

CNC

MELDAS 600M Series

INSTRUCTION MANUAL



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Introduction






This instruction manual is mainly targeted for milling machines and machining centers. This is to be used as a guide when using MELDAS 600M 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 600M Series so as to be read thoroughly before using.

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

Details described in this manual

CAUTION

-  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 is written on the assumption that all option functions are added. Refer to the specifications issued by the machine manufacturer before using.
-  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 600M Series Programming Manual BNP-B2239

MELDAS 600M Series Programming Manual (M2/M0 format)..... BNP-B2240




- (2) The font used with MELDAS 615M/635M is Meldas Gothic, developed by RICOH COMPANY LTD. under the license agreement with RYOBI IMAGIX CO.


Precautions for Safety

Always thoroughly 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.


Do not use this numerical controller, before understanding the construction safety items and cautions.








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

 DANGER	When the user may be subject to imminent fatalities or major injuries if handling is mistaken.
 WARNING	When the user may be subject to fatalities or major injuries if handling is mistaken.
 CAUTION	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. Observe the important information described below in any case.



 DANGER
Not applicable in this manual.

 WARNING
Not applicable in this manual.







 CAUTION
<p>1. Items related to product and manual</p> <ul style="list-style-type: none"> 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 is written on the assumption that all option functions are added. Refer to the specifications issued by the machine manufacturer before using. 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. <p>2. Items related to installation and assembly</p> <ul style="list-style-type: none"> 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 input/output device cables. The NC and input/output device could be damaged if the cable is connected in the power ON state.





4. Items related to screen operation

-  To set the tool compensation amount (tool length and tool radius) during automatic operation, set it during single block stop. (Refer to section "3.1 Tool offset amount screen" for details.)
-  Pay close attention to the sequence operation when carrying out forced data setting (forced output) in the I/F diagnosis screen.
-  All the 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.

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 are: For ISO: "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.

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.
-  Do not turn OFF the NC and data server power during communication (S) between the NC and data server. Failure to observe this could lead to NC or data server damage.

CAUTION

7. Items related to faults and errors

-  If the BATTERY LOW warning is output, save the machining programs, tool data and parameters to an input/output 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 backlight while the power is ON.
-  Dispose of the spent backlights 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.

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CHAPTER 1 SCREEN OPERATIONS

1. Operating the Setting and Display Unit

1.1 Setting and display unit

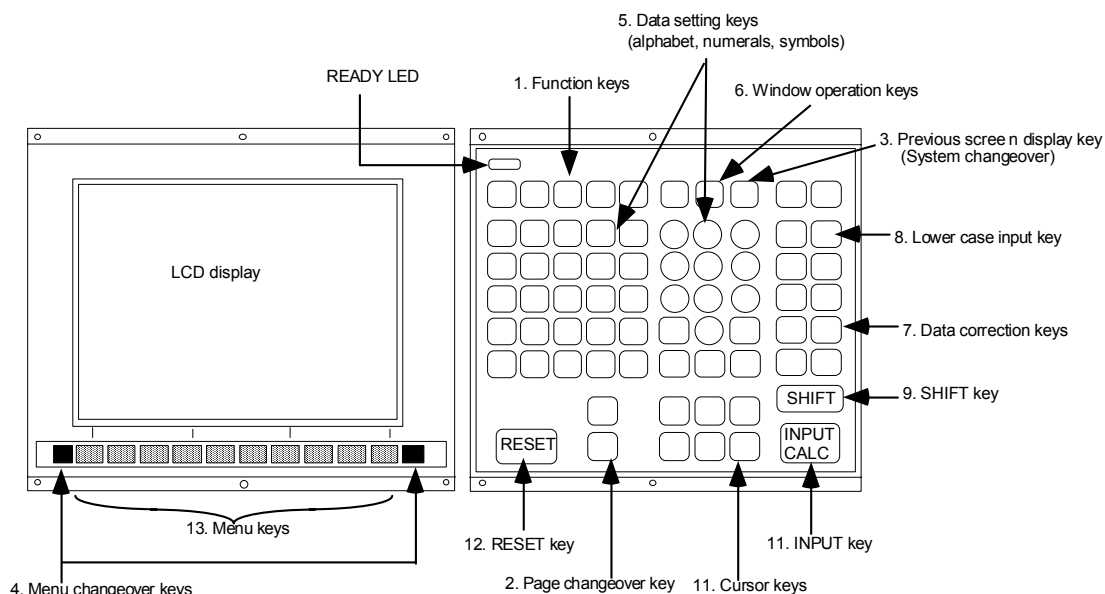
(1) Setting and display unit appearance

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 and 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 and 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 (alphabet, numerals, symbols)	<table border="1" style="border-collapse: collapse; text-align: center;"> <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)																																																
			(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 key.																																																

CHAPTER 1 SCREEN OPERATIONS
1. Operating the Setting and Display Unit

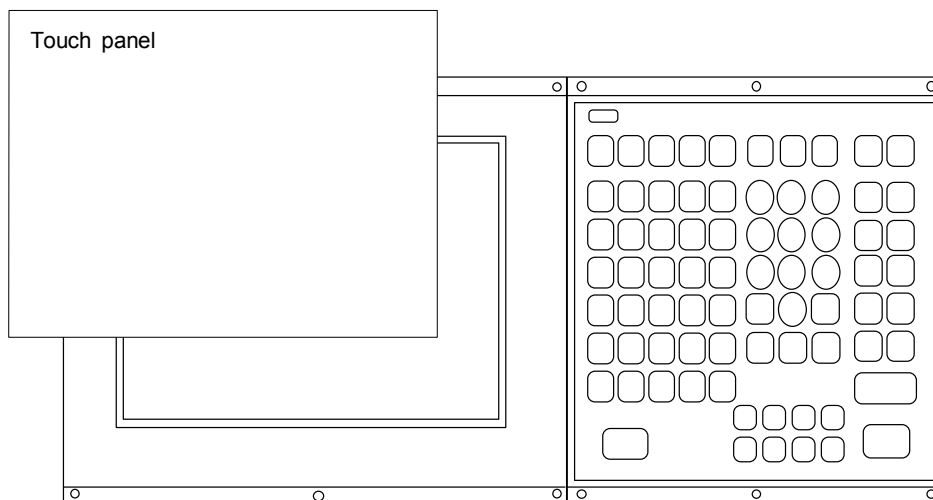
	Key type	Key	Operation
10.	Cursor key	<div style="display: inline-block; border: 1px solid black; padding: 2px;">↑</div> <div style="display: inline-block; border: 1px solid black; padding: 2px;">↓</div>	This moves the cursor up or down one when setting data in the screen display items.
		<div style="display: inline-block; border: 1px solid black; padding: 2px;">←</div> <div style="display: inline-block; border: 1px solid black; padding: 2px;">→</div>	This moves the cursor one item to the left or right when selecting data in the screen display items. <div style="display: inline-block; border: 1px solid black; padding: 2px;">←</div> at cursor left end : Moves to the right end of previous line. <div style="display: inline-block; border: 1px solid black; padding: 2px;">→</div> at cursor right end: Moves to left end of next line.
		<div style="display: inline-block; border: 1px solid black; padding: 2px;">←</div> <div style="display: inline-block; border: 1px solid black; padding: 2px;">→</div>	This moves the data input cursor one character to the left or right in the data setting area.
11.	INPUT key	<div style="border: 1px solid black; padding: 2px;">INPUT</div>	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	<div style="border: 1px solid black; padding: 2px;">RESET</div>	This resets the NC.
13.	Menu keys		This changes the screen and displays the data.

(2) Touch panel

When the touch panel specifications are provided, some key operations can be carried out by directly touching the screen. In this case, the menu keys are not provided on the setting and display unit.

The following operations can be carried out with the touch panel.

- Selection of each menu (menu keys)
- Changeover of menus (buttons on left and right ends of menu)
- Selection of screen group (function keys)



(Note 1) This specification can be selected with the MELDAS 615/635.

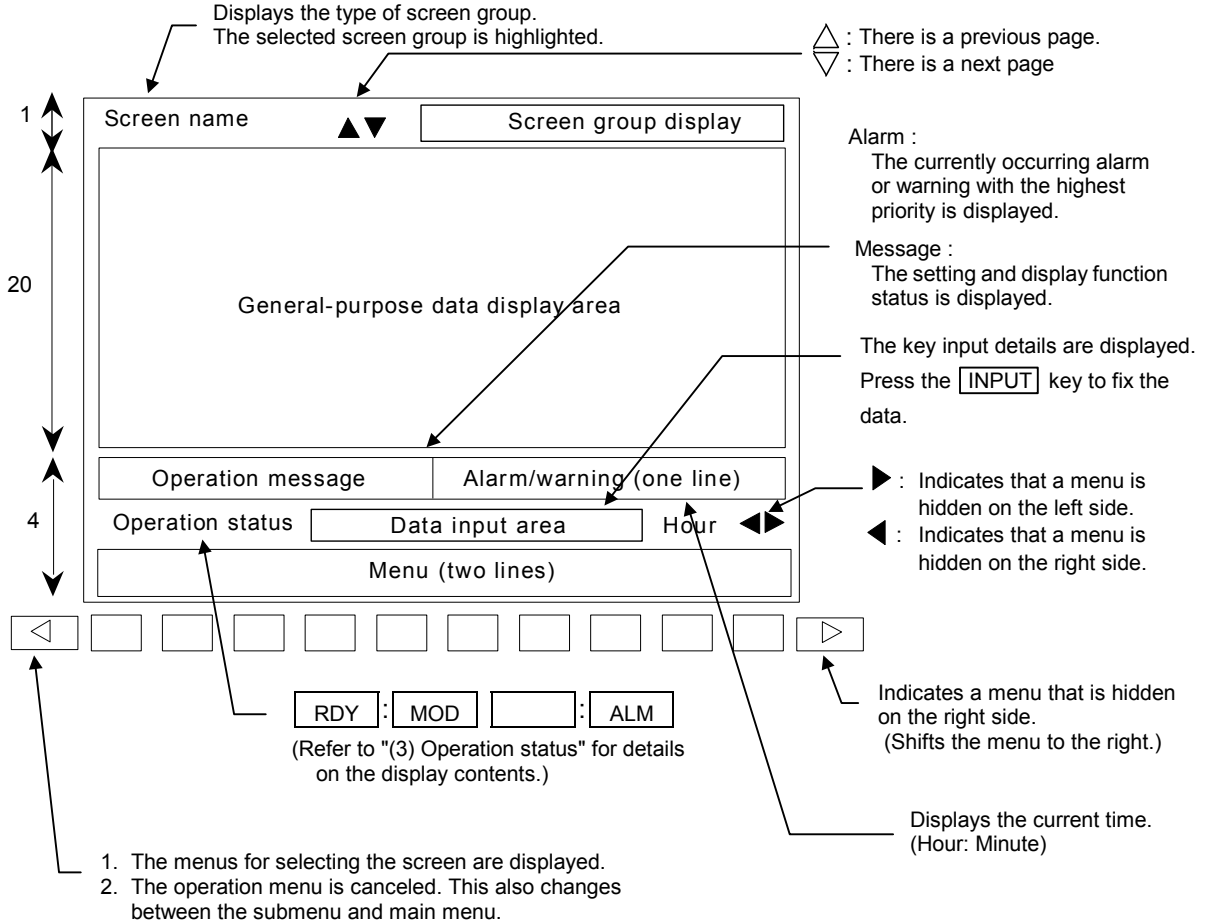
(Note 2) There is no difference in the screen operations when the touch panel is used or the normal keys are used.

(Note 3) If the mouse is used when using the touch panel, correct operation may not take place.

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1. Operating the Setting and Display Unit

(3) Display configuration

The screen is displayed with the following type of configuration.



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1. Operating the Setting and Display Unit

(4) Operation status



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

The details of these items are as follows.

- 1) RDY : This displays the NC status. The following symbols may be displayed depending on the status.

EMG	Emergency stop status
RDY	Not starting in the manual mode or automatic mode
AUT	In automatic operation
HLD	Start stopped status (feed hold or block skip) (This state is neither the READY state nor the emergency stop.)
BST	Block stop

- 2) MOD : This displays the selected operation mode.

MEM	Memory mode
RMT	RS-232C I/F continuous operation mode
JOG	JOG mode
STP	Step
ZRN	Zero point return mode
MDI	MDI mode
HDL	Handle mode

- 3) . : This displays the MDI status when the MDI mode is selected as the operation mode in item 2) above.

NON	No MDI setting
SET	MDI setting completed
RUN	In MDI operation

- 4) ALM : This indicates that an alarm is occurring. (This usually does not appear.)

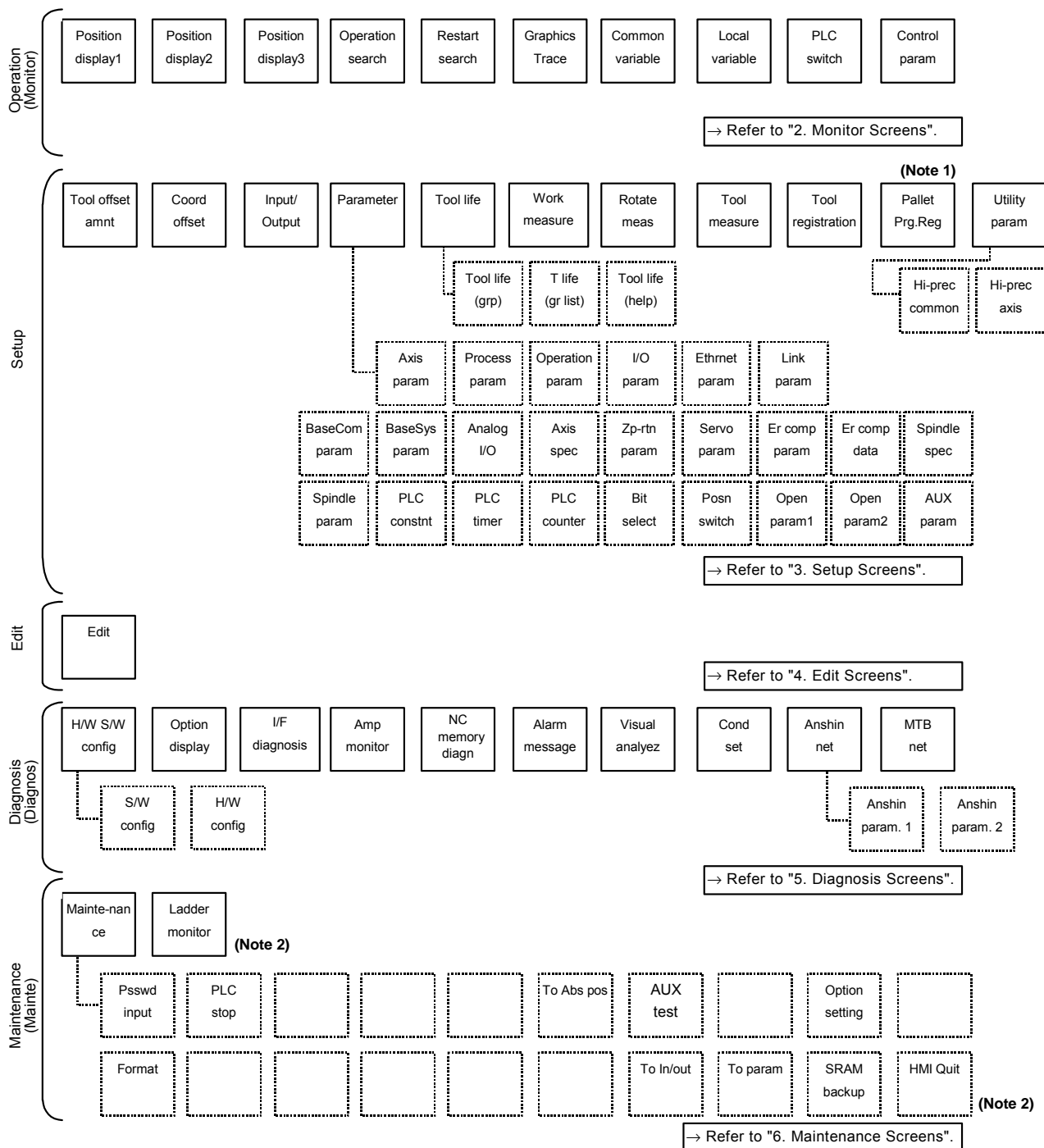
ALM	Alarm
-----	-------

CHAPTER 1 SCREEN OPERATIONS

1. Operating the Setting and 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.



(Note 1) The displayed screen will change according to the parameters.

- Base common parameter #110141 APC type
 - When set to 0 Standard Pallet Registration screen
 - When set to 1 Pallet 4 Page Registration screen (Pallet list screen, Pallet details screen)

(Note 2) This menu does not appear with MELDAS 610/630. If the **[F0]** key is pressed, the on-board screen or custom release screen appears with MELDAS 610/630.

1.3 Screen selection procedures

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

1) Press the function key **SETUP**.

➔ The screen menus related to "Setup" appear.

Tool offset	Coord offset	Input/Output	Param	Tool life	Work measure
-------------	--------------	--------------	-------	-----------	--------------

2) Press the menu key **Input/Output**.

➔ The Input/Output screen appears.

The screenshot shows the 'Input/Output' screen with the following data:

Program	Char	Comment
1	92	RESEARCH
2	102	59
3	100	Z IDOU
5	65	
7	102	HERIKARU
8	82	LOOP
9	69	
10	82	
11	98	USER MACRO
12	117	USER MACRO SUB
13	98	UZUMAKI
14	116	BIG ARC
16	158	

Additional screen details: A:Device Memory, Directory Program, B:Device HD, Directory /, File, INP data, CMP data, RDY: JOG, 14:48.

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) key input

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

1) Menu selection

Press the menu key for the item to be set.

Menu



The Tool offset amnt screen appears.
The cursor appears at the Tool data.

2) Number selection

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

Menu



The cursor moves to the designated number.

Tool offset amnt				
Offset No	Length	L wear	Radius	R wear
11	-12345.678	-12345.678	-12345.678	-12345.678
12	-12345.678	-12345.678	-12345.678	-12345.678
13	-12345.678	-12345.678	-12345.678	-12345.678
14	-12345.678	-12345.678	-12345.678	-12345.678
15	-12345.678	-12345.678	-12345.678	-12345.678
16	-12345.678	-12345.678	-12345.678	-12345.678
17	-12345.678	-12345.678	-12345.678	-12345.678

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.

Tool offset amnt				
Offset No	Length	L wear	Radius	R wear
11	-12345.678	-12345.678	-12345.678	-12345.678
12	-12345.678	-12345.678	-12345.678	-12345.678
13	-12345.678	-12345.678	-12345.678	-12345.678
14	-12345.678	-12345.678	-12345.678	-12345.678
15	-12345.678	-12345.678	-12345.678	-12345.678
16	-12345.678	-12345.678	-12345.678	-12345.678
17	-12345.678	-12345.678	-12345.678	-12345.678

4) Data key input

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



The data is set in the data setting area.

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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.

Tool offset amnt				
Ofset No	Length	L wear	Radius	R wear
11	-12345.678	-12345.678	12.205	-12345.678
12	-12345.678	-12345.678	-12345.678	-12345.678
13	-12345.678	-12345.678	-12345.678	-12345.678
14	-12345.678	-12345.678	-12345.678	-12345.678
15	-12345.678	-12345.678	-12345.678	-12345.678
16	-12345.678	-12345.678	-12345.678	-12345.678
17	-12345.678	-12345.678	-12345.678	-12345.678

- (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 ■ 5 6

2)

Press the **→** key.



The cursor moves one character space to the right.

1 2 3 7 7 7 4 ■ 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 ■ 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 ■ 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 █ 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 █ 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.

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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 four rules 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)	52.431

(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.

240

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 measure screen, Tool registration screen (M, T)
- Coord offset screen, Workpiece measure screen, Rotate measure screen (M, T)
- Pallet prog regist screen (S, M, T, B)

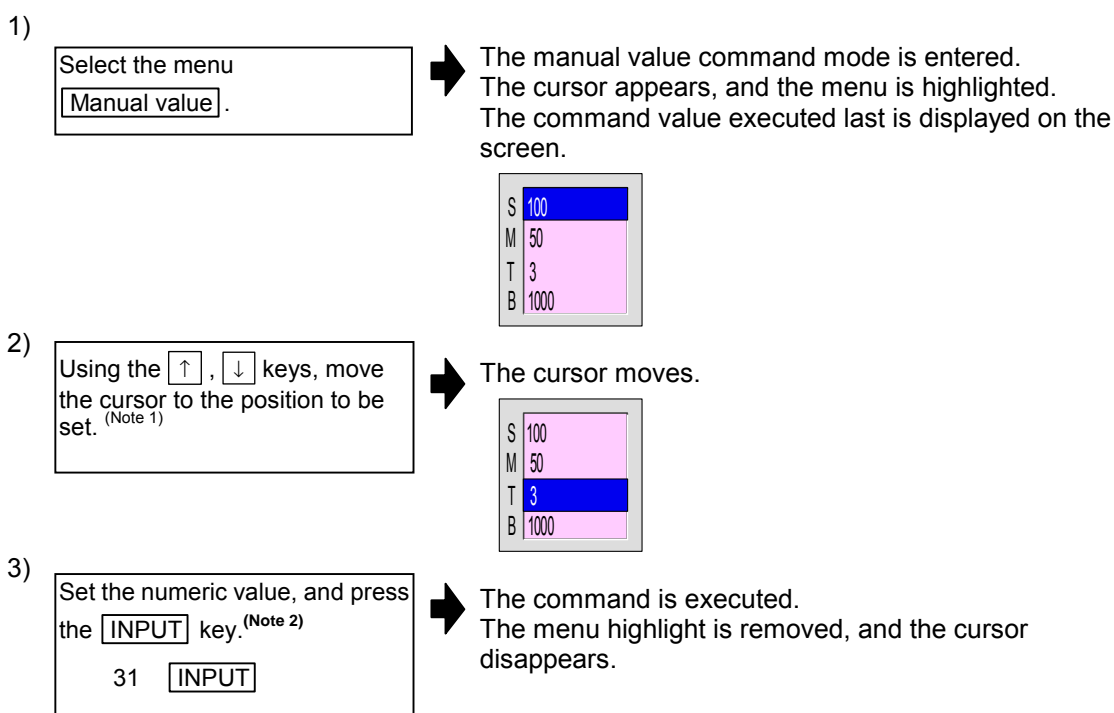
(Note 1) Manual value commands can be issued with address inputs on the Position display1 screen and Position display2 screen.

(Note 2) Issue the commands for the 2nd spindle and following on the Position display2 screen.

(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)



(Note 1) On the position display 1 and 2 screens, by inputting an address key such as **[S]**, **[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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1. Operating the Setting and Display Unit

(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 ~ 9999999	-99999999 ~ 99999999
M	0 ~ 9999999	-99999999 ~ 99999999
T	0 ~ 9999999	-99999999 ~ 99999999
B	0 ~ 9999999	-99999999 ~ 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) 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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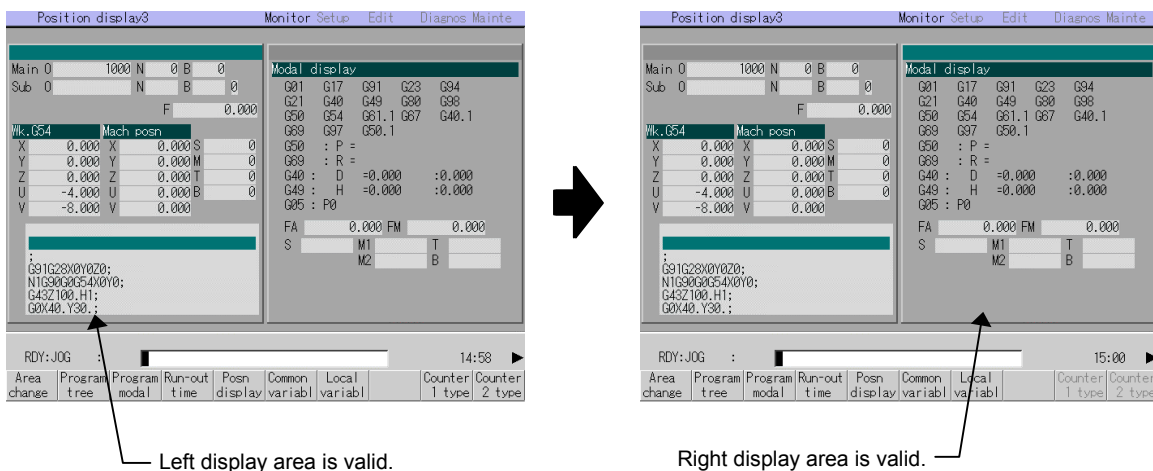
1. Operating the Setting and Display Unit

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 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 screen
- Tool offset amt screen
- Coord offset screen

(2) Operation method

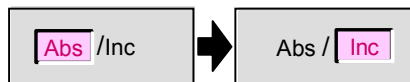
(To change the absolute value setting mode to the incremental value setting mode)

1)

Press the menu Abs/Inc.

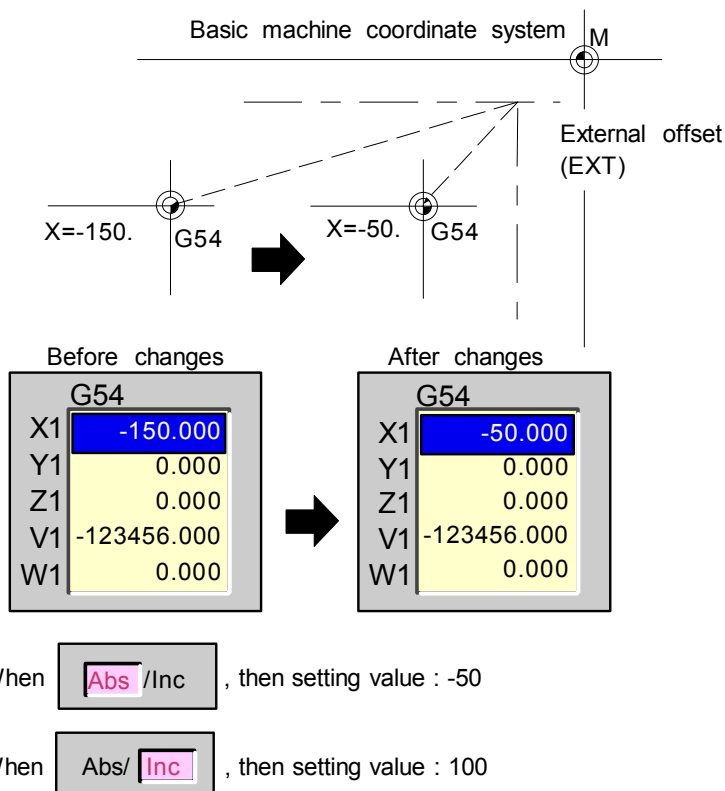


The display on the screen changes to incremental value. (Following figure.)
 Settings can be made in the incremental value mode.



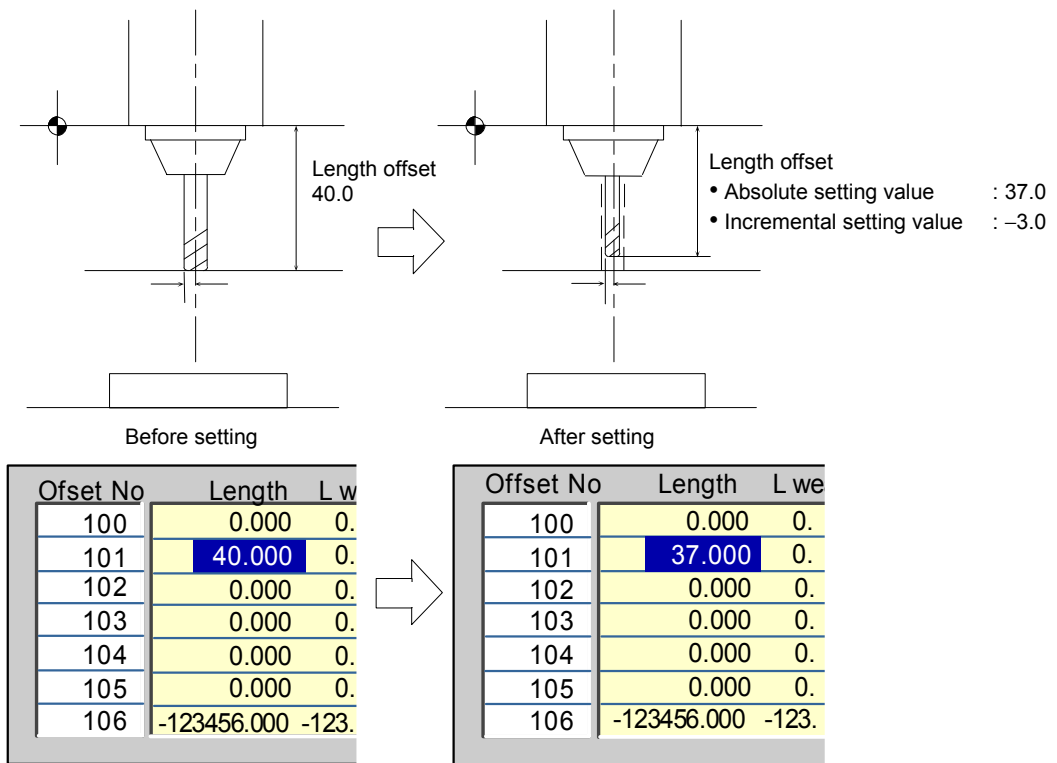
(3) Differences between the absolute value setting mode and incremental value setting mode

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



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(Example 2) To set the tool length offset amount



When Abs / Inc , then setting value: 37.0

When Abs / Inc , then setting value: -3.0

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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:

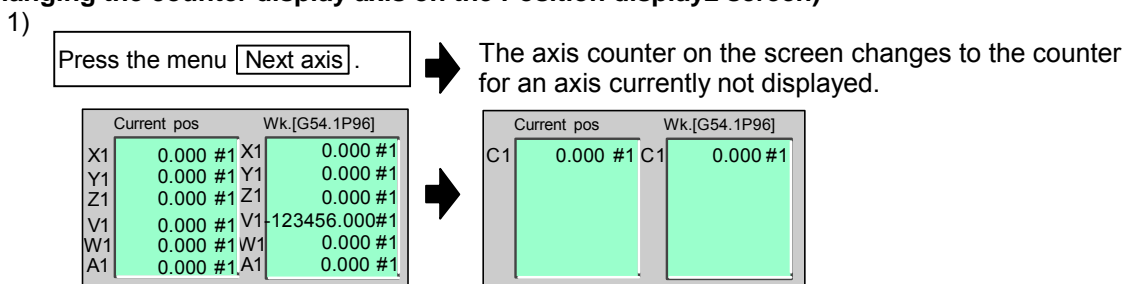
Position display1 screen, Position display2 screen, Position display3 screen, Workpiece measure screen, Rotate measure screen

Parameter axis:

Axis parameters, Axis specification parameters, Zero point return parameters, Servo parameters, Spindle specification parameters, Spindle parameters, High accuracy axis parameters

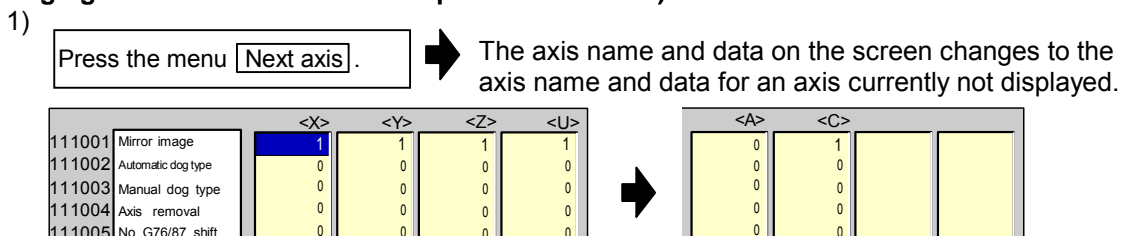
(2) Changing the counter display axis

(Changing the counter display axis on the Position display2 screen)



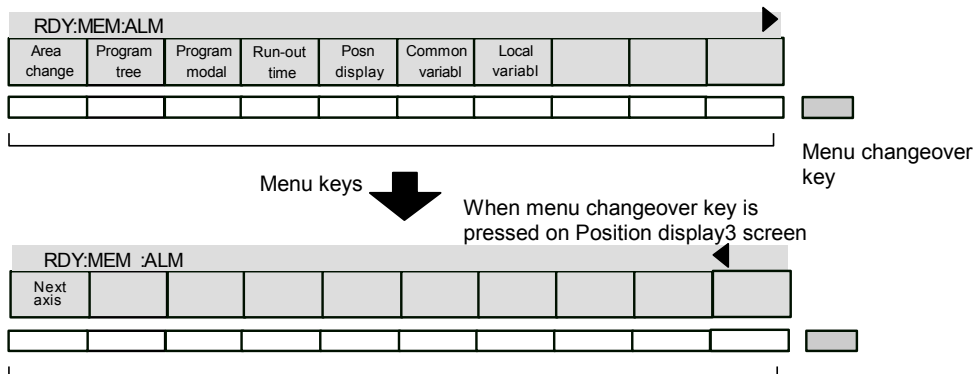
(3) Changing the Parameter screen display axis

(Changing the axis name on the Axis parameter screen)



(4) 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

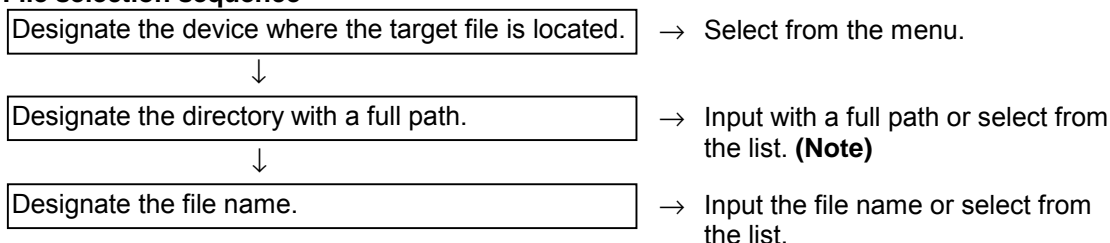
When using a file such as to input/output a file, carry out an operation search or edit a file, the device, directory and target file is designated. These can be selected from the screen list.

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

- Monitor screen (Select the program to be run)
- Restart search screen
(Select the program to be resume searched, or to calculate the machining time)
- Input/Output screen (Select the machining program or other data file)
- Edit screen (Select the machining program to edit)
- Check search screen (Select the program targeted for the program check.)

(2) File selection sequence



(Note) 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
<div style="border: 1px solid black; padding: 2px; display: inline-block;">Device select</div>	This displays the menu where the machining program is stored. Use this menu to select which program in which device to search. If a device having a directory is selected, the directory is set to the root.	A	Submenu for <div style="border: 1px solid black; padding: 2px; display: inline-block;">Device</div> menu.
<div style="border: 1px solid black; padding: 2px; display: inline-block;">Dir</div>	This enters the mode for inputting the directory name.	A	–
<div style="border: 1px solid black; padding: 2px; display: inline-block;">File name</div>	This enters the mode for inputting the file name.	A	–
<div style="border: 1px solid black; padding: 2px; display: inline-block;">List update</div>	This updates the list. (A list of the latest details of the currently selected device and directory is displayed.)	C	–
<div style="border: 1px solid black; padding: 2px; display: inline-block;">From list</div>	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. To end the setting when using this menu, press the key and cancel the list read mode.	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	-
HD	This selects the hard disk. (Note) This menu is indicated as Data server for the MELDAS610M, 630M and 650M.	C	-
IC card	This selects the IC card. (Note) Use a recommended IC card that matches the Mitsubishi quality standards. (Refer to section "3.3 Data Input/Output screen" for the recommended products.)	C	-
Ethernet	This selects Ethernet.	C	-
FLD	This selects the floppy disk.	C	-

- (Note 1)** The devices that can be used differ according to the operations 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 Operate screen

- 1)

Select the Operation search screen.

 → The Operation search screen appears. The following menu appears.

Search exec	Verify stop	Stop cancel	Device select	Dir change	List update	From list
-------------	-------------	-------------	---------------	------------	-------------	-----------

- 2)

Select the device.
Menu Device select

 → The menu for the selection devices appears.

Memory	RS232C	HD	IC card		FLD	
--------	--------	----	---------	--	-----	--

- 3)

Select the menu HD.

 → The selected device name appears in the device setting column. The HD root directory (\) appears.

Device HD
 Directory \

- 4) Device: HD, FLD and IC card

Press the menu Dir change.

 → The mode for inputting the directory name entered.

- 5) Device: HD, FLD and IC card

Set the directory path.
/PROGRAM INPUT

 → The set directory path appears.

Device HD
 Directory /PROGRAM

O
N
B

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

- Input 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.

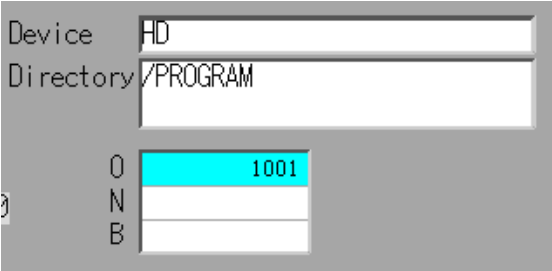
CHAPTER 1 SCREEN OPERATIONS
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6)

Designate the file name
(program No.).
1001

➔

The set file name appears on the screen.



The screenshot shows a screen with the following elements:
- 'Device' field: FD
- 'Directory' field: PROGRAM
- A list of options: O, N, B
- The 'O' option is highlighted in cyan, and the number '1001' is displayed to its right.

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.

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

7)

Set the sequence No. and block
No. in N, B respectively.

➔

Each set No. appears in the setting column.
Refer to the Operation search explanation for details.

8)

Press the menu key
.

➔

The search starts.
A message appears when the search is completed.

CHAPTER 1 SCREEN OPERATIONS
1. Operating the Setting and Display Unit

(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	HD	IC card	Ethernet	FLD	
--------	--------	----	---------	----------	-----	--

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.

Program	Tool offset	Variabl		Tool life		User param	Machine param	System param	

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.

CHAPTER 1 SCREEN OPERATIONS
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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						
-----------	--	--	--	--	--	--

(Note) If the device is set to memory, and the directory is not the program, the file name does not need to be set.

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 designation) display area. → The B display area is validated and the cursor appears.

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

Memory	RS232C	HC	IC card	Ethernet	FLD	
--------	--------	----	---------	----------	-----	--

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

A : Device	: FLD
Directory	:
File	:

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

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

13) Input the directory path.
 /PROGRAM/TEST **INPUT** → The input directory path appears.

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

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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.

14)

Press the menu **File name**.



The mode for inputting the file name is entered.
The following menu appears.

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

15)

Input the file name.
precut **INPUT**



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

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.

CHAPTER 1 SCREEN OPERATIONS

1. Operating the Setting and 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 No. 1 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

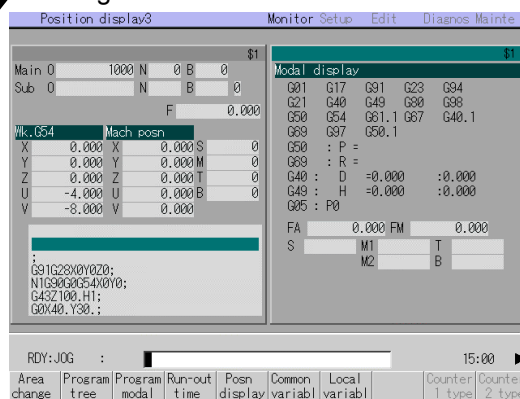
(To change the left area of the Position display3 screen to the No. 2 system)

1)

Press the menu **[Area change]**,
and validate the right area.



The right area is validated.



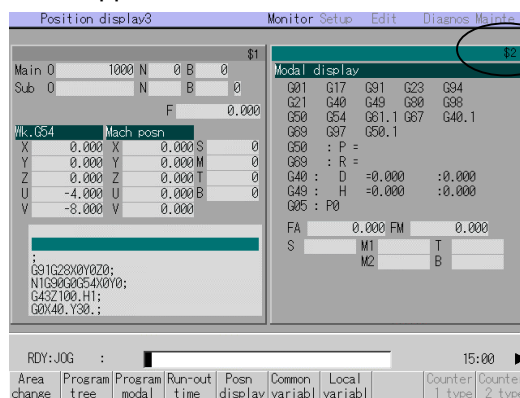
(Note) Refer to "1.5.2 Changing the valid area" for how to change the area.

2)

Press the **[\$ → \$]** key.



The details displayed on the left is the No. 2 system information.
"\$2" appears.



CHAPTER 1 SCREEN OPERATIONS

1. Operating the Setting and Display Unit



1.5.7 Changing the menu

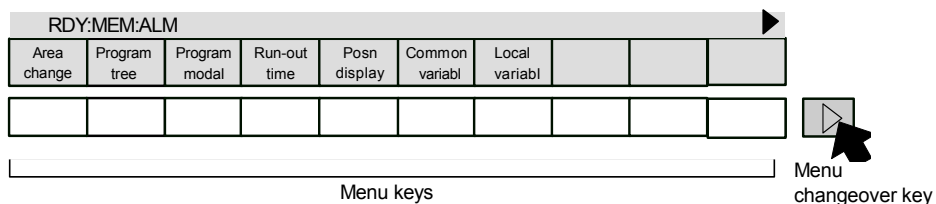
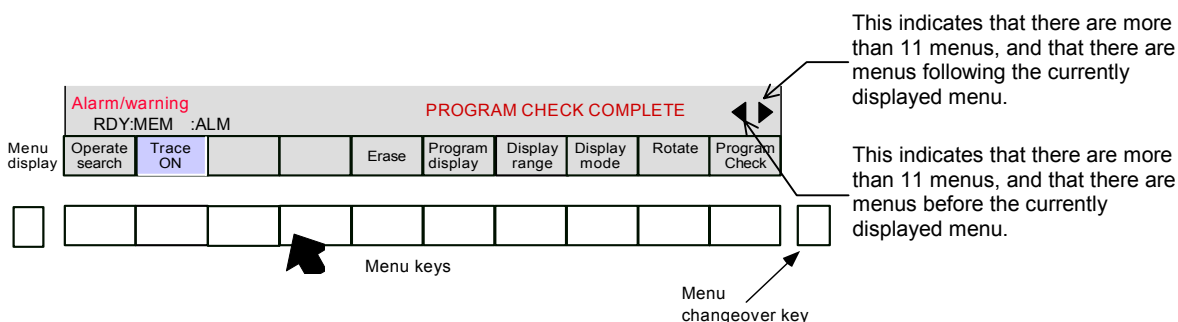
The menu can be used to select screens and to select functions or setting items. Up to ten menus can be displayed at once.

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

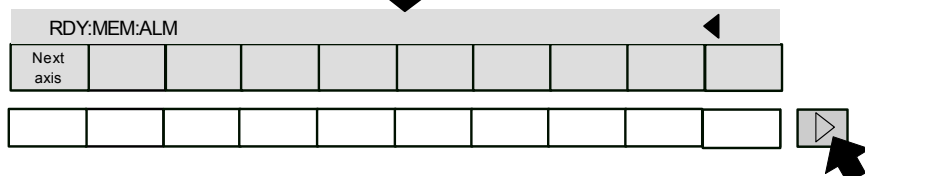
To change the menu, use the menu changeover key.

(Refer to the following figures.)

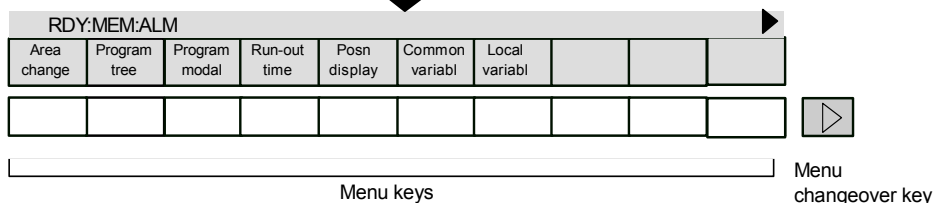
-  key : The operation menu is canceled.
 The screen selection menu for the currently displayed screen group appears.
 The display for the currently displayed menu is highlighted.
-  key : When there are more than 11 menus, this key displays the remaining menus.
 (Menu change) This key can be used when "▶" 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 and 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 Screens", this categorization is described as follows.

(Example) Explanation of menus used in Data 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	3.3.2 Transferring a file
Stop	This interrupts the process (transfer, compare, etc.) during execution.	C	

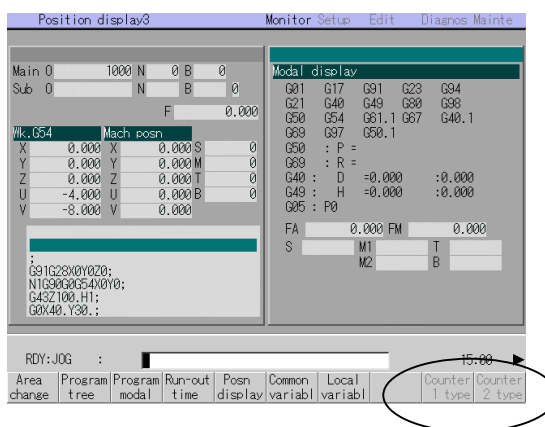
Operation when menu is pressed

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 (operation parameter "Invalid gray menu*") setting, menus that are not used can be set not to display.

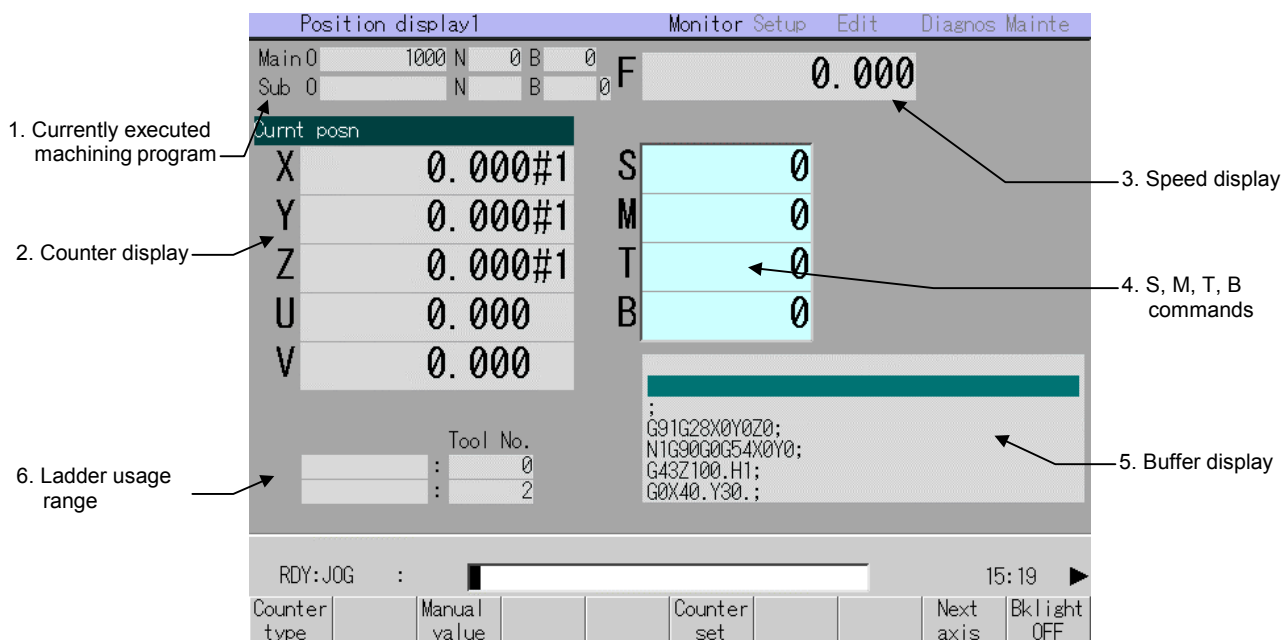
The counter display area is not valid in the screen below, indicating that the menu for selecting the counter type is invalid.



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 numeric 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 program No., sequence No. and block No. 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	In interpolation feed: This displays the vector direction speed currently being moved in. In each axis independent feed: This displays the speed of the axis with highest speed. The actual machine feedrate is displayed with the machine parameters (Real-fd).
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. 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 revising the buffer.
6. Ladder usage range	(The name of this display area differs according to the output from the ladder.)

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.	C	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 counter set is executed for each axis.	A	2.1.3 Presetting the counter
Counter expand	The counter display is expanded. (Note) This menu is not provided with the MELDAS610M, 630M or 650M.	B	-
Next axis	This can be selected when there are seven or more display axes in the selected system. The axis to be displayed is changed to the 1st to 6th axis and 7th and following axes. (Note) This is displayed when there are seven axes or more in one system.	C	1.5.4 Changing the display axis
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	-
Origin cancel	This cancels the origin. The coordinate system is shifted so the zero point of the workpiece coordinate system matches the zero point of the basic machine coordinate system.	C	2.1.3 Presetting the counter
Origin set	This sets the origin. The coordinate system is shifted so the current position becomes the zero point of the workpiece coordinate system.	C	2.1.3 Presetting the counter

(Note 1) If another screen is displayed while the counter display is expanded and then the Position display1 screen is opened again, the expanded counter will display.

(Note 2) If the counter type is changed while the counter display is expanded, the counter display will remain expanded.

(Note 3) If the C•B ESC key is pressed while the counter display is expanded, the expanded counter display state will not be canceled. To return to the normal counter display, press the Counter expand key again.

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 No. and the workpiece coordinate position in that workpiece coordinate system.	C
Mach 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
Prog posn	This displays the value obtained by subtracting the tool offset amount offset for that axis from the position actually being executed for each axis. [Program position] = [Current position] – Tool offset amount	C
Remain cmd	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
Man 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
Next cmd	This displays the command contents of the block executed after the block currently in execution during automatic operation.	C
Prog 0-pnt	This displays the position of the program zero point.	C
Err compen	This displays the error compensation amount.	C

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

(Note 2) Changeover of the counter type can be prohibited by setting the basic common parameter "Counter selct invld" to 1.

(Note 3) If the counter type is changed, the selected counter type will be held. When the power is turned ON, the previously displayed counter will be displayed.

(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	Wk co posn	Mach posn	Prog posn	Remain cmd	Man 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.

Four values each for the S command and M command, two values for the T command and one value for the 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, origin cancel)

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

The counter set, origin set and origin cancel can be executed only when the counter display is the current position.

(1) Differences between counter set, origin set and origin cancel

	Counter set	Origin set	Origin cancel
Function	A random value is set in the current position counter.	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.)	The coordinate system is shifted so the zero point of the workpiece coordinate system matches the zero point of the basic machine coordinate system. This is equivalent to "G92 G53 X0". (When X is the target axis.)
Changes in the counter value	The setting data appears in the current position counter only.	The current position counter and workpiece coordinate counters become "0".	The current position counter matches the machine coordinate counter.
Offset	–	The G92 shift amount is updated.	The G52 shift amount of the G92 shift amount and G54 to G59 shift amount becomes "0".

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 No. 1 axis of the current position counter.

Curnt posn		
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



Curnt posn		
X1	123.435#1	
Y1	62.735#1	
Z1	804.017#1	
V1	180.203#1	
W1	272.076#1	

← The cursor appears at the designated axis.

3)

Input a numeric value.
 100.000 INPUT



"100.000" appears at the cursor position.

Curnt posn		
X1	100.000#1	
Y1	62.735#1	
Z1	804.017#1	
V1	180.203#1	
W1	272.076#1	

← The set value appears at the cursor position. The cursor moves 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 or canceling the origin, carry out the following operations instead of steps 2) and 3) in the operation above.

○ To set the origin Press the menu key Origin set and INPUT.

○ To cancel the origin Press the menu key Origin cancel and INPUT.

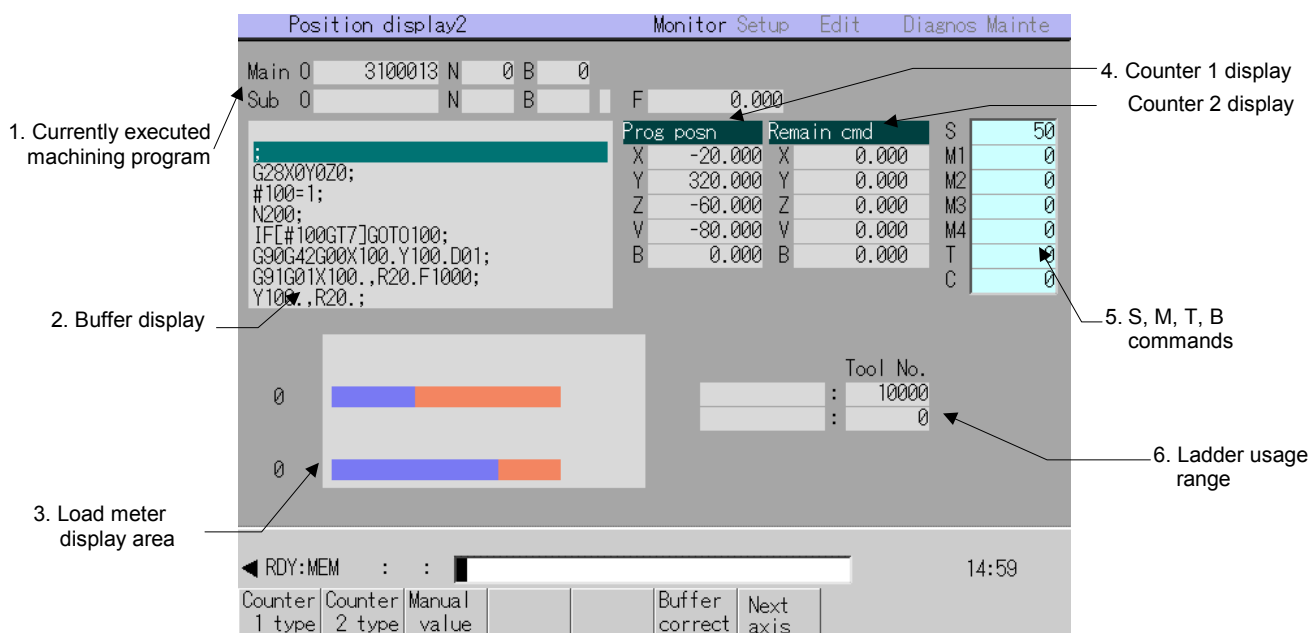
2.1.4 Changing the display axis

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.

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 revisions and manual value commands (S, M, T, B) 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 program No., sequence No. and block No. are displayed.
2. Buffer display	This displays the contents of the machining program currently being executed. The block being executed is highlighted. While revising the buffer, the work area for revisions appears. Refer to "2.2.3 Correcting the buffer" for details on revising 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. Up to four S and M commands can be displayed.
6. Ladder usage range	(The name of this display area differs according to the output from the ladder.)

CHAPTER 1 SCREEN OPERATIONS
2. Monitor (Operation) Screens

(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>	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;">Buffer correct</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 axis</div>	This can be selected when there are seven or more display axes in the selected system. The axis to be displayed is changed to the 1st to 6th axis and 7th and following axes. (Note) This is used when there are seven axes or more in one system.	C	1.5.4 Changing the display axis

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.

Four values each for the S command and M command, two values for the T command and one value for the B command can be set.

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.

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
- Machin posn
- Prog posn
- Remain cmd
- Man int amt
- Next cmd
- Prog 0-pnt
- Err compen

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

CHAPTER 1 SCREEN OPERATIONS

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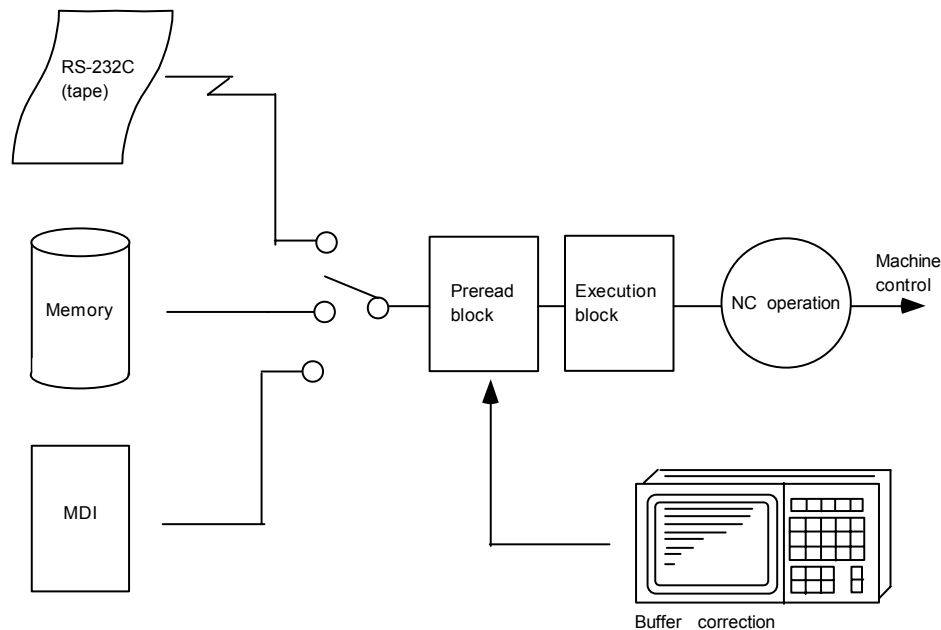
2.2.3 Correcting the buffer

(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.

(Note) When running a machining program from the external memory, even if the buffer is corrected, the revisions are not reflected on the original program.



(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.)
- 4) If an "In pre-read block" error occurs, the block in which the error occurred can be corrected.

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.



The buffer correction mode is entered.

3)

Press the key.



The buffer correction mode ends, and the corrected data is written into to 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.

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(4) Notes

■ Starting and ending buffer corrections

- 1) If automatic operation is started or there is not a next command data, the buffer correction mode is not entered even if the menu key is pressed.
- 2) If an "In 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.
- 6) The buffer cannot be corrected for a program running with HD (data server), FLD or IC card operation.

■ 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.

■ RS-232C operation buffer correction

- 1) There is a limit to the number of blocks that can be inserted for buffer correction during RS-232C operation. Normally, up to ten blocks can be added. However, depending on the execution state of the added blocks due to buffer correction, the number of blocks that can be inserted may be less than the maximum number of blocks to be added originally.
If there are not enough empty blocks and the blocks cannot be inserted, the "Can't write into file" will occur. Cancel the buffer correction being carried out.
- 2) Blanks cannot be inserted to make the machining program easier to read. The blanks in the display will be deleted when the corrections are set by pressing the **INPUT** key.
- 3) During buffer correction, if "(" is added as the first character of the comment, the closing parenthesis ")" must always be included in the same machining program as the last character of the comment.
If only a single parenthesis "(" is added without ")", a "Program end error" will occur when automatic operation is started thereafter.
- 4) The maximum number of characters that can be included in one buffer correction block during RS-232C operation is 128 characters including ";" (EOB).

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 can be pressed to change the displayed axes and display the remaining axes.

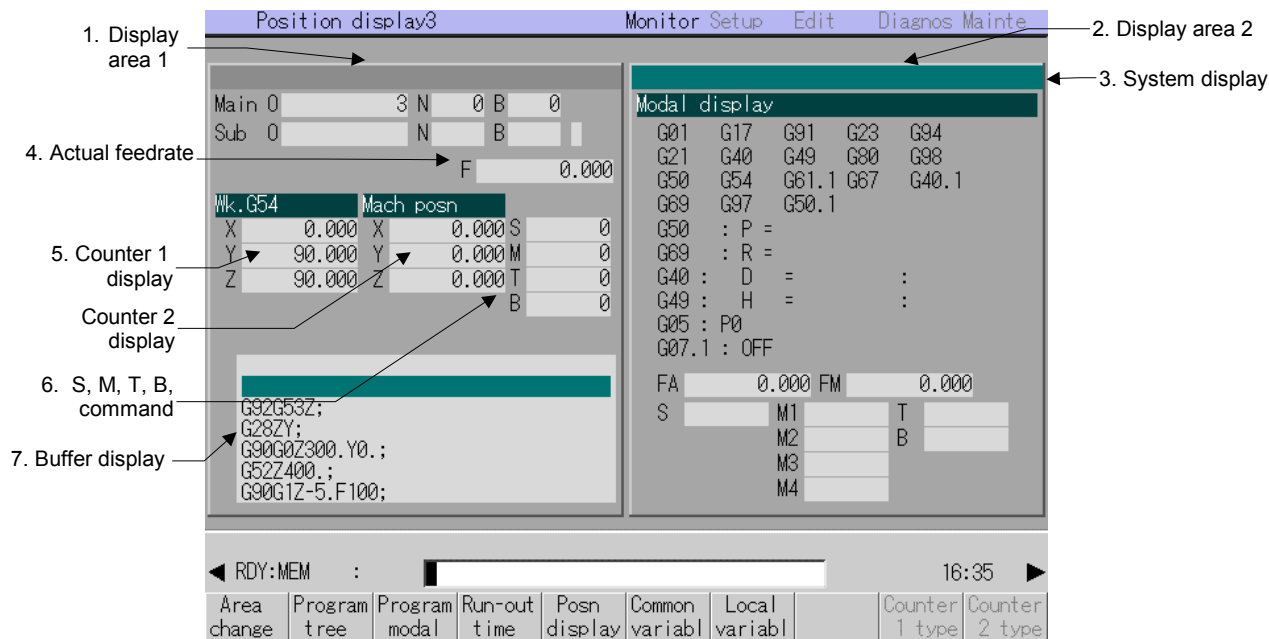
Refer to "1.5.4 Changing the display axis" for details.

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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 variabl 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 counter is selected for display area 1, the modal display for display area 2, and the display area 2 is valid.
2. Display area 2	
3. System display	This displays the currently selected system.
4. Actual feedrate	This displays the actual feedrate.
5. 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.
6. 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).
7. Buffer display	This displays the details of the currently executed machining program. The currently executed block is highlighted.

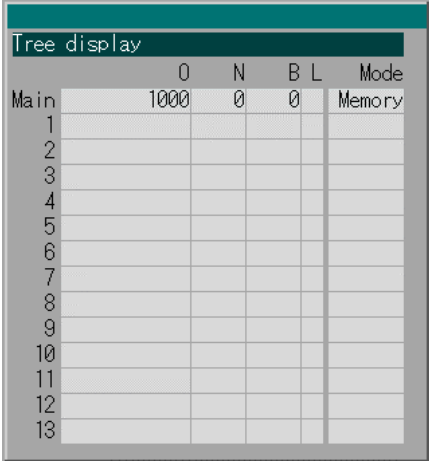
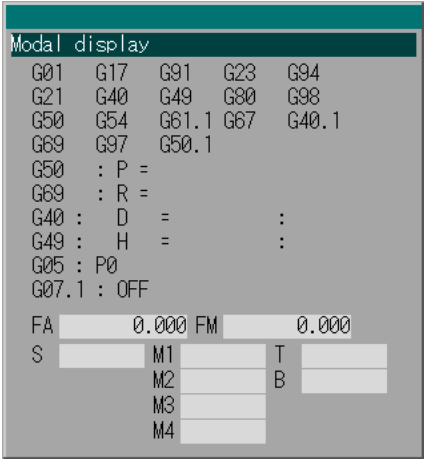
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(2) Menus

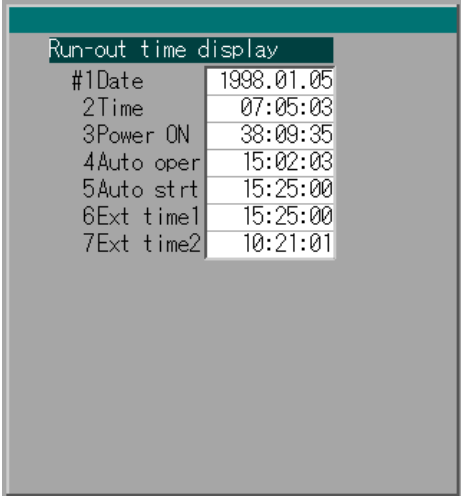
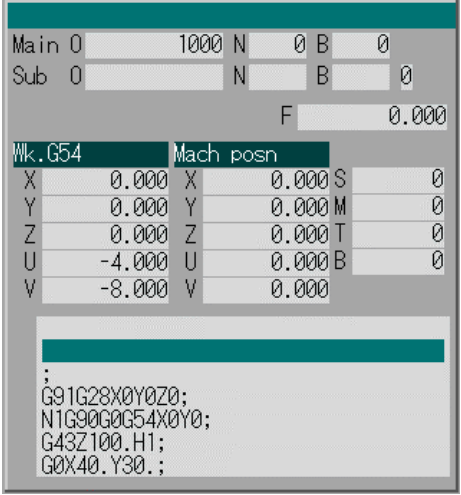
Menu	Details	Type	Reference
Area change	This changes between display area 1 and display area 2.	C	1.5.2 Changing the valid area
Program tree	The display area 1 and 2 display details are selected from these menus.	C	(3) Display area 1 and 2 details
Program modal			
Run-out time			
Posn display			
Common variabl			
Local variabl			
Counter 1 type Counter 2 type	The counter type displayed when Posn display is selected is selected from the menu. The display details and selection method are the same as the Position display1 screen and Position display2 screen.	C	2.1.1 Changing the counter display
Next axis	This can be selected when there are seven or more display axes in the selected system. The axis to be displayed is changed to the 1st to 6th axis and 7th and following axes. (Note) This is used when there are seven axes or more in one system.	C	-
Variabl No.	A random variable No. can be selected. When the variable No. is set and the INPUT key is pressed, the variables appear with that variable No. at the top. The cursor moves to the details of that variable No.	A	2.7.1 Setting common variables 2.8.1 Displaying local variables
Display level	A display level can be selected in a valid area. When the level (0 to 4) to be displayed is set and the INPUT key is pressed, the local variables appear from the top of that level. The cursor appears at the top variable No.	A	2.8.1 Displaying local variables
Abs/Inc	This changes between the absolute and incremental value setting modes. 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	This sets the incremental time.	A	2.3.2 Setting the incremental time

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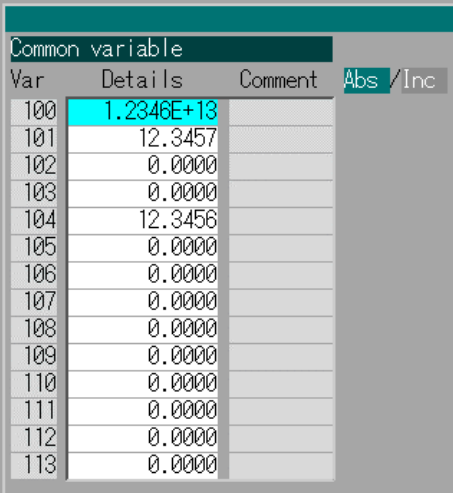
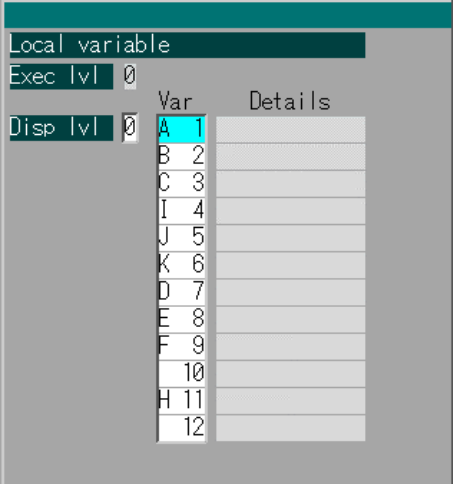
(3) Display area 1 and 2 details

Menu	Display details	Details																		
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">Program tree</div>		<p>This displays the main program, subprogram, MDI interrupt and user macro call nesting structure. This information is held even when the NC power is turned OFF, and thus is handy for resuming program execution.</p> <p>O : Program No. N : Sequence No. B : Block No. L : Remaining number of subprogram repetitions</p> <p>Mode : Operation mode 1 to 13 : Called subprogram, user macro call and MDI interrupt</p>																		
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">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="0"> <tr> <td style="vertical-align: top;">G01...G94</td> <td style="vertical-align: top;">Status of currently executed G command modal</td> </tr> <tr> <td style="vertical-align: top;">G66.1...G50.1</td> <td style="vertical-align: top;">Scaling magnification</td> </tr> <tr> <td style="vertical-align: top;">G50: P=0.000001</td> <td style="vertical-align: top;">Coordinate rotation angle (Displays within a $\pm 360^\circ$ range)</td> </tr> <tr> <td style="vertical-align: top;">G68: P=50.000</td> <td style="vertical-align: top;">Tool length offset modal Offset No. Shape offset amount in respect to tool radius Tool radius wear amount</td> </tr> <tr> <td style="vertical-align: top;">G41: D1 =30.000: 0.040</td> <td style="vertical-align: top;">Tool length offset modal Offset axis name Offset No. Offset amount Tool length wear amount</td> </tr> <tr> <td style="vertical-align: top;">G43: Z H20 =250.500: 0.240</td> <td style="vertical-align: top;">High-speed machining mode modal</td> </tr> <tr> <td style="vertical-align: top;">G05: P0</td> <td style="vertical-align: top;">Cylindrical interpolation modal</td> </tr> <tr> <td style="vertical-align: top;">G07.1: OFF</td> <td style="vertical-align: top;">F modal value of currently executed program command Manual feedrate</td> </tr> <tr> <td style="vertical-align: top;">FA 200.00 FM 1200.00</td> <td style="vertical-align: top;">Program command modal value of each currently executed command S command M command T command 2nd miscellaneous function (B) command</td> </tr> </table>	G01...G94	Status of currently executed G command modal	G66.1...G50.1	Scaling magnification	G50: P=0.000001	Coordinate rotation angle (Displays within a $\pm 360^\circ$ range)	G68: P=50.000	Tool length offset modal Offset No. Shape offset amount in respect to tool radius Tool radius wear amount	G41: D1 =30.000: 0.040	Tool length offset modal Offset axis name Offset No. Offset amount Tool length wear amount	G43: Z H20 =250.500: 0.240	High-speed machining mode modal	G05: P0	Cylindrical interpolation modal	G07.1: OFF	F modal value of currently executed program command Manual feedrate	FA 200.00 FM 1200.00	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 incremented time in each NC operation state. Refer to "2.3.2 Setting the incremental 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 incremented 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 incremented 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: This displays the counter and manual value command. The details displayed in the counter 1 and 2 can be selected from the menu Counter1 type and Counter2 type submenus. Refer to "2.1.1 Changing the counter display" for details. The command values for S, M, T and B are displayed.</p> <p>Lower line: This displays the program currently being executed in the buffer. Note that the buffer must be revised on the Position display1 or 2 screen.</p>

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Menu	Display details	Details
<div style="border: 1px solid black; padding: 2px; width: fit-content;">Common variabl</div>		<p>This displays or sets the details of the common variables. 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 "2.7.1 Setting common variables" for details on setting.</p>
<div style="border: 1px solid black; padding: 2px; width: fit-content;">Local variabl</div>		<p>This displays the details of the local variables.</p> <p>There are 1 to 33 local variables for each subprogram call level in the user macros. For each level, 33 local variable data items are displayed. These are configured from level 0 to level 4 in page order. If a block containing a variable command is executed, the details are rewritten.</p> <p>Refer to "2.8.1 Displaying local variables" for details on the display.</p>

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
- Prog posn
- Next cmd
- Work co posn
- Remain cmd
- Prog 0-pnt
- Machin posn
- Man int amt
- Err compen

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

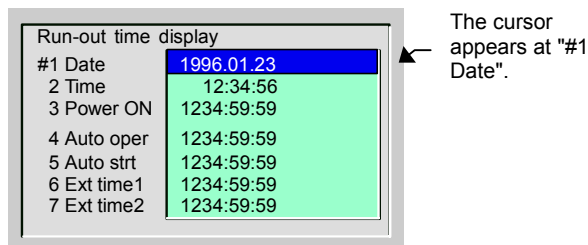
2.3.2 Setting the incremental time

Each data for the incremental time display is set.

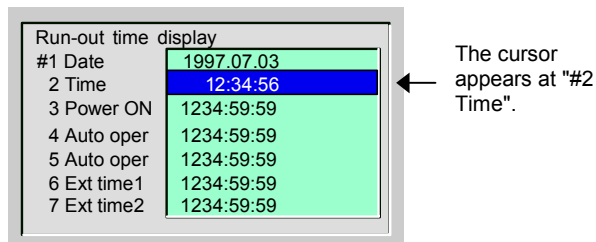
(1) Operation method

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



3) Set the current data (ex.; "1997.07.03"), and press the INPUT key. → "1997.07.03" 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.

2.3.3 Changing the display system

The currently displayed data system can be changed by pressing the key.
Select an area, and press the key.
Refer to "1.5.6 Changing the display system" for details on each item.

2.3.4 Changing the display axis

If all axis counters cannot be displayed when the counters are displayed in display area 1 or 2, the key can be pressed to display the remaining axes.

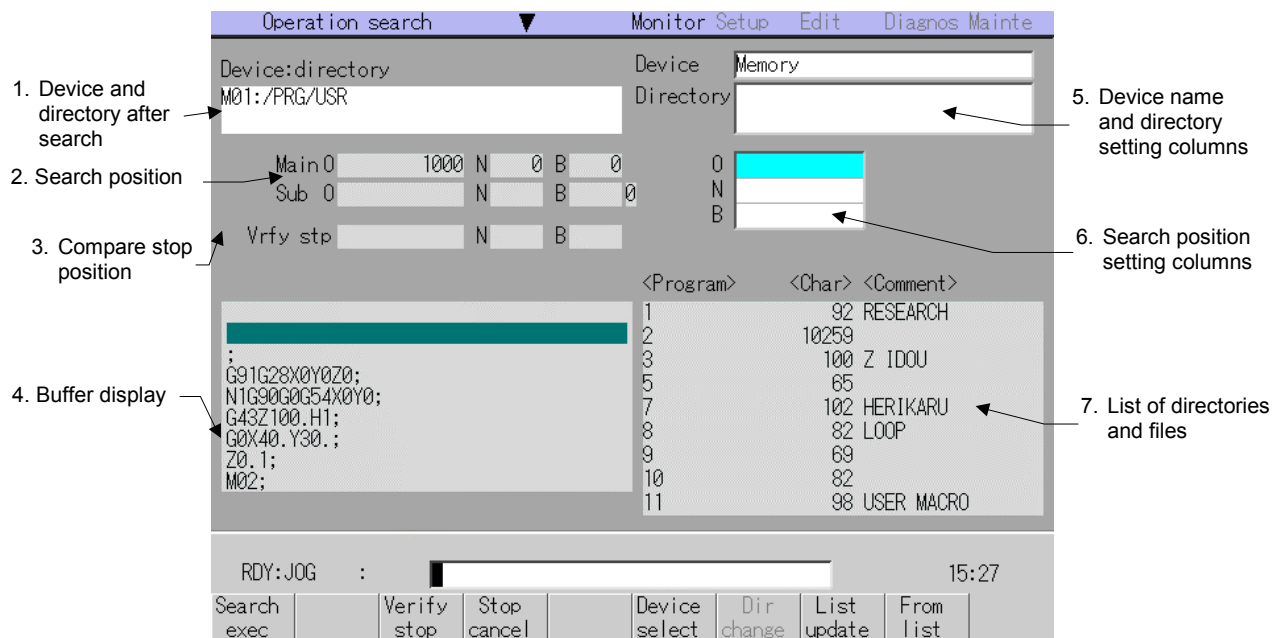
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2.4 Operation Search screen

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.

This screen is also used to designate the position to execute compare stop.



(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. Compare stop position	This displays the program position to carry out compare stop. This display is cleared when the program stop is ended, when the NC is reset, or when canceled.
4. Buffer display	This displays the contents of the currently executed or searched machining program. The block being executed is highlighted.
5. Device name and directory setting columns	This displays the device name and directory designated when the program was selected.
6. Search position setting columns	This sets the program No. (O), sequence No. (N) and block No. (B) of the program to be searched.
7. List of directories and files	This displays a list of the contents contained in the device or directory displayed at item 5. To update the list contents, press the menu key. To scroll the list, use the  and  keys. This list will not appear when the screen is changed. When the operation parameter "List comment type" is set and the HD (DS), FLD or IC card list is displayed, the date of file creation, file size or machining program comment will display at the <Comment> field.

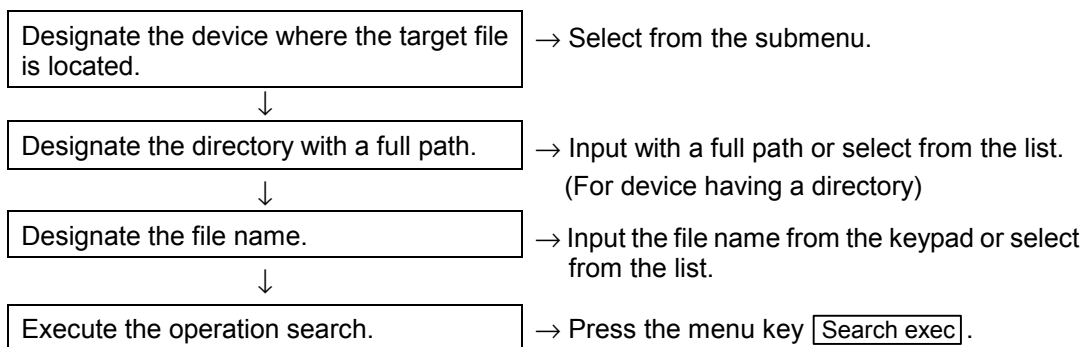
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(2) Menus

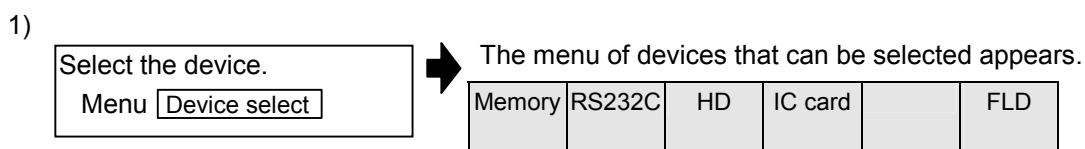
Menu	Details	Type	Reference
Search exec	This executes an operation search based on the input program No. (O), sequence No. (N) and block No. (B). After the search is completed, each number is cleared.	C	2.4.1 Executing an operation search
Verify stop	This executes compare stop. The positions of the O, N and B Nos. currently displayed in the compare stop position display column are registered as the stop position.	C	2.4.2 Executing verify stop
Stop cancel	This cancels the compare stop setting. Note that the automatic operation is not reset.	C	
Device select	This displays the device menu. Select which device program to search for from this menu. If a device having a directory is selected, the root is selected first.	A	2.4.1 Executing an operation search
Dir change	This enters the mode for inputting the directory name. (Note) This menu does not change when the device is "Memory".	A	
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	

2.4.1 Executing an operation search

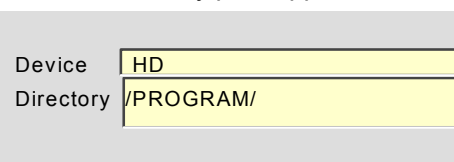
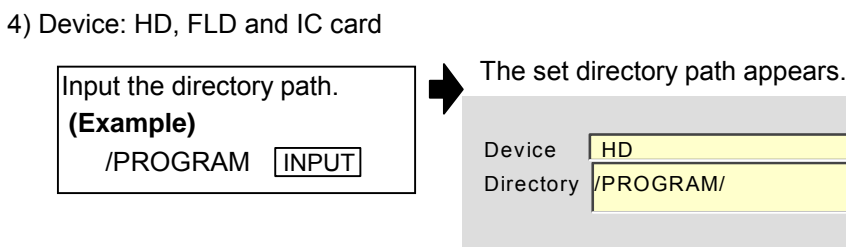
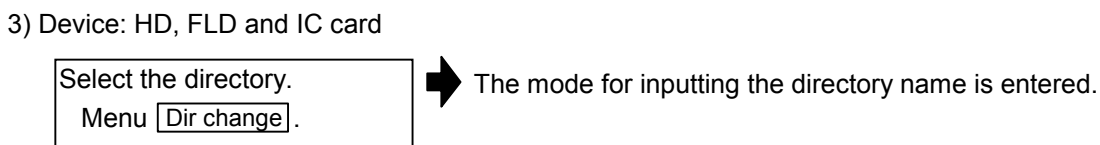
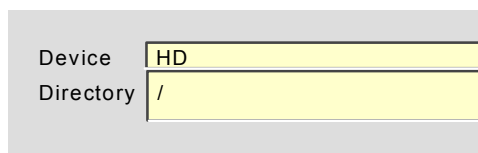
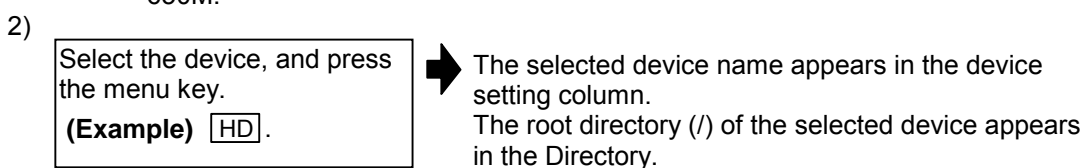
(1) Operation search operation sequence



(2) Operation method



(Note) The menu key **HD** will display as **Data server** for the MELDAS610M, 630M and 650M.



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.

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

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5)

Input the program No.
(Example)
1001

Set the sequence No. and block No. in N and B respectively.



Each set No. appears in the setting column.

Device	<input type="text" value="HD"/>
Directory	<input type="text" value="/PROGRAM"/>
O	<input type="text" value="1001"/>
N	<input type="text"/>
B	<input type="text"/>

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

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

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

6) Device: RS-232C

Enter the 1001 file output enabled state with the external device.

7)

Press the menu key
.





The search starts.
When the search is completed, a message indicating the end of the search appears.
The device and directory after searching and the search position appear, and the contents of the setting column on the right side of the screen are cleared.

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(3) Notes when executing operation search

■ Device and 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.
- 4) When operating with the RS-232C, the settings of parameters related to the data input/output and the settings of the operation device must match. Refer to "3.5.4 Input/Output Parameter screen" for details on each data input/output parameter.
- 5) Use a recommended IC card that matches the Mitsubishi quality standards. Refer to section "3.3 Data Input/Output screen" for details.

■ 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
 - When the searched sequence No. is erased
 - When the block corresponding to the searched block No. 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.

2.4.2 Executing verify stop

(1) To register the verify stop

1)

Set the program device and directory for executing verify stop.



The selected device name and directory path appear in the setting column.

2)

Set the program No., and press the **INPUT** key.
Set the sequence No. and block No. in N and B respectively.



The set numbers appear in the setting column.

Device	HD
Directory	/PROGRAM
O	1001
N	
B	

When carrying out a verify stop of the MDI, set "0" for the program No.

(Note) If the list contents differ from the actual directory, press the **List update** menu.

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3)

Press the menu key
.

4)

Start the automatic operation.



When the verify stop is completed, a message indicating the end appears.
The stop position displayed on the screen is displayed.

(Note 1) When registering the stop position (O, N and B values), confirm that the block exists in the searched program. If the block corresponding to the registered stop position is not found, operation continues without executing compare stop.

Always set one of O, N or B.

(Note 2) If none of the numbers are set, a setting error occurs.

(Note 3) If one or two of O, N and B Nos. are set, the other numbers not set are ignored during the search.

(Note 4) Verify stop can also be registered during operation.

(2) Canceling the verify stop

1)

Press the menu key
.



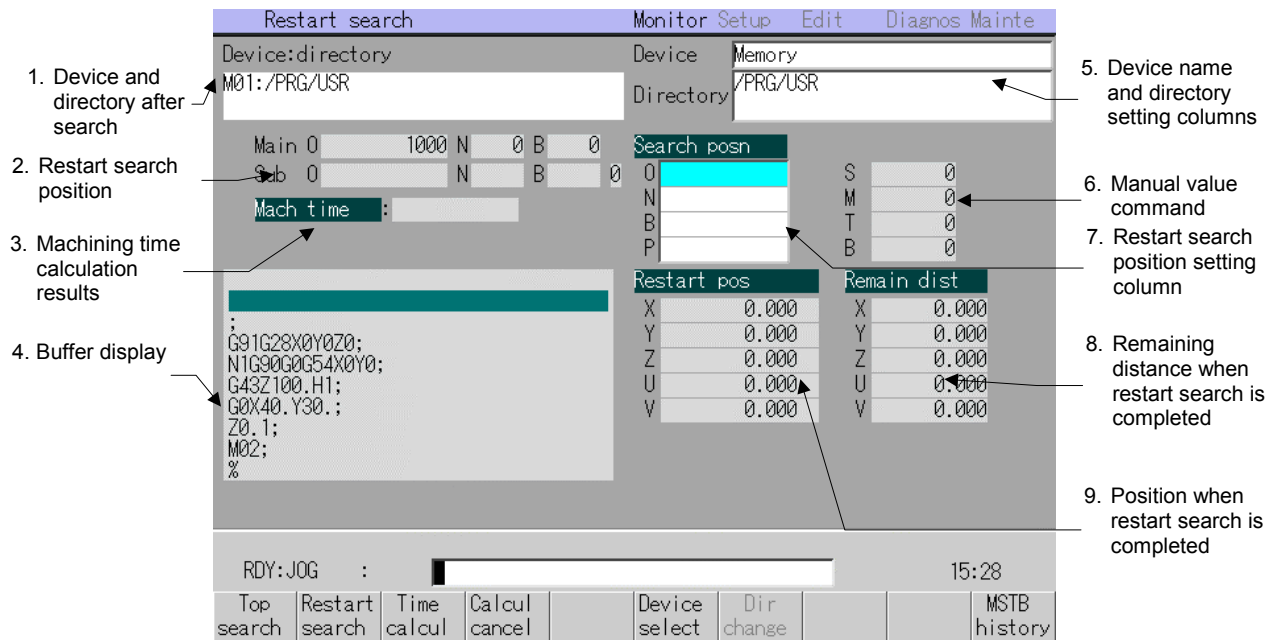
The stop position displayed on the screen is cleared.

(Note) Verify stop can also be canceled during operation.

2.5 Restart Search screen

Restart search for resuming machining after being interrupted due to tool damaged, etc., is executed on this screen. When restart search is executed, machining can be resumed while maintaining the modal up to the restart position.

The machining time can also be calculated on this screen.



(1) Display items

Display item	Details
1. Device and directory after search	This displays the device and directory where the restart searched machining program is located.
2. Restart search position	This displays the restart searched position (program No., sequence No., block No.). If a subprogram is searched, those numbers also display.
3. Machining time calculation results	This displays the machining time after calculation.
4. Buffer display	This displays the contents of the currently executed or restart searched machining program. The block being executed is highlighted.
5. Device name and directory setting columns	If a device or directory is designated during program selection, it is displayed here.
6. Manual value command	This displays the latest command.

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Display item	Details	
7. Restart search position setting column	This displays the program No. (O), sequence No. (N), block No. (B) and the No. of block executions (P) of the program being restart searched (including top search), or the program that is the target of the machining time calculation. These are cleared after restart search is completed.	
	O	This sets the program No., sequence No. and block No. targeted for search and machining time calculation.
	N	(Note) The program No. cannot be omitted for restart search.
	B	
P	This sets the number of block executions (number of times before restart) targeted for the search and machining time calculation. For example, if a block in a subprogram is searched, and the subprogram is called out several times, the block to be searched is also executed several times. Thus, which execution block to search must be set. To search the block executed first, or if the block is executed only once, this item does not need to be set. If "0" is set, the first execution block is the target.	
8. Remaining distance when restart search is completed	This displays the remaining distance when the restart search is completed.	
9. Position when restart search is completed	This displays the position on the local coordinate system when the restart search is completed.	

(2) Menus

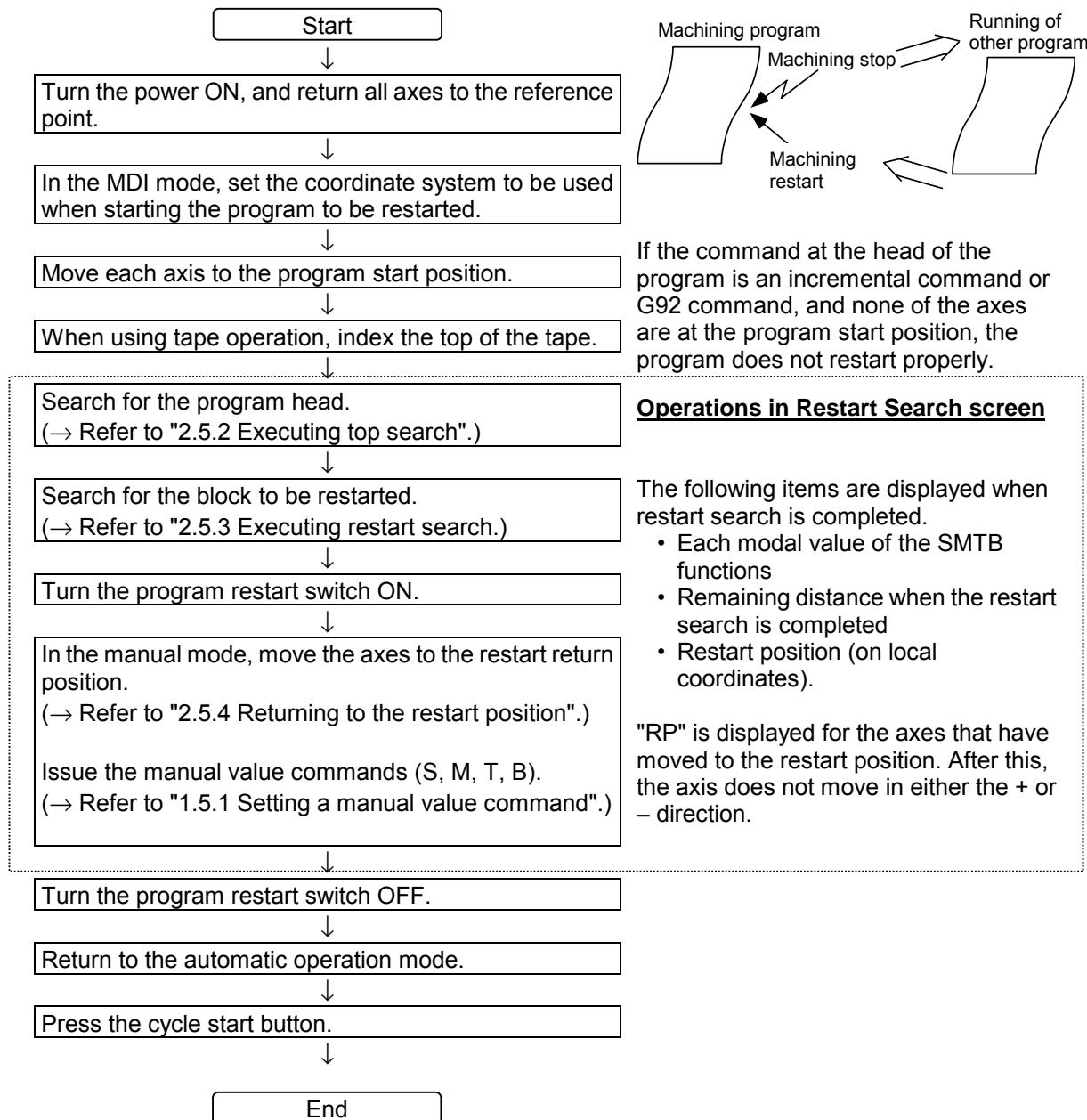
Menu	Details	Type	Reference
Top search	This executes a top search based on the device, directory, program No. (O), sequence No. (N) and block No. (B) in the setting columns.	C	2.5.2 Executing top search
Restart search	This executes a restart search based on the device, directory, program No. (O), sequence No. (N), block No. (B) and the No. of block executions (P) in the setting columns.	C	2.5.3 Executing restart search
Time calcul	This calculates the machining time when the program is executed.	B	2.5.6 Calculating the machining time
Calcul cancel	This cancels the machining time calculation process.	C	
Device select	This displays the device menu. Select the device storing the program to be searched from the menu.	A	2.4.1 Executing an operation search (2) Operation method
Dir change	This enters the mode for inputting the directory name.	A	
From list	Press this key to select a directory, file name or program No. from a list. The selection cursor will appear in the list, and a random item can be selected.	A	
MSTB history	This displays the history of S, M, T and B. When the cursor is moved and the INPUT key pressed, that value becomes the current modal value of that operation.	A	2.5.5 Setting the S, M, T and B current modal values

2.5.1 Operation sequence for restarting program

Before restart searching for the machining program to be restarted, if a machining program differing from that program is being run in the tape or memory modes, etc., the machining program to be restarted can be restarted using the following operation.

The program can also be restarted when the coordinate system from the previous automatic operation and the coordinate system for machining restart are to be changed.

- All necessary items (setting the coordinate system, etc.) required for running the machining program must be carried out before starting restart search.
- The head of the program to be restarted must be searched for. (Top search)



2.5.2 Executing top search

Top search is used to designate the start position in the program at a random position when executing restart search and machining time calculation.
Always carry out top search.

(1) Operation method

1)

Set the program device and directory for top search.



The selected device name and directory path appear in the setting column.

Device	HD
Directory	/PROGRAM

(Note) The setting method is the same as operation search. Refer to "2.4.1 Executing an operation search".

2)

Set the program No., and press the key.



The set numbers appear in the setting column.

Set the sequence No. and block No. in N and B respectively.

(Note) Always set the program No.

3)

Press the menu key .



Top search starts. When top search is completed, a message appears.
The setting column contents are cleared.

(2) Notes for top search

- 1) Always carry out a top search before restart search. An operation error occurs if not carried out.
- 2) O No. (program number) cannot be omitted.
- 3) If one or two , N and B Nos. are set, the numbers that are not set are ignored.

2.5.3 Executing restart search

Restart search is used to designate the position to restart the program.

The search completion position (position on the local coordinate system) is the setting value of the O, N, B and P items when the menu key is pressed. "Restart Pos" appears on the screen when completed.

The modal information of the S, M, T and B (latest 16 Ms) in the program are sequentially updated and displayed so that the program up to the restart position is executed.

Each modal information at the completion of the search is used at the next automatic start as the current modal values.

(1) Operation method

1)



The selected device name and directory path appear in the setting column.

The setting method is the same as that for an operation search. Refer to section "2.4.1 Executing an operation search".

Device	<input type="text" value="HD"/>
Directory	<input type="text" value="/PROGRAM"/>

2)



The set numbers appear in the setting column.

Set the sequence No. block No. and No. of block executions in the same manner in N, B and P respectively.

(Note 1) Steps 1) and 2) are the same as for operation search and top search. Refer to "2.4.1 Executing an operation search".

(Note 2) Always set the program No.

(Note 3) P sets the number of times that the block targeted for the search (or machining time calculation) appears.

For example, if a block in a subprogram is searched, and the subprogram is called out several times, the block to be searched is also executed several times. Thus, which execution block to search must be set. (If "0" is set, it is handled in the same manner as "1".)

To search the block that appears first, or to search for a block executed only once, this item does not need to be set.

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3)

Press the menu key
.



Restart search starts.

A message appears when restart search is completed.

When the menu key is pressed, each

type of modal information in the program is displayed.

The latest 16 items are displayed for M, and the latest 3 items are displayed for S, T and B respectively.

MSTB History				
T	101	100		
S	3500	1000	1000	
B	22			
M	96	11	10	9
	97	8	7	6
	98	5	4	3
	99	3	2	1

The restart position and restart remaining distance displays for each axis.

4)

Move the cursor to the value
in the MSTB history display to
be set as the current modal
value.
Then press the key.



The selected item becomes the current modal value and
is used for the next automatic operation.

(2) Notes for restart search

■ Returning to the restart position

- 1) Do not carry out the following operations. Doing so prevents correct returning to the machining restart position.
 - Changing the conditions such as tool offset amount or parameters after restart search is executed.
 - Set the various conditions such as tool offset amount and parameters before executing restart search.
 - Carrying out automatic operation or MDI operation before starting the program that is restart searched.
 - Using user macro external signal input, machine coordinate read or external mirror image, etc., in the restart searched program.
 - Carrying out operations such as manual or MDI interrupt to shift the coordinate systems when executing the previous machining program.

■ NURBS interpolation mode

- 1) A block in the NURBS interpolation mode cannot be designated as a restart position. A search error will occur.
- 2) If a block immediately after the NURBS interpolation mode is designated as the restart position, the restart search will be completed. However, when restarting, the modal in the blocks in the NURBS interpolation mode is used so an illegal operation will take place. At this time, the "Research after NURBS invalid" error will occur when starting, and starting will be inhibited.

■ Restart search

- 1) A macro statement block cannot be searched.
To restart search a macro statement, turn the control parameter "Macro single" ON, and execute restart search.
Note that due to the radius compensation, corner R/C or geometric pre-read block, the tool path may change.
- 2) The program No. cannot be omitted when carrying out a restart search.
If the program No. is omitted, an error occurs, and restart search cannot be executed. Set the program No., and restart the operation.
- 3) When restart search is executed, the commands for S2 to S4 will all be input as S1 data.
- 4) If the N or B Nos. are not set, the other numbers not set are ignored.
- 5) If the menu key MSTB history is pressed after restart search is completed, the command values for S, M, T and B display. Note that at this stage, the values are only displayed and are not valid.
Before operating, use the cursor to select the value to be used as the current modal value, and press the INPUT key.

2.5.4 Returning to the restart position

The method for returning to the restart position (manual/automatic) after restart search is completed can be selected with the parameters.

(1) Manual return to restart position

The program restart switch is turned ON, and the axis is moved to the restart position manually.

1) Turn the restart switch ON.

2) Enter the manual (JOG/rapid traverse) mode.

3) Move the axis in the restart return direction.



The sequential restart position and "RP" appear from the axes that have been returned. The Restart remaining distance is "0".

Restart pos	Remain dist
X1-123456.678 RP	X1 0.000
Y1-123456.678 RP	Y1 0.000
Z1 100.000	Z1 100.500
A1 0.000	A1 -200.600
B1 120.000	B1 103.678
C1 5000.500	C1 -10000.000
U1 10.001	U1 50.005
V1 0.500	V1 300.100

4) When all axes have been returned, turn the restart switch OFF.

- (Note 1)** When the restart switch is ON, move the axis in the same direction as the restart direction. An operation error occurs if the axis is moved in the opposite direction.
- (Note 2)** After restart position return is completed, the axis cannot be moved if the restart switch is ON.
- (Note 3)** During cycle start, if there is even one axis that has not completed restart position return, the "Operation error" occurs.

Note that if the axis has been returned to the restart position once and is not at the restart position during cycle start, the operation error does not occur.

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(2) Automatic return to restart position

If the "#320020 Auto restart valid" parameter on the Control Parameter screen is turned ON and cycle start is executed, all axes simultaneously return to the restart position with dry run. After return is completed, machining restarts.

- (Note 1) In the manual or MDI mode, remove the axis to a position where the tool does not contact the workpiece, and then execute cycle start.
- (Note 2) Even if the "Auto restart valid" parameter is ON, the axis can be returned to the restart position manually.
- (Note 3) If the axis is returned to the restart position manually once and then is moved from that restart position, the axis does not return to the restart position even if automatic return to restart position is executed.
- (Note 4) If the manual mode is entered and the axis is moved during the automatic restart position return, the return position after restarting will be shifted by the amount the axis was moved manually. In this case, the restart remaining distance will not be 0 when automatic restart position return is completed.

2.5.5 Setting the S, M, T and B current modal values

After restart search is completed, if the menu key is pressed, the modal values of S, M, T and B used in the machining program appear. After restart search is completed, the S, M, T and B function settings can be made manually before executing reset or cycle start.

The maximum number of displayed codes are 16 for M, three for S, three for T and three for B. If there are many codes used for machining, the recently used codes are displayed. To designate the current modal value of each command, move the cursor to select the value, and press the key.

Codes that are not displayed cannot be commanded on this screen. Execute the manual value command on the Position Display 1 or 2 screen.

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

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2.5.6 Calculating the machining time

The machining program can be sequentially read at a high speed without moving the machine, and the approximate machining time can be calculated. The calculated results are displayed in the order of Hour: Minute: Second in "Mach time".

The position to start the machining time calculation is designated on the Check Search or Restart Search screen. (The designation method is the same for both the check search and restart search.)

When the machining time has been calculated, the origin automatic start standby state is returned to. When carrying out automatic operation, execute operation search to restart machining.

(1) Basic operation method

Basically, the time is calculated by designating the program for calculating the time, and pressing the menu key Time calcul. However, the operation procedure differs when the range for calculating the machining time is to be designated.

Refer to operation examples 1 to 2 for details on each operation.

The outline of operations required to designate each range is shown below.

	Calculation target range		Setting method		Reference
	Start position	End position	Start point	End position setting (Note)	
1	Random position in machining program	End of same machining program	Set start position, and execute top search	<ul style="list-style-type: none"> • Same program No. as top search 	Operation example 1
2	Random position in machining program	Random position in same machining program	Set start position, and execute top search	<ul style="list-style-type: none"> • Same program No. as top search • End position (sequence No., block No., etc.) 	Operation example 1
3	Random position in machining program	Random position in other machining program	Set start position, and execute top search	<ul style="list-style-type: none"> • Program No. when completed • End position (sequence No., block No., etc.) 	Operation example 2

(Note) After setting according to the "End position" in the "Setting method", press the Time calcul key.

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Operation example 1

(Calculating the machining time from midway in the program to the end of the same program.)

1)

Designate the start position.
Top search to position for
starting machining time
calculation.

- Machining program
device, directory
- Program No., sequence
No., block No.



The selected device name, directory path and program No., etc., appear in the setting column. When the search is completed, the message "Top search completed" appears.

(Note 1) Refer to "2.5.2 Executing top search" for details on how to execute top search.

(Note 2) Always set the program No.

2)

Reset the device, directory
and program Nos. designated
in step 1).



The set numbers appear in the setting column.

(Note 1) If the end position is designated as a random position instead of the program end, set the end position sequence No. and block No. here.

(Note 2) Always set the program No.

(Note 3) If the program differs from the start and end of the machining calculation, refer to "Operation example 2".

3)

Press .



The machining time calculation starts. When the machining time is calculated, a message appears. The calculation results appear in "Mach time" on the screen.

The setting column contents are cleared.

Press the menu key to cancel the calculation process.

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Operation example 2

(Calculating the machining time to a random position in another program)

1)

Designate the start position.
Top search to position for
starting machining time
calculation.
→ Refer to step 1) of
"Operation example 1".



The selected device name, directory path and program No., etc., appear in the setting column. When the search is completed, the message "Top search completed" appears.

(Note 1) Refer to "2.5.2 Executing top search" for details on how to execute top search.

(Note 2) The other program refers to a subprogram, etc., called out during this machining. If a program that is not called out in this machining is designated, the time is calculated to the end of machining.

(Note 3) Always set the program No.

2)

Designate the end position
and its program No.
• Machining program
device, directory
• Program No., sequence
No., block No. (number of
executions to restart), etc.



The set numbers appear in the setting column.

(Note) Always set the program No.

3)

Press .



The machining time calculation starts. When the machining time is calculated, a message appears. The calculation results appear in "Mach time" on the screen.

The setting column contents are cleared.

Press the menu key to cancel the calculation process.

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(2) Details displayed on screen during machining time calculation operation

■ Screens displayed during and after machining time calculation

MSTB History				
T	101	100		
S1	3500	1000	1000	1000
S2	3500	1000	1000	1000
S3	3500	1000	1000	1000
C	22			
M	96	11	10	9
	97	8	7	6
	98	5	4	3
	99	3	2	1

(Screen displayed when the menu key MSTB history is pressed.)

- 1) The time in the "Mach time" column is displayed in the order of Hour: Minute: Second. The value can be cumulated up to 1193:02:47.
- 2) The S, M, T and B displays indicate the codes these commands are issued during the time calculation.
For M, a list of up to 16 sets can be displayed in the commanded order.

(Note 1) The calculated machining time data is held until the machining time calculation is carried out next.

(Note 2) The S, M, T and B code data is erased at the top search and machining time calculation continuation.

The data can also be erased by selecting Calcul cancel.

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(3) Notes for machining time calculation operation

- 1) If the NC operation status is as shown below when starting the machining time calculation, an alarm occurs.

NC operation status at time calculation operation start	Alarm display
In automatic operation	Program running
In graphic check	Checking
In restart search	Executing restart search

- 2) During the machining time calculation (while the "Calculating machin time" message is displayed), setting display unit key operations are not accepted except on the menu and menu. Thus, screen operations are not possible.

The time calculation can be stopped by pressing the menu key.

- 3) In the following cases, the system will standby for the menu key operation during the calculation of the machining time.
- When a program error occurs while calculating the time, and the system stops.
 - When the block corresponding to the designated end position stops due to an error that the block does not exist in the program.

To cancel the machining time calculation, press instead of NC Reset.

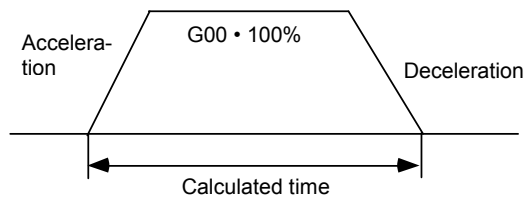
(Note) The machining time calculation process is canceled if the screen is changed during calculation of the machining time.

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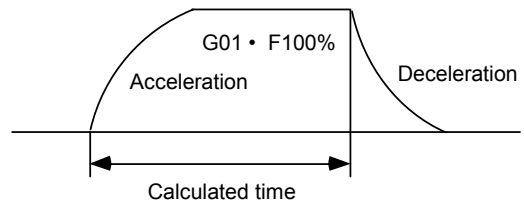
(4) Calculating the machining time for each CNC function (command)

The machining time for each command in the machining program is calculated as follows.

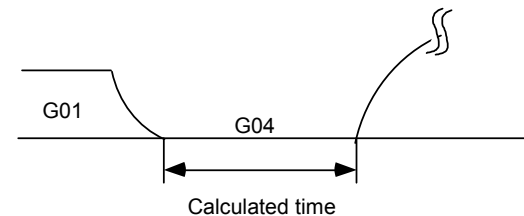
- 1) For a rapid traverse command such as G00, the acceleration/deceleration time is also calculated, assuming that the override is 100%.



- 2) For cutting feed commands such as G01, G02 and G03, the acceleration/deceleration time is not calculated, although the override is assumed as 100%. Thus, an error corresponding to the acceleration/deceleration time occurs during G90, G04 and exact stop check. For an F1-digit command, the time is calculated based on the parameter data designated by the F1-digit.



- 3) For a G04 dwell command, the dwell time is cumulated as is.



- 4) When a G10 or G11 program parameter command is issued, the actual parameter data is rewritten.
 Note that designating up to 160 data items does not affect the tool offset data, but that designating more data rewrites the actual data.
- 5) The reference point return command such as G27, G28 and G29 differs according to the high-speed method or dog-type method used. Note that as the time is obtained from the coordinate position, an error may occur.
- 6) For the skip commands such as G31 and G31.1, the machining time is calculated up to the end point.
- 7) For synchronous feed such as G95, the S command is handled as a direct rotation command to determine the feedrate and calculate the machining time. Thus, the accurate time cannot be cumulated.
- 8) The G33 (thread cutting) and G37 (automatic tool length measurement command) times cannot be calculated.
- 9) For commands called repeatedly, such as subprogram, user macro and Fixed cycle, the time is accumulated by the number of times the commands are called.
- 10) The time cannot be calculated for non-movement commands such as macro operation commands whose required time is not determined. Thus, the error increases when calculating the time of a machining program containing many of these commands.
- 11) The actual data for the common and local variables is not affected.
- 12) As the time to execute the S, M, T and B functions varies with the sequence and each function code, the time is not calculated.

The M command displays a maximum of 16 sets of codes with up to eight digits each. M02/M30 are the time calculation end codes.

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(5) Commands valid for machining time calculation

○ : Valid for calculation △ : Special process × : Invalid

G code	Calculation	Group	Function	
			Machining center format I (Standard format)	Machining center format II (M2/M0 format)
** 00	○	01	Positioning	Same as left
* 01	○	01	Linear interpolation	Same as left
02	○	01	Circular interpolation cw	Same as left
03	○	01	Circular interpolation ccw	Same as left
02.1	○	01	Spiral interpolation cw	Same as left
03.1	○	01	Spiral interpolation ccw	Same as left
04	○	00	Dwell	Same as left
05	○	00	High-speed mode	Same as left
06			(Spare)	
06.2	○	00	NURBS interpolation	Same as left
07	○	00	Hypothetical axis interpolation	Same as left
07.1	○	00	Cylindrical interpolation	Same as left
08			(Spare)	
09	×	00	Exact stop check	Same as left
10	△	00	Program parameter input/ compensation input	Same as left
11	○	00	Program parameter input cancel	Program tool offset input
12	○	00	Circle cutting cw	Same as left
13	○	00	Circle cutting ccw	Same as left
14			(Spare)	
15			(Spare)	
16			(Spare)	
* 17	○	02	Plane selection X-Y	Same as left
** 18	○	02	Plane selection Z-X	Same as left
** 19	○	02	Plane selection Y-Z	Same as left
** 20	○	06	Inch command	Same as left
* 21	○	06	Metric command	Same as left
22	○	04 / -	Stroke check before movement ON	Subprogram call/Pattern rotation
* 23	○	04 / -	Stroke check before movement OFF	Subprogram return
22.1	×	04		Stroke check before movement ON
23.1	×	04		Stroke check before movement OFF
24			(Spare)	
25			(Spare)	
26			(Spare)	
27	○	00	Reference point compare	Same as left

(Note 1)

(Note 2)

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○ : Valid for calculation △ : Special process × : Invalid

G code	Calculation	Group	Function	
			Machining center format I (Standard format)	Machining center format II (M2/M0 format)
28	○	00	Reference point return	Same as left
29	○	00	Start point return	Same as left
30	○	00	2nd to 4th reference point return	Same as left
31	○	00	Skip	Same as left
31.1	○	00	Multi-step skip 1	Same as left
31.2	○	00	Multi-step skip 2	Same as left
31.3	○	00	Multi-step skip 3	Same as left
31.4	○	00	Multi-step skip 4	Same as left
32			(Spare)	
33	×	01	Thread cutting	Same as left
34	○	00	Special Fixed cycle (bolt hole circle)	Same as left
35	○	00	Special Fixed cycle (line at angle)	Same as left
36	○	00	Special Fixed cycle (arc)	Same as left
37	○/×	00	Automatic tool length measurement	Special Fixed cycle (grid)
37.1	○/×	00	Special Fixed cycle (grid)	Automatic tool length measurement
38	○	00	Tool radius compensation vector designation	Same as left
39	○	00	Tool radius compensation corner arc	Same as left
* 40	○	07	Tool radius compensation cancel	Same as left
40.1	○	15	Normal control cancel	Same as left
41.1	○	15	Normal control left	Same as left
42.1	○	15	Normal control right	Same as left
41	○	07	Tool radius compensation left	Same as left
42	○	07	Tool radius compensation right	Same as left
43	○	08	Tool length offset (+)	Same as left
* 44	○	08	Tool length offset (-)	* Tool length offset cancel
45	○	00	Tool position offset enlargement	Same as left
46	○	00	Tool position offset reduction	Same as left
47	○	00	Tool offset double enlargement	Same as left
48	○	00	Tool offset double reduction	Same as left
* 49	○/△	08	Tool length offset cancel	Same as left
* 50	○	11	Scaling cancel	Same as left
51	○	11	Scaling ON	Same as left
* 50.1	○	19	G command mirror image cancel	Same as left
51.1	○	19	G command mirror image ON	Same as left

(Note 3)

(Note 4)

(Note 4)

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○ : Valid for calculation △ : Special process × : Invalid

G code	Calculation	Group	Function	
			Machining center format I (Standard format)	Machining center format II (M2/M0 format)
52	○	00	Local coordinate system setting	Same as left
53	○	00	Machine coordinate system selection	Same as left
* 54	○	12	Workpiece coordinate system 1 selection	Same as left
54.1	○	12	Workpiece coordinate system (extension) selection	Same as left
55	○	12	Workpiece coordinate system 2 selection	Same as left
56	○	12	Workpiece coordinate system 3 selection	Same as left
57	○	12	Workpiece coordinate system 4 selection	Same as left
58	○	12	Workpiece coordinate system 5 selection	Same as left
59	○	12	Workpiece coordinate system 6 selection	Same as left
60	○	00	Uni-directional positioning	Same as left
61	○	13	Exact stop check mode	Same as left
61.1	○	13	High-accuracy control mode	Same as left
61.2	○	13	High-accuracy control for die machining (CAM data)	Same as left
61.3	○	13	High-accuracy control for die machining (Height sensor data)	Same as left
61.5	○	13	High-accuracy control for part machining	Same as left
62	○ ×	13 19	Automatic corner override	G command mirror image
* 64	×	13	Cutting mode	Same as left
65	○	00	User macro simple call	Same as left
66	○	14	User macro modal call A	Same as left
66.1	○	14	User macro modal call B	Same as left
* 67	○	14	User macro modal call cancel	Same as left
68	○	16 _	Coordinate rotation ON	User macro subprogram end
* 69	○	16 00	Coordinate rotation cancel	End point error check release
68.1	○	16		Coordinate rotation ON
* 69.1	○	16		Coordinate rotation cancel
70	○	09	User Fixed cycle	Same as left
71	○	09	User Fixed cycle	Same as left

(Note 5)

(Note 6)

(Note 7)

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○ : Valid for calculation △ : Special process × : Invalid

G code	Calculation	Group	Function	
			Machining center format I (Standard format)	Machining center format II (M2/M0 format)
72	○	09	User Fixed cycle	Same as left
73	○	09	Fixed cycle (step)	Same as left
74	○	09	Fixed cycle (reverse tapping)	Same as left
75	○	09	User Fixed cycle	Same as left
76	○	09	Fixed cycle (fine boring)	Same as left
77	○	09	User Fixed cycle	Same as left
78	○	09	User Fixed cycle	Same as left
79	○	09	User Fixed cycle	Same as left
* 80	○	09	Fixed cycle cancel	Same as left
81	○	09	Fixed cycle (drilling/spot drilling)	Same as left
82	○	09	Fixed cycle (drilling/counter boring)	Same as left
83	○	09	Fixed cycle (deep hole drilling)	Same as left
84	○	09	Fixed cycle (tapping)	Same as left
85	○	09	Fixed cycle (boring)	Same as left
86	○	09	Fixed cycle (boring)	Same as left
87	○	09	Fixed cycle (back boring)	Same as left
88	○	09	Fixed cycle (boring)	Same as left
89	○	09	Fixed cycle (boring)	Same as left
** 90	○	03	Absolute value command	Same as left
* 91	○	03	Incremental value command	Same as left
92	○	00	Machine coordinate system setting	Same as left
93	○	05	Inverse time feed	Same as left
* 94	○	05	Asynchronous feed (feed per minute)	Same as left
** 95	○	05	Synchronous feed (feed per revolution)	Same as left
* 98	○	10	Fixed cycle initial level return	Same as left
99	○	10	Fixed cycle R point level return	Same as left

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○ : Valid for calculation △ : Special process × : Invalid

M code	Calculation	Group	Function	
			Machining center format I (Standard format)	Machining center format II (M2/M0 format)
00	×	–	Program stop	Same as left
01	×	–	Optional stop	Same as left
02	○	–	Program end	Same as left
30	○	–	Program end	Same as left
96	×	–	Macro interrupt ON	I ON
97	×	–	Macro interrupt cancel	I OFF
98	○	–	Subprogram call	(G22)
99	○	–	Subprogram return	(G23)

* : Indicates the codes that should be selected or that are selected in the initial state.

** : Codes that should be selected or that are selected in the initial state by the control parameters.

(Note 1) The deceleration time in the exact stop check mode is not accumulated, so this causes an error.

(Note 2) If there is a program parameter input, check the parameter after calculation.

(Note 3) The thread cutting mode is not cumulated.

(Note 4) The automatic tool length measurement is not cumulated.

(Note 5) The deceleration time in the exact stop check mode causes an error in the cumulated time.

(Note 6) The corner deceleration time is not cumulated in the high accuracy control mode, so an error occurs.

(Note 7) Even with automatic corner override, the time is calculated by assuming a 100% override. Thus, an error occurs.

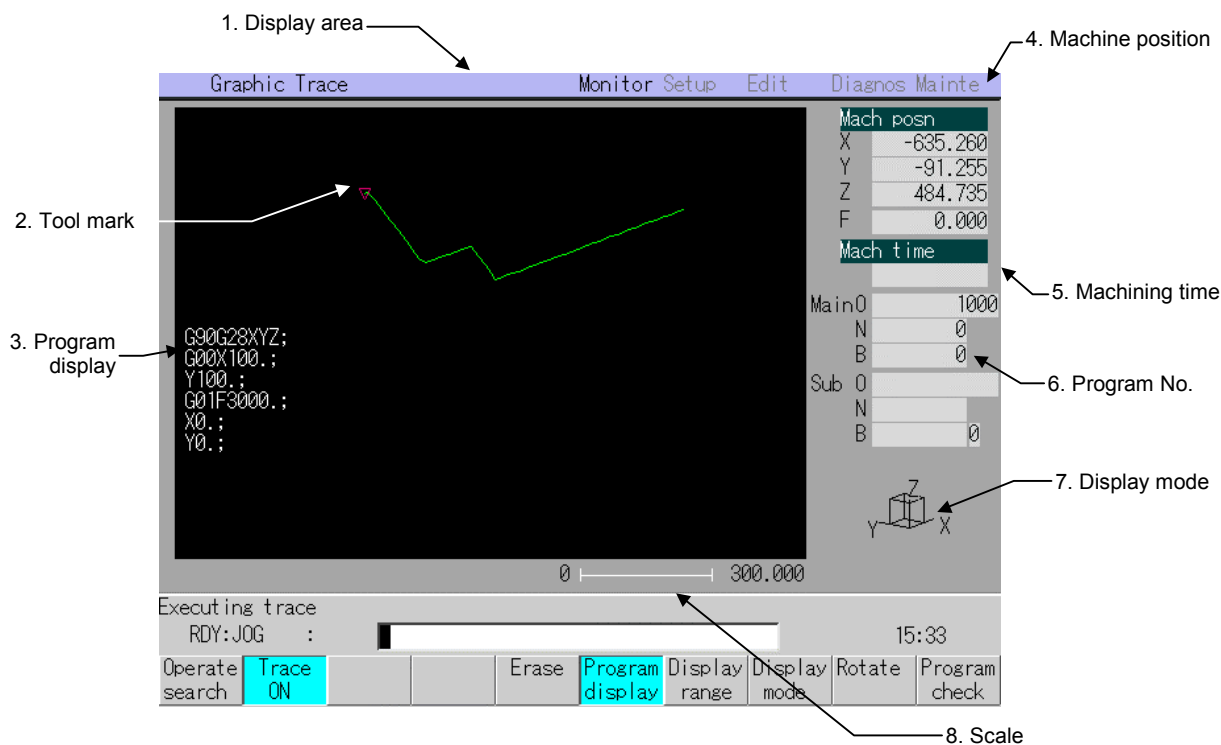
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2.6 Graphics screen

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.

Program check function : This function displays the machining program movement path without carrying out automatic operation. The operation results in the CNC are drawn. Thus, the figure can be drawn at a high speed, allowing the machining program to be checked.



(1) Display items

Display item	Details
1. Display area	This is the area for drawing the tool path during the check and 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. Machine position	This displays the machine position counter and feedrate (F). The three axes set in the parameters are displayed.
5. Machining time	When a program check is carried out, this calculates and displays the time required for machining.
6. 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.
7. Display mode	This displays the plane to be displayed. The plane can be selected with the menu [Display mode].
8. Scale	This displays the scale of the display area. The scale value can be set with [Display range].

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2.6.1 Tracing and displaying the machine position

Press the menu key 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
<input type="button" value="Operate search"/>	This changes the screen to Operation Search screen.	C	2.4 Operation Search screen
<input type="button" value="Trace ON"/>	This enters the trace mode. If there is a program currently running, the path of the machine position is drawn from the current position.	B	–
<input type="button" value="Erase"/>	This erases the figure displayed with graphics.	C	–
<input type="button" value="Program display"/>	This displays the machining program being drawn.	C	–
<input type="button" value="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	2.6.3 Changing the display range
<input type="button" value="Display mode"/>	This changes the display plane and system. The axes corresponding to X, Y and Z are set with operation parameters. • Parameter (370020 to 370025) \$1 \$2 X X1 X2 ... Axis for each system corresponding to X Y Y1 Y2 ... Axis for each system corresponding to Y Z Z1 Z2 ... Axis for each system corresponding to Z The graphics displayed on the screen are erased.	C	2.6.4 Changing the display mode
<input type="button" value="Rotate"/>	This changes the direction of the view when displaying in the three-dimensional display mode. Rotate the cube at the lower right with the <input type="button" value="↑"/> , <input type="button" value="↓"/> , <input type="button" value="→"/> and <input type="button" value="←"/> keys, and fix with the <input type="button" value="INPUT"/> key. The graphics displayed on the screen are erased.	A	2.6.5 Changing the display angle
<input type="button" value="Program check"/>	This is used when checking the program.	B	2.6.2 Checking the program

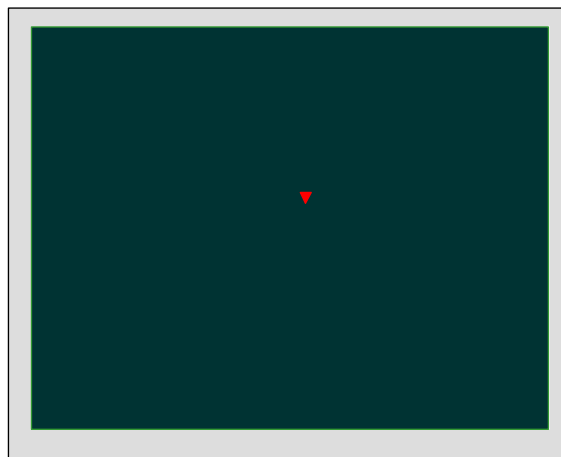
(2) Entering the trace mode

1)

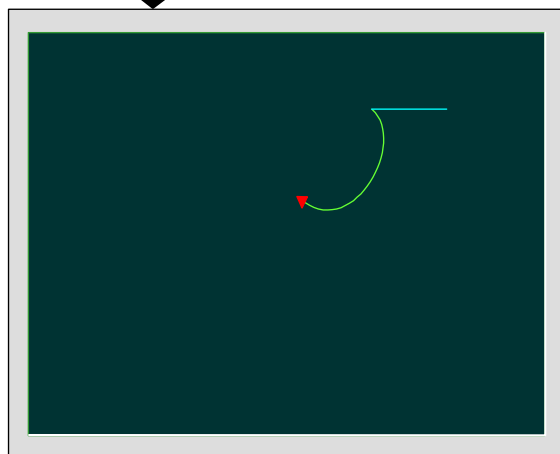
Press the menu key
Trace ON.



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

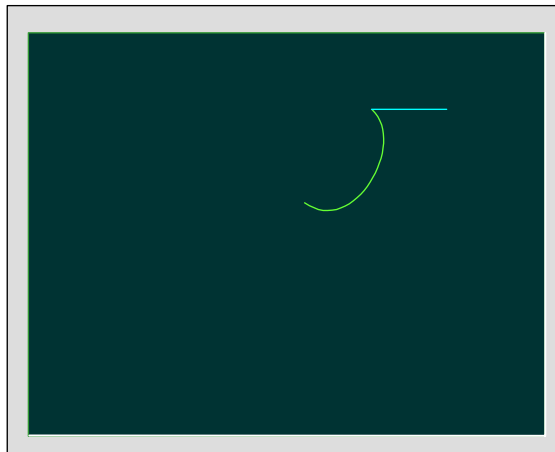
1)

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) The program cannot be checked during the trace mode (when **Trace ON** is highlighted).

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2.6.2 Checking the program

Press the menu key to select the program to be checked.

Press the menu key or to select the check mode.

The tracing starts immediately when the check mode is selected.

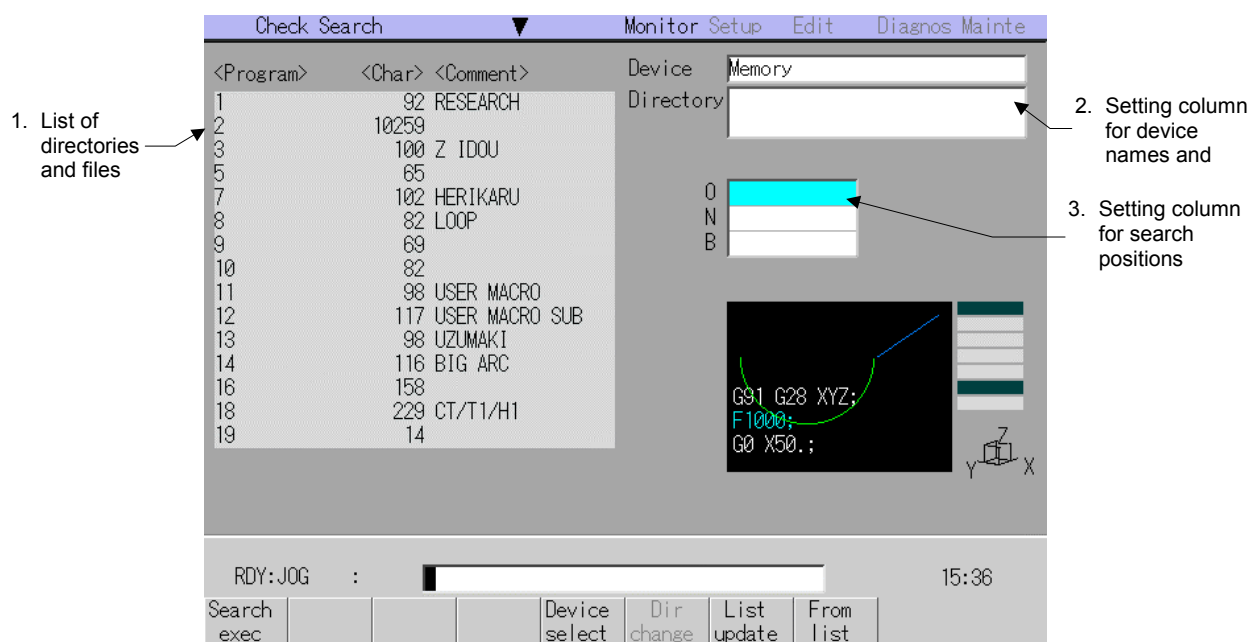
(1) Menus used for program checking

Menu	Details	Type	Reference
<input type="button" value="Check search"/>	This changes the screen to the Check Search screen. The program to be checked is searched for on this screen.	C	(2) Check Search screen
<input type="button" value="Check continu"/>	This checks the program continuously.	B	(3) Checking continuously
<input type="button" value="Check step"/>	This check the program per block.	B	(4) Checking one block at a time
<input type="button" value="Check reset"/>	This cancels the program check.	C	(5) Canceling the program check
<input type="button" value="Erase"/>	This erases the graphics displayed on the screen. Each time this menu is pressed, the graphics are erased in the order of rapid traverse and cutting feed.	C	–
<input type="button" value="Program display"/>	This displays the machining program being drawn on the screen.	C	–
<input type="button" value="Display range"/>	This changes the display scale and the display position. (Note) When the display range is changed, the displayed graphics are erased.	A	2.6.3 Changing the display range
<input type="button" value="Display mode"/>	This changes the plane and system to be displayed. The axes corresponding to X, Y and Z are set in the operation parameters. <ul style="list-style-type: none"> • Parameter (370020 to 370025) <li style="padding-left: 20px;">\$1 \$2 <li style="padding-left: 20px;">X X1 X2 Axis of each system corresponding to X. <li style="padding-left: 20px;">Y Y1 Y2 Axis of each system corresponding to Y. <li style="padding-left: 20px;">Z Z1 Z2 Axis of each system corresponding to Z. (Note) When the display range is changed, the displayed graphics are erased.	C	2.6.4 Changing the display mode
<input type="button" value="Rotate"/>	This changes the direction of the view when displaying in the three-dimensional display mode. Rotate the cube at the lower right by inputting the <input type="button" value="↑"/> , <input type="button" value="↓"/> , <input type="button" value="→"/> and <input type="button" value="←"/> keys, and fix with the <input type="button" value="INPUT"/> key. The graphics displayed on the screen are erased.	A	2.6.5 Changing the display angle
<input type="button" value="Program trace"/>	This is used when tracing.	C	2.6.1 Tracing and displaying the machine position



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(2) Check Search screen

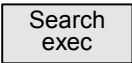
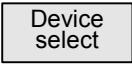
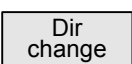

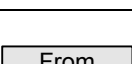


■ Display item

Display item	Details
1. List of directories and files	This displays a list of details included in the device and directory displayed in 2. Use the menu keys to change the details of the list, and the  /  keys to scroll the display list. This list does not appear during screen changeover.
2. Setting column for device names and directories	This displays the device name and directory designated during program selection.
3. Setting column for search positions	This is used to set the program No. (O), sequence No. (N) and block No. (B) of the program to be searched.

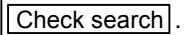
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■ **Menu keys used during check search**

Menu	Details	Type	Reference
	This executes a check search.	C	-
	This displays the device menu. The device for which the program search is carried out can be selected from this menu.	A	2.4.1 Executing an operation search
	This enters the mode for inputting the directory name. (Note) This cannot be used when the device is "Memory".	A	
	This updates the list details. (A list of the latest details of the currently selected device and directory is displayed.)	C	
	Press this key to select a directory, file name, and program No. from the list. The selection cursor appears in the list, and items can be randomly selected.	C	

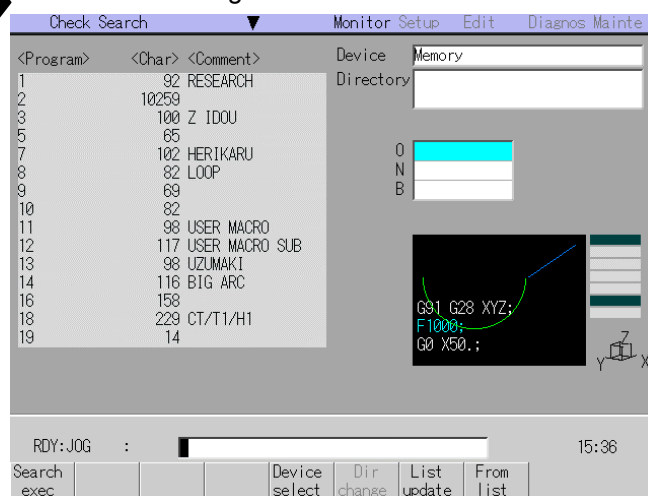
(3) Checking continuously ()

1)

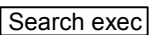
Press the menu key




The screen changes to that for check search.



2)

Select the program to be checked, and press the menu key




The check search is carried out, and the screen returns to the Graphics screen (this screen).

(Note) Refer to "2.4.1 Executing an operation search (2) Operation method" for how to select the program.

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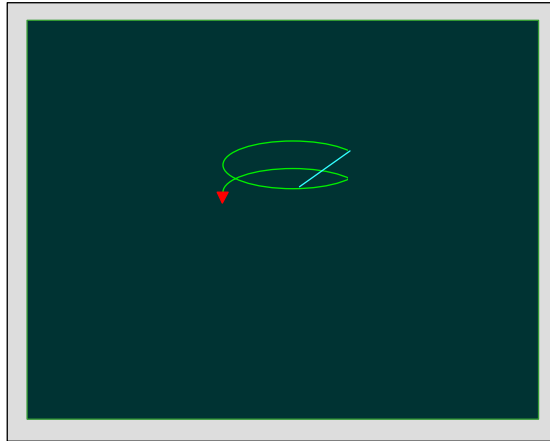
3)

Press the menu key
[Check continu].



The program is checked, and the path is displayed.
The message "Checking" appears, and the menu key is highlighted.

If [Check step] is pressed
midway, the program is
checked block by block from
the next block.

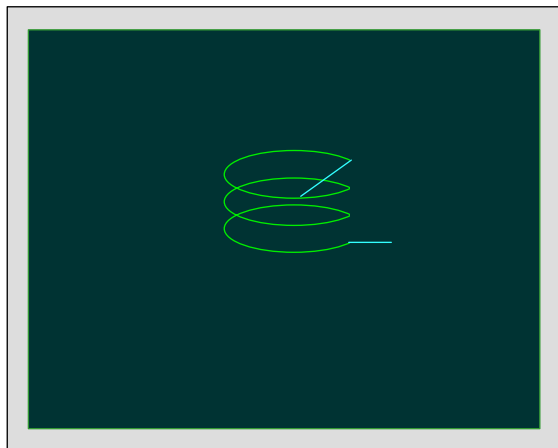


4)

When the continuous check is
completed



The message "Program check completed" appears,
and the check mode is canceled.
The menu highlight returns to normal.



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(4) Checking one block at a time (**Check step**)

1)

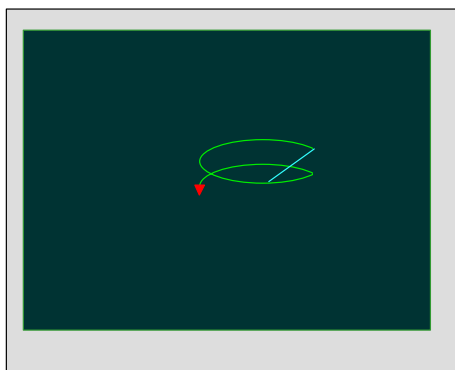
Search the program with the same procedure as method (3).

2)

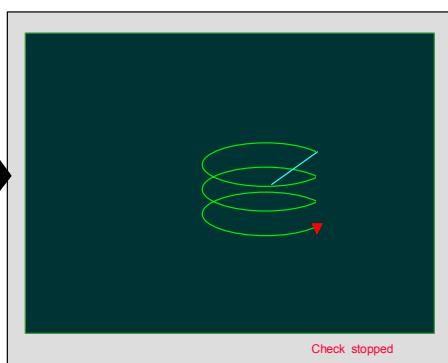
Press the menu key **Check step**.



Only one block of the program is checked, and the path for that block is displayed. The menu is highlighted during the check. When one block of checking is completed, a message appears, and the menu highlight returns to normal.



State during one block check



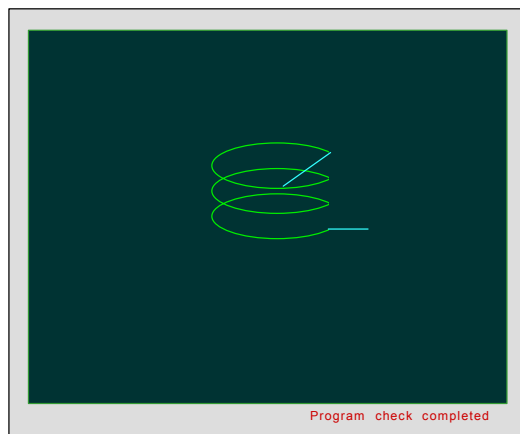
State when one block check is completed

3)

Press **Check step** repeatedly.



The program is checked block by block. When the check is completed, a message appears, and the check mode is canceled. The menu highlight returns to normal.



(Note 1) If **Check continu** is pressed midway, the program is checked continuously to the end of the program.

(Note 2) The workpiece coordinate position counter and G command modal (Group 03, 01, 07, 09) are displayed during the check step.

(5) Canceling the program check (**Check reset**)

1)

Press the menu key **Check reset**.



The check mode is canceled, and the menu highlight returns to normal. The message such as "Checking" disappears.

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(6) Drawing during the check

During the check, the machine position (tool center) path is drawn. However, if a radius compensation is applied on the program during the check, the program path and tool center are drawn.

The lines displayed during the check are expressed as follows.

		During radius compensation	Not during radius compensation
Manual feed		-	-
Rapid traverse	Program move path	Solid line (White)	-
	Tool center move path	Solid line (Blue)	Solid line (Blue)
Cutting feed	Program move path	Solid line (White)	-
	Tool center move path	Solid line (Green)	Solid line (Green)

(7) Availability of check mode with other functions

Note that some commands and button operations in the program, etc., cannot be used with the program check.

Function name	Program check	Remarks
Coordinate rotation	○	Available with either program coordinate rotation or parameter coordinate rotation.
Pattern rotation	○	
Decimal point programming	○	Available with either Type I or Type II.
Mirror image	○	See item (9).
Z-axis command cancel	×	A move path is drawn exactly as specified.
Interlock	×	
External deceleration	×	
Override	×	
Feed hold	×	
Cycle start	×	If CYCLE START is pressed during checking, alarm message "PROG. CHECK MODE" is displayed while it is held down.
Auto-restart	×	CHECK COMPLETE occurs with M02/M30.
Work coordinate offset	○	Set to the position determined by the actually specified offset amount.
Local coordinate offset	○	Set to the position determined by the actually specified offset amount.
Verify stop	×	The system does not stop operation even when it executes the set stop block.
Helical interpolation	×	Drawn in straight lines.
Fixed cycle and special Fixed cycle	○	
Manual mode/handle	×	During checking, the machine can be moved by switching the mode to manual handle mode. This disables checking, however.

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Function name	Program check	Remarks
F1-digit feed	×	
Spiral interpolation	○	
Reference point return/ return to start point	×	See (Note).
User macros	○	<p>Basic variable arithmetic operation and all check and branch functions are effective. However, the following functions are not effective:</p> <ul style="list-style-type: none"> • Macro interface input/output • NC alarm • Single block stop, miscellaneous function complete signal, wait suppression • Feed hold, feedrate override, G09 on/off • Position information (The preceding block end point coordinates are effective.) <p>If any one of the above commands is issued, it is ignored or garbage data is input.</p>

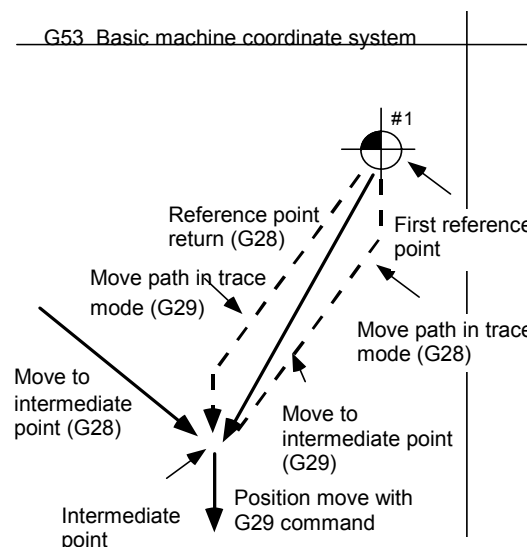
(Note) Reference point return and start position return

The reference point return command and return to start position command are valid, but actual machine motion (trace display) is partially different from the drawing by program check.

As shown in the figure right, when returning to the reference point via the intermediate point with the G28 or G30 command, positioning to the intermediate point is done by a straight line and positioning from there to the reference point is done by individual axes independently.

With the G29 command, positioning to the intermediate point is done by individual axes independently.

Under program checking, however, positioning is always done by a straight line even when returning via the intermediate point; this may cause a little difference from the trace display.




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(8) Variables, parameters, and offset amount

Under program checking, data is treated as follows:

	Saving data before program check	Explanation
Parameter	Unavailable	Parameter input commands executed in program checking are set as actual data. (The data before the check is not saved.)
Work offset	Available	Work offset data can be set in the check program. Upon completion of checking, the original data is restored.
Common variable	Available	Common variable data can be set in the check program. Upon completion of checking, the original data is restored.
Local variable	Available	Local variable data can be set in the check program. Upon completion of checking, the original data is restored.
Tool offset amount	Available (up to 40 sets)	Offset amount for up to 40 sets can be updated in one check process. There is no limitation on offset numbers. If offset amount for more than 40 sets (160 types) is updated, original data is rewritten.

 **Caution**

 If the parameter input command or tool offset amount change command (40 sets or more) is issued by G10 during the graphic check, the actual data will be overwritten.

(9) Notes for program check

■ Check function

- 1) The check function draws while referring only to the NC internal operation results. Thus, the path is not drawn for commands requiring machine movement.
- 2) Check search and check start are not possible during automatic start or automatic stop. The operation alarm "Program running" appears.
- 3) The program cannot be checked during the trace mode.

■ Notes for check search

- 1) After the check search is executed, the check start standby state is entered. Automatic start cannot be applied. However, this state can be canceled by applying reset, program check completed or operation search.
- 2) The program selected for the check search is not the program run during automatic operation. Search for the program to be automatically run from the Operation Search screen.

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■ Notes for checking (Common for continuous check and step check)

- 1) If the menu key `[Display range]` is pressed while drawing in the trace or check mode, the drawing stops. The drawing resumes when the selected function is completed. Note that in the trace mode, the area executed while stopped is not displayed. However, the display up to this point is erased when the range is changed.
- 2) During the trace and check modes, the drawing continues even if another screen is changed to.
- 3) If the automatic start button is pressed during the check, the operation alarm "Program checking" appears while the button is held down, and automatic start is inhibited. Execute automatic start after completing the check or after stopping the check by pressing the `[Check reset]`.
- 4) The check mode ends when reset, the trace display is turned ON, etc.
If a program error occurs, cancel the error with these operations.
- 5) Refer to "(6) Variables, parameters, and offsets" for details on handling the various data set in the program being checked.
- 6) If an M00/M01 command is found, "Program stopped" is applied. However, when an M01 command is executed, the drawing stops regardless of the ON/OFF state of the optional stop switch signal.

■ When various menu keys are pressed during continuous check or step check

- 1) If `[Check continu]` is pressed during the continuous check, the program check stops.
If `[Check continu]` is pressed while stopped, the program check resumes.
- 2) If `[Check step]` is pressed during the continuous check, the menu highlight changes from `[Check continu]` to `[Check step]`, and the program is checked one block at a time.
- 3) If `[Check reset]` is pressed during the continuous check, the mode is canceled after the currently executed block is completed.
- 4) If `[Check continu]` is pressed during step check, the menu highlight changes from `[Check step]` to `[Check continu]`, and the program is continuously checked.

■ Notes for ending check

- 1) If an M02/M30 command is found, "Program check completed" occurs. Note that in the tape mode (RS-232C), the tape is not rewound.
- 2) The check mode ends when reset, the trace display is turned ON, etc.

2.6.3 Changing the display range

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

If the display range is changed while two planes are displayed on the screen, the range of both screens change.

(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	–

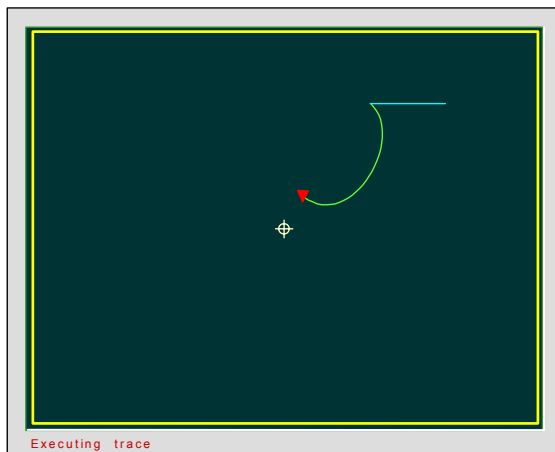
(2) Changing the display position

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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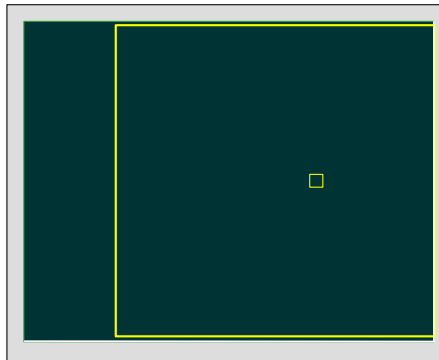
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2)

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.

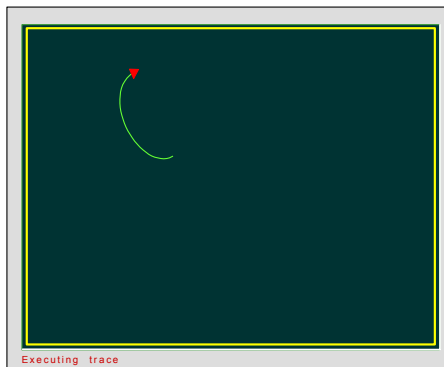


3)

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 solid movement amount (three-dimensional).

(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.

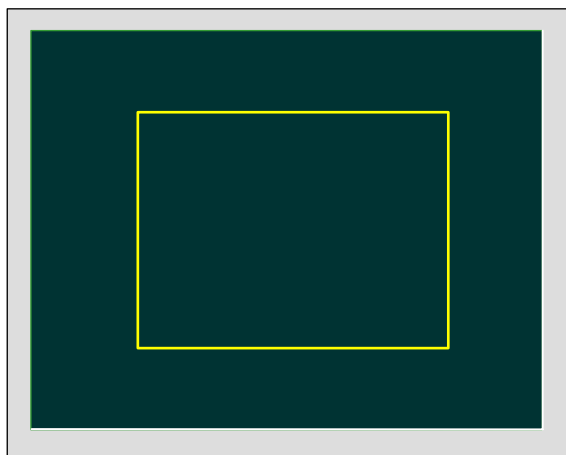
The frame is displayed with a dotted line.

To enlarge the figure:

Press the - key.

The scale value decreases.

The frame is displayed with a solid line.

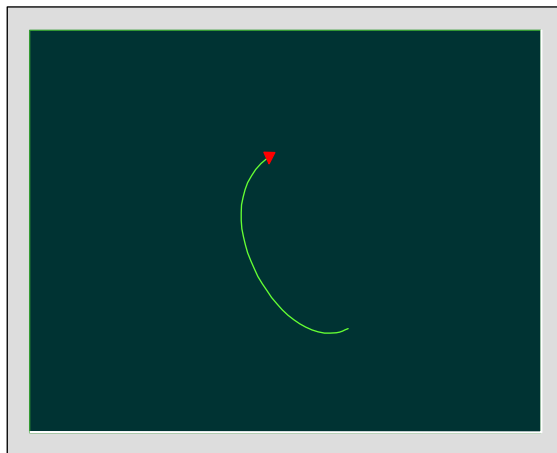


3)

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 .

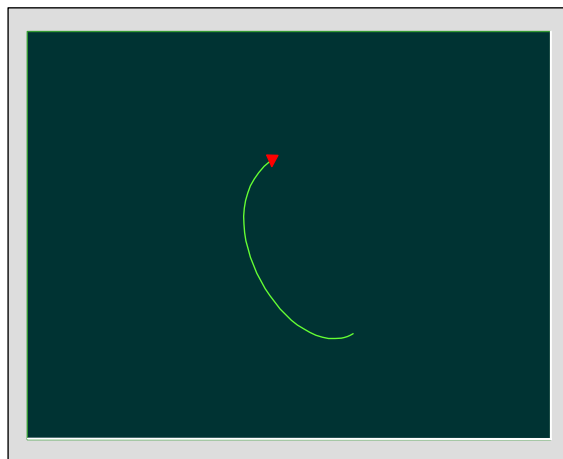
 → The data setting cursor appears in the data input area.
- 3)

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.

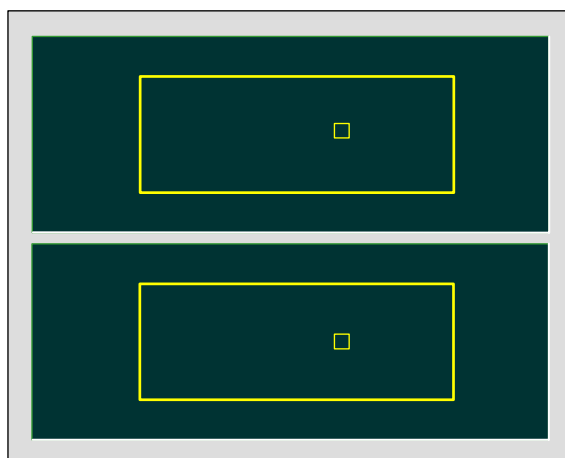
To enlarge the figure:
Set a value smaller than the current value.



(5) Changing the display range for the two plane display mode

When using a two plane display mode such as X-Y/Y-Z, the upper and lower areas change to the same display range (position and scale value). The operation method is the same as the one plane display mode.

(Note) The position display movement using the **↑** and **↓** keys takes place only for the upper area or lower area. Use the **▲** and **▼** keys to change the area to be moved (upper/lower).



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2.6.4 Changing the display mode

The graphics display mode includes one plane, two plane or solid displays. By pressing the menu key corresponding to each plane's axis configuration, the screen changes. The system also changes.

The axes corresponding to X, Y and Z are set with operation parameters.

○ Parameters

	\$1	\$2	
X	X1	X2	Axis for each system corresponding to X
Y	Y1	Y2	Axis for each system corresponding to Y
Z	Z1	Z2.....	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.	C	-
YZ	This changes to the one plane display mode configured of Y-Z.	C	-
XZ	This changes to the one plane display mode configured of Z-X.	C	-
XY/XZ	This changed the display mode to that displaying the two planes X-Y and X-Z or Y-X and Z-X.	C	-
YX/YZ	This changed the display mode to that displaying the two planes Y-X and Y-Z or X-Y and Z-Y.	C	-
XYZ	This changes to the three-dimensional display mode. A cube is displayed on the lower right of the screen.	C	-

2.6.5 Changing the display angle

This sets the direction for viewing the graphics in the three-dimensional display mode.

Rotate the cube at the lower right by pressing the , , and keys, and fix with the key.

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

(1) Changing the display angle

1)

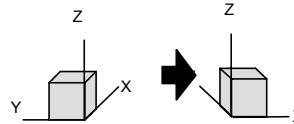
Press the menu key .

2)

Press the , , and keys to rotate the cube at the lower right.



The solid display at the lower right of the screen rotates according to the key operations.

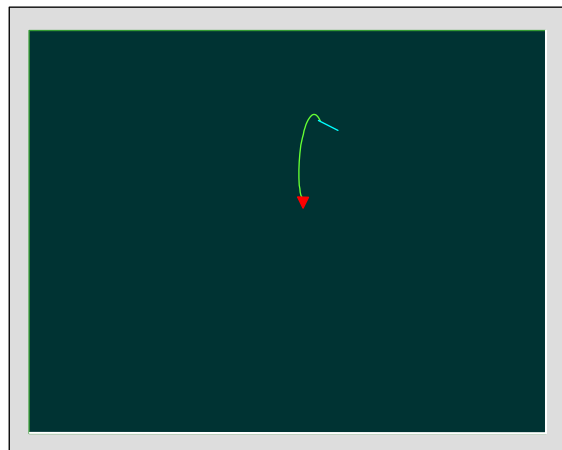


3)

Press the key.



The new angle is reflected on the screen. The graphics displayed up to that point are erased, and drawing resumes from the current position.



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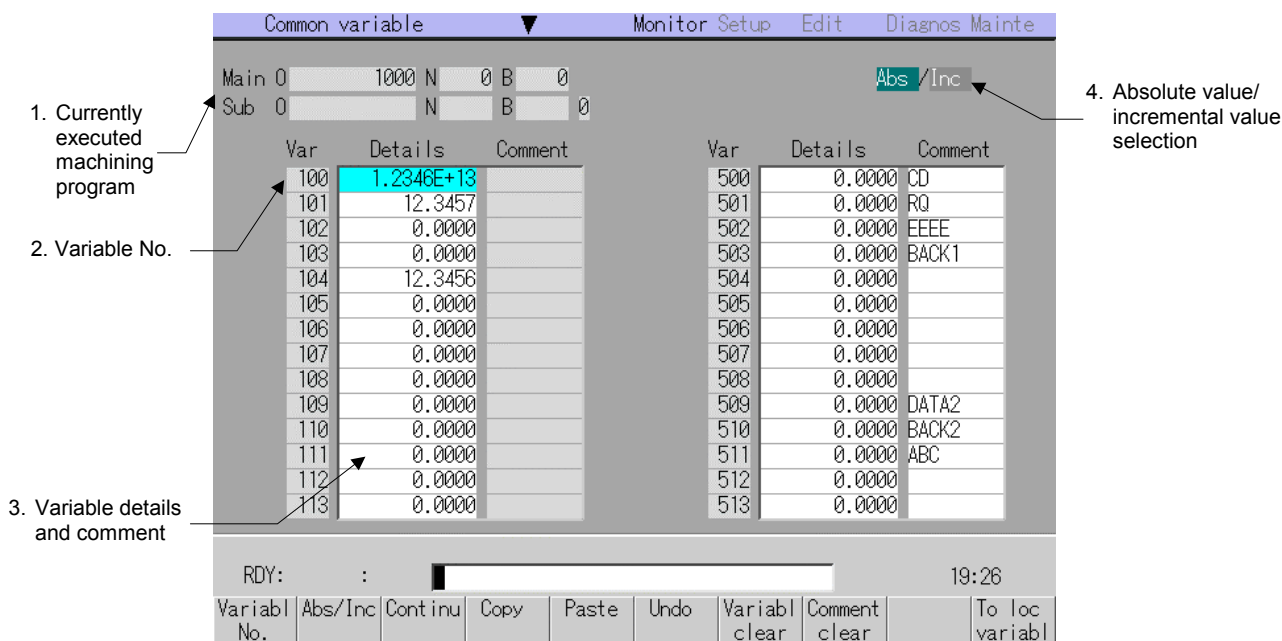
2.7 Common Variable screen

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

The number of common variable sets differs according to the specifications.

(Note 1) For 500 to 519, the comment setting is included.

(Note 2) If the control parameter "310004 Com-var RST clear" is ON, the common variable data is cleared when reset. If the control parameter "310005 Com-var PWR-ON clear" is ON, the common variable data is cleared when the power is turned ON.



(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 (▲/▼). If the number and variable details are set in the setting area and the INPUT key is pressed, the page containing that number appears.
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 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 changeover	This displays whether the absolute value setting mode or incremental value setting mode is selected.

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(2) Menus

Menu	Details	Type	Reference
Variabl No.	A random variable No. can be selected. 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 Setting common variables
Abs/Inc	This changes the setting mode to the absolute value or incremental value mode. This menu changes the setting method (absolute value/incremental value).	C	1.5.3 Changing the absolute value/ incremental value setting
Continu	This displays the variables following the variable displayed in the area with the cursor in the area not containing the cursor. <ul style="list-style-type: none"> ■ When cursor is at left area: The continuing variable Nos. appear in the right area. If the variable No. at the last line of the left area is the last variable, the display on the right area starts from the head of the variable No. ■ When cursor is at right area: The variables with numbers smaller than those displayed in the right area are displayed in the left area. If the head line of the right area is the first variable No., the section to the end of the variable No. is displayed in the left area. (Note) This menu can be used when the Machine parameters Base com param "110049 Invid Continu menu" is set to 0.	C	-
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	2.7.2 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	2.7.2 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	2.7.3 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	2.7.3 Erasing common variables (2)
To loc variabl	This changes the screen to the Local Variable screen. Press the [To com variabl] menu key to return to the Common Variable screen.	C	2.8 Local Variable screen

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2.7.1 Setting common variables

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

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

2)

Press the menu key
.

3)

Designate the variable No.
 102

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

The variable No. can also be set by moving the cursor to the 102 position with the and keys.

Var	Details	Comment
100	-123456.7890	
101	-1.2345 -10	
102	0.0000	
103	100.0000	
104	0.0005	

Var	Details	Comment
102	0.0000	
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	

4)

Input a value.
 135

→ 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).

→ The 509 variable appears at the head of the area, and the cursor moves to the variable details.

2)

Press the key.

→ The cursor moves to the comment area for 509.

3)

Input a comment.
 counter

→ "counter" appears.

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

2.7.2 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 | |
| 103 | 0.0000 | |
| 104 | 100.0000 | |
| 105 | -10.0000 | |

(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.
- Press , set the variable No. in the data setting area, and press the key.

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

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

2.7.3 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.

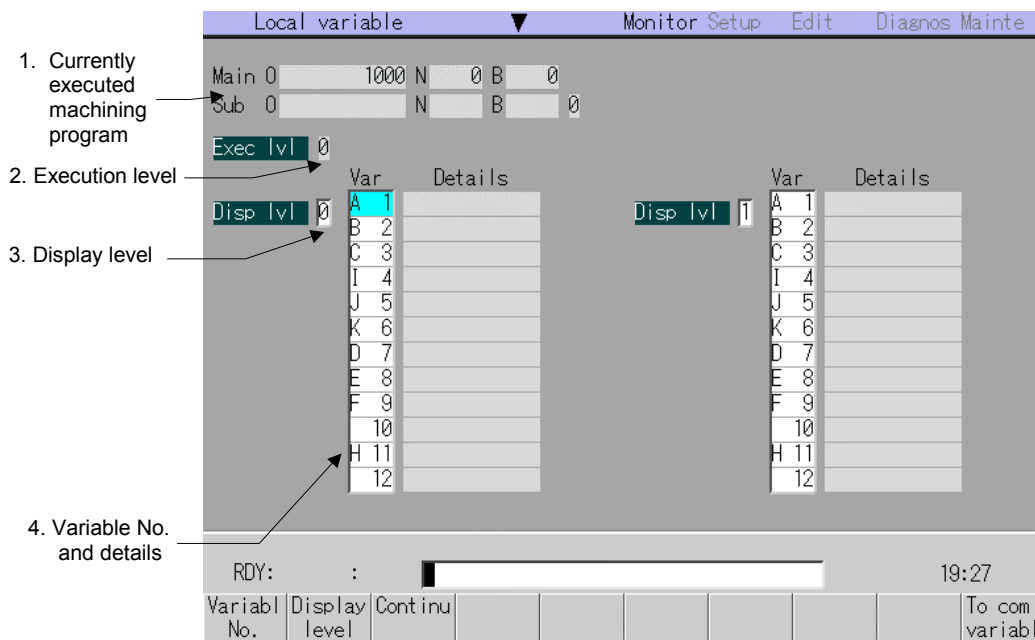
➔ Only the 509 comment is erased.
 The variable contents are not erased.

(3) Notes for erasing common variables

- 1) If the Control parameter "310004 Com-var RST clear" is ON, the common variable data is cleared when reset. If the Control parameter "310005 Com-var PWR-ON" is ON, the common variable data is cleared when the power is turned ON.
- 2) The variable at the cursor position will become the target of the erasing if the key is pressed without designating a variable No.

2.8 Local Variable screen

The details of the local variables are displayed on this screen. Local variables 1 to 33 are prepared for each user macro subprogram call level. Up to 33 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 33 local variables (1 to 33) 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 type="text" value="INPUT"/> key. The variable with that number at the head displays. The cursor moves to the details for that variable No.	A	2.8.1 (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 type="text" value="INPUT"/> key. The local variables appear from the head of that level. The cursor moves to the variable No. at the head.	A	2.8.1 (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. <p>(Note) This menu can be used when the Machine parameters "Base com param 110049 Invid Continu menu" is set to 0.</p>	C	-
To com variabl	This changes the screen to the Common Variable screen. Press the <input type="text" value="To loc variabl"/> menu key to return to the Local Variable screen.	C	2.7 Common Variable screen

2.8.1 Displaying local variables

(1) Displaying random variables

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

2)

Press the menu key
.

3)





Designate the variable No. to be displayed.
 23



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

Disp Ml	Vrbl	Details
4	W 23	-123456.7890
	X 24	-1.2345 E-10
	Y 25	0.0000
	Z 26	0.0000
	27	100.0000
	28	-10.0000
	29	0.0005
	30	123456.7890

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

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

(2) Changing the display level

1)

Press the menu key
.



The cursor appears at the display level.

2)

Designate the display level.
 4

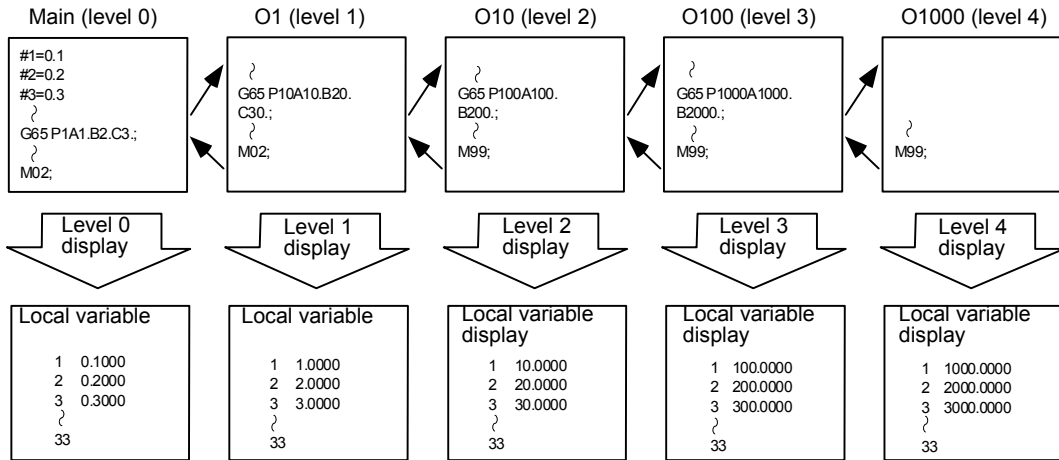


The level 4 local variables display from the head. The cursor moves to the head line.

Disp Ml	Vrbl	Details
4	A 1	-123456.7890
	B 2	-1.2345 E-10
	C 3	0.0000
	I 4	0.0000
	J 4	100.0000
	K 5	-10.0000

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



(4) Notes for local variables

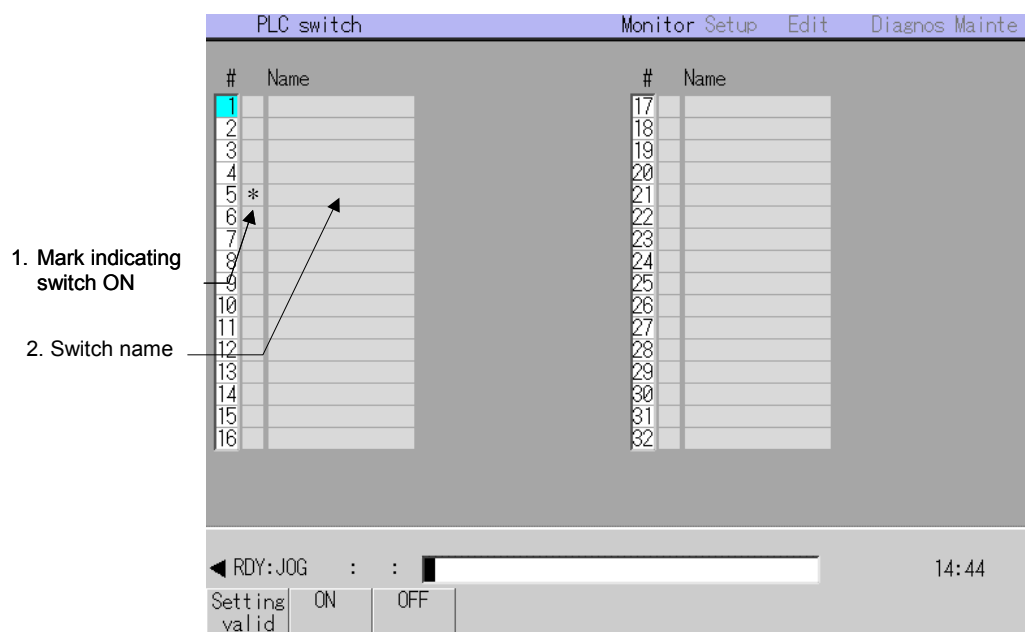
The local variables are not erased when reset or when the power is turned OFF. They are erased at macro call.

2.9 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
Setting valid	Setting of the PLC switch is started.	A	2.9.1 Turning PLC switches ON/OFF
ON	This turns ON the switch currently indicated by the cursor.	C	2.9.1 Turning PLC switches ON/OFF
OFF	This turns OFF the switch currently indicated by the cursor.	C	2.9.1 Turning PLC switches ON/OFF

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2.9.1 Turning PLC switches ON/OFF

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

1)

Press the menu key .

A message confirming the start of PLC switch setting will appear. The menu key will be highlighted.

2)

Press "Y" or .

The PLC switch setting mode will be entered. The cursor will appear at the PLC switch No. position. The menu keys and will appear normally.

3)

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

The #6 number is highlighted.

#	Name
1	Auto restart
2	<input type="text" value="*"/> Protect delete
3	Manual/Absolute
4	<input type="text" value="Optional stop"/>
5	<input type="text" value="*"/> Handl interrupt
<input type="text" value="6"/>	Program restart
7	

4)

Press the menu key .



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

To turn OFF, press the menu key .

#	Name
1	Auto restart
2	<input type="text" value="*"/> Protect delete
3	Manual/Absolute
4	<input type="text" value="Optional stop"/>
5	<input type="text" value="*"/> Handl interrupt
<input type="text" value="6"/>	<input type="text" value="*"/> Program restart
7	

↑ A * mark appears.

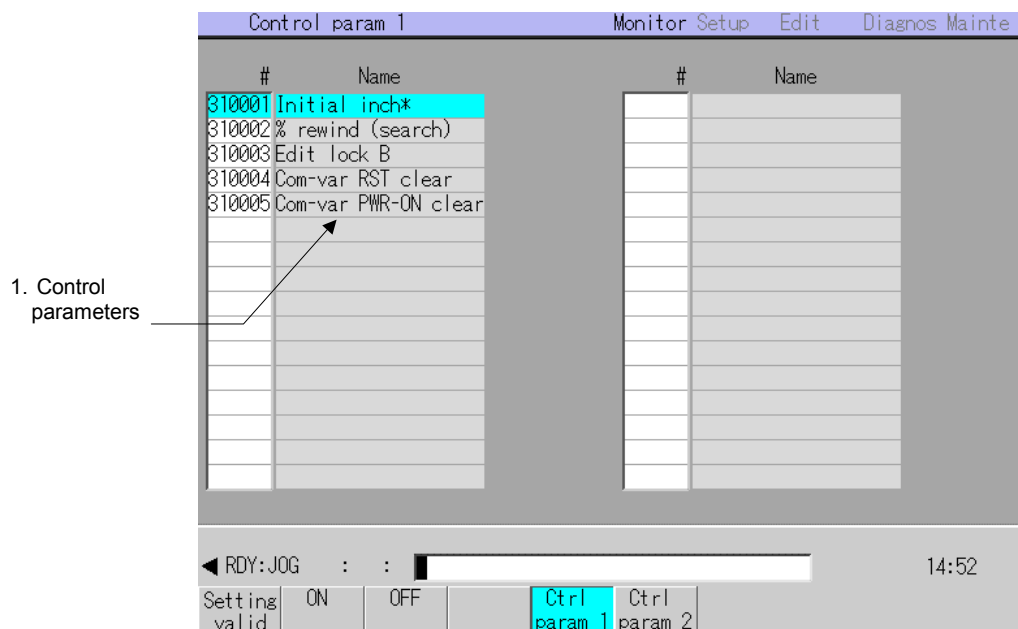
(Note 1) If the menu or key is pressed again during the PLC switch setting mode, the PLC switch setting mode will be canceled.

(Note 2) The PLC switch setting mode will be canceled when another screen is opened.

(Note 3) The cursor will not appear in modes other than the PLC switch setting mode. If the menu key or is pressed in this state, a message indicating that the mode is not the PLC switch setting mode will appear.

2.10 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 2.10.2 to 2.10.3 for details on the parameters.

(2) Menus

Menu	Details	Type	Reference
Setting valid	Setting of the parameters will start.	A	2.10.1 Turning control parameters ON/OFF
ON	This turns ON the parameter currently indicated by the cursor.	C	2.10.1 Turning control parameters ON/OFF
OFF	This turns OFF the parameter currently indicated by the cursor.	C	2.10.1 Turning control parameters ON/OFF
Ctrl param 1	This changes the screen to the system common control parameter screen.	C	2.10.2 Control parameter 1 details
Ctrl param 2	This changes the screen to the system independent control parameter screen.	C	2.10.3 Control parameter 2 details

(Note) The page changeover keys can also be used to change the number.

2.10.1 Turning control parameters ON/OFF

(1) Operation method (To turn control parameters "#310001 Initial inch*" ON)

1)

Press the menu key
.

A message confirming the start of parameter setting will appear. The menu key will be highlighted.

2)

Press "Y" or .

The parameter setting mode will be entered. The cursor will appear at the parameter No. position. The menu keys and will appear normally.

3)

Press the cursor keys
 and to move the cursor to "#310001".

4)

Press the menu key .



The parameter at the cursor position will turn ON, and the parameter name will be highlighted.

To turn OFF, press the menu key .

#	Name
310001	Initial inch*
310002	% rewind
310003	Edit lock B
310004	Com_var RST clear
310005	Com_var PWR_ON clear

- (Note 1)** If the menu or key is pressed again during the parameter setting mode, the parameter setting mode will be canceled.
- (Note 2)** If another screen is opened, including the Control parameter 1 and 2 screens, the parameter setting mode will be canceled.
- (Note 3)** The cursor will not appear in modes other than the parameter setting mode. If the menu key or is pressed in this state, a message indicating that the mode is not the parameter setting mode will appear.

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2.10.2 Control parameter 1 details

The system common control parameters 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
310001	Initial inch *	ON	The inch command mode the initial state when the power is turned ON. (The parameters, offset amount, etc., all are inch settings.)
		OFF	The metric command mode the initial state when the power is turned ON. (The input setting unit is also metric.)
310002	% rewind (search)	ON	During tape search, the tape is rewound and stopped when the program is read to program end (%), and the designated block is not found.
		OFF	During tape search, the tape is not rewound when the program is read to program end (%), and the designated block is not found. Instead the program is stopped at that position.
310003	Edit lock B	ON	Editing of the label No. 8000 to 9999 machining program is locked.
		OFF	Editing of the label No. 8000 to 9999 machining program is enabled.
310004	Com-var RST clear	ON	After resetting, #100 to #149 are cleared to "blank" when there are 100 common variable sets, and #100 to #199 when there are 200 or 300 common variable sets.
		OFF	The common variables are held when reset.
310005	Com-var PWR-ON clear	ON	When the power is turned ON, #100 to #149 are cleared to "blank" when there are 100 common variable sets, and #100 to #199 when there are 200 or 300 common variable sets.
		OFF	The common variables are held when the power is turned ON or OFF.

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2.10.3 Control parameter 2 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
320001	G00 dry run	ON	The external manual feedrate is enabled in respect to rapid traverse (G0, G27, G28, G29, G30, G60).
		OFF	The "rapid traverse rate × rapid traverse override value" set in the machine parameters is applied.
320002	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.
320003	Middle point ignore	ON	During G28, 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, G30, the program designation is followed, and the axis returns to the reference point via the middle point.
320004	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 Base system param "120072 M_lock rapid feed".
		OFF	During machine lock, the feedrate is the commanded speed, and is the same process time as normal automatic operation.
320005	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).
320006	Rad compen intrf byp (Note)	ON	During the radius compensation interference check, the path is changed so that the workpiece is not cut into by the tool radius.
		OFF	During the radius 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.
320007	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.

(Note) If the control parameter "#320033 Tcomp interf chk OFF" is set to "OFF", the "#320006 Rad compen intrf byp" setting is invalid. Even if the workpiece is cut into, an alarm is not generated. Machining proceeds without changing the path.

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#	Item	Setting	Details
320008	Macro interrupt valid	ON	The user macro interrupt is validated.
		OFF	The user macro interrupt is invalidated.
320009	Sub-prog interrupt	ON	Subprogram type user macro interrupt is applied.
		OFF	Macro type user macro interrupt is applied.
320010	G0 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.
320011	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.
320012	Radius compen type B	ON	When radius compensation or executing start up or a cancel command during radius compensation, the intersecting point of the command block and next command block is operated.
		OFF	When radius compensation or executing start up or a cancel command during 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.
320013	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.
320014	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.
320015	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.
320016	Init cnst prphl spd	ON	(Not used.)
		OFF	(Not used.)
320017	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.
320018	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.

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#	Item	Setting	Details
320019	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.
320020	Auto restart valid	ON	The restart position is automatically moved to at the first start when the program is restarted.
		OFF	The program is restarted after moving to the restart position with manual operations.
320021	Drilling Z fixed	ON	The fixed cycle drilling axis is fixed to the Z axis.
		OFF	The fixed cycle drilling axis is an axes in a plane other than that designated with G17 to G19.
320022	Fixed cycle modal	ON	During the fixed cycle mode, movement to the drilling position follows the NC unit modal state (G0, G1).
		OFF	During the fixed cycle mode, the axis is positioned to the drilling position with G00.
320023	T leng offset Z fix	ON	The offset axis during tool length offset is fixed to the Z axis.
		OFF	The offset axis during tool length offset is designated with the program.
320024	Synchronized tapping	ON	The G74, G84 tap cycle is a floating tap chuckless tap cycle.
		OFF	The G74, G84 tap cycle is a tape cycle with floating tap chuck.
320025	T-life manage valid	ON	The tool life management is controlled.
		OFF	The tool life control data is ignored.
320026	Tool command mthd 2 (When tool life management is valid)	ON	The program tool command is handled as a tool No.
		OFF	The program tool command is handled as a group No.
320027	Tool select mthd 2 (When tool life management is valid)	ON	The tool with the maximum remaining life is selected from the tools used or not used within the same group.
		OFF	The tools are selected in registered No. order from the tools used in the same group.
320028	Initial high precis	ON	The G61.1 (high-precision control) mode is the initial state when the power is turned ON.
		OFF	The G64 (cutting) mode is the initial state when the power is turned ON.
320029	Playback G90	ON	The machining program created with playback is created with absolute values.
		OFF	The machining program created with playback is created with incremental values.
320030	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 coordinates 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 coordinates deviated by the interruption are held.)

CHAPTER 1 SCREEN OPERATIONS
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#	Item	Setting	Details
320031	Coord rot param invd	ON	Coordinate rotation by the parameters is invalid.
		OFF	Coordinate rotation by the parameters is valid.
320032	G04P decim pt valid	ON	The decimal point command of G04 address P is valid.
		OFF	The decimal point command of G04 address P is invalid.
320033	Tcomp interf chk OFF	ON	Interference check is not carried out during radius compensation. Turn this on when carrying out radius compensation with a fine segment program. This is the performance condition for the high-speed machining mode IB.
		OFF	Interference check is carried out during radius compensation. When OFF, the performance is halved even in the high-speed machining mode IB.
320035	Dry run in thred cut	ON	Dry run is executed during thread cutting.
		OFF	Dry run is not executed during thread cutting. This parameter is normally set to OFF.
320036	Host link	ON	The on-line state with the host computer is established.
		OFF	The off-line state with the host computer is established.
320037	1-digit F feed valid	ON	F1-digit feed control becomes valid. When an F1 to F9 command is issued, the machine runs at the speed set in the machining parameters "F1" to "F9". When an "F10" or higher command is issued, the feedrate will be directly commanded. This parameter cannot be selected when F1-digit feed specifications are not supported.
		OFF	The feedrate is directly commanded in all cases without referring to the F1-digit feedrate parameter.
320039	OFS Diameter DESIGN	ON	The compensation amount for radius compensation is input as a diameter value.
		OFF	The compensation amount for radius compensation is input as a radius value.
320043	Prec ctrl dec chk2	ON	If the positioning command (G0) and cutting feed command (G1) movement directions do not change, the deceleration check is not carried out at the joints of the positioning command (G0) and cutting feed command (G1) blocks.
		OFF	Deceleration check is carried out at the joints of the positioning command (G0) and cutting feed command (G1) blocks.

3. Setup Screens

3.1 Tool offset amount screen (Tool offset amnt screen)

The tool offset data is set and displayed in the Tool offset amnt screen. This screen is configured of two areas. Seven continuous numbers can be displayed in one area. The number of offset data items that can be used differs depending on the specifications.

■ **Tool offset type I**

The combined amount of the shape offset and wear offset are set as the offset data, with no distinction between shape offset memory and wear offset memory. (The tool offset data is the shape offset amount + wear offset amount.)

The offset data is used commonly for the tool length, tool position offset, tool radius, and three-dimensional tool radius offset.

The screenshot shows the 'Tool offset amnt' screen with the following data:

Offset No	Offset data
1	12.000
2	5.000
3	25.000
4	2.000
5	5.000
6	0.000
7	0.000
8	25.000
9	26.000
10	0.000
11	25.000
12	0.000
13	25.000
14	0.000

Mach posn	
X	0.000
Y	0.000
Z	0.000
U	0.000
V	0.000
W	0.000

Annotations in the image:

- 1. Program No. → Sub 0
- 2. Absolute/Incremental selection → Abs / Inc
- 3. Display area → [Table of Offset No and Offset data]

■ **Tool offset type II**

The shape offset amount and wear offset amount are set separately. The shape offset amount is furthermore divided into length and radius dimensions.

Of the offset data, the length dimension data is used for the tool length and tool position offset, and the radius dimension data is used for the tool radius and three-dimensional tool radius offset.

The screenshot shows the 'Tool offset amnt' screen with the following data table:

Offset No.	Length	L wear	Radius	R wear	Mach posn
1	12.000	0.000	0.000	0.000	X 0.000
2	5.000	0.000	0.000	0.000	Y 0.000
3	25.000	0.000	9.000	0.000	Z 0.000
4	2.000	0.000	0.000	0.000	U 0.000
5	5.000	0.000	0.000	0.000	V 0.000
6	0.000	0.000	0.000	0.000	W 0.000
7	0.000	0.000	0.000	0.000	
8	25.000	0.000	0.000	0.000	
9	26.000	0.000	0.000	0.000	
10	0.000	0.000	0.000	0.000	
11	25.000	0.000	0.000	0.000	
12	0.000	0.000	0.000	0.000	
13	25.000	0.000	0.000	0.000	
14	0.000	0.000	0.000	0.000	

Annotations in the image:

- 1. Program No. points to the 'Main' and 'Sub' fields at the top left.
- 2. Absolute/Incremental selection points to the 'Abs / Inc' button at the top right.
- 3. Display area points to the main data table.





Caution

To set the tool compensation amount (tool length and tool radius) during automatic operation, set it during single block stop. Use the following to set the compensation amount during automatic operation.

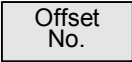
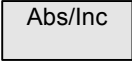
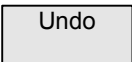
State during automatic operation	To set the tool length compensation amount	To set the tool radius compensation amount
During single stop	Whether the compensation amount is to be validated from the next block or from the next H No. command can be selected with the parameter (110051 Op Tolcomp ofs valid).	The compensation amount is validated from the next block.
Other than the above	The compensation amount after setting is validated from the tool compensation command block that is several blocks ahead of the block being executed.	

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(1) Display items

Display item	Details																					
1. Program No.	This displays the program No., sequence No. and block No. currently being executed. When executing a subprogram, the subprogram program No., sequence No. and block No. are displayed.																					
2. Absolute/Incremental selection	This indicates the selected mode (absolute or incremental).																					
3. Display area	<p>This displays the tool offset 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>  ,  : Scroll one line at a time.  ,  : Change the display contents, 14 lines at a time. Offset No. : The number of the offset data. (Types) : The display items differ, depending on the tool offset type. Type I : Offset data Type II: Length dimension / Length wear / Radius dimension / Radius wear </p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Type</th> <th style="text-align: center;">Setting item</th> <th style="text-align: center;">Details</th> <th style="text-align: center;">Display range</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Type I</td> <td>Offset data</td> <td>This sets the combined amount of the shape offset and wear offset.</td> <td style="text-align: center;">-99999.999 ~99999.999</td> </tr> <tr> <td rowspan="4" style="text-align: center;">Type II</td> <td>Length dimension</td> <td>This sets the offset amount of the tool length.</td> <td style="text-align: center;">-99999.999 ~99999.999</td> </tr> <tr> <td>Length wear</td> <td>This sets the wear offset amount of the tool length.</td> <td style="text-align: center;">-999.999 ~999.999</td> </tr> <tr> <td>Radius dimension</td> <td>This sets the offset amount of the tool radius.</td> <td style="text-align: center;">-99999.999 ~99999.999</td> </tr> <tr> <td>Radius wear</td> <td>This sets the wear offset amount of the tool radius.</td> <td style="text-align: center;">-999.999 ~999.999</td> </tr> </tbody> </table>	Type	Setting item	Details	Display range	Type I	Offset data	This sets the combined amount of the shape offset and wear offset.	-99999.999 ~99999.999	Type II	Length dimension	This sets the offset amount of the tool length.	-99999.999 ~99999.999	Length wear	This sets the wear offset amount of the tool length.	-999.999 ~999.999	Radius dimension	This sets the offset amount of the tool radius.	-99999.999 ~99999.999	Radius wear	This sets the wear offset amount of the tool radius.	-999.999 ~999.999
Type	Setting item	Details	Display range																			
Type I	Offset data	This sets the combined amount of the shape offset and wear offset.	-99999.999 ~99999.999																			
Type II	Length dimension	This sets the offset amount of the tool length.	-99999.999 ~99999.999																			
	Length wear	This sets the wear offset amount of the tool length.	-999.999 ~999.999																			
	Radius dimension	This sets the offset amount of the tool radius.	-99999.999 ~99999.999																			
	Radius wear	This sets the wear offset amount of the tool radius.	-999.999 ~999.999																			

(2) Menu

Menu	Details	Type	Reference
	When this menu key is pressed, a random number is set, and the INPUT key is pressed, the tool offset data with that number at its head appears. The cursor moves to the contents at the head of the line.	A	3.1.1 Setting the tool offset data
	This changes the setting mode to the absolute value mode or incremental value mode. This menu key changes the "Abs/Incr" selection from incremental to absolute, and vice versa.	C	1.5.3 Changing the absolute value/incremental value setting
	This returns the last rewritten data to its original value. (This menu key is valid for "Data Input", "Paste", and "Undo" operations.)	C	-

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Menu	Details	Type	Reference
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">Line clear</div>	<p>This erases a designated line (multiple lines possible) of offset data. Designation method: Offset No. where erasing begins/ Offset No. where erasing finishes (Ex.) 1/E : All offset data is set to "0".</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	3.1.2 Erasing the tool offset data
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">Line copy</div>	<p>This copies the contents of the designated line (one line amount) of tool offset data.</p>	C	3.1.3 Copying/pasting the tool offset data (1)
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">Line paste</div>	<p>This writes, in the line where the cursor is at, the contents (one line amount) of the copied tool offset data. If the copied line of data is changed after the menu key Line copy is pressed, original data is written when pasted. Once copied, a line of data can be pasted any number of times until a new area is copied.</p>	C	
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">Copy</div>	<p>This copies one data item at the cursor position. The copied data item is highlighted, and returns to normal when pasted.</p>	C	3.1.3 Copying/pasting the tool offset data (2)
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">Paste</div>	<p>This pastes the copied data item at the cursor position. Once copied, an item of data can be pasted any number of times until a new data item is copied.</p>	C	

3.1.1 Setting the tool offset 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 length wear data of offset No. (102).

1)

Press the menu key
.

2)

Designate the offset No.
102



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

Even when the cursor is moved to 102 position with the and keys, setting is possible.

Offset No	Length	L wear
100	0.000	0.000
101	0.000	0.000
102	0.000	0.000
103	0.000	0.000
104	0.000	0.000

Offset No	Length	L wear	Radius	R wear
102	0.000	0.000	0.000	0.000
103	0.000	0.000	0.000	0.000
104	0.000	0.000	0.000	0.000
105	0.000	0.000	0.000	0.000
106	0.000	0.000	0.000	0.000
107	0.000	0.000	0.000	0.000
108	-12345.000	-123.000	-12345.000	-123.000

3)

Using the key, move the cursor to the length wear setting column.

4)

Set the length wear value.
10



The set value appears.

Offset No	Length	L wear	Radius	R wear
102	0.000	10.000	0.000	0.000
103	0.000	0.000	0.000	0.000
104	0.000	0.000	0.000	0.000
105	0.000	0.000	0.000	0.000
106	0.000	0.000	0.000	0.000
107	0.000	0.000	0.000	0.000
108	-12345.000	-123.000	-12345.000	-123.000

5)

Set other data in the same manner.

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3.1.2 Erasing the tool offset data

(1) Erasing one line of tool offset 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	Length	L wear	Radius	R wear
101	0.000	0.000	0.000	0.000
102	23.630	10.000	42.140	8.000
103	130.023	10.000	23.340	3.000
104	0.000	0.000	0.000	0.000
105	0.000	0.000	0.000	0.000
106	0.000	0.000	0.000	0.000
107	0.000	0.000	0.000	0.000

(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	Length	L wear	Radius	R wear
102	0.000	0.000	0.000	0.000
103	130.023	10.000	23.340	3.000
104	0.000	0.000	0.000	0.000
105	0.000	0.000	0.000	0.000
106	0.000	0.000	0.000	0.000
107	0.000	0.000	0.000	0.000
108	-12345.000	-123.000	-12345.000	-123.000

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

1)

Press the menu key
[Line clear].



The menu is highlighted.

2)

Set the erasing range by marking the first and last offset Nos. with a "/", and press the [INPUT] key.
122/125 [INPUT]



A message confirming the erasing appears.

3)

Press the [Y] or [INPUT] 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 [Y] and

[INPUT].

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

Offset No	Length	L wear	Radius	R wear
122	0.000	0.000	0.000	0.000
123	0.000	0.000	0.000	0.000
124	0.000	0.000	0.000	0.000
125	0.000	0.000	0.000	0.000
126	34.000	10.000	7.000	0.000
127	42.000	8.000	10.000	2.000
128	-12345.000	-123.000	-12345.000	-123.000

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

3.1.3 Copying/pasting the tool offset data

(1) Copying/pasting a line at the cursor position (one line amount)

1)

Move the cursor to the line to be copied.

(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 , set the offset No. in the setting area, and press the key.

2)

Select line copy.
Menu



One line of the copied data is highlighted.

The highlight of the copied line returns to normal.

Offset No	Length	L wear	Radius	R wear
100	0.000	0.000	0.000	0.000
101	0.000	0.000	0.000	0.000
102	56.000	19.000	10.000	8.000
103	0.000	0.000	0.000	0.000
104	0.000	0.000	0.000	0.000
105	0.000	0.000	0.000	0.000
106	-12345.000	-123.000	-12345.000	-123.000

3)

Move the cursor to the line (offset No.: 109) where the data is to be pasted.

4)

Press the menu key .



The copied data is written in the line where the cursor is at. The highlight of the copied line returns to normal. The copied data is held until another line is copied.

Offset No	Length	L wear	Radius	R wear
107	0.000	0.000	0.000	0.000
108	0.000	0.000	0.000	0.000
109	56.000	19.000	10.000	8.000
110	0.000	0.000	0.000	0.000
111	0.000	0.000	0.000	0.000
112	0.000	0.000	0.000	0.000
113	-12345.000	-123.000	-12345.000	-123.000

(Note) If the copied line of data is changed after the menu key is pressed, the changed data is written when pasted.

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(2) Copying/pasting data at the cursor position

1)

Move the cursor to the data to be copied.



The cursor appears at the selected data.

(Note) One of the following methods can be used to select the data.

- Using the cursor movement keys \downarrow , \uparrow , \rightarrow , and \leftarrow , move the cursor to the data to be selected.
- Press **Offset No.**, set the compensation No. in the setting area, and press the **INPUT** key.

2)

Press menu key **Copy**.



The copied data item is highlighted.

Offset No	Length	L wear	Radius	R wear
100	0.000	0.000	0.000	0.000
101	0.000	0.000	0.000	0.000
102	56.000	19.000	10.000	8.000
103	0.000	0.000	0.000	0.000
104	0.000	0.000	0.000	0.000
105	0.000	0.000	0.000	0.000
106	-12345.000	-123.000	-12345.000	-123.000

3)

Move the cursor to the position (offset No.: 104, length wear) where the data is to be pasted.

4)

Press the menu key **Paste**.



The copied data is written in the line where the cursor is at, and the menu highlight returns to normal. The copied data is held until another line is copied.

Offset No	Length	L wear	Radius	R wear
100	0.000	0.000	0.000	0.000
101	0.000	0.000	0.000	0.000
102	56.000	19.000	10.000	8.000
103	0.000	0.000	0.000	0.000
104	0.000	19.000	0.000	0.000
105	0.000	0.000	0.000	0.000
106	-12345.000	-123.000	-12345.000	-123.000

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3.2 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)

Using the option, the number of coordinate system offset sets can be increased by 48 or 96 sets.

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

The screenshot shows the 'Coord offset' screen with the following callouts:

- 1. Coordinate system offset data area: Points to the grid of offset values for G54-G59.
- 2. Coordinate system EXT area: Points to the 'EXT' column in the G57-G59 grid.
- 3. G92/G52 area: Points to the 'G92' column in the G57-G59 grid.
- 4. Absolute/Incremental selection: Points to the 'Abs / Inc' button.
- 5. Manual value setting: Points to the 'M' and 'T' input fields.
- 6. Counter display area: Points to the 'RDY: JOG' and '16:17' status bar.

(1) Display items

Display item	Details
1. Coordinate system offset data area	<p>This displays the offset amount for all axes in the workpiece coordinate system (G54 to G59) or the expansion coordinate system (G54.1 Pn).</p> <p>The size of the display area differs depending on the number of axes. A maximum of eight axes can be displayed.</p> <p>The workpiece coordinate 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 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, program zero point, error compensation value). (These cannot be set.) These values are used during operation to confirm the zero point position of the selected coordinate system.

(2) Menu

Menu	Details	Type	Reference
Coord G54-G59	This displays the G54 to G59 offset. The cursor moves to the G54 offset data. This menu can be used when the G54 to G59 offset data is not displayed.	C	3.2.1 Setting the coordinate system offset data
Coord G54.1P_	If the P No. to be displayed on the screen is input, this displays the coordinate system offset data area and expansion workpiece coordinate (G54.1 Pn) offset data. If the local coordinate offset (G52) is displayed in the G92/G52 area, the display will change to the G92 display.	A	-
Coord G92/G52	This displays the G92 or G52 coordinate system offset data. The G92 offset data is also 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 absolute value setting mode is entered when the power is turned ON.	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	3.2.2 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	3.2.2 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	3.2.3 Setting the workpiece coordinate zero point
Counter type	This displays the submenu for changing the display counter.	C	2.1.1 Changing the counter display
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

3.2.1 Setting the coordinate system offset data

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

1)

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

2)

Press the menu key **Coord G54-G59**.



The G54 to G59 coordinate system offset appears.

3)

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



G54		G55		G56	
X	122.480	X	0.000	X	-191.245
Y	-225.590	Y	0.000	Y	-596.025
Z	0.000	Z	0.000	Z	0.000
U	0.000	U	0.000	U	0.000
V	0.000	V	0.000	V	0.000
W	0.000	W	0.000	W	0.000
G57		G58		G59	
X	0.000	X	0.000	X	0.000
Y	0.000	Y	0.000	Y	0.000
Z	0.000	Z	0.000	Z	0.000
U	0.000	U	0.000	U	0.000
V	0.000	V	0.000	V	0.000
W	0.000	W	0.000	W	0.000

The coordinate system display can be changed using the page keys **▲**, **▼**. Refer to section "3.2.6 Changing the coordinate system display (2)" for details.

4)

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

5)

Set the offset data.
122 **INPUT**



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

G54		G55	
X	122.000	X	0.000
Y	-225.590	Y	0.000
Z	0.000	Z	0.000
U	0.000	U	0.000
V	0.000	V	0.000
W	0.000	W	0.000

6)

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 "3.3.2 Transferring a file" for details.)

3.2.2 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 appears to confirm the erasing.

2)

Press the key.



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

G54		G55	
X	0.000	X	0.000
Y	0.000	Y	0.000
Z	0.000	Z	0.000
U	0.000	U	0.000
V	0.000	V	0.000
W	0.000	W	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 appears to confirm the erasing.

2)

Press the key.



All of the coordinate system data is erased.

3.2.3 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. The local coordinate system offset is cleared to zero.

3.2.4 Changing the counter display

(1) Counter type menus

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



Menu	Details	Type
<input type="text" value="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
<input type="text" value="Program Z-point"/>	This displays the machine position of the local coordinate zero point.	C
<input type="text" value="Er comp amnt"/>	This displays the total compensation amount (error compensation amount such as pitch error) that does not appear in the counter.	C

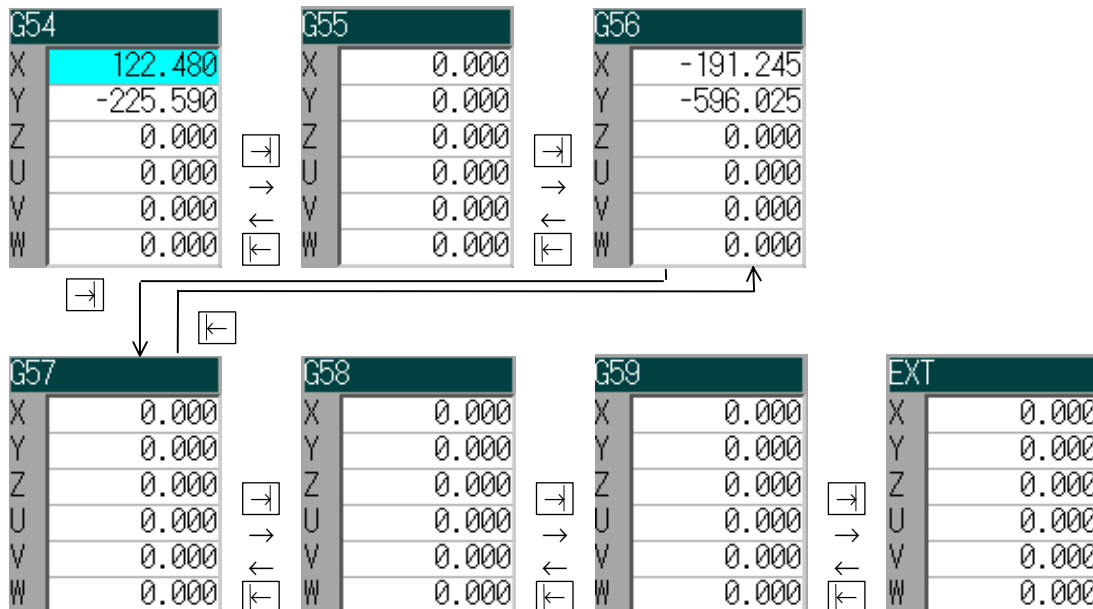
3.2.5 Setting the manual value command



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

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

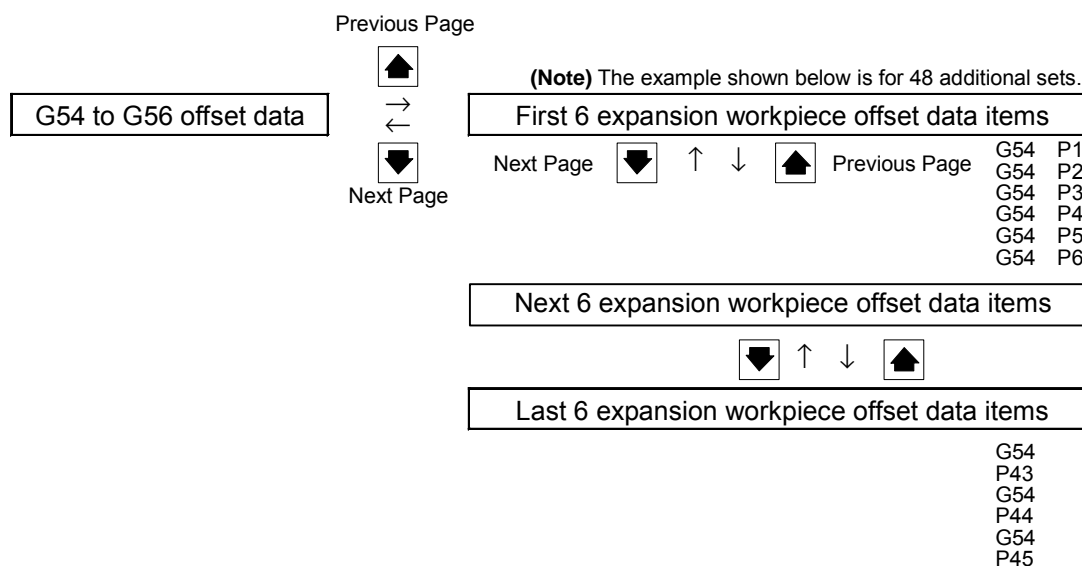
3.2.6 Changing the coordinate system display

- (1) **Changing the coordinate system offset data area display using the TAB keys**  and 
The cursor will change as shown below when the TAB keys are pressed.



- (2) **Changing the offset data in 6 set units using the page changeover keys**
(Previous Page , Next Page )

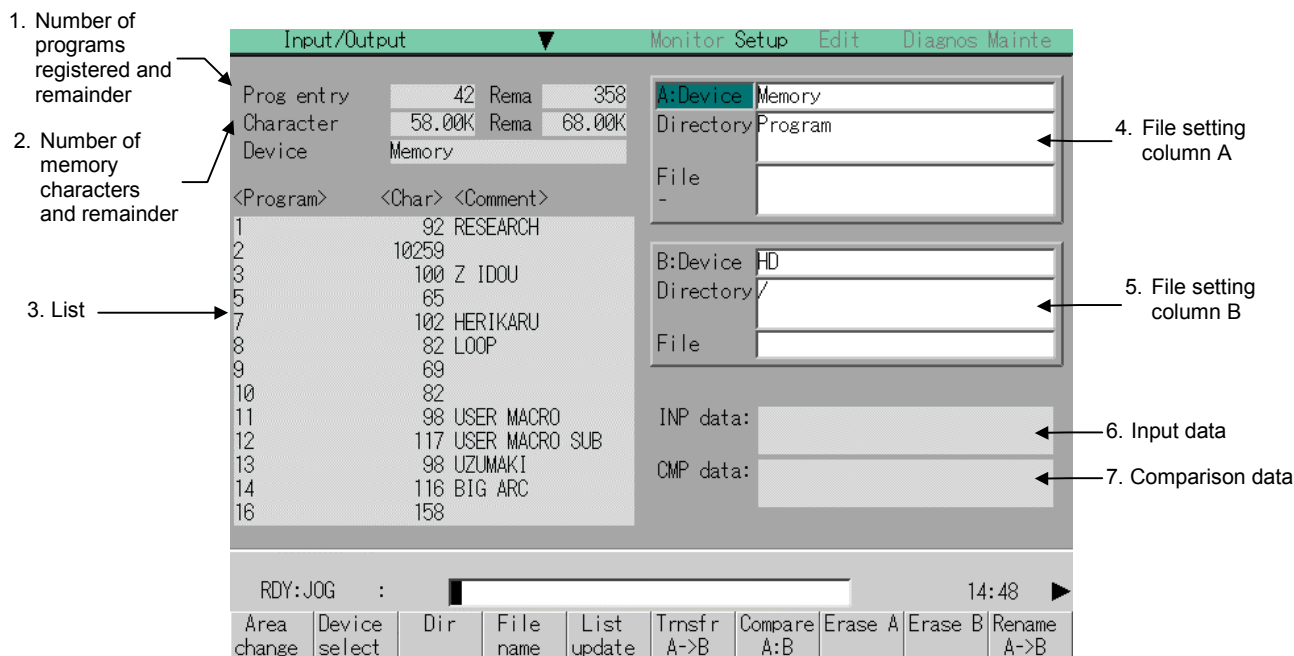
The display will change as shown below when the page changeover keys are pressed.
This is valid when the expansion workpiece coordinate system specifications are provided.



3.3 Data Input/Output screen (Input/Output screen)

The Data 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 ^(Note 1)	<p>This displays the registration information of machining program of the selected device.</p> <p>Number of programs registered (Prog entry) :</p> <p>This displays the number of programs previously registered as user machining programs.</p> <p>Remainder (Rema) :</p> <p>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 ^(Note 1)	<p>This displays the number of characters of the machining program of the selected device.</p> <p>Number of memory characters (Character) :</p> <p>This displays the number of characters previously registered as user machining programs.</p> <p>Remainder (Rema) :</p> <p>This displays the remaining number of characters that can be registered.</p> <p>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 ^(Note 2)	<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. For Ethernet files, the date and time are displayed as the comment. When displaying the HD, FLD, DS or IC card list, the date of file creation, file size or machining program comment will appear in the comment field according to the operation parameter "List comment type" setting.</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/ Data server	Ethernet	FLD	IC card
Number of programs registered	○	×	○	○	○	○
Remainder	○	×	×	×	×	×
Number of memory characters	○	×	○	○*	○	○
Remainder	○	×	○	×	○	○
List	○	×	○	○	○	○

○ : Displayed × : Not displayed

- Menu HD is Data server for the MELDAS610M, 630M and 650M.
- When the Ethernet parameters "#360114 Host1 no total char." to "#360414 Host 4 no total char." are set to "1", the number of memory characters will not appear.

(Note 2) A list is not displayed when operating with an RS-232C I/F connection.

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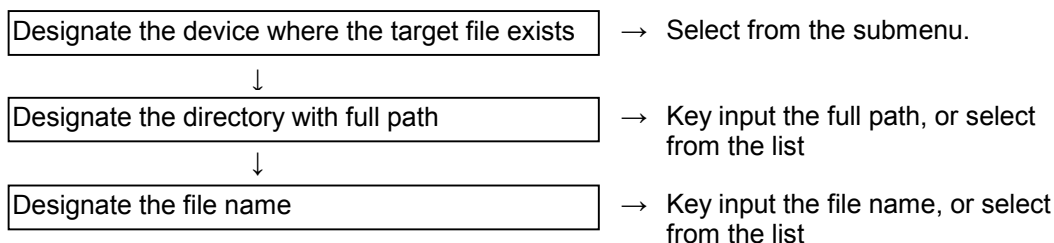
(2) Menus

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 confirmed, and if a directory exists it is set in the root. The memory is selected as the default.	A	3.3.1 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 directly 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	3.3.2 Transferring a file
Compare A:B	This compares the files in file setting column A (transfer origin) and file setting column B (transfer destination).	C	3.3.3 Comparing files
Erase A	This erases the file in file setting column A. (Note) Not possible for the Ethernet.	B	3.3.4 Erasing a file
Erase B	This erases the file in the file setting column B. (Note) Not possible for the Ethernet.	B	3.3.4 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	3.3.5 Changing a file name
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, IC card or FLD is selected for the device.	A	3.3.6 Creating a directory
Merge B-> A	The file contents in the file setting column B are added to the file in the file setting column A. (The file in the file setting column B is not changed.)	B	3.3.7 Merging a file
FLD format	This formats the FLD.	B	3.3.8 Formatting an FLD
IC format	This formats the IC card.	B	3.3.9 Formatting an IC card
Stop	This interrupts the process (transfer, compare, etc.) during execution.	C	-

3.3.1 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 menu submenus

Menu	Details	Type	Reference
Memory	This selects the memory.	C	-
RS232C	This selects the RS-232C (including tape)	C	-
HD	This selects the HD (hard disk). (Note) This menu is indicated as Data server for the MELDAS610M, 630M and 650M.	C	-
IC card	This selects the IC card. Use a recommended IC card that matches the Mitsubishi quality standards. (Refer to * for details)	C	-
Ethernet	This selects Ethernet.	C	-
FLD	This selects the FLD.	C	-

* The list of recommended IC cards is given below.

Item	Maker	Type	Specifications	Remarks	
ATA flash IC card	SANDISK	SDP3B-6-101-B4	6MB	Recommended part	101-B4 given in the type on the left may be omitted from the type when sold.
		SDP3B-20-101-B4	20MB	Recommended part	
		SDP3B-40-101-B4	40MB	Recommended part	
		SDP3B-85-101-B4	85MB	Recommended part	

(Note 1) Only the FAT16 format IC card can be used. If a FAT32 format IC card is used, it will be recognized as non-formatted, and an error will occur.

(Note 2) An IC card with a capacity of up to 2GB can be used.

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

Menu	Details	Type	Reference
From list	<p>The cursor appears in the list display. The list contents can be selected with the INPUT key.</p> <p>When a directory is selected, the contents of the selected directory are displayed in the list. Continued selection is possible.</p> <p>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.</p>	A	

■ **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 Select from the list
	File other than the machining program	Select from the submenu	Select from the submenu	– (Fixed)
Device other than the NC memory	All files	Select from the submenu	Key input in the data setting area, and press INPUT	Key input in the data setting area, and press 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 **INPUT** key.
 - Press submenu **Dir** of the menu **File name** or **From list**. Move the cursor to the target directory or file name, and press the **INPUT** 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 a file in the NC memory other than a machining program is designated, it is not necessary to set the file name. (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 **INPUT** 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 parameters 110007 "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	HD	IC card	Ethernet	FLD
--------	--------	----	---------	----------	-----

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

4)-2

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



The selected file name appears in the data setting area.

10013					
Device select	Dir	File name	List update	Trnsfr A -> B	Compare A:B

4)-3

Press the key.



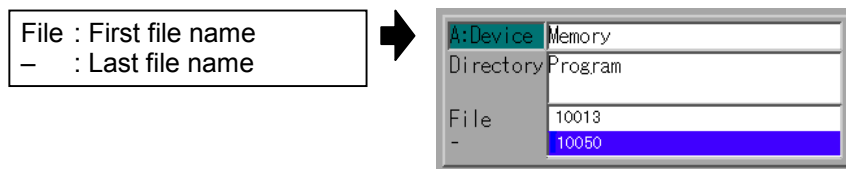
The selected file name appears.

A:Device	Memory
Directory	Program
File	10013
-	

(4) Designating multiple files

■ Designating multiple serial files

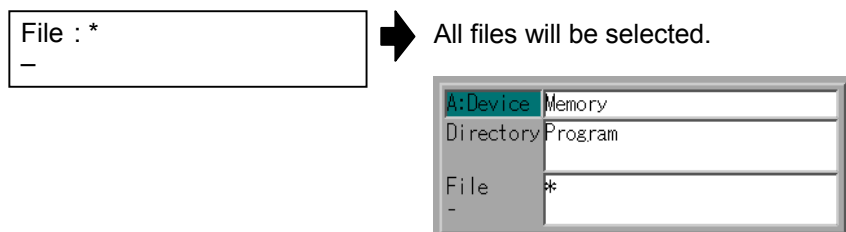
Multiple serial files can be transferred, compared and erased in the file setting column A. Set as follows in this case.



■ Using a wild card

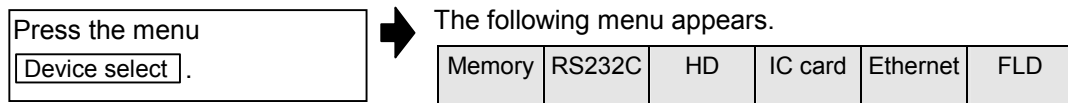
A wild card (*) can be used in the file name.

(Note) When using RS-232C, multiple files cannot be compared.

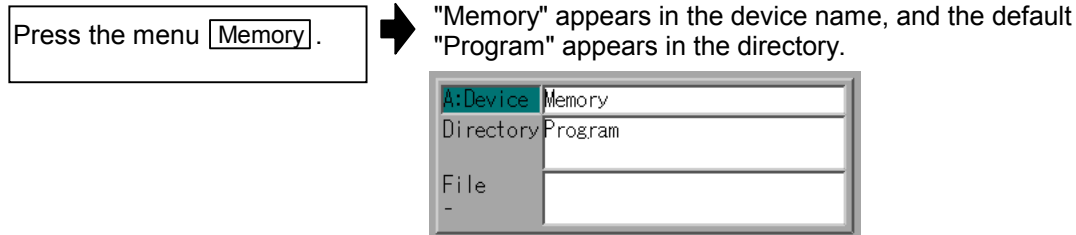


(5) Selecting an NC memory file other than a program

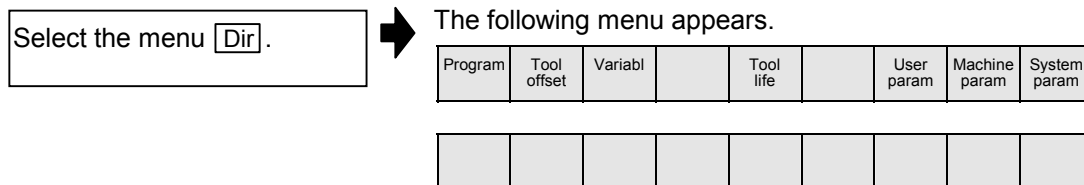
1)



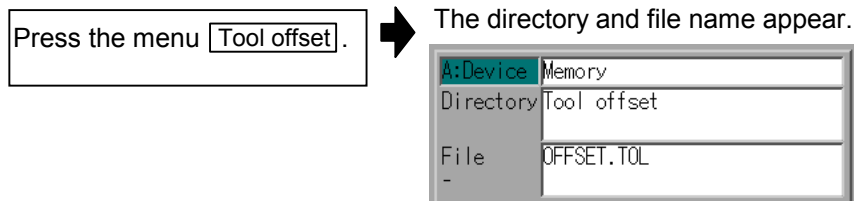
2)



3)



4)



(Note) The file name for each directory is fixed. Refer to "3.3.10 List of file names" for the file names.

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

- 1)

Press the menu Device select.	➔	The following menu appears.
----------------------------------	---	-----------------------------

Memory	RS232C	HD	IC card	Ethernet	FLD
--------	--------	----	---------	----------	-----

- 2)

Select a device. HD	➔	The device name appears. The root directory is selected as the default.
------------------------	---	---

A:Device	HD
Directory	/
File	-

- 3)

Designate the directory. Select the menu Dir.	➔	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. PRG/PRE CUT INPUT	➔	<table border="1" style="display: inline-table;"> <tr> <td>A:Device</td> <td>HD</td> </tr> <tr> <td>Directory</td> <td>/PRG/PRE CUT/</td> </tr> <tr> <td>File</td> <td>-</td> </tr> </table>	A:Device	HD	Directory	/PRG/PRE CUT/	File	-
A:Device	HD							
Directory	/PRG/PRE CUT/							
File	-							

Next, refer to the operation in step 5).

■ When selecting the directory from the list

- 4)-1

Press the menu From list.	➔	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
PRG	DIR	93.01.20 13:43

- 4)-2

Move the cursor to directory to be selected, and fix. ↑, ↓ INPUT	➔	The selected directory appears in the data setting column. The contents of the selected directory appear in the list.
---	---	--

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).

A:Device	HD
Directory	/PRG/PRE CUT/
File	-

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5)

Designate the file name.
Press the menu **File name**.



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 **INPUT**



A:Device	HD
Directory	/PRG/PREOUT/
File	10013.prg
-	

■ When selecting the file name from the list

6)-1

Press the menu **From list**.



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.
↑, ↓ **INPUT**



The selected file name appears in the data setting area.

10013

Device select	Dir	File name	List update	Trnsfr A -> B	Compare A:B	
---------------	-----	-----------	-------------	---------------	-------------	--

6)-3

Press the **INPUT** key.





The selected file name appears.

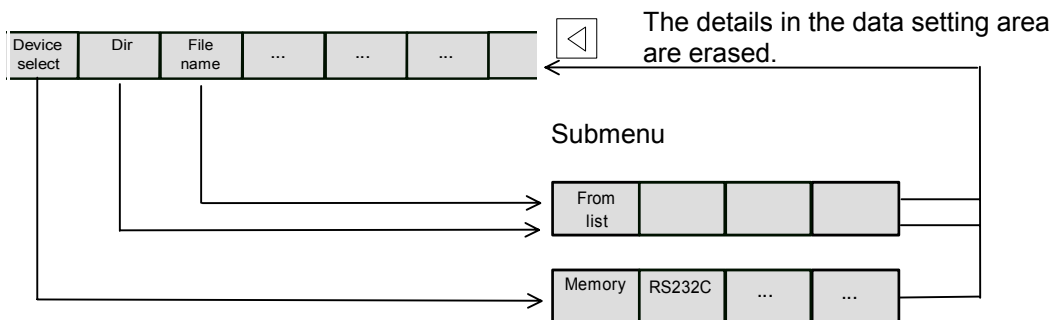
A:Device	HD
Directory	/PRG/PREOUT/
File	10013.prg
-	

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(7) Canceling the input mode

- 1) When the **Device**, **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



3.3.2 Transferring a file

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

Refer to "3.3.1 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 Parameter 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.



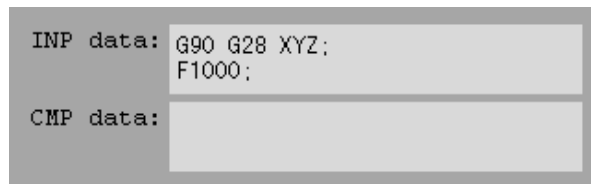
A message appears to confirm the transfer.

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 are:
 For ISO: "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.)
- 4) Up to 223 files, including the directory, can be registered in the FLD's root directory.
- 5) Up to 511 files, including the directory, can be registered in the IC card's root directory. (512 files can be registered when volume labels are not used. However, if the "File open error" occurs when the 512th file is registered, the operation message is not an "File open error" but a "File entry over".)
- 6) An error will occur if the IC card is not mounted.

■ **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 transfer speed is slower if there are many registrations.
- 3) The size of one block of the machining program 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 tool offset data files**

- 1) If an error occurs during offset data transfer, an error message appears on the screen, and the transfer operation is interrupted.

■ **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.
- 3) System parameters can be transferred from the NC memory to an external device, but cannot be transferred from an external device to the NC memory.

■ **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.

■ Notes when transferring tool life data files

- 1) When tool life data is output from the NC memory, the file information is inserted at the first and last of the file.
 - First file information : Number of registered tools (P No.) and the maximum number of possible registrations (T No.)
 - Last file information : Finish code

3.3.3 Comparing files (Compare)

This section explains the method of comparing transferred files.
Refer to "3.3.1 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 Data Input/Output screen. (An error occurs.)
The size of one block of data should be within 250 characters.

3.3.4 Erasing a file

This section explains the method of erasing a file.

Refer to "3.3.1 Selecting a device, directory and file" for the method of designating a device, directory and file.

(1) Erasing a file

- 1)

Press the menu
- 2)

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

 ➔ The designated file appears.
- 3)

Press the menu .

 ➔ A message to confirm the erasing appears.
- 4)

Press or .

 ➔ 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 menu to update the list.

(2) Erasing a file

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 .

(Note) If the file to be erased is running, an error will occur, and the file will not be erased.

3.3.5 Changing a file name (Rename)

This section explains the method of changing a file name.

Refer to "3.3.1 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 .
.

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.

3.3.6 Creating a directory

This section explains the method of creating a directory.

Refer to "3.3.1 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.
A directory can be created for the HD, IC card and FLD
devices.

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 area B.

(Note 1) Up to 223 files, including the directory, can be registered in the FLD's root directory.

(Note 2) Up to 511 files, including the directory, can be registered in the IC card's root directory.
(512 files can be registered when volume labels are not used. However, if the "File open error" occurs when the 512th file is registered, the operation message is not an "File open error" but a "File entry over".)

(Note 3) An error will occur if the IC card is not mounted.

3.3.7 Merging a file

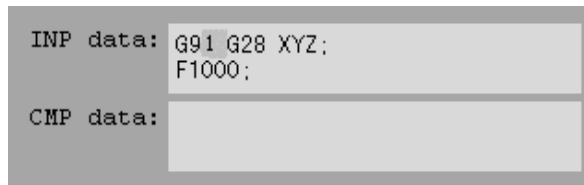
This section explains the method for adding the file in file setting column B to the file in file setting column A.

Refer to section "3.3.1 Selecting a device, directory and file" for the method of designating a device, directory and file.

The various conditions such as the port No. and the device No., etc. at merging, are set on the "I/O param" screen.

(1) Merging a file

- 1) Press the menu , and select the file setting column A.
- 2) Designate the merge destination device, directory and file name. → The designated file name appears.
- 3) Press the menu , and select the file setting column B.
- 4) Designate the merge origin device, directory and file name. → The designated file name appears.
- 5) Press the menu . → A message confirming the merge appears.
- 6) Press Y or . → The file merge starts. The data being merged will appear in the Input Data display column.
A message appears when the merge is completed.



The details of the file in file setting column A will be as follows when the merge is completed.

<pre>(FILE A) G28 XYZ; G90 F800; G00 X100. Y100.; (FILE B) G91 G28 XYZ; F1000; G01 X200. Y200.; M02; %</pre>	<p>Details of file in file setting column A before merge.</p> <p>Details of file in file setting column B before merge.</p>
--	---

The details of the file in file setting column B do not change.

(Note 1) If the merge destination file (file in file setting column A) is running, an error will occur, and the files will not be merged.

(Note 2) The devices that can be merged are the memory, HD, IC card and FLD.

3.3.8 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 FLD format.



A message confirming the formatting appears.

2)

Press Y or INPUT.



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

(Note 1) The FLD is formatted with the 1.44MB format.

(Note 2) The volume label is automatically assigned when the FLD is formatted.

3.3.9 Formatting an IC card

This section explains the method for formatting an IC card.

(1) Formatting an IC card

1)

Press the menu IC format.



A message confirming the formatting appears.

2)

Press Y or INPUT.



The IC card is formatted.
A message appears when the formatting is completed.

3.3.10 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.

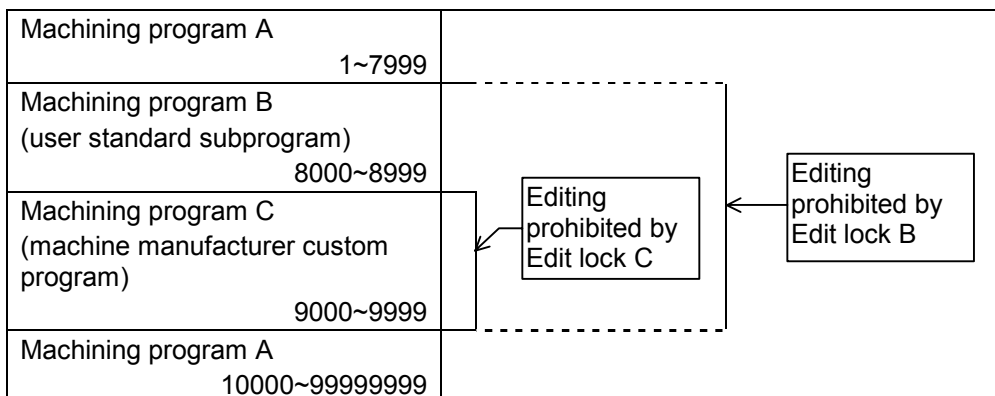
Do not change the extensions (.XXX) when storing in a device other than the NC memory.

Data type	NC memory directory path	Fixed file name
Machining program	M01:/PRG/USR	(Program No.)
Fixed cycle program	M01:/PRG/FIX	(Program No.)
Tool offset data	M02:/TOL/	OFFSET. TOL
Common variable	M02:/COM/	COMMON. VAR
Tool life data	M02:/TLF/	TOOLLIFE. TLF
Parameters • User parameters • Machine parameters • System parameters	M02:/PRM/	USER. PRM MACHINE. PRM SYSTEM. PRM
Tracking data	M02:/LOG/	TRACK. MNT
Auxiliary axis absolute position data	M02:/AUX/	AUXABS. AUX

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3.3.11 Edit lock B and C

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



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

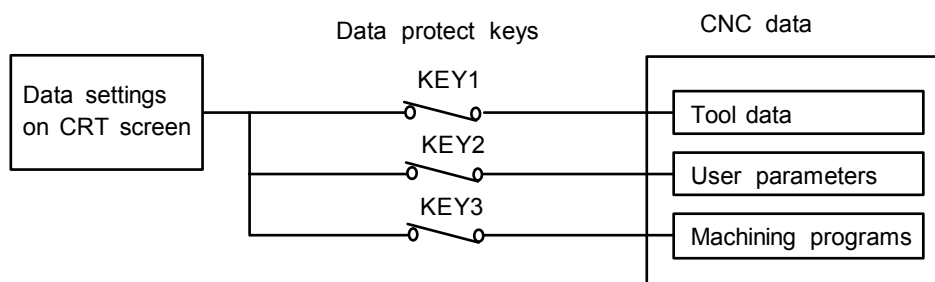
Screen	Operation	Edit lock B			Edit lock C		
		Machining program			Machining program		
		A	B	C	A	B	C
Edit	Search	○	○	×	○	○	×
	Edit	○	×	×	○	○	×
	MDI registration	○	×	×	○	○	×
Input/Output	Transfer	○	×	×	○	○	×
	Compare	○	×	×	○	○	×
	Copy	○	×	×	○	○	×
	Condense	○	×	×	○	○	×
	Merge	○	×	×	○	○	×
	Rename	○	×	×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

3.3.12 Data protect keys

The data protect keys can be used to prohibit data setting and erasure. 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 offset amnt, Tool measure
3	Tool registration data setting/erasing	Tool registration
4	Tool life data setting/erasing	Tool life
5	Workpiece coordinate offset amount setting/erasing	Coord offset, Workpiece measure, Rotate meas
6	Tool offset data tape input/output	Input/Output
7	Tool offset amount input/output	Input/Output
8	Tool registration data input/output	Input/Output
9	Tool life data input/output	Input/Output
10	Workpiece coordinate offset amount input/output	Input/Output

(Note) If setting of data in the screens shown in Table 1 No. 2 to 5 is attempted when the KEY1 is OFF, the message "Data protect" appears.

If origin set is attempted on the Position display1 screen and the key is pressed, the origin set is not executed, and the message "Origin set not possible" appears.

If operation No. 6 to 10 in Table 1 is performed, the "Data protect" message appears when the input key is entered, and input or output is prohibited.

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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	Parameter/Control param
2	Axis parameter setting	Parameter/Axis param
3	Operation parameter setting	Parameter/Operation param
4	Machining parameter setting	Parameter/Process param, Rotate meas
5	Common variable setting	Position display/Common variable
6	I/O basic parameter setting	Input/Output/Parameter
7	Parameter input/output	Input/Output
8	Common variable input/output	Input/Output

(Note) If setting of data in the screens shown in Table 2 No. 1 to 6 is attempted when the KEY2 is OFF, the message "Data protect" appears.
If the operations shown in Table 2 No. 7 and 8 are attempted and the INPUT key is pressed, the message "Data protect" appears, and the input and output are disabled.

(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 entry	MDI	MDI entry
2	Machining program editing	Edit	–
3	New program editing	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 display	–

(Note) If editing or setting, etc., is attempted on the screens shown in Table 3 No. 1 to 8 when the KEY3 is OFF, the message "Data protect" appears.

3.4 Parameter screens

The parameters include the user parameters and the machine parameters. The screens can be selected with the menu keys.

This section explains the configuration and operation of the User Parameter screens.

Refer to "3.5 User parameter details" for the contents of each user parameter.

The configuration of all of the User Parameter screens follows that of either of the two screens shown below.

- 1. This is the screen for setting the common parameters for the system, axis, device, etc. (Process param, etc.)

Process param			Monitor Setup	Edit	Diagnos Mainte
No.	Name	Data	No.	Name	Data
330001	Base axis I	X	330018	Coord rot plane (V)	
330002	Base axis J	Y	330019	Coord rot center (H)	-256.442
330003	Base axis K	Z	330020	Coord rot center (V)	52.074
330004	Parallel axis 1I	X	330021	Coord rot vector (H)	0.000
330005	Parallel axis 1J	Y	330022	Coord rot vector (V)	0.000
330006	Parallel axis 1K	Z	330023	Coord rotation angle	40.0246
330007	Parallel axis 2I	X	330024	Scaling magnificat'n	1.0000
330008	Parallel axis 2J	Y	330025	Auto corner override	75
330009	Parallel axis 2K	Z	330026	A.cmr over max ang	135.000
330010	G73 return amount	0.000	330027	A.cmr over dcc zon	20.000
330011	G83 return amount	0.000	330028	A.cmr over ins arc	50
330012	Arc finish pt error	1.000	330029	Prog comand unit mgf	1
330013	3-dimensional compen	0.000	330030	Subpro search 1:dev	M01
330014	F cmd mgf type /min	0	330031	Subpro search 1:dir	/PRG/USR
330015	Normal C axis turn R	0.000	330032	Subpro search 2:dev	HD
330016	Norm C insrt radius	0.000	330033	Subpro search 2:dir	/
330017	Coord rot plane (H)		330034	Subpro search 3:dev	FD1

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Area copy	Area paste		Axis param	Process param	Operate param	I/O param	Ethnet param
-----------	------------	--	------------	---------------	---------------	-----------	--------------

- 2. This is the screen for setting the parameters having an array structure for each system, axis, device, etc. (Axis param, etc.)

Axis param						Monitor Setup	Edit	Diagnos Mainte
No.	Name	X	Y	Z	U			
340001	Mirror image	0	0	0	0			
340002	Automatic dog type	0	0	0	0			
340003	Manual dog type	0	0	0	0			
340004	Axis removal	0	0	0	0			
340005	No G76/87 shift	0	0	0	0			
340006	G76/87 shift (-)	0	0	0	0			
340007	Soft limit invalid	0	1	1	1			
340008	Soft limit (-)	-120.000	1.000	-1.000	0.000			
340009	Soft limit (+)	200.000	200.000	821.000	0.000			
340010	G60 shift amount	0.000	0.000	0.000	0.000			
340011	Soft limit inside	0	0	0	0			
340012	Rotation axis type*	0	0	0	0			

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Area copy	Area paste	Next axis	Axis param	Process param	Operate param	I/O param	Ethnet param
-----------	------------	-----------	------------	---------------	---------------	-----------	--------------

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(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	3.4.2 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 six or more display axes in the selected system. The axis to be displayed is changed to the 1st to 5th axis and 6th to 8th axis. (This is used when there are six to eight axes in one system.) This is used in the screen for the parameters having an array structure for each system, axis, device, etc.	C	1.5.4 Changing the display axis
Axis param Process param Operate param I/O param Ethernet param Link param	This changes the screen to the user parameter screen.	C	3.5 User parameter details
BaseCom param BaseSys param Analog I/O Axis spec Zp-rtn param Servo param Er Comp param Er Comp data	This changes the screen to the Machine parameter screen. (Note) Normally, the machine parameters can be referred to, but cannot be set.	C	-

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Menu	Details	Type	Reference
Spindle spec	This changes the screen to the Machine parameter screen. (Note) Normally, the machine parameters can be referred to, but cannot be set.	C	-
Spindle param			
PLC constnt			
PLC timer			
PLC counter			
Bit select			
Posn switch			
Open param 1			
Open param 2			

3.4.1 Setting the parameters

The method of setting the parameters is explained. For the setting range of each parameter, refer to "3.5 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 "340011 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
340001	Mirror image	1
340002	Automatic dog type	0
340003	Manual dog type	0
340004	Axis removal	0
340005	No G76/87 shift	0
340006	G76/87 shift (-)	0
340007	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
340001	Mirror image	0
340002	Automatic dog type	0
340003	Manual dog type	0
340004	Axis removal	0
340005	No G76/87 shift	0
340006	G76/87 shift (-)	0
340007	Soft Limit invalid	0

4)

Continue setting the values. Lastly, restart the computer.

➔ Parameters with a . mark are valid.

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

No.	Name	X
340005	No G76/87 shift	0
340006	G76/87 shift (-)	0
340007	Soft limit invalid	0
340008	Soft limit (-)	-120.000
340009	Soft limit (+)	200.000
340010	G60 shift amount	0.000
340011	Soft limit inside	0

(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.
 340007/340009



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

No.	Name	X
340005	No G76/87 shift	0
340006	G76/87 shift (-)	0
340007	Soft limit invalid	0
340008	Soft limit (-)	-120.000
340009	Soft limit (+)	200.000
340010	G60 shift amount	0.000
340011	Soft limit inside	0

(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
.



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

3)

Press or .



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 key is pressed.

The menu highlight returns to normal.

3.5 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 "3.4 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	3.5.1 Axis Parameter screen
Process param	This changes the screen to the Process Param screen.	C	3.5.2 Machining Parameter screen
Operate param	This changes the screen to the Operation Param screen.	C	3.5.3 Operation Parameter screen
I/O param	This changes the screen to the I/O Param screen.	C	3.5.4 Input/Output Parameter screen
Ethernet param	This changes the screen to the Ethernet Param screen.	C	3.5.6 Ethernet Parameter screen
Link param	This changes the screen to the Cmtr link Param screen.	C	3.5.7 Computer Link Parameter screen

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

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3.5.1 Axis Parameter screen (Axis param screen)

The necessary parameters are set for each axis. Parameters with a "*" mark added are validated after restarting.

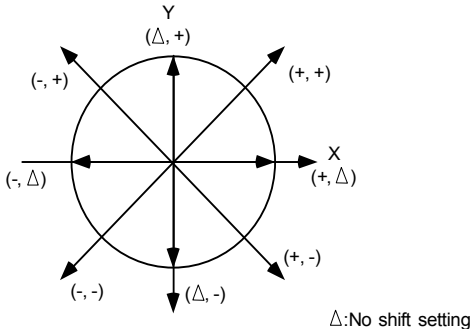
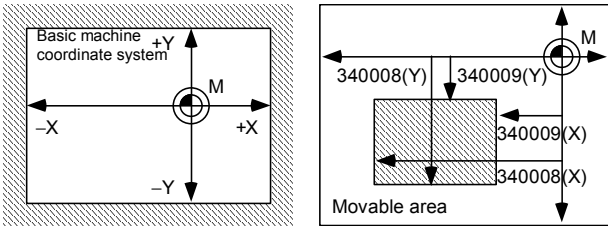
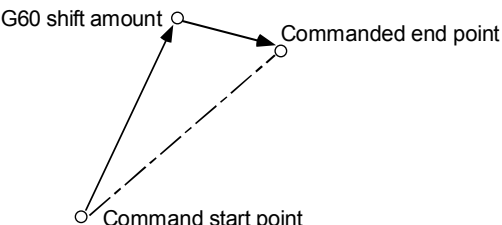
Axis param		Monitor	Setup	Edit	Diagnos	Mainte
No.	Name	X	Y	Z	U	
340001	Mirror image	0	0	0	0	0
340002	Automatic dog type	0	0	0	0	0
340003	Manual dog type	0	0	0	0	0
340004	Axis removal	0	0	0	0	0
340005	No G76/87 shift	0	0	0	0	0
340006	G76/87 shift (-)	0	0	0	0	0
340007	Soft limit invalid	0	1	1	1	1
340008	Soft limit (-)	-120.000	1.000	-1.000	0.000	0.000
340009	Soft limit (+)	200.000	200.000	821.000	0.000	0.000
340010	G60 shift amount	0.000	0.000	0.000	0.000	0.000
340011	Soft limit inside	0	0	0	0	0
340012	Rotation axis type*	0	0	0	0	0

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Area copy	Area paste	Next axis				Axis param	Process param	Operate param	I/O param	Ethernet param
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Number	Name	Details	Setting range (units)
34 0001	Mirror image	In memory and MDI operation, this reverses the sign for the next block movement data (incremental amount). (Note) During execution of a machining program, turn the mirror image parameter OFF at the same coordinate position where the parameter was turned ON. When the changeover position changes, always execute a reference point return and "G92 G53 X_ Y_ Z_ a_ ;".	0: Mirror image invalid 1: Mirror image valid
34 0002	Automatic dog type	The first reference point return is always dog-type, but this selects either dog-type or high-speed (memory type) for the second and subsequent reference point returns.	0: High-speed return 1: Dog-type return
34 0003	Manual dog type	This sets the manual reference point return method for the function above.	0: High-speed return 1: Dog-type return
34 0004	Axis removal	This excludes the control axis from the NC control targets. It is used for controlling other axes such as the additional axes (rotation table, etc.) separately from the machine.	0: Axis removal invalid 1: Axis removal valid
34 0005	No G76/87 shift	This is set when the axis direction is not shifted.	0: Shift 1: No shift

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Number	Name	Details	Setting range (units)
34 0006	G76/87 shift (-)	<p>This designates the tool shift direction (-) for tool relief after spindle orientation in the fixed cycle G76 (fine boring) and G87 (back boring).</p> 	<p>0: Shift direction (+) 1: Shift direction (-)</p>
34 0007	Soft limit invalid	<p>This selects the stored stroke limit II function set in 340008 and 340009.</p>	<p>0: Valid 1: Invalid</p>
34 0008	Soft limit (-)	<p>This sets the coordinates of the (-) direction in the moveable range of the stored stroke limit II or the lower limit coordinates of the prohibited range of stored stroke limit IIB.</p> <p>When the stored stroke limit IIB function is selected, the prohibited range will be between two points even when 340008 and 340009 are set in reverse. When II</p>	<p>-999999.999 to 999999.999 (mm)</p> <p>When the same value (other than 0) is set in 340008 and 340009, this function is invalidated.</p>
34 0009	Soft limit (+)	<p>is selected, the entire range will be prohibited.</p> <p>Soft limit outside (340011=0) Soft limit inside (340011=1)</p> 	<p>(Ex.) 340008 = 10. 340009 = 10.</p>
34 0010	G60 shift amount	<p>When G60 (uni-direction positioning) is commanded, this sets the last positioning direction and distance for each axis.</p> 	<p>-999999.999 to 999999.999 (mm)</p>

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Number	Name	Details	Setting range (units)
34 0011	Soft limit inside	This sets whether the stored stroke limit function set with 340008 and 340009 prohibits entry from outside the designated range or entry from inside the range.	0: Prohibited range is outside (Stored stroke limit II is selected.) 1: Prohibited range is inside (Stored stroke limit IIB is selected.)
34 0012	Rotation axis type*	This designates the type of rotation axis.	0: Rotation axis 1: Linear type 2: Shortcut type

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3.5.2 Machining Parameter screen (Process param screen)

The machining parameters are set. Parameters with a "*" mark added are validated after restarting.
 If the parameter length exceeds 12 characters, the data will be echo-backed into the data setting area.

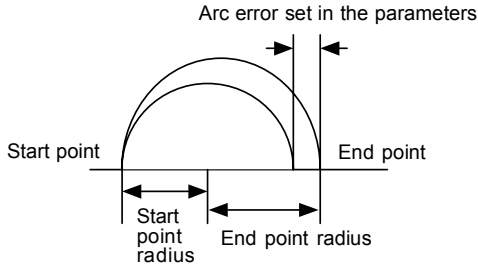
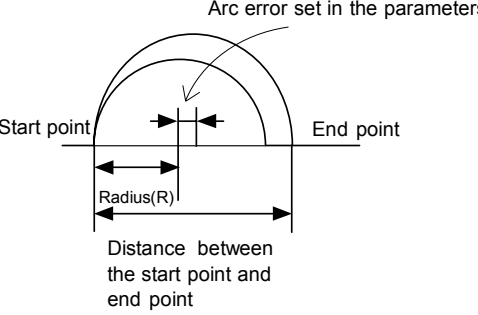
Process param ▼			Monitor	Setup	Edit	Diagnos	Mainte
No.	Name	Data	No.	Name	Data		
330001	Base axis I	X	330018	Coord rot plane (V)			
330002	Base axis J	Y	330019	Coord rot center (H)	-256.442		
330003	Base axis K	Z	330020	Coord rot center (V)	52.074		
330004	Parallel axis 1I	X	330021	Coord rot vector (H)	0.000		
330005	Parallel axis 1J	Y	330022	Coord rot vector (V)	0.000		
330006	Parallel axis 1K	Z	330023	Coord rotation angle	40.0246		
330007	Parallel axis 2I	X	330024	Scaling magnificat'n	1.0000		
330008	Parallel axis 2J	Y	330025	Auto corner override	75		
330009	Parallel axis 2K	Z	330026	A.cmr over max ang	135.000		
330010	G73 return amount	0.000	330027	A.cmr over ddc zon	20.000		
330011	G83 return amount	0.000	330028	A.cmr over ins arc	50		
330012	Arc finish pt error	1.000	330029	Prog comand unit mgf	1		
330013	3-dimensional compen	0.000	330030	Subpro search 1:dev	M01		
330014	F cmdnd mgf type /min	0	330031	Subpro search 1:dir	/PRG/USR		
330015	Normal C axis turn R	0.000	330032	Subpro search 2:dev	HD		
330016	Norm C insrt radius	0.000	330033	Subpro search 2:dir	/		
330017	Coord rot plane (H)		330034	Subpro search 3:dev	FD1		

RDY:JOG : 16:33 ▶

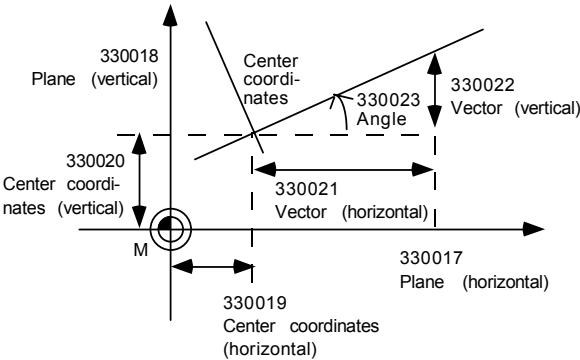
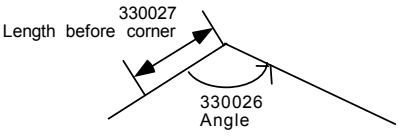
Area copy	Area paste				Axis param	Process param	Operate param	I/O param	Ethnet param
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Number	Name	Details	Setting range (units)
33 0001	Base axis I	This sets the control axis address corresponding to G17, G18 and G19.	Axis name
33 0002	Base axis J		
33 0003	Base axis K		
33 0004	Parallel axis 1I		
33 0005	Parallel axis 1J		
33 0006	Parallel axis 1K		
33 0007	Parallel axis 2I		
33 0008	Parallel axis 2J		
33 0009	Parallel axis 2K		
33 0010	G73 return amount	This sets the return amount per G73/G83 (deep hole drilling) command.	0 to 999999.999 (mm)
33 0011	G83 return amount		

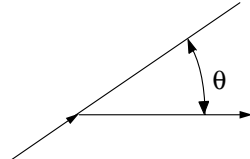
CHAPTER 1 SCREEN OPERATIONS
3. Setup Screens

Number	Name	Details	Setting range (units)
33 0012	Arc finish pt error	<p>This sets the tolerable radius error amount of the arc command end point.</p> <p>When the center coordinates of the arc are designated</p>  <p>When the arc radius (R) is designated</p> 	<p>0 to 1.000 (mm)</p> <p>(Note) When "0" is set, it is processed as 0.100mm. Set a smaller value for more detailed control.</p>
33 0013	3-dimen-sio nal compen	<p>A denominator variable by the three-dimensional tool radius compensation</p> <p>P value in $V_x = i \times r/p$, $V_y = j \times r/p$, $V_z = k \times r/p$ V_x, V_y, V_z: XYZ axis or vector of parallel axes i, j, k: Program command value r: Compensation amount</p> <p>When the setting value is "0": $P = \sqrt{i^2 + j^2 + k^2}$</p>	0 to 999999.999 (mm)
33 0014	F cmnd mgf type /min	This multiplies the commanded F command value (per minute) using no decimal points.	<p>0 : 1-fold 1 : 1/10-fold 2 : 1/100-fold</p>
33 0015	Normal C axis turn R	<p>This sets the length from the center of the C axis (spindle) to the tip of the tool.</p> <p>This is used in the turning speed calculation of the block seam during normal line control type II.</p>	0 to 999999.999 (mm)
33 0016	Norm C insrt radius	<p>During C axis normal line control, this sets the radius of the arc automatically inserted in the corner.</p> <p>This is only valid for normal line control type I.</p>	0 to 999999.999 (mm)

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3. Setup Screens

Number	Name	Details	Setting range (units)
33 0017	Coord rot plane (H)	This sets the plane, center coordinates, vector components and angle.	Axis name
33 0018	Coord rot plane (V)	Plane (horizontal axis): This sets the name of the 1st axis when measuring the rotation.	Axis name
33 0019	Coord rot center (H)	When not set, the name will be the X axis.	-999999.999 to 999999.999 (mm)
33 0020	Coord rot center (V)	Plane (vertical axis): This sets the name of the 2nd axis when measuring the rotation.	-999999.999 to 999999.999 (mm)
33 0021	Coord rot vector (H)	When not set, the name will be the Y axis.	-999999.999 to 999999.999 (mm)
33 0022	Coord rot vector (V)		-999999.999 to 999999.999 (mm)
33 0023	Coord rotation angle	 <p>(Note) The angle is automatically calculated and enumerated at vector component setting, but direct setting of the angle is possible. When directly setting the angle, "0" appears in both the horizontal axis and vertical axis of the vector components.</p>	-180.000 to 180.000 (°)
33 0024	Scaling magnificat'n	This sets the reduction/enlargement magnification for the machining program designated in G50 and G51. It is validated when the magnification is not designated in the program.	0 to 999.99999
33 0025	Auto corner override	This sets the judgment conditions of the automatic corner override valid designated in G62.	0 to 100 (%)
33 0026	A. cmnr over max ang	The minimum value of the automatically calculated arc inside override is set.	0 to 180.000 (°)
33 0027	A. cmnr over dcc zon	The override is invalidated when "0" is set.	0 to 999999.999 (mm)
33 0028	A. cmnr over ins arc		0 to 100 (%)
33 0029	Prog comand unit mgf	This designates the magnification of the actual movement value for the movement command input value (no decimal point) in the machining program. Note that, this is limited to when the command unit parameter is 0.001mm or 0.0001mm control.	1 : 1-fold 10 : 10-fold 100 : 100-fold

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3. Setup Screens

Number	Name	Details	Setting range (units)
33 0030	Subpro search 1:dev	<p>This designates the drive and directory name to be referred to during a subprogram search. Referred to in prioritized order from search destination 1 to 4.</p> <p style="text-align: center;">Search destination 1 ← Priority order: High ↓ Search destination 2 ↓ Search destination 3 ↓ Search destination 4 ← Priority order: Low</p>	Drive name
33 0031	Subpro search 1:dir		Directory 20 characters
33 0032	Subpro search 2:dev		Drive name
33 0033	Subpro search 2:dir		Directory 20 characters
33 0034	Subpro search 3:dev		Drive name
33 0035	Subpro search 3:dir		Directory 20 characters
33 0036	Subpro search 4:dev		Drive name
33 0037	Subpro search 4:dir		Directory 20 characters
33 0038	Precision coefficient	<p>This sets the compensation coefficient of the control error during the high-accuracy mode. The compensation coefficient is set when further reducing the control error of the roundness and arc radius reduction amount at the corner. The maximum control error is displayed in (). (Unit: mm)</p> <p>Theoretically, the accuracy error becomes smaller as the setting value becomes larger, but because the speed and arc clamp speed at the corner become lower, the cycle time becomes longer.</p>	–1000 to 100 (%) (Standard value: 0)
33 0039	Corner slow angle	<p>In the high-accuracy mode, this automatically judges the corner, and realizes a smooth, curved line or a sharp corner.</p> <p>In the high-accuracy control mode, when the angle (exterior angle) between blocks is larger than the setting value, it is judged as a corner. The machine will decelerate to make the edge. Consequently, set the minimum value to be recognized as an angle (exterior angle).</p>  <p style="margin-left: 400px;">$\theta >$ setting value → Optimum corner deceleration</p>	0 to 90 (°) 0: Interpreted as 5°
33 0040	Arc speed ctrl valid	During high-accuracy control, this sets whether the speed control is valid or invalid at the arc entrance and exit.	0: Speed control invalid 1: Speed control valid
33 0041	Arc slowdown speed	During high-accuracy control, this sets the deceleration speed when the speed control is valid at the arc entrance and exit.	0 to 480000 (mm/min)

CHAPTER 1 SCREEN OPERATIONS
3. Setup Screens

Number	Name	Details	Setting range (units)												
33 0042	F cmdnd mgf type/rot	This multiples the commanded F command value (per rotation) using no decimal points.	0: 1-fold 1: 1/10-fold 2: 1/100-fold												
33 0043	Subpro stor D0: dev	<p>If D1 to D4 is designated when calling the subprogram, the subprogram to be called will be searched from the storage destination (device and directory) designated with this parameter.</p> <p>(Example) The following will be searched: M98 P (program No.), D0 → Device : "330043 Subpro stor D0:dev" device Directory : "330044 Subpro stor D0:dir" directory</p> <p>(Note 1) If the called subprogram is not found in the designated storage destination, a program error will occur.</p> <p>(Note 2) If D0 to D4 is not designated when calling the subprogram, the subprogram will be searched for according to the setting of "330030 Subpro search 1: dev to 4: dir".</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Device</th> <th>Drive name</th> </tr> </thead> <tbody> <tr> <td>Memory</td> <td>MO1</td> </tr> <tr> <td>Data server</td> <td>DS</td> </tr> <tr> <td>IC card</td> <td>IC</td> </tr> <tr> <td>Floppy disk</td> <td>FD1</td> </tr> <tr> <td>Hard disk</td> <td>HD</td> </tr> </tbody> </table>	Device	Drive name	Memory	MO1	Data server	DS	IC card	IC	Floppy disk	FD1	Hard disk	HD	Drive name
Device	Drive name														
Memory	MO1														
Data server	DS														
IC card	IC														
Floppy disk	FD1														
Hard disk	HD														
33 0044	Subpro stor D0: dir		Directory 20 characters												
33 0045	Subpro stor D1: dev		Drive name												
33 0046	Subpro stor D1: dir		Directory 20 characters												
33 0047	Subpro stor D2: dev	Drive name													
33 0048	Subpro stor D2: dir	Directory 20 characters													
33 0049	Subpro stor D3: dev	Drive name													
33 0050	Subpro stor D3: dir	Directory 20 characters													
33 0051	Subpro stor D4: dev	Drive name													
33 0052	Subpro stor D4: dir	Directory 20 characters													
33 0053	Spline cancel angle	If the angle created by two continuing blocks exceeds this setting value, the high-accuracy spline function will be temporarily canceled. Set the angle for creating an edge.	0 to 90 (°) (Standard value: 60)												
33 0054	Minute line length	This is valid during the high-accuracy spline control. Curve interpolation will be carried out on linear blocks of which the length of one block is less than this setting value.	0 to 10 (mm) 0: 1 (mm) (Standard value: 0)												
33 0055	Tolrnc (inflctn)	This corrects the curve shape so that the spline curve's helical difference is within this setting value for blocks containing an inflection point.	0 to 100 (mm) (Standard value: 0.01)												
33 0056	Tolrnc (smooth)	This corrects the curve shape so that the spline curve's helical difference is within this setting value for blocks not containing an inflection point.	0 to 100 (mm) (Standard value: 0.01)												
33 0057	Tolrnc (thin out)	This thins out blocks of which the block length does not satisfy this setting value.	0 to 10 (mm) (Standard value: 0.01)												
33 0058	Tolrnc (fairing)	This corrects the path so that the path correction amount by fairing with less than this setting value.	0 to 10 (mm) (Standard value: 0.1)												
33 0059	Tolrnc (ACCS)	This corrects the curve shape so that the error separated from the original path caused by ACCS control is within the setting value.	0 to 10 (mm) (Standard value: 0.25)												

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Number	Name	Details	Setting range (units)
33 0060	Tolrnc (hi-spd)	Not used.	
33 0061	Tolrnc ctrl flag	Not used.	
33 0062	cmnr correct width	This sets the corner correction width at ACCS control. Set within a range that is 1/2 or less (normally approx. 1/4) of the minute line length.	0 to 10 (mm) (Standard value: 0.25)
33 0063		(Not used currently.)	(Standard value: 0.0)
33 0064		(Not used currently.)	(Standard value: 0.0)
33 0065	F1	F1 to F9 This sets the actual speed data to convert to when F1-digit code is commanded. FM1,FM2 This sets the upper limit value for the F1-digit speed change. FM1 : The clamp value for F1 to F4. FM2 : The clamp value for F5 to F9. K This sets the constant that determines the speed change amount per manual handle pulse during speed change.	F1 to F9 1 to 60000 (mm/min)
33 0066	F2		FM1, FM2 1 to 60000 (mm/min)
33 0067	F3		K 0 to 32767
33 0068	F4		$\Delta F = \Delta P \times \frac{FMn}{K}$
33 0069	F5		$\Delta P: \text{Handle pulse } (\pm)$
33 0070	F6		
33 0071	F7		
33 0072	F8		
33 0073	F9		
33 0074	FM1		
33 0075	FM2		
33 0076	K		
33 0078	prec coef (curve) vald	This selects whether a precision coefficient or precision coefficient for curves is used as the compensation coefficient to further reduce the radius reduction amount of a curve (arc, spline, NURBS curve) during the high-accuracy control mode. When "0" is set, the precision coefficient is applied, and when "1" is set, the precision coefficient for curves is applied.	0: Precision coefficient 1: Precision coefficient for curves (Standard value: 0)
33 0079	prec coef (curve)	This sets the compensation coefficient to further reduce the radius reduction amount of a curve (arc, spline, NURBS curve) during the high-accuracy control mode.	-1000 to 99 (%) (Standard value: 0)
33 0106	Tap back speed CLR	Set whether to hold the return spindle rotation speed command (,S) during multi-step acceleration/ deceleration after synchronous tap is canceled.	0: Hold 1: Do not hold
33 0107	SS ctrl std length	Adjust the maximum value of the pre-read range for recognition with SS control. To avoid the effect of steps or errors, etc., set a large value. To decelerate sufficiently, set a small value. SS control will be invalid when "0.000" is set.	0.000 to 100.000 (mm) (Standard value: 1.000)
33 0108	SS ctrl clamp coef	Set the degree of applying speed clamp on a corner less than the corner deceleration angle. The clamp speed will decrease as a larger value is set. SS control speed clamp will be invalid when "0" is set.	0 to 99 (%) (Standard value: 0)

CHAPTER 1 SCREEN OPERATIONS
3. Setup Screens

3.5.3 Operation Parameter screen (Operation param screen)

The operation parameters are set. Parameters with a "*" mark added are validated after restarting.

Operation param			Monitor	Setup	Edit	Diagnos	Mainte
No.	Name	Data	No.	Name	Data		
370001	Sensor length	200.000	370022	Sys1 draw plane ax3	Z		
370002	Sensor diameter	6.000	370023	Sys2 draw plane ax1			
370003	Center compen (H)	7.000	370024	Sys2 draw plane ax2			
370004	Center compen (V)	7.000	370025	Sys2 draw plane ax3			
370005	Skip return amount	3.000	370030	Length measure speed	480000.000		
370006	Skip feed rate	10.000	370031	L meas slow area r	0.000		
370007	Skip past amout(H)	0.000	370032	L meas slow area d	0.000		
370008	Skip past amout(V)	0.000	370040	Program save type	1		
370009	tlml X	10.000	370041	STN contrast	8		
370010	tlml Y	0.000	370042	Space mode in Editor	1		
370011	tlml Z	0.000	370043	Invalid gray menu*	0		
370012	Surface height	1.000					
370013	TLM L meas axis						
370014	TLM D meas axis						
370015	Meas ext menu invld*	0					
370020	Sys1 draw plane ax1	X					
370021	Sys1 draw plane ax2	Y					

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Area copy	Area paste			Axis param	Process param	Operate param	I/O param	Ethnet param
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Number	Name	Details	Setting range (units)
37 0001	Sensor length (TL)	This sets the length to the touch sensor tip.	-999999.999 to 999999.999 (mm)
37 0002	Sensor diameter (TD)	This sets the ball diameter to the touch sensor tip.	-999999.999 to 999999.999 (mm)
37 0003	Center compen (H)	This designates the X axis direction for the spindle center deviation amount from the touch sensor center.	-999999.999 to 999999.999 (mm)
37 0004	Center compen (V)	This designates the Y axis direction for the spindle center deviation amount from the touch sensor center.	-999999.999 to 999999.999 (mm)
37 0005	Skip return amount	This sets the one-time return distance for contacting again.	-999999.999 to 999999.999 (mm)
37 0006	Skip feed rate	This sets the feedrate when contacting again.	1 to 80000 (mm/min)
37 0007	Skip past amout (H)	This sets the difference (horizontal axis direction) of the skip read value and actual skip position.	-999999.999 to 999999.999 (mm)
37 0008	Skip past amout (V)	This sets the difference (vertical axis direction) of the skip read value and actual skip position.	-999999.999 to 999999.999 (mm)
37 0009	tlml X	This sets the TLM reference length. Set the distance from the tool change point (reference point) 0 point to the measurement reference point (plane) for tool length measurement.	-99999.999 to 99999.999 (mm)
37 0010	tlml Y		
37 0011	tlml Z		
37 0012	Surface height	When using tool length measurement I, this sets the deviation amount of the reference measurement plane and actual measurement plane. When using tool length measurement II, this sets the distance from the table to the reference measurement plane.	-99999.999 to 99999.999 (mm)
37 0013	TLM L meas axis	This sets the tool length measurement axis.	Axis name
37 0014	TLM D meas axis	This sets the tool diameter measurement axis.	Axis name

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Number	Name	Details	Setting range (units)	
37 0015	Meas ext menu invld*	This invalidates the extended menu (Coordi EXT, SkipPos take in) on the Workpiece Measurement and Rotation Measurement screens.	Extended menu 0: Display 1: Do not display	
37 0020	Sys1 draw plane ax1	This sets the control axis address when drawing System 1.	Axis name	
37 0021	Sys1 draw plane ax2			
37 0022	Sys1 draw plane ax3			
37 0023	Sys2 draw plane ax1	This sets the control axis address when drawing System 2.	Axis name	
37 0024	Sys2 draw plane ax2			
37 0025	Sys2 draw plane ax3			
37 0030	Length measure speed	[Automatic tool length measurement]	This sets the feedrate during automatic tool length measurement.	1 to 60000 (mm/min)
37 0031	L meas slow area r		This sets the distance from the measurement point to the deceleration start point.	0 to 999999.999 (mm)
37 0032	L meas slow area d		This sets the area of the point where the tool should stop.	0 to 999999.999 (mm)
37 0040	Program save type	This selects the method for saving the program in the Edit screen. 0: Save program being edited with Save file menu. 1: Save program being edited each time the <input type="text" value="INPUT"/> key is pressed.	0,1	
37 0041	STN contrast	This adjusts the contrast of STN display.	0 to 15	
37 0042	Space mode in Editor	This selects the method of displaying the program on the Edit screen. 0: Display the texts as that was input. 1: Display with inserting a space between each word.	0,1	
37 0043	Invalid gray menu*	This shows or hides the menus that cannot be operated. 0: Display as gray menus. 1: Do not display.	0,1	
37 0044	Work center pos H	Set the workpiece rotation center position on the machine coordinate system for each axis, using the table angle as 0 degrees. (Valid only during manual operation.)	-999999.999 to 999999.999 (mm)	
37 0045	Work center pos V			
37 0046	List comment type	The list comments are changed when HD, FLD or IC card is selected as the Device on the Input/Output screen, etc. 0: The date and time are displayed as the comment. 1: The file comment is displayed.	0,1	

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3. Setup Screens

3.5.4 Input/Output Parameter screen (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			
350001	Data input port No.	1	350110	Dev 1 hndshk method	3			
350002	Data input dev No.	1	350111	Dev 1 DC code parity	1			
350003	Data output port No.	1	350112	Dev 1 DC2/DC4 output	0			
350004	Data output dev No.	1	350113	Dev 1 CR output	0			
350005	NC oper port No.	1	350114	Dev 1 EIA output	0			
350006	NC oper dev No.	1	350115	Dev 1 parity V	0			
350007	Macro print port No.	0	350116	Dev 1 timeout time	100			
350008	Macro print dev No.	3	350118	Dev 1 EIA code 1 [00			
350101	Dev 1 name	PTR	350119	Dev 1 EIA code 2]	00			
350102	Dev 1 baud rate	4800	350120	Dev 1 EIA code 3 #	00			
350103	Dev 1 stop bit	3	350121	Dev 1 EIA code 4 *	00			
350104	Dev 1 parity valid	0	350122	Dev 1 EIA code 5 =	00			
350105	Dev 1 even parity	0	350123	Dev 1 EIA code 6:	00			
350106	Dev 1 char length	3	350124	Dev 1 printer type	0			
350107	Dev 1 termina type	0	350125	Dev 1 feed number	0			
350108	Dev 1 termina code 1	00	350126	Dev 1 Rewind code	00			
350109	Dev 1 termina code 2	00	350201	Dev 2 name	PTP			

RDY:JOG : 16:44 ▶

Area copy	Area paste				Axis param	Process param	Operate param	I/O param	Ethnet param
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Number	Name	Details	Setting range (units)
35 0001	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> M6A: 1 to 2 M6B: 1 to 2 1 : Port 1 2 : Port 2
35 0002	Data input dev No.		
35 0003	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> { }
35 0004	Data output dev No.		
35 0005	NC oper port No.	This sets the I/O port No. and device No. when the RS-232C is operating.	<Port> M6A : 1 to 2 M6B : 1 to 2 <Device> 1 : Device No. <1> { }
35 0006	NC oper dev No.		
35 0007	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.	<Port> M6A : 1 to 2 M6B : 1 to 2 1 : Port 1 2 : Port 2 <Device> 1 : Device No. <1> { }
35 0008	Macro print dev No.		

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Number	Name	Details	Setting range (units)
35 0101	Dev 1 name	This sets the device name corresponding to the device No. It is used to easily discriminate each device. (Example) PTR/PTP	Three characters (alphabetic, numeric and symbols) or less
35 0102	Dev 1 baud rate	This sets the data transfer speed.	1200/2400/4800/9600/19200 (bit/s)
35 0103	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 I/O device. Refer to the item "350104 Parity valid".	1 : 1 (bit) 2 : 1.5 3 : 2
35 0104	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 I/O device.	0 : No parity 1 : Parity
35 0105	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 I/O device.	0 : Odd parity 1 : Even parity
35 0106	Dev 1 char length	This sets the data bit length. The character length (data bit) is set matching the specifications of the I/O device. Refer to the item "350104 Parity valid".	0 : 5 bit 1 : 6 bit 2 : 7 bit 3 : 8 bit
35 0107	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
35 0108	Dev 1 termina code 1	This sets the code that terminates the reading when the "350107 Termina type" setting is "4" or "5".	0 to FF (hexadecimal)
35 0109	Dev 1 termina code 2	This sets the code that terminates the reading when the "350107 Termina type" setting is "5".	0 to FF (hexadecimal)
35 0110	Dev 1 hndshk method	This is an RS-232C transmission control method. It is set matching the control method of the I/O device to be connected.	1 : RTS/CTS 2 : No handshake 3 : DC code method
35 0111	Dev 1 DC code parity	This is only valid when "2" is selected in "350111 Hndshk method". It is a parity addition for the DC code. It is set matching the specifications of the I/O device.	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)

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Number	Name	Details	Setting range (units)
35 0112	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
35 0113	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
35 0114	Dev 1 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
35 0115	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
35 0116	Dev 1 timeout time	During data transfer, this sets 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 I/O device fault or an exchange in the transmission. The timeout time setting must be changed depending on the baud rate.	0 to 999 (1/10s)
35 0118	Dev 1 EIA code 1 [<p>An alternate code can be designated for the codes at left that exist in the ISO but not in the EIA.</p> <p>Designate codes (odd-numbered codes) that do not duplicate preexisting EIA codes, and will not become parity H.</p> <p>(Note) Do not designate the following codes: 0 to 9, A to Z, +, -, ·, ', EOR, EOB, (,), BS, TAB, SP, &, DEL, DC1 to DC4</p>	0 to FF
35 0119	Dev 1 EIA code 2]		
35 0120	Dev 1 EIA code 3 #		
35 0121	Dev 1 EIA code 4 *		
35 0122	Dev 1 EIA code 5 =		
35 0123	Dev 1 EIA code 6 :		
35 0124	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)
35 0125	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)

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Number	Name	Details	Setting range (units)
35 0126	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 the rewinding command is executed.	0 to FF
35 0201 to 0226	Device 2 parameters	Same as device 1.	Same as device 1.
35 0301 to 0326	Device 3 parameters	Same as device 1.	Same as device 1.
35 0401 to 0426	Device 4 parameters	Same as device 1.	Same as device 1.

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3.5.5 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	2	2	2	2	1	2	2	2	2
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				1	2				
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 2×2 3×3 4×4 5×8 6 } 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

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3.5.6 Ethernet Parameter screen (Ethernet param screen)

The necessary parameters are set when carrying out Ethernet operations. Parameters with an "*" added are validated after restarting.

If the parameter length exceeds 12 characters, the data will be echo-backed into the data setting area.

Parameters 360001 to 360006 : These parameters are necessary for a network connection. When connecting to a network, always set these parameters regardless of whether the Ethernet function is being used. Windows must be restarted to validate the set details. If multiple TCP/IP drivers are installed, the same setting is made for all drivers.

Parameters 360101 to 360413 : The server information necessary for using the Ethernet function is set.

Server information for up to four units can be set. The set details are validated immediately after setting.

Ethernet param			Monitor Setup			Edit	Diagnos	Mainte
No.	Name	Data	No.	Name	Data			
360001	Address	0.97.46.160	360112	Host1 Word pos:comnt	0			
360002	Gateway	0.97.46.254	360113	Host1 Word num:comnt	0			
360003	Connection	0	360201	Host2 host name	msnrb13			
360004	Timeout	10	360202	Host2 user name	itouyu			
360005	Host No.	2	360203	Host2 password	yuuki			
360006	Sub net mask	5.255.255.0	360204	Host2 directory	home/itouyu			
360101	Host1 host name	0.97.46.254	360205	Host2 address	10.97.46.97			
360102	Host1 user name	itouyu	360206	Host2 host type	0			
360103	Host1 password	yuuki	360207	Host2 NOOP output	0			
360104	Host1 directory	/	360208	Host2 ABOR output	0			
360105	Host1 address		360209	Host2 Word pos:name	0			
360106	Host1 host type	0	360210	Host2 Word pos:size	0			
360107	Host1 NOOP output	0	360211	Host2 Word pos:<Dir>	0			
360108	Host1 ABOR output	0	360212	Host2 Word pos:comnt	0			
360109	Host1 Word pos:name	3	360213	Host2 Word num:comnt	0			
360110	Host1 Word pos:size	3	360301	Host3 host name	mshpc150			
360111	Host1 Word pos:<Dir>	3	360302	Host3 user name	itouyu			

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Area copy	Area paste			Axis param	Process param	Operate param	I/O param	Ethernet param
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Number	Name	Details	Setting range (units)
36 0001	Address	This sets the internet address. This sets the IP address of the TCP/IP assigned to the NC (Windows) computer. Contact the network controller for the address to be set.	15 characters or less Dot notation numeric value train
36 0002	Gateway	This sets the gateway of the TCP/IP assigned to the NC (Windows) computer.	15 characters or less Dot notation numeric value train
36 0003	Connection	This is not used currently.	0
36 0004	Timeout	This sets the timeout time (s) for when the communication is not completed correctly, or when there is no communication response.	10 to 99 (s) (Standard: 30)
36 0005	Host No.	This selects the number of the host to be used from host 1 to host 4.	1 to 4 : Host No.
36 0006	Sub net mask	This sets the subnet mask of the TCP/IP assigned to the NC (Windows) computer. Contact the network controller for the subnet mask to be set.	Within 15 characters Dot notation numeric value train (User setting)

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Number	Name	Details	Setting range (units)
36 0101	Host1 host name	This sets the host computer name. This parameter allows the NC to easily recognize the host computer on the network. Set the host computer's name (name registered in C:\windows\hosts) or the IP address. <Setting example> For host name : Mspc160 For IP address : 150.40.0.111 (Note) Set the host computer's TCP/IP address if communication is not carried out correctly.	15 characters (alphanumeric) or less
36 0102	Host1 user name	This sets the user name when logging into the host computer.	8 characters (alphanumeric) or less
36 0103	Host1 password	This sets the password when logging into the host computer.	8 characters (alphanumeric) or less
36 0104	Host1 directory	This sets the directory name of the host computer.	15 characters (alphanumeric) or less
36 0105	Host1 address	Not used.	15 characters (alphanumeric) or less
36 0106	Host1 host type	This sets the type of host computer.	0 : UNIX 1 : PC (DOS)
36 0107	Host1 NOOP output	Not used.	0
36 0108	Host1 ABOR output	Not used.	0
36 0109	Host1 Word pos: name	This sets the file name display position (nth word from left) of the list displayed when the ftp command "dir" is executed. Refer to "2.6.1 Setting the Ethernet Parameters (word position)". (Note) One word designates a character string divided by one or more spaces.	0 to 100 0: When using UNIX
36 0110	Host1 Word pos: size	This sets the size display position (nth word from left) of the list displayed when the ftp command "dir" is executed. Refer to "2.6.1 Setting the Ethernet Parameters (word position)". (Note) One word designates a character string divided by one or more spaces.	0 to 100 0: Default value

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Number	Name	Details	Setting range (units)
36 0111	Host1 Word pos: <Dir>	This sets the <DIR> display position (nth word from left) of the list displayed when the ftp command "dir" is executed. Refer to "(1) Setting the Ethernet parameters (word position)". (Note) One word designates a character string divided by one or more spaces.	0 to 100 0: Default value
36 0112	Host1 Word pos: comnt	This sets the comment (date, time, etc.) display position (nth word from left) of the list displayed when the ftp command "dir" is executed. Refer to "(1) Setting the Ethernet parameters (word position)". (Note) One word designates a character string divided by one or more spaces.	0 to 100 0: Default value
36 0113	Host1 Word num: comnt	This sets the number of words to be displayed as a comment. (Note) One word designates a character string divided by one or more spaces.	0 to 100
36 0114	Host1 no total char.	This sets whether to display the total number of characters registered in the machining programs of host1 when displaying the file list. If there are many files in the directory to be referred to, the list can be updated quickly by setting "1".	0: Display 1: Do not display
36 0201 to 0214	Host 2 parameters	Same as host 1.	
36 0301 to 0314	Host 3 parameters	Same as host 1.	
36 0401 to 0414	Host 4 parameters	Same as host 1.	

(Note 1) The user name and password are required when logging in.

(Note 2) It is necessary to enable reading/writing when exchanging files.

(Note 3) With the Personal WEB Server and Windows NT 4.0 ftp Server, the file list format can be selected from DOS or UNIX.

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(1) Setting the Ethernet parameters (word position)

Confirm the word positions and set each in the Ethernet parameters with the following method.
Underlined section : Input by user. *Italicized section* : Differs according to user. Confirm the setting before inputting.

- 1)

Select the MS-DOS prompt from the NC computer "Task Manager".

 → The MS-DOS window will appear.

- 2)

Using the ftp command, log into the host computer. <u>ftp IP address</u> (Example) c:\windows>ftp <i>150.46.0.16</i>
--

 → Display on MS-DOS window :
Connected to 150.46.0.16
220 mspc 150 FTP server (SunOS 4.1) ready
User (150.46.0.16 : (name)) :

- 3)

Input the user name for logging in. <u>User name</u> (Example) User (150.46.0.16 : (name)): <i>m6</i>

 → Display on MS-DOS window :
331 Password required for m6.
Password :

- 4)

Input the password. <u>Password</u> (Example) Password : <i>m6</i>
--

 → Display on MS-DOS window :
230 User m6 logged in.

- 5)

Display the directory list. ftp> <u>dir</u>
--

 → Display on MS-DOS window :

02-21-97 08-25-97 01-27-97 02-04-97	07:27PM 06:05PM 10:03AM 11:05AM	<DIR> <DIR>	1916 1850880	bin prjopn.dat NcPrograms m6mmi.exe
Word position: 1 (Comment)	Number of words: 2 (Comment)	<DIR> : 3	Size : 4	File name position: 5

- 6)

Confirm the file name position, size display position and <DIR> position in step 5).
--

 → File name position : 5
Size display position : 4
<DIR> display position : 3
Word position (comment) : 1
No. of words (comment) : 2

- 7)

Log off. ftp> <u>by</u>

 → Display on MS-DOS window :
c:\windows>

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8)

Close the MS-DOS window.

9)

Set each position confirmed in step 5) into the Ethernet parameters.
--

<Setting example>

	Host type	Word pos: file name	Word pos: size	Word pos: <DIR>	Word pos: Comment	No. of Word (Comment)
Chameleon (Windows 3.1)	1	1	2	2		
Chameleon (Windows 95/NT)	1	4	3	3	1	2
Personal WEB Server						
UNIX format	0	0	0	0	0	0
DOS format	1	4	3	3	1	2
Windows NT3.51 ftp Server	1	4	3	3	1	2
Windows NT4.0 ftp Server						
UNIX format	0	0	0	0	0	0
DOS format	1	4	3	3	1	2

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3.5.7 Computer Link Parameter screen

The computer link parameters are set. Parameters with an "*" added are validated after restarting.

Cmptr link param			Monitor Setup			Edit	Diagnos	Mainte
No.	Name	Data	No.	Name	Data			
380001	Port number	2	380018	Start code	0			
380002	Link type	0	380019	NAK output	0			
380003	Baud rate	9600	380020	SYN output	0			
380004	Stop bit	3	380021	DC3 output	0			
380005	Parity valid	0	380022	Wait time	0			
380006	Even parity	0	380023	Buffer size	256			
380007	Char length	3	380024	Operation start size	256			
380008	Handshake method	3	380025	DC1 output size	256			
380009	Timeout time	50	380026	DC3 output size	256			
380010	Data code	0	380027	Poling time	0			
380011	Check sum	0	380028	Retry counter	0			
380012	DC1 after NAK or SYN	0						
380013	Buffer compensation	0						
380014	Reset validity	0						
380015	CR output	0						
380016	DC code parity	1						
380017	Parity V	0						

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Area copy	Area paste				Axis param	Process param	Operate param	I/O param	Ethnet param
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Number	Name	Details	Setting range (units)
38 0001	Port number	This sets the number of the I/O port for the computer link. The I/O port No. is fixed to 1.	0 : Port 0 1 : Port 1 2 : Port 2
38 0002	Link type	This sets the computer link function type. The computer link function type is fixed to 2.	1 : Link A 2 : Link B
38 0003	Baud rate	This sets the speed for transmitting the data.	2400 (bps) 4800 9600 19200
38 0004	Stop bit	This sets the stop bit length for the start-stop method. Refer to the item for "380005 Parity valid". Set the bit length that matches the input/output device's specifications.	1 : 1 (bit) 2 : 1.5 3 : 2
38 0005	Parity valid	This parameter is set to use a parity bit different from the data bit. <div style="text-align: center;"> <p>ON OFF</p> <p>Start bit Data bit Parity bit Stop bit</p> </div> Set this to match the I/O device specifications.	0 : No parity bit at input/output 1 : Parity bit at input/output
38 0006	Even parity	This parameter selects the odd parity or even parity when the above parity is valid. This parameter is ignored when the parity is invalid. Set this to match the I/O device specifications.	0 : Odd parity 1 : Even parity

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Number	Name	Details	Setting range (units)
38 0007	Char length	This sets the data bit length. Refer to the item "38005 Parity valid" for details. Set this to match the I/O device specifications.	0 : 5 (bit) 1 : 6 2 : 7 3 : 8
38 0008	Handshake method	This is the RS-232C transmission control method. Set this to match the control method of the connected I/O device.	1 : RTS/CTS method 2 : No handshake 3 : DC code method
38 0009	Timeout time	This sets the timeout time for detecting an interruption in the data transmission during data input/output. An error occurs if the one block read or 250 characters output time exceeds the designated time, due to an I/O device fault or an exchange during transmission. Depending on the baud rate, the timeout time setting must be changed. The setting "0" is equivalent to approx. 90 minutes.	0 to 999 (1/10s)
38 0010	Data code	This sets the code to be used.	0 : ASCII code 1 : ISO code
38 0011	Check sum	This sets the validity of the computer link A check sum function.	0 : Check sum invalid 1 : Check sum valid
38 0012	DC1 after NAK or SYN	This sets the presence of a DC1 code output after the NAK code or SYN code is output. This is valid only when "3" is selected for "380008 Handshake method".	0 : Do not output DC1 code 1 : Output DC1 code
38 0013	Buffer correction	This selects whether to validate the buffer correction during operation	0 : Buffer correction invalid 1 : Buffer correction valid
38 0014	Reset validity	This sets whether to validate the reset during computer link. Normally, this is set to "0".	0 : Computer link reset valid 1 : Computer link reset invalid
38 0015	CR output	This selects whether to output the CR code just before the LF code.	0 : Do not output CR code 1 : Output CR code
38 0016	DC code parity	This is valid only when 3: DC code method is selected for "380008 Handshake method". The even parity in respect to the control code is added. Set this to match the I/O device specifications.	0 : DC code with no parity 1 : DC code with parity
38 0017	Parity V	This is set when the parity V in one block is to be checked during data input.	0 : Invalid 1 : Valid
38 0018	Start code	This sets the code instructing the start of the first transmission in the file data transmission. This is intended for specific users, and is normally set to "0". This is valid only when 3: DC code method is selected for "380008 Handshake method".	0 : DC1 1 : BEL
38 0019	NAK output	This selects whether to send an NAK code to the host if a communication error occurs in computer link B.	0 : Do not output NAK code 1 : Output NAK code

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Number	Name	Details	Setting range (units)
38 0020	SYN output	This selects whether to send a SYN code to the host if an NC reset or emergency stop occurs in computer link B.	0 : Do not output SYN code 1 : Output SYN code
38 0021	DC3 output	This selects whether to send a DC3 code to the host when the communication is completed in computer link B. This is valid only when 3: DC code method is selected for "380008 Handshake method".	0 : Do not output DC3 code 1 : Output DC3 code
38 0022	Wait time	When a command is received from the host in computer link A, a reply command is returned after the time set in the wait time has passed. Also, during the machining program download, the file transmission start code (DC1 or BEL) is sent after waiting the set time.	0 to 255 (1/10s)
38 0023	Buffer size	The DC3 code is output when the several bytes of data set in buffer size is received. Normally, "4096" is set.	248 to 4096 (byte)
38 0024	Operation start size	Operation starts when enough data is received in the reception buffer. Set a value less than "380026 DC 3 output size". Normally, "248" is set.	248 to "380026 DC3 output size" setting value (byte)
38 0025	DC1 output size	The DC1 code is output when the number of data items in the reception buffer drops to below the number of bytes set in the DC1 output size. Normally, the same value as "380026 DC3 output size" is set.	248 to "380026 DC3 output size" setting value (byte)
38 0026	DC3 output size	The DC3 code is output when the number of data items in the reception buffer drops to below the number of bytes set in the DC3 output size. Normally, this is set as "380023 Buffer size" –16. Normally, set "4000".	248 to "380023 Buffer size" setting value –16 (byte)
38 0027	Poling time	This sets the time to wait after the control code in respect to the data sent from the host is received by the host, or after the control code in respect to the data sent from the NC is received. The next data or control code is transmitted after the set time has passed.	0 to 999 (1/10s)
38 0028	Retry counter	The number of times to retransmit the data when the data sent to the host or the data sent from the host is found illegal after inspections such as check sum.	0 to 99 (times)

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3.6 Tool Life screen

The life management data of the tool usage conditions, etc., is set and displayed on this screen. The two types of management methods in tool life management are shown below.

■ **Tool life management I**

The usage time or number of uses of the tool commanded in the program is incremented, and the usage state of that tool is monitored.

■ **Tool life management II**

This method is the same as tool life management I, but with a spare tool selection function added. A spare tool is selected from the group of tool commands commanded in the program. Tool offset (tool position offset and nose radius compensation) is carried out for the selected tool.

When tool life management II is used, the following items can be selected on the Control param screen.

#	Item	Setting	Details
320025	T-life manage valid	ON	This controls the tool life management.
		OFF	This ignores the tool life management data.
320026	Tool command mthd 2 (When tool life management is valid.)	ON	This treats the program tool command as a tool No. The group No. containing the tool that matches the tool No. in the tool registration data is searched. The spare tool is selected from that group.
		OFF	This treats the program tool command as a group No. The spare tool is selected from the tools that match the group No. in the tool registration data.
320027	Tool select mthd 2 (When tool life management is valid.)	ON	This selects the tool with the maximum remaining life from the tools in use and not in use in the same group. When several tools have the same remaining life, the tools are selected in order of registration No. If there are no "Tools in use" or "Tools not in use", the tools are selected in order of "Tools not in use", "Normal life tools" and "Abnormal tools", following the registration No. order.
		OFF	This selects the tool from the tools in use in the same group, following the registration No. order. If there are no "Tools in use", the tools are selected in order of "Tools not in use", "Normal life tools" and "Abnormal tools", following the registration No. order.

In the Tool Life screen, each data can be displayed in group units. There is also a Group List screen and Help screen. After restarting, the displayed screens are selected in group list when the Tool Life screen is first selected.

These screens are changed over by the menu key.

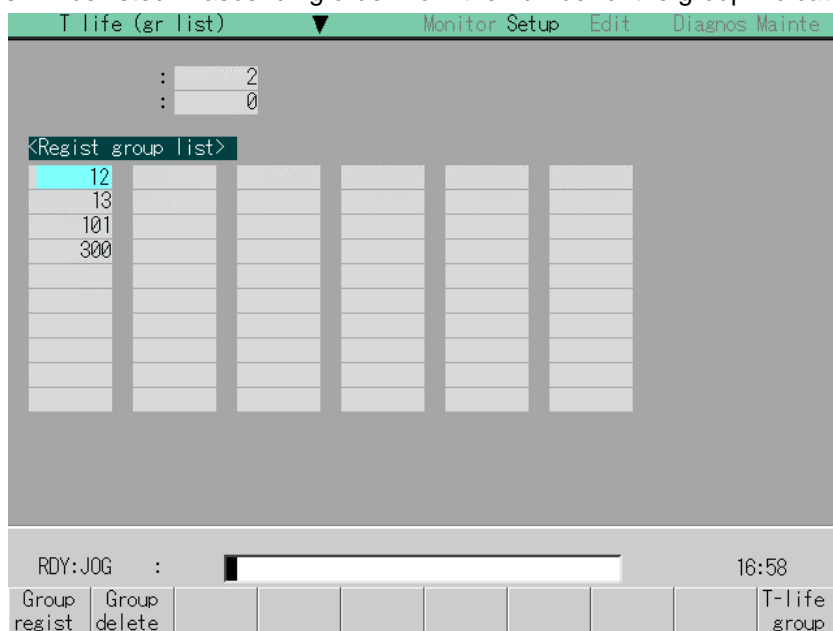
Refer to "3.6.1 Displaying in group list" and subsequent sections for the menus and explanations of each screen.

Screen	Menu										Reference	
T life (gr list)	Group regist	Group delete								T-life group	3.6.1	
Tool life (grp)	Group No.	Line copy	Line paste	Line clear	Grp No. change	Horiz scroll				Help	Group list	3.6.2
Tool life (help)												3.6.3



3.6.1 Displaying the group list (T life (gr list) screen)

This screen is only a display screen, so setting cannot be carried out. Registration and erasing of life management data groups can be carried out.



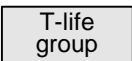
The cursor will appear at the number of the group currently displayed on the Tool life (grp) screen. The group numbers will be listed in ascending order from the number of the group indicated by the cursor.



(1) Display items

Display item	Details
Spnd	This displays the tool No. and tool life management data of tools mounted on the spindle and in the standby position. Only the tool No. appears when the tool life management is invalid.
Standby	
Regist group list	This displays the group No. registered as tool life management data. Up to 60 group Nos. can be displayed on one screen. If the number of group Nos. exceeds 60, change the page using the  /  keys. An asterisk will be added to the number of the group in which all tools have reached their lives.

(2) Menus

Menu	Details	Type	Reference
	This creates a new group, and adds it to the group Nos. on the screen.	A	(3) Registering a group
	This erases all of the tool life management data included in the designated group No. If the group number is not designated, the tool life management data for the group number indicated by the cursor will be deleted.	A	(4) Erasing a group
	The tool life data for the group number indicated by the cursor will be displayed. The mode setting and displaying registration data in group No. units is entered.	C	3.6.1 Displaying in group units

(3) Registering a group

1)

Press the menu
Group regist.

2)

Designate the group No. to be registered.
25 INPUT



The designated group No. appears.

<Regist group list>	
25	
44	
45	
72	
92	
112	
134	
244	

(Note 1) An error occurs if the group No. duplicates a preexisting group No.

(Note 2) Life management data cannot be set in this screen. Set that data in the screen for group unit display.

(4) Erasing a group

1)

Press the menu
Group delete.

2)

Designate the group to be erased.
72 INPUT





The designated group is erased, and the next number is carried and displayed.

<Regist group list>	
45	
92	
112	
134	
244	

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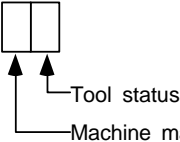
3.6.2 Displaying in group units (Tool life (grp) screen)

The tool life management data of a random group is set and displayed. If the registered tools cannot be displayed on one screen, scroll the screen using the  or  key.

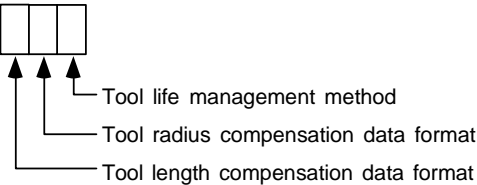
Tool life (grp) ▼									
Monitor Setup Edit Diagnos Mainte									
Group No. : 100									
#	Tool No.	ST	Mthd	L compen	R compen	Auxil	Life	Used	
1	100	1	2	15.000	5.000	0	1.000	2.000	set
2	101	1	1	5.000	8.000	3	0.000	0.000	set
3	102	0	3	1.000	4.000	4	0.000	0.000	mm
4	103	2	2	5.000	4.000	0	2.000	2.000	set
5	104	0	1	0.000	0.000	0	0.000	0.000	set
6	105	2	2	5.000	4.000	0	2.000	2.000	set
7	106	2	2	3.000	0.000	4	1.000	7.000	set
8	107	1	3	5.000	4.000	0	0.000	0.000	mm
9	108	2	2	5.000	4.000	0	2.000	2.000	set
10	109	2	2	5.000	4.000	0	2.000	2.000	set
11	110	2	2	5.000	4.000	0	2.000	2.000	set
12	113	0	0	2.000	0.000	0	0.000	0.000	min
13	115	0	0	0.000	0.000	0	0.000	0.000	min
14	116	0	0	0.000	0.000	0	0.000	0.000	min
15	117	0	0	0.000	0.000	0	0.000	0.000	min

RDY: JOG :	16:50								
Group No.	Line copy	Line paste	Line clear	Grp No. change	Horiz scroll	Prev group	Next group	Help	Group list

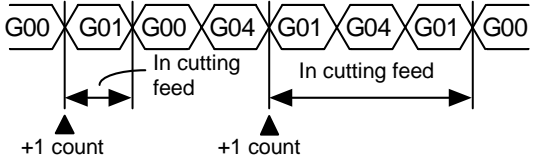
(1) Display items

Display item	Details	Setting range
Group No.	This is the number of the tool on which the tool life management is being carried out. These numbers are only displayed when displaying by group units.	1 to 99999999
Tool No.	This is the number corresponding to each tool. Depending on the specification configuration, up to 1000 tools can be registered.	1 to 99999999
ST	 <p>Tool status</p> <ul style="list-style-type: none"> 0 : Unused tool Normally set to "0" when the tool is replaced with a new tool. 1 : Used tool This becomes "1" when the cutting actually starts. 2 : Normal life tool This becomes "2" when the usage data (usage time and number of uses) exceeds the life data. 3 : Tool abnormality 1 tool 4 : Tool abnormality 2 tool <p>(Note) Item 3 and 4 differ depending on the machine manufacturer specifications.</p>	

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3. Setup Screens

Display item	Details	Setting range
Mthd	 <p>a. Tool life management method 0 : Usage time This manages by the cutting execution time. 1 : Number of mounting times This manages by the number of times the tool became the spindle tool in tool replacement, etc. 2 : Number of uses Refer to Note of the "Life" explanation. 3 : Wear (Not used)</p> <p>b. Tool radius compensation data format</p> <p>c. Tool length compensation data format 0 : Compensation No. method This treats the compensation data in the tool data as a compensation No., and compensates by substituting that number for the compensation No. commanded in the machining program. 1 : Addition compensation method This treats the compensation data in the tool data as an addition compensation amount. Compensation is carried out by adding that amount indicated by the compensation No. commanded in the machining program. 2 : Direct compensation method This treats the compensation data in the tool data as a direct compensation amount. Compensation is carried out by substituting that amount for the compensation amount indicated by the compensation No. commanded in the machining program.</p>	
L compen	This depends on the data format designated in "Mthd".	Compensation No. : 1 to 400
R compen		Added compensation amount : ±1 to 99999.999 Direct compensation amount : ±1 to 99999.999
Auxil	This depends on the machine manufacturer specifications.	0 to 65535

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Display item	Details	Setting range
Life	<p>This sets the life corresponding to each tool following one of the following methods: usage time (mins.), number of mounting times (number of times installed on the spindle) or number of uses (number of holes drilled). The method to be used is decided by the data format designated in "Mthd". The life is infinite when "0" is set.</p> <p>(Note) Number of uses count The number of uses is counted when the command changes from rapid traverse command (G00, etc.) to a cutting feed command (G01, G02, G03, etc.). Note that, rapid traverse or cutting feed commands with no movement are invalid.</p> 	Usage time: 0 to 4000(min) Number of mounting times: 0 to 9999 (times) Number of uses: 0 to 9999 (times) Wear (Not used)
Used	<p>This displays the usage data of each tool following the method designated by the tool life management method.</p> <p>(Note) This data is not counted during machine lock, auxiliary function lock, dry run or for a single block.</p>	Usage time: 0 to 4000(min) Number of mounting times: 0 to 9999 (times) Number of uses: 0 to 9999 (times) Wear (Not used)
L wear	Not used.	0
R wear	Not used.	0

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3. Setup Screens

(2) Menus

Menu	Details	Type	Reference
Group No.	This displays the data of a group when that group No. of tool life management data is set and the INPUT key is pressed. The group No. can be referred to in the group list.	A	3.6.1 (3) Designating a group No.
Line copy	This copies one line of data at the cursor position.	C	3.6.1 (6) Copying/pasting the tool life data
Line paste	This writes, in the line where the cursor is at, the contents (one line amount) of the copied data. If the copied line of data is changed after the menu key Line copy is pressed, the data before changing is written when pasted. Once copied, a line of data can be pasted any number of times until a new area is copied.	B	
Line clear	This erases a designated line (multiple lines possible) of tool life management data. Designation method: Compensation No. where erasing begins/Compensation No. where erasing finishes (Ex.) 1/E : All compensation data is set to " " (blank). When the INPUT key is pressed without designating a line, only the line where the cursor is currently at is erased. After erasing, the subsequent lines are carried and displayed.	A	3.6.1 (7) Erasing one line of tool life management data (8) Designating and erasing a line
Grp No. change	This changes a group No. When a group No. is set and the INPUT key is pressed, the new number is validated, and the number display changes. An error occurs if a preexisting group No. is set.	A	3.6.1 (4) Changing a group No.
Horiz scroll	This scrolls the display of the tool life management data to the left and right.	C	-
Previous group	The group data for the previous group number will display.	C	-
Next group	The group data for the next group number will display.	C	-
Help	This changes the screen to the screen that explains the ST and method setting details.	C	3.6.3 Displaying the Help screen
Group list	This displays the list of tool life data groups.	C	3.6.2 Displaying the group list

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3. Setup Screens

(3) Designating a group No.

- 1)

Press the menu Group No..

 → The cursor moves to the group No.
- 2)

Designate the group No. to be displayed.
12 INPUT

 → The tool life data of the designated group No. appears, and the cursor moves to the head of the data.

Tool life (grp) ▼				Monitor Setup	Edit	Diagnos	Mainte	
Group No. : 12								
#	Tool No.	ST	Mthd	L compen	R compen	Auxil	Life	Used
1	8	1	111	20.000	0.000	0	0.000	0.000set
2	9	1	111	0.000	0.000	0	0.000	0.000set
3	10	1	111	10.000	50.000	0	0.000	0.000set
4	11	1	111	20.000	-2.000	0	123.000	123.000set
5	22	1	111	5.000	1.234	0	45.000	45.000set
6	25	1	111	-1.000	-2.000	0	0.000	0.000set

(Note) If a group No. that does not exist is set, a message appears to confirm the creation of a new number. A new group is created if Y or INPUT is pressed.

(4) Changing a group No.

- 1)

Press the menu Grp No. change.

 → The cursor moves to the group No.
- 2)

Designate the group No. after changing.
112 INPUT

 → The group No. after changing appears.

Tool life (grp) ▼				Monitor Setup	Edit	Diagnos	Mainte	
Group No. : 112								
#	Tool No.	ST	Mthd	L compen	R compen	Auxil	Life	Used
1	8	1	111	20.000	0.000	0	0.000	0.000set
2	9	1	111	0.000	0.000	0	0.000	0.000set
3	10	1	111	10.000	50.000	0	0.000	0.000set
4	11	1	111	20.000	-2.000	0	123.000	123.000set
5	22	1	111	5.000	1.234	0	45.000	45.000set
6	25	1	111	-1.000	-2.000	0	0.000	0.000set

(Note) An error occurs if the group No. duplicates a preexisting group No.

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(5) Setting the tool life data

1)

Move the cursor to the data to be set.

(Note) One of the following methods can be used to move to the target data.

- Using the cursor movement keys , , , and , move the cursor to the line to be set.

2)

Input the value.

20



The set value appears.

Tool life (grp)		Monitor Setup	Edit	Diagnos	Mainte			
Group No. : 12								
#	Tool No.	ST	Mthd	L compen	R compen	Auxil	Life	Used
1	8	1	111	20.000	0.000	0	0.000	0.000set
2	9	1	111	0.000	0.000	0	0.000	0.000set
3	10	1	111	10.000	50.000	0	0.000	0.000set
4	11	1	111	20.000	-2.000	0	123.000	123.000set
5	22	1	111	5.000	1.234	0	45.000	45.000set
6	25	1	111	-1.000	-2.000	0	0.000	0.000set

(Note 1) The other settings will be invalid when the tool ST (status) setting data are not set.

(Note 2) The same tool cannot be set in more than one group.

(Note 3) If the tool No. is not set, the other data cannot be set.

(6) Copying/pasting the tool life data

1)

Move the cursor to the line to be copied.

2)

Press the menu key , and then press the key.



The menu is highlighted.

The entire copy target line is highlighted.

Tool life (grp)		Monitor Setup	Edit	Diagnos	Mainte			
Group No. : 12								
#	Tool No.	ST	Mthd	L compen	R compen	Auxil	Life	Used
1	8	1	111	20.000	0.000	0	0.000	0.000set
2	9	1	111	0.000	0.000	0	0.000	0.000set
3	10	1	111	10.000	50.000	0	0.000	0.000set
4	11	1	111	20.000	-2.000	0	123.000	123.000set
5	22	1	111	5.000	1.234	0	45.000	45.000set
6	25	1	111	-1.000	-2.000	0	0.000	0.000set

3)

Move the cursor to the line where the data is to be pasted.

4)

Press the menu key .



The copied data is written in the line where the cursor is.

(Note) Once copied, an item of data is held until a new data item is copied.

(7) Erasing one line of tool life management data

- 1)

Move the cursor to the line to be erased.

 → The cursor appears at the data item of the selected line (index No.).

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

- Using the cursor movement keys

 and

, move the cursor to the line to be selected.

- 2)

Select erase.
Menu <table border="1">Line clear</table> <table border="1">INPUT</table>

 → The menu is highlighted.
A message appears to confirm the erasing.

- 3)

Press the <table border="1">Y</table> or <table border="1">INPUT</table> key.

 → One line of the selected life data is erased.
After erasing, the next line is carried.

To cancel the erasing, press a key other than

 and

.

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

- 1)

Press the menu key <table border="1">Line clear</table> .

 → The menu is highlighted.

- 2)

Set the erasing range by marking the first and last # Nos. with a "/", and press <table border="1">INPUT</table> key.
122/125 <table border="1">INPUT</table>

 → A message appears to confirm the erasing.

- 3)

Press the <table border="1">Y</table> or <table border="1">INPUT</table> key.

 → The tool life data corresponding to the designated # No. is erased, and the menu highlight returns to normal.
The next line after the erased range is carried.

To cancel the erasing, press a key other than


 and

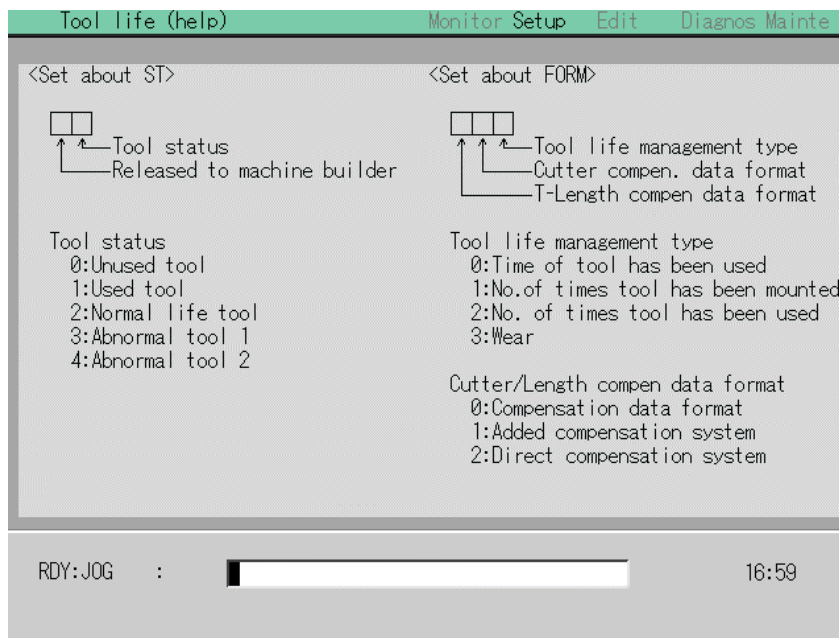
.

(Note) If the

 key is pressed without setting a # No., the line at the cursor is erased.

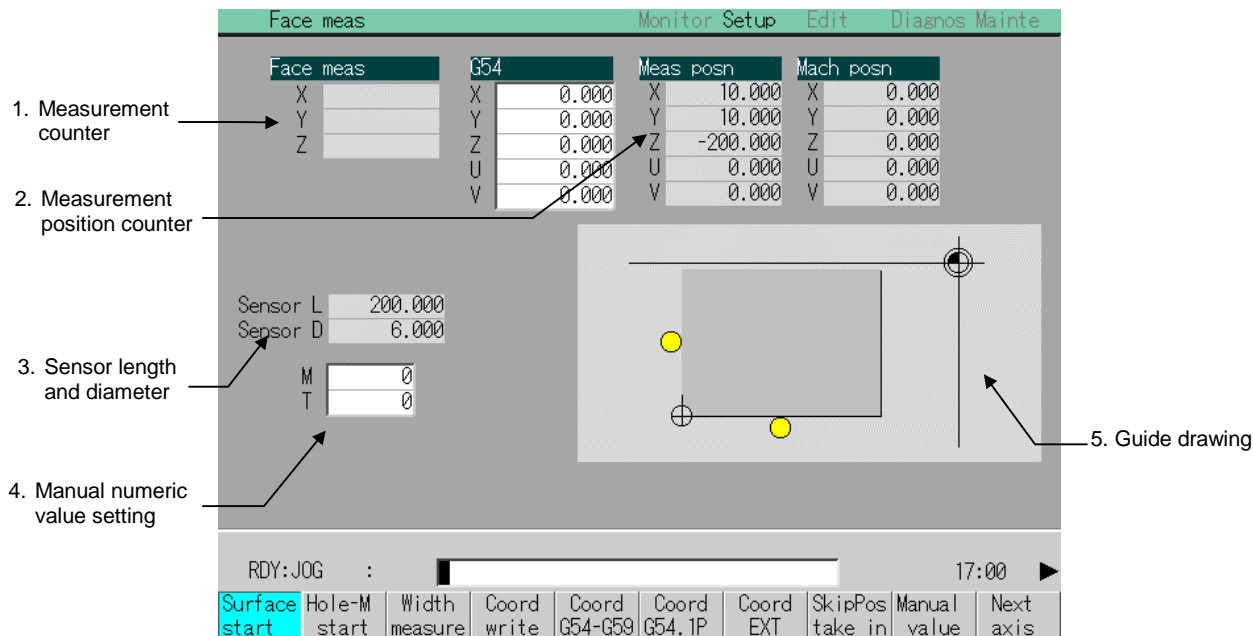
3.6.3 Displaying the Help screen (Tool life (help) screen)

This screen displays the meanings and setting methods of the display items "ST" and "Mthd".
The Tool life (grp) screen appears if the  key is pressed.



3.7 Workpiece Measurement screen

The surface, width center, and hole center workpiece offsets are measured in this screen, and the offset data is set based on those measured values.



(1) Display items

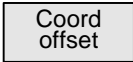
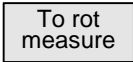
Display item	Details
1. Measurement counter	This displays the values during measurement. This counter becomes blank when setting coordinate system offset data, or when the NC is reset. The display format differs depending on the surface, hole or width measurement type.
Surface measurement counter	Machine position when the skip signal is read + Skip flow rate ^(Note) + Center compensation amount + Sensor radius (Note) The skip flow rate changes between +/- with the movement direction.
Hole measurement counter	Machine position when the skip signal is read + Skip flow rate ^(Note) + Center compensation amount (Note) The skip flow rate changes between +/- with the movement direction.
Width measurement counter	Machine position when the skip signal is read + Skip flow rate ^(Note) + Center compensation amount (Note) The skip flow rate changes between +/- with the movement direction.
2. Measurement position counter	Machine position + Sensor radius ^(Note) + Skip flow rate + Center compensation amount (Note) The sensor radius changes between +/- with the movement direction.
3. Sensor length and diameter	Sensor length : This displays the length to the tip of the touch sensor. Sensor diameter: This displays the diameter of the ball at the tip of the touch sensor.
4. Manual numeric value setting	This displays each command value of M (miscellaneous function command value) and T (tool command value).
5. Guide drawing	This plots the measurement location to match each measurement. "On meas" at the upper right of the drawing appears while the TLM switch is ON.

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(2) Menus

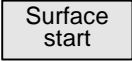
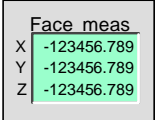
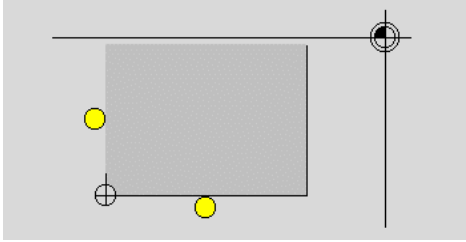

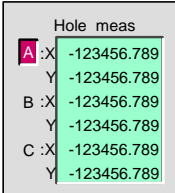
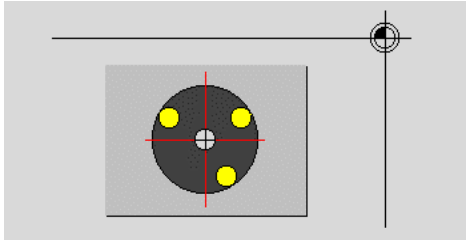
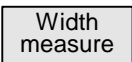
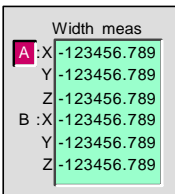
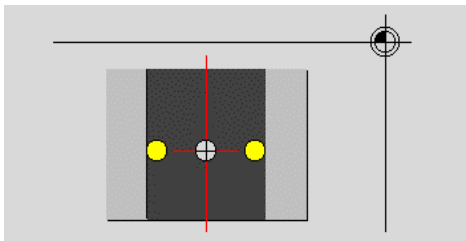
Menu	Details	Type	Reference
Surface start	This puts the machine in a state to start surface measurement.	C	(3) Details of the "Measurement counter" and "Guide drawing" display areas 3.7.1 Carrying out surface measurement 3.7.2 Carrying out hole measurement 3.7.3 Carrying out width measurement
Hole-M start	This puts the machine in a state to start hole measurement. (The cursor moves to the point A measurement counter.)	C	
Width measure	This puts the machine in a state to start width measurement. (The cursor moves to the point A measurement counter.)	C	
Coord write	The results calculated from the measurement counter are set in the displayed workpiece coordinate offset. Only the axis for which a value is displayed in the measurement counter can be set. (Note) If the workpiece coordinate system to be set is G54 to G59, the local coordinate offset value will be zero. (Only for the measured axis.)	C	–
Coord G54-G59	This selects the number of the coordinate system to be displayed from the submenu (G54 to G59). When the number is selected, that workpiece coordinate system offset data is displayed. Note that the cursor does not appear, and setting is not possible. (Setting is carried out on the Coord write menu.)	C	3.2.1 Setting the coordinate system offset data
Coord G54.1 P_	When the P No. is input, this displays the expansion workpiece coordinates (G54.1 Pn) offset data in the counter display area. (Setting is carried out on the Coord write menu.)	A	3.2 Coordinate System Offset screen
Coord EXT	This displays the offset data of the external coordinate system. (Setting is carried out on the Coord write menu.) (Note)	C	
SkipPos take in	In simple measurement (measurement without using a touch sensor), the sensor signal is pseudo-generated, and the skip position is read in. When this menu is pressed, the machine position of the axis that moved last (1 axis or 2 axis) is read in and displayed in the measurement counter. (Note)	B	–
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.	A	1.5.1 Setting a manual value command
Next axis	This can be selected when there are seven or more display axes for the selected system. The axes displayed are changed between the 1st to 6th axes and the 7th to 8th axes. (This is used when there are seven to eight axes in one system.)	C	1.5.4 Changing the display axis

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3. Setup Screens

Menu	Details	Type	Reference
	This changes the screen to the Coordinate System Offset screen.	C	3.2 Coordinate System Offset screen
	This changes the screen to the Rotation Measurement screen.	C	3.8 Rotation Measurement screen

(Note) This menu appears only when the operation parameter "370015 Meas ext menu invld" is set to 0.

(3) Details of the "Measurement counter" and "Guide drawing" display areas

Menu	Measurement counter	Guide drawing
	 <pre> Face meas X -123456.789 Y -123456.789 Z -123456.789 </pre>	
	 <pre> Hole meas A :X -123456.789 Y -123456.789 B :X -123456.789 Y -123456.789 C :X -123456.789 Y -123456.789 </pre>	
	 <pre> Width meas A :X -123456.789 Y -123456.789 Z -123456.789 B :X -123456.789 Y -123456.789 Z -123456.789 </pre>	

(4) Restrictions

- 1) Each measurement counter display becomes blank after reflecting on the NC reset and workpiece coordinate offset. Note that the counter is cleared to blank (measurement canceled) by the NC reset only when the workpiece measurement screen is displayed, and only the selected measurement counter (surface, width center or hole center) is targeted.
- 2) An error will not occur during the measurement, even if there is axis movement other than that of the measurement target axis.
- 3) The measurement mode and measurement counter are held even when the screen changes during measurement.
- 4) Only 1st system axes can be used as measurement target axes.
The measurement target axis is set in the operation parameters.
The axis names that can be set are those in 1st system.
- 5) The measurement values can only be set in the workpiece coordinate offset of 1st system.
- 6) An axis other than the measurement axis cannot be moved during the measurement operation after the skip signal is input.

3.7.1 Carrying out surface measurement

- 1)

Press the menu <code>Surface start</code> .
--
- 2)

Carry out an operation such as a reference point return to position the tool on the reference point.
--
- 3)

Turn ON the measurement switch on the machine operation board.
--

 → The message "On meas" appears.
- 4)

Move the spindle near the workpiece using manual feed and manual handle feed.

- 5)

Put the spindle in contact with the workpiece in the X direction.

 → When the tool contacts the workpiece, the skip position is displayed in the X axis section of the measurement counter.
- 6)

Select the workpiece coordinate offset in which the measurement data will be set. (Example) Press the menus <code>Coord G54-G59</code> <code>G55</code> to select G55.
--
- 7)

Press the menu <code>Coord write</code> .

 → The X axis measurement data is set in the workpiece coordinate offset G55 (coordinate system selected in step 6.)
The measurement counter display becomes blank
- 8)

Carry out the operations in steps 4) to 7) in the same way for the Y and Z axes.
--
- 9)

Return the spindle to the reference point, and turn OFF the measurement switch.

 → The message "On meas" disappears.

3.7.2 Carrying out hole measurement

- 1)

Press the menu Hole-M start.

 → The cursor appears at point A.
Using the

 and

 keys, move the cursor to points B and C.
- 2)

Turn ON the measurement switch on the machine operation board.
--

 → The message "On meas" appears.
- 3)

Move the spindle into the hole using manual feed and manual handle feed.
--
- 4)

Put the tool in contact with the inner walls of the hole.

 → When the tool contacts the inner walls of the hole, the skip position is displayed at the X axis and Y axis of the point A measurement counter. The cursor moves to point B. The cursor moves to point A when at point C.
- 5)

Measure points B and C in the same way.

- 6)

Select the workpiece coordinate offset in which the measurement data will be set. (Example) Press the menus <table border="1">Coord G54-G59</table> <table border="1">G55</table> to select G55.
--
- 7)

Press the menu <table border="1">Coord write</table> .
--

 → The hole center is measured, and the value is set in the workpiece coordinate offset G55 (coordinate system selected in step 6.)
The measurement counter display becomes blank.
- 8)

Turn OFF the measurement switch.

 → The message "On meas" disappears.

3.7.3 Carrying out width measurement

- 1)

Press the menu <code>Width meas</code> .
--

 → The cursor appears at point A. Using the `↑` and `↓` keys, move the cursor to points A and B for each axis.
- 2)

Turn ON the measurement switch on the machine operation board.
--

 → The message "On meas" appears.
- 3)

Move the spindle into the groove, using manual feed and manual handle feed.

- 4)

Put the tool in contact with the inner walls of the groove.

 → When the tool contacts the inner walls of the groove, the skip position is displayed at the movement axis of the point A measurement counter. The cursor moves to point B. The cursor moves to point A when at point B.
- 5)

Put the tool in contact with the opposite side of the groove.

 → When the tool contacts the opposite side of the groove, the skip position is displayed at the movement axis of the point B measurement counter.
- 6)

Select the workpiece coordinate offset in which the measurement data will be set. (Example) Press the menus <code>Coord G54-G59</code> <code>G55</code> to select G55.

- 7)

Press the menu <code>Coord write</code> .

 → The width center is measured, and the value is set in the workpiece coordinate offset G55 (coordinate system selected in step 6.)
The measurement counter display becomes blank.
- 8)

Carry out the operations in steps 3) to 7) in the same way for the Y and Z axes.
--
- 9)

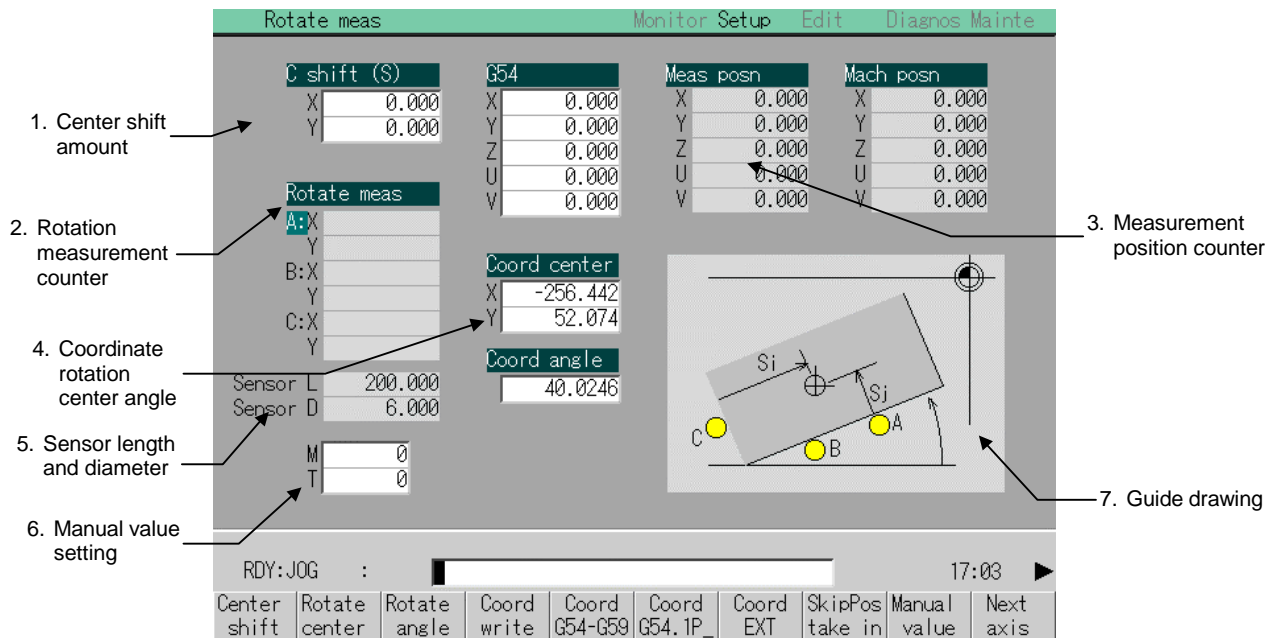
Turn OFF the measurement switch.

 → The message "On meas" disappears.

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3. Setup Screens

3.8 Rotation Measurement screen

The offset (rotation center and rotation angle) of the rotation coordinate system is measured in this screen. The measurement results can be reflected in the workpiece offset (rotation center) and parameters ("Coordinate rotation: center coordinate" and "Coord rotation angle" machining parameters).



(1) Display items

Display item	Details
1. Center shift amount	This displays the shift amount of the rotation coordinates.
2. Rotation measurement counter	This displays the machine position when the skip signal is read + Flow rate + Center compensation amount
3. Measurement position counter	This displays the machine position + Sensor radius ^(Note) + Flow rate + Center compensation amount. (Note) The sensor radius changes between +/- with the movement direction.
4. Coordinate rotation center and angle	Center : This displays the coordinates that are the center during coordinate rotation. Angle : This displays the rotation angle during coordinate rotation.
5. Sensor length and diameter	Sensor length : This displays the length to the tip of the touch sensor. Sensor diameter : This displays the diameter of the ball at the tip of the touch sensor.
6. Manual value setting	This displays each command value of M (miscellaneous function command value) and T (tool command value).
7. Guide drawing	This plots the measurement location. "On meas" at the upper right of the drawing appears while the TLM switch is ON.

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(2) Menus

Menu	Details	Type	Reference
Center shift	This sets the center shift amount. (The cursor moves to the center shift amount display column (C shift) when this is selected.)	A	3.8.1 Carrying out rotation measurement
Rotate center	This sets the coordinate rotation center. (The cursor moves to the coordinate rotation center display column (Coord center) when this is selected.)	A	
Rotate angle	This sets the coordinate rotation angle. (The cursor moves to the coordinate rotation angle display column (Coord angle) when this is selected.)	A	
Coord write	The results calculated from the measurement counter are set in the displayed workpiece coordinate offset. Only the axis for which a value is displayed in the measurement counter can be set. (Note) IF the workpiece coordinate system to be set is G54 to G59, the local coordinate offset value will be zero. (Only for the measured axis.)	C	-
Coord G54-G59	This selects the number of the coordinate system to be displayed from the submenu (G54 to G59). When the number is selected, that workpiece coordinate system offset data is displayed. Note that the cursor does not appear, and setting is not possible. (Setting is carried out on the Coord write menu.)	C	3.2.1 Setting the coordinate system offset data
Coord G54.1 P	When the P No. to be displayed on the screen is input, this displays the offset data of the expansion workpiece coordinates (G 54.1 Pn) in the workpiece offset area. (Setting is carried out on the Coord write menu.)	A	3.2 Coordinate System Offset screen
Coord EXT	This displays the offset data of the external coordinate system. (Setting is carried out on the Coord write menu.) (Note)	C	
SkipPos take in	In simple measurement (measurement without using a touch sensor), the sensor signal is pseudo-generated, and the skip position is read in. When this menu is pressed, the machine position (2 axes) is read in and displayed in the measurement counter. (Note)	B	-
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.	A	1.5.1 Setting a manual value command
Next axis	This can be selected when there are seven or more display axes for the selected system . The axes displayed are changed between the 1st to 6th axes and the 7th to 8th axes. (This is used when there are seven to eight axes in one system.)	C	1.5.4 Changing the display axis
Coord offset	This changes the screen to the Coordinate System Offset screen.	C	3.2 Coordinate System Offset screen
To param	This changes the screen to the Parameter screen.	C	3.4 Parameter screens
To wkp measure	This changes the screen to the Workpiece Measurement screen.	C	3.7 Workpiece Measurement screen

(Note) This menu appears only when the operation parameter "370015 Meas ext menu invld" is set to 0.

(3) Restrictions

- 1) The rotation measurement counter display becomes blank after reflecting on the NC reset and workpiece coordinate offset. Note that the display becomes to blank (measurement canceled) by the NC reset only when the Rotate meas screen is displayed.
- 2) An error will not occur during the measurement, even if there is axis movement other than that of the measurement target axis.
- 3) The measurement mode and measurement counter are held even when the screen changes during measurement.
- 4) Only 1st system axes can be used as measurement target axes.
- 5) The measurement results can only be set in the 1st system workpiece coordinate offset, coordinate rotation center and coordinate rotation angle.
- 6) An axis other than the measurement axis cannot be moved during the measurement operation after the skip signal is input.

3.8.1 Carrying out rotation measurement

1)

Turn ON the control parameter "Coord rot param invd".

2)

Turn ON the manual absolute switch.

3)

Set the following machining parameters to "0".
"Coord rot center (H)"
"Coord rot center (V)"
"Coord rotation angle"

(Note) The measured value will not be set if these parameters are not set to "0".

4)

Carry out an operation such as a reference point return to position the tool on the reference point.

5)

Turn ON the measurement switch on the machine operation board.



The message "On meas" appears.

6)

Set the center shift amount. Setting is not required if the coordinate rotation center is to be the workpiece zero point.

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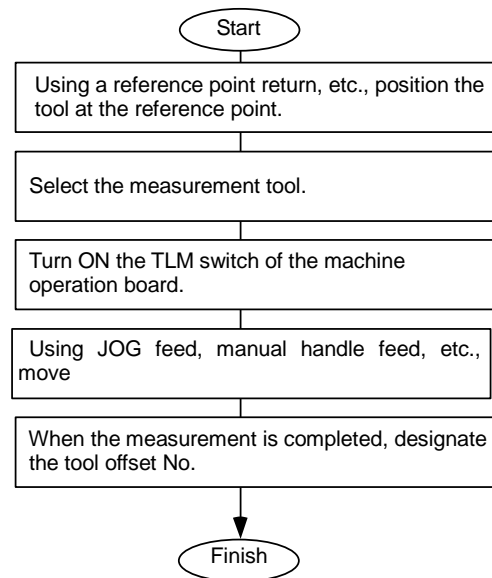
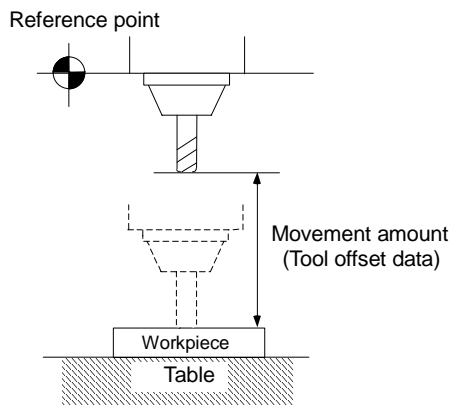
- 7) Put the spindle in contact with the workpiece using the manual feed or manual handle feed. → When the spindle contacts the workpiece, the skip position is displayed at the point A measurement counter.
The cursor moves to point B. The cursor moves to point A when at point C.
- 8) Measure points B and C in the same way.
- 9) Select the workpiece coordinate offset in which the measurement data will be set.
(Example)
Press the menus to select G55.
- 10) Press the menu . → The rotation center coordinates and rotation angle are measured, and the value is set in the parameters for workpiece coordinate offset G55 (coordinates selected in step 9)), the coordinate rotation center and coordinate rotation angle.
The measurement counter display becomes blank.
- 11) Turn OFF the measurement switch. → The message "On meas" disappears.

3.9 Tool Measurement screen

The tool length is measured on this screen and set as tool offset data.

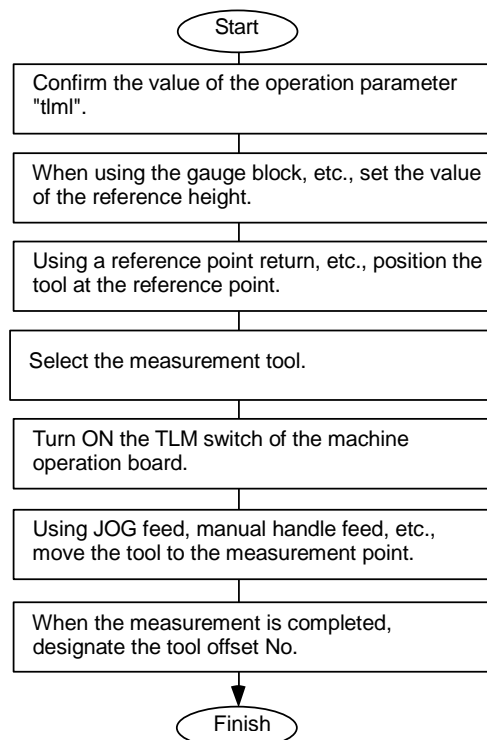
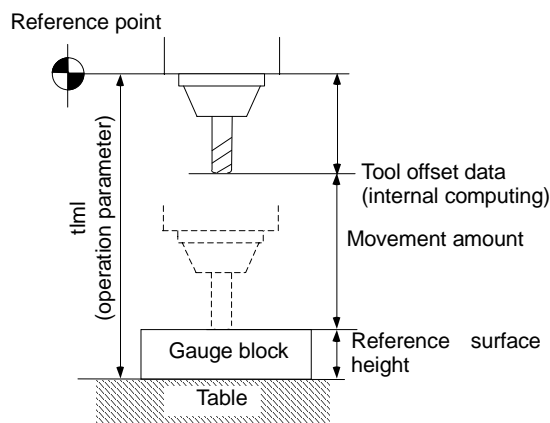
■ Tool length measurement I

When the tool is at the reference point, the distance from the tool tip to the measurement point (workpiece upper end) is measured, and can be set as tool offset data.



■ Tool length measurement II

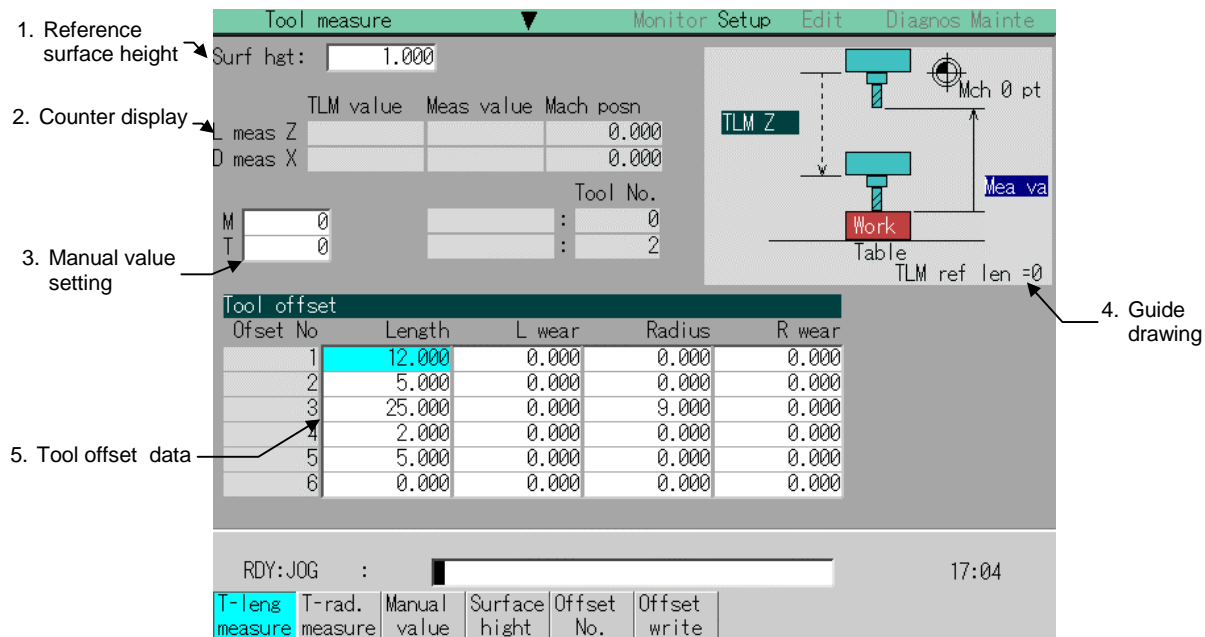
When the tool is at the reference point, the distance from the reference point to the tool tip is measured, and can be set as tool offset data.



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■ Screen image



(1) Display items

Display item	Details
1. Reference surface height	This displays a value for the reference surface height.
2. Counter display	<p>TLM value : This displays the value during measurement. (Note) This is equivalent to the machine position when the sensor is in contact with the workpiece. This is the machine position where the skip signal is read in from the sensor contact to return position.</p> <p>Measurement value :</p> <p>For tool length measurement type I : TLM value – Reference surface height</p> <p>For tool length measurement type II : TLM value – Reference surface height + TLM reference length</p>
L meas : Z R meas : X	The axis selected in the operation parameters "TLM L meas axis" and "TLM D meas axis" is the target axis for the measurement.
3. Manual value setting	This displays each command value of M (miscellaneous function command value) and T (tool command value).
4. Guide drawing	This plots the measurement location. The drawing differs depending on the type (I/II) of tool length measurement. "On meas" at the upper left of the drawing appears while the measurement switch is ON.
5. Tool offset data	When tool life management is invalid : (control parameter "T-life manage valid" = 0) This displays the tool offset data. Depending on the tool offset type (I/II), the display details of the displayed tool offset data will differ.

(Note) The TLM value counter differs according to the base common parameter "110044 TLM type *" value.

- 0 : The position when the measurement switch was turned ON is displayed as 0.
- 1 : The display is based on the machine zero point.

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(2) Menus

Menu	Details	Type	Reference
T-leng measure	This changes the mode to the tool length measurement mode. (The cursor moves to the length dimension position for tool offset type II.)	C	3.9.1 Carrying out tool length measurement
T-rad. measure	This changes the mode to the tool radius measurement mode. (This is valid only for tool length measurement II.) (The cursor moves to the radius dimension position for tool offset type II.)	C	3.9.2 Carrying out tool radius measurement
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.	A	1.5.1 Setting a manual value command
Surface hight	This sets the reference surface height data. (The cursor moves to the reference surface height.) When the data is set in the setting area and the <input type="text" value="INPUT"/> key is pressed, the reference surface height is set.	A	
Offset No.	When the offset No. is set and the <input type="text" value="INPUT"/> key is pressed, the tool offset data with that number at its head appears. The cursor moves to the length dimension data of the top line of that data.	A	3.1 Tool offset amount screen
Offset write	This writes the value displayed in "Meas value" as the tool offset amount. The wear amount is cleared to "0" for the tool offset type II.	C	-

3.9.1 Carrying out tool length measurement

(1) Carrying out tool length measurement

- 1)

Turn ON the measurement switch (Y720).

 → The message "On meas 0" appears.

- 2)

Press the menu T-leng measure .

 → The menu is highlighted, and the tool length measurement starts. The measurement values are displayed in "Meas value" during the measurement. The menu T-leng measure is highlighted as a default after the power is turned ON.

- 3)

Contact the measurement tool against the sensor, using manual feed and manual handle feed. Stop the feed when the tool contacts the sensor.

 → When the measurement tool contacts the sensor, the skip position displayed in the measurement values counter.

- 4)

The cursor moves to the compensation No. that sets the measurement results.
Offset No. 12 INPUT

 → The cursor appears.

Tool offset				
Offset No.	Length	Length wear	Radius dim.	Radi wear
12	-123456.678	-123456.678	-123456.678	-123456.678
13	-123456.678	-123456.678	-123456.678	-123456.678
14	-123456.678	-123456.678	-123456.678	-123456.678
15	-123456.678	-123456.678	-123456.678	-123456.678
16	-123456.678	-123456.678	-123456.678	-123456.678
17	-123456.678	-123456.678	-123456.678	-123456.678

The cursor display position differs depending on the measurement mode.
Tool length measurement mode: Length dimension
Tool radius measurement mode: Radius dimension

- 5)

Press the menu Offset write .

 → The measurement values are written as a tool offset amount.
The wear amount is cleared to "0" for the tool offset type II.

- (Note 1)** The measurement values are not written if the cursor is in a position other than "Length" or "Radius".
(Note 2) The axis returns and stops after contacting the sensor, but be careful that the axis does not move after that. If the axis moves after contacting the sensor, the coordinate value that was actually moved will be displayed in the measurement values counter, and the skip position will not be held.

- 6)

Turn OFF the measurement switch to finish measuring.

 → The screen returns to the main menu.
The message "On meas 0" disappears.

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(2) Manual measurement status display

The display will change as shown below during manual measurement.

Display	Meaning
On meas 1	This state is entered if a skip signal is input during manual measurement. The "On meas 2" state is shifted to after deceleration stop is confirmed.
On meas 2	This is the state during the first retract operation. The "On meas 3" state is shifted to after retracting the retract amount.
On meas 3	This is the state in which retract by the retract amount has completed. If the skip after deceleration stop confirmation signal is ON, the status display will remain the same. The "On meas 0" state is shifted to when this state is reset.
On meas 4	This is the state during the second measurement. If the skip signal is not input even after moving to the specified position, a warning will appear, and the status display will remain the same. The "On meas 0" state is shifted to when this state is reset.
On meas 5	This state is entered when the skip signal is input during the second measurement. The "On meas 6" state is shifted to after deceleration stop is confirmed.
On meas 6	This is the state during the second return operation. The "On meas 0" state is shifted to after retracting the retract amount.
On meas 0	This state is entered when not in the "On meas 1" to "On meas 6" states.

3.9.2 Carrying out tool radius measurement

The operating procedure of the tool radius measurement and submenu details are the same as when measuring tool length.

(Use T-rad. measure instead of T-leng measure)

Refer to "3.9.1 Carrying out tool length measurement" for details.

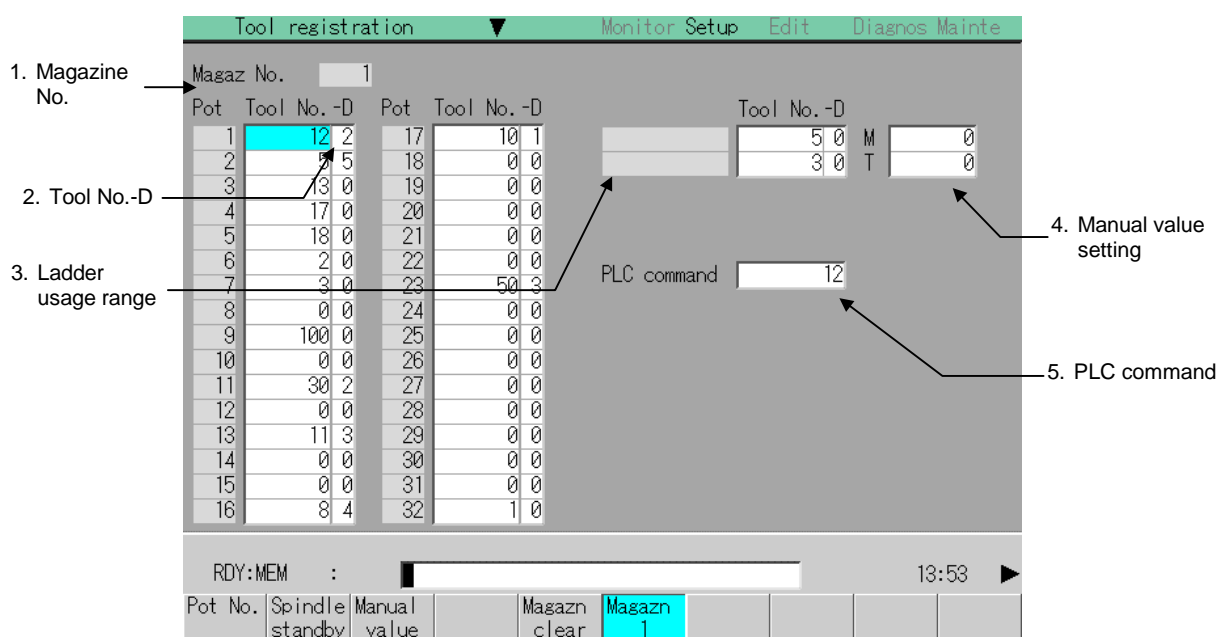
3.10 Tool Registration screen

In this screen, a tool No. is assigned to each tool to make the tools installed on the machine recognizable to the NC. The tool No. is registered corresponding to the magazine pot and spindle where that tool is installed, and the standby location.

When the tool No. and magazine pot are changed by a tool selection command or tool replacement command, the new tool No. is displayed.

The number of tool registrations differs depending on the specification configuration. A maximum of 120 tools can be registered. Tool Nos. can have up to eight digits.

The usage of this screen differs depending on the user PLC. Refer to the instruction manual issued by the machine manufacturer for details.



(1) Display items

Display item	Details
1. Magazine No.	This displays the currently selected magazine No.
2. Tool No.-D	This displays the tool No. (Refer to the instruction manual issued by the manufacturer for D data functions and targets.) If the number display is blank, the tool is probably not installed or does not match the spindle. Check the tool. If "0" is input, the tool registration is erased.
3. Ladder usage range	(The name of this area differs depending on the output from the ladder.)
4. Manual value setting	This displays each command value of M (miscellaneous function command value) and T (tool command value).
5. PLC command	Data can be transferred from the screen on the ladder side, and sequence processing carried out by the user PLC.

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(2) Menus

Menu	Details	Type	Reference
Pot No.	When the magazine pot No. to be displayed in the setting area is set, and the <input type="text" value="INPUT"/> key is pressed, the magazines are displayed with the set pot No. at the top and in continuing order below. The cursor moves to the data of the set pot No., and the tool No. can be input.	A	3.10.1 Register-ing a tool in the magazine pot
Spindle standby	This changes the spindle/standby tool No. The cursor moves to the head of the spindle/standby tool No.	A	3.10.2 Changing the spindle/standby tool No.
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 manual value mode is canceled.	A	1.5.1 Setting a manual value command
Magazn clear	This erases all of the magazine data (tool Nos. and D) of the magazine displayed on the screen. (Only the magazine data displayed is erased.) (Note) The contents of the ladder display cannot be erased with this menu. Input "0" when erasing.	B	3.10.4 Erasing the tool registration data
Magazn 1 : Magazn 5	This designates the magazine No. to be displayed on the screen. The displayed menu differs according to the machine specifications.	C	3.10.1 Register-ing a tool in the magazine pot
PLC command	The cursor moves to the PLC command setting area and the mode changes to the setting mode.	A	3.10.3 Setting the PLC command

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3.10.1 Registering a tool in the magazine pot

(1) Selecting a magazine No.

1)

Press the menu .



The tool registration data of the set magazine No. appears.

Magaz No. : <input type="text" value="2"/>		
Pot	Tool No.	D
11	31	1
12	32	2
13	42	3
14	36	4
15	26	5

(Note) The No. of magazines differs according to the machine specification.

(2) Registering the tool in the magazine pot

1)

Designate the pot No.
 21



The tool registration No. data appears with the designated pot No. at the head.
 The cursor moves to the tool No. setting column.

Magaz No. : <input type="text" value="2"/>		
Pot	Tool No.	D
21	50	1
22	32	2
23	42	3
24	36	4
25	26	5

2)

Register the tool No.
 50



The tool No. appears, and the cursor moves to the next tool No.

Magaz No. : <input type="text" value="2"/>		
Pot	Tool No.	D
21	50	1
22	32	2
23	42	3
24	36	4
25	26	5

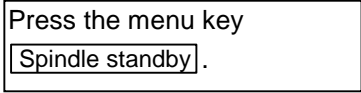
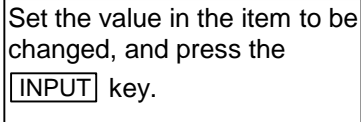
If the key is pressed without a numeric value being set, "0" will be set for that value and the cursor will move to "Tool No." of the next pot No.

(Note) To set "D", use the key to move the cursor.

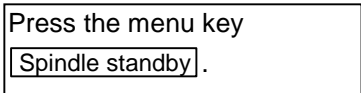
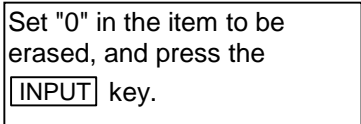
Refer to the manual issued by the machine manufacturer for details on the "D" data functions and purpose.

3.10.2 Changing the spindle/standby tool No.

(1) Changing the spindle/standby tool No.

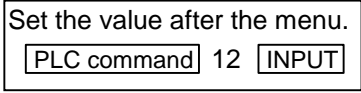
- 1)  → The cursor appears at the tool No. of "Spnd/standby".
- 2)  → The spindle/standby data is changed.

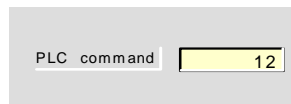
(2) Erasing the spindle/standby tool No.

- 1)  → The cursor appears at the tool No. of "Spnd/standby".
- 2)  → The spindle/standby data is invalidated.

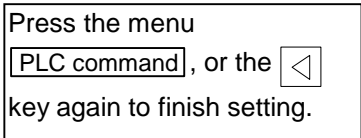
3.10.3 Setting the PLC command

(1) Setting command

- 1)  → The set value appears in the PLC command setting column, and the PLC command is validated. The command details differ with the machine manufacturer.



(Note) If the menu **PLC command** is pressed again before the **INPUT** key, the menu highlight returns to normal and the setting is invalidated.

- 2)  → The PLC command setting mode is released, and the menu highlight returns to normal.

3.10.4 Erasing the tool registration data

(1) Selecting a magazine No. and erasing the tool registration data

- 1)

Press the menu <input type="text" value="Magazn 2"/> .
--

 ➔ The tool registration data of the selected magazine No. appears.
- 2)

Press the menu <input type="text" value="Magazn clear"/> .
--

 ➔ The message "Erase? (Y/N)" appears.
- 3)

Press the <input type="text" value="Y"/> or <input type="text" value="INPUT"/> key.

 ➔ All of the "Tool No.-D" data of the magazine No. displayed in the screen are erased. Spindle/standby data is not erased.

(2) Erasing spindle/standby tool registration data

- 1)

Press the menu key <input type="text" value="Spindle standby"/> .

 ➔ The cursor appears in the "Spnd/standby" tool No.
- 2)

Using <input type="text" value="↑"/> and <input type="text" value="↓"/> , move the cursor to the item where the data is to be erased.

- 3)

Set "0", and press the <input type="text" value="INPUT"/> key.
0 <input type="text" value="INPUT"/>

 ➔ The spindle/standby data is erased.

3.11 Pallet Program Registration screen

The Pallet Program Registration screens include the following screens.

- Standard Pallet Registration screen (Displayed when 0 is set for the base common parameter #110141 APC type)
- Pallet 4 Page Registration screen (Displayed when 1 is set for the base common parameter #110141 APC type)

(Note 1) The Pallet 4 Page Registration screen is configured of the Pallet list screen and Pallet details screen.

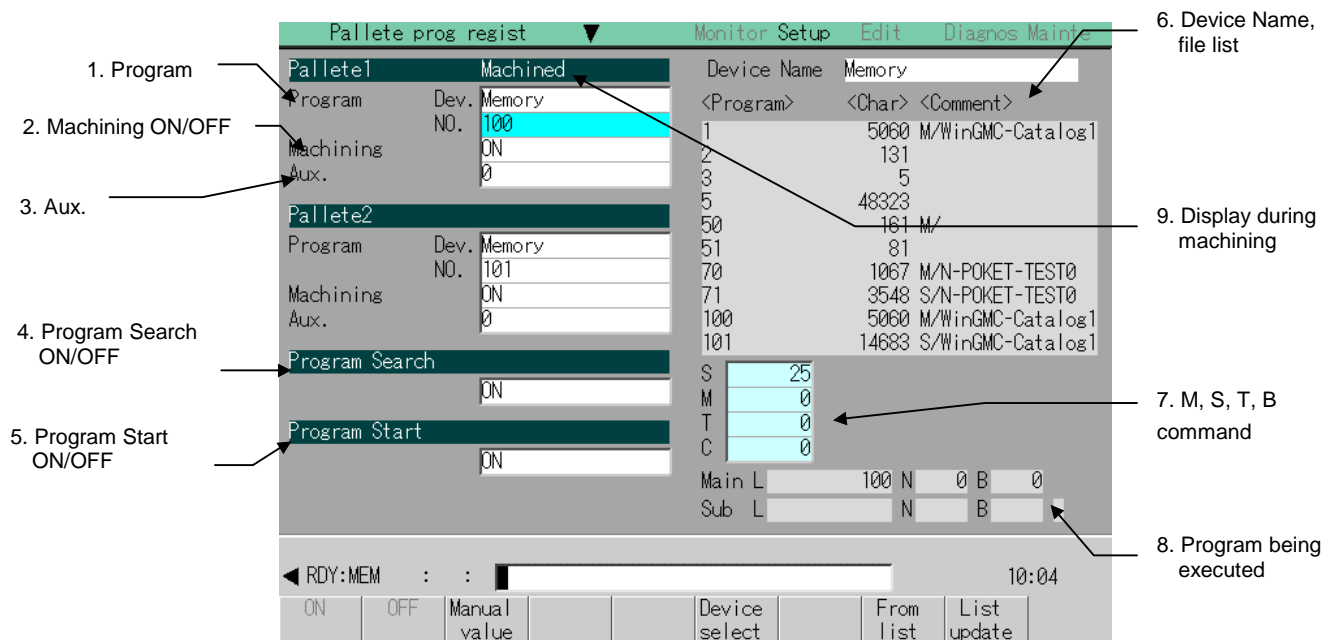
- Pallet list screen : The program No., machining validity and machining index plane for each pallet plane are displayed.
- Pallet details screen : The program No., machining validity and external workpiece coordinates, etc., for each pallet plane are displayed.

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3.11.1 Standard Pallet Registration screen (Pallet prog regist)

The machining program for the pallet is registered on this screen.

(Note 1) This screen appears when the base common parameter APC type (#110141) is set to 0.



(1) Display items

Display item	Details
1. Pallette prog regist	The machining program and device name registered for each pallet are displayed.
2. Machining ON/OFF	The ON/OFF state of machining for each pallet is displayed.
3. Aux.	If there are any auxiliary functions, the auxiliary function data for each pallet is displayed. (Refer to the Instruction Manual issued by the machine manufacturer for details on the corresponding functions.)
4. Program Search ON/OFF	The ON/OFF state of search for the registered machining program is displayed.
5. Program Start ON/OFF	The ON/OFF state of continuous start for the registered machining program is displayed. When set to ON, the searched program will be restarted for the pallet in the machine. This setting is valid only when Program Search is set to ON.
6. Device Name, file list	The device names and a list of the files are displayed.
7. M, S, T, B command	Each M, S, T, B command value is displayed. A manual value command can be issued.
8. Program being executed	The program being executed is displayed.
9. Display during machining	"Machined" is displayed for the pallet in the machine.

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(2) Menus

Menu	Details	Type	Reference
<input type="button" value="ON"/>	The state (Machining, Program Search, Program Start) indicated by the cursor is validated. This menu can be used only when the cursor is at Machining, Program Search or Program Start.	C	(3) Registering a machining program for the pallet
<input type="button" value="OFF"/>	The state (Machining, Program Search, Program Start) indicated by the cursor is invalidated. This menu can be used only when the cursor is at Machining, Program Search or Program Start.	C	(3) Registering a machining program for the pallet
<input type="button" value="Manual value"/>	A random value can be set for each S, M, T and B data on the screen. When a value is set, the selected S, M, T or B function will be executed.	A	1.5.1 Setting a manual value command
<input type="button" value="Device select"/>	The device menu is displayed. Designate the device of the program to be registered. The selected device is registered as the device for the program indicated by the cursor.	A	3.11.1 Standard Pallet Registration screen
<input type="button" value="From list"/>	The program to be registered can be selected from the file list. Select the file using the cursor displayed in the list. When the <input type="button" value="INPUT"/> key is pressed, the selected file will be registered as the machining program No.	A	-
<input type="button" value="List update"/>	The file list for the device indicated by the cursor is updated.	C	-

(3) Registering a machining program for the pallet

1)

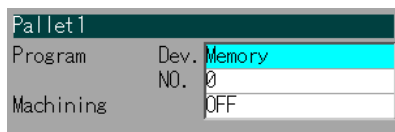
Using the , and tab keys, move the cursor to the area of the pallet for which a program is to be registered.

➔ The cursor will move between the Program field, Machining field, Aux. field, Program Search field and Program Start field for each pallet.

2)

Press the menu key , and select the device.

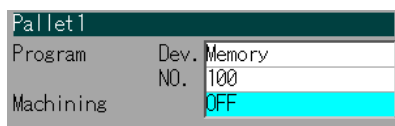
➔ The selected device name will appear at "Program Dev.".



3)

Move the cursor to the "Program NO." position, and input the program No.
100

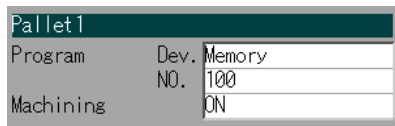
➔ The set details will appear at "Program NO.".



4)

Move the cursor to the "Machining ON/OFF" position, and press the menu key or .

➔ The set details will appear at "Machining".



5)

Move the cursor to the "Program Search ON/OFF" position, and press the menu key or .

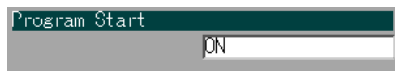
➔ The set details will appear at "Program Search".



6)

Move the cursor to the "Program Start ON/OFF" position, and press the menu key or .

➔ The set details will appear at "Program Start".



(4) Precautions

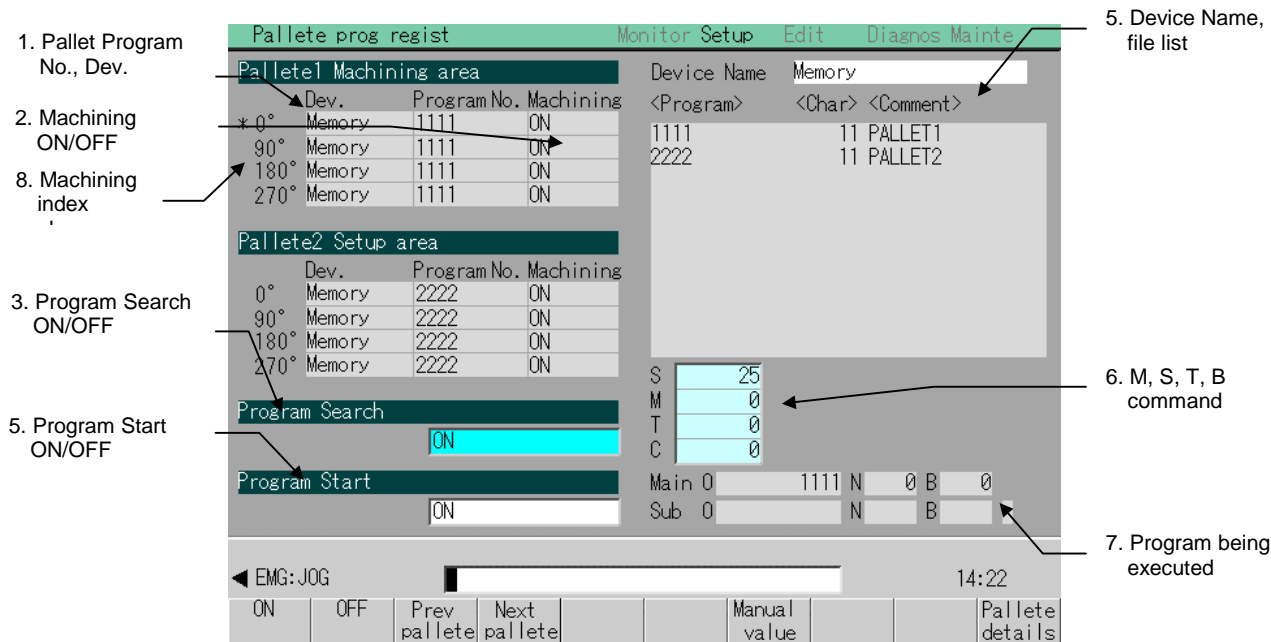
- Only decimal (1 to 99999999) programs can be registered. In addition to the NC memory, the HD, FLD and IC card programs can be registered. However, these programs must be in the root directory.
- Up to two pallets can be registered.
- Regardless of whether the program is running, an error message may appear depending on the PLC device value.
- The auxiliary setting range is -32768 to 32767.

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3.11.2 Pallet list screen

The program No., machining validity and machining index plane for each pallet are displayed on this screen.

(Note 1) This screen appears when the base common parameter APC type (#110141) is set to 1.

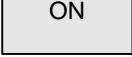

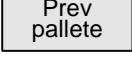
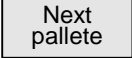
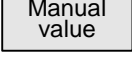



(1) Display items

Display item	Details
1. Program No., Dev.	The machining program No. and device registered for each index plane of each pallet are displayed.
2. Machining ON/OFF	The ON/OFF state of machining for each pallet is displayed.
3. Program Search ON/OFF	The ON/OFF state of search for the registered machining program is displayed. When set to ON and the program being machined ends, the next program registered will automatically be searched for. The next program is a program for which machining is set to ON, and is the next index plane program for the pallet in the machine. When the search is executed, the external workpiece coordinates set on the Pallet details screen will be set as the external workpiece coordinate shift (EXT). Note that automatic restart is invalid in this case. If automatic restart is turned ON with the PLC switch, it will be turned OFF automatically.
4. Program Start ON/OFF	The ON/OFF state of continuous start for the registered machining program is displayed. When set to ON, the searched program will be restarted for the pallet in the machine. This setting is valid only when Program Search is set to ON.
5. Device Name, file list	The device names and a list of the files are displayed. The listed devices cannot be updated on the Pallet list screen. The displayed list is the list displayed on the Pallet details screen. Note that the memory list is displayed when the power is turned ON.
6. M, S, T, B command	Each M, S, T, B command value is displayed. A manual value command can be issued.
7. Program being executed	The program being executed is displayed.
8. Machining index plane	An asterisk is displayed at the angle to which the machining plane is indexed.





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(2) Menus

Menu	Details	Type	Reference
	The state (Program Search, Program Start) indicated by the cursor is validated. This menu can be used only when the cursor is at Program Search or Program Start.	C	(3) Setting pallet program search (4) Setting continuous start
	The state (Program Search, Program Start) indicated by the cursor is invalidated. This menu can be used only when the cursor is at Program Search or Program Start.	C	
	Information on the previous two pallets is displayed.	C	-
	Information on the next two pallets is displayed.	C	-
	A random value can be set for each S, M, T and B data on the screen. When a value is set, the selected S, M, T or B function will be executed.	A	1.5.1 Setting a manual value command
	The screen is shifted to the Pallet details screen. The 0° or 90° data of the pallet displayed on the top line of the Pallet List screen is displayed.	C	3.11.3 Pallet Details screen

(3) Setting pallet program search

1)

Using the ,  or tab keys, move the cursor to the "Program Search ON/OFF" position, and press the menu key  or .







The set details will appear at "Program Search".



(4) Setting continuous start

1)

Using the ,  or tab keys, move the cursor to the "Program Start ON/OFF" position, and press the menu key  or .



The set details will appear at "Program Start".



(5) Precautions

- Only decimal (1 to 99999999) programs can be registered.
In addition to the NC memory, the HD, FLD and IC card programs can be registered. However, these programs must be in the root directory.
- Up to twelve pallets can be registered.
- Regardless of whether the program is running, an error message may appear depending on the PLC device value.
- The auxiliary setting range is -32768 to 32767.

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3.11.3 Pallet details screen

The program No., machining validity and external workpiece coordinates, etc., for each pallet plane are set on this screen.

(Note 1) This screen appears when the base common parameter APC type (#110141) is set to 1.

The screenshot shows the 'Pallet details screen' with the following elements and callouts:

- 1. Pallet Program No., Dev.:** Points to the 'Pallet1 0° Machining area' header and the 'Machined' status.
- 2. Machining ON/OFF:** Points to the 'Machining ON' indicator.
- 3. External workpiece coordinates:** Points to the 'Ext coord' fields for X, Y, and Z axes.
- 4. Device Name, file list:** Points to the 'Device Name Memory' field and the list of programs (1111, 2222) and comments (11 PALLET1, 11 PALLET2).
- 5. M, S, T, B command:** Points to the 'S 25', 'M 0', 'T 0', and 'C 0' command fields.
- 6. Program being executed:** Points to the 'Main 0 1111 N 0 B 0' and 'Sub 0' fields.
- 7. Machining indication:** Points to the 'Machining ON' indicator.

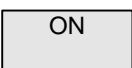
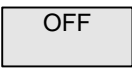



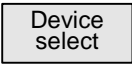
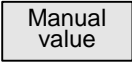



(1) Display items

Display item	Details
1. Program No., Dev.	The machining program No. and device registered for each index plane of each pallet are displayed.
2. Machining ON/OFF	Set whether machining is valid for each index plane of each pallet. This data cannot be set if the machining ON/OFF screen setting is set to OFF (when R903 is set to 1). The cursor will not move to this item in this case.
3. Ext coord	<p>Set the external workpiece coordinates of each index plane of each pallet. The set data (X to Z axes, B axis) is set in the expanded workpiece coordinate offset corresponding to the pallet No. and index plane.</p> <p>X to Z axes : External workpiece coordinate data B axis : Index angle shift amount (0, 90, 180, 270)</p> <p>Example) Pallet 1 0° : Expanded workpiece coordinate offset set 49 Pallet 1 90° : Expanded workpiece coordinate offset set 50 Pallet 1 180° : Expanded workpiece coordinate offset set 51 Pallet 1 270° : Expanded workpiece coordinate offset set 52 Pallet 2 0° : Expanded workpiece coordinate offset set 53 :</p> <p>Pallet 12 270°: Expanded workpiece coordinate offset set 96</p> <p>The value set as the external workpiece coordinate is written into the external workpiece coordinate shift (EXT) according to the commands from the PLC.</p> <p>If the external workpiece coordinates for the machining plane of the pallet in the machine are updated, only the data of the changed axis will be written into the external workpiece coordinate shift (EXT).</p> <p>The data can also be input into the external workpiece coordinates from the program using the programmable data input (G10). Note that the values set with programmable data input will not be reflected onto the screen.</p>

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Display item	Details
4. Device Name, file list	The device names and a list of the files are displayed.
5. M, S, T, B command	Each M, S, T, B command value is displayed. A manual value command can be issued.
6. Program being executed	The program being executed is displayed.
7. Machining indication	"Machined" is indicated for the pallet in the machine.

(2) Menus

Menu	Details	Type	Reference
	The state (Machining) indicated by the cursor is validated. This menu can be used only when the cursor is at Machining, Program Search or Program Start.	C	-
	The state (Machining) indicated by the cursor is invalidated. This menu can be used only when the cursor is at Machining, Program Search or Program Start.	C	-
	The pallet details data for the previous index plane is displayed.	C	(4) Displaying each pallet index plane data 2
	The pallet details data for the next index plane is displayed.	C	
	A random pallet can be selected. When the pallet No. is set and the INPUT is pressed, the 0° or 90° pallet details data for that pallet will be displayed. The cursor will move to the 0° processing program No.	A	(3) Displaying each pallet index plane data 1
	The device menu is displayed. Designate the device of the program to be registered. The selected device is registered as the device for the program indicated by the cursor.	A	-
	A random value can be set for each S, M, T and B data on the screen. When a value is set, the selected S, M, T or B function will be executed.	A	1.5.1 Setting a manual value command
	The program to be registered can be selected from the file list. Select the file using the cursor displayed in the list. When the INPUT key is pressed, the selected file will be registered as the machining program No.	A	-
	The file list for the device indicated by the cursor is updated.	C	-
	The Pallet list screen will open. A list of the pallets, including the pallet displayed on the Pallet details screen will appear.	C	3.11.2 Pallet list screen

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(3) Displaying each pallet index plane data 1 ([Pallet select])

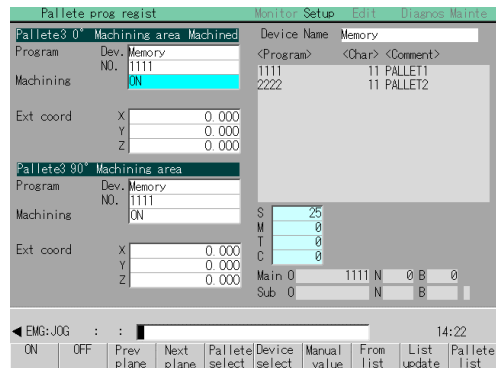
1)

Press the [Pallet select] menu, input the pallet No., and then press the [INPUT] key.

3 [INPUT]



The pallet 3 0° and 90° data will appear.



(4) Displaying each pallet index plane data 2 ([Preve plane] , [Next plane])

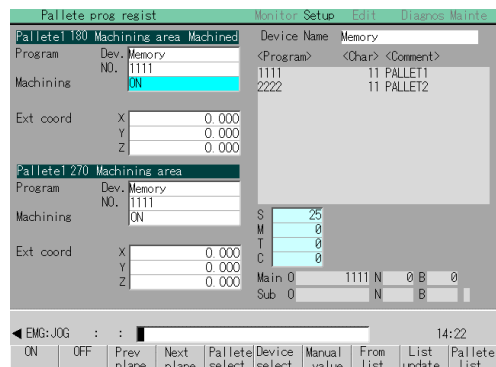
(Example) Opening the screen when the pallet 1's 0° and 90° data are currently displayed

1)

Press the [Next plane] menu.



The pallet 1 180° and 270° data will appear.

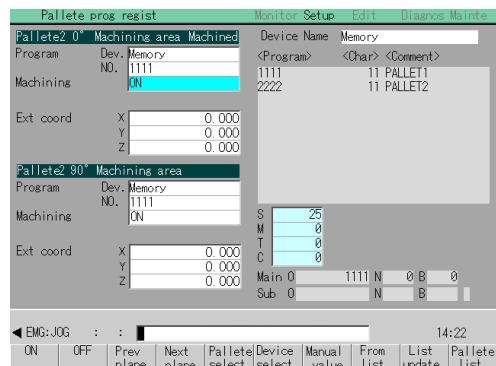


2)

Press the [Next plane] menu again.



The pallet 2 0° and 90° data will appear.



When the [Next plane] menu is pressed after this, the screen will shift in the order of the pallet 2 180°, 270° data display, and pallet 3 0°, 90° data display, etc.

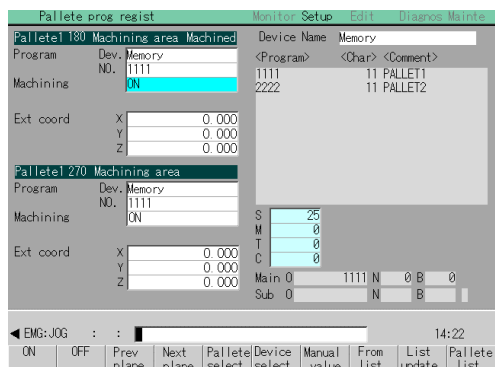
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3)

Press the Preve plane menu again.

The pallet 1 180° and 270° data will appear.



(5) Precautions

- Only decimal (1 to 99999999) programs can be registered.
In addition to the NC memory, the HD, FLD and IC card programs can be registered. However, these programs must be in the root directory.
- Up to twelve pallets can be registered.
- Regardless of whether the program is running, an error message may appear depending on the PLC device value.
- The auxiliary setting range is -32768 to 32767.

3.12 Parameter Per Application screen

The parameter screen for each application can be selected from this screen.

(1) Menus

Menu	Details	Type	Reference
Paswd input	When a password is input, data attributed to the machine parameters can be set.	A	3.12.1 Setting the machine parameters
Next axis	This can be selected when there are more or five display axes in the selected system. When axes displayed can be switched from the 1st to 4th axis and the 5th to 8th axis.	C	1.5.4 Changing the display axis
Hi-prec common	The high-precision common parameter screen will open. (Note) The machine parameters can be referred to even if a password is not input, but the parameters cannot be set.	B	3.13.1 High-precision common parameters
Hi-prec axis	The high-precision axis parameter screen will open. (Note) The machine parameters can be referred to even if a password is not input, but the parameters cannot be set.	B	3.13.2 High-precision axis parameters

3.12.1 Setting the machine parameters

A password is required to set the machine parameters.

1)

Press the menu key
Paswd input.



The password input menu will be highlighted, and the system will wait for a password to be input.

2)

Set the password and press
the INPUT key.



The password input menu highlight will turn OFF, and the machine parameters can be set.

3.12.2 Setting the parameters

Press the menu key and select the parameter screen. Select the data to be set with the cursor key. Note that the cursor cannot be moved to display-only data (data display fields with a light gray background).

(Example) Setting "0" to "330038 Precision coefficient"

1)

Press the menu key
Hi-prec common



The password input menu will be highlighted, and the system will wait for a password to be input.

2)

Using the , and tab keys, move the cursor to the position to be set.



The cursor will move to the position of the data to be set. When the cursor key is pressed and the cursor is moved to a display-only data position, the cursor will move downward.

3)

Input a value.
0



The setting value will appear and the cursor will move. Parameters not indicated with an asterisk will be validated after setting.

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3.13 Details of parameters per applications

3.13.1 High-precision common parameters

The high-precision common parameters are set.

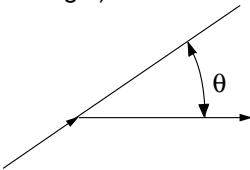
If a parameter related to a calculation expression is changed, the display-only data will be recalculated and displayed.

For the theoretical corner roundness amount, theoretical right angle corner roundness amount and theoretical radius decrease error amount, the value converted into inches will be displayed when the control parameter 310001 Initial inch is set to ON.

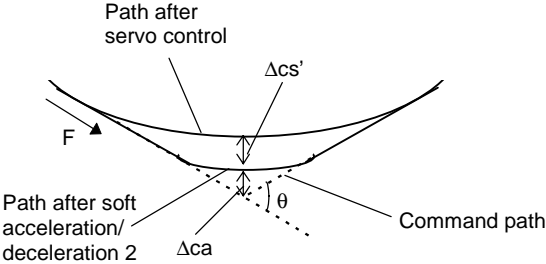
Hi-prec Com Param			Monitor Setup	Edit	Diagnos Mainte
No.	Name	Data	No.	Name	Data
330038	Precision coefficient	90	330055	Tolrnc(inflctn)	0.010
330039	Corner slow angle	5	330056	Tolrnc(smooth)	0.010
	Theor Cor dull amt	0.003	330057	Tolrnc(thin out)	0.010
	Corner dclr speed	254.729	110092	Fix prec SS coef	0
	Theor 90deg dull amt	0.003	120037	Acc/dclr std feed	50000.000
	90deg Cor dec speed	15.713	120038	Acc/dclr std time	400
330078	Prec coef(curve)valid	0		Acc of cutting feed	0.212
330079	Prec coef(curve)	0	120071	Prec soft time cst	50
	Theor R decrease	0.018		Notch frequency Hz	11.250
	R5mm arc dclr speed	1936.492	120082	Prec soft time cst2	50
	R1mm arc dclr speed	866.025		Notch frequency Hz	20.000
330040	Arc speed ctrl valid	0	120039	Acc/dclr G0 valid	0
330041	Arc slowdown speed	0.000			
330107	SS ctrl std length	0.000			
330108	SS ctrl clamp coef	0			
330053	Spline cancel angle	60			
330054	Minute line length	1.000			

◀ RDY: JOG : : 20:28

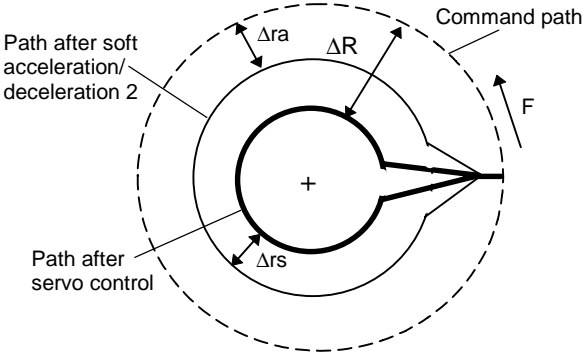
Psswd input Next axis Hi-prec common Hi-prec axis

No.	Name	Details	Setting range (units)
33 0038	Precision coefficient	<p>This sets the compensation coefficient of the control error during the high-accuracy mode.</p> <p>The compensation coefficient is set when further reducing the control error of the roundness and arc radius reduction amount at the corner.</p> <p>Theoretically, the accuracy error becomes smaller as the setting value becomes larger, but because the speed and arc clamp speed at the corner become lower, the cycle time becomes longer.</p>	-1000 to 100 (%) (Standard value: 0)
33 0039	Corner slow angle	<p>In the high-accuracy mode, this automatically judges the corner, and realizes a smooth, curved line or a sharp corner.</p> <p>In the high-accuracy control mode, when the angle (exterior angle) between blocks is larger than the setting value, it is judged as a corner. The machine will decelerate to make the edge. Consequently, set the minimum value to be recognized as an angle (exterior angle).</p> <div style="text-align: center;">  <p>$\theta > \text{setting value}$ \rightarrow Optimum corner deceleration</p> </div>	0 to 90 (°) 0: Interpreted as 5°

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No.	Name	Details	Setting range (units)
	Theor Cor dull amt	<p>The corner roundness amount Δc (mm) in respect to the angle (outer angle) θ ($^{\circ}$) corner is displayed as the value obtained by totaling the error Δca (mm) in soft acceleration/deceleration 2 and the error Δcs (mm) in the servo system.</p> $\Delta c = \Delta ca + \Delta cs$ <p>This data is calculated using the following parameters.</p> <ul style="list-style-type: none"> 330039 Corner slow angle ($^{\circ}$) 120082 Prec soft time const 2 (ms) 160003 Position loop gain 1st axis (1/s) 130021 Feed forward gain 1st axis (%)  <p style="text-align: center;">Theoretical roundness amount at corner</p>	(Display-only) (mm)
	Corner dclr speed	<p>The value calculated with the following data is displayed as the corner deceleration speed F_c (mm/min) for the angle (outer angle) θ ($^{\circ}$) corner.</p> <p>This data is calculated using the following parameters.</p> <ul style="list-style-type: none"> 330039 Corner slow angle ($^{\circ}$) 120037 Acc/dclr std feed (mm/min) 120038 Acc/dclr std time (ms) 330038 Precision coefficient (%) 	(Display-only) (mm/min)
	Theor 90deg dull amt	The corner droop amount for a 90 $^{\circ}$ angle (outer angle) is displayed. θ is calculated as 90.	(Display-only) (mm)
	90deg Cor dec speed	The corner deceleration speed for a 90 $^{\circ}$ angle (outer angle) is displayed. θ is calculated as 90.	(Display-only) (mm/min)
33 0078	Prec coef (curve) vald	This selects whether a precision coefficient or precision coefficient for curves is used as the compensation coefficient to further reduce the radius reduction amount of a curve (arc, spline, NURBS curve) during the high-accuracy control mode. When "0" is set, the precision coefficient is applied, and when "1" is set, the precision coefficient for curves is applied.	0: Precision coefficient 1: Precision coefficient for curves (Standard value: 0)
33 0079	Prec coef (curve)	This sets the compensation coefficient to further reduce the radius reduction amount of a curve (arc, spline, NURBS curve) during the high-accuracy control mode.	-1000 to 99 (%) (Standard value: 0)

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No.	Name	Details	Setting range (units)
	Theor R decrease	<p>The value calculated with the following data is displayed for the theoretical radius reduction error amount ΔR (mm). ΔR is the value when the high-accuracy control mode is valid and SHG is valid.</p> <p>This data is calculated using the following parameters.</p> <ul style="list-style-type: none"> 160003 Position loop gain 1st axis (1/s) 130021 Feed forward gain 1st axis (%) 120082 Prec soft time cst2 (ms) 330038 Precision coefficient (%) (When 330078 Prec coef (curve) vald is set to 0) 330079 Prec coef (curve) (%) (When 330078 Prec coef (curve) vald is set to 1) <div style="text-align: center;">  </div> <p>Theoretical radius reduction amount at arc center</p>	(Display-only) (mm)
	R5mm arc dclr speed	<p>The value calculated with the following data is displayed for the arc deceleration speed F_{ci} (mm/min) for the radius 5 (mm) arc.</p> <p>This data is calculated using the following parameters.</p> <ul style="list-style-type: none"> 120037 Acc/dclr std feed (mm/min) 120038 Acc/dclr std time (ms) 330038 Precision coefficient (%) (When 330078 Prec coef (curve) vald is set to 0) 330079 Prec coef (curve) (%) (When 330078 Prec coef (curve) vald is set to 1) 	(Display-only) (mm/min)

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No.	Name	Details	Setting range (units)
	R1mm arc dclr speed	<p>The value calculated with the following data is displayed for the arc deceleration speed Fci (mm/min) for the radius 1 (mm) arc.</p> <p>This data is calculated using the following parameters.</p> <p>120037 Acc/dclr std feed (mm/min)</p> <p>120038 Acc/dclr std time (ms)</p> <p>330038 Precision coefficient (%) (When 330078 Prec coef (curve) vald is set to 0)</p> <p>330079 Prec coef (curve) (%) (When 330078 Prec coef (curve) vald is set to 1)</p>	(Display-only) (mm/min)
33 0040	Arc speed ctrl valid	During high-accuracy control, this sets whether the speed control is valid or invalid at the arc entrance and exit.	0: Speed control invalid 1: Speed control valid
33 0041	Arc slowdown speed	During high-accuracy control, this sets the deceleration speed when the speed control is valid at the arc entrance and exit.	0 to 480000 (mm/min)
33 0107	SS ctrl std length	Adjust the maximum value of the pre-read range for recognition with SS control. To avoid the effect of steps or errors, etc., set a large value. To decelerate sufficiently, set a small value. SS control will be invalid when "0.000" is set.	0.000 to 100.000 (mm) (Standard value: 1.000)
33 0108	SS ctrl clamp coef	Set the degree of applying speed clamp on a corner less than the corner deceleration angle. The clamp speed will decrease as a larger value is set. SS control speed clamp will be invalid when "0" is set.	0 to 99 (%) (Standard value: 0)
33 0053	Spline cancel angle	If the angle created by two continuing blocks exceeds this setting value, the high-accuracy spline function will be temporarily canceled. Set the angle for creating an edge.	0 to 90 (°) (Standard value: 60)
33 0054	Minute line length	This is valid during the high-accuracy spline control. Curve interpolation will be carried out on linear blocks of which the length of one block is less than this setting value.	0 to 10 (mm) 0: 1 (mm) (Standard value: 0)
33 0055	Tolrnc (inflctn)	This corrects the curve shape so that the spline curve's helical difference is within this setting value for blocks containing an inflection point.	0 to 100 (mm) (Standard value: 0.01)
33 0056	Tolrnc (smooth)	This corrects the curve shape so that the spline curve's helical difference is within this setting value for blocks not containing an inflection point.	0 to 100 (mm) (Standard value: 0.01)
33 0057	Tolrnc (thin out)	This thins out blocks of which the block length does not satisfy this setting value.	0 to 10 (mm) (Standard value: 0.01)
		(The following parameters are machine parameters.)	
11 0092	Fix prec ss coef	The pre-read range recognized with SS control is fixed.	0, 1 (Standard value: 0)

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No.	Name	Details	Setting range (units)
12 0037	Acc/dclr std feed	Set the cutting feedrate for acceleration/ deceleration before interpolation.	1 to 999999mm/min
12 0038	Acc/dclr std time	Set the linear control time constant used in the cutting feed acceleration during acceleration/ deceleration before interpolation.	1 to 500ms
	Acc of cutting feed	<p>The value calculated with the following data is displayed for the cutting feed acceleration (G).</p> <p>This data is calculated using the following parameters.</p> <p>120037 Acc/dclr std feed (mm/min) 120038 Acc/dclr std time (ms) Standard gravity acceleration 9.80665 (m/s²)</p>	(Display-only) (G) The number of digits displayed after the decimal point is fixed to three digits.
12 0071	Prec soft time cnst	The pattern acceleration/deceleration before interpolation is made smooth.	0 to 200 (16/9ms)
	Notch frequency Hz	<p>The value calculated with the following expression is displayed for the notch frequency fn (Hz) in respect to the S-pattern filter for the 120071 soft acceleration/deceleration time constant T (16/9 ms).</p> $fn = 1000 / (T \times dt)$ <p>(dt is 16/9 (ms))</p>	(Display-only) (Hz) The number of digits displayed after the decimal point is fixed to three digits.
12 0082	Prec soft time cnst 2	<p>Set this to smooth the speed pattern of each axis during acceleration/deceleration before interpolation.</p> <p>This will not activate when "0" or "1" is set.</p>	0 to 50 (ms)
	Notch frequency Hz	<p>The value calculated with the following expression is displayed for the notch frequency fn (Hz) in respect to the S-pattern filter for the 120082 soft acceleration/deceleration time constant 2 T (ms).</p> $fn = 1000 / T$	(Display-only) (Hz) The number of digits displayed after the decimal point is fixed to three digits.
12 0039	Acc/dclr G0 valid	<p>Designate whether to validate the acceleration/ deceleration before G0 interpolation.</p> <p>0: The G0 acceleration/deceleration is always the acceleration/deceleration after interpolation.</p> <p>1: Regardless of whether or not in the high-accuracy mode, the G0 acceleration/deceleration is the acceleration/deceleration before interpolation.</p>	0, 1

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3.13.2 High-precision axis parameters

The high-precision axis parameters are set.

If a parameter related to a calculation expression is changed, the display-only data will be recalculated and displayed.

Hi-prec Axis Param		Monitor Setup	Edit	Diagnos	Mainte
No.	Name	X1	Y1	Z1	A
130120	Cor dclr speed coef	0	0	0	0
130021	Feed forward gain	57	40	40	0
130003	Max. cutting feedrate	10000.000	10000.000	10000.000	1.000
130063	Clamp(higt prec mod)	0	0	0	0
130002	Rapid feedrate	24000.000	24000.000	20000.000	1.000
130064	Rapid(higt prec mod)	0	0	0	0
160003	Position loop gain 1	47	33	33	0
160004	Position loop gain 2	86	86	86	0
160057	High gain ctrl const	187	187	187	0
160005	Vel. loop gain 1	250	250	500	0
160027	Servo function 1	C230	C210	C200	0100
	LMC type	TYPE2	TYPE2	TYPE2	TYPE1
130013	Backlash for G1	16	34	23	0
130012	Backlash for G0	6	1	3	0
160016	LMC gain 1	10	20	0	0
160041	LMC gain 2	0	0	0	0
160039	LMC timing	0	0	0	0

◀ RDY:MEM : : ██████████ 11:54

Psswd input Next axis Hi-prec common Hi-prec axis

No.	Name	Details	Setting range (units)
13 0120	Cor dclr speed coef	Set the adjustment coefficient of each axis in respect to the pre-interpolation acceleration/ deceleration tolerable acceleration rate. When "0" (%) is set, the operation will be the same as when "100" (%) is set.	0 to 200 (%) (Standard value: 0)
13 0021	Feed forward gain	Set the feed forward gain for acceleration/ deceleration before interpolation. The larger the setting value is, theoretically, the smaller the control error will be. However, if machine vibration occurs, the setting value must be lowered.	0 to 200 (%)
13 0003	Max. cutting feedrate	Define maximum cutting feedrate for each axis.	1 to 480000 (mm/min)
13 0063	Clamp (higt prec mod)	Set the maximum cutting feedrate for each axis in the high-accuracy control mode. When "0" is set, "130003 Max. cutting feedrate" is used.	0 to 480000 (mm/min)
13 0002	Rapid feedrate	Set rapid traverse rate for each axis. Maximum setting value depends on machine system and so care is required in this respect.	1 to 480000 (mm/min)
13 0064	Rapid (higt prec mode)	Set the rapid traverse rate for each axis in the high-accuracy control mode. When "0" is set, "130002 Rapid feedrate" is used.	0 to 480000 (mm/min)
16 0003	Position loop gain 1	Set the position loop gain in increments of "1". Set "33" for ordinary operation. For SHG control, set both SV004 (PGN2) and SV057 (SHGC). (When using MDS-B-SVJ2.)	1 to 200 (1/s)
16 0004	Position loop gain 2	For SHG control, set this parameter with SV003 (PGN1), SV057 (SHGC). (When using MDS-B-SVJ2.) Set "0" when it is not used.	0 to 999 (1/s)

CHAPTER 1 SCREEN OPERATIONS
3. Setup Screens

No.	Name	Details	Setting range (units)																																																																																																								
16 0057	High gain ctrl const	Set this with SV050 (PGN2sp), SV003 (PGN1) and SV004 (PGN2) when carrying out SGH control. Set to "0" when not using this function.	0 to 999 (1/s)																																																																																																								
16 0005	Vel. loop gain 1	Set the speed loop gain. The standard value is 150. When it is increased, response is improved but vibration and sound become larger.	1 to 999																																																																																																								
16 0027	Servo function 1	<p style="text-align: center;">For MDS-B-V1/V2</p> <p>Select the servo functions.</p> <table style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr> <td style="padding: 2px;">F</td><td style="padding: 2px;">E</td><td style="padding: 2px;">D</td><td style="padding: 2px;">C</td><td style="padding: 2px;">B</td><td style="padding: 2px;">A</td><td style="padding: 2px;">9</td><td style="padding: 2px;">8</td> </tr> <tr> <td style="padding: 2px; border: 1px solid black;">aft</td><td style="padding: 2px; border: 1px solid black;">zrn2</td><td style="padding: 2px; border: 1px solid black;">afrg</td><td style="padding: 2px; border: 1px solid black;">afse</td><td style="padding: 2px; border: 1px solid black;">ovs2</td><td style="padding: 2px; border: 1px solid black;">ovs1</td><td style="padding: 2px; border: 1px solid black;">lmc2</td><td style="padding: 2px; border: 1px solid black;">lmc1</td> </tr> <tr><td colspan="8"> </td></tr> <tr> <td style="padding: 2px;">7</td><td style="padding: 2px;">6</td><td style="padding: 2px;">5</td><td style="padding: 2px;">4</td><td style="padding: 2px;">3</td><td style="padding: 2px;">2</td><td style="padding: 2px;">1</td><td style="padding: 2px;">0</td> </tr> <tr> <td style="padding: 2px; border: 1px solid black;"></td><td style="padding: 2px; border: 1px solid black;"></td><td style="padding: 2px; border: 1px solid black;">vfct2</td><td style="padding: 2px; border: 1px solid black;">vfct1</td><td style="padding: 2px; border: 1px solid black;"></td><td style="padding: 2px; border: 1px solid black;">upc</td><td style="padding: 2px; border: 1px solid black;">vcnt2</td><td style="padding: 2px; border: 1px solid black;">vcnt1</td> </tr> </table> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; width: 100%;"> <thead> <tr> <th style="width: 5%;">bit</th> <th style="width: 15%;">Name</th> <th style="width: 35%;">Meaning when set to 0</th> <th style="width: 45%;">Meaning when set to 1</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>vcnt1</td> <td colspan="2">This prevents overshooting and limited cycles, etc., during the closed loop. 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3. Setup Screens

No.	Name	Details	Setting range (units)																																																																																																			
16 0027	Servo function 1	<p>For MDS-B-SVJ2 (Continued from the previous page.)</p> <p>Select the servo functions.</p> <table style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td style="width: 12.5%;">F</td><td style="width: 12.5%;">E</td><td style="width: 12.5%;">D</td><td style="width: 12.5%;">C</td><td style="width: 12.5%;">B</td><td style="width: 12.5%;">A</td><td style="width: 12.5%;">9</td><td style="width: 12.5%;">8</td> </tr> <tr> <td>aflt</td><td>zrn2</td><td></td><td></td><td>ovs2</td><td>ovs1</td><td>lmc2</td><td>lmc1</td> </tr> <tr> <td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td> </tr> <tr> <td></td><td></td><td>vfct2</td><td>vfct1</td><td></td><td></td><td></td><td></td> </tr> </table> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 5%;">bit</th> <th style="width: 15%;">Name</th> <th style="width: 40%;">Meaning when set to 0</th> <th style="width: 40%;">Meaning when set to 1</th> </tr> </thead> <tbody> <tr><td>0</td><td></td><td></td><td></td></tr> <tr><td>1</td><td></td><td></td><td></td></tr> <tr><td>2</td><td></td><td></td><td></td></tr> <tr><td>3</td><td></td><td></td><td></td></tr> <tr> <td>4</td> <td>vfct1</td> <td>00: Jitter compensation invalid</td> <td rowspan="4">01: Jitter compensation 1 pulse 10: Jitter compensation 2 pulse 11: Jitter compensation 3 pulse</td> </tr> <tr> <td>5</td> <td>vfct2</td> <td></td> </tr> <tr><td>6</td><td></td><td></td><td></td></tr> <tr><td>7</td><td></td><td></td><td></td></tr> <tr> <td>8</td> <td>lmc1</td> <td colspan="2">Set the compensation gain with SV016 (LMC1) and SV041 (LMC2).</td> </tr> <tr> <td>9</td> <td>lmc2</td> <td colspan="2">00: Lost motion compensation invalid 01: Lost motion compensation type 1 10: Lost motion compensation type 2 11: Reserved</td> </tr> <tr> <td>A</td> <td>ovs1</td> <td colspan="2">00: Overshoot compensation invalid</td> </tr> <tr> <td>B</td> <td>ovs2</td> <td colspan="2">01: Overshoot compensation type 1 10: Overshoot compensation type 2 11: Overshoot compensation type 3</td> </tr> <tr><td>C</td><td></td><td></td><td></td></tr> <tr><td>D</td><td></td><td></td><td></td></tr> <tr> <td>E</td> <td>zrn2</td> <td colspan="2">Set "1".</td> </tr> <tr> <td>F</td> <td>aflt</td> <td>Adaptive filter stop</td> <td>Adaptive filter start</td> </tr> </tbody> </table> <p>(Note) Set "0" in bits with no particular description.</p>	F	E	D	C	B	A	9	8	aflt	zrn2			ovs2	ovs1	lmc2	lmc1	7	6	5	4	3	2	1	0			vfct2	vfct1					bit	Name	Meaning when set to 0	Meaning when set to 1	0				1				2				3				4	vfct1	00: Jitter compensation invalid	01: Jitter compensation 1 pulse 10: Jitter compensation 2 pulse 11: Jitter compensation 3 pulse	5	vfct2		6				7				8	lmc1	Set the compensation gain with SV016 (LMC1) and SV041 (LMC2).		9	lmc2	00: Lost motion compensation invalid 01: Lost motion compensation type 1 10: Lost motion compensation type 2 11: Reserved		A	ovs1	00: Overshoot compensation invalid		B	ovs2	01: Overshoot compensation type 1 10: Overshoot compensation type 2 11: Overshoot compensation type 3		C				D				E	zrn2	Set "1".		F	aflt	Adaptive filter stop	Adaptive filter start	0000 to FFFF HEX setting
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	LMC type	The lost motion compensation type for 160027 servo function 1 bit 8 and 9 (1mc1, 1mc2) is displayed.	(Display-only) (Blank): Compensation type invalid TYPE1: Compensation type 1 TYPE2: Compensation type 2																																																																																																			
13 0013	Backlash for G1	Set the backlash compensation amount with movement command in the cutting feed mode or with reverse direction in the manual mode.	-99999 to 99999 (Interpolation unit)																																																																																																			
13 0012	Backlash for G0	Set the backlash compensation amount with movement command in rapid traverse mode or with reverse direction in manual mode. Note that "G1back" is used for the movement in the handle mode.	-99999 to 99999 (Interpolation unit)																																																																																																			

CHAPTER 1 SCREEN OPERATIONS
3. Setup Screens

No.	Name	Details	Setting range (units)
16 0016	LMC gain 1	<p>Set this parameter if the protrusion (caused by non-sensitive band from friction, torsion, backlash, etc.) is large when the arc quadrant is changed.</p> <p>This is valid only when lost motion compensation SV027 (lmc1, lmc2) is selected.</p>	-1 to 200
		<p>Type 1 SV027 (SSF1) 1mc1=1, 1mc2=0</p> <p>In low-speed interpolation mode, compensation of this type eliminates bump.</p> <p>Setting "0" to this parameter indicates interpolation gain 0.</p> <p>Setting "100" causes 100% compensation.</p>	0 to 200 (%)
		<p>Type 2 SV027 (SSF1) 1mc1=0, 1mc2=1</p> <p>Use type 2 when type 1 is not enough for compensation such as in high-speed, high-accuracy interpolation.</p> <p>Set data in percentage to stall rated current.</p> <p>Set "0" to prevent compensation.</p> <p>Set the double value the current percentage on the servo monitor screen for jog feeding (about F1000).</p>	0 to 100 (Stall rated current %)
		<p>To change the compensation gain (type 1) or compensation amount (type 2) according to the direction.</p> <p>To set a different value according to the command direction, set this with SV041 (LMC2).</p> <p>Set the value for changing the command speed from the – to + direction (during command direction CW) in SV016 (LMC1).</p> <p>Set the value for changing the command speed from the + to – direction (during command direction CW) in SV041 (LMC2).</p> <p>When "–1" is set, compensation will not be carried out when the command speed direction changes.</p>	
16 0041	LMC gain 2	<p>Normally set this to "0".</p> <p>Set this with SV016 (LMC1) only when setting the lost motion compensation's gain (type 1) or compensation amount (type 2) to different values according to the command direction.</p> <ul style="list-style-type: none"> • Set the value for changing the command speed from the – to + direction (during command direction CW) in SV016 (LMC1). • Set the value for changing the command speed from the + to – direction (during command direction CW) in SV041 (LMC2). • When "–1" is set, compensation will not be carried out when the command speed direction changes. <p>This is valid only when lost motion compensation (SV027: lmc1, lmc2) is selected.</p>	-1 to 200 (Stall rated current %)
16 0039	LMC timing	<p>Set when the lost motion compensation timing is not suitable. Adjust upwards in increments of "10".</p>	0 to 2000 (ms)

CHAPTER 1 SCREEN OPERATIONS
3. Setup Screens

No.	Name	Details	Setting range (units)
16 0040	LMC non-sensi band (low-order 8 bits)	The lost motion compensation dead zone can only be set during feed forward control. Set in the low-order 8 bits. When set to "0", 2µm will actually be set. Adjust upwards in increments of 1µm.	-32768 to 32767 (Note) The setting range of the low-order 8 bits is 0 to 100 (µm)
	Current bias (high-order 8 bits)	This is used in combination with high-order 8 bits of SV030 and SV045.	
	LMC non-sensi band	The value set for the low-order 8 bits of the 160040 lost motion parameter is displayed.	(Display-only) 0 to 100 (µm)

4. Edit Screens

4.1 Edit screen

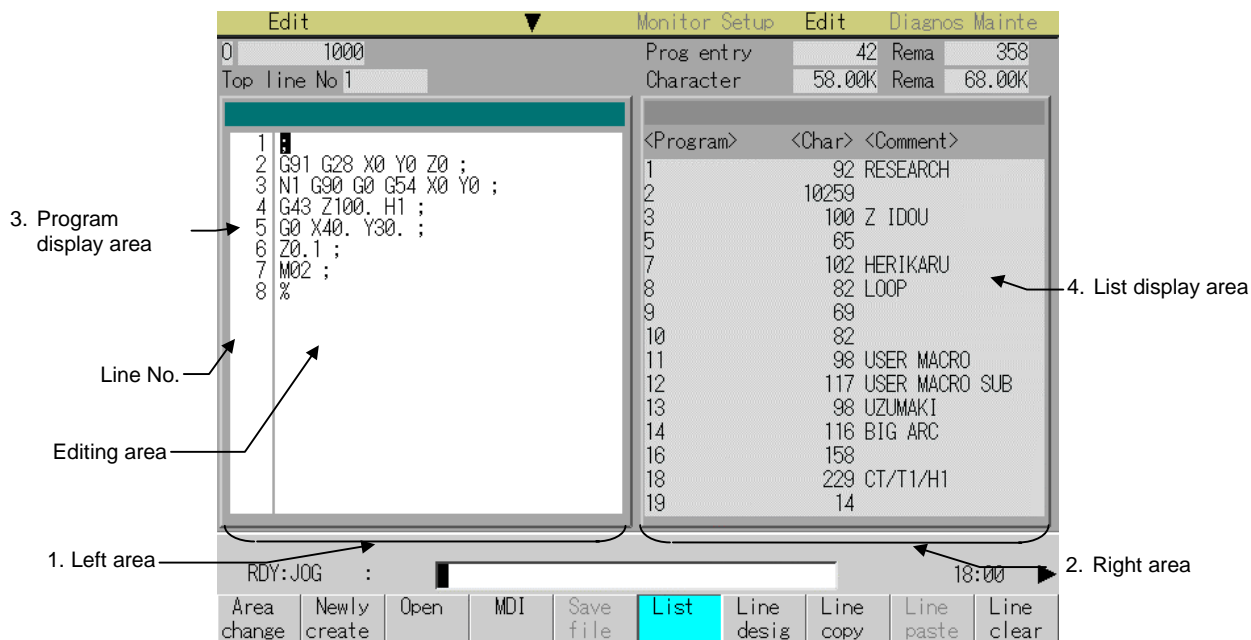
The programs in the NC memory are edited (added, deleted, changed) and newly created in the Edit screen.

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 operation parameter 370042 "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 2. Right area	The left and right areas are used as the work areas. The area to be used is selected with the menu key [Area change] . The area that is not selected is used for displaying the list, etc. In the screen on the previous page, editing is carried out in the left area, and the list is displayed in the right area.
3. Program display area	This area is used to edit the program (machining program, MDI program, Fixed cycle program). When editing machining program : Select menu [Open] or [Newly create] , and designate the No. When editing MDI program : Select menu [MDI] . The number does not need to be designated and searched to edit. Fixed cycle program : After setting the machine parameter's basic common parameter "Fix_P" to 1, select [Open] , and designate the No.
O 1234 ●●	This displays the No. and comment 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 two 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.
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 not selected.
Prog entry and Rema	Prog entry : This displays the number of registered programs. Rema : This displays the remaining number of programs that can be registered.
Character and Rema	Character : This displays the number of characters in the registered programs. Rema : This displays the remaining number of characters that can be registered.
<Program> <Char> <Comment>	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. Character : This displays the number of characters registered in correspondence to the machining program No. Comment : The area in parentheses () on the top line of the machining program is the comment. Up to 18 alphanumeric characters and symbols can be used.

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 type="text" value="INPUT"/> is pressed, the comment and program contents can be newly created.	A	4.1.1 Creating a new machining program
Open	This edits and refers to an existing program. When the program No. is set and <input type="text" value="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 operation parameter "Program save type", the machining program may be saved with the <input type="text" value="INPUT"/> key.	B	4.1.2 Editing a program
List	A list of the machining programs in the memory appears in the area that is not selected. 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
Line desig	When the line No. is set and the <input type="text" value="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	4.2.5 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	4.2.6 Deleting data
String search	When the character string is designated and the <input type="text" value="INPUT"/> key is pressed, that character string is searched for.	A	4.2.7 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 type="text" value="INPUT"/> key is pressed, the replace operation takes place.	A	4.2.8 Replacing character strings
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 17 characters long. Even if a comment exceeding 17 characters is input, the 18th and following characters are cut off.	A	-

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Menu	Details	Type	Reference
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
Delete 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	-
Play back	This displays the area to display the playback movement amount.	B	4.1.4 Playback editing
To In/out	The screen changes to the Input/output screen.	C	3.3 Data Input/ Output screen

(3) Notes related to editing operation

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

4.1.1 Creating a new machining program

(1) Operation method

1)

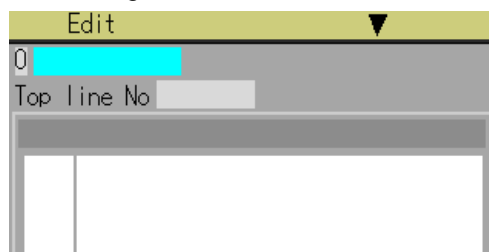
Press the menu key
[Area change], and select the
usage area.

2)

Press the menu key
[Newly create].



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



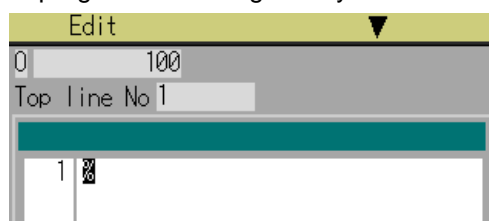
3)

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



A program consisting of only EOR is created.

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



4)

Create a machining program.



Refer to "4.2 Editing operations".

5)

Save the program.
Menu [Save file] [Y] (Note 3)



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

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

(Note 2) The texts in parentheses () at the top block of the program is the comment.

(Note 3) If the operation parameter "Program save type" is set to 1, the program is saved
each time the [INPUT] key is pressed. Thus, it is not necessary to press the

[File save] menu.

4.1.2 Editing a program

(1) Operation method

1)

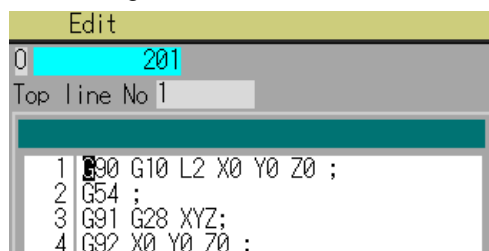
Press the menu key , and select the usage area.

2)

Press the menu key .



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



3)

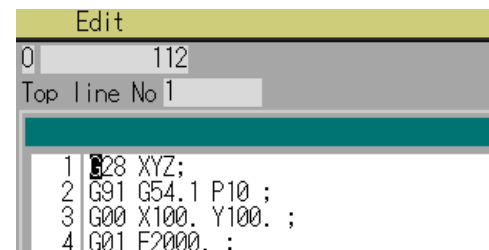
Input the program No.
112



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

When is pressed again, the process ends.

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)

Edit the machining program.



Refer to "4.2 Editing operations".

5)

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. Even if data is set, an error occurs when the key is pressed, and the program is not saved.

(Note 3) When changing to the Edit screen after operation search, the searched program becomes the edit program.

(Note 4) If the operation parameter "Program save type" is set to 1, the program is saved each time the key is pressed. Thus, it is not necessary to press the

menu.

(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.

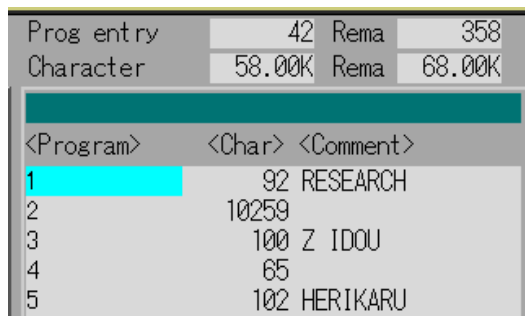
1)

Press the menu key **List**.



The menu is highlighted, and the list appears in the area currently not used. The area displayed is active. The cursor moves to the head program No. in the list.

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



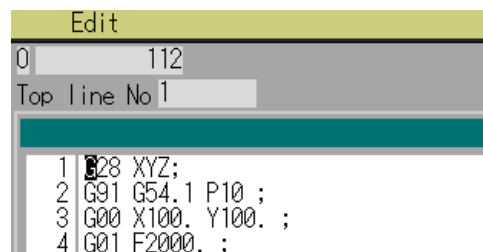
2)

Move the cursor and select the program No.
 or **INPUT**



The selected program is displays from the head. 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. Even if data is set, an error will occurs when the **INPUT** key is pressed, and the data will not be saved.

4.1.3 Creating MDI data

(1) Operation method

1)

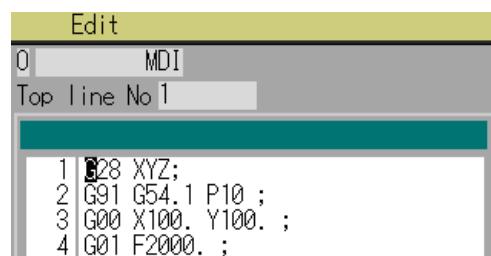
Press the menu key
, and select the
usage area.

2)

Press the menu key .



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 key is pressed, the head block will be searched, and the message "MDI search complete" will appear. The setting will then be completed. If the cursor is moved without editing, the block indicated by the cursor will be searched for when the key is pressed.

(2) Registering an MDI program

1)

Press the menu key
.



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

2)

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



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

4.1.4 Playback editing

Playback editing cannot be carried out during automatic operation or when editing is locked.

(1) Operation method

- 1) Set "320029 Playback G90" on the Control param 2 screen. ➔ G91 cannot be designated when ON. G90 cannot be designated when OFF.

- 2) Open the program on the Edit screen.

(Note) If the list is active, playback editing cannot be carried out.

- 3) Press the menu key
Play back. ➔ The playback movement amount is displayed in an inactive area.
For an absolute value, the total value of the program position and manual interrupt amount is displayed as the playback movement amount.
For an incremental value, the default value is 0.

(Note) The area cannot be changed during playback editing. Furthermore, the list cannot be displayed.

Mach posn		Playback:ABS	
X	239.407	X	139.407
Y	139.852	Y	109.852
Z	94.815	Z	74.815
A	0.000	A	0.000
C	0.000	C	0.000
U	0.000	U	0.000
V	0.000	V	0.000
W	0.000	W	0.000

- 4) Move the axis in the manual mode. ➔ The axis movement amount will appear as the playback movement amount.
For an absolute value, the total value of the program position and manual interrupt amount is displayed as the playback movement amount.
For an incremental value, the amount that the axis was moved in the manual mode is added to the current playback movement amount.

- 5) Input the data such as the G codes in the area for playback editing. ➔ The alphanumeric characters, → and ← keys are input in the area for playback editing.

(Note) When the C.B ESC key is pressed, all data in the playback editing area will be erased.

F3000G01█

(Note 1) When the ↑ and ↓ keys are pressed, the cursor in the left area will move.

(Note 2) When the page change key is pressed, the program in the left area will scroll.

(Note 3) When the menu key is pressed, the process corresponding to the left area will run.

6)

Press the axis address key such as X or Y.



The playback movement amount is input after the axis address in the playback editing area. If the axis address key is pressed while the playback movement amount is being changed, the playback movement amount at the time the key was pressed will be input.

F3000G01X46.152

(Note) When inputting a comment, etc., the characters that are the same as the axis address will all be handled as the axis address.

7)

Press the key.



The program in the playback editing area will be inserted at the line before the cursor position in the left area. For an absolute value, the playback movement amount will not change. For an incremental value, the difference of the axis command value for the axis used in step 6) and the playback movement amount will remain as the playback movement amount.

8)

Save the program, and press the menu key .



Playback editing will end. The right area will be erased, and the screen (list, etc.) displayed previously will appear.

Playback editing can also be ended by pressing the button.

(2) Notes for playback editing

- 1) Playback editing of a program in automatic operation is not possible.
- 2) Up to 95 characters can be edited in the playback editing area.
- 3) If the program to be edited is in the playback edit area and the menu or button is pressed to change the screen, the program being edited will be aborted.
- 4) Other files can be opened during playback editing. Playback editing can be continued even when another file is opened. However, if an incremental value is designated, the playback movement amount will be cleared to 0 for all axes. A new file can be created and edited, and MDI editing carried out in the same manner.
- 5) If the program being playback edited automatically starts, playback editing cannot be continued.

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- 6) The playback movement amount after playback editing will differ according to the control parameter "Playback G90" state and the commanded G code.

	For an absolute value	For an incremental value
Playback : *** X 100.000 G01 X10. ; Press <input type="button" value="INPUT"/> .	Playback : ABS X 100.000 <input type="text"/> The program position + manual interrupt amount is inserted as the playback movement amount.	Playback : INC X 90.000 <input type="text"/> The difference of the axis command value (X10.) and playback movement amount before <input type="button" value="INPUT"/> (X100.) is inserted as the playback movement amount.
Playback : *** X 100.000 G92 X10. ; Press <input type="button" value="INPUT"/> .	Playback : ABS X 10.000 <input type="text"/> The command value (X10.) following G92 is inserted as the playback movement amount.	Playback : INC X 0.000 <input type="text"/> Regardless of the command value following G92, 0 is inserted as the playback movement amount.

The playback movement amount after is pressed is calculated for each block that has been playback edited. The following table shows the update results of the playback movement amount when there are multiple axis commands before is pressed once.

X axis playback movement amount before editing	Details to be playback edited	X axis playback movement amount after <input type="button" value="INPUT"/>	
		For an absolute value	For an incremental value
100	(No G code) X10.;	100	90
100	(No G code) X10.X20.;	100	80
100	(No G code) X10.X20.;	100	70
100	(No G code) X0.;	100	100
100	GX01 X10.;	100	90
100	GX01 X10.X20.;	100	80
100	GX01 X10.;G01 X20.;	100	70
100	GX92 X10.;	10	0
100	GX92 X10.X20.;	20	0
100	GX92 X10.;G92 X20.;	20	0

4.1.5 Displaying the history data

The history data can be displayed by inputting the machine manufacturer password.
The following items are displayed as the history data.

- Alarm history
- Warning history
- Signal history
- Key history

(1) History data format

- Alarm history
Symbol: E
Number of history items: 250
Format: [History type (E)] [Date] [Time] [Alarm No.] [Parameter data 1] [Parameter data 2]
- Warning history
Symbol: W
Number of history items: 170
Format: [History type (W)] [Date] [Time] [Warning No.] [Parameter data 1] [Parameter data 2]
- Signal history
Symbol: S
Number of history items: 426
Format: [History type (S)] [Date] [Time] [Device name] [ON/OFF (data for R239)] [Signal name]
(or [Power signal]) (or [Power signal])
- Key history
Symbol: K
Number of history items: 426
Format: [History type (K)] [Date] [Time] [NC key code (hexadecimal display)] [Key name]

(2) Displaying all histories

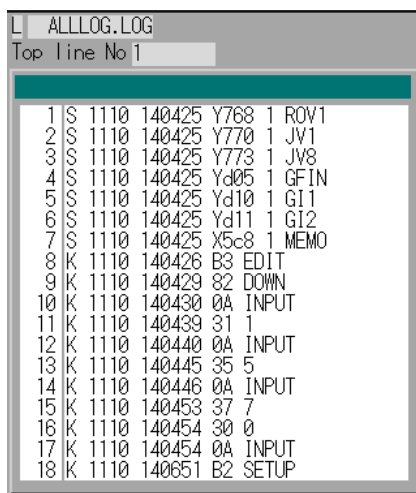
1) Press the menu key **Area change**, and select the working range.

2) Press the menu key **Open**.

➔ The menu will be highlighted, and the cursor will appear at the number setting field.

3) Input "M02:\LOG\ALLLOG.LOG", and press the **INPUT** key.

➔ All histories will appear.



(3) Displaying the key history

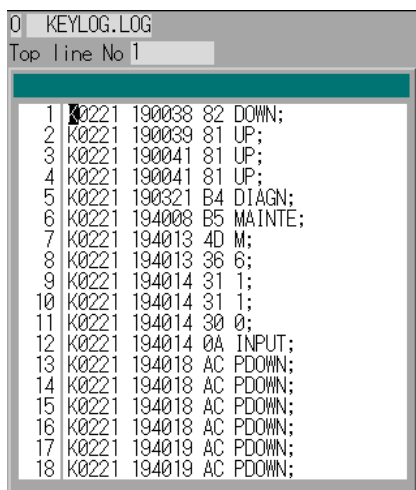
1) Press the menu key **Area change**, and select the working range.

2) Press the menu key **Open**.

➔ The menu will be highlighted, and the cursor will appear at the number setting field.

3) Input "M02:\LOG\KEYLOG.LOG", and press the **INPUT** key.

➔ The key history will appear.



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 key is pressed, EOB (;) is added to the end of the line.

The method of saving into the memory differs according to the operation parameter "370040 Program save type" setting.

When the program save type is 0:

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

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

When the program save type is 1:

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

The message "Editing" disappears when the 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.

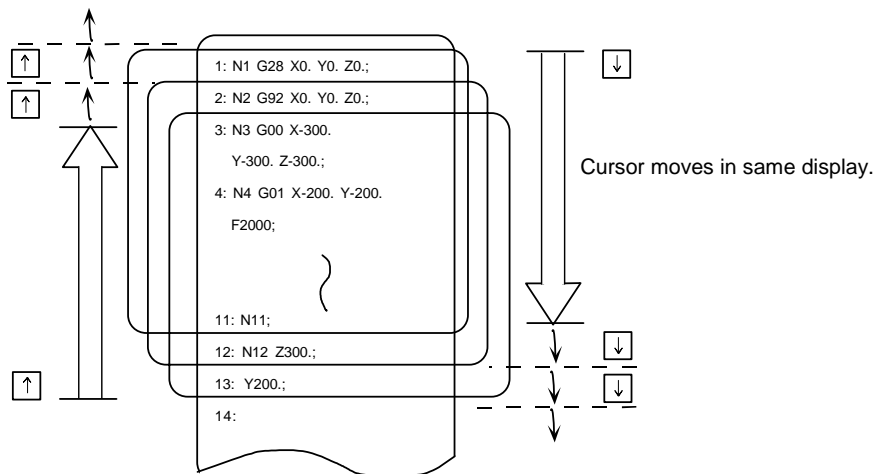
4.2.1 Changing the display

(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 top 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.




Display scrolls without cursor position moving.

(2) Changing the display using the page changeover keys


( : Previous Page,  : Next Page)

This displays one page of data having the line before the current display top line as its top line.

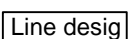
 key : When there is less than one page of data, a page of data will be displayed including the data currently displayed.

(The cursor moves to the last line of the screen.)

This displays one page of data having the line after the current display bottom line as its bottom line.

 key : (The cursor moves to the top line of the screen.)

(3) Displaying a random line No.

If the menu key  is pressed and a random line No. is input, the program contents can be displayed with that line at the head.

4.2.2 Designating a random line

When the menu key `[Line desig]` is pressed and a random line No. is input, that line can be displayed, and the cursor can be moved to that line. This is handy when displaying or editing a program having many lines.

(1) Operation method

- 1)

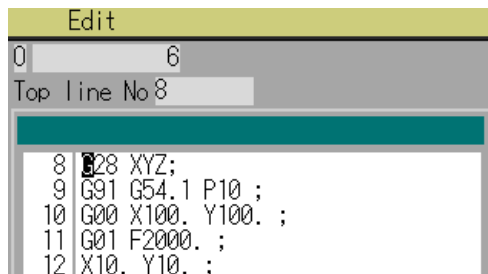
Press the menu key
`[Line desig]`.

 → The menu is highlighted.

- 2)

Input the line No.
8 `[INPUT]`

 → The program displays with the set line No. at the head. The cursor moves to the head.



4.2.3 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 operation parameter "370040 Program save type".

(Note 2) Up to 256 characters can be set in one line.

4.2.4 Inserting data


(1) Operation method

- 1)

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


- 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 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.

- 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 move 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 operation parameter "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 , INPUT , ↑ or ↓ key pressed.

4.2.5 Copying/pasting data

(1) Copying a line at the cursor position

1)

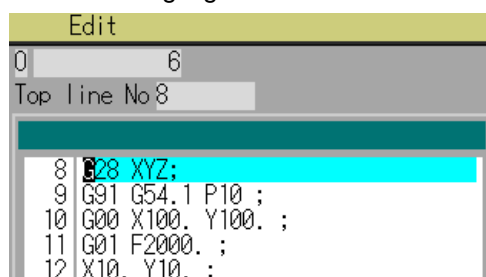
Move the cursor to the line to be copied.

2)

Press the menu key , and press the key.



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



(2) Copying by designating lines (multiple lines possible)

1)

Press the menu key .



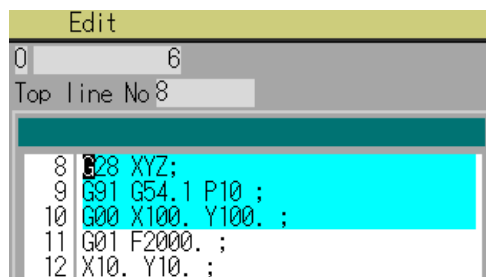
The menu is highlighted.

2)

Designate the range to be copied.
Format: first line/last line
8/10



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



(3) Notes when copying

- 1) If is input without setting a line No., the line where the cursor is at is copied.
- 2) The highlight of the copy target lines disappears when editing operations are resumed.
- 3) If the file is edited after the menu is pressed, the data copied in the line is canceled.
- 4) If the last line of the file is the range to be copied, the last line can be designated as "E".

Example From 8th line to last line → 8/E

(4) Pasting the copied data

1)

Move the cursor to the line where the data is to be pasted.

2)

Press the menu key
.



The copied data is inserted to the line before the cursor position.

4.2.6 Deleting data

(1) Deleting one character

1)

Move the cursor to the character to be deleted.

2)

Press the 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)

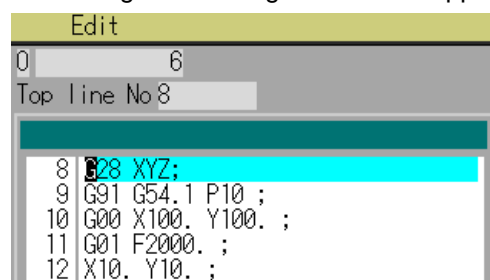
Move the cursor to the line to be deleted.

2)

Delete the line.
Menu



The menu is highlighted. All lines targeted for deletion are highlighted. A message confirming the deletion appears.



3)

Press the or 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 top line No. do not change.

To cancel the deletion, press the key.

(3) Deleting designated lines (multiple lines possible)

1)

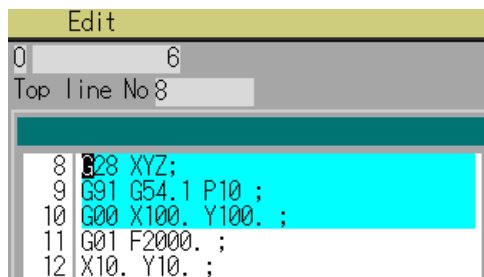
Press the menu key
.

➔ 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.

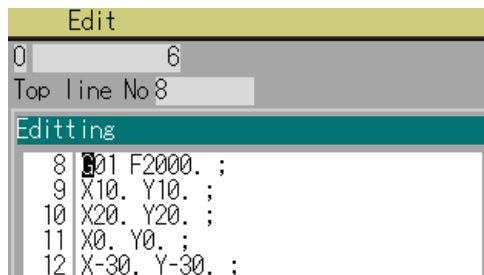


3)

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 top 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) If the last line of the file is the range to be deleted, the last line can be designated 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.

4.2.7 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. When the character string is found, the program is displayed with that character string at the head. 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 end 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 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.)

4.2.8 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 to be searched for and the replacement character string. <small>(Note 1) (Note 2)</small>
Search character string/ replacement character string <input type="text" value="INPUT"/>

 → The character string is searched downward from the character string after the current cursor position. When the character string is found, it is replaced with the set character string. The program is displayed with that character string line at the head. The cursor moves to the head of the replaced character string. 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 end 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 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) If the program character strings from the current cursor position to the last line are to be replaced in a batch, add "/E" to the above setting.

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

The screenshot shows the 'H/W S/W config' screen with a menu bar containing 'Monitor Setup', 'Edit', and 'Diagnos Mainte'. The main area is titled 'Software list' and contains the following text:

```

NCMAIN: BND352W001-B0
PLC :
BOOT : BND-362W005-A1
NC OS : BND-362W010-B0
LANG1 : BND352W200-B0 <ENG>
LANG2 : BND352W201-B0 <JPN>
HMI : BND352W101-B0
OS ID : 32796-OEM-0016752-81663
    
```

An arrow labeled '1. Software list' points to the 'Software list' header. At the bottom, there is a status bar with 'RDY: JOG : 19:05' and two buttons: 'S/W config' (highlighted in cyan) and 'H/W config'.

■ Hardware configuration screen

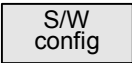

The screenshot shows the 'H/W S/W config' screen with a menu bar containing 'Monitor Setup', 'Edit', and 'Diagnos Mainte'. The main area contains three large input fields for configuration data. An arrow labeled '2. NC serial number' points to the top-left field, and an arrow labeled '3. Hardware card serial number' points to the bottom-left field. At the bottom, there is a status bar with 'RDY: JOG : 19:05' and two buttons: 'S/W config' and 'H/W config' (highlighted in cyan).

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(1) Display items

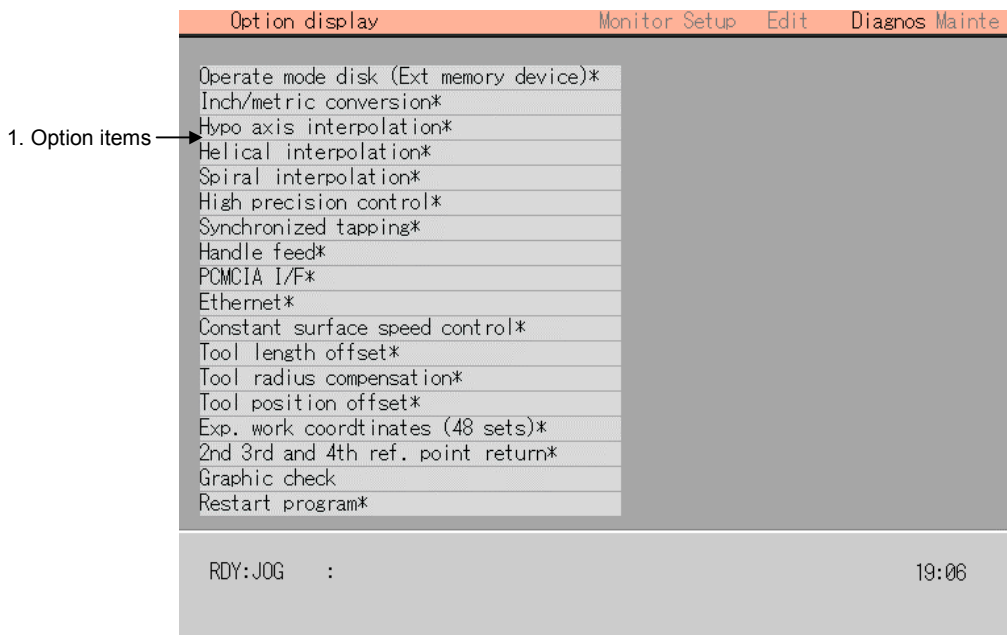
Display item	Details
1. Software list	This displays a list of the software being used.
2. NC serial No.	This displays the NC serial No., NC type and unit type.
3. Hardware card serial No.	This displays the serial No. of each hardware card.

(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

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

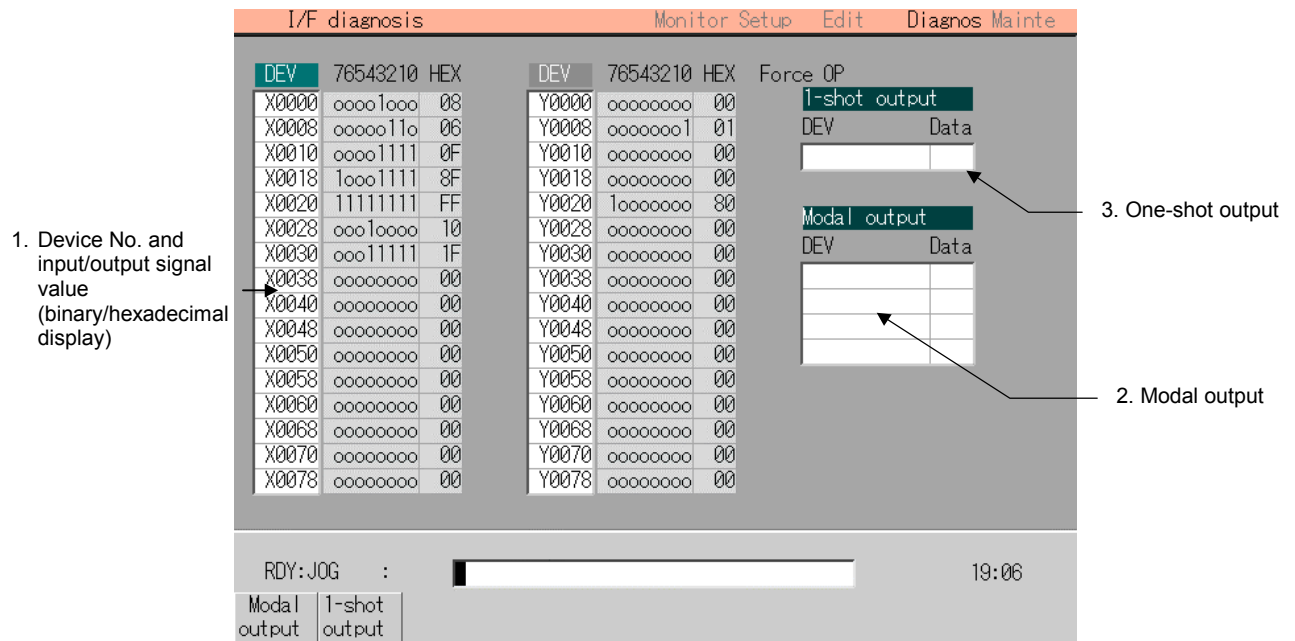
Display item	Details
1. Option items	The list of currently usable options are displayed.

5.3 I/F Diagnosis screen

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 \leftarrow , \rightarrow key when operations such as display changeover and data setting are carried out. Each X, Y, M, F, L, SM, TI, TO, TS, TA, CI, CO, CS, CA, D and R data is the target data.
2. Modal output	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	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.

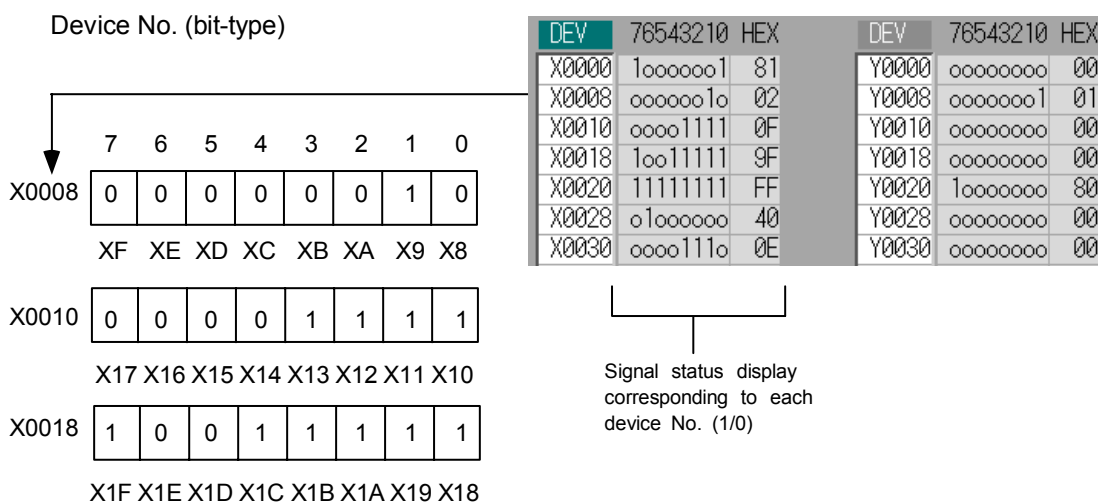
CHAPTER 1 SCREEN OPERATIONS
5. Diagnosis Screens

(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.



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(4) List of devices for PLC use

Device	Device No.	Units	Details
X*	X0~XAFF (2816 points)	1-bit	Input signals to the PLC. Machine input, etc.
Y	Y0~YDFF (3584 points)	1-bit	Output signals to the PLC. Machine output, etc.
M	M0~M8191 (8192 points)	1-bit	For temporary memory
F	F0~F255 (256 points)	1-bit	For temporary memory. Alarm message interface.
L	L0~L255 (256 points)	1-bit	Latch relay (Backup memory)
SM*	SM0~SM127 (128 points)	1-bit	Special relay
TI	TI0~TI55 (56 points)	1-bit	10ms unit timer coil
	TI56~TI231 (176 points)	1-bit	100ms unit timer coil
	TI232~TI255 (24 points)	1-bit	100ms incremented timer coil
TO	TO0~TO55 (56 points)	1-bit	10ms unit timer contact
	TO56~TO231 (176 points)	1-bit	100ms unit timer contact
	TO232~TO255 (24 points)	1-bit	100ms incremented timer contact
TS	TS0~TS55 (56 points)	16-bit	10ms unit timer setting value
	TS56~TS231 (176 points)	16-bit	100ms unit timer setting value
	TS232~TS255 (24 points)	16-bit	100ms incremented timer setting value
TA	TA0~TA55 (56 points)	16-bit	10ms unit timer current value
	TA56~TA231 (176 points)	16-bit	100ms unit timer current value
	TA232~TA255 (24 points)	16-bit	100ms incremented timer current value
CI	CI0~CI127 (128 points)	1-bit	Counter coil
CO	CO0~CO127 (128 points)	1-bit	Counter contact
CS	CS0~CS127 (128 points)	16-bit	Counter setting value
CA	CA0~CA127 (128 points)	16-bit	Counter current value
D	D0~D1023 (1024 points)	1-bit/16-bit	Data register. Interface between the PLC and CNC.
R*	R0~R8191 (8192 points)	1-bit/32-bit	File register. Interface between the PLC and CNC.



(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" 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
X0020	11111111	FF	Y0000	00000000	00
X0028	01000000	40	Y0008	00000001	01
X0030	00001111	0F	Y0010	00000000	00
X0038	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
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: auto;">Modal clear</div>	This releases the modal output for the device at the cursor position in the modal output area. The released data is erased from this area.	C	(3) Releasing the 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) Releasing the 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 released.

- 3)

Press the menu key

Modal clear

➔

The data that was in the cursor position is released 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.

5.4 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

	X	Y	Z	V
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	10.000	10.000	10.000	90.000
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)	0.000	0.000	0.000	0.000

2. Data of each axis and unit

◀ RDY:MEM : 15:55

Servo unit | Spindle unit | Power unit | AUX unit | Synchro error | Next axis | Alarm his clr

(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 5.4.5 for details.
2. Data of each axis and unit	This displays the data of each axis being monitored.

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5. Diagnosis Screens



(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
AUX unit	This monitors the various data related to the auxiliary axis (MR-J2-CT) servo control.	C	5.4.4 Display items for auxiliary axis unit
Synchro error	This displays the diagnosis information of the synchronous error in the data display area.	C	5.4.5 Display items for the synchronous error
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	–
Alarm his clr	This clears the diagnosis information alarm history.	B	5.4.6 Clearing the alarm history

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5. Diagnosis Screens

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
	X	Y	Z	V				
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	10.000	10.000	10.000	90.000				
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)	0.000	0.000	0.000	0.000				

◀ RDY:MEM : 15:55

Servo unit	Spindle unit	Power unit	AUX unit	Synchro error	Next axis	Alarm his clr
------------	--------------	------------	----------	---------------	-----------	---------------

(1) Display items

Display item	Details
Gain (1/s)	This displays the position loop gain. 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 rate of current FB to 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 (i)	This displays the grid space for the zero point return.

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Display item	Details
Grid amnt (i)	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.
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. (mm)
Power ON posn	This displays the coordinate value during NC power ON in the basic machine coordinate system. (mm)
Current posn	This displays the current coordinate value in the basic machine coordinate system. (mm)
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.

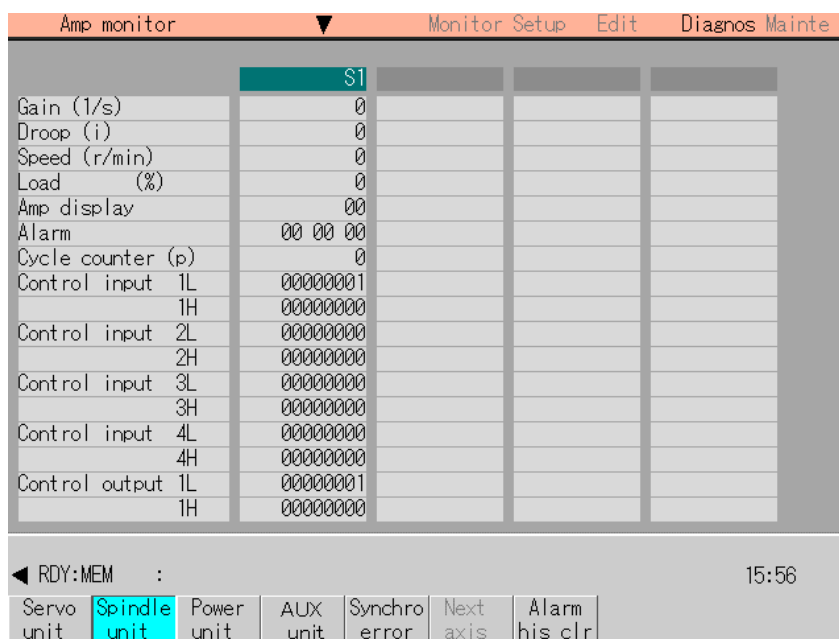
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Display item	Details
Motor	This displays the motor type.
Work time	This displays the READY ON work time. (Units: 1hr)
Alarm hist 1 : Time 1 : Alarm to 8 : Alarm	This displays servo alarms that occurred in latest order with the following formats. Alarm No. : Number of the servo alarms 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. 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: 10%; text-align: center;">Bit</th> <th style="text-align: center;">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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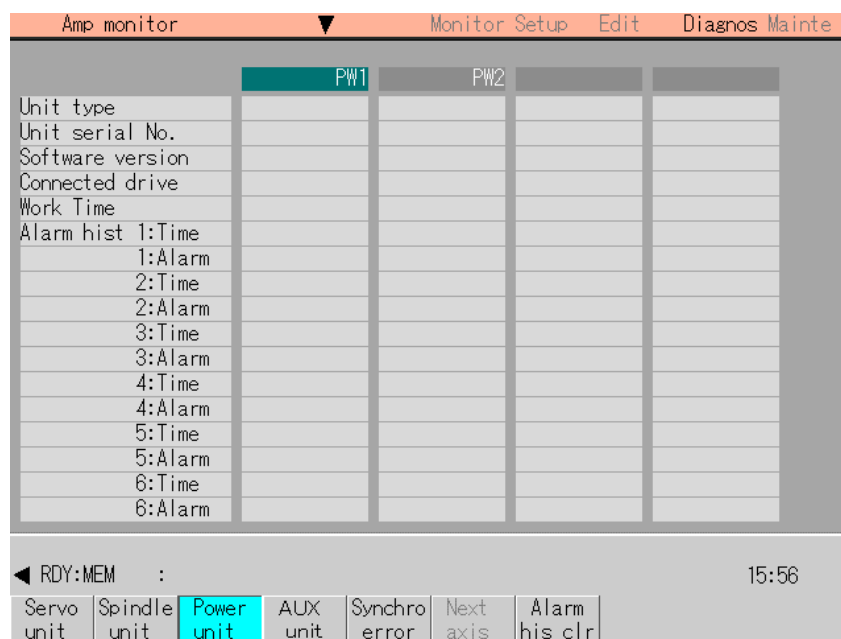
Display item	Details
Amp type	This displays the spindle type.
Amp serial No.	This displays the spindle serial No.
Software version	This displays the software No. and version on the spindle side.
Work time	This displays the READY ON cumulative time. (Units: 1hr)
Alarm hist 1 : Time 1 : Alarm to 8 : Alarm	This displays servo alarms that occurred in latest order with the following formats. Alarm No. : Number of the servo alarms 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.

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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 alarms that occurred in latest order with the following formats. Alarm No. : Number of the servo alarms 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.

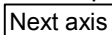
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5.4.4 Display items for the auxiliary axis unit

The various data related to the auxiliary axis (MR-J2-CT) servo control is monitored. For reference, change the display items using the  key and  key.

Amp monitor		Monitor Setup	Edit	Diagnos	Mainte
	AUX1				
Droop (i)	0				
Speed (r/min)	0				
Load current (%)	0				
Max current 1 (%)	-1				
Max current 2 (%)	2				
Motor load (%)	0				
Regen load (%)	0				
Current station No.	1				
Current posn	0.014				
Inst station No.	1				
Inst posn	0.000				
Posn. con. gain1	36				
Speed con. gain1	216				
Posn. con. gain2	30				
Speed con. gain2	714				
Speed int. comp	92				
Load inertia	0.1				
◀ RDY:MEM :		16:25			
Servo unit	Spindle unit	Power unit	AUX unit	Synchro error	Next axis
					Alarm his clr

Data for the number of axes (up to six) set with the basic common parameter "110067 AUX axis nos* (auxiliary axis connection)" is displayed. This will not appear when zero is set in the parameter.

(Note 1) If there are more than five auxiliary axes, the display can be changed for the 1st to 4th axis, and the 5th and 6th axis by pressing the  menu.

Display item	Details
Droop (i)	The error of the actual machine position to the commanded position is called droop. This difference is displayed.
Speed (r/min)	This displays the actual rotation speed of the motor.
Load current (%)	This displays the continuous non-executable torque. This is 100% when the constant torque is generated.
Max current 1 (%)	This displays the commanded torque.
Max current 2 (%)	This displays the maximum generation torque of the commanded torque.
Motor load (%)	This displays the rate of the load torque to the tolerable load torque as a percentage.
Regen load (%)	This displays the rate of the regenerative power to the tolerable regenerative power as a percentage.
Current station No.	This displays the number of the currently stopped station.
Current posn	This displays the current coordinate value. (Unit: 10 ⁻³ degrees)
Inst station No.	This displays the commanded station number for automatic operation, or the nearest station number to be stopped at for manual operation.
Inst posn	This displays the coordinate position corresponding to the target station number. (Unit: 10 ⁻³ degrees)

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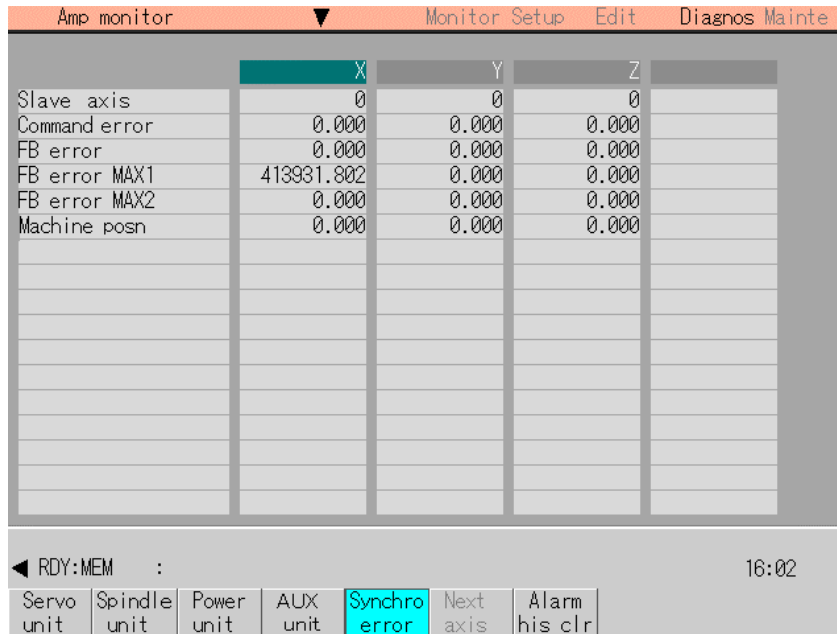
Display item	Details
Posn. con. gain1	This displays the position control gain 1.
Speed con. gain1	This displays the speed control gain 1.
Posn. con. gain2	This displays the position control gain 2.
Speed con. gain2	This displays the speed control gain 2.
Speed int. comp	This displays the speed integral compensation value.
Load inertia	This displays the estimated motor shaft conversion load inertia rate value in respect to the motor's rotor inertia.
Unit type	This is the unit type.
Software version	This is the servo amplifier software version.
Motor type	This is the motor type.
Alarm hist 1:No.	Alarm history: Alarm number
1:State	Alarm history: Alarm details information
2:No.	Alarm history: Alarm number
2:State	Alarm history: Alarm details information
3:No.	Alarm history: Alarm number
3:State	Alarm history: Alarm details information
4:No.	Alarm history: Alarm number
4:State	Alarm history: Alarm details information
5:No.	Alarm history: Alarm number
5:State	Alarm history: Alarm details information
6:No.	Alarm history: Alarm number
6:State	Alarm history: Alarm details information

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5.4.5 Display items for the synchronous error

The various data related to the synchronous error is monitored.

Change the display items using the  key and  key to refer to the data.



Display item	Details
Slave axis	This displays the slave axis No. corresponding to the master axis.
Command error	This is the deviation of the slave axis machine value in respect to the master axis. The error of the command value to the servo control section before pitch error compensation, relative position compensation and backlash compensation is displayed. If this error occurs, the parameters that should be the same for the synchronous axes are different. Command error = Command s – command m – Δ Command s : Slave axis command value Command m: Master axis command value Δ : Command s – command m at start of synchronous control
FB error	This is the deviation of the slave axis feedback value in respect to the feedback value from the master axis servomotor. The error of the actual machine position is displayed. The synchronous error check is carried out on this error. FB error = FBs – FBm – Δ FBs : Slave axis feedback value FBm: Master axis feedback value Δ: FBs – FBm at start of synchronous control
FB error MAX1	This displays the max. FB error value from the start of synchronous control.
FB error MAX2	This displays the max. FB error value at every approx. 30 seconds from the start of synchronous control.
Machine posn	This displays the commanded machine position for the master axis.

5.4.6 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.

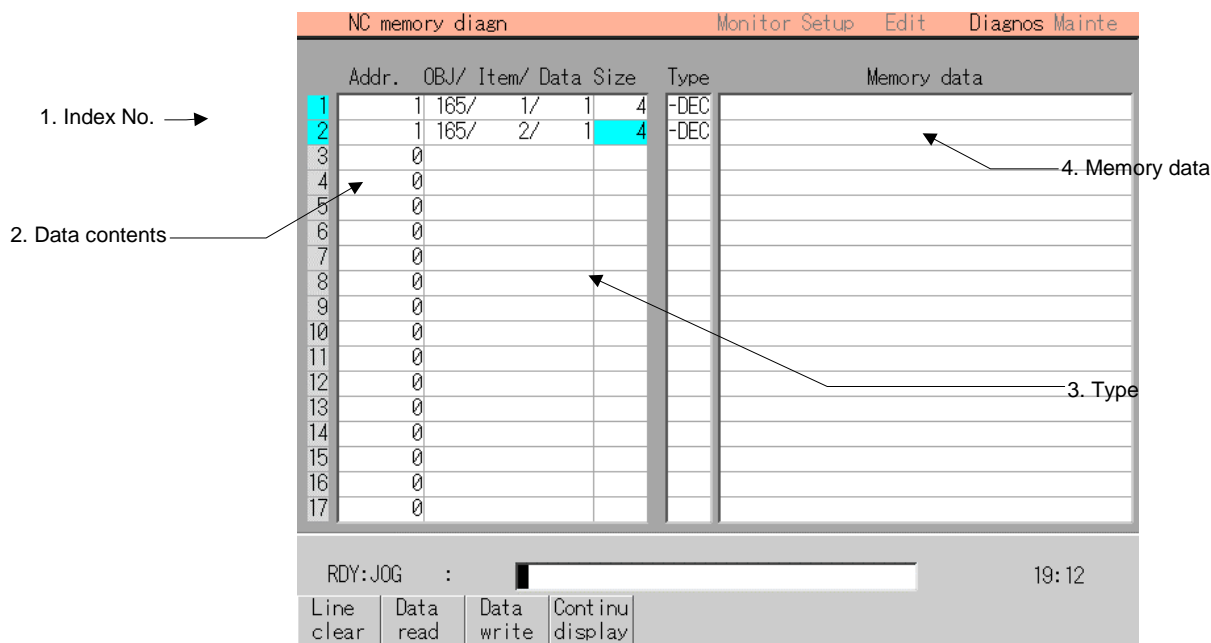


The alarm history data is cleared to zero.

	<input type="text" value="Y"/>
Motor	7
Work Time	0
Alarm hist 1:Time	0
1:Alarm	0
2:Time	0
2:Alarm	0
3:Time	0
3:Alarm	0

5.5 NC Memory Diagnosis screen (NC memry diagn screen)

The contents of the NC internal memory can be displayed and rewritten in this screen. When address, memory size (1 to 48 bytes) are designated, the contents of that data can be displayed. When Object Nos., Item Nos. and Data Nos. are designated, the contents of the NC data can also be displayed.



(1) Display items

Display item	Details
1. Index No.	This displays the registration No. of the NC memory data. When one of the "2. Data contents" is set, the number is highlighted indicating that the normal display of the data contents has stopped.
2. Data contents	<p>Addr: This directly designates the NC memory address. Note that when the NC data is designated, the system No. is designated.</p> <p style="text-align: center;">○○○○○○○○○</p> <p style="text-align: right;">└────────── System No. (When common for all systems, set to "0".)</p> <p>(Note) Set as a hexadecimal.</p> <p>OBJ/Item/Data: This is the Object No., Item No. and Data No. of the data to be set and displayed. (This is set when carrying out an NC data designation.) The setting form is Object No./Item No./Data No.</p> <p>Size: This is the size of the data to be set and displayed. The setting range is a 1, 2, 4 or 8 bytes. Note that for a character string, up to 48 bytes can be set, but only forty characters from the head are displayed. (Note) This setting is meaningless for designating the NC data.</p>
3. Type	This displays the data type.
4. Memory data	This displays the setting value amount of "Size" only.

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(2) Menus

Menu	Details	Type	Reference
Line clear	This erases the information in the line where the cursor is at. (One entire line becomes blank.) The cursor does not move at this time.	C	-
Data read	The contents of the set address data (Addr, Object No./Item No./Data No./Size/Display format) for all the lines is constantly displayed. The Data No. highlight (indicating data is being set) is released. The cursor appears in "Addr" of that line.	C	5.5.1 Writing/ reading the data using the NC data designation
Data write	This writes the data ^(Note) in the setting area to the NC memory indicated by address data at the cursor position. The Data No. highlight (indicating data is being set) is released, and constant display is started. After writing, the cursor moves to "Addr" of the next line.	A	
Continu display	Based on the "Addr" and "Size" data of the line where the cursor is at, the address contents are continuously displayed from the cursor line. When NC data is designated, the data is continuous data to which the data Nos. are added. The cursor moves to "Addr" of that line.	C	-

(Note) Decimal, hexadecimal and floating point data writing is possible.

Decimal : Integers without decimal points..... (Ex.) -1234

Hexadecimal : An "H" is necessary at the end..... (Ex.) 1234H

Floating point data : Data with a decimal point (Ex.) -12.3

5.5.1 Writing/reading the data using the NC data designation

When reading the Process parameter "330002 Base axis", the following data is set.

Basic system	: System No.1	Data No.	: 1
Object No.	: 33	Size	: (No setting)
Item No.	: 2		

(1) Setting the data

The written contents appear.

- 1)

Using the cursor keys, move the cursor to the "Addr." position.

 →

The cursor moves to the "Addr." position.

	Addr	OBJ / Item / Data	Size
1	12345678	1/99999/	1 48
2	12345678	999/ 100/99999	4
3	12345678		8
4	12345678		4

- 2)

Set the address.
1

 →

The index No. is highlighted, and the set value is displayed.
The cursor moves to the right item position.

- 3)

Separate the Object No., Item No. and Data No. with a "/", and set.
33/2/1

 →

The set value appears.
The cursor moves to the right item position.

- 4)

Press the menu key
.

- 5)

Set the data, and press the key.

 →

Write processing is executed.
The Index No. highlight returns to normal.

(2) Reading the data

- 1)

Set the address, object No., item No. and data No. in the same way as step (1).

- 2)

Press the menu key
.

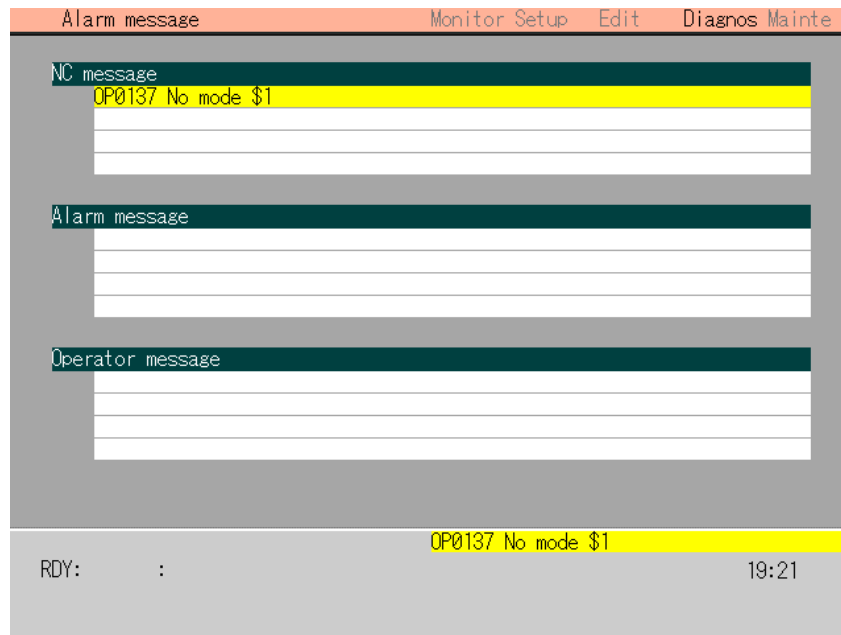
 →

The index No. highlight is released, and the normal display of the memory data starts.
The data format (data size, display format) of the data displayed in the memory data differs according to the data type to be displayed.

(Note) The cursor is constantly displayed. Using the cursor keys, the cursor can be moved to the Addr area, OBJ/Item/Data area and Size area.

5.6 Alarm screen

A list of currently occurring alarms or messages is displayed on this screen.

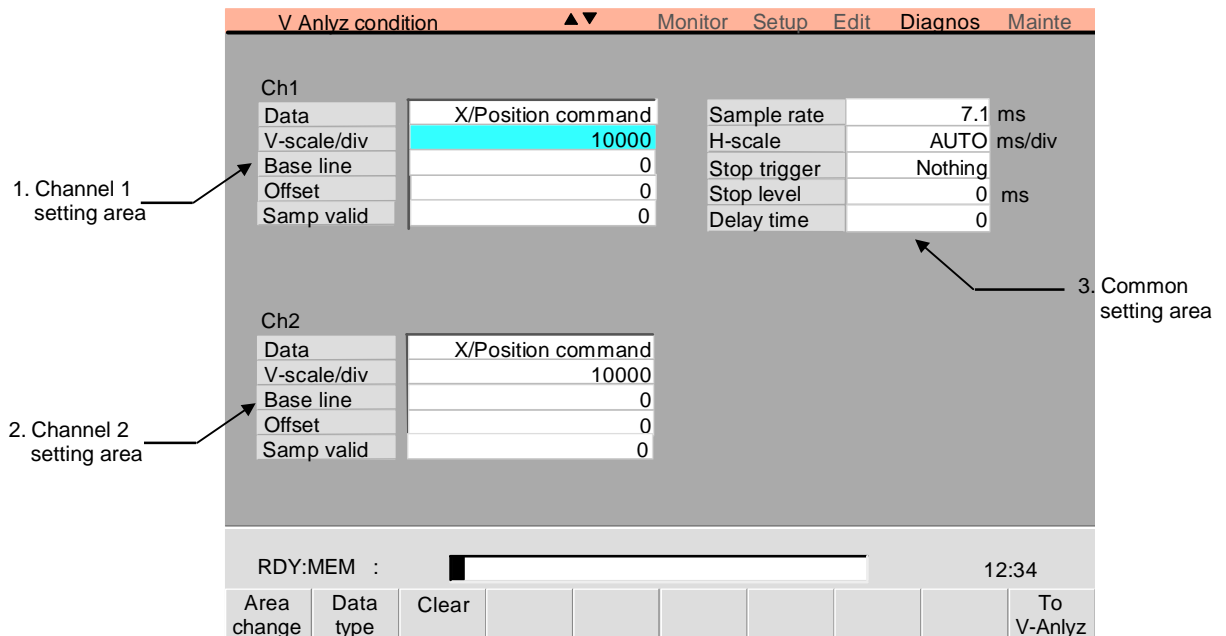


(1) Display items

Display item	Details
NC message	This displays the NC status and error messages, etc., caused by operator operation. Up to 16 messages can be displayed by scrolling with the page key.
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.

5.7 Condition Setting screen (V Anlyz condition screen)

The various conditions such as sampling data and trigger data are set on this screen.



(1) Display items

Display item	Details
1. Channel 1 setting area	<p>The various data for channel 1 and channel 2 are set. "Data" can be selected from the menu. For the conditions other than "Data", select the item with the cursor, and input the value. When the Next Page key is pressed, the setting area will change from Channel 1 and 2 to Channel 3 and 4. The data for up to ten channels can be set.</p> <p>Data : Set the type of data to be sampled and the axis name.</p> <p>Vert scale/div : This is the vertical axis scale. Set how many sample data items corresponds to one scale. (Setting range: 0 to 10000000)</p> <p>Base line : Designate at which the scale the vertical axis' zero is positioned. (Setting range: - 8 to 8)</p> <p>Offset : Set the value to be added as the offset value to the sample data. (Setting range: - 10000000 to 10000000)</p> <p>Samp valid : Set whether channel sampling is valid or not. (0: Invalid, 1: Valid)</p>
2. Channel 2 setting area	

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Display item	Details
3. Common setting area	<p>The common data for channel 1 and channel 2 is set.</p> <p>Sample rate : Set the interval for sampling. The sampling rate (multiple of 1.77) closest to the input value is displayed. (Setting range: 0 to 1000, Unit : ms)</p> <p>Horiz scale : Set the time for per one horizontal scale with a ms unit. When "0" is input, "AUTO" will appear. When "AUTO" is displayed, the horizontal axis will be calculated automatically, and the waveform will be displayed to fit on one screen. (Setting range: 0 to 9999)</p> <p>Stop trigger : Set the trigger conditions for stopping the continuous waveform sampling. The signals that can be used for the trigger data are the X and Y PLC signals. When 0 is input, the display will change to "Nothing", and the sampling will not be stopped with a trigger. (Note) This is valid only during continuous waveform sampling.</p> <p>Stop level : Set whether to stop the sampling at the rising edge or falling edge of the stop trigger signal. (0: Falling edge, 1: Rising edge)</p> <p>Delay time : Designate the time to stop the sampling after the trigger conditions are established. The value (multiple of 1.77) closest to the input value will be displayed. (Setting range: 0 to 1000000ms)</p>

(2) Menus

Menu	Details	Type	Remarks
Area change	This changes the setting target area. The valid area changes in the order of channel 1 setting area → channel 2 setting area → common setting area. The setting area will change when the tab key is pressed.	C	1.5.2 Changing the valid area
Data type	This displays the submenu for the class of data to be sampled.	C	5.7.2 Selecting the sampling data
Clear	This erases all of the conditions set in the currently selected area.	C	5.7.3 Erasing the condition data
To V-Anlyz	This changes to the Waveform display screen (Visual analyzer screen).	C	5.8 Waveform display screen

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(3) Data setting unit

The sampling data is sampled at the units shown below. The value set in "Vert scale" is handled with these unit, so refer to the following table when setting.

Submenu name	Data type	Unit	Details
Servo ax data	Posn command	μm	Position command after machine error compensation. (Note 1)
	Droop	i	Droop on Amp monitor screen (Servo unit).
	FB posn	μm	Machine position on Amp monitor screen (Servo unit). (Note 1)
	Speed FB	r/min	Speed on Amp monitor screen (Servo unit).
	Current FB	%	Load current on Amp monitor screen (Servo unit). Motor current when continuous current at stall is 100%.
	Cycle counter	p	Position per rotation in encoder. The position within one rotation is displayed in the range from 0 to RNG ×1000 using the grid point as 0.
	Smooth posn	μm	Position command after smoothing. (Note 1)
	Program posn	μm	Program position. (Note 1)
Spindle data	Machine posn	μm	Machine position. (Note 1)
	Droop	i	Droop on Amp monitor screen (Spindle unit).
	Motor speed	r/min	Rotation speed on Amp monitor screen (Spindle unit).
	Motor load	%	Load on Amp monitor screen (Spindle unit).
	Cycle counter	p	Cycle counter on Amp monitor screen (Spindle unit).
	Current FB surv	%	Actual measurement value of load current on Amp monitor screen (Spindle unit). Motor current when continuous current at stall is 100%.
	Current FB infr	%	Estimate value of load current on Amp monitor screen (Spindle unit).
	Spindle torque	%	Spindle load value.
AUX data	Motor speed	r/min	Auxiliary axis motor rotation speed.
	Speed FB	r/min	Auxiliary axis speed FB.
	Command torque	%	Auxiliary axis command torque.
	FB torque	%	Auxiliary axis FB torque.
	Droop	i	Auxiliary axis position droop.
	Command speed	1/1000°	Auxiliary axis command speed FΔT.
Other data	Tap err range	μm	Synchronous tapping error width.
	NC file	–	Differs according to the data type.

(Note 1) The position command, FB position, smoothing position, program position and machine position differ according to the system unit and the setting of initial inch.

5.7.1 Setting the condition data

Set the various condition data.

When setting the type of sampling data, refer to section "5.7.2 Selecting the sampling data". The other items can be set with method (1) below. (Also refer to section "1.4 Setting data".)

For actual setting examples, refer to section (2).

(1) Example for setting "8.0" for offset in channel 2 setting area

1)

Press the menu key , and select the channel 2 area.



The cursor appears at the channel 2 area.

Ch2	
Data	X/Position command
V-scale/div	10000
Base line	0
Offset	0
Samp valid	0

2)

Using the and keys, move the cursor to the position.



The cursor moves to the "Offset" position.

Ch2	
Data	X/Position command
V-scale/div	10000
Base line	0
Offset	0
Samp valid	0

3)

Input the data.
 8.0



The set value displays.

Ch2	
Data	X/Position command
V-scale/div	10000
Base line	0
Offset	8.0
Samp valid	0

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(2) Setting range and setting examples (Setting the conditions for continuous sampling with trigger conditions)

■ **When setting channel**

Setting item	Menu	Setting range	Setting example	Operation
Data	Data type	–	Servo ax data	The data selection menu appears.
	(Selected data)	–	Posn command	Data can be input.
	–	Follows data type	X <input type="text" value="INPUT"/>	The axis name and data name input in the channel 1 data appears.
Vert scale/div	–	0 to 10000000	10000 <input type="text" value="INPUT"/>	
Base line	–	– 8 to 8	0 <input type="text" value="INPUT"/>	The 0 scale is set as the vertical axis' zero position.
Offset	–	– 10000000 to 10000000	0 <input type="text" value="INPUT"/>	The 0mm (offset value) is added to the sample data.
Samp valid	–	0/1	1 <input type="text" value="INPUT"/>	Sampling is validated.

■ **When setting common items**

Setting item	Menu	Setting range	Setting example	Operation
Sample rate		0 to 1000	5 <input type="text" value="INPUT"/>	The value (multiple of 1.77) closest to the input value is displayed for the sampling rate. (unit : ms)
Horiz scale	–	0 to 9999ms	100 <input type="text" value="INPUT"/>	
Stop trigger signal	–	Usable device and No. 0: Condition invalid	X100 <input type="text" value="INPUT"/>	Stops when the X100 signal is output.
Stop signal level	–	0/1	1 <input type="text" value="INPUT"/>	Sampling stops at the rising edge of the stop trigger signal.
Delay time	–	0 to 1000000 (1/7.11ms)	0 <input type="text" value="INPUT"/>	

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5.7.2 Selecting the sampling data

(1) Data setting format and data type menus

When the Data type menu key is pressed, the data type submenu will appear. When the data type (Servo ax data, Spindle data, Auxiliary ax data and Other data) menu is selected, the sampling data items will appear on the menu.

The setting details for the sampling data differ according to the type.

Setting format	Setting example	Setting method reference
Axis name	X, X2, etc.	(2) Setting the servo ax data (Note) The auxiliary axis data is set in the same manner.
Spindle name S + No. (No. can be omitted for Spindle 1)	S, S2, etc.	(3) Setting the spindle data
File No./Sub-program ID/ Item No./Data No.	101/1/1/2	(4) Setting the NC file

The following items will appear on the submenu.

Menu	Details	Type	Reference	
Servo ax data	The menu of the data related to the servo axis appears.		C	-
	Posn command	The servo position command of the designated axis is registered as the data.	A	(2)
	Droop	The servo droop of the designated axis is registered as the data.	A	
	FB posn	The feedback position of the designated axis is registered as the data.	A	
	Speed FB	The speed feedback of the designated axis is registered as the data.	A	
	Current FB	The current feedback of the designated axis is registered as the data.	A	
	Cycle counter	The cycle counter of the designated axis is registered as the data.	A	
	Smooth posn	The position command after smoothing of the designated axis is registered as the data.	A	
	Program posn	The program coordinate value of the designated axis is registered as the data.	A	
	Machine posn	The machine coordinate value of the designated axis is registered as the data.	A	

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Menu	Details	Type	Reference	
Spindle data	The menu of the data related to the spindle appears.	C	-	
	Spindle droop	The droop of the designated spindle is registered as the data.	A	(3)
	Motor speed	The actual motor rotation speed of the designated spindle is registered as the data.	A	
	Motor load	The motor load of the designated spindle is registered as the data.	A	
	Spdl cyc counter	The cycle counter of the designated spindle is registered as the data.	A	
	Current FB surv	The current FB actual measurement value of the designated spindle is registered as the data.	A	
	Current FB infr	The current FB estimate value of the designated spindle is registered as the data.	A	
	Spindle torque	The spindle load value of the designated spindle is registered as the data.	A	
AUX data	The menu of the data related to the auxiliary axis appears.	C	-	
	Motor speed	The motor speed of the auxiliary axis is registered as the data.	A	(2)
	Speed FB	The speed feedback of the auxiliary axis is registered as the data.	A	
	Command torque	The command torque of the auxiliary axis is registered as the data.	A	
	FB torque	The FB torque of the auxiliary axis is registered as the data.	A	
	Aux Droop	The droop of the auxiliary axis is registered as the data.	A	
	Command speed	The command speed of the auxiliary axis is registered as the data.	A	
Other data	The menu of the data other than the servo axis, spindle, auxiliary axis appears.	C	-	
	Tap err range	The synchronous tap error width (μm) of the designated servo axis is registered as the data.	A	(2)
	NC file	The NC data I/F data is registered as the sampling data.	A	(4)
Data clear	If the Ch1 or Ch2 area is valid, the data type in that area will be cleared.	C	-	

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(2) Setting the servo ax data

Data related to the servo axis, such as the Posn command, Droop and FB posn, and the data related to the auxiliary axis are set with the following procedure.

As an example, the position command data for X2 axis will be set.

Setting format	Setting example
Axis name	X, X2, etc.

1)

Move the cursor to the "Data" position, and press the menu key Posn command.

2)

Input the axis name.
X2 INPUT.



The details set in "Data" will appear.

Ch2	
Data	X2/Position command
V-scale/div	10000
Base line	0
Offset	0
Samp valid	0

(Note) Data related to the auxiliary axis is set in the same manner.

(3) Setting the spindle data

The data related to the spindle, such as the spindle droop and motor rotation speed is set with the following procedure.

As an example, the motor rotation speed for 2nd spindle will be registered.

Setting format	Setting example
Spindle name S + No. (No. can be omitted for 1st spindle)	S, S2, etc.

1)

Move the cursor to the "Data" position, and press the menu key Motor speed.

2)

Input the spindle name.
S2 INPUT



The details set in "Data" will appear.

Ch2	
Data	S2/Motor speed
V-scale/div	10000
Base line	0
Offset	0
Samp valid	0

(Note) For 1st spindle, "1" can be omitted, and only "S" set.
If the spindle No. is omitted, 1st spindle will be set as the default.

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(4) Setting the NC file

The NC file is set with the following procedure.

As an example, the following data will be registered.

File No. = 101, Subprogram ID = 1, Item No. = 1, Data No. = 2

Setting format	Setting example
File No./Sub program ID/Item No./Data No.	101/1/1/2

1)

Move the cursor to the "Data" position, and press the menu key .

2)

Set the file No., subprogram ID, item No. and data No. using a slash "/" as the identifier.
 101/1/1/2



The details set in "Data" will appear.

Ch2	
Data	101/1/1/2/NC file
V-scale/div	10000
Base line	0
Offset	0
Samp valid	0

(Note) Only the data handled as the Long type can be set.

5.7.3 Erasing the condition data

Press the menu keys **Clear** or **Data clear** to erase the data.
The details erased differ according to the key.

Clear : All of the conditions set in the currently selected area will be erased.
This is the main menu of this screen.

Ch2	
Data	X/Position command
V-scale/div	10000
Base line	0
Offset	8.0
Samp valid	0

	0
	0
	0
	0
	0

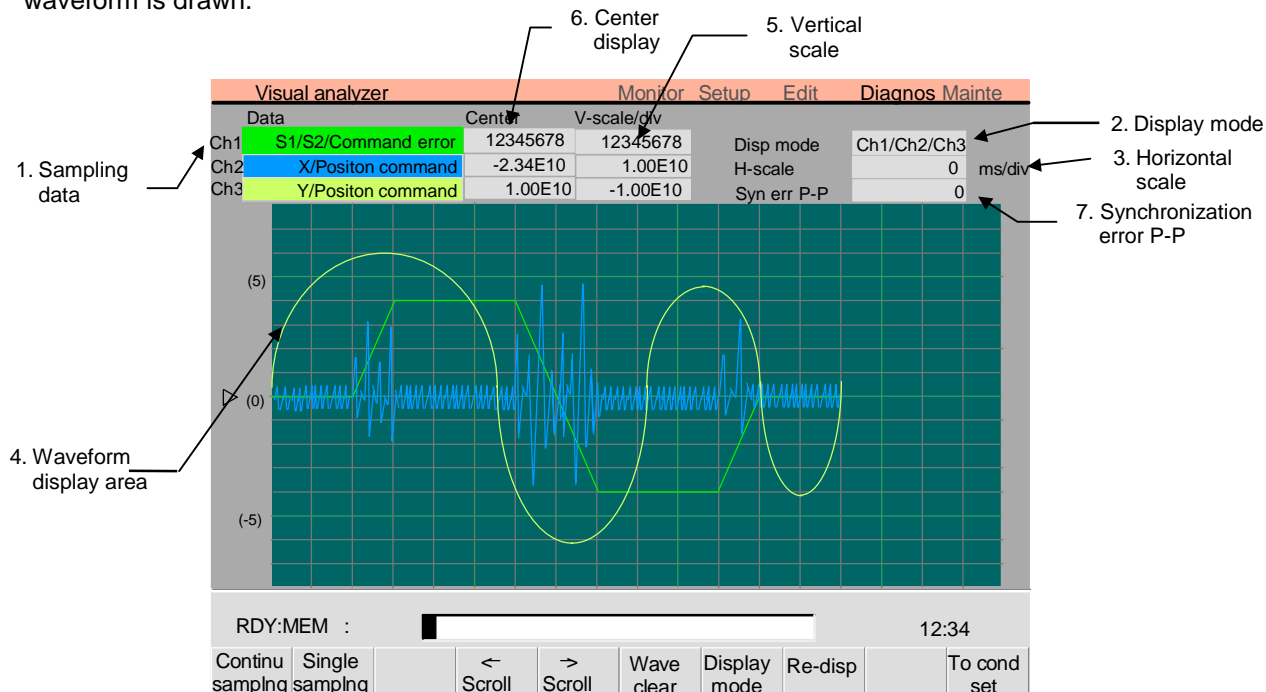
Data clear : If the Ch1 or Ch2 area is valid, the "Data" item in that area will be erased.
This is a submenu included below the main menu key **Data type**.

Ch2	
Data	X/Position command
V-scale/div	10000
Base line	0
Offset	8.0
Samp valid	0

	10000
	0
	8.0
	0

5.8 Waveform display screen (Visual analyzer screen)

On this screen, the data set as the condition is sampled at the sampling rate cycle and the data waveform is drawn.



(1) Display items

Display item	Details
1. Sampling data	The sampling data set on the setting screen is displayed.
2. Display mode	This displays the channel display mode to be sampled. The mode is changed with the menu keys, but cannot be changed while sampling.
3. Horizontal scale	The horizontal scale set on the setting screen is displayed. When "AUTO" is set on the setting screen, the automatically calculated horizontal scale will appear.
4. Waveform display area	The waveform is plotted. Waveforms for up to three channels can be displayed.
5. Vertical scale	The vertical scale is displayed. When there are more than seven digits, an exponential with two digits after the decimal point will be displayed.
6. Center display	The value of the waveform display area's center (right ▲ (0)) is displayed. When there are more than seven digits, an exponential with two digits after the decimal point will be displayed.
7. Synchronization error P-P	This appears when synchronous error is set for the data on the setting screen. The synchronous tap error P-P value is displayed.

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(2) Menus

Menu	Details	Type	Reference
Continu sampling	<p>Sampling starts and the waveform is continuously displayed. If this menu is selected again, the menu highlight returns to normal, and the sampling is canceled.</p> <p>If a trigger is set, the waveform will not appear until the trigger is input. Even if another screen is displayed during sampling, the sampling will not stop.</p> <p>If a trigger is not set and another screen is displayed during continuous sampling, the sampling will end at that point.</p>	A	5.8.2 Carrying out continuous sampling
Single sampling	<p>Sampling starts and the waveform for the sampled buffer is displayed.</p> <p>If another screen is displayed during single sampling, the sampling will end at that point.</p> <p>The sampling ends when the sampled buffer is filled, and the menu highlight returns to normal.</p> <p>The trigger setting is invalid.</p>	A	5.8.3 Carrying out single sampling
<- Scroll	<p>The area displaying the waveform is scrolled 1/4 of a screen to the left.</p> <p>Note that this menu cannot be used during sampling.</p>	C	-
-> Scroll	<p>The area displaying the waveform is scrolled 1/4 of a screen to the right.</p> <p>Note that this menu cannot be used during sampling.</p>	C	-
Wave clear	<p>The waveform displayed on the screen is erased.</p> <p>Note that this menu cannot be used during sampling.</p>	C	-
Display mode	<p>Set the channel of the waveform to be displayed. Up to three channels can be set.</p> <p>The cursor will move to the display mode field when this menu is pressed.</p>	C	5.8.1 Setting the channel of the waveform to be displayed
Re-disp	<p>This redisplay the waveform displayed before the screen was changed.</p> <p>Note that this menu cannot be used during sampling.</p> <p>(Note) If the vertical scale, horizontal scale, base line and offset conditions have been changed, the waveform will be redisplayed using the changed conditions. However, the other condition changes will not be handled.</p>	C	-
To cond set	<p>This changes to condition setting screen (screen for setting conditions such as sampling, trigger data, waveform display).</p>	C	5.7 Condition Setting screen (V Anlyz condition screen)

5.8.1 Setting the channel of the waveform to be displayed

- 1)

Press the menu key Display mode .

 → The cursor will appear at the display mode field.

- 2)

Input a value. 1/3/9 INPUT

 → "1/3/9" will appear at the cursor position.
The channels in the sampling data display field will change to the 1, 3 and 9 channels.
The channel 1, 3 and 9 data will be sampled.

5.8.2 Carrying out continuous sampling

When the menu key **Continu sampling** is pressed, the sampling will start and the waveform will be displayed continuously. When the menu key is pressed again, the menu highlight will return to normal, and the sampling will stop.

(1) Carrying out continuous sampling

- 1)

Press the menu key To cond set to display the V Anlyz condition screen. Then, set the conditions and data.

 → The V Anlyz condition screen will open.
After setting the conditions or data, press the menu
key **To V-Anlyz** to display the Visual analyzer
screen.

Refer to section "5.7.1
Setting the condition data" for
details.

- 2)

Press the menu key Display mode , and set the channel of the waveform to be displayed.
--

Refer to "5.8.1 Setting the
channel of the waveform to
be displayed" for details.

- 3)

Press the menu key Continu sampling .

 → The sampling and waveform display will start.

(2) Notes for continuous sampling

- 1) If there are no trigger conditions and another screen is displayed during continuous sampling, the sampling will end at the point the other screen was displayed. Thus, when the Visual analyzer screen is returned to from the other screen, the waveform will be cleared and the sampling will be stopped.
- 2) If there is a trigger condition and another screen is displayed during continuous sampling, the sampling will not end. However, the waveform will not appear until the sampling is completed after the trigger conditions are established.
- 3) Only data handled as Long type data can be registered as an NC file on the V Anlyz condition screen. If data that cannot be handled as a Long type is set, a "Setting error" will occur when the Continu samplng menu is selected.
- 4) The sampling buffer is a 3072-point ring buffer (1536 points for 2-channel synchronization, 1024 points for 3-channel synchronization). Thus, the waveform display will rely on these number of points. The waveform will be cut off during continuous sampling because of this.
- 5) The auxiliary axis data can be sampled when the parameter "110067 AUX axis nos" is set to more than one.

5.8.3 Carrying out single sampling

When the menu key `Single sampling` is pressed, the sampling will start and the waveform for the sampled buffer will display. When the sampled buffer is filled, the sampling will stop and the menu highlight will return to normal.

(1) Carrying out single sampling

1)

Press the menu key `To cond set` to display the V Anlyz condition screen. Then, set the conditions and data.



The V Anlyz condition screen will open. After setting the conditions or data, press the menu key `To V-Anlyz` to display the Visual analyzer screen.

Refer to section "5.7.1 Setting the condition data" for details.

2)

Press the menu key `Display mode`, and set the channel of the waveform to be displayed.

Refer to "5.8.1 Setting the channel of the waveform to be displayed" for details.

3)

Press the menu key `Single sampling`.



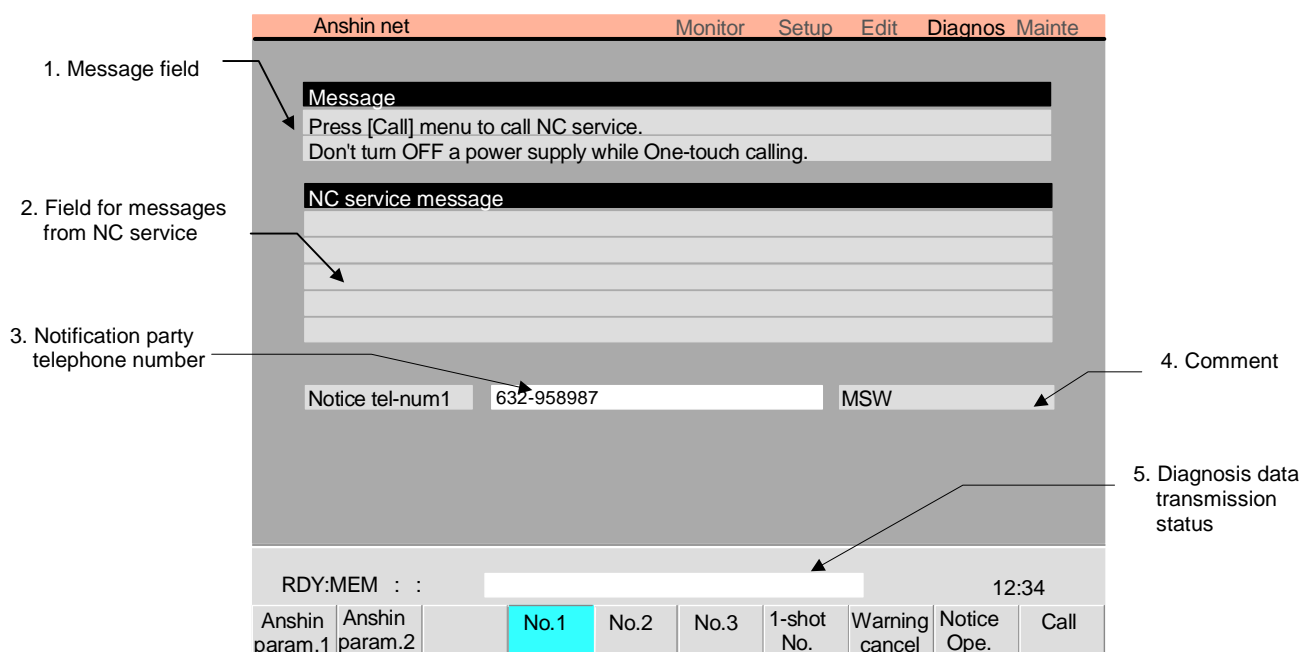
The sampling and waveform display will start.

(2) Notes for single sampling

- 1) If another screen is displayed during single sampling, the sampling will end at the point the other screen was displayed. Thus, when the Visual analyzer screen is returned to from the other screen, the waveform will be cleared and the sampling will be stopped.
- 2) The waveform single stops when the sampling buffer is full. The stop trigger conditions (stop trigger signal, stop signal level setting) and delay time will be invalidated.
- 3) Only data handled as Long type data can be registered as an NC file on the V Anlyz condition screen. If data that cannot be handled as a Long type is set, a "Setting error" will occur when the `Single sampling` menu is selected.
- 4) The sampling buffer is a 3072-point ring buffer (1536 points for 2-channel synchronization, 1024 points for 3-channel synchronization). Thus, the waveform display will rely on these number of points.
- 5) The auxiliary axis data can be sampled when the parameter "110067 AUX axis nos" is set to more than one.

5.9 Anshin-net Message screen

The status of the anshin-net (worry-free net) connection and messages from the NC service are displayed on this screen. The messages displayed from the NC service, one-touch call, operator notice validity and notification party telephone number, etc., can be changed on this screen.



(1) Display items

Display item	Details
1. Message	Messages indicating the anshin-net connection status, etc., are displayed.
2. NC service message	Messages from the NC service are displayed. (Note 1) If the message on one line exceeds 72 characters, the excessive characters will be discarded. (Note 2) The message is held until the power is turned OFF or until another message is received from the NC service.
3. Notice tel-num	The notification party telephone number is displayed.
4. Comment	A comment for the notification party is displayed.
5. Diagnosis data transmission status	The status (NE) is displayed during transmission of the diagnosis data.

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(2) Menus

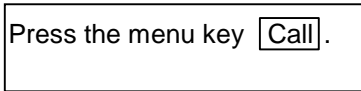
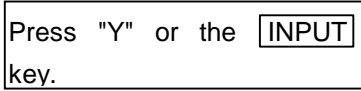
Menu	Details	Type	Reference
Anshin param.1	The Anshin net param.1 screen is opened.	C	5.10.1 Anshin net param.1 screen
Anshin param.2	If the machine manufacturer password is set, the Anshin net param.2 screen will open.	C	-
No. 1	The notification part telephone number will be the Notice tel-num 1 displayed on the Anshin net param.1 screen.	B	-
No. 2	The notification part number will be the Notice tel-num 2 displayed on the Anshin net param.1 screen.	B	-
No. 3	The notification part number will be the Notice tel-num 3 displayed on the Anshin net param.1 screen.	B	-
1-shot No.	The notification party telephone number will be a randomly set telephone number.	A	5.9.3 Setting a random telephone number
Warning cancel	The warning displayed when an error occurs is canceled.	B	5.9.4 Canceling the network service warning
Notice Ope.	The operator notification is turned ON or OFF.	B	5.9.1 Validating operator notification
Call	One-touch calling is enabled.	B	5.9.2 Placing a one-touch call

5.9.1 Validating operator notification

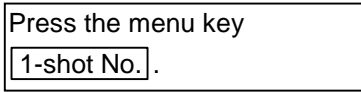
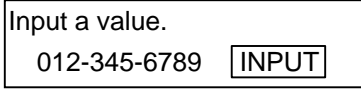
- 1) Press the menu key
Notice Ope. The menu will be highlighted, and the message "Operator notice effective" will appear.

If the Notice Ope. menu key is pressed again while the operator notification is valid, the menu highlight will be turned OFF, and the operator notification will be canceled.
 If machining is completed normally or abnormally while operator notification is valid, a call will be placed from the Call Center to the currently displayed notification party number.

5.9.2 Placing a one-touch call

- 1)  Press the menu key . → The menu will be highlighted, and the message "Carry out one-touch call? (Y/N)" will appear.
- 2)  Press "Y" or the key. → Messages indicating the status will appear in sequence, and a connection to the NC service will be established. ("Dialing" → "Connecting" → "Transmitting" → "Connecting")
After connecting, the diagnosis data will be transmitted to the NC service. After the diagnosis data has been transmitted, the menu highlight will be turned OFF, and a message from the net server will appear.

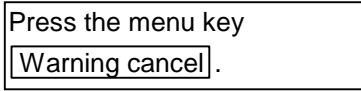
5.9.3 Setting a random telephone number

- 1)  Press the menu key . → The menu will be highlighted, and the random number setting mode will be entered. The cursor will appear at the Notice-tel num field.
- 2)  Input a value.
012-345-6789 → The menu highlight will turn OFF, and the telephone number "012-345-6789" will appear at the cursor position.
The Notice-tel num will change to the input number.

If the key is pressed again after setting a random telephone number, the Notice-tel num will change to the selected Notice-tel num (number 1 to 3).

(Note 1) If the , or menu key is pressed after inputting a random number, the displayed random telephone number will be cleared. The Notice-tel num will change to the Notice tel-num 1, 2 or 3 set on the Anshin net param.1 screen.

5.9.4 Canceling the network service warning

- 1)  Press the menu key . → The network service warning message will be cleared and canceled.

(Note 1) If an error occurs during communication, the network service warning message will appear.

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5.9.5 Message displays

Messages that indicate the anshin-net connection status, etc., are displayed on the Anshin-net message screen.

A message also appears if a communication error occurs during the anshin-net connection.

"***" is displayed at the end of the message to indicate the transmission/reception status during transmission/reception of files.

(Note 1) The asterisks increase by one each time the operation progresses.
Up to five asterisks will be displayed.

(1) Messages related to all Anshin-net screens

Message	Display in message field	Details
(None)	Press <input type="button" value="Call"/> to call the NC service. Do not turn the power OFF during the one-touch call.	<ul style="list-style-type: none"> • Communication has not been started. • A call is being placed with automatic alarm notification or one-touch call, and a call is being received from the NC service.

(2) Messages related to automatic alarm notification

Message	Display in message field	Details
Dialing	Do not turn the power OFF until the automatic alarm notification ends.	<ul style="list-style-type: none"> • A call is being placed with the automatic alarm notification. • Communication starts when an alarm occurs, but the line is not connected yet in this state. • This state is also entered when standing by for transmission.
Connecting	Do not turn the power OFF until the automatic alarm notification ends.	<ul style="list-style-type: none"> • The line is connected with automatic alarm notification.
Sending	Do not turn the power OFF until the automatic alarm notification ends.	<ul style="list-style-type: none"> • The diagnosis data is being sent with automatic alarm notification. • Communication has been started with emergency stop by the servo, spindle or PLC alarm, or by the establishment of the conditions set in the parameters.
(None)	Press <input type="button" value="Call"/> to call the NC service. Do not turn the power OFF during the one-touch call.	<ul style="list-style-type: none"> • Automatic alarm notification has ended, and the line has been disconnected.
Waiting for dialing	Do not turn the power OFF until the automatic alarm notification ends.	<ul style="list-style-type: none"> • Redialing since the NC service is using the line for other communication.
(Status of communication with NC service)	Connecting with NC service. Wait for communication to end.	<ul style="list-style-type: none"> • In connection standby state since line is being used by anshin-net.
(Status of communication with machine manufacturer)	Connecting with machine manufacturer. Wait for communication to end.	<ul style="list-style-type: none"> • In connection standby state since line is being used by machine network.

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(3) Messages related to operator notification

Message	Display in message field	Details
Operator notice effective	If automatic operation stops while operator notification is valid, the designated telephone number will be contacted.	<ul style="list-style-type: none"> Operator notification is valid. If machining ends normally or abnormally in this state, communication with operator notification will start.
Dialing	Do not turn the power OFF until the operator notification ends.	<ul style="list-style-type: none"> Data is being transmitted with operator notification. Communication will start when machining ends normally or abnormally, but the line is not connected yet in this state. This state is also entered when standing by for transmission.
Connecting	Do not turn the power OFF until the operator notification ends.	<ul style="list-style-type: none"> The line is connected with operator notification.
Sending	Do not turn the power OFF until the operator notification ends.	<ul style="list-style-type: none"> The diagnosis data is being sent with operator notification.
(None)	Press <input type="button" value="Call"/> to call the NC service. Do not turn the power OFF during the one-touch call.	<ul style="list-style-type: none"> Communication with operator notification has ended, and the line has been disconnected.
Waiting for dialing	Do not turn the power OFF until the operator notification ends.	<ul style="list-style-type: none"> Redialing since the NC service is using the line for other communication.
(Status of communication with NC service)	Connecting with NC service. Wait for communication to end.	<ul style="list-style-type: none"> In connection standby state since line is being used by anshin-net.
(Status of communication with machine manufacturer)	Connecting with machine manufacturer. Wait for communication to end.	<ul style="list-style-type: none"> In connection standby state since line is being used by machine network.

(4) Messages related to one-touch call

Message	Display in message field	Details
Carry out one-touch call? (Y/N)	Press "Y" to make a one-touch call, and press "N" to cancel. If the line is being, a connection with NC service will be established as soon as the line is idle.	<ul style="list-style-type: none"> A connection with NC service has not been established. The system is confirming whether to actually make a one-touch call.
Dialing	Do not turn the power OFF until the one-touch call is completed.	<ul style="list-style-type: none"> Data is being transmitted with one-touch call. Communication will start when "Y" is pressed in step 1, but the line is not connected yet in this state.
Connecting	Do not turn the power OFF until the one-touch call is completed.	<ul style="list-style-type: none"> The line is connected with one-touch call.
Sending	Do not turn the power OFF until the one-touch call is completed.	<ul style="list-style-type: none"> The diagnosis data is being sent with one-touch call.

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Message	Display in message field	Details
(None)	Press <input type="button" value="Call"/> to call the NC service. Do not turn the power OFF during the one-touch call.	<ul style="list-style-type: none"> • Communication with one-touch call has ended, and the line has been disconnected.
Waiting for dialing	Do not turn the power OFF until the one-touch call is completed.	<ul style="list-style-type: none"> • Redialing since the NC service is using the line for other communication.
(Status of communication with NC service)	Connecting with NC service. Wait for communication to end.	<ul style="list-style-type: none"> • In connection standby state since line is being used by anshin-net.
(Status of communication with machine manufacturer)	Connecting with machine manufacturer. Wait for communication to end.	<ul style="list-style-type: none"> • In connection standby state since line is being used by machine network.

(5) Messages related to number 1 to 3 menu operations

Message	Display in message field	Details
(None)	Press <input type="button" value="Call"/> to call the NC service. Do not turn the power OFF during the one-touch call.	<ul style="list-style-type: none"> • The selected telephone number will be set as the telephone number to be notified to the NC service. • Hereafter, the telephone number set with one-touch call or operator notification will be notified to the NC service.

(6) Messages related to random number setting

Message	Display in message field	Details
(None)	Input the new telephone number.	<ul style="list-style-type: none"> • The input telephone number will be set as the telephone number to be notified to the NC service. • Hereafter, the telephone number set with one-touch call or operator notification will be notified to the NC service.

(7) Messages related to communication errors

Message	Display in message field	Details
Modem initial error	Press one-touch call to call the NC service. Do not turn the power OFF during the one-touch call.	<ul style="list-style-type: none"> • Communication is not possible because the modem is not connected, etc.
Communication error	Press one-touch call to call the NC service. Do not turn the power OFF during the one-touch call.	<ul style="list-style-type: none"> • A communication error occurred while connected to the NC service.

(Note) If the process from start to completion of automatic alarm notification is completed while shifting to other screens, the message may not appear even if the Anshin-net screen is opened.

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5.10 Details of the anshin-net parameters

5.10.1 Anshin net param.1 screen

The notification party telephone number and comment are set on this screen. If more than 12 characters are set, the data will be echo-backed to the data setting area.

Anshin net param.1			Monitor	Setup	Edit	Diagnos	Mainte		
No.	Name	Data	No.	Name	Data				
379001	Notice tel num 1	-632-958987							
379002	Comment 1	AAA							
379003	Notice tel num 2	5321							
379004	Comment 2	HMI							
379005	Notice tel num 3	52-223-3156							
379006	Comment 3	(MS)							
RDY:MEM : :							12:34		
Anshin param.1	Anshin param.2		No.1	No.2	No.3	1-shot No.	Warning cancel	Notice Ope.	Call

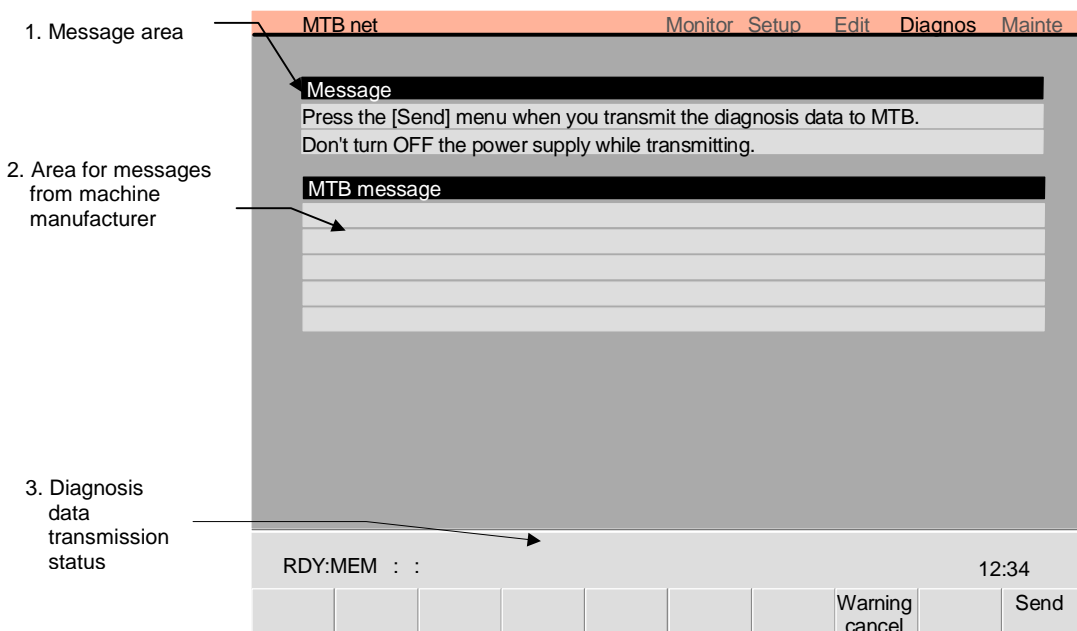
Data setting area

Number	Name	Details	Setting range (units)
379001	Notice tel num 1	Set the telephone number 1 used for one-touch call and operator notification. Hyphens "-" can be used as a delimiting character.	Within 28 characters
379002	Comment 1	Set a comment, such as the party's name, for the notification party telephone number 1.	Within 20 characters
379003	Notice tel num 2	Set the telephone number 2 used for one-touch call and operator notification. Hyphens "-" can be used as a delimiting character.	Within 28 characters
379004	Comment 2	Set a comment, such as the party's name, for the notification party telephone number 2.	Within 20 characters
379005	Notice tel num 3	Set the telephone number 3 used for one-touch call and operator notification. Hyphens "-" can be used as a delimiting character.	Within 28 characters
379006	Comment 3	Set a comment, such as the party's name, for the notification party telephone number 3.	Within 20 characters

5.11 MTB net screen

Diagnosis data can be transmitted to the machine manufacturer from this screen. The net connection state and messages from the machine manufacturer are also displayed on this screen.

The MTB net screen can be selected when the network service specifications are valid and when the base common parameter "MTB net valid" is valid.



(1) Display items

Display item	Details
1. Message	Messages, such as the machine net connection status, are displayed.
2. MTB message	Messages from the machine manufacturer are displayed. (Note 1) If the message on one line exceeds 72 characters, the excessive characters will be discarded. (Note 2) The message is held until the power is turned OFF or until another message is received from the machine manufacturer.
3. Diagnosis information transmission status	The status (NE) is displayed during transmission of the diagnosis data.

(2) Menus

Menu	Details	Type	Reference
Send	The diagnosis data is transmitted to the machine manufacturer.	B	5.11.1 Transmitting diagnosis data to the machine manufacturer
Warning cancel	The warning displayed if an error occurs when the diagnosis results are received is canceled.	B	5.11.2 Canceling network service warnings

5.11.1 Transmitting diagnosis data to the machine manufacturer

- 1)

Press the menu key Send .	➔
---	---

 The menu will be highlighted, and the message "Transmit diagnosis data? (Y/N)" will appear.

- 2)

Press "Y" or the INPUT key.	➔
---	---

 Messages indicating the status will appear in sequence, and a connection to the NC service will be established.
("Connecting" → "Waiting for the reply" → "Connecting" → "Transmitting" → "Connecting")
After establishing a connection, the diagnosis data is transmitted to the machine manufacturer. The menu highlight is turned OFF after the diagnosis data has been transmitted, and messages from the machine manufacturer will appear.

5.11.2 Canceling network service warnings

- 1)

Press the menu key Warning cancel .	➔
---	---

 The network service warning message will be erased and canceled.

(Note 1) A warning message will appear if an error occurs when reception of the diagnosis results is completed or during communication.

5.11.3 Message displays

Messages indicating the net communication state, etc., are displayed on the MTB net screen. "***" is displayed at the end of the message to indicate the transmission/reception status during transmission/reception of files.

(Note 1) The asterisks increase by one each time the operation progresses. Up to five asterisks will be displayed.

(1) Messages related to all MTB net screens

Message	Display in message field	Details
(None)	Press the Send menu to transmit the diagnosis data to the machine manufacturer. Do not turn the power OFF during transmission.	<ul style="list-style-type: none"> • Communication is not established.

(2) Messages related to transmission of diagnosis data

Message	Display in message field	Details
Transmit diagnosis data? (Y/N)	Press "Y" to transmit the diagnosis data, and "N" to cancel the process. When the line is busy, the connection will be established after the line becomes idle.	<ul style="list-style-type: none"> • The system is not connected with the machine manufacturer. • The system is checking whether to actually send the diagnosis data to the machine manufacturer.

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Message	Display in message field	Details
Dialing	Do not turn the power OFF until transmission of the diagnosis data is completed.	<ul style="list-style-type: none"> • The diagnosis data is being transmitted. • The line is not connected yet in this state.
Waiting for the reply	Do not turn the power OFF until transmission of the diagnosis data is completed.	<ul style="list-style-type: none"> • The line has been disconnected once, and the system is waiting for a connection from the machine manufacturer.
Connecting	Do not turn the power OFF until transmission of the diagnosis data is completed.	<ul style="list-style-type: none"> • A connection with the machine manufacturer is established, or the system is connected to the machine manufacturer.
Transmitting***	Do not turn the power OFF until transmission of the diagnosis data is completed.	<ul style="list-style-type: none"> • The diagnosis data is actually being transmitted.
(None)	Press the Send menu to transmit the diagnosis data to the machine manufacturer. Do not turn the power OFF during transmission.	<ul style="list-style-type: none"> • Transmission of the diagnosis data has completed, and the line has been disconnected.
Waiting for dialing	Do not turn the power OFF until transmission of the diagnosis data is completed.	<ul style="list-style-type: none"> • The machine manufacturer is using the line for other communication.
(Status of communication with NC service)	Connecting with NC service. Wait for communication to end.	<ul style="list-style-type: none"> • In connection standby state since line is being used by anshin-net.
(Status of communication with machine manufacturer)	Connecting with machine manufacturer. Wait for communication to end.	<ul style="list-style-type: none"> • In connection standby state since line is being used by machine manufacturer.

(3) Messages related to reception of the diagnosis results

Message	Display in message field	Details
Connecting	Connecting with machine manufacturer. Wait for communication to end.	<ul style="list-style-type: none"> • A connection with the machine manufacturer is established.
Receiving	Connecting with machine manufacturer. Wait for communication to end.	<ul style="list-style-type: none"> • The diagnosis results are actually being received.
(None)	Press the Send menu to transmit the diagnosis data to the machine manufacturer. Do not turn the power OFF during transmission.	<ul style="list-style-type: none"> • Reception of the diagnosis results has completed, and the line has been disconnected.

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(4) Messages related to reception of messages

Message	Display in message field	Details
Connecting	Connecting with machine manufacturer. Wait for communication to end.	<ul style="list-style-type: none"> • A connection with the machine manufacturer is established.
(None)	Press the Send menu to transmit the diagnosis data to the machine manufacturer. Do not turn the power OFF during transmission.	<ul style="list-style-type: none"> • Reception of the message has completed, and the line has been disconnected.

(5) Messages related to communication errors

Message	Display in message field	Details
Modem initial error	Press the Send menu to transmit the diagnosis data to the machine manufacturer. Do not turn the power OFF during transmission.	<ul style="list-style-type: none"> • Communication is not possible because the modem is not connected, etc.
Communication error	Press the Send menu to transmit the diagnosis data to the machine manufacturer. Do not turn the power OFF during transmission.	<ul style="list-style-type: none"> • An error occurred during communication. (Redial over, no call back, communication error, etc.)

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.

■ **When the menu **Ladder monitor** is pressed:**

The screen changes to the On-board screen. Refer to the section "6.4 On-board screen".

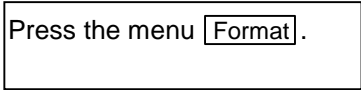

(Note) With the MELDAS610M/630M, the Custom Release screen can also be displayed by setting the parameters.

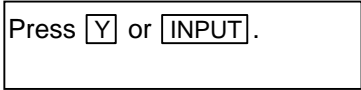

■ **When the menu **Mainte** is pressed.**

The following menus appear.

Menu	Details	Type	Reference
Psswd input	This changes the screen related to the maintenance by setting the password.	A	–
PLC stop	This forcible stops the PLC ladder process. If this menu key is pressed in the stopped state, the stop is canceled.	C	6.1 Maintenance screen (1) Display items 1. PLC stop state
To Abs pos	This changes the screen to that for setting the absolute position zero point.	C	6.2 Absolute Position Setting screen
AUX test	This changes the screen to that for testing the auxiliary axis operation.	C	6.3 AUX test operation screen
Option setting	This sets the options.	C	–
Format	This formats the NC memory.	B	–
To In/out	This changes the screen to the Data Input/Output screen.	C	3.3 Data Input/Output screen
To param	This changes the screen to the Parameter screen.	C	3.4 Parameter screens
SRAM backup	This backs up the NC SRAM information in a file (SRAM.DAT) on the HD.	B	–
HMI Quit	This quits the screen operation.	B	–

(1) Formatting the NC memory

- 1)  Press the menu .  A message appears to confirm the format.

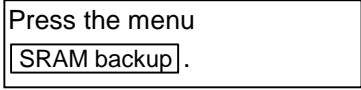

- 2)  Press or .
 The NC memory format starts.
All of the machining programs in the NC memory are erased.
Press a key other than or to cancel the formatting.

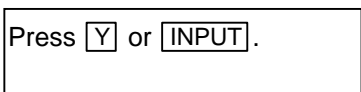



Caution

All of the various data in the NC memory is erased when formatting. Be sure to use the transfer function to move all necessary data to another storage device before formatting.

(2) Backing up the NC SRAM information

- 1)  Press the menu .  A message appears to confirm the backup execution.

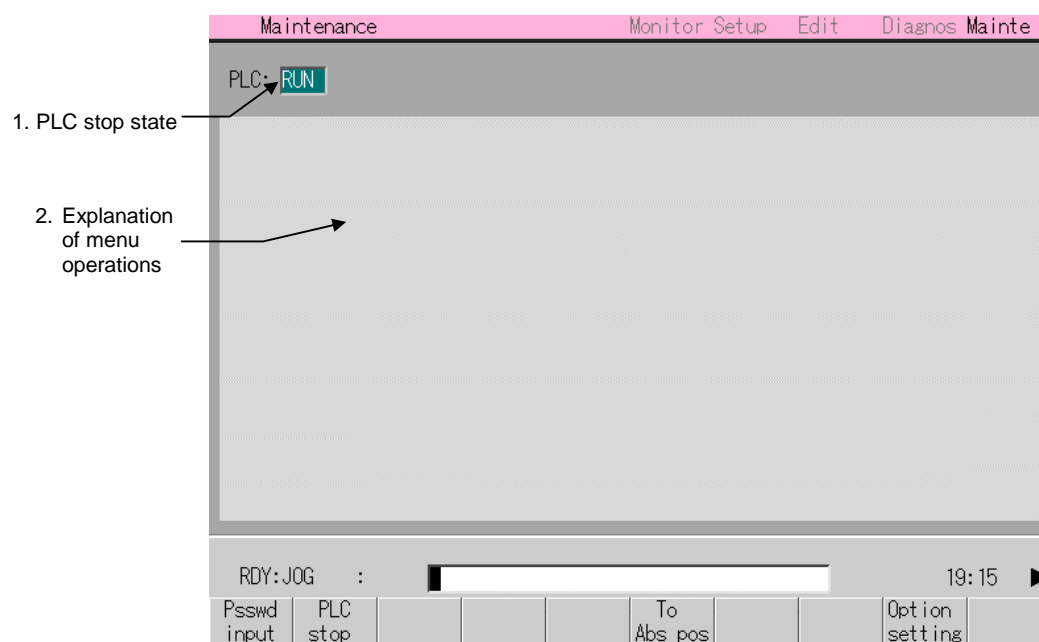
- 2)  Press or .
 The backup is executed.
The data is backed up into "D:\SRAM.DAT" on the HD.
Press a key other than or to cancel the backup.

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.

6.2 Absolute Position Setting screen

The absolute position of the servo axis (random NC axis, PLC 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. Status display → Status

2. Machine end display → Machine end

3. Various data for absolute position setting → 270004 G28 verify width

Number	Absolute posn set	X
1	Ref position set	0
270002	Ref position offset	-3.500
270003	Move amnt in pwr OFF	0.000
270004	G28 verify width	0.000
270005	No stopper	1
270006	Current lim stopper	0
270007	Max error width	0
270008	Ref position type	1

Method of init. setting abs position

1. Push [Axis select] and input the corresponding axis name. → The selected axis is displayed.
2. Push [Abs pos set]. → 'Absolute posn set' is reversed.
3. Move the axis to + or - direction with a JOG.
4. Set '1' to '1 Ref position set'.
5. Move the axis in the opposite direction to a grid point with a JOG. → The abs position is established and 'Status' changes to '*'. The axis stops automatically.
6. Restart NC system.

RDY: JOG : 19:16

Axis select Abs pos set

(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, "0" is displayed.</p> <p>(b) "1", "2" or "*" are displayed according to the zero point initialization operations.</p> <p>■ Meaning of display when using machine end stopper method</p> <p>1 : From after the "1 Ref position set" is set, to when the current limit is reached by pushing the table against the machine end.</p> <p>2 : From when the stopper current limit is reached to when the absolute position reference point (point on grid) is detected.</p> <p>* : The absolute position is established.</p> <p>■ Meaning of display when using reference point method</p> <p>2 : From after the "1 Ref position set" is set, to when the absolute position reference point (point on grid) is detected.</p> <p>* : The absolute position is established.</p> <p>(Note) With either method, "2" displays only when "270008 Ref position type" is set to "1".</p>

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Display item	Details
2. Machine end display	<p>The distance from the reference point to the grid is displayed. Display range : -99999.999 to 99999.999 (mm) (radius value display)</p> <p>■ Meaning of display when using machine end stopper method The distance from the machine end to the previous grid is displayed.</p> <p>■ Meaning of display when using reference point method The distance from the marked point to the previous grid 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.</p>
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

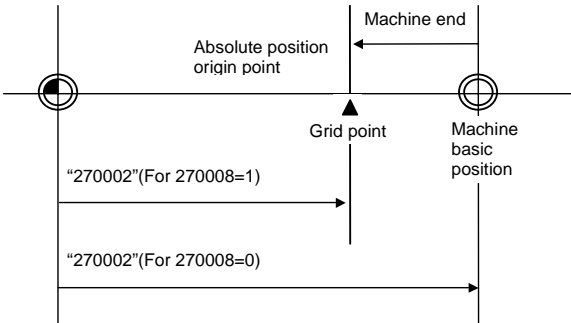
Menu	Details	Type
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: auto;">Axis select</div>	<p>This changes the display of the axis name and corresponding data. After pressing this menu, set the axis name (X, Y, S1, etc.), and press the INPUT key. The axis information appears in the selected area.</p>	A
<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. During execution: The absolute position detection data (Ref position set, Ref position offset) can be changed from the setting display unit. Canceled state: The absolute position detection data (Ref position set, Ref position offset) cannot be changed from the setting display unit.</p>	C

CHAPTER 1 SCREEN OPERATIONS
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(3) List of data related to absolute position setting

No.	Setting item	Details	Setting range
1	Ref position set	0 : The zero point initialization "270002 Ref position offset" cannot be set. 1 : Zero point initialization can be executed. 2 : The basic machine coordinate system can be reset.	0 to 2 This is set to "0" when the power is turned OFF.
270002	Ref position offset	This sets the distance of the absolute position reference point looking from the basic machine coordinate system zero point. Note that when "1 Ref position set" is set to "0", and when the absolute position detection alarm has occurred, this item cannot be set. (Note) Make the setting with the following procedure. <ul style="list-style-type: none"> • Select the detection method with the axis specification parameter "Abs On*", and turn the power ON again. • Set "Absol position" "ON". (Press menu Abs pos set.) • Set "1 Ref position set" to "1". • Set "270002 Ref position offset" • Turn the power ON again, and carry out reference point return. 	± 99999.999 (mm) (Radius value setting)
270003	Move amnt in pwr OFF	This checks the difference of the machine positions when the power is turned OFF and turned ON again. If excessive, this outputs the axis error "AX0022 Abs posn tolerance amnt over". This will be invalid when "0" is set. Set this to "0" when initializing the zero point, and set the tolerable value after turning the power ON again.	0~99999.999 (mm) (Radius value setting) 0 : Check invalid
270004	G28 verify width	Not used.	0
270005	No stopper	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).	0 : Stopper method 1 : Reference point method
270006	Current lim stopper	This sets the current limit value for initialization. The setting value is a ratio of the limit current in respect to the stall current. Calculation expression $(\text{Setting value}) = \frac{(\text{Limit current})}{(\text{Stall current [Peak]})} \times 100$	0~500 (%)
270007	Max error width	This sets the excessive error width for pushing during absolute position setting using the machine end stopper method.	0~32767 (mm)

CHAPTER 1 SCREEN OPERATIONS
6. Maintenance Screens

No.	Setting item	Details	Setting range
270008	Ref position type	<p>This selects whether the absolute position reference point is a random point (machine end or reference 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>

6.2.1 Selecting the axis

(1) Operation method

1)

Press the menu key
.



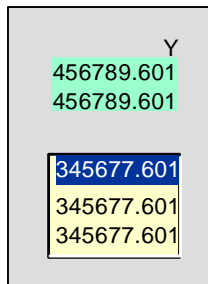
The menu is highlighted.
 The system stands by for the axis name input.

2)

Set the axis name, and press
 the key.

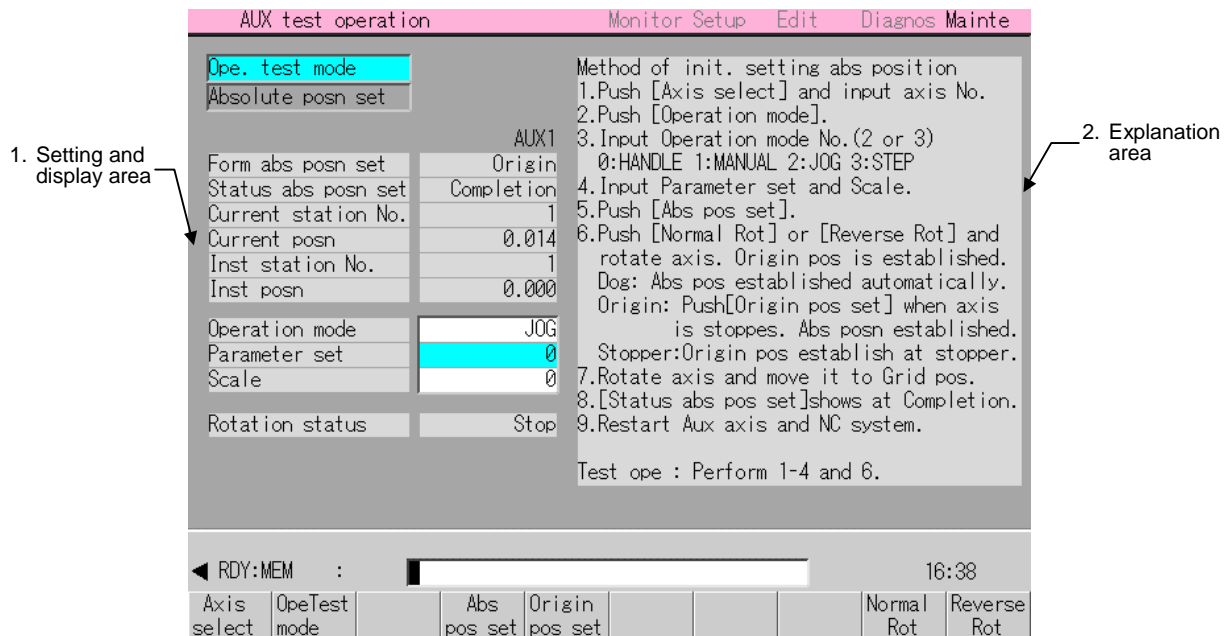


The axis name and the various data details change.



6.3 AUX test operation screen

The absolute position can be set and test operations carried out by separating the auxiliary axis control from the PLC starting forward run (or reverse run) with the menu operations. The screen is provided with the setting and display area on the left, and an explanation area on the right.



(1) Display items

Display item	Details	Display details and range
1. Setting and display area		
Ope. Test mode	This is highlighted when the absolute position can be initialized or test operation is possible. This cuts off the signals from the PLC.	
Absolute posn set	This is highlighted when the absolute position can be initialized.	
Form abs posn set	This displays the initialization method of the absolute position set with the auxiliary axis parameter "700120 ABS Type".	Dog / Stopper / Origin method
Status abs posn set	This displays the initialization state of the absolute position.	Refer to the table "Position setting display item" in CHAPTER 3 MAINTENANCE section "5.1.1 Initialization".
Current station No.	This displays the number of the currently stopped station.	This follows the "#700100 station*" setting.
Current posn	This displays the current coordinate position.	0 to 360°
Inst station No.	This displays the commanded station number for automatic operation, or the nearest station number to be stopped at for manual operation.	This follows the "#700100 station*" setting.
Inst posn	This displays the coordinate position corresponding to the target station number.	0 to 360°

CHAPTER 1 SCREEN OPERATIONS
6. Maintenance Screens

Display item	Details	Display details and range
(Continued from the previous page)		
Operation mode	This displays the currently selected operation mode.	0: Handle 1: Manual 2: JOG 3: Incremental
Parameter set	This displays the number of the currently selected operation parameter group.	0: Operation parameter group 1 1: Operation parameter group 2 2: Operation parameter group 3 3: Operation parameter group 4
Scale	This displays the feed amount scale. (Feed amount) = 0.001 degree × (Scale)	0: 1-fold 1: 10-fold 2: 100-fold 3: 1000-fold
Rotation status	This displays the state of the auxiliary axis.	Normal rot / Reverse rot / Stop
2. Explanation area	This displays the initialization procedures for the auxiliary axis absolute position detection.	

(2) Menus

Menu	Details	Type
Axis select	This designates the number of the auxiliary axis for which initialization or test operation is to be carried out. After pressing this menu, set the auxiliary axis number 1 to 6, and then press the INPUT key. The information on that axis will appear in the selected area. The default value is 1.	A
OpeTest mode	This changes the designated axis to the operation adjustment mode. Absolute position initialization and test operation are not possible in modes other than the operation adjustment mode. If the operation adjustment mode valid signal is not ON, or if the auxiliary axis is being executed, the operation adjustment mode cannot be entered.	C
Abs pos set	This changes the absolute position initialization mode for the designated axis. The absolute position can be set by starting in this state. This menu can be selected only in the operation adjustment mode.	C
Origin pos set	When the display item "Form abs posn set" is set to origin point method, press this key at the position to be used as the origin point. The absolute position will then be set at this position.	C

CHAPTER 1 SCREEN OPERATIONS
6. Maintenance Screens

Menu	Details	Type
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: auto;">Normal Rot</div>	<p>The menu will be highlighted and forward run operation will start. This menu cannot be selected unless the operation adjustment mode is selected.</p> <p>Handle : Starting from the menu is not possible.</p> <p>Manual and JOG : When pressed again during forward run the operation will stop. When pressed during reverse run the operation will stop once, and then forward run will start.</p> <p>Incremental : This key is invalid when operation has started. When stopped, the highlight will be automatically released.</p>	C
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: auto;">Reverse Rot</div>	<p>The menu will be highlighted and reverse run operation will start. This menu cannot be selected unless the operation adjustment mode is selected.</p> <p>Handle : Starting from the menu is not possible.</p> <p>Manual and JOG : When pressed again during reverse run the operation will stop. When pressed during forward run the operation will stop once, and then reverse run will start.</p> <p>Incremental : This key is invalid when operation has started. When stopped, the highlight will be automatically released.</p>	C

(Note) Refer to section "5. Operations Related to Auxiliary Axis " in "CHAPTER 3 MAINTENANCE" for details on initializing the auxiliary axis absolute position, and carrying out test operation.

6.3.1 Selecting the axis

(1) Operation method

- 1)

Press the menu key

Axis select

 .

➔

The menu is highlighted.
 The system stands by for the axis name input.

- 2)

Set the axis name, and press the

INPUT

 key.

➔

The axis name and the various data details change.

Y

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6.4 On-board screen

Press the following keys to start up the On-board screen.

For MELDAS 610/630M : F0 key on operation board

For MELDAS 615/635M : Ladder monitor menu key displayed on screen **(Note)**

(Note) The MELDAS610/630M does not have the Ladder monitor menu key.

With the On-board screen, the sequence circuit operation can be confirmed, the circuit edited, and the sequence circuit saved into FROM.

However, with the MELDAS 610/630M, the F0 key used to change to the On-board screen is also used to change to the Custom Release (APLC) screen. Thus, the bit selection parameter must be designated beforehand to indicate which screen to change to when the key is pressed.

The methods for starting the On-board screen, the specifications, parameters and options are shown below.

■ Display screen

Model	Displayed screen	
	#51/bit0=0	#51/bit0=1
MELDAS 610/630	Customer Release screen	On-board screen
MELDAS 615/635	On-board screen	

■ Operations on On-board screen

Possible operations	On-board function options	
	When valid	When invalid
Monitor function (ladder monitor)	○	○
Editing function	○	×
ROM-writing function	○	○

When options are invalid, the circuit monitor can be displayed, but the circuit cannot be edited. The ROM-writing function menu can be used regardless of the provision of options.

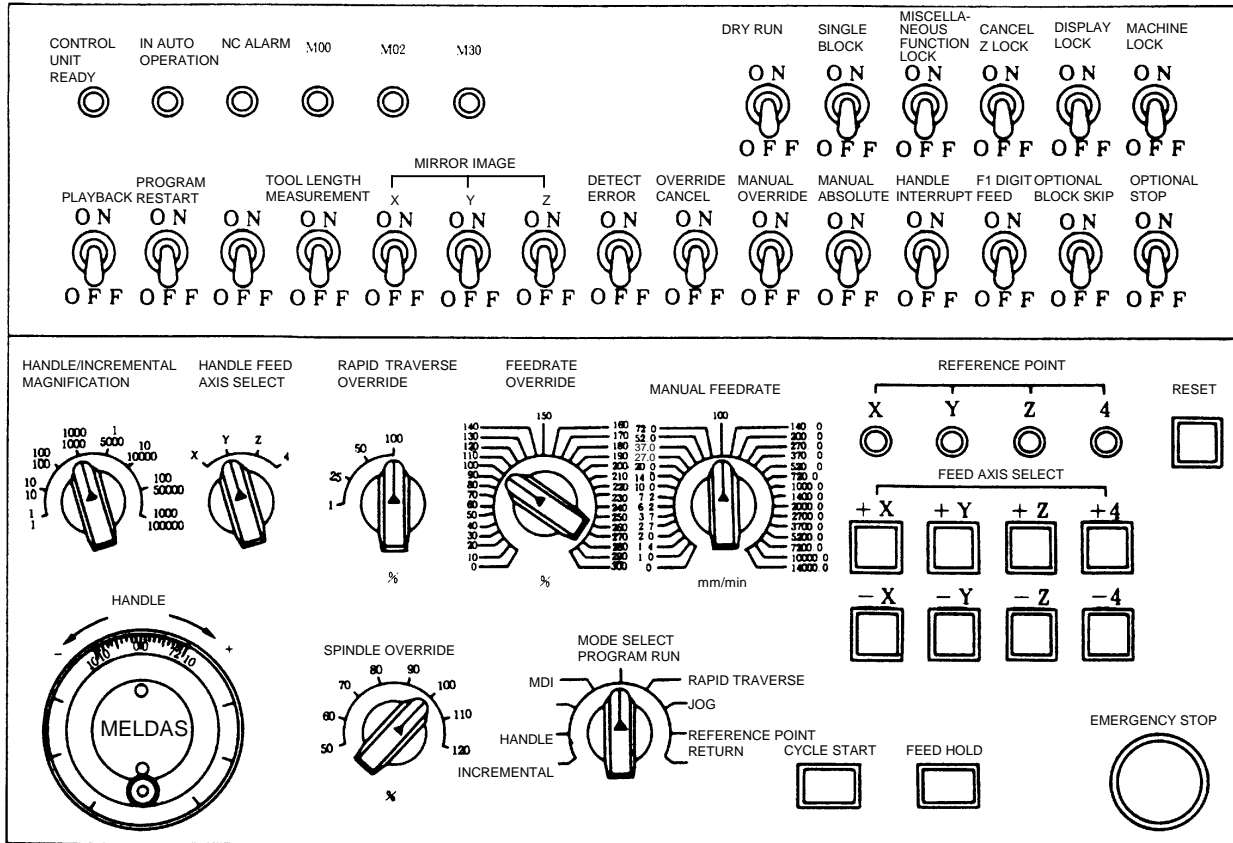
The screen configuration and specifications may differ according to the machine manufacturer. Refer to the manual issued by each machine manufacturer for details. Refer to the following manual for details on the On-board screen operation and displays, etc.

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 operation (automatic operation and manual operation) by using the illustration of the machine operation panel. 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.



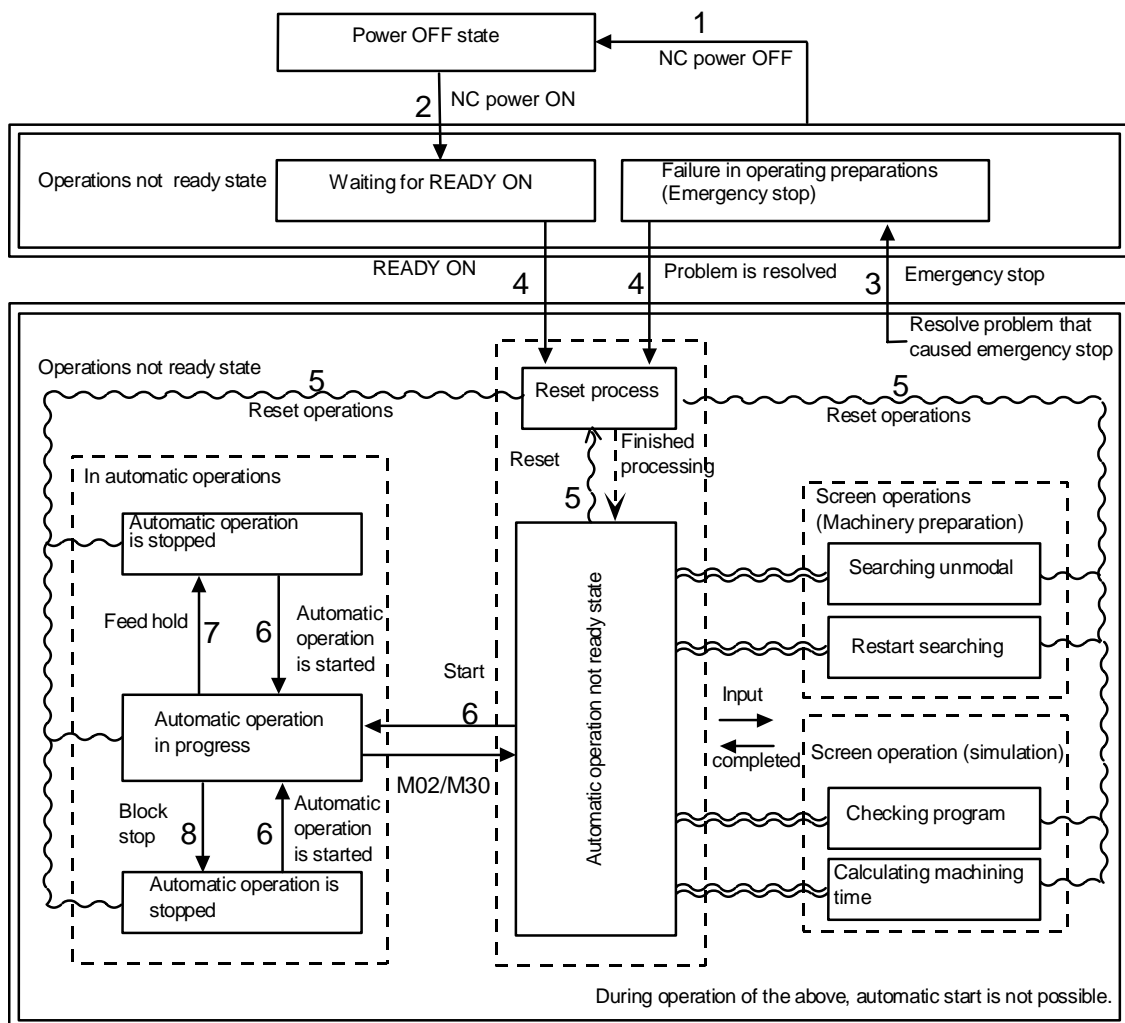
1. Operation State

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 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 and display unit is pressed.
- When POWER OFF signal is input from the machine.
- When power supplied from the machine to NC unit is turned OFF.

1.3 Run 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 and display unit is OFF.

- (1) From power OFF to not ready (transition (2))
 - When the POWER ON switch of the setting and 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 and display unit screen; or
 - When any of the following alarms is displayed on the setting and 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 and 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 ready (transition (4))

This state is also called initial state.
- (2) From another ready state to reset (transition (5))
 - When the RESET key on the setting and display unit is turned ON;
 - When external reset signal is input from the machine; or
 - 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 ready state to automatic operation start (transition (6))
 - When the CYCLE START switch on the machine operation panel is pressed in automatic mode.

CAUTION



Stay out of the moveable range of the machine during automatic operation. During rotation, keep hands, feet and face away from the spindle.

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; or
- 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; or
- When automatic mode input is changed to another automatic mode input.
- Operation has stopped with a program error.

2. Indicator Lamps

2.1 "Control 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 to manual mode during the automatic operation.

2.5 Return to reference point

Output is executed when the controlled axis arrives at the reference point during manual and automatic reference point return.

2.6 NC alarm

The ALARM lamp goes on when an alarm occurs during NC operation.

2.7 M00

If M00 given in a program is executed during automatic operation, automatic operation stop is performed after execution of the M00 block is completed. The M00 lamp is turned on. (This depends on PLC processing.)

2.8 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 PLC processing.)

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 and 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.

3.2 Emergency stop button


The EMERGENCY STOP button is a red mushroom-shape pushbutton. The unready state is set by pressing the EMERGENCY STOP button. During emergency stop, the READY lamp goes OFF and auto 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.

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 emits an abnormal noise, immediately press the emergency stop button 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 the mode to move the controlled axis consecutively at manual feedrate.

Rapid traverse feed mode:

Select the mode to move the controlled axis consecutively at rapid traverse feedrate.

Return to reference point mode:

Select the mode to position the controlled axis at the machine reference point manually.

Incremental mode:

Select the mode to move the controlled axis at a given distance.

Handle feed mode:

Select the mode to move the controlled axis by using the manual handle.

Program run mode:

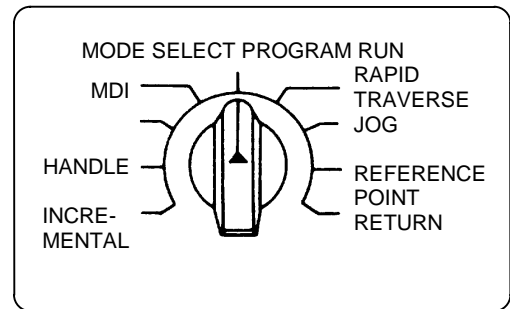
Select to automatically run the machining program.

Select to carry out an operation search of the device (memory, RS-232C, HD/data server, FLD, IC Card) stored in the machining program to be run.

MDI mode:

Select the mode for MDI operation.

(Note 1) See 1.4 for the running state when a change is made to another mode during automatic operation.



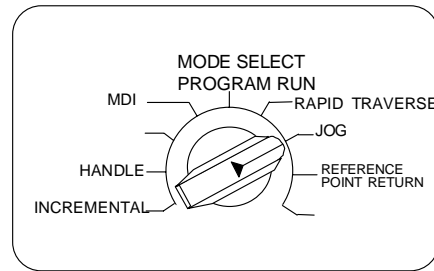
4.2 Jog feed mode

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.

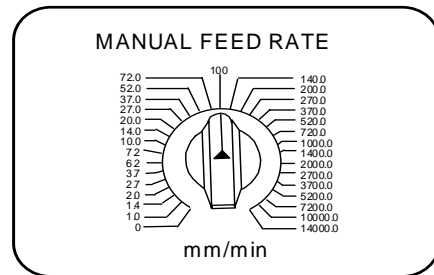
See Section 5.3 for the MANUAL FEEDRATE switch.

Operation procedure

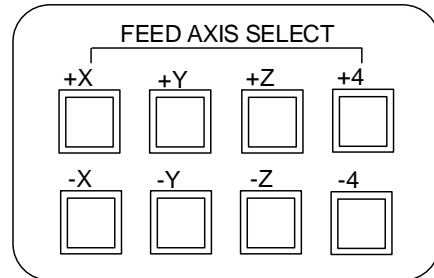
Using the MODE SELECT switch, select the jog mode.



Using the MANUAL FEEDRATE switch, set the feedrate. The feedrate unit is the travel distance (mm) per minute.



To move the controlled axis, turn on the FEED AXIS SELECT switch. The controlled axis is moved while the switch is turned on. When the switch is turned off, the controlled 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 feed mode


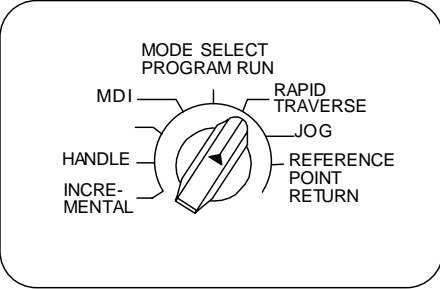

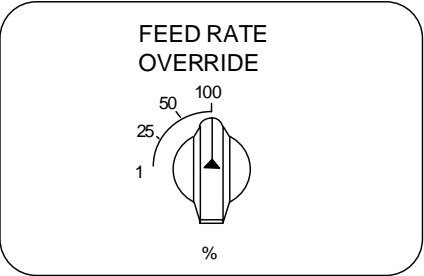

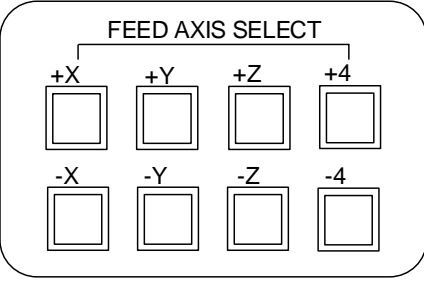
The rapid traverse feed mode enables the machine to be moved consecutively at rapid traverse feedrate manually.

The rapid traverse feedrate can be changed in four steps by using the RAPID TRAVERSE OVERRIDE switch. The rapid traverse feed 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 feedrate.

(Note 2) See Section 5.1 for the RAPID TRAVERSE OVERRIDE switch.

Operation procedure

<p>Using the MODE SELECT switch, select the rapid traverse feed mode.</p>		
<p>Using the RAPID TRAVERSE OVERRIDE switch, set any desired override value.</p>		
<p>To move the controlled axis, turn ON the FEED AXIS SELECT switch. The controlled axis is moved while the switch is turned ON. When the switch is turned OFF, the controlled axis stops with deceleration.</p>		

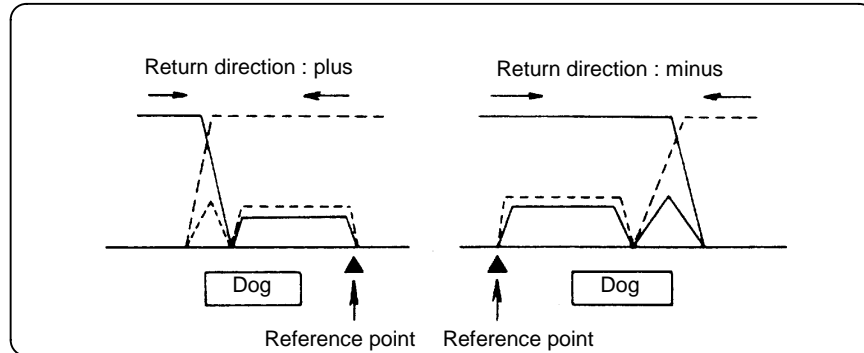
(Note 1) The override value set by using the CUTTING FEED OVERRIDE switch is not effective for the rapid traverse feedrate; when the override value is 0%, the controlled axis does not move.

4.4 Reference point return mode

This mode enables a given controlled axis to be manually returned to a determined position unique to the machine (reference point).

The first reference point return after the NC power is turned ON is carried out in the dog mode. In the second or later reference point return, the dog mode or high speed return can be selected by setting a given parameter.

Patterns of reference point return are shown below.



Dog mode reference point return

The following type of reference point return operation will take place during the first reference point return after the power is turned ON or when dog-type is selected with the parameters.

- (1) The controlled 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 controlled axis carries out a deceleration stop.
- (3) Next, the controlled axis moves to the reference point at the approach rate set in the parameter.
- (4) When it arrives at the reference point, the reference point arrival signal is output.

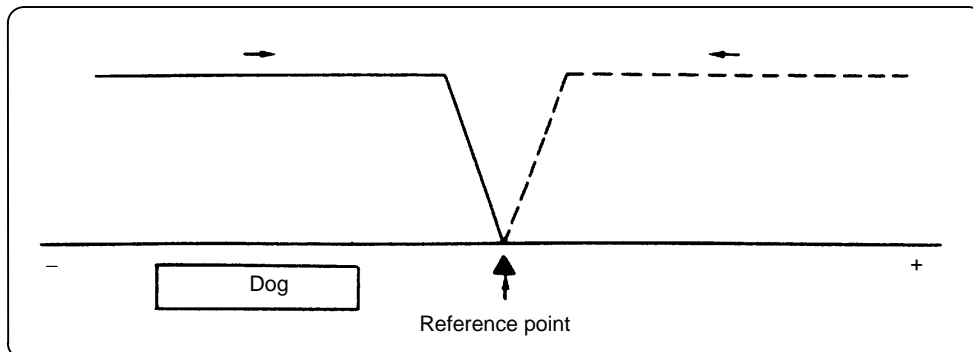
High speed return to reference point

If high speed return is set in a given parameter after dog mode return to reference point is executed, then high speed return to reference point will be made.

When using the absolute position detection method, the high-speed reference point return will always be carried out.

If the return direction is erroneous in high speed reference point return, an alarm occurs.

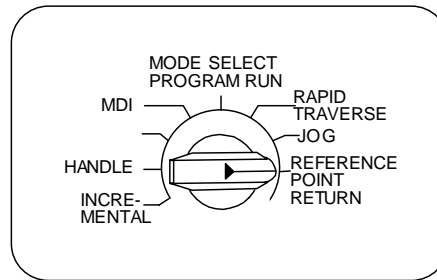
A return reference point at the rapid traverse feedrate.



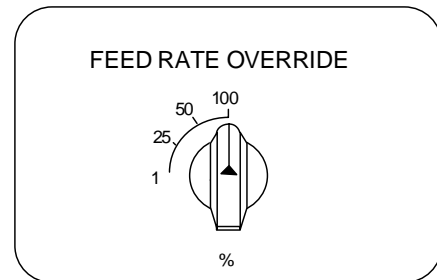
CHAPTER 2 MACHINE OPERATIONS
4. Operation Mode

Operation procedure

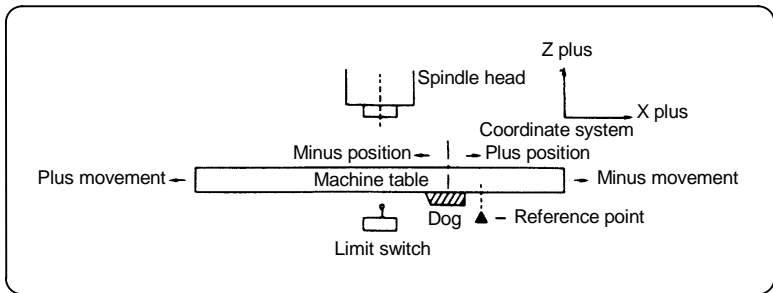
Using the MODE SELECT switch, select the reference point return.



Using the RAPID TRAVERSE OVERRIDE switch, set any desired override value.

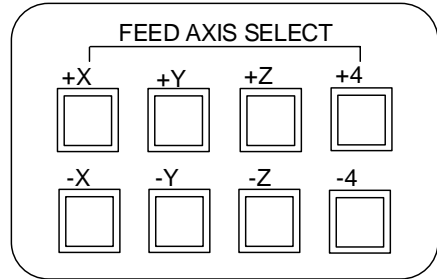


Check the current machine position.



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 plus FEED AXIS SELECT switch.



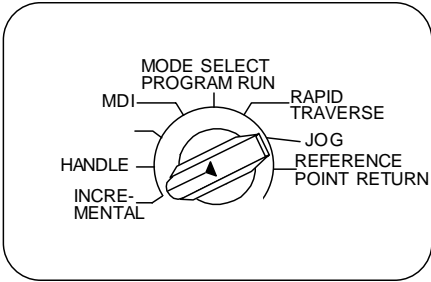
For dog mode reference point return, turn ON the FEED AXIS SELECT switch (+ or -) in the direction where the dog and limit switch approach each other. For high-speed reference point return, turn ON the FEED AXIS SELECT switch (+ or -) in the direction that the spindle head approaches the reference point. Hold the FEED AXIS SELECT switch ON during reference point until the machine passes by the dog (dog mode) or the REFERENCE POINT ARRIVAL lamp goes ON (high speed return).

4.5 Incremental feed mode

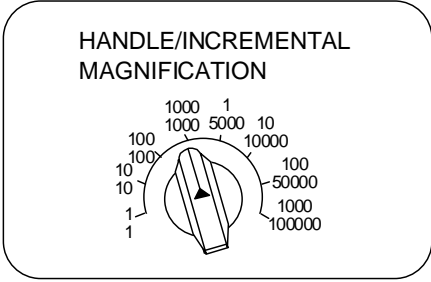
The incremental feed mode enables the controlled axis to be moved a given distance selected by using the HANDLE/INCREMENTAL MAGNIFICATION switch at the manual feedrate when the FEED AXIS SELECT switch is ON.

Operation procedure

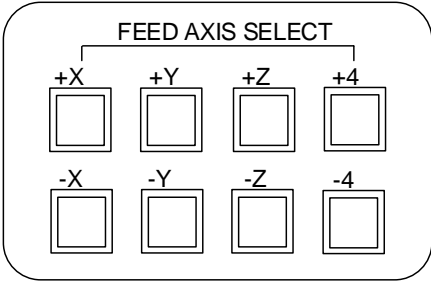
Using the MODE SELECT switch, select the incremental feed mode.



Using the HANDLE/INCREMENTAL MAGNIFICATION switch, set a travel distance.



The controlled axis selected by turning ON the FEED AXIS SELECT switch once is moved at a given distance.



4.6 Handle feed mode

The controlled axis can be moved by turning the manual handle.

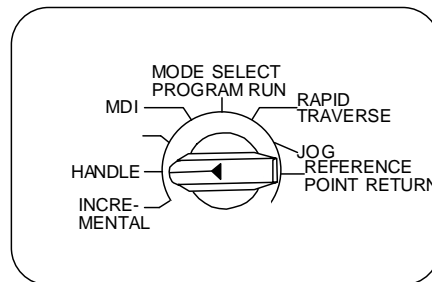
The travel distance per graduation of the handle depends on how the HANDLE/INCREMENTAL MAGNIFICATION switch is set.

The axis that can be moved by using the manual handle is determined by setting the HANDLE FEED AXIS SELECT switch.

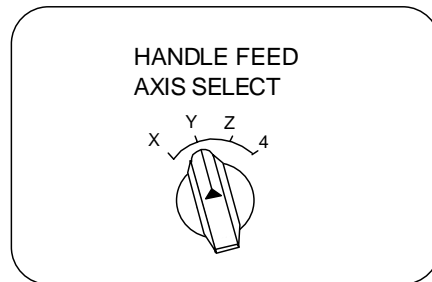
(Note 1) For 3-axis handle feed specifications, the three handles are controlled corresponding to the respective X, Y and Z axes. Changeover to 4-axis specifications by selecting the handle for the Z axis.

Operation procedure

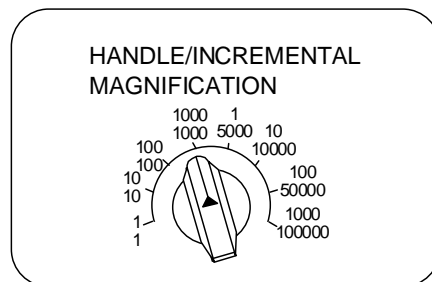
Using the MODE SELECT switch, select the handle feed mode.



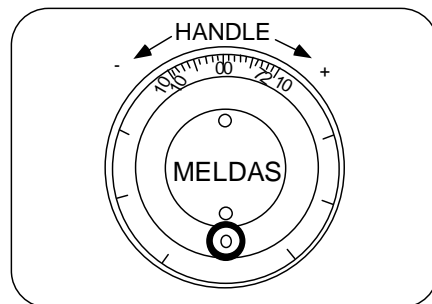
Using the HANDLE FEED AXIS SELECT switch, select the controlled axis to be moved.



Using the HANDLE/INCREMENTAL MAGNIFICATION switch, set the travel distance per graduation of the handle.



Move the axis by turning the HANDLE in the required 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".

4.7 Program run mode

A machining program is called and automatic operation is executed.

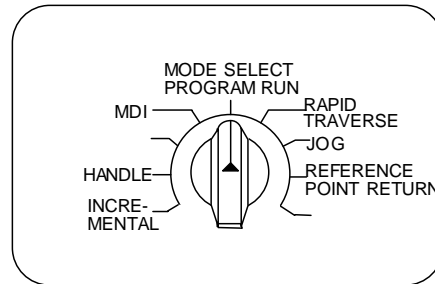
Operation procedure

Call the machining program for memory operation by using the setting and display unit.
 At this time, designate the device (memory, RS-232C, HD/data server, FLD, IC Card) from which the machining program will be called.

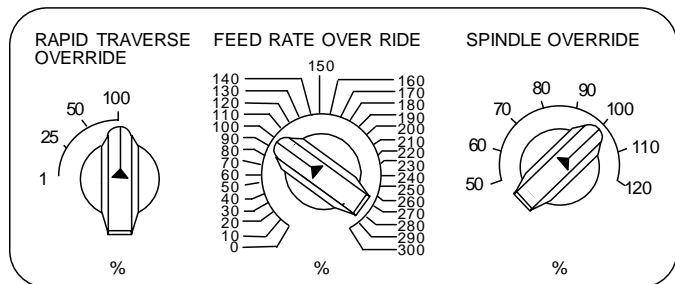
(Refer to the section on operation searches in the Operation Manual.)

Check whether or not the machining program is called normally.

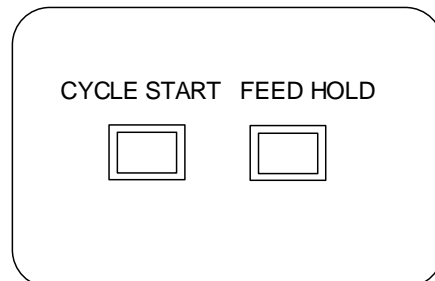
Using the MODE SELECT switch, select the memory mode.



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 controlled axes being moved stop with deceleration.

CHAPTER 2 MACHINE OPERATIONS


4. Operation Mode

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 operator panel is turned ON.

To forcibly terminate automatic operation, turn ON the RESET switch.

CAUTION

-  Carry out dry operation before actually machining, and confirm the machining program, tool offset and workpiece coordinate system offset.

4.8 MDI operation mode

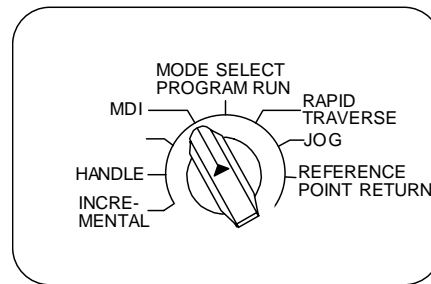
In the MDI operation mode, automatic operation is executed by using a program set on the CRT setting and display unit MDI screen.

Operation procedure

The MDI operation follows the memory operation.

Set data on the setting and display unit MDI screen.

Using the MODE SELECT switch, select the MDI mode.



The following steps are the same as the memory operation steps. See 4.7.

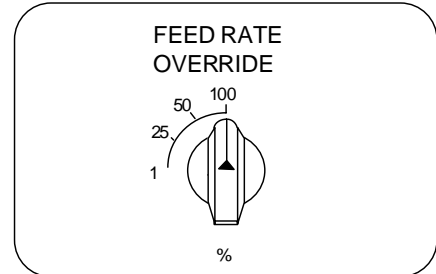
5. Operation Panel Switches in Operation Mode

5.1 Rapid traverse override

Use the RAPID TRAVERSE OVERRIDE switch to override the rapid traverse feedrate in automatic or manual operation.

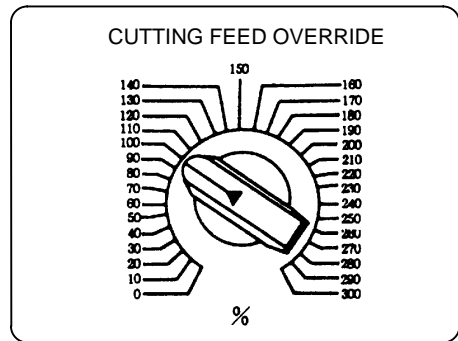
RAPID TRAVERSE OVERRIDE is applicable to the following:

- Automatic operation: G00, G27, G28, G29, G30
- Manual operation: Rapid traverse, return to reference point, incremental feed



5.2 Cutting feed override

Use the FEEDRATE OVERRIDE switch to override the feedrate in automatic operation (G01, G02, or G03F 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 rate in automatic operation.



(Note 1) The dry run rate is the movement rate set by using the MANUAL FEEDRATE switch by overriding the programmed feedrate in automatic operation.

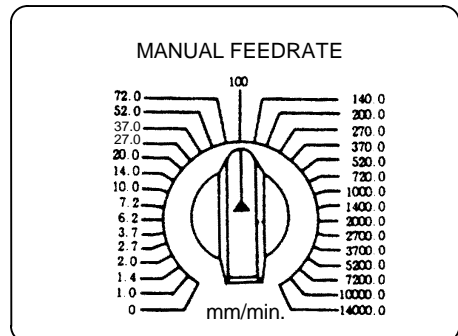
(Note 2) See Section 6.7 for feedrate override applied to manual feedrate.

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 14000.0 mm/min.

When the MANUAL OVERRIDE switch (interrupt 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.

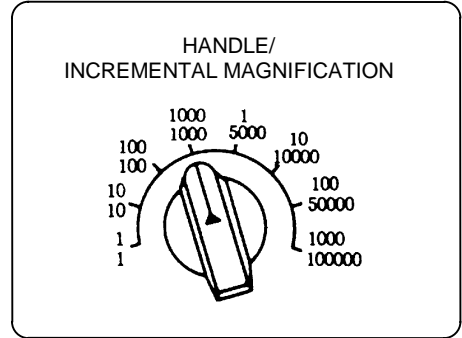
Manual feedrate (mm/min)				
0.	7.2	72	720	7200
1.0	10.0	100	1000	10000
1.4	14.0	140	1400	14000
2.0	20.0	200	2000	
2.7	27.0	270	2700	
3.7	37.0	370	3700	
5.2	52.0	520	5200	



5.4 Handle/incremental feed magnification factor

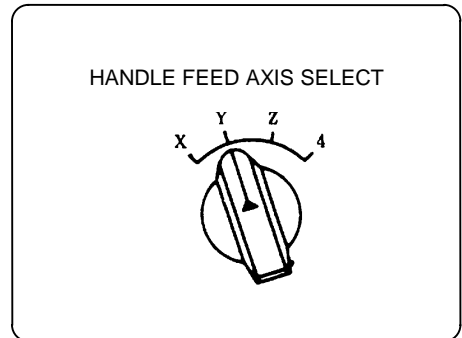
Use the HANDLE/INCREMENTAL MAGNIFICATION switch to set the travel distance specified when manual handle feed or incremental feed is made.
 The travel distances for each axis are listed below:
 (Up to 1000 can be set for handle feed.)

Handle	Incremental
1	1
10	10
100	100
1000	1000
1	5000
10	10000
100	50000
1000	100000



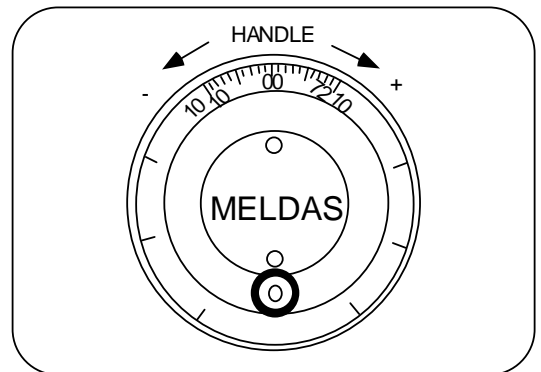
5.5 Handle feed axis selection

Use the HANDLE FEED AXIS SELECT switch to select the axis moved by handle operation when the handle mode is selected.



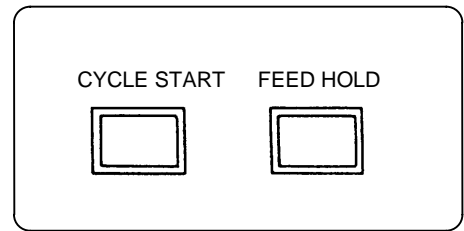
5.6 Manual pulse generator

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 revolution 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.

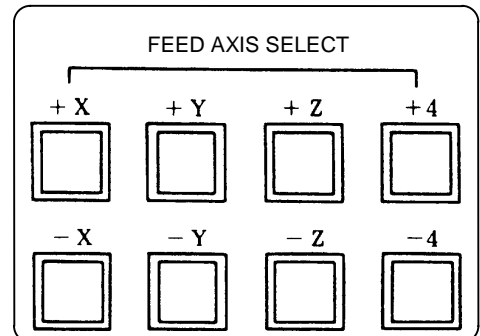


The CYCLE START switch is validated when the switch is turned ON, then OFF.

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 controlled axis during manual operation. While the FEED AXIS SELECT switch is ON, the selected controlled axis is moved. When the switch is turned OFF, the controlled 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 and automatic operation without moving the machine.
The current position display of the setting and display unit is incremented.
- (2) Either the command speed or the machine lock speed can be selected with the control parameter (#320004 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 the high speed of 60m/min., 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 120072.)
- (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 finishes.
- (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 Display lock

- (1) By turning ON the "DISPLAY LOCK" switch, the machine will move for the movement by automatic and manual operation, but the current position display of the setting and 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 finishes.
- (3) Use this switch when shifting the program zero point with the manual interrupt, without changing the value on the display.

6.3 Cancel Z lock

- (1) By turning ON the "CANCEL Z LOCK" switch, NC commands can be executed for the movement by automatic operation, without moving the machine in the Z axis only.
The Z axis does not move, but the current position display of the setting display unit is incremented.
- (2) The Z axis moves by manual operation even when the CANCEL Z LOCK switch is turned ON.
- (3) If the "CANCEL Z LOCK" switch is changed over during automatic operation, the new switch setting is validated when the automatic operation stops after the block being executed finishes.
- (4) In reference point returns (G28, G30), the axis is controlled to the middle point in a canceled Z axis state, but this state is ignored after the middle point.

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) M, S, T, B function code data is made, but the start signal is not output.
- (3) If the MISCELLANEOUS FUNCTION LOCK switch is changed during command execution, automatic operation stops after the block being executed is terminated. Then, it becomes effective.

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).

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

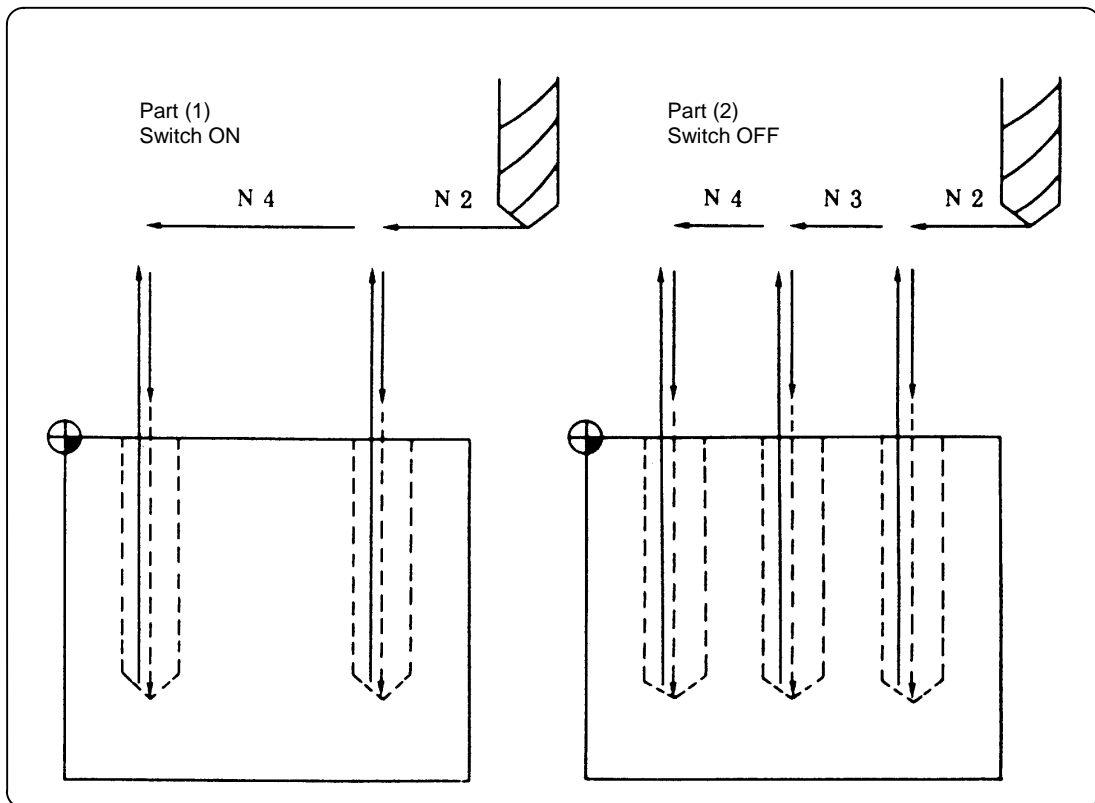
- (1) If M01 is programmed, the machine automatically stops by turning ON the OPTIONAL STOP switch. When the switch is OFF, M01 is ignored and the machine does not stop.
- (2) The machine stops after the M01 block is executed.

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.

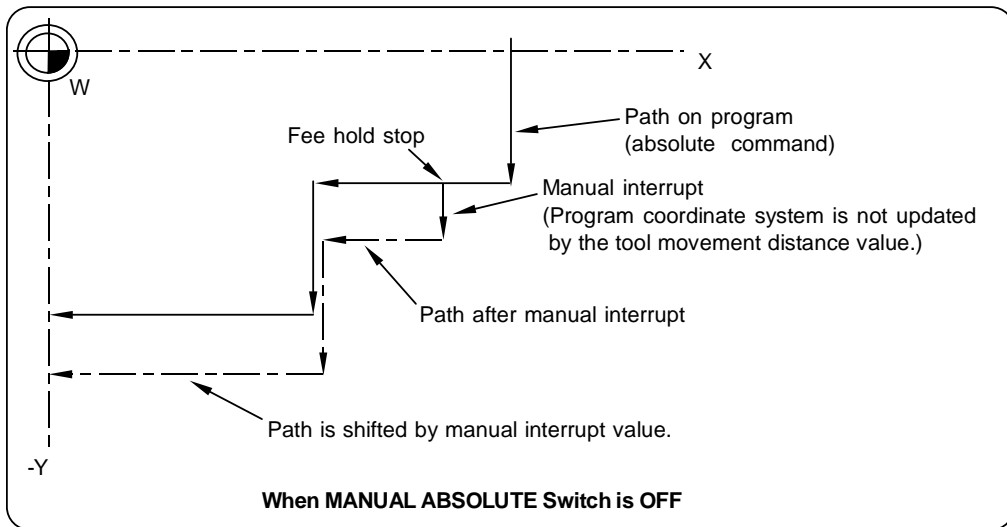
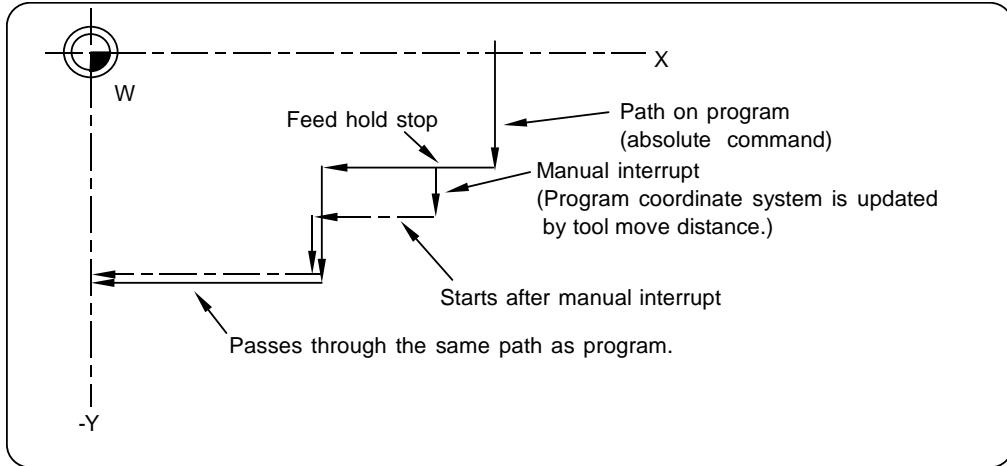
(Example) To work two parts as illustrated below, if the following program is prepared and work is made by turning ON the OPTIONAL BLOCK SKIP switch, part (1) is provided; if work is made by turning OFF the switch, part (2) is provided:

```
Program N1G54 ;  
N2G90G81X50. Z-20. R3. F100 ;  
/N3X30. ;  
N4X10. ;  
N5G80 ;  
M02 ;
```



6.11 Manual absolute

When the MANUAL ABSOLUTE switch is turned ON, the program coordinate system is updated by 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 that before manual movement when the automatic operation is started. If the switch is OFF, the program coordinate system is updated by manual tool move distance.



(Note) A "switch ON" status normally results when there is no Manual Absolute switch. Note that depending on the machine manufacturer, a "switch OFF" status may result. Therefore, refer to the specifications issued by the machine manufacturer.

6.12 Mirror image

(1) Outline

When cutting a shape having bilateral symmetry, this function can be used to machine either the right or left side of the shape from the program for the other side, thus saving programming time. The mirror image function is effective in this case.

For example, when there is a program for machining the left side of the shape shown in the following drawing, a symmetrical shape to the left side shape can be machined on the right side by applying the mirror image function and running the same program.

Be sure the machining program starts and finishes at the mirror center.

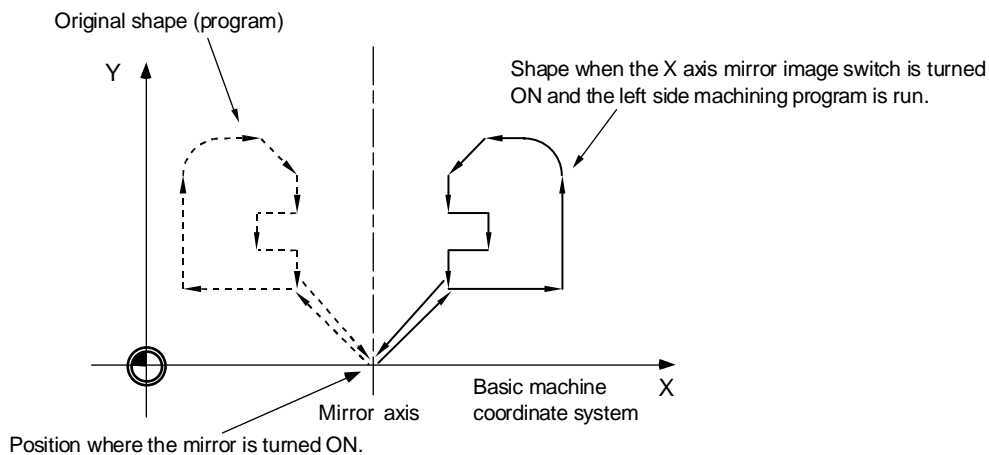
Mirror image includes external switch mirror image, parameter mirror image, G command mirror image, etc. The external switch mirror image and parameter-controlled mirror image are explained here. (Refer to the Programming Manual for information on G command mirror image.)

External switch mirror image : The mirror image function is controlled with the MIRROR IMAGE switch installed on the machine operation panel.

Parameter mirror image : The mirror image function is controlled using the NC unit screen (Axis param screen).

(Note) Refer to the Operation Manual issued by the machine manufacturer for information on the operation panel MIRROR IMAGE switch.

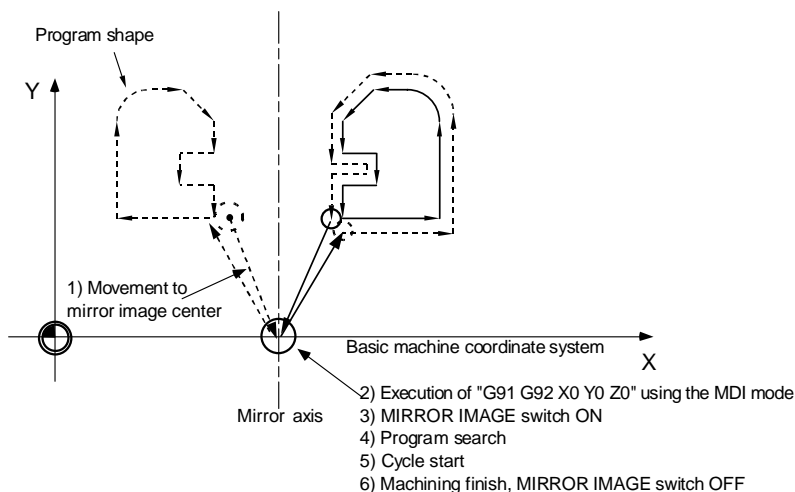
The mirror image can be validated/invalidated for each axis in both external switch mirror image and parameter mirror image.



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(c) Example of operation with an external switch

- 1) Move the axis to the mirror image center using a the JOG mode.
- 2) Execute "G91 G92 X0 Y0 Z0" using the MDI mode.
- 3) Turn ON the MIRROR IMAGE switch.
- 4) Search for the program to which mirror image will be applied.
- 5) Press the CYCLE START switch to start the program.
- 6) Turn OFF the MIRROR IMAGE switch when the machining is finished.

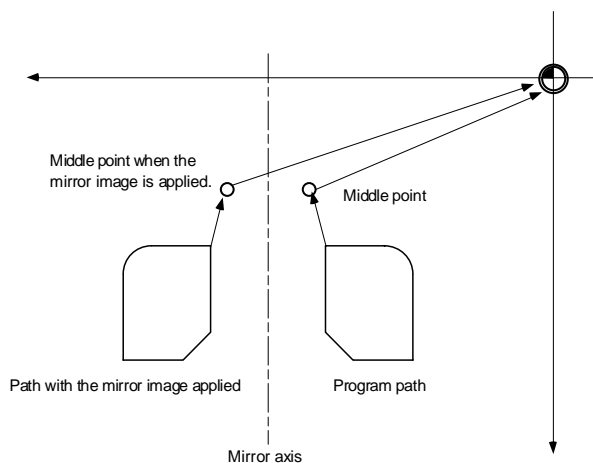


(Note) If an "NC reset" or "Machining program restart" is carried out during operation with 3) MIRROR IMAGE switch ON, the mirror image center will move to the "Restart position" and the coordinate system will shift.

(3) Combination with other functions

(a) Zero point return command (G28, G30) during mirror image

When a zero point return command (G28, G30) is issued during mirror image, the mirror image is valid in the operation until the middle point, but is invalid in the operation from the middle point to the zero point.



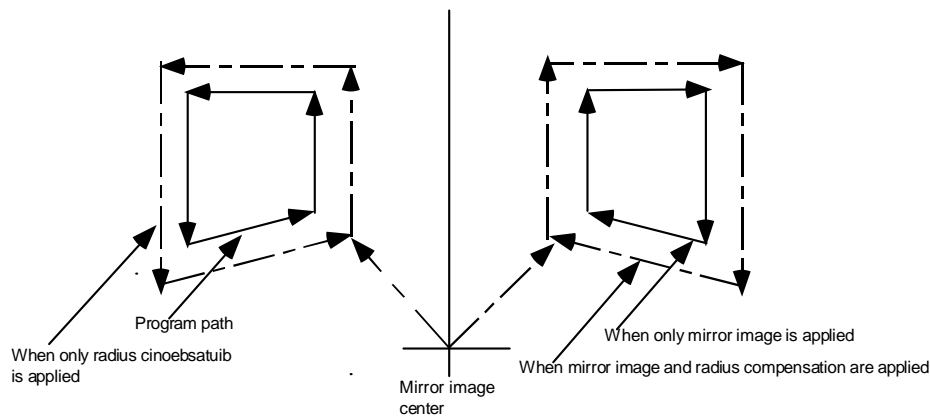
CHAPTER 2 MACHINE OPERATIONS
6. Operation Switch Functions and Other Functions

(b) Zero point return command (G29) from the zero point

When a zero point return command (G29) is issued from the zero point, the middle point becomes the middle point passed through during the previous zero point return command (G28, G30), unrelated to the current mirror state. The axis moves following the current mirror state (ON/OFF) for operations after the middle point.

(c) Radius compensation commands (G41, G42) during mirror image

Because the mirror image is processed after the radius compensation (G41, G42) is applied, the cutting is carried out as follows.



(d) Machine coordinate system selection (G53)

The mirror image is not applied for positioning by a G53 command. Issue the next movement command in the G90 mode.

(e) Fixed cycle (G76, G87)

The mirror image is not applied to shift operations in the XY direction for G76 and G87 commands.

The mirror image is applied to positioning operations.

(f) Handle interrupt

When the manual ABS is ON, the handle interrupt amount is reflected on the workpiece coordinate system counter, and the workpiece coordinate system does not shift. Because of that, the mirror center also does not shift.

When the manual ABS is OFF, the handle interrupt amount is not reflected on the workpiece coordinate system counter. The amount is held as an interrupt amount, and the mirror center shifts.

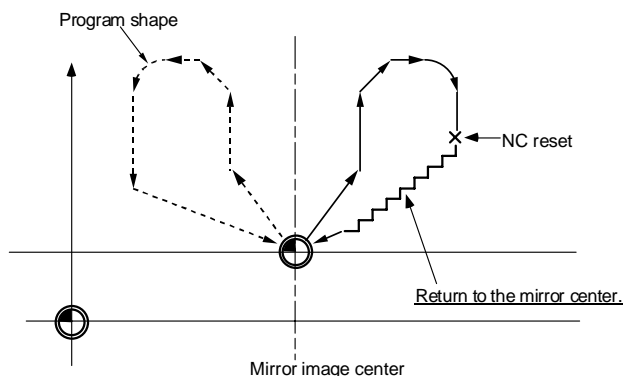
(4) Precautions

(a) Reset and mirror image cancel

The mirror image center is canceled by the NC reset (including M02, M30 internal resets). The next time the mirror image center will be established is when an automatic start is carried out. This operation enables the mirror image center to be changed with the mirror image ON using a simple operation, so that another shape can be machined after the machining finishes.

Be sure to move the axis to the mirror image center with the manual handle, etc. before carrying out an automatic start when restarting the same machining program.

Be sure the final command M02 (or M30) position is at the mirror image center (program start position) when repeating the same machining program.



NC reset during operation

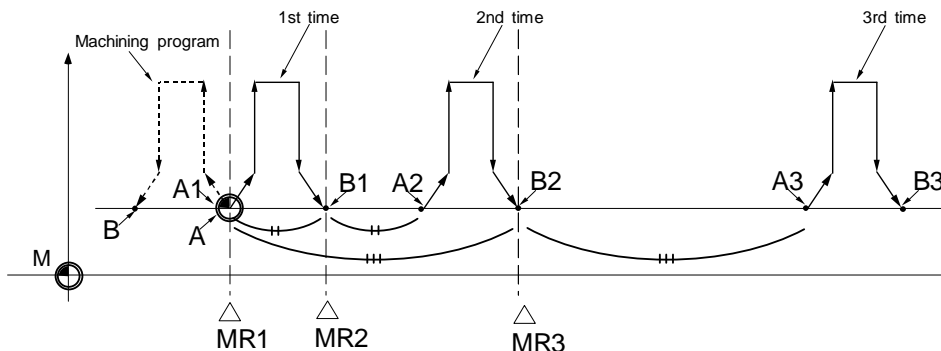
< Program example when repeating the program >

```

G90 G0 X0 Y0 ; ..... Program start position
      X___ Y___ ;
      :
G0 X0 Y0 ; ..... Return to program start position.
M02 ; ..... NC reset
    
```

If the NC is reset at a point other than the mirror image center, and the same machining program is restarted, the mirror image center will move to that location. The coordinate system will shift.

If the machining program is repeated without returning to the mirror image center (program start position), the positioning point shifts from A1 → A2 → A3 as shown in the following drawing, and does not go to the desired position. This means the end point shifts from B1 → B2 → B3. At this point the M02 reset and automatic start is carried out, because the mirror image center moves from MR1 → MR2 → MR3.



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< Example of a machining program in which the mirror image center shifts >

```

G90 G0 X0 Y0 ; ..... A positioning point
G1 X___ Y___ ;
:
X-100. Y0 ; ..... B end point
M02 ; ..... NC reset
  
```

(b) Incremental commands after the mirror image is canceled

When the mirror image is canceled at a point other than the mirror image center, the current position and machine position will be in a shifted state as shown in the following drawing. To return this state to normal, carry out a return process to the external switch mirror image or parameter OFF position.

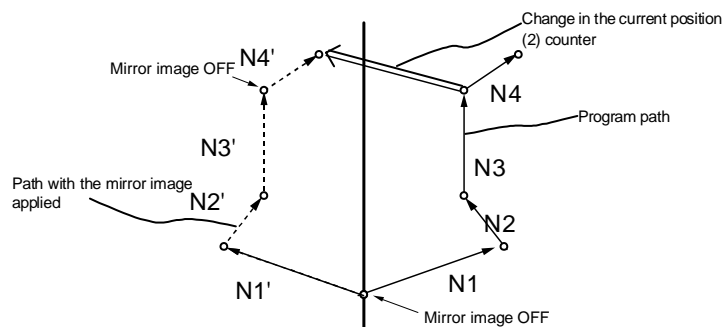
Because of this, the current position counter (2) in the cycle start may change greatly.

Cancel the mirror image at the mirror image center, or issue an absolute value positioning or zero point return command (G28, G30) once after canceling the mirror image.

The mirror state in the NC can be confirmed with the "MR" display.

Axes displayed with a "MR" are handled in the NC as having the mirror image applied. This is so the MIRROR IMAGE switch ON/OFF can be monitored.

The "MR" display disappears when the MIRROR IMAGE switch is turned OFF and the CYCLE START is pressed.



< Movement to the mirror center >

			Current position		Current position (2)	
			X axis	Y axis	X axis	Y axis
X axis mirror image ON	N1	G91 G00 X250. Y50. ;	-250. MR	50.	250.	50.
	N2	G01 X-100. Y100. ;	-150. MR	150.	150.	150.
	N3	Y200. ;	-150. MR	350.	150.	350.
X axis mirror image OFF	N4	X100. Y100. ; M02 ;	-50	450.	50.	450.

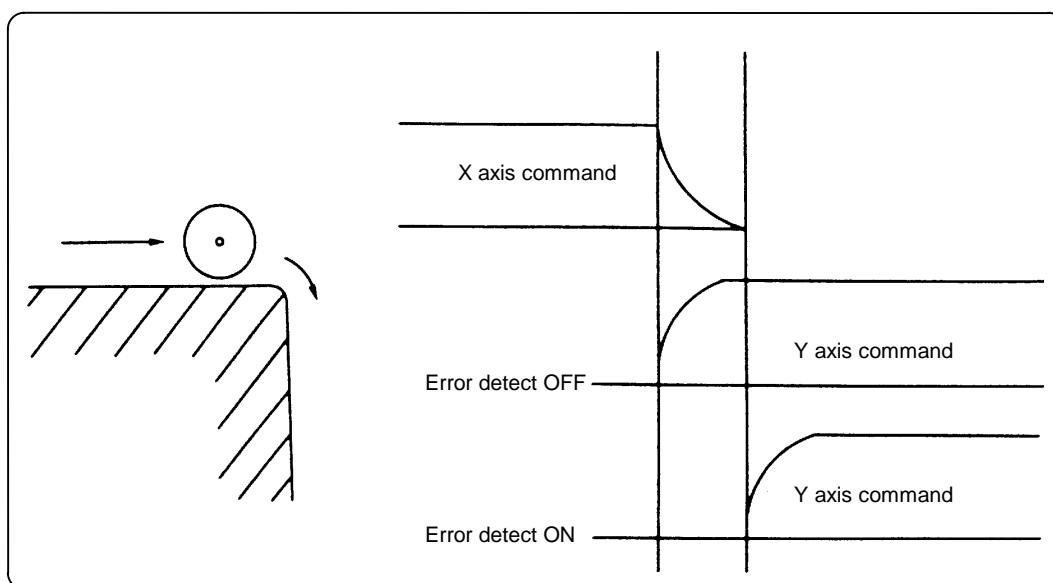
6.13 Error detect

For positioning (G00), machine deceleration check is made before next block move is started. For cutting (G01, G02, or G03), the next block is started before the machine reaches the movement command end point. Thus, the corner part is slightly rounded.

To prevent rounded corners, turn ON the error detect signal. This will cause the machine to decelerate until the remaining distance falls below the value of the parameter. The next block command is stopped during this time.

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 settings monitor device.



6.14 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.

6.15 Axis removal

When the machine receives the axis removal signal, that axis no longer becomes the controlled axis. Accordingly, the alarm for the stroke end axis and the servo alarms (excessive errors, lack of signal, drive alarm, etc.) will be ignored. At the same time, the axis will become interlocked.

6.16 F1 digit feed

- (1) Turning ON the "F1 DIGIT FEED" switch enables the feedrate to be increased/decreased by turning the handle when the feedrate in the program is an F1 digit.
- (2) The increase/decrease amount per handle gradient is expressed with the following equation.

$$F = \frac{F \text{ max}}{K}$$

K : Operation constant (parameter setting value)
F max : F1 - F4 max. speed (FM1 parameter setting value)
 : F5 - F8 max. speed (FM2 parameter setting value)

(Example) For a 10mm/min. increase/decrease amount per handle gradient:

If F max = 3600mm/min :

$$F = 10 = \frac{3600}{K}$$

Thus, K = 360

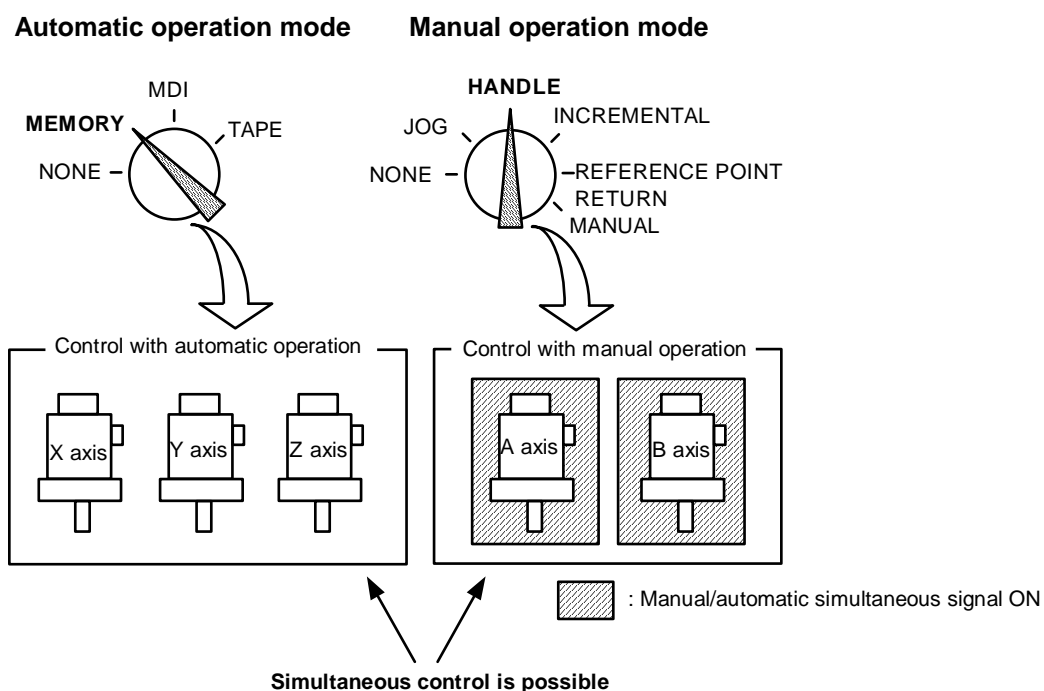
- (3) The conditions for validation are as follows:
 - (a) The operation must be automatic (program run, MDI).
 - (b) The operation must be in automatic start.
 - (c) The operation must be in cutting feed, and F1 digit feedrate command must be issued.
 - (d) The F1 digit feed parameter must be ON.
 - (e) The F1 digit feed switch must be ON.
 - (f) The operation must not be in machine lock.
 - (g) The operation must not be in dry run.

6.17 Manual and automatic synchronous feed

6.17.1 Outline

Using this function, a random axis can be moved with manual operation even while another axis is moving with automatic operation. One automatic operation mode and one manual operation mode are selected with the user PLC, and the axis to be moved with manual operation is selected. (This axis is hereafter called the "manual/automatic simultaneous valid axis".)

If the axis being moved with automatic operation is selected as the manual/automatic simultaneous valid axis, or if a movement command is issued with automatic operation to an axis already selected as the manual/automatic simultaneous valid axis, interlock will be applied on the movement by automatic operation, and the movement with manual operation will have the priority.



6.17.2 Detailed explanation

(1) Conditions for validating this function

This function is valid when the following conditions are established (in any order).

- (a) This function's option is added.
- (b) One automatic operation mode and one manual operation mode are selected.
 (The manual operation mode can be selected during automatic operation. Normally, if the operation mode is selected in duplicate, the operation warning "OPW0108 Operation mode duplicated" will occur. However, this will not occur if this function's option is added.)
- (c) The manual/automatic simultaneous valid axis is selected.
 (The "manual/automatic simultaneous valid" signal is ON for the axis to be controlled with manual operation.)

The manual/automatic simultaneous valid axis (axis for which "manual/automatic simultaneous valid" signal is ON) can be controlled with the selected manual operation mode.

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(2) Operation during manual/automatic simultaneous operation

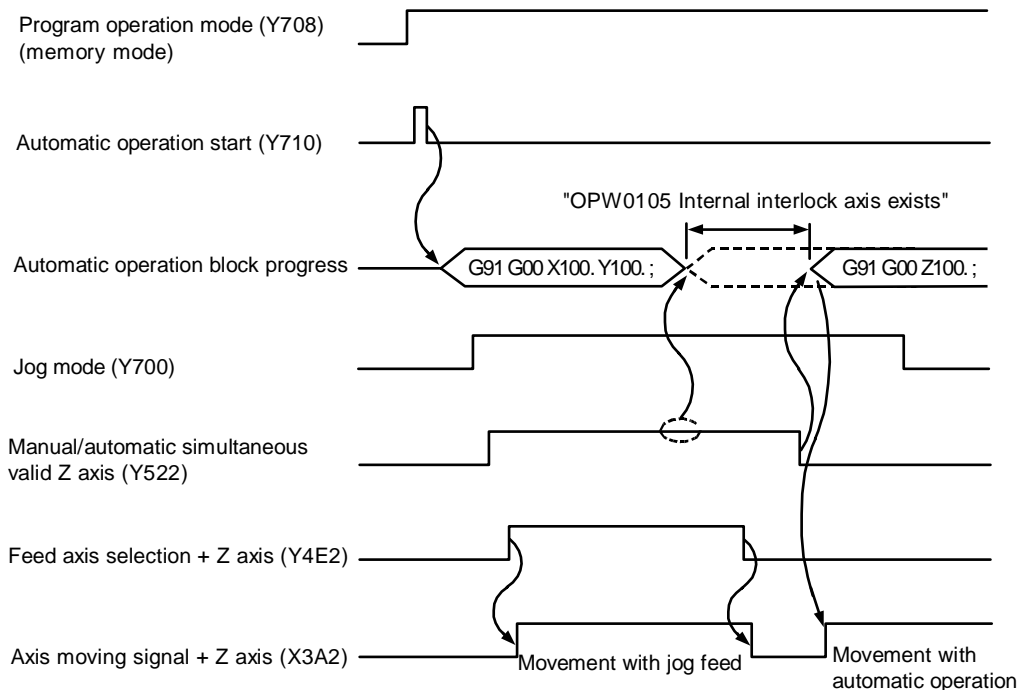
- (a) The manual operation and automatic operation feedrates are independent. The acceleration/ deceleration mode (rapid traverse/cutting feed) and time constants are also independent.
- (b) The rapid traverse override is valid for both automatic operation and manual operation. The cutting feed override and 2nd cutting feed override are valid only for automatic operation. However, these will also be valid during manual operation if the manual override valid signal is ON. Override cancel is valid only for automatic operation.
- (c) Manual interlock is valid for the manual/automatic simultaneous valid axis, and automatic interlock is valid for the axis in automatic operation.
- (d) Manual machine lock is valid for the manual/automatic simultaneous valid axis, and automatic machine lock is valid for the axis in automatic operation.
- (e) The signals in cutting feed and in rapid traverse will follow the automatic operation movement mode.
- (f) Movement of the manual/automatic simultaneous valid axis will not stop with the single block stop or feed hold stop.
- (g) If the manual/automatic simultaneous valid axis reaches the stored stroke limit or stroke limit, the axis moving in automatic operation will also stop immediately, and the feed hold state will be entered. In this case, automatic operation can be restarted by canceling the stored stroke limit or stroke limit with manual operation.
- (h) Even if the automatic operation handle interrupt option is added and the handle mode is selected for the manual operation mode, the manual/automatic simultaneous function will be the priority for the axis for which the "manual/automatic simultaneous valid" signal is ON.
- (i) The speed display indicates the following speeds according to the actual feedrate display parameter (base system #120040).

	For actual feedrate display 1	For actual feedrate display 0
Manual/automatic simultaneous operation	Composite manual and automatic speeds (The actual feedrates are independent.)	Automatic F command speed priority (Manual command speed when there is no axis moving with automatic operation)
Only manual operation	Manual actual feedrate	Manual command speed
Only automatic operation	Automatic actual feedrate	Automatic F command speed

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6. Operation Switch Functions and Other Functions

(3) Operation when automatic operation commands and manual/automatic simultaneous valid selection are issued for same axis

- (a) If a movement command with automatic operation is issued to a manual/automatic simultaneous valid axis, the operation warning "OPW0105 Internal interlock axis exists" will occur. Automatic operation will stop in the interlock state until the "manual/automatic simultaneous valid" signal turns OFF. The manual/automatic simultaneous valid axis can be controlled in the manual operation mode during this time.

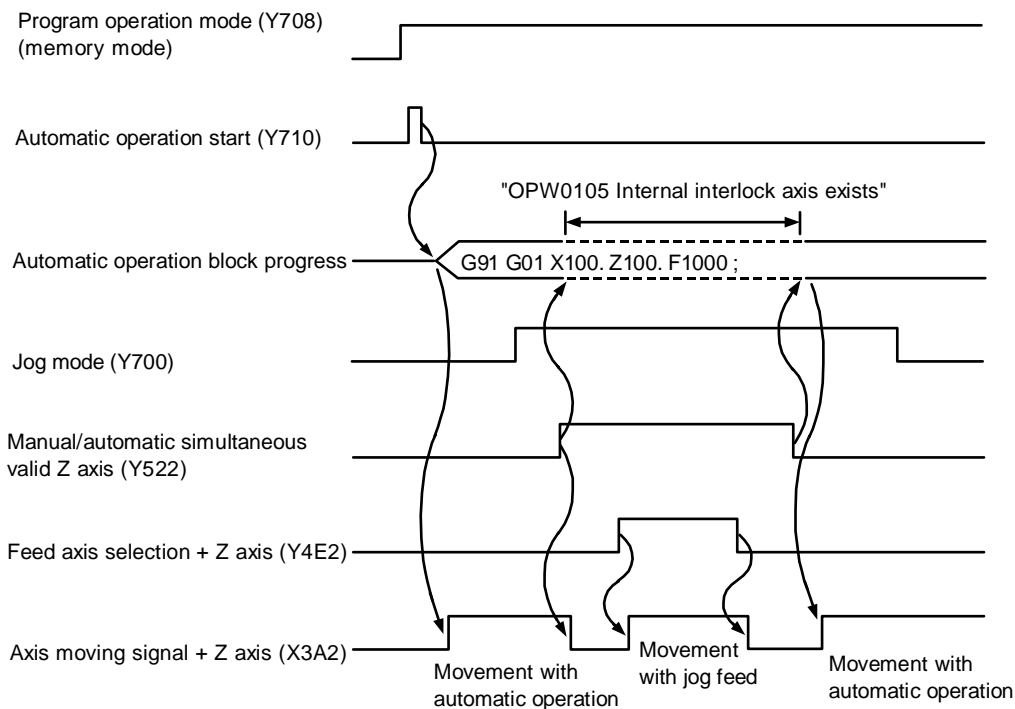


- (b) If the "manual/automatic simultaneous valid" signal is turned ON for an axis moving with automatic operation, the operation warning "OPW0105 Internal interlock axis exists" will occur, and the operation will decelerate to a stop immediately. Automatic operation will stop in the interlock state until the "manual/automatic simultaneous valid" signal turns OFF. The manual/automatic simultaneous valid axis can be controlled in the manual operation mode during this time.

Note that the interlock will be applied even during a tap modal.

Interlock will also be applied during synchronous tap cutting, and the spindle will also be synchronized to the manual drilling axis.

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- (c) When the manual/automatic simultaneous valid axis is moving, the G92 command from the automatic operation will be executed after the axes, including this axis, have stopped.
- (d) When several axes are interpolated and moving with automatic operation, all axes will stop if the "manual/automatic simultaneous valid" signal turns ON for even one axis. When moving the axes independently such as during automatic reference point return, or during rapid traverse when the control parameter "G0 interpolation OFF" is ON, only the axis for which the "manual/automatic simultaneous valid" signal is ON will stop.
- (e) The interlock will not be applied even if the "manual/automatic simultaneous valid" signal is turned ON for the virtual axis in virtual axis interpolation.
- (f) If the "manual/automatic simultaneous valid signal" is turned ON for an axis moving with the automatic operation's G90 modal or G53 command and the manual/automatic simultaneous valid axis is moved manually, when the "manual/automatic simultaneous valid" signal turns OFF, the end point of automatic operation will be deviated by the amount the axis was moved manually.
 During the G90 modal, the command path will be returned to during the next block.
- (g) If the "manual/automatic simultaneous valid signal" is turned ON for an axis during reference point return and the axis is manually moved, the reference point return operation will be executed again.
 When the reference point is reached manually, the interlock will be released, and the block will end.
 Manual operation after the block is completed will follow the manual operation block.

(4) Other precautions

- (a) If only the automatic operation mode is selected and the manual operation mode is not selected, the "manual/automatic simultaneous valid" signal will be invalid.
- (b) Even if one automatic operation mode and one manual operation mode are selected, all manual operations of an axis for which the "manual/automatic simultaneous valid" signal is OFF will be invalid. Note that if the automatic operation handle interrupt option is added, interrupt can be applied with handle feed.

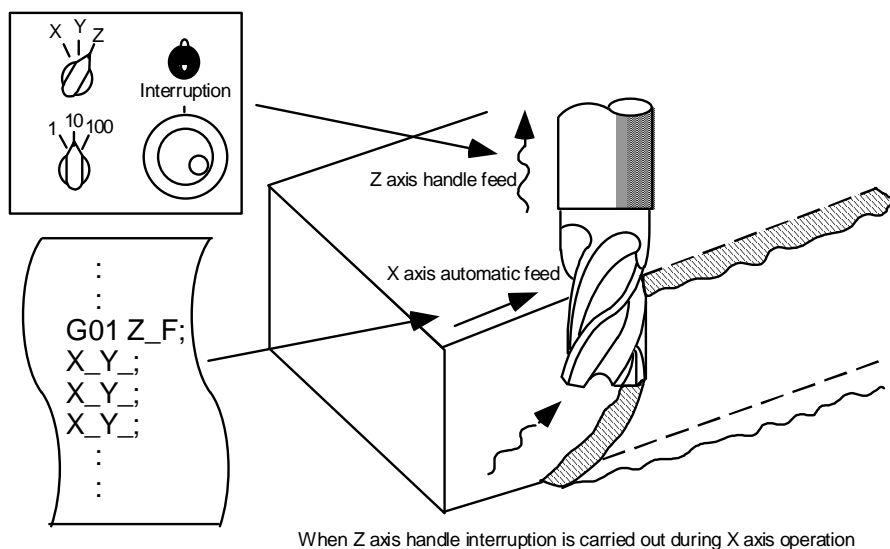
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- (c) If the "manual/automatic simultaneous valid" signal is ON for the 1st and 2nd axes and the "manual arc feed valid" signal (Y79C) is turned ON during automatic operation, the manual arc feed will not be validated.
If automatic operation is attempted while manual arc feed is valid, the manual arc feed will be invalidated even if the "manual/automatic simultaneous valid" signal for the 1st and 2nd axes is ON. In this case, none of the axes can be moved with manual operation until the "manual arc feed valid" signal (Y79C) is turned OFF.
- (d) The "manual/automatic simultaneous valid" signal is invalid for the chopping axis during chopping.
- (e) The "manual/automatic simultaneous valid" signal is invalid for the slave axis during synchronous control. When the "manual/automatic simultaneous valid" signal is turned ON for the master axis, the slave axis will become the manual/automatic simultaneous valid axis.
- (f) Manual random feed will not be executed if even one axis other than the manual/automatic simultaneous valid axis is set as the manual random feed axis. Note that only the manual/automatic simultaneous valid axis is executed during non-interpolation.
- (g) When the manual mode is selected for the manual/automatic simultaneous valid axis while moving in the automatic high-accuracy mode, if the axis is moved manually before the automatic operation decelerates to a stop with the interlock, the speed may change in steps when the manual movement is started.
Start manual operation after the automatic operation has decelerated to a stop.

6.18 Handle interruption

6.18.1 Outline

This section explains automatic handle interruption, 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 manually interrupted by selecting the manual handle mode in automatic mode selection (program run, MDI, etc.). However the interrupt cannot be generated from the manual handle when an automatic reference point return command (G28, G29, G30), thread cutting (G33), or skip command (G31) has been executed or when tapping in the tapping cycle.
- (2) If automatic operation 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 is enabled.
- (3) If the axis is moved during dwell (G04) command processing by using automatic handle interruption, 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 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 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.

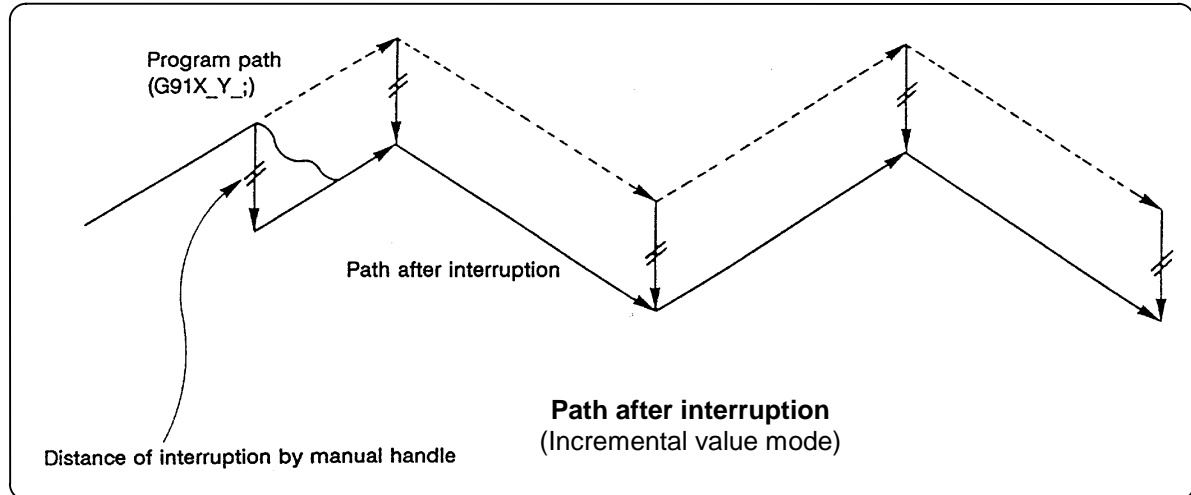
6.18.4 Axis movement speed resulting from interruption

- (1) The movement speed of the axis for which handle interruption is executed, may exceed the rapid traverse feed rate during rapid traverse feed command (G00) processing in automatic start. To prevent this, clamp the axis. (The movement speed equals Automatic-start 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 rapid traverse rate of that axis. The movement speed equals the Automatic movement speed + Interruption speed by the manual handle. (The movement speed equals Automatic start 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 start 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

The locus deviates from the program path by the distance of interruption. (See the figure below.)



(2) For absolute value (G90) mode

If program absolute value update by the distance of handle interruption is disabled, the locus deviates from the program path by the distance of interruption.

If this update is enabled, the locus returns to the program path during processing of the following command:

For single block running — Return command is issued in the block next to the one for which the interruption has been completed.

For continuous running — Return command is issued in the third block, if the block for which the interruption has been completed is the first block.

(Note) Each of the POSITION and MACHINE display includes the distance of handle interruption.

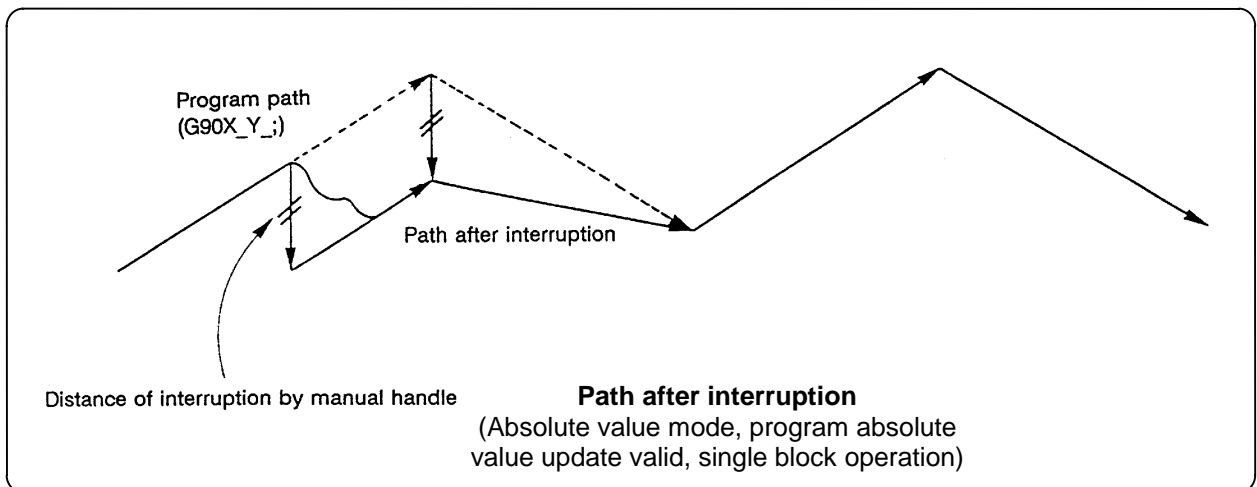
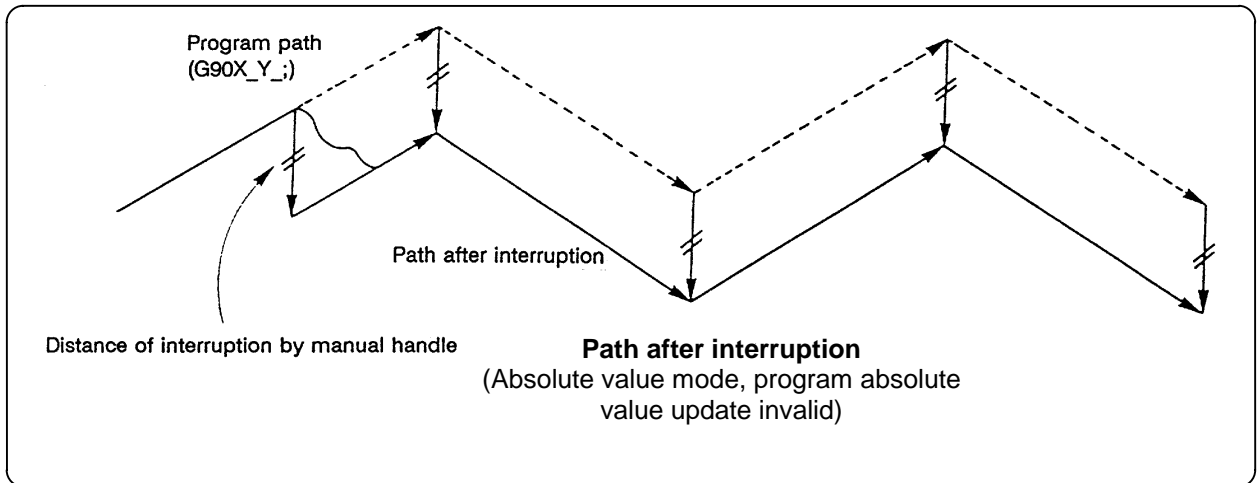
For automatic handle interruption, select whether absolute data is updated or not, as follows:

- 1) Using machine parameters, set whether the manual absolute changeover switch or parameters are used.
- 2) If the parameters are used, set whether or not absolute data is updated for each axis, by using machine parameters other than those in item .
- 3) If the manual absolute changeover switch is used, use the machine operation panel switch for selection.

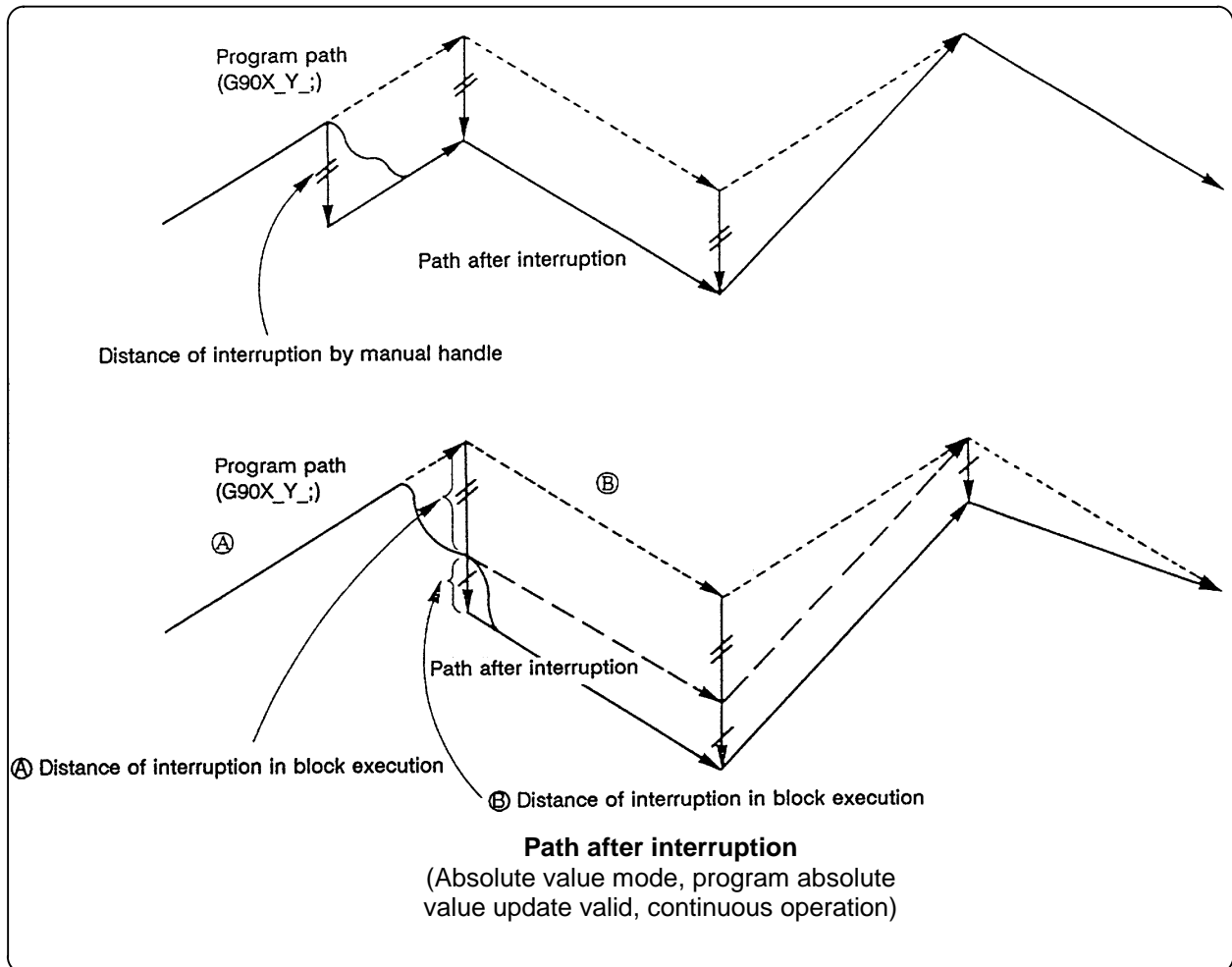
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Absolute value update conditions for automatic handle interruption

			Absolute data update		MONITOR screen manual interruption distance display
Parameter 1_abs	ON "1"	Parameter 130038 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 switching	ON	Absolute value is updated.	Not updated.
			OFF	Absolute value is not updated.	Updated.



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6.18.6 Handle interruption in tool radius compensation

Special movement described below relates only to the tool radius compensation plane axis. It has no influence on the other axes.

At time of tool radius 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 tool radius 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 running. If program absolute update is active during continuous running, the proper tool path will return with the following:

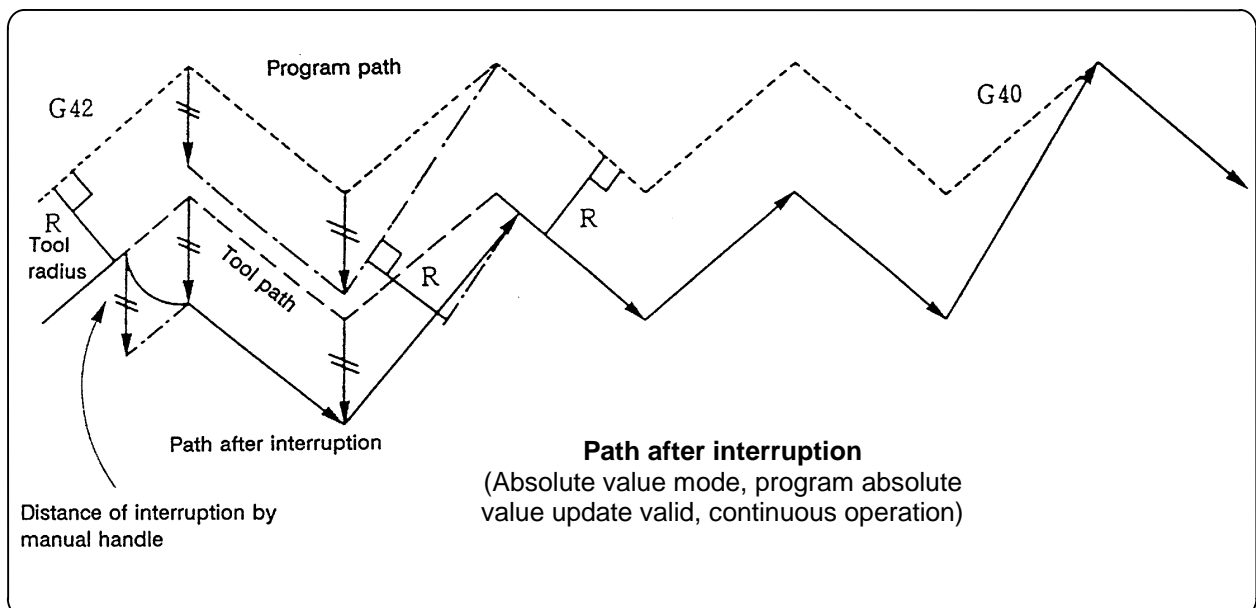
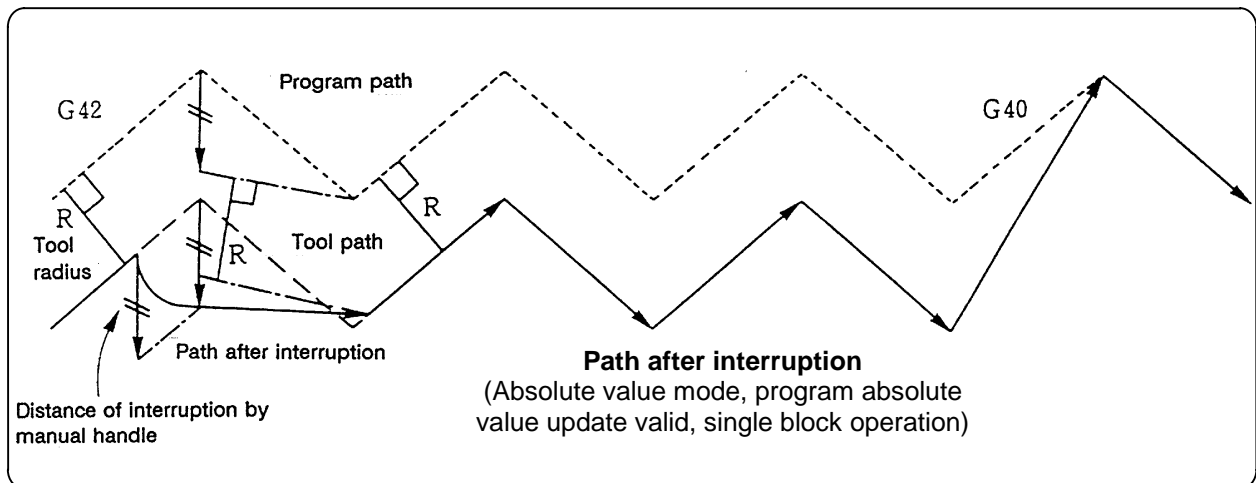
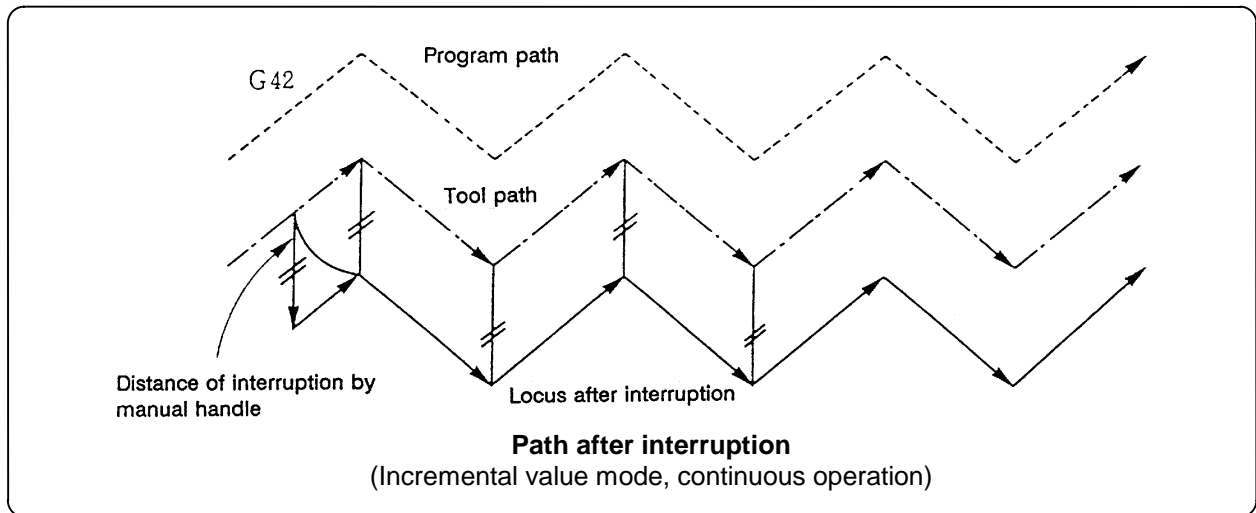
- Executing the command in the fourth block after the one for which the interruption has been completed.

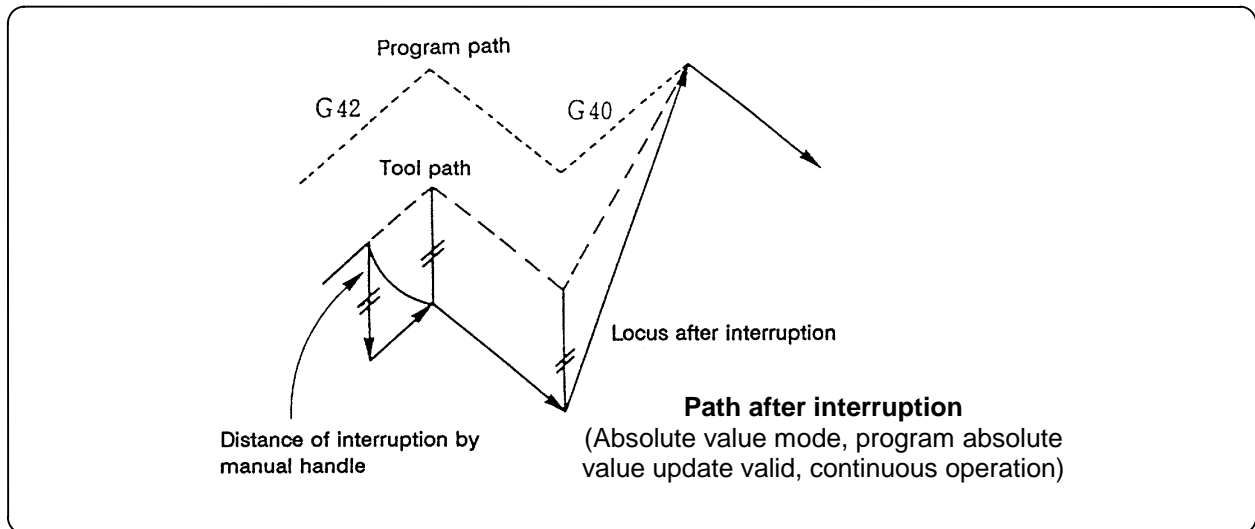
At this time, four or more blocks may not exist between

- Block for which the interruption has been completed and
- Block that contains the tool radius compensation cancel command (G40).

In this case, the proper tool path will return at the block next to the tool radius compensation cancel command (G40).

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6.18.7 Interrupt amount reset

Interrupt amount is reset when

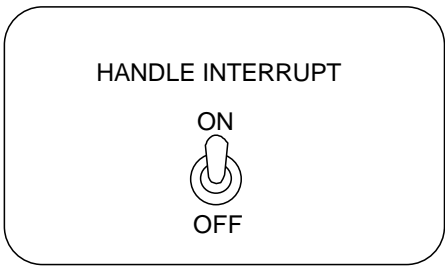
- (1) Dog reference point return is executed;
- (2) Emergency stop is released;
- (3) Reset rewind is executed; or
- (4) Reset 1 is executed when the interrupt amount reset parameter is ON.

6.18.8 Operation sequence

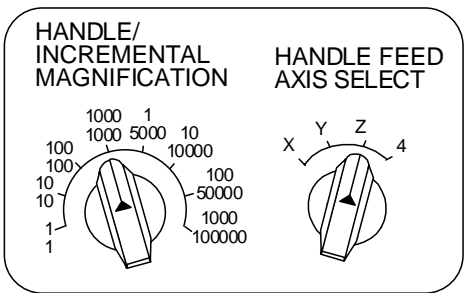
An operation example is given where automatic operation of XYZ axes is executed in the memory operation mode and the Z axis is used as a handle interrupt axis.

Perform automatic operation.

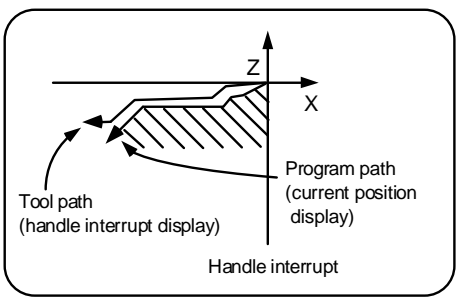
Turn ON the HANDLE INTERRUPT switch on the machine operation panel.



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

A deceleration check is carried out at the block joints before executing the next block when any one of the following conditions is valid during the cutting feed mode.

- 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.

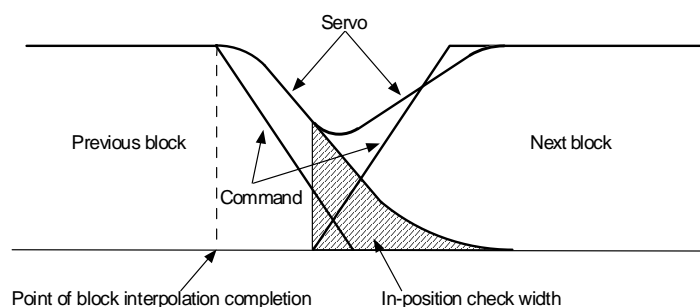
G61.1	High-precision control
G61.2	High-precision control for die machining (CAM data)
G61.3	High-precision control for die machining (height sensing data)
G61.5	High-precision control for part machining
G62	Automatic corner override
G64	Cutting mode

(c) Deceleration check and parameters

In a deceleration check, the in-position width is set in the parameters (servo parameter 160024 SV0024), and the check is carried out with that parameter value as a reference.

(2) Deceleration check method

Execution of the next block starts after confirming that the positional error amount, including the servo system, is less than the value set in the parameters (130023 G0inps or 130024 G1inps).



Separate in-position widths can be set for the rapid traverse and cutting feed. In blocks where there is little danger of interference with the workpiece, a reduction in acceleration time can be achieved by setting a large in-position value.

6.20 Tool retract return

(1) Outline

Due to tool breakage or temporary monitoring, the tool is manually retracted after the machine program is interrupted by feed hold. This function allows the machine to approach the interruption point via the transit point that was designated as the automatic start point and restart the machining, after the workpiece is checked or the tool is changed.

Up to two transit points can be designated in the retract path.

After the tool is changed, the compensation amount cannot be changed.

(2) Retracting method

(a) Designating the interruption point (return position)

The interruption point is designated by applying feed hold or single block stop during automatic operation, and then turning the transit point switch ON. At this time, when the NC completes recognition of the interruption point, the evasion return mode will be entered.

(b) Retracting methods

Retracting is carried out manually by changing to the manual mode (handle, JOG, JOG rapid traverse). At this time, the transit point for designating the return path can be designated.

Retracting is also possible by automatic operation handle interrupt.

(c) Designating the transit point

Two transit points can be designated. To designate, move to the transit point with the manual mode, and then turn ON the transit point switch to memorize it.

The transit point 1 (#1) is the point designated first after interruption, and the transit point 2 (#2) is the point designated last. Stop all axes before designating the transit points. (The transit points will not be designated unless all axes are stopped.)

(d) Example of retracting operation

Apply feed hold or single block stop during automatic operation.

Designate the interruption point by turning the transit point switch ON.



The retract return mode (X602) will be entered when the NC recognizes the interruption point.

Move to transit point #1 with the manual mode (JOG, handle, step).




Turn the transit point switch (Y78D) ON.



Transit point #1 will be memorized. The transit point recognition complete signal (X61F) will turn ON.

Move to transit point #2 with the manual mode (JOG, handle, step).

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Turn the transit point switch (Y78D) ON.	 Transit point #2 will be memorized. The transit point recognition complete signal (X61F) will turn ON.
Move to the return start point with the manual mode (JOG, handle, step).	 Transit point #2 will be memorized. The transit point recognition complete signal (X61F) will turn ON.
Change to the automatic operation mode. Turn the feed hold switch OFF, and start the automatic operation.	 The return will start.

(e) Starting the return

To start the return, change from the manual mode to the automatic mode, and move toward the transit point with cycle start. The retract return mode is entered during the return.

(f) Resetting the retract mode

The retract mode is reset when reset 1 is input, emergency stop occurs the return is completed.

(g) Return path

1) The axis returns in the following order.

Return start point → Transit point #2 → Transit point #1 → Interruption point

When transit point #2 is not designated	When only interruption point is designated without transit point designation
When transit point #2 is not designated, the return start point will be regarded as the transit point #2.	When only the interruption point is designated without a transit point designation, the return start point will be regarded as transit point #1.
Return path: Return start point (= transit point #2) → transit point #1 → interruption point	Return path: Return start point (= transit point #1) → interruption point

After the interruption point is reached, the retract return mode is canceled. Automatic operation starts, and the remaining blocks are executed.

(h) Movement path

3 kinds of movement path are shown below. For types (1) and (3), the return type must be set with the parameters.

(1) Return start point to #2

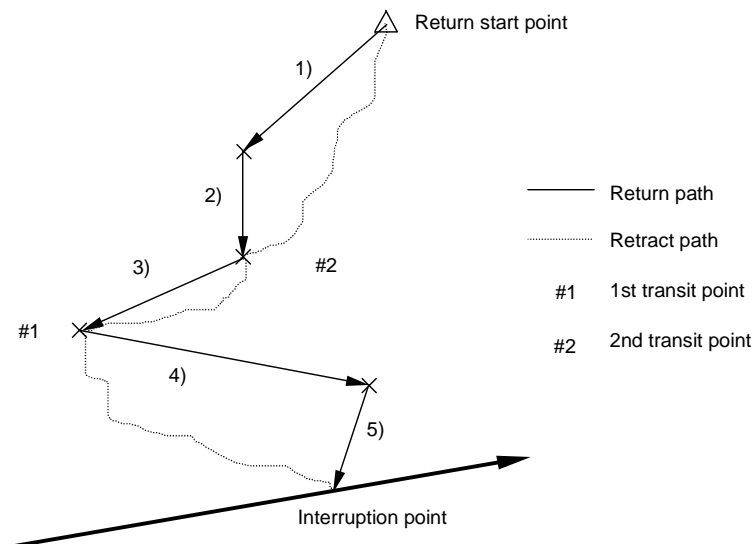
- 1) First, the axes other than that designated in parameter ret2 simultaneously move.
- 2) Next, the axes designated in parameter ret2 move simultaneously.

(2) #2 to #1

- 3) All axes move simultaneously.

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- (3) #1 to interruption point
- 4) First, the axes other than that designated in parameter "ret1" simultaneously move.
- 5) Next, the axes designated in parameter "ret1" move simultaneously.



(i) Setting the parameters "ret1" and "ret2"

The return type parameters are set with the base common parameters "110011 ret1" and "110012 ret2".

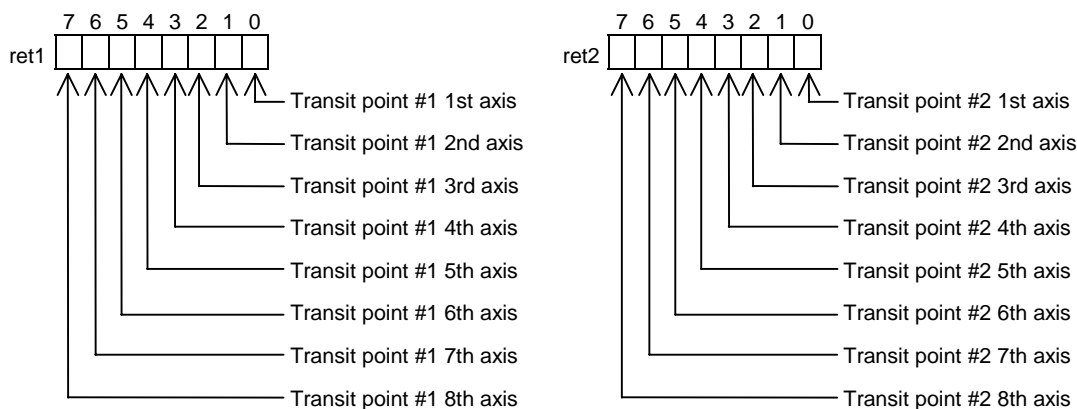
Set the axis to be moved as a bit unit in "ret1" and "ret2".

The axes designated with "ret1" move to the interruption point as shown with 5) in the drawing.

The non-designated axes move as shown with 4) in the drawing.

The axes designated with "ret2" move to the #2 transit point shown as 2) in the drawing, while the non-designated axes move as shown with 1).

The parameter details are as shown below.



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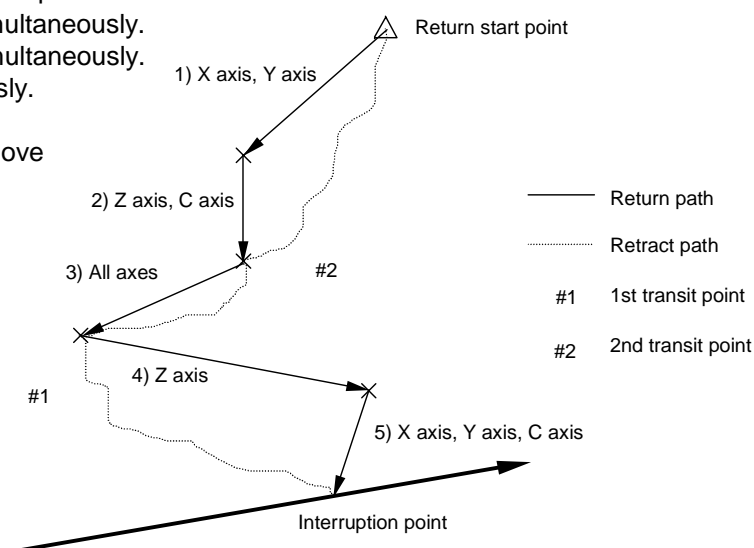
(3) Example of operation

(Example) When using a 4-axis system with the X axis as the 1st axis and, Y, Z, C in the order, set the parameters (ret1 and ret2) as shown below.

```
ret1 00001011
ret2 00001100
```

In this case, the return movement path will be as shown below.

- 1) X axis and Y axis move simultaneously.
- 2) Z axis and C axis move simultaneously.
- 3) All axes move simultaneously.
- 4) Z axis moves.
- 5) X axis, Y axis and C axis move simultaneously.



(4) Others and precautions

- (a) If reset is applied between the designation of the interruption point and the restart of machining (in other words, during the retract mode), the memorized transit points and interruption point will be canceled. The halted or stopped automatic operation will be reset and finished.
- (b) The tool compensation amount cannot be changed during the retract mode.
- (c) The manual random feed function cannot be used during the retract mode.
- (d) As for the override, the manual override is valid.
- (e) The single block is valid.
- (f) If reference point return is carried out during the tool retract return, the tool compensation amount will be invalidated when the reference point return is completed. Thus, if the tool is compensated before tool retract, when the tool is returned after reference point return, the path will shift by the tool compensation amount at the block following the block containing the interruption point.
 Thus, if the operation mode is changed to reference point return during tool retract return, a warning will occur.

Warning occurrence conditions	<ul style="list-style-type: none"> • If the reference point return mode is selected during the tool retract return mode, "OPW168 Ref.pnt ret cancel tool offset" will occur.
Warning reset conditions	<ul style="list-style-type: none"> • When the operation mode is changed to a mode other than reference point return before the axis returns to the reference point. • When the tool return is completed. • When reset 1 is input. • When emergency stop occurs.

(Note) As this warning is only on display, reference point return can be carried out correctly.

6.21 Manual synchronous tapping

(1) Outline

After a synchronous tap cycle is stopped with block stop or feed hold stop, this function carries out tapping by selecting and moving the drilling axis with manual handle operation.

(2) Command format

This function is commanded with the same format as for synchronous tapping.

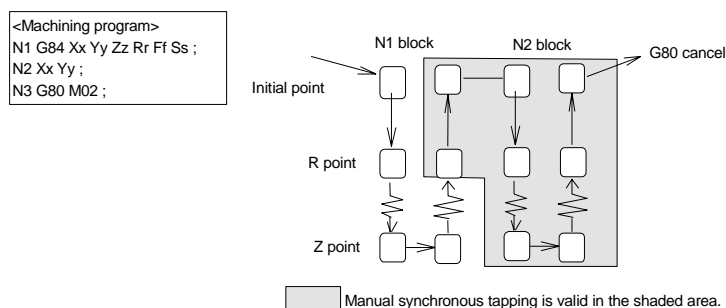
(3) Operation procedures

The procedures for manual synchronous tapping are described below.

- (a) When using the multiple spindle specifications, select the command spindle.
- (b) Stop the spindle and servo axis, and select the automatic operation mode.
- (c) Execute the synchronous tapping cycle program.
- (d) Apply block stop or feed hold stop.
- (e) Change to the handle mode. Select and move the drilling axis.
- (f) To cancel manual synchronous tapping, execute G80 in the same manner as the normal synchronous tap mode, or reset the program.

(4) Precautions

- (a) When selecting the axis for the handle mode, select the same axis as that commanded in the program.
- (b) After executing the program with automatic operation, do not reset the program until manual synchronous tapping is completed.
The manual synchronous tapping mode will be canceled even if reset is applied in the handle mode.
- (c) During manual synchronous tapping, the acceleration/deceleration time constant is the same as normal handle operation. The return override is also invalid.
- (d) When using the multiple spindle specifications, changes to the commanded spindle selection will be validated after G80; is executed or reset is input to cancel synchronous tapping, and then manual synchronous tapping is started.
- (e) The spindle rotation speed during manual synchronous tapping is not clamped by the program's S command or spindle specification parameters Stap1 to 4 (tap rotation speed).
- (f) Manual synchronous tapping is valid from the point that synchronous tapping and cutting is carried out once during automatic operation, and block stop is applied.



(Note) To validate manual synchronous tapping without carrying out cutting, run the following type of program with no movement commands.

G91 G84 X0 Y0 Z0 R0 F2. S1000 ;

6.22 External deceleration

(1) Outline

When the external deceleration signal, an external input from the user PLC, is input, this function immediately drops the feedrate to the external deceleration speed set in the parameters.

(2) Explanation of function

- (a) The external deceleration input signal is provided for each axis and for each movement direction (+/-). The speed will decelerate when a signal in the direction matching the movement direction is input.
- (b) When the axis is returned in the reverse direction, the command speed will be returned to immediately.
- (c) During manual operation or automatic operation's non-interpolation positioning, only the axis for which a signal matching the movement direction is input will decelerate.
- (d) During automatic operation interpolation, if there is any axis for which the input signal matches the movement direction, the feedrate will be lowered to the external deceleration speed.
- (e) The external deceleration input signal can be invalidated only for cutting feed by setting the parameter (control parameter: #320013 external deceleration invalid).
- (f) A warning is output while moving with external deceleration speed.

(3) Combination with other functions

- (a) External deceleration is valid even during the feed per rotation (G95) and inverse time feed (G93) modals.
- (b) External deceleration is valid even during F1-digit feed.
- (c) External deceleration is valid even during dry run.
- (d) If the external deceleration speed is slower than the overridden speed, the speed will drop to the external deceleration speed.
- (e) External deceleration is valid even during automatic corner override (G62).
- (f) The external deceleration signal is invalid for the machine lock axis.
- (g) External deceleration is valid even during incremental feed movement.
- (h) External deceleration is invalid during the synchronous tap modal.
- (i) External deceleration is invalid during the tapping mode.
- (j) External deceleration is valid even during skip feed.
- (k) External deceleration is valid during G28 in the automatic operation, or up to the dog on when using the dog-type manual reference point return mode. Note that external deceleration is invalid while creeping.
- (l) When calculating the machining time, the external deceleration signal input is not considered.
- (m) When an inch command is issued, the axis moves at the speed obtained by converting the external deceleration speed into inches.
- (n) The external deceleration signal for the slave axis is invalid during synchronous control.
- (o) External deceleration is invalid for the axis moving with chopping.
- (p) External deceleration is invalid during thread cutting.
- (q) The external deceleration signal is invalid for the virtual axis.
- (r) During the manual speed command, the external deceleration signal is valid for the movement axis as well as the axis and direction that is the same as the selected feed axis (+/-).
- (s) During manual random feed, the external deceleration axis is valid for the same axis and direction as the axis for which manual random feed is valid.
(If the manual random feed is valid for the axis but the movement amount is 0, the external deceleration signal + for the same axis will be valid.)
- (t) During manual arc feed, the external deceleration signal for same axis and direction as the selected feed axis (+/-) will be valid instead of the movement axis.

(4) Precautions

- If the external deceleration signal is input while moving at a speed lower than the external deceleration speed, the feedrate will not be affected.
- Excluding during G00 non-interpolation, the composite speed of each axis will be the external deceleration speed during automatic operation.
- The signal is valid after resetting and applying emergency stop.

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 "130034 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 DIAGNOSIS screen of the setting and 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 DIAGNOSIS screen of the setting and 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 SERVO MONITOR screen of the setting and 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 SERVO MONITOR 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

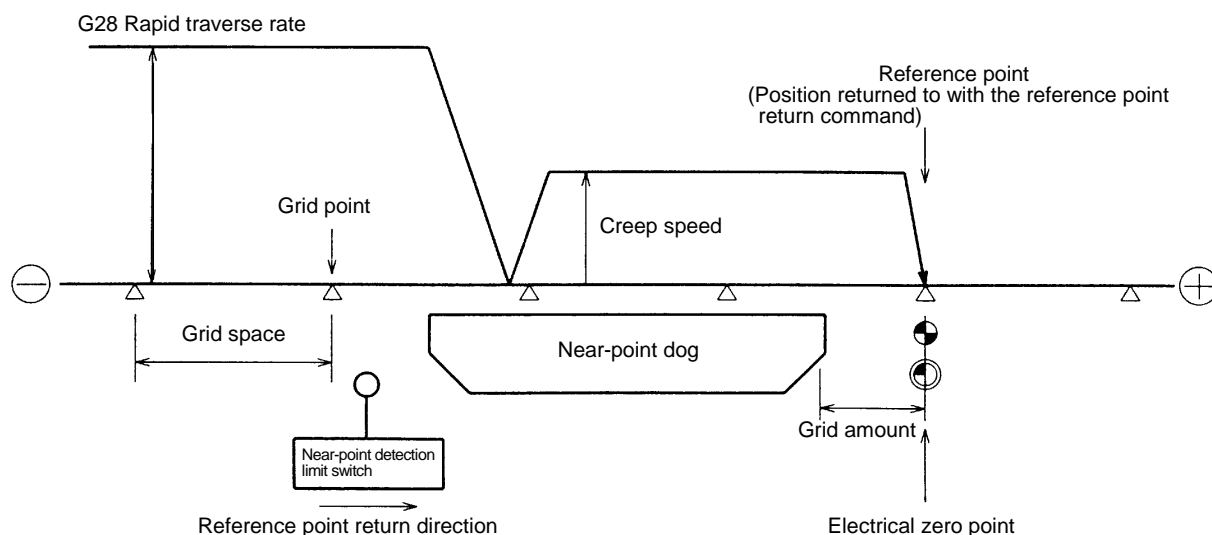
(1) Reference point return operation

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, the "PR0430 Return incomplete axis exists" 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 space by setting the grid spacing (ZERO POINT RETURN PARAM. 150004 Grspc). Thus, multiple grid points can be set per detector rotation.

(4) Grid space

The distance between the grid points is the grid space. The grid space can be set in mm (millimeter) units in the ZERO POINT RETURN PARAM. 150004 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 AMOUNT" on the "ALM/DIAG" "SERVO MONITOR" screen of the setting and 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.

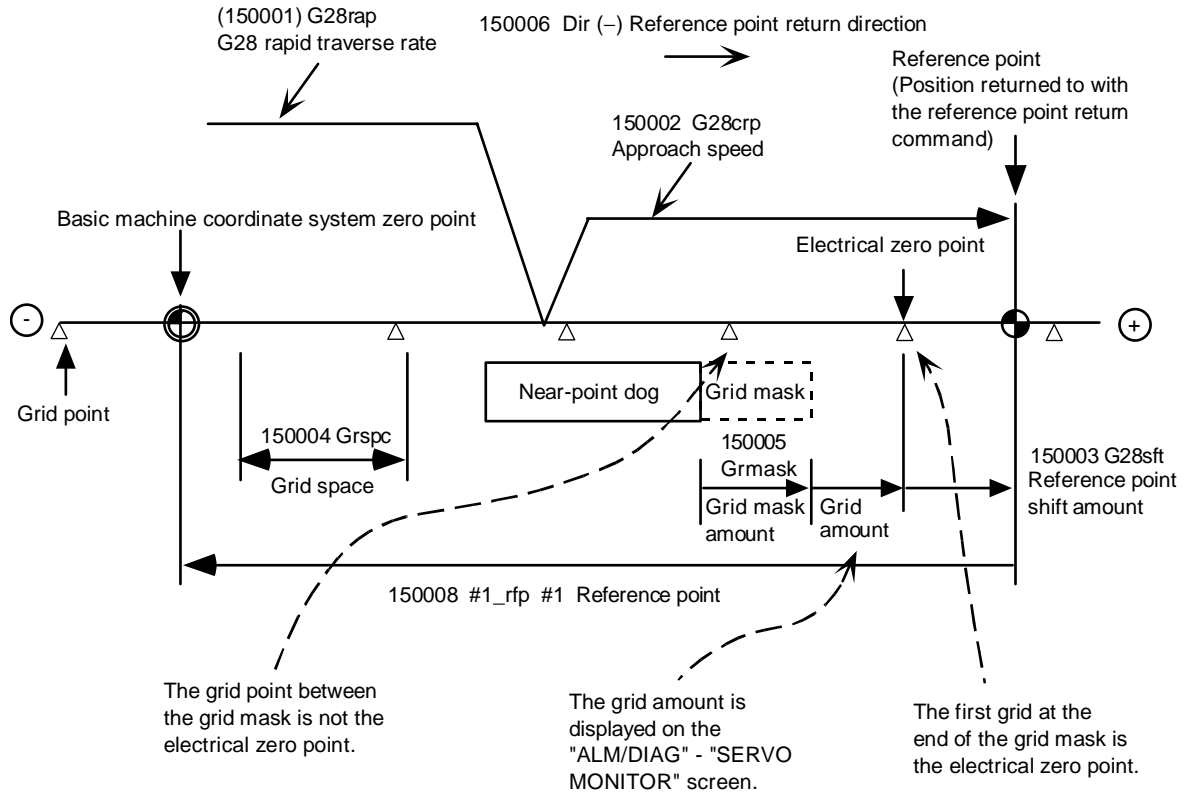
The following positions are expressed with the machine coordinate system.

- 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.

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 (150001 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 PARAM. 130002 Rapid).

(3) G28 approach speed (150002 G28crp)

This parameters sets the approach speed (creep speed) to the reference point after decelerating to a stop by the near-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 300 mm/min., and within 500 mm/min. at the fastest.

(4) Reference point shift amount (150003 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 space (150004 Grspc)

This parameter sets the distance between grids.

The normal grid space is the ball screw pitch (SERVO PARAM. #160018 PIT) value or the movement amount per motor rotation set as a mm (millimeter) unit.

To make the grid space smaller, set a divisor of the grid space.

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 & 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 rotary axis

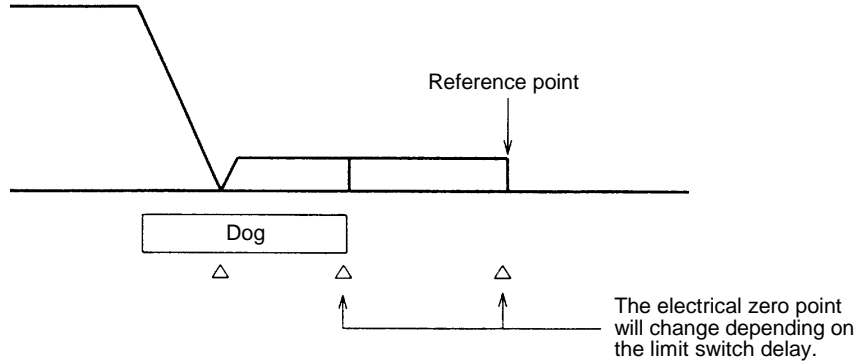
$$\text{Movement angle per motor rotation} = \frac{\text{Motor side gear ratio}}{\text{Machine side gear ratio}} * 360$$

$N = \frac{PC1}{PC2} * PIT$	<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 (150005 Grmask)

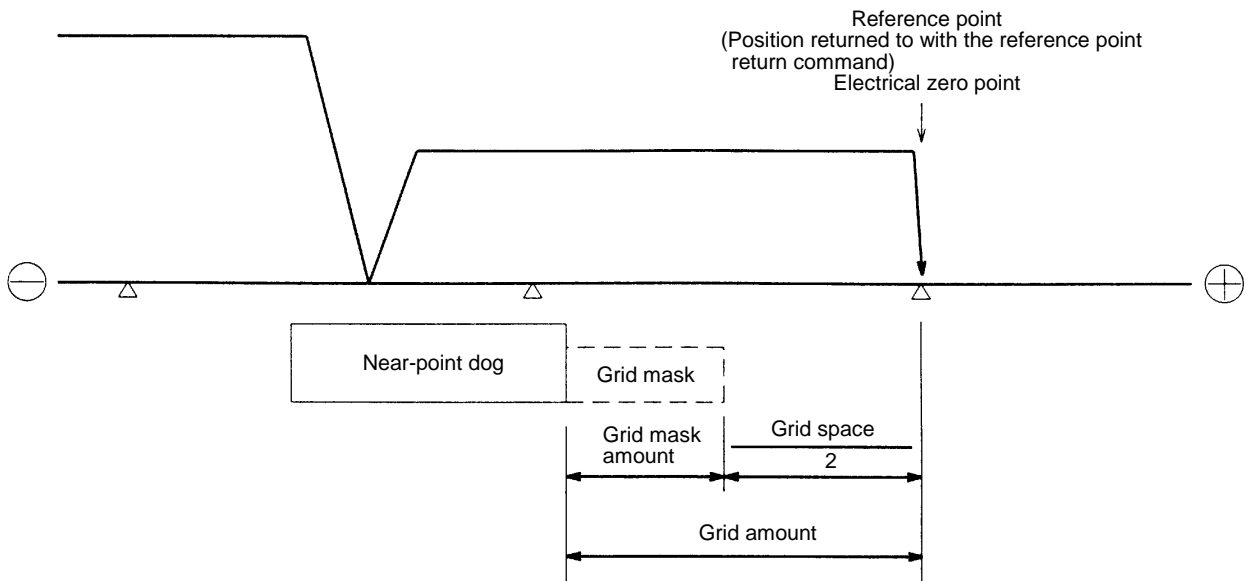
The electrical zero point is the first grid point after the dog is kicked.
 If the grid point is at the position where the near-point dog is kicked, the electrical zero point will be the grid point at the position where the dog is kicked because of the delay of the limit switch operation. Thus, the next grid point will be applied, or in the end, the reference point position may be deviate by the amount of the grid space.
 Thus, the position that the dog is kicked must be at the approximate center of the grid space.



Adjustments can be made by changing the near-point dog 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 space or 0, the grid point will be at the position that the near-point dog is kicked, so set a grid mask. The grid mask amount is set so that the grid mask is one-half of the grid space. The grid mask amount can be set only in the reference point return direction. The grid amount and grid space can be confirmed on the "SERVO MONITOR" screen. Refer to the grid mask amount calculation expressions on the next page for the grid mask amount values.

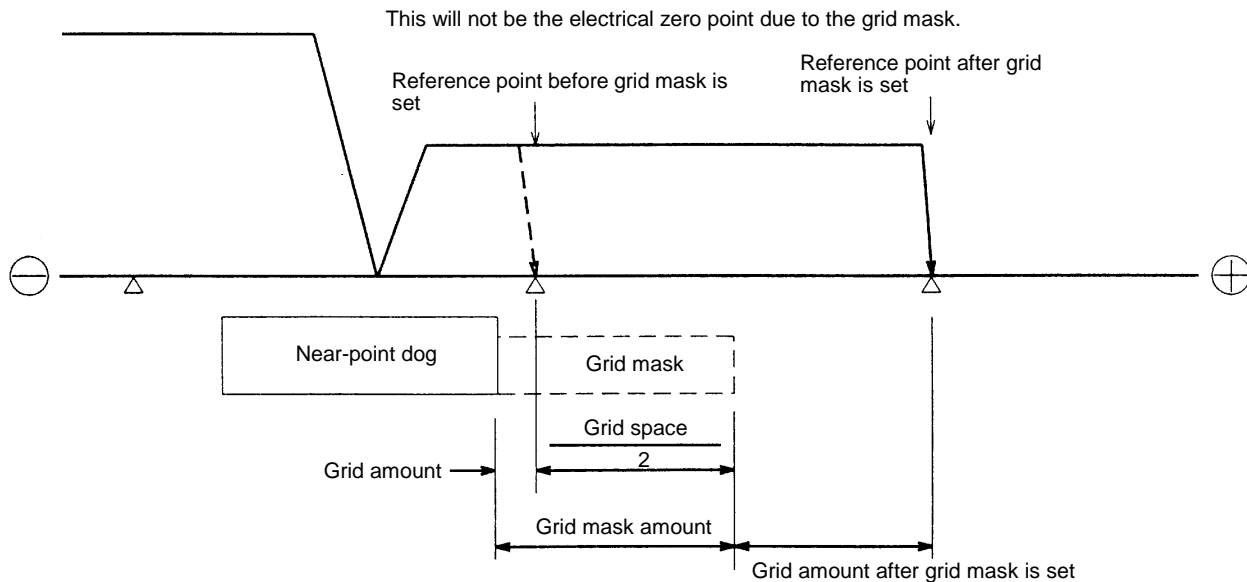
Grid mask amount calculation expression

(a) When $\frac{\text{Grid space}}{2} < \text{Grid amount}$ $\text{Grid mask amount} = \text{Grid amount} - \frac{\text{Grid space}}{2}$



CHAPTER 3 MAINTENANCE
3. Adjusting the Dog-Type Reference Point Return

(b) When $\frac{\text{Grid space}}{2} > \text{Grid amount}$ $\text{Grid mask amount} = \text{Grid amount} + \frac{\text{Grid space}}{2}$

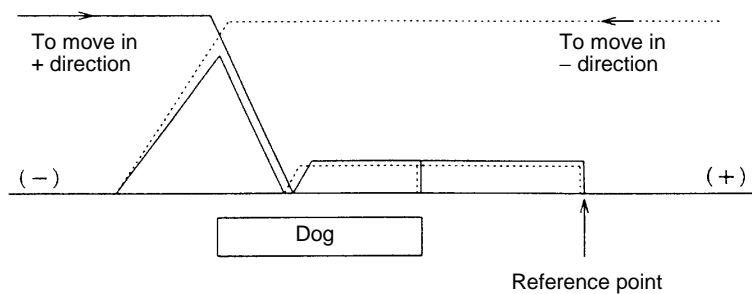


(7) Reference point return direction (150006 Dir (-))

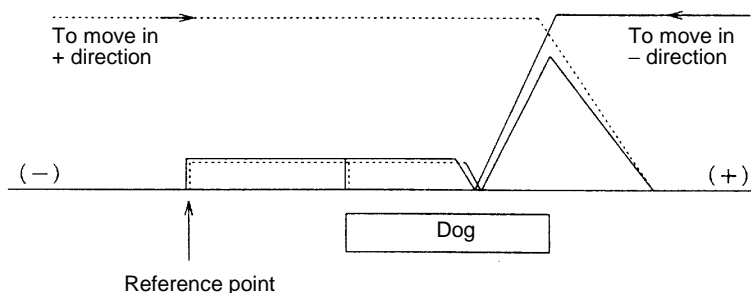
This parameter sets the direction to move after the limit switch kicks the dog causing a deceleration stop during dog-type reference point return. The direction is either positive "0" or negative "1".

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 (150007 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) Machine coordinate system offset (150008 #1_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.

#1_rfp sets the reference point position from the basic machine coordinate system zero point 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 "ALM/DGN" "SERVO MONITOR" screen on the setting and display unit.
The grid space and grid amount values can be read.
- (4) Calculate the grid mask amount with the grid mask amount calculation method.
- (5) Display the "ZERO POINT RETURN PARAM." screen.
Set the grid mask amount.
- (6) Turn the power OFF and ON, and then execute reference point return.
- (7) Display the "ALM/DGN" "SERVO MONITOR" screen on the setting and display unit.
The grid space and grid amount values can be read.
If the grid amount value is approx. half of the grid space, 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.
- (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

The absolute position detection function detects the machine movement amount while the power is OFF. This allows automatic operation to be started without carrying out reference point return after the power is turned ON. This function carries out a mutual check of the feedback amount from the detector, and checks the absolute position unique to the machine to ensure reliability.

To carry out absolute position detection, the zero point must be initialized to establish the absolute position basic point.

The following methods can be used depending on how the absolute position basic point is established.

(a) Dog-type absolute position detection

The absolute position basic point can be 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 basic point can be established without using a dog. This eliminates the need to install a dog or a limit switch on the machine, and simplifies the machine structure.

The following four methods can be used for the dogless-type zero point initialization.

Method	Basic point type	Adjustment procedures to be referred
Machine end stopper method	Random point type	4.4 (1)
	Grid point type	4.4 (2)
Marked point alignment method	Random point type	4.5 (1)
	Grid point type	4.5 (2)

Method/type	Details
Machine end stopper method	The zero point is initialized by pushing against the machine end stopper with manual movement.
Marked point alignment method	A mark is applied at a random point in the machine's moveable range, and the zero point is initialized by moving to the marked point with manual movement.
Random point type	The machine end or marked point is set as the absolute position basic point.
Grid point type	The detector grid point near the machine end or marked position is set as the absolute position basic point.

The validity and methods of the absolute position detection system can be selected with parameters for each axis.

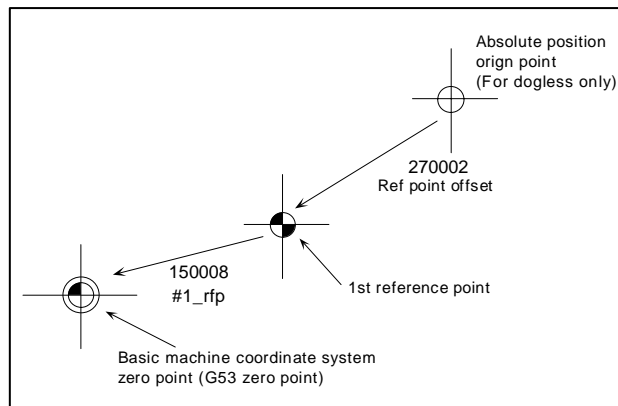
The servo amplifier and detector must have absolute position detection specifications.

CHAPTER 3 MAINTENANCE
4. Absolute Position Detection

(2) Absolute position detection system coordinate system

For the dogless-type, the machine end, marked point or grid point is used as the absolute position basic point. The 1st reference point is set at the position (reversed sign) designated with "270002 Ref position offset" on the Zero point set screen.

The basic machine coordinate system zero point is set at the position set with "150008 #1_rfp" on the Z-point rtn param screen, using the reference point as the basic point.



With the dog-type, there is no absolute position basic point. The reference point is the basic point, and the basic machine coordinate system is determined by the "#150008 #1_rfp" value.

(3) Reference point return operation

The "dog-type" and "high-speed" reference point return operations are as follows.

	Manual reference point return	G28 automatic reference point return
Dog-type absolute position detection	Follows axis parameter "Manual dog type"	Follows axis parameter "Automatic dog"
Dogless-type absolute position detection	High-speed	High-speed
Absolute position detection invalid	Follows axis parameter "Manual dog type"	Follows axis parameter "Automatic dog"

4.2 Starting up absolute position detection

(1) When the absolute position basic point has not been established.

When 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, tape, MDI	General movement commands	Not possible (Note 1)	Not possible (Note 2)
	G28	Possible	Not possible (Note 2)
JOG feed, rapid traverse, handle, stop		Possible	Possible
Reference point return		Possible	Not possible

(Note 1) The program error "PR0430 Return incomplete axis exists" 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.

130041 Abs on* (Axis spec param screen)	0: Incremental position detection 1: Absolute position detection (dog-type) 2: Absolute position detection (dogless-type)
270005 No stopper (Zero point set screen)	0: Machine end stopper method 1: Marked point alignment method
270008 Ref posn type (Zero point set screen)	0: The machine end or marked point is set as the absolute position basic point. 1: The grid point is set as the absolute position basic point.

(3) Setting other machine parameters

The following parameters must be set in addition to those in item (2).

150004 Grspc (Z-point rtn param screen)	Set the grid interval with mm unit.
160017 SPEC* (Servo param screen)	Set the absolute position detection valid bit (bit 7) to "1". Set as a hexadecimal.

(4) Initializing the zero point

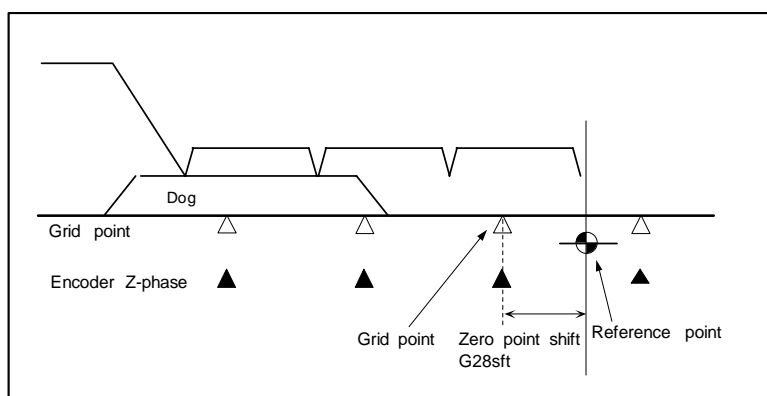
Refer to the explanations given in sections 4.3 to 4.5 and initialize the zero point.

4.3 Procedures for initializing for the dog-type absolute position detection

Zero point initialization is carried out by executing dog-type reference point return with the manual reference point return mode or the automatic reference point return command (G28).

Only "Status" and "27003 Move amnt in pwr OFF" are valid on the Zero point set screen.

Operation procedure	"Status" display on Zero point set screen
1. Select the Zero point set screen.	"0" will appear at "Status" for the axis for which the zero point has not been initialized.
2. Carry out manual or automatic dog-type reference point return. (Notes 1, 2)	
3. When the reference point is reached, the absolute position basic point will be memorized. The zero point is initialized at this stage. (Notes 3, 4)	When the absolute position basic point memorizing process is completed, "*" will appear.
4. After all axes have been returned to the zero point, output the parameters.	



(Note 1) If the execution of the dog-type reference point return is interrupted by resetting, etc., the previous state (0 or *) will appear at "Status".

(Note 2) With dog-type reference point return, even if "*" 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 basic 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 manually.

The stopper method includes the type that uses the machine end as the absolute position basic point, and the type that uses the grid point near the machine end as the absolute position basic point.

(The grid point is the hypothetical grid determined by the zero point return parameter "150004 Grspc" setting.)

(1) Random (machine end) point type

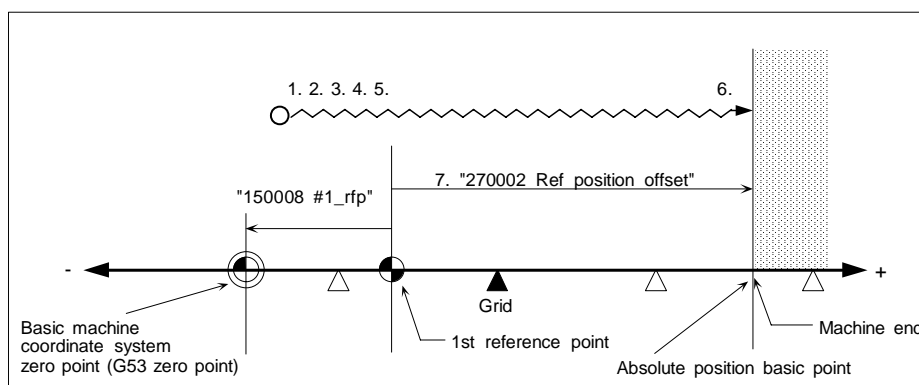
With this method, the zero point initialization is carried out by pushing against the machine end manually. The machine end is used as the absolute position basic point.

The following parameters on the Zero point set screen must be set before initializing.

Set "270005 No stopper" to "0" (machine end stopper method).

Set "270008 Ref position type" to "0" (set machine end as absolute position basic points).

Operation procedure	"Status" display on Zero point set screen
1. Select the Zero point set screen.	"0" will appear at "Status" for 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 270008) for pushing against the machine end stopper. (Note 1)	
3. Press the Abs posn set key. (Note 2)	
4. Confirm the parameters for the axis for which zero point initialization is to be carried out. "270005 No stopper" = 0 "270008 Ref position type" = 0 (Note 3)	
5. Set "1" for "1 Ref position set" of the axis for which zero point initialization is to be carried out.	When "1" is set for "1 Ref position set", "1" 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, "2" will appear at the "Status" for that axis. When writing to the SRAM is completed, "*" will appear.
7. Set the distance from the 1st reference point to the machine end stopper in "270002 Ref position offset". (Note 5) "270002 Ref position offset" = 1st reference point – absolute position basic point	
8. After the zero point has been initialized for all axes, turn the power ON again.	
9. After all axes have been returned to the zero point, output the parameters. (Note 7)	



CHAPTER 3 MAINTENANCE
4. Absolute Position Detection

(2) Grid point type

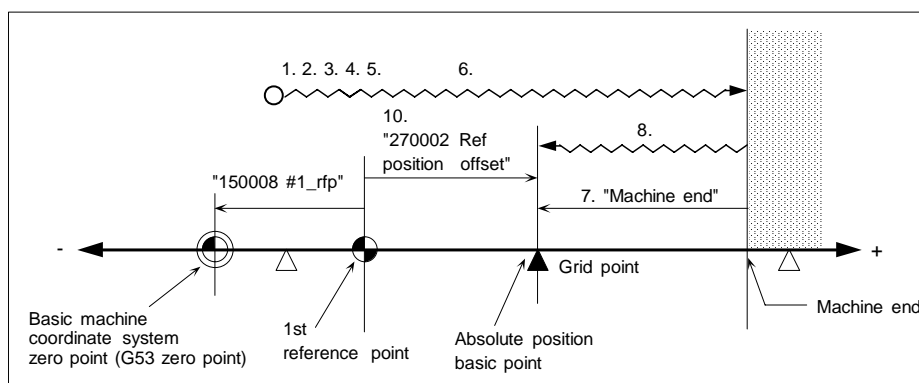
After pushing against the machine end manually, the machine will move and stop at the first grid point. With this method, the zero point is initialized at the grid point, which is used as the absolute position basic point.

The following parameters on the Zero point set screen must be set before initializing.

Set "270005 No stopper" to "0" (machine end stopper method).

Set "270008 Ref position type" to "1" (set grid point as the absolute position basic point).

Operation procedure	"Status" display on Zero point set screen
1. Select the Zero point set screen.	"0" will appear at "Status" for 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. Press the Abs posn set key. (Note 2)	
4. Confirm the parameters for the axis for which zero point initialization is to be carried out. "270005 No stopper" = 0 "270008 Ref position type" = 1 (Note 3)	
5. Set "1" for "1 Ref position set" of the axis for which zero point initialization is to be carried out.	When "1" is set for "1 Ref position set", "1" 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, "2" 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. Move in the direction opposite to the machine end with the manual mode. The machine will not move in the machine end stopper direction at this time.	
9. When the first grid point is returned to, the machine will automatically stop, and the absolute position basic point will be memorized. (Note 5)	When the movement stops at the grid point and the writing to the SRAM is completed, the "Status" will change to "*".
10. Set the distance from the 1st reference point to the absolute position basic point in "270002 Ref position offset". (Note 5) "270002 Ref position offset" = 1st reference point – absolute position basic point	
11. After the zero point has been initialized for all axes, turn the power ON again.	
12. After all axes have been returned to the zero point, output the parameters. (Note 7)	

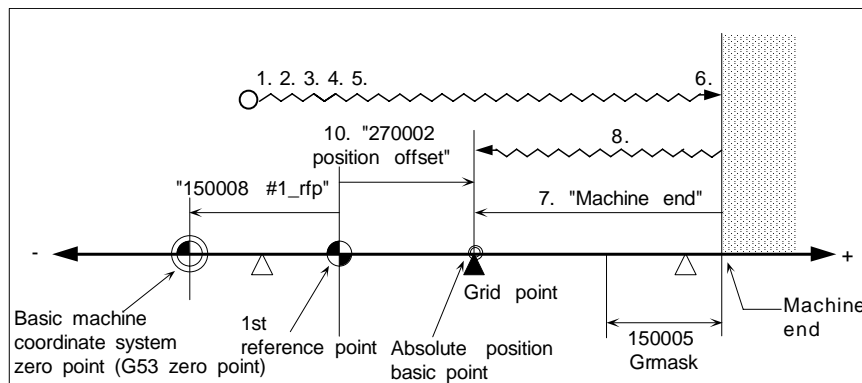


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4. Absolute Position Detection

(3) Precautions

(Note 1) to (Note 7) in sections (1) and (2) correspond to the following items.

- 1) The current limit value (%) can also be set with servo parameter "160014 SV014". The excessive error width can be set with servo parameter "160053 SV053".
- 2) The Abs posn set menu key on the Zero point set screen cannot be turned OFF on 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) If "270005 No stopper" is "1", set it to "0" before setting "1 Ref position set".
- 4) Before carrying out zero point initialization, the Z-phase grid point must be passed once after the power is turned ON. If the grid point is not passed even once after the power is turned ON, the message "AX0104 Some ax does not cross Z phase" will appear when the current limit is reached. In this case, return one or more grid back, and repeat the procedures from step 6.
- 5) When the grid mask amount (zero point return parameter "150005 Grmask") is set and the grid mask amount is larger than the distance from the machine end stopper to the grid point, the next grid point will be the absolute position basic point.



- 6) When carrying out initialization of the dogless-type absolute position, the reference point shift amount (zero point return parameter "150003 G28sft") is invalid.
- 7) When zero point initialization is carried out, the data required for absolute position detection is saved as parameters. Thus, back up the data.

4.5 Procedures for the dogless-type detection; initializing with marked point alignment method

With this method, a mark is assigned on a random point in the machine's moveable range, and the axis is moved to the marked point manually initialize the zero point.

The marked point alignment method includes the type that uses a random marked point as the absolute position basic point, and the type that uses the grid point near the marked point as the absolute position basic point.

(The grid point is the hypothetical grid determined by the zero point return parameter "150004 Grspc" setting.)

(1) Random point type

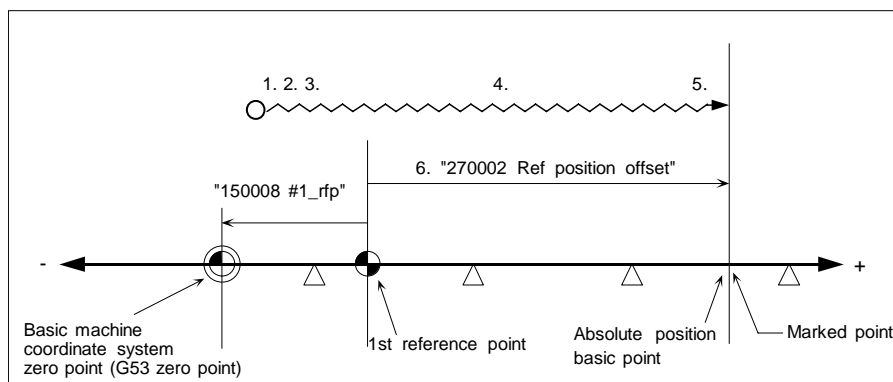
With this method, the machine is moved to the marked point manually to initialize the zero point, regarding the marked point as the absolute position basic point.

The following parameters on the Zero point set screen must be set before carrying out zero point initialization.

Set "270005 No stopper" to "1" (marked point alignment method).

Set "270008 Ref position type" to "0" (set marked point as absolute position basic point).

Operation procedure	"Status" display on Zero point set screen
1. Select the Zero point set screen.	"0" will appear at "Status" for the axis for which the zero point has not been initialized.
2. Press the Abs posn set key. (Note 1)	
3. Confirm the parameters for the axis for which zero point initialization is to be carried out. "270005 No stopper" = 0 "270008 Ref position type" = 1 (Note 2)	
4. Change to the manual mode, and move to the marked point. (Note 3)	
5. Set "1" for "1 Ref position set" of the axis for which zero point initialization is to be carried out.	When the axis movement stops and "1" is set for "1 Ref position set", "2" will appear at the "Status" for that axis. When writing to the SRAM is completed, "*" will appear.
6. Set the distance from the 1st reference point to the marked point in "270002 Ref position offset". (Note 5) "270002 Ref position offset" = 1st reference point – absolute position basic point	
7. After the zero point has been initialized for all axes, turn the power ON again.	
8. After all axes have been returned to the zero point, output the parameters. (Note 7)	



CHAPTER 3 MAINTENANCE
4. Absolute Position Detection

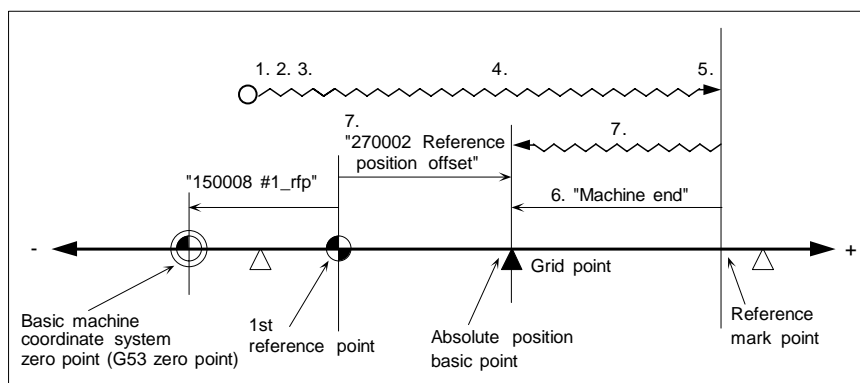
(2) Grid point type

After moving to the marked point manually, the machine will move and stop at the first grid point. The zero point is initialized at the grid point, which is used as the absolute position basic point. The following parameters on the Zero point set screen must be set before carrying out zero point initialization.

Set "270005 No stopper" to "1" (marked point alignment method).

Set "270008 Ref position type" to "1" (set grid point as absolute position basic point).

Operation procedure	"Status" display on Zero point set screen
1. Select the Zero point set screen.	"0" will appear at "Status" for the axis for which the zero point has not been initialized.
2. Press the Abs posn set key. (Note 1)	
3. Confirm the parameters for the axis for which zero point initialization is to be carried out. "270005 No stopper" = 1 "270008 Ref position type" = 1 (Note 2)	
4. Change to the manual mode, and move to the marked point.	
5. Set "1" for "1 Ref position set" of the axis for which zero point initialization is to be carried out. (Note 3)	When the axis movement stops and "1" is set for "1 Ref point set", "2" will appear at the "Status" for that axis.
6. The distance from the machine basic position to the previous grid will appear at "Machine End".	
7. Return in the direction opposite to the final entry direction with manual movement. (Note 4)	
8. When reached to the first grid point, the machine will automatically stop, and the absolute position basic point will be saved. (Note 5)	When the machine stops at the grid point and writing to the SRAM is completed, "*" will appear at "Status".
9. Set the distance from the 1st reference point to the marked point in "270002 Ref position offset". (Note 6) "270002 Ref position offset" = 1st reference point – absolute position basic point.	
10. After the zero point has been initialized for all axes, turn the power ON again.	
11. After all axes have been returned to the zero point, output the parameters. (Note 7)	

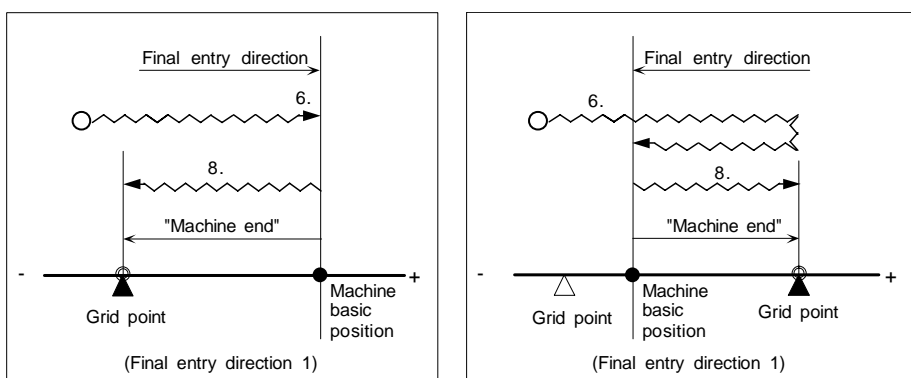


CHAPTER 3 MAINTENANCE
4. Absolute Position Detection

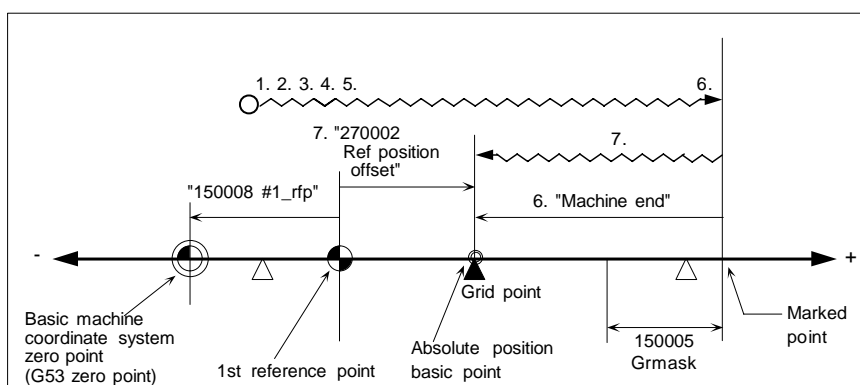
(3) Precautions

(Note 1) to (Note 7) in sections (1) and (2) correspond to the following items.

- 1) The Abs posn set menu key on the Zero point set screen cannot be turned OFF on 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.)
- 2) If "270005 No stopper" is "0", set it to "1" before setting "1 Ref position set".
- 3) Before carrying out zero point initialization, the Z-phase grid point must be passed once after the power is turned ON. If the grid point is not passed even once after the power is turned ON, "1" cannot be set in "Ref position set". (An error will occur.) In this case, return one or more grid back, and repeat the procedures from step 4.
- 4) With the grid point type, movement into the final entry direction is not possible. The final entry direction refers to the movement direction when the marked point (machine basic position) is reached with the procedure in step 4.



- 5) When the grid mask amount (zero point return parameter "150005 Grmask") is set and the grid mask amount is larger than the distance from the marked point to the grid point, the next grid point will be the absolute position basic point.



- 6) When carrying out the dogless-type absolute position detection, the reference point shift amount (zero point return parameter "150003 G28sft") is invalid.
- 7) When zero point initialization is carried out, the data required for absolute position detection is saved as parameters. Thus, back up the data.

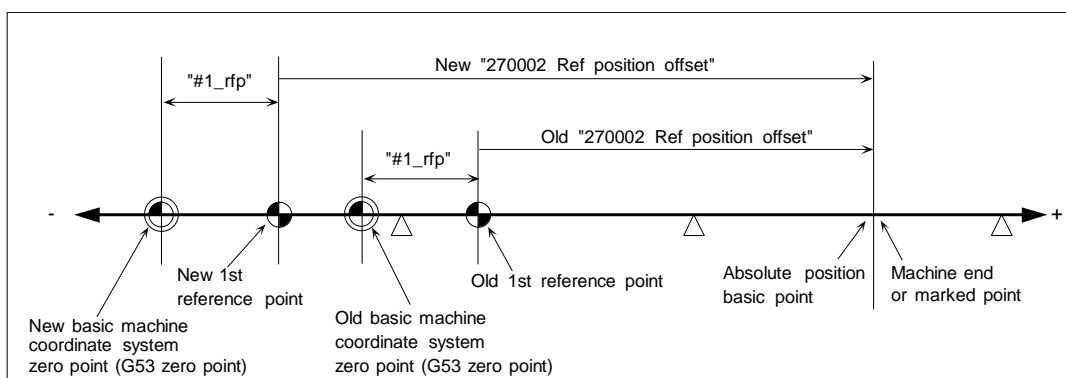
4.6 Various settings for dogless-type absolute position detection

(1) Resetting the basic machine coordinate system and setting the reference point (G28 zero point)

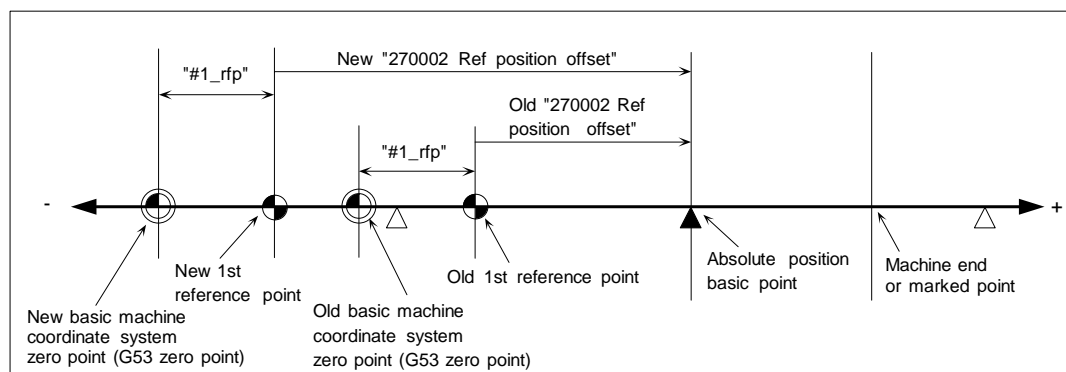
The basic machine coordinate system can be reset after the zero point initialization by changing the "270002 Ref position offset" parameter.

Operation procedure	"Status" display on Zero point set screen
1. Select the Zero point set screen.	"0" will appear at "Status" for the axis for which the zero point has not been initialized.
2. Press the Abs posn set menu key.	
3. Designate the axis for which the basic machine coordinate system is to be reset, and set "1" for the "1 Ref position set" of that axis.	
4. Reset the distance from the 1st reference point to the basic machine position in "270002 Ref position offset".	
5. After the zero point has been initialized for all axes, turn the power ON again.	
6. After all the axes have been returned to the zero point, output the parameters.	

<When "270008 Ref point type" = 0>



<When "270008 Ref point type" = 1>



(Note 1) Make sure that the basic machine coordinate system zero point (G53 zero point) and reference return point (G28 zero point) are not outside of the machine end stopper.

CHAPTER 3 MAINTENANCE
4. Absolute Position Detection

(2) Resetting the absolute position basic point

After zero point initialization, the absolute position basic point can be reset by setting "2" for "1 Ref position set" on the Zero point set screen. With this method, the parameters do not need to be changed, and the power does not need to be turned OFF.

Operation procedure	"Status" display on Zero point set screen
1. Select the Zero point set screen.	"0" will appear at "Status" for the axis for which the zero point has not been initialized.
2. Push the Abs posn set menu key.	
3. Designate the axis for which the absolute position basic point is to be reset, and set "2" for the "1 Ref position set" of that axis. (Note 1)	
4. Following the previously explained zero point initialization procedures, carry out initialization again.	
5. After the zero point has been initialized, turn the power ON again.	
6. After the axes have been returned to the zero point, output the parameters.	

(Note 1) When "2" is set for "1 Ref position set", the initialization will be incomplete, and an error will occur. Always reset the absolute position basic point.

4.7 Recovering the absolute position

(1) Outline

Conventionally with the absolute position detection system, the absolute position is lost for safety purposes when the parameters such as the motor type, ball screw pitch or gear ratio were changed. (Note that this is only a process on the NC side, and the data on the amplifier side is not lost.)

This function is used to recover the original absolute position when the absolute position has been lost due to changes of the parameters, such as the motor type above. The position can be recovered without initializing the absolute position basic point again.

(Note) When the absolute position has been lost due to any other causes, the machine zero point may be deviated. Thus, do not recover the absolute position using this function.

(2) Detailed explanation

Operation procedure	Operation
1. Select the Zero point set screen.	
2. Press the menu Axis select and set the axis name.	The axis name at the top line of the display will change to the designated axis name.
3. Press the menu Abs posn set .	
4. Set "9" for "1 Ref position set". To recover other axes, repeat steps 2 and 3.	
5. Turn the power ON again.	The original absolute position will be recovered.

4.8 Setting the auxiliary axis absolute position

Refer to section "5. Operations Related to Auxiliary axis" for details on setting the auxiliary axis' absolute position.

5. Operations Related to Auxiliary Axis

5.1 Setting the auxiliary axis absolute position

5.1.1 Initialization

By initializing the absolute position, the coordinate system is established and operation can be carried out.

Confirm that the following parameters are set for the absolute position setting.

"700102 Cont2 (control parameter 2)/bit7 (absolute position detection execution)" = 1

"700120 ABS Type (absolute position detection method)" (position setting method) = 1

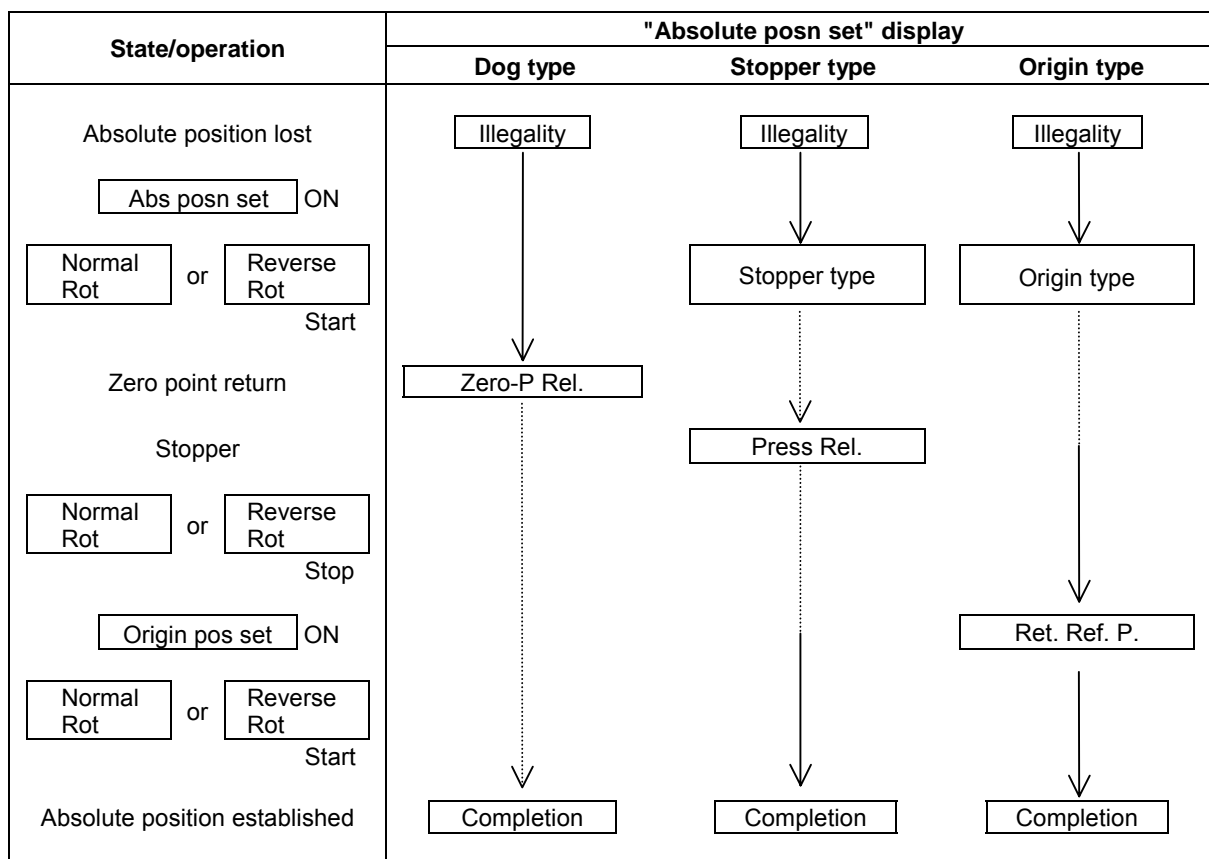
(Note 1) Before changing to the AUX test operation screen, first release the auxiliary axis servo OFF and release the interlock with the PLC.

(Note 2) Do not turn the operation start signal (ST) ON during the auxiliary axis operation adjustment mode.

Operation procedure	Operation
1. Select the AUX test operation screen.	
2. Press the menu Axis select , and set the axis name.	An error will occur if an invalid axis name is set.
3. Press the menu Ope Test mode , and turn the operation adjustment mode signal ON.	The operation adjustment mode signal can be turned ON only when the auxiliary axis is stopped and the operation adjustment mode valid signal from the PLC is ON.
4. Press the menu Abs posn set .	
5. Move the cursor to the "Operation mode", and select the operation mode.	A setting other than 0 to 3 will cause an error. When "1" is selected, operation can be started only when the absolute position is established.
6. When the "Operation mode" is STEP or HANDLE, move the cursor to "Scale", and set the feed amount per pulse.	A setting other than 0 to 3 will cause an error.
7. Move the cursor to "Parameter set", and set the No. of the operation parameter group.	A setting other than 0 to 3 will cause an error.
8. Move the axis and set the absolute position basic point. (Start by pressing Normal Rot or Reverse Rot .)	
Dog type : When started, the absolute position is set automatically.	
Stopper type : After starting, the position pushed against is the absolute position basic point.	When started, the axis will move automatically from the basic position to the grid point and the initialization will be completed.
Origin type : After starting, stop at the position to be set as the zero point. Press the Origin pos set menu, and set the absolute position basic point.	The axis will move in the direction of bit 3 (basic point Z direction) of "700120 ABS Type (absolute position detection parameter)". Initialization is completed when the grid point is reached.
9. After initialization, turn the power ON again to enable normal operation.	

CHAPTER 3 MAINTENANCE
5. Operations Related to Auxiliary Axis

Depending on the state during operation, the display will change as shown below. Refer to the following table for details on each display item.



"Absolute posn set" display item	Details
Illegality	This appears when the absolute position has been lost.
Stopper type	This appears when the absolute position is being initialized with the stopper method zero point initialization. This state is maintained until the machine end is pushed against.
Press Rel.	This appears after the machine end is pushed against, and the current limit is reached continuously for a set time.
Origin type	This appears until the machine basic point is moved to from the initialization of the absolute position, and the basic point is designated.
Ret. Ref. P.	This appears after the basic point is designated, and the nearest grid is reached with the "700120 ABS TYPE" basic point direction movement.
Zero-P. Rel.	This appears when the zero point has been returned to with the dog-type initialization.
Completion	This appears when the absolute position has been established. This indicates the state that the zero point initialization has been completed.

(Note) When using position setting methods other than the above, the initialization state will be blank.

5.1.2 Recovering the absolute position data

The absolute position data file can be backed up in a device such as an HD and FLD. (Refer to section "3.3 Data Input/Output screen" in "CHAPTER 1 SCREEN OPERATIONS".)

The absolute position can be recovered using the absolute position data file backed up in an external device.

To recover the absolute position, input the data file into the NC memory on the Input/Output screen, and then turn the power ON again.

CHAPTER 3 MAINTENANCE
5. Operations Related to Auxiliary Axis

5.2 Test operation

Test operation can be carried out by turning OFF the auxiliary axis control and operating the **Normal Rot** / **Reverse Rot** on the menu.

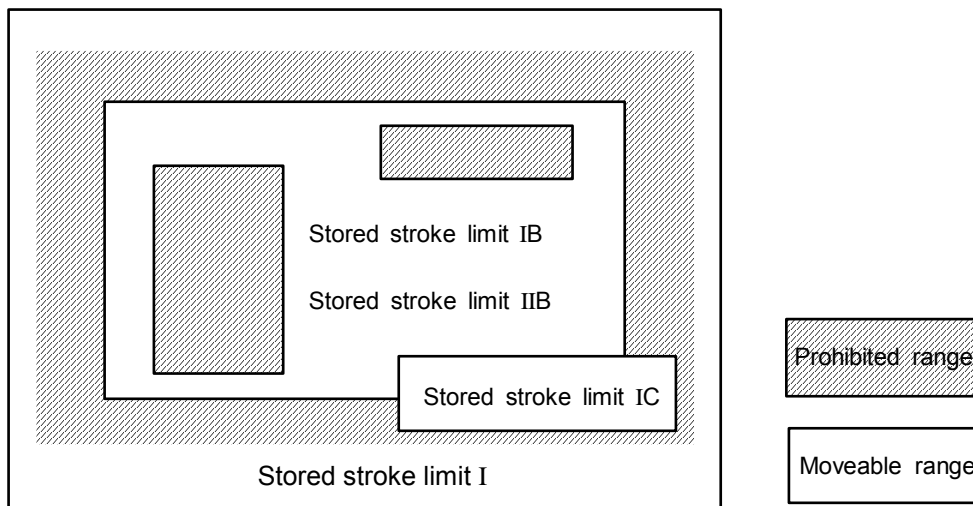
Operation procedure	Operation
1. Select the AUX test operation screen.	
2. Press the menu Axis select , and set the axis name.	An error will occur if an axis other than that set is designated.
3. Press the menu Ope Test mode , and turn the operation adjustment mode signal ON.	(Note) The operation adjustment mode signal can be turned ON only when the auxiliary axis is stopped and the operation adjustment mode valid signal from the PLC is ON.
4. Move the cursor to the "Operation mode", and select the operation mode.	A setting other than 0 to 3 will cause an error.
5. When the "Operation mode" is STEP or HANDLE, move the cursor to "Scale", and set the feed amount per pulse.	A setting other than 0 to 3 will cause an error.
6. Move the cursor to "Parameter set", and set the No. of the operation parameter group.	A setting other than 0 to 3 will cause an error.
7. Rotate the auxiliary axis. (Start by pressing Normal Rot or Reverse Rot .)	
JOG : Rotation will start in the commanded direction.	When the same menu is pressed again, the axis will immediately decelerate and stop. If the Normal Rot menu is pressed during reverse run, the rotation will stop, and then forward run will start.
MANUAL : Rotation will start in the commanded direction.	When the same menu is pressed again, the axis will be positioned to the nearest station, and will stop. If the Reverse Rot menu is pressed during forward run, the rotation will stop, and then reverse run will start. Note that the rotation cannot be started unless the absolute position is established.
STEP : Each time the movement is started, the axis will rotate by the amount set in the Scale.	Other operations are disabled during movement.
HANDLE : The axis is fed with handle rotation.	

(Note) The test operation state cannot be displayed with waveforms or monitored.

6. Setting the Stored Stroke Limit

(1) Outline

Three tool entry prohibited ranges can be set with the stored stroke limit I, the stored stroke limit II (IIB) and the stored stroke limit IB. Part of the prohibit range on the outside of the soft limit I can be validated with the stored stroke limit IC.



If a tool tries to move past the set range, an alarm will occur, and the axis will decelerate to a stop. If the prohibited range is entered and an alarm occurs, movement will be possible only in the direction opposite the entry direction.

CHAPTER 3 MAINTENANCE
6. Setting the Stored Stroke Limit

(2) Explanation of details

The stored stroke limit sets the prohibited range with the parameters or program command. The minimum and maximum values of the prohibited range are set as a distance from the 0 point on the machine coordinate system for each axis. The stroke is not checked for axes set to the same value. This function is valid only for the axis returned to the reference point after the power was turned ON.

If the machine enters into the prohibited range, an error (AX0102 S/W stroke end axis exists) will occur, and the machine movement will stop. The alarm can be reset by moving the erroneous axis in the opposite direction.

During automatic operation, if an alarm occurs with even one axis, all axes will decelerate to a stop. During manual operation, only the axis that caused the alarm will decelerate to a stop. The axis always stops at a position before the prohibited range. The distance between the prohibited range and stopping position depends on the feedrate, etc.

The stored stroke limits I, II, IIB, IB and IC are handled as follows.

Type	Prohibited range	Explanation	Range setting parameter	Validating conditions
I	Outside	<ul style="list-style-type: none"> Set by the machine manufacturer. When used with II, the narrow range designated by the two types becomes the movement valid range. 	130014 Swot– 130015 Swot+	<ul style="list-style-type: none"> Zero point return is completed. 130014 and 130015 are not set to the same value.
II	Outside	Set by the user. The parameters can be changed and the function turned ON/OFF with the program.	340008 soft limit (–) 340009 soft limit (+)	<ul style="list-style-type: none"> Zero point return is completed. 340008 and 340009 are not set to the same value. 340007 soft limit invalid = 0
IIB	Inside			
IB	Inside	<ul style="list-style-type: none"> Set by the machine manufacturer. 	130025 OT_IB– 130026 OT_IB+	<ul style="list-style-type: none"> Zero point return is completed. 130025 and 130026 are not set to the same value. 130027 1B_off = 0
IC	Inside	<ul style="list-style-type: none"> Set by the machine manufacturer. Rewriting can be carried out on the PLC window. 	130025 OT_IB– 130026 OT_IB+	<ul style="list-style-type: none"> 130025 and 130026 are not set to the same value. 130027 IB_off = 2 Connected to I range.
			130060 OT_IC– 130061 OT_IC+	<ul style="list-style-type: none"> 130060 and 130061 are not set to the same value. 130027 IB_off is 0 or 1 130062 IC_off = 0 Connected to I range.

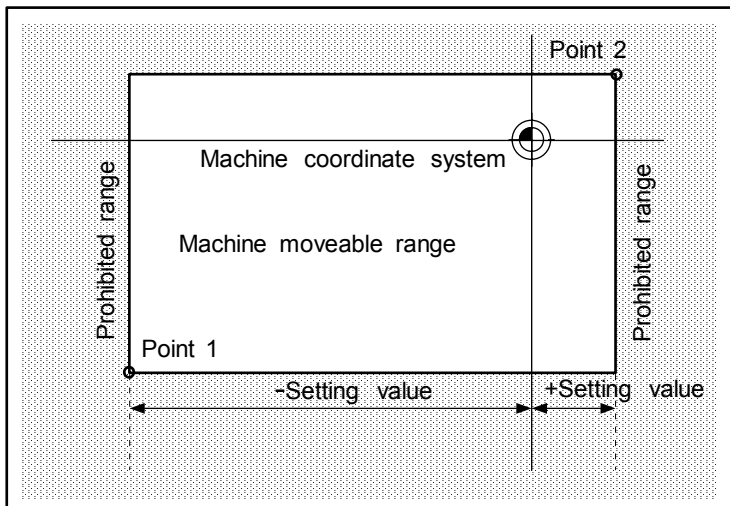
Order of priority: IIB ≥ IB > IC > II ≥ I

- 1) For I and II, the mode with the confined range will have the priority.
- 2) IIB and IB are used for convenience in writing, and there is no particular priority between them.

6.1 Stored stroke limit I

This is a stroke limit function used by the machine manufacturer. The boundary is set with the parameters (axis specification parameters "130014 Swot-" and "130015 Swot+"). The outside of the set boundary is the prohibited range.

When used with the stored stroke limit II function, the confined range designated by the two functions becomes the moveable valid range.



The following values are set with the coordinate values in the machine coordinate system.
Point 1: 130014 Swot-
Point 2: 130015 Swot+

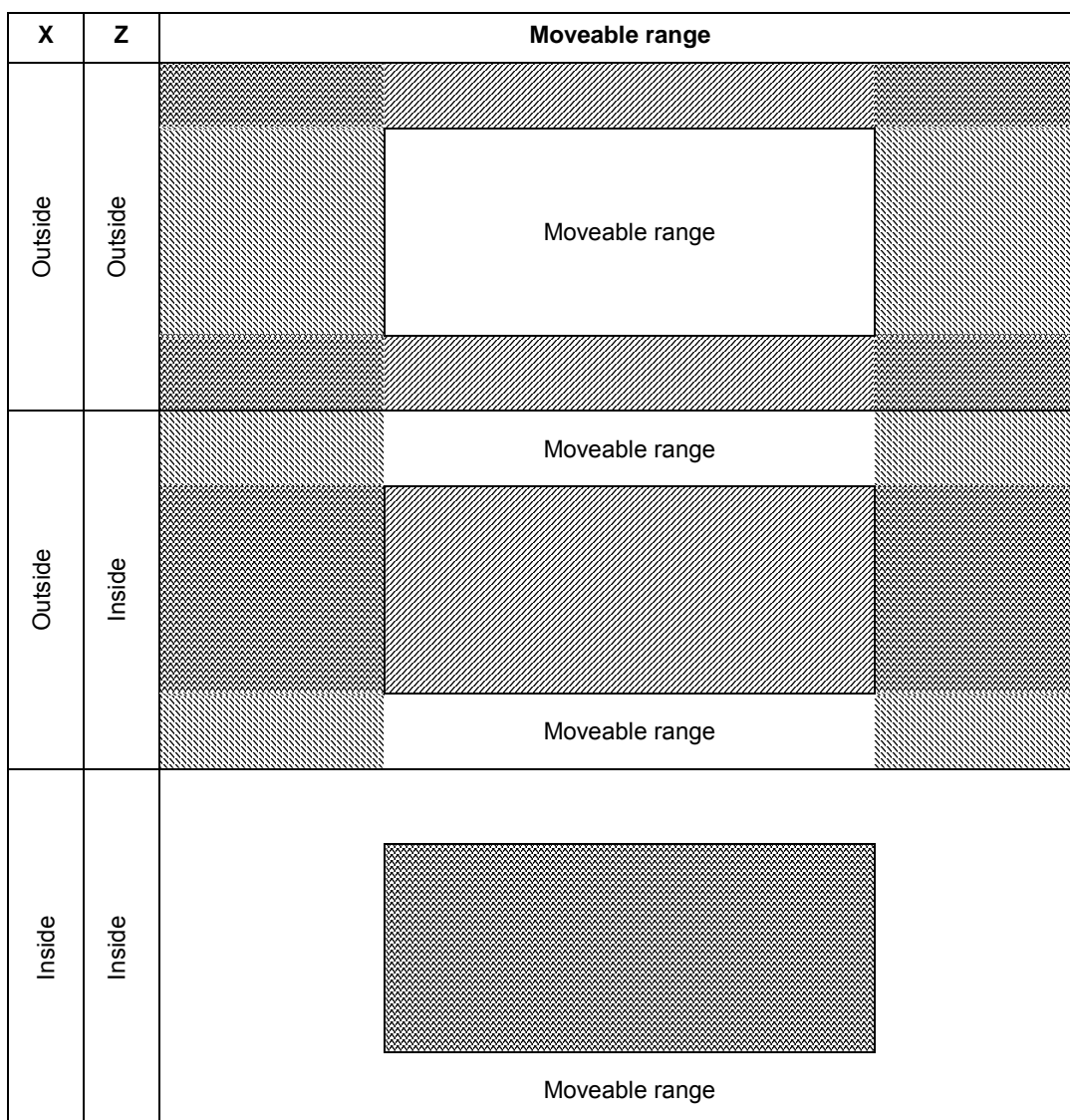
6.2 Stored stroke limit II

The boundary is set with the parameters (axis parameters "340008 soft limit (-)" and "340009 soft limit (+)" or with the program commands. Either the inside or the outside of the set boundary is the prohibited range. Whether the inside or outside of the range is prohibited is determined by parameter ("340011 soft limit inside"). When the inside is selected, this function is called stored stroke limit IIB.

When using program commands, entry of the tool into the prohibited range is prohibited with G22, and entry into the prohibited range is enabled with G23.

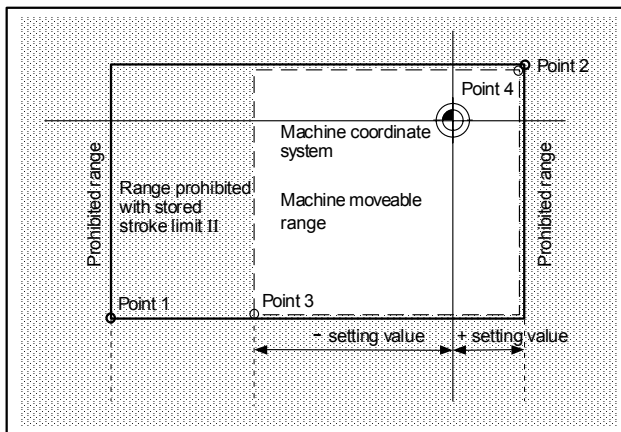
The stored stroke limit II function can be invalidated for each axis with the parameter setting ("340007 soft limit invalid" = 1).

"340011 soft limit inside" can be set for each axis, but when used in combination, the following operations are possible:



(1) Stored stroke limit II (When prohibited range is outside)

Used with the stored stroke limit I function, the confined range designated by the two functions becomes the moveable range.



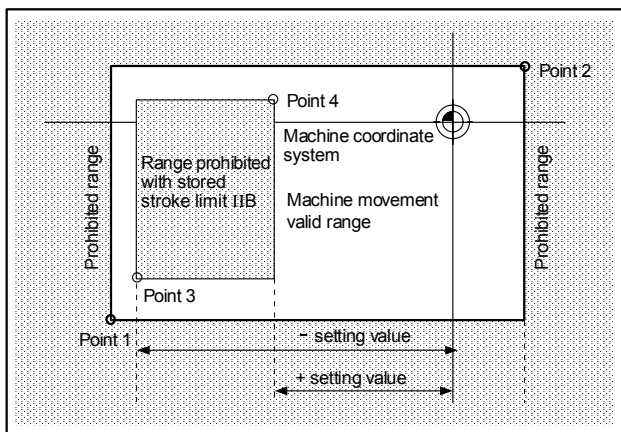
The following values are set with the coordinate values in the machine coordinate system:

- Point 3: 340008 soft limit (-)
- Point 4: 340009 soft limit (+)

The area determined by points 1 and 2 is the prohibited range set with stored stroke limit I.

(2) Stored stroke limit IIB (When prohibited range is inside)

A range besides the stored stroke limit I becomes the movement prohibited range.



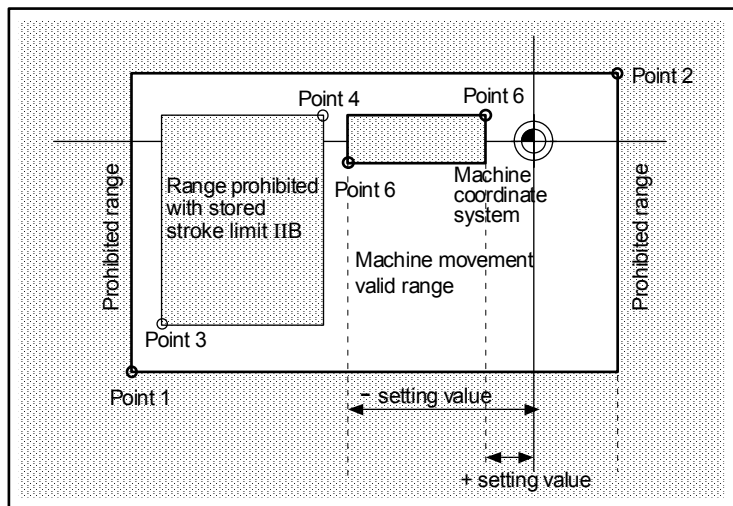
(3) Setting with program commands

With the stored stroke limit II (IIB) function, the prohibited range (parameters) can be changed and this function can be turned ON and OFF with the program commands. Refer to the section on the program parameters inputs in the Programming Manual, and the Parameter Manual for details.

6.3 Stored stroke limit IB

The boundary is set for each axis with the parameters (axis parameters "340025 OT_IB-" and "340026 OT_IB+"). The inside of the set boundary is the prohibited range.

This is valid when the axis specification parameter "130027 IB_off" is set to "0".



The following values are set with the coordinate values in the machine coordinate system:

Point 5: 340025 OT_IB-

Point 6: 340026 OT_IB+

The area determined by points 1 and 2 is the prohibited range set with stored stroke limit I, and the area determined by points 3 and 4 is the one with stored stroke limit IIB.

6.4 Stored stroke limit IC

(1) To share the setting range designation with soft limit IB and IC

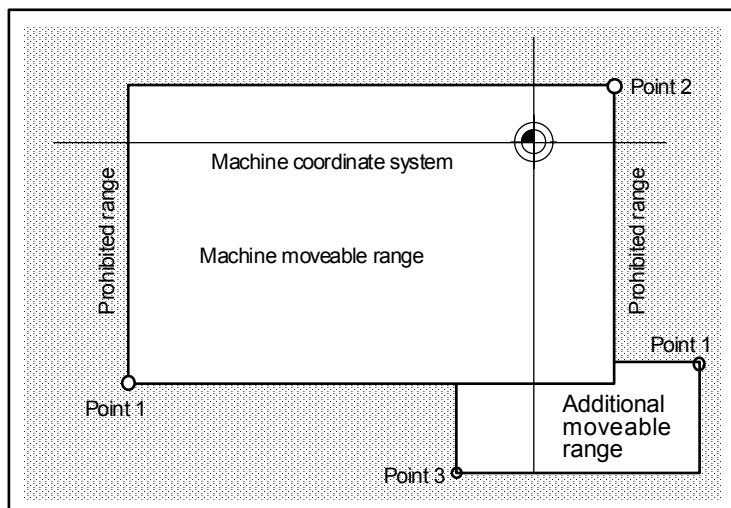
Stored stroke limit IC is valid when the axis specification parameter "130027" is set to "2", and cannot be used with soft limit IB.

The boundary is set for each axis with the parameters (axis parameters "340025 OT_IB-" and "340026 OT_IB+"). The inside of the set boundary becomes the additional moveable range.

(2) To independently designate the setting range with soft limit IB and IC

This is valid when the axis specification axis parameter "130027 IB_off" is set to "0" or "1", and "130062 IC_off" is set to "0".

The boundary is set for each axis with the parameters (axis specification parameters "130060 OT_IC-" and "130061 OT_IC+"). The inside of the set boundary becomes the additional moveable range.



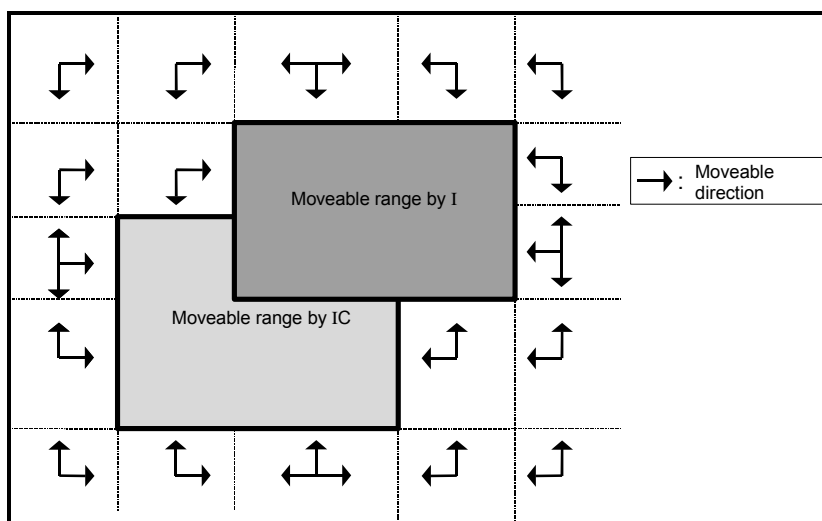
The following values are set with the coordinate values in the machine coordinate system:

- Point 3: 130025 OT_IB- or 130060 OT_IC-
- Point 4: 130026 OT_IB+ or 130061 OT_IC+

The area determined by points 1 and 2 is the prohibited range set with stored stroke limit I.

6.5 Precautions related to stroke limit

- (1) When the maximum value and minimum value of the stored stroke limit's prohibited range are set to the same data, note that the following will occur:
 - (a) When the maximum value and minimum value are set to the same data, if the outside is the prohibited range, the entire range will be prohibited. If the inside is the prohibited range, the entire range will be the moveable range.
- (2) Stored stroke limit IC is validated by changing the axis specification parameter "130027 IB_off".
- (3) Make sure that the lower limit value of the stored stroke limit IC setting value is smaller than the upper limit value.
- (4) Movement in the prohibited range is limited to that in the direction that approaches both I and IC.



7. Daily Maintenance

7.1 Daily inspection

7.1.1 Checking the external view

- (1) Machine oil (cutting oil, lubrication oil) have been scattered onto the servomotor, detector, or main 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.

7.1.2 Checking the inside of the NC unit

Check that the following troubles have been eliminated:

- (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) Printed circuit boards have been inserted abnormally.

7.2 Replacement

7.2.1 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 (LOW BATTERY VOLTAGE CAUTION ALARM) 2.6V (LOW BATTERY VOLTAGE 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

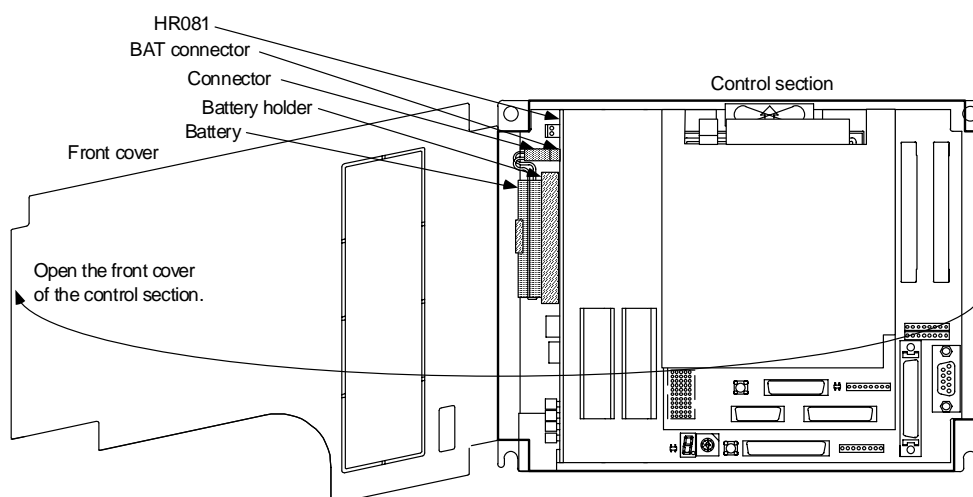
(Replace the battery immediately if a LOW BATTERY VOLTAGE CAUTION ALARM appears. The internal data may be destroyed if the LOW BATTERY VOLTAGE WARNING ALARM appears.)

(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 unit 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 precautions

- 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 according to local laws.



CAUTION

❗ If the BATTERY LOW warning is output, save the machining programs, tool data and parameters to an input/output 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.

7.2.2 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)

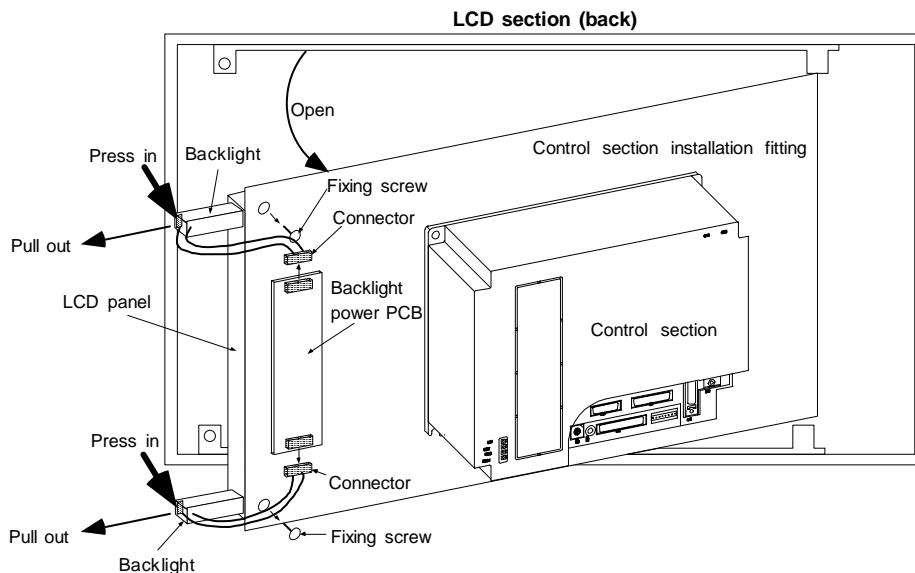
Backlight..... KCI-04 (Kyocera)

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 unit 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 left.)
- 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.

7.2.3 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.

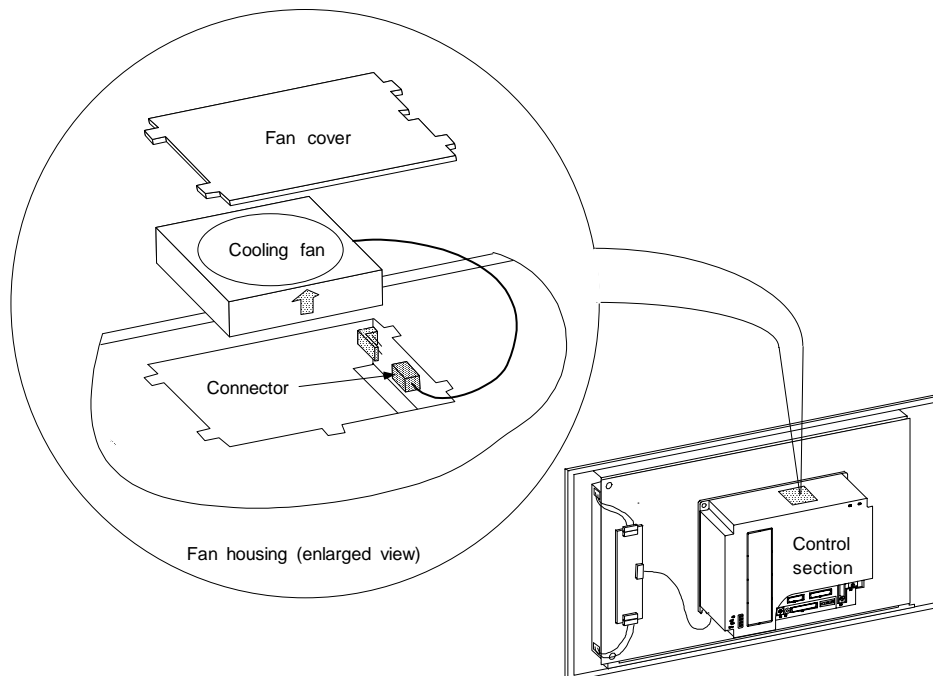
Cooling fan MMF-04B05DM-R (DDK, with Mitsubishi Electric specifications)

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 unit 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 out 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.

7.2.4 Replacing the hard disk drive (HDD)

Depending on the 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 >

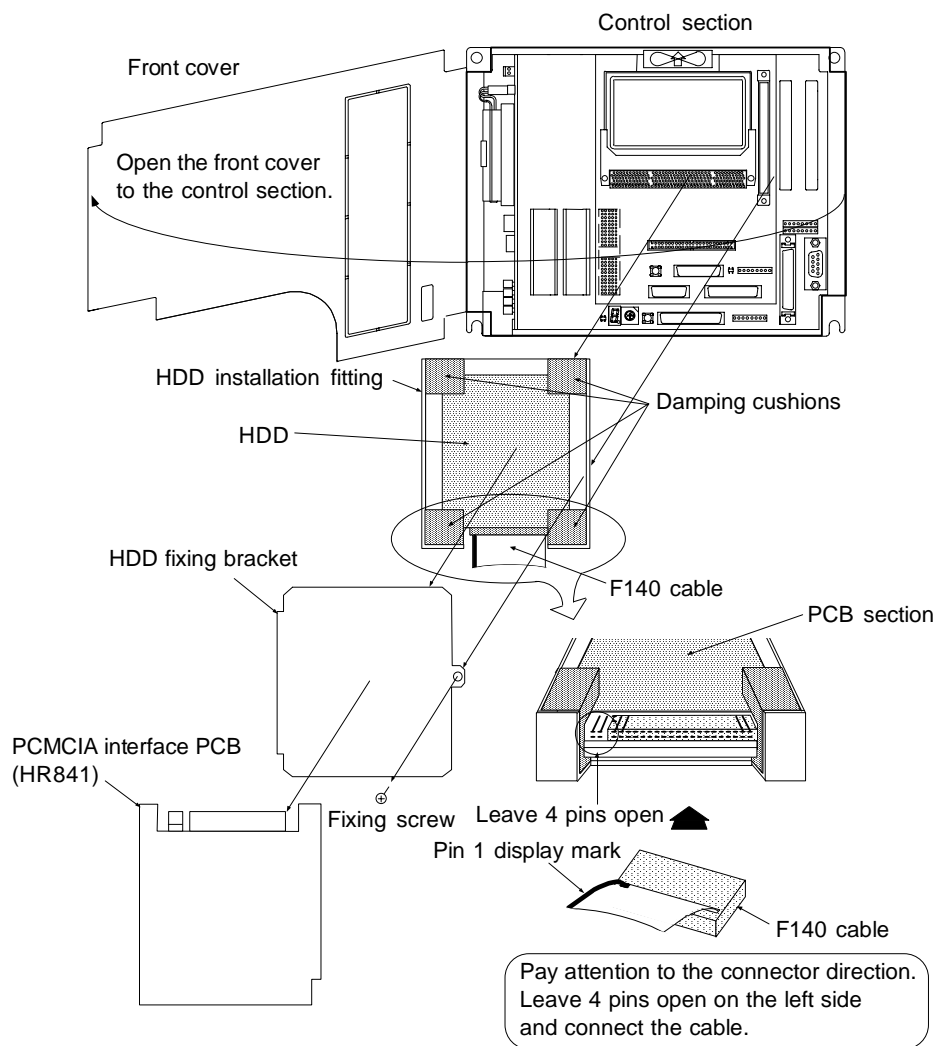
Turn the control section power OFF when replacing the HDD.

- 1) Confirm that the control unit 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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7. Daily Maintenance

< HDD built into the control section >



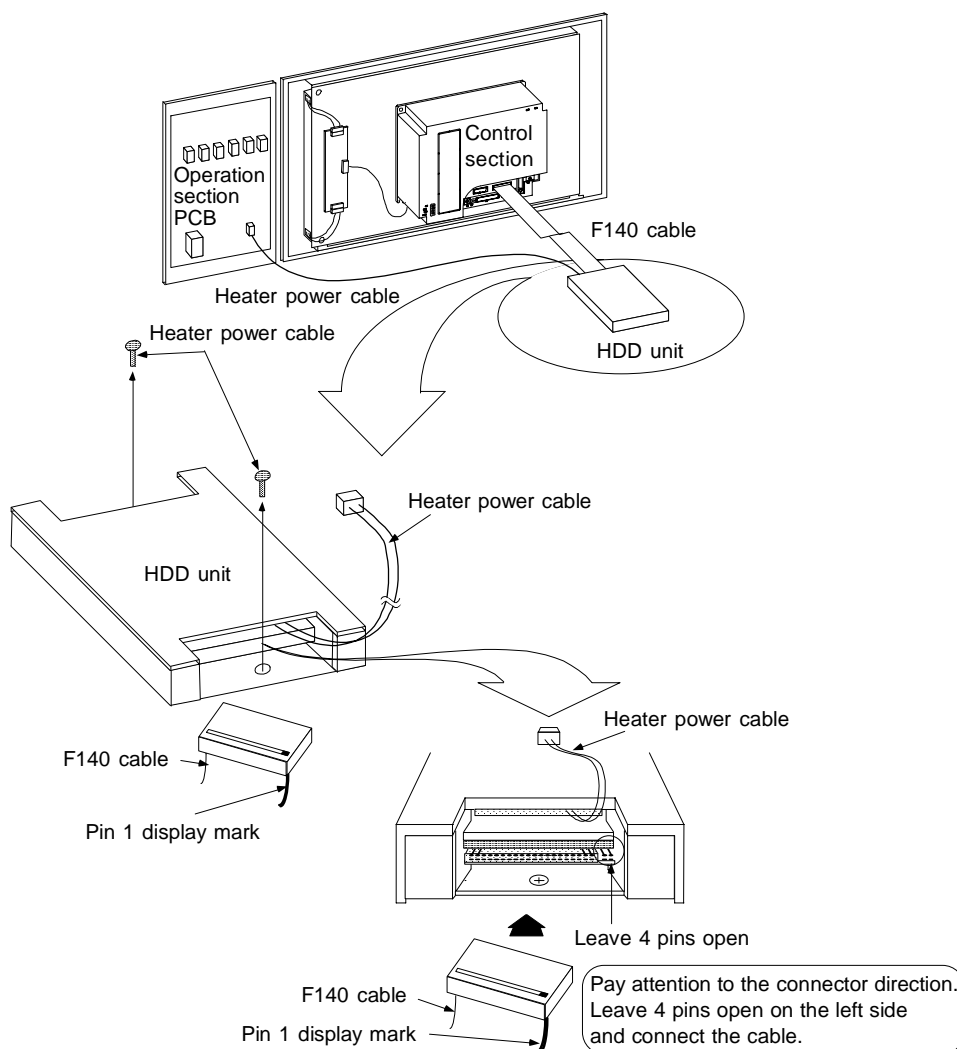
CAUTION

-  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.

< HDD unit installed externally to the control section >

Turn the control section power OFF when replacing the HDD unit.

- 1) Confirm that the control unit 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.

7.3 Cleaning and handling

7.3.1 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.

7.3.2 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) Precautions 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.



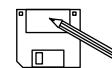
- 3) Keep the floppy disk away from cigarette smoke, etc. Do not allow any solvent to contact the magnetic surface.



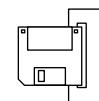
- 4) When attaching an index label on the floppy disk, attach the label in the correct positions so it will not peel off. Do not attach more than one label on the floppy disk.



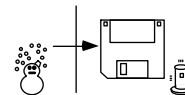
- 5) Write on the label before attaching it to the floppy disk. Use a soft-tipped instrument such as a felt-tip pen to write on labels already attached to the floppy disk.



- 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.

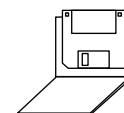


- 7) Before using a floppy disk brought in from outdoors where there is a great difference in temperature or humidity, leave the disk in the room for at least 30 minutes.

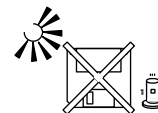


(b) Precautions for storage

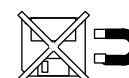
- 1) Always store floppy disks that are not being used and backup floppy disks in a plastic case.



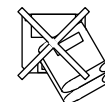
- 2) Do not leave floppy disks in direct sunlight or near heaters.



- 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.



(3) Other precautions 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 hours 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 (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 precautions 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.

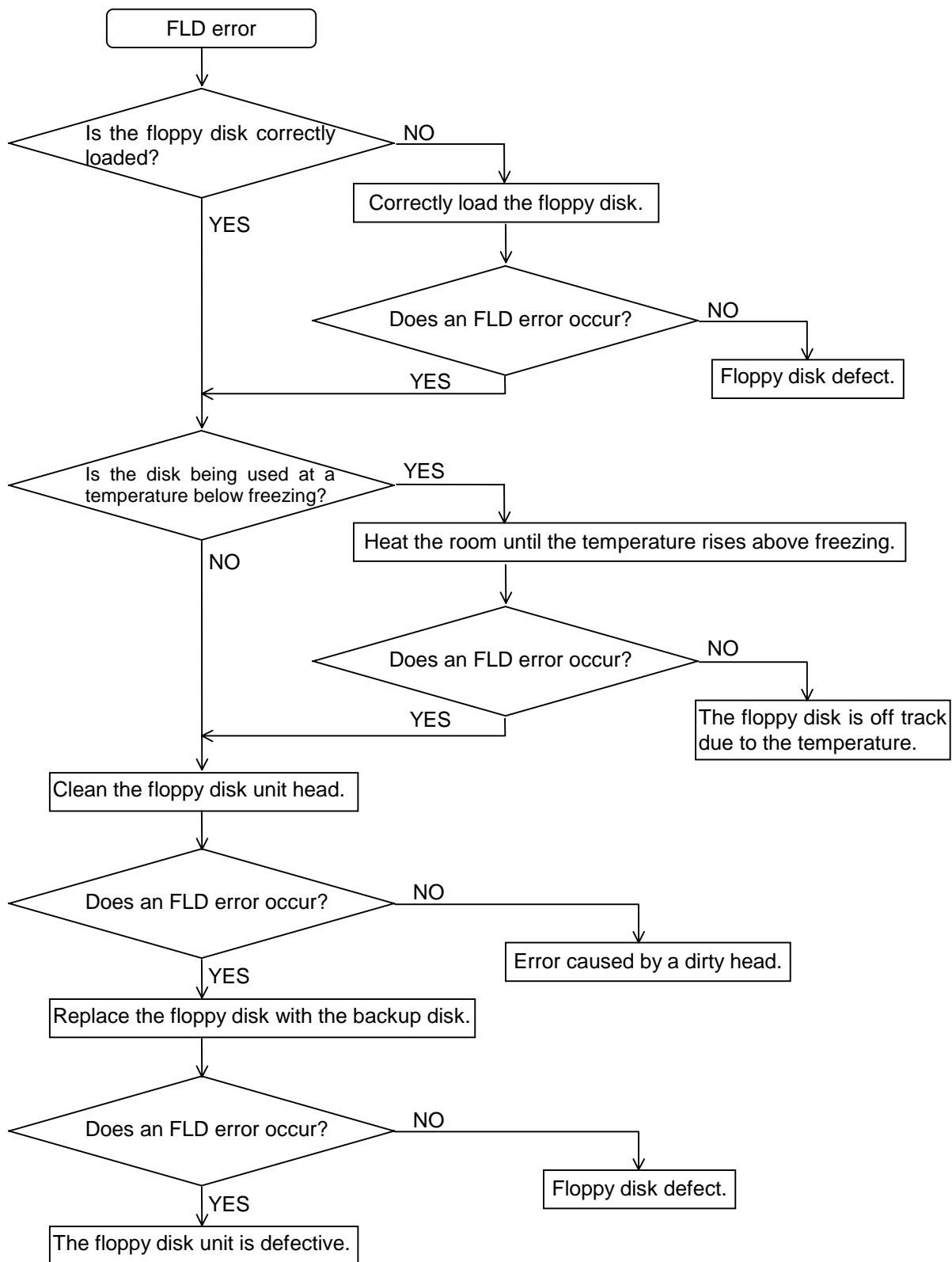
In this case wait for the inside temperature to rise before starting.

(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



7.3.3 Hard disk drive

(1) Handling the hard disk

(a) Precautions 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) Precautions 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 precautions for use

(a) Backup recommendation

Hard disks have a limited life, and so should be copied when suitable as a precaution as well as for storing important data.

7.3.4 LCD panel

(1) Handling the LCD panel

(a) Precautions 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) Precautions for storage

1. Do not store the hard disk 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 precautions 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.

7.3.5 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) Precautions 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) Precautions 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.

8. Fault Diagnosis and Action

8.1 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 and display unit's screen?
- During I/O operation?
- Machine system status?
- During tool change?
- Controlled axis hunting?

(3) What fault occurred?

- What does the alarm display of the setting and display unit's alarm diagnosis 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 noises of the supply voltage, for example. In this case, check that (i) the supply 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?)

8.2 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.

[Precautions]

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.
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 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 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.

(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 (VR1) volume 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 CONTRAST ADJUSTMENT screen.
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.

(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.

(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 HR3○○ 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 HR3○○ Card.
The 5OUT LED goes out. (Input voltage 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 subprograms of the standard Fixed cycle G73, G74, G76 and G81 to G89 commands.

In addition, separate subprograms can be created and G70, G71, G72, G75, G77, G78 and G79 can be used as user Fixed cycles so that these subprograms can also be input/output and edited.

CAUTION

 Do not change the Fixed cycle program without prior approval from the machine manufacturer.

1.1 Parameters for Fixed cycle program operation

To input/output or edit the data of each fixed subprogram of G70 to G89, use the "IN/OUT" and "EDIT" screens in the same way as when creating usual user-created machining programs. In this case, the parameter "Basic specification parameter 110007 Fix_P" must have been set.

(1) Turning ON the parameters for Fixed cycle operation

1)

Display the basic specification parameter screen of machine parameters.

2)

Set 1 in parameter "110007 Fix_P".



When this parameter is valid, the "IN/OUT" and "EDIT" screens are 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 "110007 Fix_P". (Normal user-created machining programs can be operated.) 0 is set in the parameter also by turning the power OFF and turning it ON again.

1.2 Inputting/outputting Fixed cycle programs

Fixed cycle programs are transferred (input/output with an external device) on the input/output (IN/OUT) screen. Check that the parameter "110007 Fix_P" for Fixed cycle operation on the basic specification parameter 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 program entry, it should be checked that the programs have been entered correctly on the program file and editing pages.

(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 entered: output of one program at a time or output of all programs together.

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 batches of several continuous programs.

Designate the device, directory and No. of the program to be erased in the setting column A. When erasing a batch of several continuous programs, 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

G81 (O100000810)	Drill, spot drill
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<pre>G. 1 ; IF [#30] GOTO1 ; G0 Z#2 G#6 H#7 ; #2 = ##5 #3003 = #8 OR 1 ; G1 Z#3 ; #3003 = #8 ; G0 Z-#3-#2 ; N1 M99%</pre>	<p>Fixed cycle block 1 movement command Check for Fixed cycle invalidity.</p> <p>Inhibit single block stop.</p> <p>Return.</p>
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G82 (O100000820)	Drill, counter boring
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<pre>G. 1 ; IF [#30] GOTO1 ; G0 Z#2 G#6 H#7 ; #2 = ##5 #3003 = #8 OR 1 ; G1 Z#3 ; IF [#4 EQ #0] GOTO5 ; G4 P#4 ; N5 #3003 = #8 ; G0 Z-#3-#2 ; N1 M99%</pre>	<p>Fixed cycle block 1 movement command Check for Fixed cycle invalidity.</p> <p>Inhibit single block stop.</p> <p>Dwell.</p> <p>Return.</p>
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G83 (O100000830)	Deep hole drill cycle
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<pre>G. 1 ; IF [#30] GOTO2 ; #29 = #11 #28 = 0 ; G0 Z#2 G#6 H#7 ; #2 = ##5 #3003 = #8 OR 1 ; DO 1 ; #28 = #28-#11 #26 = -#28-#29 Z#26 ; IF [ABS [#28] GE [ABS [#3]]] GOTO 1 ; G1 Z#29 ;</pre>	<p>Fixed cycle block 1 movement command Check for Fixed cycle invalidity. Define the cutting amount. Initialize the return amount(total cutting amount).</p> <p>Inhibit single block stop.</p> <p>Define the return amount of the next block. Calculate the feed amount. Feed. Does the total cutting amount (return amount) exceed the cut amount? Cutting feed</p>
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<p>G0 Z#28 ; #29 = #11+#14 ; END1 ; N1 G1 Z#3-#26 ; #3003 = #8 ; G0 Z-#3-#2 ; N2 M99%</p>	<p>Return. Define the cutting amount for block 2 and after.</p> <p>Cutting feed</p> <p>Return.</p>
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G84 (O100000840)	Tap cycle
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<p>G. 1 ; IF [#30] GOTO1 ; G0 Z#2 G#6 H#7 ; #2 = ##5 #3003 = #8 OR 1 ; #3004 = #9 OR 3 ; G1 Z#3 ; IF [#4 EQ #0] GOTO5 ; G4 P#4 ; N5 M4 ; #3900 = 1 ; G1 Z-#3 ; #3004 = #9 ; IF [#4 EQ #0] GOTO6 ; G4 P#4 ; N6 M3 ; #3003 = #8 ; G0 Z-#2 ; N1 M99%</p>	<p>Fixed cycle block 1 movement command Check for Fixed cycle invalidity.</p> <p>Inhibit single block stop.</p> <p>Dwell. Rotate the spindle reversely.</p> <p>Dwell. Rotate the spindle forward.</p> <p>Return.</p>
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G85 (O100000850)	Boring 1
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<p>G. 1 ; IF [#30] GOTO1 ; G0 Z#2 G#6 H#7 ; #2 = ##5 #3003 = #8 OR 1 ; G1 Z#3 ; #3003 = #8 ; Z-#3 ; G0 Z-#2 ; N1 M99%</p>	<p>Fixed cycle block 1 movement command Check for Fixed cycle invalidity.</p> <p>Inhibit single block stop.</p> <p>Return.</p>
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G86 (O100000860)	Boring 2
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<pre> G. 1 ; IF [#30] GOTO1 ; G0 Z#2 G#6 H#7 ; #2 = ##5 #3003 = #8 OR 1 ; G1 Z#3 ; IF [#4 EQ #0] GOTO5 ; G4 P#4 ; N5 M5 ; G0 Z-#3-#2 ; #3003 = #8 ; M3 ; N1 M99%</pre>	<p>Fixed cycle block 1 movement command Check for Fixed cycle invalidity.</p> <p>Inhibit single block stop.</p> <p>Dwell. Stop the spindle. Return.</p> <p>Rotate the spindle forward.</p>
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G87 (O100000870)	Back boring
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<pre> G. 1 ; IF [#30] GOTO1 ; #3003 = #8 OR 1 ; #26 = #30064+#30074 ; #28 = #12*COS[#26]+#13*SIN[#26] ; #29 = #13*COS[#26]-#12*SIN[#26] ; M19 ; X#28 Y#29 ; #3003 = #8 ; G0 Z#2 G#6 H#7 ; #3003 = #8 OR 1 ; G1 X-#28 Y-#29 ; #3003 = #8 ; M3 ; #3003 = #8 OR 1 ; Z#3 ; M19 ; G0 X#28 Y#29 ; Z-#2-#3 ; #3003 = #8 ; X-#28 Y-#29 ; M3 ; N1 M99%</pre>	<p>Fixed cycle block 1 movement command Check for Fixed cycle invalidity. Inhibit single block stop.</p> <p>Orient the spindle.</p> <p>Cancel single block stop inhibition.</p> <p>Inhibit single block stop.</p> <p>Cancel single block stop inhibition. Rotate the spindle forward. Inhibit single block stop.</p> <p>Orient the spindle. Shift. G87 is not affected by the G98 or G99 modal. Cancel single block stop inhibition. Shift. Rotate the spindle forward.</p>
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G88 (O100000880)	Boring 3
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<pre>G. 1 ; IF [#30] GOTO1 ; G0 Z#2 G#6 H#7 ; #2 = ##5 #3003 = #8 OR 1 ; G1 Z#3 ; IF [#4 EQ #0] GOTO5 ; G4 P#4 ; N5 #3003 = #8 ; M5 ; #3003 = #8 OR 1 ; G0 Z-#3-#2 ; #3003 = #8 ; M3 ; N1 M99 ;</pre>	<p>Fixed cycle block 1 movement command Check for Fixed cycle invalidity.</p> <p>Inhibit single block stop.</p> <p>Dwell.</p> <p>Cancel single block stop inhibition. Stop the spindle. Inhibit single block stop. Return. Cancel single block stop inhibition. Rotate the spindle forward.</p>
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G89 (O100000890)	Boring 4
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<pre>G. 1 ; IF [#30] GOTO1 ; G0 Z#2 G#6 H#7 ; #2 = ##5 #3003 = #8 OR 1 ; G1 Z#3 ; IF [#4 EQ #0] GOTO5 ; G4 P#4 ; N5 #3003 = #8 ; Z-#3 ; G0 Z-#2 ; N1 M99%</pre>	<p>Fixed cycle block 1 movement command Check for Fixed cycle invalidity.</p> <p>Inhibit single block stop.</p> <p>Dwell.</p> <p>Return. Return.</p>
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G73 (O100000730)	Step cycle
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<pre>G. 1 ; IF [#30] GOTO2 ; #29 = 0 #28 = #11 ; G0 Z#2 G#6 H#7 ; #2 = ##5 #3003 = #8 OR 1 ; DO 1 ; #29 = #29+#11 ; IF [ABS [#29] GE [ABS [#3]]] GOTO 1 ;</pre>	<p>Fixed cycle block 1 movement command Check for Fixed cycle invalidity. Initialize the total cutting amount. Define the cutting amount.</p> <p>Single block stop command</p> <p>Increment the total cutting amount counter. Does the total cutting amount exceed the cut amount Z?</p>
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CHAPTER 4 APPENDICES
Appendix 1. Fixed cycle Programs

<p>G1 Z#28 ; IF [#4 EQ #0] GOTO5 ; G4 P#4 ; N5 G0 Z-#14 ; #28 = #11+#14 ; END1 ; N1 G1 Z#3-#29+#28 ; IF [#4 EQ #0] GOTO6 ; G4 P#4 ; N6 #3003 = #8 ; G0 Z-#3-#2 ; N2 M99%</p>	<p>Cutting feed</p> <p>Dwell. Return. Define the cutting amount for block 2 and after.</p> <p>Cutting feed</p> <p>Dwell.</p> <p>Return.</p>
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G74 (O100000740)	Reverse tap cycle
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<p>G. 1 ; IF [#30] GOTO1 ; G0 Z#2 G#6 H#7 ; #2 = ##5 #3003 = #8 OR 1 ; #3004 = #9 OR 3 ; G1 Z#3 ; IF [#4 EQ #0] GOTO5 ; G4 P#4 ; N5 M3 ; #3900 = 1 ; Z-#3 ; #3004 = #9 ; IF [#4 EQ #0] GOTO6 ; G4 P#4 ; N6 M4 ; #3003 = #8 ; G0 Z-#2 ; N1 M99%</p>	<p>Fixed cycle block 1 movement command Check for Fixed cycle invalidity.</p> <p>Inhibit single block stop. Invalidate feed hold/override.</p> <p>Dwell. Rotate the spindle forward.</p> <p>Dwell. Rotate the spindle reversely.</p> <p>Return.</p>
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G76 (O100000760)	Fine boring
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<pre>G. 1 ; IF [#30] GOTO1 ; G0 Z#2 G#6 H#7 ; #2 = ##5 #26 = #30064+#30074 ; #28 = #12*COS[#26]+#13*SIN[#26] ; #29 = #13*COS[#26]-#12*SIN[#26] ; #3003 = #8 OR 1 ; G1 Z#3 ; M19 ; X#28 Y#29 ; G0 Z-#3-#2 ; #3003 = #8 ; X-#28 Y-#29 ; M3 ; N1 M99%</pre>	<pre>Fixed cycle block 1 movement command Check for Fixed cycle invalidity. Inhibit single block stop. Orient the spindle. Shift. Return. Shift. Rotate the spindle forward.</pre>
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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.
Verifying	<ul style="list-style-type: none"> • The data is being compared correctly.
Verifying stopped	<ul style="list-style-type: none"> • The data comparison 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.
Verify error	<ul style="list-style-type: none"> • Could not find the designated program No., sequence No. or block at the compare stop.
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.
Can't cancel verify stop	<ul style="list-style-type: none"> • The compare stop cannot be canceled because the operation is not in a compare stop.

2.3 Restart search-related operation messages

Message	Details
Executing restart search	<ul style="list-style-type: none"> • The restart search is being executed correctly.
Restart search is completed	<ul style="list-style-type: none"> • The restart search completed correctly.
Executing top search	<ul style="list-style-type: none"> • The top search is being executed correctly.
Top search completed	<ul style="list-style-type: none"> • The top search completed correctly.
Search error	<ul style="list-style-type: none"> • The restart search or top search process failed. → Reconsider the program.
Calculating machining time	<ul style="list-style-type: none"> • The machining time is being calculated correctly.
Calculating machining time completed	<ul style="list-style-type: none"> • The machining time calculation completed correctly.
Can't input data	<ul style="list-style-type: none"> • Data input was attempted during M, S, T, B history display.
Calculating machining time canceled	<ul style="list-style-type: none"> • The machining time calculation was canceled correctly. • The machining time calculation was canceled because the screen was changed to another screen during the process.

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Message	Details
Machining time calculating error	<ul style="list-style-type: none"> • The machining time calculation process failed.
Setting error	<ul style="list-style-type: none"> • Restart search, top search or machining time calculation was attempted without setting the program No. → Always set the program No. before starting restart search, top search or machining time calculation. • The directory name designated for the list retrieval exceeded the display range. → A directory path for which the entire directory cannot be displayed cannot be designated in the directory name area.
FLD not ready	<ul style="list-style-type: none"> • FLD restart search, top search or machining time calculation was attempted when an FLD was not inserted. → Insert an FLD before starting restart search, top search or machining time calculation. • The FLD list display was attempted when an FLD was not inserted. → Insert an FLD and press the [From list] menu again.
Can't input data	<ul style="list-style-type: none"> • Data input was attempted when M, S, T, B history was displayed. → Input the data after closing the M, S, T, B history display.
Can't command manual value	<ul style="list-style-type: none"> • The manual value command process failed.

2.4 Graphic display-related operation messages

Message	Details
Program check completed	<ul style="list-style-type: none"> • The trace in the program check completed with an M02/M30 code.
Checking	<ul style="list-style-type: none"> • The program check is being executed.
Check stopped	<ul style="list-style-type: none"> • When the [Check step] menu key is pressed, one step of the check is executed, and the operation goes into standby in a check stopped state.
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.
Reset complete	<ul style="list-style-type: none"> • The program check was reset.
Push [Check reset] menu	<ul style="list-style-type: none"> • An error occurred in the graphic check. → Press the [Check reset] menu key to reset the error.
Memory over	<ul style="list-style-type: none"> • This error occurs when outputting the accuracy measurement tool's reference shape data.

2.5 Compensation-related (tool offset, 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;">[Y] or [INPUT] : Erase the data. <li style="padding-left: 20px;">[N] : 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;">[Y] or [INPUT] : Clear the data for all axes. <li style="padding-left: 20px;">[N] : 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;">[Y] or [INPUT] : Clear all data. <li style="padding-left: 20px;">[N] : 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 [Coord G54.1 P] menu was pressed. • The expansion workpiece coordinate system P No. was input.

2.6 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;">[Y] or [INPUT] : Execute the operation <li style="padding-left: 20px;">[N] : 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.
Can't read file for dev A	<ul style="list-style-type: none"> • Could not read in the file for device A. <li style="padding-left: 20px;">→ Recheck the connection status for device A or the input/output parameter setting.

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Message	Details
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"> • An error occurred while creating 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 have 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. [Y] or [INPUT] : Overwrite the file. [N] : Do not overwrite the file.
Compare error. Compare next file?(Y/N)	<ul style="list-style-type: none"> • Message to confirm the operation. [Y] or [INPUT] : Compare the next file. [N] : Do not compare the next file.
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 block B	<ul style="list-style-type: none"> • Execution was attempted of an operation (edit, play back, input/output, etc.) that is prohibited for machining program B (8000 to 8999: standard user subprogram).

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Message	Details
Edit block C	<ul style="list-style-type: none"> • Execution was attempted of an operation (edit, play back, 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.
Variable conversion error	<ul style="list-style-type: none"> • An error occurred during the M2 macro conversion, and the conversion failed.
Make directory complete	<ul style="list-style-type: none"> • Creation of the directory has been completed.
Directory pass is illegal	<ul style="list-style-type: none"> • The designated directory path name is illegal. → Input a correct directory path 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.

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2.7 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. [Y] or [INPUT] : Paste the data at the current cursor position. [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 [Param No.] menu, but the password has not been input. → Press the [Machine param] menu, and input the password for displaying the machine parameters.

2.8 Tool-related operation messages

Message	Details
Designated group already exists	<ul style="list-style-type: none"> An already existing group No. was designated when changing the group No. (Tool life screen (grp)) An already existing group No. was designated when newly creating the group. (Tool life screen (grp list)) → Designate a group No. that does not already exist.
Designated group does not exist	<ul style="list-style-type: none"> Erasing was attempted on the Tool life screen (grp list) of a group that does not exist.
Can't register group	<ul style="list-style-type: none"> The group registration process on the Tool life screen (grp list) failed.
Can't delete group	<ul style="list-style-type: none"> The group deletion process on the Tool life screen (grp list) failed.
Input the tool number	<ul style="list-style-type: none"> Pasting was attempted in a line that does not have a tool No. (Tool life screen (grp)). → Paste in a line that has a tool No.
Copy range is inadequate	<ul style="list-style-type: none"> Copying was attempted of a line that does not have a tool No. (Tool life screen (grp)). → Copy a line that has a tool No.
Clear not possible	<ul style="list-style-type: none"> The line clear process failed. (Tool life screen (grp))
Erase? (Y/N)	<ul style="list-style-type: none"> Message to confirm the operation. [Y] or [INPUT] : Erase the data [N] : Do not erase the data.
Create new file? (Y/N)	<ul style="list-style-type: none"> Message to confirm the operation when newly creating data, files, etc. [Y] or [INPUT] : Newly create. [N] : Cancel the operation.

2.9 Measurement-related (workpiece, rotation) operation messages

Message	Details
TLM switch OFF	<ul style="list-style-type: none"> • Measurement was attempted when the TLM switch was OFF.
Can't take-in skip posn	<ul style="list-style-type: none"> • Could not retrieve the skip position. → Check the following: < When measuring the workpiece > <ol style="list-style-type: none"> 1. Is the name of the axis to be measured designated in the basic axis (I, J, K)? 2. Is the axis that executed the axis movement a measurement axis? < When measuring the rotation > <ol style="list-style-type: none"> 1. Is the name of the axis to be measured designated in the coordinate rotation plane (horizontal axis, vertical axis)? 2. Is the axis that executed the axis movement a measurement axis?
Can't write coordinates data	<ul style="list-style-type: none"> • Could not obtain the measured axis No. • The measured angle was illegal. • Could not write into the coordinate system offset. → Measure again.
Can't write rotation parameter	<ul style="list-style-type: none"> • Could not write the measurement results to the machining parameters.
Can't calculate center & angle for rot	<ul style="list-style-type: none"> • The three points required for measurement have not been taken in. • Retrieval of the center shift amount failed. • Retrieval of the sensor radius failed. • The center and angle measurement failed. → Measure three points before writing the coordinate system.
Sensor take in not possible	<ul style="list-style-type: none"> • Could not retrieve the position measured with the touch sensor. → Measure again.
Input 0 to coord center & angle for rot	<ul style="list-style-type: none"> • The center and angle are not set to "0". → Set the parameters [Coord rot center] and [Coord rotation angle] to "0".
Can't write compensation data	<ul style="list-style-type: none"> • The cursor position and the cell for writing the compensation amount (length dimension, radius dimension) do not match. → Match the cursor position with the cell for writing the compensation amount.

2.10 Operation messages related to pallet program registration

Message	Details
Pallet running	<ul style="list-style-type: none"> • The program for the pallet in the machine was registered.
APC executing	<ul style="list-style-type: none"> • The program was registered during APC (automatic pallet changer) execution.
Setting error	<ul style="list-style-type: none"> • Data exceeding the setting range was set.

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2.11 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. [Y] : Save the changes to the current file. [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. [Y] : Save the file on the left side. [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. [Y] : Save the file on the right side. [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.
No. of 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, play back, 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, play back, 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.
Abs/Inc mode is illegal	<ul style="list-style-type: none"> During playback editing: G90 was set when control parameter "Playback G90" was OFF. G91 was set when control parameter "Playback G90" was ON.
Replace ? (Y/N)	<ul style="list-style-type: none"> Message to confirm the character string replacement. [Y] or [INPUT] : Replace the character string. [N] : Do not replace the character string.

2.12 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.
Change Ope. test mode	<ul style="list-style-type: none"> • Operation of the Operation test screen was attempted when the operation adjustment mode was not selected.

2.13 Waveform-related operation messages

Message	Details
Scroll execution	<ul style="list-style-type: none"> • The waveform display is being scrolled.
Refresh execution	<ul style="list-style-type: none"> • The waveform is being redisplayed.
Executing sampling	<ul style="list-style-type: none"> • The waveform data is being sampled.
Input the axis name	<ul style="list-style-type: none"> • This appears when the data type is selected in the Ch1 or Ch2 data setting area. → Input the name of the axis to be sampled.
Input axis name/signal No./bit	<ul style="list-style-type: none"> → Set the sampling conditions common for Ch1 and Ch2.
Input file/sub-ID/item/data	<ul style="list-style-type: none"> • This appears when an NC file is selected in the Ch1 or Ch2 data setting area.
Change the area	<ul style="list-style-type: none"> → Change the area with the Area change menu, and set the required data.
Sampling conditions are illegal	<ul style="list-style-type: none"> • The data cannot be sampled as the setting conditions are illegal. → Review the data, vertical scale, sampling rate and horizontal scale on the Condition setting screen.

2.14 Messages related to anshin-net

(1) Messages related to all Anshin-net screens

Message	Display in message field	Details
(None)	Press <input type="button" value="Call"/> to call the NC service. Do not turn the power OFF during the one-touch call.	<ul style="list-style-type: none"> • Communication has not been started. • A call is being placed with automatic alarm notification or one-touch call, and a call is being received from the NC service.

(2) Messages related to automatic alarm notification

Message	Display in message field	Details
Dialing	Do not turn the power OFF until the automatic alarm notification ends.	<ul style="list-style-type: none"> • A call is being placed with the automatic alarm notification. • Communication starts when an alarm occurs, but the line is not connected yet in this state. • This state is also entered when standing by for transmission.
Connecting	Do not turn the power OFF until the automatic alarm notification ends.	<ul style="list-style-type: none"> • The line is connected with automatic alarm notification.
Sending	Do not turn the power OFF until the automatic alarm notification ends.	<ul style="list-style-type: none"> • The diagnosis data is being sent with automatic alarm notification. • Communication has been started with emergency stop by the servo, spindle or PLC alarm, or by the establishment of the conditions set in the parameters.
(None)	Press <input type="button" value="Call"/> to call the NC service. Do not turn the power OFF during the one-touch call.	<ul style="list-style-type: none"> • Automatic alarm notification has ended, and the line has been disconnected.
Waiting for dialing	Do not turn the power OFF until the automatic alarm notification ends.	<ul style="list-style-type: none"> • Redialing since the NC service is using the line for other communication.
(Status of communication with NC service)	Connecting with NC service. Wait for communication to end.	<ul style="list-style-type: none"> • In connection standby state since line is being used by anshin-net.
(Status of communication with machine manufacturer)	Connecting with machine manufacturer. Wait for communication to end.	<ul style="list-style-type: none"> • In connection standby state since line is being used by machine network.

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(3) Messages related to operator notification

Message	Display in message field	Details
Operator notice effective	If automatic operation stops while operator notification is valid, the designated telephone number will be contacted.	<ul style="list-style-type: none"> • Operator notification is valid. • If machining ends normally or abnormally in this state, communication with operator notification will start.
Dialing	Do not turn the power OFF until the operator notification ends.	<ul style="list-style-type: none"> • Data is being transmitted with operator notification. • Communication will start when machining ends normally or abnormally, but the line is not connected yet in this state. • This state is also entered when standing by for transmission.
Connecting	Do not turn the power OFF until the operator notification ends.	<ul style="list-style-type: none"> • The line is connected with operator notification.
Sending	Do not turn the power OFF until the operator notification ends.	<ul style="list-style-type: none"> • The diagnosis data is being sent with operator notification.
(None)	Press <input type="button" value="Call"/> to call the NC service. Do not turn the power OFF during the one-touch call.	<ul style="list-style-type: none"> • Communication with operator notification has ended, and the line has been disconnected.
Waiting for dialing	Do not turn the power OFF until the operator notification ends.	<ul style="list-style-type: none"> • Redialing since the NC service is using the line for other communication.
(Status of communication with NC service)	Connecting with NC service. Wait for communication to end.	<ul style="list-style-type: none"> • In connection standby state since line is being used by anshin-net.
(Status of communication with machine manufacturer)	Connecting with machine manufacturer. Wait for communication to end.	<ul style="list-style-type: none"> • In connection standby state since line is being used by machine network.

(4) Messages related to one-touch call

Message	Display in message field	Details
Carry out one-touch call? (Y/N)	Press "Y" to make a one-touch call, and press "N" to cancel. If the line is being, a connection with NC service will be established as soon as the line is idle.	<ul style="list-style-type: none"> • A connection with NC service has not been established. • The system is confirming whether to actually make a one-touch call.
Dialing	Do not turn the power OFF until the one-touch call is completed.	<ul style="list-style-type: none"> • Data is being transmitted with one-touch call. • Communication will start when "Y" is pressed in step 1, but the line is not connected yet in this state.
Connecting	Do not turn the power OFF until the one-touch call is completed.	<ul style="list-style-type: none"> • The line is connected with one-touch call.
Sending	Do not turn the power OFF until the one-touch call is completed.	<ul style="list-style-type: none"> • The diagnosis data is being sent with one-touch call.

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Message	Display in message field	Details
(None)	Press [Call] to call the NC service. Do not turn the power OFF during the one-touch call.	<ul style="list-style-type: none"> • Communication with one-touch call has ended, and the line has been disconnected.
Waiting for dialing	Do not turn the power OFF until the one-touch call is completed.	<ul style="list-style-type: none"> • Redialing since the NC service is using the line for other communication.
(Status of communication with NC service)	Connecting with NC service. Wait for communication to end.	<ul style="list-style-type: none"> • In connection standby state since line is being used by anshin-net.
(Status of communication with machine manufacturer)	Connecting with machine manufacturer. Wait for communication to end.	<ul style="list-style-type: none"> • In connection standby state since line is being used by machine network.

(5) Messages related to number 1 to 3 menu operations

Message	Display in message field	Details
(None)	Press [Call] to call the NC service. Do not turn the power OFF during the one-touch call.	<ul style="list-style-type: none"> • The selected telephone number will be set as the telephone number to be notified to the NC service. • Hereafter, the telephone number set with one-touch call or operator notification will be notified to the NC service.

(6) Messages related to random number setting

Message	Display in message field	Details
(None)	Input the new telephone number.	<ul style="list-style-type: none"> • The input telephone number will be set as the telephone number to be notified to the NC service. • Hereafter, the telephone number set with one-touch call or operator notification will be notified to the NC service.

(7) Messages related to communication errors

Message	Display in message field	Details
Modem initial error	Press one-touch call to call the NC service. Do not turn the power OFF during the one-touch call.	<ul style="list-style-type: none"> • Communication is not possible because the modem is not connected, etc.
Communication error	Press one-touch call to call the NC service. Do not turn the power OFF during the one-touch call.	<ul style="list-style-type: none"> • A communication error occurred while connected to the NC service.

2.15 Messages related to machine (MTB) net

(1) Messages related to all MTB net screens

Message	Display in message field	Details
(None)	Press the Send menu to transmit the diagnosis data to the machine manufacturer. Do not turn the power OFF during transmission.	<ul style="list-style-type: none"> • Communication is not established.

(2) Messages related to transmission of diagnosis information

Message	Display in message field	Details
Transmit diagnosis data? (Y/N)	Press "Y" to transmit the diagnosis data, and "N" to cancel the process. When the line is busy, the connection will be established after the line becomes idle.	<ul style="list-style-type: none"> • The system is not connected with the machine manufacturer. • The system is checking whether to actually send the diagnosis data to the machine manufacturer.
Dialing	Do not turn the power OFF until transmission of the diagnosis data is completed.	<ul style="list-style-type: none"> • The diagnosis data is being transmitted. • The line is not connected yet in this state.
Waiting for the reply	Do not turn the power OFF until transmission of the diagnosis data is completed.	<ul style="list-style-type: none"> • The line has been disconnected once, and the system is waiting for a connection from the machine manufacturer.
Connecting	Do not turn the power OFF until transmission of the diagnosis data is completed.	<ul style="list-style-type: none"> • A connection with the machine manufacturer is established, or the system is connected to the machine manufacturer.
Transmitting***	Do not turn the power OFF until transmission of the diagnosis data is completed.	<ul style="list-style-type: none"> • The diagnosis data is actually being transmitted.
(None)	Press the Send menu to transmit the diagnosis data to the machine manufacturer. Do not turn the power OFF during transmission.	<ul style="list-style-type: none"> • Transmission of the diagnosis data has completed, and the line has been disconnected.
Waiting for dialing	Do not turn the power OFF until transmission of the diagnosis data is completed.	<ul style="list-style-type: none"> • The machine manufacturer is using the line for other communication.
(Status of communication with NC service)	Connecting with NC service. Wait for communication to end.	<ul style="list-style-type: none"> • In connection standby state since line is being used by anshin-net.
(Status of communication with machine manufacturer)	Connecting with machine manufacturer. Wait for communication to end.	<ul style="list-style-type: none"> • In connection standby state since line is being used by machine manufacturer.

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(3) Messages related to reception of the diagnosis results

Message	Display in message field	Details
Connecting	Connecting with machine manufacturer. Wait for communication to end.	<ul style="list-style-type: none"> • A connection with the machine manufacturer is established.
Receiving	Connecting with machine manufacturer. Wait for communication to end.	<ul style="list-style-type: none"> • The diagnosis results are actually being received.
(None)	Press the Send menu to transmit the diagnosis data to the machine manufacturer. Do not turn the power OFF during transmission.	<ul style="list-style-type: none"> • Reception of the diagnosis results has completed, and the line has been disconnected.

(4) Messages related to reception of messages

Message	Display in message field	Details
Connecting	Connecting with machine manufacturer. Wait for communication to end.	<ul style="list-style-type: none"> • A connection with the machine manufacturer is established.
(None)	Press the Send menu to transmit the diagnosis data to the machine manufacturer. Do not turn the power OFF during transmission.	<ul style="list-style-type: none"> • Reception of the message has completed, and the line has been disconnected.

(5) Messages related to communication errors

Message	Display in message field	Details
Modem initial error	Press the Send menu to transmit the diagnosis data to the machine manufacturer. Do not turn the power OFF during transmission.	<ul style="list-style-type: none"> • Communication is not possible because the modem is not connected, etc.
Communication error	Press the Send menu to transmit the diagnosis data to the machine manufacturer. Do not turn the power OFF during transmission.	<ul style="list-style-type: none"> • An error occurred during communication. (Redial over, no call back, communication error, etc.)

2.16 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 "Abs pos 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 "130014 Abs On*") must be set.

2.17 Maintenance-related operation messages

Message	Details
Execute? (Y/N)	<ul style="list-style-type: none"> • Message to confirm the operation. [Y] or [INPUT] : Execute the operation. [N] : Do not execute the operation.
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. → Contact the nearest service center.
Format NC memory? (Y/N)	<ul style="list-style-type: none"> • Message to confirm the operation. [Y] or [INPUT] : Start formatting the NC memory. [N] : Do not format the NC memory.
Quit HMI? (Y/N)	<ul style="list-style-type: none"> • Message to confirm the operation. [Y] or [INPUT] : Quit the HMI. [N] : Do not quit the HMI.
Password is illegal	<ul style="list-style-type: none"> • The input password is incorrect.
Input the password	<ul style="list-style-type: none"> • The [Password] menu key was pressed, and the password input mode was entered. → Input a password.
Execute SRAM backup? (Y/N)	<ul style="list-style-type: none"> • Confirmation of operations. [Y] or [INPUT] : Backup the SRAM data on the HD. [N] : 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.

2.18 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.
Launching application	<ul style="list-style-type: none"> • The application is running.

Appendix 3. Alarm Messages

3.1 Errors common to all systems (SY○○○○)

No.	Message	Details	Remedy
SY0001	No main ladder	Could not find a label for the main ladder P252.	<ul style="list-style-type: none"> • Check whether the ladder P252 exists.
SY0002	User ladder code error	There is an error in the ladder code.	<ul style="list-style-type: none"> • Check the ladder.
SY0003	S/W illegal interrupt	The ladder process stopped abnormally.	<ul style="list-style-type: none"> • Write down as much information as possible about the conditions in which the problem occurred, and contact the nearest service center.
SY0004	S/W exceptional interrupt	The ladder process stopped abnormally.	<ul style="list-style-type: none"> • Write down as much information as possible about the conditions in which the problem occurred, and contact the nearest service center.
SY0010	Watch dog	A watch dog error occurred.	<ul style="list-style-type: none"> • Write down as much information as possible about the conditions in which the problem occurred, and contact the nearest service center.
SY0020	SV initial communication error	An error occurred during the servo initial communication.	<ul style="list-style-type: none"> • Check the servo/spindle amplifier setting, connection, axis No. in the spindle specification parameters, “No amp” of the axis specification parameters, etc.
SY0021	SV commu err: Ax No/type ilegal	There is an error in the communication between the NC and amplifier.	Check whether there is any abnormality in the following : <ul style="list-style-type: none"> • Cable (Are there any broken wires?) • Cable shield ground • Connector connections • Mounting state of the amplifier Contact the nearest service center.
SY0022	SV commu err: CRC er/rcv incmp		
SY0023	SV commu err: Recev frame No		
SY0024	SV commu er sum: Ax No/type ilg		
SY0025	SV commu er sum: CRC er/rcv incmp		
SY0026	SV commu er sum: Recev frame No		
SY0030	Motor overheat	The NC temperature has risen above the specified range.	<ul style="list-style-type: none"> • Cooling measures are required. • Turn OFF the NC power, or lower the temperature with an air conditioner, etc.
SY0031	Battery alarm	The voltage of the battery provided for saving data in the NC has dropped.	<ul style="list-style-type: none"> • Replace the battery. • Check the machining program after replacing the battery.
SY0032	Battery alarm detect circit err	The battery alarm detection circuit is faulty.	<ul style="list-style-type: none"> • Write down as much information as possible about the conditions in which the problem occurred, and contact the nearest service center.
SY0040	Initial parameter error	The parameter is incorrect.	<ul style="list-style-type: none"> • An illegal parameter No. is output. Check the value.

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3.2 Servo errors (SV○○○○○)

The following markings show the appropriate method for canceling the error.

- AR : Cancel by turning the servo drive unit power OFF, then ON again.
- PR : Cancel by turning the NC power OFF, then ON again.
- NR : Cancel by resetting the NC.

(Note) The "SV0050 Overload 1" alarm cannot be canceled unless the reset level or less has been reached. Refer to the MELDAS AC Servo and Spindle Specifications Manual (BNP-B3759) for details.

- : The normal status will automatically return when the warning state is canceled.

No.	Abbrev.	Message	Details	Cancel- lation method
SV0010	UV	Under voltage	The PN bus voltage is 200V or less.	PR
SV0011	ASE	Axis selection error	The setting of the axis setting rotary switches on the 2-axis integrated drive unit is illegal.	AR
SV0012	ME1	Memory error 1	The memory IC (SRAM or FLROM) check sum is illegal.	AR
SV0013	SWE	S/W processing error	S/W data processing did not end within the specified time. (Including peripheral G/A errors.)	PR
SV0016	RD1	Magnetic pole position detect err 1	The difference 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".	PR
SV0017	ADE	AD converter error	The AD convertor for current detection did not work correctly at initialization.	PR
SV0018	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.	PR
SV001A	WATS	Communication error (SUB)	Initial communication with the detector was not possible with the system that uses the OHA25K-ET machine end detector.	PR
SV001B	SCPUS	CPU error (SUB)	An error was detected in the data stored in the EEPROM with the high-speed serial detector connected to the machine end.	PR
SV001C	SLEDS	LED error (SUB)	LED deterioration was detected with the high-speed serial detector connected to the machine end.	PR
SV001D	SDATS	Data error (SUB)	An error was detected in the position per rotation with the high-speed serial detector connected to the machine end.	PR
SV001E	SOHE	Thermal error (SUB)	The thermal protector built into the detector activated with the high-speed serial detector connected to the machine end.	PR
SV001F	STRES	Communication error (SUB)	Communication with the detector was cut off with the high-speed serial detector connected to the machine end.	PR

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No.	Abbrev.	Message	Details	Cancel- lation method
SV0020	NS1	No signal detection 1	The difference 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.)	PR
SV0021	NS2	No signal detection 2	The difference 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.)	PR
SV0022	LSIE	LSI error	An error occurred in the LSI operation.	AR
SV0024	PG	Ground fault	A motor cable ground fault was detected.	PR
SV0025	ABSE	Absolute position lost	The absolute position data in the absolute position detector was lost.	AR
SV0026	NAE	Unused axis error	A power module error occurred in an axis for which the rotary switch on the 2-axis integrated drive unit was set to F to exclude from control.	PR
SV0027	SCCPU	Abs posn detect scale CPU err	The CPU in the absolute position detection linear scale is not operating correctly.	PR
SV0028	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.)	PR
SV0029	SABS	Absolute posn detect 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.)	PR
SV002A	SINC	Relative posn detect 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.)	PR
SV002B	SCPU	Scale CPU error	An error occurred in the CPU in the serial encoder installed on the motor end. (Alarm output from the detector.)	PR
SV002C	SLED	LED error	Deterioration of the LED in the detector was detected.	PR
SV002D	SDAT	Data error	An error was detected in the position per rotation in the detector.	PR
SV002F	STRE	Communication error	Communication with the detector was cut off, or the communication data was abnormal.	PR
SV0030	OR	Over regeneration	Overheating of the regenerative resistor was detected.	PR
SV0031	OS	Overspeed	The motor speed reached 1.2 times the rated motor speed.	PR
SV0032	PMOC	Power module error	An overcurrent was detected in the IPM used in the servo drive main circuit section.	PR
SV0033	OV	Over voltage	The PN bus voltage is more than 400V.	PR
SV0034	DP	CRC error	A CRC error occurred in the communication data from the NC.	PR

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No.	Abbrev.	Message	Details	Cancellation method
SV0035	DE	Data error	The movement command data from the NC is abnormally large.	PR
SV0036	TE	Transferring error	The periodic data transfer from the NC was interrupted.	PR
SV0037	PE	Initial parameter error	There is an error in the servo parameters transferred from the NC during servo drive initialization.	PR
SV0038	TP1	Protocol error 1 (frame)	There is an error in the communication protocol with the NC. (Frame error)	PR
SV0039	TP2	Protocol error 2 (information)	There is an error in the communication protocol with the NC. (Information error)	PR
SV003A	OC	Overcurrent	An excessive current flowed in the motor.	PR
SV003B	PMOH	Power module error (overheat)	Overheating of the IPM used in the inverter was detected.	PR
SV0042	FE1	Feedback error 1	1. A detector feedback signal pulse was omitted in the OHE-type/OHA-type detector used in a semiclosed 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.	PR
SV0043	FE2	Feedback error 2	A deviation was detected in the motor end detector and machine end detector feedback amounts in a closed loop system.	PR
SV0046	OHM	Motor overheat	The motor or detector thermal protector activated.	NR
SV004F	IPS	Instantaneous stop	The control power was disconnected for 50ms or more.	NR
SV0050	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).	NR
SV0051	OL2	Overload 2	A current command of 95% or more of the max. output current continued for 1 second or more.	NR
SV0052	OD1	Excessive error1	When the servo was turned ON, the actual position in respect to the command exceeded the excessive error width 1 value (parameter OD1).	NR
SV0053	OD2	Excessive error2	When the servo was turned OFF, the actual position in respect to the command exceeded the excessive error width 2 value (parameter OD2).	NR
SV0054	OD3	Excessive error3	When the servo was turned OFF, the actual position in respect to the command exceeded the excessive error width 3 value (parameter OD3).	NR

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No.	Abbrev.	Message	Details	Cancellation method
SV0055	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 while the control axis is removed.)	NR
SV0058	CLT1	Collision detection 0	During the G0 modal (rapid traverse), the collision detection method 1 error was detected.	NR
SV0059	CLT2	Collision detection 1	During the G1 modal (cutting feed), the collision detection method 1 error was detected.	NR
SV005A	CLT3	Collision detection 2	The collision detection method 2 error was detected.	NR
SV005F	MCE	Contactor fusing	The external contactor contact was fused.	
SV0061	POC	Pwr sply regenerate overcurrent	An overcurrent (Ic) was detected in the power module (IPM).	PR
SV0063	PARE	Pwr sply auxi regeneration err	The auxiliary regeneration transistor remained ON.	PR
SV0065	PRAE	Pwr sply rush relay error	The rush resistance short-circuit relay is not ON.	PR
SV0067	PPHL	Pwr sply phase error detected	The input power (R, S, T) has an open phase.	PR
SV0068	PWD	Pwr sply watch dog	The power supply software processing failed to finish within the specified time.	AR
SV0069	PPNG	Pwr sply grounding detected	A ground fault was detected in the motor. This is only detected during ready ON.	PR
SV006A		Pwr sply ext contactor fusion	The external contactor was turned ON in spite of the READY OFF status.	PR
SV006B		Pwr sply rush relay fusion	The rush resistance short-circuit relay is still ON.	PR
SV006C	PCHE	Pwr sply main circuit error	The main circuit condenser is not correctly charged.	PR
SV006E	PME	Pwr sply memory error	An error occurred in the memory circuit section.	AR
SV006F	PADE	Pwr sply AD error	An error was detected in the A/D converter section or power supply.	AR
SV0071	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.	NR
SV0073		Pwr sply over regeneration	The regenerative capacity limit of the power supply was exceeded.	AR (Note)
SV0075	POV	Pwr sply overvoltage	The voltage between L+ and L- exceeded 410V.	NR
SV0076		Pwr sply EMG stop setting err	The rotary switch setting and parameter (PTYP) setting do not match.	AR

(Note) To prevent operation from restarting immediately from the over-regeneration state, alarm "SV0073" 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.

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No.	Abbrev.	Message	Details	Cancel- lation method
SV0077		Pwr sply power module overheat	Overheating of the power module (IPM) was detected.	PR
SV0088	WD	Watch dog	The servo amplifier software processing failed to finish within the specified time.	AR
SV1001		AMP unequipped	The servo/spindle amplifier is not connected. Or, the axis No. setting for the servo/spindle amplifier is incorrect.	PR
SV1002		Illegal servo amp	A spindle amplifier is connected to the servo axis. Or, a servo amplifier is connected to the spindle. Check the axis No. of the spindle specification parameters.	PR

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3.3 Spindle errors (SP○○○○○)

The following markings show the appropriate method for canceling the error.

- AR : Cancel by turning the servo drive unit power OFF, then ON again.
- PR : Cancel by turning the NC power OFF, then ON again.
- NR : Cancel by resetting the NC.

No.	Abbrev.	Message	Details	Cancel- ation method
SP0012	ME1	Memory error 1	A ROM check sum error or RAM check error occurred in the spindle drive control card.	PR
SP0013	SWE	S/W processing error	The S/W data processing failed to finish within the specified time.	PR
SP0017	ADE	AD converter error	The AD converter for current detection did not operate normally at initialization.	PR
SP0021	NS2	No signal detection (spdl encoder)	No signal from the spindle encoder is input or the signal is not at its proper level.	PR
SP0023	OSE	Excessive speed deviation	The difference between the speed command and motor speeds exceeded the specified limit for the specified duration.	PR
SP0031	OS	Overspeed	The motor speed exceeded 115% of the maximum speed.	PR
SP0032	PMOC	Overcurrent	A current higher than the specified value was supplied to the IPM used in the main spindle drive main circuit.	PR
SP0034	DP	CRC error	A CRC error occurred in the data transmitted from the NC.	PR
SP0035	DE	Data error	The size of move command data transmitted from the NC for position control is too large.	PR
SP0036	TE	Transferring error	The periodic data transmission from the NC was interrupted.	PR
SP0037	PE	Initial parameter error	A parameter value exceeding the tolerable range was set.	PR
SP0038	TP1	Protocol error 1 (frame)	A protocol error occurred during communication with the NC. (Frame error)	PR
SP0039	TP2	Protocol error 2 (information)	A protocol error occurred during communication with the NC. (Information error)	PR
SP003B	PMOH	Power module overheat	Overheating of the IPM used in the spindle drive's main circuit section was detected.	PR
SP0040	KE1	TK unit switching error	While the TK unit was used, the procedure for signal changeover was incorrect.	PR
SP0041	KE2	TK unit communication error	While the TK unit was used, communication with the TK unit could not be performed correctly.	PR
SP0044	CAXE	C axis changeover alarm	When using the coil changeover motor, C-axis control was applied to the H coil.	NR
SP0046	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.	NR
SP0050	OL	Overload	The time during which the motor current exceeded the overload detection level, exceeded the detection time constant.	NR
SP0052	OD	Excessive error	The position tracking error exceeded the specified value during position loop operation.	NR

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No.	Abbrev.	Message	Details	Cancellation method
SP005C	ORFE	Orientation feedback error	After orientation in-position was completed, the pulse miss value was higher than the parameter setting value (SP0114 OPER).	NR
SP0061	POC	Pwr sply regenerate overcurrent	An overcurrent (Ic) was detected in the power module (IPM).	PR
SP0063	PARE	Pwr sply auxi regeneration err	The auxiliary regeneration transistor remained ON.	PR
SP0065	PRAE	Pwr sply rush relay error	The rush resistance short-circuit relay is not ON.	PR
SP0067	PPHL	Pwr sply phase error detected	The input power (R, S, T) has an open phase.	PR
SP0068	PWD	Pwr sply watch dog	The power supply software processing failed to finish within the specified time.	AR
SP0069	PPNG	Pwr sply grounding detection	A ground fault was detected in the motor. This is only detected during ready ON.	PR
SP006A		Pwr sply ext contct fusion det	The external contactor was turned ON in spite of the READY OFF status.	PR
SP006B		Pwr sply rush relay fusion det	The rush resistance short-circuit relay is still ON.	PR
SP006C	PCHE	Pwr sply main circuit error	The main circuit condenser is not correctly charged.	PR
SP006E	PME	Pwr sply memory error	An error occurred in the memory circuit section.	AR
SP006F	PADE	Pwr sply AD error	An error was detected in the A/D converter section or power supply.	AR
SP0071	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.	NR
SP0073		Pwr sply over regeneration	The regenerative capacity limit of the power supply was exceeded.	PR (Note)
SP0075	POV	Pwr sply overvoltage	The voltage between L+ and L- exceeded 410V.	NR
SP0076		Pwr sply EMG stop setting err	The rotary switch setting and parameter (PTYP) setting do not match.	AR
SP0077		Pwr sply power module overheat	Overheating of the power module (IPM) was detected.	PR
SP0088	WD	Watch dog	The spindle amplifier software processing was not executed within the specified time.	AR
SP1001		AMP unequipped	The servo/spindle amplifier is not connected. Or, the axis No. setting for the servo/spindle amplifier is incorrect.	PR
SP1002		Illegal spindle amp	A spindle amplifier is connected to the servo axis. Or, a servo amplifier is connected to the spindle. Check the axis No. of the spindle specification parameters.	PR

(Note) To prevent operation from restarting immediately from the over-regeneration state, alarm "SV0073" 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.

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3.4 Axis errors (AX○○○○)

No.	Message	Details	Remedy
AX0021	Absolute position lost	An error occurred (the absolute position was lost) as a result of checking the absolute position data as follows when the power was turned ON.	<ul style="list-style-type: none"> • Check the check sum. • Take the total of all the data. • Take the total Exclusive OR of the vertical direction parity check data, and check.
AX0022	Abs posn tolerance amnt over	The machine moved over the allowable movement amount with the power OFF. Allowable movement amount > (absolute position when the power is turned ON - absolute position when the power is turned OFF)	<ul style="list-style-type: none"> • The tolerable movement amount is set in "270003 Move amnt in pwr OFF" on the Absolute Position Setting screen. • The setting range is 0.001 to 99999.999m, but if 0 is set, the check will be invalidated.
AX0024	Abs posn ref set incomplete	The absolute position reference point has not been set.	<ul style="list-style-type: none"> • Set the absolute position reference point.
AX0051	Synchronous error excessive	During synchronous control, the synchronization error of the master axis and slave axis exceeded the allowable value.	<ul style="list-style-type: none"> • In the correction mode, move one of the axes in the direction that the error is reduced. • Set the allowable value to 0 (check invalid), or increase the allowable value in the correction mode. • Check the parameters, etc., that should be the same for synchronous axes.
AX0052	No synchronous CTRL spec	Synchronous control was commanded though the synchronous control specifications are not provided.	<ul style="list-style-type: none"> • Check the specifications.
AX0101	H/W stroke end axis exists	An axis exists at its stroke end, and the stroke end function is validated (the input signal is OFF).	<ul style="list-style-type: none"> • The stroke end limit switch is activated (is at the stroke end), so move the machine with a manual operation. • Check for broken wires in the stroke end signal line. • Check whether the limit switch is faulty.
AX0102	S/W stroke end axis exists	The stored stroke limit 1 or 2 function has been activated.	<ul style="list-style-type: none"> • The machine is at the stroke end, so move the machine manually. • Reset the stored stroke limit setting in the parameters.
AX0103	Dog overrun	During the reference point return, the limit switch for near-point detection passed over the dog without being able to stop on it.	<ul style="list-style-type: none"> • Increase the length of the near-point dog. • Decrease the reference point return speed. <p>(Note) An error does not occur in some systems, depending on the system type.</p>

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No.	Message	Details	Remedy
AX0104	Some ax does not cross Z phase	An axis exists that did not cross the detector Z phase in the initial reference point return 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 opposite direction of the reference point and carry out the reference point return again.
AX0105	Invalid return	During the manual reference point return, the direction of the return differed from the axis movement direction selected with the axis selection key.	<ul style="list-style-type: none">• The +/- direction selection with the axis compensation key is incorrect. The error is canceled by carrying out the feed in the correct direction.
AX0106	Rotate work compen excessive	The rotation axis workpiece position compensation amount exceeded 3mm.	<ul style="list-style-type: none">• Turn the rotation axis workpiece position compensation OFF.• Set the deviation of the workpiece center position and table rotation center to 3mm or less.• Check whether the workpiece coordinate zero point is at the center of the workpiece.

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3.5 Operation errors (OP○○○○○)

No.	Message	Details	Remedy
OP0101	Stroke end axis exists	The automatic operation paused because an axis exists that is at its stroke end.	<ul style="list-style-type: none"> • After resetting, cancel the stroke end by a manual operation.
OP0102	Stored stroke limit axis exists	The automatic operation paused because an axis exists that has reached its stored stroke limit.	<ul style="list-style-type: none"> • After resetting, cancel the stored stroke limit by a manual operation.
OP0103	No. of spindle rot times over	The spindle rotation speed exceeded the clamp speed of the axis when the thread cutting command was issued.	<ul style="list-style-type: none"> • Decrease the spindle command rotation speed.
OP0104	Verification error axis exists	An axis exists in which a verification error in the verification of the reference point return.	<ul style="list-style-type: none"> • Reconsider the program.
OP0105	In axis control	Operation is not possible because an axis exists that is already being controlled.	<ul style="list-style-type: none"> • Restart after stopping the operation.
OP0106	Emergency stop	Operation is not possible because an emergency stop has occurred.	<ul style="list-style-type: none"> • Restart after canceling the emergency stop.
OP0107	Program running	A program check, etc., was attempted during operation.	<ul style="list-style-type: none"> • Carry out program checks after finishing the operation.
OP0108	Program checking	A program operation, restart search or machining time calculation was attempted during a program check.	<ul style="list-style-type: none"> • Carry out the operation again after the program check is completed or after resetting.
OP0109	No option spec	An operation not provided in the specifications was attempted.	<ul style="list-style-type: none"> • Check the specifications.
OP0110	Invalid Research after NURBS	The block immediately after the NURBS interpolation mode was designated as the restart position, and the program was restarted.	<ul style="list-style-type: none"> • Designate a block other than the block immediately after the NURBS mode as the restart position.
OP0111	No NB number	An NB number not available was designated for the search.	<ul style="list-style-type: none"> • Check the NB number. • Search may not be possible in the NURBS interpolation mode.
OP0114	Restart from PRG TOP invalid	The program was restarted from the head.	<ul style="list-style-type: none"> • To restart the operation from the program head, press cycle start.

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3.6 Program errors (PR○○○○)

These are alarms that occur during automatic operation. Program errors mainly occur when there are mistakes in the creation of machining programs and when programs are created that do not match the NC specifications. The error No. and a message appear on the screen.

Error No.	Message	Details	Remedy
PR0001	Mode mismatch	Automatic start was attempted in a mode different from that of the device for which operation search was performed.	<ul style="list-style-type: none"> • Match the operation mode with that of the searched device, then retry automatic start.
PR0002	Search during auto operation	A search was attempted during program operation.	<ul style="list-style-type: none"> • Execute the search after the program operation has finished.
PR0003	Device invalid	A nonexistent or inoperable device was designated.	<ul style="list-style-type: none"> • Check the device availability and whether it is usable.
PR0004	No file designation	A program file has not been designated.	<ul style="list-style-type: none"> • Reconsider the program.
PR0005	No file	The designated program file does not exist.	<ul style="list-style-type: none"> • Reconsider the program.
PR0006	No N/B number	The designated sequence No. (or program No.) does not exist, or a block having the designated block No. does not exist.	<ul style="list-style-type: none"> • Reconsider the program.
PR0010	No. of simultaneous axes over	The number of axis addresses commanded in the same block exceeds the specifications.	<ul style="list-style-type: none"> • Divide the alarm block command into two. • Check the specifications.
PR0011	Illegal axis address	The axis address commanded by the program and the axis address set by the parameter do not match.	<ul style="list-style-type: none"> • Revise the axis names in the program.
PR0020	Division error	An axis command that cannot be divided by the command unit was issued.	<ul style="list-style-type: none"> • Reconsider the program.
PR0032	Illegal address	An address not listed in the specifications has been designated.	<ul style="list-style-type: none"> • Check and revise the program address. • Check the specifications.
PR0033	Format error	The command format in the program is not correct.	<ul style="list-style-type: none"> • Reconsider the program.
PR0034	Illegal G code	A G code not listed in the specifications has been used.	<ul style="list-style-type: none"> • Check and correct the G code address in the program.
PR0035	Address range over	The setting range for the addresses has been exceeded.	<ul style="list-style-type: none"> • Reconsider the program.
PR0036	Program end error	<ul style="list-style-type: none"> • "EOR" has been read during tape and memory operation. • M02 and M30 are not entered at the end of the program. • M99 is not entered at the end of the subprogram. (Or, G23 or G68 is not entered at the end of the subprogram when it is compliant with an M2/M0 format.) 	<ul style="list-style-type: none"> • Reconsider the program.

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Error No.	Message	Details	Remedy
PR0037	Label and N number zero	Zero has been designated for a program number or sequence number.	<ul style="list-style-type: none"> • The program numbers are designated across a range from 1 to 99999999. • The sequence numbers are designated across a range from 1 to 99999.
PR0038	No additional Op block skip	"/n" has been issued even though there are no optional block skip addition specifications.	<ul style="list-style-type: none"> • Check the specifications.
PR0039	No EOB	There was no EOB code at the end of the program block, and an EOR (%) code resulted.	<ul style="list-style-type: none"> • Use an EOB code at the end of the program block.
PR0040	Unused address exists	More address than those that can be simultaneously commanded in one block were commanded. Number of simultaneous commands in one block: M = maximum 4 commands, other than M = 1	<ul style="list-style-type: none"> • Reconsider the program.
PR0041	Overlap G code exists	Multiple G codes were commanded in the same group.	<ul style="list-style-type: none"> • Reconsider the program.
PR0042	Meaningless H code	An H command other than H0 was commanded independently during tool length offset.	<ul style="list-style-type: none"> • Reconsider the program.
PR0043	No end point operation in arc	The end point coordinate command has not been issued for the R-designated arc.	<ul style="list-style-type: none"> • Reconsider the program.
PR0050	No inch/mm spec.	A command has been issued with a G code for inch/mm conversion even though there is no inch/mm conversion G code specifications.	<ul style="list-style-type: none"> • Check the specifications.
PR0060	Compensation length over	The commanded movement distance is excessive. (It exceeds 2^{31})	<ul style="list-style-type: none"> • Reconsider the program.
PR0061	No 1-direction positioning spec.	The G60 command has been issued even though there is no uni-direction positioning specifications.	<ul style="list-style-type: none"> • Check the specifications. • Change the G60 program command to G00.
PR0062	No F command	<p>The feedrate command has not been entered.</p> <p>This alarm occurs because the movement modal command is set to G01 when the power is switched ON, and so movement will be based on the G1 command, provided that a movement command is issued, even without G01 having been designated in the program.</p>	<ul style="list-style-type: none"> • Designate an F command in the program.

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Error No.	Message	Details	Remedy
PR0063	No high speed mode spec.	The high speed mode command has been issued even though there are no specifications.	<ul style="list-style-type: none"> • Check the specifications.
PR0070	Arc end point deviation large	There is an error in the arc start and end points as well as in the arc center.	<ul style="list-style-type: none"> • Check the numerical values of the addresses that specify the start and end points as well as the arc center in the program. • Check the "+" and "-" directions of the address numerical values.
PR0071	Can't calculate arc center	The arc center is not calculated during R-specified circular interpolation.	<ul style="list-style-type: none"> • Check the numerical values of the addresses in the program.
PR0072	No helical spec.	<p>A helical command was issued even though there are no helical specifications.</p> <p>Three axes were commanded for the arc command.</p>	<p>Check the specifications.</p> <ul style="list-style-type: none"> • If this is not a helical command, move the linear axes command to the next block.
PR0073	No scroll spec.	A spiral command was issued despite the fact that such a command does not exist in the specifications.	<ul style="list-style-type: none"> • The G02.1 and G03.1 commands are issued for circular interpolation. • Check the spiral specifications.
PR0080	No hypothetical axis spec.	A hypothetical axis command (G07) was issued despite the fact that such a command does not exist in the specifications.	<ul style="list-style-type: none"> • Check the hypothetical axis specifications. • Change the G07 command.
PR0090	No thread cutting spec.	A thread cutting command was issued despite the fact that such a command does not exist in the specifications.	<ul style="list-style-type: none"> • Check the specifications.
PR0093	Screw pitch err	The thread lead (thread pitch) is incorrect.	<ul style="list-style-type: none"> • Correctly set the thread lead.
PR0100	No cylinder interpolation spec.	Cylindrical interpolation was commanded even though there are no cylindrical interpolation specifications.	<ul style="list-style-type: none"> • Check the specifications.
PR0101	Cylinder mode error	A command not permitted with the cylindrical mode was issued.	<ul style="list-style-type: none"> • Reconsider the machining program.
PR0110	Plane selected during pattn rot	A plane selection command (G17, G18, G19) has been issued in a pattern rotation command.	<ul style="list-style-type: none"> • Delete the plane selection command (G17, G18, G19) from the pattern rotation subprogram.

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Error No.	Message	Details	Remedy
PR0111	Coord rotation plane selection	A plane selection command (G17, G18, G19) has been issued in a coordinate rotation command (G68).	<ul style="list-style-type: none"> Upon completion of the G68 command, the plane selection command must be issued following the G69 command (coordinate rotation cancel). (For the program based on the M2/M0 format, the coordinate rotation command is G68.1 and the coordinate rotation cancel command is G69.1.)
PR0112	Plane selected during R compen	A plane selection command (G17, G18, G19) has been issued when the tool radius compensation command (G41, G42) is issued.	<ul style="list-style-type: none"> Issue the plane selection command after the tool radius compensation command has been completed (issue the G40 cancel command.)
PR0120	No synchronous feed spec.	Synchronous feed was commanded even though there are no synchronous feed specifications.	<ul style="list-style-type: none"> Check the specifications. Change the synchronous feed command (G95) to a feed per minute command (G94). (Also change the F command value.)
PR0121	In F0 arc modal mode	The F0 command (F1-digit rapid traverse command) has issued when the circular interpolation command (G02, G03) was issued during the F1-digit feed command.	<ul style="list-style-type: none"> Rapid traverse cannot be commanded and so any F1-digit command except F0 should be designated for the circular interpolation command. Issue the G0 or G1 command unless the block which caused the alarm is the circular command block.
PR0122	No auto corner override spec.	An automatic corner override command (G62) was issued despite the fact that such a command does not exist in the specifications.	<ul style="list-style-type: none"> Check the specifications. Delete the G62 command from the program.
PR0124	No G93 spec.	The inverse time feed option is not provided.	<ul style="list-style-type: none"> Check the specifications.
PR0125	G93 mode error	A G command that cannot be commanded in the G93 mode was issued. Or, the G93 was commanded in a mode incapable of inverse time feed.	<ul style="list-style-type: none"> Reconsider the program.
PR0140	No t-pos offset	The tool position compensation option is not provided.	<ul style="list-style-type: none"> Check the specifications.
PR0141	T-pos during pat/cood rot	Tool position compensation was attempted during figure rotation or program coordinate rotation.	<ul style="list-style-type: none"> Reconsider the program.
PR0142	T-pos offset G3 error	An arc command with which position compensation is not possible was issued.	<ul style="list-style-type: none"> Reconsider the program.

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Error No.	Message	Details	Remedy
PR0150	No nose radius compensation	A tool radius compensation command (G41, G42) has been issued even though such a command does not exist in the specifications.	<ul style="list-style-type: none"> • Check the tool radius compensation specification.
PR0151	Radius compen in arc modal	A compensation command (G40, G41, G42, G43, G44) has been issued in the arc modal (G02, G03).	<ul style="list-style-type: none"> • Issue the linear command (G01) or rapid traverse command (G00) in the compensation command block or cancel block. (Set the modal to linear interpolation.)
PR0152	No intersection	The intersection is not obtained when one block is skipped during the processing of an interference block with the execution of a tool radius compensation command (G41, G42).	<ul style="list-style-type: none"> • Reconsider the program.
PR0153	Compensation interference	An interference error has arisen while the tool radius compensation command (G41, G42) was being executed.	<ul style="list-style-type: none"> • Reconsider the program.
PR0154	No 3D-compensation spec.	A three-dimensional compensation command was issued even though there are no three-dimensional compensation specifications.	<ul style="list-style-type: none"> • Check the specifications.
PR0155	Fix cyc executed during compen	A fixed cycle command has been issued 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 issued.
PR0164	No optional backward spec.	Backward movement was commanded even though there are no backward movement specifications.	<ul style="list-style-type: none"> • Check the specifications.
PR0170	No compensation number	The compensation number (D $\circ\circ$) command was not given when the radius compensation command (G41, G42, G43) was issued. Alternatively, the compensation number is larger than the number of sets in the specifications.	<ul style="list-style-type: none"> • Add the compensation number command to the compensation command block.
PR0171	No G10 spec.	G10 command has been issued even though such a command does not exist in the specifications.	<ul style="list-style-type: none"> • Check the specifications.
PR0172	G10 L-number error	The address command is not correct when the G10 command is issued.	<ul style="list-style-type: none"> • Check the address L-number of the G10 command and correct the number.

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Error No.	Message	Details	Remedy
PR0174	No G11 spec.	The G11 command has been issued even though there are no program tool compensation input (G11) specifications.	<ul style="list-style-type: none"> • Check the specifications.
PR0180	No fixed cycle	A fixed cycle command was issued even though there are not fixed cycle (G72 to G89) specifications.	<ul style="list-style-type: none"> • Check the specifications. Correct the program.
PR0181	No spindle command (Tap cycle)	The spindle speed command has not been issued when the hole drilling fixed cycle command is given.	<ul style="list-style-type: none"> • Issue the spindle speed command (S) when the hole drilling fixed cycle command G84 or G74 is given.
PR0182	Synchronous tap error	Connection with the spindle unit was not established.	<ul style="list-style-type: none"> • Check the connection with the spindle. • Check that the spindle encoder exists.
PR0183	No pitch/thread number	The pitch or thread number command has not been issued in the tap cycle of a hole drilling fixed cycle command.	<ul style="list-style-type: none"> • Specifies the pitch data and the number of threads via F or E command.
PR0184	Pitch/thread number error	The pitch or thread number command is not correct in the tap cycle of a hole drilling fixed cycle command.	<ul style="list-style-type: none"> • Check the pitch data or the number of threads.
PR0220	No special fixed cycle spec.	There are no special fixed cycle specifications.	<ul style="list-style-type: none"> • Check the specifications.
PR0221	No. of special fixed holes = 0	0 has been specified as the number of holes in special fixed cycle.	<ul style="list-style-type: none"> • Reconsider the program.
PR0222	G36 angle interval error	0 has been specified as the angle interval with G36.	<ul style="list-style-type: none"> • Reconsider the program.
PR0223	G12/G13 radius error	The radius value is less than the compensation amount specified with G12 or G13.	<ul style="list-style-type: none"> • Reconsider the program.
PR0224	No G12/G13 spec.	There are no circular cutting specifications.	<ul style="list-style-type: none"> • Check the specifications.
PR0230	Sub-program nesting over	A subprogram has been called 8 or more times in succession from the subprogram.	<ul style="list-style-type: none"> • Check the number of subprogram calls and correct the program so that it does not exceed 8 times.
PR0231	No N-Number	The sequence number set at sub-program call time, at return from the subprogram or specified by GOTO, was not set.	<ul style="list-style-type: none"> • Specify the sequence numbers in the call block of the subprogram.
PR0232	No program No.	When the subprogram is called, it is not registered.	<ul style="list-style-type: none"> • Register the subprogram.
PR0240	No variable command	A variable command was issued even though there are no variable command (#○○) specifications.	<ul style="list-style-type: none"> • Check the specifications.
PR0241	No variable number	The variable number commanded is higher than the variable numbers in the specifications.	<ul style="list-style-type: none"> • Check the specifications. • Check the program variable number.

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Error No.	Message	Details	Remedy
PR0242	Variable definition = none	The "=" sign has not been commanded when a variable is defined.	<ul style="list-style-type: none"> • Designate the "=" sign in the variable definition of the program.
PR0243	Can't use variables	An unavailable variable has been commanded in the left side or right side of a formula.	<ul style="list-style-type: none"> • Correct the program.
PR0244	No. of var definitions over	The No. of variables that can be defined in one block was exceeded.	<ul style="list-style-type: none"> • Correct the program.
PR0250	No pattern rotation	A pattern rotation command was issued even though there are no such command specifications.	<ul style="list-style-type: none"> • Check the specifications.
PR0251	Pattern rotation duplicated	A pattern rotation command was issued during another pattern rotation command.	<ul style="list-style-type: none"> • Check the program.
PR0252	Pattern and coord rotation	A pattern rotation command and coordinate rotation command have been designated simultaneously.	<ul style="list-style-type: none"> • Check the program.
PR0260	No coordinates rotation	A coordinate rotation command was issued even though there are no such command specifications.	<ul style="list-style-type: none"> • Check the specifications.
PR0270	No user macro	A macro specification was commanded even though there are no such command specifications.	<ul style="list-style-type: none"> • Check the specifications.
PR0271	No macro interrupt	A macro interrupt command was issued even though there are no macro interrupt specifications.	<ul style="list-style-type: none"> • Check the specifications.
PR0272	NC text/macro text simultaneous	An NC statement and a macro statement exist together in the same block.	<ul style="list-style-type: none"> • Reconsider the program and place the NC statement and macro statement in separate blocks.
PR0273	Macro call nesting over	The frequency of the macro call has exceeded the quantity determined in the specifications.	<ul style="list-style-type: none"> • Reconsider the program and correct it so that the macro calls do not exceed the limit imposed by the specification.
PR0275	Variable number illegal	The number of macro call argument type II sets has exceeded the limit.	<ul style="list-style-type: none"> • Reconsider the program.
PR0276	Macro call cancel independent	A G67 command was issued even though it was not during the G66 command modal.	<ul style="list-style-type: none"> • Reconsider the program. The G67 command is the call cancel command and so the G66 command must be designated first before G67 is issued.
PR0277	Macro alarm message	An alarm command has been issued in #3000.	<ul style="list-style-type: none"> • Refer to OPERATOR MESSAGE on DIAGN screen. • Refer to instruction manual issued by machine manufacturer.

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Error No.	Message	Details	Remedy
PR0280	'[' and ']' nesting over	The number of parentheses [,] which can be commanded in a single block has exceeded five.	<ul style="list-style-type: none"> Reconsider the program and correct it so that the number of "[" or "]" does not exceed five.
PR0281	Number of '[' and ']' differ	The number of "[" and "]" parentheses commanded in a single block do not match.	<ul style="list-style-type: none"> Reconsider the program and correct it so that the "[" and "]" parentheses are paired up properly.
PR0282	Can't calculate	The arithmetic formula is incorrect.	<ul style="list-style-type: none"> Reconsider the program to correct the arithmetic formula.
PR0283	Zero division	The denominator of the division is zero.	<ul style="list-style-type: none"> Reconsider the program and correct it so that the denominator for division in the formula is not zero.
PR0284	Overflow value	The integer value exceeded -2^{31} (2^{31-1}) during the operation process.	<ul style="list-style-type: none"> Review the program's operation expression, and correct so that the operated integer value does not exceed -2^{31} (2^{31-1}).
PR0285	Float value overflow	The variable data has overflowed.	<ul style="list-style-type: none"> Reconsider the variable data in the program.
PR0290	IF statement error	There is an error in the IF [<conditional>] GOTO statement.	<ul style="list-style-type: none"> Reconsider the program.
PR0291	WHILE statement error	There is an error in the WHILE [<conditional>] DO - END statement.	<ul style="list-style-type: none"> Reconsider the program.
PR0292	SETVN statement error	There is an error in the SETVN statement when the variable name was set.	<ul style="list-style-type: none"> Reconsider the program. The number of characters in the variable name of the SETVN statement must be 7 or less.
PR0293	DO-END nesting over	The number of []'s for DO - END in the WHILE [<conditional>] DO - END statement has exceeded 27.	<ul style="list-style-type: none"> Reconsider the program and correct it so that the number of the DO - END statements does not exceed 27.
PR0294	DO and END not in proper pairs	The DOs and ENDS are not paired off properly.	<ul style="list-style-type: none"> Reconsider the program and correct it so that the DOs and ENDS are paired off properly.
PR0295	Tape WHILE/ GOTO	There is a WHILE or GOTO statement on the tape during tape operation.	<ul style="list-style-type: none"> During tape operation, a program which includes a WHILE or GOTO statement cannot be executed and so the memory operation mode is established instead.
PR0300	Variable name illegal	The variable names have not been commanded properly.	<ul style="list-style-type: none"> Reconsider the variable names in the program and correct them.
PR0301	Variable name duplicated	The name of the variable has been duplicated.	<ul style="list-style-type: none"> Correct the program so that the name is not duplicated.
PR0350	No scaling spec.	A scaling command (G50, G51) was issued even though there are no such scaling specifications.	<ul style="list-style-type: none"> Check the specifications.

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Error No.	Message	Details	Remedy
PR0360	No program mirror spec.	A mirror image command (G50.1, G51.1) was issued even though there are no programmable mirror image specifications.	<ul style="list-style-type: none"> • Check the specifications.
PR0380	No corner R/C spec.	A command was issued for corner rounding or corner chamfering even though there are no such specifications.	<ul style="list-style-type: none"> • Check the specifications. • Remove the corner rounding or chamfering command from the program.
PR0382	No corner movement	The block next to corner rounding/ chamfering is not a movement command.	<ul style="list-style-type: none"> • Replace the G01 command by the block succeeding the corner rounding/ chamfering command.
PR0383	Corner movement short	In the corner rounding or chamfering command, the movement distance was shorter than the value in the corresponding command.	<ul style="list-style-type: none"> • Make the corner rounding or chamfering less than the movement distance since this distance is shorter than the corner rounding or chamfering.
PR0384	Corner next movement short	When the corner rounding or chamfering command was input, the movement distance in the following block was shorter than the corner rounding or chamfering.	<ul style="list-style-type: none"> • Make the corner rounding or chamfering less than the movement distance since this distance in the following block is shorter than the corner rounding or chamfering.
PR0385	Corner during G0/G33	Corner rounding or chamfering command was given during G00 or G33 modal.	<ul style="list-style-type: none"> • Reconsider the program.
PR0386	Can't execute corner R (C)	The corner R/C movement cannot be created.	<ul style="list-style-type: none"> • Reconsider the program.
PR0390	No geometric spec.	A geometric command was issued even though there are no specifications.	<ul style="list-style-type: none"> • Check the specifications.
PR0391	No geometric arc spec.	An arc command was issued with the geometric command even though there are no arc specifications.	<ul style="list-style-type: none"> • Check the specifications.
PR0392	Angle less than 1 deg (GEOMT)	The angle difference of two straight lines in the geometric command was within 1°.	<ul style="list-style-type: none"> • Correct the geometric angle.
PR0393	Inc value in 2nd block (GEOMT)	The second block of the geometric command was an incremental value command.	<ul style="list-style-type: none"> • Command the second geometric block with an absolute value.
PR0394	No linear move command (GEOMT)	The second block of the geometric command was not linear.	<ul style="list-style-type: none"> • Command G01 in the second geometric block.
PR0395	Illegal address (GEOMT)	<p>The plane selection horizontal axis and plane selection vertical axis are not commanded in the second block of the geometric command.</p> <p>There is no A command in the second block of the geometric command.</p>	<ul style="list-style-type: none"> • Reconsider the program.

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Error No.	Message	Details	Remedy
PR0396	Plane selected in GEOMT ctrl	The plane was changed between the first and second blocks of the geometric command.	<ul style="list-style-type: none"> • Change the plane before the geometric command.
PR0420	No parameter input spec.	A parameter input command was issued even though there are no parameter input specifications.	<ul style="list-style-type: none"> • Check the specifications.
PR0421	Parameter input error	Insufficient data was input in parameter. An address other than P, S, N, A or D was commanded. The P, S, N, A or D value is illegal. A character-string type parameter was input.	<ul style="list-style-type: none"> • Enter the correct parameter input data. • Reconsider the program.
PR0430	Return incomplete axis exists	A command was issued to move an axis, which has not returned to the reference point, away from that reference point.	<ul style="list-style-type: none"> • Execute reference point return manually.
PR0431	No 2nd 3rd 4th ref-p ret spec.	The 2nd, 3rd and 4th reference point return was commanded even though there are no 2nd, 3rd and 4th reference point return specifications.	<ul style="list-style-type: none"> • Check the specifications.
PR0435	G27 and M commands in same block	An M individual command was issued simultaneously in the G27 command block.	<ul style="list-style-type: none"> • An M individual command cannot be issued in a G27 command block and so the G27 command and M individual command must be placed in separate blocks.
PR0436	G29 and M commands in same block	An M individual command was issued simultaneously in the G29 command block.	<ul style="list-style-type: none"> • An M individual command cannot be issued in a G29 command block and so the G29 command and M individual command must be placed in separate blocks.
PR0437	No. G54.1 spec.	Although there are no specifications of workpiece coordinate system offset set addition, G54.1 has been specified.	<ul style="list-style-type: none"> • Check the specifications.
PR0438	Local coord set during exp wk co	Local coordinate system command (G52) is given during the G54.1 mode.	<ul style="list-style-type: none"> • Reconsider the program.
PR0451	No check-before-move spec.	The pre-movement stroke check (G22/G23 (G22.1/G23.1 for M2/M0 format)) was commanded even though there are no pre-movement stroke check function specifications.	<ul style="list-style-type: none"> • Check the specifications.

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Error No.	Message	Details	Remedy
PR0452	Movement limit	When the axis movement start point or end point is in the prohibited area designated with the pre-movement stroke check function, an alarm will occur before executing that movement block.	<ul style="list-style-type: none"> • Reconsider the axis address coordinate value in the program.
PR0460	Tape I/O error	An error has arisen in the tape reader or, alternatively, in the printer during macro printing.	<ul style="list-style-type: none"> • Check the power supply and cable of the connected devices. Check the input/output device parameters.
PR0461	File I/O	A file of the machining program cannot be read.	<ul style="list-style-type: none"> • If this error occurs during memory operation, the program stored in the memory may be destroyed. • Output the program and all other tool data and work offset data, then format the memory. • When using the FD, replace the floppy disk. • During IC card operation, confirm that the IC card is correctly inserted.
PR0462	Computer Link error	A communication error occurred during computer link A, B, high-speed server running.	<ul style="list-style-type: none"> • After resetting, check the cables and power supply of the connected devices, and computer link parameters.
PR0463	Read forced quit	The process was interrupted during input/output by resetting.	<ul style="list-style-type: none"> • Carry out input/output again.
PR0470	No Computer Link A	Computer link A was executed even though there are no computer link A specifications.	<ul style="list-style-type: none"> • Check the specifications.
PR0471	No Computer Link B	Computer link B was executed even though there are no computer link B specifications.	<ul style="list-style-type: none"> • Check the specifications.
PR0490	No disk operation	Disk operation was attempted even though there are no disk operation specifications.	<ul style="list-style-type: none"> • Check the specifications.
PR0491	No FLD operation	FLD operation was attempted even though there are no FLD operation specifications.	<ul style="list-style-type: none"> • Check the specifications.
PR0492	No IC card operation	IC card operation was attempted even though there are no IC card operation specifications.	<ul style="list-style-type: none"> • Check the specifications.
PR0493	No dataserver operation	Data server operation was attempted when the data server operation specifications were not available.	<ul style="list-style-type: none"> • Check the specifications.
PR0600	No auto TLM	An automatic tool length measurement command (G37) was executed even though there are no such command specifications.	<ul style="list-style-type: none"> • Check the specifications.

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Error No.	Message	Details	Remedy
PR0601	No skip	A skip command (G31) was issued even though there are no such command specifications.	<ul style="list-style-type: none"> • Check the specifications.
PR0602	No multi skip	The multi-step skip command (G31.n) was issued even though there are no multi-step skip specifications.	<ul style="list-style-type: none"> • Check the specifications.
PR0603	Skip speed 0	The skip speed is 0.	<ul style="list-style-type: none"> • Designate the skip speed.
PR0604	G37 illegal axis	No axis or more than 2 axes was designated in the automatic tool length measurement block.	<ul style="list-style-type: none"> • Designate only one axis.
PR0605	H and G37 commands in same block	The H code is in the same block as the automatic tool length measurement command.	<ul style="list-style-type: none"> • Designate the H code before the automatic tool length measurement command block.
PR0606	H command not found before G37	The H code was not yet designated in automatic tool length measurement.	<ul style="list-style-type: none"> • Designate the H code before the automatic tool length measurement command block.
PR0607	Signal turned illegally with G37	Before the area commanded by the D command or the parameter deceleration area D, the measurement position arrival signal went ON, or resulted in not going ON.	<ul style="list-style-type: none"> • Reconsider the program.
PR0608	Skip during radius compen	A skip command was issued during the radius compensation processing.	<ul style="list-style-type: none"> • Designate a radius compensation cancel command (G40), or remove the skip command.
PR0611	No hi-prec (G61.1) spec.	A high-accuracy mode (G61.1) command was issued even though there are no such command specifications.	<ul style="list-style-type: none"> • Check the specifications. • Remove the high-accuracy mode command from the program.
PR0612	No hi-prec die (G61.2/3) spec.	A high-accuracy (die) (G61.2/G61.3) command was issued even though there are no such command specifications.	<ul style="list-style-type: none"> • Check the specifications. • Remove the high-accuracy (die) command from the program.
PR0615	No hi-prec part (G61.5) spec.	A high-accuracy (part) (G61.5) command was issued even though there are no such command specifications.	<ul style="list-style-type: none"> • Check the specifications. • Remove the high-accuracy (part) command from the program.
PR0621	NURBS knot error	The knot was not correctly designated in the NURBS command.	<ul style="list-style-type: none"> • Designate the knot following the NURBS command format.
PR0622	NURBS weight error	The weight was not correctly designated in the NURBS command.	<ul style="list-style-type: none"> • Designate the weight following the NURBS command format.
PR0623	NURBS degree error	The number of stages was not correctly designated in the NURBS command.	<ul style="list-style-type: none"> • Designate the number of stages following the NURBS command format.
PR0624	NURBS control point error	The control point was not correctly designated in the NURBS command.	<ul style="list-style-type: none"> • Designate the control point following the NURBS command format.

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Error No.	Message	Details	Remedy
PR0625	NURBS misc error	The general precautions were not observed for the NURBS command.	<ul style="list-style-type: none"> • Check the commands and modes that cannot be used with the NURBS interpolation. • Check the restrictions described in the Operation Manual.
PR0626	No NURBS spec.	The NURBS interpolation command was issued even though there are no specifications.	<ul style="list-style-type: none"> • Check the specifications.
PR0900	No normal control	A normal line direction control command (G40.1/G41.1/G42.1) was issued even though there are no such command specifications.	<ul style="list-style-type: none"> • Check the specifications. • Remove the normal line direction control command from the program.
PR0901	G92 command on normal axis	The normal line control axis work offset rewrite command (G92) was issued during normal line control.	<ul style="list-style-type: none"> • Reconsider the program.
PR0902	Normal axis set as linear axis	Normal line control was set for a linear axis.	<ul style="list-style-type: none"> • Set normal line control for a rotation axis.
PR0903	At block joint turn angle over	The turning angle at the block seams exceeded the limit during normal line control.	<ul style="list-style-type: none"> • Reconsider the program.
PR0920	No 3DIM coord conversion spec.	There is no three-dimensional coordinate conversion function.	<ul style="list-style-type: none"> • Check the specifications.
PR0921	3DIM coord convert error	A G code that cannot be commanded during the three-dimensional coordinate conversion modal was issued.	<ul style="list-style-type: none"> • Reconsider the program.
PR0922	Illegal 3DIM coord convert	A three-dimensional coordinate conversion command was issued in a modal incapable of three-dimensional coordinate conversion.	<ul style="list-style-type: none"> • Reconsider the program.
PR0990	Illegal process	An error occurred during the program analysis process, and it became impossible to continue.	<ul style="list-style-type: none"> • Call the service center with as many details about the operation status as possible.

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3.7 Auxiliary axis servo alarms (AS○○○○)

AS0001 Aux axis servo alarm 1			
Alarm information	Details		Remedy
0011	PCB error	An error occurred in the amplifier's internal PCB.	<ul style="list-style-type: none"> • Replace servo amplifier.
0013	Software processing timeout, clock error	An error occurred in the amplifier's internal reference clock.	<ul style="list-style-type: none"> • Replace servo amplifier.
0016	Motor type, detector type error	Motor type error	<ul style="list-style-type: none"> • Use a correct amplifier and motor combination.
		Detector initial communication error.	<ul style="list-style-type: none"> • Connect correctly. • Replace the motor. • Replace or repair cable.
		Detector CPU error	<ul style="list-style-type: none"> • Replace the motor (detector).
0017	PCB error (A/D conversion initial error)	An error occurred in the amplifier's internal A/D converter.	<ul style="list-style-type: none"> • Replace servo amplifier.
0025	Absolute position lost	An error occurred in the detector's internal absolute position data.	<ul style="list-style-type: none"> • Turn the power ON for 2 to 3 minutes while the alarm is occurring, and then turn the power ON again. • Replace the battery, and initialize the absolute position again.
0034	CRC error	An error occurred in the communication with the NC.	<ul style="list-style-type: none"> • Take countermeasures against noise.
0036	Timeout, NC power down	Communication with the NC was cut off.	<ul style="list-style-type: none"> • Connect correctly. • Turn the NC power ON. • Replace the amplifier or NC.
0037	Parameter error (regenerative resistor type error)	The parameter setting value is incorrect.	<ul style="list-style-type: none"> • Set the parameter correctly.
0038	Communication frame error	An error occurred in the communication with the NC.	<ul style="list-style-type: none"> • Take countermeasures against noise.
0039	Communication INFO error	Undefined data was transferred from the NC.	<ul style="list-style-type: none"> • Change the NC software version to a compatible version.

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AS0002 Aux axis servo alarm 2			
Alarm information	Details		Remedy
0011	PCB error 1 (drive circuit error)	An error occurred in the amplifier's internal PCB.	<ul style="list-style-type: none"> • Replace servo amplifier.
0013	Software processing timeout, clock error	An error occurred in the amplifier's internal reference clock.	<ul style="list-style-type: none"> • Replace servo amplifier.
0015	EEROM error	A write error occurred to the EEROM in the amplifier.	<ul style="list-style-type: none"> • Replace servo amplifier.
0017	PCB error (A/D conversion error)	An error occurred in the amplifier's internal A/D converter.	<ul style="list-style-type: none"> • Replace servo amplifier.
0018	PCB error (LSI error)	An error occurred in the amplifier's internal LSI.	<ul style="list-style-type: none"> • Replace servo amplifier.
0020	Detector error	An error occurred in the communication between the servo amplifier and detector.	<ul style="list-style-type: none"> • Connect correctly. • Replace or repair cable.
0024	Ground fault detection	A ground fault of the output was detected when the power was turned ON.	<ul style="list-style-type: none"> • Repair the ground fault section. • Replace the cable or motor.

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AS0003 Aux axis servo alarm 3			
Alarm information	Details		Remedy
0010	Undervoltage	The power voltage is 160V or less.	<ul style="list-style-type: none"> • Review the power supply. • Replace servo amplifier.
0030	Regeneration error	The tolerable regeneration power of the internal regenerative resistor or external regenerative option was exceeded.	<ul style="list-style-type: none"> • Set parameter #002 correctly. • Connect correctly. • Lower the positioning frequency. • Change the regenerative option to a larger capacity. • Lower the load. • Review the power supply.
		Regenerative transistor error	<ul style="list-style-type: none"> • Replace servo amplifier.
0031	Overspeed	The motor's speed exceeded the tolerable momentary speed.	<ul style="list-style-type: none"> • Increase the acceleration/ deceleration time constant. • Review the gear ratio. • Replace the detector.
0032	Overcurrent	A current exceeding the servo amplifier's tolerable current flowed.	<ul style="list-style-type: none"> • Repair the wiring. • Replace servo amplifier. • Take countermeasures against noise.
0033	Overvoltage	The voltage of the converter in the servo amplifier was 400V or more.	<ul style="list-style-type: none"> • Wire correctly. • Replace servo amplifier. • For the internal regenerative resistor, replace the amplifier. • For the external regenerative option, replace the regenerative option.
0046	Motor overheating	An operation state causing the motor to overheat continued.	<ul style="list-style-type: none"> • Reduce the motor load. • Review the operation pattern.
0050	Overload 1	The servo amplifier or servomotor overload protection function activated.	<ul style="list-style-type: none"> • Reduce the motor load. • Review the operation pattern. • Change to a motor or amplifier with large output. • Change the setting of the automatic tuning response characteristics. • Connect correctly. • Replace servo motor.
0051	Overload 2	The max. output current flowed for several seconds due to a machine collision or overload.	<ul style="list-style-type: none"> • Review the operation pattern. • Change the setting of the automatic tuning response characteristics. • Connect correctly. • Replace servomotor.

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Alarm information	Details		Remedy
0052	Excessive error	A position deflection exceeding the excessive error detection setting value occurred.	<ul style="list-style-type: none">• Increase the acceleration/ deceleration time constant.• Increase the torque limit value.• Review the power facility capacity.• Review the operation pattern.• Replace motor.• Connect correctly.• Repair or replace the cable.

3.8 Auxiliary axis system alarms (AZ○○○○)

AZ0070 Aux axis ABS position error			
Alarm information	Details		Remedy
	0001	Zero point initialization incomplete	
0002	Absolute position data lost	The absolute position coordinate data in the amplifier has been lost.	<ul style="list-style-type: none"> • Initialize the zero point.
0003	Absolute position system related parameter error	The absolute position system related parameters have been changed or lost.	<ul style="list-style-type: none"> • Correctly set the parameters and then initialize the zero point.

AZ0071 Aux axis drop voltage			
Alarm information	Details		Remedy
	0001	Absolute position detector data lost	

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3.9 Auxiliary axis common alarms (AY○○○○)

No.	Message	Details	Remedy
AY0020	Aux axis initial communication error	An error occurred during the auxiliary axis initial communication.	<ul style="list-style-type: none"> • Check the auxiliary axis amplifier setting, connection, axis No. in the spindle specification parameters, "No amp" of the axis specification parameters, etc.
AY0021	Aux axis commu err: Ax No/type ilegal	There is an error in the communication between the NC and amplifier.	Check whether there is any abnormality in the following : <ul style="list-style-type: none"> • Cable (Are there any broken wires?) • Cable shield ground • Connector connections • Mounting state of the amplifier Contact the nearest service center.
AY0022	Aux axis commu err: CRC er/rcv incmp		
AY0023	Aux axis commu err: Recev frame No		
AY0024	Aux axis commu er sum: Ax No/type ilgl		
AY0025	Aux axis commu er sum: CRC er/rcv incmp		
AY0026	Aux axis commu er sum: Recev frame No		

3.10 Auxiliary axis emergency stop (AQ○○○○)

No.	Message	Details	Remedy
AQ0001	Aux axis emergency stop	An emergency stop occurred due to some cause other than bus emergency stop input and external emergency stop input.	The emergency stop cause is displayed with bit correspondence in ##, so check the cause.
		The bus emergency stop and external emergency stop was input.	Check the NC emergency stop and external emergency stop.

Appendix 4. Warning Messages

4.1 Warnings common to all systems (SYW○○○○)

No.	Message	Details	Remedy
SYW0001	External switch emergency stop	An external emergency stop input signal was received. (24V is not being applied to the CN23 connector.)	<ul style="list-style-type: none"> Examine the causes of the emergency stop, and remove them.
SYW0002	RIO1 communication error	An emergency stop input signal was received from a remote I/O unit (RIO1). Or, the communication cable with the remote I/O unit (RIO1) is not connected properly.	<ul style="list-style-type: none"> Examine the causes of the remote I/O unit emergency stop, and remove them. Check the cable connection.
SYW0003	RIO2 communication error	An emergency stop input signal was received from a remote I/O unit (RIO2). Or, the communication cable with the remote I/O unit (RIO2) is not connected properly.	<ul style="list-style-type: none"> Examine the causes of the remote I/O unit emergency stop, and remove them. Check the cable connection.
SYW0004	RIO3 communication error	An emergency stop input signal was received from a remote I/O unit (RIO3). Or, the communication cable with the remote I/O unit (RIO3) is not connected properly.	<ul style="list-style-type: none"> Examine the causes of the remote I/O unit emergency stop, and remove them. Check the cable connection.
SYW0005	PLC emergency stop	The user PLC (ladder sequence) is not running. This error also occurs when an error occurs in the data communication with the remote I/O.	<ul style="list-style-type: none"> Turn ON the PLC ladder RUN switch on the CPU Card. (Second switch from the top of the QX○○○ DIP switches.) Check whether there is an abnormality in the connection between the NC main unit and remote IO unit.
SYW0006	PLC signal	An emergency stop signal was input from the PLC.	<ul style="list-style-type: none"> Cancel the signal with a machine switch such as READY.
SYW0007	EMG stop: SV commu stop	This appears when the power is OFF.	<ul style="list-style-type: none"> This is not a particular problem.
SYW0008	Ext board EMG stop: SV end off	An emergency stop occurred because the servo terminator or battery is not connected properly.	<ul style="list-style-type: none"> Check the connection status of the servo communication cable and connectors.
SYW0009	RIO4 communication error	The emergency stop input signal was input from the remote IO unit (R104). The communication cable with the remote IO unit (R104) is disconnected.	<ul style="list-style-type: none"> Check and remove the cause of the remote IO unit emergency stop. Check the cable connection.
SYW0040	The others EMG	An emergency stop occurred for some other reason.	<ul style="list-style-type: none"> Contact the Service Center.
SYW0050	Low battery voltage	The voltage of the battery provided for saving data in the NC has dropped.	<ul style="list-style-type: none"> Charge the battery. Replace the battery. Check the machining program after replacing or charging the battery.

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No.	Message	Details	Remedy
SYW0060	PLC-H timer over	The PLC high-speed process exceeded the allocated time.	<ul style="list-style-type: none">• Shorten the high-speed process.
SYW0070	Receive result of diagnosis	The diagnosis data file has been received.	<ul style="list-style-type: none">• Erase the message.
SYW0071	Modem initial error	When the modem was connected after power ON, an error was found in the modem and communication could not be established.	<ul style="list-style-type: none">• Connect the model and turn the power ON again.
SYW0072	Redial over	Dialing failed, and the number of redials was exceeded.	<ul style="list-style-type: none">• Check the number of redials setting.
SYW0073	No dial tone	When dialing, the phone line was not connected with an analog modem.	<ul style="list-style-type: none">• Connect the phone line.
SYW0074	Network error	An error other than SYW0070 to SYW0073 occurred during communication.	<ul style="list-style-type: none">• Check the cause.
SYW0999	Tool double registration	The tool No. was registered in duplicate.	<ul style="list-style-type: none">• Change the tool No.

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4.2 Servo warnings (SVW○○○○)

No.	Abbrev.	Message	Details	Cancel- lation method
SVW0090	WST	Low-speed communication err	Initial communication with the absolute position linear scale was not possible.	PR
SVW0091	WAS	Communication error	An error in the communication with the detector was detected in the absolute position detection system using the OHA type detector and serial absolute position linear scale.	–
SVW0092	WAF	Serial format error	There is an error in the serial data format from the OHA-type detector or serial-type absolute position linear scale.	–
SVW0093	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.	PR
SVW0096	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.	–
SVW0097	MPO	MP scale offset error	An error was detected in the offset data read in when the CNC power was turned ON in the MP scale absolute position detection system.	PR
SVW009E	WAn	High-speed rotary counter err	An error was detected in the multi-rotation counter with the serial type detector. The absolute position was not compensated.	–
SVW009F	WAB	Low battery voltage	The battery voltage supplied to the absolute position detector dropped.	–
SVW00E0	WOR	Over regeneration warning	Eighty percent of the regenerative alarm was detected.	–
SVW00E1	WOL	Overload warning	Eighty percent of the overload 1 alarm level has been detected. (An overload 1 alarm may occur if this operation continues as it.)	PR
SVW00E3	WAC	Abs position counter warning	The value in the absolute position counter is illegal. The absolute position must be initially set.	–
SVW00E4	WPE	Parameter error warning	The set parameter exceeds the setting range. This invalid parameter is ignored and the value before the invalid parameter was set remains valid.	–
SVW00E6	AXE	Removing control axis	The control axis is being removed.	–
SVW00E7	NCE	NC emergency stop	An emergency stop command was input from NC.	–
SVW00E8	O	Aux regeneration frequency over	Regeneration at the limit of the power supply regeneration capacity is occurring frequently.	–
SVW00E9	P	Instantaneous stop warning	An instantaneous power failure for 25ms occurred. (The main circuit voltage has not dropped, so an alarm does not occur.)	NR
SVW00EA	Q	External emergency stop	An external emergency stop input signal was input. (24V is not applied on the CN23 connector.)	–
SVW00EB	R	Over regeneration warning	Eighty percent of the over-regeneration alarm was reached.	–

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4.3 Spindle warnings (SPW○○○○)

No.	Abbrev.	Message	Details	Cancel- lation method
SPW00E1	WOL	Overload warning	The time during which the motor current exceeded the overload detection level continued for eighty percent or more of the detection time constant.	AR
SPW00E4	WPE	Parameter error warning	The set parameter exceeds the setting range. This invalid parameter is ignored and the value before the invalid parameter was set remains valid.	–
SPW00E7	NCE	NC emergency stop	An emergency stop command was input from NC.	–
SPW00E8	O	Aux regeneration frequency over	Regeneration at the limit of the power supply regeneration capacity is occurring frequently.	–
SPW00E9	P	Instantaneous stop warning	An instantaneous power failure for 25ms occurred. (The main circuit voltage has not dropped, so an alarm does not occur.)	NR
SPW00EA	Q	External emergency stop	An external emergency stop input signal was input. (24V is not applied on the CN23 connector.)	–
SPW00EB	R	Over regeneration warning	Eighty percent of the over-regeneration alarm was reached.	–

4.4 Axis warnings (AXW○○○○)

No.	Message	Details	Remedy
AXW0101	External interlock axis exists	The external interlock function has activated (the input signal is "OFF") and one of the axes has entered the interlock state.	<ul style="list-style-type: none"> • The interlock function has been validated, so the interlock before resuming operation. • Check the sequence on the machine side. • Check for broken wires in the interlock signal line.
AXW0102	Servo OFF	An axis movement command was issued while the servo was OFF.	<ul style="list-style-type: none"> • The servo OFF function is valid. Cancel the servo OFF function.
AXW0103	Now axis detached	An axis removal command was input from the NC.	<ul style="list-style-type: none"> • Examine the causes of the axis removal, and remove them.
AXW0104	No spindle POS control spec.	A command was issued even though the specifications for spindle position control are not provided.	<ul style="list-style-type: none"> • Check the specifications.
AXW0105	OMR-II parameter error	The parameter settings related to OMR-II are illegal. OMR-II is invalid in this case.	<ul style="list-style-type: none"> • Check the related parameter settings.

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4.5 Operation warnings (OPW○○○○)

No.	Message	Details	Remedy
OPW0101	Auto operation pause signal ON	The automatic operation stopped because the automatic operation stop signal turned ON.	<ul style="list-style-type: none"> • The operation can be restarted by canceling the automatic operation stop signal.
OPW0102	Single block stop signal ON	The block stopped because the single block stop signal turned ON.	<ul style="list-style-type: none"> • Restarting will cause one block to be executed and then the block will stop. Canceling the single block stop signal and starting will cause continuous operation.
OPW0103	Verify stop	The operation is in a compare stop state.	<ul style="list-style-type: none"> • Restarting will cause the continuous operation to restart.
OPW0104	External interlock axis exists	The external interlock function has been validated and one of the axes has entered the interlock state.	<ul style="list-style-type: none"> • Cancel the interlock signal.
OPW0105	Internal interlock axis exists	The servo OFF function is valid. Or, an axis in an axis removal state was commanded.	<ul style="list-style-type: none"> • Cancel the servo OFF signal. • Cancel the command.
OPW0106	Operation mode change	The automatic operation mode changed to another automatic operation mode during operation.	<ul style="list-style-type: none"> • Return to the original automatic operation mode, and restart.
OPW0107	No operation mode	Starting was attempted without selecting the operation mode. Or, canceling of the operation mode was attempted during operation.	<ul style="list-style-type: none"> • Restart after selecting the operation mode.
OPW0108	Operation mode duplicated	Starting was attempted with duplicated operation modes, or another duplicating operation mode was selected during operation.	<ul style="list-style-type: none"> • Restart after selecting the operation mode.
OPW0109	Cutting override zero	The cutting feed override switch on the machine operation panel is set to "0".	<ul style="list-style-type: none"> • Set the switch to a value other than "0" to cancel the error. • If the switch is set to a value other than "0", check for a short circuit in the signal wire. • Check the sequence program.
OPW0110	Rapid feed override zero	The "RAPID TRAVERSE OVERRIDE" switch on the machine operation panel is set to "0".	<ul style="list-style-type: none"> • Cancel the error by setting the "RAPID TRAVERSE OVERRIDE" switch to a value other than "0". • If the "RAPID TRAVERSE OVERRIDE" switch is set to a value other than "0", check for short-circuits in the signal wire. • Check the sequence program.

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No.	Message	Details	Remedy
OPW0111	External feedrate zero	The MANUAL FEEDRATE switch on the machine operation panel is set to "0" when the machine is in the jog mode or automatic dry run mode.	<ul style="list-style-type: none"> • Set the switch to a value other than "0" to release the error. • If the switch is set to a value other than "0", check for a short circuit in the signal wire. • Check the sequence program.
OPW0112	Spindle stop	The spindle stopped during the synchronous feed command.	<ul style="list-style-type: none"> • Rotate the spindle. If the workpiece is not being cut, start dry run. • Check for a broken wire in the spindle encoder cable. • Check the connections for the spindle encoder connectors. • Check the spindle encoder pulse.
OPW0113	Block start interlock	An interlock signal that locks the start of the block has been input.	<ul style="list-style-type: none"> • Check the sequence program. Restart the program while simultaneously canceling the signal.
OPW0114	Cutting block start interlock	An interlock signal that locks the start of the cutting block has been input.	<ul style="list-style-type: none"> • Check the sequence program. Restart the program while simultaneously canceling the signal.
OPW0115	Restart switch ON	The restart switch was turned ON before the restart search was completed, and the manual mode was selected.	<ul style="list-style-type: none"> • Search the block to be restarted. • Turn OFF the restart switch.
OPW0116	Prog restart posn not searched	Restarting was attempted before the program restart search was completed.	<ul style="list-style-type: none"> • Restart after the program restart search is completed.
OPW0117	Prog restart posn not returned	Automatic start is not possible because the axis has not returned to the program restart position.	<ul style="list-style-type: none"> • Manually return the axis to the restart position, or turn ON the Auto restart valid parameter and automatically start.
OPW0118	No MDI setting	Starting was attempted without setting an MDI in the MDI mode.	<ul style="list-style-type: none"> • Restart after setting an MDI.
OPW0119	In program search	Operation was attempted during a program search.	<ul style="list-style-type: none"> • Wait for the program search to complete, or restart after canceling the program search by resetting.
OPW0120	Program check mode	Starting was attempted during a program check or program check mode.	<ul style="list-style-type: none"> • Wait for the program check to complete, or restart after canceling the program check by resetting.
OPW0121	In buffer correction	Starting was attempted during buffer correction.	<ul style="list-style-type: none"> • Cancel the buffer correction by resetting or screen changeover. Complete the buffer correction by pressing the (INPUT CALC) key.
OPW0122	In reset process	Starting was attempted during the reset process.	<ul style="list-style-type: none"> • Restart after the reset process is completed.

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No.	Message	Details	Remedy
OPW0123	Machining time calculate mode	Starting was attempted during the machining time calculation or during the machining time calculation mode.	<ul style="list-style-type: none"> • Wait for the machining time calculation to complete, or restart after canceling the machining time calculation by resetting.
OPW0124	In synchronous correction mode	The synchronous correction mode switch was turned ON in a mode other than the handle mode.	<ul style="list-style-type: none"> • Select the handle mode. • Turn OFF the synchronous correction mode switch.
OPW0125	In axis control	Starting is not possible because the axis is already being controlled.	<ul style="list-style-type: none"> • Restart after stopping the axis being controlled.
OPW0126	Acc/dec T cnst pre-intrpl large	An internal interlock occurred because the pre-interpolation acceleration/deceleration time constant is too large.	<ul style="list-style-type: none"> • Reduce the command speed, or reduce the parameter setting value for the pre-interpolation acceleration/deceleration time constant.
OPW0127	In emergency stop	Starting was attempted during an emergency stop.	<ul style="list-style-type: none"> • Restart after canceling the emergency stop.
OPW0128	In absolute position alarm	Starting was attempted during an absolute position detection alarm.	<ul style="list-style-type: none"> • Start after canceling the absolute position detection alarm.
OPW0129	In abs posn initial setting	Starting was attempted during zero point initialization of the absolute position detection system.	<ul style="list-style-type: none"> • Start after the zero point initialization is completed.
OPW0130	Tool life over	The tool life (No. of uses, time, etc.) has reached the setting value.	<ul style="list-style-type: none"> • Replace the tool.
OPW0131	Overheat	The NC or operation board temperature has risen above the specified range.	<ul style="list-style-type: none"> • Cooling measures are required. Turn OFF the NC power, or lower the temperature with an air conditioner, etc.
OPW0132	Top search not completed	A top search was not executed before the restart search.	<ul style="list-style-type: none"> • Execute a top search.
OPW0133	Restart search error	In internal error occurred during the restart search.	<ul style="list-style-type: none"> • Execute from the restart top search after resetting.
OPW0134	Restart search completed	Another restart search was attempted in the program restart after the restart search was completed.	<ul style="list-style-type: none"> • If continuing the program restart operation (automatically/manually returning to the restart position), restart is possible from the first block searched. • If executing the search again, first cancel the previous restart search by resetting. Then execute a restart search after executing a top search.

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No.	Message	Details	Remedy
OPW0135	Axis-moving direction opposite	Manual return of the axis to the restart position was attempted, but the axis was moved in the opposite direction.	<ul style="list-style-type: none"> • Move the axis in the correct direction.
OPW0136	Ref point return No. invalid	The 2nd reference point return was attempted, even though the 1st reference point return was not completed.	<ul style="list-style-type: none"> • Execute the 2nd reference point return again after the 1st reference point return is completed.
OPW0137	No mode	Neither the automatic nor manual mode has been selected.	<ul style="list-style-type: none"> • Select the automatic or manual mode.
OPW0138	Ref. point return in research	When moving manually to the program restart position, the axis was moved in the reference point return mode.	<ul style="list-style-type: none"> • Move to the restart position in the jog feed mode.
OPW0150	Now skip on	The skip signal was input when the skip return operation changed to the measurement operation.	<ul style="list-style-type: none"> • Increase the skip return amount.
OPW0151	No skip	Even though the 1st skip was to the correct position, the 2nd skip could not be found.	<ul style="list-style-type: none"> • Check whether the measurement target has moved.
OPW0160	Chopping axis ZRN incomplete	The chopping signal turned ON before the chopping axis zero point return was completed.	<ul style="list-style-type: none"> • Turn OFF the chopping signal, and execute the chopping axis zero point return.
OPW0161	Chopping override zero	The override amount became "0" during the chopping operation.	<ul style="list-style-type: none"> • Check the chopping override amount. • Check the rapid traverse override when in rapid traverse.
OPW0162	Chopping axis conflict	A chopping axis command was issued from the program during the chopping mode.	<ul style="list-style-type: none"> • Reset, or turn OFF the chopping signal. • The program movement command is executed after a return to the reference position when the chopping signal is turned OFF.
OPW0163	Chopping stroke zero	The bottom dead center position was set to the same position as the top dead center position by the chopping operation command.	<ul style="list-style-type: none"> • Correctly set the bottom dead center position.
OPW0164	Chopping occupied by manual	The chopping signal was turned ON when the chopping axis was selected as the handle axis or when the axis was being moved manually. Or, the chopping axis was selected as the handle axis during a chopping operation or when the axis was being moved manually.	<ul style="list-style-type: none"> • Select an axis other than the chopping axis as the handle axis, or turn ON the chopping signal after stopping the manual feed of the chopping axis.

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No.	Message	Details	Remedy
OPW0165	Chopping rot axis invalid	Chopping operation of the rotation axis was attempted.	<ul style="list-style-type: none"> • Chopping cannot be commanded to the rotation axis.
OPW0166	Invalid Ope in NURBS mode	An illegal operation was carried out during NURBS interpolation.	<ul style="list-style-type: none"> • Do not carry out MDI interrupt, etc., during NURBS interpolation.
OPW0167	F1 Feed Rate Zero	When the F1-digit feed command was executed, the F1-digit feedrate was zero.	<ul style="list-style-type: none"> • Set the F1-digit feedrate on the user parameter screen. • Accelerate the speed with the manual handle.
OPW0168	Ref.pnt ret cancel tool offset	Zero point return was carried out during tool evasion return, so the tool offset after zero point return was invalidated.	<ul style="list-style-type: none"> • To reset the error, change the operation mode to a mode other than zero point return before the axis returns to the zero point. • The error will be reset when the tool return is completed. • The error will be reset when reset 1 is input or emergency stop is applied.
OPW0169	Rotate work compen excessive	The rotary axis workpiece position compensation amount exceeded 3mm.	<ul style="list-style-type: none"> • Turn the rotary axis workpiece position compensation OFF. • Set the deviation between the workpiece center position and table rotation center to 3mm or less. • Check that the workpiece coordinate zero point is set at the workpiece center.
OPW0170	External deceleration axis	More than one axis moves at the external deceleration speed.	<ul style="list-style-type: none"> • Invalidate external deceleration.

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4.6 Program warnings (PRW○○○○)

No.	Message	Details	Remedy
PRW0001	Overlap address exists	Because the No. of addresses that can be simultaneously commanded in one block was exceeded, the previously designated address was ignored. No. of addresses that can be simultaneously commanded in one block : M = Max. 4 addresses. Other than M = 1 address	<ul style="list-style-type: none"> • Reconsider the program.
PRW0002	Overlap G code exists	Because several G codes were commanded in the same group, the previously designated G code was ignored.	<ul style="list-style-type: none"> • Reconsider the program.
PRW0003	Ignored G code exists	A G code exists that was ignored due to a G code priority order check.	<ul style="list-style-type: none"> • Reconsider the program.
PRW0004	Unused address exists	An address exists that was not used in the program block.	<ul style="list-style-type: none"> • Reconsider the program.
PRW0005	Ref point ret in pattern rot	Reference point return was attempted while rotating the figure.	<ul style="list-style-type: none"> • Reconsider the program.
PRW0006	No end point operation in arc	There is no end point coordinate command for the R-designated arc.	<ul style="list-style-type: none"> • Reconsider the program.
PRW0007	Cylinder mode warning	A command illegal for the cylindrical mode was issued.	<ul style="list-style-type: none"> • Reconsider the program.

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4.7 Auxiliary axis servo warnings (ASW○○○○)

ASW0052 Aux axis servo warning			
No.	Details		Remedy
0092	Battery voltage drop	The absolute position detection battery voltage dropped.	<ul style="list-style-type: none"> • Mount a battery. • Replace the battery and initialize the absolute position.
00E0	Over-regeneration warning	The regeneration power may have exceeded the tolerable range of the built-in regenerative resistor or external regenerative option.	<ul style="list-style-type: none"> • Lower the positioning frequency. • Change the regenerative option to a larger one. • Lower the load.
00E1	Overload warning	The overload alarm 1 could occur.	<ul style="list-style-type: none"> • Refer to the items for ASW0033 0050.
00E3	Absolute position counter warning	There is an error in the absolute position detector internal data.	<ul style="list-style-type: none"> • Take countermeasures against noise. • Replace the servomotor.
00E9	Main circuit OFF warning	The servo ON signal was input while the main circuit power was OFF. The contactor operation is faulty.	<ul style="list-style-type: none"> • Turn ON the main circuit power.

4.8 Auxiliary axis system warnings (AZW○○○○)

AZW0073 Aux axis system warning			
No.	Details		Remedy
0001	Absolute position memory battery voltage warning	Battery voltage drop Detector cable wire breakage or looseness	<ul style="list-style-type: none"> • Check the battery and detector cable. The zero point does not need to be initialized.
0003	Absolute position counter warning	An error occurred in the detector's absolute position counter.	<ul style="list-style-type: none"> • Replace the detector.

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4.9 Auxiliary axis operation warnings (AMW○○○○○)

AMW0001 Aux axis operation error			
No.	Details		Remedy
0001	Near-point dog length insufficient	When executing dog-type reference point, the zero point return speed is too fast or the dog length is too short.	<ul style="list-style-type: none"> • Lower the zero point return speed or increase the dog length.
0003	Reference point return direction illegal	When executing reference point return, the axis was moved in the opposite of the designated direction.	<ul style="list-style-type: none"> • Move the axis in the correct direction.
0004	External interlock	The axis interlock function is valid.	<ul style="list-style-type: none"> • Cancel the interlock signal
0005	Internal interlock	An interlock was established by the servo OFF function.	<ul style="list-style-type: none"> • Cancel the servo OFF.
0007	Soft limit	The soft limit was reached.	<ul style="list-style-type: none"> • Check the soft limit setting and machine position
0024	In absolute position alarm. Reference point return not possible.	Reference point return was executed during an absolute position alarm.	<ul style="list-style-type: none"> • Initialize the absolute position and then fix the absolute position coordinates.
0025	In initializing absolute position. Reference point return not possible.	Reference point return was executing while initializing the absolute position.	<ul style="list-style-type: none"> • Initialize the absolute position and then fix the absolute position coordinates.

AMW0002 Aux axis operation error			
No.	Details		Remedy
0001	No operation mode	The operation mode is not designated, or the operation mode was changed during axis movement.	<ul style="list-style-type: none"> • Correctly designate the operation mode.
0003	Feedrate 0	The operation parameter's feedrate setting is zero. Or, the override is valid, and the override value is zero.	<ul style="list-style-type: none"> • Set a value other than zero in the feedrate setting or override value.
0060	Station No. designation illegal. Starting not possible.	A station No. exceeding the No. of indexed divisions was designated.	<ul style="list-style-type: none"> • Correctly designate the station No.

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No.	Details		Remedy
0061	Reference point return incomplete. Starting not possible.	Automatic/manual operation was started before reference point return was executed with the incremental system.	<ul style="list-style-type: none"> • Execute the reference point return.
0062	In initializing absolute point. Starting not possible.	The start signal was input while initializing the absolute position.	<ul style="list-style-type: none"> • Complete the absolute position initialization.
0063	In absolute position alarm. Starting not possible.	The start signal was input during an absolute position alarm.	<ul style="list-style-type: none"> • Initialize the absolute position and then fix the absolute position coordinates.
0064	In random positioning mode. Manual operation not possible.	The manual operation mode was started during the random positioning mode.	<ul style="list-style-type: none"> • Turn the random positioning mode OFF before switching to the manual operation mode.
0065	Uneven indexing station No. illegal. Starting not possible.	The commanded station No. was higher than 8 during uneven indexing.	<ul style="list-style-type: none"> • Check the commanded station No.

Revision History

Date of revision	Manual No.	Revision details
Nov. 1997	BNP-B2237*	First edition
Apr. 1998	BNP-B2237A	<ul style="list-style-type: none"> • Revisions due to changes of screens, specifications and operation details, etc., and addition of screens. • Mistakes were corrected.
Oct. 1998	BNP-B2237B	<ul style="list-style-type: none"> • Revisions due to changes of screens, specifications and operation details, etc., and addition of screens. • Mistakes were corrected. • This manual's document No. has been changed as follows. Old : BNP-B3950-004 New : BNP-B2237
Sep. 1999	BNP-B2237D	<ul style="list-style-type: none"> • Editing: Section of playback edit function was added. • Diagnosis: Section of waveform display (condition setting) screen, and waveform display screen was added. • Restart search: Section of list retrieval menu was added. • Data input/output: Section of merge function was added. • Contents of control parameter screens and user parameters screens were deleted / added / changed. • Magazine 1 to 5 menu on tool registration screen was added. • Synchronous error screen • Machining parameter names and details were changed partially. • Mistakes were corrected.
Oct. 2000	BNP-B2237E	<p>Revisions due to changes of screens, specifications and operation details according to ver. DO S/W. (Followings are main points to be changed.)</p> <ul style="list-style-type: none"> • Touch panel functions were added. • Screens related to auxiliary axis were added. • Section about absolute position detection were added. • Section about stored stroke limit was added. • Descriptions about ladder monitor menu were changed. • Parameters and messages were deleted / added / changed. • Mistakes were corrected.
Dec. 2000	BNP-B2237F	<ul style="list-style-type: none"> • Incorrect collations caused by printing replaced.
Mar. 2001	BNP-B2237G	<p>Revisions due to changes of screens, specifications and operation details according to ver. FO S/W. (Followings are main points to be changed.)</p> <ul style="list-style-type: none"> • Pallete prog regist screen added • Parameter Per Application screen added • Anshin-net Message screen added • MTB Net screen added • Explanation on external deceleration added • Mistakes were corrected

Date of revision	Manual No.	Revision details
Mar.2002	BNP-B2237H	<ul style="list-style-type: none"> • Design of the cover and the back cover were changed. • MODEL, MODEL CODE, and Manual No. were added on the back cover. <p>Revisions due to changes of screens, specifications and operation details according to ver. FO S/W. (Followings are main points to be changed.)</p> <ul style="list-style-type: none"> • PLC Switch screen, Control Parameter screen, menus added • Pallet 4-Page Registration screen added • Anshin-net Message screen menu, messages added • MTB Net screen menu, messages added • Explanation of simultaneous manual/automatic added • Mistakes were corrected
Jul. 2003	BNP-B2237J	<ul style="list-style-type: none"> • Explanation of the setting and display unit was rewritten. • Restart search: Section of list was deleted partially. • Control parameter 2: The details of parameter were rewritten. • Tool registration screen: Explanation of the erasing the tool registration data was rewritten. • Deceleration check: A modal command was deleted partially. • Fault diagnosis: Fault example was deleted partially. • Program error messages were changed. • Mistakes were corrected.

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.

Please contact your Mitsubishi Electric dealer with any questions or comments regarding the use of this product.

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MODEL	M600M Series
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