

MITSUBISHI CNC

MELDAS 600L Series

INSTRUCTION MANUAL

Introduction

This instruction manual mainly targets lathe. This is to be used as a guide when using MELDAS 600L Series, the software-fixed type of CNC (NC hereafter) systems which are designed to execute high-performance contour control.






This instruction manual describes the screen operations of the MELDAS 600L Series. Read this instruction manual thoroughly before using.

This manual is written assuming that all functions of the MELDAS 600L Series are provided. However, depending on the NC unit, all functions and options may not necessarily be provided. Therefore, always check the specifications issued by the machine manufacturer before starting use.

Read the "Precautions for Safety" given on the next page to ensure safe use of the NC.

Details described in this manual

CAUTION

-  For items described in "Restrictions" or "Usable State", the instruction manual issued by the machine manufacturer takes precedence over this manual.
-  Items not described in this manual must be interpreted as "Not Possible".
-  This manual has been written on the assumption that all option functions are added. Refer to the specifications issued by the machine manufacturer before starting use.
-  Refer to the manuals issued by the machine manufacturer for each machine tool explanation.
-  Some screens and functions may differ or may not be usable depending on the NC version.

General precautions

- (1) Refer to the documentation below for details on programming:

MELDAS 600L Series Programming Manual BNP-B2232

- (2) The font used with MELDAS 600L is Meldas Gothic, developed by RICOH COMPANY LTD. under the license agreement with RYOBI IMAGIX CO.

Precautions for Safety

Always read the specifications issued by the machine manufacturer, this manual, related manuals and attached documents before installation, operation, programming, maintenance or inspection to ensure correct use.

Understand this numerical controller, safety items and cautions before using the unit.

This manual ranks the safety precautions into "**DANGER**", "**WARNING**" and "**CAUTION**".



When the user may be subject to imminent fatalities or major injuries if handling is mistaken.



When the user may be subject to fatalities or major injuries if handling is mistaken.



When the user may be subject to injuries or when physical damage may occur if handling is mistaken.

Note that even items ranked as "**CAUTION**", may lead to major results depending on the situation. In any case, important information that must always be observed is described.

DANGER






Not applicable in this manual.

WARNING


Not applicable in this manual.

CAUTION

1. Items related to product and manual



-  For items described as "Restrictions" or "Usable State" in this manual, the instruction manual issued by the machine manufacturer takes precedence over this manual.
-  Items not described in this manual must be interpreted as "Not Possible".
-  This manual has been written on the assumption that all option functions are added. Refer to the specifications issued by the machine manufacturer before starting use.
-  Refer to the manuals issued by the machine manufacturer for each machine tool explanation.
-  Some screens and functions may differ or may not be usable depending on the NC version.

2. Items related to installation and assembly










-  Always ground the signal cable to ensure stable operation of the system. Ground the NC unit, power distribution panel and machine to a one-point ground to establish the same potential.

CAUTION




3. Items related to preparations before use.

-  Always set the stored stroke limit. If not set, the axis could collide at the machine end.
-  Always turn the power OFF before connecting/disconnecting the I/O device cables. The NC and I/O device could be damaged if the cable is connected/disconnected in the power ON state.

4. Items related to screen operation




-  If the tool offset amount is changed during automatic operation (including single block stop), the amount will be validated from the next block or several blocks following commands.
-  Pay close attention to the sequence operation when carrying out forced data setting (forced output) in the I/F diagnosis screen.
-  All of the various data in the NC memory is erased when formatting. Be sure to use the transfer function to transfer all the necessary data to another storage device before formatting.
-  The actual data is rewritten when parameter input and tool compensation amount change commands (40 sets or more) are issued using a G10 command during graphic check.
-  To prevent the influence of data loss and data transformation over the line, always carry out data comparison after transferring a machining program.
-  Do not change the machine parameters without prior consent from the machine manufacturer.
-  If initialization is executed on the MELDAS Diagnosis screen before the data is saved, all of the diagnosis data will be erased.
-  If another screen is opened before saving the data on the MELDAS Diagnosis screen, the set diagnosis information parameters will all be invalidated.
-  If an alarm occurs, remove the cause, and confirm that the operation signal is not being input. Then secure the safety and reset the alarm before restarting operation.

5. Items related to programming



-  If there is no value after the G command, the operation will be the "G00" operation when the program is run due to key chattering, etc., during editing.
-  " ; " "EOB" and " % " "EOR" are symbols used for explanation. The actual codes for ISO are: "CR, LF", or "LF" and "%".
Programs created on the Edit screen are stored in the NC memory in a "CR, LF" format, but programs created with external devices such as the FLD or RS-232C may be stored in an "LF" format.
The actual codes for EIA are: "EOB (End Of Block)" and "EOR (End Of Record)".
-  Do not change the Fixed cycle program without prior consent from the machine manufacturer.

CAUTION














6. Items related to operation

-  Program so the mirror image function is turned ON/OFF at the mirror image center. The mirror image center will deviate if the function is turned ON/OFF at a position other than the mirror image center.
-  Do not enter the movable range of the machine during automatic operation. Make sure not to place hands, legs or face near the spindle during rotation.
-  Always carry out dry run operation before actual machining, and confirm the machining program, tool offset amount and workpiece coordinate system offset amount.

7. Items related to faults and errors

-  If the BATTERY LOW warning is output, save the machining programs, tool data and parameters to an I/O device, and then replace the battery. If the BATTERY alarm occurs, the machining programs, tool data and parameters may be damaged. After replacing the battery, reload each data item.
-  If the axis overruns or makes an abnormal noise, press the emergency stop button immediately, and stop the axis.

8. Items related to maintenance

-  Do not apply voltages on the connector other than those indicated in this manual. Doing so may lead to destruction or damage.
-  Incorrect connections may damage the devices, so connect the cables to the specified connectors.
-  Do not connect or disconnect the connection cables between each unit while the power is ON.
-  Do not connect or disconnect any PCB while the power is ON.
-  Do not replace the battery while the power is ON.
-  Do not short-circuit, charge, overheat, incinerate or disassemble the battery.
-  Dispose of the spent battery according to local laws.
-  Do not replace the cooling fan while the power is ON.
-  Dispose of the old cooling fan according to local laws.
-  Do not replace the HDD while the power is ON.
-  Dispose of the old HDD according to local laws.
-  Do not replace the backlight while the power is ON.
-  Dispose of the spent backlights according to local laws.

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CHAPTER 1 SCREEN OPERATIONS

1. Operating the Setting Display Unit

1.1 Setting display unit

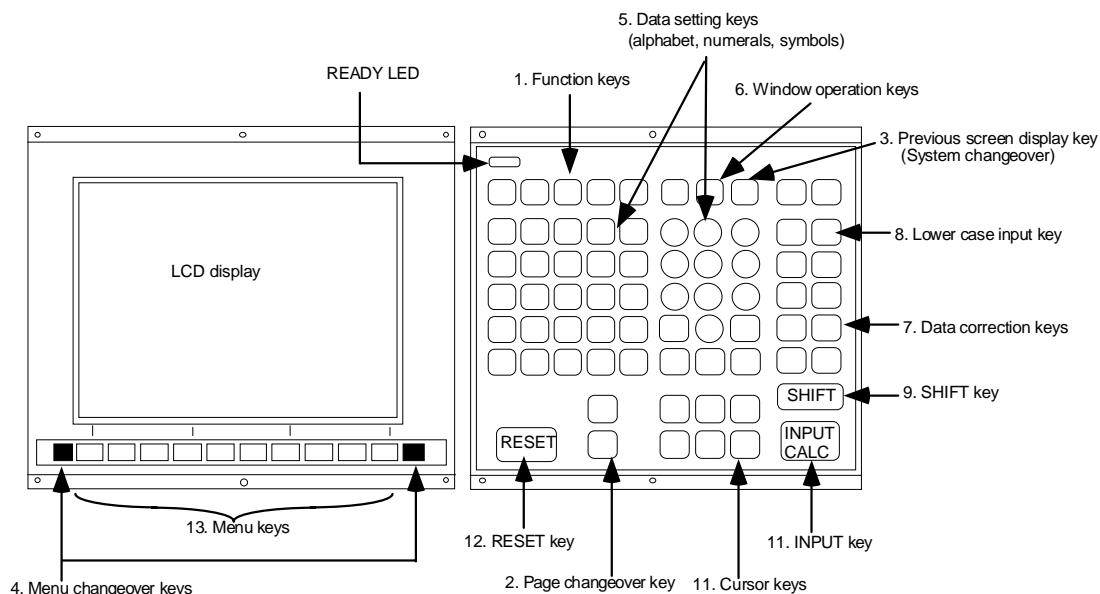
(1) Setting display unit appearance

An LCD display is used for the screen displays.

Operations such as screen transition and data setting are carried out with the NC keyboard.

The setting display unit is configured of the LCD display, various keys and menu keys as shown below.







The drawing below shows a horizontal layout of the LCD display and NC keyboard, but these can also be arranged vertically.



The following keys are provided on the keyboard.

	Key type	Key	Operation
1.	Function key	MONITOR	This displays the menu of the screen related to "operations". (→ Refer to "2. Monitor Screens".)
		SETUP	This displays the menu of the screen related to "setup". (→ Refer to "3. Setup Screens".)
		EDIT	This displays the menu of the screen related to "editing". (→ Refer to "4. Edit Screens".)
		DIAGN	This displays the menu of the screen related to "diagnosis". (→ Refer to "5. Diagnosis Screens".)
		MAINTE	This displays the menu of the screen related to "maintenance". (→ Refer to "6. Maintenance Screens".)
2.	Page changeover key	Previous page key	When the displayed contents cover several pages, this displays the contents of the previous page. The "▲" mark at the top of the screen indicates that there is a previous page.
		Next page key	When the displayed contents cover several pages, this displays the contents of the next page. The "▼" mark at the top of the screen indicates that there is a next page.

CHAPTER 1 SCREEN OPERATIONS
1. Operating the Setting Display Unit

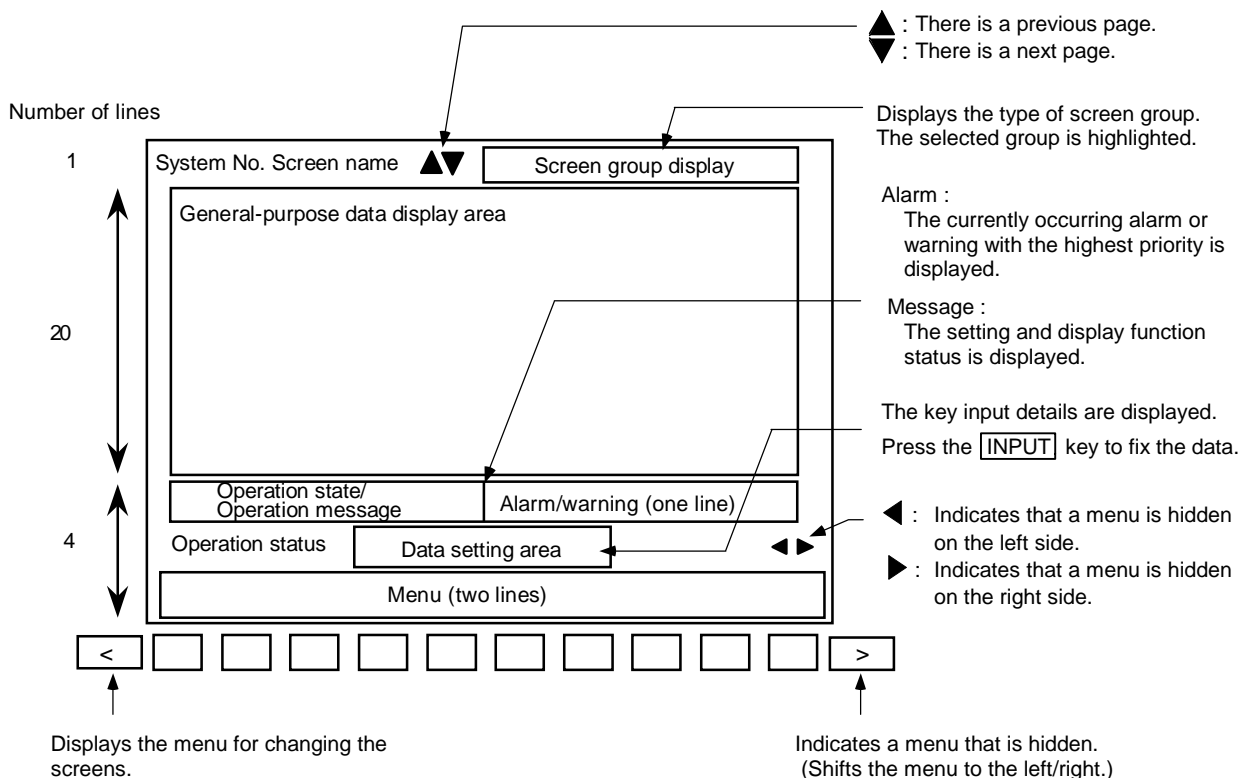
	Key type	Key	Operation																																																
3.	Previous screen display key (System changeover)	BACK Previous screen display key	This redisplay the previously displayed screen.																																																
		\$ → \$ System changeover key	When using a multi-system NC, this displays the data of the next system. The screen does not change if it is a system common screen or when only one system is used.																																																
4.	Menu changeover key	 (left side)	This changes the operation menu for the displayed screen to the current screen group screen selection menu. This is also used to cancel the menu operations of the displayed screen.																																																
		 (right side)	When all of the menus cannot be displayed at once, this displays the menus not currently displayed. The "◀" and "▶" marks at the bottom of the screen indicate that there are menus not displayed.																																																
5.	Data setting key	<table border="1" style="border-collapse: collapse; text-align: center; width: 100%;"> <tr><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td></tr> <tr><td>G</td><td>H</td><td>I</td><td>J</td><td>K</td><td>L</td></tr> <tr><td>M</td><td>N</td><td>O</td><td>P</td><td>Q</td><td>R</td></tr> <tr><td>S</td><td>T</td><td>U</td><td>V</td><td>W</td><td>X</td></tr> <tr><td>Y</td><td>Z</td><td></td><td></td><td></td><td></td></tr> <tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td>6</td><td>7</td><td>8</td><td>9</td><td></td><td></td></tr> <tr><td>+</td><td>-</td><td>=</td><td>/</td><td>.</td><td>:</td></tr> </table> etc.	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z					0	1	2	3	4	5	6	7	8	9			+	-	=	/	.	:	These keys are pressed to set alphabetic characters, numerals and operation symbols, etc.
A	B	C	D	E	F																																														
G	H	I	J	K	L																																														
M	N	O	P	Q	R																																														
S	T	U	V	W	X																																														
Y	Z																																																		
0	1	2	3	4	5																																														
6	7	8	9																																																
+	-	=	/	.	:																																														
6.	Window operation key		This displays a window. (Not used)																																																
			This changes the active window. (Not used)																																																
			This displays the menu for selecting operations on the window. (Not used)																																																
		 Help key	This displays the help. (Not used.)																																																
7.	Data correction key	INSERT Data insert key	This inputs the data insertion mode. When a data setting key is pressed, a character is inserted in front of the current cursor position. The overwrite mode is entered when the DELETE , C·B ESC , INPUT , cursor or Tab, etc., keys are pressed, or when the screen is changed.																																																
		DELETE Data delete key	This deletes the character just before the cursor position in the data setting area.																																																
		C·B ESC Cancel key	This cancels the setting in the data setting area.																																																
8.	Lower case input key	LOWER CASE	This changes the input between upper case and lower case alphabetic characters.																																																
9.	SHIFT key	SHIFT	This validates the setting on the lower line of data setting key.																																																

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	Key type	Key	Operation
10.	Cursor key	↑ ↓	This moves the cursor up or down one when setting data in the screen display items.
		← →	This moves the cursor one item to the left or right when selecting data in the screen display items. ← at cursor left end : Moves to the right end of previous line. → at cursor right end: Moves to left end of next line.
		← →	This moves the data input cursor one character to the left or right in the data setting area.
11.	INPUT key	INPUT	This fixes the data in the data setting area, and writes it to the internal data. The cursor moves to the next position.
12.	RESET key	RESET	This resets the NC.
13.	Menu keys		This changes the screen and displays the data.

(2) Display configuration

The screen is displayed with the following type of configuration:



When using one system, the system No. is not displayed at the upper left of the screen. The number of the currently displayed system is displayed only when two or more systems are being used.

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1. Operating the Setting Display Unit

(3) Operation state/operation message

1) Operation state

1 SYN 2 SYN 3 AUT 4 BST 5 AUT 6 BST 7 BST 8 BST

The operation state indicates the currently selected operation state for each system. (The state for up to eight systems can be displayed.)

Note that if an operation message is displayed, the operation message will appear instead of the operation state.

Symbol	Details	Character color	Background color
EMG	Emergency stop	Black	Red
RST	Resetting NC	Black	Green
RDY	Operation READY state	Black	Green
AUT	In automatic operation	Black	Green
SYN	Waiting for synchronization	Black	Green
CRS	Waiting for cross conversion	Black	Green
BST	Stopped	Black	Green
HLD	Halted	Black	Green

2) Operation message

E01 Setting error

	Character color	Background color
Operation message	Black	Gray

- The operation message can be canceled by pressing any key (the operation state display will reappear).
- Even if the operation mode changes while an operation message is displayed, the operation message display will not be canceled.

(4) Alarm/warning

\$1 P232 No program No.

The number of the system in which the alarm occurred, the alarm No. and the alarm message character string are displayed.

The system No. is not displayed for an alarm common to the systems.

When a warning occurs, the system No., alarm No. and alarm message character string are displayed in the same manner as the alarm.

The system No. is not displayed for a warning common to the systems.

(Example) Display of warning common to system

z90 Diagnosis information acquired

	Character color	Background color
Alarm	Black	Red
Warning	Black	Yellow

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(5) Operation status

MDI

 : RUN

The operation status displays the operation state in the following order.

- 1) MDI: The selected operation mode is displayed.
 When two or more systems are used, the operation mode of the 1st system is displayed.

Whether to display the operation mode can be selected with the Basic common parameter "1329 sp_3" value.

1329 sp_3(bit3) OFF : Display operation mode
 ON : Do not display operation mode

Symbol	Details	Character color	Background color
MEM	Memory mode	Black	Gray
MDI	MDI mode	Black	Gray
RPD	Rapid traverse	Black	Gray
JOG	Jog mode	Black	Gray
HDL	Handle	Black	Gray
STP	Step	Black	Gray
MNL	Manual random feed	Black	Gray
ZRN	Zero point return mode	Black	Gray
INI	Automatic dog-less zero point return	Black	Gray
	No mode	Black	Gray

(Note 1) Note the following points when using two or more systems.
 The operation status displays the operation mode selected for the 1st system. Thus, when using two-or-more-systems machine for which the operation modes are separately selected for each system, the operation mode displayed for a system other than the 1st system, and the operation mode on the machine may not match.

- 2) RUN: The MDI status is displayed when the 1) operation mode is the MDI mode.

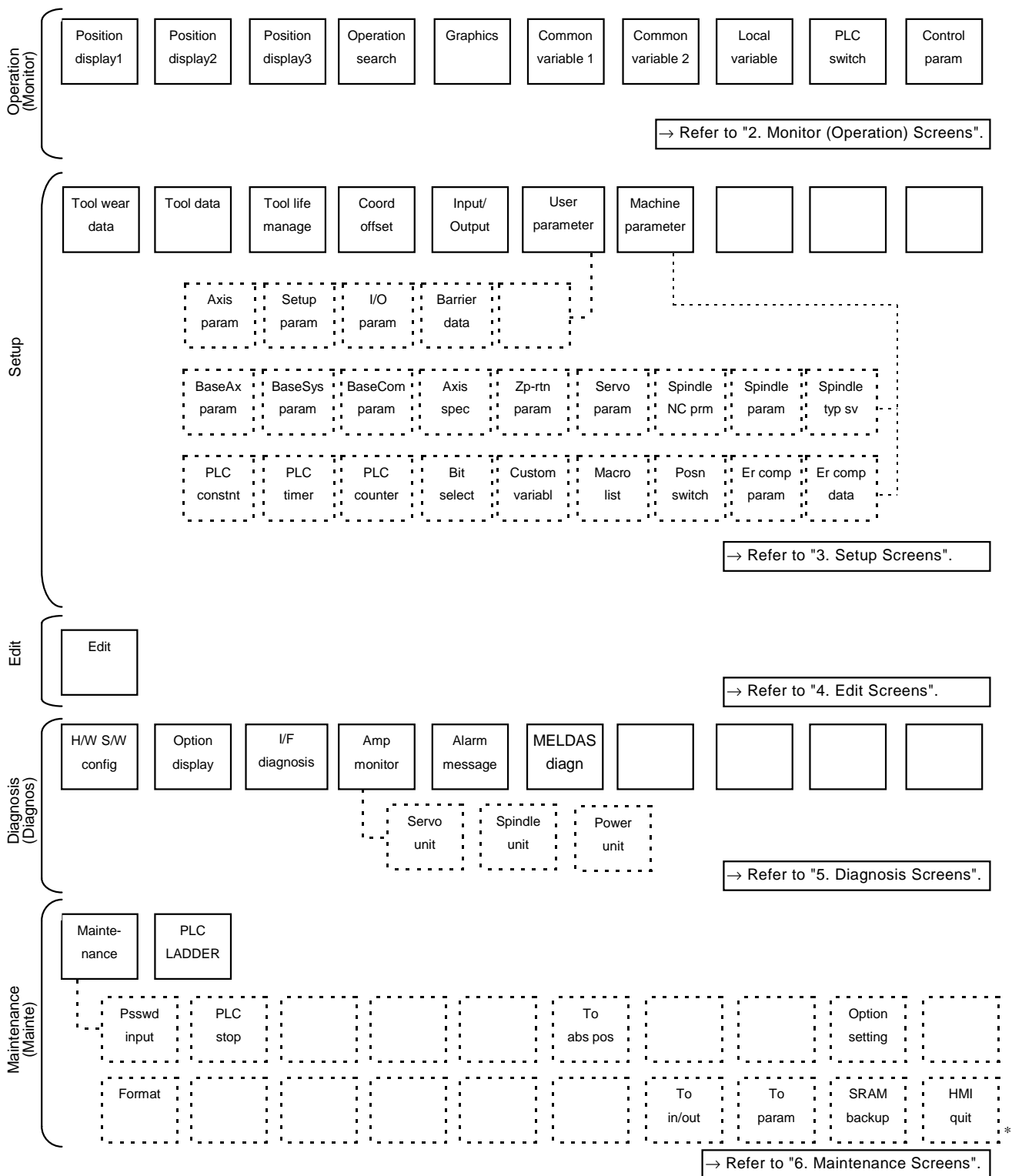
Symbol	Details	Character color	Background color
NON	No MDI setting	Black	Gray
SET	MDI setting completed	Black	Gray
RUN	MDI running	Black	Gray

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1. Operating the Setting Display Unit

1.2 Screen transition diagram

The screen is configured of operation groups.
 Refer to "1.3 Screen selection procedures" for how to display the screens.



CHAPTER 1 SCREEN OPERATIONS

1. Operating the Setting Display Unit

1.3 Screen selection procedures

The screen is selected by pressing a function key such as **MONITOR** or **SETUP**, or by pressing a menu key displayed in the screen selection menu.

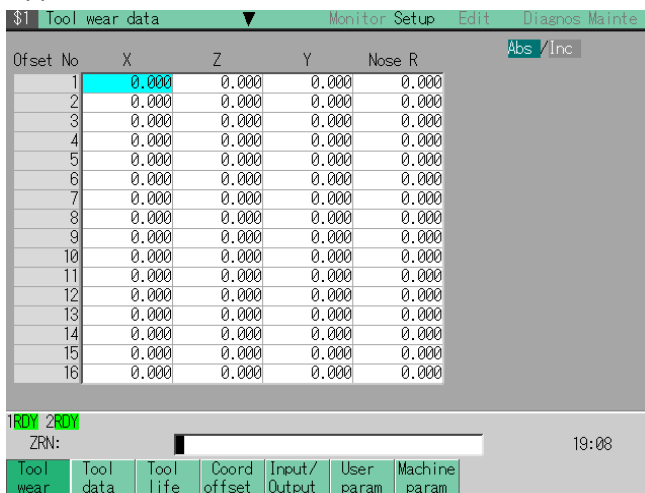
(1) Operation method (To display "Input/Output" screen from the "Setup" group)

1)

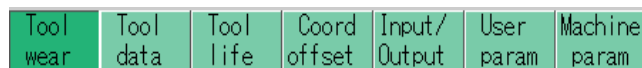
Press the function key
SETUP.



The previously displayed setup related screen will appear.



The menu display will differ according to the Setup parameter "Default menu" settings.

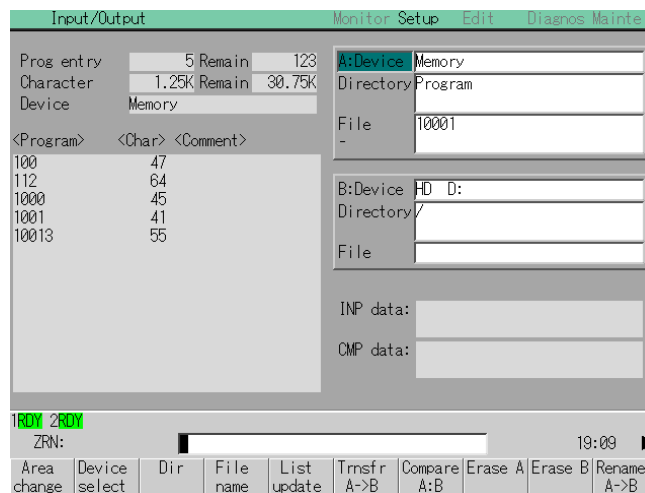


2)

Press the menu key
Input/Output.



The Input/Output screen appears.



1.4 Setting data

1.4.1 Setting numerals and alphabetic characters

(1) Operation method

The data is basically set with the following methods:

- 1) Menu selection
- 2) Number selection
- 3) Cursor movement
- 4) Data key input
- 5) **INPUT** key input

An example for setting the data on the Tool wear data screen is shown below.

1) Menu selection

Press the menu key for the item to be set.

Menu **Tool wear**



The Tool wear data screen appears.
The cursor appears at the Tool wear data.

2) Number selection

If the setting item has a number (No.), designate that number.

Menu **Offset No.** 11 **INPUT**



The cursor moves to the designated number.

Offset No	X	Z	Y	Nose R
11	0.000	0.000	0.000	0.000
12	0.000	0.000	0.000	0.000
13	0.000	0.000	0.000	0.000
14	0.000	0.000	0.000	0.000
15	0.000	0.000	0.000	0.000

3) Cursor movement

If there is no number or when moving up/down/left/right, move the cursor with cursor keys.

Up/down: Move with **↑**, **↓**

Left/right: Move with **←**, **→**



The cursor moves.

Offset No	X	Z	Y	Nose R
11	0.000	0.000	0.000	0.000
12	0.000	0.000	0.000	0.000
13	0.000	0.000	0.000	0.000
14	0.000	0.000	0.000	0.000
15	0.000	0.000	0.000	0.000

4) Data key input

Set data with the numeral keys or alphabet keys, etc.

1 **2** **.** **2** **0** **5**



The data is set in the data setting area.

12. 205 ■

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1. Operating the Setting Display Unit

5) **INPUT** key input

Press the **INPUT** key.



The contents in the data setting area are fixed, the data setting is processed, and the results appear on the screen.

The cursor moves to the next position.

Offset No	X	Z	Y	Nose R
11	0.000	0.000	12.205	0.000
12	0.000	0.000	0.000	0.000
13	0.000	0.000	0.000	0.000
14	0.000	0.000	0.000	0.000
15	0.000	0.000	0.000	0.000

(Note 1) The contents in the data setting area are only displayed until the **INPUT** key is pressed. These contents are invalidated if the screen is changed. The data is written into the memory when the **INPUT** key is pressed.

(Note 2) Special settings may be required depending on the data type. Refer to each item.

(Note 3) The cursor may move to the right of the display item depending on the data type.

(Note 4) If an illegal key is set, an error occurs when **INPUT** is pressed. Reset the correct data.

(2) Operations in the data setting area

The key is input at the position where the cursor is displayed. If a cursor is not displayed, the key input is invalid.

When a key is input, the data appears at the cursor position, and the cursor moves one character space to the right.

■ **→** / **←** keys: Moves the cursor one character to the left or right.

1)

The cursor is at the position shown on the right.



1 2 3 7 7 7 **4** 5 6

2)

Press the **→** key.



The cursor moves one character space to the right.

1 2 3 7 7 7 4 **5** 6

■ **INSERT** key: Enters the insert mode.

1)

Move the cursor to the position where the data is to be inserted.



The cursor moves in the data setting area.

1 2 3 **4** 5 6

2)

Press the **INSERT** key, and then the data keys.
INSERT **7** **7** **7**



The data is inserted, and the cursor moves to the right.

1 2 3 7 7 7 **4** 5 6

(Note) The overwrite mode is entered when the **DELETE**, **C·B ESC** keys are pressed, or when the screen is changed.

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■ **DELETE** key: Deletes the character in front of the cursor.

1)

Move the cursor to the position where the data is to be deleted.



The cursor moves in the data setting area.

1 2 3 7 7 **4** 5 6

2)

Press the **DELETE** key.



The character in front of the cursor is deleted, and the cursor moves.

1 2 3 7 7 **4** 5 6

■ **C·B ESC** key: Deletes all characters in the data setting area.

1)

Press the **C·B ESC** key.







All characters in the data setting area are deleted, and the cursor moves to the left end.



(3) Cursor operations on the screen

If a cursor is displayed on the screen, data is set in the data setting area and the **INPUT** key is pressed, the data appears at the cursor position on the screen. The cursor moves to the next position.

The following keys can be used to move the cursor with the cursor keys.

-  : Moves the cursor to the previous line.
-  : Moves the cursor to the next line.
-  : Moves the cursor one item to the left.
-  : Moves the cursor one item to the right.

1.4.2 Inputting operations

In addition to the method of directly inputting numeric data for specific data settings, a method to input the operation results using arithmetical operators and function symbols can be used.

(1) Input method

Numeric values, function symbols, operators and parentheses () are combined and set in the data setting area.

The operation results appear when the **INPUT** key is pressed. If the **INPUT** key is pressed again, the data is processed and displayed on the screen. The contents in the data setting area are erased.

Examples of operator settings, and results		
Operation	Setting example	Operation results
Addition	=100+50	150.000
Subtraction	=100-50	50.000
Multiplication	=12.3*4	49.200
Division	=100/3	33.333
Function	=1.2*(2.5+SQRT(4))	5.4

Function symbols, setting examples and results			
Function	Function symbol	Setting example	Operation results
Absolute value	ABS	=ABS (50-60)	10
Square root	SQRT	=SQRT (3)	1.732
Sine	SIN	=SIN (30)	0.5
Cosine	COS	=COS (15)	0.966
Tangent	TAN	=TAN (45)	1
Atangent	ATAN	=ATAN (1.3)	0.915

(2) Operation examples

1)

Set as shown below, and press the **INPUT** key.
 =12*20 **INPUT**



The operation results appear in the data setting area.

2 4 0 ■

2)

Press the **INPUT** key again.



The contents of the data setting area are fixed, the data setting is processed and the results appear on the screen.

The cursor moves to the next position.

(3) Notes for using operators and functions

- Division : Zero division causes an error.
- Square root : If the value in the parentheses is negative, an error occurs.
- Triangle function : The unit of angle θ is degree ($^{\circ}$).
- Atangent : $-90 < \text{operation results} < 90$.

(4) Restrictions

- Always use "=" for the first character.
- Do not use the following characters as the second character or last character.
 Invalid as second character: *, /,)
 Invalid as last character: *, /, (, +, -
- Make sure that the left parentheses and right parentheses are balanced.
- The 360° limit does not apply on the angle. SIN (500) is interpreted as SIN (140).

1.5 Screen operations

1.5.1 Setting a manual value command (S, M, T, B)

The spindle function S, miscellaneous function M, tool function T and 2nd miscellaneous function B commands can be set with screen operations. This carries out the S, M, T, B command execution program by commanding the operations with key inputs on the screen.

**(1) Screens in which manual value commands can be set
(Target commands that can be set are shown in parentheses.)**

- Position display1 screen, Position display2 screen (S, M, T, B)
- Tool data screen (M, T)
- Coord offset screen (M, T)

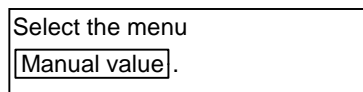
(Note) On the Position display1 screen and Position display2 screen, manual value commands can be issued by inputting the address.

(2) Conditions for manual value commands

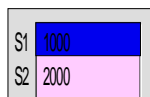
- The manual value command option must be valid.
- S, M, T or B command must not be in execution.

(3) Operation methods (When executing T31 with a manual value command)

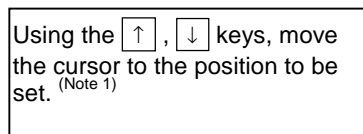
1)



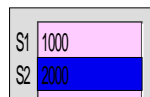
The manual value command mode is entered. The cursor appears, and the menu is highlighted. The command value executed last is displayed on the screen.



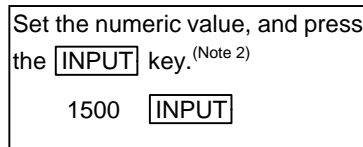
2)



The cursor moves.



3)



The command is executed. The menu highlight is removed, and the cursor disappears.

(Note 1) On the position display1 and 2 screens, by inputting an address key such as **[S]** **[1]**, **[M]** or **[T]** instead of steps 1) and 2), the cursor appears at the corresponding display position.

(Note 2) To set a negative value, add a "-" in front of the numeric value. Refer to "(4) Manual value command setting and output range". When using a BCD output type or unsigned binary output type, a value converted into a positive value is set.

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(4) Manual value command setting and output range

For the S, M, T and B commands, the type of data output from the NC unit to the user PLC is preset to one of the following by the Machine parameters.

- BCD output
- Unsigned binary data
- Signed binary data

The following table shows the manual value command setting and output range according to the specifications of the three types.

	BCD/unsigned binary	Signed binary
S	0 to 99999999	-99999999 to 99999999
M	0 to 99999999	-99999999 to 99999999
T	0 to 99999999	-99999999 to 99999999
B	0 to 99999999	-99999999 to 99999999

(Note 1) When using the BCD output type or unsigned binary output type, a value converted into a positive value is output.

(Example) Setting value: M-100 → Output value: M 100

(Note 2) If a value exceeding the setting range is set, the high-order data is dropped.

(Example) M 1234
↑
Set 5 → M 2345
↙ 1 is dropped.

(5) Number of displayed commands

Command	Number of displayed commands
S	Follows the value set for the Machine parameter "Sfig". (Maximum six commands)
M	Follows the value set for the Machine parameter "Mfig". (Maximum four commands)
T	One command
B	One command

(Note 1) The S command value is displayed with the name set with the Machine parameter "Sname".

(Note 2) The final command value is displayed for the S command value.

(6) Other notes

- 1) If the program command format is the MELDAS 600 Series standard format and a macro interruption command code (M96, M97) or subprogram call code (M98, M99) is commanded, the command will not be processed.
- 2) The manual value command mode is canceled if the following operations are carried out before pressing the INPUT key.
 - When the Manual value menu key is pressed again.
 - When the ◀ key is pressed.
 - When another menu key is pressed.
 - When the screen is changed.

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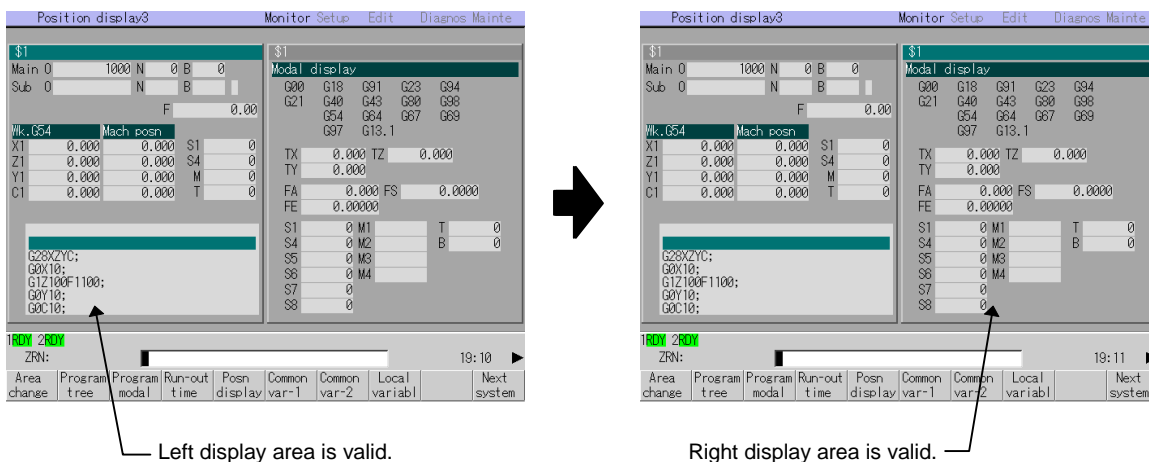
1. Operating the Setting Display Unit

1.5.2 Changing the valid area

In screens where the display area is split, such as the Position display3 screen, Input/Output screen or Edit screen, the area containing the screen must be validated before the display can be changed or the data set.

The display area can be changed by pressing the menu key (Area change). There are screens that are changed with the Tab keys (← , →).

After changing, all operations such as data setting and cursor movement are valid in that area.



(1) To change with the menu keys.

If an Area change menu is provided, such as on the Position display3 screen or Input/Output screen, the area is changed with the menu keys.

- 1) When left side of Position display3 screen is valid. (Refer to the screens above.)

Press the menu Area change.

➔ The right area is validated.

(2) To change with Tab keys

The area is changed with the Tab keys on the Common variable (1, 2) screen, Local variable screen and Parameter screen, etc.

1.5.3 Changing the absolute value/incremental value setting

The mode (absolute value setting mode/incremental value setting mode) for setting the data can be selected with the menus.

Once the mode is selected, it is saved even when the screen is changed and after the power is turned OFF.

The absolute value setting mode is selected as the default.

(1) Screen for changing the absolute value/incremental value

- Position display3 screen (when common variables are displayed)
- Common variable (1, 2) screen
- Tool wear data screen
- Tool data screen
- Coord offset screen

(2) Operation method

(To change the absolute value setting mode to the incremental value setting mode)

1)

Press the menu Abs/Inc.

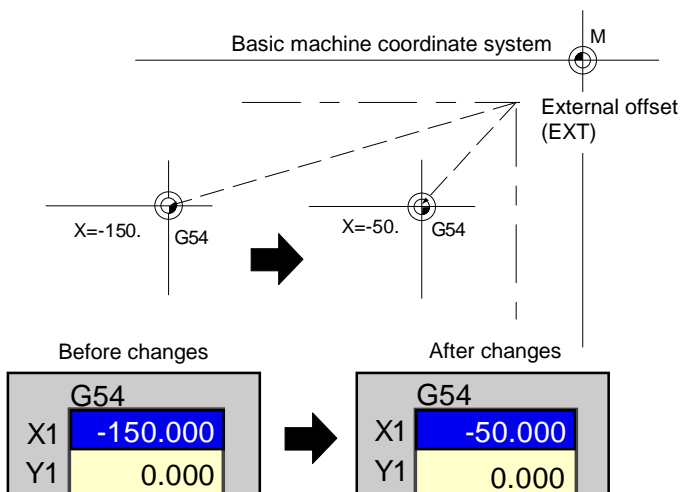


The display on the screen changes to incremental value. (Following figure.)
 Settings can be made in the incremental value mode.



(3) Differences between the absolute value setting mode and incremental value setting mode

(Example 1) To change the G54 workpiece coordinate system as shown below.



When Abs/Inc, then setting value : -50

When Abs/Inc, then setting value : 100

1.5.4 Changing the display axis

When axis counter or axis unit parameters are displayed on a random screen, there may be cases when all axis information cannot be displayed because many axes are used. In this case, the remaining axis details can be displayed by using the menu key.

(1) Screen for changing axis display

Counter display axis:

Position display1 screen

Parameter axis:

Axis param, Base axis param, Axis spec param, Z-point rtn param, Servo param,
 Spindle NC param, Spindle param

(2) Changing the Parameter screen display axis (Changing the axis name on the Axis param screen)

1)

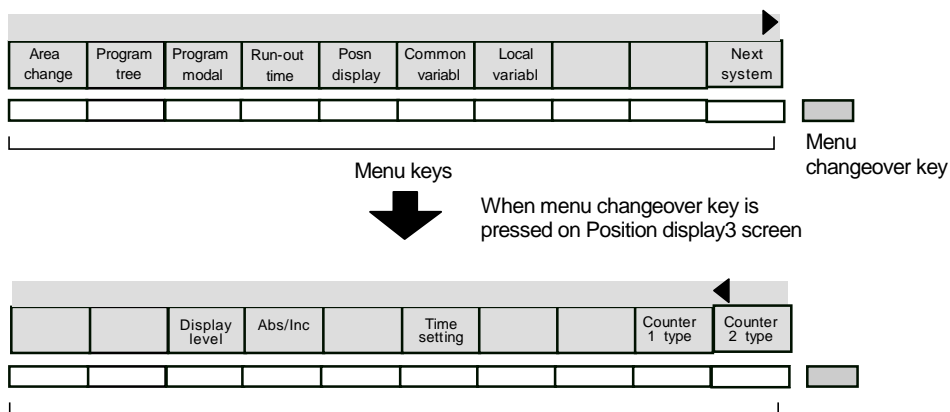
Press the menu Next axis. The axis name and data on the screen changes to the axis name and data for an axis currently not displayed.

No.	Name	X1	Z1	Y1	C1
8201	Mirror image	0	0	0	0
8202	Automatic dog type	0	0	0	0
8203	Manual dog type	1	1	1	1
8204	Axis removal	0	0	0	0

No.	Name	X2	Z2	Y2	C2
8201	Mirror image	0	0	0	0
8202	Automatic dog type	0	0	0	0
8203	Manual dog type	1	1	1	1
8204	Axis removal	0	0	0	0

(3) Notes

- 1) When all axes can be displayed in a batch, the Next axis menu is not displayed.
- 2) Depending on the screen, there may be many menus and the Next axis menu may be hidden. If a mark is displayed on the upper right of the menu, change the menu by pressing the menu changeover key. (Refer to "1.5.7 Changing the menu".)



1.5.5 Selecting a device, directory and file

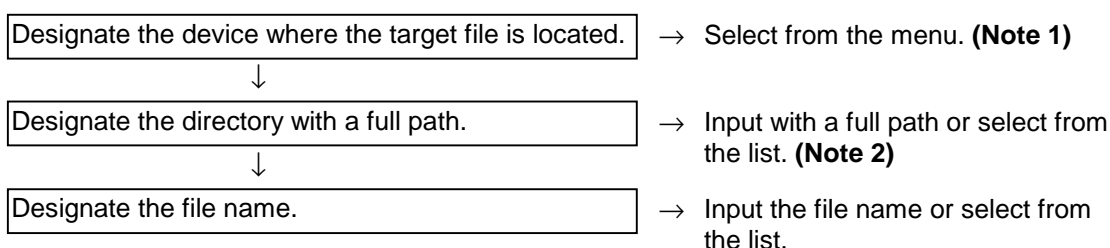
When using a file such as to input/output a file, carry out an operation search or edit a file, the device, directory and target file is designated. These can be selected from the screen list.

A general explanation common for all screens is given here. Refer to the corresponding section for details on operation for each screen.

(1) Screens requiring file selection

- Operation search screen (Select the program to be run)
- Input/Output screen (Select the machining program or other data file)
- Edit screen (Select the machining program to edit)

(2) File selection sequence



(Note 1) Only memory can be used for the device on the Operation search screen.

(Note 2) If the device is the memory, other than on the Input/Output screen, the directory does not need to be designated.

(3) Menu keys used


■ Main menu

Menu	Details	Type	Reference
Device select	This displays the menu where the machining program is stored. If a device having a directory is selected, the directory is set to the root.	A	Submenu for Device menu.
Dir	This enters the mode for inputting the directory name.	A	–
File name	This enters the mode for inputting the file name.	A	–
List update	This updates the list. (A list of the latest details of the currently selected device and directory is displayed.)	C	–
From list	Press this key to select the directory, file name or program No. The selection cursor appears in the list, and a random item can be selected.	C	–

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■ **Device** menu's submenus

Menu	Details	Type	Reference
Memory	This selects the memory.	C	–
RS232C	This selects RS-232C (including tape).	C	–
FLD	This selects the floppy disk.	C	–
HD	This selects the hard disk.	C	–

- (Note 1)** The devices that can be used differ according to the screens and to the provision of options.
- (Note 2)** If the  key is pressed when selecting the file name, the file name at the data setting area is erased. The file already selected on the screen may or may not be erased, depending on the screen.
- (Note 3)** When designating the directory or file name, the designated is not fixed when the directory name or file name is just displayed at the data setting area. Confirm that these items are displayed at the data setting area, and then press the **INPUT** key.
- (Note 4)** If a file other than a machining program is selected when Device:memory is set, the file name cannot be designated. (The file name is fixed.)
- (Note 5)** Depending on the screen, the **List update** and **From list** menus may not be provided. In this case, input the directory path and file name from the data setting area.

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(4) Operation method

The method to select the file (program) to be operation searched on the Operate screen (example 1), and the method for transferring the memory file to a FLD on the Input/Output screen (example 2) are explained in this section.

(Example 1) To select the file to be operation searched on the Operation search screen

1)

Select the Operation search screen.



The Operation search screen appears. The following menu appears.

NB srch	NB srch exec				List update	From list	Next system
---------	-----------------	--	--	--	----------------	--------------	----------------

2)

Designate the file name
(program No.).

1001



The set file name appears on the screen.

Device Memory

Directory

O 1001

N

B

The following two methods can be used to designate the file name.

- Input the file name, and press the key.
- Press the menu key key.

(Note 1) If the list contents differ from the actual device or directory, press the menu.

(Note 2) Refer to section "2.4 Operation search screen" for details on the NB search method.

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(Example 2) To select a program file to be transferred from the memory to a FLD on the Input/Output screen

■ Select the memory program file as the transfer origin.

1)

Select the Input/Output screen.



The Input/Output screen appears.
The following menu appears.

Area change	Device select	Dir	File name	List update	Trnsfr A -> B	...
-------------	---------------	-----	-----------	-------------	---------------	-----

2)

Press **Area change**, and validate the A: (transfer origin) display area.



The A display area is validated.

3)

Press the menu **Device select**.



The cursor appears at "A: Device".
The following menu appears.

Memory	RS232C	FLD A:	HD D:			
--------	--------	--------	-------	--	--	--

4)

Press the menu **Memory**.



The selected device name appears.
When memory is selected, "Program" appears in the directory as a default.

A : Device	: Memory
Directory	: Program
File	:

5)

Select the menu **Dir**.



The mode for inputting the directory name is entered.
(The cursor appears at "Directory:".)
The following menu appears. When selecting a device other than the memory, refer to the procedures for selecting the transfer destination FLD file.

From list	Program	Param	PLC prog	NC data
-----------	---------	-------	----------	---------

6)

Select the directory path (program) from the menu.



The set directory path appears on the screen.

A : Device	: Memory
Directory	: Program
File	:

The following two methods can be used to set the directory path.

- Set the directory path (full path) in the data setting area, and press the **INPUT** key.
- Press the menu key **From list**, move the cursor to the target directory, and press the **INPUT** key.

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1. Operating the Setting Display Unit

7) Press the menu **File name**. → The mode for inputting the file name is entered.
 (The cursor appears at "File:.")

The following menu appears.

From list	System param	Param (Text)	Param (Bin)			
-----------	--------------	--------------	-------------	--	--	--

8) Designate the file name.
 1001 **INPUT** → A : Device : Memory
 Directory : PROGRAM
 File : **1001**

The following two methods can be used to designate the file name.

- Input the file name, and press the **INPUT** key.
- Press the menu key **From list**, move the cursor to the target file name, and press the **INPUT** key.

■ Designate the FLD program file as the transfer destination.

9) Press **Area change**, and validate the B: (transfer destination) display area. → The B display area is validated and the cursor appears.

10) Press the menu **Device select**. → The following menu appears.

Memory	RS232C	FLD A:	HD D:			
--------	--------	--------	-------	--	--	--

11) Press the menu **FLD**. → The selected device name appears.

A : Device : **FLD A:**
 Directory :
 File :

12) Select the menu **Dir**. → The mode for inputting the directory name is entered.
 The following menu appears.

From list						
-----------	--	--	--	--	--	--

CHAPTER 1 SCREEN OPERATIONS
1. Operating the Setting Display Unit

13)

Input the directory path.
/PROGRAM/TEST



The input directory path appears.

A : Device	:	FLD A:
Directory	:	/PROGRAM/TEST
File	:	

The following two methods can be used to set the directory path.

- Set the directory path (full path) in the data setting area, and press the key.
- Press the menu key , move the cursor to the target directory, and press the key.

14)

Press the menu .



The mode for inputting the file name is entered.

The following menu appears.

From list						
-----------	--	--	--	--	--	--

15)

Input the file name.
precut



A : Device	:	FLD A:
Directory	:	/PROGRAM/TEST
File	:	precut

The following two methods can be used to designate the file name.

- Input the file name, and press the key.
- Press the menu key , move the cursor to the target file name, and press the key.

CHAPTER 1 SCREEN OPERATIONS

1. Operating the Setting Display Unit

1.5.6 Changing the display system

When using multiple systems, information such as the counter value and modals can be changed to those for another system. Once the system is changed, the information for that system is displayed even when the screen is changed.

The 1st system is selected when the power is turned ON.

When using a single system, and when the screen is common for all systems, the system cannot be changed.

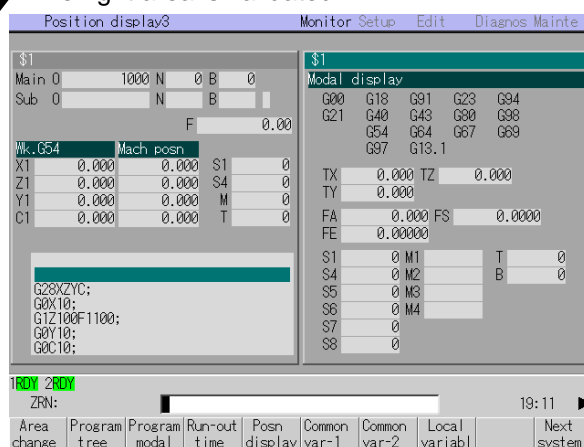
(1) Operation method

(To change the right area of the Position display3 screen to the 2nd system)

1)

Press the menu Area change, and validate the right area.

➔ The right area is validated.

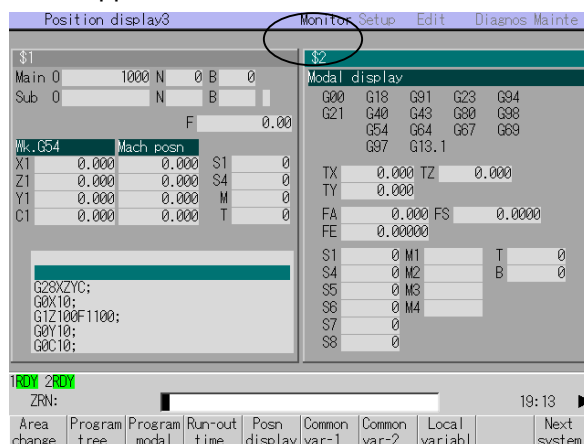


(Note) Refer to "1.5.2 Changing the valid area" for how to change the area.

2)

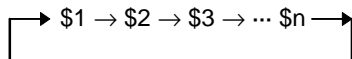
Press the \$ → \$ key.

➔ The details displayed on the right is the 2nd system information. "\$2" appears.



(Note 1) By pressing the Next system menu, the system can be changed in the same manner as the \$ → \$ key.

(Note 2) The system No. changes in the following order:



n: Maximum No. within valid system numbers. (Maximum: \$8)

CHAPTER 1 SCREEN OPERATIONS

1. Operating the Setting Display Unit

1.5.7 Changing the menu

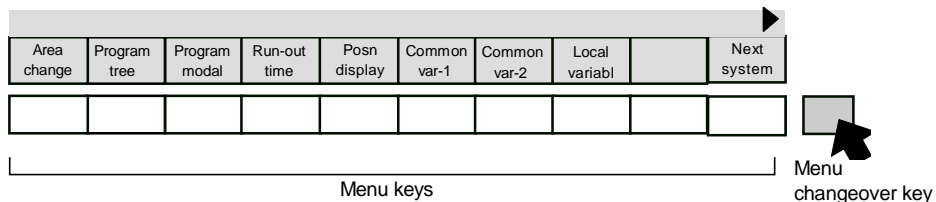
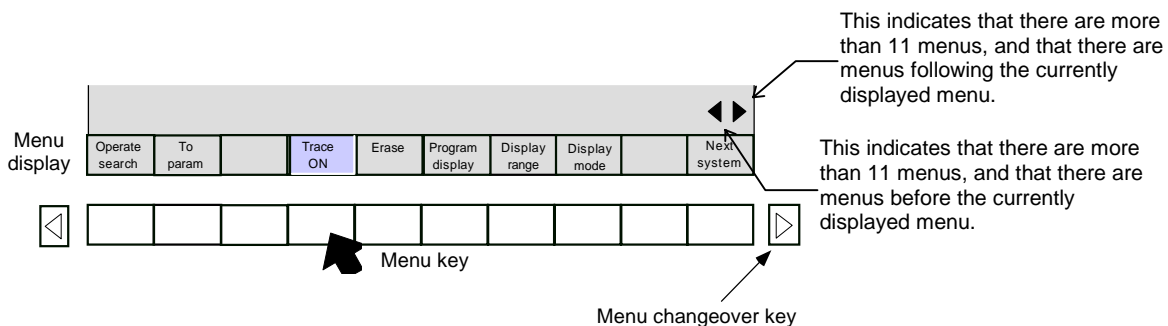
The menu can be used to select screens and to select functions or setting items. Up to ten menus can be displayed at once.

To select the menu, use the menu key below the menu display.

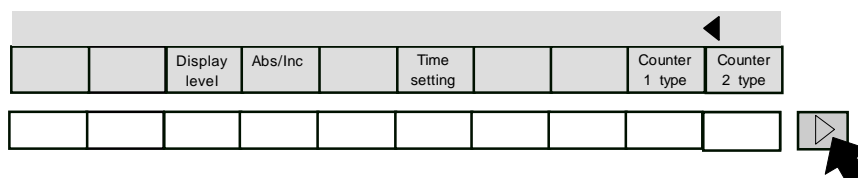
To change the menu, use the menu changeover key.

(Refer to the following figures.)

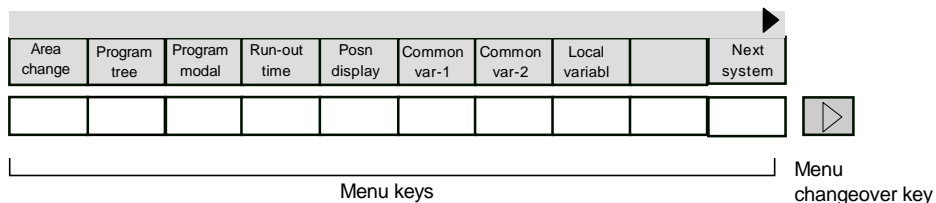
- ◀ key : The operation menu is canceled.
The screen selection menu for the currently displayed screen group appears.
The display for the currently displayed menu is highlighted.
- ▶ key : When there are more than 11 menus, this key displays the remaining menus.
(Menu change) This key can be used when "▶" or "◀" is displayed at the upper right of the menu.



↓ When menu changeover key is pressed on Position display3 screen



↓ When menu changeover key is pressed again



CHAPTER 1 SCREEN OPERATIONS
1. Operating the Setting Display Unit

1.5.8 Menu operations

(1) Menu types

The menus can be categorized as follow according to the operation after the menu key is pressed.

When the menu key is pressed:

- A. The menu is highlighted, and the user input standby state is entered. After input, the operation follows the input details.
- B. The menu is highlighted, and operation starts.
- C. Operation starts without the menu highlighted.

In this manual following "2. Monitor (Operation) Screens", this categorization is described as follows.

(Example) Explanation of menus used in Input/Output screen

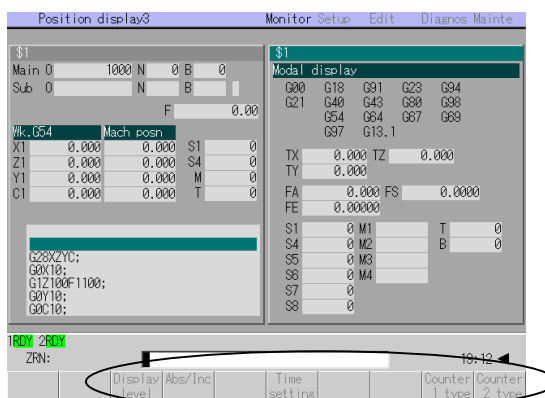
Menu	Details	Type	Reference
Area change	This changes the setting area to file setting column A (transfer origin) or file setting column B (transfer destination). The display of the valid area (A or B) is highlighted.	C	1.5.2 Changing the valid area
List update	This updates the list. The directory list selected in the currently valid file setting column (A or B) is updated.	C	
Trnsfr A→B	This copies the file in file setting column A (transfer origin) to the file setting column B (transfer destination). (The transfer origin file is not changed.) A message appears during transfer and when the transfer is completed.	B	3.5.2 Transferring a file
Stop	This interrupts the process (transfer, compare, etc.) during execution.	C	

Operation when menu is pressed

Menu type Reference section

(2) Menu display

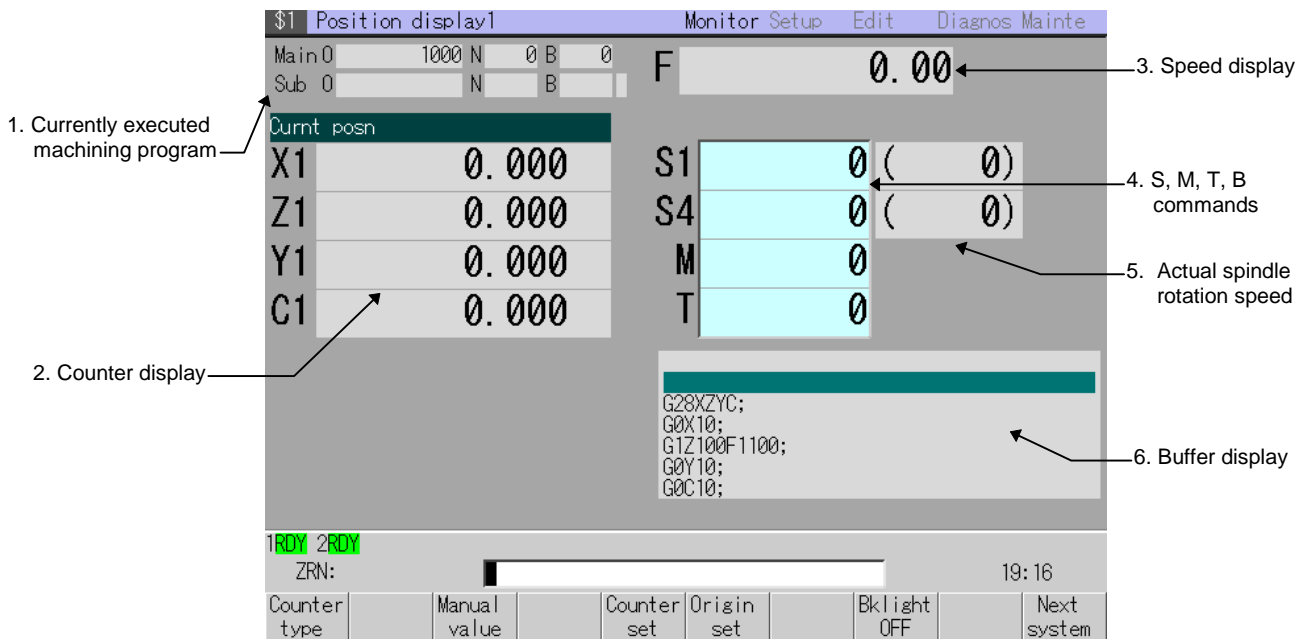
The menu that can currently be used appears in the menu display area. A menu name displayed in gray indicates that the menu cannot be used. Depending on the parameter (Setup parameter "Invalid gray menu*") setting, menus that are not used can be set not to display. The following screen shows that the menu used for the modal display is invalid.



2. Monitor (Operation) Screens

2.1 Position Display 1 screen (Position display1 screen)

The counter value of each axis in automatic operation can be referred to on this screen. Furthermore, on this screen, the counter can be set, and manual values can be commanded.



(1) Display items

Display item	Details
1. Currently executed machining program	
Main 0 10 ...	This displays the program No., sequence No. and block No. currently being executed.
Sub 0 1234 ...	When executing a subprogram, the subprogram's program No., sequence No., block No., and subprogram's nesting level are displayed.
2. Counter display	This displays the counter of the current position and workpiece coordinates positions, etc. The type of counter displayed can be selected with the menu key.
3. Speed display	The speed in the vector direction, currently being moved in, is displayed.
4. S, M, T, B commands	This displays the command value for the S (spindle speed command value), M (miscellaneous function command value), T (tool command value), and B (2nd miscellaneous function command value). Refer to "1.5.1 Setting a manual value command" for how to set the manual value command.
5. Actual spindle rotation speed	The actual rotation speed of the 1st spindle and 2nd spindle is displayed.
6. Buffer display	This displays the contents of the machining program currently being executed. The block being executed is highlighted. Refer to "2.2.3 Correcting the buffer" for details on correcting the buffer.

CHAPTER 1 SCREEN OPERATIONS
2. Monitor (Operation) Screens

(2) Menus

Menu	Details	Type	Reference
Counter type	This displays the submenu for changing the display counter. At this time, the same menu as the currently selected counter is highlighted.	B	2.1.1 Changing the counter display
Manual value	Random values can be input in each data item of S, M, T and B on the screen. When the numeric value is input, the selected S, M, T and B functions are executed.	A	1.5.1 Setting a manual value command
Counter set	This presets the counter. The current position counter value is set to "0".	A	2.1.3 Presetting the counter
Origin set	This sets the origin. The coordinate system is shifted so that the current position becomes the zero point of the workpiece coordinate system.	C	
Next system	This appears when there are two or more valid systems. The system No. will be incremented by one each time this menu is pressed. (Note) If the system No. to be displayed next exceeds the number of valid systems, the information for the 1st system will appear.	C	1.5.6 Changing the display system
Bklight OFF	This turns off the entire screen to prevent deterioration of the LCD screen, etc. The screen reappears when any key is pressed.	C	-

CHAPTER 1 SCREEN OPERATIONS
2. Monitor (Operation) Screens

2.1.1 Changing the counter display

(1) Counter type menus

When the menu key Counter type is pressed, the following submenu appears. The display contents of the counter display can be selected from the following types.

Menu	Details	Type
Currnt posn	This displays the currently executed position and the status symbol when the position is at a specified position or status. #1 to #4: 1st to 4th reference point position] [: Servo OFF state MR : Mirror image > < : Axis removal state	C
Work co posn	This displays the G54 to G59 workpiece coordinate system modal Nos. and the workpiece coordinate position in that workpiece coordinate system.	C
Machine posn	This displays the coordinate value of each axis in the basic machine coordinate system having a characteristic position, specified by the machine, as a zero point.	C
Program posn	This displays the value obtained by subtracting the tool compensation amount compensated for that axis from the position actually being executed for each axis. [Program position] = [Current position] – Tool compensation amount	C
Remain command	This displays the remaining distance of the movement command being executed during automatic start or automatic halt. (The remaining distance is the incremental distance from the current position to the end point of that block.)	C
Manual int amt	This displays the amount moved with the manual mode while the manual absolute switch was OFF. If the Control parameter "Interrupt amt reset" is ON, the interrupt amount is cleared when the reset button is pressed.	C
Er comp amnt	This displays the error compensation amount.	C

(Note 1) If the ◀ key is pressed while the submenu is displayed, the main menu appears.

(2) Operation methods (To display the current position in the counter display.)

1)

Press the menu key Counter type.



The following menu appears.

Currnt posn	Work co posn	Machine posn	Program posn	Remain command	Manual int amt	...
-------------	--------------	--------------	--------------	----------------	----------------	-----

2)

Press the menu key Currnt posn.



The current position counter appears in the counter display area.

CHAPTER 1 SCREEN OPERATIONS
2. Monitor (Operation) Screens

2.1.2 Executing manual value commands

Each value for S, M, T and B can be set and executed using the menu Manual value.

Up to six S commands, four M commands, or one T command or one B command can be set. The manual value command can be set and executed by inputting an address such as S, M or T. Refer to "1.5.1 Setting a manual value command" for the setting method.

2.1.3 Presetting the counter (Counter set, origin set)

Counter set and origin set can be executed on this screen.

The counter set can be executed only when the counter display is the current position.

(1) Differences between counter set and origin set

	Counter set	Origin set
Function	The current position counter is cleared to zero.	The coordinate system is shifted so the current position becomes the zero point of the workpiece coordinate system. This is equivalent to "G92 X0". (When X is the target axis.)
Changes in the counter display	"0" is displayed only for the current position counter.	The current position counter and workpiece coordinate counters become "0".
Offset	–	The G92 shift amount is updated.

The counter set mode can also be entered by inputting the axis name address.

CHAPTER 1 SCREEN OPERATIONS
2. Monitor (Operation) Screens

(2) Basic operation methods

1)

Display the current position counter in the counter display area.

2)

Press the menu key
Counter set.



The cursor appears at the 1st axis of the current position counter.

POSITION	
X1	123.435#1
Y1	62.735#1
Z1	804.017#1

← The cursor appears at the 1st axis.

Instead of pressing Counter set, the axis name address key can be pressed to set the counter.

(Example) Z 1 INPUT

POSITION	
X1	123.435#1
Y1	62.735#1
Z1	804.017#1

← The cursor appears at the designated axis.

3)

Press the INPUT key.



"0.000" appears at the cursor position.

POSITION	
X1	0.000 #1
Y1	62.735#1
Z1	804.017#1

← "0" is displayed. The cursor will move to the next axis.

4)

Repeat step 3) for each axis.

When the counter for the final axis has been set, the Counter set mode is canceled. The mode can also be quit by pressing the other menu key or by pressing the Counter set menu key again.

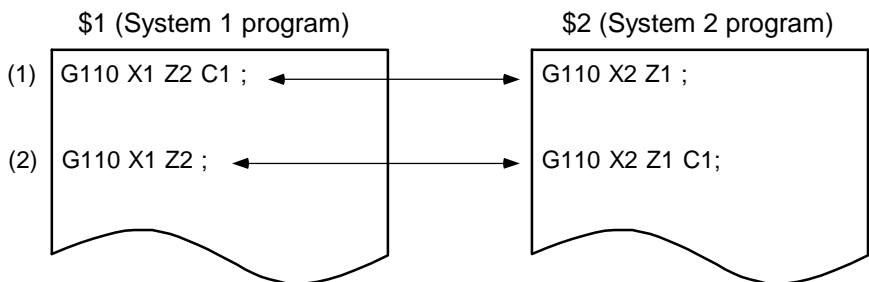
- (Note 1)** To set a value for an axis that is not displayed, press the menu key Next axis to display the target axis, or input the address name of that axis.
- (Note 2)** For axes that are not to be operated, press the ↓ key and move the cursor.
- (Note 3)** When setting the origin, carry out the following operations instead of steps 2) and 3) in the operation above.
 Press the menu key Origin set and INPUT.

2.1.4 Axis display during G110 (cross axis command) execution

With the M600L Series, the G110 (cross axis command) can be used to control a random axis with a system different from the one that set with the parameters. The counter is displayed for the system currently being controlled.

(1) Operation example

Basic definition 1st system X1, Z1, C1
 2nd system X2, Z2



Counter display before program execution

<p>(\$1)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #004a99; color: white;"> <th colspan="2">POSITION</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px 5px;">X1</td> <td style="padding: 2px 5px;">100.000</td> </tr> <tr> <td style="padding: 2px 5px;">Z1</td> <td style="padding: 2px 5px;">50.000</td> </tr> <tr> <td style="padding: 2px 5px;">C1</td> <td style="padding: 2px 5px;">-10.000</td> </tr> </tbody> </table>	POSITION		X1	100.000	Z1	50.000	C1	-10.000	<p>(\$2)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #004a99; color: white;"> <th colspan="2">POSITION</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px 5px;">X2</td> <td style="padding: 2px 5px;">200.000</td> </tr> <tr> <td style="padding: 2px 5px;">Z2</td> <td style="padding: 2px 5px;">150.000</td> </tr> </tbody> </table>	POSITION		X2	200.000	Z2	150.000
POSITION															
X1	100.000														
Z1	50.000														
C1	-10.000														
POSITION															
X2	200.000														
Z2	150.000														

CHAPTER 1 SCREEN OPERATIONS
2. Monitor (Operation) Screens

1) Counter display after Z1 axis and Z2 axis systems are interchanged

(\$1)		(\$2)	
POSITION		POSITION	
X1	100.000	X2	200.000
Z1	50.000	Z2	150.000
C1	-10.000		

2) Counter display after C1 axis system is changed

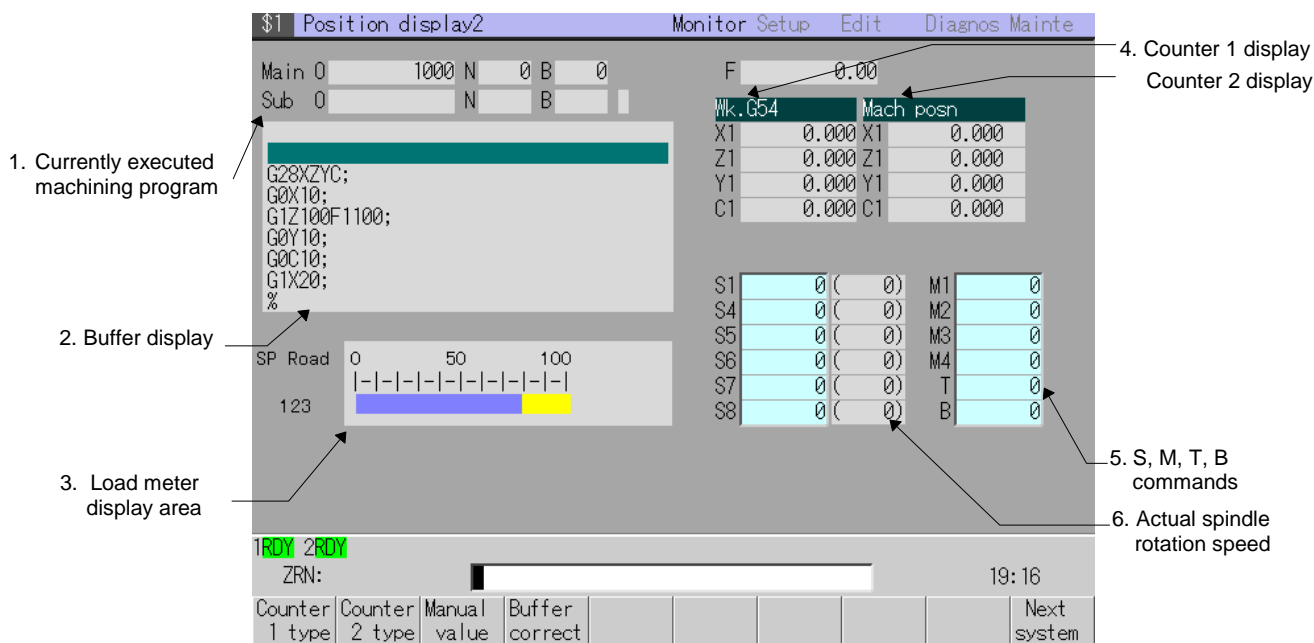
(\$1)		(\$2)	
POSITION		POSITION	
X1	100.000	X2	200.000
Z2	150.000	Z1	50.000
		C1	-10.000

- (Note 1)** If an axis not controlled by any system (free axis) is found during the random axis change command, that axis will be counted and displayed with the system set in the parameters.
- (Note 2)** The free axis is shown with black characters and a yellow background.
- (Note 3)** If the current position simultaneous display is validated, the axis designated with the parameters will appear. The axis displayed with the counter following the cross axis command or random axis exchange command will not change.

CHAPTER 1 SCREEN OPERATIONS
2. Monitor (Operation) Screens

2.2 Position Display 2 screen (Position display2 screen)

Various information regarding automatic operation is displayed on this screen.
 Buffer corrections and manual value commands (SMTB) are made on this screen.



(1) Display items

Display item	Details
1. Currently executed machining program	
Main O 10...	This displays the program No., sequence No. and block No. currently being executed.
Sub O 1234...	When executing a subprogram, the subprogram's program No., sequence No., block No., and subprogram's nesting level are displayed.
2. Buffer display	This displays the contents of the machining program currently being executed. The block being executed is highlighted. While correcting the buffer, the work area for corrections appears. Refer to "2.2.3 Correcting the buffer" for details on correcting the buffer.
3. Load meter display area	Using the user PLC, the spindle load and Z axis load, etc., is displayed as bar graphs. (If not created with the user PLC, this does not appear on the screen.) This function differs depending on the machine manufacturer.
4. Counter 1 display Counter 2 display	This displays the counter of the current position and workpiece coordinates positions, etc. The type of counter displayed can be selected with the menu key.
5. S, M, T, B commands	This displays the S (spindle speed command value), M (miscellaneous function command value), T (tool command value) and B (2nd miscellaneous function command value). Refer to "1.5.1 Setting a manual value command" for details on the manual value command setting method.
6. Actual spindle rotation speed	The actual rotation speed of the 1st spindle and 2nd spindle is displayed.

CHAPTER 1 SCREEN OPERATIONS
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(2) Menus

Menu	Details	Type	Reference
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 5px;">Counter 1 type</div> <div style="border: 1px solid black; padding: 2px; width: fit-content;">Counter 2 type</div>	This displays the submenu for changing the display counter. At this time, the same menu as the currently selected counter is highlighted.	C	2.1.1 Changing the counter display
<div style="border: 1px solid black; padding: 2px; width: fit-content;">Manual value</div>			
<div style="border: 1px solid black; padding: 2px; width: fit-content;">Buffer correct</div>	Random values can be input in each data item of S, M, T and B on the screen. When the numeric value is input, the selected S, M, T and B functions are executed.	A	1.5.1 Setting a manual value command
<div style="border: 1px solid black; padding: 2px; width: fit-content;">Next system</div>	This enters the buffer correction mode.	B	2.2.3 Correcting the buffer
<div style="border: 1px solid black; padding: 2px; width: fit-content;">Next system</div>	This appears when there are two or more valid systems. The system No. will be incremented by one each time this menu is pressed. (Note) If the system No. to be displayed next exceeds the number of valid systems, the information for the 1st system will appear.	C	1.5.6 Changing the display system

2.2.1 Setting manual value commands

Each value for S, M, T and B can be set and executed using the menu Manual value.

Up to six S commands, four M commands, or one T command or B command can be set. **(Note 1)** The manual value command can also be set and executed by inputting an address such as S, M or T, etc.

Refer to "1.5.1 Setting a manual value command" for the setting method.

(Note 1) The number of S commands and M commands displayed and the axis name follow the Machine parameter settings.

2.2.2 Changing the counter display

By pressing menu Counter 1 type, the counter 1 display contents can be selected from the following types. For counter 2, the contents can be selected by pressing Counter 2 type.

- Currnt posn
- Work co posn
- Machine posn
- Program posn
- Remain command
- Manual int amt
- Er comp amnt

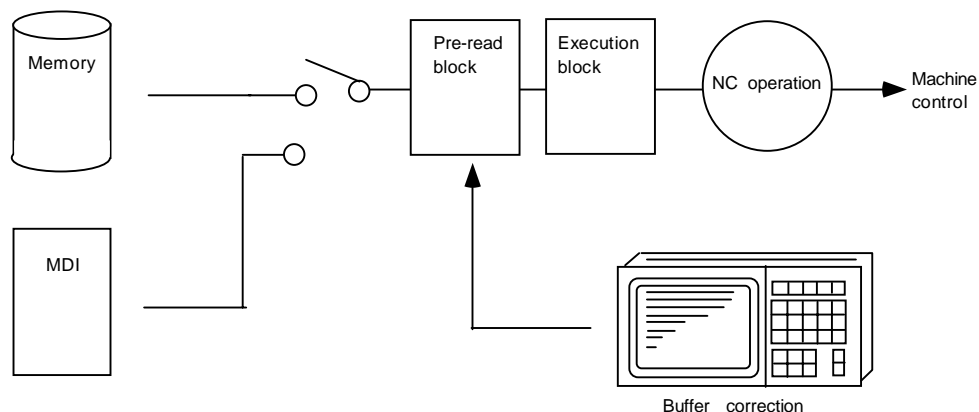
Refer to "2.1.1 Changing the counter display" for each counter type and display changeover method.

2.2.3 Correcting the buffer

(1) Outline

During automatic operation or MDI operation, a block stop can be applied, and the next command can be corrected or changed.

When a program error occurs, the block in which the error occurred can be corrected without resetting the NC, and operation can be continued.



(2) Details

- 1) The next command can be corrected in the following two cases.
 - When single block stop is applied, and there is a machining program containing a next command to be corrected.
 - During automatic operation, there is an error (program error) in the next command's machining program, and the program is stopped.
- 2) During memory or MDI operation, not only the displayed buffer data but also the memory and MDI contents are corrected with the buffer corrections. (The corrected data is reflected.)
- 3) Several blocks following the next command can be corrected simultaneously. (Note that this is limited to the range displayed on the screen.)

CHAPTER 1 SCREEN OPERATIONS
2. Monitor (Operation) Screens

(3) Operation method

During a single block stop or when a program error stop occurs, the buffer can be corrected with the following operations, and operation can be continued.

1)

Press the menu
.

➔ The buffer correction mode is entered.

The normally executed program appears in the buffer correction area.

```
N121 G28 X10.Y10.;
N122 T1212;
N123 S1230 M3;
N124 G00 X68. Z201.;
N125 G01 X80. Z195. F50;
N126 Z150.;
N127 G02 X100. Z185. R20;
```

← Previous command
 ← Command in execution
 ← Next command and subsequent commands

During buffer correction, the display changes so that the next command is at the head of the area. The buffer correction area becomes the valid area, and the keys can be input or the cursor moved.

The cursor can be moved freely within the buffer correction area using the cursor keys.

```
N121 G28 X10.Y10.;
N122 T1212;
N123 S1230 M3;
N124 G00 X68. Z201.;
N125 G01 X80. Z195. F50;
N126 Z150.;
N127 G02 X100. Z185. R20;
```

← Next command and subsequent commands

2)

Correct the program with the same method as editing a normal program.

3)

Press the key.

➔ The buffer correction mode ends, and the corrected data is written into program.
 If a program error has occurred, the error display disappears.

4)

Confirm that the corrected data is correct, and then restart.


➔ The program execution resumes from the currently stopped position.

CHAPTER 1 SCREEN OPERATIONS

2. Monitor (Operation) Screens

(4) Notes

■ Starting and ending buffer corrections

- 1) If automatic operation is started or there is no next command data, the buffer correction mode is not entered even if the menu key is pressed.
- 2) If an "Pre-read block error" occurs and the buffer correction mode is entered, the block in which the error occurred displays at the head of the area.
- 3) To stop or to cancel the buffer corrections, press the **Buffer correct** key again, or press the  key.
- 4) If another menu key, etc., is pressed before pressing the **INPUT** key, the corrected buffer contents return to the original data.
- 5) If another screen is changed to or if the NC is reset during buffer correction, the buffer correction is canceled. In this case, the corrected contents are not saved, and the buffer correction mode ends.

■ Display data during buffer correction

- 1) The key operations used for corrections in the buffer correction mode are the same as the operations when editing a program. However, blocks not displayed in the buffer correction area cannot be displayed or edited.
- 2) The number of characters that can be input at once is the total of the number of characters incremented (or decremented) through the buffer correction and the number of characters in the other blocks displayed in the correction area. The number is a max. 234 characters (39 characters × six lines). Therefore, if adding data, when there is no open area left in the correction area, further characters cannot be input.

By pressing the **INPUT** key again at this time, the program is redisplayed for each block. Enter the buffer correction mode again, and then add the data.

■ Operations during buffer correction

- 1) If there is no ";" (EOB) at the data in the last block corrected when the **INPUT** key is pressed, it is added automatically.
- 2) When the buffer correction mode is entered, the last block displayed in the buffer correction area may not fit in if the block is long, etc.
To correct this type of block, take care to the following points.
 - (a) If a ";" (EOB) is added to the end of the displayed data, the section following the incomplete display becomes another block. If ";" (EOB) is not added, the following section stays the same, and is handled as the continuation of the displayed section.
 - (b) If one block is deleted by pressing the **C-B ESC** key, the block is deleted up to the section following the incomplete display (up to the ";").
- 3) Operation cannot be started during buffer correction. An alarm occurs.

2.2.4 Changing the display axis

If many axes are being used and all axes cannot be displayed on the counter at once, the menu key **Next axis** can be pressed to change the displayed axes and display the remaining axes.

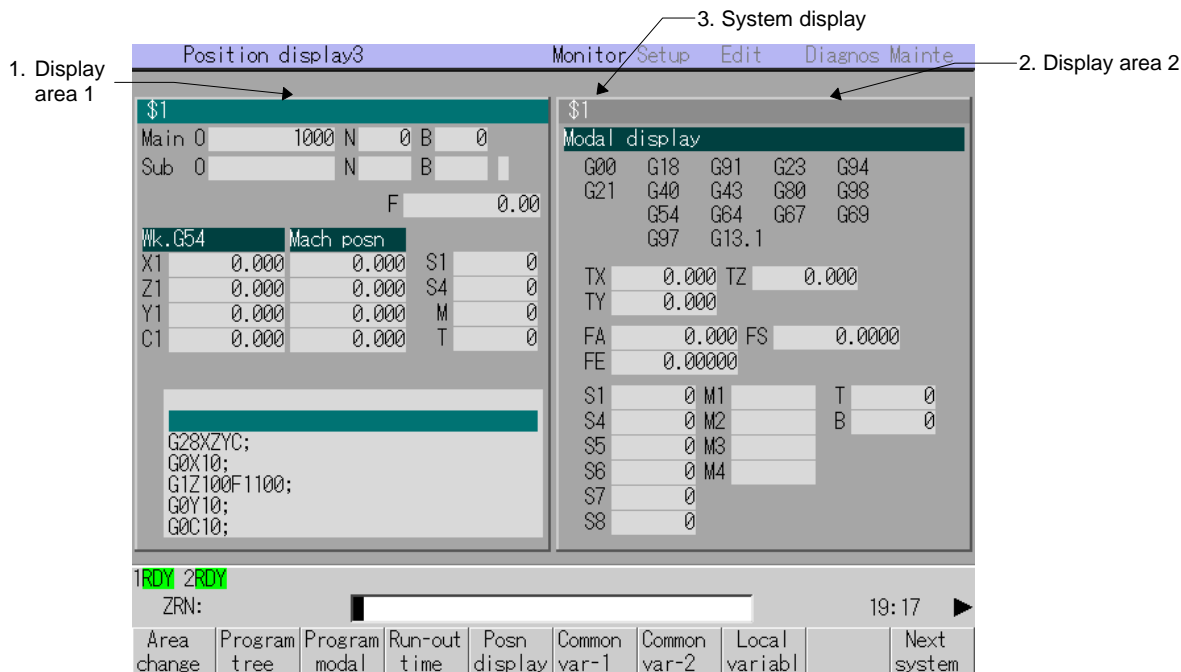
Refer to "1.5.4 Changing the display axis" for details.

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2.3 Position Display 3 screen (Position display3 screen)

Various information regarding automatic operation is displayed on this screen, and the program can be checked.

This screen has two display area, and the displayed details and system can be randomly selected and displayed from the menu. The selected screen is held even when the screen is changed.



(1) Display items

Display item	Details
1. Display area 1	The display can be randomly selected from the Program tree , Program modal , Run-out time , Posn display , Common var-1 , Common var-2 or Local variabl menus. The system can be selected for each area. When changing the display details or system, select display area 1 or 2, and validate the area before starting. In the above screen, the display area 1: 1st system position display, display area 2: 1st system modal display are selected, and the display area 2 is valid.
2. Display area 2	
3. System display	This displays the currently selected system.

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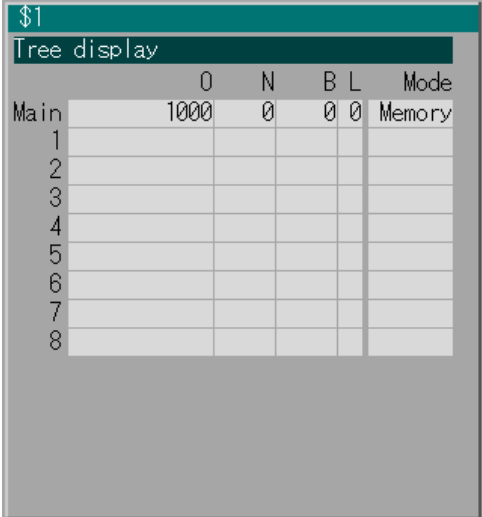
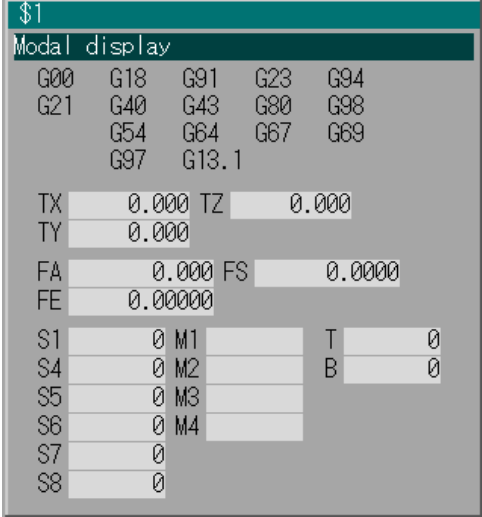
(2) Menus

Menu	Details	Type	Reference
Area change	This changes between display area 1 and display area 2.	C	1.5.2 Changing the valid area
Program tree	The display area 1 and 2 display details are selected from these menus.	C	(3) Display area 1 and 2 details
Program modal			
Run-out time			
Posn display			
Common var-1			
Common var-2			
Local variabl			
Counter 1 type			
Counter 2 type	The display details and selection method are the same as the Position display1 screen and Position display2 screen.		
Next system	This appears when there are two or more valid systems. The system No. will be incremented by one each time this menu is pressed. (Note) If the system No. to be displayed next exceeds the number of valid systems, the information for the 1st system will appear.	C	1.5.6 Changing the display system
Variabl No.	A random variable No. can be selected when Common var-1 , Common var-2 or Local variabl is selected. When the variable No. is set and the INPUT key is pressed, the variables appear with that variable No. at the head. The cursor moves to the details of that variable No.	A	2.6.2 Setting common variables 2.7.1 Displaying local variables
Display level	The display level can be selected when Local variabl is selected. When the level (0 to 4) to be displayed is set and the INPUT key is pressed, the local variables appear from the head of that level. The cursor appears at the head variable No.	A	2.7.1 Displaying local variables
Abs/Inc	The absolute value/incremental value setting mode can be changed when Common var-1 or Common var-2 is selected. The "Abs/Inc" on the screen changes from incremental to absolute, or from absolute to incremental.	C	1.5.3 Changing the absolute value/incremental value setting
Time setting	The cumulative time can be set when Run-out time is selected.	A	2.3.2 Setting the cumulative time

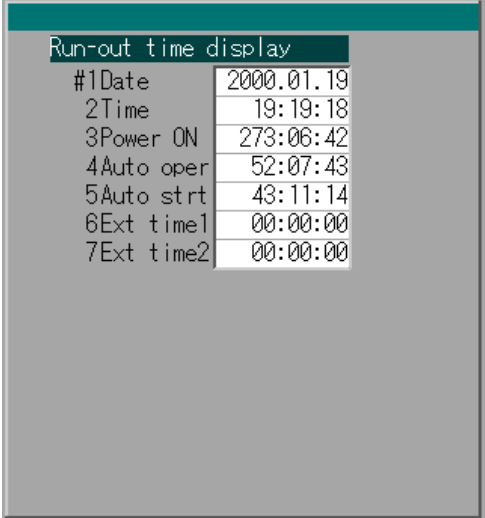
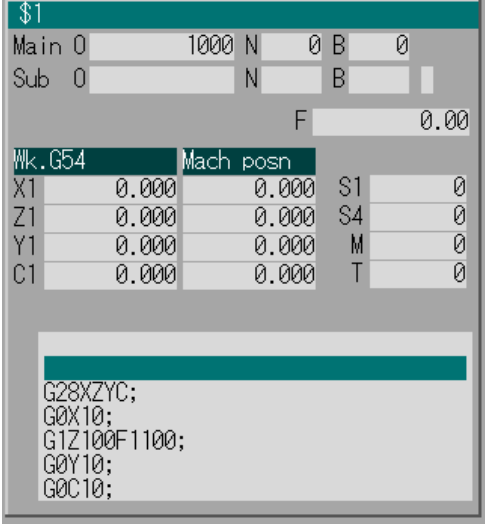
(Note) The **Common var-2** menu cannot be selected when type C (450 sets) or type D (900 sets) is selected for the number of common variable sets.

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(3) Display area 1 and 2 details

Menu	Display details	Details														
<div style="border: 1px solid black; padding: 2px; width: fit-content;">Program tree</div>		<p>This displays the main program, subprogram, MDI interrupt and user macro call nesting structure.</p> <p>O : Program No. N : Sequence No. B : Block No. L : Remaining number of subprogram repetitions Mode : Operation mode 1 to 8 : Called subprogram, user macro call and MDI interrupt</p>														
<div style="border: 1px solid black; padding: 2px; width: fit-content;">Program modal</div>	 <p>(Note) Fixed cycle programs When a Fixed cycle command is executed, the G command in the Fixed cycle subprogram does not influence the G modal in the original program that was called.</p>	<p>This displays each modal state.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">G01...G98</td> <td>Status of currently executed G command modal</td> </tr> <tr> <td>G97...G13.1</td> <td></td> </tr> <tr> <td>TX: TZ: T□:</td> <td>The X axis, Z axis tool length and wear offset amount for the tool being used are displayed. T□ indicates the tool length or wear offset amount for the axis selected from the additional axes.</td> </tr> <tr> <td>FA:</td> <td>The program command asynchronous feed speed modal value currently being executed is displayed. (mm/min)</td> </tr> <tr> <td>FS:</td> <td>The program command synchronous feed speed modal value currently being executed is displayed. (mm/rev)</td> </tr> <tr> <td>FE:</td> <td>The thread lead command synchronous feed speed modal value currently being executed is displayed. (mm/rev)</td> </tr> <tr> <td>S1 to S6 M1 to M4 T B</td> <td>Program command modal value of each currently executed command S command M command T command 2nd miscellaneous function (B) command</td> </tr> </table>	G01...G98	Status of currently executed G command modal	G97...G13.1		TX: TZ: T□:	The X axis, Z axis tool length and wear offset amount for the tool being used are displayed. T□ indicates the tool length or wear offset amount for the axis selected from the additional axes.	FA:	The program command asynchronous feed speed modal value currently being executed is displayed. (mm/min)	FS:	The program command synchronous feed speed modal value currently being executed is displayed. (mm/rev)	FE:	The thread lead command synchronous feed speed modal value currently being executed is displayed. (mm/rev)	S1 to S6 M1 to M4 T B	Program command modal value of each currently executed command S command M command T command 2nd miscellaneous function (B) command
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S1 to S6 M1 to M4 T B	Program command modal value of each currently executed command S command M command T command 2nd miscellaneous function (B) command															

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Menu	Display details	Details
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 5px;">Run-out time</div>		<p>This displays the total cumulative time in each NC operation state. Refer to "2.3.2 Setting the cumulative time" for details on setting each data.</p> <p>Date : Current date Time : Current time Power ON : Total time from NC power ON to OFF</p> <p>Auto oper: Total cumulative time of each machining time in memory mode from when automatic start button is pressed to M02/M30 or to when reset button is pressed.</p> <p>Auto strt: Total cumulative time of automatic start in memory mode from when automatic start button is pressed to feed hold stop, block stop or to when reset button is pressed.</p> <p>Ext time: This differs depending on the user PLC. Refer to the instruction manual issued by the machine manufacturer.</p>
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 5px;">Posn display</div>		<p>Upper line: This displays the currently executed program No., sequence No. and block No.</p> <p>Middle line: The counter is displayed. The details displayed in the counter 1 and 2 can be selected from the menu Counter 1 type and Counter 2 type submenus. Refer to "2.1.1 Changing the counter display" for details.</p> <p>Lower line: This displays the program currently being executed in the buffer. Note that the buffer must be corrected on the Position display2 screen.</p>

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2. Monitor (Operation) Screens

Menu	Display details	Details																																																																																
Common var-1	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Common variable 1</th> <th colspan="4"></th> </tr> <tr> <th style="text-align: left;">Var</th> <th style="text-align: left;">Details</th> <th style="text-align: left;">Comment</th> <th style="text-align: left;">Abs</th> <th style="text-align: left;">Inc</th> </tr> </thead> <tbody> <tr><td>500</td><td>19.0000</td><td>ABC</td><td></td><td></td></tr> <tr><td>501</td><td>-11.0000</td><td></td><td></td><td></td></tr> <tr><td>502</td><td>2.1213E+07</td><td></td><td></td><td></td></tr> <tr><td>503</td><td>1.2000E-06</td><td></td><td></td><td></td></tr> <tr><td>504</td><td></td><td></td><td></td><td></td></tr> <tr><td>505</td><td></td><td></td><td></td><td></td></tr> <tr><td>506</td><td></td><td></td><td></td><td></td></tr> <tr><td>507</td><td></td><td></td><td></td><td></td></tr> <tr><td>508</td><td></td><td></td><td></td><td></td></tr> <tr><td>509</td><td></td><td></td><td></td><td></td></tr> <tr><td>510</td><td></td><td></td><td></td><td></td></tr> <tr><td>511</td><td></td><td></td><td></td><td></td></tr> <tr><td>512</td><td></td><td></td><td></td><td></td></tr> <tr><td>513</td><td></td><td></td><td></td><td></td></tr> </tbody> </table>	Common variable 1					Var	Details	Comment	Abs	Inc	500	19.0000	ABC			501	-11.0000				502	2.1213E+07				503	1.2000E-06				504					505					506					507					508					509					510					511					512					513					<p>This displays or sets the details of the common variables 1 (variables common to systems). When there is a common variable command in the machining program, the set variable (comment) appears when that block is executed.</p> <p>Refer to "2.6.2 Setting common variables" for details on setting.</p>
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2.3.1 Changing the counter display

The details displayed in the counter 1 and counter 2 displays can be randomly selected from the following types.

- Currnt posn
- Program posn
- Er comp amnt
- Work co posn
- Remain command
- Machine posn
- Manual int amt

Refer to "2.1 Position Display 1 screen" for details on each item and the setting methods.

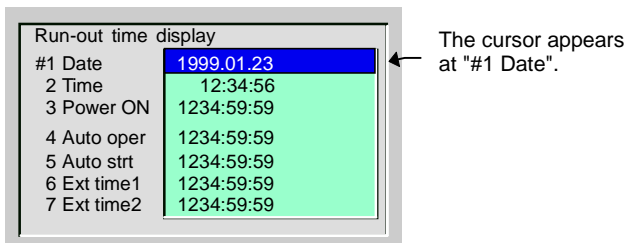
2.3.2 Setting the cumulative time

Each data for the cumulative time display is set.

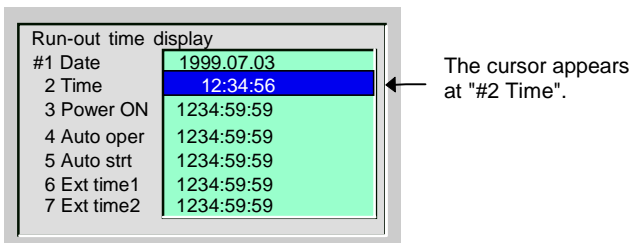
(1) Operation method

1) Select display area 1, and press the menu key Run-out time. → The cumulative time appears in display area 1.

2) Press the menu key Time setting. → The time setting mode is entered. The cursor appears at the "#1 Date" position in the Run-out time display.



3) Set the current date (ex.; "1999.07.03"), and press the INPUT key. → "1999.07.03" appears at "#1 Date", and the cursor moves to "#2 Time".



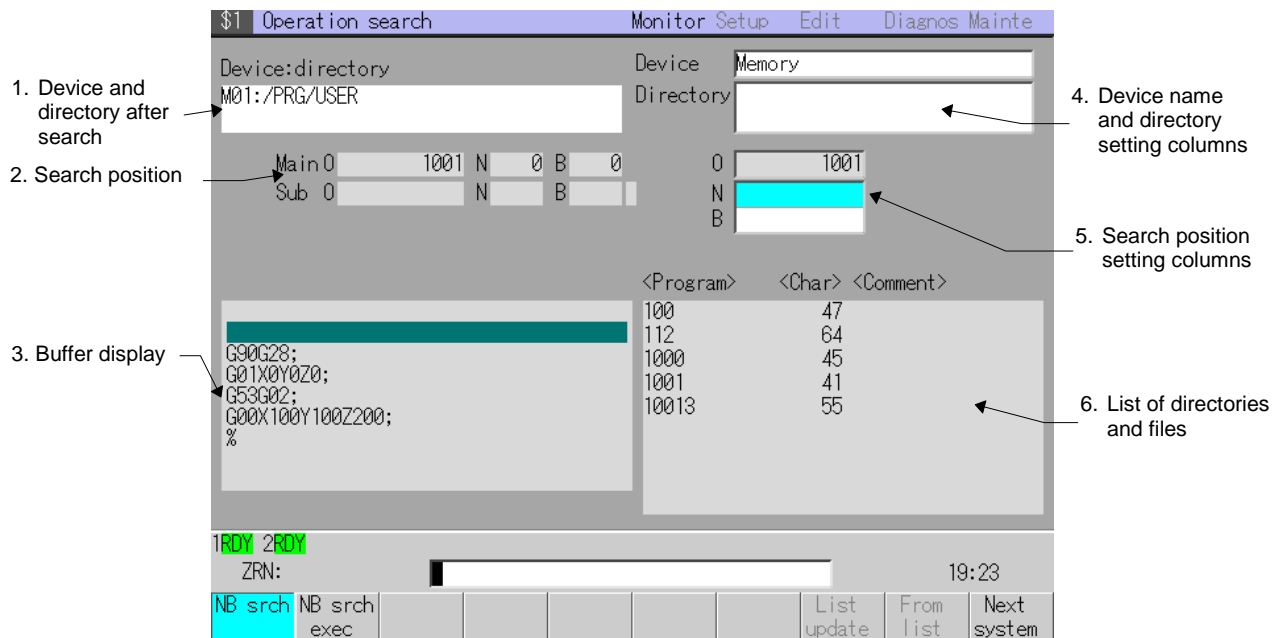
4) Set the data for each item, and press the INPUT key. → When the "#7 Ext time2" setting is finished, the cursor disappears, and the time setting ends. (The menu highlight returns to normal.)

(Note) If the Time setting menu is pressed again or the ◀ key is pressed during the time setting mode, the time setting is canceled.

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2.4 Operation Search screen

In this screen, the program (program No.) to be automatically run, the program start position (sequence No., block No.) can be designated, and the program can be called out from the storage place such as the memory.



(1) Display items

Display item	Details
1. Device and directory after search	This displays the device and directory where the searched machining program is located.
2. Search position	This displays the searched program position (program No., sequence No., block No.).
3. Buffer display	This displays the contents of the currently executed or searched machining program. The block being executed is highlighted.
4. Device name and directory setting columns	This displays the device name and directory designated when the program was selected.
5. Search position setting columns	This sets the program No. (O), sequence No. (N) and block No. (B) of the program to be searched.
6. List of directories and files	This displays a list of the contents contained in the device or directory displayed at item 4. To update the list contents, press the menu key. To scroll the list, use the and keys.

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(2) Menus

Menu	Details	Type	Reference
NB srch	The mode changes to the sequence No. (N) and block No. (B) input mode.	A	2.4.1 Executing an operation search
NB srch exec	The operation search is executed based on the input sequence No. (N) and block No. (B). When the search is completed, these Nos. are cleared.	C	
List update	This updates the list contents. (The latest contents of the currently selected device and directory are listed.)	C	
From list	Press this key to select the directory, file name or program No. from the list. The selection cursor appears in the list, and a random item can be selected.	C	
Next system	This appears when there are two or more valid systems. The system No. will be incremented by one each time this menu is pressed. (Note) If the system No. to be displayed next exceeds the number of valid systems, the information for the 1st system will appear.	C	1.5.6 Changing the display system

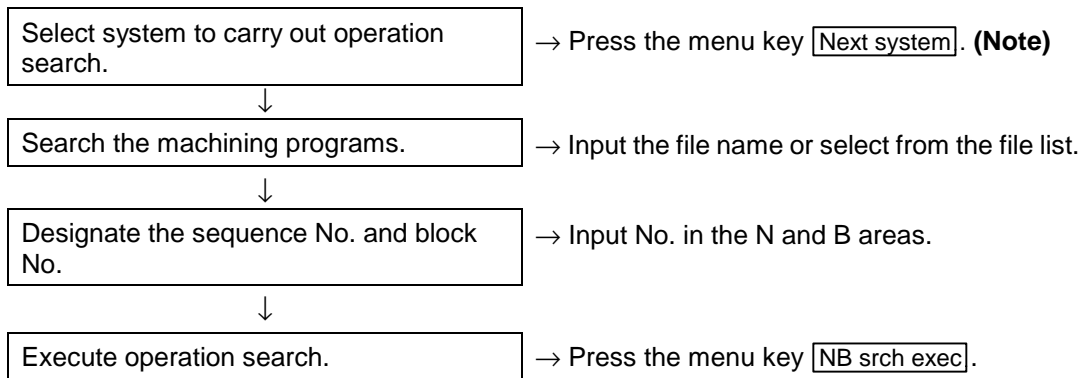
2.4.1 Executing an operation search

The following two methods can be used to search the machining program.

- System common search : The program No. is searched for by the entire system.
- System independent search : The program No. is searched for by each system.

Which search method to use can be selected with the Machine parameters. Refer to the M600L Series Parameter Manual (BNP-B2233) for details on the parameters.

(1) Operation search operation sequence



(Note) The system must be selected in the following cases:

- When the machining programs are searched with the system independent search.
- When the machining programs are searched with designated sequence No. or block No.

(2) Operation method

1)

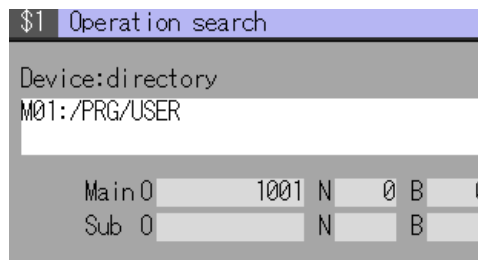
Select the system to run.
Menu **Next system**



The currently selected system will appear at the upper left of the screen.

For system independent search:
Select the system in which to execute the search.

For system common search:
Select the system for designating the sequence No. and block No.



2)

Input the program No.
(Example)
1001 **INPUT**



The designated program is searched for. When the search is completed, a message indicating the completion of the search will appear. The program No. will appear at the search position on the left side of the screen.

The following two methods can be used to designate the file name (program No.):

- Set the file name, and press the **INPUT** key.
- Press the menu key **From list**, move the cursor to the target file name, and press the **INPUT** key.

With either method, the search will start when the **INPUT** key is pressed.

(Note) If the contents of the list differ from the actual contents, press the **From list** menu.

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3)

Change to the sequence No. (N) and block No. (B) input mode.

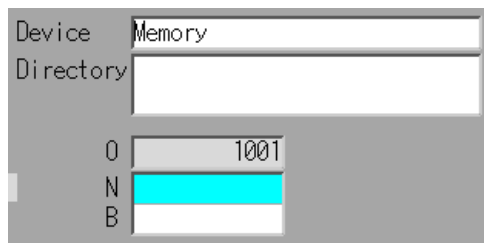
Menu



The menu key will be highlighted.

The searched program No. will appear in the search position setting area O, and the cursor will move to the N area.

When the search is completed, a message indicating the completion of the search will appear.



4)

Designate the sequence No. and block No. in the respective search position setting areas (N, B).



The set numbers will appear in the setting areas.

5)

Press the menu key

.



The search will start.



When the search is completed, a message indicating the completion of the search will appear.

When the search is completed, the designated No. will appear at the search position on the left of the screen, and the contents of the setting areas will be cleared.

The menu key highlight will turn OFF, and the cursor will move to the search position setting area O.

(3) Notes when executing operation search

■ Program No. settings

- 1) Always set the O, N or B No. If none of the numbers are set, a setting error occurs.
- 2) If one or two of O, N and B Nos. are set, the other numbers not set are ignored during the search.
- 3) Use the  and  keys to scroll through the list.

■ Program after searching

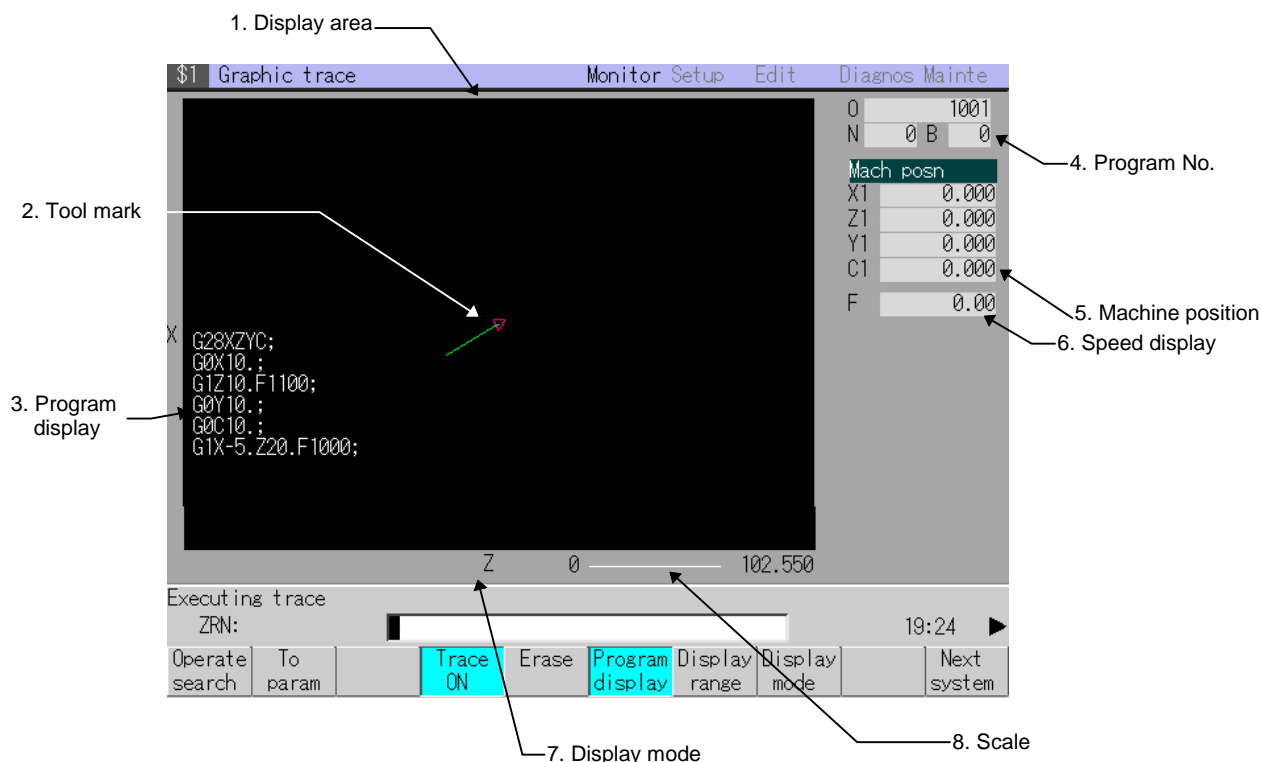
- 1) If the following operations are carried out on the edit screen after operation search, the state changes to that in which nothing is searched, and operation is not possible. Research in this case.
 - When the searched program is erased
- 2) Even when the block is stopped, operation search cannot be carried out with another mode during MDI multiple block operation. Start the search after MDI operation is completed, or after the NC is reset.

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2.5 Graphics screen (Graphic trace screen)

The machine tool operation can be monitored and the machining program path displayed on the Graphics screen. This is handy for inspecting the program.

Trace function : This function displays the actual machine movement path, and draws the actual machine movement.
 The machine operation during machining can be monitored.



(1) Display items

Display item	Details
1. Display area	This is the area for drawing the tool path during the trace.
2. Tool mark	This indicates the tool position during the trace. If this mark is not within the display area, it is assumed that the tool position is outside the screen's display range. Thus, the display range must be changed.
3. Program display	This displays the machining program being drawn. The block being executed is displayed in blue.
4. Program No.	This displays the program No., sequence No. and block No. currently being executed. During execution of a subprogram, each subprogram No. is displayed.
5. Machine position	The machine position is displayed.
6. Speed display	The feedrate (FC) is displayed.
7. Display mode	This displays the plane to be displayed. The plane can be selected with the menu <code>Display mode</code> .
8. Scale	This displays the scale of the display range. The scale value can be set with <code>Display range</code> .

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2.5.1 Tracing and displaying the machine position

Press the menu key Trace ON when selecting the trace mode.

During the trace mode, the path of the machine by actual automatic operation or manual operation is constantly drawn.

(1) Menus used in trace display

Menu	Details	Type	Reference
Operate search	This changes the screen to Operation search screen.	C	2.4 Operation Search screen
To param	This changes the screen to the Parameter screen. The parameters used on the Graphic trace screen can be set on the Setup param screen.	C	3.7 User parameter details
Trace ON	This enters the trace mode. If there is a program currently running, the path of the machine position is traced and displayed from the current position.	B	-
Erase	This erases the figure displayed with graphics.	C	-
Program display	This displays the machining program being drawn on the screen.	C	-
Display range	This changes the display scale and the display position. The changes are selected from the menu. The graphics displayed on the screen are erased.	A	2.5.2 Changing the display range
Display mode	The plane and system to be displayed are changed. The axes corresponding to X, Y and Z are set with the plane parameters (Setup parameters). <ul style="list-style-type: none"> • Parameter (8001 to 8003) I ... Axis for each system corresponding to X J ... Axis for each system corresponding to Y K ... Axis for each system corresponding to Z The graphics displayed on the screen are erased.	C	2.5.3 Changing the display mode
Next system	This appears when there are two or more valid systems. The system No. will be incremented by one each time this menu is pressed. (Note) If the system No. to be displayed next exceeds the number of valid systems, the information for the 1st system will appear.	C	1.5.6 Changing the display system

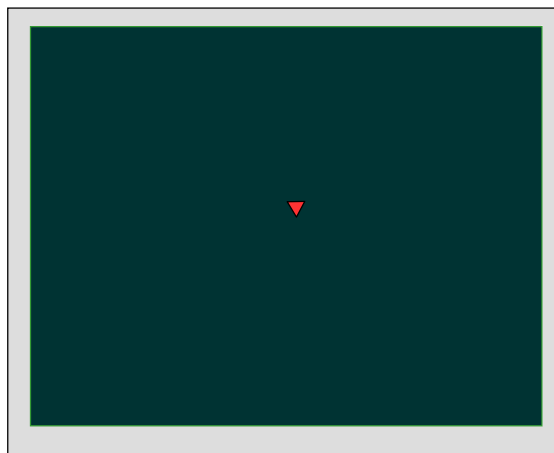
(2) Entering the trace mode

1)

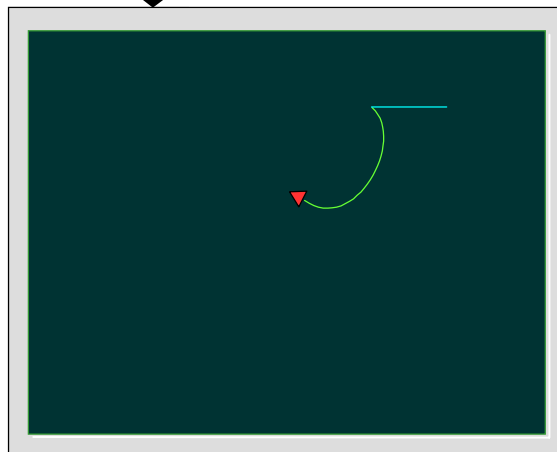
Press the menu key
Trace ON.



The trace mode is entered, and the tool mark appears at the machine position. (The **Trace ON** menu is highlighted.)
The message "Executing trace" appears.



The path that the machine moves is drawn.



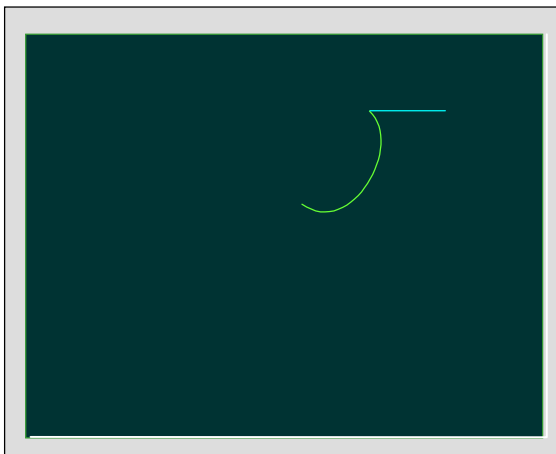
(3) Canceling the trace mode

1)

Press the menu key
Trace ON during the trace
mode.



The trace mode is canceled, and the message and tool mark disappear. The **Trace ON** menu highlight returns to normal.



(4) Notes for tracing

- 1) When drawing in the trace mode, the graphic shape easily deforms as the commanded speed increases. Note that correct shapes are not drawn when using the machine lock high-speed function.

2.5.2 Changing the display range

The scale used for drawing the graphics in trace display and the display position can be changed.

(Note) If the display range is changed, the graphics displayed up to that point are erased.

(1) Menus used for changing the display range

Menu	Details	Type	Reference
Std range	This returns the scale to the standard scale.	C	-
Scale	This sets scale to be changed with a random value.	A	(4) Randomly changing the display scale 2
Centering	This moves the display position so that the current position is in the center.	C	-

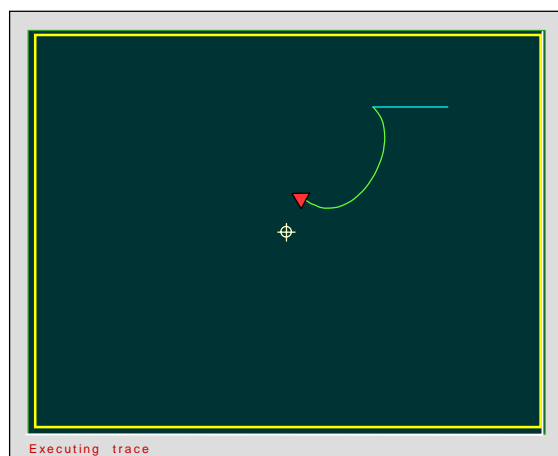
(2) Changing the display position

1)

Press the menu key
Display range.







A white frame indicating the display range appears on the screen, and the menu for changing the display range appears.




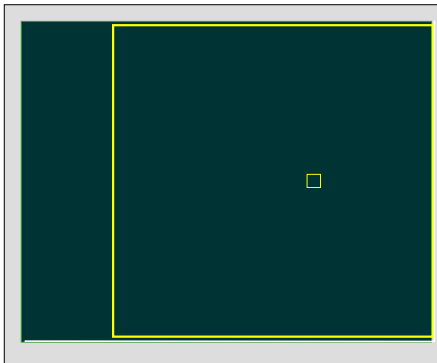
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2)


Change the figure's display position.
Press the , ,  and  keys to adjust the position to the display center.




The displayed graphics are erased, and the cursor () indicating the center of the display moves according to the key operation.

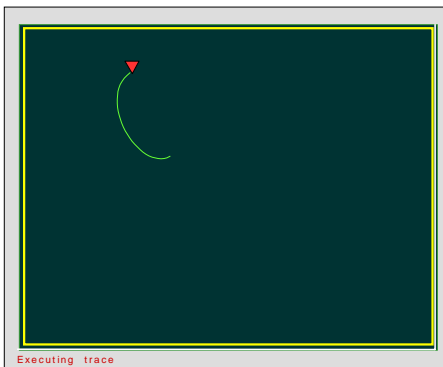


3)

Press the  key.



The cursor position () becomes the coordinate system that is the center of the screen. The drawing resumes from the current position.



(Note 1) The amount that the center moves when the cursor shifts one space depends on the current display scale value.

(Note 2) When displaying a solid, cursor position is not the center position of the display. This is because there is a deviation between the cursor movement amount (two-dimensional) and the actual solid movement amount (three-dimensional).

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(3) Randomly changing the display scale 1 (Using the + and - keys)

1)

Press the menu key
Display range.



A white frame indicating the display range appears on the screen, and the menu for changing the display range appears.

2)

Change the size of the figure.
Press the + or - key to adjust the scale.



The size of the white frame changes according to the key operation.

To reduce the figure:

Press the + key.

The scale value increases.

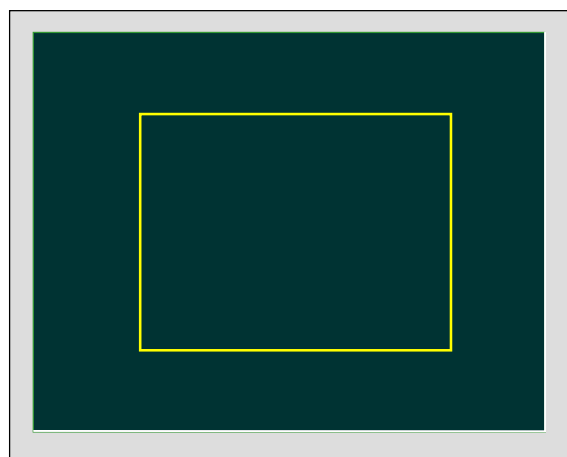
The frame is displayed with a dotted line.

To enlarge the figure:

Press the - key.

The scale value decreases.

The frame is displayed with a solid line.

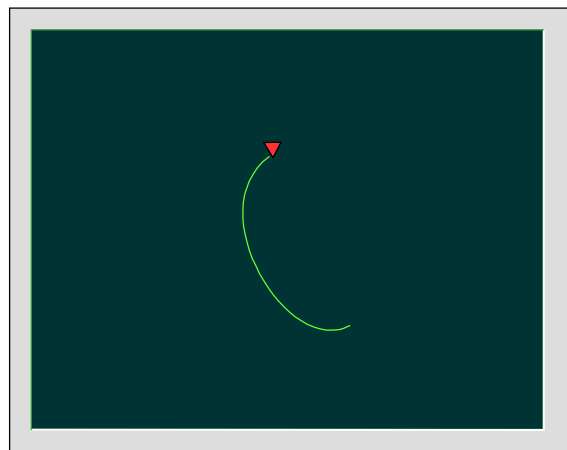


3)

Press the INPUT key.



The current graphics display is erased, and a screen with the new scale value appears. Drawing resumes from the current position.



(Note 1) The scale value increments or decrements by approx. 5% each time the + key or - key is pressed.

(Note 2) The scale value can be changed within the range of 0.100 to 9999.999.

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(4) Randomly changing the display scale 2 (Pressing the **Scale** key)

1)

Press the menu key
Display range.



A white frame indicating the display range appears on the screen, and the menu for changing the display range appears.

2)

Press the menu key
Scale.



The data setting cursor appears in the data input area.

3)

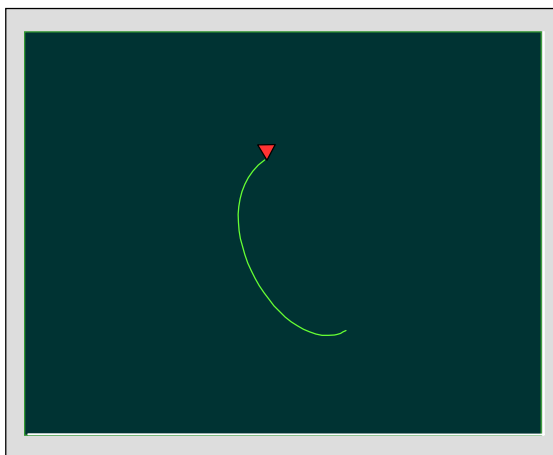
Set a random value (ex.: 270),
and press the **INPUT** key.



The current graphics display is erased, and a screen with the new scale value (270) appears. Drawing resumes from the current position.

To reduce the figure:
Set a value larger than the
current value.

To enlarge the figure:
Set a value smaller than the
current value.



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2.5.3 Changing the display mode

In the graphic display mode, which axis to be set as the vertical axis and horizontal axis when drawing can be set using the parameter.

The changed display mode is held by the Setup parameter "8091 Graphic disp mode".

The axes corresponding to X, Y and Z are set with the plane parameters (Setup parameters).

○ Parameters

I Axis for each system corresponding to X

J Axis for each system corresponding to Y

K Axis for each system corresponding to Z

(Note) When the display mode is changed, the graphics displayed up to that point are erased.

(1) Menus used for changing the display mode

Menu	Details	Type	Reference
XY	This changes to the one plane display mode configured of X-Y. The X axis is displayed as the horizontal axis, and the Y axis is displayed as the vertical axis.	C	-
XZ	This changes to the one plane display mode configured of X-Z. The X axis is displayed as the horizontal axis, and the Z axis is displayed as the vertical axis.	C	-
YX	This changes to the one plane display mode configured of Y-X. The Y axis is displayed as the horizontal axis, and the X axis is displayed as the vertical axis.	C	-
YZ	This changes to the one plane display mode configured of Y-Z. The Y axis is displayed as the horizontal axis, and the Z axis is displayed as the vertical axis.	C	-
ZX	This changes to the one plane display mode configured of Z-X. The Z axis is displayed as the horizontal axis, and the X axis is displayed as the vertical axis.	C	-
ZY	This changes to the one plane display mode configured of Z-Y. The Z axis is displayed as the horizontal axis, and the Y axis is displayed as the vertical axis.	C	-
XYZ	This changes to the three-dimensional display mode. A cube is displayed on the lower right of the screen.	C	-

2.5.4 Changing the axis display direction

Set the direction of the horizontal axis and vertical axis when drawing the graphics.

(Note) When the display direction is changed, the graphics displayed up to that point will be erased.

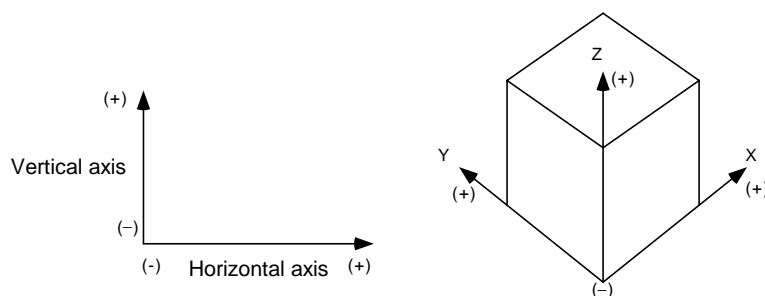
When drawing the machine position on the Graphics screen, the axis drawing direction can be designated using the Setup parameter direct.

If the direct is set to a positive scale, the path will be drawn in the reference drawing direction. If the direct is set to a negative value, the path will be drawn in the direction opposite the reference drawing direction.

(1) Parameter

Setup parameter	Description
8093 Graphic direct <I>	Drawing scale on Graphics screen for axis selected with plane selection <I>
8094 direct <J>	Drawing scale on Graphics screen for axis selected with plane selection <J>
8095 direct <K>	Drawing scale on Graphics screen for axis selected with plane selection <K>

(2) Reference drawing direction



2.5.5 Changing the drawing scale for each axis

On the Graphics screen, drawings are made using the value obtained by multiplying the currently valid scale value with the drawing scale set for each axis.

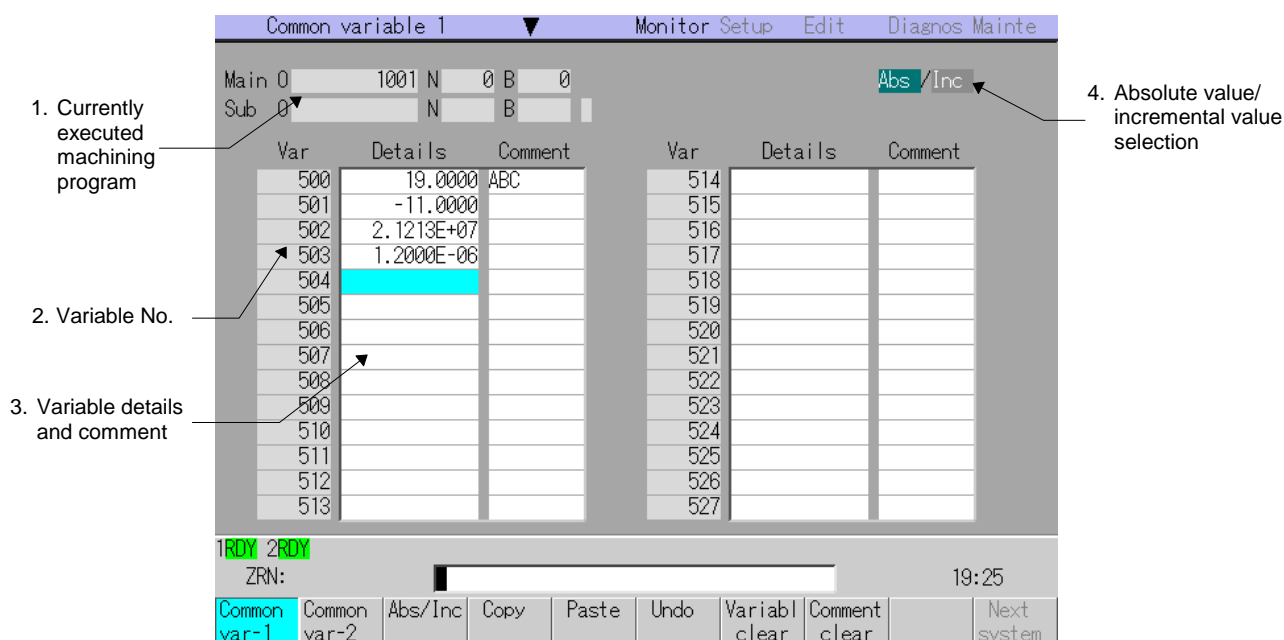
Thus, to change the proportion of the horizontal axis and vertical axis in the drawing, change the Setup parameter direct.

Refer to "3.7.2 Setup parameter" for details on the Setup parameters.

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2.6 Common Variable screen

The common variable 1 and common variable 2 details are displayed and set on these screens. If there is a common variable command in the machining program, the variables (comment) set when that block is executed are displayed.



(1) Display items

Display item	Details
1. Currently executed machining program	This displays the machining program No., sequence No. and block No. currently being executed. When executing a subprogram, each number of the subprogram is displayed.
2. Variable No.	This displays the common variable No. The number can be changed by pressing the page changeover keys (▲/▼).
3. Variable details and comment	Variable details : If the variable data is cleared, the data display area is blank. If the data has many digits, (if the data has 6 digits above the decimal point, or 4 digits below the decimal point), an exponential is displayed. Comment : Comments are added for Common variable 1 (#500 to #519). The comment has 7 or less alphanumeric characters starting with an alphabetic character. User macro specifications are required to set the variable name and to command an argument.
4. Absolute value/incremental value selection	This displays whether the absolute value setting mode or incremental value setting mode is selected. This mode is held even when the power is turned ON.

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(2) Menus

Menu	Details	Type	Reference
Common var-1	The common variables 1 are displayed.	C	–
Common var-2	The common variables 2 are displayed.	C	–
Abs/Inc	This changes the setting mode to the absolute value or incremental value mode. This menu key changes the "Abs/Inc" selection from incremental to absolute, and vice versa.	C	1.5.3 Changing the absolute value/ incremental value setting
Copy	This copies the contents (only one line amount) of the variable No. at the cursor position to the clipboard. The copied line is highlighted, and returns to normal after pasted.	A	2.6.3 Copying/ pasting common variables
Paste	This pastes the copied contents (only one line amount) of the variable No. at the cursor position. The copied line can be pasted as often as necessary until a new area is copied.	C	2.6.3 Copying/ pasting common variables
Undo	This returns the last rewritten data to its original value. (This menu key is valid for "Data Input", "Paste" and "Undo" operations.) (Note) Return to the original value is not possible after variable clear and comment clear operations.	C	–
Variabl clear	This clears the contents of the variable No. or continuous variable Nos. at the cursor position. (Note) The contents are not cleared to "0". The state with no data is entered.	A	2.6.4 Erasing common variables (1)
Comment clear	This clears the comment of the variable No. or continuous variable Nos. at the cursor position (Comment: variable Nos. 500 to 519).	A	2.6.4 Erasing common variables (2)
Next system	This appears when there are two or more valid systems. The system No. will be incremented by one each time this menu is pressed. (Note) If the system No. to be displayed next exceeds the number of valid systems, the information for the 1st system will appear.	C	1.5.6 Changing the display system

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2.6.1 Common variables 1, common variables 2

The common variables are classified into the common variables 1, which can be used commonly between systems, and the common variables 2, which are used independently within each system. The configuration of the common variables 1 and common variables 2 differ according to the number of sets provided in the specifications.

(1) Number of common variable sets

Type A	Common variables 1 (system common)	#500 to #549	50 sets
	Common variables 2 (system independent)	#100 to #149	50 sets
Type B	Common variables 1 (system common)	#500 to #599	100 sets
	Common variables 2 (system independent)	#100 to #199	100 sets
Type C	Common variables 1 (system common)	#500 to #549 #100100 to #100149 (Same as #100 to #149 in system 1) #200100 to #200149 (Same as #100 to #149 in system 2) #300100 to #300149 (Same as #100 to #149 in system 3) #400100 to #400149 (Same as #100 to #149 in system 4) #500100 to #500149 (Same as #100 to #149 in system 5) #600100 to #600149 (Same as #100 to #149 in system 6) #700100 to #700149 (Same as #100 to #149 in system 7) #800100 to #800149 (Same as #100 to #149 in system 8)	450 sets
	Common variables 2 (system independent)	#100 to #149 (Common with #100100 to #100149 (for system 1))	50 sets
Type D	Common variables 1 (system common)	#500 to #599 #100100 to #100199 (Same as #100 to #199 in system 1) #200100 to #200199 (Same as #100 to #199 in system 2) #300100 to #300199 (Same as #100 to #199 in system 3) #400100 to #400199 (Same as #100 to #199 in system 4) #500100 to #500199 (Same as #100 to #199 in system 5) #600100 to #600199 (Same as #100 to #199 in system 6) #700100 to #700199 (Same as #100 to #199 in system 7) #800100 to #800199 (Same as #100 to #199 in system 8)	900 sets
	Common variables 2 (system independent)	#100 to #199 (Common with #100100 to #100199 (for system 1))	100 sets

(Note) The Common var-2 menu will not appear when type C or type D is selected for the number of common variable sets.

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2.6.2 Setting common variables

(1) Setting "135.000" in variable No. (102)

1)

Move the cursor to the 102 position with the cursor keys.

2)

Input a value.
135 INPUT



The set value appears.


Var	Details	Comment
102	135.0000	
103	0.0000	
104	100.0000	
105	-10.0000	
106	0.0005	
107	-123456.7890	
108	-1.2345 E-10	
109	0.0000	
110	0.0000	
111	100.0000	
112	-10.0000	
113	0.0005	
114	-123456.7890	
115	-1.2345 E-10	

(2) Setting the comment "COUNTER" in variable No. (509)

1)

Select 509 with the same procedure as method (1).

2)

Press the  key.



The cursor moves to the comment area for 509.

3)

Input a comment.
COUNTER INPUT



"COUNTER" appears.

(Note) A comment can be set only for variable Nos. 500 to 519.

2.6.3 Copying/pasting common variables

(1) Copying/pasting

- 1) Select the variable to be copied. → The cursor moves to the selected variable.
- | Vrbl | Details | Comment |
|------|--------------|---------|
| 100 | -123456.7890 | |
| 101 | -1,2345 E-10 | |
| 102 | 0.0000 | |
| 103 | 0.0000 | |
| 104 | 100.0000 | |

(Note) One of the following methods can be used to select the variable:

- Using the cursor movement keys ↓ and ↑, move the cursor to the variable to be selected.

- 2) Press the menu key Copy. → One line of the copied variable is highlighted.

- 3) Select the variable to be pasted, and press the menu key Paste. → The copied variable is pasted, and the highlight returns to normal.
The copied variable is held until a variable is newly copied.

2.6.4 Erasing common variables

(1) Erasing the contents of variable (102 to 104)

1)

Press the menu key
.

➔ The menu is highlighted.

2)

Set the No. (range) of the variable to be erased in the data setting area, and press the key.
 102/104

➔ A message confirming the erasing appears.

To erase only one variable, set the variable No. only.

102

3)

Press the key.

➔ The selected variable is erased.

Vrbl	Details	Comment
102		
103		
104		
105	-10.0000	
106	0.0005	
107	-123456.7890	
108	-1.2345 E-10	
109	0.0000	
110	0.0000	
111	100.0000	
112	-10.0000	
113	0.0005	
114	-123456.7890	
115	-1.2345 E-10	

(2) Erasing the comment of variable (509)

1)

Press the menu key
.

➔ The menu is highlighted.

2)

Select the variable in the same manner as for item (1) above, and press the key.
 509

➔ A message confirming the erasing appears.

3)

Press the key.

➔ Only the 509 comment is erased.
 The variable contents are not erased.

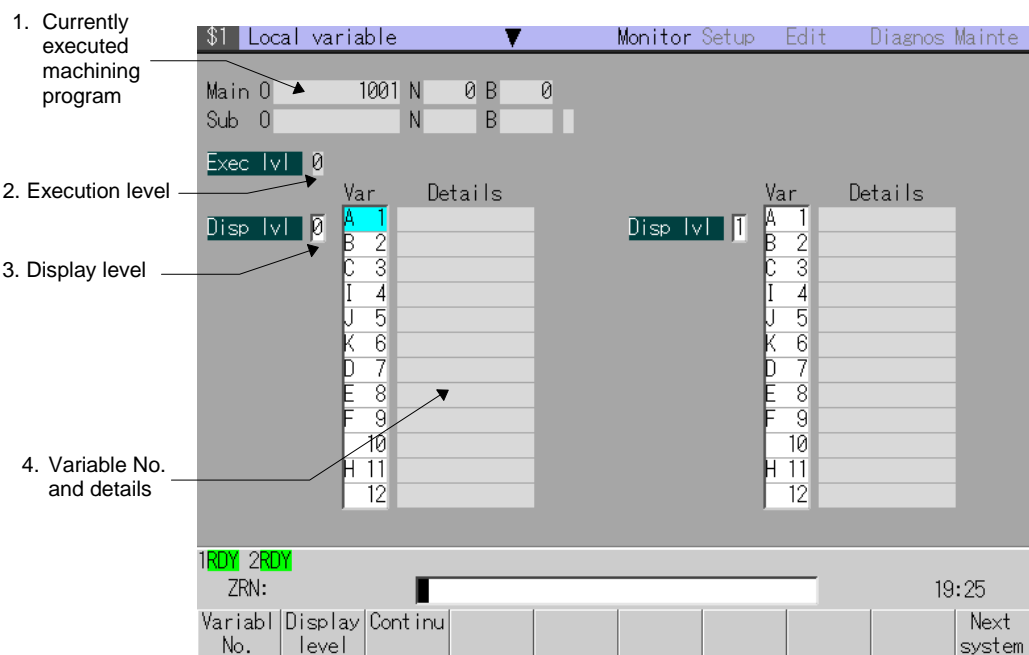
(3) Notes for erasing common variables

- 1) The variable at the cursor position will become the target of the erasing if the key is pressed without designating a variable No.

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2.7 Local Variable screen

The details of the local variables are displayed on this screen. Local variables 1 to 32 are prepared for each user macro subprogram call level. Up to 32 local variable data items are displayed on one level. A four-level configuration from level 0 to level 4 is used in page order. When a block containing a variable command is executed, the details are overwritten.



(1) Display details

Display item	Details
1. Currently executed machining program	This displays the machining program No., sequence No. and block No. currently being executed. When executing a subprogram, the subprogram numbers are displayed.
2. Execution level	This displays the nest level of the subprogram control called by the user macro. 0 : Not in user macro call state 1 : User macro call level 1 2 : User macro call level 2 3 : User macro call level 3 4 : User macro call level 4
3. Display level	This displays the nest level of the local variable displayed in the area.
4. Variable No. and details	This displays the local variable No. and its details. The alphabetic character before the local variable No. is the argument code. G, L, N, O and P cannot be used as arguments, and thus do not display. There are 32 local variables (1 to 32) for each user macro subprogram call level. If the variable data is cleared, the data display area is blank. If the data has many digits (if the data has 6 digits above the decimal point, or 4 digits below the decimal point), an exponential is displayed.



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(2) Menus

Menu	Details	Type	Reference
Variabl No.	A random variable No. can be selected in the valid area. Set the variable No., and press the INPUT key. The variable with that number at the head displays. The cursor moves to the details for that variable No.	A	2.7.1 (1) Displaying random variables
Display level	The display level can be selected in the valid area. Set the level (0 to 4) to be displayed, and press the INPUT key. The local variables appear from the head of that level. The cursor moves to the variable No. at the head.	A	2.7.1 (2) Changing the display level
Continu	This displays the variables following the variables displayed in the valid area (area containing cursor) in the area with no cursor currently displayed. <ul style="list-style-type: none"> • When cursor is in left area : The following variable Nos. are displayed in the right area. • When cursor is in right area : The variables with numbers smaller than the variables displayed in the right area are displayed in the left area. 	C	-
Next system	This appears when there are two or more valid systems. The system No. will be incremented by one each time this menu is pressed. (Note) If the system No. to be displayed next exceeds the number of valid systems, the information for the 1st system will appear.	C	1.5.6 Changing the display system

2.7.1 Displaying local variables

(1) Displaying random variables

1) Using the  and  keys, change the area to be set.

2)

Press the menu key
Variabl No.





3)

Designate the variable No. to
be displayed.
23

➔ The set number appears at the head of the area, and the cursor moves.

Vrbl		Details
Disp M 4	W23	-123456.7890
	X24	-1.2345 E-10
	Y25	0.0000
	Z26	0.0000
	27	100.0000
	28	-10.0000
	29	0.0005

(Note) The variable can also be displayed with the following methods.

- Using the  and  keys, move the cursor to the Vrbl 23 position.
- Change the display with the / keys.

(2) Changing the display level

1)

Press the menu key
Display level.

➔ The cursor appears at the display level.

2)

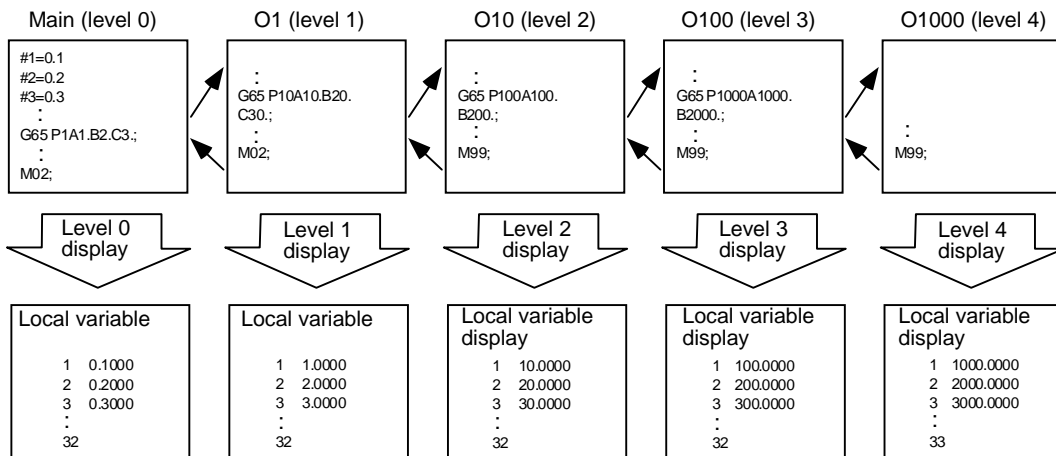
Designate the display level.
4

➔ The level 4 local variables display from the head. The cursor moves to the head line.

Vrbl		Details
Disp M 4	A 1	-123456.7890
	B 2	-1.2345 E-10
	C 3	0.0000
	I 4	0.0000
	J 5	100.0000

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(3) Relation of user macro subprogram call execution level and display level



(4) Notes for local variables

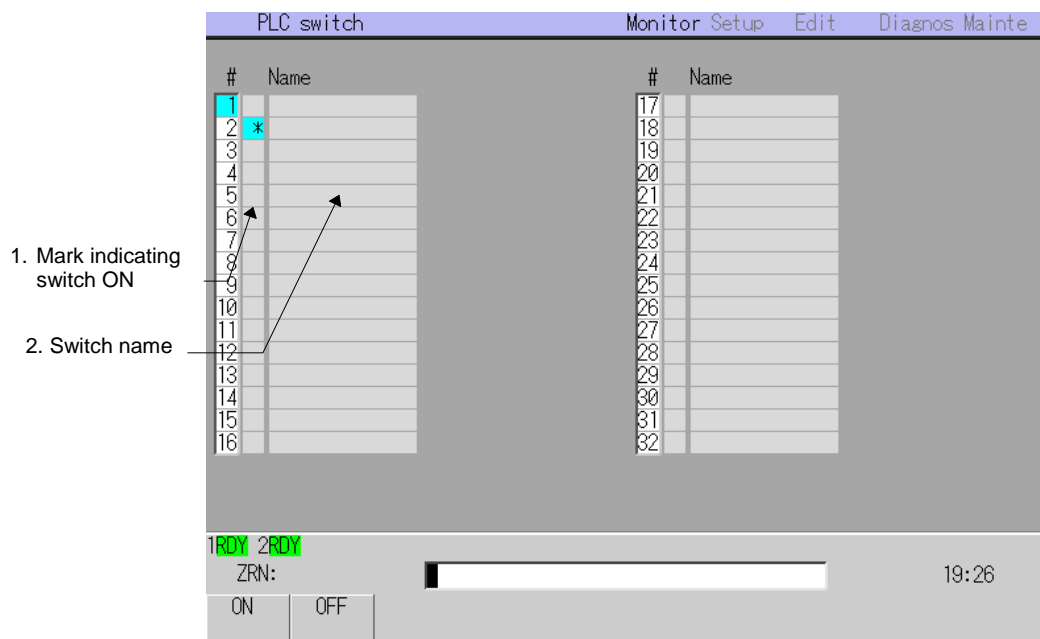
The local variables are not erased when reset or when the power is turned OFF. They are erased at macro call.

2.8 PLC Switch screen

When the various control signals for NC operation are assigned with the user PLC, the signals can be turned ON and OFF on this screen. (Max. 32 sets)

The display items (switch names) are also created using the user PLC.

As this screen is created with the user PLC, the display items and the display specifications when turned it ON differ according to each NC. Refer to the instruction manual issued by the machine manufacturer for details.



(1) Display items

Display item	Details
1. Mark indicating switch ON	This is displayed for switches that are turned ON.
2. Switch name	The switch names and highlight functions are created with the user PLC. (Max. 32 sets). Thus, this differs according to the machine manufacturer.

(2) Menus

Menu	Details	Type	Reference
ON	This turns ON the switch currently indicated by the cursor.	C	-
OFF	This turns OFF the switch currently indicated by the cursor.	C	-

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2.8.1 Turning PLC switches ON/OFF

(1) Operation method (To turn switch "#6 Program restart" ON)

1)

Press the cursor keys
↑ and ↓ to move the
cursor to "#6".

The #6 number is highlighted.

#	Name
1	Auto restart
2	Protect delete
3	Manual/Absolute
4	Optional stop
5	Handl interrupt
6	Program restart
7	

2)

Press the menu key [ON].



The "#6 Program restart" switch turns ON, and an * mark appears.

To turn OFF, press the menu
key [OFF].

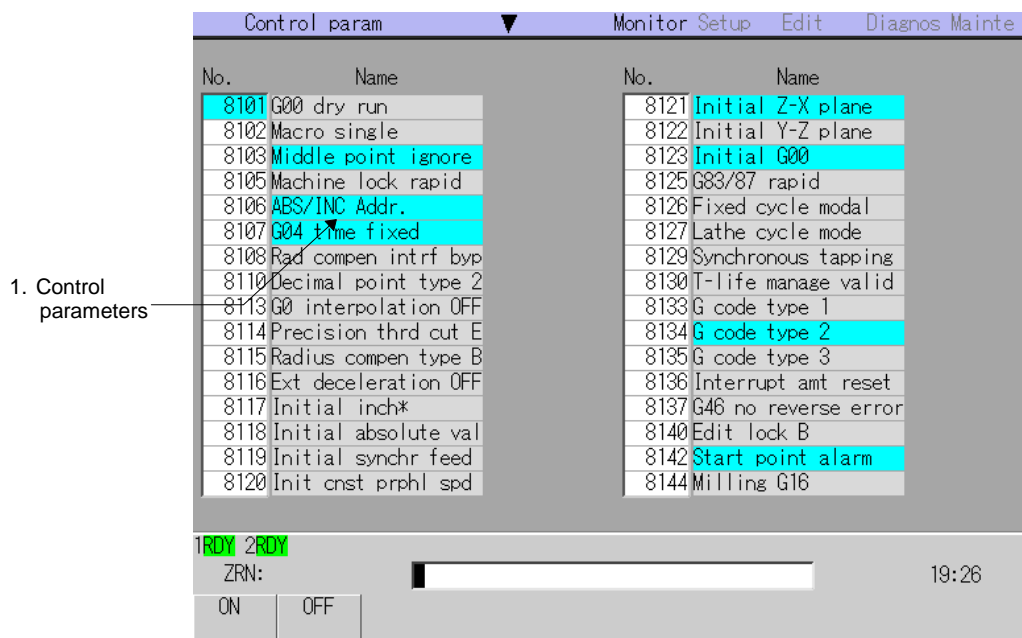
#	Name
1	Auto restart
2	Protect delete
3	Manual/Absolute
4	Optional stop
5	Handl interrupt
6	Program restart
7	

A * mark appears.

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2.9 Control Parameter screen (Control param screen)

The Control parameters for NC operation can be turned ON/OFF on this screen.



(1) Display items

Display item	Details
1. Control parameters	These are each item of the Control parameters. Refer to 2.9.2 for details on the parameters.

(2) Menus

Menu	Details	Type	Reference
ON	This turns ON the parameter currently indicated by the cursor.	C	-
OFF	This turns OFF the parameter currently indicated by the cursor.	C	-

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2.9.1 Turning Control parameters ON/OFF

Select the item and press the menu key ON or OFF.

2.9.2 Control parameter details

The Control parameters for each system are displayed and set on this screen.
 For parameters indicated with a "*" in the table, turn the NC power OFF after setting. The setting is validated after the power is turned ON again.

#	Item	Setting	Details
8101	G00 dry run	ON	The external manual feedrate is enabled in respect to rapid traverse (G0, G27, G28, G29, G30, G53).
		OFF	The "rapid traverse rate x rapid traverse override value" set in the Machine parameters is applied.
8102	Macro single	ON	The macro block is handled as one block. The single block operation can be stopped at each macro block.
		OFF	The macro block is not handled as one block. The program is processed at a high speed.
8103	Middle point ignore	ON	During G28 or G30 reference point return command, the middle point designated in the program is ignored, and the axis returns directly to the reference point.
		OFF	During G28 or G30, the program designation is followed, and the axis returns to the reference point via the middle point.
8104	(Not used)	ON	
		OFF	
8105	Machine lock rapid	ON	When carrying out automatic operation in the machine lock state, the feedrate becomes the Machine lock speed. The machine lock speed is set with the Machine parameter's Axis specification parameter "#2001 rapid".
		OFF	During machine lock, the feedrate is the commanded speed, and is the same process time as normal automatic operation.
8106	ABS/INC Addr.	ON	The absolute/incremental changeover is carried out with the address set in the parameters.
		OFF	The absolute/incremental changeover is carried out with the G code (G90/G91).
8107	G04 time fixed	ON	The G04 command is a time designation in both the synchronous feed mode (G95) and asynchronous feed mode (G94).
		OFF	The G04 command is a time designation in the asynchronous feed mode (G94), and a rotation designation in the synchronous feed mode (G95).
8108	Rad compen intrf byp	ON	During the nose R compensation interference check, the path is changed so that the workpiece is not cut into by the tool radius.
		OFF	During the nose R compensation interference check, if the block is determined to cause cutting into the workpiece by the tool radius, an alarm is generated before execution, and the operation stops.
8109			

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#	Item	Setting	Details
8110	Decimal point type 2	ON	1 of a position command data without a decimal point command is controlled as 1mm (1 inch).
		OFF	1 of a position command data without a decimal point command is controlled as the min. input command unit (0.01mm, 0.001mm or 0.0001mm) designated in the specifications.
8111	(Not used)	ON	
		OFF	
8112	(Not used)	ON	
		OFF	
8113	G00 interpolation OFF	ON	When positioning in the G00 mode, each axis independently moves at the respective rapid traverse rate. The path is not linear in respect to the end point.
		OFF	When positioning in the G00 mode, the axis moves at the shortest distance linearly in respect to the end point.
8114	Precision thrd cut E	ON	When cutting an inch thread, address E designates the precision lead.
		OFF	When cutting an inch thread, address E designates the number of threads per inch.
8115	Radius compen type B	ON	When executing start up or a cancel command during nose R compensation or radius compensation, the intersecting point of the command block and the next command block is operated.
		OFF	When executing start up or a cancel command during nose R compensation or radius compensation, the start up or cancel command block are not targets for the intersecting point operation. The offset vector in the command right angle direction is applied.
8116	Ext deceleration OFF	ON	Even if the machine interface signal's external deceleration signal is input, it is ignored. (The machine's rapid traverse rate is not decelerated.)
		OFF	When the external deceleration signal is input, the machine's feedrate decelerates to the speed set with the machine parameters.
8117	Initial inch*	ON	The inch command mode is entered as the default when the power is turned ON. (Inch settings are used for the parameters and compensation amounts, etc.)
		OFF	The metric command mode is entered as the default when the power is turned ON. (The input setting unit is also a metric setting.)
8118	Initial absolute val	ON	The absolute value command mode is the initial state when the power is turned ON.
		OFF	The incremental value command mode is the initial state when the power is turned ON.
8119	Initial synchr feed	ON	The synchronous feed mode is the initial state when the power is turned ON.
		OFF	The asynchronous feed mode is the initial state when the power is turned ON.

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#	Item	Setting	Details
8120	Init cnst prphl spd	ON	The constant surface speed control mode is the initial state when the power is turned ON.
		OFF	The constant surface speed control cancel mode is the initial state when the power is turned ON.
8121	Initial Z-X plane	ON	G18 (plane selection ZX) mode is the initial state when the power is turned ON.
		OFF	G17 (plane selection XY) mode or G19 (plane selection YZ) mode is the initial state when the power is turned ON.
8122	Initial Y-Z plane	ON	G19 (plane selection YZ) mode is the initial state when the power is turned ON.
		OFF	G17 (plane selection XY) mode or G18 (plane selection ZX) mode is the initial state when the power is turned ON.
8123	Initial G00	ON	G00 (positioning) mode is the initial state when the power is turned ON.
		OFF	G01 (linear interpolation) mode is the initial state when the power is turned ON.
8124	(Not used)	ON	
		OFF	
8125	G83/87 rapid	ON	After completing each step in the deep hole drilling cycle, the axis returns by "d" (parameter setting), and then the next step is executed.
		OFF	After completing each step in the deep hole drilling cycle, the axis returns to the R point, and then the next step is executed.
8126	Fixed cycle modal	ON	During the Fixed cycle mode, movement to the hole drilling position follows the NC unit modal state (G0, G01).
		OFF	During the Fixed cycle mode, the axis is positioned to the hole drilling position with G00.
8127	Lathe cycle mode	ON	If there is a block without movement in the lathe cycle (G77 to G79) mode, the same process (G77 to G79) is carried out again. (G code type 2)
		OFF	If there is a block without movement in the lathe cycle (G77 to G79) mode, the lathe cycle is not executed.
8128	(Not used)	ON	
		OFF	
8129	Synchronous tapping	ON	The synchronous tapping is controlled.
		OFF	The synchronous tapping is not controlled.
8130	T-life manage valid	ON	The tool life management is controlled.
		OFF	The tool life management is not controlled.
8131	(Not used)	ON	
		OFF	
8132	(Not used)	ON	
		OFF	
8133	G code type 1		Select the G code series 1 to 3.
8134	G code type 2		The standard G code is type 2.
8135	G code type 3		Type 3 is for additional specifications.

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2. Monitor (Operation) Screens

#	Item	Setting	Details
8136	Interrupt amt reset	ON	By pressing the reset button, the amount interrupted with manual or handle feed (when manual ABS is OFF) is cleared to zero. (The coordinate system deviated by the interruption are returned to the original values.)
		OFF	Even if the reset button is pressed, the amount interrupted with manual or handle feed (when manual ABS is OFF) is held. (The coordinate system deviated by the interruption are held.)
8137	G46 no reverse error	ON	In cases when the compensation direction reverses during G46 execution, when an error occurs it will not be interpreted as an error. Instead the process will be executed in the same compensation direction.
		OFF	In cases when the compensation direction reverses during G46 execution, and error will occur.
8138	(Not used)	ON	
		OFF	
8139	(Not used)	ON	
		OFF	
8140	Edit lock B	ON	Editing of a label No. 8000 to 9999 machining program is locked.
		OFF	Editing of a label No. 8000 to 9999 machining program is enabled.
8141	(Not used)	ON	
		OFF	
8142	Start point alarm	ON	If the operation start point cannot be obtained, a program error will occur.
		OFF	The process starts after the movement block is completed.
8143	(Not used)	ON	
		OFF	
8144	Milling G16	ON	The default value for the plane selection is set to the G16 plane when starting the milling mode.
		OFF	The default value for the plane selection is set to the G17 plane when starting the milling mode.
8145	Milling G19	ON	The default value for the plane selection is set to the G19 plane when starting the milling mode.
		OFF	The default value for the plane selection is set to the G17 plane when starting the milling mode.
8146	(Not used)	ON	
		OFF	
8147	(Not used)	ON	
		OFF	
8148	(Not used)	ON	
		OFF	
8149	(Not used)	ON	
		OFF	
8150	(Not used)	ON	
		OFF	

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#	Item	Setting	Details
8151	(Not used)	ON	
		OFF	
8152	(Not used)	ON	
		OFF	
8153	(Not used)	ON	
		OFF	
8154	(Not used)	ON	
		OFF	
8155	(Not used)	ON	
		OFF	
8156	(Not used)	ON	
		OFF	
8157	(Not used)	ON	
		OFF	
8158	Tool set type 2	ON	If data without a decimal point (ex., 1) is set on the Tool offset or Wear compensation screen, the data will be input as 1.000 (1mm/inch).
		OFF	If data without a decimal point (ex., 1) is set on the Tool offset or Wear compensation screen, the data will be input as the minimum setting unit determined by the specifications.
8159	(Not used)	ON	
		OFF	

3. Setup Screens

3.1 Tool Wear Data screen (Tool wear data screen)

On the Tool wear data screen, the wear amount for the tool nose is set for each tool being used. When the tool compensation No. is designated by the tool command (T command), the compensation will be carried out together with the tool data's tool length.

Offset No.	X	Z	Y	Nose R
1	0.000	0.000	0.000	0.000
2	0.000	0.000	0.000	0.000
3	0.000	0.000	0.000	0.000
4	0.000	0.000	0.000	0.000
5	0.000	0.000	0.000	0.000
6	0.000	0.000	0.000	0.000
7	0.000	0.000	0.000	0.000
8	0.000	0.000	0.000	0.000
9	0.000	0.000	0.000	0.000
10	0.000	0.000	0.000	0.000
11	0.000	0.000	0.000	0.000
12	0.000	0.000	0.000	0.000
13	0.000	0.000	0.000	0.000
14	0.000	0.000	0.000	0.000
15	0.000	0.000	0.000	0.000
16	0.000	0.000	0.000	0.000

1. Absolute/incremental selection

2. Display area

Caution

If the tool offset amount (tool wear data) is changed during automatic operation (including single block stop), the amount will be validated from the next block or several blocks following.

CHAPTER 1 SCREEN OPERATIONS
3. Setup Screens

(1) Display items

Display item	Details												
1. Absolute/Incremental selection	This indicates the selected mode (absolute or incremental).												
2. Display area	<p>This displays the tool wear data. The cursor appears, and setting becomes possible. Data that cannot be displayed in the display area can be displayed using the following keys.</p> <p> <input type="button" value="↑"/> , <input type="button" value="↓"/> : Scroll one line at a time. <input type="button" value="▲"/> , <input type="button" value="▼"/> : Change the display contents, 16 lines at a time. </p> <p>Offset No. : The number of the offset data.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Screen</th> <th style="text-align: center;">Setting item</th> <th style="text-align: center;">Function</th> <th style="text-align: center;">Display range</th> </tr> </thead> <tbody> <tr> <td>Tool wear data</td> <td>X, Y, Z</td> <td>Tool wear amount</td> <td>-99.999 to 99.999</td> </tr> <tr> <td>Nose R data</td> <td>r</td> <td>Tool radius (nose R) wear amount</td> <td>0.000 to 99.999</td> </tr> </tbody> </table> <p>A diameter value can be commanded for the wear data depending on the Machine parameter settings.</p>	Screen	Setting item	Function	Display range	Tool wear data	X, Y, Z	Tool wear amount	-99.999 to 99.999	Nose R data	r	Tool radius (nose R) wear amount	0.000 to 99.999
Screen	Setting item	Function	Display range										
Tool wear data	X, Y, Z	Tool wear amount	-99.999 to 99.999										
Nose R data	r	Tool radius (nose R) wear amount	0.000 to 99.999										

(2) Menus

Menu	Details	Type	Reference
<input type="button" value="Offset No."/>	When the offset No. is set, and the <input type="button" value="INPUT"/> key is pressed, the tool offset data with that number at its head appears. The cursor moves to the contents at the top line.	A	3.1.1 Setting the tool wear data
<input type="button" value="Abs/Inc"/>	This changes the setting mode to the absolute value mode or incremental value mode. This menu key changes the "Abs/Inc" selection from incremental to absolute, and vice versa.	C	1.5.3 Changing the absolute value/incremental value setting
<input type="button" value="Undo"/>	This returns the last rewritten data to its original value. (This menu key is valid for data input, paste, and undo operations.)	C	-
<input type="button" value="Line clear"/>	This erases the designated line (multiple lines possible) of tool wear data. Designation method: Tool wear No. where erasing begins/Tool wear No. where erasing finishes (Ex.) 1/E : All tool wear data is set to "0". When the <input type="button" value="INPUT"/> key is pressed without designating a line, only the line where the cursor is currently at is erased.	A	3.1.2 Erasing the tool wear data
<input type="button" value="Next system"/>	This appears when there are two or more valid systems. The system No. will be incremented by one each time this menu is pressed. (Note) If the system No. to be displayed next exceeds the number of valid systems, the information for the 1st system will appear.	C	1.5.6 Changing the display system

3.1.1 Setting the tool wear data

When the menu key is pressed and a random number is input, the line corresponding to that number is displayed, and the cursor can be moved to that line.

(1) Setting "10.000" in the <Z> wear data of offset No. (12)

1)

Press the menu key
.

2)

Designate the offset No.
 12

➔ The set number appears at the head of the area, and the cursor moves.

Even when the cursor is moved to 12 position with the page changeover key and and keys, setting is possible.

Offset No	X	Z	Y	Nose R	P
12	0.000	0.000	0.000	0.000	0
13	0.000	0.000	0.000	0.000	0
14	0.000	0.000	0.000	0.000	0
15	0.000	0.000	0.000	0.000	0
16	0.000	0.000	0.000	0.000	0
17	0.000	0.000	0.000	0.000	0
18	0.000	0.000	0.000	0.000	0

3)

Using the key, move the cursor to the <Z> wear setting column.

4)

Set the data.
 10

➔ The set value appears.

When the control parameter "8158 Tool set type 2" is OFF, set data with a decimal point.

Offset No	X	Z	Y	Nose R	P
12	0.000	10.000	0.000	0.000	0
13	0.000	0.000	0.000	0.000	0
14	0.000	0.000	0.000	0.000	0
15	0.000	0.000	0.000	0.000	0
16	0.000	0.000	0.000	0.000	0
17	0.000	0.000	0.000	0.000	0
18	0.000	0.000	0.000	0.000	0

5)

Set other data in the same manner.

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3. Setup Screens

3.1.2 Erasing the tool wear data

(1) Erasing one line of tool wear data at the cursor position

1)

Move the cursor to the line to be erased.



The cursor appears at the data item of the selected offset No.

Offset No	X	Z	Y	Nose R	P
12	0.000	0.000	0.000	0.000	0
13	23.690	10.000	42.120	8.000	1
14	13.023	10.000	23.340	3.000	2
15	0.000	0.000	0.000	0.000	0
16	35.100	13.000	21.110	5.000	0
17	0.000	0.000	0.000	0.000	0
18	0.000	0.000	0.000	0.000	0

(Note) One of the following methods can be used to designate the line:

- Using the cursor movement keys and , move the cursor to the line to be selected.
- Press the menu key key.

2)

Select erase.
 Menu



The menu is highlighted.
 A message confirming the erasing appears.

3)

Press the or key.



The selected line of data (one line amount) is cleared to zero.
 Without the cursor moving, that line becomes the first line of the display area.

To cancel the erasing, press a key other than or .

Offset No	X	Z	Y	Nose R	P
13	0.000	0.000	0.000	0.000	0
14	13.023	10.000	23.340	3.000	2
15	0.000	0.000	0.000	0.000	0
16	35.100	13.000	21.110	5.000	0
17	0.000	0.000	0.000	0.000	0
18	0.000	0.000	0.000	0.000	0

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(2) Designating and erasing a line (multiple lines possible)

1)

Press the menu key
.



The menu is highlighted.

2)

Set the erasing range by marking the first and last offset Nos. with a "/", and press the key.
 14/17



The range to be erased is highlighted.
 A message confirming the erasing appears.

Offset No	X	Z	Y	Nose R	P
13	0.000	0.000	0.000	0.000	0
14	13.023	10.000	23.340	3.000	2
15	0.000	0.000	0.000	0.000	0
16	35.100	13.000	21.110	5.000	1
17	31.110	12.000	33.011	5.000	3
18	23.260	10.000	21.110	8.000	1

3)

Press the or key.



The offset data corresponding to the designated offset Nos. is erased, and the menu highlight returns to normal.

To cancel the erasing, press a key other than and .

The cursor moves to the first line of the erased range, and that line becomes the first line of the display area.

Offset No	X	Z	Y	Nose R	P
14	0.000	0.000	0.000	0.000	0
15	0.000	0.000	0.000	0.000	0
16	0.000	0.000	0.000	0.000	0
17	0.000	0.000	0.000	0.000	0
18	23.260	10.000	21.110	8.000	1
19	0.000	0.000	0.000	0.000	0

(Note) If the key is pressed without setting a offset No., the line where the cursor is at is erased.

CHAPTER 1 SCREEN OPERATIONS
3. Setup Screens

3.2 Tool Data screen (Tool data screen)

On the Tool data screen, the length of the tool in respect to the program base position, the radius value (R) of the tool nose installed on the tool, and the tool nose end point are set for each tool being used. When the tool compensation No. is designated by the tool command (T command), the compensation will be carried out with the wear data.

Offset No.	X	Z	Y	Nose R	P
1	0.000	0.000	0.000	0.000	0
2	0.000	0.000	0.000	0.000	0
3	0.000	0.000	0.000	0.000	0
4	0.000	0.000	0.000	0.000	0
5	0.000	0.000	0.000	0.000	0
6	0.000	0.000	0.000	0.000	0
7	0.000	0.000	0.000	0.000	0
8	0.000	0.000	0.000	0.000	0
9	0.000	0.000	0.000	0.000	0
10	0.000	0.000	0.000	0.000	0
11	0.000	0.000	0.000	0.000	0
12	0.000	0.000	0.000	0.000	0
13	0.000	0.000	0.000	0.000	0
14	0.000	0.000	0.000	0.000	0
15	0.000	0.000	0.000	0.000	0
16	0.000	0.000	0.000	0.000	0

Annotations:

- Absolute/incremental selection (Abs/Inc)
- Display area (the table)
- Machine position display (Mach posn)
- Manual value command (M, T)
- Tool length measurement display (Work meas val)

Caution

⚠ If the tool offset amount (tool data) is changed during automatic operation (including single block stop), the amount will be validated from the next block or several blocks following.

CHAPTER 1 SCREEN OPERATIONS
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(1) Display items

Display item	Details																
1. Absolute/Incremental selection	This indicates the selected mode (absolute or incremental).																
2. Display area	<p>This displays the tool data. The cursor appears, and setting becomes possible. Data that cannot be displayed in the display area can be displayed using the following keys.</p> <p> <input type="button" value="↑"/>, <input type="button" value="↓"/> : Scroll one line at a time. <input type="button" value="▲"/>, <input type="button" value="▼"/> : Change the display contents, 16 lines at a time. </p> <p>Offset No. : The number of the offset data.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Display item</th> <th style="text-align: center;">Setting item</th> <th style="text-align: center;">Description</th> <th style="text-align: center;">Display range</th> </tr> </thead> <tbody> <tr> <td><X>, <Z>, <Y></td> <td>Tool data</td> <td>Tool length offset amount</td> <td style="text-align: center;">-99999.999 to 99999.999</td> </tr> <tr> <td><Nose R></td> <td>Tool nose data</td> <td>Tool radius (nose R)</td> <td style="text-align: center;">0.000 to 999.999</td> </tr> <tr> <td><P></td> <td>Tool nose point</td> <td>Noise point No.</td> <td style="text-align: center;">0 to 9</td> </tr> </tbody> </table> <p>A diameter value can be commanded for the wear data depending on the Machine parameter settings.</p>	Display item	Setting item	Description	Display range	<X>, <Z>, <Y>	Tool data	Tool length offset amount	-99999.999 to 99999.999	<Nose R>	Tool nose data	Tool radius (nose R)	0.000 to 999.999	<P>	Tool nose point	Noise point No.	0 to 9
Display item	Setting item	Description	Display range														
<X>, <Z>, <Y>	Tool data	Tool length offset amount	-99999.999 to 99999.999														
<Nose R>	Tool nose data	Tool radius (nose R)	0.000 to 999.999														
<P>	Tool nose point	Noise point No.	0 to 9														
3. Machine position display	The machine position is displayed.																
4. Manual value command	The command values for each M (miscellaneous function command value) and T (tool command value) are displayed. Refer to "1.5.1 Setting a manual value command" for details on the manual value commands.																
5. Tool length measurement display	Use this to measure the tool length. Refer to "3.2.3 Measuring the tool length" for details.																

(2) Menus

Menu	Details	Type	Reference
<input type="button" value="Offset No."/>	When the offset No. is set, and the <input type="button" value="INPUT"/> key is pressed, the tool offset data with that number at its head appears. The cursor moves to the contents at the top line.	A	3.2.1 Setting the tool data
<input type="button" value="Abs/Inc"/>	This changes the setting mode to the absolute value mode or incremental value mode. This menu key changes the "Abs/Inc" selection from incremental to absolute, and vice versa.	C	1.5.3 Changing the absolute value/incremental value setting
<input type="button" value="Undo"/>	This returns the last rewritten data to its original value. (This menu key is valid for data input, paste, and undo operations.)	C	-
<input type="button" value="Line clear"/>	This erases the designated line (multiple lines possible) of offset data. Designation method: Offset No. where erasing begins/Offset No. where erasing finishes When the <input type="button" value="INPUT"/> key is pressed without designating a line, only the line where the cursor is currently at is erased.	A	3.2.2 Erasing the tool data

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Menu	Details	Type	Reference
T-leng measure	This changes to the tool length measurement mode.	C	3.2.3 Measuring the tool length
Next system	This appears when there are two or more valid systems. The system No. will be incremented by one each time this menu is pressed. (Note) If the system No. to be displayed next exceeds the number of valid systems, the information for the 1st system will appear.	C	1.5.6 Changing the display system

3.2.1 Setting the tool data

When the menu key is pressed and a random number is input, the line corresponding to that number is displayed, and the cursor can be moved to that line.

(1) Setting "10.000" in the <Z> tool data of offset No. (12)

1)

Press the menu key .

2)

Designate the offset No.
12

➔ The set number appears at the head of the area, and the cursor moves.

Offset No	X	Z	Y	Nose R	P
12	0.000	0.000	0.000	0.000	0
13	0.000	0.000	0.000	0.000	0
14	0.000	0.000	0.000	0.000	0
15	0.000	0.000	0.000	0.000	0
16	0.000	0.000	0.000	0.000	0
17	0.000	0.000	0.000	0.000	0
18	0.000	0.000	0.000	0.000	0

Even when the cursor is moved to 12 position with the page changeover key and and keys, setting is possible.

3)

Using the key, move the cursor to the <Z> tool data setting column.

4)

Set the data.
10

➔ The set value appears.

Offset No	X	Z	Y	Nose R	P
12	0.000	10.000	0.000	0.000	0
13	0.000	0.000	0.000	0.000	0
14	0.000	0.000	0.000	0.000	0
15	0.000	0.000	0.000	0.000	0
16	0.000	0.000	0.000	0.000	0
17	0.000	0.000	0.000	0.000	0
18	0.000	0.000	0.000	0.000	0

When the control parameter "8158 Tool set type 2" is OFF, set data with a decimal point.

5)

Set other data in the same manner.

CHAPTER 1 SCREEN OPERATIONS
3. Setup Screens

3.2.2 Erasing the tool data

(1) Erasing one line of tool data at the cursor position

1)

Move the cursor to the line to be erased.



The cursor appears at the data item of the selected offset No.

Offset No	X	Z	Y	Nose R	P
12	0.000	0.000	0.000	0.000	0
13	23.690	10.000	42.120	8.000	1
14	13.023	10.000	23.340	3.000	2
15	0.000	0.000	0.000	0.000	0
16	35.100	13.000	21.110	5.000	0
17	0.000	0.000	0.000	0.000	0
18	0.000	0.000	0.000	0.000	0

(Note) One of the following methods can be used to designate the line:

- Using the cursor movement keys and , move the cursor to the line to be selected.
- Press the menu key key.

2)

Select erase.
 Menu



The menu is highlighted.
 A message confirming the erasing appears.

3)

Press the or key.



The selected line of data (one line amount) is cleared to zero.
 Without the cursor moving, that line becomes the first line of the display area.

To cancel the erasing, press a key other than or .

Offset No	X	Z	Y	Nose R	P
13	0.000	0.000	0.000	0.000	0
14	13.023	10.000	23.340	3.000	2
15	0.000	0.000	0.000	0.000	0
16	35.100	13.000	21.110	5.000	0
17	0.000	0.000	0.000	0.000	0
18	0.000	0.000	0.000	0.000	0

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(2) Designating and erasing a line (multiple lines possible)

1)

Press the menu key
.



The menu is highlighted.

2)

Set the erasing range by marking the first and last offset Nos. with a "/", and press the key.
 14/17



The range to be erased is highlighted.
 A message confirming the erasing appears.

Offset No	X	Z	Y	Nose R	P
13	0.000	0.000	0.000	0.000	0
14	13.023	10.000	23.340	3.000	2
15	0.000	0.000	0.000	0.000	0
16	35.100	13.000	21.110	5.000	1
17	31.110	12.000	33.011	5.000	3
18	23.260	10.000	21.110	8.000	1

3)

Press the or key.



The offset data corresponding to the designated offset Nos. is erased, and the menu highlight returns to normal.

To cancel the erasing, press a key other than and

.

The cursor moves to the first line of the erased range, and that line becomes the first line of the display area.

Offset No	X	Z	Y	Nose R	P
14	0.000	0.000	0.000	0.000	0
15	0.000	0.000	0.000	0.000	0
16	0.000	0.000	0.000	0.000	0
17	0.000	0.000	0.000	0.000	0
18	23.260	10.000	21.110	8.000	1
19	0.000	0.000	0.000	0.000	0

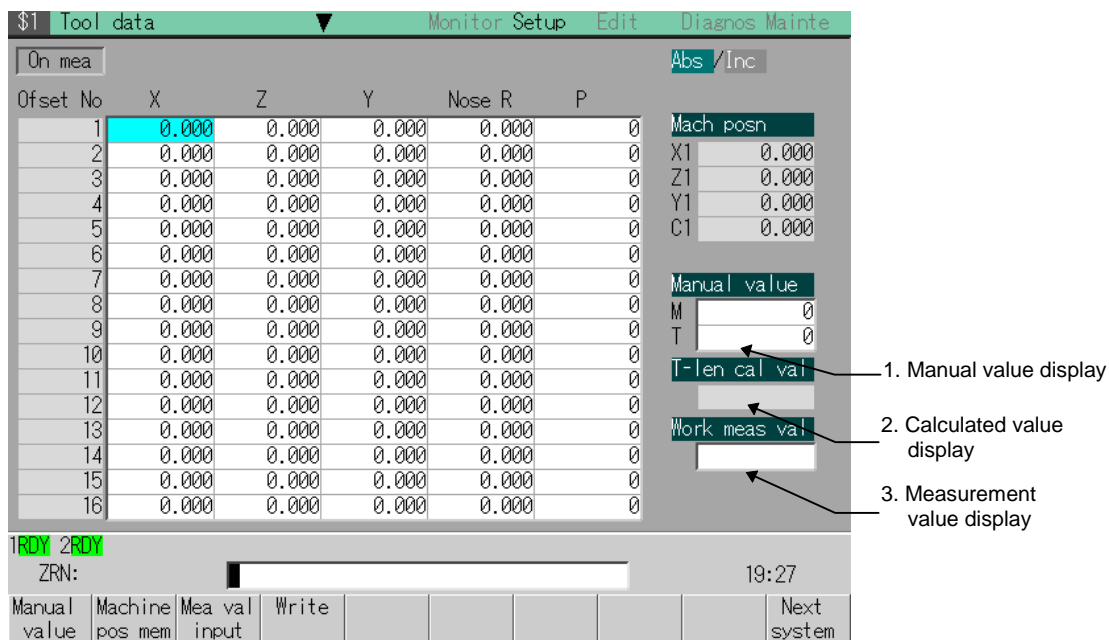
(Note) If the key is pressed without setting a offset No., the line where the cursor is at is erased.

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3.2.3 Measuring the tool length

The tool length is manually measured, and the obtained value is set in the tool data.



(1) Display items

Display item	Details
1. Manual value display	The value command executed from the Manual value menu is displayed.
2. Calculated value display	The calculated compensation amount is displayed. <Calculation method> <ul style="list-style-type: none"> • Manual tool length measurement I Base point alignment method: Tool compensation amount = Machine position – measurement base position Measured value input method: Tool compensation amount = Machine position – measurement base position – measured value
3. Measurement value display	When using the measured value input method of manual tool length measurement I, the results of the workpiece measurement are displayed. The measured value can be input from the data setting area.

(2) Menu

Menu	Details	Type	Reference
Manual value	Random values can be set for the M and T data on the screen. When the value is set, the selected M/T function will be executed.	A	1.5.1 Setting a manual value command
Machine pos mem	When using the measured value input method of manual tool length measurement I, the machine position at the end of machining is saved.	C	3.2.3 (1) Manual tool length measurement I
Mea val input	When using the measured value input method of manual tool length measurement I, the workpiece measurement value is input.	A	

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Menu	Details	Type	Reference
Write	The displayed calculated values are written into the memory.	A	-
Next system	The system of the displayed tool data is changed.	C	1.5.6 Changing the display system

(1) Manual tool length measurement I

■ **Base point alignment method**

1)

Set the measurement point's machine coordinate value in the parameters beforehand as the measurement base value.

2)

Select the tool to be measured.

Select the **Manual value** menu from the Tool data screen, and select the tool.

M	0
T	1

3)

Set the tool nose to the measurement point with manual feed.

4)

Move the cursor to the axis to be set.



The tool length will be calculated automatically, and the calculated value will appear.

T-len cal val
23.200

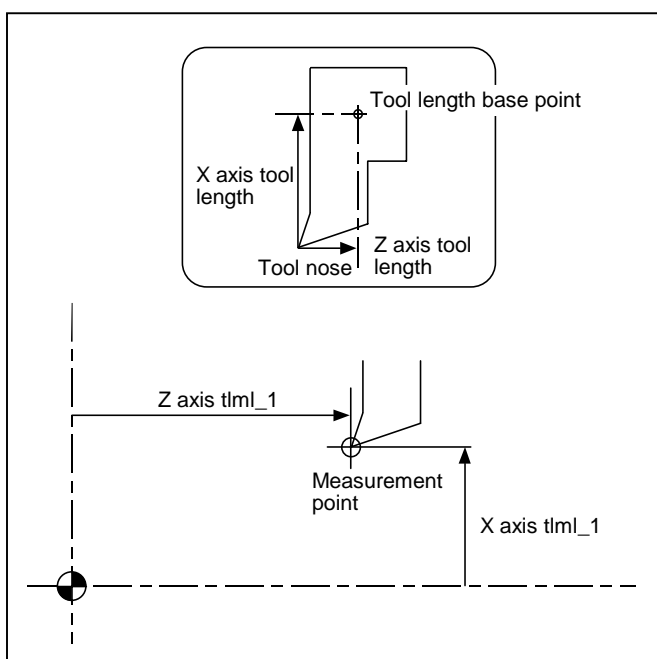
5)

Press the **Write** menu.



The calculated value will be set in the tool data.

Offset No	X	Z	Y	Nose R	P
14	23.200	0.000	0.000	0.000	0
15	0.000	0.000	0.000	0.000	0
16	0.000	0.000	0.000	0.000	0
17	0.000	0.000	0.000	0.000	0
18	23.260	10.000	21.110	8.000	1



■ Measured value input method

1) Select the tool to be measured.

Using the **Manual value** menu on the Tool data screen, select the tool.



2) Move the cursor to the axis to be set.

3) Cut the surface corresponding to the axis to be measured.

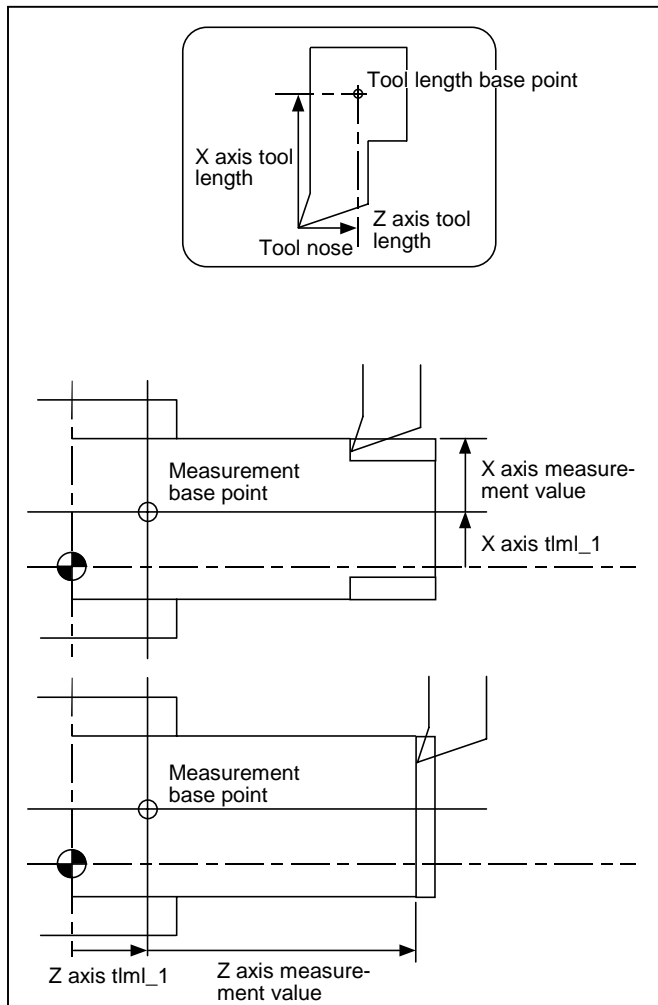
X axis: Longitudinal direction
Z axis: Edge

4) When the cutting is completed, press the **Machine pos mem** menu without retracting the tool.

5) Retract the tool and stop the spindle.

6) Measure the workpiece, and set the measured value.
Type: Measured value
INPUT
(Example) 23.2 **INPUT**

7) Press the **Write** menu.



➔ The tool length will be automatically calculated and will appear in the tool length calculated value area.



➔ The calculated value will be set in the tool data, and the cursor will move.

Ofset No	X	Z	Y	Nose R	P
14	23.200	0.000	0.000	0.000	0
15	0.000	0.000	0.000	0.000	0
16	0.000	0.000	0.000	0.000	0
17	0.000	0.000	0.000	0.000	0
18	23.260	10.000	21.110	8.000	1

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(2) Manual tool length measurement II

1) Set the machine coordinates of the touch sensor's contact surface in the parameters beforehand as the measurement base value.

2) Select the tool to be measured.
 Select the **Manual value** menu from the Tool data screen, and select the tool.

M	0
T	1

3) Using manual feed, contact the tool nose against the touch sensor.

The axis data corresponding to the contact surface of the touch sensor that the tool contacted will be set.

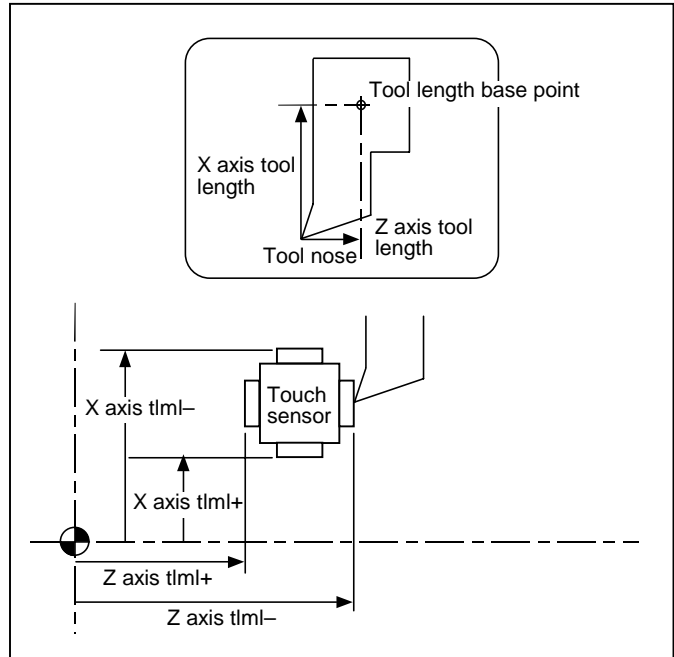
X axis contact surface (+/-):

X axis

Z axis contact surface (+/-):

Z axis

Tool compensation amount = Machine position – contact surface



➡ The tool length will be automatically calculated, and the data will be set.

Offset No	X	Z	Y	Nose R	P
14	23.200	0.000	0.000	0.000	0
15	0.000	0.000	0.000	0.000	0
16	0.000	0.000	0.000	0.000	0
17	0.000	0.000	0.000	0.000	0
18	23.260	10.000	21.110	8.000	1

(3) Notes for manual tool length measurement

1) When "On mea" is highlighted at the upper left of the screen, the tool data cannot be set from the data setting area.

3.3 Tool Life Management screen (Tool life manage screen)

The life management data, such as the tool usage state, is set and displayed on this screen. The following two types of tool life management can be used.

■ Tool life management I

Tool life management is validated when the Control parameter "T-life manage valid" is turned ON. The life is managed according to the tool's usage time and number of usages. When the usage time reaches the life time, or when the number of usages exceeds the number of lives, the tool life over signal (X20E) is output to the user PLC, and the tool No. on the Tool life data screen is highlighted. The life of up to 40 tools (tool numbers 1 to 40) in system 1 and system 2, and for system 3 onward, up to 20 tools (tool numbers 1 to 20) can be managed. The number of tool offset sets and tool life management tools correspond as shown below.

Number of tool life management tools

Number of tool offset sets	Offset per system		System common offset
	\$1, \$2	\$3 and following	
20	20	20	20
40	40	20	40
80	40	20	80

This function is handy for finding the period to polish the tool, for setting the wear data and for replacing the tool with a new tool.

■ Tool life management II

The spare tool selection function is added to tool life management I. With this function, a spare tool is provided for each tool, and if the tool life is exceeded when the tool is selected, the tool is automatically changed to the spare tool.



Up to three spare tools can be registered for one master tool. Up to ten master tools can be set. The tool No. setting range follows the number of tool sets.

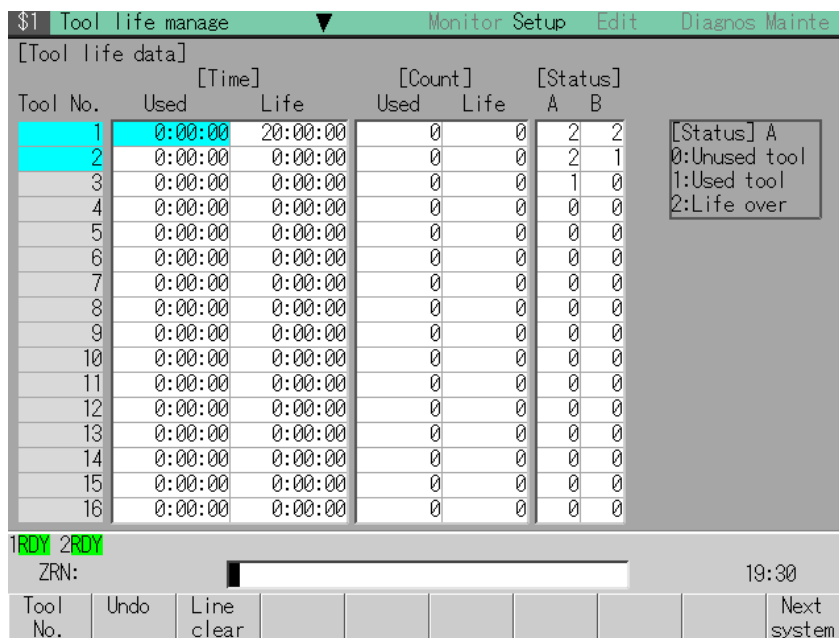
If the tool life is exceeded when a tool is selected, the spare tool will be automatically selected. Note that the spare tool will not be replaced in the following conditions:

- When the Control parameter "T-life manage valid" is OFF
- When the tool No. is not registered for <Master> on the [Spare tool] screen
- When a spare tool No. is not registered for <Spare*> on the [Spare tool] screen
- When the spare tool replace function invalid signal is ON (When input signal (system common) from the PLC is Y2CB)

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3.3.1 Tool life management I

The tool life management data is set and displayed. If the registered tools cannot be displayed on one screen, scroll the screen with the  /  keys.



(1) Display items

Display item		Details	Setting range
[Time]	Used	Tool usage cumulative time This value is incremented at each cut.	0:0 to 99:59 (Note) The display is 0:0:0 to 99:59:59
	Life	Tool life setting time Set the maximum usable time.	
[Count]	Used	Tool usage cumulative times This value is incremented when the tool is selected.	0 to 9999
	Life	Tool life setting times Set the maximum number of usages.	
[Status]	A	The tool life management state is indicated. 0: Unused tool 1: Used tool 2: Life over	0 to 2
	B	(Machine maker open area)	0 to 99

(Note) If the usage time reaches the life time, or if the number of uses exceeds the number of lives, the tool No. will be highlighted.

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(2) Menu

Menu	Details	Type	Reference
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">Tool No.</div>	<p>When the tool No. is set and the INPUT key is pressed, the tool life data with that number at its head appears. The cursor moves to the contents at the top line.</p>	A	3.3.1 (3) Setting the life management data
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">Undo</div>	<p>This returns the last rewritten data to its original value. (This menu key is valid for data input, paste, and undo operations.) Note that the time from the data input operation to the undo operation will not be counted.</p>	C	-
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">Line clear</div>	<p>This erases the designated line (multiple lines possible) of tool life management data. Designation method: Tool No. where erasing begins/Tool No. where erasing finishes (Example) 1/E: All tool data is cleared.</p> <p>When the INPUT key is pressed without designating a line, only the line where the cursor is currently at is erased.</p>	A	3.3.1 (4) Erasing one line of tool management data (5) Erasing several lines of tool management data
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">Spare tool</div>	<p>The Spare tool screen will open.</p>	C	-
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">Next system</div>	<p>The system of the life management data to be displayed will change. When this menu key is pressed, the displayed system No. will be incremented by one. If the maximum number of systems is exceeded, the display will change to 1st system.</p>	C	1.5.6 Changing the display system

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(3) Setting the life management data

1) Press the menu key
Tool No.

2) Designate the tool No.
 12 INPUT

The tool No. can also be set by moving the cursor to the 12 position with the ↓ and ↑ keys.

➔ The set number appears at the head of the area, and the cursor moves to the head data.

Tool No.	[Time]		[Count]		[Status]	
	Used	Life	Used	Life	A	B
12	0:00:00	0:00:00	0	0	0	0
13	0:00:00	0:00:00	0	0	0	0
14	0:00:00	0:00:00	0	0	0	0
15	0:00:00	0:00:00	0	0	0	0
16	0:00:00	0:00:00	0	0	0	0
17	0:00:00	0:00:00	0	0	0	0
18	0:00:00	0:00:00	0	0	0	0

3) Move the cursor to the data to be set.

(Note) To move to the target data, move the cursor to the data to be set with the cursor movement keys ← and →.

4) Input the value.
 20/0 INPUT **(Note 1)**

➔ The set value appears. The cursor moves to the next data item.

Tool No.	[Time]		[Count]		[Status]	
	Used	Life	Used	Life	A	B
12	0:00:00	20:00:00	0	0	0	0
13	0:00:00	0:00:00	0	0	0	0
14	0:00:00	0:00:00	0	0	0	0
15	0:00:00	0:00:00	0	0	0	0
16	0:00:00	0:00:00	0	0	0	0
17	0:00:00	0:00:00	0	0	0	0
18	0:00:00	0:00:00	0	0	0	0

(Note 1) The time data displays up to the second unit, but the setting format is as shown below.

Setting format: Hour/minute (For both usage time and life time)

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(4) Erasing one line of tool management data

- 1) Move the cursor to the line to be erased. ➔ The cursor appears at the selected line (Tool No.) data.

Tool No.	[Time]		[Count]		[Status]	
	Used	Life	Used	Life	A	B
12	8:13:41	20:00:00	231	500	0	0
13	2:33:24	10:00:00	135	300	0	0
14	0:54:01	15:00:00	55	400	0	0
15	0:00:00	0:00:00	0	0	0	0
16	0:00:00	0:00:00	0	0	0	0
17	0:00:00	0:00:00	0	0	0	0
18	0:00:00	0:00:00	0	0	0	0

(Note) One of the following methods can be used to designate the line (Tool No.);

- Using the cursor movement keys ↑ and ↓, move the cursor to the line to be selected.
- Press the menu key Tool No., set the offset No. in the data setting area, and press the INPUT key.

- 2) Select to erase.
Menu Line clear INPUT ➔ The menu is highlighted.
A message confirming the erasing appears.

- 3) Press the Y or INPUT key. ➔ One line of the selected life data will be erased.

To cancel the erasing, press a key other than Y or INPUT.

Tool No.	[Time]		[Count]		[Status]	
	Used	Life	Used	Life	A	B
12	0:00:00	0:00:00	0	0	0	0
13	2:33:24	10:00:00	135	300	0	0
14	0:54:01	15:00:00	55	400	0	0
15	0:00:00	0:00:00	0	0	0	0
16	0:00:00	0:00:00	0	0	0	0
17	0:00:00	0:00:00	0	0	0	0
18	0:00:00	0:00:00	0	0	0	0

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(5) Erasing several lines of tool management data

1) Press the menu key
 → The menu is highlighted.

2) Set the erasing range by marking first and last tool Nos. with a "/", and press the key.
 12/14

→ The range to be erased is highlighted.
 A message confirming the erasing appears.

Tool No.	[Time]		[Count]		[Status]	
	Used	Life	Used	Life	A	B
12	8:13:41	20:00:00	231	500	0	0
13	2:33:24	10:00:00	135	300	0	0
14	0:54:01	15:00:00	55	400	0	0
15	0:00:00	0:00:00	0	0	0	0
16	0:00:00	0:00:00	0	0	0	0
17	0:00:00	0:00:00	0	0	0	0
18	0:00:00	0:00:00	0	0	0	0

3) Press the or key. → The tool life data corresponding to the designated tool Nos. is erased, and the menu highlight returns to normal.

To cancel the erasing, press a key other than or .

Tool No.	[Time]		[Count]		[Status]	
	Used	Life	Used	Life	A	B
12	0:00:00	0:00:00	0	0	0	0
13	0:00:00	0:00:00	0	0	0	0
14	0:00:00	0:00:00	0	0	0	0
15	0:00:00	0:00:00	0	0	0	0
16	0:00:00	0:00:00	0	0	0	0
17	0:00:00	0:00:00	0	0	0	0
18	0:00:00	0:00:00	0	0	0	0

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3.3.2 Tool life management II

The life management spare tool is set and displayed.



(1) Display items

Display item		Details	Setting range
Master	No.	Number of master tool having a spare tool	0 to number of tool life management tools (Note)
	ST	Status of master tool having a spare tool	–
Spare 1 to 3	No.	Number of spare tool	0 to number of tool life management tools (Note)
	ST	Status of spare tool	–
Offset		Compensation value for tool offset No.	0 to number of tool life management tools (Note)

(Note) Refer to the first page of this chapter (3.3 Tool Life Management screen) for details on the number of tool life management tools.

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(2) Menus

Menu	Details	Type	Reference
# No.	When the # No. is set and the <input type="text" value="INPUT"/> key is pressed, the tool change data with that number at its head appears. The cursor moves to the contents at the top line.	A	3.3.2 (3) Setting the life management spare tool
Undo	This returns the last rewritten data to its original value. (This menu key is valid for data input, paste, and undo operations.)	C	-
Line clear	This erases the designated line (multiple lines possible) of tool change data. Designation method: # No. where erasing begins/# No. where erasing finishes (Example) 1/E: All data is cleared. When the <input type="text" value="INPUT"/> key is pressed without designating a line, only the line where the cursor is currently at is erased.	A	3.3.2 (4) Erasing one line of spare tool data (5) Erasing several lines of spare tool data
Life data	The [Tool life data] screen (1st page of Tool life manage screen) will open.	C	-
Next system	The system of the life management data to be displayed will change. When this menu key is pressed, the displayed system No. will be incremented by one. If the maximum number of systems is exceeded, the display will change to 1st system.	C	1.5.6 Changing the display system

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(3) Setting the life management spare tool

1) Press the menu key .

2) Designate the # No.
 3

The tool No. can also be set by moving the cursor to the 3 position with the and keys.

➔ The cursor moves the head data of the set tool No.

# No.	Master No.	ST	Spare1 No.	ST	Spare2 No.	ST	Spare3 No.	ST	Offset
1	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0

3) Move the cursor to the data to be set.

(Note) To move to the target data, move the cursor to the data to be set with the cursor movement keys and .

4) Input the value.
 20

➔ The set value appears.
 The cursor moves to the next data item.

# No.	Master No.	ST	Spare1 No.	ST	Spare2 No.	ST	Spare3 No.	ST	Offset
1	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0
3	0	0	20	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0

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(4) Erasing one line of spare tool data

1)

Move the cursor to the line to be erased.



The cursor appears at the selected line (# No.) data.

# No.	Master		Spare1		Spare2		Spare3		Offset
	No.	ST	No.	ST	No.	ST	No.	ST	
1	10	2	11	2	12	0	13	0	1
2	14	2	15	0	0	0	0	0	2
3	18	2	17	0	18	0	0	0	1
4	20	2	21	0	22	0	0	0	3
5	23	2	24	0	25	0	0	0	4
6	26	0	27	0	0	0	0	0	1
7	30	2	31	2	32	2	33	0	1

(Note) One of the following methods can be used to designate the line (#No.);

- Using the cursor movement keys and , move the cursor to the line to be selected.
- Press the menu key key.

2)

Select to erase.
Menu



The menu is highlighted.
A message confirming the erasing appears.

3)

Press the or key.



One line of the selected spare tool data will be erased.

To cancel the erasing, press a key other than or .

# No.	Master		Spare1		Spare2		Spare3		Offset
	No.	ST	No.	ST	No.	ST	No.	ST	
3	0	0	0	0	0	0	0	0	0
4	20	2	21	0	22	0	0	0	3
5	23	2	24	0	25	0	0	0	4
6	26	0	27	0	0	0	0	0	1
7	30	2	31	2	32	2	33	0	1
8	34	0	35	0	0	0	0	0	1
9	36	2	37	0	38	0	0	0	1

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(5) Erasing several lines of spare tool data

1)

Press the menu key
.



The menu is highlighted.

2)

Set the erasing range by marking first and last tool Nos. with a "/", and press the key.
 3/5



The range to be erased is highlighted.
 A message confirming the erasing appears.

# No.	Master No.	ST	Spare1 No.	ST	Spare2 No.	ST	Spare3 No.	ST	Offset
1	10	2	11	2	12	1	13	0	1
2	14	2	15	1	0	0	0	0	2
3	16	2	17	1	18	0	0	0	1
4	20	2	21	1	22	0	0	0	3
5	23	2	24	1	25	0	0	0	4
6	26	1	27	0	0	0	0	0	1
7	30	2	31	2	32	2	33	1	1

3)

Press the or key.



The spare tool data corresponding to the designated tool Nos. is erased, and the menu highlight returns to normal.

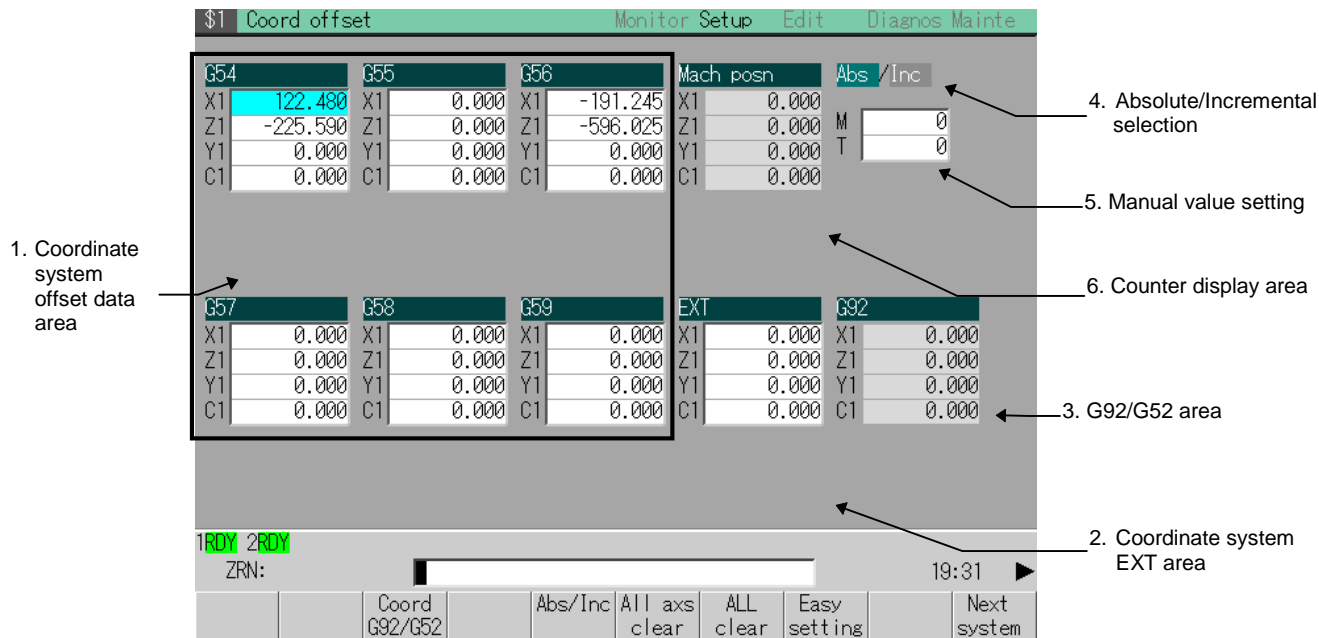
To cancel the erasing, press a key other than or .

# No.	Master No.	ST	Spare1 No.	ST	Spare2 No.	ST	Spare3 No.	ST	Offset
3	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0
6	26	1	27	0	0	0	0	0	1
7	30	2	31	2	32	2	33	1	1
8	34	1	35	1	0	0	0	0	1
9	36	2	37	1	38	0	0	0	1

3.4 Coordinate System Offset screen (Coord offset screen)

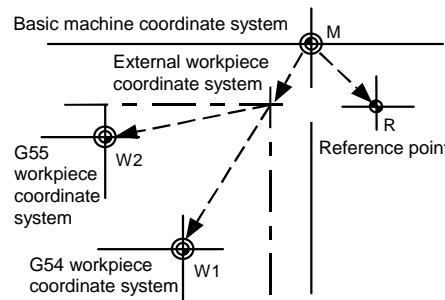
In this screen, it is possible to set and display all of the coordinate system offsets controlled by the NC.

(Note) The G92 coordinate system offset cannot be set.



(1) Display items

Display item	Details
1. Coordinate system offset data area	<p>This displays the offset amount for the workpiece coordinate system (G54 to G59).</p> <p>The size of the display area differs depending on the number of axes. A maximum of five axes can be displayed.</p> <p>The coordinate system offset data can be set with absolute values or incremental values.</p> <p>Setting range: -99999.999 to 99999.999 (mm)</p>
2. Coordinate system EXT area	<p>This displays or sets the offset data for the external workpiece coordinate system.</p>



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Display item	Details
3. G92/G52 area	This displays the offset amount for G92 or the local coordinate system. The offset amount of the corresponding local coordinate system (G52) is displayed only when the cursor is at G54 to G59.
4. Absolute/ incremental selection	This indicates whether the absolute value setting mode or incremental value setting mode is selected.
5. Manual value setting	This displays the command values of each M (miscellaneous function command value) and T (tool command value). Refer to "1.5.1 Setting a manual value command" for more details on the manual value command.
6. Counter display area	This displays the counter (machine position). (These cannot be set.) These values are used during operation to confirm the zero point position of the selected coordinate system.

(2) Menus

Menu	Details	Type	Reference
Coord G92/G52	This displays the G92 or G52 coordinate system offset data. The G92 offset data is always displayed when the cursor is not at the G54 to G59 offset data.	C	-
Abs/Inc	This changes the setting mode to the absolute value mode or incremental value mode. The setting mode is held even when the power is turned OFF.	C	1.5.3 Changing the absolute value/ incremental value setting
All axs clear	This erases the local offset data for all axes corresponding to the offset data of the coordinate system where the cursor is located.	C	3.4.2 Erasing the coordinate system offset data (1)
ALL clear	This erases all offset data (G54 to G59, and expansion data), and the local offset data.	C	3.4.2 Erasing the coordinate system offset data (2)
Easy setting	This sets the coordinate system offset so that the current machine coordinate value becomes the workpiece coordinate zero point. Only the axis at the cursor position is set.	C	3.4.3 Setting the workpiece coordinate zero point
Next system	The system of the offset data displayed is changed. The system No. will be incremented by one each time this menu is pressed.	C	1.5.6 Changing the display system
Manual value	Random values can be input in each data item of M and T on the screen. When the numeric value is input, the selected M and T functions are executed. When the menu key is pressed again, the mode quits and the menu highlight returns to normal. The cursor moves to the coordinate system offset data area.	A	1.5.1 Setting a manual value command

3.4.1 Setting the coordinate system offset data

(1) Setting the offset data of coordinate system G54 to G59

1)

Confirm the setting mode (Abs/Inc) in the upper right area of the screen. Press the menu key Abs/Inc to change the setting mode.

2)

Using the Tab keys (← , →), move the cursor to the workpiece coordinate offset to be set.

3)

Using ↑ and ↓, move the cursor to the axis where the data is to be set.

4)

Set the offset data.
 122 INPUT



The set data appears, and the cursor moves to the next data item.

G54		G55	
X1	122.000	X1	0.000
Z1	-255.590	Z1	0.000
Y1	0.000	Y1	0.000
C1	0.000	C1	0.000

5)

Set other data in the same manner.

(2) Setting the offset data of the external coordinate system

When the external workpiece coordinate system data is set, the coordinate system deviation is measured using the external touch sensor, etc.
 While keeping the current offset value of the workpiece coordinate systems G54 to G59 as they are, all of the data can be compensated (offset).
 Using the data transfer function, the external data can be directly written to the external offset data (EXT). (Refer to "3.5.2 Transferring a file" for details.)

3.4.2 Erasing the coordinate system offset data

(Note) G92 data cannot be erased.

(1) Erasing the offset data of the coordinate system (excluding G92) indicated by the cursor for all axes

1)

Press the menu key

➔ The menu is highlighted.
 A message confirming the erasing appears.

2)

Press the key.

➔ All of the coordinate system data indicated by the cursor is cleared to zero.
 (Including local coordinate data)

G54		G55	
X1	0.000	X1	0.000
Z1	0.000	Z1	0.000
Y1	0.000	Y1	0.000
C1	0.000	C1	0.000

(2) Erasing all axis offset data of all coordinate systems (excluding G92 and EXT)

1)

Press the menu key

➔ The menu is highlighted.
 A message confirming the erasing appears.

2)

Press the key.

➔ All of the coordinate system data is erased.

3.4.3 Setting the workpiece coordinate zero point

When the menu key is pressed, the coordinate system offset is set so the current machine position (for all axes) becomes the workpiece coordinate zero point. Only the axis at the cursor can be set. Note that the local coordinate system offset is cleared to zero.

3.4.4 Setting the manual value command

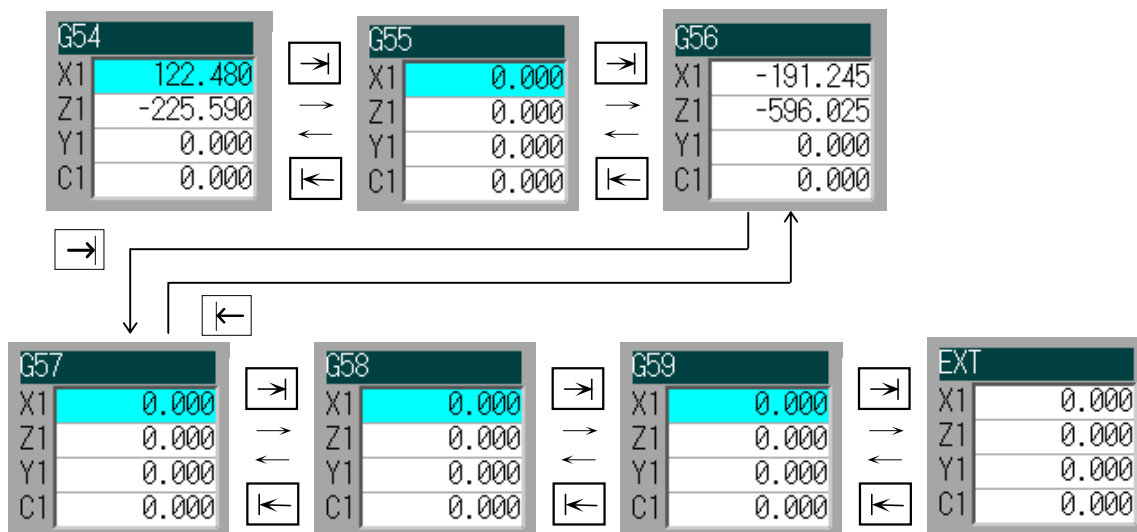
Using the menu Manual value, set each M and T value. The command is executed when the INPUT key is pressed.

Refer to "1.5.1 Setting a manual value command" for details on the setting method.

3.4.5 Changing the coordinate system display

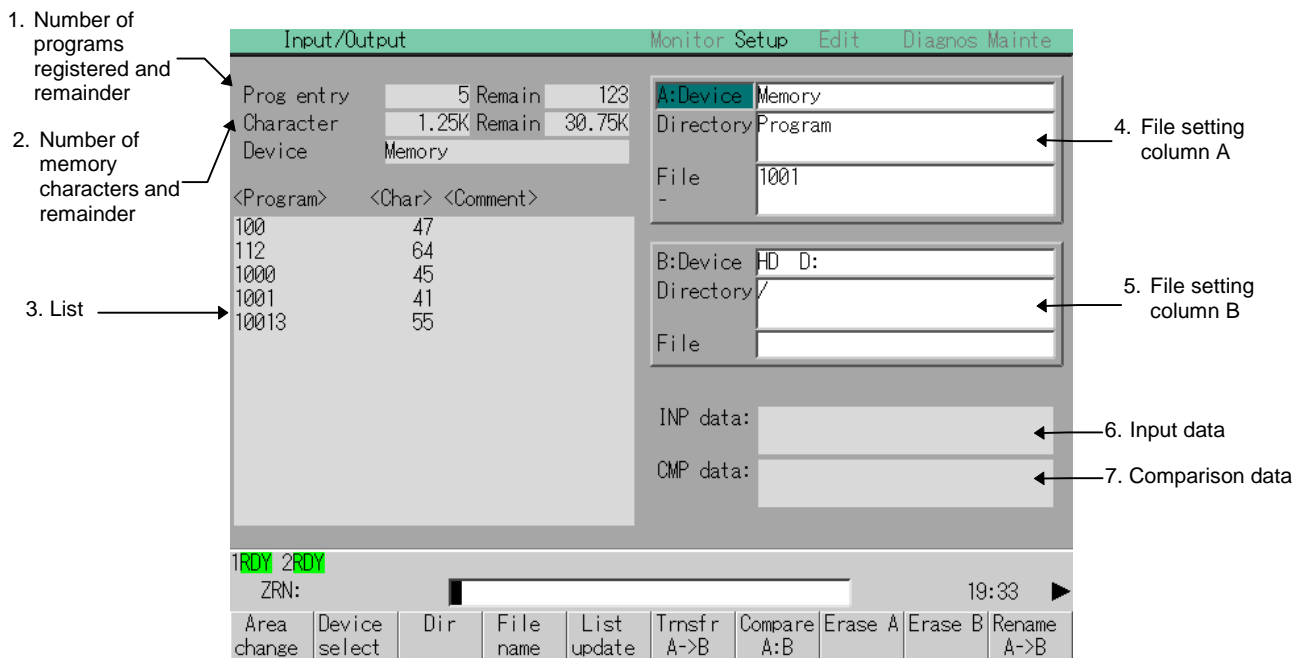
- (1) **Changing the coordinate system offset data area cursor display using the Tab keys ← and →**

The cursor will change as shown below when the Tab keys are pressed.



3.5 Data Input/Output screen (Input/Output screen)

The Input/Output screen is used to carry out NC data input/output between the NC internal memory and the external input/output devices. Here, the hard disk built into the NC device is also treated as external devices.



(1) Display items

Display item	Details
1. Number of programs registered and remainder <small>(Note 1)</small>	<p>This displays the registration information of machining program of the selected device.</p> <p>Number of programs registered (Prog entry) : This displays the number of programs previously registered as user machining programs.</p> <p>Remainder (Remain) : This displays the remaining number of programs that can be registered.</p> <p>When "Memory" is selected as the device, the total of the number of programs registered and the remainder is the maximum number of registrations set in the specifications.</p>
2. Number of memory characters and remainder <small>(Note 1)</small>	<p>This displays the number of characters of the machining program of the selected device.</p> <p>Number of memory characters (Character) : This displays the number of characters previously registered as user machining programs.</p> <p>Remainder (Remain) : This displays the remaining number of characters that can be registered.</p> <p>When "Memory" is selected as the device, the total of the number of memory characters and the remainder is the maximum number of memory characters set in the specifications.</p>

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Display item	Details
3. List	<p>This displays a contents list (directory and file name) of the directory in the setting column (file setting column A or B) where the cursor is currently located.</p> <p><Program> : When "Memory" is selected for the device, this displays the file name (program No.) of the machining programs already registered. The file names are displayed in order from the smallest number, from 1 to 99999999. When a device other than "Memory" is selected, this displays the file name and directory to be included in the directory that is set in the current setting column.</p> <p><Char>: The size of each file (when "Memory" is selected for the device, the number of characters in the machining program). When directory is selected, this displays "DIR".</p> <p><Comment> : This displays the comment (up to 18 alphanumeric characters and symbols) of each file.</p> <p>(Note 1) For an HD or FLD file, the date and time will be displayed as a comment.</p>
4. File setting column A	<p>This sets the device, directory, and file name of the target file for transfer, compare, erasing, etc., operations. When transferring, the file name of the transfer origin file is set. When renaming, the file name before renaming is set. When erasing, the erasing range is set.</p>
5. File setting column B	<p>This sets the device, directory, and file name of the target file for transfer, compare, erasing etc., operations. When transferring, the file name of the transfer destination file is set. When renaming, the file name after renaming is set. When erasing, the erasing file name is set.</p>
6. Input data	This displays the data being transferred.
7. Comparison data	This displays the data being compared. If an error occurs during comparison, the block with the error is displayed.

(Note 1) Depending on the device, some items are not displayed.

Device Display item	Memory	RS-232C	HD	FLD
Prog entry	○	×	○	○
Remain	○	×	×	×
Character	○	×	○	○
Remain	○	×	○	○
List	○	×	○	○

○ : Displayed × : Not displayed

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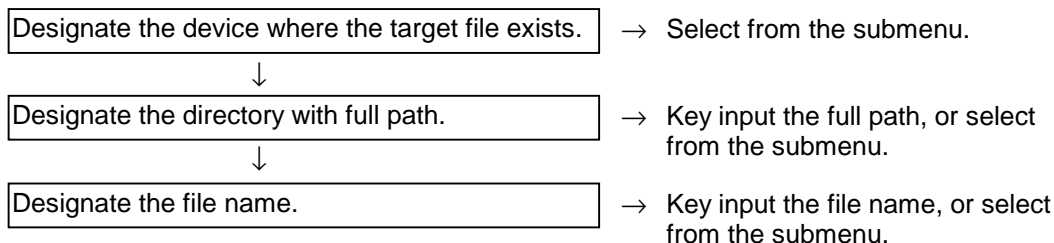
(2) Menus

Menu	Details	Type	Reference
Area change	This changes the setting area to file setting column A (transfer origin) or file setting column B (transfer destination). The display of the valid area (A or B) is highlighted.	C	1.5.2 Changing the valid area
Device select	This displays the submenu of the machining program storage area. When the submenu is selected, the device is fixed, and if a directory exists it is set in the root. The memory is selected as the default.	A	3.5.1 Selecting a device, directory and file
Dir	This menu sets the directory that carries out input/output operations, and is on standby for input. Note that when "Memory" is selected for the device, the directory can be selected from the submenu.	A	
File name	This menu sets the file name that carries out input/output operations, and is on standby for input. When "Memory" is selected for the device, setting is not necessary if the directory is not the program.	A	
List update	This updates the list. The list of the directory selected in the currently valid file setting column (A/B) is updated.	C	-
Trnsfr A -> B	This copies the file in file setting column A (transfer origin) to the file setting column B (transfer destination). (The transfer origin file is not changed.) A message appears during transfer and when the transfer is completed.	B	3.5.2 Transferring a file
Compare A:B	This compares the files in file setting column A (transfer origin) and file setting column B (transfer destination). (Note) Normally only one file can be compared, however, with the RS-232C, multiple files can be compared.	C	3.5.3 Comparing files (Compare)
Erase A	This erases the file in file setting column A.	B	3.5.4 Erasing a file
Erase B	This erases the file in file setting column B.	B	3.5.4 Erasing a file
Rename A -> B	This changes the name of the file in file setting column A (transfer origin) to the name of the file in file setting column B (transfer destination). (Note) The same device must be selected for A and B.	B	3.5.5 Changing a file name (Rename)
Dir create	This creates a new directory in the directory of the currently valid file setting column (A/B). The directory can be created when HD or FLD is selected for the device.	A	3.5.6 Creating a directory
FLD format	This formats the FLD.	B	3.5.7 Formatting an FLD
Stop	This interrupts the process (transfer, compare, etc.) during execution.	C	-

3.5.1 Selecting a device, directory and file

This section explains the methods of designating the device, directory and file name of the target file for operations such as file transfer and erasing carried out on this screen.

(1) File selection sequence



(2) Menus used

■ **Device select** menu submenus

Menu	Details	Type	Reference
Memory	This selects the memory.	C	–
RS232C	This selects the RS-232C (including tape).	C	–
FLD A:	The FLD is selected. The drive name will appear at the right side.	C	–
HD D:	The HD (hard disk) is selected. The drive name will appear at the right side.	C	–

■ **Dir** (other than memory) and **File name** menu submenus

Menu	Details	Type	Reference
From list	The cursor appears in the list display. The list contents can be selected with the INPUT key. When a directory is selected, the contents of the selected directory are displayed in the list. Continued selection is possible. When a file name is selected, the file name is temporarily displayed in the data setting area. When the INPUT key is pressed again, it is fixed.	A	

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■ **Outline of device, directory, and file name setting methods**

Device	Designation target file	Designation method		
		Device	Directory	File name
NC memory	<ul style="list-style-type: none"> • Machining program • User macro • Fixed cycle program 	Select from the submenu	– (Default)	Key input in the data setting area, and press <input type="text" value="INPUT"/>
				Select from the list
	File other than the machining program	Select from the submenu	Select from the submenu	Select from the submenu
				Select from the list
Device other than the NC memory	All files	Select from the submenu	Key input in the data setting area, and press <input type="text" value="INPUT"/>	Key input in the data setting area, and press <input type="text" value="INPUT"/>
			Select from the list	Select from the list

The device can be selected from the submenu. (The devices that can be used will differ depending on the specifications.)

One of the following methods can be used to designate the directory (for devices other than the NC memory) and file name.

- Set the directory path (full path) or file name in the data setting area, and press the key.
- Press submenu of the menu or . Move the cursor to the target directory or file name, and press the key.

A wild card (*) can be used when selecting a file name.

■ **Notes when selecting a file**

- (Note 1)** During directory and file name setting, the designated directory, path or file name will be set, even if it does not actually exist. This will not cause an error. Note that the previously set directory is overwritten.
- (Note 2)** When designating a file other than a machining program in the NC memory, select the file name from the submenu. (The file name is fixed.)
- (Note 3)** When a file name is selected from the menu, it first is displayed in the data setting area. However, at this time the file name has not yet been fixed. Press the key again to fix the file name.
- (Note 4)** When the key is pressed when setting a file name, the file name in the data setting area is erased.
- (Note 5)** When a Fixed cycle program is designated, the Basic common parameter 1306 "fix_P" must be set. Select "Memory" for the device, and "Program" for the directory.

(3) Selecting an NC memory program

1)

Press the menu
.



The following menu appears.

Memory	RS232C	FLD A:	HD D:			
--------	--------	--------	-------	--	--	--

2)

Press the menu .



"Memory" appears in the device name, and the default "Program" appears in the directory.

A:Device	Memory
Directory	Program
File	-

3)

Press the menu .



The following menu appears.

From list						
-----------	--	--	--	--	--	--

• When inputting from the data setting area

4)

Input the file name.
 10013



A:Device	Memory
Directory	Program
File	10013
-	

• When selecting the file name from the list

4)-1

Press the menu .



The cursor appears in the list.

<Program>	<Char>	<Comment>
10011	518	93.01.20 13:43
10012	130	93.01.20 13:43
10013	100	93.01.20 13:43
10014	162	93.01.20 13:43
10015	80	93.01.20 13:43
10016	160	93.01.20 13:43

4)-2

Move the cursor to file name to be selected, and fix.
,



The selected file name appears in the data setting area.

4)-3

Press the key.



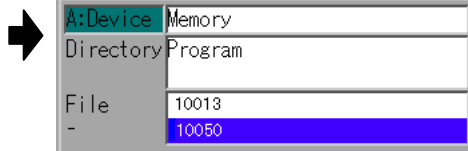
The selected file name appears.

A:Device	Memory
Directory	Program
File	10013
-	

(4) Designating multiple files

Multiple serial files can be transferred and erased in the file setting column A. Set as follows in this case.

File : First file name
 - : Last file name



(5) Selecting an NC memory file other than a program

1)

Press the menu .



The following menu appears.

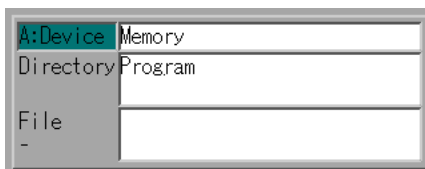
Memory	RS232C	FLD A:	HD D:			
--------	--------	--------	-------	--	--	--

2)

Press the menu .



"Memory" appears in the device name, and the default "Program" appears in the directory.



3)

Select the menu .



The following menu appears.

List	Program	Param	PLC prog	NC data	
------	---------	-------	----------	---------	--

4)

Press the menu .



The names of the NC data files will be listed.

5)

Press the menu .



The following menu will appear.

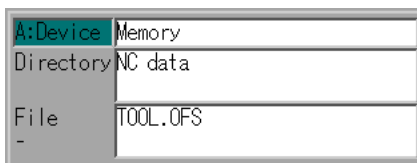
List	Tool offset	Work offset	Common variabl	Custom variabl	SRAM data
------	-------------	-------------	----------------	----------------	-----------

6)

Select the required file from the menu.



Directory and file name will appear.



(Note) Refer to "3.5.8 List of file names" for details on the file names.

(6) Selecting a device file other than the NC memory

1) Press the menu .

➔ The following menu appears.

Memory	RS232C	FLD A:	HD D:			
--------	--------	--------	-------	--	--	--

2) Select a device.

➔ The device name appears. The root directory is selected as the default.

A:Device	HD D:
Directory	/
File	-

3) Designate the directory. Select the menu .

➔ The mode changes to the mode for inputting the directory name. The following menu appears.

From list						
-----------	--	--	--	--	--	--

■ When inputting the directory from the data setting area

4) Input the directory path as a full path.

➔

A:Device	HD D:
Directory	/PRG/PRECUT/
File	-

Next, refer to the operation in step 5).

■ When selecting the directory from the list

4)-1 Press the menu .

➔ The cursor appears in the list.

4)-2 Move the cursor to directory to be selected, and fix. ,

➔ The selected directory appears in the data setting column. The contents of the selected directory appear in the list.

A:Device	HD D:
Directory	/PRG/PRECUT/
File	-

Repeat this operation until the target directory is reached. When the target directory is reached, press the key and quit the mode for inputting the directory. Next, refer to the operation in step 5).

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5)

Designate the file name.
Press the menu .



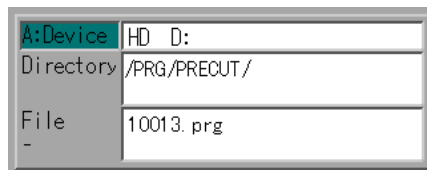
The mode changes to the mode for inputting the file name.
The following menu appears.

From list						
-----------	--	--	--	--	--	--

■ When inputting the file name from the data setting area

6)

Input the file name.
10013.prg



■ When selecting the file name from the list

6)-1

Press the menu .



The cursor appears in the list.

<Program>	<Char>	<Comment>
10011	518	93.01.20 13:43
10012	130	93.01.20 13:43
10013	100	93.01.20 13:43
10014	162	93.01.20 13:43
10015	80	93.01.20 13:43

6)-2

Move the cursor to file name to be selected, and fix.
 ,



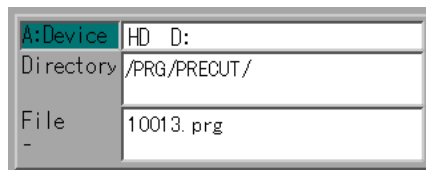
The selected file name appears in the data setting area.

6)-3

Press the key.





The selected file name appears.

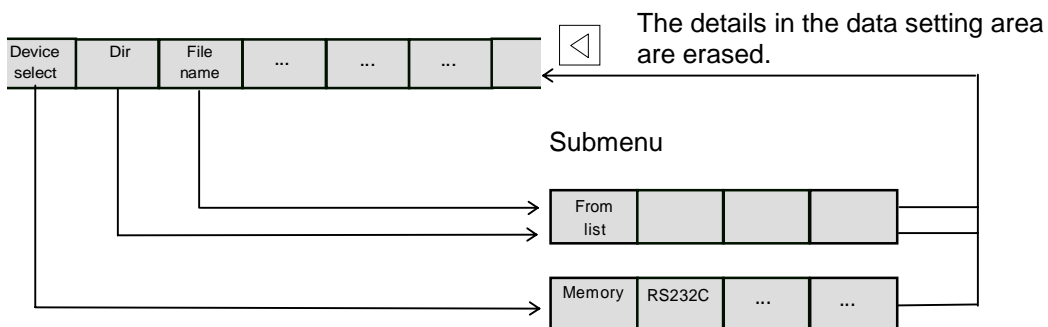



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(7) Canceling the input mode

- 1) When the **Device select**, **Dir** or **File name** menu is pressed, a submenu appears.
- 2) To cancel the data input at this time, press the  key.
- 3) When the  key is pressed, the details in the data setting area are erased, and the main menu appears.

Main menu



(Note) If the  key is pressed when selecting the file name, the file name displayed at the data setting area will be erased.
The file name currently displayed in the file name setting area will not be erased.

3.5.2 Transferring a file

This section explains the method of transferring files between differing devices, or between the same type devices.

Refer to "3.5.1 Selecting a device, directory, and file" for the method of designating device, directory and files.

The various conditions during transfer such as port No. and device No. are set in the Input/Output param screen.

(1) Transferring a file

1)

Press the menu Area change, and select file setting column A.

2)

Designate the transfer origin device, directory and file name.



The designated file appears. Multiple files can be designated in the file setting column A. Designate the first and last file name of the target range. A wildcard "*" can be designated for the file name.

3)

Press the menu Area change, and select file setting column B.

4)

Designate the transfer destination device, directory and file name.



The designated file appears.

5)

Press the menu Trnsfr A ->B.



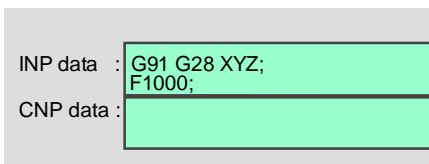
A message appears to confirm the transfer.

6)

Press Y or INPUT.



The file transfer starts. The data being transferred appears in the input data display column. A message appears when the transfer is completed.



Caution



" ; " "EOB" and " % " "EOR" are symbols used for explanation. The actual codes for ISO are: "CR, LF", or "LF" and "%".

Programs created on the Edit screen are stored in the NC memory in a "CR, LF" format, but programs created with external devices such as the FLD or RS-232C may be stored in an "LF" format.

The actual codes for EIA are: "EOB (End of Block)" and "EOR (End of Record)".



To prevent the influence of data loss and data transformation over the line, always carry out data comparison after transferring a machining program.

(2) Notes

■ **Notes related to transferring in general**

- 1) Depending on the type of file, some data cannot be transferred during automatic operation. Do not transfer during automatic operation.
- 2) When the capacity of the transfer destination is reached during file transfer, only the data transferred up to that point is registered as a file, and an error will result.
- 3) During input to the NC memory or comparison, if the file format size on the NC memory side differs from the other side file format size (when the maximum number of registrations differs between the NC memory and the other side), processing is carried out matched to the smaller size.

(Ex. 1) If a format size of 200 files is input for a format size of 1000 NC files, 200 files are registered.

(Ex. 2) If a format size of 1000 files is input for a format size of 200 NC files, the files up to the 200th file are registered and an error message appears. (The remaining files are not registered.)

■ **Notes when transferring machining program files**

- 1) For the RS-232C, always set feed (Null) at both ends of the "EOR" code at the head and end. If "EOB" etc., is directly after "EOR", the operation may not execute normally due to the input buffer influence during the next input operation.
- 2) The baud rate is slower if there are many registrations.
- 3) The size of one block of the machining program transferred should be 250 characters or less.
- 4) When using tape, carry out parity V adjustment to improve the reliability of the tape format. Then use with the Input/output parameter "Parity V" validated.
- 5) When the machine manufacturer macro and Fixed cycle program are input, change the program type with the parameter (fix_P). Also, set in the Input/Output screen as follows.
Device: Memory, Directory: Program
- 6) With machining program created before the MELDAS500 Series, "EOB" is registered as "LF". However, when these programs are stored in the MELDAS600 Series NC memory, "EOB" will be converted to "CR LF", and the number of characters will increase. Thus, when all of the machining programs output from an MELDAS500 Series or earlier NC, having the same specifications as the maximum memory capacity, are stored in the MELDAS600 Series NC memory, the memory capacity may be exceeded.

■ **Notes when transferring parameter files**

- 1) In the same manner as when setting in the Parameter screen, there are parameters validated immediately after input, and parameters validated after a restart. Restart when a parameter file has been transferred to the NC memory.
- 2) When a parameter file is transferred to the NC memory, the setting value of the Input/output parameters is also changed. Before transferring again, set the Input/output parameters again.

■ **Notes when transferring common variable data files**

- 1) If the variable value is 100000 or more or less than 0.0001 when transferring common variable data, it is expressed with an exponential expression.

3.5.3 Comparing files (Compare)

This section explains the method of comparing transferred files.

Refer to "3.5.1 Selecting a device, directory and file" for the method of designating a device, directory and file.

(1) Comparing files

1)

Press the menu
[Area change], and select file
setting column A.

2)

Designate the device,
directory and file name to be
compared.



The designated file name appears.

3)

Press the menu
[Area change], and select file
setting column B.

4)

Designate the other side
device, directory and file
name to be compared.



The designated file name appears.

5)

Press the menu
[Compare A:B].



The file comparison starts. The data being compared
appears in the comparison data display column.
A message appears when the comparison is
completed.

If a comparison error occurs, the block with the error is
displayed in the comparison data display column on the
screen.

```
INP data: G90 G28 XYZ;  
          F1000;  
CMP data: G91 G28 XYZ;  
          F1000;
```

(Note) Comparison is not possible for blocks having 251 characters or more when files are compared on the Input/Output screen. (An error occurs.)
The size of one block of data should be within 250 characters.

3.5.4 Erasing a file

This section explains the method of erasing a file.

Refer to "3.5.1 Selecting a device, directory and file" for the method of designating a device, directory and file.

(1) Erasing a file **Erase A**

1)

Press the menu
Area change, and select file
setting column A.

2)

Designate the device,
directory and file name to be
erased.



The designated file appears.

3)

Press the menu **Erase A**.



A message to confirm the erasing appears.

4)

Press **Y** or **INPUT**.



The file is erased.
A message appears when the erasing is completed.
The number of programs registered, number of
memory characters and remainder reappear. Press the
List update menu to update the list.

(2) Erasing a file **Erase B**

The operations are the same as method (1) above. Set the target device, directory and file name in the file setting column B, and press the menu **Erase B**.

3.5.5 Changing a file name (Rename)

This section explains the method of changing a file name.

Refer to "3.5.1 Selecting a device, directory and file" for the method of designating a device, directory and file.

(1) Changing a file name

1)

Press the menu ,
and select file setting column
A.

2)

Designate the original device,
directory and file name.



The designated original file name appears.

3)

Press the menu ,
and select file setting column
B.

4)

Designate the new device,
directory and file name.



The designated new file name appears.

5)

Press the menu
.



A message confirming the operation will appear.

6)

Press or .



Renaming of the file starts.
A message appears when the renaming is completed.

(Note 1) Make sure the original and new devices are the same.

(Note 2) If the file to be renamed is running, an error occurs, and the name is not changed.

(Note 3) If a file that does not exist is designated for the original file, or if an existing file name is designated for the new file selection, an error occurs, and the name is not changed.

3.5.6 Creating a directory

This section explains the method of creating a directory.

Refer to "3.5.1 Selecting a device, directory and file" for the method of designating a device, directory and file.

(1) Creating a directory

1)

Press the menu ,
and select file setting column
A.

2)

Designate the device.



The designated details appear.

3)

Designate the directory where
the new directory is to be
created.



The designated details appear.

4)

Set the new directory in file
setting column A.



The designated details appear.

5)

Press the menu .



The designated directory is created.

The directory can also be created in file setting column B.

(Note) Select HD or FLD for the device.

3.5.7 Formatting an FLD

This section explains the method for formatting an FLD.

(1) Formatting an FLD

1)

Insert a floppy disk in the FLD
drive, and press .



A message confirming the formatting appears.

2)

Press or .



The FLD is formatted.
A message appears when the formatting is completed.

(Note) The FLD is formatted with the 1.44MB format.

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3.5.8 List of file names

There is a directory for each type of data in the NC memory.
Each directory and file name (fixed) in the NC memory is shown below.
Do not change the extensions (.XXX) when storing in a device other than the NC memory.

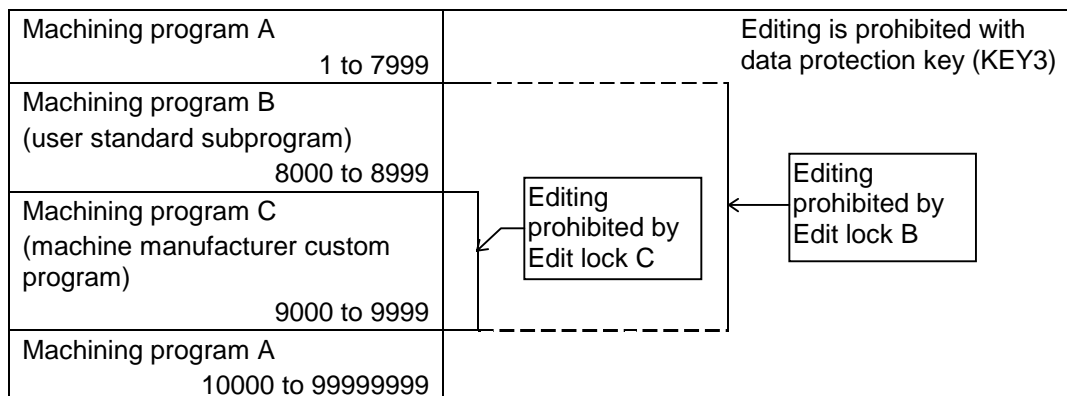
Data type	NC memory directory path	Fixed file name
Machining program	M01:/PRG/USER/	Program No.PRG
User macro program	M01:/PRG/UMACRO/	Program No.PRG
Machine maker macro program	M01:/PRG/MMACRO/	Program No.PRG
Fixed cycle program	M01:/PRG/FIX/	Program No.PRG
MDI program	M01:/PRG/MDI/	MDI.PRG
Tool offset data	M01:/DAT/	TOOL.OFS
Workpiece offset data	M01:/DAT/	WORK.OFS
Common variable	M01:/DAT/	COMMON.VAR
Custom variable	M01:/DAT/	CUSTOM.VAR
Parameter	M01:/PRM/	PARAMET.BIN
	M01:/PRM/	All.PRM
	M01:/PRM/	SYSCFG.BIN
PLC program	M01:/LAD/	USERPLC.LAD (SRAM)
	M01:/LAD/	FROM-A.LAD (FROM A)
	M01:/LAD/	FROM-B.LAD (FROM B)
R register data	M01:/REG/	RREG.REG
T register data	M01:/REG/	TREG.REG
C register data	M01:/REG/	CREG.REG

(Note) The machine manufacturer macros are optional specifications.

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3.5.9 Edit lock B and C

This function prohibits editing, erasing, etc., of the machining programs B and C, and protects the machining programs.



(Note) The machine manufacturer macros (machine manufacturer custom programs) are optional specifications.

The operations below in the Edit/MDI and the Input/Output screens are influenced by the edit lock setting. An error will result if operations that are not possible are attempted. When the edit lock is valid, processing is executed (except the edit lock target program) by the input/output function.

○ : Operation possible × : Operation not possible

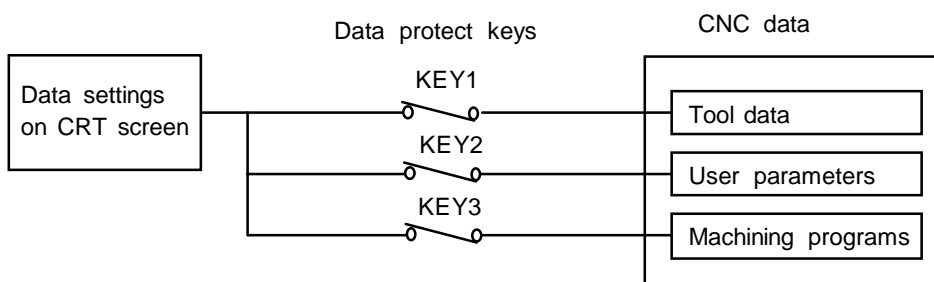
Screen	Operation	Edit lock B			Edit lock C		
		Machining program			Machining program		
		A	B	C	A	B	C
Edit	Search	○	×	×	○	○	×
	Edit	○	×	×	○	○	×
	MDI registration	○	×	×	○	○	×
Input/Output	Transfer	○	×	×	○	○	×
	Compare	○	×	×	○	○	×
	Copy	○	×	×	○	○	×
	Condense	○	×	×	○	○	×
	Merge	○	×	×	○	○	×
	Rename	○	×	×	○	○	×
	Erase	○	×	×	○	○	×
Position display2	Buffer correction	○	×	×	○	○	×

3.5.10 Data protect keys

The data protect keys can be used to prohibit data setting and erasure, etc. The following three keys are available. (Their names differ according to the machine manufacturer. For further details, refer to the instruction manual issued by the machine manufacturer.)

- 1) KEY 1 : For protecting all kinds of tool data, and for protecting coordinate system presettings based on origin set
- 2) KEY 2 : For protecting user parameters and common variables
- 3) KEY 3 : For protecting machining programs

Each of the keys prohibits setting and erasing at the OFF position.



(1) Tool data protection (KEY 1)

The operations listed in Table 1 are prohibited when KEY 1 is OFF.

Table 1 Data protected by KEY1

No.	Operation	Screen
1	Origin set	Position display1
2	Tool offset amount setting/erasing	Tool wear data/Tool data
3	Tool life data setting/erasing	Tool life manage
4	Workpiece coordinate offset amount setting/erasing	Coord offset
5	Tool offset amount input/output	Input/Output
6	Tool data input/output	Input/Output
7	Tool life data input/output	Input/Output
8	Workpiece coordinate offset amount input/output	Input/Output

(Note) If an operation shown in Table 1 is attempted when KEY1 is OFF, the message "Data protect" will appear.
 Inputting and outputting cannot be carried out on the Input/Output screen.
 If origin set is attempted on the Position display1 screen and the INPUT key is pressed, the origin set is not executed, and the message "Origin set not possible" appears.

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(2) User parameter, common variable protection (KEY 2)

The operations listed in Table 2 are prohibited when KEY 2 is OFF.

Table 2 Data protected by KEY 2

No.	Operation	Screen
1	Control parameter ON/OFF	Control param
2	Axis parameter setting	Axis param
3	Setup parameter setting	Setup param
4	Machining parameter setting	Process param
5	Common variable setting	Common variable
6	I/O parameter setting	I/O param
7	Parameter input/output	Input/Output
8	Common variable input/output	Input/Output

(Note) If an operation shown in Table 2 is attempted when KEY2 is OFF, the message "Data protect" will appear.
Inputting and outputting cannot be carried out on the Input/Output screen.

(3) Machining program protection (KEY 3)

The operations listed in Table 3 are prohibited when KEY 3 is OFF.

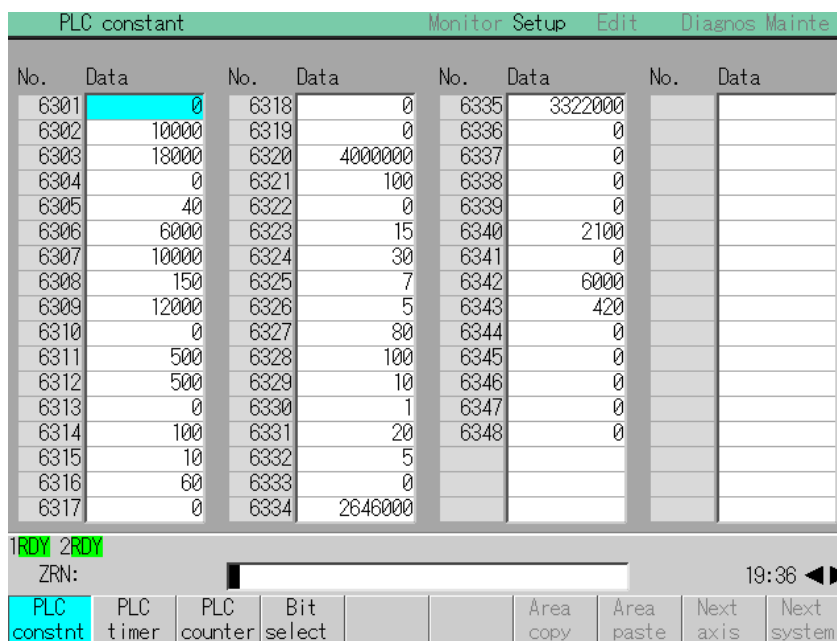
Table 3 Data protected by KEY3

No.	Operation	Screen	Expansion menu
1	MDI data memory register	MDI	MDI regist
2	Machining program editing	Edit	–
3	New machining program creating	Edit	Newly create
4	Registered program comment setting	Edit	List
5	Machining program memory, compare, input/output	Input/Output	–
6	Machining program erasing (single, all)	Input/Output	–
7	Registered program comment setting	Input/Output	–
8	Machining program copy, number change	Input/Output	–
9	Machining program buffer correction	Position display2	–

(Note) If an operation shown in Table 3 is attempted when KEY3 is OFF, the message "Data protect" will appear.
Inputting and outputting cannot be carried out on the Input/Output screen.

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- 3. Screen on which common parameters are set for the axes and devices, and on which the parameter names are not displayed. (Machine error data, PLC constant, etc.)



(1) Menu

Menu	Details	Type	Reference
Area copy	This copies the parameter setting values in the designated range. The range is designated with numbers.	A	3.6.2 Copying/pasting parameters
Area paste	This pastes the range of parameters designated in area copy. They are pasted in a parameter corresponding to the axis or system where the cursor is at. Once copied, a parameter can be pasted any number of times until a new parameter is copied.	B	
Next axis	This can be selected when there are five or more axes displayed for all systems. This is used on the screen for the parameters having an array structure for each axis.	C	1.5.4 Changing the display axis
Next system	This can be selected when there are two or more systems displayed. This is used on the parameter screen for each system.	C	1.5.6 Changing the display system
Axis param Setup param I/O param Barrier data	This changes the screen to the user parameter screen.	C	3.7 User parameter details

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Menu	Details	Type	Reference
BaseAx param	<p>This changes the screen to the Machine parameter screen.</p> <p>(Note) Normally, the Machine parameters can be referred to, but cannot be set.</p>	C	-
BaseSys param			
BaseCom param			
Axis spec			
ZP-rtn param			
Servo param			
Spindle NC prm			
Spindle param			
Spindle typ sv			
PLC constnt			
PLC timer			
PLC counter			
Bit select			
Custom variabl			
Macro list			
Posn switch			
Er comp param			
Er comp data			
Variabl clear	This is used to erase the variables when the Custom variable screen is selected.	A	-

3.6.1 Setting the parameters

The method of setting the parameters is explained. For the setting range of each parameter, refer to "3.7 User parameter details" and the separate instruction manual.

Press the menu key to select the parameter screen, and select the data to be set with the cursor key.

(1) Setting "0" in "8201 Mirror image"

1)

Press the menu .

2)

Use the , , , and keys to move the cursor to the position to be set.

➔ The cursor moves to the position of the setting target data.

No.	Name	X
8201	Mirror image	1
8202	Automatic dog type	0
8203	Manual dog type	0
8204	Axis removal	0
8207	Soft limit invalid	0

3)

Input the value.
0

➔ The setting value appears, and the cursor moves. Parameters not having a * mark are validated after setting.

No.	Name	X
8201	Mirror image	0
8202	Automatic dog type	0
8203	Manual dog type	0
8204	Axis removal	0
8207	Soft limit invalid	0

4)

Continue setting the values. Lastly, restart the computer.

➔ Parameters with a * mark are valid.

3.6.2 Copying/pasting parameters

The parameters can be copied and pasted to the parameters with the same number in another axis.

(1) Copying the line where the cursor is at

1)

Move the cursor to the parameter to be copied.

2)

Select area copy.
Menu



The menu is highlighted.
 The parameter setting value at the cursor position is highlighted.
 The menu highlight returns to normal.

No.	Name	X1
8201	Mirror image	0
8202	Automatic dog type	0
8203	Manual dog type	1
8204	Axis removal	0
8207	Soft limit invalid	1
8208	Soft limit (-)	1.000
8209	Soft limit (+)	1.000

(2) Designating and copying a range

1)

Move the cursor to the display area of the axes to be copied.

2)

Press the menu .



The menu is highlighted.

3)

Designate the copy range.
 Format: First No./Last No.
 8208/8209



The copy target range is highlighted.
 The menu highlight returns to normal.

No.	Name	X1
8201	Mirror image	0
8202	Automatic dog type	0
8203	Manual dog type	1
8204	Axis removal	0
8207	Soft limit invalid	1
8208	Soft limit (-)	1.000
8209	Soft limit (+)	1.000

(Note 1) If the key is pressed without setting a number, the parameter where the cursor is at is copied.

(Note 2) The copy target range highlight returns to the normal display by pasting.

(3) Pasting the copied data

1)

Move the cursor to the axis or displayed area where the data will be pasted.

2)

Press the menu key
Area paste.



The menu is highlighted, and a message confirming the operation appears.

3)

Press the **Y** or **INPUT** key.



The copied data is written to the parameter with the same number as when copied, in the area where the cursor is at.

The copied data is not written in when the **N** key is pressed.

The menu highlight returns to normal.

3.7 User parameter details

Each user parameter screen can be selected from the Parameter screen. This section explains the user parameter details and setting range.

Refer to "3.6 Parameter screens" for details on Parameter screen operations.

■ **User parameter menu**

Menu	Details	Type	Reference
Axis param	This changes the screen to the Axis param screen.	C	3.7.1 Axis Parameter
Setup param	This changes the screen to the Setup param screen.	C	3.7.2 Setup Parameter
I/O param	This changes the screen to the I/O param screen.	C	3.7.3 Input/Output Parameter
Barrier data	The Barrier data screen will open.	C	3.7.4 Barrier Data

(Note) The * mark next to a name means that the parameter is validated after restarting.

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Number	Name	Details	Setting range (units)
8208	Soft limit (-)	<p>The movable range in the negative and positive directions from the zero point of the basic machine coordinate system is set for each axis.</p> <div style="text-align: center; border: 1px solid black; padding: 10px;"> </div>	99999.999 to 99999.999 (mm)
8209	Soft limit (+)		<p>If the same value (other than 0) is set for 8208 and 8209, this function will be invalidated.</p> <p>(Example)</p> <p style="padding-left: 40px;">8208 = 10. 8209 = 10.</p>

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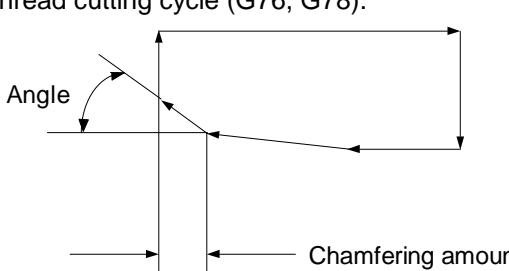
3.7.2 Setup Parameter (Setup param screen)

Set the Setup parameters. Parameters with a "*" mark added are validated after restarting.

\$1 Setup param			Monitor	Setup	Edit	Diagnos	Mainte
No.	Name	Data	No.	Name	Data		
8001	Plane <I>	X	8021	Angle	60		
8002	<J>	Y	8022	G71 Pocket	1		
8003	<K>	Z	8023	G73 Cut X	0.000		
8004	Aux-plane <I>		8024	Cut Z	0.000		
8005	<J>		8025	Times	0		
8006	<K>		8026	G83 Retract	0.500		
8010	G02/G03 Error	0.010	8031	Tool wear max	10.000		
8011	Chamfer value	15	8032	inc max	10.000		
8012	Chamfer angle	45	8033	Auto TLM speed	1000		
8013	G71 Minimum thick	0.000	8034	zone r	0.000		
8014	Delta-D	0.020	8035	zone d	0.000		
8015	Pull up	5.000	8051	Constant speed	1800		
8016	Thick	20.000	8052	Interval	1.0		
8017	G74 Retract	0.200	8053	Control*	02		
8018	G76 Finishing	0.020	8055	Scrn saver time-out	0		
8019	Minimum thick	0.010	8056	Intrf byps time-out	0		
8020	Times	2	8057	Corner check angle	0		

1RDY 2RDY
 ZRN: _____ 19:35

Axis param **Setup param** I/O param Barrier data Area copy Area paste Next axis Next system

#	Item	Details	Setting range (unit)
8001 8002 8003	Plane <I> <J> <K>	These set the control axis addresses corresponding to the plane selection. The tool compensation axis becomes the axis set in I, J, and K.	X, Z, Y and other control axis addresses
8004 8005 8006	Aux-plane <I> <J> <K>	These set the parallel axis addresses corresponding to the above setting axes.	
8007			
8008			
8009			
8010	G02/G03 Error	This sets the tolerance for the radial error at the end point of the circular command.	0 to 0.100 (mm)
8011	Chamfer value	This sets the chamfering distance of the thread area in the thread cutting cycle (G76, G78).	0 to 127 (0.1 lead)
8012	Chamfer angle	This sets the chamfering angle of the thread area in the thread cutting cycle (G76, G78). 	0 to 89 (°)

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#	Item	Details	Setting range (unit)
8013	G71 Minimum thick	This sets the remainder as the cut amount at the end of the rough cutting cycle (G71, G72). But the cycle is not undertaken when this is less than the value set by the parameter.	0 to 99.999 (mm)
8014	Delta-D	The value (d) commanded with D is used as the reference for the rough cutting cycle (G71, G72) cut amount, and $d - \Delta d$, d , $d + \Delta d$ are repeated. Cut change amount Δd is set.	0 to 99.999 (mm)
8015	Pull up	This sets the amount of retraction when a return is made to the cutting start point in the rough cutting cycle (G71, G72).	0 to 99.999 (mm)
8016	Thick	This sets the cut amount in the rough cutting cycle (G71, G72). <div style="text-align: center;"> </div>	0 to 99.999 (mm)
8017	G74 Retract	This sets the chamfering amount (retraction) in the cut-off cycle (G74, G75). <div style="text-align: center;"> </div>	0 to 99.999 (mm)
8018	G76 Finishing	This sets the final cut amount in the compound thread cutting cycle (G76). <div style="text-align: center;"> </div>	0 to 99.999 (mm)
8019	Minimum thick	The minimum cut amount is used for cutting when the value is less than the mini-cut amount with constant cutting at the cut amount in the compound thread cutting cycle (G76). G code types (1) and (2) apply for the above mentioned code.	0 to 99.999 (mm)

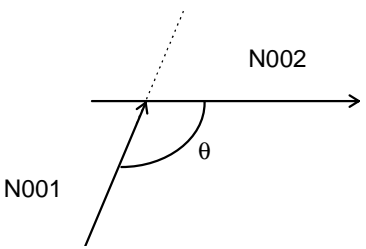
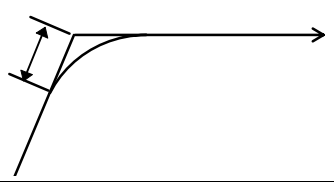
CHAPTER 1 SCREEN OPERATIONS
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#	Item	Details	Setting range (unit)
8020	Times	This sets the times the final cut amount (G76 Finishing) is divided in the compound thread-cutting cycle (G76).	0 to 99 (rev)
8021	Angle	This sets the angle of the tool nose (thread angle) for the G76 command.	0 to 99 (°)
8022	G71 Pocket	This sets the pocket machining in the rough cutting cycle (G71, G72) finish program when there is a cavity (pocket).	0: Pocket machining OFF 1: Pocket machining ON
8023	G73 CUT X	This sets the X-axis cutting allowance in the formed rough cutting cycle (G73).	0 to 99.999 (mm)
8024	CUT Z	This sets the Z-axis cutting allowance for G73.	0 to 99.999 (mm)
8025	Times	This sets the number of G73 cutting passes.	0 to 99999 (rev)
8026	G83 Retract	With the second and subsequent cutting passes in the deep-hole drilling cycle (G83). This moves the tool by rapid traverse from the position machined immediately before by the amount equivalent to the setting, and then establishes cutting feed.	0 to 99.999 (mm)
8027 to 8030			
8031	Tool wear max	This sets the maximum value check data in the input data when the tool wear data is set.	0 to 99.999 (mm)
8032	inc max	This sets the maximum value check data in the input data when the tool wear data is added. (Note) When the setting is "0", the maximum value check is not performed.	0 to 99.999 (mm)
8033	Auto TLM speed	[Automatic tool length measurement] Deceleration start point Start point	This sets the feedrate for automatic tool length measurement.
8034	zone r		This sets the distance from the measurement point to the deceleration start point.
8035	zone d		This sets the area of the point where the tool should stop.
8051	Constant speed	This sets the speed constant in the program check operation function.	1 to 60000
8052	Interval	This sets the frame feed time (from start up to pause) in the frame feed operation function.	0 to 9.9 (s)

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#	Item	Details	Setting range (unit)																																	
8053	Control*	<p>These are the parameters that select machine functions.</p> <table style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr> <td style="text-align: center; padding: 0 5px;">7</td> <td style="text-align: center; padding: 0 5px;">6</td> <td style="text-align: center; padding: 0 5px;">5</td> <td style="text-align: center; padding: 0 5px;">4</td> <td style="text-align: center; padding: 0 5px;">3</td> <td style="text-align: center; padding: 0 5px;">2</td> <td style="text-align: center; padding: 0 5px;">1</td> <td style="text-align: center; padding: 0 5px;">0</td> </tr> <tr> <td style="border: 1px solid black; width: 20px; height: 15px;"></td> <td style="border: 1px solid black; width: 20px; height: 15px;"></td> <td style="border: 1px solid black; width: 20px; height: 15px; text-align: center;">VDEG</td> <td style="border: 1px solid black; width: 20px; height: 15px;"></td> <td style="border: 1px solid black; width: 20px; height: 15px; text-align: center;">SGC</td> <td style="border: 1px solid black; width: 20px; height: 15px; text-align: center;">THU</td> <td style="border: 1px solid black; width: 20px; height: 15px; text-align: center;">LTC</td> <td style="border: 1px solid black; width: 20px; height: 15px;"></td> </tr> </table> <p>bit0: LTC (Linear type rotation axis function) 0: Invalid 1: Valid [This parameter is, however, valid when the Basic common parameter "1328 sp_2 bit7" is set to 0 (common to systems).]</p> <p>bit1: THU (High-precision thread cutting) 0: Invalid (normal thread cutting) 1: Valid This is effective when the thread cutting is valid (chamfering is invalid) during thread cutting fixed cycle (G78) or compound thread cutting Fixed cycle (G76).</p> <p>bit2: SGC Select whether to change the servo gain of the related axis when the C axis is selected for the Spindle/C axis function. 0: Do not change the position loop gain. 1: Change the position loop gain.</p> <p>bit4, 5: VDEG (angle between vectors) Set the angle between vectors for canceling the automatic insertion block during the nose R compensation mode. If the angle between vectors is set to 0° (VDEG="00"), the automatic insertion block will be validated. Normally, set this to "00".</p> <table style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">VDEG</th> <th rowspan="2" style="text-align: center;">Angle between vectors</th> </tr> <tr> <th style="text-align: center;">Bit5</th> <th style="text-align: center;">Bit4</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0°</td> </tr> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2°</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">0</td> <td style="text-align: center;">4°</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">8°</td> </tr> </tbody> </table> <p>bit3, bit6, bit7: Not used. Normally set to "0".</p>	7	6	5	4	3	2	1	0			VDEG		SGC	THU	LTC		VDEG		Angle between vectors	Bit5	Bit4	0	0	0°	0	1	2°	1	0	4°	1	1	8°	00 to FF (hexadecimal)
7	6	5	4	3	2	1	0																													
		VDEG		SGC	THU	LTC																														
VDEG		Angle between vectors																																		
Bit5	Bit4																																			
0	0	0°																																		
0	1	2°																																		
1	0	4°																																		
1	1	8°																																		
8055	Scrn saver time-out	Not used.	0																																	
8056	Intrf byps time-out	<p>This sets the time from axis stop to the time an interference alarm is output when the interfering object axis movement stops during interference bypass execution. The interference alarm will not be output when the setting value is "0".</p>	0 to 255 (s)																																	

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#	Item	Details	Setting range (unit)
8057	Corner check angle	<p>If the angle between blocks (inner angle) in automatic error detect is less than the set value, this judges a corner, and controls the start timing of the next block.</p> 	0 to 180 (°)
8058	Corner check width	<p>After the block being executed has begun decelerating, this begins the next block if the position error amount of the command end point and the machine position is less than the set value.</p> 	0 to 99.999 (mm)
8059	Angle (G1 -> G0)	Not used.	0 to 180 (°)
8080	Counter selct invld*	This invalidates the display counter selection on the Position display screen.	0, 1
8081	Test mode	This validates the Windows key.	0, 1
8082	Default menu	This selects the menu when the screen is selected. 0: Operation menu for each screen 1: Screen selection menu	0, 1
8083	Program save type	This selects the method for saving the program in the Edit screen: 0: Save program being edited each time the <input type="text" value="INPUT"/> key is pressed. 1: Save program being edited with Save file menu.	0, 1
8084	STN contrast	This adjusts the contrast of STN display.	0 to 15
8085	Space mode in editor	This selects the method of displaying the program on the Edit screen: 0: Display input. 1: Display with inserting a space between each word.	0, 1
8086	Invalid gray menu*	This shows or hides the menus that cannot be operated: 0: Display as gray menus. 1: Do not display.	0, 1

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3. Setup Screens

#	Item	Details	Setting range (unit)																				
8090	Graphic disp scale	Set the display scale used for drawing a path on the Graphics screen.	0 to 999.999																				
8091	disp mode	Set the display plane for drawing a path on the Graphics screen. <table border="1" style="margin: 10px auto;"> <thead> <tr> <th>Setting value</th> <th>Display plane</th> <th>Setting value</th> <th>Display plane</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>ZX</td> <td>4</td> <td>YX</td> </tr> <tr> <td>1</td> <td>ZY</td> <td>5</td> <td>YZ</td> </tr> <tr> <td>2</td> <td>XZ</td> <td>6</td> <td>XYZ</td> </tr> <tr> <td>3</td> <td>ZY</td> <td></td> <td></td> </tr> </tbody> </table>	Setting value	Display plane	Setting value	Display plane	0	ZX	4	YX	1	ZY	5	YZ	2	XZ	6	XYZ	3	ZY			0 to 6
Setting value	Display plane	Setting value	Display plane																				
0	ZX	4	YX																				
1	ZY	5	YZ																				
2	XZ	6	XYZ																				
3	ZY																						
8092	coord change	Designate the coordinate system used when drawing a path on the Graphics screen. 0: Basic machine coordinate system 1: Workpiece coordinate system	0, 1																				
8093	direct <I>	Set the magnification of the display scale for the X axis (*1) drawn on the Graphics screen. When a negative value is set, the drawing direction will reverse.	-128 to 127																				
8094	direct <J>	Set the magnification of the display scale for the Y axis (*2) drawn on the Graphics screen. When a negative value is set, the drawing direction will reverse.	-128 to 127																				
8095	direct <K>	Set the magnification of the display scale for the Z axis (*3) drawn on the Graphics screen. When a negative value is set, the drawing direction will reverse.	-128 to 127																				

- *1 Axis having command axis name that is the same as the axis name designated with the Setup parameter "8001 Plane <I>".
- *2 Axis having command axis name that is the same as the axis name designated with the Setup parameter "8002 Plane <J>".
- *3 Axis having command axis name that is the same as the axis name designated with the Setup parameter "8003 Plane <K>".

CHAPTER 1 SCREEN OPERATIONS
3. Setup Screens

3.7.3 Input/Output Parameter (I/O param screen)

The necessary parameters are set when transferring files between differing devices. Parameters with a "*" mark added are validated after restarting.

I/O param			Monitor Setup			Edit	Diagnos	Mainte
No.	Name	Data	No.	Name	Data			
9001	Data input port No.	0	9110	Dev 1 hndshk method	0			
9002	Data input dev No.	0	9111	Dev 1 DC code parity	0			
9003	Data output port No.	0	9112	Dev 1 DC2/DC4 output	0			
9004	Data output dev No.	0	9113	Dev 1 CR output	0			
9005	NC oper port No.	0	9114	Dev 1 EIA output	0			
9006	NC oper dev No.	0	9115	Dev 1 parity V	0			
9007	Macro print port No.	0	9116	Dev 1 timeout time	0			
9008	Macro print dev No.	0	9118	Dev 1 EIA code 1 [00			
9101	Dev 1 name		9119	Dev 1 EIA code 2]	00			
9102	Dev 1 baud rate	0	9120	Dev 1 EIA code 3 #	00			
9103	Dev 1 stop bit	0	9121	Dev 1 EIA code 4 *	00			
9104	Dev 1 parity valid	0	9122	Dev 1 EIA code 5 =	00			
9105	Dev 1 even parity	0	9123	Dev 1 EIA code 6:	00			
9106	Dev 1 char length	0	9124	Dev 1 printer type	0			
9107	Dev 1 termina type	0	9125	Dev 1 feed number	0			
9108	Dev 1 termina code 1	00	9126	Dev 1 rewind code	00			
9109	Dev 1 termina code 2	00	9201	Dev 2 name				

1RDY 2RDY
 ZRN: [] 19:35

Axis param	Setup param	I/O param	Barrier data		Area copy	Area paste	Next axis	Next system
------------	-------------	-----------	--------------	--	-----------	------------	-----------	-------------

Number	Name	Details	Setting range (units)
9001	Data input port No.	This sets the I/O port No. and device No. when each file of machining program, tool data, parameters, etc., is input from the external device to the NC memory.	<Port> 1 : Port 1 2 : Port 2
9002	Data input dev No.		
9003	Data output port No.	This sets the I/O port No. and device No. when each file of machining program, tool data, parameters, etc., is output from the NC memory to the external device.	<Device> 1 : Device No. <1> to 5 : Device No. <5>
9004	Data output dev No.		
9005	NC oper port No.	Not used.	
9006	NC oper dev No.		
9007	Macro print port No.	This sets the I/O port No. and device No. of the output device when carrying out an external output command in the user macro.	
9008	Macro print dev No.		

CHAPTER 1 SCREEN OPERATIONS
3. Setup Screens

Number	Name	Details	Setting range (units)																																
9101	Dev 1 name	This sets the device name corresponding to the device No. It is used to easily discriminate each device. (Ex.) PTR, PTP	Three characters (alphabetic, numeric and symbols) or less																																
9102	Dev 1 baud rate	This sets the data transfer speed.	300, 600, 1200, 2400, 4800, 9600, 19200 (bit/s)																																
9103	Dev 1 stop bit	This sets the stop bit length in the start stop method. The bit length is set matching the specifications of the input/output device. Refer to the item "9104 Dev 1 parity valid".	1 : 1 (bit) 2 : 1.5 3 : 2																																
9104	Dev 1 parity valid	This is the parameter when using a parity bit other than a data bit. It is set matching the specifications of the input/output device.	0 : No parity 1 : Parity																																
9105	Dev 1 even parity	This is the parameter that selects the odd or even parity when the parity above is valid. This parameter is ignored when the parity is invalid. It is set matching the specifications of the input/output device.	0 : Odd parity 1 : Even parity																																
9106	Dev 1 char length	This sets the data bit length. The character length (data bit) is set matching the specifications of the input/output device. Refer to the item "9104 Dev 1 parity valid".	0 : 5 bit 1 : 6 bit 2 : 7 bit 3 : 8 bit																																
9107	Dev 1 termina type	The code that terminates the data reading can be selected.	0 : No terminator 1 : EOR or EOB 2 : EOB 3 : EOR 4 : One random character 5 : Two random characters																																
9108	Dev 1 termina code 1	This sets the code that terminates the reading when the "9107 Dev 1 termina type" setting is "4" or "5".	0 to FF (hexadecimal)																																
9109	Dev 1 termina code 2	This sets the code that terminates the reading when the "9107 Dev 1 termina type" setting is "5".	0 to FF (hexadecimal)																																
9110	Dev 1 hndshk method	This is an RS-232C transmission control method. It is set matching the control method of the input/output device to be connected.	1 : RTS/CTS 2 : No handshake 3 : DC code method																																
9111	Dev 1 DC code parity	This is only valid when "2" is selected in "9110 Dev 1 hndshk method". It is a parity addition for the DC code. It is set matching the specifications of the input/output device. <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td></td> <td>8</td> <td>7</td> <td>6</td> <td>5</td> <td>4</td> <td>3</td> <td>2</td> <td>1</td> <td></td> </tr> <tr> <td rowspan="2" style="text-align: center;">DC-3</td> <td style="text-align: center;">No parity</td> <td></td> <td></td> <td></td> <td style="text-align: center;">○</td> <td></td> <td></td> <td style="text-align: center;">○</td> <td style="text-align: center;">○</td> <td style="text-align: right;">(13H)</td> </tr> <tr> <td style="text-align: center;">Parity</td> <td style="text-align: center;">○</td> <td></td> <td></td> <td style="text-align: center;">○</td> <td></td> <td></td> <td style="text-align: center;">○</td> <td style="text-align: center;">○</td> <td style="text-align: right;">(93H)</td> </tr> </table>			8	7	6	5	4	3	2	1		DC-3	No parity				○			○	○	(13H)	Parity	○			○			○	○	(93H)	0 : No DC code parity 1 : Even code parity for DC codes
		8	7	6	5	4	3	2	1																										
DC-3	No parity				○			○	○	(13H)																									
	Parity	○			○			○	○	(93H)																									

CHAPTER 1 SCREEN OPERATIONS
3. Setup Screens

Number	Name	Details	Setting range (units)
9112	Dev 1 DC2/DC4 output	This is set when starting the output device with a DC code while transmitting data from the NC memory to the output device. It is set matching the specifications of the output device.	0 : DC2 invalid DC4 invalid 1 : DC2 valid DC4 invalid 2 : DC2 invalid DC4 valid 3 : DC2 valid DC4 valid
9113	Dev 1 CR output	During output with the ISO code, this is set when inserting a <CR> code immediately before the EOB (L/F) code.	0 : Invalid 1 : Valid
9114	Dev1 EIA output	During data output, this sets output by either the ISO code or EIA code. The ISO/EIA are automatically judged during data input.	0 : ISO output 1 : EIA output
9115	Dev 1 parity V	During data input into the NC memory, this is set when checking the parity V in one block.	0 : Invalid 1 : Valid
9116	Dev 1 timeout time	During data transfer, this set the timeout time that detects the interruption of the data transfer. An error occurs when the reading of one block or output time of 250 characters exceeds the designated time (timeout time), due to an input/output device fault or an exchange in the transmission. The timeout time setting must be changed depending on the transfer speed.	0 to 999 (0.1s)
9118	Dev 1 EIA code 1 [An alternate code can be designated for the codes at left that exist in the ISO but not in the EIA. Designate codes (odd-numbered codes) that do not duplicate preexisting EIA codes, and will not become parity H. (Note) Do not designate the following codes. 0 to 9, A to Z, +, -, •, ', EOR, EOB, (,), BS, TAB, SP, &, DEL, DC1 to DC4	0 to FF
9119	Dev 1 EIA code 2]		
9120	Dev 1 EIA code 3 #		
9121	Dev 1 EIA code 4 *		
9122	Dev 1 EIA code 5 =		
9123	Dev 1 EIA code 6 :		
9124	Dev 1 printer type	This sets the type of printer to output to. (Valid for device name PTR.)	0 : Other than device name PTR 1 : Mitsubishi printer 2 : EPSON (ESC/P)

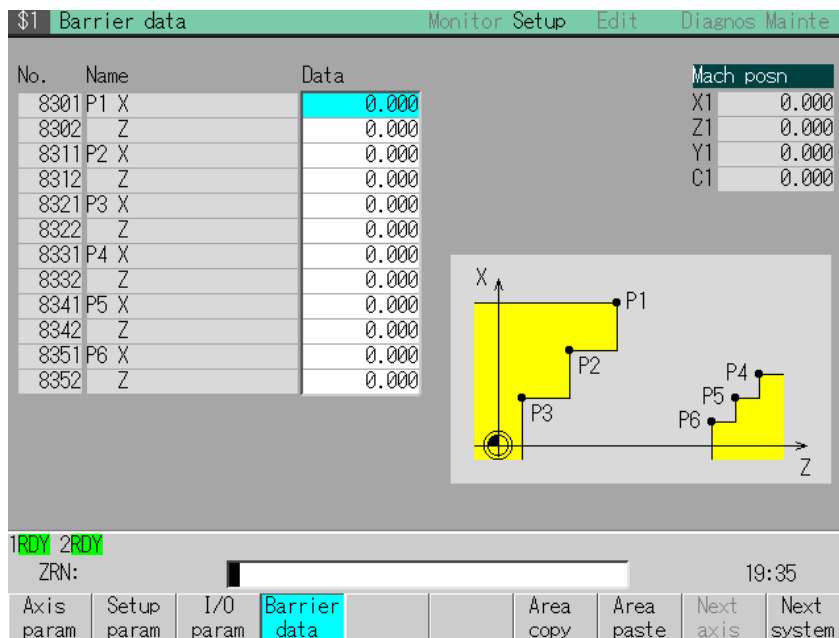
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3. Setup Screens

Number	Name	Details	Setting range (units)
9125	Dev 1 feed number	This designates the length of the paper tape feed section (feed holes only) output before and after the data when outputting the tape. The length is set as a number of characters. The feed length is the same for both before and after the data.	0 to 999 (characters)
9126	Dev 1 rewind code	This sets the tape rewind code. Set the rewind code of the tape reader device being used. (Note) The tape will not rewind when "0" is set, even if a rewind command is issued.	0 to FF
9201 to 9226	Dev 2 parameters	Same as Dev 1.	Same as Dev 1.
9301 to 9326	Dev 3 parameters	Same as Dev 1.	Same as Dev 1.
9401 to 9426	Dev 4 parameters	Same as Dev 1.	Same as Dev 1.
9501 to 9526	Dev 5 parameters	Same as Dev 1.	Same as Dev 1.

CHAPTER 1 SCREEN OPERATIONS
3. Setup Screens

3.7.4 Barrier data (Barrier data screen)

Set the barrier data on this screen.



#	Item	Details	Setting range (unit)
8301	P1 X	<p>Three points of the chuck barrier or tailstock barrier can be set as a parameters. These are set with the basic machine coordinate system.</p> <p>Points P1, P2 and P3 are the chuck barrier, and points P4, P5 and P6 are the tailstock barrier.</p> <p>The barrier range has a symmetrical shape in respect to the Z axis. If the X axis coordinate of the barrier point P_ is a minus value, the sign will be reversed to a positive sign, and the value will be calculated and checked.</p> <p>The absolute value of the X axis coordinate value of each barrier point must be set in the following manner.</p> <p>$P1 \geq P2 \geq P3, P4 \geq P5 \geq P6$</p> <p>(Note that this does not apply for the Z axis.)</p>	±99999.999 (mm)
8302	Z		
8311	P2 X		
8312	Z		
8321	P3 X		
8322	Z		
8331	P4 X		
8332	Z		
8341	P5 X		
8342	Z		
8351	P6 X		
8352	Z		

CHAPTER 1 SCREEN OPERATIONS
3. Setup Screens

3.7.5 RS-232C I/O device parameter setting examples and cable connections

I/O device Parameter	Tape reader (Mitsubishi)		Tape puncher (Mitsubishi)	Printer (Mitsubishi)	Printer EPSON ESC/P support	Floppy disk (Kyoritsu)	Reader and puncher (Kyoritsu)	Floppy disk (Ricoh)	Floppy disk (Tanaka Business)
	PTR-240	PTR-02A	PTP-02A	PRT-02A/B	VP135K	D-30	KRP-8250	FD-3.5	TBM-F1
Device name									
Baud rate	4800	4800	4800	4800	9600	4800	4800	4800	4800
Stop bit	1	3	3	3	1	3	3	3	3
Parity valid	1	0	0	0	1	0	0	0	0
Even parity	1	0	0	0	1	0	0	0	0
Character length	3	3	3	3	3	3	3	3	3
Terminator type	1	0	0	0	0	Input: 1 Output: 0	0	0	0
Code 1	00	00	00	00	00	00	00	00	00
Code 2	00	00	00	00	00	00	00	00	00
Rewind code	0: No rewind 1: Rewind	0	0	0	0	0	0	0	0
Handshake method	3	3	3	1	3	3	3	3	3
DC code parity	1	1	1	0	0	1	0	1	1
DC2/DC4 output	0	0	0	0	0	1	Puncher:1	0	1
CR output	0	0	0	0/1	0	0	0	0	0
EIA output	0	0	0/1	0/1	0	0	0/1	0/1	0/1
No. of feeds	0	0	No. of characters	0	0	0	No. of characters	0	0
Parity	0	0	0/1	0	0	0	0/1	0/1	0/1
Timeout time	100	100	100	100	100	100	100	100	
Printer type									
Cable connection (enclosed cable)	NC I/O 1—1 2×2 3×3 4) [4 5) [5 6) [6 20) [20 7—7	NC I/O 1—1 2×2 3×3 4×4 5×5 6×6 20×20 7—7	NC I/O 1—1 2×2 3×3 14×14 5×5 6×6 20×20 7—7	NC I/O 1—1 2×2 3×3 14×14 5×5 6×6 20×20 7—7	NC I/O 1—1 2×2 3×3 4 [4 5 [5 6 [6 20 [20 7—7	NC I/O 1—1 2×2 3×3 4×4 5×8 6 [6 20 [20 8]	NC I/O 2×1 3×10 4×5 5×11 6] 2 8] 20] 12 7—7	NC I/O 2×2 3×3 4×4 5×5 6 [6 20 [20 8 [8	NC I/O 2×2 3×3 4×4 5×5 6 [6 20 [20 8 [8

4. Edit Screens

4.1 Edit screen (Edit screen)

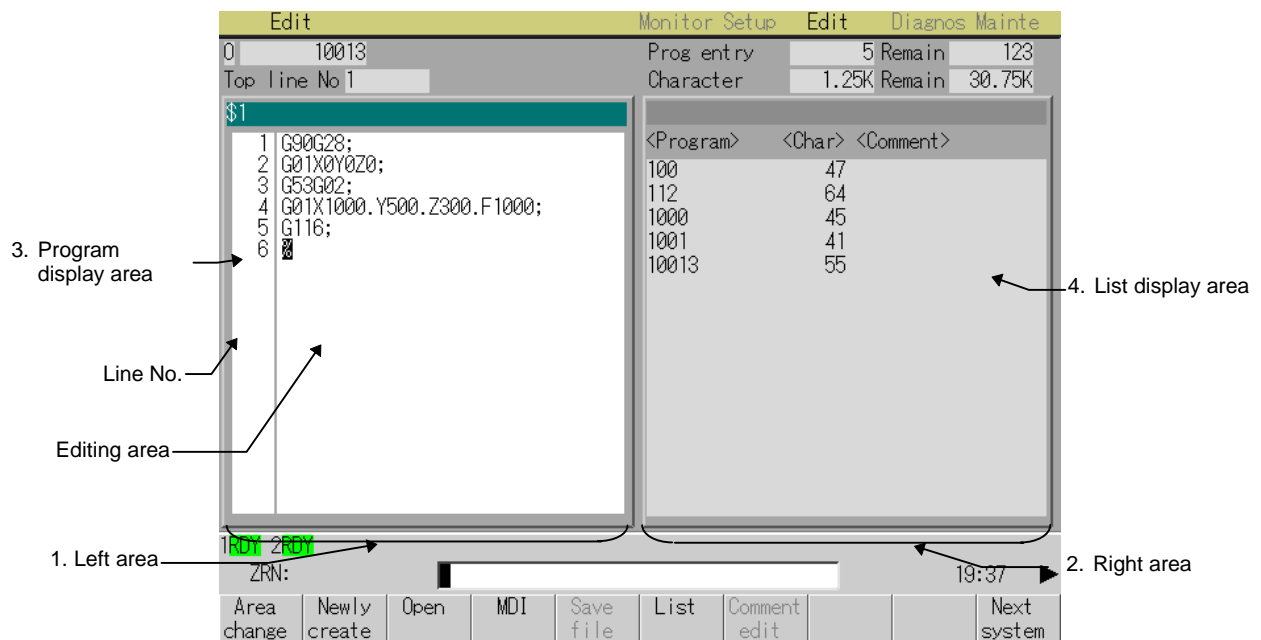
The programs in the NC memory are edited (added, deleted, changed) and newly created in the Edit screen.

Programs include the machining programs, MDI programs and Fixed cycle programs. These are stored in different directories within the memory.

(Note) Machining programs are managed with numbers (long type data).

This screen is configured of the left and right areas. The edit buffer or machining program list is displayed in each area. (These can be changed with the menu keys.)

If operations on this screen are canceled, and another screen is moved to, the next time the Edit screen is selected, the selected area, cursor position and display area, etc., will be the same as before the Edit screen was previously left. This allows editing operations to be continued.



If the Setup parameter 8085 "Space mode in editor" is set to 1, spaces are inserted in word units when the program is displayed.

CHAPTER 1 SCREEN OPERATIONS
4. Edit Screens

(1) Display items

Display items	Details
1. Left area	The left and right areas are used as the work areas.
2. Right area	The area to be used is selected with the menu key Area change .
3. Program display area	<p>This area is used to edit the program (machining program, MDI program, Fixed cycle program).</p> <p>When editing machining program :</p> <p style="padding-left: 20px;">Select menu Open or Newly create, and designate the No.</p> <p>When editing MDI program :</p> <p style="padding-left: 20px;">Select menu MDI.</p> <p style="padding-left: 20px;">The number does not need to be designated and searched to edit.</p> <p>Fixed cycle program :</p> <p style="padding-left: 20px;">After setting the Machine parameter's Basic common parameter "fix_P" to "1", select Open, and designate the No.</p>
O 1234 ●●●	This displays the No. of the program currently being edited. "MDI" is displayed when editing MDI data.
Top line No.	This displays the No. of the head line of the program to be displayed.
Editing area and Line No.	The contents of the program being edited are displayed in the editing area. Numbers are assigned to each line of the program, and the last three digits of that number are displayed. If the line is long and line is fed, a line No. will not be assigned at the head of the next line.
\$ 1, 2, 3 ●●●	The system No. of the program displayed in the editing area is displayed.
4. List display area	When the menu key List is pressed, a list of the currently registered machining programs will appear in the area that is selected.
Prog entry and Remain	<p>Prog entry :</p> <p style="padding-left: 20px;">This displays the number of registered programs.</p> <p>Remain :</p> <p style="padding-left: 20px;">This displays the remaining number of programs that can be registered. The display unit is byte, but if the displayable number of digits (7 digits) is exceeded, K (=Kbyte) or M (=Mbyte) will be added accordingly to the display.</p>
Character and Remain	<p>Character :</p> <p style="padding-left: 20px;">This displays the number of characters in the registered programs.</p> <p>Remain :</p> <p style="padding-left: 20px;">This displays the remaining number of characters that can be registered. The numbers are indicated in byte. If the digits of the number exceed 7, the maximum digit to be displayed, indicate with K (= Kbyte) or M (=Mbyte).</p>
<Program> <Char> <Comment>	<p><Program> This displays the No. of the machining programs already registered. The program Nos. are displayed in order from the smallest number, from 1 to 99999999.</p> <p><Character> This displays the number of characters registered in correspondence to the machining program No.</p> <p><Comment> The machining program comment is displayed. Up to 18 alphanumeric characters and symbols can be used.</p>

CHAPTER 1 SCREEN OPERATIONS
4. Edit Screens

(2) Menus

Menu	Details	Type	Reference
Area change	This changes the operation target area (left area/right area). The cursor appears in the valid area, and editing work can be carried out.	C	1.5.2 Changing the valid area
Newly create	This newly creates a program. When the program No. is set and [INPUT] is pressed, the program contents can be newly created.	A	4.1.1 Creating a new machining program
Open	This opens an existing program to edit or refer to. When the program No. is set and [INPUT] is pressed, the contents of the program appear in the selected area, and can be edited.	A	4.1.2 Editing a program
MDI	This edits the MDI program. When this menu key is pressed, the MDI program appears in the selected area, and can be edited.	C	4.1.3 Creating MDI data
Save file	This saves the machining program in the NC memory. Depending on the Setup parameter "8085 Program save type", the machining program may be saved with the [INPUT] key.	B	4.1.2 Editing a program
List	This displays a list of the machining programs saved in the memory in the selected area. If the Basic common parameter "fix_P" is set to 1, a list of the Fixed cycle programs will appear.	B	4.1.2 Editing a program
Comment edit	This changes the program comment. (This is valid only when the list is active.) The comment at the current cursor position can be edited. (Note 1) The comment of the editing program (left/right) cannot be changed. (Note 2) The comment can only be 18 characters long. Even if a comment exceeding 18 characters is input, the 19th and following characters are cut off.	A	-
Next system	The contents of the system obtained by incrementing the system No. of the program displayed in the selected area by one are displayed. Note that if the next system's program is already displayed in the non-active area, the system No. will be incremented by two.	C	-
Line desig	When the line No. is set and the [INPUT] key is pressed, the program data for that No. and following appear on the screen. The cursor moves to the set No.	A	4.2.2 Designating a random line
Line copy	This copies a character string at a designated line (multiple lines possible).	A	4.2.4 Copying/pasting data
Line paste	This inserts the copied line at the line before the cursor.	C	
Line clear	This deletes the character string at the designated line (multiple lines possible).	A	4.2.5 Deleting data

CHAPTER 1 SCREEN OPERATIONS
4. Edit Screens

Menu	Details	Type	Reference
String search	When the character string is designated and the INPUT key is pressed, that character string is searched for.	A	4.2.6 Searching for character strings
String replace	If the character string to be searched for and the character string to be replaced are separated with a "/" and designated, when the INPUT key is pressed, the replace operation takes place.	A	4.2.7 Replacing character strings
MDI regist	This registers the MDI program into the memory. (This is valid only when the MDI is active.)	A	4.1.3 Creating MDI data
Erase file	This deletes a program. When the number of the program is input, the designated file is deleted. (Note) A wildcard (*) can be used for the file name.	A	-
To In/out	The screen changes to the Input/output screen.	C	3.5 Data Input/Output screen

(3) Notes related to editing operation

All operates such as editing, MDI, area copy, paste, deletion, line designation, character string search, replacement and system change are valid in respect to the active area.

4.1.1 Creating a new machining program

(1) Operation method

1)

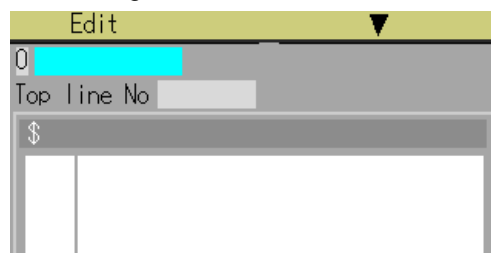
Press the menu key
[Area change], and select the
usage area.

2)

Press the menu key
[Newly create].



The menu is highlighted, and the cursor appears at the No. setting column.



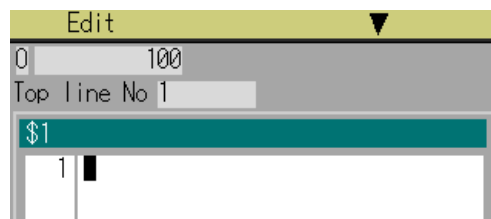
3)

Input the program No.
100 [INPUT] (Note 1)



A program is created.

When [Newly create] is
pressed again, the new
creation process ends.



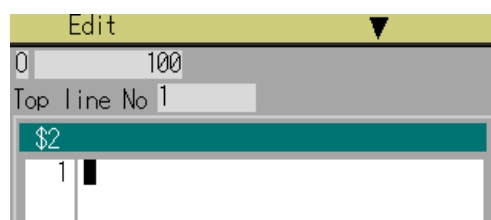
4)

Press the menu key
[Next system], and select the
system.



The usage area's \$ No. will be incremented by one
each time [Next system] is pressed.

If the maximum number of
valid systems is exceeded,
the \$No. will return to 1. If
[Next system] is pressed while
editing, a message confirming
whether to save the program
will appear.



5)

Edit the machining program.



Refer to "4.2 Editing operations".

6)

Save the program.
Menu [Save file] [Y]



The created machining program is saved in the NC
memory.
The menu highlight returns to normal.

CHAPTER 1 SCREEN OPERATIONS

4. Edit Screens

(Note 1) An error occurs if an existing program No. is set.

(Note 2) If the Setup parameter "8085 Program save type" is set to "0", the program is saved each time the key is pressed. Thus, it is not necessary to press the menu.

(Note 3) EOR (%) is added when the program is saved for the first time.

(Note 4) If the system is changed in the "Editing" state, a message confirming whether to save the program will appear.

4.1.2 Editing a program

(1) Operation method

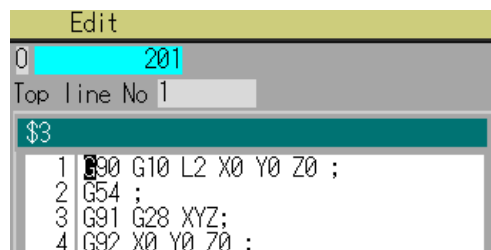
1)

Press the menu key
[Area change], and select the
usage area.

2)

Press the menu key [Open].

➔ The menu is highlighted, and the cursor appears at the No. setting column.

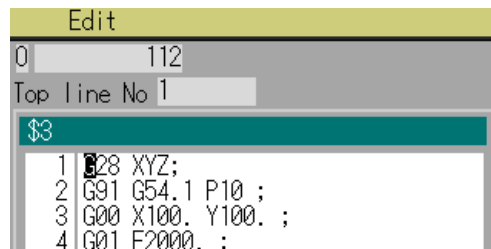


3)

Input the program No.
112 [INPUT] (Note 1)

When [Open] is pressed
again, the process ends.

➔ The program is displays from the head. The cursor moves to the head character of the program. The mode enters the overwrite mode. When the display is completed, the menu highlight returns to normal.



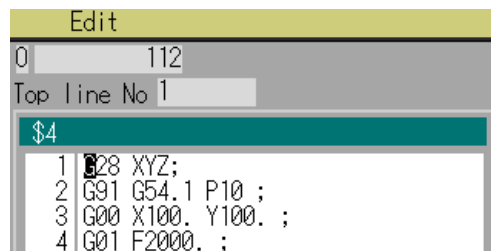
The program No. can be selected from a list.
Refer to "(2) Selecting a program from a list".

4)

Press the menu key
[Next system], and select the
system.

If the maximum number of
valid systems is exceeded,
the \$No. will return to 1. If
[Next system] is pressed while
editing, a message confirming
whether to save the program
will appear.

➔ The usage area's \$ No. will be incremented by one
each time [Next system] is pressed.



5)

Edit the machining program.

➔ Refer to "4.2 Editing operations".

CHAPTER 1 SCREEN OPERATIONS

4. Edit Screens

6)

Save the program.
Menu (Note 4)



The created machining program is saved in the NC memory.
The menu highlight returns to normal.

(Note 1) An error occurs if a nonexisting program No. is set.

(Note 2) If the selected program is running, it can be displayed but not edited. An error will occur when the data is set.

(Note 3) When requesting display in a usage area, if the selected program (including system selection) is already displayed in a non-active area, an error will occur. Note that if the system No. is different, the target program will be displayed without the usage area changed. Change the system beforehand as required.

(Note 4) If the Setup parameter "8085 Program save type" is set to 0, the program is saved each time the key is pressed. Thus, it is not necessary to press the menu.

(Note 5) If the system is changed in the "Editing" state, a message confirming whether to save the program will appear.

(2) Selecting a program from a list

For step 3) in "(1) Operation method", the program can be selected from a list as explained below. Only the details relevant to the step 3) operation are explained here.

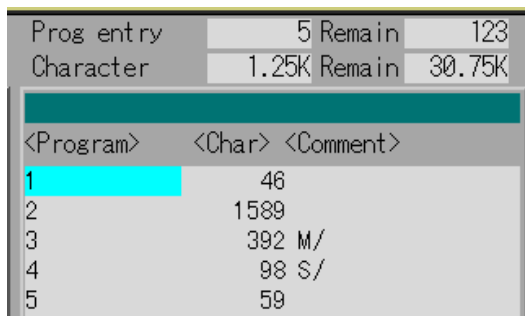
1)

Press the menu key **List**.



The menu is highlighted, and the list appears in the current active area. The cursor moves to the head of the program No. in the list.

When **List** is pressed again, the list disappears and returns to the original state.



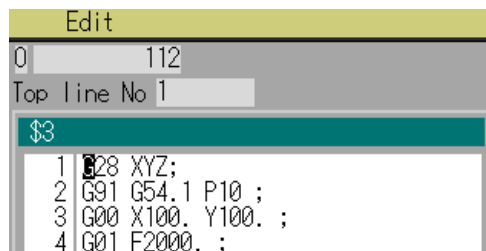
2)

Move the cursor and select the program No.
 or



The selected program is displayed from the top. The system currently selected becomes active. The cursor moves to the head character of the program. The mode enters the overwrite mode.

Even if all Nos. cannot be displayed, the remaining Nos. can be scrolled and displayed by pressing the and keys.



(Note 1) If Basic common parameter "fix_P" is set to 1, a list of the Fixed cycle programs will appear.

(Note 2) If the selected program is running, it can be displayed but not edited. An error will occur when the data is set.

(Note 3) If the selected program (including system selection) is already displayed in a non-active area (area hidden by list), an error will occur. Note that if the system No. is different, the target program will be displayed without an error occurring. Change the system beforehand as required.

4.1.3 Creating MDI data

(1) Operation method

1)

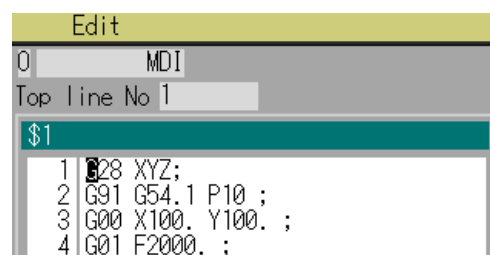
Press the menu key
[Area change], and select the
usage area.

2)

Press the menu key [MDI].



The selected program is displayed from the head. The cursor moves to the head character of the program. The mode enters the overwrite mode.



3)

Edit the MDI program.



Refer to "4.2 Editing operations".

(Note 1) An MDI program can be registered in the machining program area. Refer to "(2) Registering a MDI program" for details on the registration method.

(Note 2) Before starting MDI operation, confirm that the MDI settings are completed. If "Editing" or "MDI no setting" is displayed, the MDI operation cannot be started. When the [INPUT] key is pressed, the message "MDI search complete" appears and the setting is completed.

(2) Registering an MDI program

1)

Press the menu key
[MDI regist].



The menu is highlighted, and waits for the program No. input.

2)

Set the number of the
program to be registered, and
press the [INPUT] key.



The MDI program is registered in the memory. The menu highlight returns to normal.

4.2 Editing operations

When the program is edited, the key input data is directly written into the program display area. All data is overwritten from the cursor position. The message "Editing" appears simultaneously with the start of inputting. (The message disappears when the file is saved.)

If the cursor is at "%" and the **INPUT** key is pressed, EOB (;) is added to the end of the line.

The method of saving into the memory differs according to the Setup parameter "8085 Program save type" setting.

When the program save type is 1:

If the menu key **Save file** is pressed, the file is saved in the memory.

The message "Editing" does not disappear when the **INPUT** key is pressed.

When the program save type is 0:


The file is saved in the memory each time the **INPUT** key is pressed.

The message "Editing" appears when the **INPUT** key is pressed.

The editing operations from when the file is actually opened, or in other words, the methods of changing the display and editing (inserting, deleting, copying, pasting, searching and replacement methods) are explained in this section.



These editing operations are common for the machining program and MDI program.



Caution

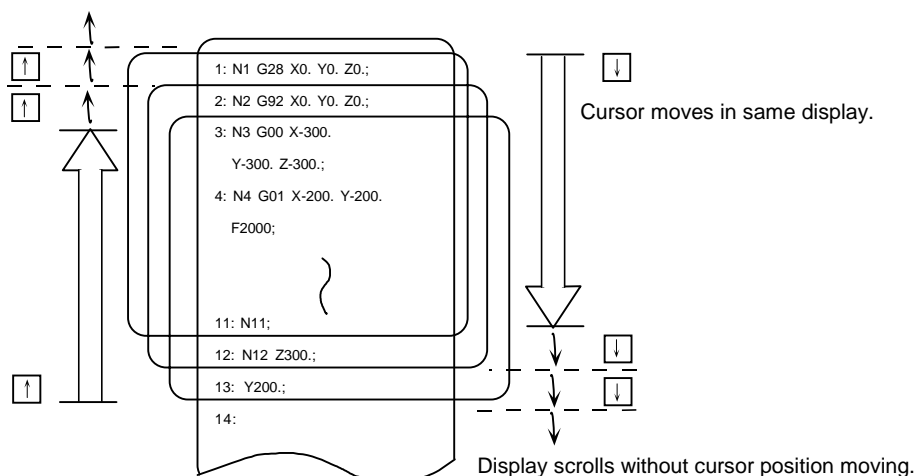
 If there is no value after the G command, the operation will be the "G00" operation when the program is run due to key chattering, etc., during editing.

4.2.1 Changing the display



(1) Changing the display with the cursor key



The cursor will move up one line in the program each time the cursor key (, ) is pressed.

If the  key is pressed at the head line of the program display area, the program will scroll up one line. If the  key is pressed at the end, the program will scroll down one line.



(2) Changing the display using the page changeover keys

( : Previous Page,  : Next Page)

-  key: This displays one page of data having the line before the current display head line as its head line.
When there is less than one page of data, a page of data will be displayed including the data currently displayed.
(The cursor moves to the last line of the screen.)
-  key: This displays one page of data having the line after the current display bottom line as its bottom line.
(The cursor moves to the head line of the screen.)

(3) Displaying a random line No.

If the menu key Line desig is pressed and a random line No. is input, the program contents can be displayed with that line at the head.

4.2.2 Rewriting data

(1) Operation method

1)

Move the cursor to the position of the data to be rewritten.

2)

Set the data.



The message "Editing" appears when setting is started. The data is set from the position of the cursor. Data at the area is overwritten. The cursor moves one space to the right as the data is set.

3)

When one line of setting is completed, press the INPUT key.



EOB (;) is added to the set data and the data is fixed. When newly creating data, the cursor moves to the head of the next line. When changing existing data, etc., the cursor does not move.

(Note 1) The data is not saved in the NC memory at this point. (It will be erased when the power is turned OFF.)

To save the data in the NC memory, press Save file.

The method for saving with the INPUT key can be selected with the Setup parameter "8085 Program save type".

(Note 2) Up to 256 characters can be set in one line.

4.2.3 Inserting data

(1) Operation method

- 1)

Move the cursor to the position where data is to be inserted.

- 2)

Press the INSERT key.

 → The insertion mode is entered. INS appears at the top of the screen.

- 3)

Set the data.

 → The message "Editing" appears when setting is started. The data is inserted from the position of the cursor. The cursor moves one space to the right as the data is set.

- 4)

When the setting is completed, press the INPUT key.

 → The set data is fixed. The cursor does not move, but if there is no EOB (;) at the end of the line, it will be added. Then, the cursor moves to the next line. The mode returns to the overwrite mode, and the message "Editing" disappears. (The message may not disappear depending on the "Program save type".)

(Note 1) The data is not saved in the NC memory at this point. (It will be erased when the power is turned OFF.)

To save the data in the NC memory, press Save file.

The method for saving with the INPUT key can be selected with the Setup parameter "8085 Program save type".

(Note 2) Up to 256 characters can be set in one line.

(Note 3) The insertion mode will be finished if a key such as DELETE , C-B ESC , x(INPUT), ↑ or ↓ key pressed.

4.2.4 Copying/pasting data

(1) Copying a line at the cursor position

1)

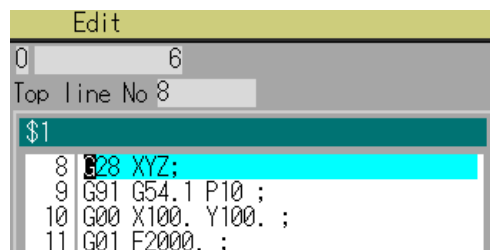
Move the cursor to the line to be copied.

2)

Press the menu key **Line copy**, and press the **INPUT** key.



The menu is highlighted.
The entire copy target line is highlighted.



(2) Copying by designating lines (multiple lines possible)

1)

Press the menu key **Line copy**.



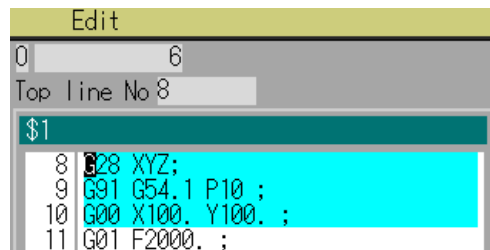
The menu is highlighted.

2)

Designate the range to be copied.
Format: first line/last line
8/10 **INPUT**



The entire copy target is highlighted.
The menu highlight returns to normal.



(Note 1) If **INPUT** key is pressed without setting a line No., the line where the cursor is at is copied.

(Note 2) The highlight of the copy target lines disappears when editing operations are resumed.

(Note 3) If the file is edited after pressing the **Line copy** menu, the copied information will be erased.

(Note 4) To copy the range up to the last line of the file, designate the last line as "E".

Example) From 8th line to last line → 8/E **INPUT**

(3) Pasting the copied data

1)

Move the cursor to the line where the data is to be pasted.

2)

Press the menu key **Line paste**.



The copied data is inserted to the line before the cursor position.

4.2.5 Deleting data

(1) Deleting one character

1)

Move the cursor to the character to be deleted.

2)

Press the **DELETE** key.



The character at the cursor position is deleted. The data following the cursor position moves one to the left. When this key is held down, the characters can be deleted one at a time.

(2) Deleting the line at the cursor position

1)

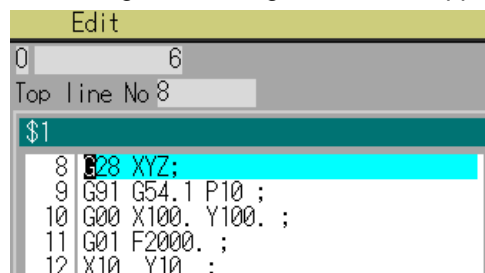
Move the cursor to the line to be deleted.

2)

Delete the line.
Menu **Line clear** **INPUT**



The menu is highlighted. All lines targeted for deletion are highlighted. A message confirming the deletion appears.



3)

Press the **Y** or **INPUT** key.



The highlighted lines are deleted, and the menu highlight returns to normal. The lines following the cursor position are shifted upward. The cursor position and head line No. do not change.

To cancel the deletion, press the **N** key.

(3) Deleting designated lines (multiple lines possible)

1)

Press the menu key
.



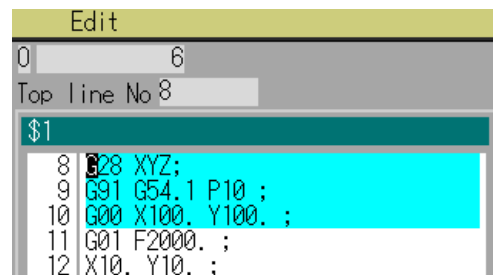
The menu is highlighted.

2)

Designate the range to be copied.
 Format: first line/last line
 8/10



The entire deletion target is highlighted.
 A message confirming the deletion appears.



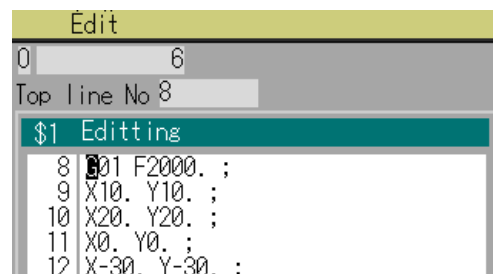
3)

Press the or key.



The highlighted range is deleted, and the menu highlight returns to normal. The lines following the cursor position are shifted upward.
 The cursor position and head line No. do not change.

To cancel the deletion, press the key.



(Note 1) If the key is pressed without setting a line No., the line where the cursor is at is deleted.

(Note 2) To delete the range up to the last line of the file, designate the last line as "E".

Example) From 8th line to last line → 8/E

(4) Deleting several lines displayed on a screen (one screen of data)

Press + .



One screen of editing data (machining program) is deleted.

4.2.6 Searching for character strings

(1) Operation method

- 1)

Press the menu key String search.

 → The menu is highlighted.

- 2)

Set the character string to be searched for, and press the INPUT key.

 → The character string is searched downward from the character string after the current cursor position. If the corresponding character string is not found in the program, a message appears.

- 3)

To continue searching, press the INPUT key again.

 → The next corresponding character string is searched for. The search finishes when the end of the program is reached.
(Note) It is not possible to return to the head of the program and resume the search. To search from the head of the program, move the cursor to the head of the program and carry out the search operation again.

- 4)

To stop the search, press the menu key.

 → The menu highlight returns to normal, and the character string in the data setting area disappears. The search mode is held until the menu key is pressed. (The character string remains in the data setting area.)

(2) Notes when searching

- 1) If the designated character string is not found, a message appears.
- 2) The character string containing the designated character string is searched for regardless of the previous and next characters. Thus, if "G2" is designated, G20 to G29, G200, etc., will be search targets.

Example of character string data setting

Designated character string	Example of character string to be searched
N10	Character string containing "N10", such as "N10", "N100", etc.
N10 X100.	Character string "N10 X100."
X-012.34	Character string "X-012.34" ("X-12.34" is not searched for.)

4.2.7 Replacing character strings

A character string in a program can be searched for and replaced. The following two methods can be used.

- The corresponding character string is searched for and replaced one by one. (To search for the next character string, press the key.)
- All corresponding character strings in the program are replaced in a batch. (Add "/G" when setting.)

(1) Operation method

- 1)

Press the menu key <input type="text" value="String replace"/> .

 → The menu is highlighted.

- 2)

Designate the character string to be searched for and the replacement character string. <small>(Note 1)</small> Search character string/ replacement character string <input type="text" value="INPUT"/>
--

 → The character string is searched downward from the character string at the current cursor position. When the character string is found, the cursor will move to the top of the searched character string. A message confirming whether to replace the character string will appear. If the character string is not found in the program, the cursor does not move.

- 3)

To continue search/ replacement, press the <input type="text" value="INPUT"/> key again.
--

 → The corresponding character string is searched for. When the end of the program is reached, a message will appear. When using batch replacement, the replacement is already completed, so the process is not carried out.

- 4)

To stop search/replace, press the menu key <input type="text" value="String replace"/> .

 → The menu highlight returns to normal, and the character string in the data setting area disappears. The replacement mode is held until the menu key is pressed.
(The character string remains in the data setting area.)

(Note 1) When batch replacing all in the program, add "/G" to the above setting.

Search character string/replacement character string/G

During batch replacement, after replacing all character strings to the end of the program, the process ends while showing the last character string replaced. Note that the replacement mode is held, and the character string remains in the data setting area.

(Note 2) To replace all program character strings from the current cursor position to the last line, input "/E".

5. Diagnosis Screens

5.1 Hardware and Software Configuration screen (H/W S/W config screen)

The hardware configuration (card name and sub-number) and software configuration (software number and sub-number) are displayed in this screen.

■ Software configuration screen

1. Software list

The screenshot shows the 'H/W S/W config' screen with a menu bar containing 'Monitor Setup', 'Edit', and 'Diagnos Mainte'. The main area displays a 'Software list' with the following items:

NCMAIN	:	BND-372W000-A0
PLC	:	
BOOT	:	BND-362W005-A4
HMI	:	BND-372W100-A0
LANG1	:	BND-372W200-A0 <ENG>
LANG2	:	BND-372W201-A0 <JPN>
OS ID	:	07197-OEM-0019997-82519

At the bottom, there are status indicators '1RDY 2RDY', 'ZRN:', and the time '19:41'. Navigation buttons for 'S/W config' and 'H/W config' are visible.

■ Hardware configuration screen

2. NC serial number

3. Hardware card serial number

The screenshot shows the 'H/W S/W config' screen with a menu bar containing 'Monitor Setup', 'Edit', and 'Diagnos Mainte'. The main area displays hardware configuration data:

ABSEFG 1234567890							
FCU6-MU123-23							
RTBUS1	:	RI01[7]	:	RI03[6]	:		
RTBUS2	:	RI01[8]	:	RI03[7]	:		
CNC	:	HR113	C	RI02[1]	:	RI03[8]	:
HMI	:	HR122	A	RI02[2]	:		
HMISUB1	:	HR123	A	RI02[3]	:		
HMISUB2	:			RI02[4]	:		
HMISUB3	:			RI02[5]	:		
CBUS1	:			RI02[6]	:		
CBUS2	:			RI02[7]	:		
RI01[1]	:			RI02[8]	:		
RI01[2]	:			RI03[1]	:		
RI01[3]	:			RI03[2]	:		
RI01[4]	:			RI03[3]	:		
RI01[5]	:			RI03[4]	:		
RI01[6]	:			RI03[5]	:		

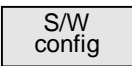
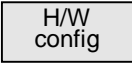
At the bottom, there are status indicators '1RDY 2RDY', 'ZRN:', and the time '19:41'. Navigation buttons for 'S/W config' and 'H/W config' are visible.

CHAPTER 1 SCREEN OPERATIONS
5. Diagnosis Screens

(1) Display items

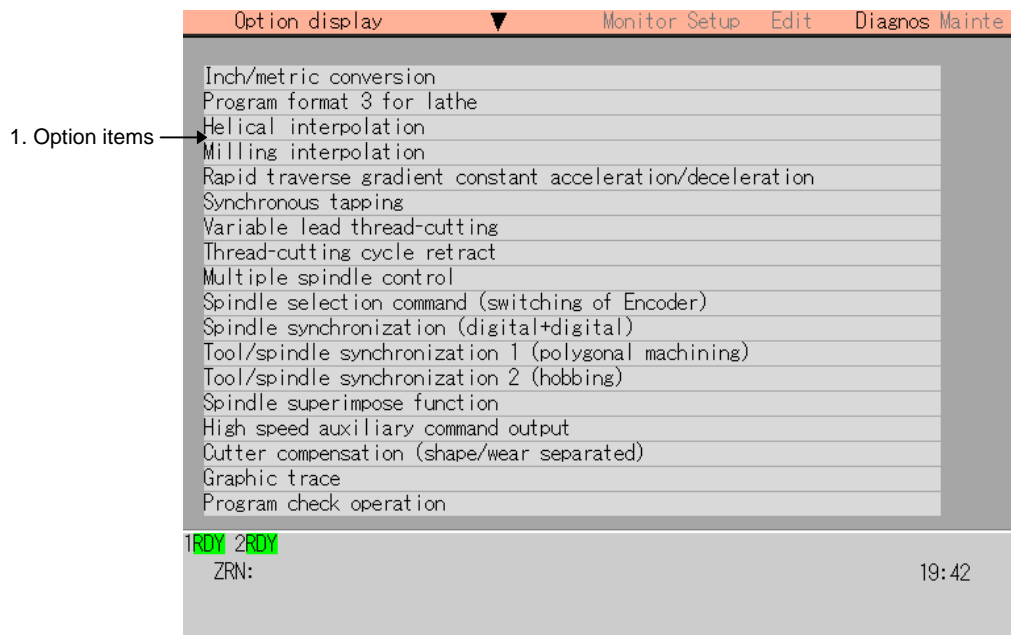
Display item	Details
1. Software list	This displays a list of the software being used.
2. NC serial No.	This displays the NC serial No., NC type and unit type.
3. Hardware card serial No.	This displays the serial No. of each hardware card.

(2) Menus

Menu	Details	Type
	This displays the software list. (Previous page, upper screen)	C
	This displays the hardware list. (Previous page, lower screen)	C

5.2 Option Display screen (Option display screen)

The contents of the options registered in the NC are displayed in this screen. The option items are displayed by name. If all of the options cannot be seen in one screen, the rest of options can be displayed by pressing the page changeover key.



(1) Display items

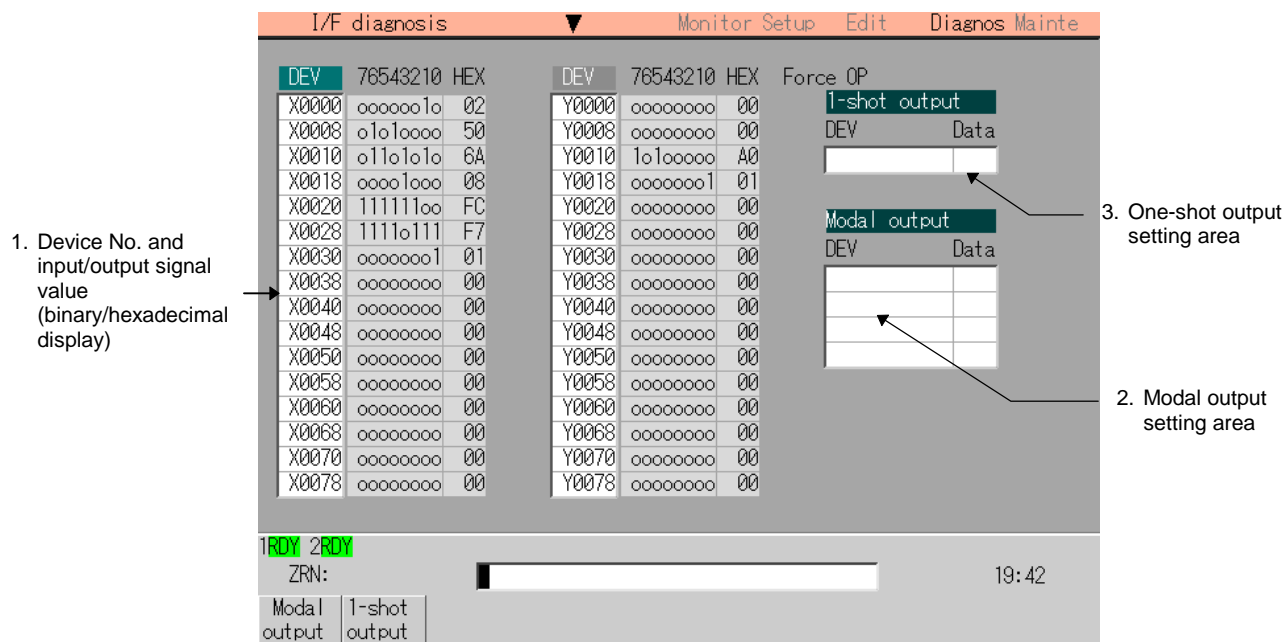
Display item	Details
1. Option items	The list of currently usable options are displayed.

5.3 I/F Diagnosis screen (I/F diagnosis screen)

The various input/output signals for the PLC (Programmable Logic Controller) control can be displayed and set in this screen.

These signals can be used in confirmation of the machine sequence operation during PLC development, and in confirmation and forced output, etc., of the input/output data between the NC and PLC.

(Note) Pay close attention to the sequence operation when using these functions during machine operation.



(1) Display items

Display item	Details
1. Device No. and input/output signal value (binary/hexadecimal display)	This displays the data from the device Nos. designated in the setting area in numerical order. The data is displayed as binary (bit units) and hexadecimal values. Individual device Nos. can be displayed separately in the left area and right area. Select the valid area with the , key when operations such as display changeover and data setting are carried out. Each X, Y, M, G, F, L, SM, TI, TO, TS, TA, CI, CO, CS, CA, D and R data is the target data.
2. Modal output setting area	This displays the data and device to carry out modal output. The details to be defined are set here when carrying out the modal type forced output of PLC interface signals. Refer to "5.3.2 Carrying out modal output" for details.
3. One-shot output setting area	This displays the data and device to carry out one-shot output. The details to be defined are set here when carrying out the one-shot output type forced output of PLC interface signals. Refer to "5.3.3 Carrying out one-shot output" for details.

CHAPTER 1 SCREEN OPERATIONS
5. Diagnosis Screens

(2) Menus

Menu	Details	Type	Reference
Modal output	This changes the setting area to an input standby status. The signal is forcibly output (modal).	A	5.3.2 Carrying out modal output
1-shot output	This changes the setting area to an input standby status. The signal is forcibly output (one-shot).	A	5.3.3 Carrying out one-shot output

(3) How to read the device No. and display data

A device is an address for classifying a signal handled in the PLC. A device No. is a series of numbers attached to that device.

Device No. (bit-type)

X0008

7	6	5	4	3	2	1	0
0	0	0	0	0	0	1	0
XF	XE	XD	XC	XB	XA	X9	X8

X0010

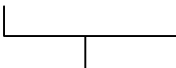
0	0	0	0	1	1	1	1
X17	X16	X15	X14	X13	X12	X11	X10

X0018

1	0	0	1	1	1	1	1
X1F	X1E	X1D	X1C	X1B	X1A	X19	X18

DEV	76543210	HEX
X0000	10000001	81
X0008	00000010	02
X0010	00001111	0F
X0018	10011111	9F
X0020	11111111	FF
X0028	01000000	40
X0030	00001110	0E

DEV	76543210	HEX
Y0000	00000000	00
Y0008	00000001	01
Y0010	00000000	00
Y0018	00000000	00
Y0020	10000000	80
Y0028	00000000	00
Y0030	00000000	00



Signal status display corresponding to each device No. (1/0)

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5. Diagnosis Screens

(4) List of devices for PLC use

Device	Device No.	Units	Details
X*	X0 to XABF (2752 points)	1-bit	Input signals to the PLC. Machine input, etc.
Y	Y0 to YDFF (3584 points)	1-bit	Output signals to the PLC. Machine output, etc.
M	M0 to M8191 (8192 points)	1-bit	For temporary memory
F	F0 to F127 (128 points)	1-bit	For temporary memory Alarm message interface
L	L0 to L255 (256 points)	1-bit	Latch relay (Backup memory)
SM*	SM0 to SM127 (128 points)	1-bit	Special relay
TI	TI0 to TI55 (56 points)	1-bit	10ms cumulative timer coil
	TI56 to TI231 (176 points)	1-bit	100ms cumulative timer coil
	TI232 to TI255 (24 points)	1-bit	1000ms cumulative timer coil
TO	TO0 to TO55 (56 points)	1-bit	10ms cumulative timer contact
	TO56 to TO231 (176 points)	1-bit	100ms cumulative timer contact
	TO232 to TO255 (24 points)	1-bit	1000ms cumulative timer contact
TS	TS0 to TS55 (56 points)	16-bit	10ms cumulative timer setting value
	TS56 to TS231 (176 points)	16-bit	100ms cumulative timer setting value
	TS232 to TS255 (24 points)	16-bit	1000ms cumulative timer setting value
TA	TA0 to TA55 (56 points)	16-bit	10ms cumulative timer current value
	TA56 to TA231 (176 points)	16-bit	100ms cumulative timer current value
	TA232 to TA255 (24 points)	16-bit	1000ms cumulative timer current value
CI	CI0 to CI127 (128 points)	1-bit	Counter coil
CO	CO0 to CO127 (128 points)	1-bit	Counter contact
CS	CS0 to CS127 (128 points)	16-bit	Counter setting value
CA	CA0 to CA127 (128 points)	16-bit	Counter current value
D	D0 to D1023 (1024 points)	1-bit/16-bit	Data register Interface between the PLC and NC
R*	R0 to R8191 (8192 points)	1-bit/16-bit	File register Interface between the PLC and NC

(Note) The use of devices marked with a * mark in the device column has already been determined. Do not use devices other than those corresponding to the input/output signals with the machine side (input/output signals of the remote I/O unit), even if it is an undefined vacant device.

5.3.1 Displaying the PLC device data



The various status signals and register data used in the PLC can be monitored and displayed. When this screen is first selected, the respective 16-byte amounts of input/output data are displayed from device "X0000" on the left display area, and from device "Y0000" on the right side.

This screen constantly monitors and displays the PLC signal statuses. Consequently, when signals are changed in the PLC, the display is changed according to the changes.

Note that because time differences occur between the PLC signal change and the signal display, there may be a delay in the display. The machine may also not be able to correspond to extremely brief signal changes.

(1) Displaying the data of a random device No. "X0020"

1)

Press the menu Tab key ,
 ,  and select the area to display the data.

2)

Set the device No. (X0020),
 and press the **INPUT** key.





The device "X0020" data appears at the head of the valid display area.

DEV	76543210	HEX	DEV	76543210	HEX
X0020	11111111	FF	Y0000	00000000	00
X0028	01000000	40	Y0008	00000001	01
X0030	00001110	0E	Y0010	00000000	00
X0038	00000000	00	Y0018	00000000	00

(Note) When setting the device No., an error will occur if a number exceeding the specifications or an illegal address is set.

(2) Changing the display with the page keys

The valid area device Nos. change in page units when  /  is pressed.

1)

Press the  key.



The data is displayed from the next number currently displayed.

DEV	76543210	HEX	DEV	76543210	HEX
X0000	10000001	81	Y0000	00000000	00
X0008	00000010	02	Y0008	00000001	01
X0010	00001111	0F	Y0010	00000000	00
X0018	10011111	9F	Y0018	00000000	00

DEV	76543210	HEX	DEV	76543210	HEX
X0080	11111111	FF	Y0000	00000000	00
X0088	01000000	40	Y0008	00000001	01
X0090	00001111	0F	Y0010	00000000	00
X0098	00000000	00	Y0018	00000000	00

5.3.2 Carrying out modal output

Modal type forced output of PLC interface signals is carried out. Once set, this data is held until canceled, the power is turned ON/OFF, or other data is overwritten. There are four sets of devices that modally output. If this number is exceeded, the previously existing data is overwritten.

(1) Menus used in modal output

Menu	Details	Type	Reference
Modal all clr	Modal output of all devices in the modal output area is canceled in a batch. The canceled data is erased from this area.	C	(3) Canceling modal output in a batch
Modal sgl clr	Modal output of the device at the position of the cursor in the modal output area is independently canceled. The canceled data is erased from this area.	C	(4) Independently canceling modal output

(2) Modally outputting data "1" to device "X0048"

1)

Press the menu key
Modal output.



The modal output mode is entered, and the cursor appears at the modal output area.

2)

Using the ↑ and ↓ keys, move the cursor to the setting position.

3)

Set the device and data, and press the INPUT key.
 X0048/1 INPUT



Modal output is executed, and the cursor disappears. The data that was in the cursor position is overwritten by the input data, and is invalidated. The modal output mode is canceled by pressing the ◀ key.

(Note) The data of the modally output device is displayed in order in the selected area. This modal output is held until the output is canceled or the power is turned OFF.

(3) Canceling modal output in a batch

1)

Press the menu key
[Modal output].




The modal output mode is entered, and the cursor appears at the modal output area.

2)

Press the menu key
[Modal all clr].



Modal output of all data is canceled. The modal output areas "DEV" and "Data" are all cleared. The modal output mode is canceled by pressing the  key.

(4) Independently canceling modal output



1)

Press the menu key
[Modal output].



The modal output mode is entered, and the cursor appears at the modal output area.


2)

Using the  and  keys, move the cursor to the data to be canceled.

3)

Press the menu key
[Modal sgl clr].



The data that was in the cursor position is canceled from modal output. The "DEV" and "Data" columns become blank. The modal output mode is canceled by pressing the  key.

 **Caution**



Pay close attention to the sequence operation when carrying out forced data setting (forced output) in the I/F diagnosis screen.

5.3.3 Carrying out one-shot output

(1) One-shot outputting data "1" to device "X0042".

- 1)

Press the menu key
[1-shot output].

 The one-shot output mode is entered, and the cursor appears at the one-shot output area.

- 2)

Set the device and data,
press the [INPUT] key.
X0042/1

 The input data is overwritten in the one-shot output area, and is one-shot output. The cursor in the one-shot output area disappears. The data of the one-shot output device is displayed in order in the selected area. The one-shot output mode is canceled by pressing the key.

(Note) Because the input signal (X, etc.) to the PLC is updated at the head of each PLC cycle, the machine immediately returns to the normal state, even if one-shot type forced output is carried out.

Caution

Pay close attention to the sequence operation when carrying out forced data setting (forced output) in the I/F diagnosis screen.

5.3.4 Diagnosis when an emergency stop status occurs

When an "EMG" (emergency stop) message appears in the operation status display area of the setting display unit, it is possible to confirm what caused the emergency stop status.

(1) Check with the Diagnosis screen

- 1)

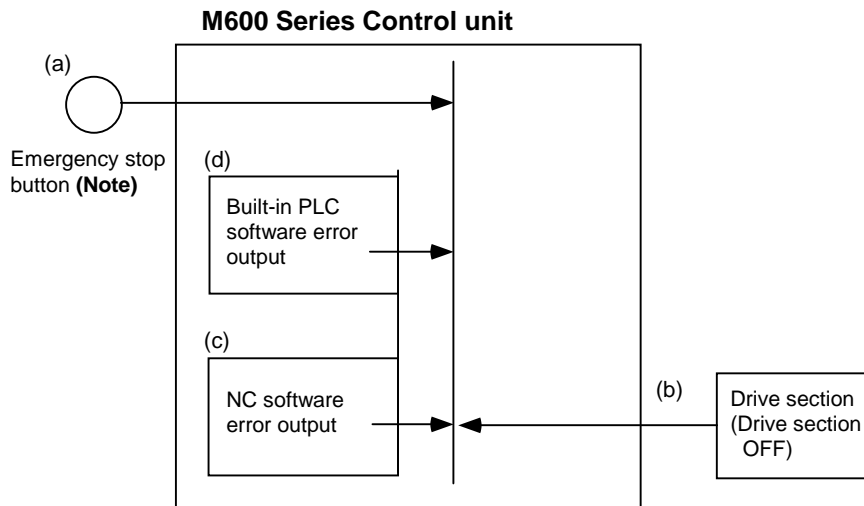
Press the device No., and set the number.
R69 [INPUT]

 The contents of device R69 appear.
-
- | | | | | | | | | | |
|-------|---|---|---|---|---|---|---|---|-----|
| R0069 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | (H) |
| | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | (L) |
- 0: EMG status
1: Normal
-

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(2) System diagram of NC control unit emergency stop causes

Emergency stop cause	(a)	Input from the emergency stop button..... machine error, etc.	I/F diagnosis	R69 bit 4
	(b)	Input from drive section servo error, etc.	I/F diagnosis	–
	(c)	NC error output watchdog alarm, memory alarm	I/F diagnosis	–
	(d)	Built-in PLC error output emergency stop output by the PLC software	I/F diagnosis	R69 bit 0, 6



(Note) The emergency stop button signal is directly supplied to the drive section as a batch with the emergency stop signal of the machine power distribution panel.

5.4 Amplifier Monitor screen (Amp monitor screen)

The diagnosis information from the drive section can be monitored with this screen. Servo axis unit, spindle unit and power supply unit information is displayed.

1. Monitoring items

	X1	Z1	Y1	C1
Gain (1/s)	0	0	0	0
Droop (i)	0	0	0	0
Speed (r/min)	0	0	0	0
Load current (%)	0	0	0	0
Max current 1 (%)	0	0	0	0
Max current 2 (%)	0	0	0	0
Overload (%)	0	0	0	0
Regen load (%)	0	0	0	0
Amp display	00	00	00	00
Alarm	00 00 00	00 00 00	00 00 00	00 00 00
Cycle counter (p)	0	0	0	0
Grid space	10	10	10	10
Grid amnt	0.000	0.000	0.000	0.000
Machine posn	0.000	0.000	0.000	0.000
Motor end FB	0.000	0.000	0.000	0.000
Machine end FB	0.000	0.000	0.000	0.000
FB error (i)	0	0	0	0

2. Data of each axis and unit

1RDY 2RDY
ZRN: 19:43

Servo unit Spindle unit Power unit Alarm his clr Next axis

(1) Display items

Display item	Details
1. Monitoring items	This displays each item being monitored. The display is changed using the page changeover keys. Refer to 5.4.1 to 5.4.3 for details.
2. Data of each axis and unit	This displays the data of each axis being monitored.

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(2) Menus

Menu	Details	Type	Reference
Servo unit	This displays the diagnosis information of the servo unit in the data display area.	C	5.4.1 Servo axis unit display items
Spindle unit	This displays the diagnosis information of the spindle unit in the data display area.	C	5.4.2 Spindle unit display items
Power unit	This displays the diagnosis information of the power unit in the data display area.	C	5.4.3 Display items for the power supply unit
Alarm his clr	This clears the diagnosis information alarm history.	B	5.4.4 Clearing the alarm history
Next axis	This displays the data for the next four axes. (Note) The menu appears and operation is possible only when diagnosis information for five or more axes is displayed.	C	-

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5.4.1 Servo axis unit display items

The various data related to the servo axis is monitored.

To reference, change the display items using the  key and  key.

Amp monitor		▼		Monitor	Setup	Edit	Diagnos	Mainte
	X1	Z1	Y1	C1				
Gain (1/s)	0	0	0	0				
Droop (i)	0	0	0	0				
Speed (r/min)	0	0	0	0				
Load current (%)	0	0	0	0				
Max current 1 (%)	0	0	0	0				
Max current 2 (%)	0	0	0	0				
Overload (%)	0	0	0	0				
Regen load (%)	0	0	0	0				
Amp display	00	00	00	00				
Alarm	00 00 00	00 00 00	00 00 00	00 00 00				
Cycle counter (p)	0	0	0	0				
Grid space	10	10	10	10				
Grid amnt	0.000	0.000	0.000	0.000				
Machine posn	0.000	0.000	0.000	0.000				
Motor end FB	0.000	0.000	0.000	0.000				
Machine end FB	0.000	0.000	0.000	0.000				
FB error (i)	0	0	0	0				
1RDY 2RDY								19:43
Servo unit	Spindle unit	Power unit	Alarm his clr					Next axis

(1) Display items

Display item	Details
Gain (1/s)	This displays the position loop gain status. $\text{Position loop gain} : \frac{\text{Feedrate (mm/s)}}{\text{Tracking delay error (mm)}}$
Droop (i)	The error of the actual machine position to the command position is called droop. This error is proportional to command speed value. (Command units)
Speed (r/min)	This displays the actual rotation speed of motor.
Load current (%)	This displays the motor current in terms of continuous current during stalling.
Max current 1 (%)	This displays the current FB ratio to the current limit as a percentage. The maximum value of the current FB peak sampled after the power was turned ON is constantly displayed.
Max current 2 (%)	This displays the current FB ratio to the current limit as a percentage. The maximum value of the current FB peak sampled in the last two seconds is constantly displayed.
Overload (%)	This is the data used to monitor motor overload.
Regen Load (%)	This is the data used to monitor the resistance over load state when the resistance regenerative power supply is connected.
Amp display	This displays the 7-segment LED of the driver.
Alarm	This displays the alarms and warnings other than the amplifier display.
Cycle counter (p)	This displays the position within one rotation of the encoder detector. The position is displayed as a grid point value as "0", within one rotation in the range of "0" to "RNG (movement units) × 1000".
Grid space	This displays the grid space for the zero point return. (Command units)

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Display item	Details
Grid amnt	This displays the length from the dog-off point to the grid point when the dog-type reference point return is displayed. The grid mask amount is not included. (Command units)
Machine posn	This displays the NC basic machine coordinate system position. (Command units)
Motor end FB	This displays the feedback position of the speed detector. (Command units)
Machine end FB	This displays the feedback position of the position detector. (Command units)
FB error (i)	This displays the error of the motor end FB and machine end FB.
DFB compen amnt (i)	This displays the compensation pulse amount during dual feedback control.
Detection system	This displays the detector type symbol of the absolute position detection system. ES : Semi-closed encoder EC : Ball screw end encoder LS : Linear scale MP : MP scale ESS : Semi-closed high-speed serial encoder ECS : Ball screw end high-speed serial encoder INC : Incremental
Power OFF posn	This displays the coordinate value during NC power OFF in the basic machine coordinate system. (Command units)
Power ON posn	This displays the coordinate value during NC power ON in the basic machine coordinate system. (Command units)
Current posn	This displays the current coordinate value in the basic machine coordinate system. (Command units)
RO	This displays the multi-rotation counter value of the detector stored in the memory during reference point setting.
PO	This displays the position within one rotation of the detector stored in the memory during reference point setting.
EO	This displays the absolute position error stored in the memory during reference point setting.
Rn	This displays the multi-rotation counter value of the current detector.
Pn	This displays the position within one rotation of the detector.
En	This displays the absolute position error during NC power OFF.
ABS _n	This displays the current absolute position.
MPOS	This displays the offset value of the MP scale when the power is turned ON.
Amp type	This displays the servo driver type.
Amp serial No.	This displays the servo driver serial No.
Software version	This displays the servo side software version.
Control method	SEMI : Semi-closed loop CLOSED : Closed loop DUAL : Dual feedback
Motor end detector	This displays the motor end detector type.
Machine end detector	This displays the machine end detector type. It is displayed only for the CLOSED and DUAL control methods.

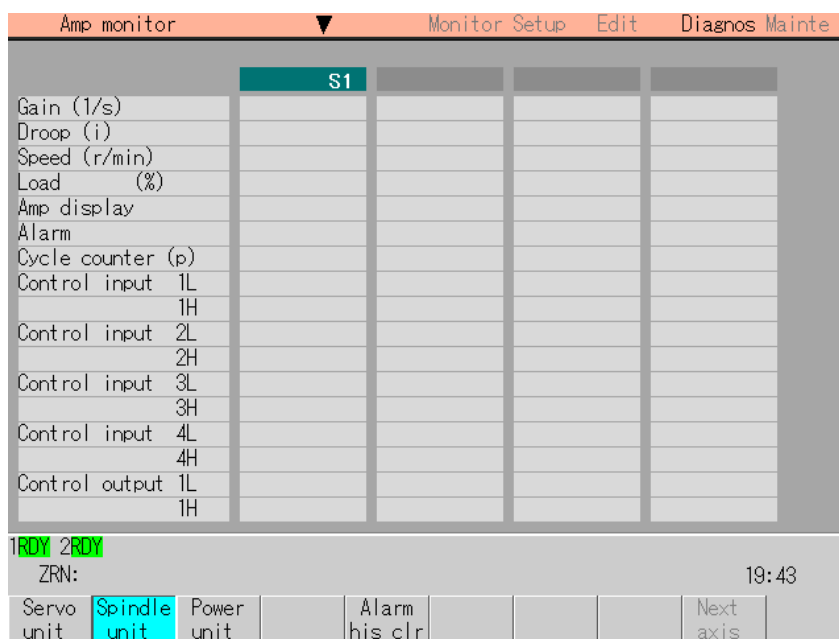
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Display item	Details
Motor type	This displays the motor type.
Work time	This displays the READY ON cumulative time. (Units: 1hr)
Alarm hist 1 : Time 1 : Alarm to 8 : Alarm	This displays servo alarm Nos. that occurred in latest order with the following formats. Alarm No. : Number of the servo alarm Nos. that occurred Time : Work time when the alarm occurred
Maint hist 1 to 4	This displays the maintenance dates. Year : One digit Month : 1 to 9, X (Oct.), Y (Nov.), Z (Dec.)
/SYS	This displays the NVRAM status.

5.4.2 Spindle unit display items

The various data related to the spindle is monitored.

Change the display items using the  key and  key to refer to the data.



(1) Display items

Display item	Details
Gain (1/s)	This displays the status of the position loop gain. $\text{Position loop gain} : \frac{\text{Feedrate (mm/s)}}{\text{Tracking delay error (mm)}}$
Droop (i)	The error of the actual machine position to the command position is called droop. This error is proportional to command speed value. (Command units)
Speed (r/min)	This displays the actual rotation speed of motor.
Load (%)	This displays the motor load.
Amp display	This displays the 7-segment LED of the driver.
Alarm	This displays the alarms and warnings other than the amplifier display.
Cycle counter (p)	This displays the position within one rotation of the encoder detector. The position is displayed within one rotation in the range of "0" to "RNG (movement units) × 1000" using the grid point value as "0".

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Display item	Details																																					
Control input 1L	<p>This displays the control input signals from the NC.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;"></th> <th style="width: 15%;">Bit</th> <th style="width: 75%;">Details</th> </tr> </thead> <tbody> <tr> <td rowspan="7" style="text-align: center; vertical-align: middle;">1L</td> <td style="text-align: center;">0</td> <td>READY ON command</td> </tr> <tr> <td style="text-align: center;">1</td> <td>Servo ON command</td> </tr> <tr> <td style="text-align: center;">2</td> <td></td> </tr> <tr> <td style="text-align: center;">3</td> <td></td> </tr> <tr> <td style="text-align: center;">4</td> <td></td> </tr> <tr> <td style="text-align: center;">5</td> <td></td> </tr> <tr> <td style="text-align: center;">6</td> <td>Parameter conversion command</td> </tr> <tr> <td style="text-align: center;">7</td> <td>Servo alarm reset command</td> </tr> <tr> <td rowspan="7" style="text-align: center; vertical-align: middle;">1H</td> <td style="text-align: center;">8</td> <td rowspan="2">Torque limit mode</td> </tr> <tr> <td style="text-align: center;">9</td> </tr> <tr> <td style="text-align: center;">A</td> <td></td> </tr> <tr> <td style="text-align: center;">B</td> <td></td> </tr> <tr> <td style="text-align: center;">C</td> <td></td> </tr> <tr> <td style="text-align: center;">D</td> <td></td> </tr> <tr> <td style="text-align: center;">E</td> <td></td> </tr> <tr> <td style="text-align: center;">F</td> <td>In G1 modal</td> </tr> </tbody> </table>		Bit	Details	1L	0	READY ON command	1	Servo ON command	2		3		4		5		6	Parameter conversion command	7	Servo alarm reset command	1H	8	Torque limit mode	9	A		B		C		D		E		F	In G1 modal	
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Display item	Details																																						
Control input 3L	This displays the control input signals from the NC.																																						
Control input 3H	<table border="1"> <thead> <tr> <th></th> <th>Bit</th> <th>Details</th> </tr> </thead> <tbody> <tr> <td rowspan="6">3L</td> <td>0</td> <td rowspan="6">Spindle control mode selection command</td> </tr> <tr> <td>1</td> </tr> <tr> <td>2</td> </tr> <tr> <td>3</td> </tr> <tr> <td>4</td> </tr> <tr> <td>5</td> </tr> <tr> <td rowspan="2">3H</td> <td>6</td> <td>Gear selection command 0: First gear 3: Fourth gear 6: Seventh gear</td> </tr> <tr> <td>7</td> <td>1: Second gear 4: Fifth gear 7: Eighth gear 2: Third gear 5: Sixth gear</td> </tr> <tr> <td rowspan="8">3H</td> <td>8</td> <td>Forward run start command</td> </tr> <tr> <td>9</td> <td>Reverse run start command</td> </tr> <tr> <td>A</td> <td>Index forward run</td> </tr> <tr> <td>B</td> <td>Index reverse run</td> </tr> <tr> <td>C</td> <td>Orientation start</td> </tr> <tr> <td>D</td> <td>L-winding selection command</td> </tr> <tr> <td>E</td> <td>Sub-motor selection command 0: Main motor 2: Sub-motor 2</td> </tr> <tr> <td>F</td> <td>1: Sub-motor 1 3: Sub-motor 3</td> </tr> </tbody> </table>			Bit	Details	3L	0	Spindle control mode selection command	1	2	3	4	5	3H	6	Gear selection command 0: First gear 3: Fourth gear 6: Seventh gear	7	1: Second gear 4: Fifth gear 7: Eighth gear 2: Third gear 5: Sixth gear	3H	8	Forward run start command	9	Reverse run start command	A	Index forward run	B	Index reverse run	C	Orientation start	D	L-winding selection command	E	Sub-motor selection command 0: Main motor 2: Sub-motor 2	F	1: Sub-motor 1 3: Sub-motor 3				
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CHAPTER 1 SCREEN OPERATIONS
5. Diagnosis Screens

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5. Diagnosis Screens

Display item	Details																																					
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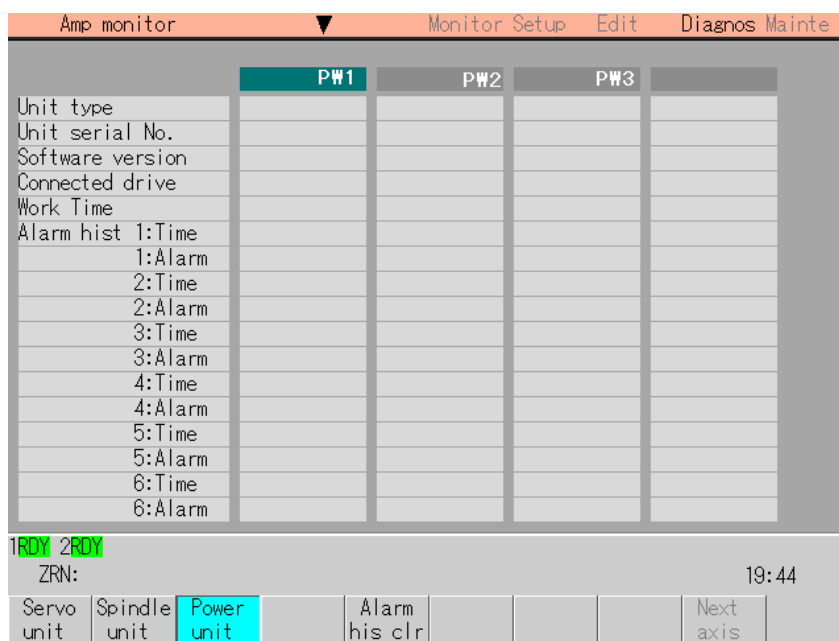
Display item	Details
Amp type	This displays the spindle type.
Amp serial No.	This displays the spindle serial No.
Software version	This displays the software No. and version on the spindle side.
Work time	This displays the READY ON cumulative time. (Units: 1hr)
Alarm hist 1 : Time 1 : Alarm to 8 : Alarm	This displays servo alarm Nos. that occurred in latest order with the following formats. Alarm No. : Number of the servo alarm Nos. that occurred. Time : Work time when the alarm occurred.
Maint hist 1 to 4	This displays the maintenance dates. Year : One digit Month : 1 to 9, X (Oct.), Y (Nov.), Z (Dec.)
/SYS	This displays the NVRAM status.

CHAPTER 1 SCREEN OPERATIONS
5. Diagnosis Screens

5.4.3 Display items for the power supply unit

The various data related to the power supply is monitored.

Change the display items using the  key and  key to refer to the data.



Display item	Details
Unit type	This displays the power supply unit type.
Unit serial No.	This displays the serial No. of the power supply unit.
Software version	This displays the software version.
Connected drive	This displays the driver connected to each power supply unit.
Work time	This displays the READY ON cumulative time. (Units: 1hr)
Alarm hist 1 : Time 1 : Alarm to 8 : Alarm	This displays servo alarm Nos. that occurred in latest order with the following formats. Alarm No. : Number of the servo alarm Nos. that occurred. Time : Work time when the alarm occurred.
Maint hist 1 to 4	This displays the maintenance dates. Year : One digit Month : 1 to 9, X (Oct.), Y (Nov.), Z (Dec.)
/SYS	This displays the NVRAM status.

5.4.4 Clearing the alarm history

(1) Operation method

Select the unit from which the alarm history is to be cleared.

1)

Press ,
 or .

2)

Using the Tab keys and
, select the axis (device)
from which to clear the alarm
history.

3)

Press the menu key
.



The menu is highlighted, and a message appears to confirm the erasing.

4)

Press the key.



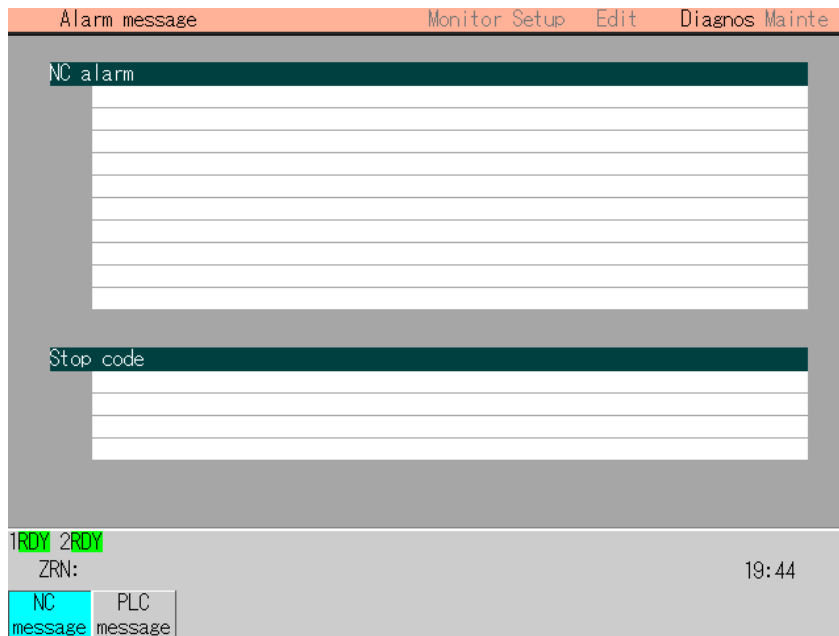
The alarm history data is cleared to zero.

Alarm hist 1:Time	0
1:Alarm	0
2:Time	0
2:Alarm	0
3:Time	0
3:Alarm	0
4:Time	0
4:Alarm	0
5:Time	0
5:Alarm	0
6:Time	0
6:Alarm	0

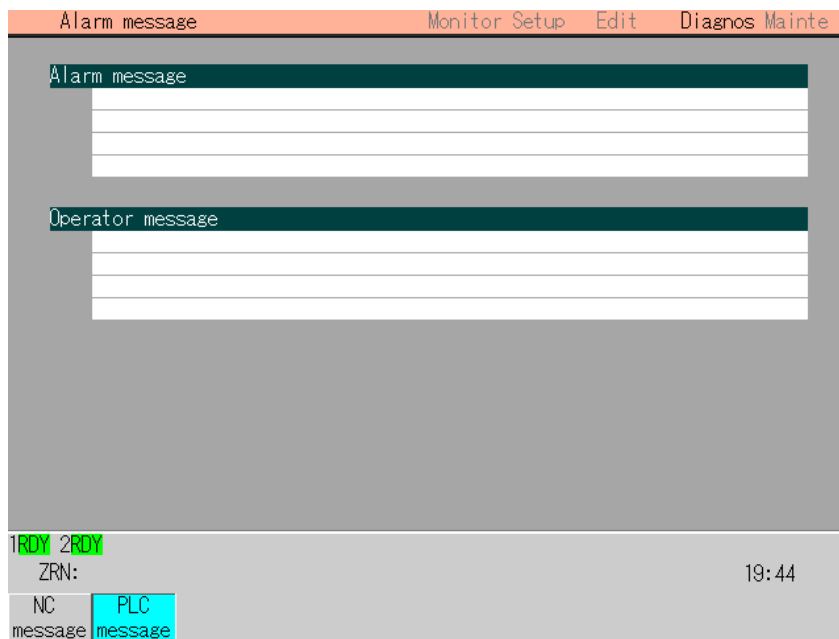
5.5 Alarm Message screen (Alarm message screen)

A list of currently occurring alarms or messages is displayed on this screen.

■ NC message



■ PLC message



CHAPTER 1 SCREEN OPERATIONS
5. Diagnosis Screens

(1) Display items

Display item	Details
NC alarm	The code and number or message related to an NC alarm (operation alarm, servo alarm, absolute position detection system alarm, spindle alarm, MCP alarm, system alarm and program error) are displayed. After confirming those items, on this screen, confirm the details in "Appendix 3. Alarm messages".
Stop code	The NC automatic operation disable state or stop state during automatic operation is indicated with a code and error No. After confirming those items, on this screen, confirm the details in "Appendix 3. Alarm messages".
Alarm message	Using the user PLC, this displays messages such as details of machine abnormalities.
Operator message	Using the user PLC, this displays operator information messages.

(2) Menus

Menu	Details	Type	Reference
Diagn save	The MELDAS diagnosis information is saved in a file (TRACK.MNT) on the hard disk.	B	5.6.1 Saving the MELDAS diagnosis information
Diagn initial	The MELDAS diagnosis information is initialized.	B	5.6.2 Initializing the MELDAS diagnosis information
Diagn param	The screen for setting the MELDAS-NET diagnosis information parameters opens.	C	5.6.3 MELDAS Diagnosis Parameter screen

5.6.1 Saving the MELDAS diagnosis information

1)

Press the menu .

➔ A message confirming the saving appears.

2)

Press or .

➔ The MELDAS diagnosis information is saved in "D:\SUPPORT\TRACK.MNT" on the hard disk. A dialog appears on the screen during the execution. When the information has been saved, the diagnosis information is initialized.

To cancel the saving, press any key other than or .

5.6.2 Initializing the MELDAS diagnosis information

1)

Press the menu .

➔ A message confirming the initialization appears.


2)

Press or .

➔ The MELDAS diagnosis information is initialized.

To cancel the initialization, press any key other than or .

 **Caution**

 If another screen is opened before saving the data on the MELDAS Diagnosis screen, the set diagnosis information parameters will all be invalidated.

CHAPTER 1 SCREEN OPERATIONS
5. Diagnosis Screens

5.6.3 MELDAS Diagnosis Parameter screen (MELDAS diagn screen)

The MELDAS diagnosis information parameters are set on this screen.
The details of the set data are explained in this section.

The screenshot shows the 'MELDAS diagn' screen with a menu bar containing 'Monitor Setup', 'Edit', and 'Diagnos Mainte'. The main area is a table with two columns of parameters. The first column has parameters 8501 through 8516, and the second column has parameters 8551 through 8671. The 'Data' column shows values, mostly 0. Below the table, there are fields for 'Used memory SRAM' (0 / 0K) and 'DRAM' (0 / 1024K). A 'RDY 2RDY' indicator is visible, along with a 'ZRN:' field and a 'Param save' button. The time '19:45' is shown in the bottom right.

(1) Display item

Display item	Details
1. Parameter	The data required for the Diagnosis parameters is set/displayed in this area. Refer to "(3) List of data used for Diagnosis parameters" for the details.
2. Usage memory size/ Maximum memory size	When setting the parameters, the size of the memory used is calculated based on the set values of history items and sampling times. If the calculated results are within the maximum memory size, the calculation results will appear as the memory size. If the usage memory size exceeds the maximum memory size, the message "Data range error" will appear. The usage memory display will not change in this case.

(2) Menu

Menu	Details	Type
Param save	The MELDAS diagnosis parameters are saved.	C

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(3) List of data used for Diagnosis parameters

No.	Setting item	Details	Setting range
8501	Setting effective	Select whether to validate the parameters set on the MELDAS Diagnosis Parameter screen.	0: Invalid (use default parameters) 1: Valid
8502	Check interval	Set the interval to monitor whether the diagnosis information has been created on the NC side. When 0 is designated, the state will be monitored at the default value (5-second interval).	0 to 9999 (s)
8503	Auto saving	When automatic save is validated, if creation of the diagnosis conditions is detected on the HMI screen, the diagnosis information will be automatically saved in the personal computer's hard disk.	0: Do not automatically save 1: Automatically save
8504	Start trigger	Select the conditions for starting collection of the diagnosis information.	0: Power ON 1: Command from program 2: PLC signal
8505	Stop trigger	Select the conditions for stopping collection of the diagnosis information.	0: Alarm 1: Command from program 2: PLC signal
8506	History suspension	Number of sampled data	0: 1/4 items 1: 2/4 items 2: 3/4 items 3: 4/4 items
8507	Sampling suspension	Sampling time	0: 1/4 (s) 1: 2/4 (s) 2: 3/4 (s) 3: 4/4 (s)
8508	PLC condition	[Valid only when Stop trigger is PLC signal] Set the conditions for establishing the PLC stop trigger (PLC signal 1 to PLC signal 4).	0: OR (One of the signal conditions is valid.) 1: AND (All signal conditions are valid.)

CHAPTER 1 SCREEN OPERATIONS
5. Diagnosis Screens

No.	Setting item	Details	Setting range
8509	PLC sgnl name 1	[Valid only when Stop trigger is PLC signal] PLC signal device name	Bit device usable by NC
8510	PLC sgnl name 2		
8511	PLC sgnl name 3		
8512	PLC sgnl name 4		
8513	PLC sgnl cond 1	[Valid only when stop trigger is PLC signal] PLC signal establishment conditions	0: OFF → ON 1: ON → OFF
8514	PLC sgnl cond 2		
8515	PLC sgnl cond 3		
8516	PLC sgnl cond 4		
8551	NC key hist num	Set the number of history data items to sample.	0 to 9999 items
8552	NC key hist mem	Designate the range for saving the NC side history data. (When DRAM is selected, the history data will not be held after the power is turned OFF.)	0: DRAM 1: SRAM
8561	NC alarm hist num	Set the number of history data items to sample.	0 to 9999 items
8562	NC alarm hist mem	Designate the range for saving the NC side history data. (When DRAM is selected, the history data will not be held after the power is turned OFF.)	0: DRAM 1: SRAM
8563	NC alarm hist sys	Designate the system for sampling the history data.	bit0: System 1 bit1: System 2 : bit7: System 8
8571	PLC hist num	Set the number of history data items to sample.	0 to 9999 items
8572	PLC hist mem	Designate the range for saving the NC side history data. (When DRAM is selected, the history data will not be held after the power is turned OFF.)	0: DRAM 1: SRAM
8601	Opt-PLC hist num	Set the number of history data items to sample.	0 to 9999 items
8602	Opt-PLC hist mem	Designate the range for saving the NC side history data. (When DRAM is selected, the history data will not be held after the power is turned OFF.)	0: DRAM 1: SRAM

(Note 1) "8508 PLC condition 1" to "8516 PLC sgnl cond 4" are valid only when the PLC signal is selected for "8505 Stop trigger".

CHAPTER 1 SCREEN OPERATIONS
5. Diagnosis Screens

No.	Setting item	Details	Setting range
8611	Opt-PLC hist sigl 1	PLC signal device name	Bit device usable by NC
8621	Opt-PLC hist sigl 2		
8631	Opt-PLC hist sigl 3		
8641	Opt-PLC hist sigl 4		
8651	Opt-PLC hist sigl 5		
8661	Opt-PLC hist sigl 6		
8671	Opt-PLC hist sigl 7		
8681	Opt-PLC hist sigl 8		
8701	(Not used)	(For future expansion)	
8702	(Not used)	(For future expansion)	
8711	(Not used)	(For future expansion)	
8712	(Not used)	(For future expansion)	
8721	Modal hist num	Set the number of history data items to sample.	0 to 9999 items
8722	Modal hist mem	Designate the range for saving the NC side history data. (When DRAM is selected, the history data will not be held after the power is turned OFF.)	0: DRAM 1: SRAM
8723	Modal hist sys	Designate the system for sampling the history data.	bit0: System 1 bit1: System 2 : bit7: System 8
8731	PREPRO samp num	Set the number of sampling data items to sample.	0 to 9999 items
8732	PREPRO samp mem	Designate the range for saving the NC side sampling data. (When DRAM is selected, the history data will not be held after the power is turned OFF.)	0: DRAM 1: SRAM

CHAPTER 1 SCREEN OPERATIONS
5. Diagnosis Screens

No.	Setting item	Details	Setting range
8733	PREPRO samp axis	Set the axis for sampling the data.	bit0 : \$1-1 axis bit1 : \$1-2 axis : bit5 : \$2-1 axis : bit10 : \$3-1 axis : bit14 : \$4-1 axis : bit18 : \$5-1 axis :
8741	ISYNC samp time	Set the sampling time.	0 to 9999 (s)
8742	ISYNC samp cycle	Set the multiplier "n" value for the sampling cycle calculation expression. (Task cycle) × 2 ⁿ Calculate the task cycle at 7.1ms.	0 to 8
8743	ISYNC samp mem	Designate the range for saving the NC side sampling data. (When DRAM is selected, the history data will not be held after the power is turned OFF.)	0: DRAM 1: SRAM
8744	ISYNC samp axis	Set the axis for sampling the data.	bit0 : \$1-1 axis bit1 : \$1-2 axis : bit5 : \$2-1 axis : bit10 : \$3-1 axis : bit14 : \$4-1 axis : bit18 : \$5-1 axis :
8751	MCP samp time	Set the sampling time.	0 to 9999 (s)

CHAPTER 1 SCREEN OPERATIONS
5. Diagnosis Screens

No.	Setting item	Details	Setting range
8752	MCP samp cycle	Set the multiplier "n" value for the sampling cycle calculation expression. (Task cycle) × 2 ⁿ Calculate the task cycle at 3.5ms.	0 to 8
8753	MCP samp mem	Designate the range for saving the NC side sampling data. (When DRAM is selected, the history data will not be held after the power is turned OFF.)	0: DRAM 1: SRAM
8754	MCP samp spindle	Designate the spindle for sampling the data. (Set the logical sum when the corresponding system's bit is ON (1).)	bit0 : Spindle 1 bit1 : Spindle 2 : bit5 : Spindle 6
8755	MCP samp axis	Set the axis for sampling the data. (Set the logical sum when the corresponding system's bit is ON (1).)	bit0 : \$1-1 axis bit1 : \$1-2 axis : bit5 : \$2-1 axis : bit10 : \$3-1 axis : bit14 : \$4-1 axis : bit18 : \$5-1 axis :

(4) Saving the MELDAS diagnosis parameters

1)

Press the menu Param save.

➔ A message confirming the saving appears.


2)

Press Y or INPUT.

➔ The MELDAS diagnosis parameters are saved in the NC memory, and then the diagnosis information is initialized.

To cancel the saving, press any key other than Y or INPUT.

 **Caution**

 If another screen is opened before saving the data on the MELDAS Diagnosis screen, the set diagnosis information parameters will all be invalidated.

6. Maintenance Screens

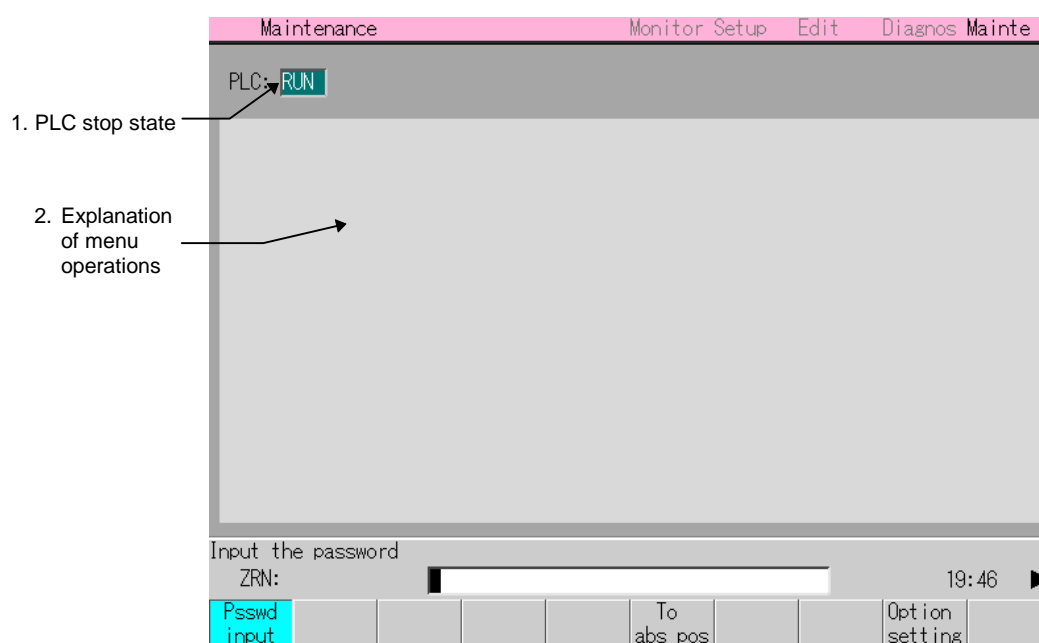
Maintenance-related menus include the menu **Mainte** for selecting maintenance-related screens, and the menu **Ladder monitor** for displaying the Ladder monitor screen.

6.1 Maintenance screen

This section explains the screen used for servicing and setting up the NC.

The following screen appears when the **Mainte** menu is pressed.

Operations such as NC memory formatting, Absolute position parameter setting and SRAM backup can be carried out at the Maintenance screen.



(1) Display items

Display item	Details
1. PLC stop state	The PLC state (stopped/stop canceled) is displayed. Stopped : "STOP" is highlighted. Stop canceled : "STOP" is not highlighted.
2. Explanation of menu operations	A brief explanation of the menu operations is displayed.

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6. Maintenance Screens

(2) Menus

Menu	Details	Type	Reference
Psswd input	This changes the screen related to the maintenance by setting the password.	A	–
To abs pos	This changes the screen to that for setting the absolute position zero point.	C	6.2 Absolute Position Setting screen
Option setting	This sets the options.	C	–
Format	This formats the NC memory.	B	–
PLC stop	This forcible stops the PLC ladder process. If this menu key is pressed in the stopped state, the stop is canceled.	C	–
To in/out	This changes the screen to the Input/Output screen.	C	3.5 Data Input/Output screen
To param	This changes the screen to the Parameter screen.	C	3.6 Parameter screens
SRAM backup	This backs up the NC SRAM information in a file (SRAM.DAT) on the hard disk.	B	–
HMI quit	This quits the screen operation.	B	–

6.1.1 Formatting the NC memory

- 1)

Press the menu Format.

 → A message appears to confirm the format.

- 2)

Press Y or INPUT.

 → The NC memory format starts.
All of the machining programs in the NC memory are erased.

Press a key other than Y or INPUT to cancel the formatting.



Caution



All of the various data in the NC memory is erased when formatting. Be sure to use the transfer function to transfer all the necessary data to another storage device before formatting.

6.1.2 Backing up the NC SRAM information

- 1)

Press the menu SRAM backup.

 → A message appears to confirm the backup.

- 2)

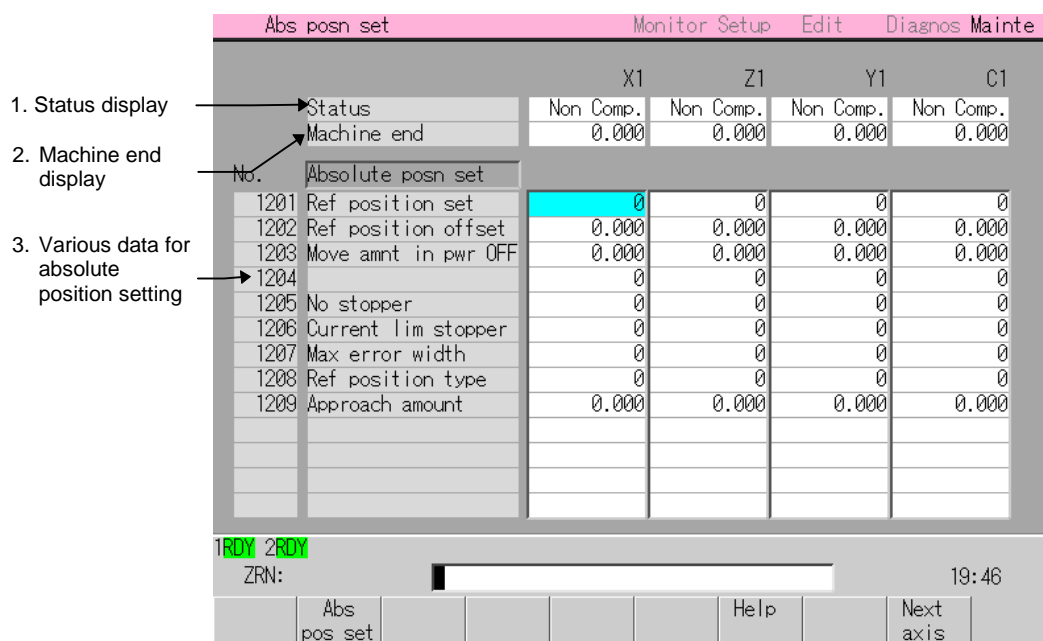
Press Y or INPUT.

 → The backup is executed.
The data is backed up into "D:\BACKUP\SRAM.BIN" on the hard disk.

Press a key other than Y or INPUT to cancel the backup.

6.2 Absolute Position Setting screen (Abs posn set screen)

The absolute position of the servo axis (NC axis) is set on this screen.
 The execution stage of the zero point initialization is displayed at "Status" and "Machine end".
 Set the required data in the absolute position setting data items, and set the absolute position.
 The data setting details are explained in this section.



(1) Display items

Display item	Details
1. Status display	<p>The execution stage of the zero point initialization is displayed.</p> <p>(a) When the absolute value is lost, "Non comp." is displayed. (b) "Pressing", "Ret. Ref. P" or "Completion" are displayed according to the zero point initialization operations.</p> <p>■ Meaning of display when using machine end stopper type</p> <p>Pressing : This is displayed after the "1201 Ref position set" is set until the current limit is reached by pushing the table against the machine end.</p> <p>Ret. Ref. P : This is displayed after the stopper current limit is reached until the absolute position origin point is detected and written into the SRAM.</p> <p>Completion : This is displayed when the absolute position is established.</p> <p>■ Meaning of display when using origin point alignment type</p> <p>Ret. Ref. P : This is displayed after "1201 Ref position set" is set until the absolute position origin point is detected and written into the SRAM.</p> <p>Completion : This is displayed when the absolute position is established.</p>

CHAPTER 1 SCREEN OPERATIONS
6. Maintenance Screens

Display item	Details
2. Machine end display	<p>The distance from the absolute position origin point to the grid point is displayed. Display range : -99999.999 to 99999.999 (mm) (radius value display)</p> <ul style="list-style-type: none"> ■ Meaning of display when using machine end stopper type The distance from the machine end to the previous grid point is displayed. ■ Meaning of display when using marked point alignment type The distance from the marked point to the previous grid point is displayed. When a grid mask is applied, the distance to the next grid point is displayed. This data is set to "0" when the power is turned ON.
3. Various data for absolute position setting	<p>This column is used to set and display the data required for absolute position setting. Refer to "(3) List of data related to absolute position setting" for details on setting the absolute position.</p>

(2) Menus

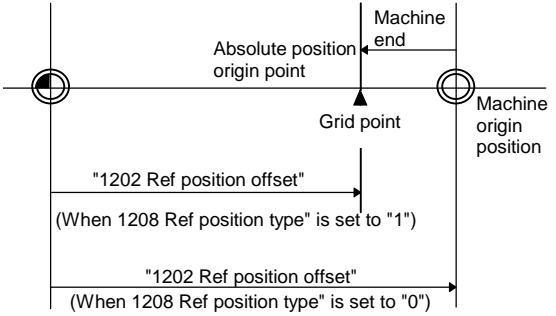
Menu	Details	Type
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: auto;">Abs pos set</div>	<p>This changes between the zero point initialization execution/cancel state. During zero point initialization, "Absolute posn set" on the screen is highlighted.</p> <p>This setting is canceled when the power is turned ON.</p> <p>During execution: The absolute position detection data ("1201 Ref position set" and "1202 Ref position offset") can be changed on the screen.</p> <p>Canceled state: The absolute position detection data ("1201 Ref position set" and "1202 Ref position offset") cannot be changed on the screen.</p>	C
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: auto;">Help</div>	<p>The screen explaining the methods of initializing the zero point and resetting the basic machine coordinate system will open.</p>	C
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: auto;">Next axis</div>	<p>The displayed axis will change to the next axis.</p>	C

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(3) List of data related to absolute position setting

No.	Setting item	Details	Setting range
1201	Ref position set	<p>0 : After the zero point is initialized and the absolute position is established, "1202 Ref position offset" cannot be set.</p> <p>1 : Zero point initialization can be executed.</p> <p>2 : The basic machine coordinate system can be reset.</p>	<p>0 to 2</p> <p>Changes to "0" when the power is turned OFF and the absolute position is established.</p>
1202	Ref position offset	<p>This sets the distance of the absolute position origin point from the basic machine coordinate system zero point.</p> <p>Note that this cannot be set if "1201 Ref position set" is 0 after the absolute position is established or if an absolute position detection alarm has occurred.</p> <p>(Note) Set with the following procedure:</p> <ul style="list-style-type: none"> • Select the detection method with the Basic axis parameter "1011 abson", and turn the power ON again. • Set "Absolute posn set" "ON". (Press menu Abs pos set.) • Set "1201 Ref position set" to "1". • Set "1202 Ref position offset". • Turn the power ON again, and carry out reference point return. 	<p>± 99999.999 (mm)</p> <p>(Radius value setting)</p>
1203	Move amnt in pwr OFF	<p>This checks the difference of the machine positions when the power is turned OFF and turned ON again. If excessive, this outputs the alarm "ABSOLUTE POSITION ERROR".</p> <p>■ When set to "0" 0.9 × PIT (ball screw pitch) × 1000 [μm]</p>	<p>0 to 99999.999 (mm)</p> <p>(Radius value setting)</p> <p>0 : Equivalent to ball screw pitch</p>
1204		Not used.	0
1205	No stopper	<p>This selects the zero point initialization method (machine end stopper pushing method or method of setting reference point without using machine end). To carry out dogless reference point return, always select "0" (stopper method).</p>	<p>0 : Stopper method</p> <p>1 : Reference point method</p>
1206	Current lim stopper	<p>This sets the current limit value for initialization. The setting value is a ratio of the limit current in respect to the stall current.</p> <p>Calculation expression</p> $(\text{Setting value}) = \frac{(\text{Limit current})}{(\text{Stall current [Peak]}} \times 100$	0 to 500 (%)
1207	Max error width	<p>This sets the excessive error width for pushing during absolute position setting using the machine end stopper type.</p>	0 to 32767 (mm)

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No.	Setting item	Details	Setting range
1208	Ref position type	<p>This selects whether the absolute position origin point is a random point (machine end or marked point) or a grid point.</p> <p>When set as a grid point, operations to move to the grid position are required.</p> 	<p>0 : Random point 1 : Grid point</p>
1209	Approach amount	<p>Designate, as an absolute value, the distance (relative distance from pressing point) to start the second pressing during automatic dog-less reference point return.</p> <p>When "0" is set, a value double grspc (grid interval) will be set.</p>	<p>0 to 99999.999 (mm) (radius value setting)</p>

6.2.1 Selecting the axis

(1) Operation method

1)

Press the Next axis menu.



The section displaying the axis name and the details of each data will change to that for the next axis.

If the Next axis menu is pressed while the last axis is displayed, the display will change to the first axis.

6.2.2 Displaying the Help screen

On this screen, the operation procedures for initializing the zero point and for resetting the basic machine coordinate system are displayed.

The Abs posn set screen will reappear if the C-B CANCEL key is pressed.

(1) Menus

Menu	Details	Type
Machine grid	The operation procedures for the machine end stopper (grid point) type are displayed.	B
Machine optimal	The operation procedures for the machine end stopper (random point) type are displayed.	B
Ref.pnt grid	The operation procedures for the marked point definition (grid point) type are displayed.	B
Ref.pnt optimal	The operation procedures for the marked point definition (random point) type are displayed.	B
Coord re-set	The operation procedures for resetting the basic machine coordinate system are displayed.	B

CHAPTER 1 SCREEN OPERATIONS
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(2) Help screens

- Operation procedures for machine end stopper (grid point) type
 (1205 No stopper = 0, 1208 Ref position type = 1)

Abs posn set(help)	Monitor Setup	Edit	Diagnos	Mainte
--------------------	---------------	------	---------	--------

Method of abs posn initializing
 *** Machine end stopper type A ***
 (Electronic grid point definition)

1. Select axis by [Next axis] menu key, tab key, and the cursor movement.
2. Set value into '1206 Current lim stopper' (current limit value) and '1207 Max error width' (error excess distance).
 These values are used for the detection of machine end stopper.
3. Push [Abs pos set] menu key.
 -> 'Absolute posn set' becomes highlighted.
4. Select manual mode and set '1' into '1201 Ref position set'.
5. Move the axis to the machine end stopper until the current limit comes ON.
6. Move the axis to the opposite direction.
 -> The movement stops at the grid and reference point is defined.
 -> 'Status' shows 'Complt'.
7. Set '2' into '1201 Ref position set'.
8. Set the distance from the zero point of the basic machine coordinate to the reference point (at grid) into '1202 Ref position offset'.
9. Restart NC system. (Power OFF/ON the system)

1RDY	2RDY	ZRN: <input style="width: 90%;" type="text"/>	19:46	
Machine grid	Machine optinal	Ref.pnt grid	Ref.pnt optinal	Coord re-set

- Operation procedures for machine end stopper (random point) type
 (1205 No stopper = 0, 1208 Ref position type = 0)

Abs posn set(help)	Monitor Setup	Edit	Diagnos	Mainte
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Method of abs posn initializing
 *** Machine end stopper type B ***
 (Free point definition)

1. Select axis by [Next axis] menu key, tab key, and the cursor movement.
2. Set value into '1206 Current lim stopper' (current limit value) and '1207 Max error width' (error excess distance).
 These values are used for the detection of machine end stopper.
3. Push [Abs pos set] menu key.
 -> 'Absolute posn set' becomes highlighted.
4. Select manual mode and set '1' into '1201 Ref position set'.
5. Move the axis to the machine end stopper until the current limit comes ON.
6. Set '2' into '1201 Ref position set'.
7. Set the distance from the zero point of the basic machine coordinate to the machine end stopper into '1202 Ref position offset'.
8. Restart NC system.
 (Power OFF/ON the system)

1RDY	2RDY	ZRN: <input style="width: 90%;" type="text"/>	19:47	
Machine grid	Machine optinal	Ref.pnt grid	Ref.pnt optinal	Coord re-set

CHAPTER 1 SCREEN OPERATIONS
6. Maintenance Screens

- Operation procedures for marked point definition (grid point) type
 (1205 No stopper = 1, 1208 Ref position type = 1)

Abs posn set(help)		Monitor Setup	Edit	Diagnos	Mainte
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Method of abs posn initializing
 *** Reference point definition type A ***
 (Electronic grid point definition)

1. Select axis by [Next axis] menu key, tab key, and the cursor movement.
2. Push [Abs pos set] menu key.
 -> 'Absolute posn set' becomes highlighted.
3. Select manual mode and move the axis to required position as reference point.
4. Set '1' into '1201 Ref position set'.
5. Move the axis to the opposite direction.
 -> The movement stops at the grid and reference point is defined.
 -> 'Status' shows 'Complt'.
6. Set '2' into '1201 Ref position set'.
7. Set the distance from the zero point of the basic machine coordinate to the reference point (at grid) into '1202 Ref position offset'.
8. Restart NC system.
 (Power OFF/ON the system)

1RDY 2RDY
 ZRN: 19:47

Machine grid	Machine optional	Ref.pnt grid	Ref.pnt optional	Coord re-set
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- Operation procedures for marked point definition (random point) type
 (1205 No stopper = 1, 1208 Ref position type = 0)

Abs posn set(help)		Monitor Setup	Edit	Diagnos	Mainte
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Method of abs posn initializing
 *** Reference point definition type B ***
 (Free point definition)

1. Select axis by [Next axis] menu key, tab key, and the cursor movement.
2. Push [Abs pos set] menu key.
 -> 'Absolute posn set' becomes highlighted.
3. Select manual mode and move the axis to required position as reference point.
4. Set '1' into '1201 Ref position set'.
5. Set '2' into '1201 Ref position set'.
6. Set the distance from the zero point of the basic machine coordinate to the reference point into '1202 Ref position offset'.
7. Restart NC system.
 (Power OFF/ON the system)

1RDY 2RDY
 ZRN: 19:48

Machine grid	Machine optional	Ref.pnt grid	Ref.pnt optional	Coord re-set
--------------	------------------	--------------	------------------	--------------

1/ *

CHAPTER 1 SCREEN OPERATIONS
6. Maintenance Screens

■ Operation procedures for resetting basic machine coordinate system

Abs posn set(help)	Monitor Setup	Edit	Diagnos Mainte
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Method of basic machine coordinate re-setting

1. Select axis by [Next axis] menu key, tab key, and the cursor movement.
2. Push [Abs pos set] menu key.
 -> 'Absolute posn set' becomes highlighted.
3. Select manual mode and set '2' into '1201 Ref position set'.
4. Set the distance from the zero point of the basic machine coordinate to the reference point into '1202 Ref position offset'.
5. Restart NC system.
 (Power OFF/ON the system)

1RDY 2RDY	ZRN: <input style="width: 90%;" type="text"/>	19:48
Machine grid	Machine optional	Ref.pnt grid
		Ref.pnt optional
		Coord re-set

6.3 Ladder Monitor screen (PLC LADDER screen)

The on-board screen will start when the menu key Ladder monitor is pressed.

The sequence circuit operation can be confirmed, the circuit can be edited, and the sequence circuit can be saved to a FROM on the on-board screen.



When options are invalid, the circuit monitor can be displayed, but the circuit cannot be edited.

To use the edit function, the on-board function options must be provided, and the parameters for validating the on-board edit function must be set.

The ROM-writing function menu can be used regardless of the provision of options.

The screen configuration and specifications may differ according to the machine maker.

Refer to the manual issued by each machine maker for details.

Refer to the following manuals for details on the On-board screen operation and displays, etc.

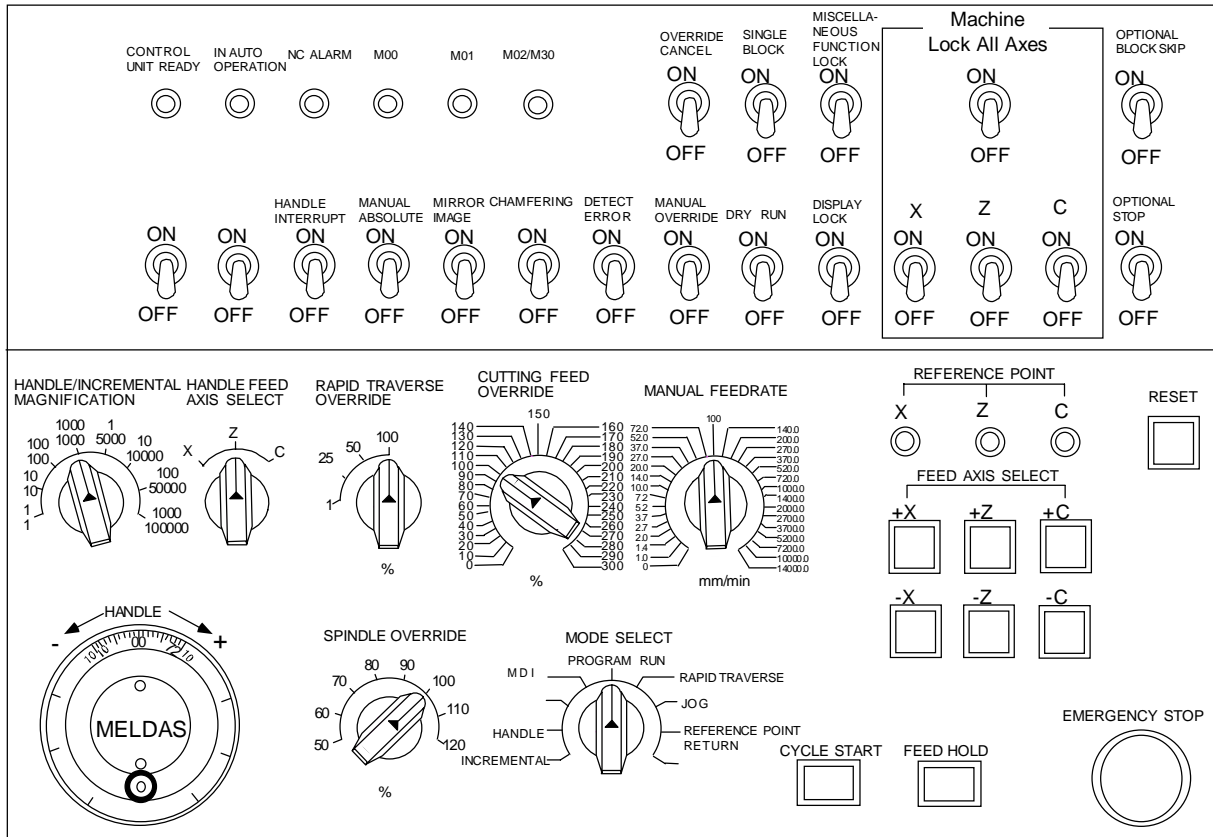
MELDAS 600 Series PLC On-board Instruction Manual BNP-B2253

CHAPTER 2 MACHINE OPERATIONS

CHAPTER 2 MACHINE OPERATIONS

This chapter explains the functions and operation method of the machine operation switches for NC operation (automatic operation and manual operation) by using the illustration of the machine operation panel below.

The actual machine operation and motion vary with each machine. Refer to the operation manual issued by the machine manufacturer. Use this chapter for reference.



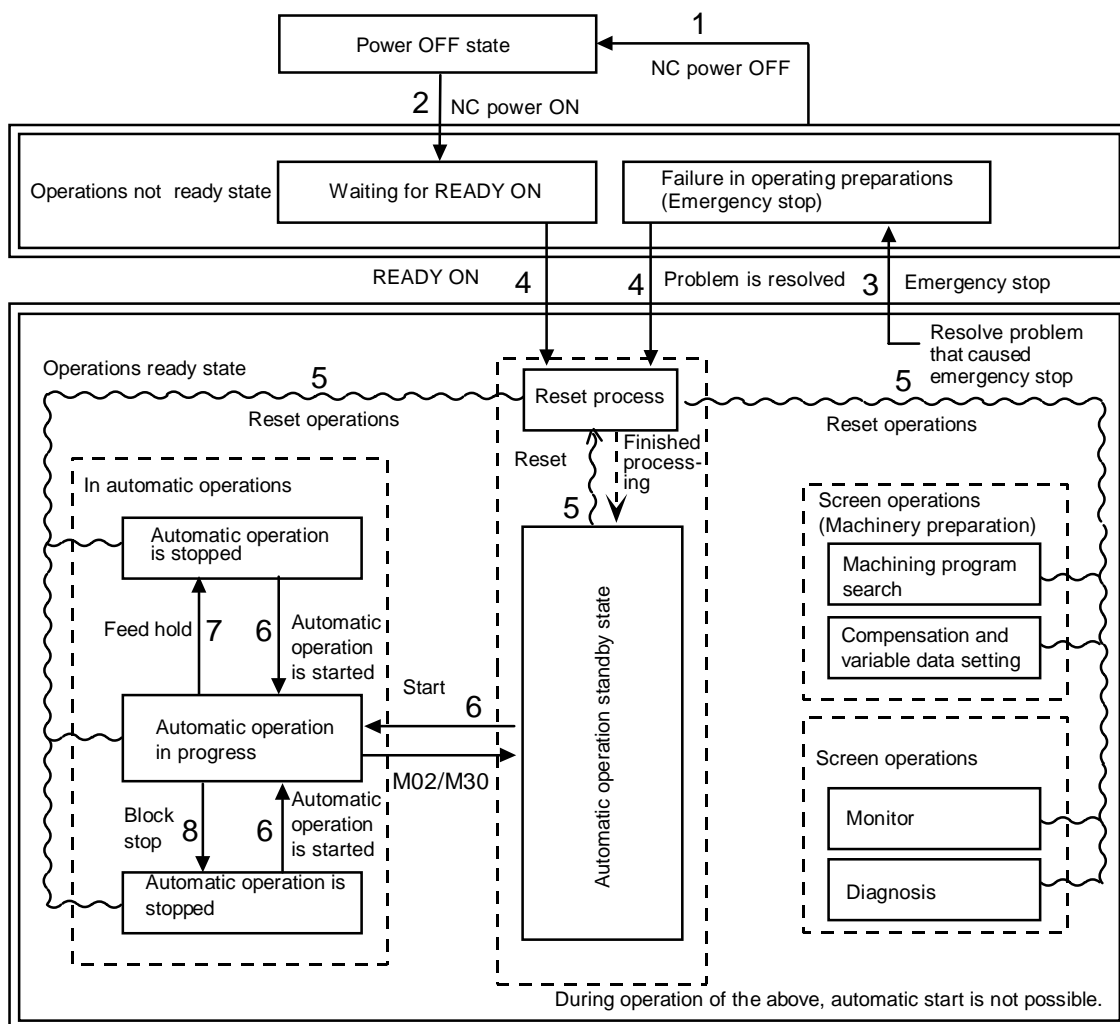
1. Operation State

1.1 Operation state transition diagram

The NC unit operation state changes momentarily according to the program contents or signals from the operation panel or machine. The controller roughly classifies the operation state into power OFF, not ready, and ready.

NC operation is enabled only in the operating preparation ready state. The operating preparation ready state is furthermore classified into reset, automatic operation stop, automatic operation start, and automatic operation pause, etc., as shown below.

Manual mode operation is enabled in the operation complete state.



1.2 Power OFF

The power OFF state means that no power is supplied to the control circuit.

(1) From any other state to power OFF (transition 1)

- When the POWER OFF switch of the setting display unit is pressed.
- When POWER OFF signal is input from the machine.
- When the power supplied from the machine to NC unit is turned OFF.
- When the fuse for the power unit in the NC unit has blown.

1.3 Not ready

The operation preparation not ready state means that the system is not ready to run because of the NC unit itself or because of the machine, even though power is supplied to the NC unit control circuit. The READY lamp on the setting display unit is OFF.

- (1) From power OFF to not ready (transition 2)
 - When the POWER ON switch of the setting display unit is pressed.
 - When POWER ON signal is input from the machine.
- (2) From ready to not ready (transition 3)
 - When EMG (emergency stop) is displayed on the setting display unit screen.
 - When any of the following alarms is displayed on the setting display unit screen;
Servo alarm, feedback alarm, excessive error alarm, etc.

1.4 Ready

The operating preparation ready state means that power is supplied to the NC unit control circuit and the system is ready to run. The READY lamp on the setting display unit is ON. The state is furthermore classified into the following four.

1.4.1 Reset

The reset state means that the NC unit is reset.

- (1) From not ready to reset (transition 4)

This state is also called initial state.
Approximately four seconds after turning power ON
- (2) From another ready state to reset (transition 5)
 - When the "RESET" key on the setting display unit is turned ON.
 - When external reset signal is input from the machine.
 - When M02 or M30 is executed (depending on the machine specifications).

1.4.2 Automatic operation start

The automatic operation start state means starting in automatic mode. The IN-AUTO OPERATION lamp on the machine operation panel is ON.

- (1) From another automatic operation ready state to automatic operation start (transition 6)
 - When the "CYCLE START" switch on the machine operation panel is pressed in automatic mode.

CAUTION



Do not enter the movable range of the machine during automatic operation. Make sure not to place hands, legs or face near the spindle during rotation.

1.4.3 Automatic operation pause

The automatic operation pause state means that operation or motion temporarily pauses during execution of one block during the automatic operation start. The AUTO PAUSE lamp on the machine operation panel is ON and the AUTO START lamp is OFF.

(1) From automatic operation start to automatic pause (transition 7)

- When the "FEED HOLD" switch on the machine operation panel is turned ON.
- When automatic mode input is out.

1.4.4 Automatic operation stop

The automatic operation stop state means that execution of one block is completed and stopped during automatic operation start. Both the AUTO START and AUTO PAUSE lamps on the machine operation panel are OFF.

(1) From automatic operation start to automatic operation stop (transition 8)

- When the "SINGLE BLOCK" switch on the machine operation panel is turned ON and execution of the block is complete.
- When automatic mode input is changed to another automatic mode input.

2. Indicator Lamps

2.1 NC unit ready

The NC UNIT READY lamp indicates that the NC unit is ready to run. The lamp goes off at emergency stop or when an alarm occurs in the drive or operation block.

2.2 Automatic operation busy

The AUTO BUSY lamp is ON from "CYCLE START" switch turning ON in the automatic operation mode (program run, or MDI) to the program end after M02 or M30 execution, reset, or emergency stop.

2.3 Automatic operation start busy

The AUTO START BUSY lamp indicates that the NC unit is executing control in the automatic operation mode. It is ON from the automatic operation start state entered when the "CYCLE START" switch is pressed in the automatic operation mode (program run, or MDI) to the automatic operation start end such as the automatic operation pause busy state entered when the "FEED HOLD" switch is pressed or block completion stop (block stop).

2.4 Automatic operation pause busy

The AUTO PAUSE lamp is ON from "FEED HOLD" switch turning ON to "CYCLE START" switch turning ON or when the mode selection switch is changed from the automatic mode to manual mode during the automatic operation.

2.5 Return to reference point

Output is executed when the control axis arrives at the reference point during manual and automatic reference point return and reference point comparison.

2.6 NC alarm

The ALARM lamp goes on when an alarm occurs during NC operation.

2.7 M00

When M00 commanded in a program is executed during automatic operation, automatic operation is stopped after the block including M00 is completed. The M00 lamp lights up in this case. (This depends on the PLC process.)

2.8 M01

When M01 commanded in the program is executed during automatic operation, the system checks whether the optional selection switch is ON or OFF. If OFF, the next block is executed, and if ON, automatic operation is stopped after the block is completed. The M01 lamp lights up in this case. (This depends on the PLC process.)

2.9 M02/M30

When M02 or M30 is executed during automatic operation, the NC unit reaches the program end and the M02 or M30 lamp is turned ON. (This depends on the PLC process.)

3. Reset Switch and Emergency Stop Button

3.1 Reset switch

The NC unit is reset by turning ON the "RESET" switch on the machine operation panel or the "RESET" key on the setting display unit. When the "RESET" switch or key is turned ON while the controller is running, the unit is placed in one of the following states.

- 1) If a movement command is being executed, move stops with deceleration and the remaining distance in the executing block is cleared.
- 2) If miscellaneous function such as M, S, or T is being executed, execution of the miscellaneous function is interrupted.
- 3) The active and buffer memory contents and display are cleared.
- 4) If a program error occurs and remains, the program error state is cleared and the ALARM lamp goes off.
- 5) Input/output is stopped while the input/output unit is being used.
- 6) If reset 2 is input, the modal state will be initialized.

3.2 Emergency stop button

The "EMERGENCY STOP" button is a red mushroom-shape pushbutton. The not ready state is set by pressing the "EMERGENCY STOP" button.

During emergency stop, the READY lamp goes off and automatic operation and manual operation do not work. The NC unit is reset.


If the "EMERGENCY STOP" button is pressed when a movement command is executed, the moving axis stops and all other machine motions also stop.

When the "EMERGENCY STOP" button is released, the READY lamp goes on in about one second and operation enable state (ready state) is entered.

When parameter is emergency stop hold type, if the "EMERGENCY STOP" button is released, the emergency stop state is held. To release the emergency stop state, turn ON the "RESET" switch.

If the "EMERGENCY STOP LIMIT" switch of each axis works, the same state as if the "EMERGENCY STOP" button were pressed may be entered depending on the machine specifications.

CAUTION

-  If the axis overruns or makes an abnormal noise, press the emergency stop button immediately, and stop the axis.

4. Operation Mode

4.1 Mode select switch

The MODE SELECT switch is used to determine the NC unit operation mode.

Jog feed mode:

Select this mode to move the control axis consecutively at manual feedrate.

Rapid traverse mode:

Select this mode to move the control axis consecutively at rapid traverse rate.

Return to reference point mode:

Select this mode to position the control axis at the machine reference point manually.

Incremental mode:

Select this mode to move the control axis at a given distance.

Handle feed mode:

Select this mode to move the control axis by using the manual handle.

Program run mode:

Select this mode to automatically run the machining program.

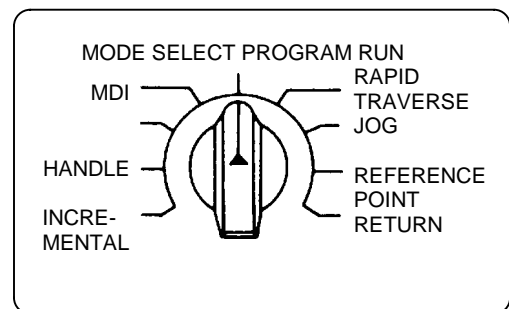
Select this mode to carry out an operation search of the device (memory) stored in the machining program to be run.

MDI mode:

Select this mode for MDI operation.

Automatic dog-less reference point return mode:

Select this mode to manually push against the machine end stopper and carry out reference point return.



(Note 1) Refer to Section 1.4 for the running state when a change is made to another mode during automatic operation.

CHAPTER 2 MACHINE OPERATIONS
4. Operation Mode

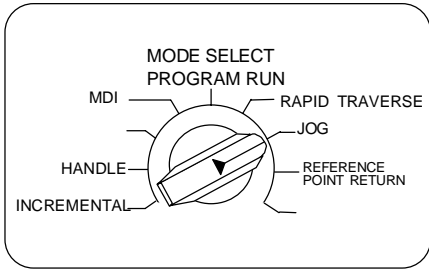
4.2 Jog feed mode

The jog feed mode enables the machine to be moved consecutively at the feedrate set by using the "MANUAL FEEDRATE" switch manually. The jog feed mode is started by using the "FEED AXIS SELECT" switch.

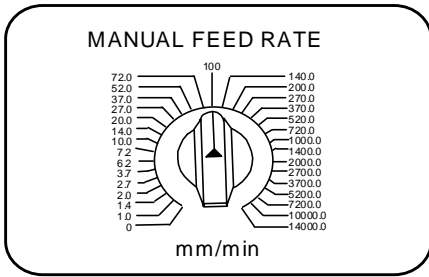
Refer to Section 5.3 for the "MANUAL FEEDRATE" switch.

Operation procedure

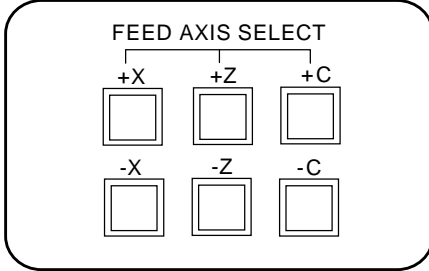
Using the "MODE SELECT" switch, select the JOG mode.



Using the "MANUAL FEEDRATE" switch, set the feedrate. The feedrate unit is the travel distance (mm) per minute.



To move the control axis, turn ON the "FEED AXIS SELECT" switch. The control axis is moved while the switch is turned ON. When the switch is turned OFF, the control axis stops with deceleration.



(Note 1) When the "MANUAL OVERRIDE" switch on the operation panel is turned ON, the override value set by using the "FEEDRATE OVERRIDE" switch takes precedence over the feedrate set by using the "MANUAL FEEDRATE" switch.

4.3 Rapid traverse mode

The rapid traverse mode enables the machine to be moved consecutively at rapid traverse rate manually.

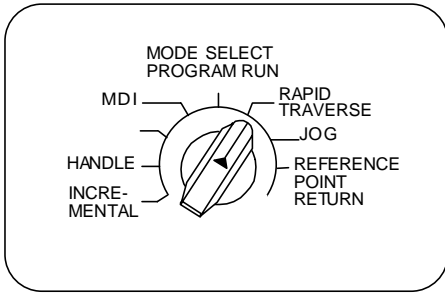
The rapid traverse rate can be changed in four steps by using the "RAPID TRAVERSE OVERRIDE" switch. The rapid traverse mode is started by using the "FEED AXIS SELECT" switch.

(Note 1) Refer to the manual issued by the machine manufacturer for the rapid traverse rate.

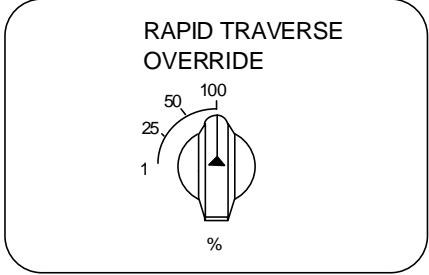
(Note 2) Refer to Section 5.1 for the "RAPID TRAVERSE OVERRIDE" switch.

Operation procedure

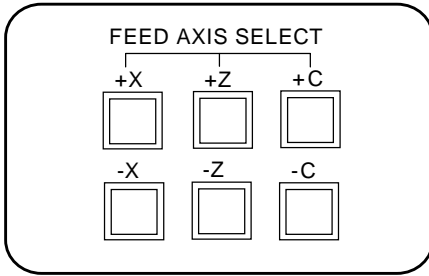
Using the "MODE SELECT" switch, select the RAPID TRAVERSE mode.



Using the "RAPID TRAVERSE OVERRIDE" switch, set any desired override value.



To move the control axis, turn ON the "FEED AXIS SELECT" switch. When the switch is turned OFF, the control axis stops with deceleration.



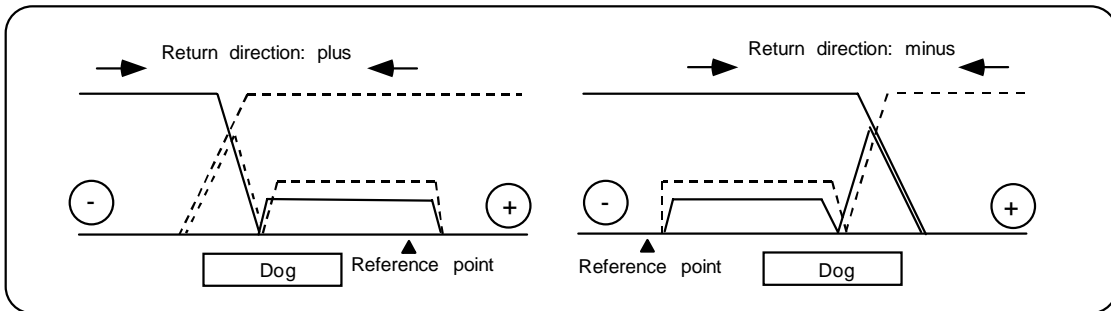
(Note 1) The override value set by using the "CUTTING FEED OVERRIDE" switch is not effective for the rapid traverse rate; when the override value is 0%, the control axis does not move.

4.4 Reference point return mode

This mode enables a given control axis to be manually returned to a determined position unique to the machine (reference point).

For the relative position detection method, the first reference point return after the NC power is turned ON is carried out in the dog-type. In the second or later reference point return, the dog-type mode or high speed return can be selected by setting a given parameter.

Patterns of reference point return are shown below.



Dog-type reference point return

The steps below describe what happens to the control axis when it carries out the reference point return for the first time with the power ON and with the machine in not ready state (emergency stop or the servo alarm occurs) or when the parameters are selected in the dog-type.

- (1) The control axis is moved in the direction where the near point detection limit switch and dog approach each other in the reference point return mode.
- (2) When the limit switch kicks the dog, the control axis carries out a deceleration stop.
- (3) Next, the control axis moves to the reference point at the approach speed set in the parameter.
- (4) When it arrives at the reference point, the reference point arrival signal is output.

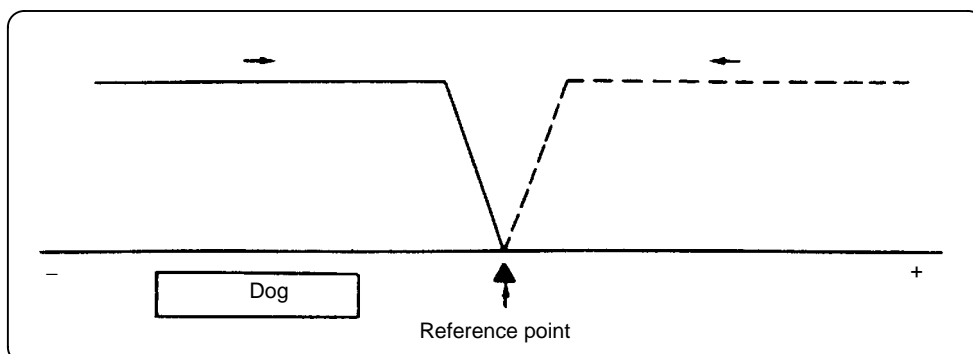
High speed return to reference point

If high speed return is set in a given parameter after dog-type return to reference point is executed, then high speed return to reference point will be made.

Note that when using the absolute position detection method, high-speed reference point return will always be applied.

If the return direction is erroneous in high speed reference point return, an alarm occurs.

Position a reference point position at the rapid traverse rate.

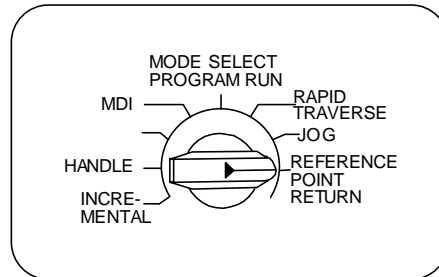


CHAPTER 2 MACHINE OPERATIONS

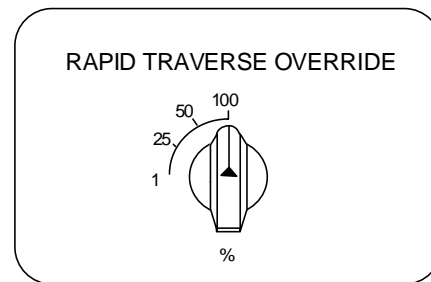
4. Operation Mode

Operation procedure

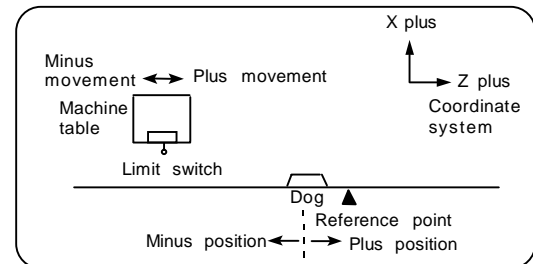
Using the "MODE SELECT" switch, select the REFERENCE POINT RETURN.



Using the "RAPID TRAVERSE OVERRIDE" switch, set any desired override value.

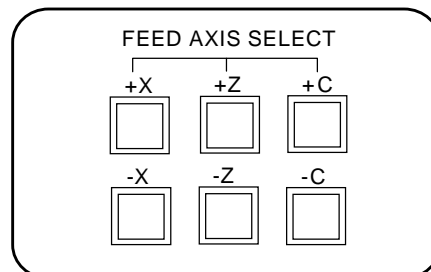


Check the current machine position.



The machine position depends on whether the near point detection limit switch is the plus or minus side with the near point dog on the machine table as illustrated above for reference. When the limit switch exists on the dog, move to either plus or minus.

Using the "FEED AXIS SELECT" switch, move the machine.
If the limit switch exists in the minus direction as illustrated above, turn ON a "+" "FEED AXIS SELECT" switch.



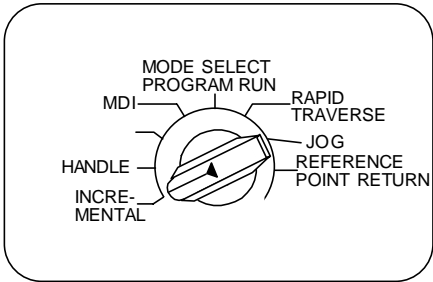
For dog-type reference point return, turn ON the "FEED AXIS SELECT" switch ("+" or "-") in the direction where the dog and limit switch approach each other.
For high-speed reference point return, turn ON the "FEED AXIS SELECT" switch ("+" or "-") in the direction that the spindle head approaches the reference point.
Hold the "FEED AXIS SELECT" switch ON during reference point return until the machine passes by the dog (dog-type) or the REFERENCE POINT ARRIVAL lamp goes on (high speed return).

4.5 Incremental feed mode

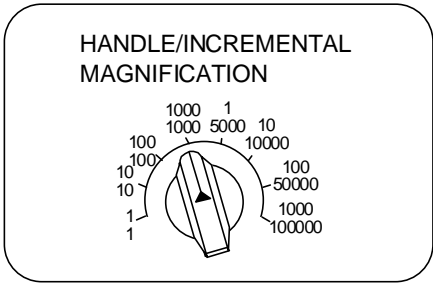
The incremental feed mode enables the controlled axis to be moved a given distance selected by using the HANDLE/INCREMENTAL MAGNIFICATION switch at the manual feedrate when the FEED AXIS SELECT switch is ON.

Operation procedure

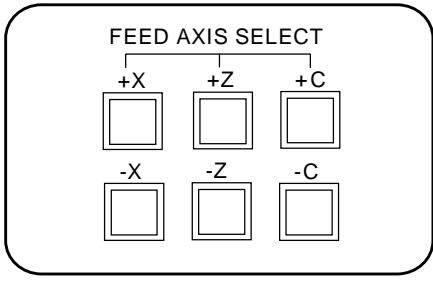
Using the MODE SELECT switch, select the incremental feed mode.



Using the "HANDLE/INCREMENTAL MAGNIFICATION" switch, set a travel distance.



The control axis selected by turning ON the "FEED AXIS SELECT" switch once is moved at a given distance.



4.6 Handle feed mode

The control axis can be moved by turning the manual handle.

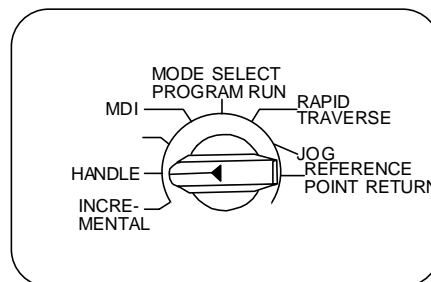
The travel distance per graduation of the handle depends on how the "HANDLE/INCREMENTAL MAGNIFICATION" switch is set.

The axis that can be moved by using the manual handle is determined by setting the "HANDLE FEED AXIS SELECT" switch.

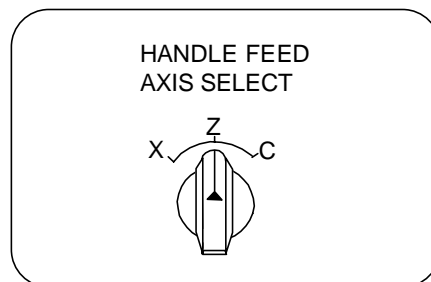
(Note 1) For 3-axis handle feed specifications, the three handles are controlled corresponding to the respective X, Y and Z axes. Changeover to 4-axis specifications by selecting the handle for the Z axis.

Operation procedure

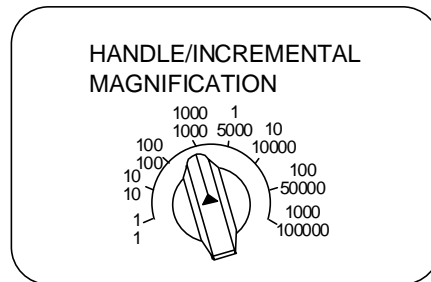
Using the "MODE SELECT" switch, select the HANDLE mode.



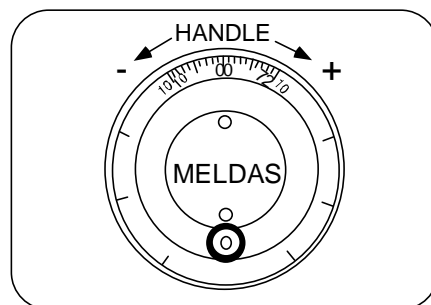
Using the "HANDLE FEED AXIS SELECT" switch, select the control axis to be moved.



Using the "HANDLE/INCREMENTAL MAGNIFICATION" switch, set the travel distance per graduation of the handle.



Move the axis by turning the "HANDLE" in the desired direction.



(Note 1)
When the handle magnification is high and the handle is turned quickly, the corresponding axis is clamped by the rapid traverse rate for safety reasons. In this case, the feed amount exceeding the clamp is discarded, so a fraction unrelated to the handle magnification is caused.

(Note 2)
The handle feed time constant is the "G1 time constant".

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4. Operation Mode

4.7 Program run mode

A machining program is called and automatic operation is executed.

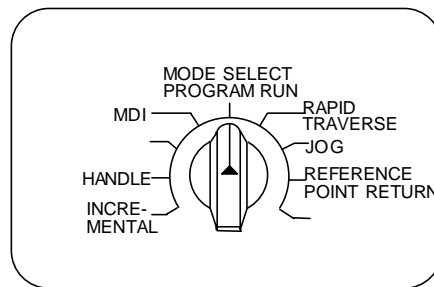
Operation procedure

Call the machining program for running by using the setting display unit.

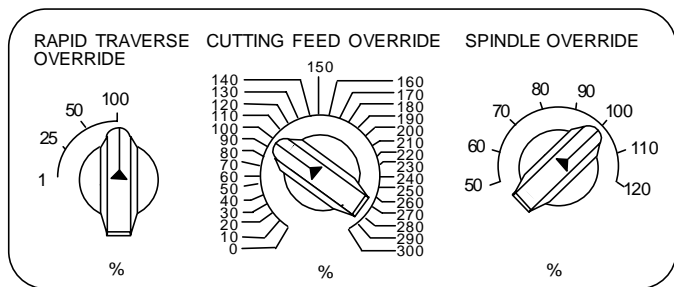
(Refer to the section on operation searches in the Operation Manual.)

Check whether or not the machining program is called normally.

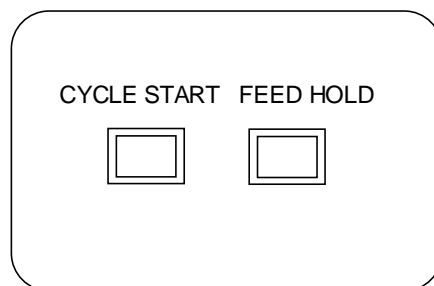
Using the "MODE SELECT" switch, select the PROGRAM RUN mode.



Set any desired override value by using the switch "RAPID TRAVERSE OVERRIDE", "FEEDRATE OVERRIDE", "SPINDLE OVERRIDE". Normally, set the value to 100%.



Automatic operation is started by turning ON the "CYCLE START" switch.



The "CYCLE START" switch becomes effective when it is once turned "ON", then "OFF".

To temporarily stop machine motion, turn ON the "FEED HOLD" switch. The control axes being moved stop with deceleration.

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When machine motion is stopped by using the "FEED HOLD" switch, automatic operation will be restarted by turning ON the "CYCLE START" switch.

Memory operation terminates when "M02" or "M30" in the program is executed. The "M02" or "M30" lamp on the machine operation panel is turned ON.

To repeat execution of a single program, input the rewind signal by reset & rewind at user PLC.

To forcibly terminate automatic operation, turn ON the "RESET" switch.

CAUTION

 Always carry out dry run operation before actual machining, and confirm the machining program, tool offset amount and workpiece coordinate system offset amount.

4.8 MDI operation mode

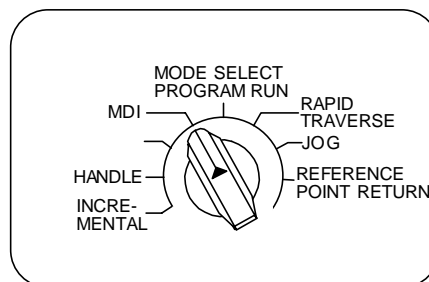
Automatic operation is executed by using a program set on the setting display unit MDI screen.

Operation procedure

The MDI operation follows the program operation.

Set data on the setting display unit MDI screen.

Using the "MODE SELECT" switch, select the MDI mode.



The following steps are the same as the memory operation steps.

5. Operation Panel Switches in Operation Mode

5.1 Rapid traverse override

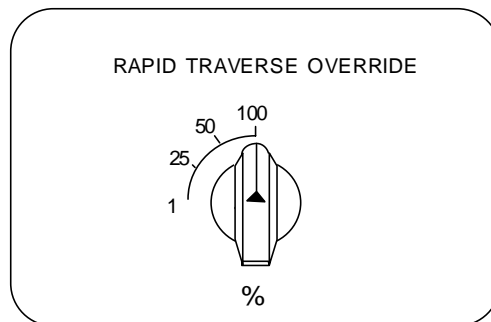
Use the "RAPID TRAVERSE OVERRIDE" switch to override the rapid traverse rate in automatic operation or manual operation.

"RAPID TRAVERSE OVERRIDE" is applicable to the following:

Automatic operation : G00, G27, G28, G29, G30

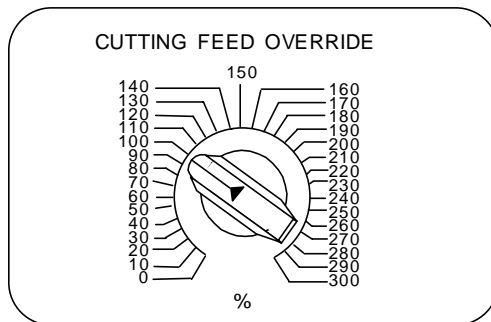
Manual operation : Rapid traverse, return to reference point, incremental feed

(Note) Set the "CUTTING FEED OVERRIDE" switch to 0 to set the rapid traverse override value to 0%.



5.2 Cutting feed override

Use the "CUTTING FEED OVERRIDE" switch to override the feedrate in automatic operation (G01, G02, or G03 F command) or the MANUAL FEEDRATE of jog feed in manual operation in 10% units in the range of 0% to 300%. "FEEDRATE OVERRIDE" is also applicable to the dry run speed in automatic operation.



(Note 1) The dry run speed is the movement speed set by using the "MANUAL FEEDRATE" switch by overriding the programmed feedrate in automatic operation.

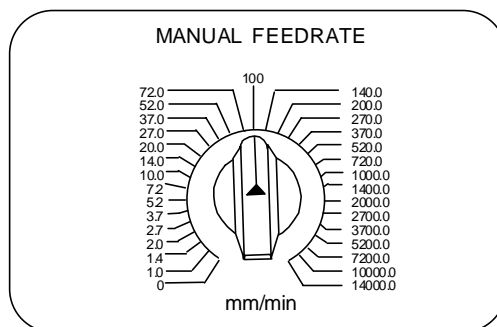
(Note 2) Refer to Section 6 for feedrate override applied to manual feedrate.

5.3 Manual feedrate

Use the "MANUAL FEEDRATE" switch to set the feedrate in jog feed mode during manual operation. The feedrate can be selected among 31 steps from 0 to 14000.0mm/min.

When the "MANUAL OVERRIDE" switch (interrupt switch) is turned ON, the override value set by using the "CUTTING FEED OVERRIDE" switch takes precedence over the value set by using the "MANUAL FEEDRATE" switch.

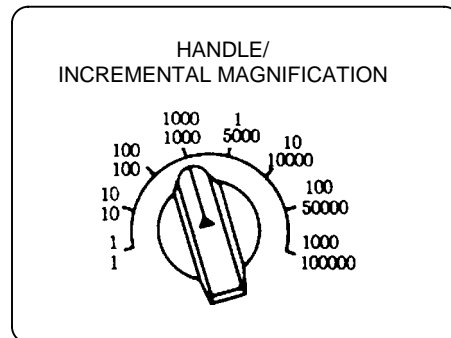
Manual feedrate (mm/min)				
0.	7.2	72	720	7200
1.0	10.0	100	1000	10000
1.4	14.0	140	1400	14000
2.0	20.0	200	2000	
2.7	27.0	270	2700	
3.7	37.0	370	3700	
5.2	52.0	520	5200	



5.4 Handle/incremental feed magnification factor

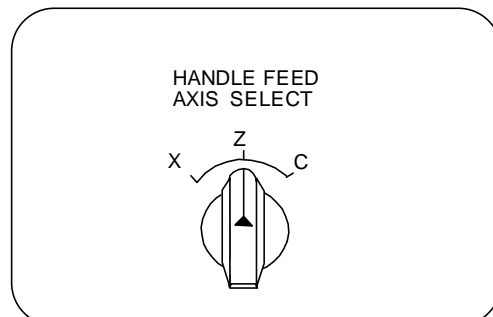
Use the "HANDLE/INCREMENTAL MAGNIFICATION" switch to set the travel distance commanded when manual handle feed or incremental feed is made. The travel distances for each axis are listed below. Up to 1000 can be set for handle feed.

Handle	Incremental
1	1
10	10
100	100
1000	1000
1	5000
10	10000
100	50000
1000	100000



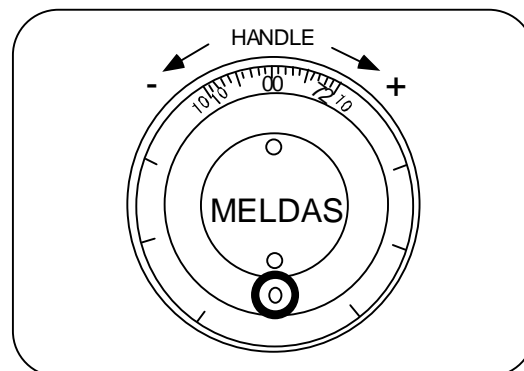
5.5 Handle feed axis selection

Use the "HANDLE FEED AXIS SELECT" switch to select the axis moved by handle operation when the handle mode is selected.



5.6 Manual pulse generator

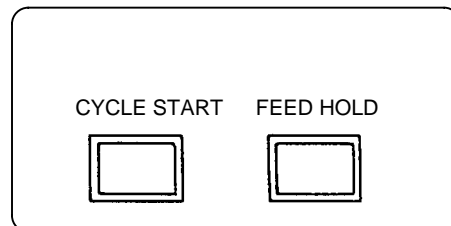
In the manual handle mode, fine feed of the machine can be made by turning the manual pulse generator. The manual pulse generator has 100 graduations per rotation and outputs one pulse per graduation. The travel distance per pulse is set by using the "HANDLE/INCREMENTAL MAGNIFICATION" switch.



5.7 Cycle start and feed hold

Use the "CYCLE START" switch to start automatic operation (program run or MDI). Automatic operation is executed by turning ON the switch.

Also use this switch to restart the operation when it has been stopped using the "FEED HOLD" switch, or from an automatic operation stop state.

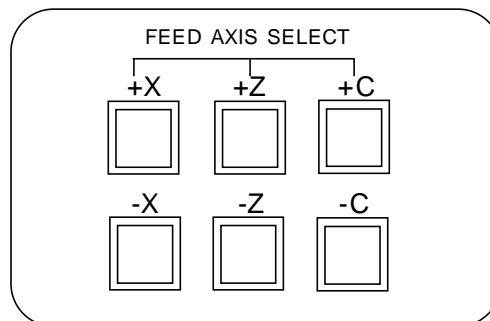


The "CYCLE START" switch is validated when the switch is turned ON, then OFF.

Use the "FEED HOLD" switch to temporarily stop automatic operation (for example, deceleration stop of the control axis during automatic operation). To restart operation, use the "CYCLE START" switch.

5.8 Feed axis selection

Use the "FEED AXIS SELECT" switch to start the control axis during manual operation. While the "FEED AXIS SELECT" switch is ON, the selected control axis is moved. When the switch is turned OFF, the control axis movement stops.



6. Operation Switch Functions and Other Functions

6.1 All axes machine lock

- (1) By turning ON the "ALL AXES MACHINE LOCK" switch, NC commands can be executed for movement by manual operation and automatic operation without moving the machine. The current position display of the setting display unit is incremented.
- (2) Either the command speed or the machine lock speed can be selected with the control parameter (#8105 Machine lock rapid) as the automatic operation speed during machine lock.
 - Command speed : Operation is carried out at the feedrate commanded in the program. Thus, the operation time is the same as the actual machining time.
 - Machine lock speed : Movement commands are processed at high speed, and dwell time, etc., is ignored. Thus, program checks, etc., can be carried out quickly. (The machine lock rapid speed can be set in the parameter 2001.)
- (3) If the "ALL AXES MACHINE LOCK" switch is changed over during automatic operation, the new switch setting is validated when the automatic operation stops after the block being executed is terminated.
- (4) In reference point returns (G28, G30), the axis is controlled to the middle point in a machine lock state, but this state is ignored from the middle point to the reference point.
- (5) If the "MACHINE LOCK" switch is changed over during manual operation, the new switch setting is validated after the operation stops once.
- (6) M, S, T and B commands are executed as programmed.

(Note 1) Each coordinate value updated by the machine lock is preset to a value created based on the machine value by resetting (including M02 and M30).

6.2 Each axis machine lock

By turning ON the "MACHINE LOCK" switch provided for each axis, machine lock will be applied only on the control axis (axes) turned ON. All matters, other than the machine lock for each axis, are the same as all axes machine lock.

6.3 Display lock

- (1) By turning ON the "DISPLAY LOCK" switch, the machine will move for the movement by automatic operation and manual operation, but the current position display of the setting display unit will not be incremented. The program coordinate system is updated.
- (2) If the "DISPLAY LOCK" switch is changed over during automatic operation, the new switch setting is validated when the automatic operation stops after the block being executed is terminated.
- (3) Use this switch when shifting the program zero point with the manual interrupt, without changing the value on the display.

6.4 Miscellaneous function lock

- (1) M, S, T, or B function execution can be ignored by turning ON the "MISCELLANEOUS FUNCTION LOCK" switch.
- (2) The BCD output for the M, S, T and B functions is output, but the start signal is not output.
- (3) If the "MISCELLANEOUS FUNCTION LOCK" switch is changed over during command execution, the new setting is validated when the automatic operation stops after the block being executed is terminated.

6.5 Single block

- (1) When the "SINGLE BLOCK" switch is turned ON, automatic operation stops after the block being executed is terminated. That is, automatic operation stops after one program block is executed.
- (2) The single block stop point in the Fixed cycle mode is fixed according to the Fixed cycle.

6.6 Dry run

- (1) When the "DRY RUN" switch is turned ON, the feedrate set by using the "MANUAL FEEDRATE" switch takes precedence over the programmed feedrate (F). If the operation panel has a "RAPID TRAVERSE" switch that can be turned ON during a program command, the cutting feed clamp speed will be applied when the switch is turned ON.

6.7 Manual override

- (1) When the "MANUAL OVERRIDE" switch is turned ON, the override value set by using the "FEEDRATE OVERRIDE" switch takes precedence over the value set by using the "MANUAL FEEDRATE" switch.
- (2) The override value also takes precedence over the dry run during automatic operation.
- (3) Manual override becomes effective immediately when the switch is turned ON.

6.8 Override cancel

- (1) When the "OVERRIDE CANCEL" switch is turned ON, the programmed F command value takes precedence over the override value set by using the "FEEDRATE OVERRIDE" switch.
- (2) It is not effective for manual override.

6.9 Optional stop

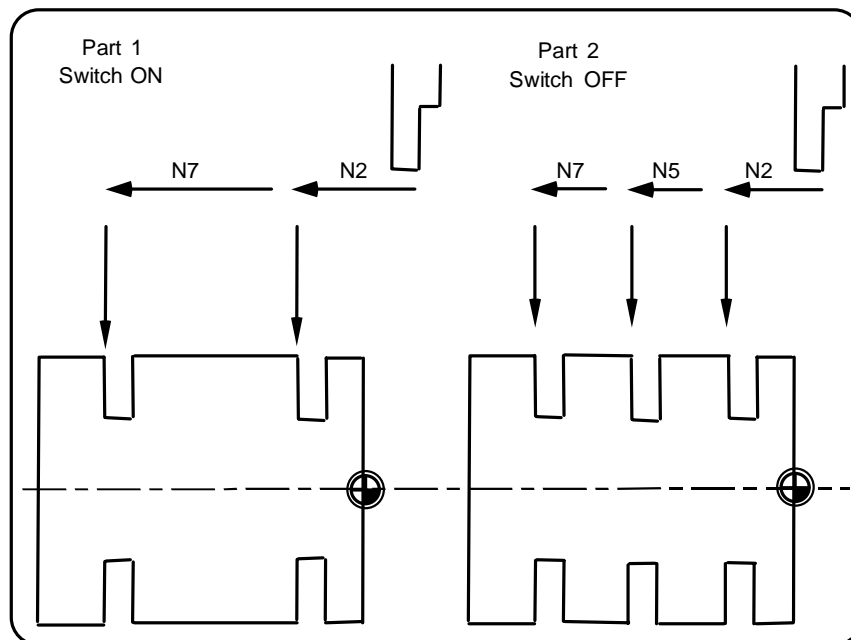
- (1) If M01 is programmed, the machine automatically stops by turning ON the "OPTIONAL STOP" switch. When the switch is OFF, M01 is ignored and the machine does not stop.
- (2) The machine stops after the block including M01 is executed.

6.10 Optional block skip

When the "OPTIONAL BLOCK SKIP" switch is turned ON, a block which begins with a slash (/) is skipped; when the switch is OFF, the block is executed. This enables the operator to specify whether or not a block beginning with a slash (/) code is executed.

(Example) To work two parts as illustrated below, if the following program is prepared and work is made by turning ON the "OPTIONAL BLOCK SKIP" switch, part 1 is provided; if work is made by turning OFF the switch, part 2 is provided:

```
Program N1 G54; /N5 Z-40.;
N2 G00X55.Z-20.; /N6 G75X30.P2.5;
N3 G75R0.5; N7 Z-60.;
N4 G75X30.P2.5Q0R0F0.2; N8 G75X30.P2.5;
N9 M02;
```

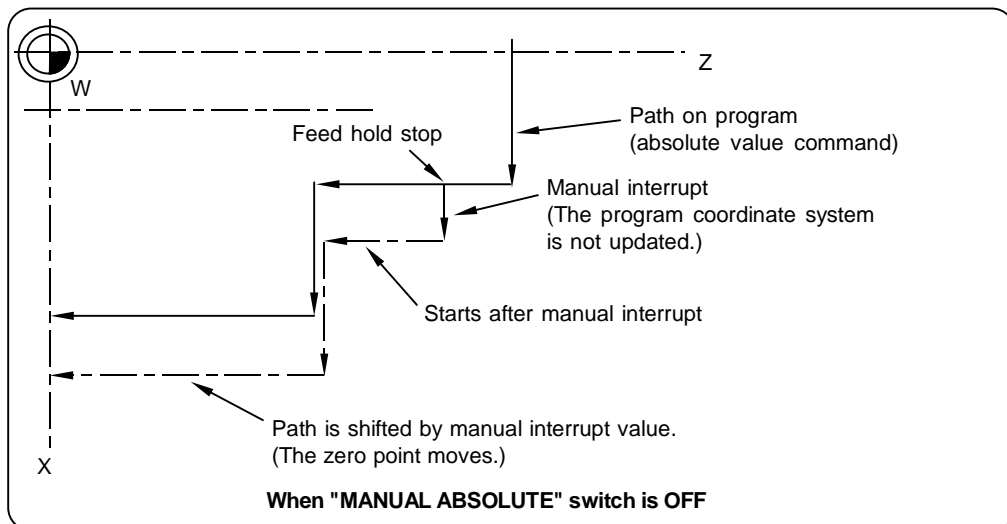
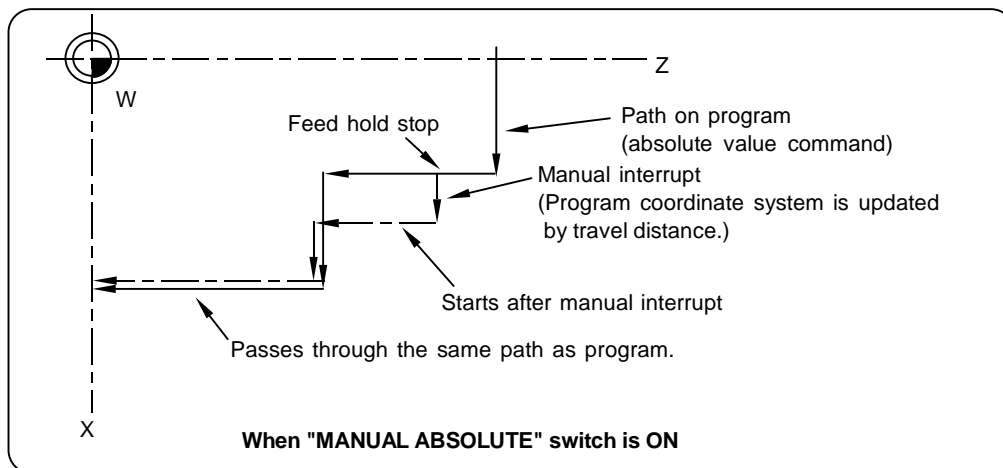


6.11 Manual absolute

When the "MANUAL ABSOLUTE" switch is turned ON, the program coordinate system is updated by the manual tool movement distance value. In other words, the coordinate system from the original program is not shifted, even when the tool (machine) is moved manually.

Thus in this case, the path returns to the one before manual movement when the automatic operation is started.

If the switch is off, the program coordinate system is not updated by the manual tool movement distance value. In other words, the coordinate system from the original program is shifted by the value that moved.



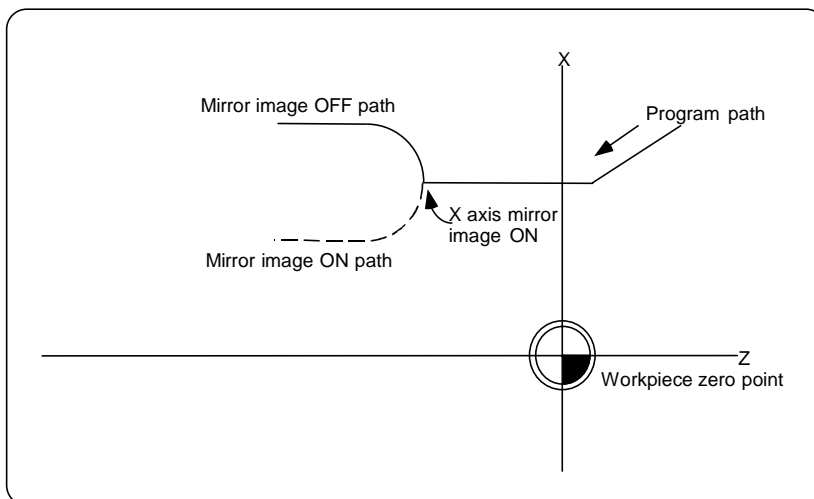
(Note) A "switch ON" status normally results when there is no "MANUAL ABSOLUTE" switch. Note that depending on the machine, a "switch OFF" status may result. Therefore, refer to the specifications issued by the machine manufacturer.

6.12 Mirror image

By turning ON the MIRROR IMAGE switch for each axis, the mirror image can be executed independently for each axis. This is a function used when carrying out symmetrical positioning of the axis by changing the sign of the command memory or MDI coordinate system, or to carry out cutting.

The mirror image is applied on the incremental amount regardless of whether the absolute value or incremental value position command method is used.

During an arc command, the rotation direction will reverse when the mirror image is ON only for one axis.



If the command is an absolute value, the mirror image will be applied on the incremental amount from the current position.

(Note 1) The mirror image is invalid for the reference point return.

(Note 2) The mirror image is valid for the counter preset.

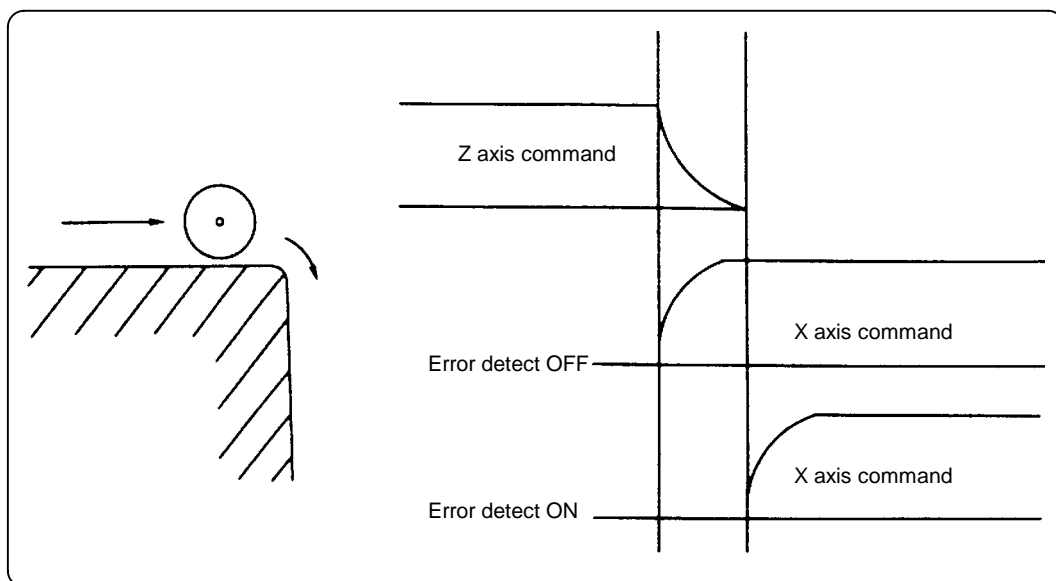
6.13 Error detect

For positioning command (G00), machine deceleration check is made before next block move is started. For cutting command (G01, G02, or G03), the next block is started before the machine reaches the movement command end point. Thus, the corner section is slightly rounded.

To prevent rounding at a corner section, the error detect signal can be turned ON to decelerate until the deceleration check. The next block command is stopped during that interval, so rounding at the corner can be prevented.

This function is equivalent to G09 in the program.

The parameter that is used by the error detect switch and the G09 command for determining the remaining distance after deceleration for moving to the next command can be set with the setting display unit.



6.14 Chamfering

The validity of chamfering during a thread cutting cycle can be changed with the external switch.

6.15 Follow-up function

The follow-up function monitors machine motion in the emergency stop state and reflects it in the current position, machine position and workpiece coordinates. Thus, the machining program can be continued without again making a reference point return after emergency stop.

6.16 Axis removal

When the machine receives the axis removal signal, that axis no longer becomes the control axis. Accordingly, the alarm for the stroke end axis and the servo alarms (Excessive error, No signal detect, drive alarm, etc.) will be ignored. At the same time, the axis will become interlocked.

6.17 Manual/automatic synchronous feed

Manual (JOG, reference point return, incremental feed, handle) operation can be simultaneously executed during automatic operation in an automatic operation mode (program run, MDI).

To select the manual mode or automatic mode, refer to the instruction manual issued by machine manufacturer.

6.18 Handle interruption

6.18.1 Outline

This section explains automatic handle interruption function, which enables the operator to interrupt movement using the manual handle in automatic modes (program run, MDI).
(The automatic handle interruption function is an option.)

6.18.2 Interruptible conditions

- (1) The automatic handle interrupt function allows the program to be interrupted from the manual handle by selecting the manual handle mode in automatic mode selection (program run, MDI, etc.). However, the interrupt can not be generated from the manual handle when an automatic reference point return command (G28, G29, G30), thread cutting command (G33), or skip command (G31) has been executed or when tapping in the tapping cycle.
- (2) If automatic mode such as program run or MDI is being selected even when an automatic operation pause (including a block stop) is established, automatic handle interruption function is enabled.
- (3) If the axis is moved during dwell (G04) command processing by using automatic handle interruption function, the dwell count operation will stop. A check is made for that the axis movement has been completed, then the dwell count operation continues.
- (4) Automatic handle interruption function is enabled even if automatic machine lock has been set. If manual machine lock has been set, the machine does not move; it only updates the POSITION display. If manual machine lock has not been set, the machine moves by the interruption distance by the manual handle and the POSITION display is updated.
- (5) This function is disabled for an axis to which the interlock signal has been input or an axis, the interruption direction of which is the soft limit.

6.18.3 Interruption effective axis

- (1) Automatic handle interruption function is enabled only for axes to which manual handle axis selection has been input.
- (2) Automatic handle interruption is enabled for a maximum of three axes. (The number of axes is restricted by the number of handles.)
- (3) One manual handle can only interrupt one axis with the automatic handle interruption function.

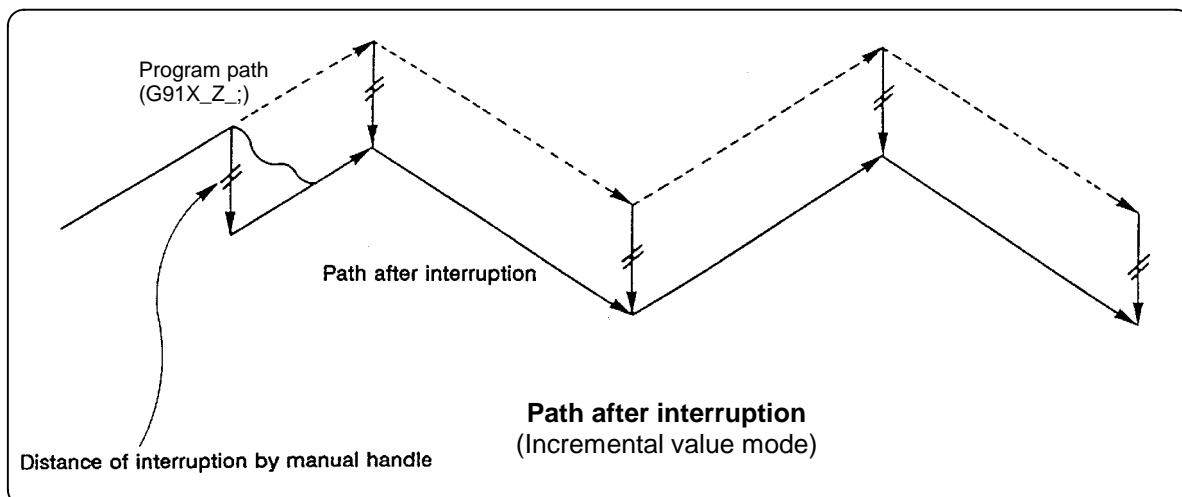
6.18.4 Axis movement speed resulting from interruption

- (1) The movement speed of the axis for which handle interruption is executed, may exceed the rapid traverse rate during rapid traverse command (G00) in automatic start. To prevent this, clamp the axis. (The movement speed equals Automatic movement speed + Speed resulting from manual handle interruption.)
- (2) When cutting feed commands (G01, G02, G03) are issued during automatic start, the movement speed of the axis for which the handle interruption is executed is clamped so it will not exceed the cutting feed clamp speed of that axis. (The movement speed equals Automatic movement speed + Speed resulting from manual handle interruption.)
- (3) If, during automatic start, manual handle interruption is executed, in the same direction, for the axis that is moving at an external decelerating speed, the axis movement speed may exceed the external decelerating speed. To prevent this, clamp the axis. (The movement speed equals Automatic movement speed + Speed resulting from manual handle interruption.)
- (4) If an attempt is made to execute interruption at a speed exceeding the clamp speed, the reading on the handle scale does not match the distance of interruption.
- (5) The handle scale factor depends on the selected input of the manual handle/step scale factor.

6.18.5 Path resulting after handle interruption

(1) For incremental value (G91) mode

During the incremental value mode, the path following the block which executed the interruption will be deviated by the interruption distance as shown in the drawing.



(2) For absolute value (G90) mode

In the absolute value mode, if the program absolute value updated by the handle interruption distance is disabled, the path will deviate by the interruption distance after the interruption is applied.

If the program absolute value updated is enabled, the path after interruption will return to the program path with the following commands:

- During single block operation : At the block command following the block at which interruption is completed.
- During continuous operation : At the command in the third block after the interruption is completed.

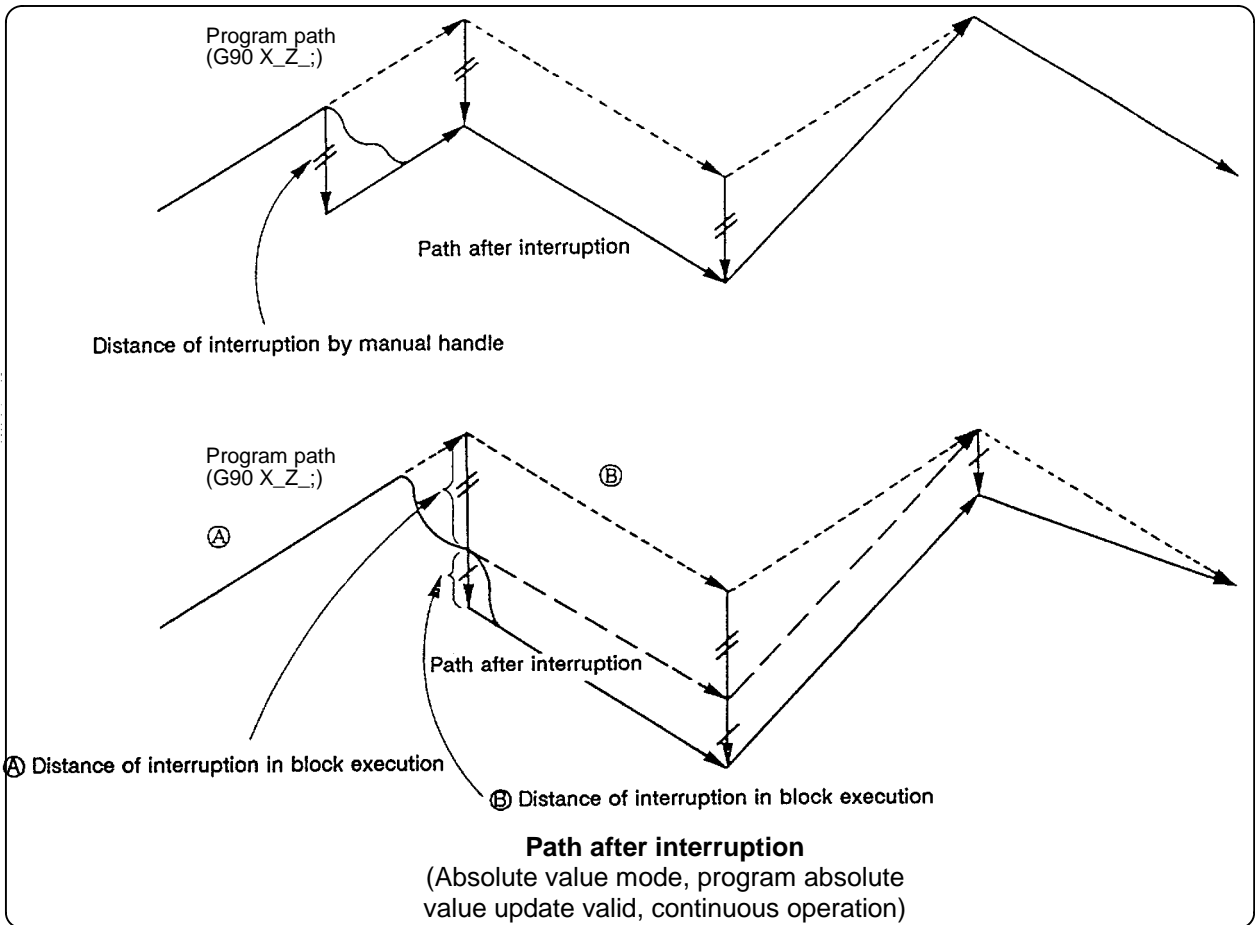
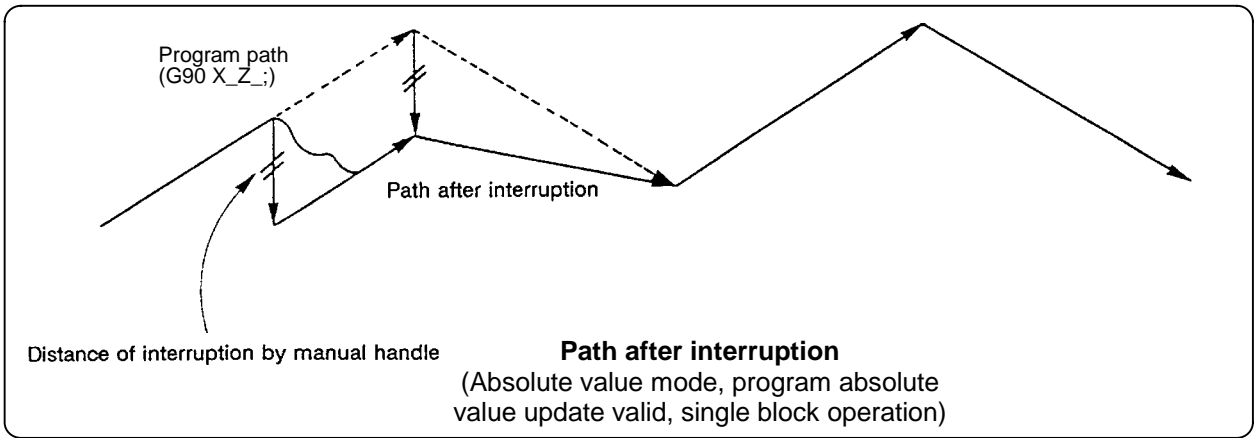
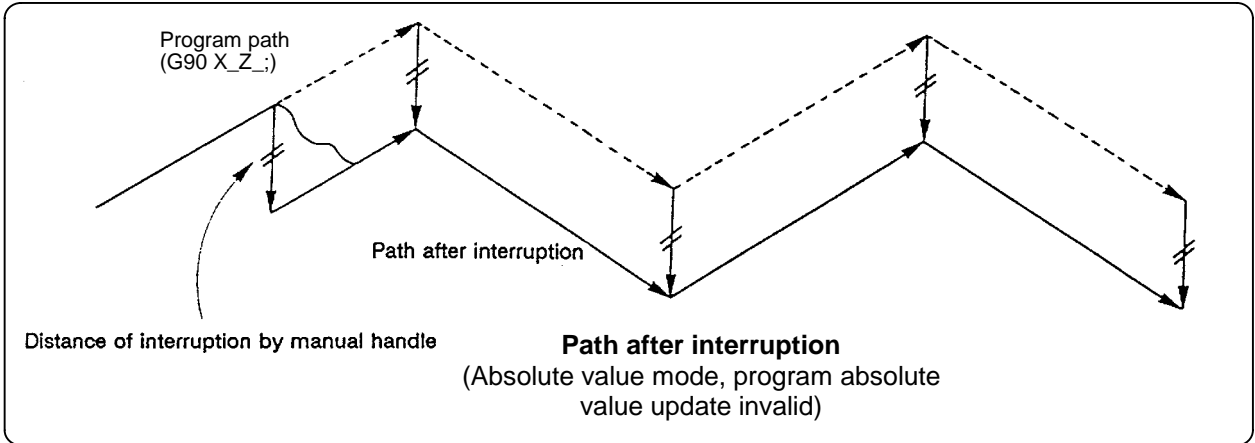
(Note) Each of the POSITION and MACHINE display includes the distance of handle interruption. For automatic handle interruption, select whether absolute value data is updated or not, as follows:

- a) Using machine parameters, set whether the manual absolute changeover switch or parameters are used.
- b) If the parameters are used, set whether or not absolute value data is updated for each axis, by using machine parameters other than those in item .
- c) If the manual absolute changeover switch is used, use the machine operation panel switch for selection.

Absolute value update conditions for automatic handle interruption

			Absolute data update		Position display2 screen manual interruption distance display
Parameter 1_abs	ON "1"	Parameter 1012 intabs (Every axis)	ON "1"	Absolute value is updated.	Not updated.
			OFF "0"	Absolute value is not updated.	Updated.
	OFF "0"	PLC interface manual absolute changeover	ON	Absolute value is updated.	Not updated.
			OFF	Absolute value is not updated.	Updated.

CHAPTER 2 MACHINE OPERATIONS
6. Operation Switch Functions and Other Functions



6.18.6 Handle interruption in nose R compensation

Special movement in nose R compensation described below relates only to the nose R compensation plane axis. It has no influence on the other axes.

At time of nose R compensation (G41, G42);

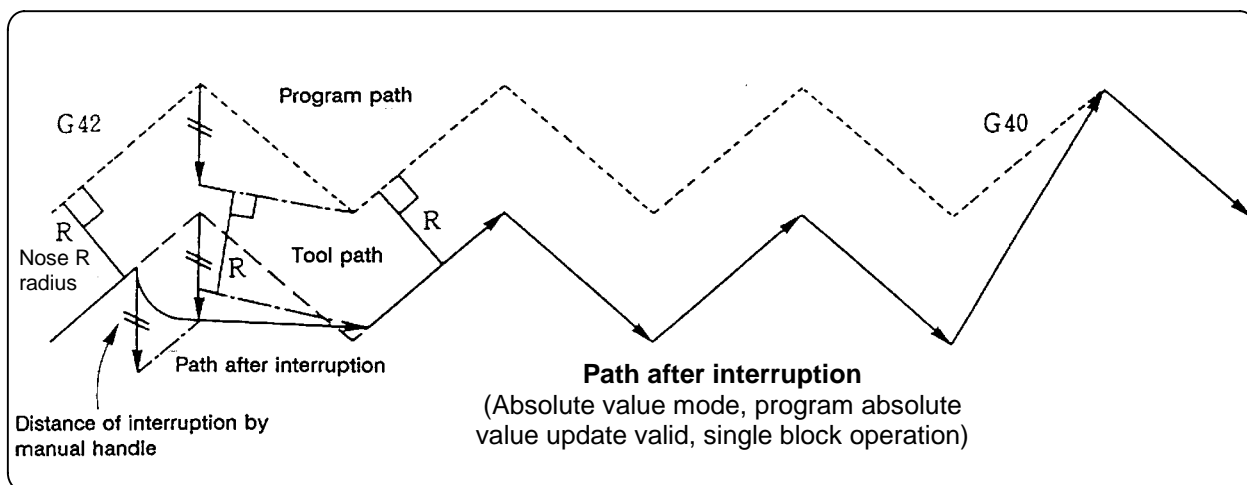
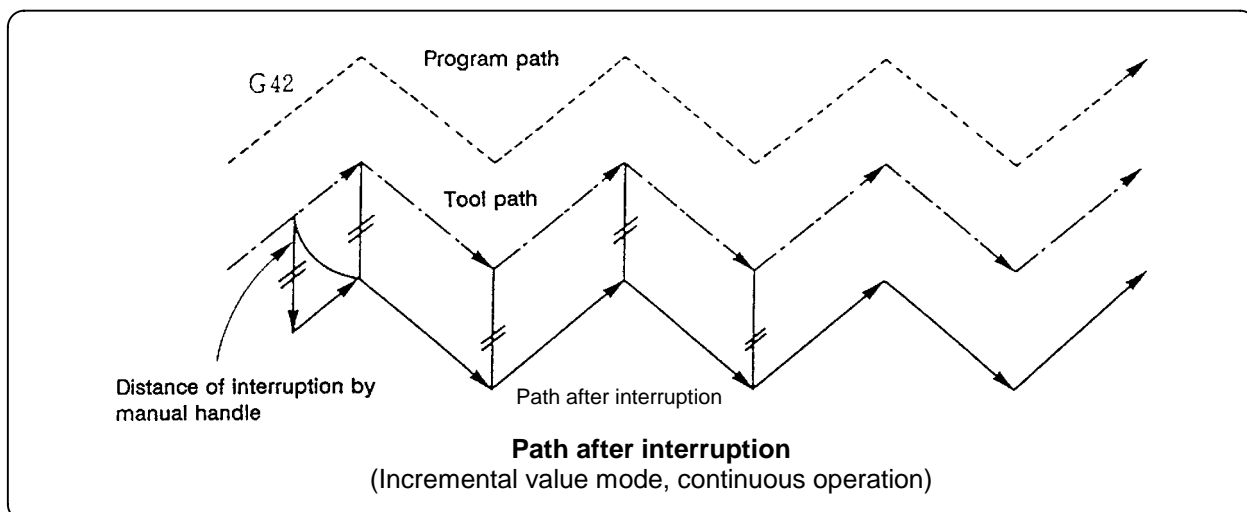
In incremental value mode (G91) — The quantity of deviation equals the distance of interruption.

In absolute value mode (G90) — If handle interruption is executed in the block for which nose R compensation (G41, G42) is being executed, the proper tool path will return in the succeeding block. This rule applies only when the program absolute update is active during single block operation. If program absolute value update is active during continuous operation, the proper tool path will return by executing the command in the fourth block after the one for which the interruption has been completed.

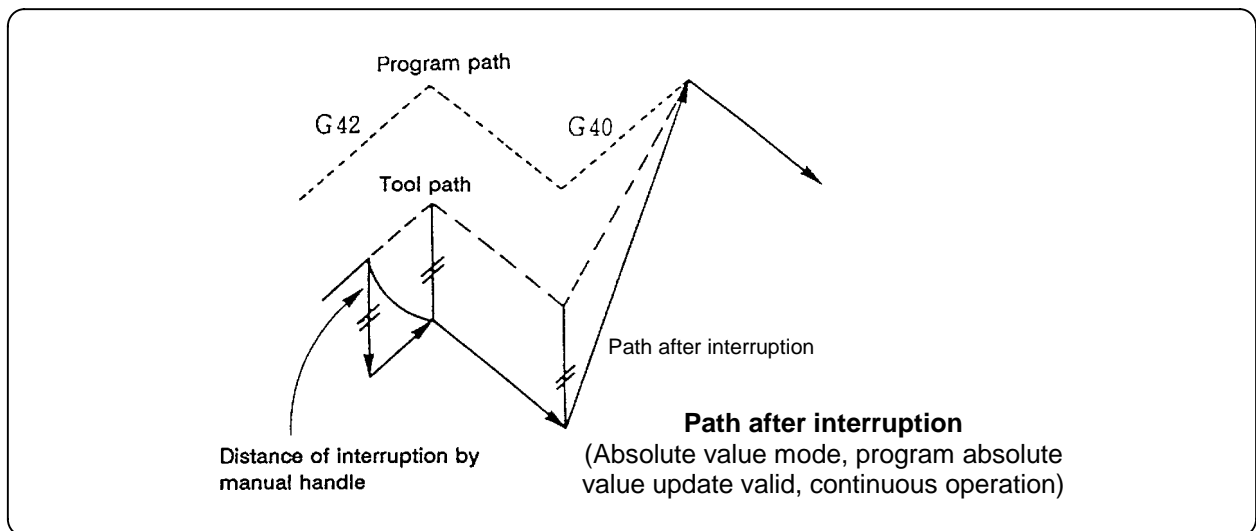
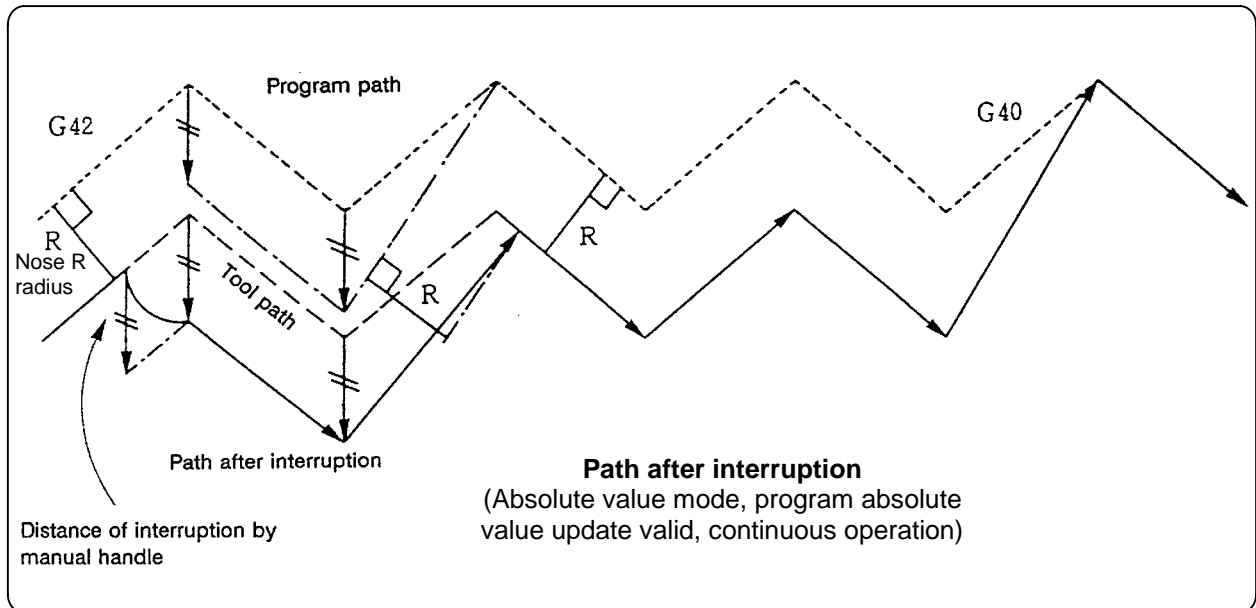
At this time, four or more blocks may not exist between

- Block for which the interruption has been completed and
- Block that contains the nose R compensation cancel command (G40).

In this case, the proper tool path will return at the block next to the nose R compensation cancel command (G40).



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6. Operation Switch Functions and Other Functions



6.18.7 Interrupt amount reset

Interrupt amount is reset when

- (1) Dog-type reference point return is executed;
- (2) Emergency stop is released;
- (3) Reset rewind or reset 2 is executed;
- (4) Reset 1 is executed when the interruption distance reset parameter is ON.

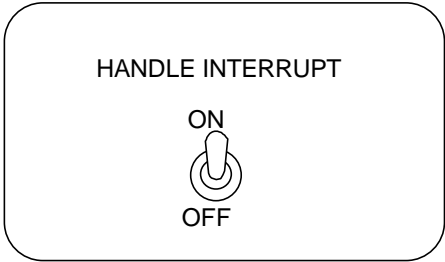
CHAPTER 2 MACHINE OPERATIONS
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6.18.8 Operation procedure

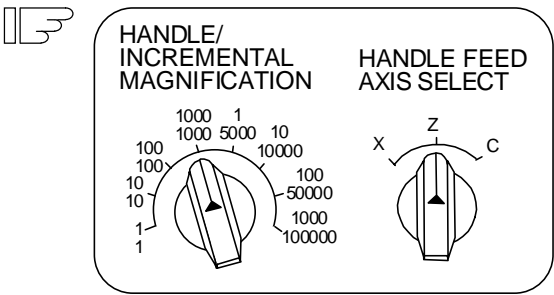
An operation example is given where automatic operation of XZ axes is executed in the memory operation mode and the Z axis is used as a handle interruption axis.

Perform automatic operation.

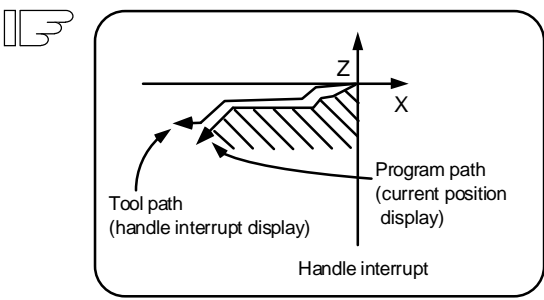
Turn ON the "HANDLE INTERRUPT" switch on the machine operation panel.



Select interrupt axis by setting the "HANDLE AXIS SELECT" switch on the machine operation panel.
Select the travel distance per handle graduation by setting the "HANDLE/INCREMENTAL MAGNIFICATION" switch.



Turn the manual handle in the + or - direction and change the Z axis cut depth amount.



When M02 or M30 is executed, automatic operation will stop.

6.19 Deceleration check

(1) Function

With the deceleration check function, a deceleration stop is executed at the block joints before the next block is executed, preventing corner roundness by reducing the machine shock that occurs when the control axis feedrate is suddenly changed.

The conditions for executing the deceleration check are as follows.

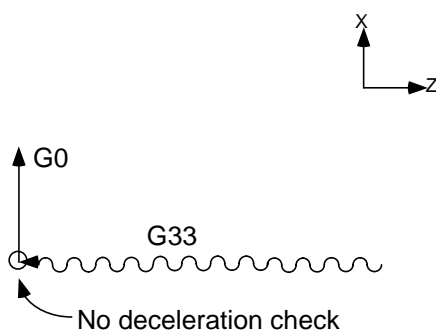
- (a) Deceleration check during rapid traverse

During the rapid traverse mode, a deceleration check is always carried out when the block movement finishes before executing the next block.
- (b) Deceleration check during cutting feed

During the cutting feed mode, if one of the following conditions is valid, the deceleration check will be carried out at the block joints.

 - 1) When the ERROR DETECT switch (external signal) is ON.
 - 2) When G09 (exact stop check) is commanded in the same block.
The G09 command is issued in the same block as the cutting command. It is an unmodal command.
 - 3) When G61 (exact stop check mode) has been selected.
The G61 command is a modal command. The modal is canceled by the following commands.
 - G62 Automatic corner override
 - G63 Tapping mode
 - G64 Cutting mode
 - 4) When next block is G00 (rapid traverse) or G53 command (only when there is a travel distance)
 - 5) When the next block is G04 command (G04 is executed after confirming smoothing zero)
- (c) Deceleration check at thread cutting

When thread cutting (G33) is commanded, the deceleration check will not be carried out at the block joints.



- (d) Exceptions

During a Fixed cycle (turning, compound turning, hole drilling, deep hole drilling), the deceleration check will not be carried out with G01 to G00. (Use G09 when deceleration check is required.)

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(e) List of operations

The list of operations following combinations of movement commands are shown below.

Current block Next block	G00	G01	G0/G1 No move- ment
G00	○	○	×
G01	○	(○)	×
G0/G1 No movement	○	(○)	×
MSTB	○	(○)	×
G04	○	○	○

○ : Carry out deceleration check
 × : Do not carry out deceleration check

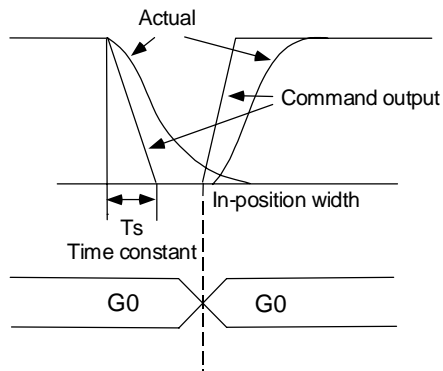
(○) : Carry out deceleration check only when ERROR DETECT is ON, G09 is valid or G61 is valid.

(f) Example of operation

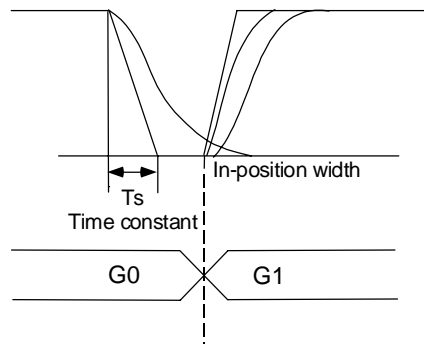
Example of operation under the following conditions:

- In-position check valid
- ERROR DETECT switch OFF
- No G09 command
- Not in G61 mode

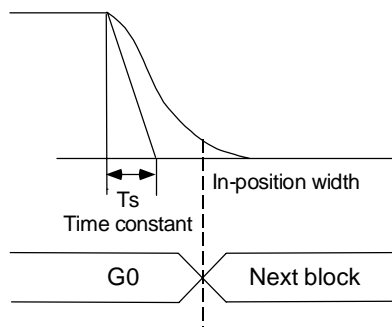
1. G0 – G0



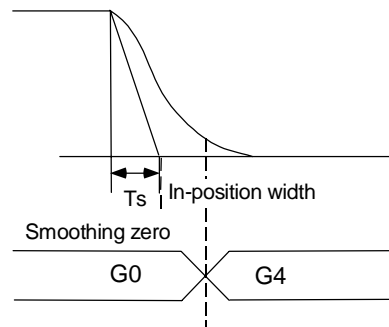
2. G0 – G1



3. G0 – no movement (same for MSTB)

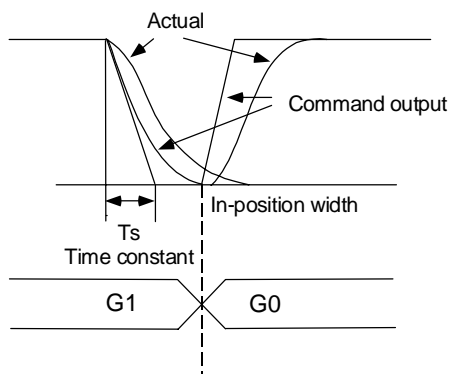


4. G0 – G4

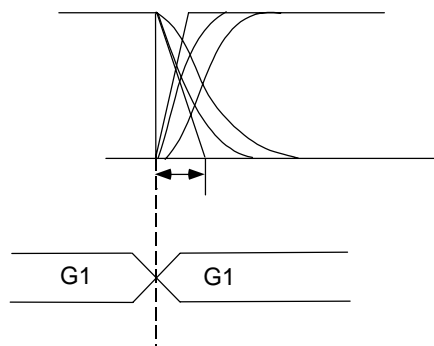


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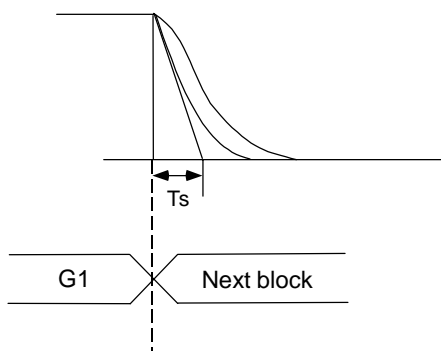
5. G1 – G0



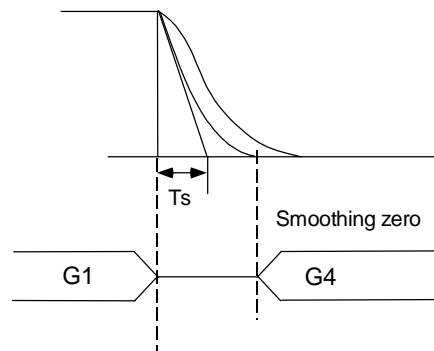
6. G1 – G1



7. G1 – no movement (same for MSTB)



8. G1 – G4



(2) Deceleration check methods

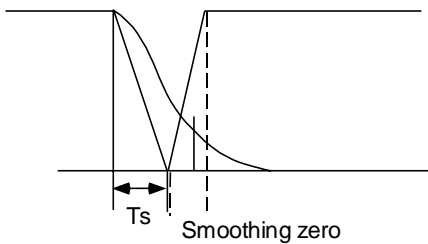
There are three methods of deceleration check that can be selected with the parameters.

Parameter name	Data	Parameter name	Data	Details
Rapid traverse (G0) deceleration check method inpos	0			The commanded deceleration check is carried out during rapid traverse.
	1	In-position check method sp_1/bit3	0	The in-position check is carried out during rapid traverse. <Conditions> The command pulse is 0, the acceleration/ deceleration circuit's tracking error is 0, and the positional deviation amount is less than parameter (SV024).
			1	The in-position check is carried out during rapid traverse. <Conditions> The command pulse is 0, the acceleration/ deceleration circuit's tracking error is 0.
Cutting feed (G1) deceleration check method sp_1/bit0	0			The commanded deceleration check is carried out during cutting feed.
	1	In-position check method sp_1/bit2	0	The in-position check is carried out during cutting feed. <Conditions> The command pulse is 0, the acceleration/ deceleration circuit's tracking error is 0, and the positional deviation amount is less than parameter (SV024).
			1	The in-position check is carried out during cutting feed. <Conditions> The command pulse is 0, the acceleration/ deceleration circuit's tracking error is 0.

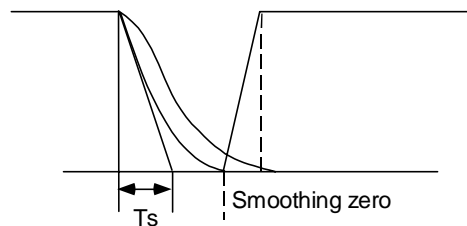
(3) Notes

- (a) **MSTB output after movement command**
The deceleration check is not carried out when the MSTB code is output. Thus, if there is an MSTB command immediately after moving with the G01 command, the MSTB code will be output before the moving axis' deceleration is completed.
If one of the MSTB codes must be executed after the axis movement is completed, check DEN signal (movement command completed) with the PLC before executing the code.
- (b) **Operation during hole drilling**
When carrying out a hole drilling operation with a combination of G01-G00, if the deceleration check method is the command deceleration check method, there may be a slight error in the hole depth (the hole may be shallower than the command). To compensate the hole depth, validate the in-position check. If further accuracy is required, command dwell between G01 and G00.
- (c) **In-position check method during control axis synchronization**
The in-position check during control axis synchronization is carried out with smoothing zero (completion of command output). The command deceleration check method is the same as the normal method.

• During linear deceleration



• During exponential deceleration



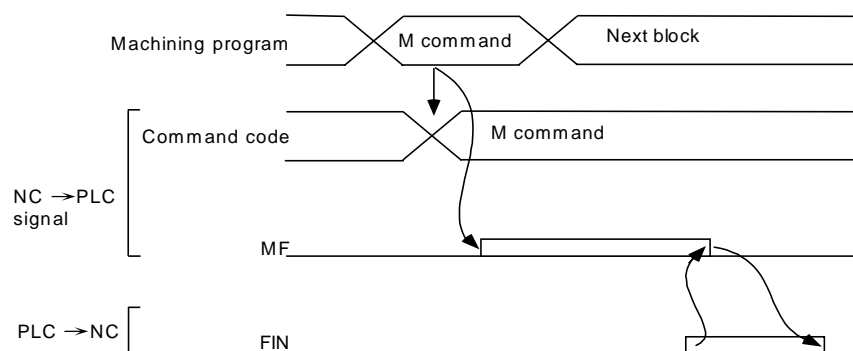
6.20 Miscellaneous command high-speed output

The miscellaneous command high-speed output function is a miscellaneous command completion method, which after outputting the miscellaneous command proceeds to the next block without waiting for the completion signal from the PLC.

Using this function, the processing time per miscellaneous function can be shortened compared to the conventional method.

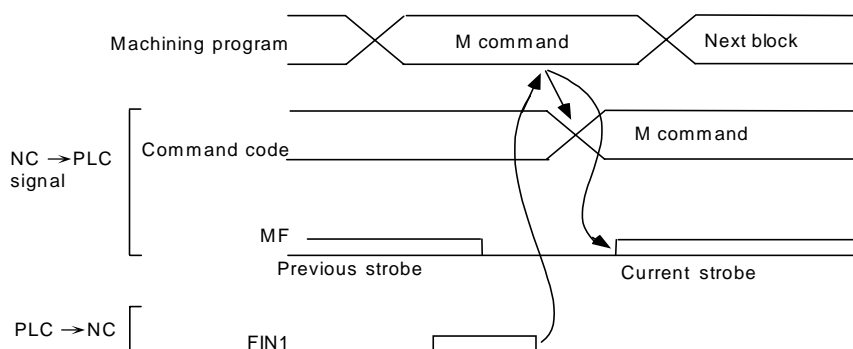
(1) Detailed explanation

If a miscellaneous command (M) is commanded from the machining program while the miscellaneous command high-speed output function is valid, the miscellaneous command code data and miscellaneous command strobe signal are output to the PLC. The NC finishes the miscellaneous command process when the miscellaneous command strobe signal is output. The operation sequence for when the miscellaneous command high-speed output function is valid is shown below.

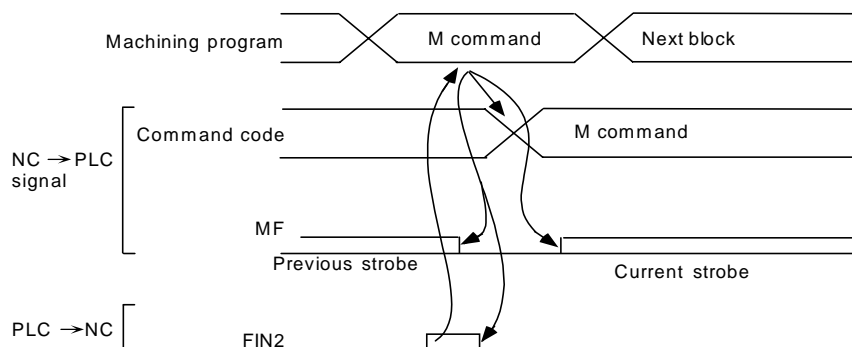


When the miscellaneous command is output by the miscellaneous command high-speed output function, if the previous miscellaneous command (M, S, T, B) has not been completed, the current command code and strobe signal will be output after waiting for the previous miscellaneous command to complete.

• Case for waiting for miscellaneous command output (using FIN1)



• **Case for waiting for miscellaneous command output (using FIN2)**

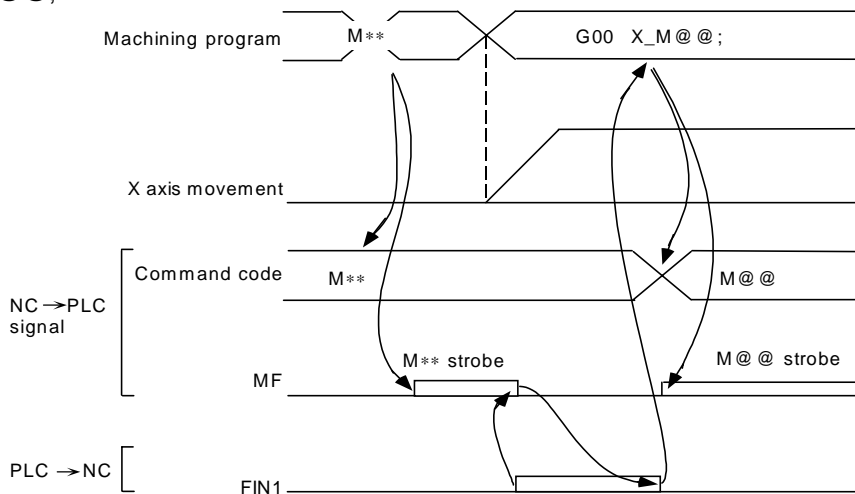


If FIN2 is used for the completion signal while the miscellaneous command high-speed output function is valid (when the option is valid), the NC will turn the strobe signal and FIN2 signal OFF at output the rising edge of FIN2.

When the movement command and miscellaneous command are commanded in the same block, if the previously commanded miscellaneous command is not completed, the axis movement start and miscellaneous command output will not be carried out simultaneously.

• **For M**; (using FIN1)**

G00 X_M@@;



Whether to carry out the commanded miscellaneous command with the high-speed output or whether to proceed to the next block after waiting for completion is set with the parameters.

The number of miscellaneous commands for which high-speed output is carried out is 256 commands (M0 to M255) for the M command.

If a miscellaneous command for high-speed output and a miscellaneous command, which waits for the completion signal from the PLC, are commanded in the same block, the next block will be proceeded to after waiting for the completion signal from the PLC.

The program command format used when the miscellaneous command high-speed output function is valid is the same as the conventional command format.

The miscellaneous command high-speed output function is invalid to M independent commands (M00, M01, M02, M30).

(2) Relation with other functions

Relation with miscellaneous command completion wait suppression (#3003 bit1)

When the miscellaneous command completion wait suppression is ON (#3003 bit1 ON), all miscellaneous command will proceed to the next block without waiting for the completion signal from the PLC regardless of whether this function is valid or invalid.

6.21 Rapid traverse constant inclination acceleration/deceleration

This function carries out acceleration/deceleration at a constant inclination during the linear acceleration/deceleration in the rapid traverse mode.

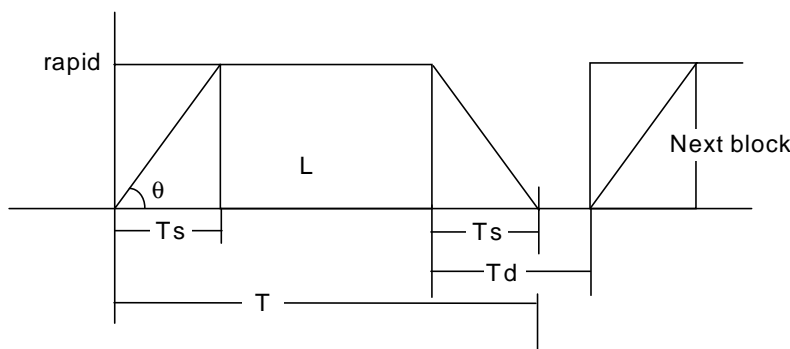
The constant inclination acceleration/deceleration method is effective in improving the cycle time compared to the conventional method.

(1) Detailed explanation

The rapid traverse constant inclination acceleration/deceleration is valid only during a rapid traverse command. It is also valid only when the rapid traverse command's acceleration/deceleration mode is linear acceleration or linear deceleration.

The acceleration/deceleration patterns when rapid traverse constant inclination acceleration/deceleration is used is shown in the next section.

(a) When interpolation distance is longer than acceleration/deceleration distance



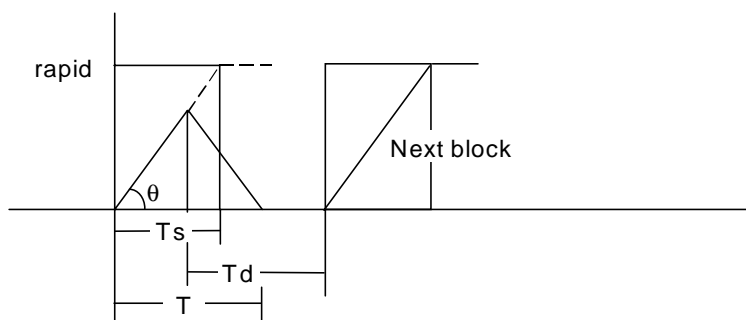
rapid: Rapid traverse rate
 Ts : Acceleration/deceleration time constant
 Td : Command deceleration check time
 θ : Acceleration/deceleration inclination
 T : Interpolation time
 L : Interpolation distance

$$T = \frac{L}{\text{rapid}} + T_s$$

$$T_d = T_s + (0 \text{ to } 14\text{ms})$$

$$\theta = \tan^{-1} \left(\frac{\text{rapid}}{T_s} \right)$$

(b) When interpolation distance is shorter than acceleration/deceleration distance



rapid: Rapid traverse rate
 Ts : Acceleration/deceleration time constant
 Td : Command deceleration check time
 θ : Acceleration/deceleration inclination
 T : Interpolation time
 L : Interpolation distance

$$T = 2 \times \sqrt{T_s \times L / \text{rapid}}$$

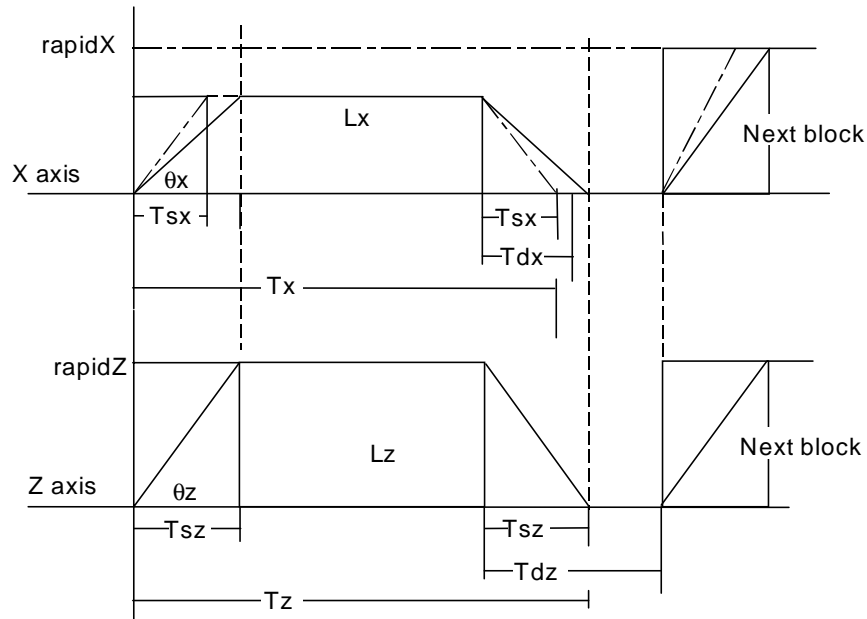
$$T_d = \frac{T}{2} + (0 \text{ to } 14\text{ms})$$

$$\theta = \tan^{-1} \left(\frac{\text{rapid}}{T_s} \right)$$

The time required for the command deceleration check during rapid traverse constant inclination acceleration/deceleration is the rapid traverse deceleration check time for each axis, determined by the simultaneously commanded axes' rapid traverse rate, rapid traverse acceleration/deceleration time constant and interpolation distance. The longest of the axis times is used.

When two-axis simultaneous interpolation (linear interpolation) is carried out during rapid traverse constant inclination acceleration/deceleration, the acceleration/deceleration time of each axis will be the acceleration/deceleration time of each axis determined by the simultaneously commanded axes' rapid traverse rate, rapid traverse acceleration/deceleration time constant and interpolation distance. The longest of the axis times is used. Thus, linear interpolation is carried out even when the acceleration/deceleration time constant for each axis is different.

(c) For two-axis simultaneous interpolation (Linear interpolation $T_{sx} < T_{sz}$, $L_x \neq L_z$)



When $T_{sz} > T_{sx}$, T_{dz} is larger than T_{dx} , and becomes the $T_d = T_{dz}$ for this block.

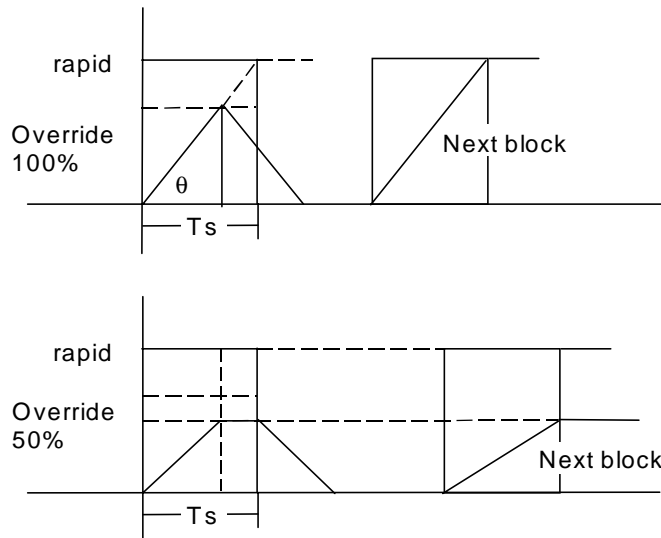
The program format for G0 (rapid traverse command) when rapid traverse constant inclination acceleration/deceleration is carried out is the same as when this function is invalid (constant time acceleration/deceleration).

This function is valid only for the G0 (rapid traverse) command.

(2) Relation with other functions

Relation with override and dry run

If the rapid traverse rate changes because of override or dry run, the acceleration/deceleration inclination will change, and constant inclination acceleration/deceleration will not be carried out.



CHAPTER 3 MAINTENANCE

1. Confirming the Operation

1.1 Confirming the axis movement direction

(1) Confirming the axis operation with the handle mode

Each axis is moved in the handle mode, and the movement of the axis corresponding to the handle rotation direction (+, -) is confirmed.

When the axis is moved in the opposite direction, the setting in the Axis specification parameter "1007 ccw" is confirmed, and changed from "0" to "1" or vice versa.

(2) Confirming the movement operation with the JOG mode

The axis is moved in the JOG mode, and the axis operation following the command direction is confirmed.

(Note 1) If the axis stability is poor when the axis is moved in the handle or JOG mode, first adjust the stability of the drive system as shown on the following sections.

1.2 Confirming the limit switch operation

(1) Confirming the stroke end operation

- 1) Turn ON the plus side stroke end limit switch by moving the axis in the plus direction using the handle feed or JOG feed.
 - The axis must stop when the limit switch kicks the dog.
 - The stroke end alarm must be displayed in the Alarm message screen of the setting display unit.
 - The axis must not move when a plus direction movement command is issued again.
 - The axis must move in the minus direction when a minus command is issued.
- 2) Turn ON the minus side stroke end limit switch by moving the axis in the minus direction.
 - The axis must stop when the limit switch kicks the dog.
 - The stroke end alarm must be displayed in the Alarm message screen of the setting display unit.
 - The axis must not move when a minus direction movement command is issued again.
 - The axis must move in the plus direction when a plus command is issued.

(2) Confirming the reference point return operation

- 1) Decrease the reference point return speed using the RAPID TRAVERSE OVERRIDE switch.
- 2) Carry out a reference point return.
- 3) Confirm that a deceleration stop is carried out once at the near- point dog.
- 4) After executing step 3), confirm that the movement is toward the reference point.
If the reference point return direction differs, the parameter setting is incorrect.
- 5) After moving in the reference point return direction and stepping on the dog, confirm that the axis reaches the reference point within 10 to 100mm. Also confirm that the reference point reached signal is output, and the reference point reached lamp of the operation panel is lit.
- 6) Confirm whether the axis position is that of the machine reference point when the reference point reached signal is output.
- 7) Display the Amp monitor (servo unit) screen of the setting display unit, and confirm the grid amount display.
 - Confirm that the grid amount is approx. 1/2 of the grid spacing.
- 8) Refer to the section "3. Adjusting the Dog-type Reference Point Return" if the reference point position must be changed or adjusted.
- 9) For absolute position detection, refer to the section "Absolute Position Setting screen" in the instruction manual.

2. Confirming the Drive Section

(1) Confirming the servo parameters

Confirm the servo parameters after setup and confirmation of the wiring, etc.

- 1) Confirm that the servo parameter data (machine specifications, servo system specifications) is correct.
The suitability of the amplifier type, control method, motor end detector, machine end detector and motor related to the servo system can be confirmed by referring to the Amp monitor (servo unit) screen.
- 2) Confirm that the correct parameters are set for the motor used.

(2) Adjusting the servo parameters

The following three servo parameters are generally used to adjust the drive section system. When changing this parameter data, do so one or two increments at a time. Do not change the parameter value greatly all at once.

- 1) PGN1 : Position loop gain Standard value: 33
While this value is usually set to 33, it is lowered to approx. 25 when overshooting in a closed loop system. Set this parameter as common for all axes.
- 2) VGN : Speed loop gain Standard value: 150
Raising this value increases the responsiveness. (Max. value: 250)
- 3) VIA : Speed loop advance compensation Standard value: 1364
Raising this value increases the responsiveness.

3. Adjusting the Dog-type Reference Point Return

The relative position detection and absolute position detection type position detection systems are available. The methods of returning to the reference point include the dog-type reference point return and the dogless-type reference point return.

The method of adjusting the dog-type reference point return using the relative position detection is described in this section.

3.1 Dog-type reference point return

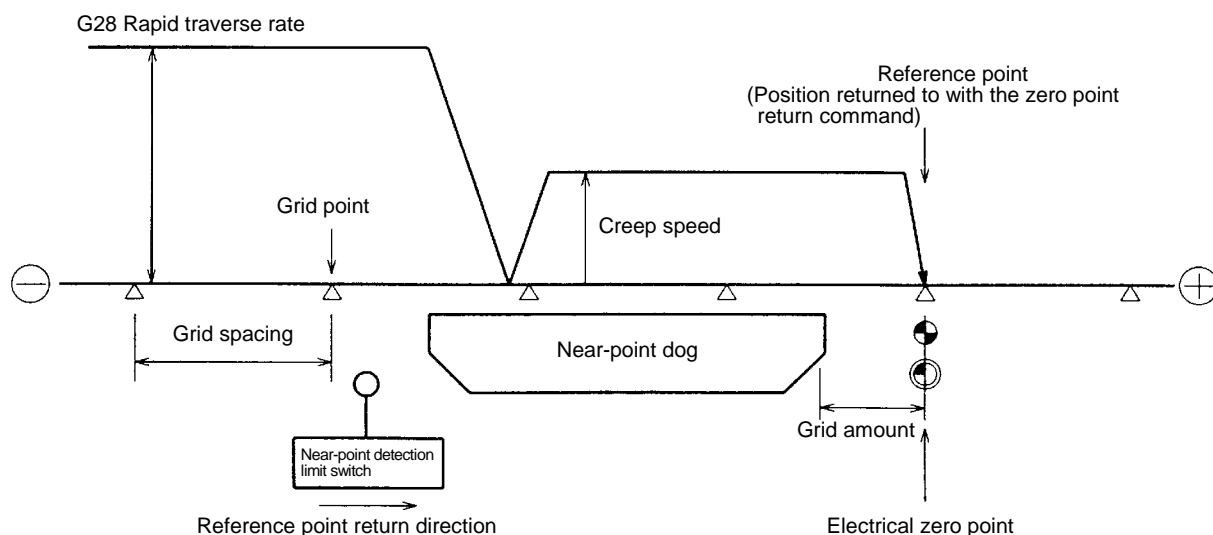
(1) Reference point return operation

When the dog-type reference point return is executed, the machine will move at the commanded speed. When the near-point detection limit switch kicks the near-point dog (when the near-point detection signal turns OFF), the machine decelerates to a stop. After decelerating to a stop, the machine moves at the creep speed, and positions to the first grid point after leaving the near-point dog.

This grid point is called the electrical zero point. Normally, this electrical zero point position is the reference point.

For the reference point return using the relative position detector, the first return after turning the power ON is carried out with the dog-type reference point return. The second and following returns are carried out with high-speed reference point return. High-speed reference point return is a function that directly positions to the reference point saved in the memory without decelerating at the near-point dog.

If reference point return has not been executed even once after turning ON the power while using relative position detection, an alarm will occur when movement commands other than G28 are executed.



CHAPTER 3 MAINTENANCE
3. Adjusting the Dog-type Reference Point Return

(2) Reference point

The reference point is the point positioned to when the dog-type reference point return is executed. Note that a separate setting method is used for the absolute position detection.

The reference point is the point positioned to with the manual reference point return and G28 command in the machining program.

Using parameters, the reference point can be shifted from the electrical zero point position.

(3) Grid point

The position detector has a Z-phase that generates one pulse per rotation. The 0-point position of this Z-phase is the grid point. Thus, there is a grid point per rotation of the position detector, and the machine has many grid points at a set pitch.

The grid point can be set per grid spacing by setting the grid spacing (Zero point return parameter 2104 grspc). Thus, multiple grid points can be set per detector rotation.

(4) Grid spacing

The distance between the grid points is the grid spacing. The grid spacing can be set in mm (millimeter) units in the Zero point return parameter 2104 grspc.

(5) Grid amount

The grid amount expresses the distance from when the near-point detection limit switch leaves the near-point dog and reaches the grid point (electrical zero point) when the dog-type reference point return is executed.

The grid amount can be confirmed with "Grid amnt" on the Amp monitor (servo unit) screen of the setting display unit.

After setting the grid mask, the grid amount shows the distance from the grid mask OFF to the grid point.

(6) Basic machine coordinate system zero point

The basic machine coordinate system is a coordinate system that expresses a position decided characteristically for the machine.

The following positions are expressed with the machine coordinate system.

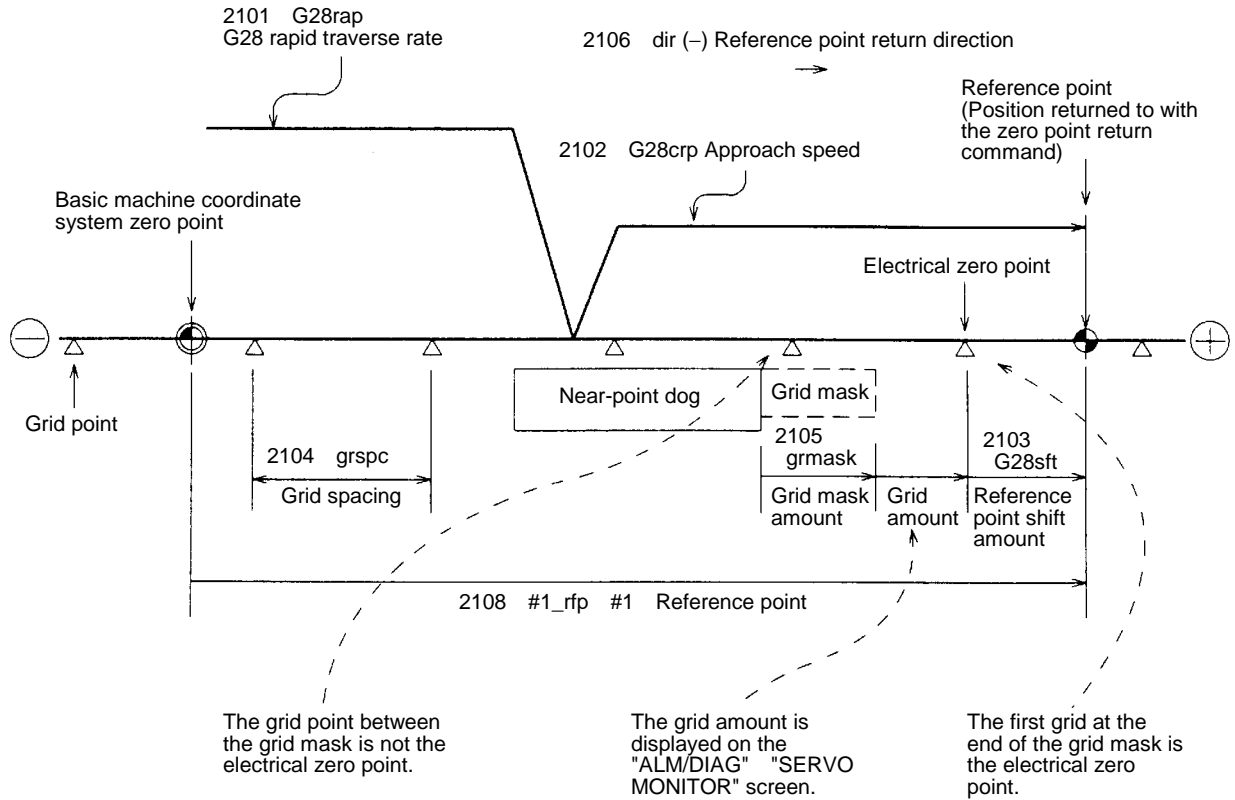
- No. 1 to No. 4 reference point position
- Workpiece coordinate system zero point position
- Stored stroke limit position

Usually, the machine coordinate zero point position is the same as the reference point position, but it can be shifted with the parameters.

CHAPTER 3 MAINTENANCE
3. Adjusting the Dog-type Reference Point Return

3.2 Reference point return parameters

(1) Reference point return operation and parameter related drawing



CHAPTER 3 MAINTENANCE
3. Adjusting the Dog-type Reference Point Return

(2) G28 rapid traverse rate (2101 G28rap)

This parameter designates the feedrate for dog-type reference point return in manual operation and automatic operation.

The feedrate during high-speed reference point return will be the rapid traverse rate (Axis specification parameter 2001 rapid).

(3) G28 approach speed (2102 G28crp)

This parameter sets the approach speed (creep speed) to the reference point after decelerating to a stop by the near-point dog detection. The creep speed is accelerated and decelerated in steps, so if the speed is fast, mechanical shock, etc., could occur.

The creep speed should be set between 100 and 300mm/min., and within 500mm/min. at the fastest.

(4) Reference point shift amount (2103 G28sft)

This parameter can set the shift amount for shifting the reference point from the electrical zero point. The shift direction can be set only in the reference point return direction.

If the reference point shift amount is "0", the grid point (electrical zero point) will be the reference point.

(5) Grid spacing (2104 grspc)

This parameter sets the distance between grids.

The normal grid spacing is the ball screw pitch (Servo parameter 2218 PIT) value or the movement amount per motor rotation set as a mm (millimeter) unit.

To make the grid spacing smaller, set a divisor of the grid spacing.

Calculation expression for movement amount per motor rotation

- When linear feed mechanism is ball screw

$$\text{Movement amount per motor rotation} = \frac{\text{Motor side gear ratio}}{\text{Machine side gear ratio}} * \text{Ball screw pitch}$$

- When linear feed mechanism is rack and pinion

$$\text{Movement amount per motor rotation} = \frac{\text{Motor side gear ratio}}{\text{Machine side gear ratio}} * \text{No. of pinion gear teeth} * \text{Rack pitch}$$

- For rotation axis

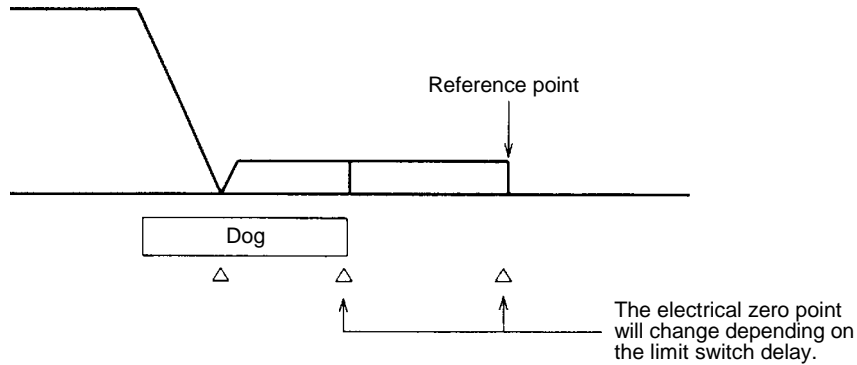
$$\text{Movement angle per motor rotation} = \frac{\text{Motor side gear ratio}}{\text{Machine side gear ratio}} * 360$$

$N = \frac{PC1}{PC2} * PIT$	<p>N = Movement amount per motor rotation PC1 = Motor side gear ratio PC2 = Machine side gear ratio PIT = Ball screw pitch</p>
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CHAPTER 3 MAINTENANCE
3. Adjusting the Dog-type Reference Point Return

(6) Grid mask amount (2105 grmask)

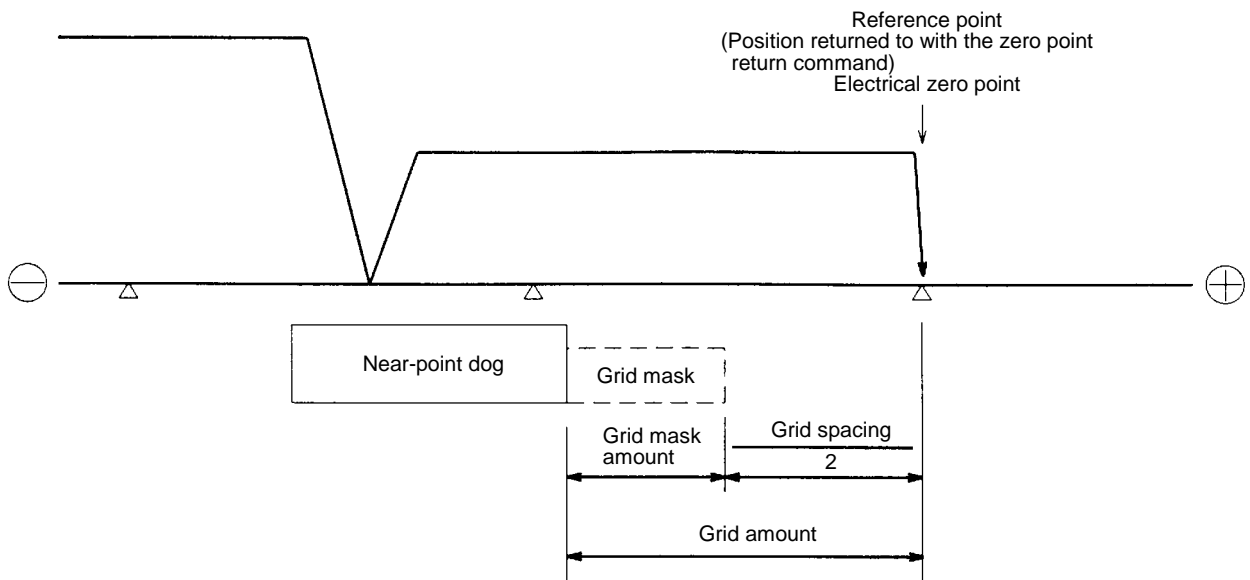
The electrical zero point is the first grid point after the dog is stepped.
 If the grid point is at the position where the near-point dog is stepped, the electrical zero point will be the grid point at the position where the dog is stepped because of the delay of the limit switch operation. Thus, the next grid point will be applied, or in the end, the reference point position may deviate by the amount of the grid spacing.
 Thus, the position that the dog is stepped must be at the approximate center of the grid spacing.



Adjustments can be made by changing the near-point dog position or by setting the grid mask amount.
 Setting the grid mask has the same effect as lengthening the near-point dog.
 If the grid amount is near the grid spacing or 0, the grid point will be at the position that the near-point dog is stepped, so set a grid mask.
 The grid mask amount is set so that the grid amount is one-half of the grid spacing.
 The grid mask amount can be set only in the reference point return direction.
 The grid amount and grid spacing can be confirmed on the Amp monitor (servo unit) screen.

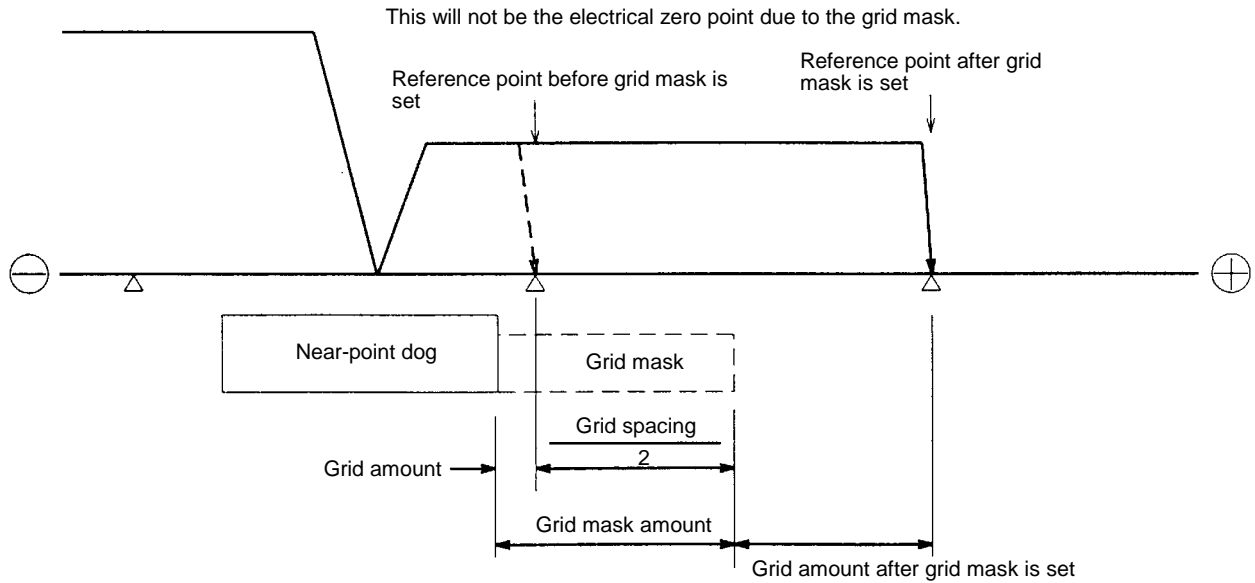
Grid mask amount calculation expression

(a) When $\frac{\text{Grid spacing}}{2} < \text{Grid amount}$ $\text{Grid mask amount} = \text{Grid amount} - \frac{\text{Grid spacing}}{2}$



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3. Adjusting the Dog-type Reference Point Return

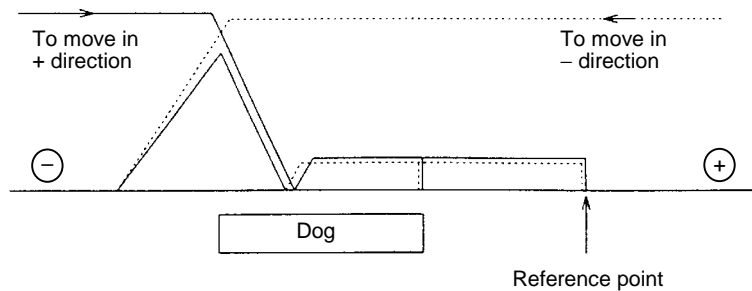
(b) When $\frac{\text{Grid spacing}}{2} > \text{Grid amount}$ $\text{Grid mask amount} = \text{Grid amount} + \frac{\text{Grid spacing}}{2}$



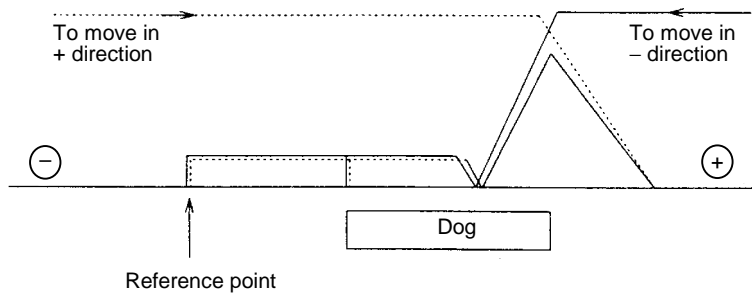
(7) Reference point return direction (2106 dir (-))

This parameter sets the direction to move after the limit switch kicks the dog causing a deceleration stop during dog-type reference point return. The direction is either positive "0" or negative "1". If the reference point position is in the positive direction from the near-point dog, set "0". If the reference point position is in the negative direction from the near-point dog, set "1".

(a) When reference point return direction is positive (+)



(b) When reference point return direction is negative (-)



CHAPTER 3 MAINTENANCE
3. Adjusting the Dog-type Reference Point Return

(8) Axis with no reference point (2107 noref)

"0" is set for the axis to carry out dog-type reference point return and the axis for absolute position detection.

"1" is set for the axis that does not carry out reference point return during relative position detection.

(9) Reference point position (2113 #1_rfp to 2116 #4_rfp)

This parameter is set when the basic machine coordinate system zero point position is to be shifted from the reference point position.

When "0" is set, the reference point position will be the position of the basic machine coordinate system zero point.

#n_rfp sets the reference point position from the basic machine coordinate system zero point position as a basic machine coordinate system coordinate value.

3.3 Dog-type reference point return adjustment procedures

Adjust the dog-type reference point return with the following steps.

- (1) Set the zero point return parameter.
Set the reference point shift amount to "0".
Set the grid mask amount to "0".
- (2) Turn the power OFF and ON, and then execute reference point return.
- (3) Display the Amp monitor (servo unit) screen on the setting display unit.
The grid spacing and grid amount values can be read.
- (4) Calculate the grid mask amount with the grid mask amount calculation method.
- (5) Display the Z-point rtn param screen.
Set the grid mask amount.
- (6) Turn the power OFF and ON, and then execute reference point return.
- (7) Display the Amp monitor (servo unit) screen on the setting display unit.
The grid spacing and grid amount values can be read.
If the grid amount value is approx. half of the grid spacing, the grid mask amount has been correctly set.
If the value is not approx. half, repeat the procedure from step (1).
- (8) Set the reference point shift amount.
- (9) Turn the power OFF and ON, and then execute reference point return.
- (10) Set #1_rfp.

4. Absolute Position Detection

4.1 Absolute position detection system

(1) Outline

Once the absolute position is detected, the absolute position detection function basically enables automatic operation without losing the absolute position even if the power is turned OFF and ON. This function is reliable as it carries out a mutual check of the feedback amount from the detector, and checks the absolute position unique to the machine, etc.

There are two methods of establishing (initializing) the absolute position.

(a) Dog-type absolute position detection

The absolute position origin point is established by executing dog-type reference point return.

(b) Dogless-type absolute position detection

By initializing the zero point at the machine end or a random point, the absolute position origin point can be established without using a dog. This eliminates the need to install a dog or limit switch on the machine, and simplifies the machine structure.

The following six methods can be used to initialize the zero point with the dogless-type detection.

Dog-less type method		Origin point type	Adjustment procedures reference
Machine end stopper method	Screen operation method	Random point type	4.4.1
		Grid point type	4.4.2
	Automatic dogless-type	Random point type	4.4.3
		Grid point type	4.4.4
Marked point alignment method (Screen operation method)		Random point type	4.5.1
		Grid point type	4.5.2

Machine end stopper method (Screen operation method)	The zero point is initialized by pushing against the machine end with manual movement. Operations are required on the "Abs posn set" screen. Mode: JOG, handle, step, manual random feed mode
Machine end stopper method (Automatic dogless-type)	The zero point is initialized by pushing against the machine end with manual movement. Screen operations are not required. Mode: Automatic dogless reference point return mode
Marked point alignment method (Screen operation method)	The zero point is initialized by making a mark at a random point within the machine's moveable range, and moving manually to the mark position. Operations are required on the "Abs posn set" screen. Mode: JOG, handle, step, manual random feed mode

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4. Absolute Position Detection

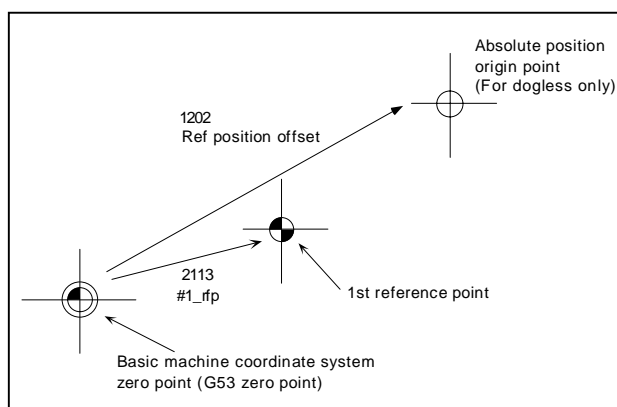
Random point type	The machine end or marked position is used as the absolute position origin point (the point unique for the dogless-type, refer to section 4.1(2)).
Grid point type	The machine end or a grid point on the detector near the marked position is used as the absolute position origin point (the point unique for the dogless-type, refer to section 4.1(2)).

The validity and method of the absolute position detection system can be selected with parameters for each axis.

The servo amplifier and detector must have absolute position detection specifications.

(2) Absolute position detection system coordinate system

When using the dogless-type, the machine end or marked point is used as the absolute position origin point and the basic machine coordinate system zero point is set at the position designated for "1202 Ref position offset" on the Abs posn set screen.



With the dog-type, there is no absolute position origin point. The 1st reference point is the reference, and the basic machine coordinate system zero point is determined by the "2113 #1_rfp" value.

(3) Reference point return operation after establishing absolute position

The reference point return operation is carried out in the following manner.

1011 abson value	Manual reference point return	G28 automatic reference point return
Dog-type absolute position detection (abson: 1)	The dog-type can be selected with the axis parameter "Manual dog type" each time. Manual dog-type: 0 High-speed method 1: Per time dog-type	High-speed method
Dogless-type absolute position detection (abson: 2)	High-speed method	High-speed method

4.2 Starting up absolute position detection

(1) Operation when initialization is not complete

If the zero point has not been initialized, or when the absolute position has been lost after initialization, an error or warning will occur.

In this state, the coordinate system will not be set, so limits will be applied in each mode. Thus, carry out zero point initialization to establish the coordinate system.

Operation mode		Absolute position detection method	
		Dog-type	Dogless-type
Memory, MDI	General movement commands	Not possible (Note 1)	Not possible (Note 2)
	G28	Possible	Not possible (Note 2)
JOG, handle, step, manual random feed		Possible	Possible
Zero point return		Possible	Not possible
Automatic dogless reference point return		Not possible	Possible (Only machine end stopper method)

(Note 1) The program error "P430 Zero return not completed" will occur.

(Note 2) Automatic start is not possible.

(2) Selecting the zero point initialization method

Select the zero point initialization method with the following parameters.

1011 abson (Base axis param screen)	0: Absolute position detection invalid (execute dog-type each time power is turned ON) 1: Absolute position detection (dog-type) 2: Absolute position detection (dogless-type)
1205 No stopper (Abs posn set screen)	0: Machine end stopper method 1: Marked point alignment method
1208 Ref posn type (Abs posn set screen)	0: Random point type The machine end or marked point is used as the absolute position origin point. 1: Grid point type A grid point near the machine end or near the marked position is used as the absolute position origin point.

(3) Setting the other machine parameters

The following parameters must be set in addition to those in item (2).

2104 grspc (Z-point rtn param screen)	Set the grid interval as mm unit.
2217 SPEC* (Servo param screen)	Set the absolute position detection valid bit (bit 7) to "1". Set as a hexadecimal.

(4) Initializing the zero point

Refer to the explanations in sections 4.3 to 4.5, and initialize the zero point.

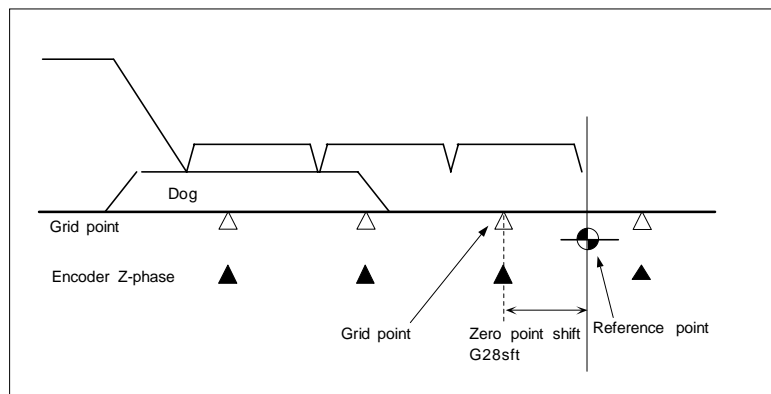
CHAPTER 3 MAINTENANCE
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4.3 Procedures for initializing for the dog-type absolute position detection

Zero point initializing is carried out by executing dog-type reference point return with the manual reference point return mode or automatic reference point return command (G28).

Only "Status" and "1203 Move amnt in pwr OFF" are valid on the Abs posn set screen.

Operation procedure	"Status" display on Abs posn set screen
1. Select the Abs posn set screen.	"Non Comp." is displayed for the "Status" of the axis for which the absolute position has not been established.
2. Carry out manual or automatic dog-type reference point return. (Notes 1 to 3)	
3. When the reference point is reached, the absolute position origin point will be memorized. The zero point is initialized at this stage. (Notes 4 to 5)	When the absolute position origin point memorizing process is completed, "Complt" will appear.



(Note 1) If execution of the dog-type reference point return is stopped by resetting, etc., the previous state ("Non Comp." or "Complt") will appear at "Status".

(Note 2) With dog-type reference point return, even if "Complt" is displayed at "Status", reference point return can be carried out again.

(Note 3) The required data is stored in the SRAM when the absolute position origin point is established.

(Note 4) The "R0" and "P0" values displayed on the Amp monitor (servo unit) screen are stored in the SRAM.

R0 : Detector's multi-rotation counter value at grid point

P0 : Position within one detector rotation at grid point

4.4 Procedures for the dogless-type detection; initializing with machine end stopper method

Initialization is carried out by pushing against the machine end with manual movement.

The stopper method includes the type that uses the machine end as the absolute position origin point, and the type that uses the grid point near the machine end as the absolute position origin point.

(The grid point is the hypothetical grid determined by the Zero point return parameter "2104 grspc" setting.)

4.4.1 Random point type (Screen operation method)

With this method, the zero point initialization is carried out by pushing against the machine end with manual movement, and using the machine end as the absolute position origin point.

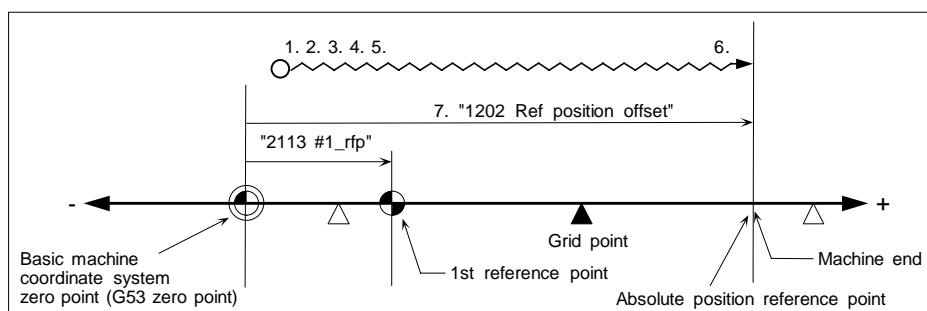
Set the following parameters on the Abs posn set screen before initialization.

Set "1205 No stopper" to "0" (machine end stopper method).

Set "1208 Ref position type" to "0" (set machine end as absolute position origin points).

Set optimum values in "1206 Current lim stopper" and "1207 Max error width".

Operation procedure	"Status" display on Abs posn set screen
1. Select the Abs posn set screen.	"Non Comp." is displayed for the "Status" of the axis for which the zero point has not been initialized.
2. Set the current limit value, the excessive error width and the point type (parameter 1208) for pushing against the machine end stopper. (Note 1)	
3. Confirm the parameters for the axis for which the zero point is to be initialized. "1205 No stopper" = 0 "1208 Ref position type" = 0 (Note 2)	
4. Press the Abs pos set menu key. (Note 3) This setting is valid for the entire system.	
5. Set "1" in "1201 Ref position set" for the axis for which the zero point is to be initialized.	When "1" is set for "1201 Ref position set", "Pressing" will appear at the "Status" for that axis.
6. Change to the manual mode, and push against the machine end stopper until the current limit is reached. (Note 4) The point where the current limit is reached is established as the absolute position origin point.	When the axis movement stops and the current limit is reached, "Ret. Ref. P" will appear at the "Status" for that axis. When writing to the SRAM is completed, "Complt" will appear.
7. Set "2" in "1201 Ref position set", and set the distance from the basic machine coordinate system zero point to the absolute position origin point in "1202 Ref position offset". (Note 7) "1202 Ref position offset" = Absolute position origin point – basic machine coordinate system zero point	
8. After the zero points have been initialized for all axes, turn the power ON again.	



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4. Absolute Position Detection

4.4.2 Grid point type (Screen operation method)

After pushing against the machine end manually, the machine will move and stop at the first grid point. With this method, the zero point is initialized at this grid point, and the grid point is used as the absolute position origin point.

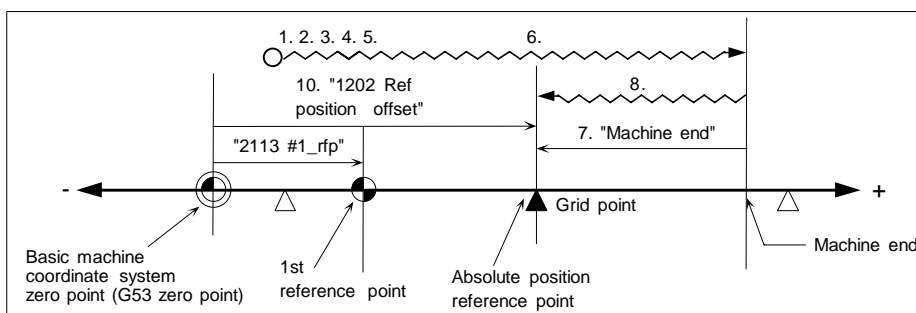
Set the following parameters on the Abs posn set screen before initializing.

Set "1205 No stopper" to "0" (machine end stopper method).

Set "1208 Ref position type" to "1" (set grid point as absolute position origin point).

Set optimum values in "1206 Current lim stopper" and "1207 Max error width".

Operation procedure	"Status" display on Abs posn set screen
1. Select the Abs posn set screen.	"Non Comp." is displayed for the "Status" of the axis for which the zero point has not been initialized.
2. Set the current limit value, the excessive error width and the point type (parameter 1208) for pushing against the machine end stopper. (Note 1)	
3. Confirm the parameters for the axis for which the zero point is to be initialized. "1205 No stopper" = 0 "1208 Ref position type" = 1 (Note 2)	
4. Press the Abs pos set menu key. (Note 3) This setting is valid for the entire system.	
5. Set "1" in "1201 Ref position set" for the axis for which the zero point is to be initialized.	When "1" is set for "1201 Ref position set", "Pressing" will appear at the "Status" for that axis.
6. Change to the manual mode, and push against the machine end stopper until the current limit is reached. (Note 4)	When the axis movement stops and the current limit is reached, "Ret. Ref. P" will appear at the "Status" for that axis.
7. When the current limit is reached with step 6, the distance from the machine end stopper to the previous grid will appear at "Machine end".	
8. Return in the direction of the Zero point return parameter "2107 dir (-)" in the manual mode. At this time, the axis cannot be moved in the direction opposite to "2107 dir (-)". (Note 5)	
9. When the axis returns to the first grid point, the movement will automatically stop, and that position will be established as the absolute position origin point. (Note 6)	When the movement stops at the grid point and the writing to the SRAM is completed, the "Status" will change to "Complt".
10. Set "2" in "1201 Ref position set", and set the distance from the basic machine coordinate system zero point to the absolute position origin point (grid point) in "1202 Ref position offset". (Note 7) "1202 Ref position offset" = Absolute position origin point – basic machine coordinate system zero point	
11. After the zero points have been initialized for all axes, turn the power ON again.	



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4. Absolute Position Detection

4.4.3 Random point type (automatic dogless-type)

After pushing against the machine end with movement in the automatic dogless reference point return mode, the axis returns to the approach point and then presses against the machine end again. The absolute position origin point is established where the axis pushes against the machine end, and then reference point return is carried out.

The parameter settings are the same as the random point type (screen operation method), but two parameters are added ("1209 Approach amount" and "2107 dir (-)"). As screen operations are not involved, preset the parameters according to the grid point type and screen operations.

Set "0" in "1205 No stopper" (machine end stopper method).

Set "1" in "1208 Ref position type" (set grid point as absolute position origin point).

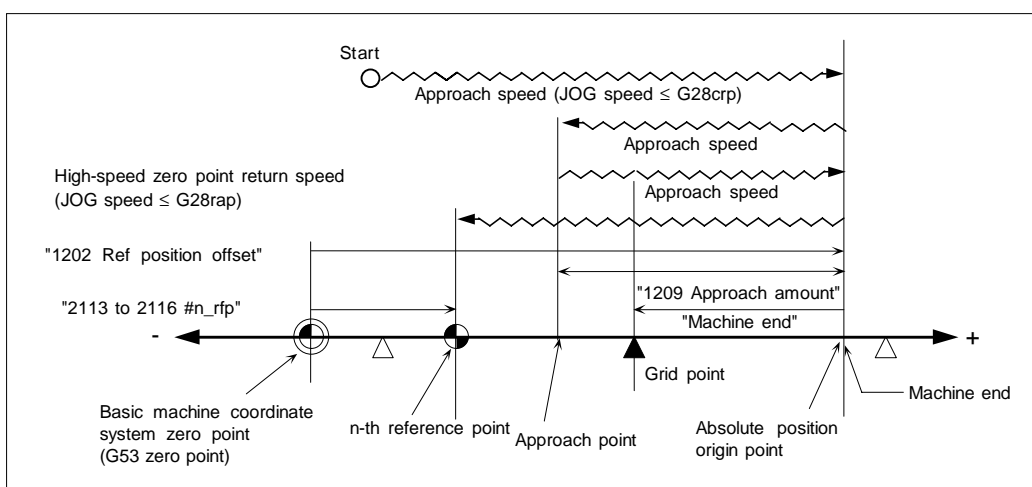
Set the optimum values for "1206 Current lim stopper" and "1207 Max error width".

Set the direction to return from the machine end in "2107 dir (-)" (set direction opposite to the machine end pushing direction).

Set the distance to start the second pushing in "1209 Approach amount".

"1202 Ref position offset" can be changed even after the zero point is initialized.

Operation procedures	Operation
1. Select the automatic dogless reference point return mode.	
2. Move the axis. Select the direction toward the machine end for the feed axis selection. (The axis selection direction will not change even when returning after pushing against the machine end. The axis will automatically head toward the approach point and reference point.)	The axis will press against the machine end stopper until the current limit is reached. The following operations take place automatically until the movement is completed. 1. When the current limit is reached, the axis will return by the "1209 Approach amount". (JOG speed (or clamped by G28crp speed)) 2. The axis will move to the machine end stopper again. (JOG speed (or clamped by G28crp speed)) 3. The axis will move to the n-th reference point position. (JOG speed (or clamped by G28rap speed))
3. After the zero points have been initialized for all axes, turn the power ON again.	



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4.4.4 Grid point type (automatic dogless-type)

After pushing against the machine end in the automatic dogless reference point return mode, the axis returns to the approach point and then presses against the machine end again. The absolute position is established at the first grid point after the machine end is pressed. After that, reference point return is carried out.

The parameter settings are the same as the grid point type (screen operation method), but one parameter is added ("1209 Approach amount"). As screen operations are not involved, preset the parameters according to the grid point type and screen operations.

Set "0" in "1205 No stopper" (machine end stopper method).

Set "1" in "1208 Ref position type" (set grid point as absolute position origin point).

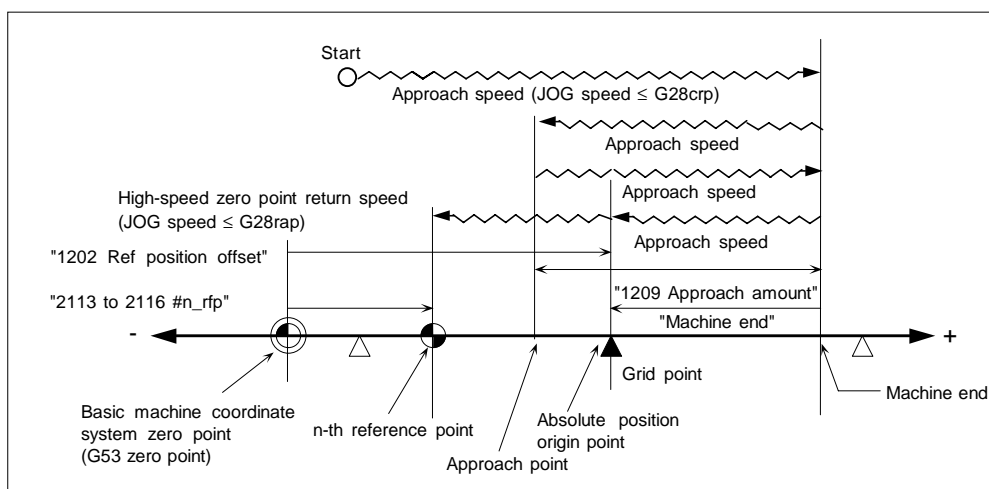
Set the optimum values for "1206 Current lim stopper" and "1207 Max error width".

Set the direction to return from the machine end in "2107 dir (-)" (set direction opposite to the machine end pushing direction).

Set the distance to start the second pushing in "1209 Approach amount".

"1202 Ref position offset" can be changed even after the zero point is initialized.

Operation procedures	Operation
1. Select the automatic dogless reference point return mode.	
2. Move the axis. Select the direction toward the machine end for the feed axis selection. (The axis selection direction will not change even when returning after pushing against the machine end. The axis will automatically head toward the approach point and reference point.)	The axis will press against the machine end stopper until the current limit is reached. The following operations take place automatically until the movement is completed. <ol style="list-style-type: none"> 1. When the current limit is reached, the axis will return by the "1209 Approach amount". (The speed less than JOG speed and G28crp speed) 2. The axis will move to the machine end stopper again. (JOG speed (or clamped by G28crp speed)) 3. The axis will return to the previous grid. (Jog speed (or clamped by G28crp speed)) 4. The axis will move to the n-th reference point position. (JOG speed (or clamped by G28rap speed))
3. After the zero points have been initialized for all axes, turn the power ON again.	

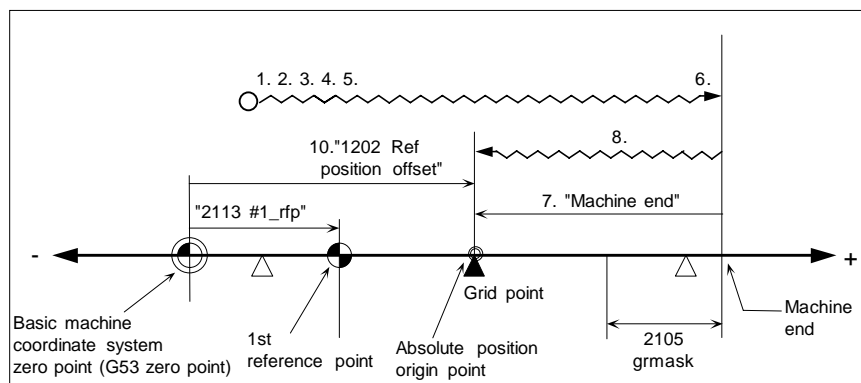


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4.4.5 Notes

(Note 1) to (Note 7) in sections 4.4.1 and 4.4.2 correspond to the following items.

- 1) The current limit value (%) can be set with Servo parameter "2114 SV014". The excessive error width can be set with Servo parameter "2253 SV053".
- 2) If "1205 No stopper" on the Abs posn set screen is set to "1", set it to "0" before setting "1201 Ref position set".
- 3) The Abs pos set menu key on the Abs posn set screen cannot be turned OFF from the screen. This menu will turn OFF when the power is turned ON again. Automatic operation and zero point return cannot be carried out while this menu is ON. (An error will occur.)
- 4) Before the zero point initialization is carried out, the Z-phase grid point must be passed once after the power is turned ON. If the grid point has not been passed even once after the power was turned ON, the error "Some ax does not pass Z phase" will occur when the current limit is reached. In this case, return the axis by one grid or more, and repeat the operations from step 6.
- 5) When using the grid point type (screen operation method) or automatic dogless-type, set the direction to return from the machine end (opposite direction from machine end stopper direction) in "2107 dir(-)".
- 6) When using the grid point type, the grid mask amount can be set in the Zero point return parameter "2105 grmask". If the grid mask amount is larger than the distance from the machine end stopper to the grid point, the next grid point will be used as the absolute position origin point.



- 7) When the dogless-type absolute position detection is carried out, the reference point shift amount (Zero point return parameter "2103 G28sft") will be invalid.

4.5 Procedures for the dogless-type detection; initializing with marked point alignment method

The absolute position is established by making a mark at a random point within the machine's moveable range, and moving manually to the marked position.

The marked point alignment method includes the type that uses a random marked point as the absolute position origin point, and the type that uses the grid point near the marked point as the absolute position origin point.

(The grid point is the hypothetical grid determined by the Zero point return parameter "2104 grspc" setting.)

4.5.1 Random point type (Screen operation method)

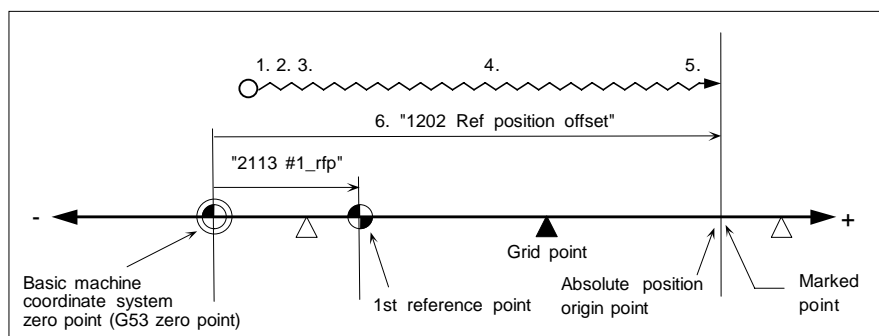
With this method, the machine is moved to the marked point manually to initialize the zero point, and using the marked point as the absolute position origin point.

Set the following parameters on the Abs posn set screen before initializing.

Set "1205 No stopper" to "1" (marked point alignment method).

Set "1208 Ref position type" to "0" (set mark point as absolute position origin point).

Operation procedure	"Status" display on Abs posn set screen
1. Select the Abs posn set screen.	"Non Comp." is displayed for the "Status" of the axis for which the zero point has not been initialized.
2. Confirm the parameters for the axis for which the zero point is to be initialized. "1205 No stopper" = 1 "1208 Ref position type" = 0 (Note 1)	
3. Press the Abs pos set menu key. (Note 2) This setting is valid for the entire system.	
4. Change to the manual mode, and move to the marked point. (Note 3)	
5. Set "1" in "1201 Ref position set" for the axis for which the zero point is to be initialized.	When the axis movement stops and "1" is set for "1201 Ref position set", "Ret. Ref. P" will appear at the "Status" for that axis. When writing to the SRAM is completed, "Complt" will appear.
6. Set "2" in "1201 Ref position set", and set the distance from the basic machine coordinate system zero point to the absolute position origin point (marked point) in "1202 Ref position offset". (Note 5) "1202 Ref position offset" = Absolute position origin point – basic machine coordinate system zero point	
7. After the zero points have been initialized for all axes, turn the power ON again.	



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4.5.2 Grid point type (Screen operation method)

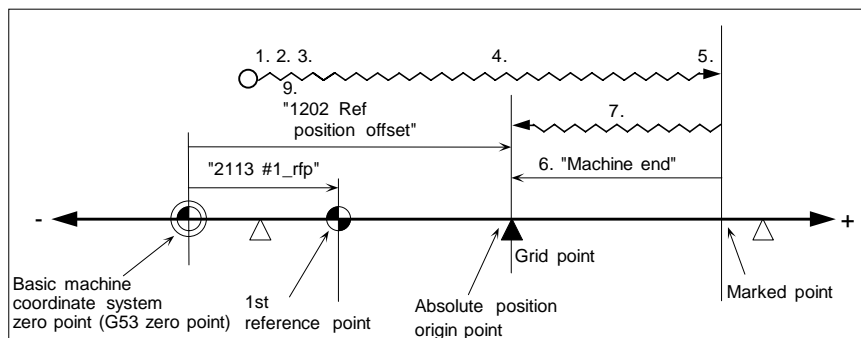
After manually moving to the marked point, the machine will move and stop at the first grid point. The absolute position origin point is established at this grid point, and the grid point is used as the absolute position origin point.

Set the following parameters on the Abs posn set screen before initializing.

Set "1205 No stopper" to "1" (marked point alignment method).

Set "1208 Ref position type" to "1" (set grid point as absolute position origin point).

Operation procedure	"Status" display on Abs posn set screen
1. Select the Abs posn set screen.	"Non Comp." is displayed for the "Status" of the axis for which the zero point has not been initialized.
2. Confirm the parameters for the axis for which the zero point is to be initialized. "1205 No stopper" = 1 "1208 Ref position type" = 1 (Note 1)	
3. Press the Abs pos set menu key. (Note 2) This setting is valid for the entire system.	
4. Change to the manual mode, and move to the marked point.	
5. Set "1" in "1201 Ref position set" for the axis for which the zero point is to be initialized. (Note 3)	When the axis movement stops and "1" is set for "1201 Ref position set", "Ret. Ref. P" will appear at the "Status" for that axis.
6. The distance from the machine reference position to the previous grid will appear at "Machine end".	
7. Return in the direction of the Zero point return parameter "2107 dir (-)" in the manual mode. At this time, the axis cannot be moved in the direction opposite to "2107 dir (-)". (Note 4)	
8. When reaches to the first grid point, the movement will automatically stop, and that position will be established as the absolute position origin point. (Note 5)	When the machine stops at the grid point and writing to the SRAM is completed, "Complt" will appear at "Status".
9. Set "2" in "1201 Ref position set", and set the distance from the basic machine coordinate system zero point to the absolute position origin point (grid point) in "1202 Ref position offset". (Note 5) "1202 Ref position offset" = Absolute position origin point – basic machine coordinate system zero point	
10. After the zero points have been initialized for all axes, turn the power ON again.	



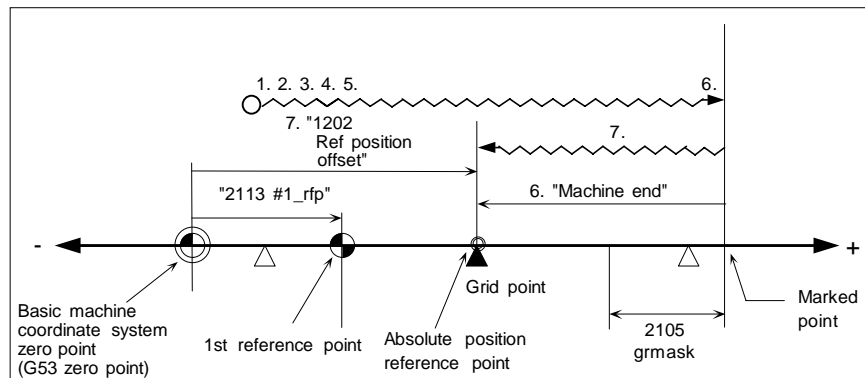
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4.5.3 Notes

(Note 1) to (Note 5) in sections 4.5.1 and 4.5.2 correspond to the following items.

- 1) If "1205 No stopper" on the Abs posn set screen is set to "0", set it to "1" before setting "1201 Ref position set".
- 2) The **Abs pos set** menu key on the Abs posn set screen cannot be turned OFF from the screen. This menu will turn OFF when the power is turned ON again. Automatic operation and zero point return cannot be carried out while this menu is ON. (An error will occur.)
- 3) Before the zero point initialization is carried out, the Z-phase grid point must be passed once after the power is turned ON. If the grid point has not been passed even once after the power was turned ON, "1" cannot be set in "1201 Ref position set". (An error will occur.) In this case, return the axis by one grid or more, and repeat the operations from step 4.
- 4) When using the grid point type (screen operation method), set the direction to return from the mark point (0: positive direction, 1: negative direction) in "2107 dir(-)".
- 5) When using the grid point type, the grid mask amount can be set in the Zero point return parameter "2105 grmask". If the grid mask amount is larger than the distance from the marked point to the grid point, the next grid point will be used as the absolute position origin point.



- 6) When the dogless-type absolute position detection is carried out, the reference point shift amount (Zero return parameter "2103 G28sft") will be invalid.

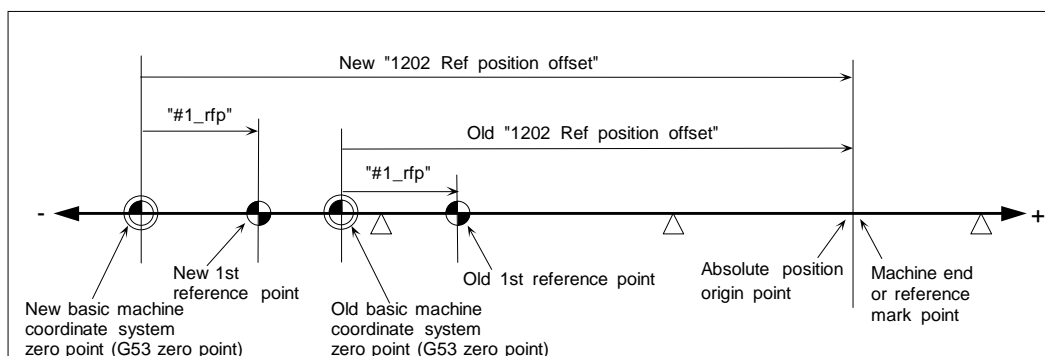
4.6 Various settings for dogless-type absolute position detection

(1) Resetting the basic machine coordinate system

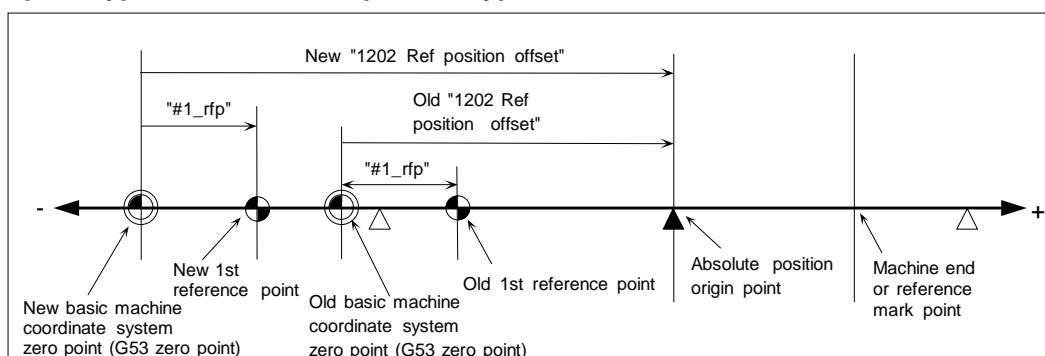
After the zero point is initialized, the basic machine coordinate system can be reset by changing the "1202 Ref position offset" parameter.

Operation procedure	"Status" display on Abs posn set screen
1. Select the Abs posn set screen.	Confirm that the zero point has been initialized for the axis. ("Non Comp" is displayed at "Status".) "2" can be set in "1201 Ref position set" if the zero point has been initialized for the axis.
2. Press the Abs pos set menu key.	
3. Change to the manual mode, and designate the axis for which the basic machine coordinate system is to be reset. Set "2" for "1201 Ref position set" of that axis.	
4. Reset the distance from the basic machine coordinate system zero point to the absolute position origin point in "1202 Ref position offset".	
5. Turn the power ON again.	

<Random point type when "1208 Ref position type" = 0>



<Grid point type when "1208 Ref position type" = 1>



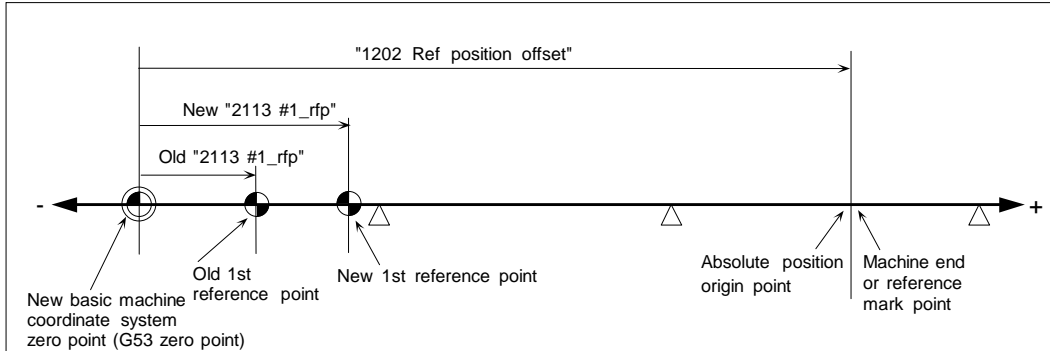
(Note 1) Make sure that the basic machine coordinate system zero point (G53 zero point) is not outside of the machine end stopper.

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4. Absolute Position Detection

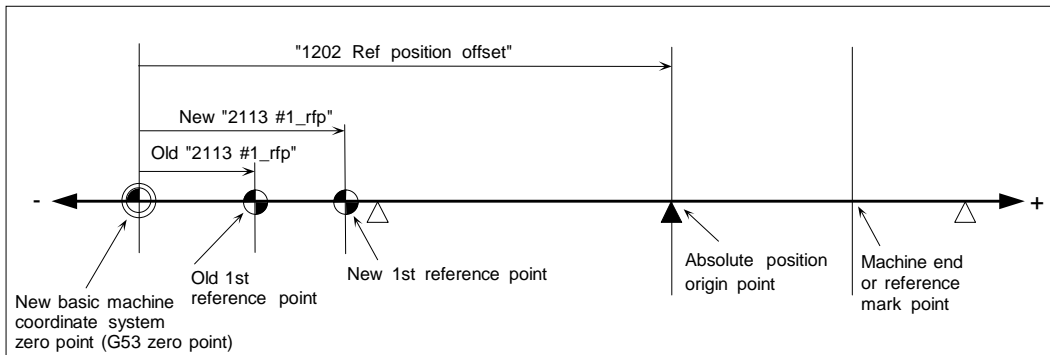
(2) Setting the reference point (G28 zero point)

By setting "2113 #1_rfp", the 1st reference point can be created in the following manner.

<Random point type when "1208 Ref position type" = 0>



<Grid point type when "1208 Ref position type" = 1>



(Note 1) Make sure that the reference return point (G28 zero point) is not outside of the machine end stopper.

4.7 Absolute position detection check function

To ensure reliability, various checks are made during the absolute position detection.

(1) Absolute position coordinate check at power ON

The following steps are carried out to obtain information for diagnosing absolute position errors in the absolute position detection system.

- (a) The machine position when the power is turned OFF and the machine position when the power is turned ON are displayed on the Amp monitor screen.
- (b) If the difference of the machine positions when the power is turned OFF and ON exceeds the tolerable value (Abs posn set screen "1203 Move amnt in pwr OFF"), an absolute position warning will turn ON and will be output to the user PLC. The absolute position warning output can be reset with the reset signal or by pressing the reset button on the operation panel.

(Note) If the "1203 Move amnt in pwr OFF" value is "0", the following value will be used as the tolerable value.

$$\text{Tolerable value} = 0.9 * \text{PIT (ball screw pitch)} * 100 [\mu\text{m}]$$

(2) Initialization data check at power ON

If errors are detected in the following data when the power is turned ON (if the data differs from that saved during initialization), an error will be output.

- (a) Absolute position origin point (Amp monitor screen "R0", "P0")
- (b) Absolute position origin point machine coordinate value (Abs posn set screen "1202 Ref position offset") (Only during dogless-type absolute position detection)

(3) Parameter check at power ON

If errors are detected in the following parameters when the power is turned ON (if the data differs from that saved during initialization), an error will be output.

Basic common parameter	1305	M_inch*
Basic axis parameter	1005	iout*
	1006	rot:*
	1007	ccw*
Servo parameter	2201	PC1
	2202	PC2
	2218	PIT
	2219	RNG1
	2225	MTYP

5. Daily Maintenance

5.1 Daily inspection

5.1.1 Checking the external view

- (1) Machine oil (cutting oil, lubrication oil) have been scattered onto the servomotor, detector, or control unit of the NC, or is leaking.
- (2) Damage is found on the cables of the movable blocks, or the cables are twisted.
- (3) Filter clogging
- (4) A door of the control panel is not open.
- (5) Ambient vibration
- (6) The unit is located in a dusty location.
- (7) Something that causes high frequency is placed near the NC unit.

5.1.2 Checking the inside of the control panel

- (1) Cable connectors are loosened.
- (2) Installing screws are loosened.
- (3) Attachment amplifier screws are loosened.
- (4) The cooling fan operates abnormally.
- (5) Cable damage
- (6) PCB have been inserted abnormally.

5.2 Replacement

5.2.1 Replacing the battery

Data such as parameters and machining programs that must be backed up when the power is OFF is saved by a lithium battery installed in the control section battery holder.

Battery	ER6 with connector (Toshiba, with Mitsubishi Electric specifications)
Initial battery voltage.....	3.6V
Low battery voltage detection voltage	2.8V (Battery voltage drop caution alarm) 2.6V (Battery voltage drop warning alarm)
Total time data is saved by the battery	45,000 hours (At room temperature. Total time will be shorter at high temperatures.)
Battery life.....	Approx. 5 years. (From the date of manufacture.)
Discharge current.....	40 μ A or less

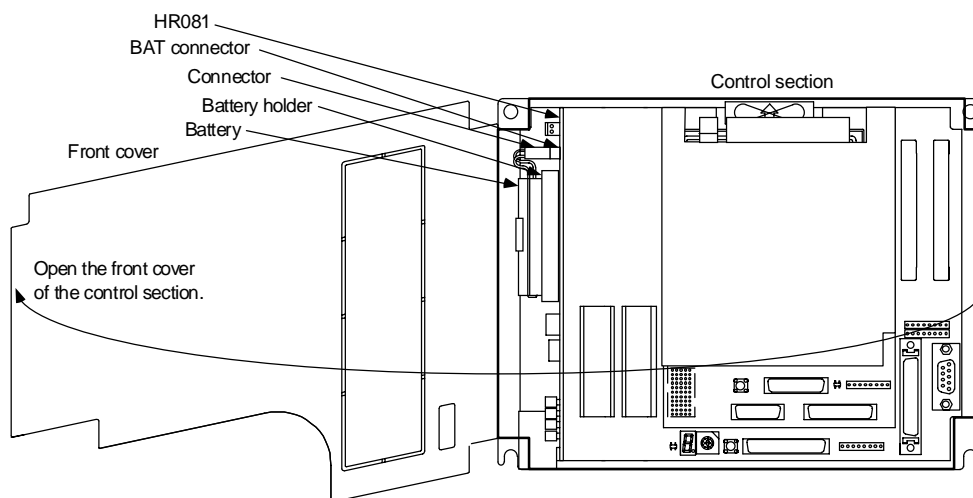
(Replace the battery immediately if a Battery voltage drop caution alarm appears. The internal data may be destroyed if the Battery voltage drop warning alarm appears.)

(1) Replacement procedure

Turn the control section power OFF when replacing the battery.

Complete the battery replacement within 30 minutes of turning the power OFF. (If a battery is not connected within 30 minutes of turning the power OFF, the data backed up by the battery may be destroyed.)


- 1) Confirm that the control section power is OFF. (If the power is not OFF, turn it OFF.)
- 2) Open the operation box door, and open the front cover to the control section.
- 3) Remove the battery from the battery holder.
- 4) Pull the connector connected to the battery out from the BAT connector on the control section HR081 PCB.
- 5) Replace the battery with the new one. Insert the connector connected to the new battery into the BAT connector on the control section HR081 PCB.
- 6) Fit the battery into the battery holder.
- 7) Close the front cover of the control section, and close the operation box door.



(2) **Battery handling notes**

- Always replace the battery with the same type battery.
- Do not disassemble the battery.
- Do not incinerate the battery or immerse it in water.
- Do not deform the battery by pressurizing.
- This is a disposable battery. Do not recharge.
- Dispose of the spent battery as the industrial waste.

 **CAUTION**

 If the BATTERY LOW warning is output, save the machining programs, tool data and parameters to an I/O device, and then replace the battery. If the BATTERY alarm occurs, the machining programs, tool data and parameters may be damaged. After replacing the battery, reload each data item.

 Do not replace the battery while the power is ON.

 Do not short-circuit, charge, overheat, incinerate or disassemble the battery.

 Dispose of the spent battery according to local laws.

5.2.2 Replacing the backlights

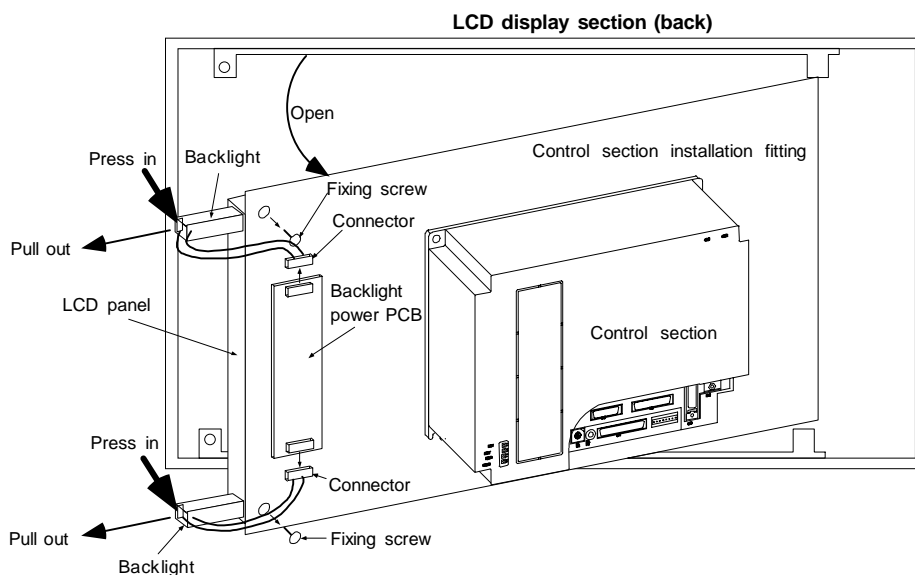
A cold-cathode tube is used as a light source (backlight) in the LCD panel.
The life of the backlight is 10,000 h/25°C (Time to when the luminance drops to 50% of the initial value.)
The backlight life is dependent on the temperature. The life tends to be shorter when used continuously at lower temperatures.

LCD panel.....	KCS6448HSTT-X3 (Kyocera)
Backlight.....	KCI-04 (Kyocera)
Backlight life	10,000 h/25°C (Time to when the luminance drops to 50% of the initial value.)

(1) Replacement procedure

Turn the control section power OFF when replacing the LCD panel backlight.

- 1) Confirm that the control section power is OFF. (If the power is not OFF, turn it OFF.)
- 2) Open the operation box door.
- 3) Pull the connectors connected to the backlights out from the backlight power PCB. (Two locations, top and bottom.)
- 4) Remove the fixing screws (two locations, top and bottom left) of the control section installation fitting, and open the control section installation fitting.
- 5) Pull out the backlights built into the top and bottom left of the LCD panel. (The backlights have locking claws on the front. Hold these claws down while pulling the backlight out.)
- 6) Insert the two new backlights into the top and bottom left of the LCD panel. (Press in until the locking claws click.)
- 7) Close the control section installation fitting, and fix it with the fixing screws. (Two locations, top and bottom left.)
- 8) Connect the backlight connectors to the backlight power PCB.
- 9) Close the operation box door.



⚠ CAUTION

- ⚠ Do not replace the backlight while the power is ON.
- ⚠ Dispose of the spent backlights according to local laws.

5.2.3 Replacing the cooling fan

A fan for cooling the card PC is installed on the top of the control section in systems mounted with a card PC.

The cooling fan specifications are such that it does not operate if the temperature detected is the setting temperature or less.

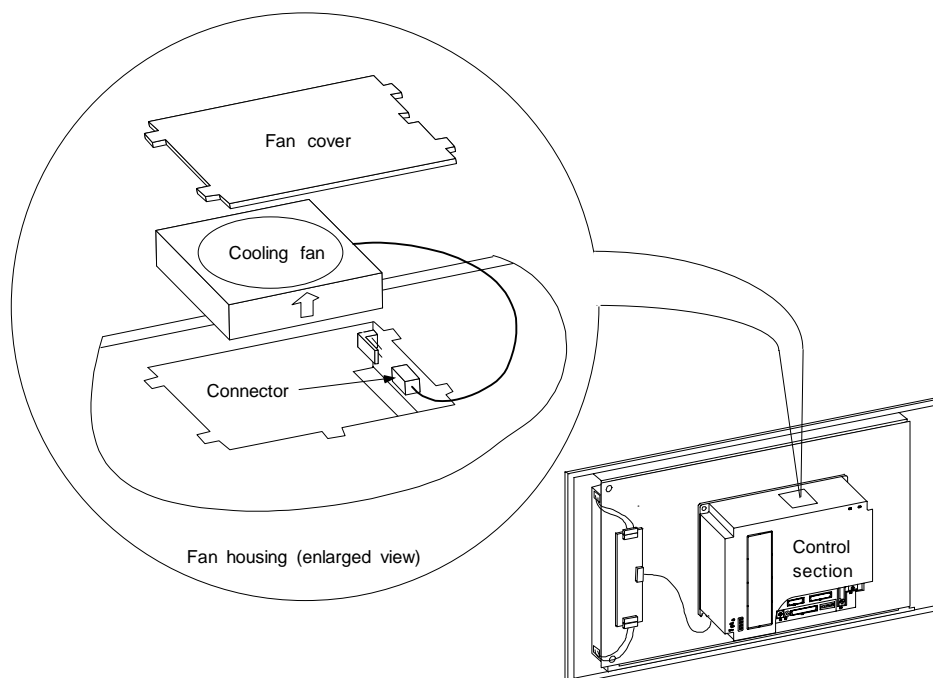
Cooling fan MMF-04B05DM-R (DDK, with Mitsubishi Electric specifications)

Cooling fan life.... 30,000 hours

(1) Replacement procedure

Turn the control section power OFF when replacing the cooling fan.

- 1) Confirm that the control section power is OFF. (If the power is not OFF, turn it OFF.)
- 2) Open the operation box door.
- 3) Remove the fan cover on the top center of the control section. (Remove the fan cover by inserting a flat-tip screwdriver (small) in the slot on the control section cooling fan housing.)
- 4) Pull out the cooling fan from the control section cooling fan housing.
- 5) Pull the connector connected to the cooling fan out from the control section PCB.
- 6) Replace the cooling fan with the new one. Insert the connector connected to the new cooling fan into the control section PCB.
- 7) Put the cooling fan into the control section cooling fan housing. (Be sure the arrow on the side of the cooling fan is pointing up.)
- 8) Arrange the cooling fan wiring neatly in the control section cooling fan housing.
- 9) Install the fan cover. (First install the side with tabs only in the control section. Then install the side with tabs and a slot.)
- 10) Close the operation box door.



⚠ CAUTION

- ⚠ Do not replace the cooling fan while the power is ON.
- ⚠ Dispose of the old cooling fan according to local laws.

5.2.4 Replacing the hard disk drive (HDD)

Depending on the hardware specifications, the hard disk drive is either built into the control section or installed externally to the control section. In either case, it is connected to the control section HR121 PCB by an F140 cable.

HDD	MK1924FCV (Toshiba)
HDD life	5 years or 20,000 hours of power ON, whichever comes first.
HDD unit	FCU6-HD101-1 (Mitsubishi Electric)

(1) Replacement procedure

< HDD built into the control section >

Turn the control section power OFF when replacing the HDD.

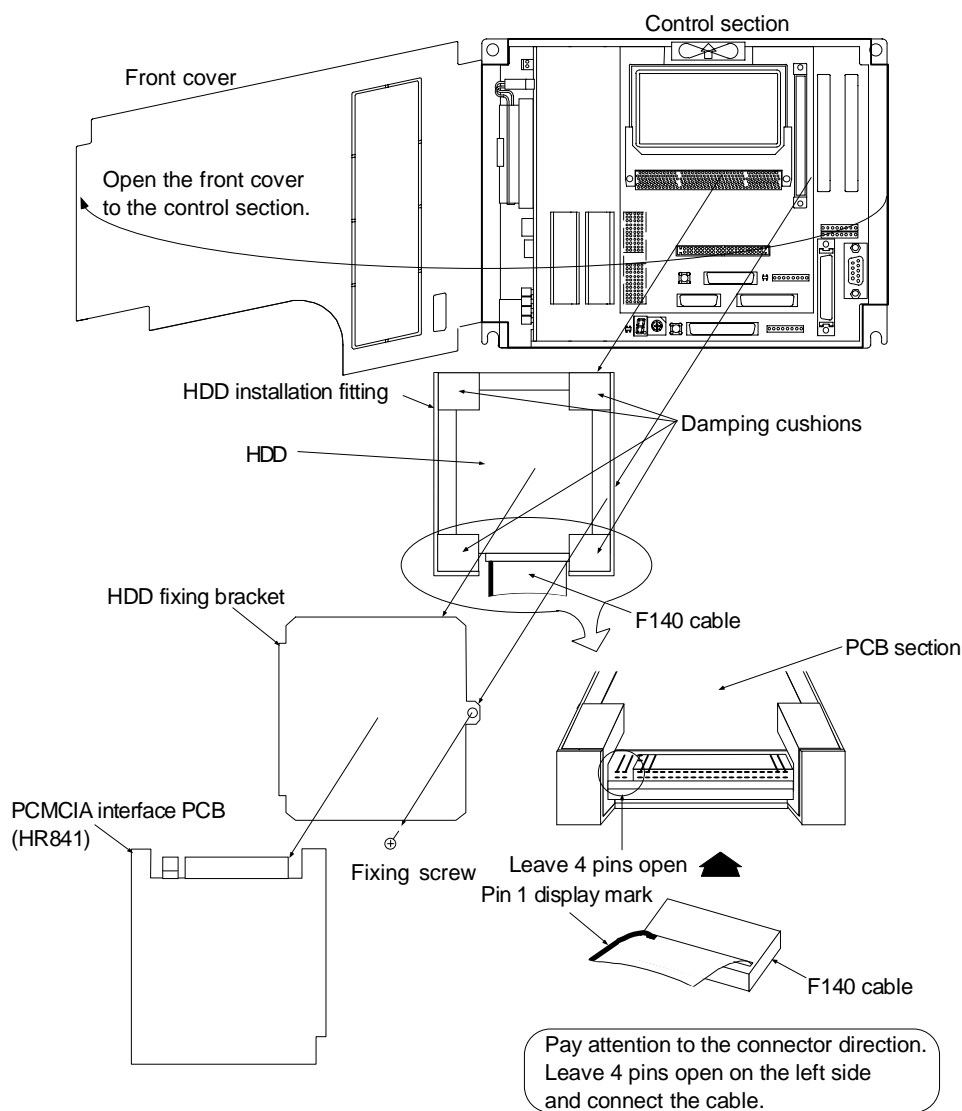
- 1) Confirm that the control section power is OFF. (If the power is not OFF, turn it OFF.)
- 2) Open the operation box door, and open the front cover to the control section.
- 3) Remove the PCMCIA interface HR841 PCB in the control section if one is built-in.
- 4) Disconnect the F140 cable connected to the control section HR121 PCB side.
- 5) Remove the fixing screws on the HDD fixing bracket, and remove the HDD fixing bracket.
- 6) Holding the center right side of the HDD installation fitting, remove the HDD and installation fitting together.
- 7) Remove the HDD from the installation fitting.
(Pull the HDD toward the top of the installation fitting and remove the damping cushions.)
- 8) Disconnect the F140 cable from the HDD, and connect it to the new HDD.
(Pay attention to the connector direction when installing.)
- 9) Install the HDD onto the HDD installation fitting with the HDD PCB section up.
(Install the HDD in the grooves of the damping cushions attached to the HDD installation fitting.)
- 10) Install the damping cushions between the tops of the HDD and HDD installation fitting.
(Install the damping cushions so they fit snugly in the positioning holes on the side of the HDD installation fitting.)
- 11) Install the HDD installation fitting onto the control section.
- 12) Install the HDD fixing bracket, and fix with the fixing screws.
(Install the HDD fixing bracket by inserting it between the HDD installation fitting and the claws on the left side of the control section case.)
- 13) Connect the F140 cable attached to the HDD to the control section HR121 PCB.
- 14) Install the PCMCIA interface HR841 PCB in the control section if one is built-in.
- 15) Close the front cover to the control section, and close the operation box door.

(Note) Refer to the Maintenance and Connection Manual for information on removal/installation of the PCMCIA interface HR841 PCB.

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< HDD built into the control section >



⚠ CAUTION

- ⚠ Incorrect connections may damage the devices, so connect the cables to the specified connectors.
- ⚠ Do not replace the HDD while the power is ON.
- ⚠ Dispose of the old HDD according to local laws.

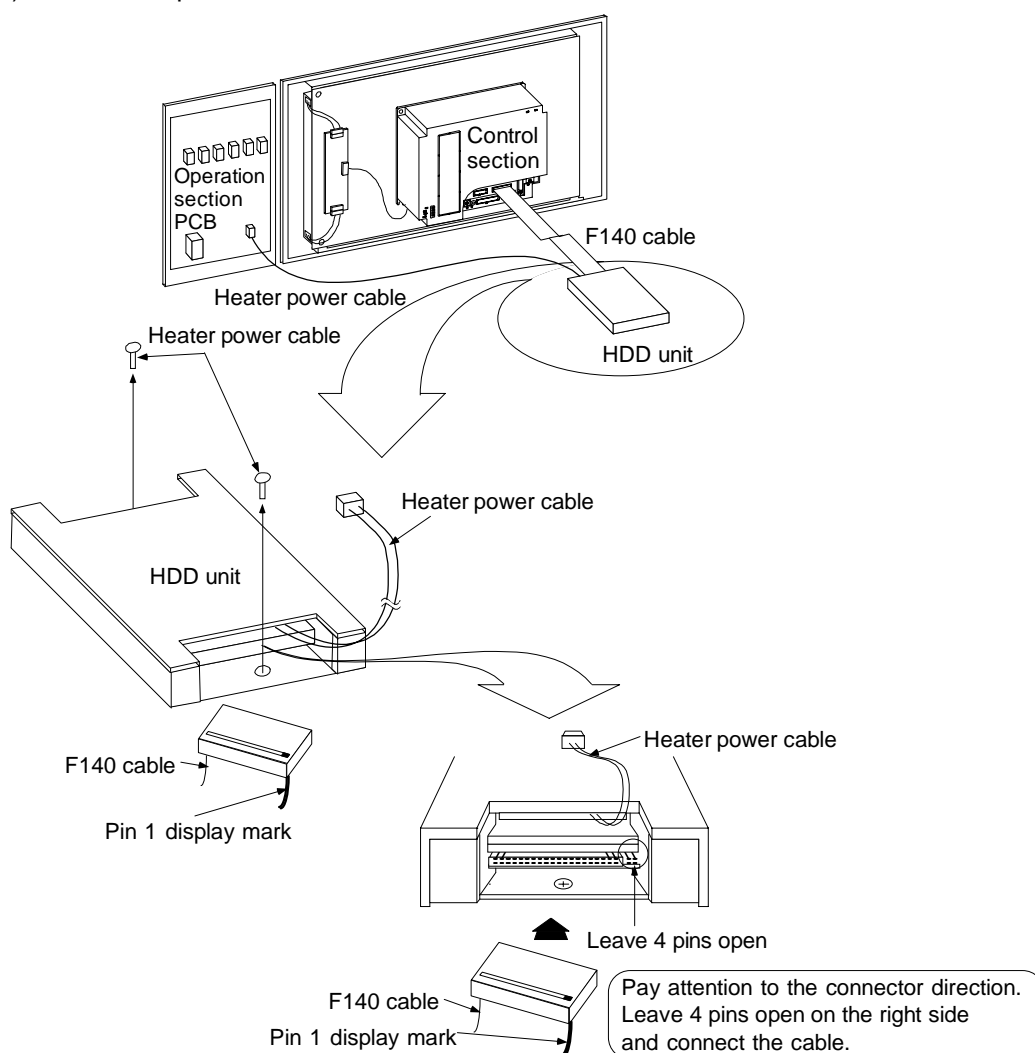
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< HDD unit installed externally to the control section >

Turn the control section power OFF when replacing the HDD unit.

- 1) Confirm that the control section power is OFF. (If the power is not OFF, turn it OFF.)
- 2) Open the operation box door.
- 3) Disconnect the heater power cable running from the HDD unit to the operation section PCB.
- 4) Disconnect the F140 cable connected to the HDD in the HDD unit.
(Hold the HDD firmly in front and back when disconnecting the F140 cable.)
- 5) Remove the HDD unit installation screws, and remove the HDD unit from the operation box.
- 6) Replace the HDD unit with the new one, install it onto the operation box, and fix with the installation screws.
- 7) Connect the F140 cable to the HDD in the HDD unit.
(Hold the HDD firmly in front and back, and pay attention to the connector direction when connecting the F140 cable.)
- 8) Connect the heater power cable of the HDD unit to the operation section PCB.
- 9) Close the operation box door.



CAUTION

- ⚠ Incorrect connections may damage the devices, so connect the cables to the specified connectors.
- ⚠ Do not replace the HDD while the power is ON.
- ⚠ Dispose of the old HDD according to local laws.

5.3 Cleaning and handling

5.3.1 Escutcheon

(1) Cleaning the escutcheon

Wipe the escutcheon with a soft, clean, dry cloth. If cleaning is still required, put some neutral detergent on a cloth and wipe. Do not use alcohol, thinner, etc.

5.3.2 Floppy disk

(1) Cleaning the floppy disk unit

After using the floppy disk unit for long periods, magnetic powder from disk, dust and dirt will adhere on the head surface. This may cause faulty reading and writing.

Periodically (about once every two months) clean the head of the floppy disk unit using the following procedure.

(a) Recommended cleaning disk

Maker : Memorex Japan

Type : Memorex Cleaning Floppy 3.5-inch double-sided

Method : Dry method

(b) Cleaning method

- 1) Insert the cleaning disk into the floppy disk unit to be cleaned.
- 2) Start the cleaning program, and operate following the instructions on the screen.
- 3) When the program is finished, eject the cleaning disk.

(Note) The cleaning disk has a limited No. of uses.

- Replace a cleaning disk that has exceeded its maximum No. of uses with a new one.
- Read the cleaning disk instruction manual to find out the maximum No. of uses.

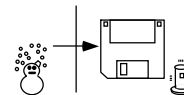
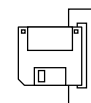
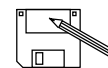
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(2) Handling floppy disks

Please observe the following points to ensure long use of floppy disks.

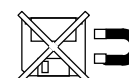
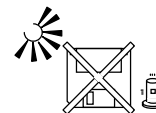
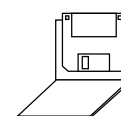
(a) Notes for use

- 1) Never touch the magnetic surface of the floppy disk.
The disk may become impossible to read if fingerprints adhere to the magnetic surface.
- 2) Do not touch the disk with oil or iron filings on the hands.
- 3) Keep the floppy disk away from cigarette smoke, etc. Do not allow any solvent to contact the magnetic surface.
- 4) When attaching an index label on the floppy disk, attach the label in the correct positions so it will not peel off. Do not attach more than one label on the floppy disk.
- 5) Write on the index label before attaching it to the floppy disk. Use a soft-tipped instrument such as a felt-tip pen to write on labels already attached to the floppy disk.
- 6) Gently insert the floppy disk into the floppy disk unit with the correct orientation. The floppy disk may be damaged if it is roughly inserted or removed.
- 7) Before using a floppy disk brought in from outdoors where there is a great difference in temperature or humidity, leave the disk in the room for at least 30 minutes.



(b) Notes for storage

- 1) Always store floppy disks that are not being used and backup floppy disks in a plastic case.
- 2) Do not leave floppy disks in direct sunlight or near heaters.
- 3) Keep floppy disks away from magnets or objects having a strong magnetic field.
Magnetic rings, necklaces, etc., can also cause damage to the floppy disk data, so avoid wearing these when handling floppy disks.
- 4) Do not place heavy objects on floppy disks.



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(3) Other notes for use

(a) Life of the floppy disk unit

The durability of the floppy disk unit is guaranteed for five years of FDD motor operation or 12,000 hr of accessing, whichever comes first. However, correct reading/writing may become impossible sooner if dust and foreign matter adhere to the drive under a dusty, dirty, etc., working environment.

Periodically clean the floppy disk unit head (refer to section 5.3.2 (1)) to avoid trouble such as this.

(b) Backup recommendation

Floppy disks should be copied when suitable, as a precaution against floppy disk damage, data damage, etc., as well as for storing important data.

(c) Observance of working conditions

Floppy disk units and floppy disks are sensitive to temperature and humidity changes, dust and dirt. Therefore, floppy disk units and floppy disks should be used observing the notes mentioned above.

If the working conditions are not satisfied, especially with regard to temperature, (for example, when starting at temperatures below freezing) the data track and head position may deviate, making correct reading impossible.

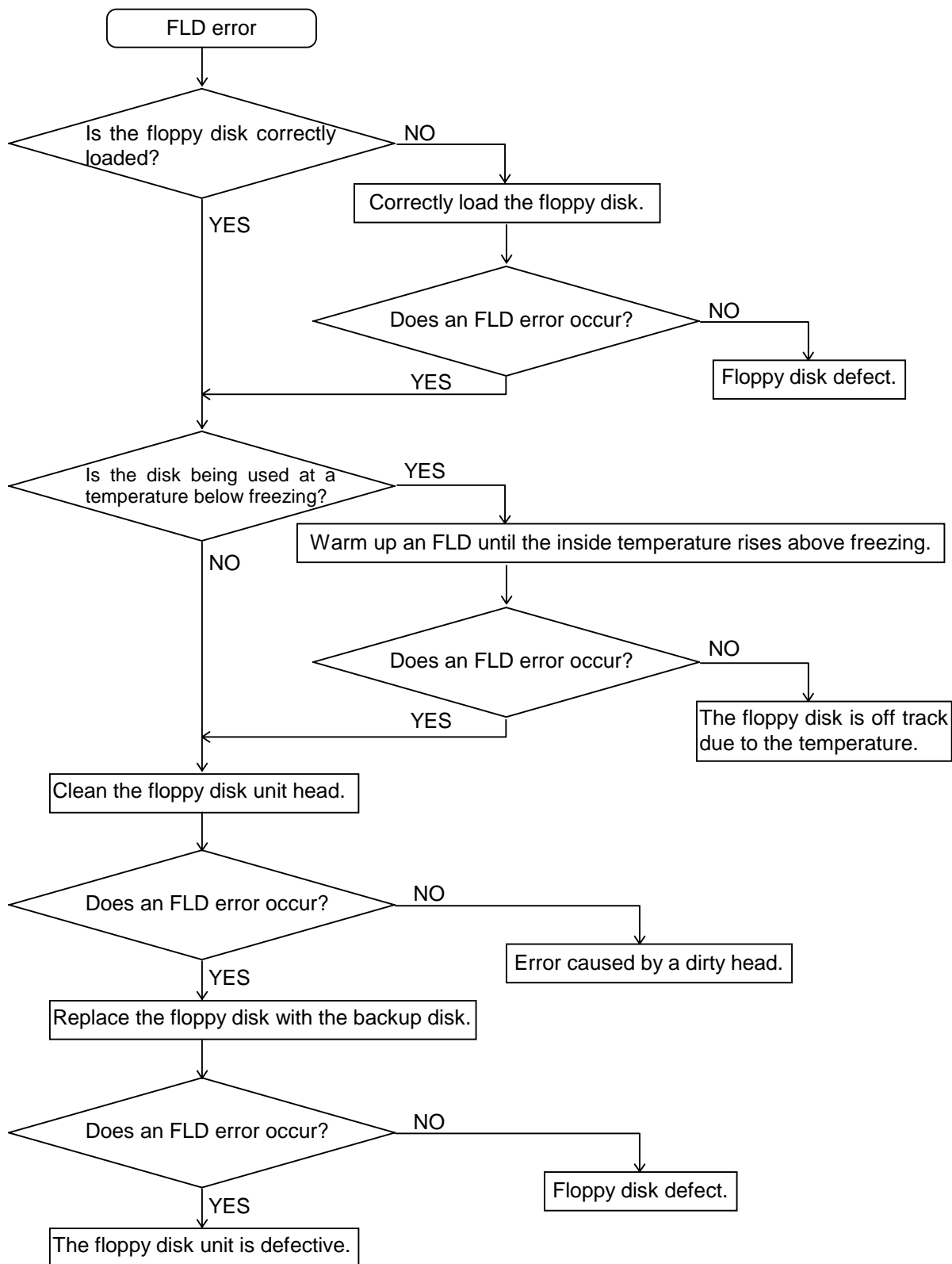
In this case wait for the inside temperature to rise before starting.

(d) Writing to floppy disks

The correct temperature range for writing to floppy disks is between 10°C to 40°C.

Observe the temperature conditions when writing to floppy disks.

(4) Troubleshooting



5.3.3 Hard disk drive

(1) Handling the hard disk

(a) Notes for use

- 1) Correctly connect the cable.
- 2) Do not touch the connector area with the hands or metal.
- 3) Do not apply excessive force to the connector area.
- 4) Do not subject the hard disk to dropping or strong impacts.
- 5) Do not disassemble the hard disk.

(b) Notes for storage

- 1) Do not store the hard disk in locations having a high temperature or humidity.
- 2) Keep the hard disk away from magnets or objects having a strong magnetic field.

(2) Other notes for use

(a) Backup recommendation

Hard disks have a limited life, and so should be copied when suitable as a note as well as for storing important data.

5.3.4 LCD panel

(1) Handling the LCD panel

(a) Notes for use

- 1) The polarizing plate (display surface) of the LCD panel surface can be easily scratched, so be careful during handling.
- 2) Glass is used in the LCD panel. Be careful not to drop the LCD panel or allow it to hit hard objects, as the glass may chip or break.
- 3) The polarizing plate may be stained or discolored if drops of water, etc., adhere to it for long periods, so be sure to wipe off any moisture immediately.
- 4) Wipe off any dirt, dust, etc., on the polarizing plate using absorbent cotton or other soft cloth.
- 5) A CMOS LSI is used in the LCD panel, so be careful of static electricity when handling.
- 6) Never disassemble the LCD panel. Doing so will damage the panel.

(b) Notes for storage

- 1) Do not store the LCD panel in locations having a high temperature or humidity. (Store within the storage temperature range.)
- 2) When storing the LCD panel as an individual unit, be sure that other objects do not touch or hit the polarizing plate (display surface).
- 3) When storing the LCD panel for extended periods, be sure to store in a dark place away from exposure to direct sunlight or fluorescent light.

(2) Other notes for use

(a) Backlight life

The life of the backlight is 10,000 h/25°C.

(Time to when the luminance drops to 50% of the initial value.)

The backlight life is dependent on the temperature. The life tends to be shorter when used continuously at lower temperatures.

(b) Luminance start

As a characteristic of the backlight, the luminance may drop slightly at lower temperatures. It takes 10 to 15 minutes for the luminance to reach the rated value after the power is turned ON.

(c) Unevenness, luminescent spots and defects

Uneven brightness, small luminescent spots or small dark spots may appear on LCD, but this is not a fault.

(d) Contrast

The contrast of STN method LCD panels changes with temperature fluctuation. If this happens and the panel is difficult to see, open the operation box door and adjust the contrast with the contrast adjustment volume on the LCD signal interface PCB.

5.3.5 PCMCIA Card

(1) Handling the PCMCIA card

The general handling methods for the PCMCIA Card are described below.

Refer to the instruction manual of the PCMCIA Card used for details.

(a) Notes for use

- 1) Insert the card in the correct direction.
- 2) Do not touch the connector area with the hands or metal.
- 3) Do not apply excessive force to the connector area.
- 4) Do not subject the card to bending or strong impacts.
- 5) Do not open the cover or disassemble the card.
- 6) Do not use the card in dusty locations.

(b) Notes for storage

- 1) Do not store the card in locations having a high temperature or humidity.
- 2) Do not store the card in dusty locations.

6. Fault Diagnosis and Action

6.1 Checking the fault occurrence status

Check the following:

- When did the fault occur?
- During what operation did the fault occur?
- What fault?

(1) When did the fault occur?

Time of day when the fault occurred.

(2) During what operation did the fault occur?

What NC operation mode?

- For automatic operation Program number, sequence number, and contents of program
- For manual operation Mode?
Operating procedure?
Preceding and succeeding operations?
- Setting display unit's screen?
- During I/O operation?
- Machine system status?
- During tool change?
- Control axis hunting?

(3) What fault occurred?

- What does the alarm display of the setting display unit's Alarm message screen indicate?
Display the alarm diagnosis screen to check the contents of alarm.
- What does the machine sequence alarm indicate?
- Is the LCD screen normal?

(4) Frequency of fault?

- When did the fault occur? Frequency? (Did the fault occur during operation of another machine?) If the frequency is too small, or the fault occurred during operation of another machine, the cause may be abnormalities, noises, etc., of the power voltage. In this case, check that (i) the power voltage is normal (does momentary drop occur during operation of another machine?) and (ii) measures have been taken against noises.
- In specific mode?
- When the ceiling crane moved?
- Frequency for the same kind of workpiece?
- Does the fault occur when the same operation is made?
(Repeatability check)
- Change the conditions (override, contents of program, operating procedure, etc.). Does the same fault occur?
- What was the ambient temperature?
(Was there a sudden temperature change? Was the fan on the top of the control unit working?)
- Was there a contact defect or insulation defect on the cable?
(Was there any oil or cutting water splashed on the cable?)

6.2 Fault examples

When there is a problem or dissatisfaction with the system operation, check the following items before contacting the service center.

– Fault examples –

- The power cannot be turned ON.
- The power fails after being turned ON.
- The screen does not display.
- The operation keys do not work.
- The HD does not operate.
- The FD does not operate.
- Machining operations cannot be carried out.

[Notes]





The NC may not start when the outside air temperature is 5°C or less. To protect the HDD from low temperatures, warm up the HDD with the heater. Check the LED on the operation board for signs while warming up the HDD. (Refer to the operation board instruction manual for each machine manufacturer.)

The NC will automatically start when the warming up is completed.

(1) Power-related problems

The power cannot be turned ON.	
Cause	Remedy
The power supply cord is not plugged in or loose.	Recheck the cables between the NC main unit and external power supply and between the external power supply and socket. Securely plug them in. Check for broken wires in the cable. Replace the cable if there are any broken wires.
The machine is in a door interlock status.	Close the control panel door if it is not completely closed. If the door interlock status continues even after the door is closed, the door interlock circuit is faulty. Repair the circuit.
There is a problem with the power supply socket.	Always turn the switch on the socket ON if one is present. Check whether the specified power voltage and power frequency are being output from the socket.
The external power supply is faulty.	Check whether the power is only being supplied by the external power supply. Depending on the external power supply being used, the power supply may not turn ON in a no-load state. Install a load and check the power supply.
The ON/OFF cable is short-circuited.	Disconnect the ON/OFF cable and check it for short-circuits. Replace the cable if short-circuited.
The input voltage of the external power supply is not within the specified range.	Check whether the input voltage is within +10 or –15% of 200 to 230VAC.





 **CAUTION**

-  Do not apply voltages on the connector other than those indicated in this manual. Doing so may lead to destruction or damage.
-  Incorrect connections may damage the devices, so connect the cables to the specified connectors.
-  Do not connect or disconnect the connection cables between each unit while the power is ON.
-  Do not connect or disconnect any PCB while the power is ON.

CHAPTER 3 MAINTENANCE
8. Fault Diagnosis and Action

The external power supply is ON, but the NC control power supply does not turn ON.	
Cause	Remedy
The external power supply output is not correct.	Disconnect the cable between the NC main unit and the external power supply, and check whether the external power supply output is correct. Connect the cable between the NC main unit and the external power supply, and check whether the external power supply output is correct.
A connection cable from the NC main unit to a peripheral device is short-circuited.	Check whether the power is supplied while disconnecting the connection cables with the peripheral devices one at a time, and check for short-circuits.
There is a short-circuit in a configuration card.	Check whether the power is supplied while removing removable cards one at a time, and check for short-circuits.
The power fails after being turned ON.	
Cause	Remedy
There is a problem with the power supply socket.	Check whether the voltage fluctuates according to the time of day. Check whether instantaneous power failures are occurring.
Faults occur when a peripheral device operation starts.	Check whether the voltage is instantaneously dropping when the peripheral device operation starts.
The PSEMG (red) LED of the HR081 Card is lit.	
Cause	Remedy
The emergency stop switch connected to the EMG connector is ON (A contact). Or, the connection is loose with the EMG connector.	Release (B contact) the emergency stop switch. Also check the connection to the EMG connector.
The BATALM (red) LED of the HR081 Card is lit.	
Cause	Remedy
The LED lights when the voltage of the battery connected to the HR081 BAT connector becomes less than $2.6V \pm 0.065V$.	Replace the battery.

 **CAUTION**





-  Do not apply voltages on the connector other than those indicated in this manual. Doing so may lead to destruction or damage.
-  Incorrect connections may damage the devices, so connect the cables to the specified connectors.
-  Do not connect or disconnect the connection cables between each unit while the power is ON.
-  Do not connect or disconnect any PCB while the power is ON.

CHAPTER 3 MAINTENANCE
8. Fault Diagnosis and Action

(2) Display area-related problems

The LCD screen is not output.	
Cause	Remedy
Power is not being supplied to the backlight power supply of the display area.	Check whether the backlight power supply and the CF02 connector of the control section power supply HR081 are connected with an F082 cable.
The connection from the LCD display to the backlight power supply is loose.	Check whether the wiring from the LCD display is connected to the backlight power supply.
The LCD connector of the HR121 Card and the LCD connector of the HR273 Card are not connected with an F090 cable.	Check whether the connection is with an F090 cable.
The connection between the HR273 Card and the LCD display is loose.	Check whether the wiring from the LCD display is connected to the HR273 Card.
The LCD display or the backlight power supply and HR121 Card are faulty.	Check the cable connection. If it is normal, the individual modules may be faulty. Contact the nearest service center.
The LCD screen is too dark or too light to see the characters.	
Cause	Remedy
The contrast voltage is not adjusted correctly.	Turn the contrast voltage fine-adjustment volume (VR1) to the left or right, to adjust the contrast of the HR273 Card mounted on the back of the display. Then check that the screen is displayed correctly.
The LCD screen characters are light and difficult to read.	
Cause	Remedy
The LCD contrast has deviated due to changes in the ambient temperature.	Adjust the contrast on the display area.
The LCD screen is distorted, is out of synchronization, and characters are unreadable, etc.	
Cause	Remedy
The Card PC or HR121 Card is faulty.	Contact the nearest service center.

 **CAUTION**

-  Do not apply voltages on the connector other than those indicated in this manual. Doing so may lead to destruction or damage.
-  Incorrect connections may damage the devices, so connect the cables to the specified connectors.
-  Do not connect or disconnect the connection cables between each unit while the power is ON.
-  Do not connect or disconnect any PCB while the power is ON.

CHAPTER 3 MAINTENANCE
8. Fault Diagnosis and Action

(3) Operation section-related problems

None of the key input works.	
Cause	Remedy
The F050 cable connecting the operation section key switches and control section is loose.	Check the F050 cable connection.
There is a circuit abnormality in the HR111 Card.	Contact the nearest service center.





(4) HDD-related problems

The message "Non System Disk Error" appears in the screen when the system is started.	
Cause	Remedy
The connector for the HDD connection is loose.	Check the connection state of the HDD F140 cable.
When the FDD is connected, a disk besides the system disk is loaded in it.	Eject the disk from the FDD, and restart.
The machine is warming-up for low temperature protection when the heat-up lamp on the operation section is lit.	Standby until the HDD warmup is completed.
When the problem does not correspond to any of the above.	Contact the nearest service center.

(5) Problems when the system starts

The NC does not start correctly.	
Cause	Remedy
The 7-segment NCLD1 display of the HR111 Card displays "8".	Check that the NCSYS rotary switch is set to "0".
The 7-segment NCLD1 display of the HR111 Card displays "E" or "F".	Contact the nearest service center.

 **CAUTION**

-  Do not apply voltages on the connector other than those indicated in this manual. Doing so may lead to destruction or damage.
-  Incorrect connections may damage the devices, so connect the cables to the specified connectors.
-  Do not connect or disconnect the connection cables between each unit while the power is ON.
-  Do not connect or disconnect any PCB while the power is ON.

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8. Fault Diagnosis and Action

(6) Remote I/O-related problems

The communication alarm LED RAL is lit.	
Cause	Remedy
The remote connection cable is not connected. Or, the cable has a broken wire or a faulty contact in the connector.	Check the NC control section and remote connection F010 cable, or the connection of the SH41 cable between remote I/O units.
The HR300 Card is defective.	Contact the nearest service center, and replace the card.





The power supply system LED goes out.	
Cause	Remedy
The 24IN LED goes out. (Input voltage not supplied.)	Supply a voltage of + 24V ± 5% to the HR300 Card.
The 5OUT LED goes out. (Input power supply outside the allowable range, internal power supply fault)	Check whether the input voltage is + 20V or less. If the correct voltage is being supplied, contact the nearest service center.

(7) Others

Check the following.

- Is the mode selected correctly?
- For tape operation, is the tape correctly mounted?
- Are the starting conditions satisfied?
(Depending on the machine, the start may be locked until the specified conditions are satisfied. Check with the instruction manual issued by the machine manufacturer.)
- Are the override and manual speed set to "0"?
- Has a reset signal been issued?
- Has a feed hold signal been issued?
- Is the machine lock ON?

 **CAUTION**

-  Do not apply voltages on the connector other than those indicated in this manual. Doing so may lead to destruction or damage.
-  Incorrect connections may damage the devices, so connect the cables to the specified connectors.
-  Do not connect or disconnect the connection cables between each unit while the power is ON.
-  Do not connect or disconnect any PCB while the power is ON.

CHAPTER 4 APPENDICES

Appendix 1. Fixed Cycle Programs

Input/output and editing operations are possible for the programs of the standard fixed cycle. In addition, subprograms can be created separately allowing the standard fixed cycle program to be used as a user fixed cycle. These subprograms can also be input/output and edited.

CAUTION

 Do not change the fixed cycle program without prior consent from the machine manufacturer.

1.1 Parameters for fixed cycle program operation

To input/output or edit the data of each fixed cycle subprogram, use the "Input/Output" and "Edit" screens in the same way as when creating usual user-created machining programs. In this case, the parameter (Basic common parameter 1306 fix_P) must have been set.

(1) Turning ON the parameters for fixed cycle operation

1)

Display the Base common param screen of machine parameters.

2)

Set "1" in parameter "1306 fix_P".
1



When this parameter is valid, the "Input/Output" screen or "Edit" screen is dedicated for operation of fixed cycle programs. (The machining program handled here becomes a program for controlling the fixed cycle.) A program list also displays only fixed cycle programs.

(Note) After completion of operation of a fixed cycle program, set "0" in parameter "1306 fix_P". (Normal user-created machining programs can be operated.)

This parameter is set to "0" when the power is turned ON.

1.2 Inputting/outputting fixed cycle programs

Fixed cycle programs are transferred (input/output with an external device) on the Input/Output screen. Check that the parameter "1306 fix_P" for fixed cycle operation on the Base common param screen has been set to "1".

The operation method is the same as for transferring user machining programs.

(1) Inputting (External device → Memory)

The operation method is the same as for user machining programs.

Generally, a group of 12 fixed cycle subprograms constitutes a set and, therefore, greater convenience is afforded if programs are prepared in such a way that the data can be input continuously.

When the data transfer begins, the message "Transferring" appears. When the EOR code is read, the data transfer stops and the message "Transfer complete" appears.

After programs have been input, they must be checked that the programs have been input correctly on the program list and Edit screen.

(2) Outputting (Memory → External device)

The operation method is the same as for user machining programs.

There are two ways of outputting the fixed cycle programs which have been registered: output of one program at a time or output of several programs in a batch.

When the data transfer begins, the message "Transferring" appears. When the EOR code is read, the data transfer stops and the message "Transfer complete" appears.

After programs have been output, they must be checked that there are no data output errors.

(3) Erasing

The operation method is the same as for user machining programs.

There are two ways of erasing registered fixed cycle programs: Erasing one program at a time or erasing of several continuous programs in a batch.

Designate the device, directory and No. of the program to be erased in the setting column A. When erasing of several continuous programs in a batch, designate the range of Nos. to be erased.

If the data erasing process completes correctly, the message "Erase complete" is displayed.

If some files remain that could not be erased when erasing several programs, the message "Erase ended. Some file not erased" is displayed.

1.3 Standard fixed cycle subprogram

O370	(AUTO-TLM)
------	------------

```
G31Z#5F#3
IF[ROUND[ABS[#2-[##10*#11]]]GT#8]GOTO1
IF[ROUND[##10*#11]EQ#4]GOTO1
##9=##10-#2/#11+##9
#3003=#1
N2
M99
N1#3901=607
%
```

O740	(FACE-PATC)
------	-------------

```
G.1
IF[ABS[#2]GT0]GOTO10
#14=1
N10#13=#3
IF[#15NE0]GOTO11
#13=#3-#5
N11#16=0
DO1
#10=0
#11=#4
DO2
#10=#10+#4
IF[ABS[#10]GE[ABS[#1]]]GOTO1
G01X#11
G00X#6
#11=#4-#6
END2
N1G01X#1-#10+#11
IF[#15EQ0]GOTO20
IF[#16EQ0]GOTO21
N20G00Y#5,I#38
N21#16=1
G00X-#1,I#38
IF[#14]GOTO3
#12=#12+#3
IF[ABS[#12]LT[ABS[#2]]]GOTO2
#14=1
#13=#2-#12+#13
N2G00Y#13
#13=#3-#5
END1
N3G00Y-#2-#5,I#38
M99
%
```


CHAPTER 4 APPENDICES
Appendix 1. Fixed cycle Programs

O750	(STRAIGHT-PATC)
------	-----------------

```
G.1
IF[ABS[#1]GT0]GOTO10
#14=1
N10#13=#4
IF[#15NE0]GOTO11
#13=#4-#5
N11#16=0
DO1
#10=0
#11=#3
DO2
#10=#10+#3
IF[ABS[#10]GE[ABS[#2]]]GOTO1
G01Y#11
G00Y#6
#11=#3-#6
END2
N1G01Y#2-#10+#11
IF[#15EQ0]GOTO20
IF[#16EQ0]GOTO21
N20G00X#5,I#38
N21#16=1
G00Y-#2,I#38
IF[#14]GOTO3
#12=#12+#4
IF[ABS[#12]LT[ABS[#1]]]GOTO2
#14=1
#13=#1-#12+#13
N2G00X#13
#13=#4-#5
END1
N3G00X-#1-#5,I#38
M99
%
```

CHAPTER 4 APPENDICES
Appendix 1. Fixed cycle Programs

O760	(THREAD-PATC)
------	---------------

```
G.1
#12=1
#13=#9
IF[ABS[#13]GE[ABS[#8]]]GOTO1
#16=1
#13=#8
N1#11=#13
IF[ABS[#11]LT[ABS[#4-#5]]]GOTO2
#11=#4-#5
#14=1
N2#17=#11
#18=ROUND[[#4-#11-#5]*#7]
IF[[#18XOR#1]GE0]GOTO10
#18=-#18
N10#19=#18
#10=ROUND[[#11+#5]*#7]
IF[[#10XOR#1]GE0]GOTO20
#10=-#10
N20G00X#10,l#38
#20=#10
DO1
#15=ROUND[#10*#3/#1]
N90G00Y#2+#3-#4-#15+#11
G33X#1-#10-#18Y-#3+#15
G00Y-#2+#4-#11,l#38
IF[[#3902AND1]EQ0]GOTO91
G00X#10+#18-#1,l#38
GOTO90
N91IF[#14GT0]GOTO3
IF[#16GT0]GOTO7
#12=#12+1
#13=ROUND[#9*SQRT[#12]]
IF[ABS[#13-#11]GE[ABS[#8]]]GOTO8
#16=1
N7#13=#11+#8
N8#11=#13
IF[ABS[#11]LT[ABS[#4-#5]]]GOTO9
#11=#4-#5
#14=1
N9#10=ROUND[[#17-#11]*#7]
IF[[#10XOR#1]GE0]GOTO6
#10=-#10
N6#10=#10+#20
G00X-#1+#10+#18,l#38
IF[#14LT0]GOTO11
#18=0
GOTO12
```

(Continued on the next page)

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Appendix 1. Fixed cycle Programs

```

N11#18=#19-#10+#20
N12END1
N3IF[ABS[#6]LT1]GOTO5
#14=0
#13=0
DO2
IF[#14GT0]GOTO5
#13=#13+#6
IF[ABS[#13]LT[ABS[#5]]]GOTO4
#13=#5
#14=1
N4G00X#10-#1,I#38
N92G00Y#2+#3-#4+#13-#15+#11
G33X#1-#10Y-#3+#15
G00Y-#2+#4-#13-#11,I#38
IF[#3902AND1]EQ0]GOTO93
G00X#10-#1,I#38
GOTO92
N93END2
N5G00X-#1,I#38
M99
%
```

O761	(THREAD-PATC-2SYSTE)
------	----------------------

```

G.1
N761!L10
#12=1
#13=#9
IF[ABS[#13]GE[ABS[#8]]]GOTO1
#16=1
#13=#8
N1#11=#13
IF[ABS[#11]LT[ABS[#4-#5]]]GOTO2
#11=#4-#5
#14=1
N2#17=#11
#18=ROUND[#4-#11-#5]*#7]
IF[#18XOR#1]GE0]GOTO10
#18=-#18
N10#19=#18
#10=ROUND[#11+#5]*#7]
IF[#10XOR#1]GE0]GOTO20
#10=-#10
N20G00X#10,I#38
#20=#10
DO1
#15=ROUND[#10*#3/#1]
G00Y#2+#3-#4-#15+#11
!L11
```

CHAPTER 4 APPENDICES
Appendix 1. Fixed cycle Programs

```
G33X#1-#10-#18Y-#3+#15
G00Y-#2+#4-#11,l#38
!L12
IF[#14GT0]GOTO3
IF[#16GT0]GOTO7
#12=#12+1
#13=ROUND[#9*SQRT[#12]]
IF[ABS[#13-#11]GE[ABS[#8]]]GOTO8
#16=1
N7#13=#11+#8
N8#11=#13
IF[ABS[#11]LT[ABS[#4-#5]]]GOTO9
#11=#4-#5
#14=1
N9#10=ROUND[[#17-#11]*#7]
IF[[#10XOR#1]GE0]GOTO6
#10=-#10
N6#10=#10+#20
G00X-#1+#10+#18,l#38
IF[#14LT0]GOTO11
#18=0
GOTO12
N11#18=#19-#10+#20
N12END1
N3IF[ABS[#6]LT1]GOTO5
#14=0
#13=0
DO2
IF[#14GT0]GOTO5
#13=#13+#6
IF[ABS[#13]LT[ABS[#5]]]GOTO4
#13=#5
#14=1
N4G00X#10-#1,l#38
G00Y#2+#3-#4+#13-#15+#11
!L11
G33X#1-#10Y-#3+#15
G00Y-#2+#4-#13-#11,l#38
!L12
END2
N5G00X-#1,l#38
M99
%
```

CHAPTER 4 APPENDICES
Appendix 1. Fixed cycle Programs

O762	(THREAD-PATC-2SYSTE)
------	----------------------

G.1
N762!L10
#12=1
#13=#9
IF[ABS[#13]GE[ABS[#8]]]GOTO1
#16=1
#13=#8
N1#11=#13
IF[ABS[#11]LT[ABS[#4-#5]]]GOTO2
#11=#4-#5
#14=1
N2#17=#11
#18=ROUND[[#4-#11-#5]*#7]
IF[[#18XOR#1]GE0]GOTO10
#18=-#18
N10#19=#18
#10=ROUND[[#11+#5]*#7]
IF[[#10XOR#1]GE0]GOTO20
#10=-#10
N20IF[#27NE1]GOTO21
G00X#10,l#38
N21#20=#10
#28=1
DO1
#15=ROUND[#10*#3/#1]
#29=#28MOD2
IF[[#27EQ1]AND[#29EQ0]]GOTO22
IF[[#27EQ2]AND[#29EQ1]]GOTO22
G00Y#2+#3-#4-#15+#11
!L11
G33X#1-#10-#18Y-#3+#15
G00Y-#2+#4-#11,l#38
#21=#18
!L12
N22IF[#14GT0]GOTO3
IF[#16GT0]GOTO7
#12=#12+1
#13=ROUND[#9*SQRT[#12]]
IF[ABS[#13-#11]GE[ABS[#8]]]GOTO8
#16=1
N7#13=#11+#8
N8#11=#13
IF[ABS[#11]LT[ABS[#4-#5]]]GOTO9
#11=#4-#5
#14=1
N9#10=ROUND[[#17-#11]*#7]
IF[[#10XOR#1]GE0]GOTO6
#10=-#10

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Appendix 1. Fixed cycle Programs

```
N6#10=#10+#20
IF[#27EQ1]AND[#29EQ1]]GOTO24
IF[#27EQ2]AND[#29EQ0]]GOTO24
IF[#27EQ2]AND[#28EQ1]]GOTO23
G00X-#1+#10+#21,l#38
GOTO24
N23G00X#10,l#38
N24IF[#14LT1]GOTO11
#18=0
GOTO12
N11#18=#19-#10+#20
N12#28=#28+1
END1
N3IF[ABS[#6]LT1]GOTO5
#14=0
#13=0
DO2
IF[#14GT0]GOTO5
#13=#13+#6
IF[ABS[#13]LT[ABS[#5]]]GOTO4
#13=#5
#14=1
N4#29=#28MOD2
IF[#27EQ1]AND[#29EQ1]]GOTO25
IF[#27EQ2]AND[#29EQ0]]GOTO25
G00X#10-#1+#21,l#38
#21=0
G00Y#2+#3-#4+#13-#15+#11
!L11
G33X#1-#10Y-#3+#15
G00Y-#2+#4-#13-#11,l#38
!L12
N25#28=#28+1
END2
N5G00X-#1,l#38
M99
%
```

CHAPTER 4 APPENDICES
Appendix 1. Fixed cycle Programs

O770	(STRAIGHT-TURNING)
------	--------------------

G.1
IF[#1EQ0]OR[#2EQ0]]GOTO1
Y#2+#7
G1X#1Y-#7
Y-#2
G0X-#1,I#38
N1M99
%

O780	(THREAD-CUTTING)
------	------------------

G.1
IF[#1EQ0]OR[#2EQ0]]GOTO1
N90Y#2+#7
G33X#1Y-#7F#9E#10
G0Y-#2,I#38
IF[#3902AND1]EQ0]GOTO91
G00X-#1,I#38
GOTO90
N91X-#1,I#38
N1M99
%

O790	(FACE-CUTTING)
------	----------------

G.1
IF[#1EQ0]OR[#2EQ0]]GOTO1
X#1+#7
G1X-#7Y#2
X-#1
G0Y-#2,I#38
N1M99
%

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Appendix 1. Fixed cycle Programs

O830	(DRILL-CYCLE-B)
------	-----------------

```
G.1
IF[#30]GOTO2
M#24
#29=#11#28=0
Z#2
#2=##5#3003=#8OR1
DO1
#28=#28-#11#26=-#28-#29
Z#26
IF[ABS[#28]GE[ABS[#3]]]GOTO1
G1Z#29
G0Z#28,I#38
#29=#11+#14
END1
N1G1Z#3-#26
G4P#4
#3003=#8
G0Z-#3-#2,I#38
IF[#24EQ#0]GOTO2
M#24+1
G4P#21
N2M99
%
```

O831	(DRILL-CYCLE-A)
------	-----------------

```
G.1
IF[#30]GOTO2
M#24
#29=0#28=#11
Z#2
#2=##5#3003=#8OR1
DO1
#29=#29+#11
IF[ABS[#29]GE[ABS[#3]]]GOTO1
G1Z#28
G0Z-#14
#28=#11+#14
END1
N1G1Z#3-#29+#28
G4P#4
#3003=#8
G0Z-#3-#2,I#38
IF[#24EQ#0]GOTO2
M#24+1
G4P#21
N2M99
%
```


CHAPTER 4 APPENDICES
Appendix 1. Fixed cycle Programs

O832	(DEEP-DRILL-CYCLE-2)
------	----------------------

```
G.1
IF[#30]GOTO3
#3003=#8OR1
#29=#12#28=0
G0Z#2
IF[#12NE#0]GOTO1
IF[#11EQ#0]GOTO2
N1#28=#28-#12#26=-#28-#29
IF[ABS[#28]GE[ABS[#3]]]GOTO2
G1Z#12
G4P#4
G0Z#28-#2,I#38
G4P#13
#29=#11+#15
DO1
#28=#28-#11#26=-#28-#29
G0Z#26+#2
IF[ABS[#28]GE[ABS[#3]]]GOTO2
G1Z#29
G4P#4
G0Z#28-#2,I#38
G4P#13
END1
N2G1Z#3-#26
G4P#4
#3003=#8
G0Z-#3-#2,I#38
N3M99
%
```

CHAPTER 4 APPENDICES
Appendix 1. Fixed cycle Programs

O840	(TAP-CYCLE)
------	-------------

G.1
IF[#30]GOTO2
M#24
Z#2
#2=##5#3003=#8OR1#3004=#9OR3
G1Z#3F#22
G4P#4
M#6
#3900=1
G1Z-#3F#23
#3004=#9
M#7
#3003=#8
IF[#24EQ#0]GOTO1
M#24+1
G4P#21
N1G0Z-#2,I#38
N2M99
%

O850	(BORING-CYCLE)
------	----------------

G.1
IF[#30]GOTO2
M#24
Z#2
#2=##5#3003=#8OR1
G1Z#3
G4P#4
#3003=#8
Z-#3F#23
F#22
IF[#24EQ#0]GOTO1
M#24+1
G4P#21
N1G0Z-#2,I#38
N2M99
%

Appendix 2. Operation Messages

The following messages appear on each screen.

2.1 Position display-related operation messages

Message	Details
Can't write into file	<ul style="list-style-type: none">• Could not write the data to the memory with the buffer correction. → Contact the nearest service center.
Origin set not possible	<ul style="list-style-type: none">• The operation is in a state in which origin set is not possible. → Check the Data protection key 1 or the parameter "Origin zero invalid" setting.

2.2 Operation search-related operation messages

Message	Details
Searching	<ul style="list-style-type: none">• The operation search is being executed correctly.
Search completed	<ul style="list-style-type: none">• The operation search completed correctly.
Executing automatic operation	<ul style="list-style-type: none">• An operation such as parameter setting or editing that cannot be carried out during automatic operation was attempted. (Input/output is also possible during automatic operation.)
Search error	<ul style="list-style-type: none">• Could not find the designated file.
Input some of ONB	<ul style="list-style-type: none">• The search is not possible because one of O, N or B is not designated.

2.3 Graphic display-related operation messages

Message	Details
Executing trace	<ul style="list-style-type: none">• The trace mode of the graphic display is valid.
Data range error	<ul style="list-style-type: none">• The input data exceeded the range.
Memory over	<ul style="list-style-type: none">• This error occurs when outputting the accuracy measurement tool's reference shape data.

2.4 Compensation-related (tool compensation, coordinate system offset) operation messages

Message	Details
Erase? (Y/N)	<ul style="list-style-type: none"> • Message to confirm the operation. <li style="padding-left: 20px;"><input type="checkbox"/> or <input type="checkbox"/> : Erase the data. <li style="padding-left: 20px;"><input type="checkbox"/> : Do not erase the data.
Clear all axes? (Y/N)	<ul style="list-style-type: none"> • Message to confirm the operation. <li style="padding-left: 20px;"><input type="checkbox"/> or <input type="checkbox"/> : Clear the data for all axes. <li style="padding-left: 20px;"><input type="checkbox"/> : Do not clear the data.
Clear all? (Y/N)	<ul style="list-style-type: none"> • Message to confirm the operation. <li style="padding-left: 20px;"><input type="checkbox"/> or <input type="checkbox"/> : Clear all data. <li style="padding-left: 20px;"><input type="checkbox"/> : Do not clear the data.
Cannot return to origin	<ul style="list-style-type: none"> • Operations other than line paste, paste and data input cannot be undone.
Input P number	<ul style="list-style-type: none"> • The coordinate system [G54.1 P] menu was pressed. • The expansion workpiece coordinate system P No. was input.

2.5 Data input/output-related operation messages

Message	Details
OK? (Y/N)	<ul style="list-style-type: none"> • Message to confirm the operation. <li style="padding-left: 20px;"><input type="checkbox"/> or <input type="checkbox"/> : Execute the operation <li style="padding-left: 20px;"><input type="checkbox"/> : Do not execute the operation.
Input the password	<ul style="list-style-type: none"> • A password must be input before the operation is executed.
Transfer complete	<ul style="list-style-type: none"> • The data transfer completed correctly.
Transferring	<ul style="list-style-type: none"> • The data is being transferred correctly.
Compare complete	<ul style="list-style-type: none"> • The data comparison completed correctly.
Compare execution	<ul style="list-style-type: none"> • The data comparison is being executed correctly.
Merge complete	<ul style="list-style-type: none"> • The data merge completed correctly.
Merge execution	<ul style="list-style-type: none"> • The data merge is being executed correctly.
Rename complete	<ul style="list-style-type: none"> • The rename has been completed.
Change complete	<ul style="list-style-type: none"> • The data conversion completed correctly.
Changing	<ul style="list-style-type: none"> • The data is being converted.
Erase complete	<ul style="list-style-type: none"> • The data erasing completed correctly.
Erase ended. Some file not erased	<ul style="list-style-type: none"> • The file erasing completed, but there are some files that could not be erased.
Can't open file for dev A	<ul style="list-style-type: none"> • Could not find the file for device A. <li style="padding-left: 20px;">Or, the file is in a state in which it cannot be accessed.
Can't open file for dev B	<ul style="list-style-type: none"> • Could not find the file for device B. <li style="padding-left: 20px;">Or, the file is in a state in which it cannot be accessed.
Can't close file for dev A	<ul style="list-style-type: none"> → Contact the nearest service center.
Can't close file for dev B	<ul style="list-style-type: none"> → Contact the nearest service center.

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Message	Details
Can't read file for dev A	<ul style="list-style-type: none"> • Could not read in the file for device A. → Recheck the connection status for device A or the Input/output parameter setting.
Can't read file for dev B	<ul style="list-style-type: none"> • Could not read in the file for device B. → Recheck the connection status for device B or the Input/output parameter setting.
Can't write file for dev B	<ul style="list-style-type: none"> • Could not write in the file for device B. → Recheck the connection status for device B or the Input parameter setting.
Can't seek file for dev A	→ Contact the nearest service center.
Can't seek file for dev B	→ Contact the nearest service center.
File name not designated for dev A	<ul style="list-style-type: none"> • A file name was not designated for device A.
File name not designated for dev B	<ul style="list-style-type: none"> • A file name was not designated for device B.
Can't open directory for dev A	<ul style="list-style-type: none"> • Could not find a directory corresponding to device A.
Can't open directory for dev B	<ul style="list-style-type: none"> • Could not find a directory corresponding to device B.
Different devices designated in A and B	<ul style="list-style-type: none"> • The same device must be designated for devices A and B, but differing devices were designated.
Password is illegal	<ul style="list-style-type: none"> • The designated password is illegal.
Can't erase designated file	<ul style="list-style-type: none"> • Erasing was attempted of a file that cannot be erased.
Can't rename designated file	<ul style="list-style-type: none"> • The name of a file that cannot be renamed was changed.
Can't make directory	<ul style="list-style-type: none"> • Could not create the directory.
Can't make directory on this device	<ul style="list-style-type: none"> • Creation of a directory was attempted for a device that cannot create a directory.
Can't condense designated file	<ul style="list-style-type: none"> • Condensing of a file that cannot be condensed was attempted.
Designated file is locked	<ul style="list-style-type: none"> • Changing was attempted of a locked file.
The file already exists	<ul style="list-style-type: none"> • The input file name already exists. • The file name after renaming already exists.
Program No. not found in the file	<ul style="list-style-type: none"> • Could not find a program No. description in the selected file.
Overwrite this file? (Y/N)	<ul style="list-style-type: none"> • Message to confirm the operation. <input type="checkbox"/> Y or <input type="checkbox"/> INPUT : Overwrite the file. <input type="checkbox"/> N : Do not overwrite the file.
Compare error. Compare next file?(Y/N)	<ul style="list-style-type: none"> • Message to confirm the operation. <input type="checkbox"/> Y or <input type="checkbox"/> INPUT : Compare the next file. <input type="checkbox"/> N : Do not compare the next file.

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Message	Details
Memory over	<ul style="list-style-type: none"> • The program cannot be written, because the memory capacity will be exceeded. (Occurs when copying a program during tape input.)
Edit lock B	<ul style="list-style-type: none"> • Execution was attempted of an operation (edit, input/output, etc.) that is prohibited for machining program B (8000 to 8999: standard user subprogram).
Edit lock C	<ul style="list-style-type: none"> • Execution was attempted of an operation (edit, input/output, etc.) that is prohibited for machining program C (9000 to 9999: machine manufacturer custom program).
Over run error	<ul style="list-style-type: none"> • The buffer overran or overflowed.
Parity H error	<ul style="list-style-type: none"> • A parity H error was detected.
Framing error	<ul style="list-style-type: none"> • An error occurred between the NC and the external device.
I/O not ready	<ul style="list-style-type: none"> • An error occurred between the NC and the external device.
I/O parameter error	<ul style="list-style-type: none"> • The external device settings and Input/output parameters do not match.
I/O port busy	<ul style="list-style-type: none"> • Input/output was not possible as the I/O port is busy.
Time out error	<ul style="list-style-type: none"> • Communication with the external device ended as a timeout.
Parity V error	<ul style="list-style-type: none"> • A parity V error was detected.
Memory alloc error	<ul style="list-style-type: none"> • Securing of the communication data range failed.
Make directory complete	<ul style="list-style-type: none"> • Creation of the directory has been completed.
Can't make directory	<ul style="list-style-type: none"> • An error occurred when creating the directory.
Directory pass is illegal	<ul style="list-style-type: none"> • The designated directory pass name is illegal. → Input a correct directory pass name.
The file name is a directory	<ul style="list-style-type: none"> • A directory was designated for the file transfer. A directory cannot be transferred.
The directory is not empty	<ul style="list-style-type: none"> • A file was found in the directory. → Erase the file in the directory.
FLD write protect	<ul style="list-style-type: none"> • The FLD is write-protected. → Release the write protection.
FLD not ready	<ul style="list-style-type: none"> • An FLD is not mounted. → Mount an FLD.
File entry over	<ul style="list-style-type: none"> • The No. of registration files designated in the specifications was exceeded, so the file could not be registered.

2.6 Parameter-related operation messages

Message	Details
Password is illegal	<ul style="list-style-type: none"> The password designated for displaying the Machine parameter screen is illegal.
Input the password	<ul style="list-style-type: none"> The menu key for first displaying the Machine parameter screen was pressed after the power was turned ON.
Paste? (Y/N)	<ul style="list-style-type: none"> Message to confirm the operation when pasting. <ul style="list-style-type: none"> <input type="checkbox"/> or <input type="checkbox"/> INPUT : Paste the data at the current cursor position. <input type="checkbox"/> N : Do not paste the data.
Copy start posn and end posn reversed	<ul style="list-style-type: none"> When the copy range was designated, a position before the start position was designated as the end position.
Copy range is inadequate	<ul style="list-style-type: none"> Could not find the parameter No. for the copy start position. A value larger than the last parameter No. was designated as the copy end position parameter No. → Check the designated copy range.
Can't select	<ul style="list-style-type: none"> The password designated for displaying the Machine parameters has not been input. Display of the Machine parameters was attempted on the <input type="text"/> Param No. menu, but the password has not been input. → Press the <input type="text"/> Machine param menu, and input the password for displaying the Machine parameters.

2.7 Tool-related operation messages

Message	Details
Erase? (Y/N)	<ul style="list-style-type: none"> Message to confirm the operation. <ul style="list-style-type: none"> <input type="checkbox"/> Y or <input type="checkbox"/> INPUT : Erase the data <input type="checkbox"/> N : Do not erase the data.
Cannot return to origin	<ul style="list-style-type: none"> The data settings were attempted to be returned to the original settings in a different system.

2.8 Manual tool length measurement-related operation messages

Message	Details
Machine position memory complete	<ul style="list-style-type: none"> The machine value was saved with the manual tool length measurement I measurement value input method.
On measure	<ul style="list-style-type: none"> Tool data was attempted to be set during measurement with manual tool length measurement II (while the line cursor was displayed).
Erase? (Y/N)	<ul style="list-style-type: none"> The operation is confirmed when writing the tool length measured value into the tool data with manual tool length measurement I. <ul style="list-style-type: none"> <input type="checkbox"/> Y or <input type="checkbox"/> INPUT : The value is written into the tool data. <input type="checkbox"/> N : The value is not written into the tool data.

2.9 Editing-related operation messages

Message	Details
File open error	<ul style="list-style-type: none"> The designated file is already open.
Designated file does not exist	<ul style="list-style-type: none"> A file that does not exist was designated when file editing.
Designated file already exists	<ul style="list-style-type: none"> When creating a new file, a file name was designated that already exists.
Can't write in READ-ONLY file	<ul style="list-style-type: none"> The file designated for writing is write-protected.
Paste position is illegal	<ul style="list-style-type: none"> Pasting was attempted within the copy range of the same file.
Copy range is inadequate	<ul style="list-style-type: none"> The copy range designation is inadequate. → Check whether the designated range exists.
Area designation is inadequate	<ul style="list-style-type: none"> The area designation is inadequate. → Check whether the designated area exists.
Designated line is out of program range	<ul style="list-style-type: none"> Designation was attempted of a line No. larger than the No. of lines in the entire program.
Designated character string not found	<ul style="list-style-type: none"> Could not find the search results and character string in the program.
Save current file? (Y/N)	<ul style="list-style-type: none"> Message to confirm the operation. <input type="checkbox"/> Y : Save the changes to the current file. <input type="checkbox"/> N : Do not save the changes to the current file.
Designated file does not exist	<ul style="list-style-type: none"> Designation and editing was attempted of a file that does not exist.
MDI search complete	<ul style="list-style-type: none"> The MDI search completed.
MDI search error	<ul style="list-style-type: none"> Could not execute the MDI search.
Save left side file? (Y/N)	<ul style="list-style-type: none"> Message to confirm the operation when saving files. <input type="checkbox"/> Y : Save the file on the left side. <input type="checkbox"/> N : Do not save the file on the left side.
Save right side file? (Y/N)	<ul style="list-style-type: none"> Message to confirm the operation when saving files. <input type="checkbox"/> Y : Save the file on the right side. <input type="checkbox"/> N : Do not save the file on the right side.
Editing	<ul style="list-style-type: none"> A program is being edited on the screen. → Save the program to write it into the memory.
Program entry over	<ul style="list-style-type: none"> The program could not be registered in the memory when attempted, because the No. of registrations would be exceeded.
Edit lock B	<ul style="list-style-type: none"> Execution was attempted of an operation (edit, input/output, etc.) that is prohibited for machining program B (8000 to 8999: standard user subprogram).
Edit lock C	<ul style="list-style-type: none"> Execution was attempted of an operation (edit, input/output, etc.) that is prohibited for machining program C (9000 to 9999: machine manufacturer custom program).
MDI no setting	<ul style="list-style-type: none"> Editing of the MDI was started, but the MDI setting was incomplete.
Replace ? (Y/N)	<ul style="list-style-type: none"> Message to confirm the character string replacement. <input type="checkbox"/> Y or <input type="checkbox"/> INPUT : Replace the character string. <input type="checkbox"/> N : Do not replace the character string.

2.10 Diagnosis-related operation messages

Message	Details
Select a menu	<ul style="list-style-type: none"> • A device No. was set without selecting a menu operation. → Press any operation menu and input the device No. with a menu highlighted.
Device is illegal	<ul style="list-style-type: none"> • The designated device is illegal.
Modal output not possible	<ul style="list-style-type: none"> • The modal output process failed.
Modal clear not possible	<ul style="list-style-type: none"> • The modal cancel process failed.
One-shot output not possible	<ul style="list-style-type: none"> • The one-shot output process failed.
Continue display not possible	<ul style="list-style-type: none"> • Continuous display is not possible, because data is not set at the cursor position.
Can't write data	<ul style="list-style-type: none"> • The data cannot be written.

2.11 Absolute position detection-related operation messages

Message	Details
Turn ON absolute position set	<ul style="list-style-type: none"> • Setting from the screen was attempted of absolute position detection data when the "Absolute posn set" was not ON. → Press the menu key Abs pos set to turn it ON.
Axis name is inadequate	<ul style="list-style-type: none"> • The designated axis name is illegal.
Not the abs position detection system	<ul style="list-style-type: none"> • An absolute position detection system has not been selected for the currently selected axis. → The Machine parameter (Axis specification parameter "abson") must be set.

2.12 Maintenance-related operation messages

Message	Details
Execute? (Y/N)	<ul style="list-style-type: none"> • Message to confirm the operation. <li style="padding-left: 20px;"><input type="checkbox"/> or <input type="checkbox"/> : Execute the operation currently selected. <li style="padding-left: 20px;"><input type="checkbox"/> : Do not execute the operation currently selected.
Executing format	<ul style="list-style-type: none"> • The formatting is being executed correctly.
Format complete	<ul style="list-style-type: none"> • The formatting completed correctly.
Format error	<ul style="list-style-type: none"> • The NC memory formatting failed. <li style="padding-left: 20px;">→ Contact the nearest service center.
Format NC memory? (Y/N)	<ul style="list-style-type: none"> • Message to confirm the operation. <li style="padding-left: 20px;"><input type="checkbox"/> or <input type="checkbox"/> : Start formatting the NC memory. <li style="padding-left: 20px;"><input type="checkbox"/> : Do not format the NC memory.
Quite HMI? (Y/N)	<ul style="list-style-type: none"> • Message to confirm the operation. <li style="padding-left: 20px;"><input type="checkbox"/> or <input type="checkbox"/> : Quit the HMI. <li style="padding-left: 20px;"><input type="checkbox"/> : Do not quit the HMI.
Password is illegal	<ul style="list-style-type: none"> • The input password is incorrect.
Input password	<ul style="list-style-type: none"> • The [Psswd input] menu key was pressed, and the password input mode was entered. <li style="padding-left: 20px;">→ Input a password.
Execute SRAM backup? (Y/N)	<ul style="list-style-type: none"> • Message to confirm the operation. <li style="padding-left: 20px;"><input type="checkbox"/> or <input type="checkbox"/> : Backup the SRAM data on the HD. <li style="padding-left: 20px;"><input type="checkbox"/> : Do not backup the SRAM data on the HD.
Executing backup	<ul style="list-style-type: none"> • The SRAM data is being backed up on the HD.
Backup complete	<ul style="list-style-type: none"> • Backup of the SRAM data on the HD has been completed.
Backup error	<ul style="list-style-type: none"> • An error occurred while backing up the SRAM data on the HD.

2.13 Other operation messages

Message	Details
Setting error	<ul style="list-style-type: none"> • The setting data is inadequate. (Alphabetic characters were set where only numeric characters can be set, etc.) • The data has not been set.
Data protect	<ul style="list-style-type: none"> • Setting, erasing, etc., of the various data is prohibited, because the DATA PROTECT key is validated.

Appendix 3. Alarm Messages

3.1 Errors during operation (MOO)

3.1.1 Operation Errors (M01)

M01 Message		Alarms resulting from incorrect operation by the operator during NC operation and alarms resulting from the machine fault are displayed. The numbers given in the table can be referred to on the Alarm list screen (Diagnosis group).	
Error No.	Message	Details	Remedy
0001	Dog overrun	<ul style="list-style-type: none"> When the spindle returned to the reference point, the near-point detecting limit switch was not stopped by the dog but it overran the dog instead. 	<ul style="list-style-type: none"> Increase the length of the near-point dog. Reduce the speed at which the spindle returns to the reference point. <p>(Note) This error may not occur depending on the system.</p>
0002	Some ax does not pass Z phase	<ul style="list-style-type: none"> One of the axes did not pass the Z-phase of the detector on the initial return of the machine to the reference point after the power was turned ON. 	<ul style="list-style-type: none"> Move the machine by an amount equivalent to one or more rotations of the detector in the reverse direction to that of the reference point, and proceed with reference point return again.
0003	Reference point return illegal	<ul style="list-style-type: none"> When returning manually to the reference point, the direction of the return differs from the axis movement direction which has been designated by the AXIS SELECTION key. 	<ul style="list-style-type: none"> An AXIS SELECTION key corresponding to the wrong direction has been selected. The error is released by feeding the axis in the correct direction.
0004	External interlock axis exists	<ul style="list-style-type: none"> The external interlock function has been activated (the input signal is "OFF"), and one of the axes is interlocked as a result. 	<ul style="list-style-type: none"> Since the interlock function has been activated, it must first be released before operation is resumed. Check the sequence on the machine side. Check for breakage in the interlock signal wire.
0005	Internal interlock axis exists	<ul style="list-style-type: none"> An internal interlock status is established. 	<ul style="list-style-type: none"> Since the servo "OFF" function has been activated, it must first be released . An axis for which axis removal is valid has been commanded. Carry out the correct operation. The manual skip is designated in the same direction as when this turned ON. Carry out the correct operation.

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Error No.	Message	Details	Remedy
0006	H/W stroke end axis exists	<ul style="list-style-type: none"> The stroke end function is activated (the input signal is "OFF") and one of the axes is in the stroke-end status. 	<ul style="list-style-type: none"> Since the stroke end limit switch has been activated (the stroke end status has been established), move the machine in reverse by operating it manually. Check for breakage or disconnection in the stroke end signal wire. Check for a failure in the limit switch.
0007	S/W stroke end axis exists	<ul style="list-style-type: none"> The stored stroke limit I or II function has been activated. 	<ul style="list-style-type: none"> Since the machine is in the stroke end status, move it in reverse by operating it manually. Reset the stored stroke limit in the parameters.
0008	Chuck/ tailstock barrier valid	<ul style="list-style-type: none"> The chuck/tail-stock barrier function was valid, and the stroke end occurred on an axis. 	<ul style="list-style-type: none"> After resetting the alarm by resetting the NC, move the machine in the reverse direction.
0009	Ref point return not completed	<ul style="list-style-type: none"> When return to the 1st reference point had not been completed, return to the 2nd reference point was executed. 	<ul style="list-style-type: none"> Execute return to the 1st reference point again.
0010	R-pnt ret invld at tool retract	<ul style="list-style-type: none"> The operation mode was changed to the zero point return mode while in the tool retract return mode. 	<ul style="list-style-type: none"> Select an operation mode other than the zero point return mode.
0011	Door open signal ON	<ul style="list-style-type: none"> The door open signal is being input. 	<ul style="list-style-type: none"> Close the door. Turn OFF the door open signal (Y488).
0012	Auto zero pt init not valid	<ul style="list-style-type: none"> When initializing the absolute position, the machine zero point is at a position exceeding the pushing point. The Basic specification parameter "1011 abson" is not set to "2". The Absolute position set parameter manual zero point initialization mode is valid. The Absolute position set parameter "1205 No stopper" is set to "1". 	<ul style="list-style-type: none"> Reset the Absolute position parameter "1202 Ref position offset" and the Zero point return parameters "2113 to 2116 #1_rfp to #4_rfp" and "2107 dir(-)" so that the pushing point is not exceeded. Set the Basic specification parameter 1 "1011 abson" to "2". If the Absolute position set parameter manual zero point initialization mode is valid, turn the NC power ON again. Set the Absolute position set parameter "1205 No stopper" to "0".
0024	R-pnt ret invld at abs pos alm	<ul style="list-style-type: none"> The zero point return signal was input while the absolute position detection alarm was occurring. 	<ul style="list-style-type: none"> After the absolute position detection alarm is released, return to zero point can be made.
0025	R-pnt ret invld at zero pt ini	<ul style="list-style-type: none"> The zero point return signal was input while carrying out zero point initialization of the absolute position detection system. 	<ul style="list-style-type: none"> Carry out zero point return after the zero point initialization is completed.

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Error No.	Message	Details	Remedy
0101	Op mode non-selected/ dupli.	<ul style="list-style-type: none"> No operation mode is selected, or two or more operation modes are selected. 	<ul style="list-style-type: none"> Check for breakage in the input mode signal wire. Check for a failure in the MODE SELECT switch. Check the sequence program.
0102	Cutting override zero	<ul style="list-style-type: none"> The "CUTTING FEED OVERRIDE" switch on the machine operation panel is set to "0". 	<ul style="list-style-type: none"> The error is released by setting the "CUTTING FEED OVERRIDE" switch to any position except "0". If the "CUTTING FEED OVERRIDE" switch has been set to any position except "0", check whether the signal wire has been short-circuited. Check the sequence program.
0103	External feed rate zero	<ul style="list-style-type: none"> The "MANUAL FEEDRATE" switch on the machine operation panel has been set to "0" when the machine is in the JOG mode and automatic dry run mode. 	<ul style="list-style-type: none"> The error is released by setting the "MANUAL FEEDRATE" switch on the machine operation panel to any position except "0". If the "MANUAL FEEDRATE" switch has been set to any position except "0", check whether the signal wire has been short-circuited. Check the sequence program.
0105	Spindle stop	<ul style="list-style-type: none"> The spindle was stopped when the synchronous feed command was input. 	<ul style="list-style-type: none"> Rotate the spindle. Establish the dry run mode unless a workpiece is being cut. Check for disconnection in the spindle encoder cable. Check the connections of the spindle encoder connectors. Check the spindle encoder pulse.
0106	Handle feed ax No. illegal	<ul style="list-style-type: none"> An axis which does not exist in the specifications has been designated for handle feed. The handle feed axis has not been selected. 	<ul style="list-style-type: none"> Check for breakage in the handle feed axis selection signal wire. Review the sequence program. Check the number of axes listed in the specifications.
0107	Spindle rotation speed over	<ul style="list-style-type: none"> The spindle speed has exceeded the clamp speed of the axis when the thread cutting command was issued. 	<ul style="list-style-type: none"> Reduce the commanded spindle speed.
0108	Fixed pnt mode feed ax illegal	<ul style="list-style-type: none"> An axis not defined in the specifications was designated during fixed point mode feed. The fixed point mode feedrate is illegal. 	<ul style="list-style-type: none"> Check the fixed point mode feed axis selection signal wire and fixed point mode feedrate wire for breakage. Check the fixed point mode feed specifications.
0109	Block start interlock	<ul style="list-style-type: none"> An interlock signal which locks the block start has been input. 	<ul style="list-style-type: none"> Check the sequence program. Cancel the block start interlock signal.
0110	Cutting block start interlock	<ul style="list-style-type: none"> An interlock signal which locks the cutting block start has been input. 	<ul style="list-style-type: none"> Check the sequence program. Cancel the cutting block start interlock signal.

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Error No.	Message	Details	Remedy
0115	In reset process	<ul style="list-style-type: none"> Starting was attempted during the reset process. 	<ul style="list-style-type: none"> Restart after the reset process is completed.
1001	Selected ax used as cross ax	<ul style="list-style-type: none"> The feed axis selected in manual operation is being used by the cross machining command issued by a different system. 	<ul style="list-style-type: none"> Reset or return the selected feed axis to the basic definition axis for the cross machining command.
1003	Mov cmnd at s-impos/ synch ilgl	<ul style="list-style-type: none"> A machine value command was issued to a superimposing axis, or a movement command was issued to a slave axis. 	<ul style="list-style-type: none"> Check the machining program.
1004	S-impos/ synch command illegal	<ul style="list-style-type: none"> A superimposition command was issued to an axis under synchronization control. A synchronization command was issued to an axis under superimposition control. A superimposition command, having three or more levels, was issued. A synchronization command, having two or more levels, was issued. 	<ul style="list-style-type: none"> Check the machining program.
1005	Illegal G114.n command	<ul style="list-style-type: none"> The G114.n command was issued in G114.n mode 	<ul style="list-style-type: none"> Review the program.
1006	Thread cutting synchro error	<ul style="list-style-type: none"> When the thread cutting cycle/ compound thread cutting cycle was started while the thread cutting spindle rotation speed automatic change was selected, the difference of the automatically changed command spindle rotation speed and the spindle actual rotation speed was not within the tolerable error width for the spindle rotation speed automatic change. 	<ul style="list-style-type: none"> Readjust the Spindle parameters. Make sure that the spindle speed clamp command is not issued in the machining program.
1008	Teaching speed illegal	<ul style="list-style-type: none"> The feedrate calculated during teaching in intersystem synchronous mode is illegal. 	<ul style="list-style-type: none"> Follow the teaching procedure again from the beginning.
1009	In teaching data setting	<ul style="list-style-type: none"> The set No. (TGSET) was designated while making settings on the screen. 	<ul style="list-style-type: none"> Stop the setting of the position control variables on the screen.
1010	No spec: Teaching	<ul style="list-style-type: none"> The teaching mode signal was turned ON though it was not included in the specifications. 	<ul style="list-style-type: none"> Check the specifications. Cancel the teaching mode signal.
1011	Teaching invalid at mirr image	<ul style="list-style-type: none"> The teaching command was issued during the mirror image. 	<ul style="list-style-type: none"> Check the machining program.
1012	Spindle detached	<ul style="list-style-type: none"> Use of a spindle cut off with the spindle cutoff signal was attempted. 	<ul style="list-style-type: none"> Check the machining program. Check the spindle changeover sequence.

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Error No.	Message	Details	Remedy
1013	C ax commnd invalid at hobbing	<ul style="list-style-type: none"> An automatic movement command was issued to the C axis during the tool-spindle synchronization control (hobbing) mode. 	<ul style="list-style-type: none"> Check the machining program.
1014	GB spindle synchro signal OFF	<ul style="list-style-type: none"> A forward run, reverse run, orientation or C-axis servo ON command was issued to the reference spindle while the G/B spindle synchronization signal was OFF. The G/B spindle synchronization signal was turned OFF during a forward run, reverse run, orientation or C-axis servo ON command. 	<ul style="list-style-type: none"> Check the ladder program.
1015	Spindle type error	<ul style="list-style-type: none"> A spindle (analog spindle) not serially connected was used for the master spindle or G/B spindle. 	<ul style="list-style-type: none"> Check the parameters. Change the analog spindle to a serially connected spindle.
1016	GB spindle connection illegal	<ul style="list-style-type: none"> The master spindle's Spindle NC parameter "3032 smcp_no" setting value is larger than the G/B spindle setting value. The master spindle's spindle amplifier and G/B spindle's spindle amplifier are not connected to the same MCP card (QX722 or QX721). 	<ul style="list-style-type: none"> Check smcp_no. Check the connection of the spindle amplifiers and MCP card.
1017	G128/G129 axis posn illegal	<p>During the axis movement synchronous superimposition command (G128, G129):</p> <ul style="list-style-type: none"> The master axis moved from the direction of the synchronous superimposition completion position. The distance between the master axis and synchronous superimposition axis is already within the relative distance. When commanding with DDBS, the synchronous superimposing axis is not within the end position from the synchronous superimposition start position. 	<ul style="list-style-type: none"> Check the program. Check the details designated for the DDBS conditions.
1018	G128/G129 command illegal	<ul style="list-style-type: none"> During the axis movement synchronous superimposition command (G128, G129), a command with which the synchronous superimposing axis exceeds the synchronous superimposition completion position was issued. 	<ul style="list-style-type: none"> Check the program.

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Error No.	Message	Details	Remedy
1019	G128 axis locked	<p>During the axis movement synchronous superimposition command (G128, G129):</p> <ul style="list-style-type: none"> • When the synchronous superimposition mode was started, the synchronous superimposing axis or master axis was moving. • When the synchronous superimposition mode was completed, the synchronous superimposing axis or master axis was moving. 	<ul style="list-style-type: none"> • Check the program. • This will be canceled when the synchronous superimposition axis or reference axis is stopped.
1020	G128 axis locked	<ul style="list-style-type: none"> • During the axis movement synchronous superimposition command (G128, G129), the synchronous superimposing axis was in the machine lock or interlock state. 	<ul style="list-style-type: none"> • Check the program.
1021	GB SP sync: Phase mem sgnl ilgl	<ul style="list-style-type: none"> • The G/B spindle synchronization phase memory signal was turned ON while the master spindle or G/B spindle was rotating. • The G/B spindle synchronization phase memory signal was turned ON while the G/B spindle synchronization signal was OFF. 	<ul style="list-style-type: none"> • Check the ladder program.
1022	GB SP sync: Phase set sgnl ilgl	<ul style="list-style-type: none"> • The G/B spindle synchronization phase alignment signal was turned ON while the master spindle or G/B spindle was stopped. 	<ul style="list-style-type: none"> • Check the ladder program.
1023	GB SP sync: Z phase not pass	<ul style="list-style-type: none"> • When the G/B spindle synchronization phase memory signal was ON, the master spindle or G/B spindle's Z-phase was not passed. 	<ul style="list-style-type: none"> • Check the ladder program.
1024	Sub-part system call illegal	<ul style="list-style-type: none"> • A subsystem command was issued for a system that was not in the subsystem operation mode. 	<ul style="list-style-type: none"> • Check the ladder program.
1025	Crss mach ilgl at sub-sys call	<ul style="list-style-type: none"> • The subsystem was started or stopped with the cross command when the basic axis configuration was not established. 	<ul style="list-style-type: none"> • Check the machining program.
1026	SP-C ax ctrl runs independntly	<ul style="list-style-type: none"> • Other spindle position control (synchronous tap/spindle synchronization (G114.n)) was commanded during Spindle/C axis control, or Spindle/C axis control was commanded during other spindle position control. 	<ul style="list-style-type: none"> • Command only one of the functions.

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Error No.	Message	Details	Remedy
1027	C-surface ctrl invld at taping	<ul style="list-style-type: none"> The constant surface speed command was issued to a spindle in the tap cycle/synchronous tap cycle, or a tap cycle/synchronous tap cycle command was issued to a spindle in the constant surface speed control. 	<ul style="list-style-type: none"> Issue only one of the commands.
1100	Sub-system start not possible	<ul style="list-style-type: none"> A sub-system that can be started is not remaining when the sub-system is called. 	<ul style="list-style-type: none"> Check the program. (Focus on process timing)
1101	Axis change not possible	<ul style="list-style-type: none"> When the random axis change command was issued, the declared axis was in a status unable to be exchanged. 	<ul style="list-style-type: none"> Check the program. (Focus on process timing)
1102	Spindle cond check time exceed	<ul style="list-style-type: none"> In the spindle status check function, the designated spindle did not reach the designated speed, and exceeded the designated check time. 	<ul style="list-style-type: none"> Check the program.
1103	G156 command at illegal system	<ul style="list-style-type: none"> The random superimposition command was issued from an external source including superimposing axes or random superimposition master axes. Or the random superimposition cancel command was issued from an external source including the random superimposing axes. 	<ul style="list-style-type: none"> Check the machining program.
1104	Prphral/ synchro ax No. ilgl	<ul style="list-style-type: none"> When setting the axis No. for the peripheral axis synchronous control, the slave axis and master axis were set to the same number, or a number that does not exist in the system was set. 	<ul style="list-style-type: none"> Check the ladder circuit.
1105	Collision detect cmd illegal	<ul style="list-style-type: none"> The collision detection function (G161) was commanded from several systems. 	<ul style="list-style-type: none"> Check the machining program.
1106	Spindle synch phase calc ilgl	<ul style="list-style-type: none"> The spindle synchronization phase alignment command was issued while the spindle synchronization phase calculation request signal was valid. 	<ul style="list-style-type: none"> Check the machining program. Check the ladder circuit.
1107	Now feed rate clamped	<ul style="list-style-type: none"> The commanded feedrate exceeded the clamp speed set in the parameters. 	<ul style="list-style-type: none"> Check the machining program.

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Error No.	Message	Details	Remedy
1108	SP clamped at superimpose tap	<ul style="list-style-type: none"> • When a tap cycle or synchronous tap cycle was commanded to a superimposing axis, the actual rotation speed of the superimposing spindle exceeded the spindle clamp speed. • The synchronous tap cycle was commanded when a rotation command was not input for the master spindle or superimposing spindle. 	<ul style="list-style-type: none"> • Check the program.
1109	Base SP C-surface invld at tap	<ul style="list-style-type: none"> • A constant surface speed command was issued to the master spindle when the tap cycle or synchronous tap cycle was being executed with the superimposing spindle. • During constant surface speed control of the master spindle, the tap cycle or synchronous tap cycle command was issued to the superimposing spindle. 	<ul style="list-style-type: none"> • Check the program.
1110	Ax exchange not possible	<ul style="list-style-type: none"> • A random axis exchange command for which axis exchange is not possible or a random axis exchange return command was issued. 	<ul style="list-style-type: none"> • Check the program.
1111	Now ax detached or servo off	<ul style="list-style-type: none"> • The movement command following the random axis superimposition command, a movement command following the superimposition/synchronization control, or a movement command following the peripheral axis synchronization control was issued during the axis removal mode or during servo OFF. 	<ul style="list-style-type: none"> • Check the program.
1112	Mirror image command illegal	<ul style="list-style-type: none"> • The mirror image was turned ON for a superimposition/synchronous axis or milling control axis. • The external mirror image and parameter mirror image were turned ON simultaneously. 	<ul style="list-style-type: none"> • Check the mirror image signal in the PLC Interface. • Check the Axis parameter mirror image. • Check the program.
1113	T-leng meas ax not retn (TLM2)	<ul style="list-style-type: none"> • Measurement of an axis that had not returned to the zero point was attempted during manual tool length measurement 2. 	<ul style="list-style-type: none"> • Carry out zero point return before measuring.
1114	Tool No. not found (TLM2)	<ul style="list-style-type: none"> • The designated tool number was not within the number of tool sets during manual tool length measurement 2. 	<ul style="list-style-type: none"> • Designate a tool number within the number of tool sets.

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Error No.	Message	Details	Remedy
1115	Compen ax illegal (TLM2)	<ul style="list-style-type: none"> • Measurement of two or more axes was attempted simultaneously during manual tool length measurement 2. • The measured axis was not the tool compensation target axis. 	<ul style="list-style-type: none"> • Check the axis to be measured.
1116	Sensor No. not specified (TLM2)	<ul style="list-style-type: none"> • Measurement without designating the sensor No. was attempted during manual tool length measurement 2. 	<ul style="list-style-type: none"> • Confirm the sensor No. designated for the parameter manual tool length measurement 2.
1117	Inclined ctrl manual mode ilgl	<ul style="list-style-type: none"> • Automatic dogless, manual zero point return, manual feed or a manual mode other than handle was selected in the actual axis mode. • Incremental feed, manual skip or automatic dogless was selected during the orthogonal mode. • Automatic handle interruption was selected during manual-automatic simultaneous operation. 	<ul style="list-style-type: none"> • Check the ladder circuit.
1118	G170/G171 cood not changed	<ul style="list-style-type: none"> • The G170/G171 coordinate changeover command was issued during start point designation wait, end point designation wait, miscellaneous function output during axis movement wait, or during superimposition/synchronous/peripheral axis synchronous control. 	<ul style="list-style-type: none"> • Check the machining program.
1119	Inclined ctrl axis illegal	<ul style="list-style-type: none"> • A cross command, random axis exchange command or superimposition/synchronous/peripheral axis synchronous control command was issued to an inclined master axis or inclined axis. • A synchronous tap command tap axis was commanded for an inclined axis. 	<ul style="list-style-type: none"> • Check the machining program.
9097	Position supervising error 3	<ul style="list-style-type: none"> • The difference of the previous cycle's feedback position and the current cycle's feedback position exceeded the tolerable range. • A positional deviation occurred. 	<ul style="list-style-type: none"> • Contact the Service Center.
9098	Position supervising error 1	<ul style="list-style-type: none"> • The data for the program analysis process and interpolation process did not match, causing a positional deviation. • A positional deviation occurred. 	<ul style="list-style-type: none"> • Contact the Service Center.
9099	Position supervising error 2	<ul style="list-style-type: none"> • The data for the interpolation process and acceleration/deceleration process did not match, causing a positional deviation. • A positional deviation occurred. 	<ul style="list-style-type: none"> • Contact the Service Center.

3.1.2 Absolute position return again (M02)

M02 Abs posn return required again	
Details	Remedy
The operation mode was changed to the zero point return mode while in the retract return mode.	<ul style="list-style-type: none"> • Select an operation mode other than the zero point return mode.

3.1.3 Interference check alarm (M03)

M03 Interfere alarm (command)	
Details	Remedy
The issued command caused an interference between two devices such as tool turrets.	<ul style="list-style-type: none"> • Release the alarm by a reset operation. • To move the interfering device further in the interfering direction, invalidate an interference check before doing it. • Refer to the instruction manual issued by the machine manufacturer for the procedure to invalidate an interference check.

3.1.4 Interference area alarm (M04)

M04 Interfere alarm (present area)	
Details	Remedy
Two interfering devices such as tool turrets entered an interference area.	<ul style="list-style-type: none"> • Invalidate an interference check, and then move the devices. • Refer to the instruction manual issued by the machine manufacturer for the procedure to invalidate an interference check.

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3.2 Stop Codes (TOO)

This code indicates that the NC has stopped for some reason.

T01 Message		In this status, automatic operation start cannot be executed when an attempt is made to execute it from the NC stop status. The numbers given in the table can be referred to on the Alarm list screen (Diagnosis group).	
Error No.	Message	Details	Remedy
0101	Axis in motion	<ul style="list-style-type: none"> Since one of the axes is in motion, automatic start is not possible. 	<ul style="list-style-type: none"> Try automatic start again after all axes have stopped.
0102	NC not ready	<ul style="list-style-type: none"> Automatic start is not possible because the NC ready signal is not supplied. 	<ul style="list-style-type: none"> Another alarm has been issued and the cause should be checked out and remedy.
0103	Reset signal ON	<ul style="list-style-type: none"> Automatic start is not possible because the reset signal has been input. 	<ul style="list-style-type: none"> Set the reset input signal to "OFF". Check for a failure in the reset switch. Check the sequence program.
0104	Auto operation pause signal ON	<ul style="list-style-type: none"> The "FEED HOLD" switch on the machine operation panel is ON (valid). 	<ul style="list-style-type: none"> Check the "FEED HOLD" switch. (B contact) Check for a breakage in the feed hold signal wire. Check the sequence program.
0105	H/W stroke end axis exists	<ul style="list-style-type: none"> Automatic start is not possible because one of the axes has reached the stroke end. 	<ul style="list-style-type: none"> If the stroke end has been reached by the axis end, move the axis by operating it manually. Check for a breakage in the stroke end signal wire. Check for a failure in the stroke end limit switch.
0106	S/W strok end axis exists	<ul style="list-style-type: none"> Automatic start is not possible because one of the axes has reached the stored stroke limit. 	<ul style="list-style-type: none"> Move the axis manually. Check the contents of the parameter unless the axis end is at the stored stroke end.
0107	No operation mode	<ul style="list-style-type: none"> The operation mode has not been selected. 	<ul style="list-style-type: none"> Restart after selecting the operation mode. Check for a breakage in the automatic operation mode (memory, MDI) signal wire.
0108	Operation mode duplicated	<ul style="list-style-type: none"> Two or more operation modes have been selected in error. 	<ul style="list-style-type: none"> Check for a shortcircuit in the mode selection signal wire (memory, MDI). Check for a failure in the switch. Check the sequence program. Restart after selecting the operation mode.
0109	Operation mode changed	<ul style="list-style-type: none"> A shift was made from one automatic operation mode to another automatic operation mode. 	<ul style="list-style-type: none"> Return to the original automatic operation mode, and then restart.
0110	In buffer correction	<ul style="list-style-type: none"> Start is impossible because buffer is being corrected. 	<ul style="list-style-type: none"> Bring the buffer correction to an end. Or cancel it and then restart.

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Error No.	Message	Details	Remedy
0114	Fixed cycle registered illegal	<ul style="list-style-type: none"> The fixed cycle subprogram is not correctly registered. 	<ul style="list-style-type: none"> Register the fixed cycle subprogram again. Refer to "Appendix 1. Fixed Cycle Program" for the procedures.
0115	CNC overheat	<ul style="list-style-type: none"> NC operation cannot be started because of a thermal warning (Z53 CNC overheat). 	<ul style="list-style-type: none"> The temperature of the NC or operation board has risen above the specified temperature. Take cooling measures. Turn OFF the NC power, or lower the temperature with a cooler, etc.
0116	Stat sgnl ON in sub-sys mode	<ul style="list-style-type: none"> An automatic start signal was input for a system in the sub-system operation mode before the subsystem was started. 	<ul style="list-style-type: none"> Check the program. Check the user PLC.
0138	In absolute position alarm	<ul style="list-style-type: none"> A start signal was input during an absolute position detection alarm. 	<ul style="list-style-type: none"> Start after the absolute position detection alarm is released.
0139	In abs posn initial setting	<ul style="list-style-type: none"> Start signal is input during zero point initialization of absolute position detection system. 	<ul style="list-style-type: none"> Start after the zero point initialization is complete.
0151	In prog check backward mode	<ul style="list-style-type: none"> Automatic start is disabled because the program check function is in backward state. 	<ul style="list-style-type: none"> Put the program check function in forward state and execute automatic start.
0160	Memory capacity over	<ul style="list-style-type: none"> The super option is invalid. The program memory capacity of the machining program has been exceeded. 	<ul style="list-style-type: none"> Delete or format the machining program. Add the super option purchase point.

T02 Message	<p>The feed hold status has been established due to some condition or other during automatic operation.</p> <p>The numbers given in the table can be referred to on the Alarm list screen (Diagnosis group).</p>
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Error No.	Message	Details	Remedy
0201	H/W stroke end axis exists	<ul style="list-style-type: none"> An axis has reached the stored stroke limit. 	<ul style="list-style-type: none"> Using manual operations, move the axis from the stroke end limit switch. The machining program must be corrected.
0202	S/W stroke end axis exists	<ul style="list-style-type: none"> An axis has reached the stored stroke limit. 	<ul style="list-style-type: none"> Using manual operations, move the axis from the stroke end limit switch. The machining program must be corrected.
0203	Reset signal ON	<ul style="list-style-type: none"> The reset signal has been input. 	<ul style="list-style-type: none"> The position at which the program is executed has returned to the head and so automatic operation is performed from the start point of the machining program.
0204	Auto operation pause signal ON	<ul style="list-style-type: none"> The "FEED HOLD" switch on the machine operation board is ON (valid). 	<ul style="list-style-type: none"> Automatic operation can be resumed by operating the CYCLE START switch.

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Error No.	Message	Details	Remedy
0205	Operation mode changed	<ul style="list-style-type: none"> The mode changed from the automatic operation mode to another automatic operation mode. 	<ul style="list-style-type: none"> Return to the original automatic operation mode, and then restart.
0206	In interference mode	<ul style="list-style-type: none"> A command where two objects (tool turrets, etc.) will interfere has been issued. Two objects (tool turrets, etc.) have entered the buffer area. 	<ul style="list-style-type: none"> Release the alarm with reset. To move the interfering object in the interfering direction, invalidate the interference check first. Refer to the instruction manual issued by the machine manufacturer for how to invalidate the interference check.
0215	Abs posn detect alarm occurred	<ul style="list-style-type: none"> Absolute position detection alarm occurred. 	<ul style="list-style-type: none"> Release the absolute position detection alarm.

T03 Message	Operation stops after a single block in the program has executed during automatic operation. The numbers given in the table can be referred to on the Alarm list screen (Diagnosis group).
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Error No.	Message	Details	Remedy
0301	Single block stop signal ON	<ul style="list-style-type: none"> Block stop occurred because the "SINGLE BLOCK STOP" switch on the machine operation panel was ON. 	<ul style="list-style-type: none"> Automatic operation can be resumed by setting the CYCLE START switch to ON.
0302	Block stop cmdnd in user macro	<ul style="list-style-type: none"> The block stop command was specified in user macro program. 	<ul style="list-style-type: none"> Automatic operation can be resumed by setting the CYCLE START switch to ON.
0303	Operation mode changed	<ul style="list-style-type: none"> The mode changed from the automatic operation mode to another automatic operation mode. 	<ul style="list-style-type: none"> First return to the original automatic mode and automatic operation can be resumed by setting the CYCLE START switch to ON.
0304	MDI interrupt completed	<ul style="list-style-type: none"> The last block of MDI completed. The last block of PLC interrupt completed. 	<ul style="list-style-type: none"> MDI operation can be resumed by setting MDI again and setting the CYCLE START switch to ON. Turn the CYCLE START switch to ON to restart automatic operation.
0305	Teaching block completed	<ul style="list-style-type: none"> The block of the position control command (G132) or position control variable skip command (G133) completed during teaching mode. 	<ul style="list-style-type: none"> Turn the CYCLE START switch to ON to restart automatic operation.

T04 Message	Collation and stop occurred during automatic operation.
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Error No.	Message	Details	Remedy
0401	Collation and stop	<ul style="list-style-type: none"> Collation and stop occurred. 	<ul style="list-style-type: none"> Automatic operation can be resumed by automatically starting.

3.3 Messages related to servo


These alarms pertain to errors in the servo system, such as the servo drive amplifier, motor and encoder. The alarm message, status No. and axis address are displayed on the Alarm message screen. If an S command name is displayed instead of the axis address, this is an alarm from the spindle side. Refer to "3.4 Messages related to spindle". Refer to the MELDAS AC Servo/Spindle Specifications (BNP-B3759) for details.

3.3.1 Servo alarms (SOO)

The method of resetting the servo alarm differs according to the alarm message No. (SOO).

No.	Resetting method	Reference
S01	The alarm can be reset by turning the NC power ON again after removing the cause of the alarm.	(1) Servo alarms
S02	Review the parameters.	(2) Initial parameter error
S03	This appears when there is an error in the servo system. The alarm can be reset by inputting the NC reset key after removing the cause of the alarm.	(1) Servo alarms
S04	This appears when there is an error in the servo system. The alarm can be reset by turning the servo drive unit power ON again after removing the cause of the alarm.	

Caution

 If an alarm occurs, remove the cause, and confirm that the operation signal is not being input. Then secure the safety and reset the alarm before restarting operation.

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(1) Servo alarms

Sto- tus	Abbrev.	Message	Details	Applicable models		
				V1/V2	SVJ2	ISV
SOO Message □□ □□ Status Axis name				The applicable models shown in the table are as follow: V1/V2 : MDS-B-V1/V2 SVJ2 : MDS-B-SVJ2 ISV : HS Series		
(Note) If an S command name is displayed instead of an axis name, refer to Section "3.4.1 Spindle alarms".						
10	UV	Under voltage	The PN bus voltage is 200V or less.		○	○
11	ASE	Axis selection error	The setting of the axis setting rotary switches on the 2-axis integrated drive unit is illegal.	○		
12	ME	Memory error 1	The memory IC (SRAM or FLROM) check sum is illegal.	○		
13	SWE	S/W processing error	S/W data processing did not end within the specified time. (Including peripheral G/A errors.)	○	○	○
15	ME2	Memory error 2	An error was detected with the amplifier's self-diagnosis.		○	○
16	RD1	Magnetic pole posn detect err1	The differential input for one of the magnetic pole position detection signal U, V or W phases of the OHE-type detector has become "H" or "L".	○		
17	ADE	AD converter error	The A/D convertor for current detection did not work correctly at initialization.	○	○	○
18	WAT	Initial communication error	Correct communication of the absolute position or magnetic pole position data is not possible with the OHA-type detector or serial pulse encoder.	○	○	○
1A	WATS	Encoder: Init commu error (SUB)	Initial communication with the detector was not possible with the system that uses the OHA25K-ET machine end detector.	○		
1B	SCPUS	Encoder: CPU error (SUB)	An error was detected in the data stored in the EEROM with the high-speed serial detector connected to the machine end.	○		
1C	SLEDS	Encoder: LED error (SUB)	LED deterioration was detected with the high-speed serial detector connected to the machine end.	○		
1D	SDATS	Encoder: Data error (SUB)	An error was detected in the position per rotation with the high-speed serial detector connected to the machine end.	○		
1E	SOHE	Encoder: Thermal error (SUB)	The thermal protector built into the detector activated with the high-speed serial detector connected to the machine end.	○		
1F	STRES	Encoder: Commu error (SUB)	Communication with the detector was cut off with the high-speed serial detector connected to the machine end.	○		
20	NS1	No signal detected 1	The differential input for one of the A, B or Z phase signals of the detector installed on the motor end has become "H" or "L". (Software detection in the B Series.)	○		
21	NS2	No signal detected 2	The differential input for one of the A, B or Z phase signals of the detector installed on the machine end has become "H" or "L". (Software detection in the B Series.)	○		

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Sta- tus	Abbrev.	Message	Details	Applicable models		
				V1/V2	SVJ2	ISV
22	LSIE	LSI error	An error occurred in the LSI operation.		○	○
24	PG	Ground fault	A motor cable ground fault was detected.		○	
25	ABSE	Absolute position lost	The absolute position data in the absolute position detector was lost.	○	○	○
26	NAE	Unused axis error	A power module error occurred in an axis for which the axis setting rotary switch on the 2-axis integrated drive unit was set to "F" to exclude from control.	○		
27	SCCPU	Abs posn detect scale CPU err	The CPU in the absolute position detection linear scale is not operating correctly.	○		
28	SOSP	Absolute position overspeed	The scale in the absolute position linear scale moved at a speed equal to or higher than 45mm/s during initialization. (Alarm output from inside the linear scale.)	○		
29	SABS	Abs posn encoder circuit err	A hardware error occurred in the absolute position detection circuit in the absolute position linear scale. (Alarm output from inside the linear scale.)	○		
2A	SINC	Inc posn encoder circuit err	A hardware error occurred in the relative position detection circuit in the relative position linear scale. (Alarm output from inside the linear scale.)	○		
2B	SCPU	Encoder: Scale CPU error	An error occurred in the CPU in the serial encoder installed on the motor end. (Alarm output from the detector.)	○	○	○
2C	SLED	Encoder: LED error	Deterioration of the LED in the detector was detected.	○	○	○
2D	SDAT	Encoder: Data error	An error was detected in the position per rotation in the detector.	○	○	○
2F	STRE	Encoder: Commu error	Communication with the detector was cut off, or the communication data was abnormal.	○	○	○
30	OR	Over regeneration	Overheating of the regenerative resistor was detected.		○	○
31	OS	Overspeed	The motor speed reached 1.2 times the rated motor speed.	○	○	○
32	PMOC	Power module overcurrent	An overcurrent was detected in the IPM used in the servo drive main circuit section.	○	○	○
33	OV	Overvoltage	The PN bus voltage is more than 400V.		○	○
34	DP	CRC error (NC)	A CRC error occurred in the communication data from the NC.	○	○	○
35	DE	Data error (NC)	The movement command data from the NC is abnormally large.	○	○	○
36	TE	Transferring error (NC)	The periodic data transfer from the NC was interrupted.	○	○	○
37	PE	Initial parameter error	There is an error in the Servo parameters transferred from the NC during servo drive initialization.	○	○	○
38	TP1	Protocol error 1 (frame)	There is an error in the communication protocol with the NC. (Frame error)	○	○	○

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Status	Abbrev.	Message	Details	Applicable models		
				V1/V2	SVJ2	ISV
39	TP2	Protocol error 2 (information)	There is an error in the communication protocol with the NC. (Information error)	○	○	○
3A	OC	Overcurrent	An excessive current flowed in the motor.	○	○	○
3B	PMOH	Power module overheat	Overheating of the IPM used in the inverter was detected.	○	○	○
3C	RCE	Regenerative circuit error	An error was detected in the regenerative transistor or resistor. Overheating of the power module was detected in the SVJ-10, 20.		○	○
42	FE1	Feedback error1 (semi-closed)	1. A detector feedback signal pulse was omitted in the OHE-type/OHA-type detector used in a semi-closed loop system and ball screw end closed loop system. 2. A detector feedback signal pulse was omitted in the low-speed serial-type absolute position linear scale.	○		
43	FE2	Feedback error2 (full-closed)	A deviation was detected in the motor end detector and machine end detector feedback amounts in a closed loop system.	○		
46	OHM	Motor overheat	The motor or detector thermal protector activated.	○	○	○
4F	IPS	Instantaneous stop	The control power was disconnected for 50ms or more.		○	○
50	OL1	Overload 1	The motor was operated with the motor current in the overload range set in the overload detection level (parameter OLL) and overload time constant (parameter OLT). (Note 1)	○	○	○
51	OL2	Overload 2	A current command of 95% or more of the max. output current continued for 1 second or more.	○	○	○
52	OD1	Excessive error (SV ON)	When the servo was turned ON, the actual position in respect to the command exceeded the excessive error width 1 value (parameter OD1).	○	○	○
53	OD2	Excessive error (SV OFF)	When the servo was turned OFF, the actual position in respect to the command exceeded the excessive error width 2 value (parameter OD2).	○	○	○
54	OD3	Excessive error 3	When the servo was turned OFF, the actual position in respect to the command exceeded the excessive error width 3 value (parameter OD3).	○	○	○
55	EM	External emergency stop error	After the external emergency stop was input, the contactor cutoff command was not issued even after 30 seconds passed. (This alarm is detected even when removing the control axis.)		○	
58	CLT1	Collision detection 0	During the G0 modal (rapid traverse), the collision detection method 1 error was detected.	○		
59	CLT2	Collision detection 1	During the G1 modal (cutting feed), the collision detection method 1 error was detected.	○		
5A	CLT3	Collision detection 2	The collision detection method 2 error was detected.	○		

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Sta- tus	Abbrev.	Message	Details	Applicable models		
				V1/V2	SVJ2	ISV
5F	MCE	Contacting fusing	The external contactor contact was fused.		○	
61	POC	Pwr sply regenerate overcurrent	An overcurrent (Ic) was detected in the power module (IPM).	○		
63	PARE	Pwr sply auxi regeneration err	The auxiliary regeneration transistor remained ON.	○		
65	PRAE	Pwr sply rush relay error	The rush resistance short-circuit relay is not ON.	○		
67	PPHL	Pwr sply phase error detected	The input power (R, S, T) has an open phase.	○		
68	PWD	Pwr sply watch dog	The power supply software processing failed to finish within the specified time.		○	○
69	PPNG	Pwr sply grounding detection	A ground fault was detected in the motor. This is only detected during READY ON.	○		
6A		Pwr sply ext contct fusion det	The external contactor was turned ON in spite of the READY OFF status.	○		
6B		Pwr sply rush relay det	The rush resistance short-circuit relay is still ON.	○		
6C	PCHE	Pwr sply main circuit error	The main circuit condenser is not correctly charged.	○		
6E	PME	Pwr sply memory error	An error occurred in the memory circuit section.	○		
6F	PADE	Pwr sply AD error	An error was detected in the A/D converter section or power supply.	○		
71	PINL	Pwr sply momentary fail detect	The external contactor was turned OFF in spite of the READY ON status. Or, an instantaneous power failure of 55ms or more occurred.	○		
73	J	Pwr sply over regeneration	The regenerative capacity limit of the power supply was exceeded. (Note 2)	○		
74	K	Pwr sply regenerate resistance overheat	Regenerative resistor overheating occurred.	○		
75	POV	Pwr sply overvoltage	The voltage between L+ and L- exceeded 410V.	○		
76		Pwr sply EMG stop setting err	The rotary switch setting and parameter (PTYP) setting do not match.	○		
77	N	Pwr sply power module overheat	Overheating of the power module (IPM) was detected.	○		
88	WD	Watch dog	The servo amplifier software processing failed to finish within the specified time.	○		○

(Note 1) The alarm "50" cannot be reset until the load drops to below the resetting level.

(Note 2) To prevent operation from restarting immediately from the over-regeneration state, alarm "73" cannot be reset after occurring until the control power (L11, L21) continuity state has continued for 15 minutes or more.

Even if the NC power or control power is turned ON again immediately after the alarm has occurred, the alarm cannot be reset.

If the power is turned ON again immediately after the alarm has occurred, maintain the continuity state for 15 minutes or more, and then turn the power ON again.

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(2) Initial parameter error

<p>S02 Initial parameter error □□□□ □□</p> <p style="text-align: center;">Parameter number Axis name</p> <p>(Note) If an S command name is displayed instead of the axis name, refer to "3.4.1 Spindle alarms".</p>	<p>An error was found in the parameters sent from the NC side to the servo amplifier side after the NC power was turned ON. The parameter No. and axis name for which an alarm occurred will appear.</p>	
Parameter No.	Details	Remedy
1 to 64	An error was found in the Servo parameters sent from the NC during initialization.	Refer to the instruction manual for the servomotor being used.

3.3.2 Servo warnings (sOO)

(1) s51 Initial parameter error

<p>s51 Parameter error □□□□ □□</p> <p style="text-align: center;">Parameter number Axis name</p> <p>(Note) If an S command name is displayed instead of the axis name, refer to "3.4.2 Spindle warnings".</p>	<p>This error is reset when the parameter is checked and set to the correct value. Illegal parameters are ignored, and if an illegal parameter is set, the previous value will be held. (The servo will not turn OFF.) The parameter No. and axis name for which a warning occurred will appear.</p>	
Parameter No.	Details	Remedy
1 to 48, 69, 71, 101 to 106, 108	The Servo parameter setting data is illegal.	Refer to the details on the servo warning alarms.

(2) s52 Servo warning

<p>s52 Message □□ □□</p> <p style="text-align: center;">Warning No. Axis name</p> <p>(Note) If an S command name is displayed instead of the axis name, refer to "3.4.2 Spindle warnings".</p>	<p>The servo warning is displayed. The parameter No. and axis name for which an alarm occurred will appear. The applicable models shown in the table are as follows:</p> <p style="margin-left: 20px;">V1/V2 : MDS-B-V1/V2 SVJ2 : MDS-B-SVJ2 ISV : HS Series</p>					
Warning No.	Abbrev.	Message	Details	Applicable models		
				V1/V2	SVJ2	ISV
90	WST	L-speed serial ini commu err	Initial communication with the absolute position linear scale was not possible.	○		
91	WAS	L-speed serial commu error	An error in the communication with the detector was detected in the absolute position detection system using the OHA25K/OHA25K-ET/absolute position linear scale.	○		
92	WAF	L-speed serial protocol error	An error was detected in the data from the detector in an absolute position detection system using the OHA25K/OHA25K-ET/absolute position linear scale.	○		
93	WAM	Absolute position dislocation	When the NC power was turned ON, the absolute position counter could not be set because absolute position data had been varied.	○	○	○

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Warning No.	Abbrev.	Message	Details	Applicable models		
				V1/V2	SVJ2	ISV
96	MPE	MP scale feedback error	An excessive deviation in the feedback amount from the motor end detector and MP scale was detected in the MP scale absolute position detection system.	○		
97	MPO	MP scale offset fluctuation	An error was detected in the offset data read in when the NC power was turned ON in the MP scale absolute position detection system.	○		
9E	WAn	H-speed serial rot count err	An error was detected in the multi-rotation counter with the serial type detector. The absolute position was not compensated.	○	○	○
9F	WAB	Battery voltage drop	The battery voltage supplied to the absolute position detector dropped.	○	○	○
E0	WOR	Overregeneration warning	A level 80% of the regenerative alarm was detected.		○	○
E1	WOL	Overload warning	A level 80% of the overload 1 alarm has been detected. (An overload 1 alarm may occur if this operation continues as it.) This warning is reset by resetting the NC.	○	○	○
E3	WAC	Abs position counter warning	The value in the absolute position counter is illegal. The absolute position must be initialized.	○	○	○
E4	WPE	Parameter error warning	The set parameter exceeds the setting range. This illegal parameter is ignored and the value before the illegal parameter was set remains valid.	○	○	○
E6	AXE	Control axis removal warning	The control axis is being removed.	○	○	
E7	NCE	CNC emergency stop	An emergency stop command was input from NC.	○	○	○
E8	O	Overregenerate (moment V/R)	Regeneration at the limit of the power supply regeneration capacity occurs frequently.	○		
E9	P	Moment power failure warning	An instantaneous power failure exceeding 25ms occurred. (The main circuit voltage has not dropped, so an alarm does not occur.) This warning is reset by turning the servo drive unit's power ON again.	○	○	○
EA	Q	External emergency stop input	An external emergency stop input signal was input. (24V is not applied on the CN23 connector.)	○	○	○
EB	R	Overregeneration warning	A level 80% of the over-regeneration alarm was reached.	○		

(Note) The servo will not turn OFF for the warnings with the following numbers.
91, 92, 96, 9E, 9F, E0, E3, E4, E6, E7, E8, EA, EB

3.4 Messages related to spindle

These alarms pertain to errors in the spindle system, such as the spindle amplifier, motor and encoder. The alarm message, status No. and S command name are displayed on the Alarm message screen. If an S command name is displayed after the status No., this is an alarm from the spindle side. If an axis address is displayed instead of the S command, this is a servo alarm. Refer to "3.3 Messages related to servo".


Refer to the MELDAS AC Servo/Spindle Specifications (BNP-B3759) for details.

3.4.1 Spindle alarms (SOO)

The method of resetting differs according to the alarm message No. (SOO).

No.	Resetting method	Reference
S01	The alarm can be reset by turning the NC power ON again after removing the cause of the alarm.	(1) Spindle alarms
S02	Review the parameters.	(2) Initial parameter error
S03	The alarm can be reset by inputting the NC reset key after removing the cause of the alarm.	(1) Spindle alarms
S04	The alarm can be reset by turning the NC power and spindle amplifier power ON again after removing the cause of the alarm.	

Caution

 If an alarm occurs, remove the cause, and confirm that the operation signal is not being input. Then secure the safety and reset the alarm before restarting operation.

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(1) Spindle alarms

SOO Message		<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Status Axis name	The applicable models shown in the table are as follow: SP/SPH: MDS-B-SP/SPH SPJ2 : MDS-B-SPJ2 SPJ2x : MDS-B-SPJ2□ Series		
(Note) If an axis name is displayed instead of the S command name, refer to "3.3.1 Servo alarms).							
No.	Abbrev.	Message	Details	Applicable models			
				SP/SPH	SPJ2	SPJ2x	
10	UV	Under voltage	The PN bus voltage dropped to 200V or less.		○	○	
12	ME1	Memory error 1	A ROM check sum error or RAM check error occurred in the spindle drive control card.	○	○	○	
13	SWE	S/W processing error	The S/W data processing failed to finish within the specified time.	○	○	○	
17	ADE	AD converter error	The A/D converter for current detection did not operate normally at initialization.	○	○	○	
20	NSP	No signal detected (PLG)	When starting PLG orientation, the Z phase was not input even with three or more feed backs from the speed detector. (This alarm is not detected in modes other than PLG orientation.)		○	○	
21	NS2	No signal detect (spdl encoder)	After changing to position control, a signal was not input from the spindle encoder (for orientation, C axis). The Z phase was not input even with three or more feed backs from the encoder. The feedback is not at the correct level. (When parameter SP037/bit8 is ON, this will be detected even in the speed control mode.)	○	○	○	
23	OSE	Excessive speed deviation	The difference between the speed command and motor speed was higher than the specified value, and that state continued for longer than the specified duration.	○	○	○	
24	PG	Ground fault	A ground fault current was detected at READY ON. (The ground fault current is detected by the current (value equivalent to 50° or more with A/D converter) which flows when the V phase lower arm turns ON after 900ms after the contactor turns ON.		○	○	
30	ORG	Over regeneration	The number of regenerative controls (number of times regenerative Tr turns ON in 0.8ms cycles) in 910ms exceeded 900 times. The heating level obtained from the number of regenerative controls during 910ms exceeded 100%. Calculation formula: Heating level = B/level conversion constant A: Heating amount per regeneration * number of regenerative controls + droop B: A- (A/heat time constant)		○	○	
31	OS	Overspeed	The motor speed exceeded 115% of the maximum speed.	○	○	○	

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No.	Abbrev.	Message	Details	Applicable models		
				SP/SPH	SPJ2	SPJ2x
32	PMOC	Overcurrent	A current higher than the specified value was supplied to the IPM used in the main spindle drive main circuit.	○	○	○
33	OV	Over voltage	The state with the DC bus voltage at 400V or more was detected two successive times within an 0.8ms cycle.		○	○
34	DP	CRC error	A CRC error occurred in the data transmitted from the NC.	○	○	○
35	DE	Data error	The size of movement command data transmitted from the NC for position control is too large.	○	○	○
36	TE	Transferring error	The periodic data transmission from the NC was interrupted.	○	○	○
37	PE	Initial parameter error	A parameter with a value exceeding the tolerable range was set.	○	○	○
38	TP1	Protocol error 1 (frame)	A protocol error occurred during communication with the NC. (Frame error)	○	○	○
39	TP2	Protocol error 2 (information)	A protocol error occurred during communication with the NC. (Information error)	○	○	○
3B	PMOH	Power module overheat	Overheating of the IPM used in the spindle drive's main circuit section was detected.	○		
40	KE1	TK unit switching error	While the TK unit was used, the procedure for signal changeover was incorrect.	○		
41	KE2	TK unit communication error	While the TK unit was used, communication with the TK unit could not be performed correctly.	○		
42	PLE	Feedback error (PLG)	The PLG skip counter variation amount exceeded the specified value even instantly when SP090 (PLG pulse check tolerable error) was not set to "0".		○	○
43	FE	Feedback error (Spindle encoder)	The ENC skip counter variation amount exceeded the specified value even instantly during closed loop position control when SP093 (encoder pulse check tolerable error) was not set to "0".		○	○
44	CAXE	C axis changeover alarm	When using the coil changeover motor, C-axis control was applied to the H coil.	○		
46	OHM	Motor overheat	The motor overheated because of overload or stopping of the motor cooling blower, which caused the thermal protector built in the motor to operate.	○	○	○
50	OL	Overload	The time during which the motor current exceeded the overload detection level, exceeded the detection time constant.	○	○	○
52	OD	Excessive error	The position tracking error exceeded the specified value during position loop operation.	○	○	○
5C	ORFE	Orientation feedback error	After orientation in-position was completed, the pulse miss value was higher than the parameter setting value (SP0114 OPER).	○	○	○

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No.	Abbrev.	Message	Details	Applicable models		
				SP/SPH	SPJ2	SPJ2x
61	POC	Pwr sply regenerate overcurrent	An overcurrent (Ic) was detected in the power module (IPM).	○		
63	PARE	Pwr sply auxi regeneration err	The auxiliary regeneration transistor remained ON.	○		
65	PRAE	Pwr sply rush relay error	The rush resistance short-circuit relay is not ON.	○		
67	PPHL	Pwr sply phase error detected	The input power (R, S, T) has an open phase.	○		
68	PWD	Pwr sply watch dog	The power supply software processing failed to finish within the specified time.	○		
69	PPNG	Pwr sply grounding detected	A ground fault was detected in the motor. (This is only detected during ready ON.)	○		
6A		Pwr sply ext contct fusion det	The external contactor was turned ON in spite of the READY OFF status.	○		
6B		Pwr sply rush relay fusion det	The rush resistance short-circuit relay is still ON.	○		
6C	PCHE	Pwr sply main circuit error	The main circuit condenser is not correctly charged.	○		
6E	PME	Pwr sply memory error	An error occurred in the memory circuit section.	○		
6F	PADE	Pwr sply AD error	An error was detected in the A/D converter section or power supply.	○		
71	PINL	Pwr sply momentary fail detect	The external contactor was turned OFF in spite of the READY ON status. Or, an instantaneous power failure of 55ms or more occurred.	○		
73		Pwr sply over regeneration	The regenerative capacity limit of the power supply was exceeded. (Note 1)	○		
75	POV	Pwr sply overvoltage	The voltage between L+ and L- exceeded 410V.	○		
76		Pwr sply EMG stop setting err	The rotary switch setting and parameter (PTYP) setting do not match.	○		
77	N	Pwr sply power module overheat	Overheating of the power module (IPM) was detected.	○		
88	WD	Watch dog	The spindle amplifier's software process was not executed within the specified time. The watch dog timer was not reset within the specified time.	○	○	○
89	EXNT	Extension unit not connected	There was no response during the initial communication with the extension unit when the extension unit connection designation (Sp033/bitD) was validated in the parameters.			○
8A	EXTE	Extension unit communication error	During communication with the extension unit, there was no response from the extension unit for four or more consecutive times. Or, the response from the extension unit was different from the requested response.			○

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No.	Abbrev.	Message	Details	Applicable models		
				SP/SPH	SPJ2	SPJ2x
8B	EXAS	Extension unit auto adjustment error	During automatic adjustment of the PLG detector connected to the extension unit, an abnormal AD conversion value was sampled.			○
8C	EXTY	Extension unit detector type error	During initial communication with the extension unit, a detector type not provided in the specifications was designated.			○
8D	EXWD	Extension unit watch dog	The watch dog timer was not reset within the specified time by the extension unit.			○

(Note 1) To prevent operation from restarting immediately from the over-regeneration state, alarm "73" cannot be reset after occurring until the control power (L11, L21) continuity state has continued for 15 minutes or more.

Even if the NC power or control power is turned ON again immediately after the alarm has occurred, the alarm cannot be reset.

If the power is turned ON immediately after the alarm has occurred, maintain the continuity state for 15 minutes or more, and then turn the power ON again.

(Note 2) With the extension unit related alarms (89 to 8D), the SPJ2x unit resets the alarm when the NC power is turned ON again. However, to reset the extension unit alarm, the extension unit's power must be turned ON again.

When an extension unit related alarm occurs, confirm that the status LED on the extension unit is turned OFF when the NC power is turned OFF, and then turn the NC power ON again.

(2) Initial parameter error

S02 Initial parameter error		□□□□ S□ Parameter number S command name	An error was found in the parameters sent from the NC side to the spindle amplifier side after the NC power was turned ON. The parameter No. and axis name for which an alarm occurred will appear.
(Note) If an axis name is displayed instead of an S command name, refer to "3.3.1 Servo alarms".			
Parameter No.	Details	Remedy	
1 to 384	An error was found in the Servo parameters sent from the NC during initialization.	Refer to the instruction manual for the servo motor being used.	

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3.4.2 Spindle warnings (sOO)

(1) s51 Initial parameter error

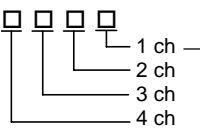
s51 Parameter warning <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <u>S</u> <input type="checkbox"/> <small>Parameter number S command name</small>		This error is reset when the parameter is checked and set to the correct value. Illegal parameters are ignored, and if an illegal parameter is set, the previous value will be held. (The spindle unit will not turn OFF.) The parameter No. and axis name for which a warning occurred will appear.
(Note) If an axis name is displayed instead of an S command name, refer to "3.3.2 Servo warnings".		
Parameter No.	Details	Remedy
1 to 384	The parameter setting data is illegal.	Refer to the details on the servo warning alarms.

(2) s52 Servo warning

s52 Message <input type="checkbox"/> <input type="checkbox"/> <u>S</u> <input type="checkbox"/> <small>Warning No. S command name</small>		The state is automatically recovered when the warning state is eliminated. The applicable models in the table are as follows: SP/SPH: MDS-B-SP/SPH SPJ2 : MDS-B-SPJ2 SPJ2x : MDS-B-SPJ2 <input type="checkbox"/> Series				
(Note) If an axis name is displayed instead of an S command name, refer to "3.3.1 Servo alarms".						
Warning No.	Abbrev.	Message	Details	Applicable models		
				SP/SPH	SPJ2	SPJ2x
E0	WOR	Overregeneration warning	A level 80% of the regenerative alarm was detected.		○	○
E1	WOL	Overload warning	The time during which the motor current exceeded the overload detection level continued for 80% or more of the detection time constant. This warning is reset by NC reset.	○	○	○
E4	WPE	Parameter error warning	The set parameter exceeds the setting range. This illegal parameter is ignored and the value before the illegal parameter was set remains valid.	○	○	○
E7	NCE	CNC emergency stop	An emergency stop command was input from NC. Another axis alarm or an external emergency stop was detected.	○	○	○
E8	O	Overregeneration (moment V/R)	Regeneration at the limit of the power supply regeneration capacity occurs frequently.	○		
E9	P	Moment power failure warning	An instantaneous power failure exceeding 25ms occurred. (The main circuit voltage has not dropped, so an alarm does not occur.) This warning is reset by turning the spindle drive unit power ON again.	○		
EA	Q	External emergency stop input	An external emergency stop input signal was input. (24V is not applied on the CN23 connector.)	○		
EB	R	Overregeneration warning	A level 80% of the over-regeneration alarm was reached.	○		

(Note) The spindle unit will not turn OFF for warnings with the following numbers.
E4, E7, E8, EA, EB

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Y03 AMP unequipped	□□□□□□□□	□□□□	Amplifier mounting state																																																										
	Axis name or spindle name	Cause of amplifier non-mounted state (Refer to following)																																																											
Details		Remedy																																																											
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Y06 Illegal mcp_no.	The MCP and Axis parameters are different when the power is turned ON.
Details	Remedy
<ul style="list-style-type: none"> • Base specification parameter : "mcp_no" • Spindle NC parameter : "smcp_no" <p>The following types of problems may be found in the above parameters.</p> <ol style="list-style-type: none"> (1) Setting values are duplicated. (2) The specified axis numbers are not continuous. (3) Too many axes are specified. (4) Too many cards are specified. 	Check the parameter setting values.

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3.5.2 MCP warnings (yOO)

y51 Message		The MCP and Axis parameters are different when the power is turned ON.	
Error No.	Message	Details	Remedy
1	Parameter G0tL illegal	<ul style="list-style-type: none"> The linear acceleration/ deceleration rapid traverse time constant has not been set. Or the set value is outside the setting range. 	<ul style="list-style-type: none"> Check the axis specification parameter "G0tL".
2	Parameter G1tL illegal	<ul style="list-style-type: none"> The linear acceleration/ deceleration cutting feed time constant has not been set. Or the set value is outside the setting range. 	<ul style="list-style-type: none"> Check the axis specification parameter "G1tL".
3	Parameter G0t0 illegal	<ul style="list-style-type: none"> The primary delay acceleration/ deceleration rapid traverse time constant has not been set. Or the set value is outside the setting range. 	<ul style="list-style-type: none"> Check the axis specification parameter "G0t1".
4	Parameter G1t0 illegal	<ul style="list-style-type: none"> The primary delay acceleration/ deceleration cutting feed time constant has not been set. Or the set value is outside the setting range. 	<ul style="list-style-type: none"> Check the axis specification parameter "G1t1".
9	Parameter Grid space error	<ul style="list-style-type: none"> The grid interval is not set, or is outside setting range. 	<ul style="list-style-type: none"> Check the zero point return parameter "grspc".
11	Parameter pG0t illegal	<ul style="list-style-type: none"> The superimposition time constant for acceleration/deceleration rapid traverse has not been set. Or the set value is outside the setting range. 	<ul style="list-style-type: none"> Check the axis specification parameter "pG0t".
12	Parameter pG1t illegal	<ul style="list-style-type: none"> The superimposition time constant for acceleration/deceleration cutting feed has not been set. Or the set value is outside the setting range. 	<ul style="list-style-type: none"> Check the axis specification parameter "pG1t".
101	Values of PC1/PC2 too large	<ul style="list-style-type: none"> The values set to PC1 and PC2 while rotation axes are used is too large. 	<ul style="list-style-type: none"> Reduce the "PC1" and "PC2" values on the servo parameter.
103	SV parameter SPEC is illegal	<ul style="list-style-type: none"> An invalid value is specified for servo parameter "SPEC". 	<ul style="list-style-type: none"> Set bit 7 of servo parameter "SPEC" to "1".

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3.6 Messages related to system

3.6.1 System alarms (Z00)

Z00 Message		A system alarm is displayed.							
No.	Message	Details	Remedy						
Z01	Watchdog alarm	<ul style="list-style-type: none"> The software process was not completed normally. 	<ul style="list-style-type: none"> Contact the Mitsubishi Service Center. 						
Z08	File area illegal	<ul style="list-style-type: none"> This occurs when the parameters related to formatting differ during formatting. This also occurs in the unformatted state. 	<ul style="list-style-type: none"> Do not carry out editing operations or input/output operations while this error is occurring. After formatting the file system, turn the power ON again. Change the parameter causing the error (refer to the error No.) to the same state as during formatting, and then turn the power ON again. 						
Z09	Remote I/O failure	<ul style="list-style-type: none"> This occurs when a fault occurs in a system using a remote I/O unit. <ul style="list-style-type: none"> The cable is disconnected Data transmission error Data input error Remote I/O fault Remote I/O unit power OFF 	<ul style="list-style-type: none"> Replace the cable. Replace the remote I/O unit. Turn the remote I/O unit power ON. 						
Z56	Fix_P re-entry	<ul style="list-style-type: none"> This occurs when the fixed cycle's subprogram is not registered correctly. 	<ul style="list-style-type: none"> Register the fixed cycle's subprogram again. 						
Z57	No spindle signal	<ul style="list-style-type: none"> A no-signal state was detected in the input signal for the 1st or 2nd spindle's encoder. <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>No.</th> <th>Spindle causing no-signal</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1st spindle</td> </tr> <tr> <td>2</td> <td>2nd spindle</td> </tr> </tbody> </table>	No.	Spindle causing no-signal	1	1st spindle	2	2nd spindle	<ul style="list-style-type: none"> Replace the encoder or encoder cable.
No.	Spindle causing no-signal								
1	1st spindle								
2	2nd spindle								
Z60	AMP power off	<ul style="list-style-type: none"> The amplifier power was turned OFF while Y48A was input. 	<ul style="list-style-type: none"> Turn the NC power OFF, and then turn the amplifier and NC power ON again. Turn Y48A OFF. (The message will change to a system error.) 						

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No.	Message	Details	Remedy
Z61	Battery empty	<ul style="list-style-type: none"> The battery no longer has the capacity to hold the data. 	<ul style="list-style-type: none"> Keep the power ON. (If the power is turned OFF, data such as the parameters and machining programs could be lost.) Request a battery replacement. (Contact the Mitsubishi Service Center immediately.)
Z62	Battery detect circuit error	<ul style="list-style-type: none"> An error occurred in the battery detection circuit. The battery may no longer have the capacity to hold the data. 	<ul style="list-style-type: none"> Contact the Mitsubishi Service Center.
Z70	(Abs data error)	(1) Refer to Abs data error (Z70).	
Z71	(Abs encoder failure)	(2) Refer to Abs encoder failure (Z71).	

(1) Abs data error (Z70)

Z70 Message □□□□ □□		If absolute position data is lost in the absolute position detection system, an error is displayed.			
Error No. Axis name					
Error No.	Message	Details	Zero-point initialization	Release alarm at power-off	Servo alarm number
0001	Abs posn ref pt set incomplete	Zero point has not been initialized. → Initialize the zero point.	Required	—	—
0002	Absolute position lost	Absolute position origin point data stored in NC is lost. → Initialize the zero point.	Required	—	—
0003	Abs posn param changed	The parameters used to detect the absolute position is changed. → Set the parameter correctly, and turn ON the power again, then execute zero-point initialization.	Required	—	—
0004	Abs posn tolerance amnt over	The difference of the machine position at power OFF and the machine position at power ON exceeded the value set in Abs posn set screen "1203 Move amnt in pwr OFF". → Initialize the zero point.	Required	—	—

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(2) Abs encoder failure (Z71)

Z71 Message □□□□ □□ Error No. Axis name		If a detector error is detected in the absolute position detection system, an error is displayed.			
Error No.	Message	Remedy	Zero-point initialization	Release alarm at power-off	Servo alarm number
0001	AbsEncoder: Backup voltag drop	The backup voltage in the absolute position detector dropped. → Charge or replace the battery, check the cable for connection, or check the detector. Initialize the zero point after power is turned ON again.	Required	—	25
0003	AbsEncoder: Communica- tion err	Communication with the absolute position detector failed. → Check the cable, card, or detector, and replace it as needed. Initialize the zero point after power is turned ON again.	(Required) Only after detector replacement	Release	91
0004	AbsEncoder: Abs data changed	Absolute position data for absolute position configuration was changed. → Check the cable, card, or detector, and replace it as needed. Initialize the zero point after power is turned ON again.	(Required) Only after detector replacement	Release	93
0005	AbsEncoder: Serial data error	Serial data from the absolute position detector contains an error. → Check the cable, card, or detector, and replace it as needed. Initialize the zero point after power is turned ON again.	(Required) Only after detector replacement	Release	92
0006	AbsEncoder: Abs/inc posn diff	The absolute position does not match the incremental position. → Check the cable, card, or detector, and replace it as needed. Initialize the zero point after power is turned ON again.	(Required)	—	E3
0007	AbsEncoder: Initial commu err	Initial communication with the absolute position detector is disabled. → Check the cable, card, or detector, and replace it as needed. Initialize the zero point after power is turned ON again.	(Required) Only after detector replacement	Release	90

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3.6.2 System warnings (zOO)

zOO Message			
No.	Message	Details	Remedy
z52	Battery fault	<ul style="list-style-type: none"> The battery for saving the data is spent. 	<ul style="list-style-type: none"> Protect the machine data. (Backup the parameters and machining programs, etc.) Request a battery replacement. (Contact the Mitsubishi Service Center.)
z53	CNC overheat	<ul style="list-style-type: none"> The temperature of the NC control unit has risen above the specified value. 	<ul style="list-style-type: none"> Take cooling measures.
z73	(Absolute position data warning)	<ul style="list-style-type: none"> (1) Refer to the absolute position warnings. 	
z80	Option points empty	<ul style="list-style-type: none"> The no remaining amount warning is output when the remaining number of points is 0 points. 	<ul style="list-style-type: none"> Turn the super options OFF. Add the super option purchasing points.
z81	Points<1000P	<ul style="list-style-type: none"> The remaining amount low warning 2 is output when the remaining number of points is lower than 1000 points. 	<ul style="list-style-type: none"> Add the super option purchasing points. The warning will be reset when the remaining number of points is larger than the remaining number of points 2 (1000P) for the warning display.
z82	Points<24h	<ul style="list-style-type: none"> A warning is output when the remaining number of points is smaller than the points equivalent to 24h. 	<ul style="list-style-type: none"> Add the super option purchasing points. The warning will be reset when the remaining number of points is larger than the remaining number of points 1 (24h) for the warning display. Reduce the number of selected super options. The warning will be reset when the remaining number of points 1 (24h) for the warning display is less than the remaining number of points.
z90	Diagnosis information acquired	<ul style="list-style-type: none"> Retrieval of the diagnosis information with MELDAS-NET stopped. 	<ul style="list-style-type: none"> Save the diagnosis information.

(1) Absolute position data warning (z73)

z73 Message □□□□ □□□□		A warning for the absolute position detection system is displayed.			
Error No.	Message	Details	Zero-point initialization	Release alarm at power-off	Servo alarm number
0001	Battery for abs data fault	The voltage of the backup battery has dropped. → Replace the battery.	—	Release	9F

3.7 Alarms related to user PLC (UOO)

UOO Message			
No.	Message	Details	Remedy
U01	No PLC	<ul style="list-style-type: none">• There is no user PLC.• There is no label for the main ladder P252.	<ul style="list-style-type: none">• Check whether ladder P252 is provided.
U10	Illegal PLC	<ul style="list-style-type: none">• An error was found in the ladder codes.	<ul style="list-style-type: none">• Review the ladder.
U50	Stop PLC	<ul style="list-style-type: none">• The PLC has stopped.	–

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3.8 Program errors (POOO)

This alarm occurs during automatic operation. If there is a mistake in the machining program creation or if a program that does not match the NC specifications has been created, a program error will occur. The error No. and message are displayed on the screen.

Error No.	Message	Details	Remedy
P10	No. of simultaneous axes over	<ul style="list-style-type: none"> The number of axis addresses commanded in the same block is greater than the number provided for by the specifications. 	<ul style="list-style-type: none"> Divide the alarm block commands into two. Check the specifications.
P11	Illegal axis address	<ul style="list-style-type: none"> The axis address names in the program commands and the axis address names set in the parameters do not match. 	<ul style="list-style-type: none"> Correct the axis names in the program.
P20	Division error	<ul style="list-style-type: none"> An axis has been commanded for which division cannot be made by the command units. 	<ul style="list-style-type: none"> Check the program.
P32	Illegal address	<ul style="list-style-type: none"> An address not contained in the specifications has been used. 	<ul style="list-style-type: none"> Check and correct the addresses in the program. Check the specifications.
P33	Format error	<ul style="list-style-type: none"> The command format in the program is not correct. 	<ul style="list-style-type: none"> Check the program.
P34	Illegal G code	<ul style="list-style-type: none"> A G code not contained in the specifications has been commanded. 	<ul style="list-style-type: none"> Check and correct the G code addresses in the program.
P35	Setting value range over	<ul style="list-style-type: none"> The setting range of the addresses has been exceeded. 	<ul style="list-style-type: none"> Check the program.
P36	Program end error	<ul style="list-style-type: none"> "EOR" has been read during memory operation. 	<ul style="list-style-type: none"> Enter M02 or M30 at the end of the program. Enter M99 at the end of the subprogram.
P37	Prog. No. and sequence No. zero	<ul style="list-style-type: none"> A zero has been designated for the program number or for the sequence number 	<ul style="list-style-type: none"> The program numbers which can be designated range from 1 to 99999999. The sequence numbers which can be designated range from 1 to 99999.
P38	No spec: Optional block skip	<ul style="list-style-type: none"> A command with /2 to /9 has been issued. 	<ul style="list-style-type: none"> Check the program. (The command cannot be issued with /2 to /9.)
P39	No specifications	<ul style="list-style-type: none"> The command issued is not included in the specifications. 	<ul style="list-style-type: none"> Check the specifications.
P50	No spec: Inch/mm	<ul style="list-style-type: none"> A command for inch/millimeter conversion has been assigned using a G code though there is no such G code specification. 	<ul style="list-style-type: none"> Check the specifications.
P60	Compensation length over	<ul style="list-style-type: none"> The commanded movement distance is too great (it exceeds 2^{31}). 	<ul style="list-style-type: none"> Check the value of each address in the program.

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Error No.	Message	Details	Remedy
P62	No F command	<ul style="list-style-type: none"> A cutting feedrate command or thread lead command has not been issued. 	<ul style="list-style-type: none"> When the power is turned ON, G01 is set as the movement modal command. Assign the feedrate using an F command. Designate F with a thread lead command.
P70	Arc radius error	<ul style="list-style-type: none"> The start and end points of the arc and the arc center are not correct. 	<ul style="list-style-type: none"> Check the address values designated for the program's start point, end point and the arc center. Check the plus and minus directions of the address value.
P71	Arc center error	<ul style="list-style-type: none"> The center of the arc is not found during R-designated circular interpolation. 	<ul style="list-style-type: none"> Check the address values in the program.
P72			
P73			
P80			
P90	No spec: Thread cutting	<ul style="list-style-type: none"> A thread-cutting command has been assigned though such specifications do not exist. 	<ul style="list-style-type: none"> Check the specifications.
P91	No spec: Vrbl lead thread (G34)	<ul style="list-style-type: none"> A variable thread-cutting command has been issued though such specifications do not exist. 	<ul style="list-style-type: none"> Check the specifications.
P93	Illegal pitch value	<ul style="list-style-type: none"> The thread lead (thread pitch) is not correct when thread cutting is commanded. 	<ul style="list-style-type: none"> Set the thread lead command properly in the thread cutting command.
P100			
P110			
P112	Plane selected while R compen	<ul style="list-style-type: none"> A plane selection command (G17, G18, G19) has been assigned during a tool radius compensation command and nose R compensation command (G41, G42, G46). 	<ul style="list-style-type: none"> Assign the plane selection command after canceling the tool radius compensation command and nose R compensation command (by issuing the G40 command).
P113	Illegal plane select	<ul style="list-style-type: none"> The circular command axis and selected plane do not match. 	<ul style="list-style-type: none"> Assign the circular command with the proper plane selection.
P120	No spec: Synchronous feed	<ul style="list-style-type: none"> A synchronous feed command has been assigned though such specifications do not exist. 	<ul style="list-style-type: none"> Check the synchronous feed command specifications. Change the synchronous feed command (G95) into a per-minute feed command (G94). (The F command value must also be changed.)
P121			
P130	2nd M function code illegal	<ul style="list-style-type: none"> The address specified by parameter is other than A, B or C. The name is duplicated with the axis name. 	<ul style="list-style-type: none"> Check the parameter's 2nd miscellaneous function address. Designate an address different from the axis address.

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Error No.	Message	Details	Remedy
P131	No spec: Cnst perphrl ctrl G96	<ul style="list-style-type: none"> • A constant surface speed command (G96) has been assigned even though such specifications do not exist. 	<ul style="list-style-type: none"> • Check the specifications. • Change the constant surface speed command (G96) into a speed command (G97).
P133	Illegal P-No.: G96	<ul style="list-style-type: none"> • An illegal constant surface speed control axis has been designated. • An axis No. that does not exist in the command system was commanded during constant surface speed control. 	<ul style="list-style-type: none"> • Check the parameter and program designation for the constant surface speed control axis.
P140			
P141			
P142			
P150	No spec: Nose R compensation	<ul style="list-style-type: none"> • The tool radius compensation and nose R compensation (G41, G42, G46) were issued even though the tool radius compensation and nose R compensation specifications are not provided. 	<ul style="list-style-type: none"> • Check the tool radius compensation and nose R compensation specifications.
P151	Radius compen during arc mode	<ul style="list-style-type: none"> • A compensation command (G40, G41, G42, G46) has been assigned in the circular mode (G02, G03). 	<ul style="list-style-type: none"> • Assign a rapid traverse command (G00) or linear command (G01) in the compensation command block or cancel block. (Set the modal to linear interpolation.)
P152	No intersection	<ul style="list-style-type: none"> • The intersection point compensation vector is not found when a tool radius compensation or nose R compensation command (G41, G42, G46) has been executed. 	<ul style="list-style-type: none"> • Check the program.
P153	Compensation interference	<ul style="list-style-type: none"> • An interference error is occurred when a tool radius compensation and nose R compensation command (G41, G42, G46) is executed. 	<ul style="list-style-type: none"> • Check the program.
P154			
P155	Fixed cyc exec during compen	<ul style="list-style-type: none"> • A fixed cycle command was assigned in the radius compensation mode. 	<ul style="list-style-type: none"> • The radius compensation mode is established when a fixed cycle command is executed and so the radius compensation cancel command (G40) should be assigned.
P156	R compen direction not defined	<ul style="list-style-type: none"> • When the G46 nose R compensation is started, the movement vector has an undefined compensation direction. 	<ul style="list-style-type: none"> • Change to a movement vector whose compensation direction is defined. • Change to a tool with a different tool nose point number.

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Error No.	Message	Details	Remedy
P157	R compen direction changed	<ul style="list-style-type: none"> The compensation direction is reversed during G46 nose R compensation. 	<ul style="list-style-type: none"> Even if the compensation direction is reversed, change to a more suitable G command (G00, G28, G30, G33, G53). Change to a tool with a different tool nose point number. Set the G46 no reverse error parameter to ON.
P158	Illegal tip point	<ul style="list-style-type: none"> The tool nose point number is illegal (any number except 1 to 8) during G46 nose R compensation. 	<ul style="list-style-type: none"> Change to the correct tool nose point number.
P159	Cmdnd invalid during R compen	<ul style="list-style-type: none"> A command disable command has been issued in nose R compensation (G41, G42, or G46) mode. 	<ul style="list-style-type: none"> Cancel nose R compensation before the block where an error occurs.
P170	No offset number	<ul style="list-style-type: none"> There is no compensation number (TOO) command when a compensation command (G41, G42, G46) is assigned. The compensation number is greater than the number of sets in the specifications. 	<ul style="list-style-type: none"> Add the compensation number command to the compensation command block. Check the number of compensation number sets and correct the command so that it has a compensation number within the number of compensation sets.
P171	No spec: G10 option	<ul style="list-style-type: none"> A G10 command has been assigned even though such specifications do not exist. 	<ul style="list-style-type: none"> Check the specifications.
P172	G10 L number error	<ul style="list-style-type: none"> The L address command is not correct when the G10 command is assigned. 	<ul style="list-style-type: none"> Check the G10 command address L number and command the proper number.
P173	G10 P number error	<ul style="list-style-type: none"> An compensation number outside the number of sets in the specifications has been assigned for the compensation number command when the G10 command is assigned. 	<ul style="list-style-type: none"> First check the number of compensation sets and then set the address P designation to within that number.
P180	No fixed cycle	<ul style="list-style-type: none"> A fixed cycle (G81 to G89) command has been assigned though such specifications do not exist. 	<ul style="list-style-type: none"> Check the specifications. Correct the program.
P181	No spindle command (Tap cycle)	<ul style="list-style-type: none"> The spindle speed command has not been assigned when a hole drilling fixed cycle command is assigned. 	<ul style="list-style-type: none"> Assign the spindle speed command (S) with the G84 or G88 hole drilling fixed cycle command.
P182	Synchronous tap error	<ul style="list-style-type: none"> Connecting is not possible with the spindle unit. A synchronous tap command was issued for a system in the constant surface speed control. 	<ul style="list-style-type: none"> Check the connection with the spindle unit. Check whether the spindle encoder is present or not. Check the program.

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Error No.	Message	Details	Remedy
P183	No pitch/thread number	<ul style="list-style-type: none"> The pitch or thread number command is not present in the tap cycle of the hole drilling fixed cycle command. 	<ul style="list-style-type: none"> Assign the pitch or thread number command using the F or E command.
P184	Pitch/thread number error	<ul style="list-style-type: none"> An incorrect pitch or thread number command has been assigned in the tap cycle of the hole drilling fixed cycle command. 	<ul style="list-style-type: none"> Check the pitch or thread number.
P190	No spec: Cutting cycle	<ul style="list-style-type: none"> A turning cycle command has been assigned though the turning cycle specifications are not provided. 	<ul style="list-style-type: none"> Check the specifications. Delete the turning cycle command.
P191	Taper length error	<ul style="list-style-type: none"> There is an error in the taper length command when the turning cycle command is assigned. 	<ul style="list-style-type: none"> Set the setting value of R in the turning cycle command to less than the movement amount of the axis.
P192	Chamfering error	<ul style="list-style-type: none"> The chamfering conducted during the thread cutting cycle is illegal. 	<ul style="list-style-type: none"> Set a chamfering amount which does not protrude from the cycle.
P200	No spec: MRC cycle	<ul style="list-style-type: none"> A compound fixed cycle command (G70 to G73) has been assigned even though the compound fixed cycle specifications are not provided. 	<ul style="list-style-type: none"> Check the specifications.
P201	Program error (MRC)	<ul style="list-style-type: none"> One or more of the following commands are present in the subprogram which has been called by the compound fixed cycle: <ol style="list-style-type: none"> Reference point return commands (G27, G28, G30), Thread cutting (G33), Fixed cycle, Skip function (G31). The first movement block of the finish shape program in compound fixed cycle contains a circular command. 	<ul style="list-style-type: none"> Delete the following G codes from the subprogram which has been called by the compound fixed cycle (G70 to G76) : G27, G28, G30, G31. G33, G code in fixed cycle. Delete G2 and G3 from the first movement block of the finish shape program in compound fixed cycle.
P202	Block over (MRC)	<ul style="list-style-type: none"> The number of blocks in the shape program which has been called by the compound fixed cycle exceeds 50. 	<ul style="list-style-type: none"> Make the number of blocks in the shape program which has been called by the compound fixed cycle (G70 to G73) less than 50.
P203	D cmdnd figure error (MRC)	<ul style="list-style-type: none"> The shape program of the compound fixed cycle (G70 to G73) does not give the shape which can be cut properly. 	<ul style="list-style-type: none"> Check the shape program in the compound fixed cycle (G70 to G73).
P204	E cmdnd fixed cycle error (MRC)	<ul style="list-style-type: none"> The command value in the compound fixed cycle (G70 to G76) is not correct. 	<ul style="list-style-type: none"> Check the command value in the compound fixed cycle (G70 to G76).
P210	No spec: Pattern cycle	<ul style="list-style-type: none"> A compound fixed cycle command has been assigned though the compound fixed cycle (G74 to G76) specifications are not provided. 	<ul style="list-style-type: none"> Check the specifications.

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Error No.	Message	Details	Remedy
P230	Sub-program nesting over	<ul style="list-style-type: none"> The number of times subprograms have been called in sequence from subprograms has exceeded 8. 	<ul style="list-style-type: none"> Check the number of subprogram calls and correct the program so that it does not exceed 8.
P231	No sequence No.	<ul style="list-style-type: none"> The sequence number commanded by GOTO has not been set when calling out a subprogram or when returning to the main program from a subprogram. 	<ul style="list-style-type: none"> Enter the sequence number in the appropriate block.
P232	No program No.	<ul style="list-style-type: none"> The subprogram has not been registered when it is called. 	<ul style="list-style-type: none"> Register the subprogram.
P240	No spec: Variable command	<ul style="list-style-type: none"> A variable command has been assigned though such specifications (#OO) do not exist. 	<ul style="list-style-type: none"> Check the specifications. Delete the variable command.
P241	No variable No.	<ul style="list-style-type: none"> The commanded variable number is higher than the variable numbers in the specifications. 	<ul style="list-style-type: none"> Check the specifications. Check the program variable numbers.
P242	" = " not defined at vrble set	<ul style="list-style-type: none"> " = " has not been commanded when a variable is defined. 	<ul style="list-style-type: none"> Set " = " into the program variable definition.
P250			
P251			
P252			
P260			
P270	No spec: User macro	<ul style="list-style-type: none"> A macro specification command has been assigned though such specifications do not exist. 	<ul style="list-style-type: none"> Check the specifications. Delete the macro command.
P271	No spec: Macro interrupt	<ul style="list-style-type: none"> A macro interrupt command has been issued though it is not included in the specifications. 	<ul style="list-style-type: none"> Check the specifications.
P272	NC and macro texts in a block	<ul style="list-style-type: none"> An NC statement and a macro statement exist in the same block. 	<ul style="list-style-type: none"> Check the program, and program so that the NC statement and macro statement are in separate blocks.
P273	Macro call nesting over	<ul style="list-style-type: none"> The maximum number of macro call nesting levels have been exceeded. 	<ul style="list-style-type: none"> Check the program and correct so that the macro calls do not exceed the number of levels provided for by the specifications.
P275	Macro argument over	<ul style="list-style-type: none"> There are too many argument sets in macro call argument type II. 	<ul style="list-style-type: none"> Check the program.
P276	Illegal G67 command	<ul style="list-style-type: none"> A G67 command has been assigned though it is not during the G66 command modal. 	<ul style="list-style-type: none"> Check the program. The G67 command serves to cancel the call and so the G66 command is assigned before this command.
P277	Macro alarm message	<ul style="list-style-type: none"> An alarm command has been issued in user macro. 	<ul style="list-style-type: none"> Check the user macro program.
P280	Brackets [] nesting over	<ul style="list-style-type: none"> More than 5 bracket " [" or "] " parentheses have been used in a block. 	<ul style="list-style-type: none"> Check the program and correct so that the number of " [" or "] " parentheses does not exceed 5 bracket.

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Error No.	Message	Details	Remedy
P281	Brackets [] not paired	<ul style="list-style-type: none"> The number of the " [" or "] " parentheses commanded in a block does not match. 	<ul style="list-style-type: none"> Check the program and correct so that the numbers of " [" and "] " parentheses are paired off properly.
P282	Calculation impossible	<ul style="list-style-type: none"> An operation formula is not correct. 	<ul style="list-style-type: none"> Check the program and correct the operation formula.
P283	Divided by zero	<ul style="list-style-type: none"> The division denominator is zero. 	<ul style="list-style-type: none"> Check the program and correct so that the denominator for division in the operation formula is not zero.
P284	Integer value overflow	<ul style="list-style-type: none"> In the process of operation the integer value has exceeded -2^{31} ($2^{31}-1$). 	<ul style="list-style-type: none"> Check the operation formula in the program and correct so that the value of the integers after the operation does not exceed -2^{31}.
P285	Float value overflow	<ul style="list-style-type: none"> There is a variable data overflow. 	<ul style="list-style-type: none"> Check the variable data in the program.
P290	IF sentence error	<ul style="list-style-type: none"> There is an error in the IF [<conditional formula>] GOTO□ statement. 	<ul style="list-style-type: none"> Check the program.
P291	WHILE sentence error	<ul style="list-style-type: none"> There is an error in the WHILE [<conditional formula>] DO□ to END□ statement. 	<ul style="list-style-type: none"> Check the program.
P292	SETVN sentence error	<ul style="list-style-type: none"> The variable name setting or SETVN□ statement is incorrect. 	<ul style="list-style-type: none"> Check the program. Make sure that the variable name of the SETVN statement has 7 or fewer characters.
P293	DO-END nesting over	<ul style="list-style-type: none"> The numbers of □'s in the DO□ and END□ of the WHILE [<conditional formula>] DO□ to END□ statement (nesting levels) has been exceeded 27. 	<ul style="list-style-type: none"> Check the program and correct so that the nesting levels of DO to END statements does not exceed 27.
P294	DO and END not paired	<ul style="list-style-type: none"> The DO and END are not paired off properly. 	<ul style="list-style-type: none"> Check the program and correct so that the DO and END are paired off properly.
P300	Variable name illegal	<ul style="list-style-type: none"> A variable name has not been commanded properly. 	<ul style="list-style-type: none"> Correct the program so that the variable name is correct. Check the variable names in the program and correct them.
P301	Variable name duplicated	<ul style="list-style-type: none"> A variable name has been duplicated. 	<ul style="list-style-type: none"> Correct the program so that the variable names are not duplicated.
P370	No spec: Mirr image dubl turet	<ul style="list-style-type: none"> An opposite tool rest mirror image command (G68) has been assigned though the double-turret mirror image specifications are not provided. 	<ul style="list-style-type: none"> Check the specifications.
P380	No spec: Corner R/C	<ul style="list-style-type: none"> A corner chamfering (C) or corner rounding (R) command has been assigned though the corner chamfering and corner rounding I and II specifications do not exist. 	<ul style="list-style-type: none"> Check the specifications. Remove "corner R" and "corner C" from the program.

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Error No.	Message	Details	Remedy
P381	No spec: Arc R/C	<ul style="list-style-type: none"> A corner chamfering (C) or corner rounding (R) command has been assigned in a circular interpolation block though the corner chamfering and corner rounding II specifications do not exist. 	<ul style="list-style-type: none"> Check the specifications.
P382	No corner movement	<ul style="list-style-type: none"> There is no movement command in the block following the corner chamfering/rounding. 	<ul style="list-style-type: none"> Assign the block following the corner R/C command in the block with movement.
P383	Corner movement short	<ul style="list-style-type: none"> The movement distance is shorter than the corner R/C command when such a command is assigned. 	<ul style="list-style-type: none"> Since the movement distance is shorter than the corner R/C, the corner R/C should be reduced to less than the movement distance.
P384	Corner next movement short	<ul style="list-style-type: none"> With a corner R/C command, the movement distance in the following block is shorter than the corner R/C. 	<ul style="list-style-type: none"> Since the movement distance in the following block is shorter than the corner R/C, the corner R/C should be made less than the movement distance.
P385	Corner during G0/G33	<ul style="list-style-type: none"> G0 or G33 is contained in the block following the corner R/C. 	<ul style="list-style-type: none"> Check the program.
P390	No spec: Geometric	<ul style="list-style-type: none"> A geometric command has been issued while geometric 1 is not included in the specifications. 	<ul style="list-style-type: none"> Check the specifications.
P391	No spec: Geometric arc	<ul style="list-style-type: none"> A geometric command has been issued while geometric 2 is not included in the specifications. 	<ul style="list-style-type: none"> Check the specifications.
P392	Angle<1 degree (GEOMT)	<ul style="list-style-type: none"> The difference in the angle between geometric lines is less than 1 degree. 	<ul style="list-style-type: none"> Correct the geometric angle.
P393	Inc value in 2nd block (GEOMT)	<ul style="list-style-type: none"> The commands in the second geometric block have been assigned as incremental values. 	<ul style="list-style-type: none"> Assign the commands in the second geometric block as absolute values.
P394	No linear move command (GEOMT)	<ul style="list-style-type: none"> There is no linear command in the second geometric block. 	<ul style="list-style-type: none"> Assign the linear command (G01) in the second block.
P395	Illegal address (GEOMT)	<ul style="list-style-type: none"> The geometric format is incorrect. 	<ul style="list-style-type: none"> Check the program.
P396	Plane selected in GEOMT ctrl	<ul style="list-style-type: none"> A plane selection command was assigned in the geometric command. 	<ul style="list-style-type: none"> Select the plane before issuing the geometric command.
P397	Arc error (GEOMT)	<ul style="list-style-type: none"> The arc end point did not contact or intersect with the next block's start point during geometric IB, II. 	<ul style="list-style-type: none"> Check the previous and next commands including the geometric arc command.
P398	No spec: Geometric 1B	<ul style="list-style-type: none"> The geometric command was issued when the geometric IB specifications were not available. 	<ul style="list-style-type: none"> Check the specifications.
P399	Direction error (GEOMT)	<ul style="list-style-type: none"> The monotone is not incremented or decremented in geometric II. 	<ul style="list-style-type: none"> Check the program so that the monotone is incremented or decremented.

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P410	No spec: Address convertor	<ul style="list-style-type: none"> The specifications for converting absolute/incremental axis addresses do not exist. 	<ul style="list-style-type: none"> Check the specifications.
P420	No spec: Parameter input	<ul style="list-style-type: none"> A parameter input command has been assigned though such specifications do not exist. 	<ul style="list-style-type: none"> Check the specifications.
P421	Parameter input error	<ul style="list-style-type: none"> The commanded parameter number and setting data is illegal. An illegal G command address has been assigned in the parameter input mode. A parameter input command has been assigned during a fixed cycle modal or nose R compensation. 	<ul style="list-style-type: none"> Check the program.
P430	Zero return not completed	<ul style="list-style-type: none"> A movement command except reference point return has been assigned for an axis which has not returned to the reference point. 	<ul style="list-style-type: none"> Execute the reference point return manually.
P431	No spec: 2, 3, 4th ref-point ret	<ul style="list-style-type: none"> A 2nd, 3rd or 4th reference point return command has been assigned though such specifications do not exist. 	<ul style="list-style-type: none"> Check the specifications.
P432	No spec: G29	<ul style="list-style-type: none"> A start position return command (G29) has been assigned though such specifications do not exist. 	<ul style="list-style-type: none"> Check the specifications.
P433	No spec: G27	<ul style="list-style-type: none"> A zero point check command (G27) has been assigned though such specifications do not exist. 	<ul style="list-style-type: none"> Check the specifications.
P434	Compare error	<ul style="list-style-type: none"> There is an axis which does not return to the zero point position when the zero point check command (G27) is executed. 	<ul style="list-style-type: none"> Check the program.
P435	G27 and M commands in a block	<ul style="list-style-type: none"> An M independent command has been assigned simultaneously in the G27 command block. 	<ul style="list-style-type: none"> An M independent command cannot be assigned in the G27 command block and so the G27 command and M independent command should be divided into separate blocks.
P436	G29 and M commands in a block	<ul style="list-style-type: none"> An M independent command has been assigned simultaneously in the G29 command block. 	<ul style="list-style-type: none"> An M independent command cannot be assigned in the G29 command block and so the G29 command and M independent command should be divided into separate blocks.
P450	No spec: Chuck barrier	<ul style="list-style-type: none"> A chuck barrier valid command (G22) has been assigned though the chuck barrier specifications are not provided. 	<ul style="list-style-type: none"> Check the specifications.
P460	Tape I/O error	<ul style="list-style-type: none"> An error has occurred in the tape reader or in the printer during macro printing. 	<ul style="list-style-type: none"> Check the power and cables for the connected units. Check the Input/output parameters.

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P461	No file data	<ul style="list-style-type: none"> The machining program file cannot be read or the file cannot be found. 	<ul style="list-style-type: none"> Review the machining program. The program saved in the memory may be damaged. Output all of the necessary data, such as the machining programs, tool data and workpiece offset data, to an external device, and then format.
P462	Computer link error	<ul style="list-style-type: none"> A communication error occurred in the computer link. 	<ul style="list-style-type: none"> Reset the system.
P480	No spec: Milling	<ul style="list-style-type: none"> No milling function specifications are found. 	<ul style="list-style-type: none"> Check the specifications.
P481	Illegal G code (mill)	<ul style="list-style-type: none"> An invalid G code was commanded in the milling mode. 	<ul style="list-style-type: none"> Remove the illegal G command.
P482	Illegal axis (mill)	<ul style="list-style-type: none"> A rotation axis command was issued in the milling mode. Alternatively, milling was performed though an illegal value was set for the milling axis number. 	<ul style="list-style-type: none"> Delete the rotation axis command. Check the milling axis number.
P484	ZRN not completed (mill)	<ul style="list-style-type: none"> A movement command was issued in milling mode to the axis that had not completed return to the reference point. 	<ul style="list-style-type: none"> Manually return the axis to the reference point.
P485	Illegal modal (mill)	<ul style="list-style-type: none"> The system entered in milling mode during nose R compensation or constant surface speed control. A T command was issued in milling mode. The milling mode was changed to the turning mode during tool radius compensation. 	<ul style="list-style-type: none"> Before issuing G12.1, issue G40 (nose R compensation cancel) or G97 (constant surface speed cancel). Before issuing G12.1, issue a T command. Before issuing G13.1, issue G40 (tool radius compensation cancel).
P500	No spec: Cross machining (G110)	<ul style="list-style-type: none"> A cross machining command (G110) was issued though it was not included in the specifications. 	<ul style="list-style-type: none"> Check the specifications.
P501	Cross (G110) impossible	<ul style="list-style-type: none"> A cross machining command (G110) was issued in nose R, milling, balance cut, fixed cycle, or double-turret mirror image mode. 	<ul style="list-style-type: none"> Check the program.
P502	Illegal G110 \$No.	<ul style="list-style-type: none"> An illegal axis system number was commanded. 	<ul style="list-style-type: none"> Correct the program address.
P503	Illegal G110 axis	<ul style="list-style-type: none"> The commanded axis was not found. Too many axes were commanded. The commanded axis cannot be controlled by the commanded system. 	<ul style="list-style-type: none"> Correct the program address.

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Error No.	Message	Details	Remedy
P510	Illegal G128/G129 axis	<ul style="list-style-type: none"> • During the axis movement synchronous superimposition command (G128, G129), the synchronous superimposing axis is not between the start position and the end position of synchronous superimposition. • A rotation axis was commanded for the synchronous superimposing axis or master axis. 	<ul style="list-style-type: none"> • Check the program.
P511	Illegal \$-command	<ul style="list-style-type: none"> • The axis movement synchronous superimposition command (G128, G129) was issued in a system that does not contain a synchronous superimposing axis. 	<ul style="list-style-type: none"> • Check the program.
P520	No TGSET value	<ul style="list-style-type: none"> • A position control command (G132) or position control variable skip command (G133) was issued before a set number specification (TGSET[]) command. 	<ul style="list-style-type: none"> • Check the program.
P521	Illegal G code (G130)	<ul style="list-style-type: none"> • One of G130 to G133 was issued during nose R compensation (G41, G42, or G46), thread cutting (G33), fixed cycle (G70 to G79, or G81 to G89), or milling (G12.1) modal. 	<ul style="list-style-type: none"> • Check the program.
P600	No spec: Auto TLM	<ul style="list-style-type: none"> • An automatic tool length measurement command (G37) has been assigned through such specifications do not exist. 	<ul style="list-style-type: none"> • Check the specifications.
P601	No spec: Skip	<ul style="list-style-type: none"> • A skip command (G31/G160) has been assigned though such specifications do not exist. 	<ul style="list-style-type: none"> • Check the specifications.
P602	No spec: Multi skip	<ul style="list-style-type: none"> • A multiple skip command (G31.1, G31.2, G31.3) was assigned though no such command exists in the specifications. 	<ul style="list-style-type: none"> • Check the specifications.
P603	Skip speed 0	<ul style="list-style-type: none"> • The skip speed is zero. 	<ul style="list-style-type: none"> • Command the skip speed.
P604	G37 illegal axis	<ul style="list-style-type: none"> • The axis has not been commanded in the automatic tool length measurement block or, alternatively, two or more axes have been commanded. 	<ul style="list-style-type: none"> • Command only one axis.
P605	H and G37 commands in a block	<ul style="list-style-type: none"> • The T code is in the same block as the automatic tool length measurement command. 	<ul style="list-style-type: none"> • Assign the T command before the block which contains the automatic tool length measurement command.
P606	H command not found before G37	<ul style="list-style-type: none"> • The T code has still not been commanded for automatic tool length measurement. 	<ul style="list-style-type: none"> • Assign the T command before the block which contains the automatic tool length measurement command.

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P607	Signal turned illegally by G37	<ul style="list-style-type: none"> • The measurement position arrival signal has been set ON before the area commanded by the parameter deceleration area "d" or D command. • Alternatively, the signal was not set ON until the end. 	<ul style="list-style-type: none"> • Check the program.
P608	Skip during radius compen	<ul style="list-style-type: none"> • The skip command was assigned during a radius compensation or nose R compensation command. 	<ul style="list-style-type: none"> • Assign the radius compensation cancel or nose R compensation cancel command (G40) or remove the skip command.
P700	No B, N number	<ul style="list-style-type: none"> • When using the end point synchronization function, the designated block's identification number was not found at the end point block. 	<ul style="list-style-type: none"> • Check the program.
P710	Inclined ax ctrl mode illegal	<ul style="list-style-type: none"> • The G170/G171 command was issued in the milling mode, nose R mode, mirror image, compound fixed cycle or constant surface speed control mode. 	<ul style="list-style-type: none"> • Check the program.
P990	PREPRO error	<ul style="list-style-type: none"> • Combining commands that required pre-reading (nose R compensation, corner chamfering/corner rounding (R), geometric I, geometric IB, and compound fixed cycle commands) resulted in eight or more pre-read blocks. 	<ul style="list-style-type: none"> • Reduce the number of commands that require pre-reading or delete such commands.

Revision History

Sub-No.	Date of revision	Revision details
A	October, 2000	First edition created.

Notice

Every effort has been made to keep up with software and hardware revisions in the contents described in this manual. However, please understand that in some unavoidable cases simultaneous revision is not possible.

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