant servo amplifier documentation.

6.23
ALARM 416
(DISCONNECTION
ALARM)

Point

Position detection signal line is disconnected or short-circuited.

Check the details using the Power Mate’s diagnostic fuction.



Causes

- 1 Signal cable is disconnected or short-circuited.
- 2 Serial pulse coder or position detector is faulty. Refer to Caution 1
- 3 Base PC board or servo module is faulty. (Refer to Sec. 6.13.)
Refer to Caution 2

CAUTION

- 1 After the pulse coder is replaced, reference position or machine’s standard position is different from former one. Adjust and set it correctly.
- 2 When the base PC board is replaced, all the data stored in memory is lost. Set NC data again, referring to Chapter 3 “INPUT AND OUTPUT OF DATA”.

6.24 ALARM 417 (DIGITAL SERVO SYSTEM IS ABNORMAL)

Digital servo parameters are abnormal.

(Digital servo parameters are set incorrectly.)

When alarm 315 is occurred at the same time, check the cause of alarm 351 of Sec. 6.16.

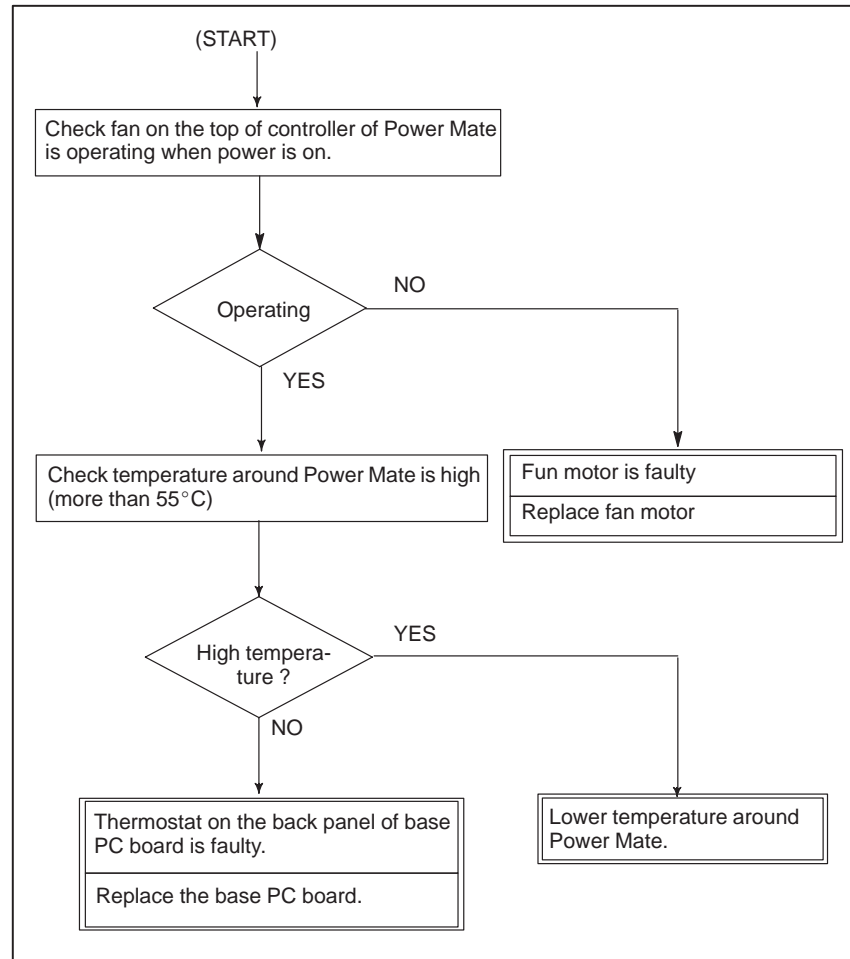
• Causes

- 1 Confirm the setting value of the following parameters:
PRM 2020 : Motor format number
PRM 2022 : Motor rotation direction
PRM 2023 : Number of pulses of velocity feedbacks
PRM 2024 : Number of pulses of position feedback
PRM 1023 : Servo axis number
PRM 2084 : Flexible feed gear ratio
PRM 2085 : Flexible feed gear ratio
Confirm the details with diagnosis function of CNC side.
- 2 Change the setting of this parameter to 0.
PRM 2047 : Observer parameter
- 3 Perform initial setting of digital servo parameters.
Refer to Sec. 5.1 “initial setting of servo parameters” .

6.25 ALARM 700 (OVERHEAT AT CONTROL SIDE)

Remedies

Because an ambient temperature of Power Mate becomes high, a thermostat mounted on Power Mate and informs an alarm.

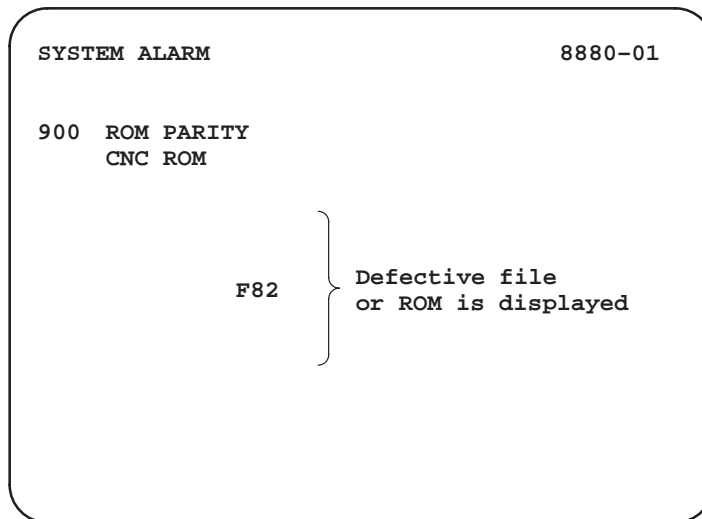


6.26 ALARM 900 (ROM PARITY ERROR)

ROM parity error occurred.

Causes and Remedies

- (1) Based PC board mounted on the base PC board or BOOT ROM is defective.



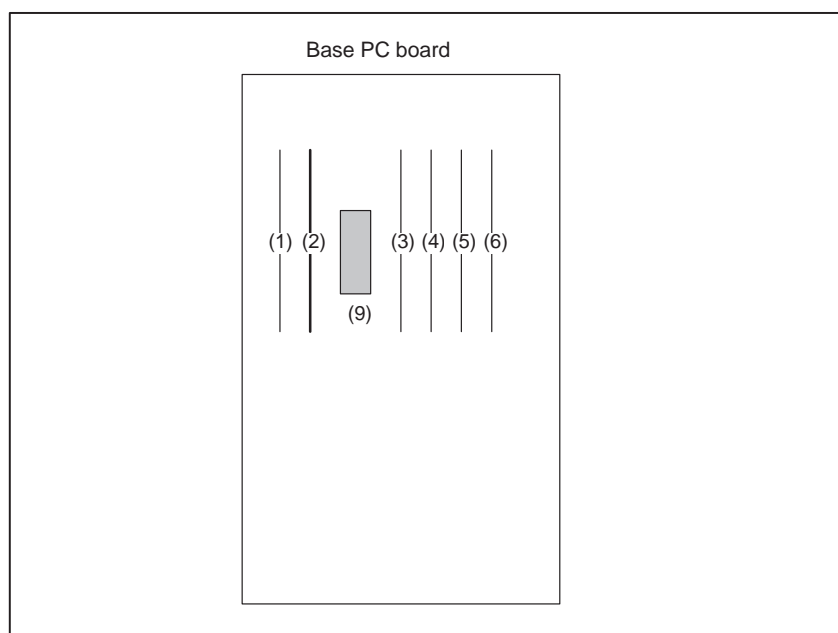
Confirm the series and versions of control software those are displayed on upper right of the screen.

*Memory module (2) may be written data (ladder program) by machine tool builder.

*Mounting position of ROM/MEMORY module

(2) : Memory module (CNC control software, Control soft for digital servo, Ladder program produced by MTB, macro executor program produced by MTB, and C language executor produced by MTB)

(9) : BOOT ROM (ROM for CNC system boot)

**CAUTION**

When the memory module is replaced, all the data stored in memory is lost. Set data again, referring to Chapter 3 "INPUT AND OUTPUT OF DATA".

6.27

ALARM 912 TO 913

(RAM PARITY)



Points

Parity error of RAM (in memory module) that stores part programs.

A parity bit is prepared for writing data in memory correctly. There are odd-number parity and even-number parity.

#7	#6	#5	#4	#3	#2	#1	#0	#P	
1	0	1	1	0	1	1	1	0	(Parity bit) (Even-number parity)

Causes and Remedies

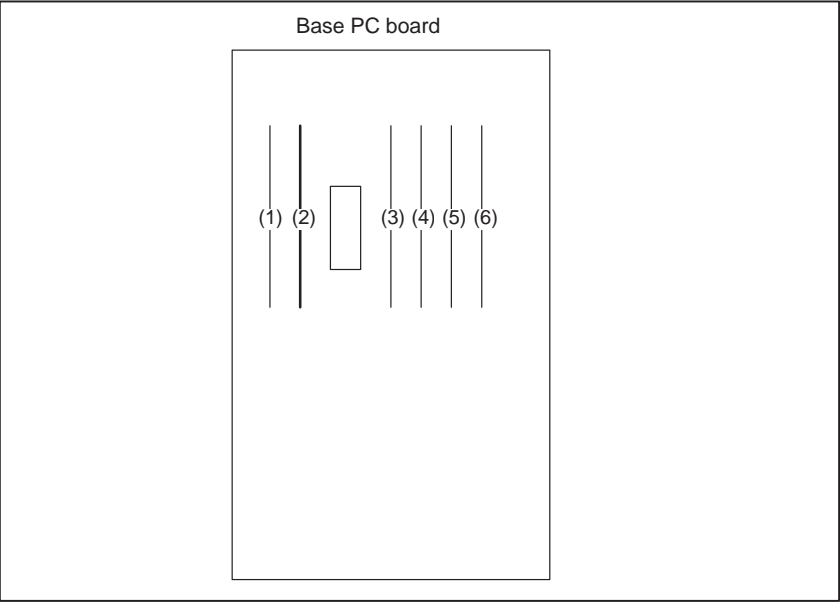
- (1) When this alarm occurs immediately after power is turned on, once turn off power, then turn on power while pushing  and  key to perform memory all clear
- If parity error is not released by clearing all memory, RAM or backup circuit of RAM may be faulty. Change memory module or base PC board.

CAUTION

When the base PC board or memory module is replaced, all the data stored in memory is lost. Set data again, referring to Chapter 3 “INPUT AND OUTPUT OF DATA”.

- Memory module mounting position

Memory module (Part program editing, parameters etc...)



- (2) Low voltage of memory back up battery.
A battery alarm occurs if a voltage rated at 3.0V drops to 2.5V typical (2.3 to 2.7V).
When the memory back up battery voltage is lowered, BAT is displayed at lower part of the screen.
When battery alarm is lit, replace with new lithium batteries as soon as possible.
Refer to 2.6 battery replacing item and change the batteries.
- (3) Power supply PC board is faulty
When alarm turns off by an operation of clearing all the memory, power supply PC board may also be faulty.

6.28**ALARM 920 TO 922
(WATCH DOG OR
RAM PARITY)****Points**

- **Watch dog timer alarm**

920: Watch dog alarm or RAM parity in servo module has occurred in the 1st or 2nd axis

921: Above alarm has occurred in the 3rd or 4th axis

922: Above alarm has occurred in the 5th or 6th axis

The timer used to monitor the operation of CPU is called the watch dog timer. The CPU resets timer time every time a constant time has passed. When an error occurs in CPU or peripheral device, timer is not reset but the alarm is informed.

- **RAM parity error**

Refer to alarm 910 to 911. RAM in servo module has been checked.

Causes and Remedies

- **Servo module is faulty**

The servo module includes servo RAM, watch dog timer circuit, etc. Defectiveness of hardware, abnormality or malfunctioning of detection circuit or the like is considered. Therefore, replace servo module.

- **Base PC board is faulty**

Base PC board may be faulty. Replace the base PC board.

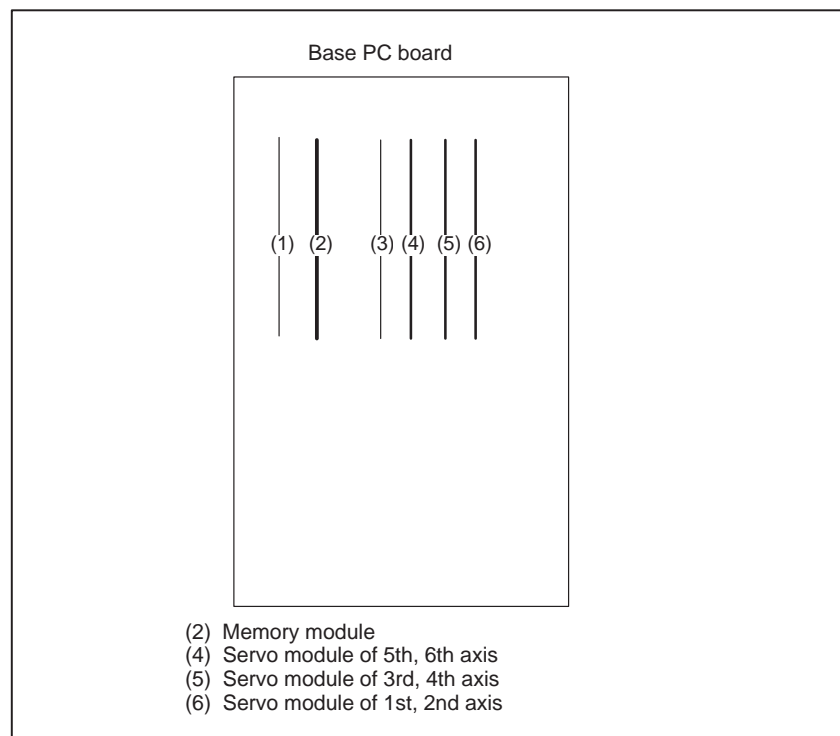
- **Memory module is faulty**

Software may not work properly due to failure of memory module. Change memory module.

- **Power supply PC board is faulty**

DC output voltage of power supply PC board may be faulty. Replace the power supply PC board.

<Location of module> Main CPU board

**CAUTION**

When the base PC board and memory module are replaced, all the data stored in memory is lost. Set data again, referring to Chapter 3 "INPUT AND OUTPUT OF DATA".

6.29

ALARM 924 (SERVO MODULE MOUNTING ERROR)

The servo module is not mounted.

NOTE

This alarm may not occur during normal operation.
This alarm may be generated when a PCB is changed for maintenance.

• Causes and remedies

Check installation and kinds of servo module on base PC board.
For location of servo module, refer to an installation diagram of alarm 920 to 922.

Unless these boards are mounted correctly, if this alarm still generates, change base PC board or servo module.

• Module location

Refer to Sec. 6.28.

• Kinds of servo module

A20B-2902-0290 (Digital servo)

A20B-2902-0510 (Analog servo)

6.30

ALARM 930 (CPU ERROR)

CPU error (illegal interrupt) has generated.

Causes and Remedies

1) Base PC board is faulty

An interrupt which will not occur during usual operation has generated.

Peripheral circuit of the CPU may be abnormal. Change the base PC board. If operation is performed normally by power off and on, noise may be a cause. Refer to Subsec. 2.2.3 "Suppressing Noise".

2) Memory module is faulty

Replace the memory module.

For location of memory module see the section of alarm 910 to 911.

CAUTION

When the base PC board and memory module are replaced, all the data stored in memory is lost. Set data again, referring to Chapter 3 "INPUT AND OUTPUT OF DATA".

6.31

ALARM 950 (PMC SYSTEM ALARM)

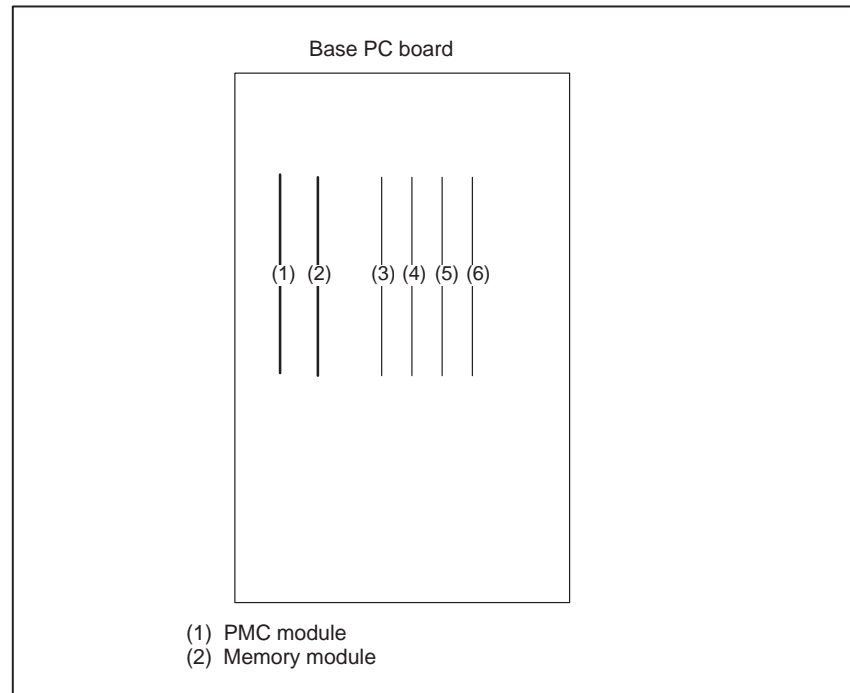
Causes and Remedies

An error occurred when RAM used for PMC test is being executed.

The following causes are considered :

- PMC module (1) is faulty.
- Memory module (2) is faulty.
- Base PC board is faulty.

Module mounting position

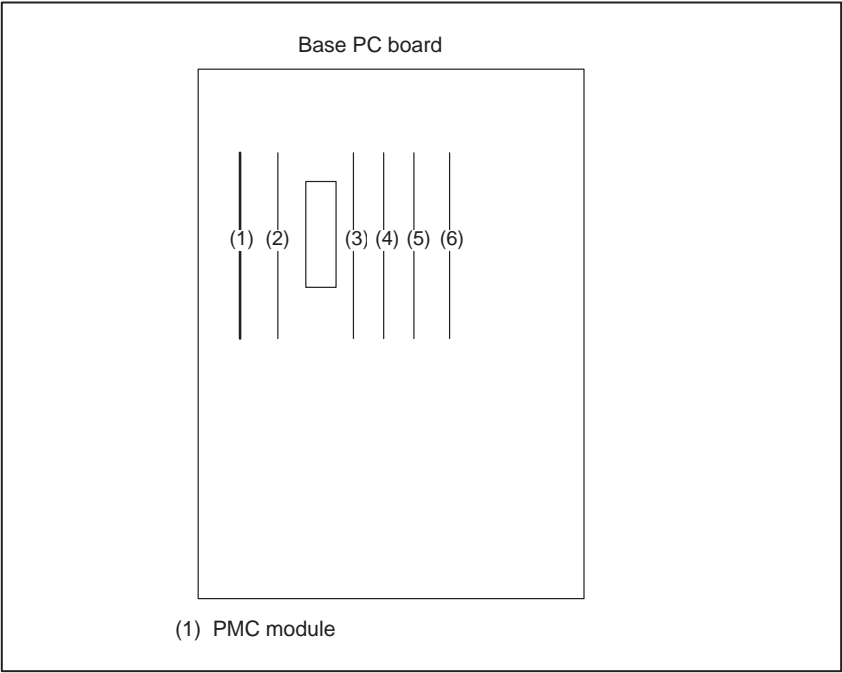


6.32
ALARM 970 (NMI
ALARM IN PMC
MODULE)

Causes and Remedies
Module mounting
position

RAM parity error or NMI has occurred in the PMC module.

Fault of PMC module is considered.

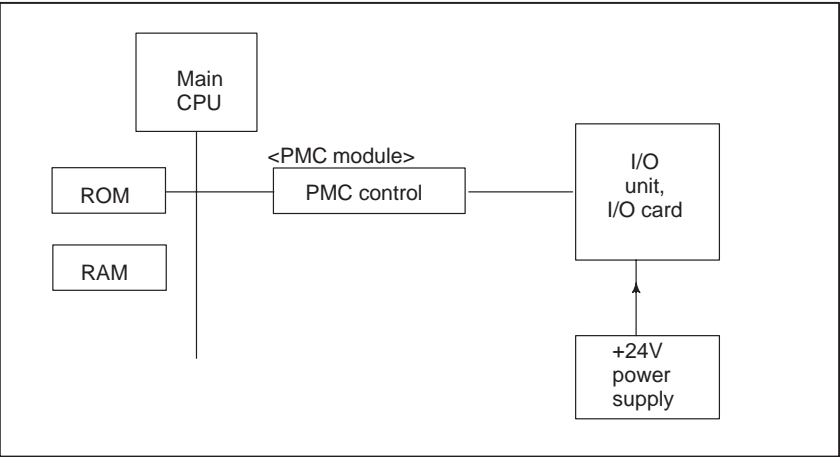


6.33
ALARM 971
(NMI ALARM IN SLC)

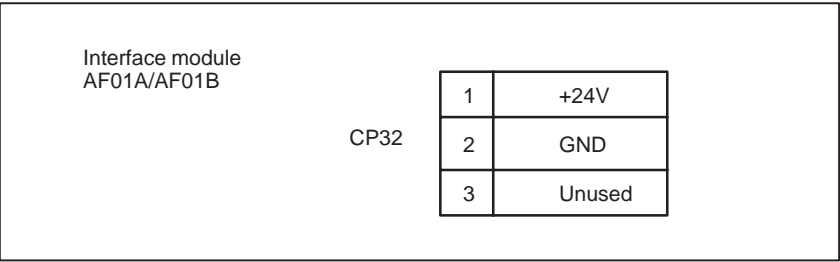
Causes and Remedies

A communication error is detected between Power Mate and I/O unit I/O card at SLC in the PMC module.

Fault of PMC module or fault of I/O unit or I/O card.



- PMC control module (1) is faulty.
Refer to Sec. 6.32 for the module mounting position.
- I/O unit or I/O card is faulty.
- +24V power to the I/O unit or I/O card is faulty.



Disconnection or broken of cable.

6.34

ALARM 973 (NMI ALARM BY UNKNOWN CAUSE)

Causes and Remedies

An unknown NMI has generated.

This alarm may also be issued when the FANUC I/O link is disconnected while the Power Mate is being used as the slave of the I/O link.

- 1) Base PC board or power supply PC board is faulty.
 - Base PC board is faulty.
 - Memory module is faulty.
 - Power supply PC board is faulty.
- 2) The power to those units connected to the I/O link is turned off, or a system alarm is issued.

Turn the power off, then back on again. This clears the alarm.

Module location

Refer to Sec. 6.27.

CAUTION

When the base PC board is replaced or the memory module is replaced (or removed then mounted again) all the data stored in memory is lost. Set data again, referring to Chapter 3 "INPUT AND OUTPUT OF DATA".

6.35

NO SIGNAL CHANGE IN FANUC I/O LINK MASTER

Point

Determine whether the FANUC I/O link is established.

Turn on the power to the Power Mate and the slave of the FANUC I/O link (such as an I/O card or I/O unit). Make sure that the Power Mate screens can be switched using the CRT or DPL keys, then turn off the power to the Power Mate only. If a communication alarm is issued by the slave unit (the red LED lights), the FANUC I/O link has already been established.

Causes and Remedies


- (1) When the FANUC I/O link has not yet been established
 - Slave unit allocation error on the Power Mate
 - Refer to the PMC documentation or “Power Mate–Model H Connection Manual” (description of the FANUC I/O link function in “PMC Interface”) to set the slave unit correctly.
 - Faulty cable contact
 - Make sure that the Power Mate connector is JD1A1 and that the slave connector is JD1B (refer to Subsection 2.3.4). Alternatively, after turning the power off, disconnect the cable, then connect it again.
 - Wrong cable
 - The cable used for the FANUC I/O link function features pins that are not connected straight through. For example, pin 1 of one connector is connected to pin 3 of the other connector. Refer to Subsection 2.3.4 for details of the cable.
 - Defective Power Mate or slave unit
 - Replace the Power Mate or slave unit.
- (2) When the FANUC I/O link has already been established

Check the connection between the machine and slave unit, I/O signal X/Y to the PMC, ladder, and others.

APPENDIX

A

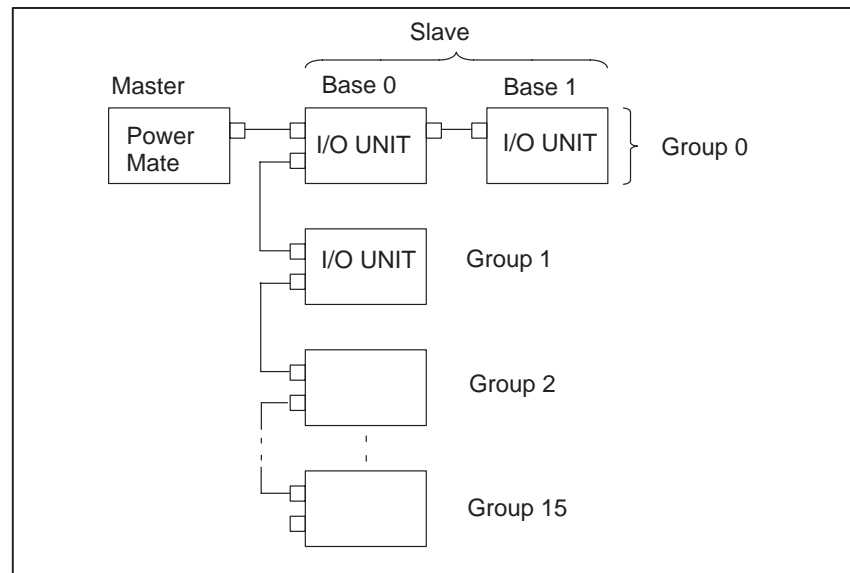
I/O UNIT MODEL A



- A.1 SYSTEM CONFIGURATION**
- A.2 HARDWARE CONFIGURATION**
- A.3 LED INDICATION**
- A.4 FUSES**
- A.5 REMOVING A PRINTED CIRCUIT BOARD**

A.1 SYSTEM CONFIGURATION

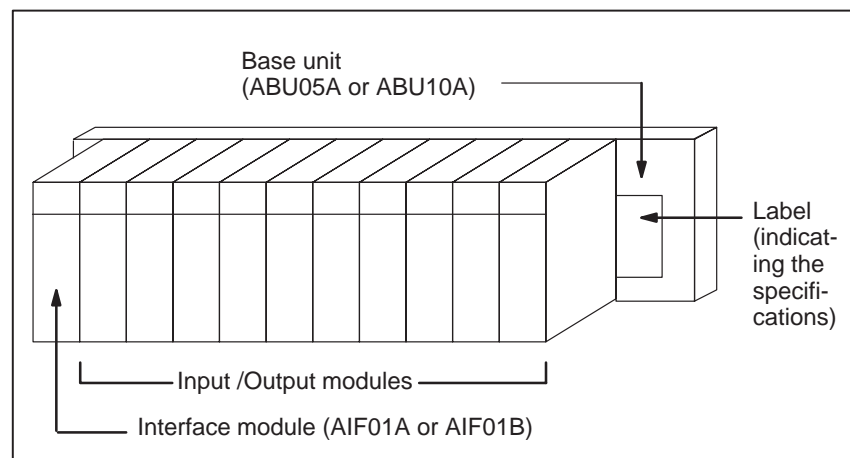
Up to 16 FANUC I/O Unit–MODEL A groups can be connected to a Power Mate through the FANUC I/O Link high-speed serial interface.



* The number and types of slave units that can be connected for each group are as follows :

- Up to two I/O Units
- One Power Mate
- One I/O card

A.2 HARDWARE CONFIGURATION



A.3

LED INDICATION

Modules having up to 16 input/output points are provided with LEDs to indicate their statuses.
Use these LED's to assist you with troubleshooting.

AIF01A

○PWR

○LINK

○BA1

○BA0

AIF01A

Symbol	Description															
PWR	Indicates that the internal 24 VDC power supply is operating normally.															
LINK	Indicates that the I/O Link is operating normally.															
BA0 BA1	Indicates the number of the base from which data is being transferred. <div><table><thead><tr><th>BA1</th><th>BA0</th><th>Base number</th></tr></thead><tbody><tr><td>○</td><td>○</td><td>Base #0</td></tr><tr><td>○</td><td>●</td><td>Base #1</td></tr><tr><td>●</td><td>○</td><td>Base #2</td></tr><tr><td>●</td><td>●</td><td>Base #3</td></tr></tbody></table><div>● On ○ Off</div><p>If the LINK went on once, but then failed, these LEDs indicate the number of the base that was transferring data when the error occurred.</p></div>	BA1	BA0	Base number	○	○	Base #0	○	●	Base #1	●	○	Base #2	●	●	Base #3
BA1	BA0	Base number														
○	○	Base #0														
○	●	Base #1														
●	○	Base #2														
●	●	Base #3														

AIF01B

○PWR

○LINK

AIF01B

Symbol	Description
PWR	Indicates that the internal 24 VDC power supply is operating normally.
LINK	Indicates that the I/O Link is operating normally.

Input / Output modules (with up to 16 input / output points)

A 0 1 2 3 4 5 6 7

B 0 1 2 3 4 5 6 7

F

A○○○○○


Symbol	Description
A0 to 7 B0 to 7	Indicate the state of an input / output signal (LED on : signal on, LED off : signal off)
F	Indicates that the internal fuse has blown

A.4 FUSES

The following modules provide the corresponding protection fuses. If a fuse blows for any reason, such as the short-circuiting of a cable connected to a load, first remove the cause of the problem, then replace the fuse.

Module	Indication of whether a fuse has blown	Parts number of fuse	Rated current
AIF01A Interface module	PWR off	A60L-0001-0290#LM32	3.2A
AIF01B Interface module	PWR off	A60L-0001-0290#LM32	3.2A
A0D08C Output module (8 DC points)	F on	A60L-0001-0260#5R00	5A
A0D08D Output module (8 DC points)	F on	A60L-0001-0260#5R00	5A
A0A05E Output module (5 AC points)	F on	A60L-0001-0276#3.15	3.15A
A0A08E Output module (8 AC points)	F on	A60L-0001-0276#3.15	3.15A
A0A12F Output module (12 AC points)	F on	A60L-0001-0276#3.15	3.15A

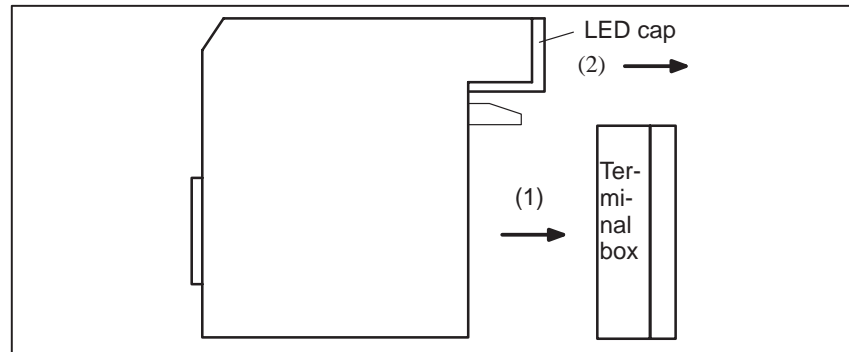
WARNING

Before replacing a blown fuse, it is necessary to remove the cause of the blown fuse. For this reason, only the personnel who have a working knowledge of maintenance and safety are allowed to carry out this work. When replacing a fuse with the cabinet open, be careful not to touch the high-voltage circuit section (marked  and shielded with a shock hazard prevention cover). If you touch the high-voltage circuit section when it is uncovered, you will get an electric shock.

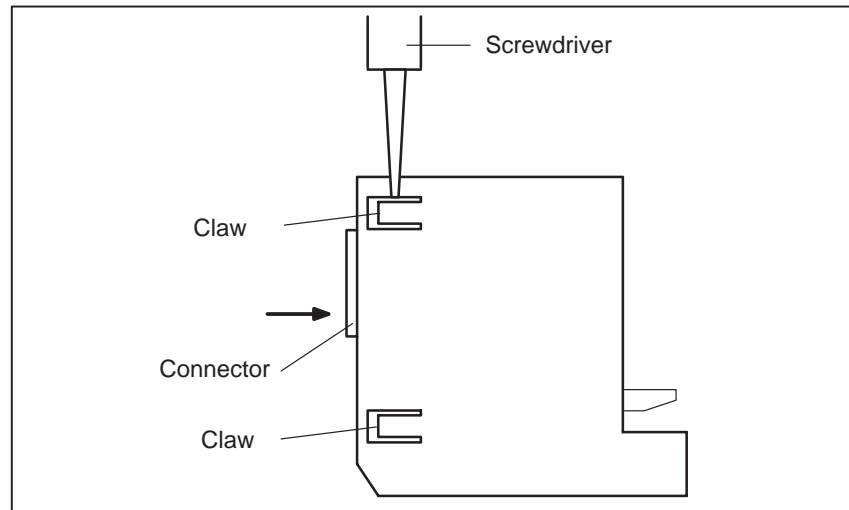
A.5 REMOVING A PRINTED CIRCUIT BOARD

• Removing a terminal-box-type input/output module

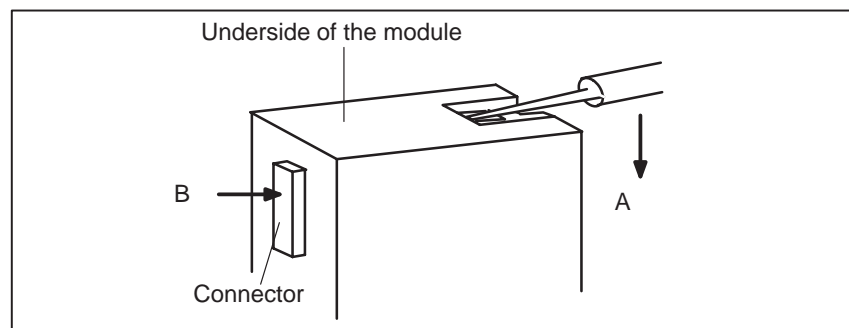
- 1 Remove the terminal box, if necessary.
- 2 Remove the LED cap by pulling it in the direction indicated by the arrow.



- 3 While pushing the connector in the direction indicated by the arrow, use a screwdriver to release the two claws on the module case.

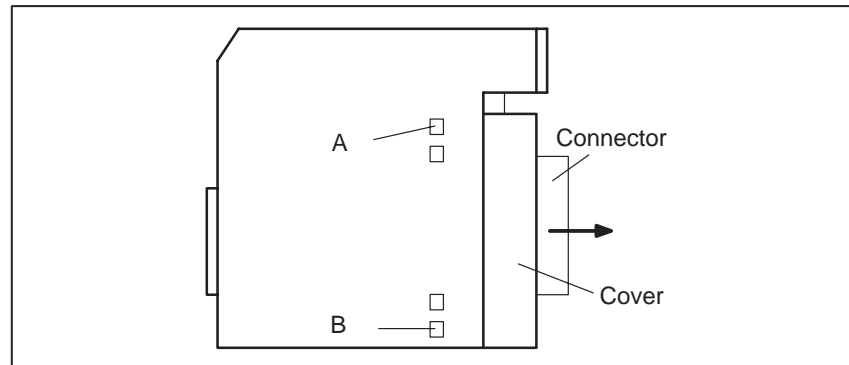


- 4 As shown on the right, insert a screwdriver into the gap between the module case and the connector of the terminal box. To remove the printed circuit board, push the connector in the direction indicated by arrow B while pushing the screwdriver in the direction indicated by arrow A.

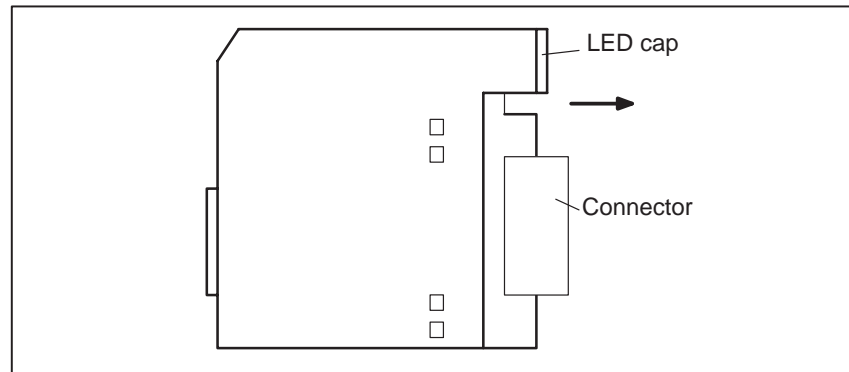


- **Removing a connector-type input/output module**

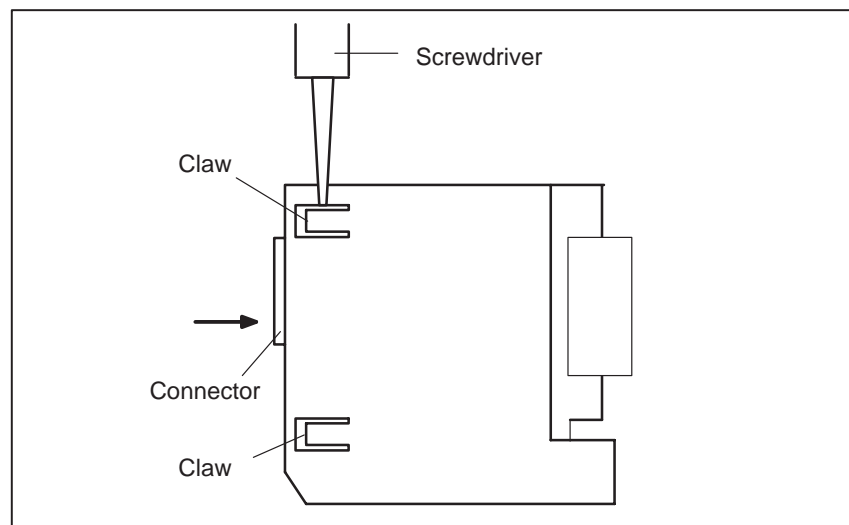
- 1 To remove the cover, pull it in the direction indicated by the arrow, while using a screwdriver to release claws A and B on both sides.



- 2 To remove the LED cap, pull it in the direction indicated by the arrow.



- 3 While pushing the connector in the direction indicated by the arrow, use a screwdriver to release the two or four claws on the module case. Then, remove the printed circuit board by pushing the connector in the direction indicated by the arrow.



B ALARM LIST

1) Program errors (P/S alarm)

Number	Message	Contents
000	PLEASE TURN OFF POWER	A parameter which requires the power off was input, turn off power.
001	TH PARITY ALARM	TH alarm (A character with incorrect parity was input). Correct the tape.
002	TV PARITY ALARM	TV alarm (The number of characters in a block is odd). This alarm will be generated only when the TV check is effective. Correct the tape.
003	TOO MANY DIGITS	Data exceeding the maximum allowable number of digits was input. (Refer to the item of max. programmable dimensions.)
004	ADDRESS NOT FOUND	A numeral or the sign “-” was input without an address at the beginning of a block. Modify the program .
005	NO DATA AFTER ADDRESS	The address was not followed by the appropriate data but was followed by another address or EOB code. Modify the program.
006	ILLEGAL USE OF NEGATIVE SIGN	Sign “-” input error (Sign “-” was input after an address with which it cannot be used. Or two or more “-” signs were input.) Modify the program.
007	ILLEGAL USE OF DECIMAL POINT	Decimal point “.” input error (A decimal point was input after an address with which it can not be used. Or two decimal points were input.) Modify the program.
009	ILLEGAL ADDRESS INPUT	Unusable character was input in significant area. Modify the program.
010	IMPROPER G-CODE	An unusable G code or G code corresponding to the function not provided is specified. Modify the program.
011	NO FEEDRATE COMMANDED	Feedrate was not commanded to a cutting feed or the feedrate was inadequate. Modify the program.
027	NO AXES COMMANDED IN G43/G44	No axis is specified in G43 and G44 blocks for the tool length offset. Offset is not canceled but another axis is offset for the tool length offset. Modify the program.
028	ILLEGAL PLANE SELECT	In the plane selection command, two or more axes in the same direction are commanded. Modify the program.
029	ILLEGAL OFFSET VALUE	The offset values specified by H code is too large. Modify the program.
030	ILLEGAL OFFSET NUMBER	The offset number specified by H code for tool length offset is too large. Modify the program.
031	ILLEGAL P COMMAND IN G10	In setting an offset amount by G10, the offset number following address P was excessive or it was not specified. Modify the program.
032	ILLEGAL OFFSET VALUE IN G10	In setting an offset amount by G10 or in writing an offset amount by system variables, the offset amount was excessive. Correct the offset value.
046	ILLEGAL REFERENCE RETURN COMMAND	Other than P2 and P3 are commanded for 2nd and 3rd reference position return command.
059	PROGRAM NUMBER NOT FOUND	In an external workpiece number search, a specified program number was not found. Otherwise, a program specified for searching is being edited in background processing. Check the program number and external signal. Or discontinue the background eiting.

Number	Message	Contents
060	SEQUENCE NUMBER NOT FOUND	Commanded sequence number was not found in the sequence number search. Check the sequence number.
070	NO PROGRAM SPACE IN MEMORY	The tape memory area is insufficient. An attempt to input a ladder program using the DPL/MDI failed because the program was too big. Delete any unnecessary programs, then retry.
071	DATA NOT FOUND	The address to be searched was not found. Or the program with specified program number was not found in program number search. Check the data.
072	TOO MANY PROGRAMS	The number of programs to be stored exceeded 63 (basic), 125 (option), 200 (option), or 400 (option). Delete unnecessary programs and execute program registration again.
073	PROGRAM NUMBER ALREADY IN USE	The commanded program number has already been used. Change the program number or delete unnecessary programs and execute program registration again.
074	ILLEGAL PROGRAM NUMBER	The program number is other than 1 to 9999. Modify the program number.
075	PROTECT	An attempt was made to register a program whose number was protected.
076	ADDRESS P NOT DEFINED	Address P (program number) was not commanded in the block which includes an M98, G65, or G66 command. Modify the program.
077	SUB PROGRAM NESTING ERROR	The subprogram was called in five folds. Modify the program.
078	NUMBER NOT FOUND	A program number or a sequence number which was specified by address P in the block which includes an M98, M99, M65 or G66 was not found. The sequence number specified by a GOTO statement was not found. Otherwise, a called program is being edited in background processing. Correct the program, or discontinue the background editing.
079	PROGRAM VERIFY ERROR	In memory or program collation, a program in memory does not agree with that read from an external I/O device. Check both the programs in memory and those from the external device.
085	COMMUNICATION ERROR	When entering data in the memory by using Reader / Puncher interface or FANUC I/O Link, an overrun, parity or framing error was generated. The number of bits of input data or setting of baud rate or specification No. of I/O unit is incorrect.
086	DR SIGNAL OFF	When entering data in the memory by using Reader / Puncher interface or FANUC I/O Link, the ready signal (DR) of reader / puncher was off. Power supply of I/O unit is off or cable is not connected or a P.C.B. is defective.
087	BUFFER OVERFLOW	When entering data in the memory by using Reader / Puncher interface or FANUC I/O Link, though the read terminate command is specified, input is not interrupted after 10 characters read. I/O unit or base P.C.B. is defective.
090	REFERENCE RETURN INCOMPLETE	The reference position return cannot be performed normally because the reference position return start point is too close to the reference position or the speed is too slow. Separate the start point far enough from the reference position, or specify a sufficiently fast speed for reference position return.
091	REFERENCE RETURN INCOMPLETE	An attempt was made to return to the reference position during feed hold. If it becomes necessary to return to the reference position during feed hold, reset the system to release the feed hold state before returning to the reference position.
092	AXES NOT ON THE REFERENCE POINT	The commanded axis by G27 (Reference position return check) did not return to the reference position.

Number	Message	Contents
093	EXTERNAL SETTING INCOMPLETE	The reference position external setting cannot be performed because the reference position external setting signal is set to 1 in the following status. 1) When the jog feed mode (JOG) is not selected. 2) When the jog feed mode (JOG) is selected, however the signal ZRN is 0. 3) When the emergency stop signal ESP is 0. 4) When the parameter APC No.1815 bit 5 is 0.
100	PARAMETER WRITE ENABLE	On the PARAMETER(SETTING) screen, PWE(parameter writing enabled) is set to 1. Set it to 0, then reset the system.
101	PLEASE CLEAR MEMORY	The power turned off while rewriting the memory by program edit operation. If this alarm has occurred, press <RESET> while pressing <PROG>, and only the program being edited will be deleted. Register the deleted program.
110	DATA OVERFLOW	The absolute value of fixed decimal point display data exceeds the allowable range. Modify the program.
111	CALCULATED DATA OVERFLOW	The result of calculation result is out of the allowable range. (-10^{47} to -10^{-29} , 0, and 10^{-29} to 10^{47}). Check the calculated data.
112	DIVIDED BY ZERO	Division by zero was specified. (including $\tan 90^\circ$) Check the calculated data.
113	IMPROPER COMMAND	A function which cannot be used in custom macro is commanded. Modify the program.
114	FORMAT ERROR IN MACRO	There is an error in other formats than <Formula>. Modify the program.
115	ILLEGAL VARIABLE NUMBER	A value not defined as a variable number is designated in the custom macro. Modify the program.
116	WRITE PROTECTED VARIABLE	The left side of substitution statement is a variable whose substitution is inhibited. Modify the program.
118	PARENTHESIS NESTING ERROR	The nesting of bracket exceeds the upper limit (quintuple). Modify the program.
119	ILLEGAL ARGUMENT	The SQRT argument is negative, BCD argument is negative, or other values than 0 to 9 are present on each line of BIN argument. Modify the program.
122	DUPLICATE MACRO MODAL-CALL	The macro modal call is specified in double. Modify the program.
124	MISSING END STATEMENT	DO – END does not correspond to 1 : 1. Modify the program.
125	FORMAT ERROR IN MACRO	<Formula> format is erroneous. Modify the program.
126	ILLEGAL LOOP NUMBER	In DOn, $1 \leq n \leq 3$ is not established. Modify the program.
127	NC, MACRO STATEMENT IN SAME BLOCK	NC and custom macro commands coexist. Modify the program.
128	ILLEGAL MACRO SEQUENCE NUMBER	The sequence number specified in the branch command was not 0 to 9999. Or, it cannot be searched. Modify the program.
129	ILLEGAL ARGUMENT ADDRESS	An address which is not allowed in <Argument Designation > is used. Modify the program.
130	ILLEGAL AXIS OPERATION	An axis control command was given by PMC to an axis controlled by part program of Power Mate. Or an axis control command was given by part program of Power Mate to an axis controlled by PMC. Modify the program.
131	TOO MANY EXTERNAL ALARM MESSAGES	Five or more alarms have generated in external alarm message. Consult the PMC ladder to find the cause.
132	ALARM NUMBER NOT FOUND	No alarm No. concerned exists in external alarm message clear. Check the PMC ladder.

Number	Message	Contents
133	ILLEGAL DATA IN EXT. ALARM MSG	Small section data is erroneous in external alarm message or external operator message. Check the PMC ladder.
139	CAN NOT CHANGE PMC CONTROL AXIS	An axis is selected in commanding by PMC axis control. Modify the program.
199	MACRO WORD UNDEFINED	Undefined macro word was used. Modify the custom macro.
224	RETURN TO REFERENCE POINT	Reference position return has not been performed before the automatic operation starts. Perform reference position return only when bit 0 of parameter 1005 ZRN _x is 0.
231	ILLEGAL FORMAT IN G10 OR L50	Any of the following errors occurred in the specified format at the programmable-parameter input. 1) Address N or R was not entered. 2) A number not specified for a parameter was entered. 3) The axis number was too large. 4) An axis number was not specified in the axis-type parameter. 5) An axis number was specified in the parameter which is not an axis type.
233	DEVICE BUSY	When an attempt was made to use a unit such as that connected via the RS-232-C interface, other users were using it.
239	BP/S ALARM	While punching was being performed with the function for controlling external I/O units, background editing was performed.
240	BP/S ALARM	Background editing was performed during MDI operation.
5010	END OF RECORD	The end of record (%) was specified.
5011	PARAMETER ZERO (CUT MAX)	The parameter (No. 1422) for the maximum cutting feedrate is set to 0.

2) Background edit alarm

Number	Message	Contents
???	BP/S alarm	BP/S alarm occurs in the same number as the P/S alarm that occurs in ordinary program edit. (070, 071, 072, 073, 074 085,086,087 etc.)
140	BP/S alarm	It was attempted to select or delete in the background a program being selected in the foreground. (Note) Use background editing correctly.

NOTE

Alarm in background edit is displayed in the key input line of the background edit screen instead of the ordinary alarm screen and is resettable by any of the MDI key operation.

3) Absolute pulse coder (APC) alarm

Number	Message	Contents
300	nth-axis origin return	Manual reference position return is required for the nth-axis ($n=1-2$).
301	APC alarm: nth-axis communication	nth-axis ($n=1-2$) APC communication error. Failure in data transmission Possible causes include a faulty APC, cable, or servo module.
302	APC alarm: nth-axis over time	nth-axis ($n=1-2$) APC overtime error. Failure in data transmission. Possible causes include a faulty APC, cable, or servo module.
303	APC alarm: nth-axis framing	nth-axis ($n=1-2$) APC framing error. Failure in data transmission. Possible causes include a faulty APC, cable, or servo module.
304	APC alarm: nth-axis parity	nth-axis ($n=1-2$) APC parity error. Failure in data transmission. Possible causes include a faulty APC, cable, or servo module.
305	APC alarm: nth-axis pulse error	nth-axis ($n=1-2$) APC pulse error alarm. APC alarm. APC or cable may be faulty.
306	APC alarm: nth-axis battery voltage 0	nth-axis ($n=1-2$) APC battery voltage has decreased to a low level so that the data cannot be held. APC alarm. Battery or cable may be faulty.
307	APC alarm: nth-axis battery low 1	nth-axis ($n=1-2$) axis APC battery voltage reaches a level where the battery must be renewed. APC alarm. Replace the battery.
308	APC alarm: nth-axis battery low 2	nth-axis ($n=1-2$) APC battery voltage has reached a level where the battery must be renewed (including when power is OFF). APC alarm. Replace battery.
309	APC alarm: nth-axis Ern impossible	An attempt was made to return to the reference position without rotating the motor. First rotate the motor through at least one turn, then turn the power off, before returning to the reference position.

4) Serial pulse coder (SPC) alarms

When either of the following alarms is issued, a possible cause is a faulty serial pulse coder or cable.

Number	Message	Contents
350	SPC ALARM: n AXIS PULSE CODER	The n axis (axis 1–2) pulse coder has a fault. Refer to diagnosis display No. 202 for details.
351	SPC ALARM: n AXIS COMMUNICATION	n axis (axis 1–2) serial pulse coder communication error (data transmission fault) Refer to diagnosis display No. 203 for details.

- **The details of serial pulse coder alarm No.350**

The details of serial pulse coder alarm No. 350 (pulse coder alarm) are displayed in the diagnosis display (No. 202 or 204) as shown below.

	#7	#6	#5	#4	#3	#2	#1	#0
202		CSA	BLA	PHA	RCA	BZA	CKA	SPH

CSA : The serial pulse coder is defective. Replace it.

BLA : The battery voltage is low. Replace the batteries. This alarm has nothing to do with alarm 350 (serial pulse coder alarm).

SPH : The serial pulse coder or feedback cable is defective. Replace the serial pulse coder or cable.

RCA : The serial pulse coder is defective. Replace it.

BZA : The pulse coder was supplied with power for the first time.
Make sure that the batteries are connected.
Turn the power off, then turn it on again and perform a reference position return. This alarm has nothing to do with alarm 350 (serial pulse coder alarm).

CKA : The serial pulse coder is defective. Replace it.

PHA : The serial pulse coder or feedback cable is defective. Replace the serial pulse coder or cable.

	#7	#6	#5	#4	#3	#2	#1	#0
204		OFS	MCC	LDA	PMS			

OFS : A current conversion error has occurred in the digital servo.

MCC : A magnetic contactor contact in the servo amplifier has welded.

LDA : The LED indicates that serial pulse coder C is defective

PMS : A feedback pulse error has occurred because the feedback cable is defective.

- **The details of serial pulse coder alarm No.351**

The details of serial pulse coder alarm No. 351 (communication alarm) are displayed in the diagnosis display (No. 203) as shown below.

	#7	#6	#5	#4	#3	#2	#1	#0
203	DTE	CRC	STB	PRM				

DTE : The serial pulse coder encountered a communication error.

The pulse coder, feedback cable, or feedback receiver circuit is defective. Replace the pulse coder, feedback cable, base PCB, or servo module.

The servo interface type (A or B) is incorrect.

CRC : The serial pulse coder encountered a communication error.

The pulse coder, feedback cable, or feedback receiver circuit is defective. Replace the pulse coder, feedback cable, base PCB, or servo module.

STB : The serial pulse coder encountered a communication error.

The pulse coder, feedback cable, or feedback receiver circuit is defective.

Replace the pulse coder, feedback cable, base PCB, or servo module.

PRM : An invalid parameter was found. Alarm 417 (invalid servo parameter) is also issued.

5) Servo alarms

Number	Message	Contents
400	SERVO ALARM: n-th AXIS OVERLOAD	The n-th axis (axis 1–2) overload signal is on. Refer to diagnosis display No. 201 for details.
401	SERVO ALARM: n-th AXIS VRDY OFF	1) The n-th (axis 1 or 2) servo amplifier ready signal (DRDY) went off. Check the servo amplifier. 2) This alarm may occur if a servo amplifier is shared by several NC units, or if a two-axis servo amplifier is used in a dual Power Mate–D system. Set NOFVY (bit 2 of parameter No. 1803).
404	SERVO ALARM: n-th AXIS VRDY ON	Even though the n-th axis (axis 1–2) READY signal (*MCON) went off, the servo amplifier READY signal (*DRDY) is still on. Or, when the power was turned on, *DRDY went on even though *MCON was off.
405	SERVO ALARM: (ZERO POINT RETURN FAULT)	Position control system fault. Due to an NC or servo system fault in the reference position return, there is the possibility that reference position return could not be executed correctly. Try again from the manual reference position return.
409	SERVO ALARM: n-th AXIS TORQUE ALM	An abnormal servo motor load was detected.
410	SERVO ALARM: n-th AXIS – EXCESS ERROR	The position deviation value when the n-th axis (axis 1–6) stops is larger than the set value. Note) Limit value must be set to parameter No.1829 for each axis.
411	SERVO ALARM: n-th AXIS – EXCESS ERROR	The position deviation value when the n-th axis (axis 1–6) moves is larger than the set value. Note) Limit value must be set to parameter No.1828 for each axis.
413	SERVO ALARM: n-th AXIS – LSI OVERFLOW	The contents of the error register for the n-th axis (axis 1–6) and beyond the range of -2^{31} to 2^{31} . This error usually occurs as the result of an improperly set parameters.
414	SERVO ALARM: n-th AXIS – DETECTION RELATED ERROR	N-th axis (axis 1–6) digital servo system fault. Refer to diagnosis display No. 200 and No.204 for details.
415	SERVO ALARM: n-th AXIS – EXCESS SHIFT	A speed higher than 511875 units/s was attempted to be set in the n-th axis (axis 1–6). This error occurs as the result of improperly set CMR.
416	SERVO ALARM: n-th AXIS – DISCONNECTION	Position detection system fault in the n-th axis (axis 1–6) pulse coder (disconnection alarm). Refer to diagnosis display No. 201 for details.
417	SERVO ALARM: n-th AXIS – PARAMETER INCORRECT	This alarm occurs when the n-th axis (axis 1–6) is in one of the conditions listed below. (Digital servo system alarm) 1) The value set in Parameter No. 2020 (motor form) is out of the specified limit. 2) A proper value (111 or –111) is not set in parameter No.2022 (motor revolution direction). 3) Illegal data (a value below 0, etc.) was set in parameter No. 2023 (number of speed feedback pulses per motor revolution). 4) Illegal data (a value below 0, etc.) was set in parameter No. 2024 (number of position feedback pulses per motor revolution). 5) Parameters No. 2084 and No. 2085 (flexible field gear rate) have not been set. 6) A value outside the limit of {1 to the number of control axes} or a non-continuous value (Parameter 1023 (servo axis number) contains a value out of the range from 1 to the number of axes, or an isolated value (for example, 3 not preceded by 2).was set in parameter No. 1023 (servo axisnumber).

• Details of servo alarm No.414

The details of servo alarm No. 414 are displayed in the diagnosis display (No. 200) as shown below.

	#7	#6	#5	#4	#3	#2	#1	#0
200	OVL	LV	OVC	HCAL	HVAL	DCAL	FBAL	OFAL

OFAL : An overflow alarm is being generated.

FBAL : A disconnection alarm is being generated.
(No relation to alarm No. 414)

DCAL : A regenerative discharge circuit alarm is being generated.

HVA : A overvoltage alarm is being generated.

HCAL : An abnormal current alarm is being generated.

OVC : A overcurrent alarm is being generated.

LV : A low voltage alarm is being generated.

OVL : An overload alarm is being generated. (No relation to alarm No. 414)

The details of servo alarms No. 400 and No. 416 are displayed in the diagnosis display (No. 201) as shown below.

	#7	#6	#5	#4	#3	#2	#1	#0
201	ALD							

When servo alarm No. 400 is being generated :

ALD 1 : Motor overheating
0 : Amplifier overheating

When servo alarm No. 416 is being generated :

ALD 1 : Built-in pulse coder disconnection (hardware)
0 : Pulse coder is not connected due to software.

6) Over travel alarms

If this alarm occurs, move the machine manually in the direction opposite to that in which it was moving when the alarm occurred, then reset the alarm.

Number	Message	Contents
500	OVER TRAVEL : +n	Exceeded the n-th axis (axis 1-2) + side stored stroke limit l. (Parameter No.1320)
501	OVER TRAVEL : -n	Exceeded the n-th axis (axis 1-2) - side stored stroke limit l. (Parameter No.1321)

7) Overheat alarms

Number	Message	Contents
700	OVERHEAT: CONTROL UNIT	Control unit overheat Check that the fan motor operates normally, and clean the air filter.
701	OVERHEAT: FAN MOTOR	The fan motor at the top of the control unit has malfunctioned. Check the operation of the fan motor. If the fan motor has stopped, replace the fan or power supply PCB.

8) System alarms

(These alarms cannot be reset with reset key.)

Number	Message	Contents
900	ROM PARITY	ROM parity error Replace the ROM.
910	DRAM PARITY: (LOW)	ROM parity error in DRAM on the base PCB Replace the base PCB.
911	DRAM PARITY: (HIGH)	ROM parity error in DRAM on the base PCB Replace the base PCB.

Number	Message	Contents
912	SRAM PARITY: (LOW)	ROM parity error in RAM for which a backup battery is used. Clear the memory or replace the base PCB or memory module. After this operation, reset all data including the parameters.
913	SRAM PARITY: (HIGH)	ROM parity error in RAM for which a backup battery is used. Clear the memory or replace the base PCB or memory module. After this operation, reset all data including the parameters.
920	SERVO ALARM (1/2 AXIS)	Servo alarm (1st or 2nd axis). A watchdog alarm or a local RAM parity error of the servo occurred. Replace the servo control module on the main CPU board.
921	SERVO ALARM (3/4 AXIS)	Servo alarm (3rd or 4th axis). A watchdog alarm or a RAM parity error in the servo module occurred. Replace the servo control module on the main CPU board.
922	SERVO ALARM (5/6 AXIS)	Servo alarm (5th or 6th axis). A watchdog alarm or a RAM parity error in the servo module occurred. Replace the servo control module on the main CPU board.
924	SERVO MODULE SETTING ERROR	The servo module is not installed. Check that the servo module or servo interface module on the base PCB is mounted securely.
930	CPU INTERRUPT	CPU error The base PCB, memory module, or CPU module is faulty.
950	PMC SYSTEM ALARM	Fault occurred in the PMC. The base PCB or PMC module may be faulty.
951	PMC-PA WATCH DOG ALARM	Fault occurred in the PMC-PA3 module (watchdog alarm). Defective base printed-circuit board or PMC control module
970	NMI OCCURRED IN BOC	A RAM parity error or NMI occurred in the PMC-PA3 module. It is likely that the base printed-circuit board or PMC module is defective.
971	NMI OCCURRED IN SLC	An alarm occurred in the FANUC I/O link master function. Check the connection between the controller and the I/O unit or I/O card. Also check whether the I/O unit and I/O card are supplied with power and whether the interface module or the I/O card is faulty. Or, check the PMC module. This alarm is issued when the power to another Power Mate connected to the FANUC I/O link is turned off, or when a system alarm is issued on another Power Mate. In this case, the unit does not indicate a failure.
973	NON MASK INTERRUPT	NMI occurred for an unknown reason. Or, a communication error occurred in the FANUC I/O link slave function. This alarm is issued when the power to another Power Mate connected to the FANUC I/O link is turned off, or when a system alarm is issued on another Power Mate. In this case, the unit does not indicate a failure.
980	SYNC ERROR	The ITP period of the master became asynchronous with that of the slave. Replace the base printed-circuit board.

9) ALARM OF M-NET

Number	Message	Contents
5051	M-NET CODE ERROR	Abnormal character received (other than code used for transmission).
5052	M-NET ETX ERROR	Abnormal ETX code.
5053	M-NET CONNECT TIMEOUT	Connection time monitoring error (parameter No. 175).
5054	M-NET RECEIVE TIMEOUT	Polling time monitoring error (parameter No. 176).
5055	M-NET PRT/FRM ERROR	Vertical parity or framing error.
5056	M-NET OVERRUN ERROR	Overrun error is detected.
5057	M-NET TRANSFER TIMEOUT	Transmission timeout error (parameter No. 178).
5058	M-NET ROM PARITY ERROR	ROM parity error is detected.
5059	M-NET BOARD SYSTEM ERROR	Unjust interruption is occurred.

10) MEMORY CARD ALARM

Number	Message	Contents and solution
5101	MEMORY CARD NOT CONNECTED	No memory card is inserted. Insert a memory card before attempting input/output.
5102	MEMORY CARD WRITE PROTECTED	The memory card is write-protected. Write-enable the memory card before attempting to write data to it.
5103	MEMORY CARD DATA ERROR	(During restoration) The memory card contains invalid data. (During saving) Data cannot be written to the memory card. The memory card may be defective. Use another memory card.
5104	EMERGENCY STOP RELEASE	The emergency stop state was released during input/output to or from the memory card. Place the system in emergency stop state, then retry input/output.
5106	MEMORY CARD SIZE ERROR	The capacity of the memory card is less than the size of the data to be saved. Use a memory card having a capacity greater than the size of the data to be saved.
5107	MEMORY CARD DATA TYPE ILLEGAL	The data stored on the memory card is not supported by the system. Retry using a memory card containing data that is compatible with the system.
5109	MEMORY CARD BATTERY ALARM	A PMC communication error occurred during input/output to or from the memory card. Retry input/output.

11) MULTI-PATH ALARM

Number	Message	Contents and solution
5160	ILLEGAL COMMAND IN THE MULTI PATH	The multi-path command format is invalid. Correct the program.
5161	ILLEGAL AXIS SELECT	1 An axis is duplicated in paths. 2 The setting of parameter 8010 is invalid.
5162	FEEDRATE IS ZERO IN THE MULTI PATH	For setting cutting feed in multi-path mode, use the F command.
5163	ILLEGAL WAIT M CODE COMMAND	The wait M code command format is invalid. Correct the program.

12) ALARM

Number	Message	Contents	Counter plan	Reference
1000 to 1999	A message created by the user or machine tool builder, using the PMC alarm message function, is displayed. NOTE) On the DPL/MDI, only the number is displayed.	Alarm generated by the user or machine tool builder using the PMC	Apply appropriate countermeasures as explained in the manual provided by the machine tool builder.	Manual provided by machine tool builder
3000 to 3200	A message created by the user or machine tool builder, using a custom macro, is displayed. NOTE) On the DPL/MDI, only the number is displayed.	Alarm generated by the user or machine tool builder, using a custom macro	Apply appropriate countermeasures as explained in the manual provided by the machine tool builder.	Manual provided by machine tool builder
3000 to 3099	P/S ALARM	Alarm generated by the user or machine tool builder, using the PMC alarm display function	Manual provided by machine tool builder	Manual provided by machine tool builder
5010	END OF RECORD	EOR was read without specifying a program end command.		
5150	PARAM. (NO. 1011) SETTING ERROR	The number of controlled axes set in parameter 1011 is invalid. Change the parameter setting.		

13) Alarm messages (PMC)

This list contains alarms which do not occur in the Power Mate-H.

Message	Contents and solution
ALARM NOTHING	Normal status
ER00 PROGRAM DATA ERROR(ROM)	The ladder program is not written correctly. (solution) Write the ladder program again.
ER03 PROGRAM SIZE ERROR(OPTION)	The size of ladder program exceeds the option specification size. (solution) Please increase the option specification size. Or, reduce the size of ladder program.
ER04 PMC TYPE UNMATCH	The PMC model setting of the ladder program is not corresponding to an actual model. (solution) Please change the PMC model setting by the offline programmer.
ER05 PMC MODULE TYPE ERROR	The module type of the PMC engine is not correct. (solution) Please exchange the module of PMC engine for a correct one.
ER07 NO OPTION (LADDER STEP)	There is no step number option of LADDER.
ER17 PROGRAM PARITY	A parity error occurred in RAM containing a ladder program. (solution) Please edit the sequence program once on PMC. Check the operation. Still the error occurs, exchange the RAM.
ER18 PROGRAM DATA ERROR BY I/O	Transferring the ladder program from offline programmer was interrupted by the power off etc. (solution) Please clear the ladder program and transfer the ladder program again.
ER19 LADDER DATA ERROR	Editing the LADDER was interrupted by the power off or by the switch to the CNC screen by the function key etc. (solution) Please edit LADDER once on PMC. Or, please input LADDER again.
ER20 SYMBOL/COMMENT DATA ERROR	Editing the symbol and comment was interrupted by the power off or by the switch to the CNC screen by the function key etc. (solution) Please edit symbol and comment once on PMC. Or, please input symbol and comment again.

Message	Contents and solution
ER21 MESSAGE DATA ERROR	Editing the message data was interrupted by the power off or the switch to the CNC screen by the function key etc. (solution) Please edit message data once on PMC. Or, please input message data again.
ER22 PROGRAM NOTHING	There is no sequence program
ER23 PLEASE TURN OFF POWER	There is a change in setting LADDER MAX AREA SIZE etc. (solution) Please restart the system to make the change effective.
ER32 NO I/O DEVICE	Any DI/DO unit of I/O Unit or the connection unit etc. is not connected. (solution) When I/O Link is used: Please confirm whether the DI/DO units turning on. Or please confirm the connection of the cable.
ER33 SLC ERROR	The LSI for I/O Link is defective. (solution) Please exchange the module of PMC engine.
ER34 SLC ERROR(xx)	The communication with the DI/DO units of the xx group failed. (solution) Please confirm the connection of the cable connected to the DI/DO units of the xx group. Please confirm whether the DI/DO units turned on earlier than Power Mate. Or, please exchange the module of PMC engine on the DI/DO units of the xx group
ER35 TOO MUCH OUTPUT DATA IN GROUP(xx)	The number of the output data in the xx group exceeded the max. The data, which exceed 32 bytes, become ineffective. (solution) Please refer to the following for the number of the data for each group. "FANUC I/O Unit-MODEL A connecting and maintenance manual" (B-61813E) "FANUC I/O Unit-MODEL B connecting manual"(B-62163E)
ER36 TOO MUCH INPUT DATA IN GROUP(xx)	The number of the input data in the xx group exceeded the max. The data, which exceed 32 bytes, become ineffective. (solution) Please refer to the following for the number of the data for each group. "FANUC I/O Unit-MODEL A connecting and maintenance manual" (B-61813E) "FANUC I/O Unit-MODEL B connecting manual"(B-62163E)
ER38 MAX SETTING OUTPUT DATA OVER(xx)	The assignment data for a group exceeds 128 bytes. (The assignment data of output side of xx group or later become ineffective.) (solution) Please reduce the assignment data to 128 bytes or less for the number of the output data of each group.
ER39 MAX SETTING INPUT DATA OVER(xx)	The assignment data for a group exceeds 128 bytes. (The assignment data of input side of xx group or later become ineffective.) (Solution) Please reduce the assignment data to 128 bytes or less for the number of the input data of each group.
WN01 LADDER MAX SIZE ERROR	The MAX LADDER AREA SIZE in the system parameter is illegal. (solution) Set the correct value to MAX LADDER AREA SIZE and restart the system.
WN03 ABORT NC-WINDOW/EXIN	LADDER was stopped while CNC and PMC were communicating. The functional instruction WINDR, WINDW, EXIN, DISPB, and etc. may not work normally. (solution) When restarting the system, this alarm will be released. Execute the sequence program(Press RUN key) after confirming whether there is a problem in LADDER or not.
WN07 LADDER SP ERROR (STACK)	When functional instruction CALL(SUB65) or CALLU(SUB66) was executed, the stack of the LADDER overflowed. (solution) Please reduce the nesting of the subprogram to 8 or less.

*When ER00 to ER23 occur, sequence program is not available.

Alarm messages (For EDIT)

Message	Contents and solution
ADDRESS BIT NOTHING	The address of the relay/coil is not set.
FUNCTION NOT FOUND	There is no functional instruction of the input number.
COM FUNCTION MISSING	The functional instruction COM (SUB9) is not correctly dealt with. Correspondence of COM and COME (SUB29) is incorrect. Or, the number of coil controlled by COM is specified by the model which the number cannot be specified.
EDIT BUFFER OVER	There is no empty area of the buffer for the editing. (solution) Please reduce NET under editing.
END FUNCTION MISSING	Functional instruction END1,END2,END3 and END do not exist. Or, there are error net in END1,END2,END3,END. Or, order of END1,END2,END3, and END is not correct.
ERROR NET FOUND	There is an error net.
ILLEGAL FUNCTION NO.	The wrong number of the functional instruction is searched.
FUNCTION LINE ILLEGAL	The functional instruction is not correctly connected.
HORIZONTAL LINE ILLEGAL	The horizontal line of the net is not connected.
ILLEGAL NET CLEARED	Because the power had been turn off while editing LADDER, some net under editing was cleared.
ILLEGAL OPERATION	Operation is not correct. The value is not specified and only INPUT key was pushed. The address data is not correctly inputted. Because the space to display the instruction on screen is not enough, the functional instruction cannot be made.
SYMBOL UNDEFINED	The symbol which was inputted is not defined.
INPUT INVALID	There is an incorrect input data. Non-numerical value was inputted with COPY, INSLIN,C-UP,C-DOWN etc. The input address was specified for write coil. An illegal character was specified for the data table.
NET TOO LARGE	The input net is larger than the editing buffer. (solution) Please reduce the net under editing.
JUMP FUNCTION MISSING	The functional instruction JMP(SUB10) is not correctly dealt with. Correspondence of JMP and JMPE(SUB30) is incorrect. The number of coil to jump is specified by the model which the number of coil cannot specified. (It is possible to specify the coil number only on PMC-RB/RC.)
LADDER BROKEN	LADDER is broken.
LADDER ILLEGAL	There is an incorrect LADDER.
OBJECT BUFFER OVER	The sequence program area was filled. (solution) Please reduce the LADDER.
PARAMETER NOTHING	There is no parameter of the functional instruction.
PLEASE COMPLETE NET	The error net was found in LADDER. (solution) After correcting the error net, please continue operating.
PLEASE KEY IN SUB NO.	Please input the number of the functional instruction. (solution) If you do not input the functional instruction, please push soft key "FUNC" again.
RELAY COIL FORBIT	There is an unnecessary relay or coil.
RELAY OR COIL NOTHING	The relay or the coil does not suffice.
PLEASE CLEAR ALL	It is impossible to recover the sequence program. (solution) Please clear the all data.
SYMBOL DATA DUPLICATE	The same symbol name is defined in other place.
COMMENT DATA OVERFLOW	The comment data area was filled. (solution) Please reduce the number of the comment.

Message	Contents and solution
SYMBOL DATA OVERFLOW	The symbol data area was filled. (solution) Please reduce the number of the symbol.
VERTICAL LINE ILLEGAL	There is an incorrect vertical line of the net.
MESSAGE DATA OVERFLOW	The message data area was filled. (solution) Please reduce the number of the message.
1ST LEVEL EXECUTE TIME OVER	The 1st level of LADDER is too large to complete execution in time. (solution) Please reduce the 1st level of LADDER.

C LIST OF MAINTENANCE PARTS



C.1 MAINTENANCE PARTS

C.1 MAINTENANCE PARTS

Maintenance Parts (Consumable)

Consumables here refer to the parts which are not reused after replacement. Rank : A>B>C

Name	Drawing number	Vender	Remarks	Rank
Fan motor	A90L-0001-0385	SANYO		A
Battery	A98L-0031-0006	SANYO		A
Fuse	A60L-0001-0046#5.0R	DAITO	5. 0A Contorol unit	B
	A60L-0001-0175#3.2R	DAITO	3. 2A CRT/ MDI, I/O card	B
	A60L-0001-0290#LM50	DAITO	5. 0A I/O card	B
	A60L-0001-0290#LM10	DAITO	1. 0A LCD	B
key board	A86L-0001-0171#SM2	FUJITSU	A02B-0166-C001	B
	A86L-0001-0171#SM2R	FUJITSU	A02B-0166-C201#R	B
	A86L-0001-0171#SM2S	FUJITSU	A02B-0120-C201#S	B
	A20B-1003-0170	FANUC	A02B-0168-C010 to C013 A02B-0118-C030 to C033 A02B-0118-C130#R to C133#R A02B-0118-C130#S to C133#S	B
	A16B-2600-0070	FANUC	A02B-0211-C020#R, #S	B
Key sheet	A98L-0001-0741	FUJI POLY-MERTECH	A02B-0168-C010 to C013 A02B-0118-C030 to C033	B
	A98L-0001-0741#R		A02B-0118-C130#R to C133#R	B
	A98L-0005-0022		A02B-0118-C130#S to C133#S	B
	A98L-0005-0035#PMGE1		A02B-0211-C020#R	B
	A98L-0005-0035#PMGS1		A02B-0211-C020#S	B
	A98L-0005-0036#PMGE1		A02B-0211-C020#R LED	B
	A98L-0005-0036#PMGS1		A02B-0211-C020#S LED	B
Plastic case	A230-0476-T004	FANUC		C

Maintenance Parts (Parts to be repaired by us)

Name	Drawing number	Vender	Remarks	Rank
Power supply P.C.B	A20B-1004-0960	FANUC		B
Base P.C.B	A20B-2100-0020	FANUC	Max.4axes	B
	A20B-2100-0021	FANUC	Max.6axes macro executer, C language executer	B
Built-in I/O card	A20B-2001-0902	FANUC	DI:32 DO:24 (Source type)	B
I/O Link- II card	A20B-2100-0040	FANUC	Drawing 0041 is compatible with drawing 0040.	B
	A20B-2100-0041	FANUC		B
Genius card	A20B-8100-0060	FANUC		B
Profibus card1	A20B-2100-0120	FANUC		B
Profibus card2	A20B-8001-0500	FANUC		B

Maintenance Parts (Parts to be repaired by us)

Name		Drawing number	Vender	Remarks	Rank
Memory module	With POS,HDI	A20B-2902-0300	FANUC	External pulse input, with following control	B
	Without POS,HDI	A20B-2902-0301	FANUC		B
	With POS	A20B-2902-0302	FANUC	External pulse input	
	For C language macro	A20B-2902-0450	FANUC	Memory increase, external pulse input	B
CRT control module		A20B-2901-0480	FANUC		B
Touch panel control module		A20B-2902-0470	FANUC		B
HSSB module		A20B-2902-0540	FANUC		B
Servo module		A20B-2902-0290	FANUC		B
Analog servo module		A20B-2902-0510	FANUC		B
PMC control module		A20B-2901-0660	FANUC		B
CRT control P.C.B.		A20B-2000-0840	FANUC		B
		A20B-2100-0061	FANUC	Simple graphic 32 screen	B
		A16B-2100-0060	FANUC	Simple graphic 64 screen	B
I/O card D		A16B-2202-0733	FANUC	DI:48DO:32 (Source type)	B
I/O card E		A16B-2202-0732	FANUC	DI:96DO:64 (Source type)	B
DPL/MDI P.C.B.		A20B-8000-0141	FANUC		B
DPL/MDI P.C.B.		A20B-8000-0490	FANUC	Long direction type	B
DPL/MDI P.C.B.		A20B-8001-0310	FANUC	Dust protected type	B
DPL/MDI Switch circuit		A16B-2600-0080	FANUC		B
Handy operator's panel control P.C.B.		A20B-2002-0200	FANUC		B
HSSB adapter P.C.B.		A20B-8001-0510	FANUC		B
Touch panel adapter P.C.B.		A20B-8001-0680	FANUC		B
CRT/MDI Unit		A02B-0166-C001	FANUC		B
		A02B-0166-C201#R	FANUC	For CE marking	B
		A02B-0166-C201#S	FANUC	For CE marking	B
CRT/MDI Unit (Picture display)		A02B-0166-C221#R	FANUC	Graphic 32 screen	B
		A02B-0166-C221#S	FANUC	Graphic 32 screen	B
		A02B-0166-C222#R	FANUC	Graphic 64 screen	B
		A02B-0166-C222#S	FANUC	Graphic 64 screen	B
LCD/MDI unit		A02B-0166-C261#R	FANUC		B
		A02B-0166-C261#S	FANUC		B
Separate type CRT		A02B-0120-C111	FANUC		B
Separate type PDP		A02B-0120-C113	FANUC	200VAC input	B
		A02B-0200-C100	FANUC	24VDC input For CE marking	B
Separate type MDI unit		A02B-0166-C010	FANUC		B
		A02B-0166-C210#R	FANUC	For CE marking	B
		A02B-0166-C210#S	FANUC	For CE marking	B

Maintenance Parts (Parts to be repaired by us)

Name		Drawing number	Vender	Remarks	Rank
Separate type MDI unit (Picture display)		A02B-0166-C231#R	FANUC	Graphic 32 screen	B
		A02B-0166-C231#S	FANUC	Graphic 32 screen	B
		A02B-0166-C232#R	FANUC	Graphic 64 screen	B
		A02B-0166-C232#S	FANUC	Graphic 64 screen	B
Separate type LCD unit		A02B-0166-C251	FANUC		B
CRT display device		A61L-0001-0093	MATSUSHITA	Usable unit A02B-0166-C001 A02B-0166-C201#R A02B-0166-C201#S A02B-0120-C111	B
Plasma display device		A61L-0001-0116	FUJITSU	Usable unit A02B-0120-C113	B
		A61L-0001-0116#S	FUJITSU	Usable unit A02B-0200-C100	B
LCD disply device		A61L-0001-0142	HITACHI	Usable unit A02B-0166-C251	B
Handy operator's panel		A02B-0211-020#R	FANUC		B
		A02B-0211-020#S	FANUC		B
LCD		A61L-0001-0119	EPSON	Usable unit A02B-0211-C020#R, #S	B
HSSB adapter		A02B-0211-C220	FANUC		B
Touch panel adapter		A02B-0166-C0240	FANUC		B
DPL/MDI	FANUC, Table mount	A02B-0168-C010	FANUC		B
	FANUC, Wall mount	A02B-0168-C011	FANUC		B
	GEFANUC, Table mount	A02B-0168-C012	FANUC		B
	GEFANUC, Wall mount	A02B-0168-C013	FANUC		B

Maintenance Parts (Parts to be repaired by us)

Name		Drawing number	Vender	Remarks	Compatibility	Rank
Long direction type DPL/MDI	FANUC, Table mount	A02B-0118-C030	FANUC		A02B-0118-C131, C132, C133	B
	FANUC, Wall mount	A02B-0118-C031	FANUC		A02B-0118-C130, C132, C133	B
	GEFANUC, Table mount	A02B-0118-C032	FANUC		A02B-0118-C130, C131, C133	B
	GEFANUC, Wall mount	A02B-0118-C033	FANUC		A02B-0118-C130, C131, C132	B

Maintenance Parts (Parts to be repaired by us)

Name		Drawing number	Vender	Remarks	Compatibility	Rank
Dust protected type DPL/MDI	FANUC, Table mount	A02B-0118-C130#R	FANUC	For CE marking	A02B-0118-C131#R, C132#R, C133#R	B
		A02B-0118-C130#S	FANUC	For CE marking	A02B-0118-C131#S, C132#S, C133#S	B
	FANUC, Wall mount	A02B-0118-C131#R	FANUC	For CE marking	A02B-0118-C130#R, C132#R, C133#R	B
		A02B-0118-C131#S	FANUC	For CE marking	A02B-0118-C130#S, C132#S, C133#S	B
	GEFANUC, Table mount	A02B-0118-C132#R	FANUC	For CE marking	A02B-0118-C130#R, C131#R, C133#R	B
		A02B-0118-C132#S	FANUC	For CE marking	A02B-0118-C130#S, C131#S, C133#S	B
	GEFANUC, Wall mount	A02B-0118-C133#R	FANUC	For CE marking	A02B-0118-C130#R, C131#R, C132#R	B
		A02B-0118-C133#S	FANUC	For CE marking	A02B-0118-C130#S, C131#S, C132#S	B
LCD		A61L-0001-0110#A	HITACHI	Usable uint A02B-0168-C010 to C013 A02B-0118-C030 to C033 A02B-0118-C130#R to C133#R A02B-0118-C130#S to C133#S		B

D

MAINTENANCE AND INPUT/OUTPUT OF MEMORY CARD IN BOOT SYSTEM



D.1 OVERVIEW

D.2 SCREEN CONFIGURATION AND OPERATING PROCEDURE

D.3 ERROR MESSAGES AND REQUIRED ACTIONS

D.1 OVERVIEW

The boot system load the system software (flash memory→DRAM), then starts it so that software can be executed.

The boot system provides the following maintenance functions for the Power Mate:

- (1) Registering a file in flash memory
 - Reads a file from a memory card, in MS-DOS format conforming to JEIDA V4.1, into flash memory.
- (2) Checking a file (series and edition) in flash memory
- (3) Deleting a file from flash memory
- (4) Batch saving and restoration of files of parameters and programs backed up by battery (SRAM area), to and from a memory card
- (5) Saving a file in flash memory to a memory card
- (6) Formatting of a memory card
- (7) Deleting a file from a memory card

This manual describes the activation of the boot system, as well as the screen displays and operation for the functions listed above.

CAUTION

Memory cards can be used as an input/output device for the Power Mate. Before attempting to insert or remove a memory card, however, ensure that the power is turned off.

For the boot system, SRAM memory cards (only those specified by FANUC) and flash memory cards can be used. To store data for an extended period, use a flash memory card.

NOTE

Use an Intel Series 2 flash memory card. (Recommended: 4MB)


D.1.1 Starting The Boot System

In ordinary system activation, the boot system automatically transfers files from flash memory to DRAM in the background.

The user is not aware of this operation. However, the boot system must be operated manually, from menu screen, when maintenance is to be carried out or when the flash memory does not contain a required file.

- 1 In system maintenance, for example, to replace a file in memory
Operation : Turn the power on by simultaneously pressing the two CRT/MDI soft keys at the right end.



Operation : Turn the power on by simultaneously pressing the  and

 DPL keys.

Hold down the two keys until the boot system screen appears.

- 2 When the flash memory does not contain a file required to start the Power Mate

Immediately after the Power Mate is turned on, the boot system starts transferring files from flash memory to DRAM. If, for some reason, a file required to start the CNC (NC basic) is not in flash memory or has been destroyed, the boot system is automatically started.

D.1.2

System Files and User Files

- **System files**
- **User files**

The boot system organizes files in flash memory into two main groups : system files and user files. These two file types have the following characteristics :

CNC and servo control software provided by FANUC

PMC sequence program (ladder), P-CODE macro program, and other user-created files

D.2 SCREEN CONFIGURATION AND OPERATING PROCEDURE

- **MAIN MENU screen
(CRT/MDI)**

When the boot system is first started, the MAIN MENU screen is displayed. This screen is described below :

```
(1)  SYSTEM MONITOR MAIN MENU                881A-01
(2)  1. SYSTEM DATA LOADING
(3)  2. SYSTEM DATA CHECK
(4)  3. SYSTEM DATA DELETE
(5)  4. SYSTEM DATA SAVE
(6)  5. SRAM DATA BACKUP
(7)  6. MEMORY CARD FILE DELETE
(8)  7. MEMORY CARD FORMAT

(9)  9. END

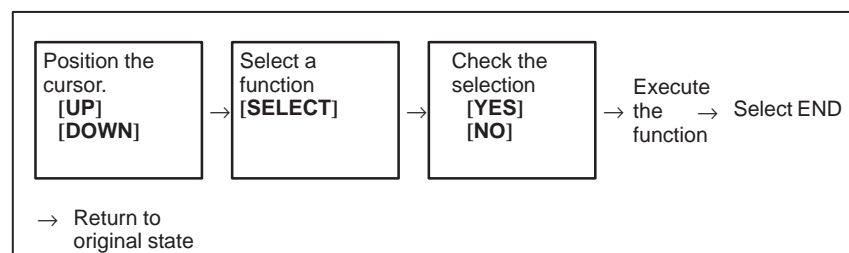
*** MESSAGE ***
(10) SELECT MENU AND HIT SELECT KEY.
      [ SELECT ][ YES  ][ NO  ][ UP  ][ DOWN ]
```

- 1 : Screen title. The series and edition of the boot system appear at the right end.
- 2 : Function for writing data to flash memory.
- 3 : Function for checking the edition of a file in ROM.
- 4 : Function for deleting a file from flash memory.
- 5 : Function for making a backup copy of the data stored on the memory card.
- 6 : Function for making a backup copy of the data in SRAM.
- 7 : Function for deleting a file from a memory card.
- 8 : Function for formatting a memory card.
- 9 : Function for terminating the boot system and starting the Power Mate.
- 10 : Condensed guidance or error message

- **Operating procedure
(CRT/MDI)**


Press the **[UP]** or **[DOWN]** soft key to select the desired function. After positioning the cursor to the desired function, press the **[SELECT]** soft key. Before executing a function, the system may request confirmation from the operator by having him/her press the **[YES]** or **[NO]** soft key.

- **Basic operation
(CRT/MDI)**



- **MAIN MENU screen (DPL/MDI)**

SYSTEM MONITOR
881A-01

When the above BOOT SYSTEM screen is displayed, pressing the  key on the DPL displays the following screens, in the order shown.

*SYSTEM DATA
LOADING

: Write to flash memory

*SYSTEM DATA
CHECK

: Checking the ROM file edition

*SYSTEM DATA
DELETE

: Deleting a flash memory file

*SYSTEM DATA
SAVE

: Backup to a memory card

*FILE DATA
BACKUP/RESTORE

: Backup of the SRAM area

*MEMORY CARD
FILE DELETE

: Deleting a memory card file


*MEMORY CARD
FORMAT

: Formatting a memory card

*SYSTEM MONITOR
EXIT

: Exiting the BOOT SYSTEM and
starting the Power Mate

- **Operation (DPL/MDI)**

When the screen for the function to be selected is displayed, press the  key on the DPL.

D.2.1

System Data Loading Screen

- **Description**

This screen is used to read a system or user file from a memory card into flash memory.

- **Screen configuration (CRT/MDI)**

```

(1)  SYSTEM DATA LOADING                                1/1
(2)  FILE DIRECTORY
      8880E10. ROM
      8880E11. ROM
(3)  END

      *** MESSAGE ***
(4)  SELECT FILE AND HIT SELECT KEY.
      [ SELECT ][ YES ][ NO ][ UP ][ DOWN ]

```

(1): Screen title. The page number (n) and total number of pages (m) are displayed, in n/m format, at the right end.

(2): Files on the memory card

(3): Option for returning to previous menu Message


(4): Message

- **Operating procedure (CRT/MDI)**

1 Position the cursor to the file to be read from the memory card and written to flash memory. Then, press the **[SELECT]** soft key.

A single page can list up to eight file names. If the memory card contains nine or more files, the remaining files are displayed on another page.

To display the next page, press the  soft key.

To display the previous page, press the  soft key. The END option is displayed on the last page.

The END option is displayed on the last page.

2 After a file has been selected, the system asks whether that file is to be loaded.

```

      *** MESSAGE ***
      LOADING OK ? HIT YES OR NO.

```




- 3 To start loading, press the **[YES]** soft key. To cancel, press the **[NO]** key.

```
*** MESSAGE ***
LOADING FROM MEMORY CARD.
```

- 4 When loading terminates normally, the system displays the following message. Press the **[SELECT]** soft key. If an error occurs, see D.3

```
*** MESSAGE ***
LOADING COMPELETE. HIT SELECT KEY.
```

• Operation (DPL/MDI)

Selecting SYSTEM DATA LOADING displays the file selection screen, shown below. Pressing the  or  key on the DPL displays the names of the files in the memory card. Once the name of the file to be loaded appears, pressing the  key starts loading of that file.



```
LOADING MENU
8880A. MEM
```

: File selection screen

During loading, the following screen is displayed:

```
8880A. MEM
LOADING
```

: The name of the file being loaded
is displayed and LOADING blinks.

Once loading has been completed, the file selection screen is displayed again. To end the operation, press the  key once *END appears on the screen. The initial screen is displayed. Pressing the  key also causes the initial screen to be displayed.

• Others

- 1 Counter display while a file is being loaded (CRT/MDI only)

While a file is being loaded, the address of the data currently being accessed is displayed.

```
*** MESSAGE ***
LOADING FROM MEMORY CARD.
ADDRESS 001: 000022FF← The counter appears under the
(1)          (2) message field.
```

- (1): Number of 128-KB management unit in flash memory

- (2): Relative address within the management unit

- 2 File name in flash memory

The boot systme identifies a file in flash memory by the first four characters of the file name. If the name of the file to be read from the memory card and the name of a file already present in flash memory begin with the same four characters, delete the latter from flash memory. Then, load the desired file. The following table lists the names and contents of files.

Note that these file names may be changed without notice.

File name	Contents	File type
NC BASIC	Basic	System file
DG SERVO	Servo	System file
PCD****	P-CODE macro file/ OMM	User file
CEX ****	C-language executor	User file
PMC - PA	Ladder software	User file

□ : A numeric character, *: An alphabetic character

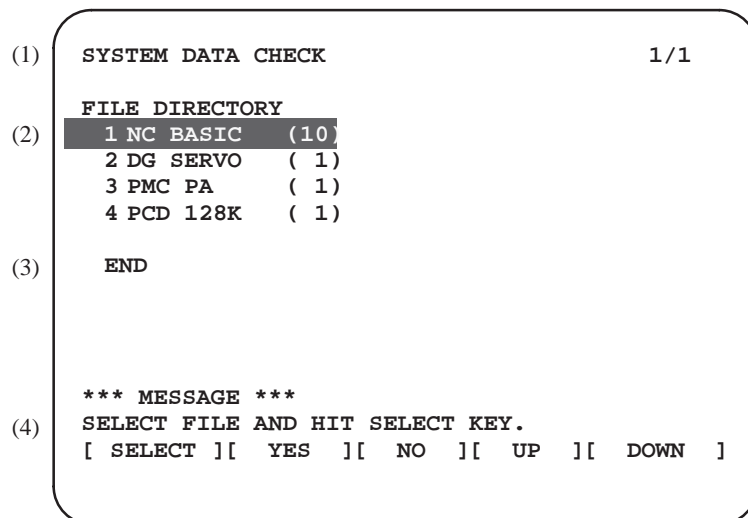
- 3 During SYSTEM DATA LOADING, if a file having the specified file name already exists in flash memory, that file is overwritten by the file existing in the memory card. Note that system files cannot be deleted, but that they can be overwritten.
- 4 During SYSTEM DATA LOADING operation, the 128K and 256K macro executors have different file names (PCD 128K, PCD56K) and thus can be loaded into flash memory at the same time. If they are loaded at the same time, however, the operation may be erroneous. Before attempting to load a file, delete any unnecessary files using SYSTEM DATA DELETE.

D.2.2

System Data Check Screen

- **Description**
- **Screen configuration (CRT/MDI)**

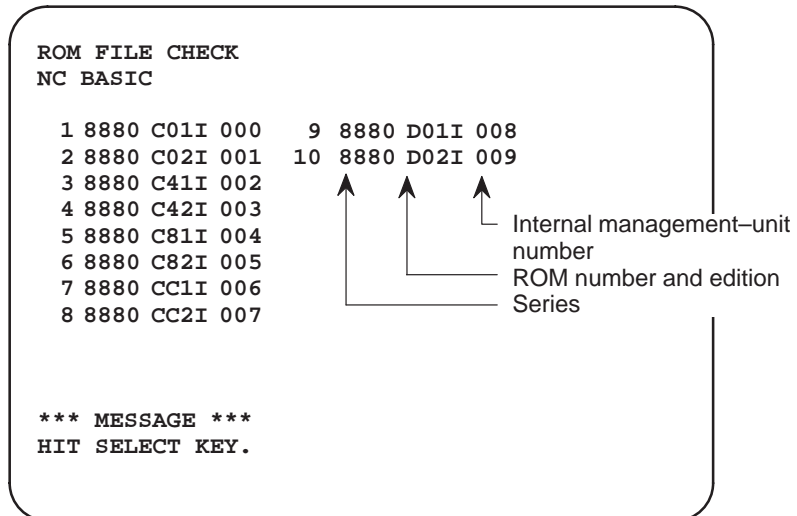
This screen is used to list files in flash memory, together with the corresponding numbers of 128-KB management units in each file and the series and edition of the software.



- (1): Screen title
- (2): Names of files in flash memory The number of management units constituting each file appears in parentheses to the right of the file name. For file name See D.2.1 others (2).
- (3): Returning to the previous menu
- (4): Message

• Operating procedure (CRT/MDI)

- 1 Select the file whose details are required. For example, select "1 NC BASIC (8)."
- 2 The numbers of management units in the selected file are listed, together with the series and edition of the software in each management unit. After checking the listed data, select the **[SELECT]** soft key to return to the file selection screen.



• Operation (DPL/MDI)

Selecting SYSTEM DATA CHECK displays the file information screen, shown below. Pressing the or key on the DPL displays other file information.

CHECK MENU
1 NC BASIC (10)

: File information screen

The number of control units used by the file (1 unit = 128 KB) is indicated in parentheses.

When a file name is displayed, pressing the key displays detailed information for that file, including the series, ROM number, edition, and internal control number (up to 16).

NC BASIC
18880 C01A 000

: File detailed information screen

To end the operation, press the key once *END appears on the screen. The file information screen is displayed. Pressing the key also displays the file information screen.

To return from the file information screen to the initial screen, press the key once *END appears on the screen. The initial screen is displayed. Pressing the key also displays the initial screen.

- **Others**

Parity information for the system file and user file

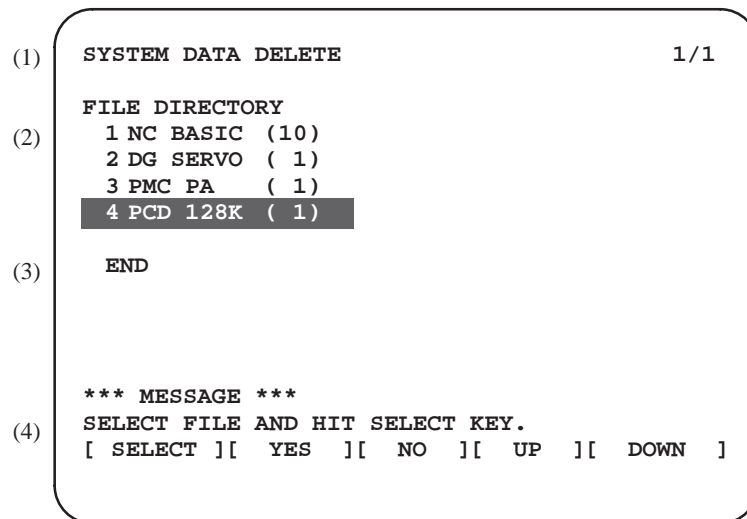
The NC BASIC, DG SERVO, and other system files in flash memory contain parity information in each management unit. If the file name field or parity field on the check screen contains a non-ASCII character or an "@" , the flash ROM may have been destroyed or a damaged file may have been read. Re-read the data from the memory card.

The PMC-PA, PCD 128K, and other user files do not contain parity information in each management unit. A non-ASCII character or an "@" may appear in the series/edition information. In this case, it does not indicate that the file has been damaged.

D.2.3 System Data Delete Screen

- **Description**
- **Screen configuration
(CRT/MDI)**

This screen is used to delete a user file from flash memory.



- (1): Screen title
- (2): Names of files in flash memory The number of management units constituting each file appears in parentheses to the right of the file name.
- (3): Returning to the previous menu
- (4): Message

- **Operating procedure (CRT/MDI)**

1 Position the cursor to the name of the file to be deleted. Press the [SELECT] soft key.

2 The system displays the following confirmation message :

```
*** MESSAGE ***  
DELETE OK ? HIT YES OR NO.
```




3 To start the deletion, press the [YES] key. To cancel, press [NO].

```
*** MESSAGE ***  
DELETING ROM FILE IN FLASH MEMORY.
```

4 When deletion terminates normally, the system displays the following message. Press the [SELECT] key.

```
*** MESSAGE ***  
DELETING COMPLETE. HIT SELECT KEY.
```

- **Operation (DPL/MDI)**

Selecting SYSTEM DATA DELETE displays the file selection screen, shown below. Pressing the  or  key on the DPL displays the names of the files in flash memory. Once the name of the file to be deleted appears, pressing the  key deletes that file.

```
DELETE MENU  
1 PCD 128K(1)
```



: File selection screen

The number of control units used
by the file (1 unit = 128 KB) is indicated

During deletion, the following screen is displayed:

```
PCD 128K  
DELETE
```

: The name of the file being deleted is
displayed and DELETE blinks.

Once deletion has been completed, the file selection screen is displayed again. To end the operation, press the  key once *END appears on the screen. The initial screen is displayed. Pressing the  key also displays the initial screen.

- **Others**

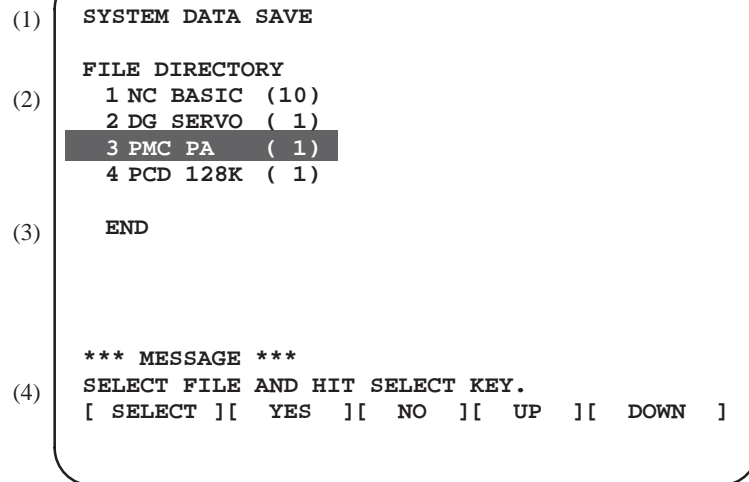
1 System files and user files on SYSTEM DATA DELETE screen The SYSTEM DATA DELETE screen guards against system files being accidentally deleted by the operator. User files, however, are not protected. Protected system files can be overwritten from the SYSTEM DATA LOADING screen.

D.2.4 System Data Save Screen

- **Description**

This screen is used to write a user file in flash memory to a memory card. Only user files can be saved from flash memory to a memory card. System files cannot be saved.

- **Screen configuration
(CRT/MDI)**



- (1): Screen title
- (2): Names of files in flash memory The number of management units constituting each file appears in parentheses to the right of the file name.
- (3): Returning to the previous menu
- (4): Message

- **Operating procedure (CRT/MDI)**

1 Position the cursor to the name of the file to be deleted. Press the **[SELECT]** soft key.

2 The system displays the following confirmation message :

```
*** MESSAGE ***  
SAVE OK ? HIT YES OR NO.
```




3 To start saving, press the **[YES]** key. To cancel, press **[NO]**.

```
*** MESSAGE ***  
WRITING FLASH ROM FILE TO MEMORY CARD.  
SAVE FILE NAME : PMC_PA.000
```

4 When saving terminates normally, the system displays the following message. Press the **[SELECT]** key. The names of files written to the memory card are listed. Check the file names by, for example, making a note of the list.

```
*** MESSAGE ***  
FILE SAVE COMPELETE. HIT SELECT KEY.  
SAVE FILE NAME : PMC_PA.000
```

- **Operation (DPL/MDI)**

Selecting SYSTEM DATA SAVE displays the file selection screen, shown below. Pressing the  or  key on the DPL displays the names of the files in flash memory. Once the name of the file to be saved appears, pressing the  key saves that file.

```
SAVE MENU  
3 PMC PA (1)
```



: File selection screen

The number of control units used by the file (1 unit = 128 KB) is indicated in parentheses.

During saving, the following screen is displayed:

```
PMC PA. 000  
SAVE
```

: The name of the file being saved is displayed and SAVE blinks.

Once saving has been completed, the file selection screen is displayed again. To end the operation, press the  key once *END appears on the screen. The initial screen is displayed. Pressing the  key also displays the initial screen.

- **Others**

1 System files and user files on SYSTEM DATA SAVE screen

The SYSTEM DATA SAVE function provides a safeguard against free copying of the system files.

User files, however, are not protected.

2 Names of saved files

Files saved from flash memory to a memory card have the following names :

Flash memory		Memory card
PMC-PA	→	PMC_PA.XXX
PCD 128K	→	PCD_128K.XXX

XXX corresponds to the file extension of MS-DOS format files. A number from 000 to 031 is specified for XXX. For example, if the PMC-PA file in flash memory is saved to a memory card that does not yet contain any PMC-PA. * files, the saved file is named PMC-PA.000. If, however, that file is saved to a memory card that already contains a file named PMC-PA.000, the saved file is named PMC-PA.001. As files are added, the extension is incremented up to a maximum of PMC-PA.031. Any no-longer used numbers in the sequence of the extension numbers are used in as sending order. If two or more files having identical names but different extension numbers are normally saved to the memory card, check the file names displayed subsequently.

D.2.5

Sram Data Backup Screen

- **Description**
- **Screen configuration (CRT/MDI)**

This screen is used to collectively save and restore parameters, programs, and other data, retained after the Power Mate's power is turned off, to and from a memory card.

Select "4 SRAM DATA BACKUP" on the SYSTEM MONITOR MAIN MENU screen. The following screen is displayed.

```

(1)  SRAM DATA BACKUP
      [BOARD:MAIN]
(2)  1. SRAM BACKUP (CNC → MEMORY CARD)
      2. RESTORE SRAM (MEMORY CARD → CNC)
(3)  END
(4)  SRAM SIZE   : 256kB (BASIC)
(5)  FILE NAME   : SRAM256k.000

      *** MESSAGE ***
(6)  SELECT MENU AND HIT SELECT KEY.
      [ SELECT ][ YES  ][ NO  ][ UP  ][ DOWN ]

```

- (1): Screen title
- (2): Menu
- (3): Returning to the previous menu
- (4): Size of SRAM mounted on the Power Mate
- (5): File name
- (6): Message

- **Operating procedure (CRT/MDI)**

[Backing up data]

- 1 Select "1. SRAM BACKUP." The following confirmation message is displayed. Press **[YES]** to start backup.

```
*** MESSAGE ***  
BACKUP SRAM DATA OK ? HIT YES OR NO.
```

- 2 The name of the file being written to the memory card is displayed in the FILE NAME: field. The time required for writing depends on the amount of free space on the memory card. Normally, writing SRAM BASIC (256KB) should take about one minutes.

```
SRAM SIZE   : 256K (BASIC)  
FILE NAME   : SRAM128K. 000 → MEMORY CARD
```

```
*** MESSAGE ***  
SRAM DATA WRITING TO MEMORY CARD.
```

↖ Name of the file being saved

- 3 Upon terminating normally, the system displays the following message. Press the **[SELECT]** soft key.

```
*** MESSAGE ***  
SRAM BACKUP COMPLETE. HIT SELECT KEY.
```

[Restoring the data]

- 1 Select "2. RESTORE SRAM." The system displays the following message. Press the **[YES]** key.

```
*** MESSAGE ***  
RESTORE SRAM DATA OK ? HIT YES OR NO.
```




- 2 The system displays the following message during restoration.

```
*** MESSAGE ***  
RESTORE SRAM DATA FROM MEMORY CARD.
```

- 3 Upon terminating normally, the system displays the following message. Press the **[SELECT]** soft key.

```
*** MESSAGE ***  
RESTORE COMPLETE. HIT SELECT KEY.
```

● Operation (DPL/MDI)

Selecting FILE DATA BACKUP/RESTORE displays the selection screen, shown below. Select BACKUP or RESTORE by pressing the  or  key. Then, pressing the  key saves or restores the file data.

BACKUP : Save data into the backup file.

RESTORE : Restore data from the backup file.



FILE MENU 1 FILE BACKUP

: The file data is saved into the memory card.

During saving or restoration, the following screen is displayed:

SRAM256K.000 BACKUP

: The name of the file being saved or restored is displayed and BACKUP blinks.

Once saving or restoration has been completed, the selection screen is displayed again. To end the operation, press the  key once *END appears on the screen. The initial screen is displayed. Pressing the  key also displays the initial screen.

● Others

1 Name of backup file

The name of the backup file written to the memory card by the SRAM backup function is SRAM 256K.xxx.

CAUTION

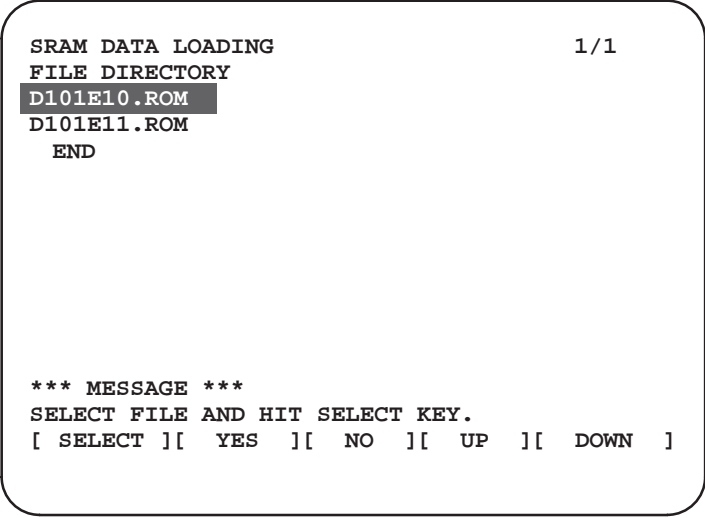
When the absolute pulse coder is used, after this function is used to restore data, determine whether the position displayed by the Power Mate deviates from the actual position. If any deviation is detected, reset the reference point.

D.2.6

Memory Card File Delete Screen

- **Description**
- **Screen configuration
(CRT/MDI)**

This screen is used to delete a file from a memory card.

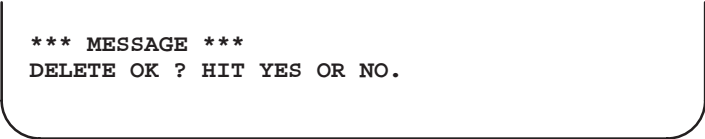
- 
- (1) SRAM DATA LOADING 1/1
FILE DIRECTORY
(2) D101E10.ROM
D101E11.ROM
(3) END

(4) *** MESSAGE ***
SELECT FILE AND HIT SELECT KEY.
[SELECT][YES][NO][UP][DOWN]

- (1): Screen title. The current page number (n) and the total number of pages (m) are displayed, in n/m format, at the right end.
- (2): Files on the memory card
- (3): Option for returning to the previous menu
- (4): Message

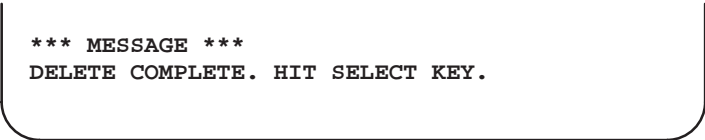
- **Operating procedure
(CRT/MDI)**

- 1 Press the **[SELECT]** key to select the name of the file to be deleted from the memory card.
- 2 The system displays the following confirmation message. Press the **[YES]** key.






*** MESSAGE ***
DELETE OK ? HIT YES OR NO.

- 3 When deletion is completed correctly, following message is displayed. Press the **[SELECT]** key.



*** MESSAGE ***
DELETE COMPLETE. HIT SELECT KEY.

- **Operation (DPL/MDI)**

Selecting MEMORY CARD FILE DELETE displays the file selection screen, shown below. Pressing the  or  key on the DPL displays the names of the files stored on the memory card. Once the name of the file to be deleted appears, pressing the  key deletes that file.

MEMORY DELETE
*BASIC. DAT

: File selection screen

During deletion, the following screen is displayed:

BASIC.DAT
DELETE

: The name of the file being deleted is
displayed and DELETE blinks.

Once deletion has been completed, the file selection screen is displayed again. To end the operation, press the CAN key. The initial screen is displayed.

- Others

- 1 When the memory card contains nine or more files
Display the desired page, following the procedure given in the description of the SYSTEM DATA LOADING screen.
- 2 For a flash memory card, the deletion of one file is impossible.

D.2.7

Memory Card Format Function

- Description

This function is used to format a memory card. Memory cards must be formatted before they can be used for the first time or before they can be re-used after their data has been destroyed or lost because of, for example, battery failure.

- Operating procedure (CRT/MDI)

- 1 From the SYSTEM MONITOR MAIN MENU screen, select “7. MEMORY CARD FORMAT.”
- 2 The system displays the following confirmation message.
Press the [YES] key.

*** MESSAGE ***
MEMORY CARD FORMAT OK ? HIT YES OR NO.



- 3 The system displays the following message during formatting :

*** MESSAGE ***
FORMATTING MEMORY CARD.

- 4 When a card has been formatted normally, the system display the following message.
Press the [SELECT] key.

*** MESSAGE ***
FORMAT COMPLETE. HIT SELECT KEY.

- **Operation (DPL/MDI)**

Selecting MEMORY CARD FORMAT displays the confirmation screen, shown below. Pressing the  key starts formatting. To cancel formatting, press the  key. The initial screen is displayed again.

CARD FORMAT OK?
PUSH INP OR CAN.

: Confirmation screen
“PUSH INP OR CAN.” blinks.

During formatting, the following screen is displayed:

CARD FORMAT
EXEC

: EXEC blinks.

Once formatting has been completed, the initial screen is displayed again.

D.2.8

Load Basic System

Function

- **Description**

The function is used to terminate the boot system and activate the Power Mate.

- **Operating procedure (CRT/MDI)**

From the MAIN MENU screen, select “9. END.” The system displays the “ARE YOU SURE? HIT YES OR NO” message. To terminate the boot system and activate the Power Mate, press the [YES] soft key. Pressing the [NO] key cancels this operation.

```
*** MESSAGE ***  
ARE YOU SURE ? HIT YES OR NO.  
  
[ SELECT ][ YES ][ NO ][ UP ][ DOWN ]
```

- 1 After pressing the [YES] soft key

The system checks the NC BASIC system file in the flash ROM. The system displays the following message :

```
*** MESSAGE ***  
CHECK CNC BASIC SYSTEM.  
  
[ SELECT ][ YES ][ NO ][ UP ][ DOWN ]
```

When the NC BASIC system file is found to be normal, the system sends the system file to DRAM and starts the NC BASIC SYSTEM. During LOADING, the system blinks the following message.

```
*** MESSAGE ***  
LOADING BASIC TO DRAM  
  
[ SELECT ][ YES ][ NO ][ UP ][ DOWN ]
```

If the contents of the NC BASIC SYSTEM file are found to have been damaged or destroyed, the system returns to the processing selection state, in exactly the same way as when the [NO] soft key is pressed.

- 2 If the [NO] soft key is pressed, the system returns to the processing selection state as shown below :



```

*** MESSAGE ***
SELECT MENU AND HIT [SELECT] KEY.

[ SELECT ][ YES ][ NO ][ UP ][ DOWN ]

```

● Operation (DPL/MDI)

Selecting SYSTEM MONITOR EXIT displays the confirmation screen, shown below. Pressing the  key loads the basic system from flash memory into DRAM. To cancel loading, press the  key. The initial screen is displayed again.

MONITOR EXIT OK?
PUSH INP OR CAN.

: Confirmation screen
“PUSH INP OR CAN.” blinks.

During loading, the following screens are displayed, in the order shown:

CHECK CNC BASIC
SYSTEM.

LOADING BASIC
TO DRAM.

CNC BASIC
LOADED.

Once loading has been completed, the series and edition are displayed, then the Power Mate-H is started.

D.3 ERROR MESSAGES AND REQUIRED ACTIONS

The following table lists and explains error messages in alphabetical order.

	Message	Description and required action
D	DELETE ERROR. HIT SELECT KEY. (ERROR-014)	An attempt to delete a file from flash memory was unsuccessful or files of memory card cannot be deleted. Retry the deletion. If the second attempt also fails, the flash memory may have been damaged or destroyed. Replace the memory module.
	DEVICE ERROR (CNC x) (ERROR-012)	An attempt to write data to flash memory was unsuccessful. Retry the write operation off power and restart the system. If the second attempt also fails, the flash memory may have been damaged or destroyed. Replace the flash memory module.
F	FILE NOT FOUND IN FLASH ROM. HIT SELECT KEY. (ERROR-029)	Files do not appear on the flash memory. After writing in flash memory, the flash memory may be destroyed. Change the memory module.
	FILE SAVE ERROR. HIT SELECT KEY. (ERROR-015)	An attempt to write a file to a memory card was unsuccessful. Check that the memory card is not damaged. Note) Check that the memory card's battery is not exhausted, that its circuitry has not been damaged, and that it is securely inserted into its slot.
	FLASH MEMORY NO SPACE (ERROR-004)	There is insufficient free flash memory to store the selected file. Delete any unnecessary files from flash memory.
	FORMAT ERROR. HIT SELECT KEY (ERROR-025)	Format of memory card is unsuccessful.
I	ILLEGAL FORMAT FILE (ERROR-003)	The selected file cannot be read into flash memory. The selected file or the header information for flash memory may have been damaged or destroyed.
	IN CORRECT PASSWORD. HIT SELECT KEY. (ERROR-017)	Password is not correct. Input correct password.
L	LOADING ERROR. HIT SELECT KEY. (ERROR-013)	An error occurred while loading data into flash memory. Do not touch the memory card while loading data.

	Message	Description and required action
M	MAX EXTENSION OVER. HIT SELECT KEY. (ERROR-022)	The extension number added to a file name exceeds 031. Delete any unnecessary backup files from the memory card.
	MEMORY CARD BATTERY ALARM. HIT SELECT. (ERROR-002)	The memory card's battery is exhausted. Replace the battery.
	MEMORY CARD FULL. HIT SELECT KEY. (ERROR-021)	The memory card is full. Delete any unnecessary files from the memory card. Alternatively, replace the memory card with another card having sufficient free space.
	MEMORY CARD MOUNT ERROR. HIT SELECT KEY (ERROR-005)	The memory card could not be accessed. Check that the memory card is normal. The memory card may not be correct format. Format correctly.
	MEMORY CARD NOT EXIST. HIT SELECT KEY. (ERROR-001)	The memory card is not inserted into its slot. Check that the memory card is pushed fully home.
	MEMORY CARD PROTECTED. HIT SELECT KEY. (ERROR-016)	Although writing to the memory card was selected, the write inhibit switch is set. Disable the write inhibit switch.
	MEMORY CARD TYPE RESET ERROR. HIT SELECT KEY. (ERROR-018)	Access to the memory card has failed. Check whether the memory card is defective.
	MEMORY CARD WRITE ERROR. HIT SELECT KEY. (ERROR-020)	Write to memory card is failed. Check whether the memory card is normal.
P	PROTECT FILE.	An attempt was made to delete the system data. System data cannot be deleted.
S	SRAM DATA BACKUP ERROR. HIT SELECT KEY. (ERROR-023)	An attempt to write a backup file to a memory card failed. Check that the memory card is normal.
	SRAM DATA RESTORE ERROR. HIT SELECT KEY. (ERROR-027)	Reading of the backup data from the memory card failed. The files stored on the memory card are erroneous. Check whether the memory card is defective.
	SRAM 256K.*NOT FOUND (ERROR-026)	The memory card does not contain system data file SRAM256K. Use a memory card containing SRAM256K.

() : Message for DPL/MDI

E DATA INPUT/OUTPUT TO AND FROM A MEMORY CARD



- E.1 OVERVIEW**
- E.2 FUNCTION DESCRIPTION**
- E.3 OPERATION**
- E.4 MEMORY CARD WRITE PROTECT SWITCH**

E.1 OVERVIEW

Data stored in memory of the Power Mate can be output to a single memory card at one time. Moreover, programs, parameters, variables, PMC data can be input to the CNC.

Use the flash type memory card specified by FANUC.

Data backup may be able to execute as execution of boot system.

See D.2.5 SRAM DATA BACKUP.

NOTE

Those files that are collectively backed up by performing this operation are incompatible with those that are backed up in the boot system, as described in Subsection D.2.5, “SRAM Data Backup Screen.”

E.2 FUNCTION DESCRIPTION

E.2.1 Conditions for Enabling This Function

Before this function can be enabled, the Power Mate and a memory card to be used must meet the conditions explained following.

☐ Conditions of the Power Mate

- (1) For input processing, EDIT or MDI mode must be set. To enable output processing, EDIT mode must be set.
- (2) The Power Mate must be placed in the emergency stop state.
- (3) The program display screen must be selected.
- (4) To input data, setting parameter <parameter write> must be set to 1. (For the DPL/MDI, <PWE> must be set to 1.)

☐ Conditions of the memory card

- (1) Use following memory card.
Flash 256KB, 512KB, 1MB, and 4MB.
- (2) To output data, the write protect switch must be set off.
- (3) The memory card must have attribute information.
*This function cannot be used with memory cards having no attribute information. So, use memory cards version 4.0 or later.

E.2.2 Output to a Memory Card

The contents of the entire memory area of the Power Mate are output to a memory card. The size of the output data is recorded in the memory card. If the capacity of the memory card is smaller than the memory size of the Power Mate, alarm 5106 is issued. The Power Mate memory cannot be divided in order to be output to two or more memory cards.

Data in two or more Power Mate units cannot be output to one memory card. For input/output processing with a memory card in the boot system described in Appendix D, data in two or more Power Mate units can be output to one memory card.

E.2.3

Input from a Memory Card

☐ Inputting all data

(1) With the CRT/MDI

M → [READ] → [EXEC]

(2) With the DPL/MDI

M
RD → READ

NOTE

“All data” includes NC programs, parameters, variables, tool compensation data, PMC data, and operation history data. (Ladders, macro executors, and C executors are not included.)

☐ Inputting data individually

(1) With the CRT/MDI

M n7 n6 n5 n4 n3 n2 n1 → [READ] → [EXEC]

(2) With the DPL/MDI

M n7 n6 n5 n4 n3 n2 n1 → READ

n1 : Program

n2 : Parameter

n3 : Variable, tool length compensation data

n4 : Be sure to set 0

n5 : PMC data

*n6: Operation history data

*n7: Be sure to set 0

Specifying 1 causes the corresponding data to be read.

Specifying 0 causes the corresponding data to be skipped.


(Example) When variable number and program are read.

M 0 0 0 0 1 0 1 → [READ] → [EXEC]

E.3 OPERATION

E.3.1 Outputting Data to a Memory Card

Data stored in Power Mate memory can be output to a memory card by following the procedure below.


- (1) Select the EDIT mode.
- (2) Place the system in the emergency stop state.
- (3) Press the <PRGRM> display button to display the program display screen.
- (4) Insert the memory card in the CNC.
- (5) Enter address <M>.
- (6) Select the [OPRT], [→], and [PUNCH] soft keys, then press [EXEC].
(When the DPL/MDI is used, press the  key.)

All data in the Power Mate memory is then output.

E.3.2 Inputting Data from a Memory Card

Data can be input from a memory card to Power Mate memory by following the procedure below.

☐ Inputting all data

- (1) Select the EDIT or MDI mode.
- (2) Place the system in the emergency stop state.
- (3) For both paths, set setting parameter [parameter write enable] to 1.
(When the DPL/MDI is used, set [PWE] to 1.)
- (4) Press the <PRGRM> display button to display the program display screen.
- (5) Insert the memory card in the Power Mate.
- (6) Enter address <M>.
- (7) Select the [OPRT] [→] and [READ] soft keys, then press [EXEC].
(When the DPL/MDI is used, press the  key.)

All data is then read into the CNC memory.

☐ Inputting specific data

- (1) Select the EDIT or MDI mode.
- (2) Place the system in the emergency stop state.
- (3) Set setting parameter [parameter write] to 1.
(When the DPL/MDI is used, set [PWE] to 1.)
- (4) Press the <PRGRM> display button to display the program display screen.
- (5) Insert the memory card in the Power Mate.
- (6) Enter address <M>.
- (7) Specify the types of data to be input by using numeric characters in the form <n7n6n5n4n3n2n1>.
n1 : Program

n2 : Parameter

n3 : Variable, tool length compensation data

n4 : Be sure to set 0

n5 : PMC data

n6 : Operation history data

n7 : Be sure to set 0

Specifying 1 causes the corresponding data to be read. Specifying 0 causes the corresponding data to be skipped.

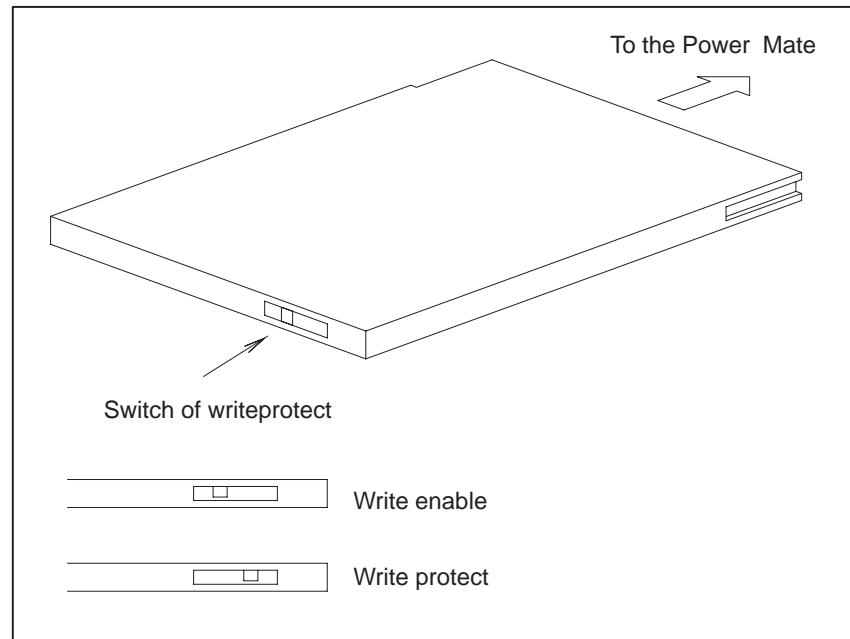
(8) Select [OPRT], [→] and [READ], then press [EXEC].

(When the DPL/MDI is used, press the  key.)

The specified data is then read into the Power Mate memory.


E.4 MEMORY CARD WRITE PROTECT SWITCH

The write protect switch is used to protect the data recorded on the card. Important data can be kept safely by setting the write protect switch as shown in the figure below. The switch prevents data from being inadvertently rewritten.



F

MEMORY CARD OPERATOR'S MANUAL



- F.1 OUTLINE**
- F.2 ADVICE FOR USE**
- F.3 NAMES AND FUNCTION OF MEMORY COMPONENTS**
- F.4 OPERATING OF MEMORY CARD**
- F.5 BATTERY CHANGE**
- F.6 SPECIFICATIONS OF MEMORY CARDS THAT ARE NOT ALLOWED TO BE USED**

F.1 OUTLINE

FANUC-specified flash memory card and the SRAM memory card can be used as a data exchanging media for CNC unit, and are based on following standards.

- JEIDA “IC Memory Card Guideline Ver. 4.0”
- PCMCIA “PC Card Standard R.2.0”

The memory card is easy to use and a data exchanging media which can be input and output data with high speed, and you should take care of operation for the memory card.

This manual describes operating procedure and advice for the memory card.

Some software of CNC unit may restrict a kind of useful memory card, input/output file function.
For detail, refer to the manual of each CNC unit.

FANUC-specified memory cards are listed below.

Flash memory card	256KB	Fujitsu Ltd.	MB98A80813-20-G-S	Appendix E
		Fuji Electro-chemical Co., Ltd.	SC-9027-22H14	
	512KB	Fujitsu Ltd.	MB98A80913-20-G-S	
		Fuji Electro-chemical Co., Ltd.	SC-9027-42H14	
	1MB	Fujitsu Ltd.	MB98A81013-20-G-S	Appendix D Appendix E
		Fuji Electro-chemical Co., Ltd.	SC-9027-82H14	
SRAM memory card	2MB	Intel	IMC002FLSA	Appendix D
	4MB	Intel	IMC004FLSA	Appendix E
	1MB	Fujitsu Ltd.	MB98A91023-20	Appendix D
	2MB	Fujitsu Ltd.	MB98A91123-20	

F.2

ADVICE FOR USE

F.2.1

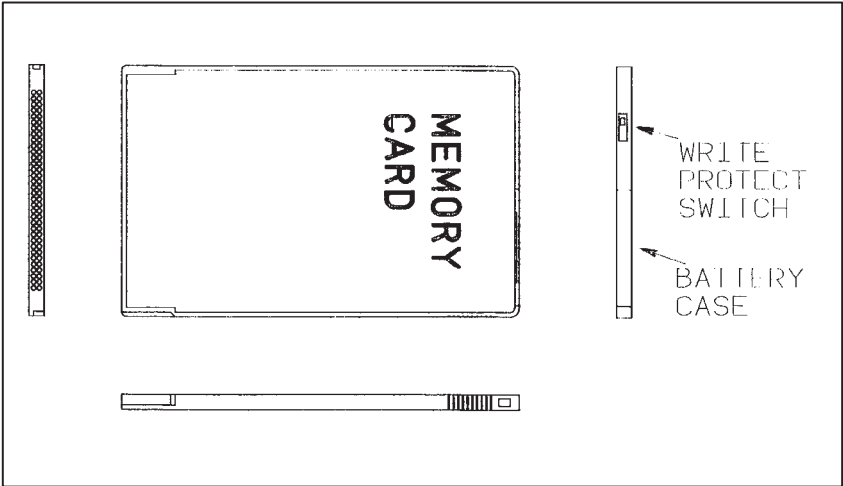
SRAM Memory Card

- (1) The SRAM memory card needs the battery for data backup, but does not include the battery when you get it.
Please insert the battery, according to “F.5 Change Battery”.
- (2) The SRAM memory card, data of memory card will be lost when the battery life is over, and please copy data of the memory card into a floppy disk.
- (3) The SRAM memory card has a battery voltage detecting function. And when the SRAM memory card which has low voltage battery is connected to CNC unit, the alarm message is displayed on CNC unit. But the battery voltage detecting function cannot operate without a battery.

NOTE

The SRAM memory card cannot be used to back up data.

F.3
NAMES AND
FUNCTION OF
MEMORY
COMPONENTS

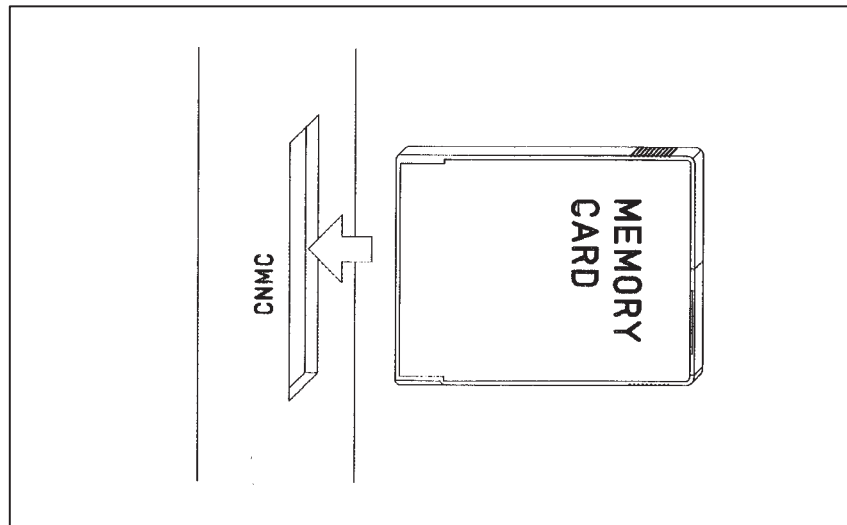


	Name	Function
1	Write Protect Switch	<p>The memory card can be protected from writing data into the memory card by setting of the write protect switch.</p> <div><div>Non Write Protect</div><div>Write protect</div></div>
2	Battery Case	<p>Incase of the SRAM memory card, the battery case includes the battery for data backup.</p> <p>The flash memory card has no battery case.</p>

F.4 OPERATING OF MEMORY CARD

F.4.1 Connection of Memory Card

- (1) Insert the memory card in the direction shown in the figure through the memory card insertion slot.
- (2) The memory card cannot be inserted with wrong side, because the memory card has insertion guides.
Take care the direction of the memory card.

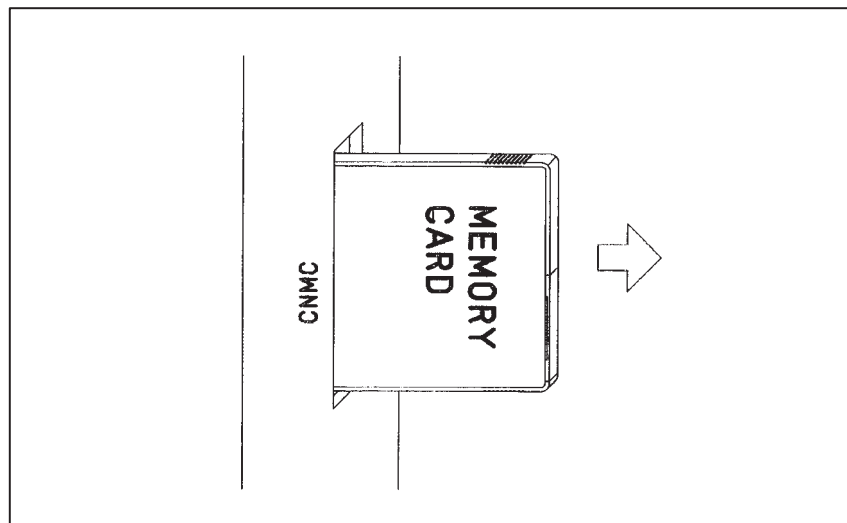


F.4.2 Operation

- (1) For the read/write operation, refer to the Addendix D or E.

F.4.3 Disconnection of Memory Card

- (1) Pull the memory card out in the direction shown in the figure.



F.5 BATTERY CHANGE

F.5.1 Battery

CR2325 or equivalent battery can be used for the SRAM memory card.

F.5.2 Battery Life

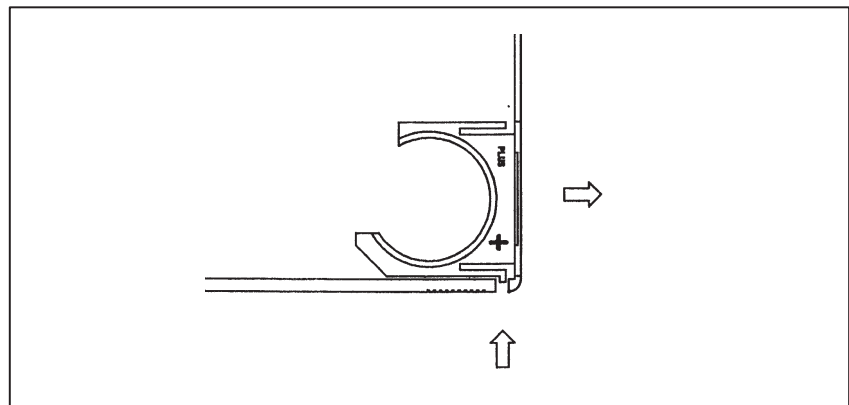
The battery life is as follows.

But the battery life in the table is only reference data, because the battery life is changeable by the change of ambient temperature.

Drawing Number	Part's Number	Battery Life
A87L-0001-0150#512K	MB98A90923-20	about 6 months
A87L-0001-0150#1M	MB98A91023-20	about 1 year
A87L-0001-0150#2M	MB98A91123-20	about 6 months

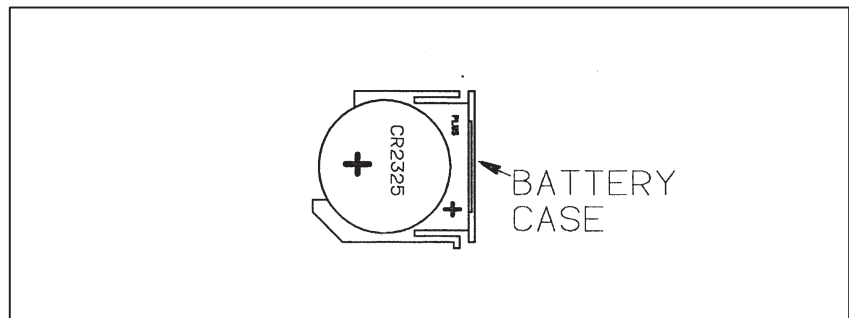
F.5.3 Procedure of Battery Change

(1) Pull the battery case out with pushing projection.

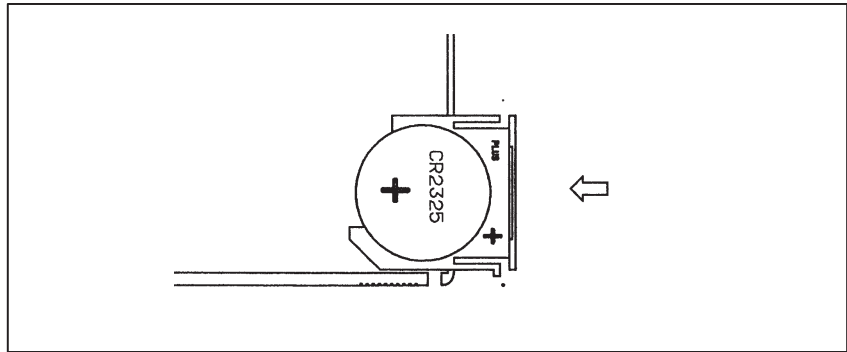


(2) Change the battery.

“+” mark of the battery must be set to “+” mark of the battery case.



- (3) Put the battery case back in the memory card, and make sure read/write operation.




F.6 SPECIFICATIONS OF MEMORY CARDS THAT ARE NOT ALLOWED TO BE USED

Among those memory cards that are compliant with the PC Card Standard, those which are operational at 3.3 V cannot be used.

- Memory cards which are operational at 3.3 V
→ This type of memory card cannot be inserted physically.
- Memory cards which are operational at 3.3 or 5 V (automatic voltage selection)
→ This type of memory card can be inserted physically, but must not be used because an electrical failure of the memory card itself or CNC control unit may result.

G NOTATION OF MDI KEYS





























FANUC Power Mate—MODEL H has two types of MDI keypads : English type and Symbolic type.













The table below shows correspondence between English keys and Symbolic keys.

This manual uses English type in the text.

























Therefore when a user uses Symbolic type MDI keypads and encounters an English key in the text, please refer to the correspondence table shown below.

MDI keys for CRT

Name	English key	Symbolic key
CANCEL key		
POSITION key		
PROGRAM key		
OFFSET/ SETTING key		
CUSTOM key		
SYSTEM key		
MESSAGE key		
GRAPH key		
CNC/MMC key		
SHIFT key		
INPUT key		
ALTER key		
INSERT key		

Name	English key	Symbolic key
DELETE key		
PAGE UP key		
PAGE DOWN key		
HELP key		
RESET key		
CUSTOM/ GRAPH key		

MDI keys for DPL

Name	English key	Symbolic key
POSITION key		
PROGRAM key		
MENU/VAR key		
INSERT key		
DELETE key		
ALTER key		
INPUT key		
DIAGNOSE/PARAMETER key		
OPERATION/ALARM key		
READ key		
WRITE key		
CANCEL key		

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02	Apr., '96	<ul style="list-style-type: none">• All pages are rewritten				
01	May, '95	_____				
Edition	Date	Contents	Edition	Date	Contents	

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