



*Changes for the Better*

**MITSUBISHI CNC**

**700 Series**

**Instruction Manual**



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## Introduction

This manual is referred to when using the MITSUBISHI CNC 700 Series.

This manual explains how to operate, run and set up this NC unit. Read this manual thoroughly before using the NC unit. To safely use this NC unit, thoroughly study the "Precautions for Safety" on the next page before use.

### Details described in this manual

#### **CAUTION**

-  For items described as "Restrictions" or "Usable State" in this manual, the instruction manual issued by the machine tool builder 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. Confirm with the specifications issued by the machine tool builder before starting use.
-  Refer to the Instruction Manual issued by each machine tool builder for details on each machine tool.
-  Some screens and functions may differ depending on the NC system (or its version), and some functions may not be possible. Please confirm the specifications before use.

Refer to the following documents.

MITSUBISHI CNC 700 Series	Programming Manual (Machining Center System) .....	IB-1500072
MITSUBISHI CNC 700 Series	Programming Manual (Lathe System).....	IB-1500057

## Precautions for Safety

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

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

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

### **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 bodily injury or when physical damage may occur if handling is mistaken.

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

### **DANGER**






Not applicable in this manual.

### **WARNING**

Not applicable in this manual.

### **CAUTION**

#### 1. Items related to product and manual

-  For items described as "Restrictions" or "Usable State" in this manual, the instruction manual issued by the machine tool builder 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. Confirm with the specifications issued by the machine tool builder before starting use.
-  Refer to the Instruction Manual issued by each machine tool builder for details on each machine tool.
-  Some screens and functions may differ depending on the NC system (or its version), and some functions may not be possible. Please confirm the specifications before use.

(Continued on next page)

## CAUTION

### 2. Items related to installation and assembly

- ⚡ Ground the signal cables to ensure stable system operation. Also ground the NC unit main frame, power distribution panel and machine to one point, so they all have the same potential.

### 3. Items related to preparation before use

- ❗ Always set the stored stroke limit. Failure to set this could result in collision with the machine end.
- ❗ Always turn the power OFF before connecting/disconnecting the I/O device cable. Failure to do so could damage the I/O device and NC unit.

### 4. Items related to screen operation

- ⚠ If the tool compensation amount or workpiece coordinate system offset amount is changed during automatic operation (including during single block stop), the changes will be valid from the command in next block or after several subsequent blocks.
- ⚠ All of the various data in the NC memory is erased when formatting. Be sure to use the transfer function to transfer all necessary data to another storage device before formatting.
- ⚠ Even if the tool compensation amount write command, parameter write command or variable data write command is executed with graphic check, the data will be actually written in, and the original data will be overwritten.
- ⚠ Pay close attention to the sequence operation when carrying out forced data setting (forced output) in the I/F diagnosis screen during machine operation.
- ❗ To prevent influence from data omission and data transformation in the communication circuit, always verify the data after inputting and outputting machining programs.
- ⊖ Do not change setup parameters without prior approval from the machine tool builder.





### 5. Items related to programming

- ⚠ Because of key chattering, etc., during editing, "NO NOS. FOLLOWING G" commands become a "G00" operation during running.
- ⚠ " ; ", "EOB", "%", and "EOR" are symbols used for explanation. The actual codes for ISO are "CR, LF" ("LF") and "%".  
The programs created on the Edit screen are stored in the NC memory in a "CR, LF" format, however, the programs created with external devices such as the FD 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 approval from the machine tool builder.



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## CAUTION

### 6. Items related to operation

-  Stay out of the moveable range of the machine during automatic operation. During rotation, keep hands, feet and face away from the spindle.
-  Carry out dry operation before actually machining, and confirm the machining program, tool offset and workpiece coordinate system offset.
-  If the operation start position is set from a block in the program and the program is started, the program before the set block is not executed. If there are coordinate system shift commands or M, S, T, and B commands before the block set as the starting position, carry out the required commands using the MDI, etc. There is a danger of interference with the machine if the operation is started from the set starting position block without carrying out these operations.
-  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.


















### 7. Items related to faults and abnormalities

-  If the battery low warning is issued, save the machining programs, tool data and parameters in an input/output device, and then replace the battery. When the battery alarm is issued, the machining programs, tool data and parameters may be destroyed. Reload the data after replacing the battery.
-  If the axis overruns or emits an abnormal noise, immediately press the emergency stop button and stop the axis movement.

(Continued on next page)

## CAUTION

### 8. Items related to maintenance

-  Incorrect connections may damage the devices, so connect the cables to the specified connectors.
-  Do not apply voltages other than those indicated according to specification on the connector. Doing so may lead to destruction or damage.
-  Do not connect or disconnect the connection cables between each unit while the power is ON.
-  Do not connect or disconnect the PCBs while the power is ON.
-  Do not connect the cable by pulling on the cable wire.
-  Do not short circuit, charge, overheat, incinerate or disassemble the battery.
-  Dispose the spent battery according to local laws.
-  Dispose the spent cooling fan according to local laws.
-  Do not replace the control unit while the power is ON.
-  Do not replace the operation panel I/O unit while the power is ON.
-  Do not replace the control section power supply PCB while the power is ON.
-  Do not replace the expansion PCB while the power is ON.
-  Do not replace the memory cassette while the power is ON.
-  Do not replace the cooling fan while the power is ON.
-  Do not replace the battery while the power is ON.
-  Be careful that metal cutting chips, etc., do not come into contact with the connector contacts of the memory cassette.
-  Do not replace the high-speed program server unit while the power is ON.

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## **I. SCREEN OPERATIONS**

# 1. Operating the Setting and Display Unit

This explains the functions common to the screens.

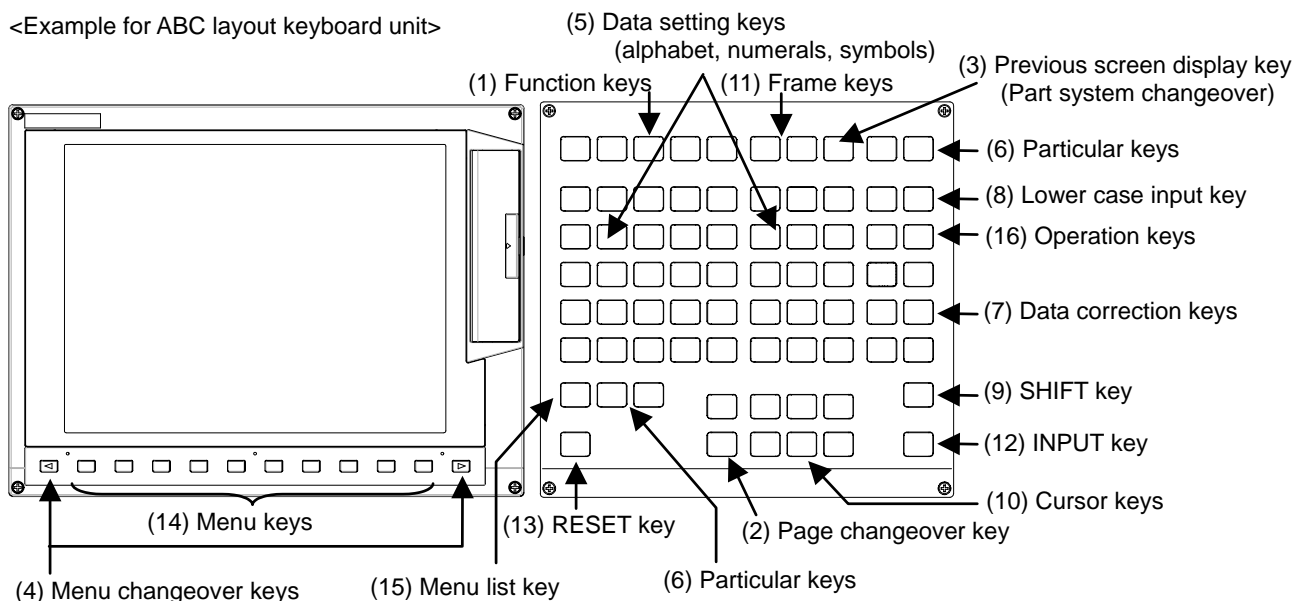
## 1.1 Setting Display Unit Appearance

An LCD display is used for the screen displays.








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





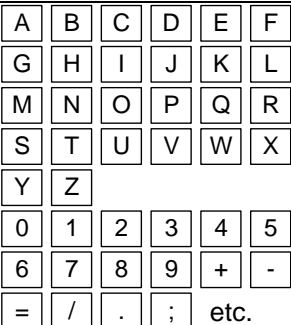












The setting display unit is configured of the LCD display, various keys and menu keys as shown below.


















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



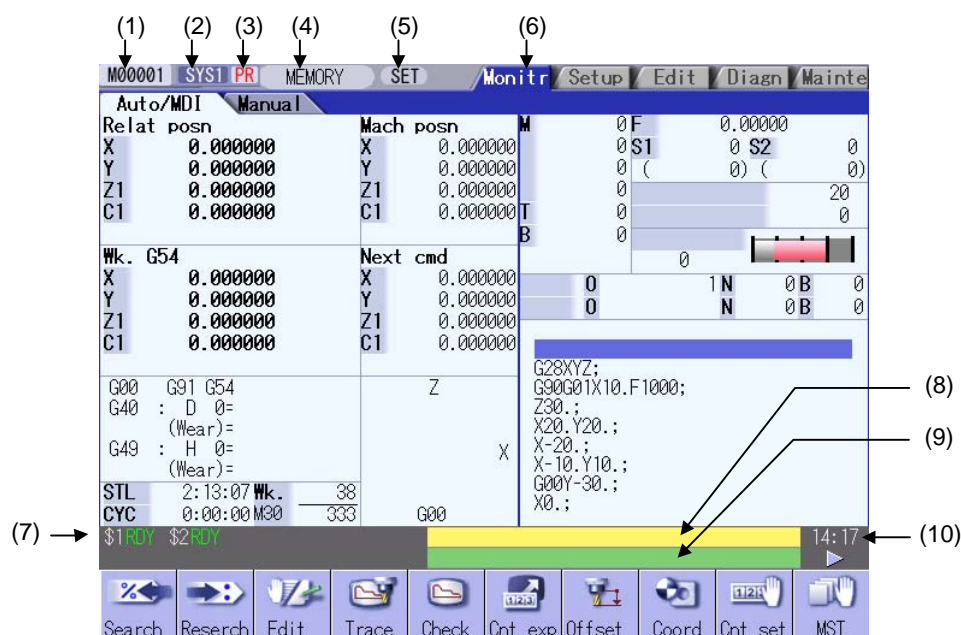
The following keys are provided on the keyboard.

	Key type	Key	Operation
(1)	Function key (Function selection key)	 (MONITOR)	This displays the screen related to "operations". (Refer to "2. Monitor Screens".)
		 (SETUP)	This displays the screen related to "setup". (Refer to "3. Setup Screens".)
		 (EDIT)	This displays the screen related to "editing". (Refer to "4. Edit Screens".)
		 (DIAGN)	This displays the screen related to "diagnosis". (Refer to "5. Diagnosis Screens".)
		 (MAINT)	This displays 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.

	Key type	Key	Operation
(3)	Previous screen display key (Part system changeover)	 (BACK) Previous screen display key	This redisplay the previously displayed screen.
		 (\$→\$) Part system changeover key	When using a multi-part system NC, this displays the data of the next part system. The screen does not change if it is a part system common screen or when only one part 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 keys		These keys are pressed to set alphabetic characters, numerals and operation symbols, etc.
(6)	Particular keys	 Help key	This displays the operation guidance, parameter guidance and alarm guidance corresponding to the current operation.
			These key definitions differ according to the machine tool builder.
			
		SFP	
		F0	
(7)	Data correction keys	 (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 CAN,  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 CAN /  C·B CAN  CAN (C·B CAN) 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.

	Key type	Key	Operation
(9)	SHIFT key	 (SHIFT)	This validates the setting on the lower line of data key.
(10)	Cursor keys	 	This moves the cursor up or down one when setting data in the screen display items.
		 	This moves the cursor one item to the left or right when selecting data in the screen display items.  at cursor left end: Moves to the right end of previous line.  at cursor right end: Moves to left end of next line.
		 	This moves the data input cursor one character to the left or right in the data setting area.
(11)	Frame keys	 	This switches the tag.
(12)	INPUT key	 (INPUT)	This fixes the data in the data setting area, and writes it to the internal data. The cursor moves to the next position.
(13)	RESET key	 (RESET)	This resets the NC.
(14)	Menu keys		This changes the screen and displays the data.
(15)	Menu list keys	 (MenuList)	This is function that displays each screen's menu configuration as a list. (Refer to "1.7 Menu list")
(16)	Operation keys	 (ALTER)	This is alternate key (Alt key).
		 (CTRL)	This is control key.
		 (SP)	This is space key.

## 1.2 Screen Configuration



## Display items

Display item	Details
(1) NC name	The currently displayed NC name (name set in parameter "#1135 unt_nm") is displayed.
(2) Part system name	When using the multi-part system, the currently displayed part system name (name set in parameter "#1169 system name") is displayed. The part system name is not displayed for the 1-part system.
(3) Power ON request	This appears if a parameter requiring the power to be turned ON again has been changed. This flickers at an approx. one-second interval.
(4) Operation status	The displayed part system's operation mode is displayed.
(5) MDI status	The MDI status is displayed when the MDI operation mode is selected. This does not appear when other operation modes are selected.
(6) Screen name	The tab for the currently selected screen is selected and displayed.
(7) Operation status	The NC operation status is displayed.
(8) Alarm	The currently occurring alarm or warning with the highest priority is displayed.
(9) Operation message	The operation message is displayed.
(10) Time	The current time is displayed. (Hour: minute)
(11) Anshin-net status	This icon appears if Anshin-net diagnosis data has been sent/received.

### 1.2.1 Operation Mode

The operation status indicates the operation mode for displayed part system.  
The selectable operation mode is following below.

Symbol	Details	Explanation
MEMORY	Memory operation	Automatic operation is based on programs stored in the memory.
TAPE	Tape operation	Automatic operation is based on tape command (RS232C input) programs stored in NC tape.
MDI	MDI operation	Automatic operation is performed with the program set in the MDI screen.
JOG	Jog	The jog feed mode enables the axis to be moved by hand consecutively at the feed rate set by using the MANUAL FEED RATE switch.
HANDLE	Manual handle	The handle feed mode enables the axis to 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.
STEP	Step	The step feed mode enables the axis to be moved by hand at feed rate when the FEED AXIS SELECT switch is ON. The travel distance per graduation of the handle depends on how the HANDLE/INCREMENTAL MAGNIFICATION switch is set.
MANUAL	Manual arbitrary feed	This mode enables to move manually with arbitrary amount or arbitrary positioning position.
ZERO-RTN	Reference point return	This mode enables a controlled axis to be returned manually to the defined position unique to the machine (reference point).
INIT-SET	Automatic dog-less reference point return	This mode enables this mode to manually push against the machine end stopper and carry out zero point return.
RAPID	Rapid traverse	The rapid traverse feed mode enables the machine to be moved consecutively at rapid traverse feedrate manually.
NO MODE	No operation mode	The operation mode is not selected.

**(Note 1)** Note the following points when using two or more part systems.

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

### 1.2.2 MDI Status

The MDI status is displayed when the operation mode is the MDI mode.  
This does not appear when other operation modes are selected.  
The displayed MDI status is following below.

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

## 1.2.3 Operation Status

1 HLD 2 HLD 3 HLD 4 BST

The operation status displays the currently selected NC operation status for each part system. (The status for up to four part systems is displayed.)

Symbol	Details	Character color	Background color
EMG	In emergency stop	Red	Dark gray
RST	Resetting NC	White	Dark gray
LSK	Paper tape reader is in label skip state	White	Dark gray
BST	In block stop	White	Dark gray
HLD	Operation halted	White	Dark gray
SYN	Synchronizing	White	Dark gray
AUT	In automatic operation	White	Dark gray
RDY	Operation completed state	Green	Dark gray

## 1.2.4 Alarms/Warnings

When an alarm or warning occurs, the alarm No. and alarm message character string are displayed.

**(Example)** Warning display

**S51 Parameter error**

	Character color	Background color
Alarm	White	Red
Warning	Black	Yellow

## 1.2.5 Operation Messages

	Character color	Background color
Operation messages	Black	Green

The operation message can be reset by pressing any key.

The following operation messages are released even if automatic start or reset is executed.

- "Search completed"
- "Restart search is completed"
- "Top search completed"
- "MDI Set ended"

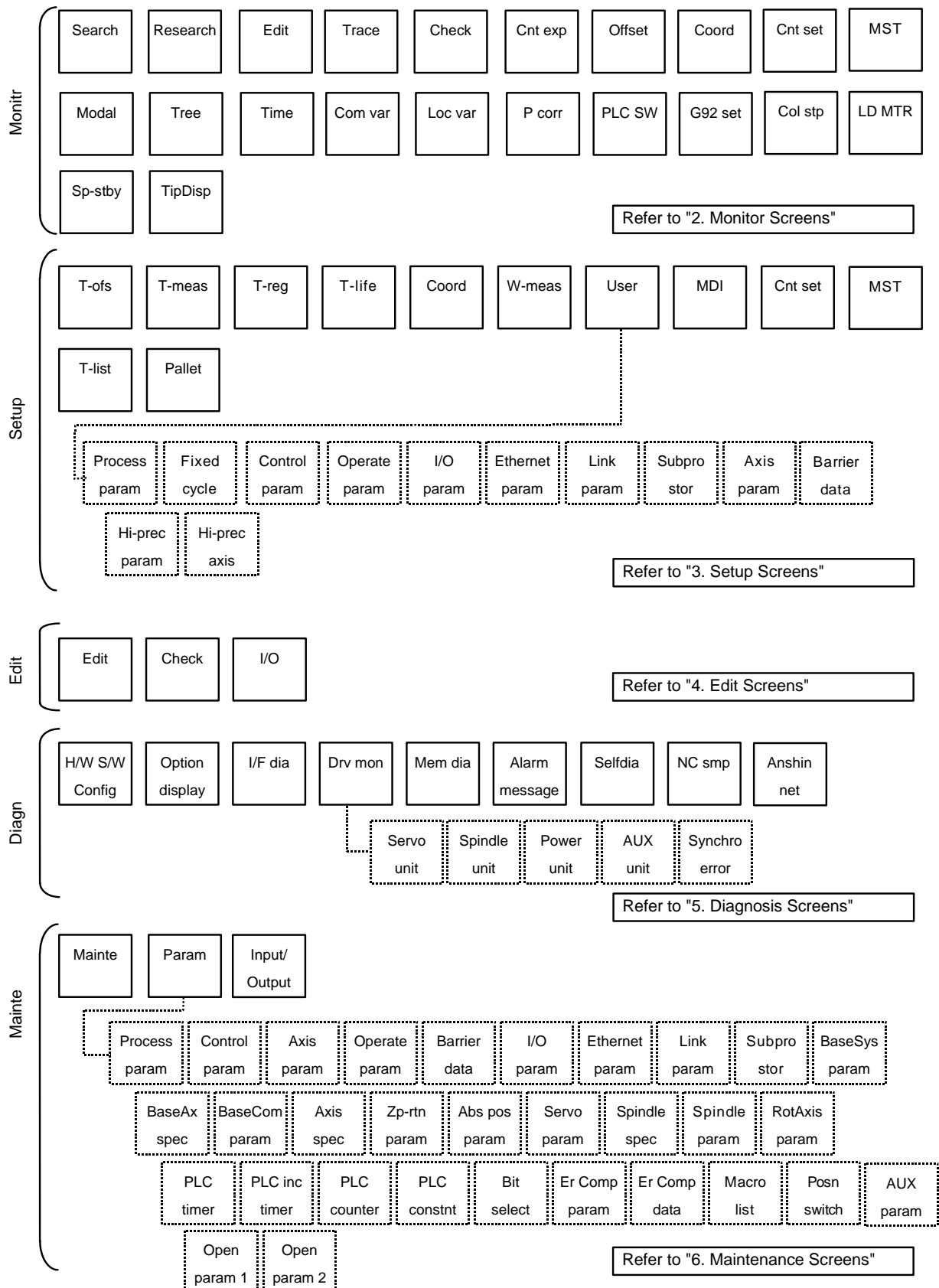
**(Example)**

**Searching**

### 1.3 Screen Transition Diagram

The screen is configured of operation groups.

Refer to "1.4 Screen Selection Procedures" for how to display the screens.





## 1.4 Screen Selection Procedure

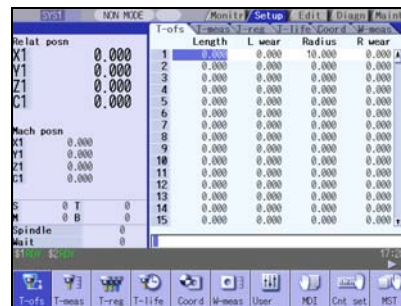
The screen is selected by pressing a function key such as **MONITOR** or **SETUP**, or by pressing a menu key displayed in the screen selection menu.

## Operation method (To display "T-ofs" screen from the "Setup screen")

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



The previously displayed setup screen will appear.

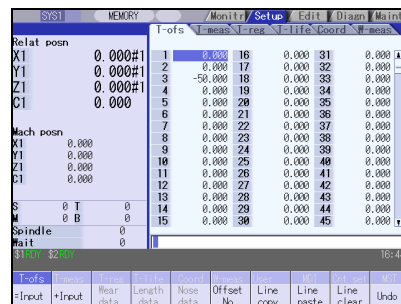


The menu display will differ according to the L system/M system and parameter setting.

- (2) Press the menu **T-ofs** key.



Tool compensation amount screen appears.



## 1.5 Setting Data

### 1.5.1 Setting Numerals and Alphabetic Characters

#### Operation method

The data is basically set with the following methods:

- (1) Menu selection
- (2) No. selection
- (3) Cursor movement
- (4) Data key input
- (5) **INPUT** key input

**(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.

#### 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.
- (2) Press the **→** key. The cursor moves one character space to the right.

■ **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.
- (2) Press the **INSERT** key, and then the data keys. The cursor moves one character space to the right.

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

- **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.  
 123777456
- (2) Press the **DELETE** key. → The character in front of the cursor is deleted, and the cursor moves.  
 12377456

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

- (1) Press the **C·B** key. → The cursor moves in the data setting area.  
 █


### Cursor operations on the screen


If a cursor is displayed on the screen, data is set in the data setting area and the **INPUT** key is pressed, the data appears at the cursor position on the screen. The cursor moves to the next position. The following keys can be used to move the cursor with the cursor keys.

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

## 1.6 Operating the Screen

### 1.6.1 Changing the Displayed Part System

When the  key is pressed, the displayed part system changes.



The displayed part system No. is counted up by one each time the  key is pressed. If the displayed part system No. exceeds the value number of part systems, the displayed part system No. returns to 1.

### 1.6.2 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.

-  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.  
This key can be used when "◀" or "▶" is displayed at the upper right of the menu.

### 1.6.3 Types of Menus

The menus are categorized into the following types according to the operation that takes place after the menu key is pressed.

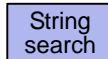

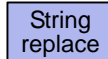

A: The menu is highlighted, and the system waits for the user input. After the input, the operation follows the input details.

B: The menu is highlighted, and operation starts.

C: Operation starts without highlighting the menu.

In section "2. Monitor screen" and following, the types are described in the following method.

**(Example)** Explanation of menus used for editing the program on the Edit screen (excerpt)

Menu	Details	Type	Reference
	When the character string is designated and the  key is pressed, that character string is searched for.	A	4.2.11 Searching for character strings
	If the character string to be searched for and the character string to be replaced are separated with a "/" and designated, when the  key is pressed, the replace operation takes place.	A	4.2.12 Replacing character strings

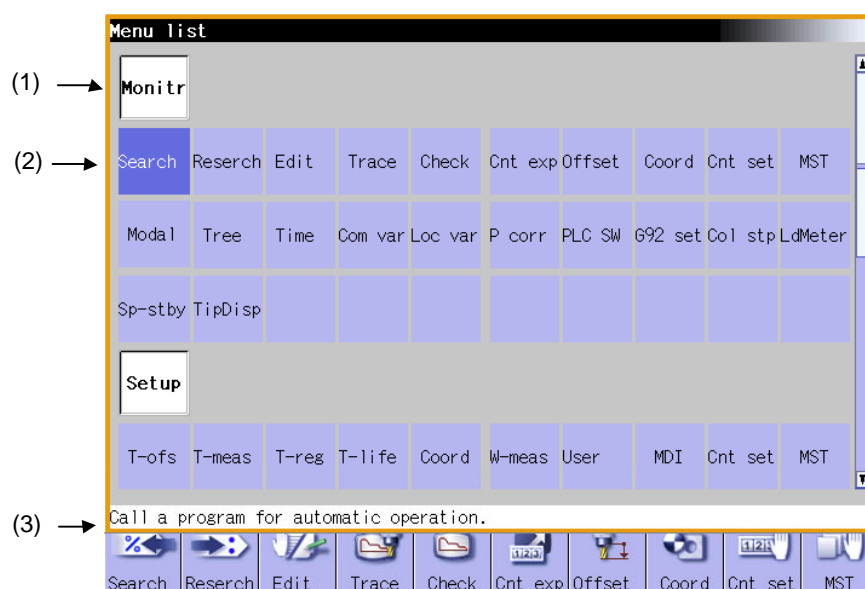
Operation when menu is pressed
Menu type
Reference section

## 1.7 Menu List

The menu list is a function that displays each screen's menu configuration as a list. The Menu list window opens when the **MenuList** key is pressed on each screen.

If a pop-up window other than the menu list is displayed, the Menu list window appears above the displayed pop-up window. The menu does not change in this case.

If the **MenuList** key is pressed again or if the **Cancel** key is pressed while the Menu list window is open, the Menu list window closes, and the state before the **MenuList** key was pressed is recovered.



### Display items

Display item	Details
(1) Screen name	The screen name is displayed. (Example) Monitr/Setup
(2) Menu name	A list of the menu names (functions) included on each screen is displayed. (Example) Search/Reserch
(3) Function outline display area	An outline of the currently selected menu name (function) is displayed.

## List of menu names (functions)

Screen	Menu name	Outline
Monitr	Search	Call a program for automatic operation.
	Reserch	Restart machining from a selected block.
	Edit	Edit the machining program searched for operation.
	Trace	Trace the T path based on the machining program being executed.
	Check	Trace the T path based on the machining program w/o running machine.
	Cnt exp	Display counters of all axes & select the type of the counters.
	Offset	Set & display tool offset data.
	Coord	Set & display workpiece coordinate system offset.
	Cnt set	Set the relative position counter to an arbitrary value.
	MST	Set & display each command for S, M, T & 2nd M functions.
	Modal	Display the execution modal value of the machining program.
	Tree	Display program/MDI interrupt/user macro call in nesting structure.
	Time	Set & display integrating time (date, time, power ON time, etc.).
	Com var	Set & display the details of common variables.
	Loc var	Specify a nesting level of subprogram & display local variables.
	P corr	Correct & change the next command by block stop during auto-/MDI op.
	PLC SW	Switch ON/OFF each NC ops. control signal allocated by ladder program.
	G92 set	Perform origin set & origin cancel.
	Col stp	Register arbitrary collation & stop position set as single block stop.
	LD MTR	Spindle load and Z axis load, etc. can be displayed in meter.
	Sp-stby	The spindle tool No. and the standby tool No. can be displayed.
	TipDisp	Display tool tip pos, handle interrupt amount and tool tip speed.
Setup	T-ofs	Set & display tool offset data.
	T-meas	Measure T length & radius manually & set them as tool offset amounts.
	T-reg	Register T No. according to the magazine pot, spindle & wait position.
	T-life	Scale workpiece to figure face/hole ctr/wid ctr & set as coord ofs.
	Coord	Set & display workpiece coordinate system offset.
	W-meas	Set & display user parameters.
	User	Display & edit MDI programs set in NC memory.
	MDI	Edit (add/delete/change) programs in NC memory & create new ones.
	Cnt set	Set the relative position counter to an arbitrary value.
	MST	Set & display each command for S, M, T & 2nd M functions.
	T-list	Reference & display T-codelist.
	Pallet	The machining program is registered into the pallet of APC.
Edit	Edit	Edit (add/delete/change) programs in NC memory & create new ones.
	Check	Trace the T path based on the machining program w/o running machine.
	NAVI	Create the part program simply.
	I/O	Input/Output machining programs betw. NC memory & external I/O device.

Screen	Menu name	Outline
Diagn	Config	Display the H/W & S/W (S/W No. & version) configurations.
	Option	Display the details of the options registered in NC memory.
	I/F dia	Set & display input/output signals of the ladder program.
	Drv mon	Display drive diagnostic information. (servo/spindle/power supply).
	Mem dia	Set & display NC internal data.
	Alarm	Display a list of currently occurring alarms & their messages.
	Selfdia	Display the H/W & Operation stop state.
	NC Smp	Set Sampling parameter & Sample NC internal data.
	A net	Customer service is available by connecting NC with NC service.
Mainte	Mainte	Perform NC memory format/abs. para. setting/maint. data backup, etc.
	Param	Select a type of parameter to set & display the parameter values.
	I/O	Input/Output machining programs betw. NC memory & external I/O device.

## 1.7.1 Displaying the Menu Function Outline

## Operation method

- (1) Press the MenuList key.



The Menu list window appears showing the selected screen's menu list at the top.

When the MenuList key is pressed while editing the file on the Edit screen, a prompt to confirm whether to save the program appears before Menu list window opens.

- (2) Using the ↑, ↓, →, ← and page keys, move the cursor to the menu for which the function outline is to be displayed.



The function outline for the selected menu appears. The function outline does not appear if a menu with no name is selected.

The cursor does not move to the group name.

## 1.7.2 Directly Moving to the Menu Function

## Operation method

- (1) Press the MenuList key.



The Menu list window appears showing the selected screen's menu list at the top.

- (2) Using the ↑, ↓, →, ← and page keys, move the cursor to the menu to move to.



The function outline for the selected menu appears.

- (3) Press the INPUT key.



The selected menu function can be moved to directly. The menu is not moved to if a menu with no name is selected. The Menu list window closes after moving.



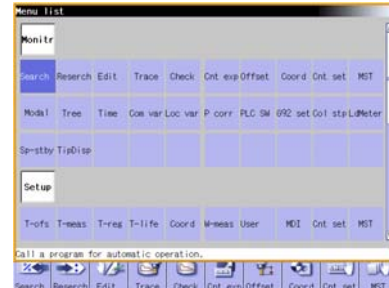
## 1.7.3 Moving the cursor

## Operation method

- (1) Press the **MenuList** key.



The Menu list window appears showing the selected screen's menu list at the top.



- (2) Press the **↓** key four times.



The cursor moves down four times, and the screen scrolls.



- (3) Press the **↑** key three times.



The cursor moves up three times, and the screen scrolls.




- (4) Press the **PageDown** key once.



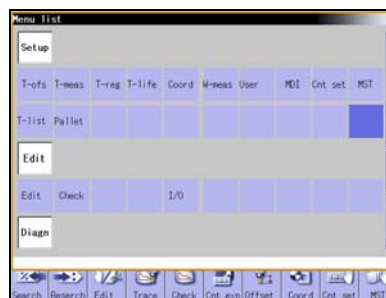
The screen scrolls.

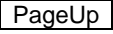


- (5) Press the  key once. **(Note 1)**



The cursor moves to the upper right, and the screen scrolls.



- (6) Press the  key once.



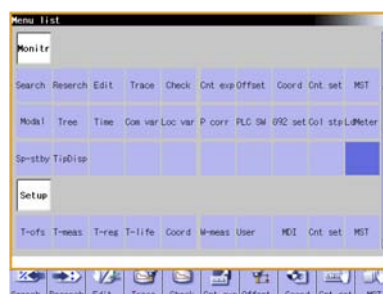
The screen scrolls.





- (7) Press the  key twice.



The cursor moves down twice.



**(Note 1)** The cursor moves in the same way even when the  key is pressed.

**(Note 2)** The cursor moves in the same way even when the  key is pressed.

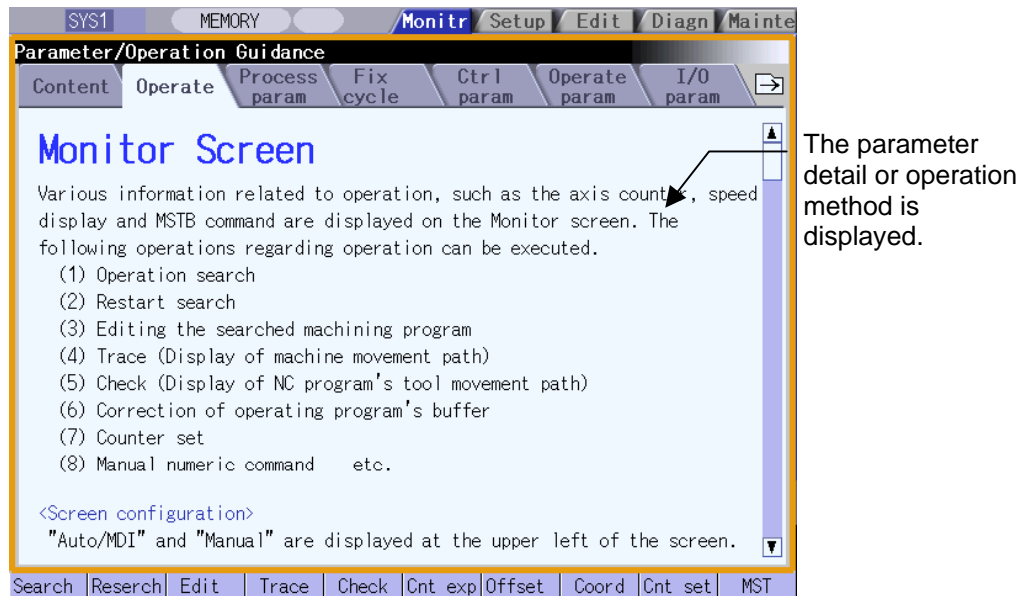
## 1.8 Guidance Function

### 1.8.1 Parameter Guidance




The parameter/operation guidance function displays the details of the parameters or the operation methods according to the state of the screen currently being displayed.

#### Screen configuration

The parameter/operation guidance window is displayed with the following type of configuration.



#### Operation method

If the  key is pressed on any screen, the guidance window will open. If a pop-up window other than the guidance window is open, the guidance window will open over the currently opened pop-up window. In this case, the menu state does not change. If  key or **CANCEL** key is pressed again when the guidance window is open, the guidance window will close and the screen will return to the previous state in which the  key was pressed.

## Displaying the operation guidance

- (1) Press the **Edit** menu on operation screen.



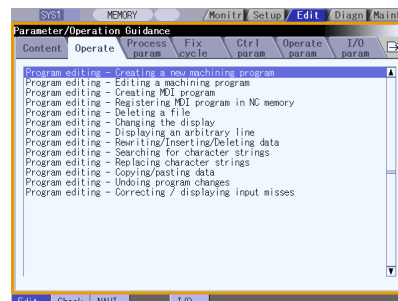
The edit window is displayed.



- (2) Press the **F2** key.



The guidance window is opened, and sub-contents for edit operation method is displayed.

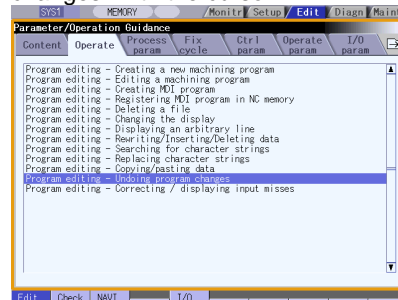


**(Note)** If the explanation of operation method is nothing, the contents list is displayed.

- (3) Move the cursor to the operation method to be displayed by **↑**, **↓**, **PAGE**, **PAGE** keys.



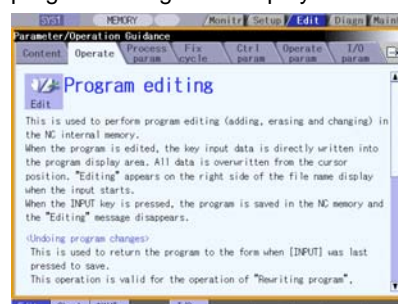
Select the "Program editing - Undoing program changes" with the cursor.



- (4) Press the **INPUT** key.

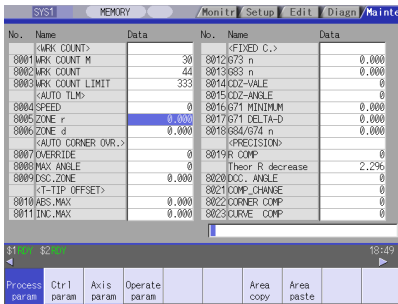
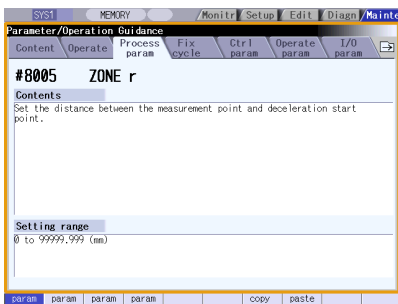
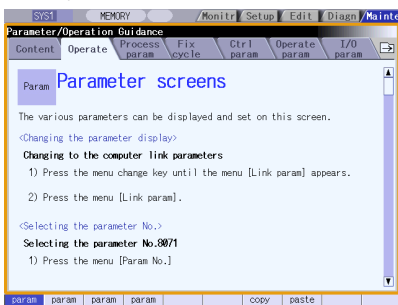


The operation method for "Program editing - Undoing program changes" is displayed.



**(Note 1)** If the parameter tag such as machine parameter, fixed cycle, etc. is opened with the **F1** key, the details for the top parameter are displayed.

## Displaying the parameter guidance

- (1) Press the **Param** menu on maintenance screen. ➡ The machining parameter screen is displayed.
- (2) Press the **↓** key, and move the cursor to "#8005 ZONE r" parameter. ➡
- 
- (3) Press the **?** key. ➡ The guidance window is opened, and the detail of "#8005 ZONE r" parameter is displayed.
- 
- (4) Press the **⏮** key. ➡ The operation method for parameter screen is displayed.
- 

**(Note 1)** While guidance window is displayed, the parameter details displayed on each parameter type tab are recorded. Therefore, when the parameter type is switched with **⏮**/**⏭** key, last displayed parameter details are displayed.

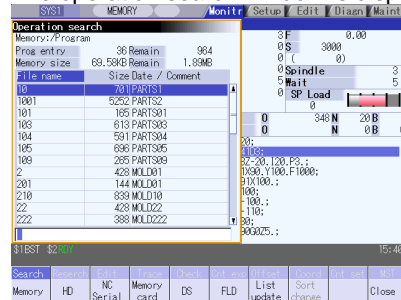
**(Note 2)** If the parameter No. cannot be gotten (the cursor is non-display, the cursor is put on blank line, the cursor is put on comment line), the top of parameter guidance for each parameter appears.

## Displaying the operation guidance by selecting the contents

- (1) Press the **Search** menu on operation screen.



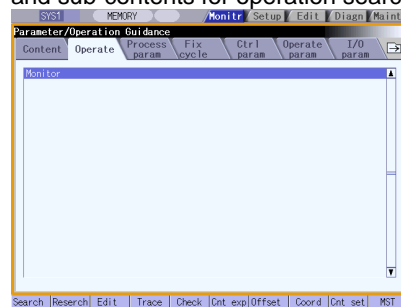
The operation search window is displayed.



- (2) Press the **[?]** key.



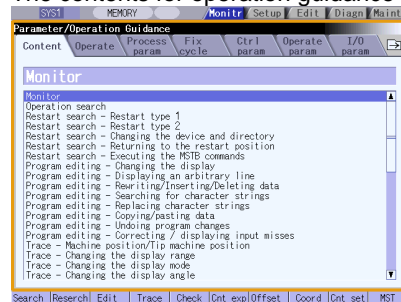
The parameter/operation guidance window is opened, and sub-contents for operation search is displayed.



- (3) Press the **[Enter]** key.



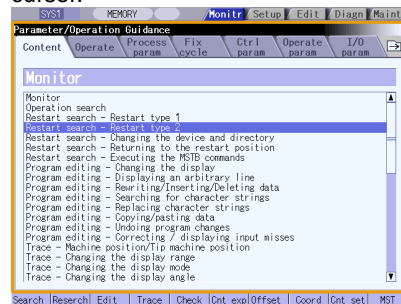
The contents for operation guidance are displayed.



- (4) Move the cursor to the operation method to be displayed by **[Up]**, **[Down]**, **[Page Up]**, **[Page Down]** keys.



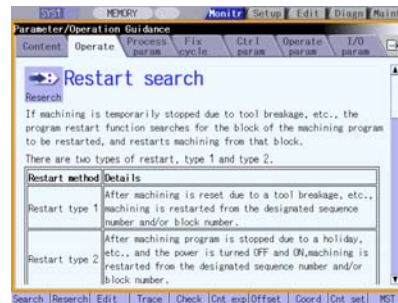
Select the "Restart search - Restart type 2" with the cursor.




- (5) Press the **INPUT** key.





The operation method for "Restart search" is displayed.



**(Note 1)** The operation details of function that cannot be selected because of no option are also displayed on the contents list.

**(Note 2)** When the  key is pressed during the contents display, the sub-contents for operation search (operation method (2)) are displayed.

### Precaution

- (1) If the  key is pressed when alarm occurs, the alarm guidance window will open.
- (2) To display another operation method, select newly an operation method from the contents list. It is not possible to jump from the parameter, operation details to other details.
- (3) When the  key is pressed while the menu list window is displayed, the guidance window is opened after the menu list window is closed.

## 1.8.2 Alarm Guidance

The alarm guidance is the function that displays message, details and remedy for the currently occurring alarms.

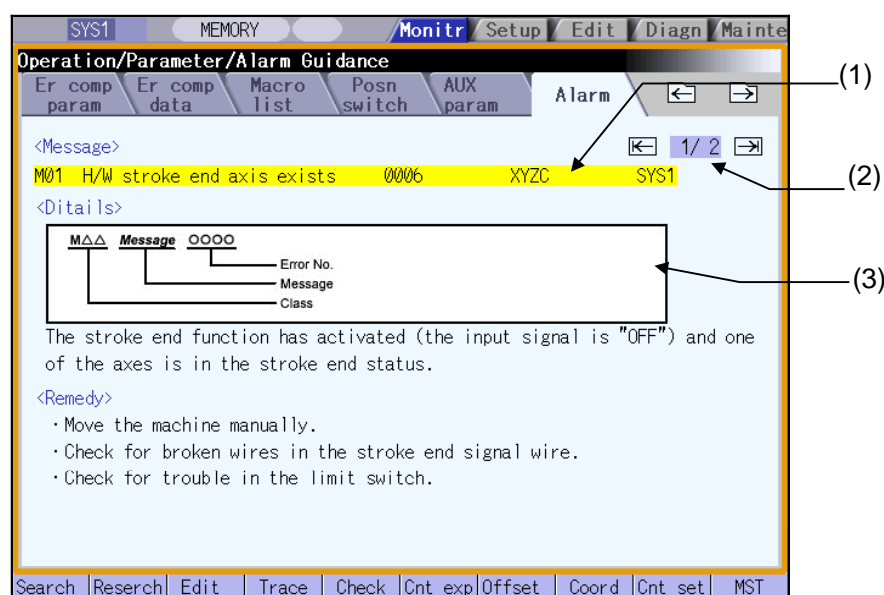
This function is an option.

### Screen configuration

The alarm guidance is displayed in "alarm" tag on "operation/parameter/alarm guidance window".

The "alarm" tag is on the rightmost end of the guidance window.

A scroll bar appears when details and remedy, etc. do not fit in one page.






### Display items


Display item	Details
(1) Message	This displays "NC alarm" and "PLC alarm message". The displayed content is same as the content displayed in the alarm message of the diagnosis screen.
(2) Number of page	This displays "order of priority / total number of occurring alarms".
(3) Details/Remedy, etc.	This displays detail and remedy, etc. for alarm message.



### Operation method

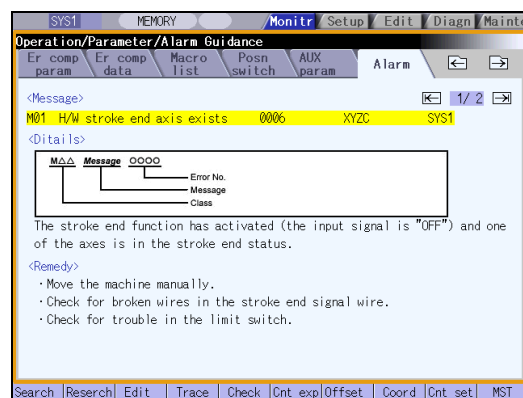
If the  key is pressed on any screen, the alarm guidance window will open. If a pop-up window other than the alarm guidance window is open, the alarm guidance window will open over the currently opened pop-up window. In this case, the menu state does not change. If  key or **CANCEL** key is pressed again when the guidance window is open, the guidance window will close and the screen will return to the previous state in which the  key was pressed.



### Displaying the alarm guidance

- (1) Press the  key during occurring alarm on operation screen.  
(Ex.) When "H/W stroke end axis exists" and another alarm occur.





The guidance window is opened while "alarm" tag is valid. The alarm details and remedy are displayed for "H/W stroke end axis exists".





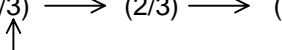
- (Note 1)** The alarm guidance is executed for the alarm that is occurred when the  key has been pressed. Therefore, the guidance will be displayed continually even if the alarm is reset while the alarm guidance is displayed. The alarm guidance is not executed for the alarm that has occurred while the alarm guidance is displayed.
- (Note 2)** If the  key is pressed when an alarm is not occurring, the operation/parameter guidance appears. In this state, if the "alarm" tag is selected with the right frame key, nothing is displayed in the message, details and remedy columns. (These columns are blank.)
- (Note 3)** All the explanations of the alarm having the same error class and No. are displayed in the details column.



## Changing the alarm guidance

- (1) Press the  key or  key when the alarm guidance is displayed.





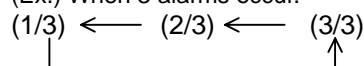
The alarm guidance with one priority lower than the current alarm guidance is displayed.  
If the  key or  key is pressed when the lowest priority alarm is displayed, the alarm with the highest priority is displayed.  
(Ex.) When 3 alarms occur.  
(1/3)  $\longrightarrow$  (2/3)  $\longrightarrow$  (3/3)







- (2) Press the  key or  key when the alarm guidance is displayed.




The alarm guidance with one priority higher than the current alarm guidance is displayed.  
If the  key or  key is pressed when the highest priority alarm is displayed, the alarm with the lowest priority is displayed.  
(Ex.) When 3 alarms occur.  
(1/3)  $\longleftarrow$  (2/3)  $\longleftarrow$  (3/3)



**(Note 1)** Up to 10 alarm guidance displays are displayed in order of priority.

**(Note 2)** Even if the , ,  or  key is pressed when only one alarm occurs, the screen display is not switched.

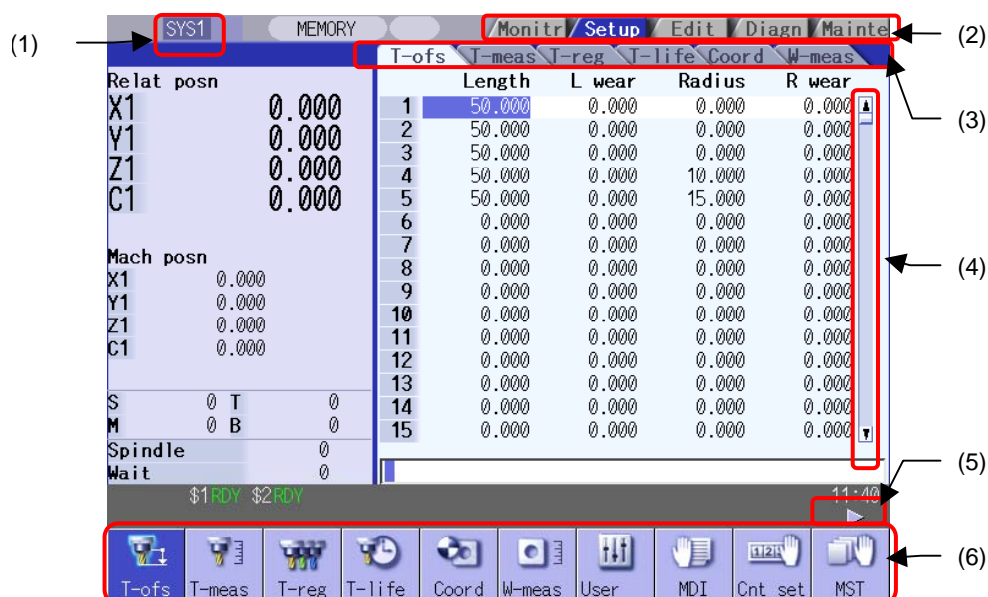
## Precautions

- (1) While the user parameter window on "Setup" or the parameter screen on "Mainte" is displayed, the parameter guidance display will be prioritized even if an alarm occurs.
- (2) When the  key is pressed while the menu list window is displayed, the guidance window is opened after the menu list window is closed.
- (3) The alarm guidance of stop code and operator message is not displayed.

## 1.9 Touch Panel Functions

Touch panel screen operation is available with a touch panel display unit.

### 1.9.1 Basic Operation



### Display items

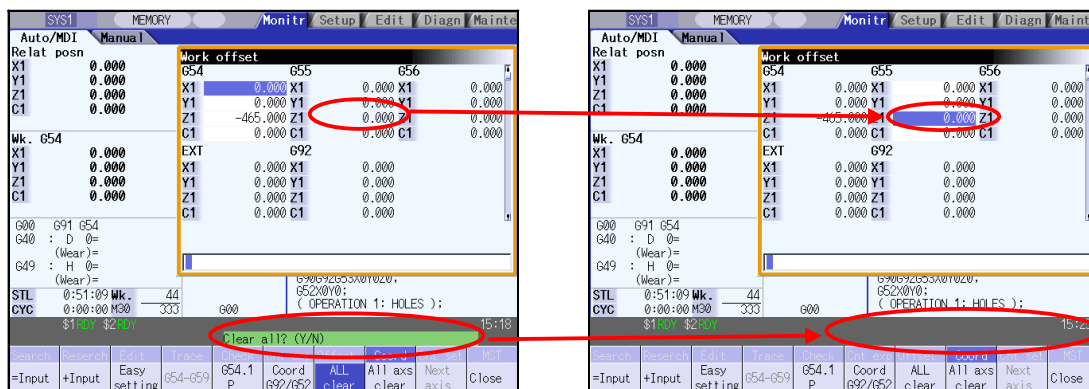
Display item	Details
(1) System	This switches from the current part system to the next current system.
(2) Main tag	A selected screen will open. As in the case with a screen change by key inputting, if a popup window is displayed, close it before changing screens. If there is a file under editing, save the file before changing screens.
(3) Sub tag	This displays the contents of the selected tag. When a tag is changed while operation menu is on a wait to be input, the input wait status is cancelled and then the tag is changed. Sub tags are available on Setup screen, Edit screen, parameter/operation guidance window.
(4) Scroll bar	If [ ▲ ] [ ▼ ] of a scroll bar is touched, the view is scrolled one line up/down. If any part of scroll bar besides tabs is touched, the page jumps to the next/previous one. (Note) In some screens, if [ ▲ ] [ ▼ ] is touched, the page jumps to the next/previous one, and scrolling by line is not possible.
(5) Next menu	This switches to the next menu if available.
(6) Menu	When a menu is selected by touching, the menu's process is executed.

## Moving cursor by touch panel

When a place within the data setting area of the screen having a cursor is touched, the cursor moves to the touched position. Cursor movement by touch panel operation is also possible in the area where the cursor is moved by , , , , keys. When a window is closed after cursor movement, the cursor position is returned to the first line. When the cursor is moved or the area is changed by touch panel operation in the Y/N input wait status (when the [Line clear] menu is selected, etc.) the status will be that when N is selected (canceled), and then the cursor movement or area change will be carried out.

**(Example)** Cursor movement while waiting for Y/N input

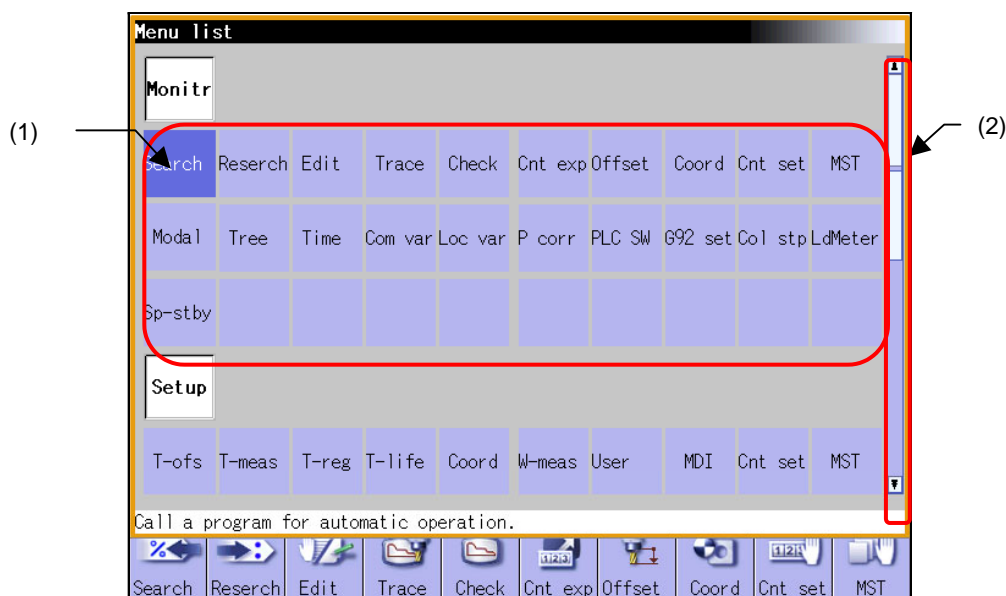
- (1) Select the **Coord** menu on the monitor screen. → Workpiece coordinate system offset window is displayed.
- (2) Select the **ALL clear** menu. → The **ALL clear** menu is highlighted.  
The message "Clear all?(Y/N)" is displayed.
- (3) Touch the coordinate value for the arbitrary coordinate system offset. → The cursor is moved to the touched position.  
The highlight of the **ALL clear** menu is undone and "All clear" is canceled.  
The message "Clear all?(Y/N)" disappears.



## Changing active area

In the screen where active area can be changed, the area touched will become active. Active area cannot be changed by touch panel operation during mass-editing or file saving for automatic backup.

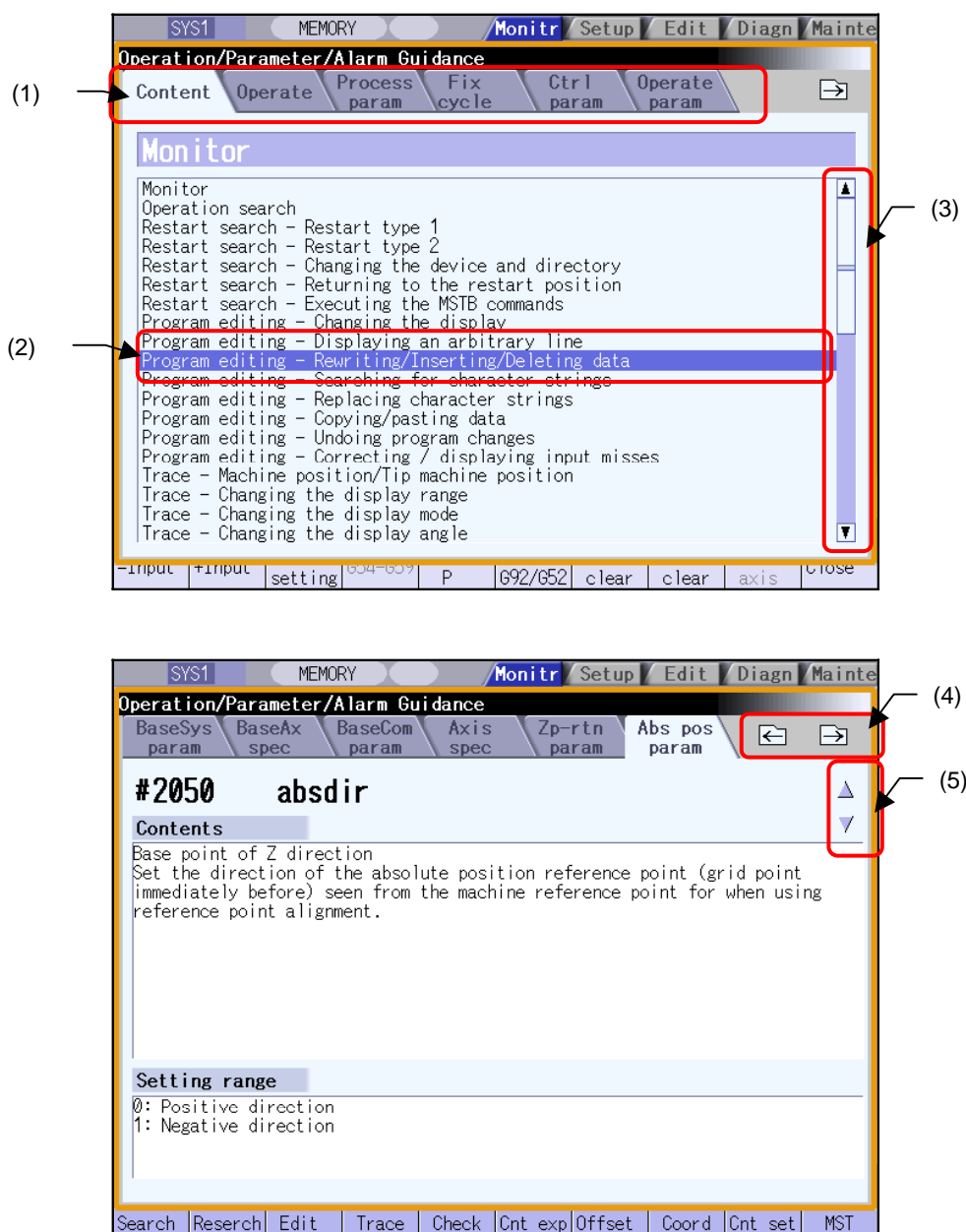
## 1.9.2 Menu List



## Display items

Display item	Details
(1) Menu selection	The menu touched is turned active. Its screen will be displayed by touching that active menu once again or by pressing the INPUT key.
(2) Scroll bar	If [ ▲ ] [ ▼ ] of a scroll bar is touched, the view is scrolled one line up/down. If any part of scroll bar besides tabs is touched, the page jumps to the next/previous one.

## 1.9.3 Operation/Parameter Guidance



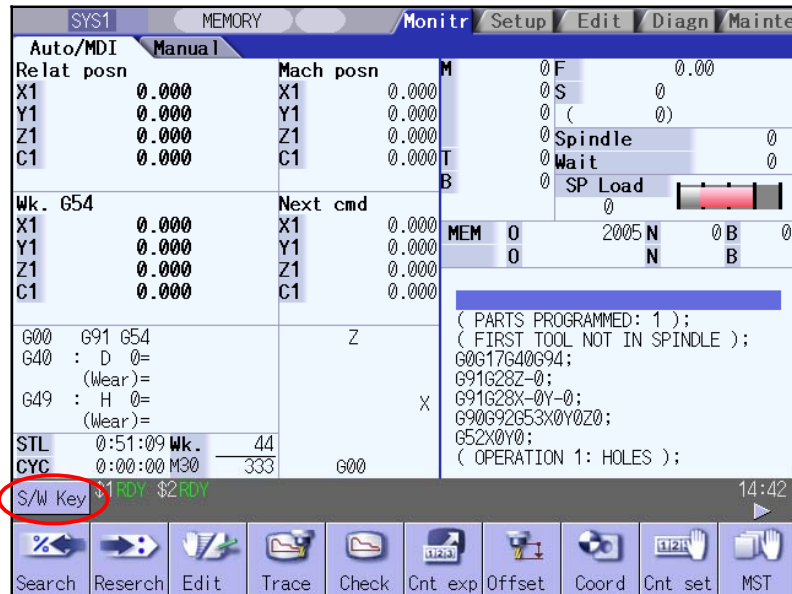
## Display items

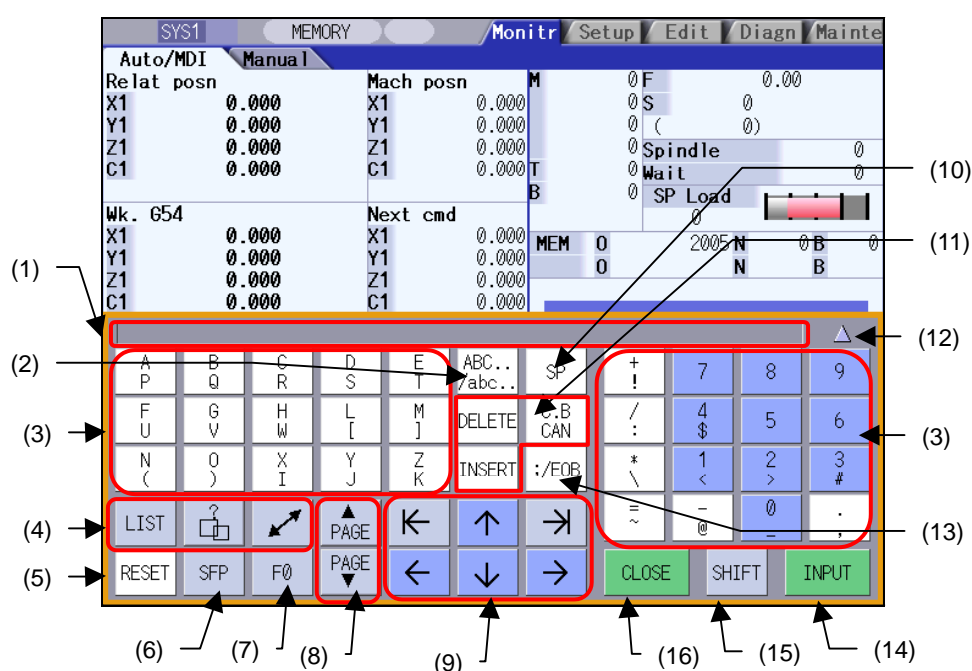
Display item	Details
(1) Guidance tag	Type of guidance is changed.
(2) Cursor	When either "Content" tag or "Operate" tag is selected, if an item is touched, the cursor moves to that item. The contents will be displayed by touching the item at the cursor position once again or by pressing the <b>INPUT</b> key.
(3) Scroll bar	If [ ▲ ] [ ▼ ] of a scroll bar is touched, the view is scrolled one line up/down. If any part of scroll bar besides tabs is touched, the page jumps to the next/previous one.
(4) Tag change	Active tab shifts one toward right/left.
(5) Page change	By touching ▲ mark, previous page is displayed; by touching ▼ mark, next page is displayed.

## 1.10 Touch Panel S/W Key



When a touch panel display unit is used, touch panel operation is available.

With the touch panel soft key function, a key input is possible by touching a key on the S/W keyboard which is displayed on the screen. S/W keyboard is displayed if **S/W Key** button is touched in each screen. In this case, screen or menu status will not change. S/W keyboard is always displayed on the front screen. When the CLOSE key on the S/W keyboard is touched, the S/W keyboard will be closed. S/W keyboard will be enabled when the parameter "#11010 Software keyboard" is set to "1". When S/W keyboard is disabled, **S/W Key** button is not displayed.





## Display items

Display item	Details
(1) Input area	This displays a character string according to the keys touched by the operator.
(2) Lower-case letter input key	This changes upper/lower-case of alphabet. The <b>ABC../abc..</b> key is highlighted when the lower-case-letter-setting is valid.
(3) Data setting key	This enters characters in the input area or screen.
(4) Window operation key	<b>LIST</b> : This displays the menu list window. <b>?</b> : This displays the parameter/operation guidance window.  : This displays the window.  : This changes active windows.
(5) Reset key	This resets the NC.
(6) SFP key	This displays the onboard screen or custom screen.
(7) F0 key	This displays the onboard screen.
(8) Page change key	This displays the contents in the previous/next page.
(9) Cursor key	If data is set in the display items on the screen, the cursor is moved to up, down, left and right.
(10) Blank key	This enters a blank.
(11) Data correction key	<b>INSERT</b> : The mode changes to data insertion mode, and characters are input at the current cursor position when data setting key is pressed. When DELETE, C.B CAN, INPUT, cursor key, or tab key, etc. is pressed, or when the screen is changed to another, the mode returns to overwriting mode. <b>DELETE</b> : This deletes a letter before the cursor position. <b>C.B</b> : This cancels the settings in the input area. <b>CAN</b> : This cancels.



Display item	Details
(12) Display position switch	This switches the display position of the S/W keyboard.
(13) Block end key	This enters ";".
(14) INPUT key	This confirms the data entered in the input area or screen.
(15) Shift key	This validates the setting on the lower line of data setting key. Once SHIFT key is selected, it will be valid until another key is pressed or the S/W keyboard is closed. Menus are displayed in highlight while SHIFT key is valid.
(16) CLOSE key	This closes the S/W keyboard.

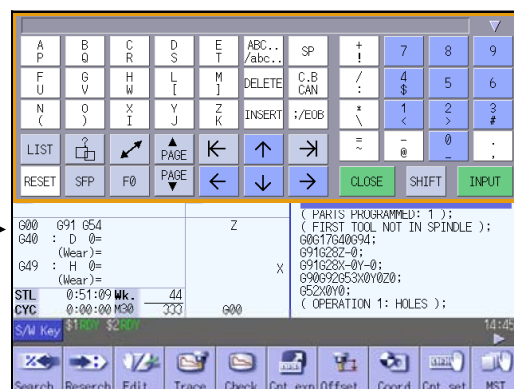
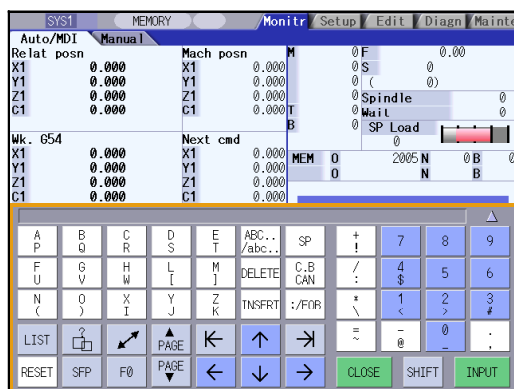
## 1.10.1 Operation Method

## Displaying/closing the S/W keyboard

- Touch the **S/W Key** button. → S/W keyboard is displayed on the front screen.  
**S/W Key** button is highlighted.
- Touch the **CLOSE** key, or touch the **S/W Key** button again. → S/W keyboard will close.

## Changing the display position

- Touch the **S/W Key** button. → S/W keyboard is displayed on the front screen.  
**S/W Key** button is highlighted.
- Touch  $\triangle$  located at the upper right corner of the S/W keyboard. → S/W keyboard is displayed on the upper side of the screen.  
 $\triangle$  changes to  $\nabla$ .







- Touch  $\nabla$  located at the upper right corner of the S/W keyboard. → S/W keyboard is displayed on the upper side of the screen.  
 $\nabla$  changes to  $\triangle$ .

**Entering data when the input area is enabled**





If displaying the S/W keyboard while input area is being displayed on a screen, such as in the case where the operation search window or setup screen is being displayed, the S/W keyboard input area will be valid. At this time, the key selected on the S/W keyboard is temporarily displayed in the S/W keyboard input area, and then is input and set in the screen by selecting the **INPUT** key.

**(Example)** Set the value in T tool compensation amount

- (1) Display T compensation tag on the setup screen and touch the **S/W Key** button. ➡ S/W keyboard is displayed.  
S/W keyboard input area will be invalid.
- (2) Touch the , , ,  keys to move the cursor to an arbitrary position. ➡ The cursor for tool compensation amount is moved.
- (3) Touch the data setting key and enter the value.  
Example: 15 ➡ "15" is displayed in the S/W keyboard input area.
- (4) Touch the **INPUT** key. ➡ "15" is input at the tool compensation amount cursor position.

**Entering data when the input area is disabled**

If S/W keyboard is displayed while edit window is displayed for program editing or input area is not displayed on a screen, or when the monitor screen main menu is displayed, S/W keyboard input area will be invalid. At this time, the key selected on the S/W keyboard is directly input to the screen.

- (1) Display the edit window on the monitor screen and touch the **S/W Key** button. ➡ S/W keyboard is displayed.  
S/W keyboard input area will be invalid.
- (2) Touch the , , ,  keys to move the cursor to an arbitrary position. ➡ The cursor for the edit window is moved.
- (3) Touch the data setting key and enter the value.  
Example: G28 ➡ "G28" is displayed in the edit window.
- (4) Touch the **INPUT** key. ➡ "G28" which has been input in the edit window is confirmed.

## 2. Monitor Screens

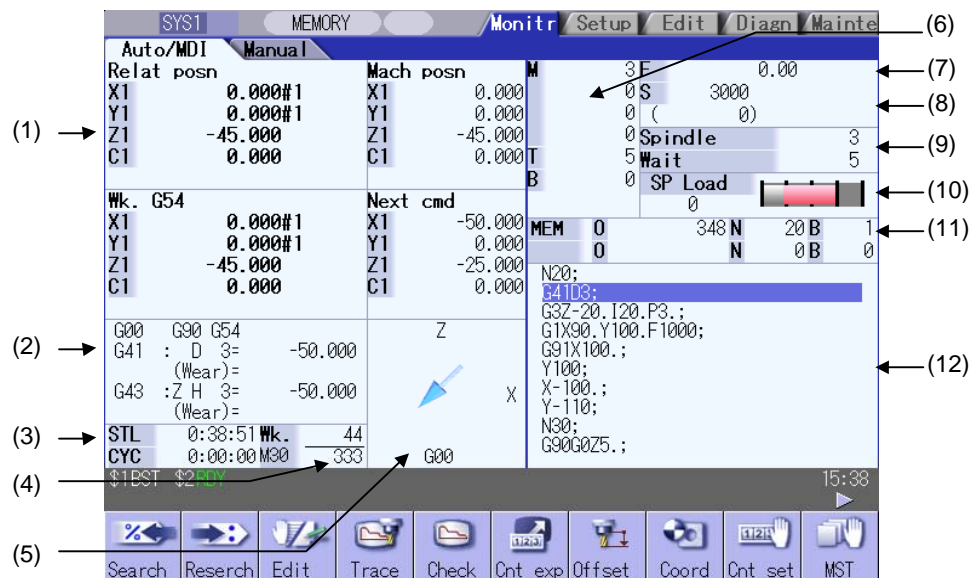
Various information related to operation, such as the axis counter, speed display and MSTB command are displayed on the Monitor screen. The following operations regarding operation can be executed.

- (1) Operation search
- (2) Restart search
- (3) Editing the searched machining program
- (4) Trace (Display of machine movement path)
- (5) Check (Display of NC program's tool movement path)
- (6) Correction of operating program's buffer
- (7) Counter set
- (8) Manual numeric command etc.

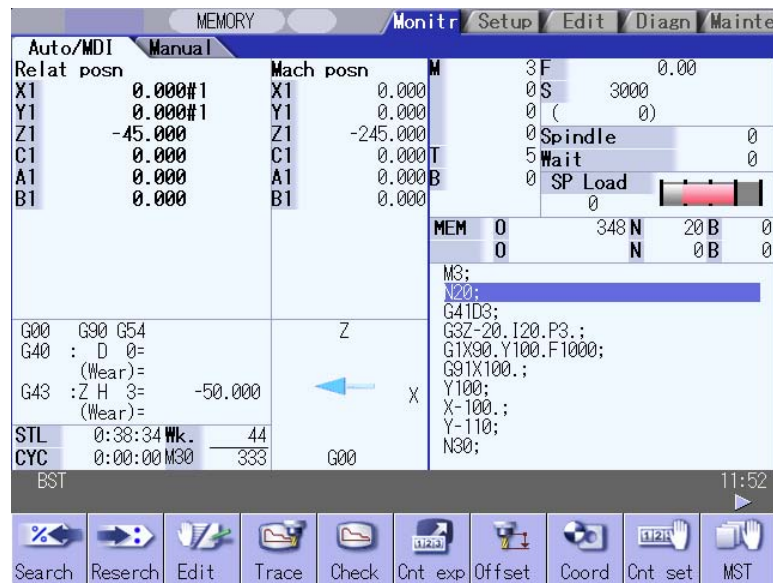
### 2.1 Screen Configuration

"Auto/MDI" and "Manual" are displayed at the upper left of the screen. These displays change according to the mode selection switch. The details displayed for [Auto/MDI] differ according to the number of NC axes.

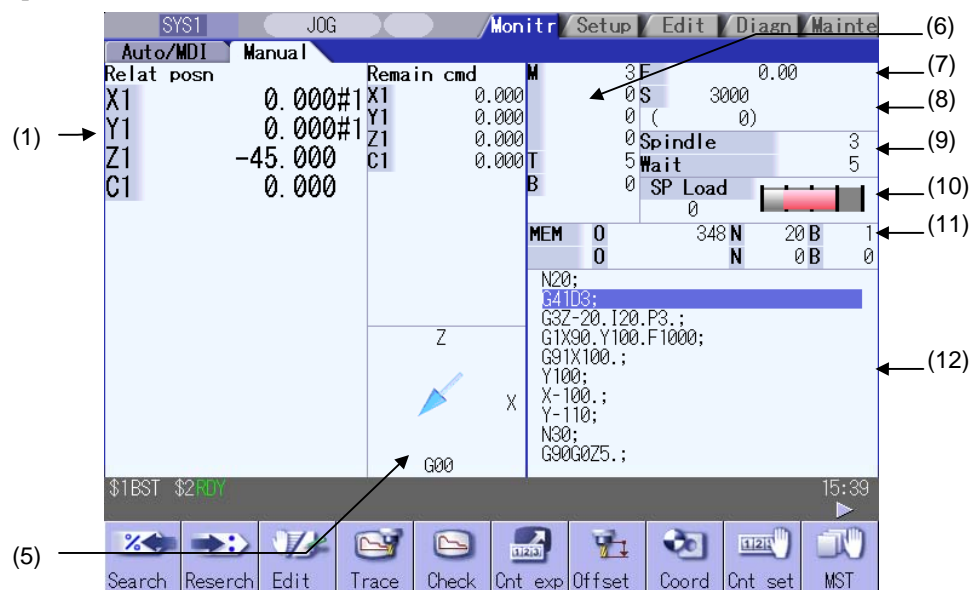
[For Auto/MDI (Part system with five or less axes)]



[For Auto/MDI (Part system with six or more axes)]



[For Manual]













## Display items













Display item	Details
(1) Counter display	<p>This displays the counter of the relative position and workpiece coordinates positions, etc.</p> <p>If each axis is in a specific position or status, the following status symbol appears.</p> <p>#1 to #4 : No. 1 to No. 4 reference position</p> <p>   : Servo OFF state</p> <p>MR : Mirror image</p> <p>&gt;&lt; : Axis removed state</p> <p>Whether to allow for the tool length compensation and tool radius compensation can be set with the parameter "#1287 ext23/bit4".</p>
(2) G modal simple display	<p>This displays the modal status.</p> <p>G command modal status of Group 1</p> <p>G command modal status of Group 3</p> <p>Selected workpiece coordinate system</p> <p>Tool radius compensation modal, compensation No. shape compensation amount, tool radius wear amount</p> <p>Tool length compensation modal, compensation axis name, compensation No., shape compensation amount, tool length wear amount</p>
(3) Cycle time display	<p>This displays the automatic operation time and cycle time.</p> <p>The displayed items are switched with integrated time window.</p>
(4) Completed workpiece display	<p>This displays the number of workpieces which have been completed.</p> <p>The display follows the machining parameters "#8001 WRK COUNT M" to "#8003 WRK COUNT LIMIT".</p>
(5) Machine status animated display	<p>This displays the current tool No., tool type, next command movement direction, coordinate rotation status, mirror image status, and spindle rotation direction/coolant status.</p> <p>Note that the spindle rotation direction/coolant status display differ according to the machine tool builder.</p>
(6) M, T, B commands	<p>This displays the values command for M (miscellaneous function command value), T (tool command value) and B (2nd miscellaneous function command value).</p> <p>The displayed number of M (miscellaneous function command value) depends on parameter "#12005 Mfig".</p> <p>The displayed number of T (tool command value) and B (2nd miscellaneous function command value) is "1" regardless of the parameters "#12009 Tfig" and "#12011 Bfig". However, the display/non-display of B (2nd miscellaneous function command value) depends on parameter "#1170 M2name".</p> <p>Refer to "Manual numerical value command" for the manual numerical value commands.</p>
(7) Speed display	<p>In interpolation feed:</p> <p>This displays the vector direction speed currently being moved in.</p> <p>In each axis independent feed:</p> <p>This displays the speed of the axis with highest speed.</p> <p>The actual machine feedrate is displayed with the parameters "#1125 real_f".</p>
(8) S command, spindle actual rotation speed display	<p>This displays the S (spindle command rotation speed) and spindle actual rotation speed value.</p> <p>If there are two or less spindles, the S command value and the spindle actual rotation speed are displayed.</p> <p>If there are three or more spindles, only the S command value is displayed.</p>
(9) Spindle/Wait display	<p>The spindle tool No. and the standby tool No. are displayed.</p> <p>These displayed contents differ according to the machine tool builder.</p>
(10) Load meter display	<p>The spindle load and Z axis load, etc., are displayed in a bar graph.</p> <p>If Spindle/standby display is not being used, a load meter can be displayed in the Spindle/standby display area. These displayed contents differ according to the machine tool builder.</p>

Display item		Details
(11)	Machining program currently being executed <b>(Note)</b>	
	Main      010...	This displays the program No., sequence No. and block No. currently being executed.
	Sub        01234...	When a subprogram is being executed, this displays the subprogram's program No., sequence No. and block No.
(12)	Buffer display	This displays the contents of the machining program currently being executed. The block being executed is highlighted.

**(Note)** If the program No. (program name) exceeds 12 characters, "\*" will appear at the 12th character.

## Menus

Menu	Details	Type	Reference
 Search	This executes operation search.		2.2 Operation Search
 Reserch	This executes restart search.		2.3 Restart Search
 Edit	This edits the machining program in search.		2.4 Program Edit
 Trace	This executes trace.		2.5 Trace
 Check	This checks the program. This menu does not appear if the program check function option is not provided.		2.6 Program Check (2D) 2.7 Program Check (3D)
 Cnt exp	This enlarges the counter, and displays the counters for all axes.		2.8 Counter All-axis Display
 Offset	This displays the tool compensation amount. A value can also be set for the tool compensation amount.		2.9 Tool Offset Amount
 Coord	This displays the workpiece coordinate system offset. A value can also be set for the workpiece coordinate system offset.		2.10 Workpiece Coordinate System Offset
 Cnt set	A arbitrary value can be set in the relative position counter.		2.11 Counter Set
 MST	This executes a manual numerical value command.		2.13 Manual Numerical Value Command

Menu	Details	Type	Reference
 Modal	This displays the program modal.		2.14 Modal Display
 Tree	This displays the program tree.		2.15 Program Tree Display
 Time	This displays the date, time and integrated time, etc., The date, time and integrated time, etc., can also be set.		2.16 Integrated Time Display
 Com var	This displays the common variables. A value can also be set for the common variable.		2.17 Common Variables
 Loc var	This displays the local variables.		2.18 Local Variables
 P corr	This corrects the buffer.		2.19 Buffer Correction
 PLC SW	This turns the PLC switches ON or OFF.		2.20 PLC Switch Function
 G92 set	This sets and cancels the origin.		2.12 Origin Set, Origin Cancel
 Col stop	This executes verify stop.		2.21 Verify Stop
 LdMeter	The spindle load and Z axis load, etc., are displayed in a bar graph. These displayed contents differ according to the machine tool builder.		2.22 Load Meter Display
 Sp-stby	The current spindle tool No. and the standby tool No. are displayed. These displayed contents differ according to the machine tool builder.		2.23 Spindle, Standby Display
 TipDisp	This displays the tool center point coordinates, handle interruption amount (tool axis movement), and tool center point speed. <b>(Note)</b> If the 5-axis related options (tool center point control, tool length compensation along the tool axis, tool handle feed & interrupt) are not mounted, these menus are not displayed.		2.24 Tool Center Point Display



## 2.1.1 &lt;Auto/MDI&gt; and &lt;Manual&gt; Counter Display

The following counters are displayed on <Auto/MDI> and <Manual>.

## &lt;Auto/MDI&gt;

Layout	5-axis related specifications disabled	5-axis related specifications enabled	Remarks
Upper left of screen	Relative position	Tip workpiece position	This can be changed with "#8901 counter type 1".
Lower left of screen	Program position	Program position	This can be changed with "#8902 counter type 2".
Upper right of screen	Remaining command	Remaining command	This can be changed with "#8903 counter type 3".
Lower right of screen	Next command	Next command	This can be changed with "#8904 counter type 4".

## &lt;Manual&gt;

Layout	5-axis related specifications disabled	5-axis related specifications enabled	Remarks
Left of screen	Relative position	Tip workpiece position	This can be changed with "#8905 counter type 5".
Right of screen	Machine position	Machine position	This can be changed with "#8906 counter type 6".

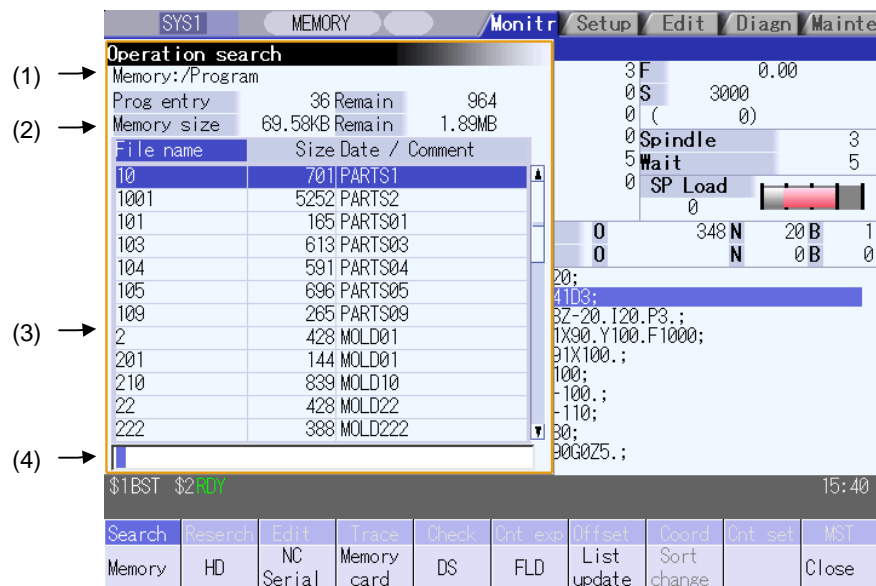
## 2.1.2 Changing Between &lt;Auto/MDI&gt; and &lt;Manual&gt;

The correspondence between the mode selection switch settings and display contents on the left side of the screen is as follows.

Mode selection switch setting	Screen display
No mode	Auto/MDI
Memory	
Tape	
MDI	
Jog	Manual
Handle	
Step	
Manual arbitrary feed	
Reference point return	
Automatic dog-less reference point return	
Rapid traverse	
Jog + handle	
Rapid traverse + handle mode	

## 2.2 Operation Search

On this screen, the program can be called from the program storage site, such as a memory, by designating the program (program No.) to be automatically run and the program start position (sequence No., block No.).



## Display items

Display item	Details
(1) Device name, directory display	This displays the device name and directory designated when the program was selected.
(2) Capacity display	This displays the capacity of the device displayed in (1).
(3) List of directories and files	<p>This displays a list of the contents contained in the device or directory displayed in (1).</p> <p>Use  and  to scroll the displayed list.</p> <p>If the device is an HD, FD, memory card or DS, the file update date/time is displayed in the &lt;Date/Comment&gt; field. For the NC memory, the machining program comment is displayed.</p> <p>Whether to show or hide the comment field can be selected by pressing the <b>Comment nondisp</b> menu. When the comment field is hidden, the file name field will be enlarged. (Up to 13 characters can be displayed in the file name field when the comment is shown, and 32 when the comment is hidden.) If the file name exceeds the maximum number of characters, "*" will appear at the last character.</p>
(4) Input area	This displays the input key details.

## Menus

Menu	Details	Type	Reference
Memory	This selects the device for searching for the program. When a device with directory is selected, the route is selected first.	C	2.2.1 Executing an Operation Search
HD		C	
NC serial		C	
Memory card		C	
DS		C	
FD		C	
List update	This updates the list contents. (The latest contents of the currently selected device and directory are listed.)	C	2.2.3 Changing the Sorting Method
Sort change	This changes the method that the list is sorted.	C	
Comment nondisp	This changes whether to show or hide the comment field in the list. When the comment field is hidden, the file name field will be enlarged.	B	
Close	This closes the pop-up window and quits this function.	C	

**(Note 1)** Some items may not be displayed depending on the device.

○: Displayed    ×: Not displayed.

Device	Memory	HD	NC serial	Memory card	DS	FD
Prog entry	○	○	×	○	○	○
Remain	○	×	×	×	×	×
Memory side	○	○	×	○	○	○
Remain	○	○	×	○	○	○
List	○	○	×	○	○	○

**(Note 2)** When using NC serial, the port number set with parameter "#9005 TAPE MODE PORT" is connected, and search.

## 2.2.1 Executing an Operation Search

## Operation method

- (1) Select the part system to run with the  keys. → The selected part system appears on the upper left of the screen.
- (2) Press the main menu . → The sub-menu appears.  
The list appears as a pop-up window.
- (3) Select the device.  
(Example)  → The selected device name and route directory (HD:/) appear in the Device name, Directory display field.
- (4) Using the , , , and  keys, move the cursor to the directory containing the file to be set. → The following is displayed.  

.	DIR
..	DIR
ABC	DIR
SRAM.BIN	1019904 Mar 06 14:54 2003

If the list contents differ from the actual device or directory, press the menu .
- (5) Press the  key. → The active window changes to the directory.  

.	DIR
..	DIR
123.PR	62 Dec 20 15:24 2002
68.PR	62 Dec 20 15:24 2002
69.PR	166 Dec 20 15:24 2002
- (6) Using the , , , and  keys, move the cursor to the target machining program.
- (7) Press the  key. → The search starts.  
When the search is completed, the message "Search Complete" appears.  
The searched device and program position appear in the field for displaying the machining program currently being executed.  
The list closes, and the main menu appears again.

When designating the sequence number and block number and searching for the program, input the search conditions in the input area. The program No. is categorized according to the presence of an extension.

Input details	Program No.	Sequence No.	Block No.
1001/1/2	O1001	N1	B2
1001.PRG/1/2	O1001.PRG	N1	B2
/1/2	(Currently searched O No.)	N1	B2
1001//2	O1001	N0	B2
1001/1	O1001	N1	B0
1001	O1001	N0	B0
/1	(Currently searched O No.)	N1	B0
//2	(Currently searched O No.)	N0	B2

**(Note 1)** Program after operation search


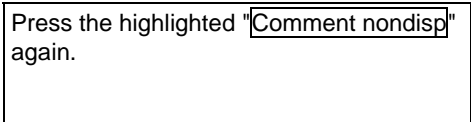
- (a) Operation search is cancelled if the following operations are carried out on the Edit screen after operation search. Execute restart search in this case.
  - If the searched program is erased.
  - If the searched sequence No. is erased.
  - If the block corresponding to the searched block No. is erased.
- (b) Operation search cannot be executed in another block during MDI operation even if the block is stopped.  
Wait for MDI operation to end or reset the NC before searching.

**(Note2)** A program with 33 or more file name characters cannot be searched.

## 2.2.2 Changing Whether to Show or Hide the Comment Field

The file name field can be extended by changing whether to show or hide the comment field.

## Operation method

- (1) Press the menu "Comment nondisp".  

➔ The file name is displayed up to 32 alphanumeric characters and symbols after the comment field disappears.  
The menu is highlighted.
- (2) Press the highlighted "Comment nondisp" again.  

➔ The comment field appears, and the file name is displayed up to 15 alphanumeric characters and symbols.  
The menu highlight returns to normal.

**(Example)** When the file name is "123456789A123456789B123456789C12"

"Comment display" is validated: The file name display is omitted and "\*" is attached.

File name	Size	Date / Comment
123456789A12*	126	COLOR_CHK_01

"Comment display" is invalidated: The file name is displayed up to 32 alphanumeric characters and symbols.

File name	Size
123456789A123456789B123456789C12	126

**(Note 1)** The set status is held even if the NC power is turned OFF.

**(Note 2)** The set status is common for list view of operation screen, restart search screen, etc.

**(Note 3)** The cursor moves to the head when display/non-display in the comment field is switched.

### 2.2.3 Changing the Sorting Method

Sorting method changes to 1→2→3→4→5→1 •••• every time the Sort change menu is pressed.

The selected sorting method is also displayed in the list on the other screens. The method is common for all the devices, as well. The sorting method will be held even after the power is turned OFF and ON.

Up to 64 files (Including current directory "." and one directory above "..") can be sorted within a directory. If exceeds 65 files, the Sort change menu is displayed in gray and changing the sorting method is impossible. In this case, the sorting method is "2. File name character code ascending order".

No.	Sorting method	Priority
1	File name No. ascending order	1. "." for current directory, ".." for one directory above 2. Numerical value (excluding the case where "0" is put at the beginning) ascending order 3. Character code ascending order
2	File name character code ascending order	1. "." for current directory, ".." for one directory above 2. Character code ascending order
3	File name character code descending order	1. Character code descending order 2. "." for current directory, ".." for one directory above
4	Comment ascending order	"Date/comment" character code ascending order
5	Comment descending order	"Date/comment" character code descending order

**(Note 1)** The character code ascending (descending) order is the method in which file names are compared one by one using the ASCII code.

Example: If the ascending order is applied, the appropriate order would be 1→A as "1" equals to "0x31" and "A" equals to "0x41".

**(Note 2)** When the device is "Memory", display for "current directory" and "one directory above" is not available.

**(Note 3)** When comments are the same, sorting is carried out by the file name character code ascending (descending) order.

**(Note 4)** "Date/comment" for the devices other than "Memory" are compared using character string only. Thus, the order will not be one by the actual date.

**(Note 5)** Sorting method cannot be changed in memory mode.

## 2.3 Restart Search

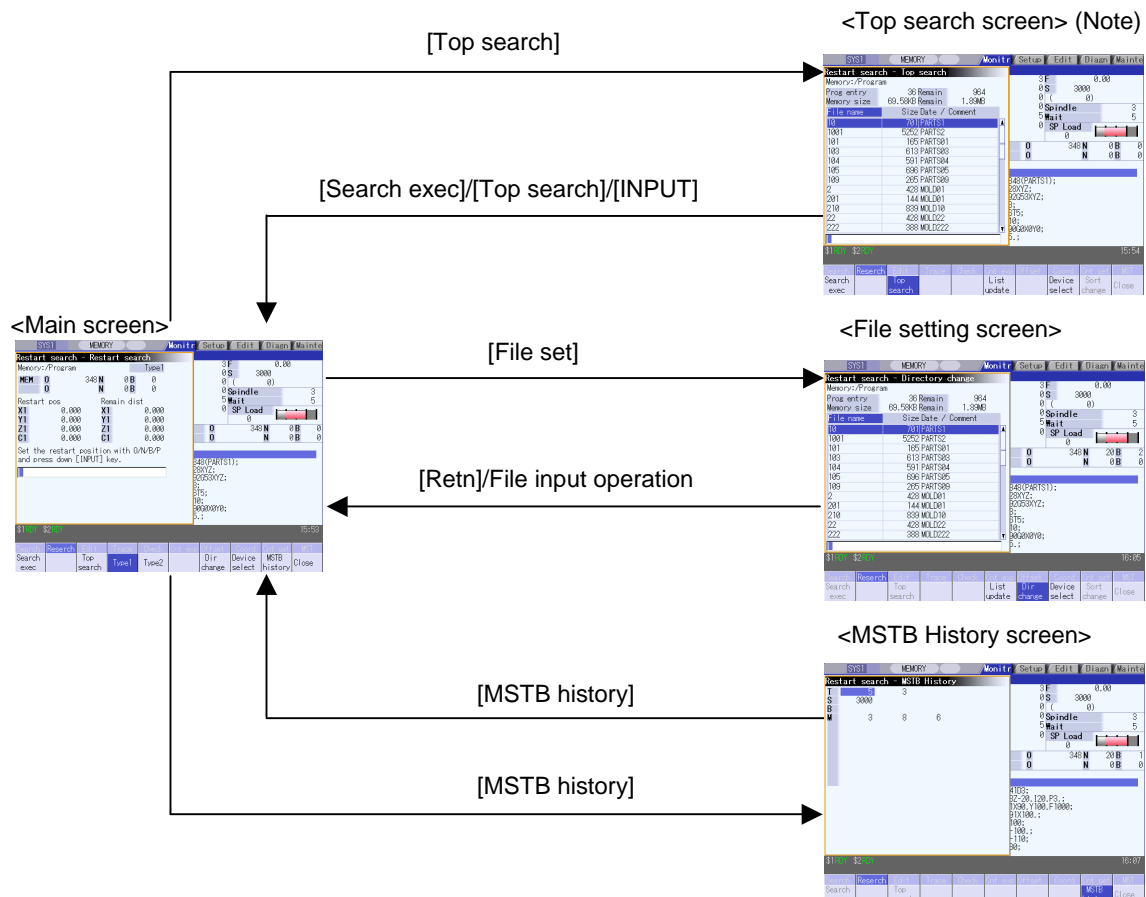
If machining is temporarily stopped due to tool breakage, etc., the program restart function searches for the block of the machining program to be restarted, and restarts machining from that block.

There are two types of restart, type 1 and type 2.

Restart method	Details
Restart type 1	After machining is reset due to a tool breakage, etc., machining is restarted from the designated sequence number and/or block number. Only the program which had been executed just before can be restarted. Even after the power is turned ON again, the program can be restarted if the program has been executed before the power supply is turned OFF.
Restart type 2	After machining program is stopped due to a holiday, etc., and the power is turned OFF and ON, machining is restarted from the designated sequence number and/or block number.
	Automatic top search OFF A top search must be executed from the screen. Then, command a sequence No. and block No., and restart a program.
	Automatic top search ON A top search may not be executed from the screen. A top search is automatically executed, so it is not necessary to execute a top search from the screen. Command a sequence No. and block No., and restart a machining. An arbitrary program can be restarted by designating the program No. When a program No. is omitted, the program currently searched is restarted.

The validity of the automatic top search can be changed with control parameter "#8914 Auto Top search".

## Screen transition



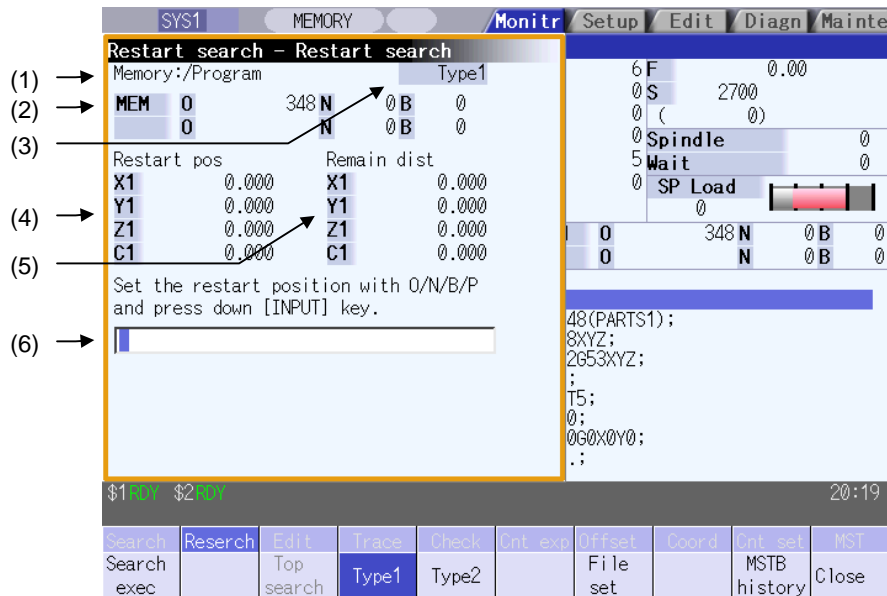
(Note) In the following cases, the screen cannot be switched to top search screen.

- Restart type 1
- The parameter "#8914 Auto Top search" is "1" (automatic top operation)



## 2.3.1 Main Screen

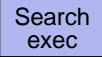

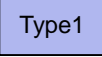
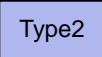
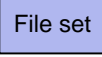


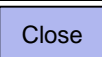
The type 1 and type 2 restart search can be executed from the Main screen.



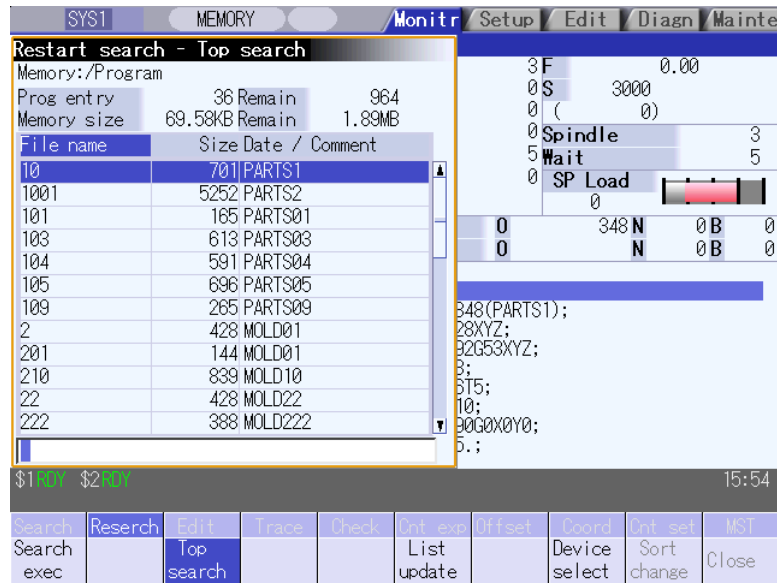
## Display items

Display item	Details
(1) Device and directory display	This displays the device and directory where the searched machining program is located.
(2) Research position	This displays the researched main program position (program No., sequence No., block No.).
(3) Restart type	This displays the restart search type.
(4) Position when restart search is completed	This displays the position on the local coordinate system when the restart search is completed.
(5) Remaining distance when restart search is completed	This displays the remaining distance when the restart search is completed.
(6) Input area	This displays the input key details.

## Menus

Menu	Details	Type	Reference
	This starts the restart search based on the designated device, directory, program number (O), sequence number (N), block number (B) and number of block execution times (P).	C	
	This changes to the pop-up window for executing top search, and enables top search. When the type 1 is selected or the parameter "#8914 Auto Top search" is set, this menu cannot be selected.	B	2.3.2 Top Search Screen
 	This selects the restart search type. Restart search is executed with the highlighted restart type. The type 1 or type 2 menu is always highlighted. When restart search is executed, the selected restart type is displayed at the display item "(3) Restart type".	B	
	This changes to the pop-up window for setting the file, and enables the file to be selected.	B	2.3.3 File Setting Screen
	This opens the MSTB history screen as a pop-up window. The M, S, T and B command used in the machining program are listed on the MSTB history screen. If the cursor is moved to the listed M, S, T or B command and the  key is pressed, that command will be executed.	B	2.3.4 MSTB History Screen
	This closes the pop-up window and quits this function.	C	

## 2.3.2 Top Search Screen



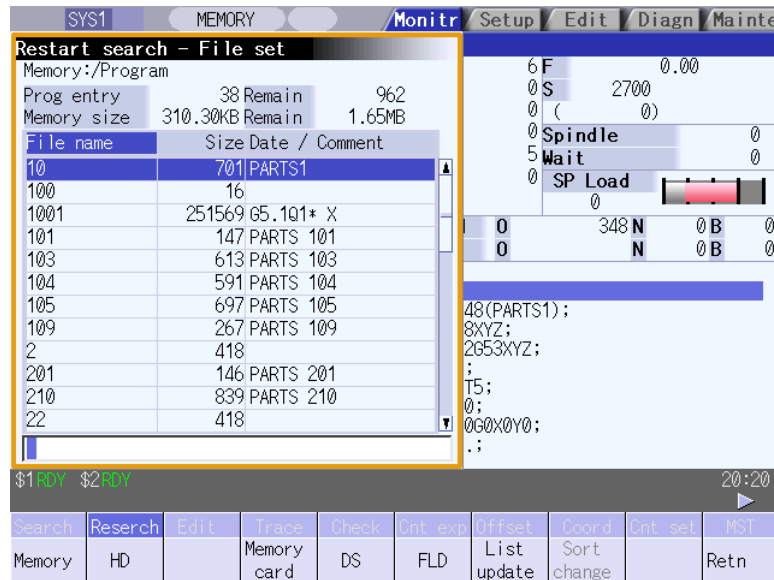
## Display items

Same as "2.2 Operation Search".

## Menus

Menu	Details	Type	Reference
Search exec	This starts the restart search based on the designated device, directory, program number (O), sequence number (N), block number (B) and number of block execution times (P).	C	
Top search	When the menu is highlighted, it indicates that the top search pop-up window is open. When this is highlighted, it indicates that the top search pop-up window is open. If pressed again when highlighted, the top search pop-up window closes, and the main pop-up window opens.	B	
List update	This updates the list details. (A list of the latest details of the currently selected device and directory is displayed.)	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.	C	
Sort change	This updates the list sorting method.	C	2.2.3 Changing the Sorting Method
Comment nondisp	This changes whether to show or hide the comment field in the list. When the comment field is hidden, the file name field will be enlarged.	C	2.2.2 Changing Whether to Show or Hide the Comment Field

## 2.3.3 File Setting Screen



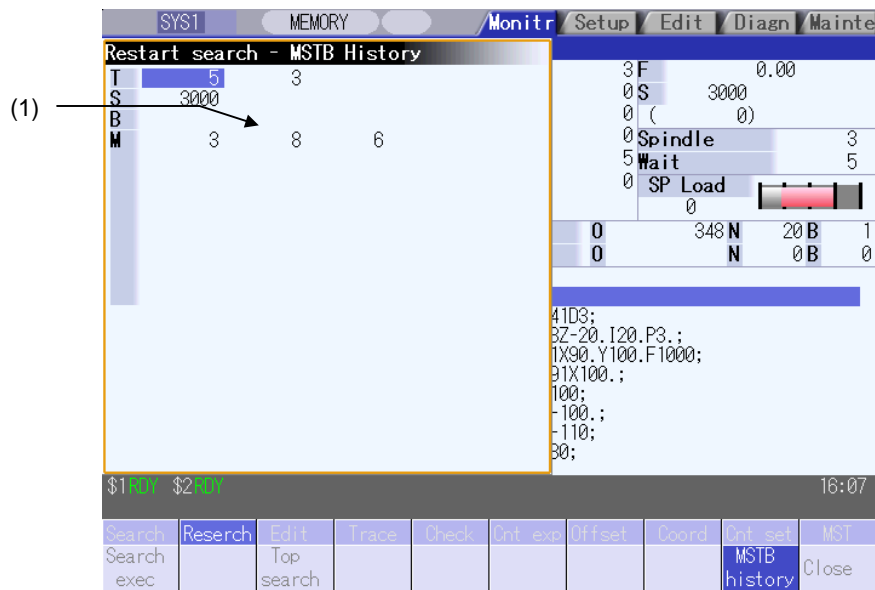
## Display items

Same as "2.2 Operation Search".

## Menus

Menu	Details	Type	Reference
Memory	Select the device to search program. When a device other than memory is selected, the root is selected first.	C	
HD		C	
M-Card		C	
DS		C	
FD		C	
List update	This updates the list details. (A list of the latest details of the currently selected device and directory is displayed.)	C	2.2.3 Changing the Sorting Method
Sort change	This updates the list sorting method.	C	
Retn	This returns the main menu.	C	
Comment nondisp	This changes whether to show or hide the comment field in the list. When the comment field is hidden, the file name field will be enlarged.	B	

## 2.3.4 MSTB History Screen



## Display items

Display items	Details
(1) MSTB history	The M, S, T and B command used in the machining program are listed. Up to 35 M commands, 3 commands each for S1 to S4, 3 T commands and 3 B commands are displayed.

## Menus

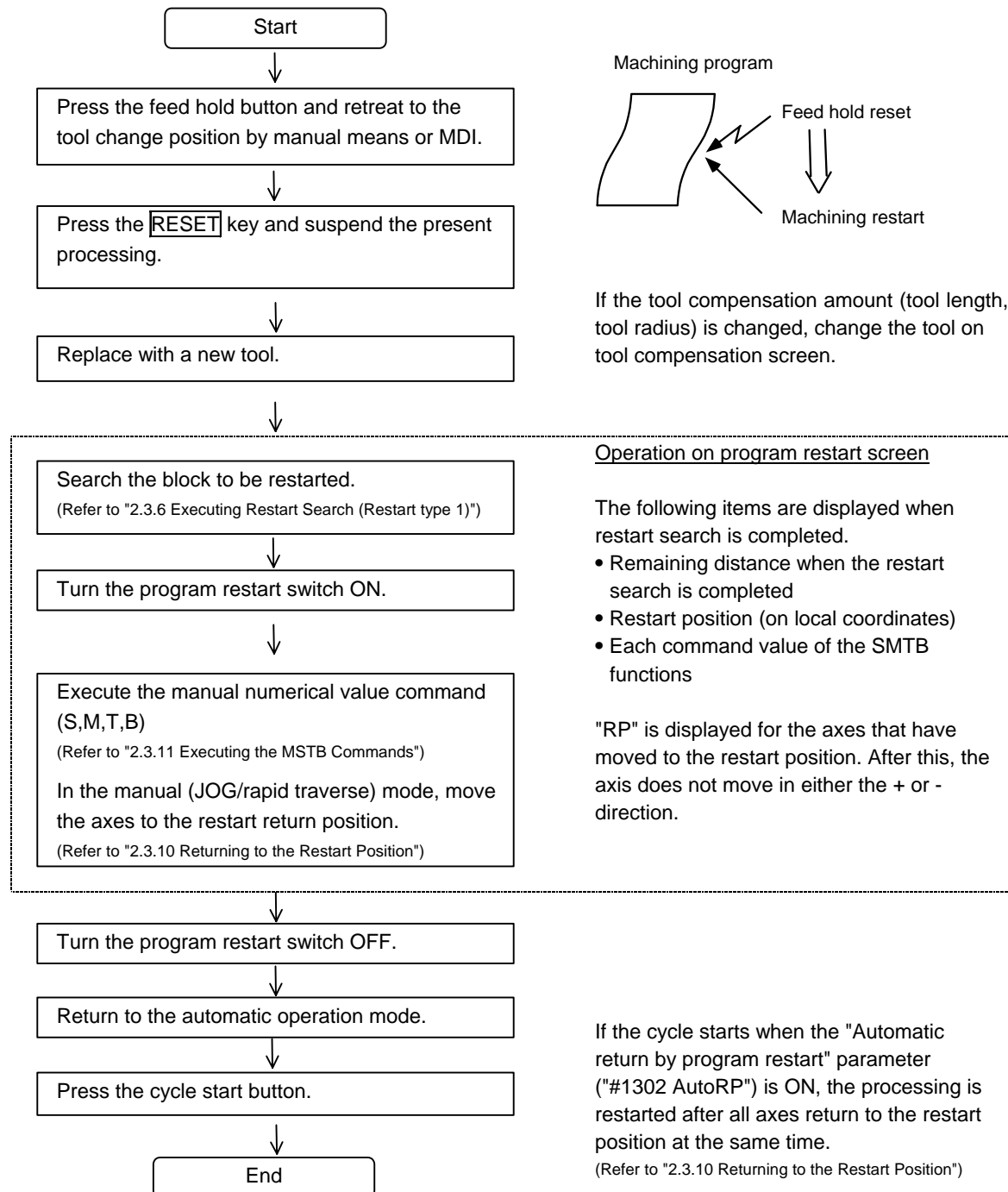
Menu	Details	Type	Reference
MSTB history	When this is highlighted, it indicates that the MSTB history pop-up window is open. If the menu is pressed when this menu is highlighted, the system will close the MSTB history pop-up window, and the main pop-up window opens.	B	

## 2.3.5 Operation Sequence for Program Restart

There are two types of restart, type 1 and type 2.

## Restart type 1

When feed hold has been applied and reset because the tool has broken, etc., restart with Restart type 1.



**(Note 1)** When single block signal is OFF, the machining is restarted without stopping temporarily after the axes return to the restart position. (The cycle starts when the automatic return by program restart is valid.)

**(Note 2)** Execute Reset & Rewind for resetting.

**(Note 3)** Restart & Search must be carried out with Restart Type 2 when the power has been turned ON again.

If Restart Type 1 is selected, "Search error" occurs.

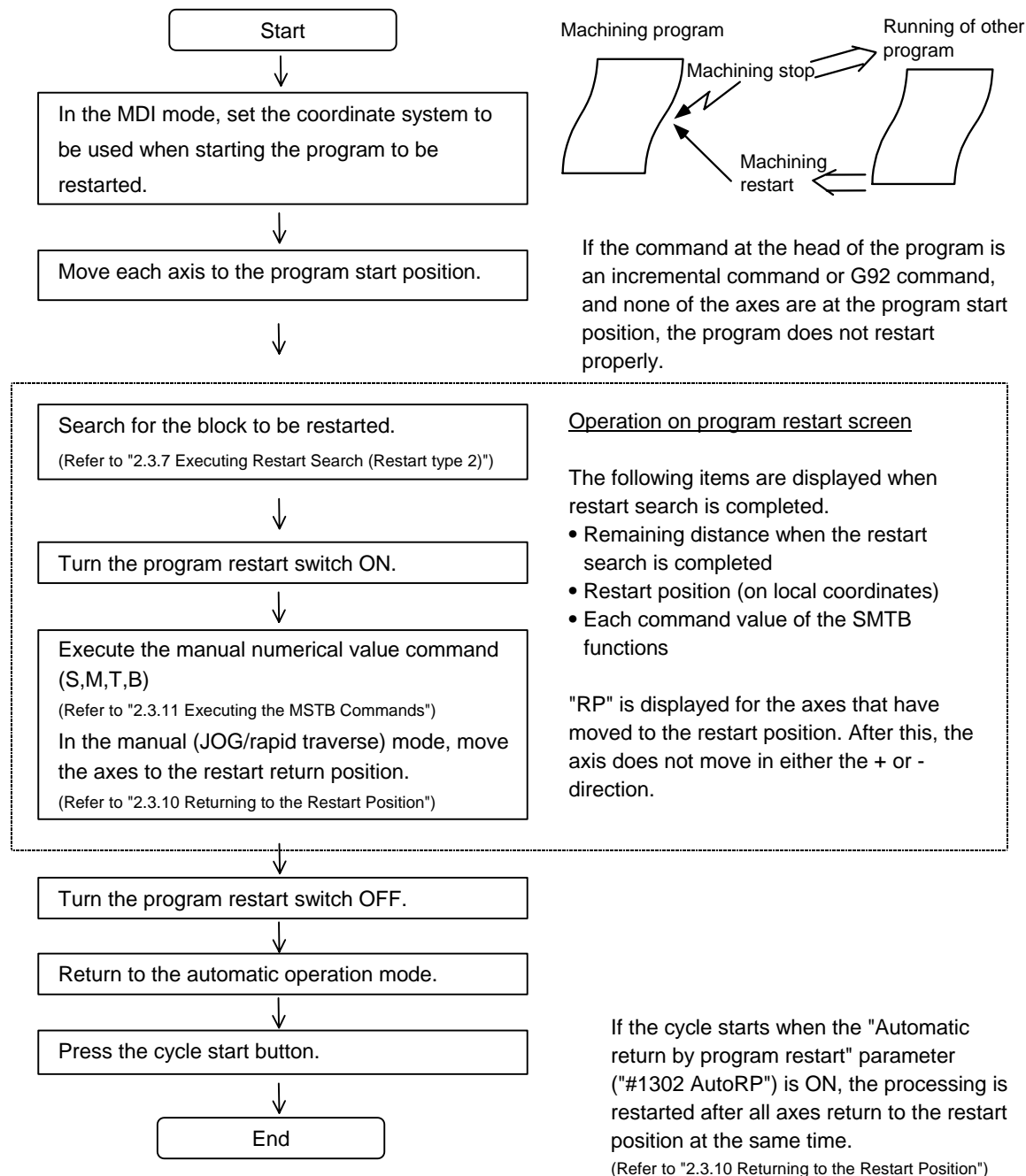
**(Note 4)** Restart Search is not possible for a program with 33 or more file name characters.

## Restart type 2

If a machining program differing from the machining program to be restarted was run before starting restart search, restart with restart type 2.

When the coordinate system of the automatic operation last time and the coordinate system of the machining restart are changed, it is possible to restart.

**(Note)** The necessary matters for starting the machining program, such as setting the coordinate system, must be completed before starting restart search.



**(Note 1)** When single block signal is OFF, the machining is restarted without stopping temporarily after the axes return to the restart position. (The cycle starts when the automatic return by program restart is valid.)

**(Note 2)** Restart Search is not possible for a program with 33 or more file name characters.

**(Note 3)** When the searched program do not exist, the operation message "Search error" appears.



## 2.3.6 Executing Restart Search (Restart Type 1)

When feed hold has been applied and reset because the tool has broken, etc., restart with Restart type 1.

## Operation method

(Example) When tool breakage during execution of O1000 N7 occurred, and restarting from the O1000 N6 block

- (1) Press the feed hold button and retreat to the tool change position by manual means or MDI.  
Press the reset key and suspend the present processing.
- (2) Replace with a new tool.
- (3) When using tape operation, index the top of the tape.
- (4) Press the main menu **Resrart**. ➡ The submenu appears.  
The main screen for restart search appears as a pop-up window.
- (5) Set the position to restart search in the setting area. ➡ Delimit the ONB number in the setting area using /.  
<When O No. was attached>  
The main or sub program is targeted.  
(Ex.) 1000/6/0  
<When O No. was not attached>  
The program currently searched is targeted.  
(Ex.) /6/0  
**(Note)** When the **INPUT** key is pressed without entering data in the input area, restart search will be carried out for the last execution block. (Type 1 only)
- (6) Press the **INPUT** or **Search exec** menu. ➡ Restart search is executed.  
The message "In restart search" appears during the search process, and the message "Restart search complete" appears when completed.  
Each axis' restart position and the restart remaining distance are displayed.  
When the **MSTB history** menu is pressed, the MSTB history screen will open as a pop-up window, and the M, S, T, B command used in the machining program will be listed.

### 2.3.7 Executing Restart Search (Restart Type 2)

If a machining program differing from the machining program to be restarted was run with tape, memory or HD operation before starting restart search, restart the respective machining program with restart type 2. The restart type 2 operation sequence is the same as restart type 1, but necessary matters for starting the machining program, such as setting the coordinate system, must be completed before starting restart search. When the parameter "#8914 Auto Top search" is "0", execute the top search for the machining program.

#### Operation method (When the parameter "#8914 Auto Top search" is "0")

(Example) When restarting from subprogram O123 N6 B2 called from main program O1000

- (1) Turn the power ON, and return all axes to the reference position.
- (2) In the MDI mode, set the coordinate system to be used when starting the program to be restarted.
- (3) Move each axis to the program restart position.
- (4) When using tape operation, index the top of the tape.
- (5) Press the main menu **Restart search**. ➡ The submenu appears.  
The main screen for restart search appears as a pop-up window.
- (6) Press the **Type 2**.
- (7) Press the sub-menu **Top search**. ➡ The window for top search appears as a pop-up window.
- (8) Using the **↑**, **↓**, **↶** and **↷** keys, move the cursor to the target machining program. ➡ Set the cursor to 1000.
- (9) Press the **INPUT** key. ➡ The top search starts.  
When the top search is completed, the message "Search Complete" appears.  
The top search pop-up window closes, and the main screen for restart search appears as a pop-up window.  
The search can be executed by pressing the menu **Search exec** instead of the **INPUT** key.

- (10) Set the position to restart search in the setting area. ➡
- Delimit the ONBP number in the setting area using /.  
 <When O No. was attached>  
 The restart search is executed at designated position by NBP No. with the set O No. at the head.  
 (Ex.) 123.PR/6/2/1  
 <When O No. was not attached>  
 The program currently searched is targeted.  
 (Ex.) /6/2/1

P sets the number of times that the block targeted for the restart search 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 be searched must be set. (If "0" is set, it is handled in the same manner as "1".)

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

- (11) Press the INPUT or Search exec menu. ➡
- Restart search is executed.  
 The message "In restart search" appears during the search process, and the message "Restart search complete" appears when completed.  
 Each axis' restart position and the restart remaining distance are displayed.  
 When the MSTB history menu is pressed, the MSTB history screen will open as a pop-up window, and the M, S, T, B command used in the machining program will be listed.

**Operation method (When the parameter "#8914 Auto Top search" is "1")**

(Example) When restarting from subprogram O123 N6 B2 called from main program O1000

- (1) Turn the power ON, and return all axes to the reference position.
- (2) In the MDI mode, set the coordinate system to be used when starting the program to be restarted.
- (3) Move each axis to the program restart position.
- (4) When using tape operation, index the top of the tape.
- (5) Press the main menu **Restart search**. ➡ The submenu appears.  
The main screen for restart search appears as a pop-up window.
- (6) Press the **Type 2**. ➡
- (7) Press the sub-menu **File set**. ➡ The window for file set appears as a pop-up window.
- (8) Using the **↑**, **↓**, **↶** and **↷** keys, move the cursor to the target machining program. ➡ Set the cursor to 1000.
- (9) Press the **INPUT** key. ➡ The screen for restart search appears as a pop-up window.

- (10) Set the position to restart search in the setting area. ➡ Delimit the ONBP number in the setting area using /.  
<When O No. was attached>  
The restart search is executed at designated position by NBP No. with the set O No. at the head.  
(Ex.) 123.PRG/6/2/1  
<When O No. was not attached>  
The program currently searched is targeted.  
(Ex.) /6/2/1
- (11) Press the **INPUT** or **Search exec** menu. ➡ Restart search is executed.  
The message "In restart search" appears during the search process, and the message "Restart search complete" appears when completed.  
Each axis' restart position and the restart remaining distance are displayed.  
When the **MSTB history** menu is pressed, the MSTB history screen will open as a pop-up window, and the M, S, T, B command used in the machining program will be listed.

## 2.3.8 Changing the Device

## Operation method

- (1) Press the submenu **File set**. → The window for file setting appears as a pop-up window.
- (2) Select the device, and press the menu key.  
(Example) **HD** → The selected device name and root directory (HD:/) appear in the Device name and Directory display field.

## 2.3.9 Changing the Directory with the Main Screen

## Operation method

- (1) Press the submenu **File set**. → The window for file setting appears as a pop-up window.
- (2) Using the **↑**, **↓**, **↶** and **↷** keys, move the cursor to the directory to be moved. → The following is displayed.
 

.	DIR
..	DIR
ABC	DIR
SRAM.BIN	1019904 Mar 06 14:54 2003

If the list contents differ from the actual device or directory, press the menu **List Update**.
- (3) Press the **INPUT** key. → The directory changes, and the contents of the designated directory appear in the list.  
The moved directory appears in the directory display field.
 

.	DIR
..	DIR
123.PRГ	62 Dec 20 15:24 2002
68.PRГ	62 Dec 20 15:24 2002
69.PRГ	166 Dec 20 15:24 2002
- (4) Repeat steps (2) and (3).
- (5) After changing the directory, press the **Retn** or **CANCEL** key. → The restart search main window opens as a pop-up window.

### 2.3.10 Returning to the Restart Position

The axis is returned to the restart position after restart search is completed.

The method for returning to the restart position (manual/automatic) can be selected with the parameters "#1302 AutoRP".

- 0 : Manual restart position return
- 1 : Automatic restart position return

#### Operation method (manual restart position return)

- (1) Turn the restart switch ON.
- (2) Enter the manual (JOG/rapid traverse) mode.
- (3) Move the axis in the restart return direction.



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

Restart pos		Remain dist	
<b>X1</b>	40.000	<b>X1</b>	40.000
<b>Y1</b>	150.100	<b>Y1</b>	150.100
<b>Z1</b>	-70.000	<b>Z1</b>	-25.000
<b>C1</b>	0.000RP	<b>C1</b>	0.000

- (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. If moved in the reverse direction, the operation error "M01 R-pnt direction illegal" occurs. If the tool needs to be retracted once, such as if the tool is interfering with the workpiece, turn the restart switch OFF and retract the axis manually.
- (Note 2)** After restart position return is completed, the axis cannot be moved if the restart switch is ON. If the axis is moved, the operation error "M01 restart switch ON" occurs.
- (Note 3)** If even one axis has not completed return to the restart position at cycle start, the error "T0112 Restart pos. return incomplete" 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 alarm does not occur.
- (Note 4)** If the axis to be returned to the restart position is a machine lock axis, the operation error "M01 program restart machine lock" occurs. Release the machine lock before returning to the restart position.
- (Note 5)** If the restart switch is turned to ON after the axis is returned to the restart position with the restart switch OFF, "PR" may not be displayed. Return to the restart position after the restart switch is turned ON.
- (Note 6)** After restart search had been completed, if the movement command is issued by MDI before automatic restart position return has been started, the program error (P48) occurs. Perform the operation again after reset.

- (Note 7)** After restart search had been completed, if the T command different from the program is issued by MDI before the searched program has been started, the program error (P48) may occur. Perform the operation again after reset. T commands which result in errors are shown below. (Only L system)
- (1) When "#1100 Tmove" = "0"  
T command that selects a tool with different tool length/wear amount than the tool selected by the program
  - (2) When "#1100 Tmove" = "1"  
A program error will not occur by T command.
  - (3) When "#1100 Tmove" = "2"  
T command that selects a tool with different wear amount than the tool selected by the program
- (Note 8)** After restart search had been completed, if the handle interruption is performed before the searched program has been started, always the same operation as manual absolute ON is executed regardless of "Manual absolute" signal.

### Automatic restart position return

If the parameter "#1302 AutoRP" is set to "1", each axis returns to the restart position with dry run at cycle start. Machining restarts after returning. The order that the axes return follows parameter "#2082 a\_rstax".

- (Note 1)** Manually move the axis to a position where the tool does not interfere with the workpiece before starting the cycle.
- (Note 2)** Even if the parameter "#1302 AutoRP" is set to 1, the axes can be returned manually to the restart position by turning the restart switch ON. In this case, move the axes in the order of manual restart position return → automatic restart position return. After completing automatic restart position return, if the operation is stopped temporarily and the restart switch is turned ON, the operation error "M01 restart switch ON" occurs.
- (Note 3)** Once the axis has been manually returned to the restart position, if it is moved from the restart position, it will not return to the restart position even if automatic restart position return is executed.
- (Note 4)** The axis for which parameter "#2082 a\_rstax" is set to 0 does not return to the restart position. Note that if 0 is set for all axes, all axes simultaneously return to the restart position. Designate the axes in part system units. If the axis for which parameter "#2082 a\_rstax" is set to 0 has not completed manual restart position return when automatic restart position return is started, the error "T0112 Restart pos. return incomplete" occurs.
- (Note 5)** After automatic restart position return had been started, if the automatic start is executed during MDI mode before not all axes have yet to complete automatic restart position return, the error "T0112 Restart pos. return incomplete" occurs.
- (Note 6)** After restart search had been completed, if the movement command is issued by MDI before automatic restart position return has been started, the program error (P48) occurs. Perform the operation again after reset.
- (Note 7)** After restart search had been completed, if the T command different from the program is issued by MDI before the searched program has been started, the program error (P48) may occur. Perform the operation again after reset. T commands which result in errors are shown below. (Only L system)
- (1) When "#1100 Tmove" = "0"  
T command that selects a tool with different tool length/wear amount than the tool selected by the program
  - (2) When "#1100 Tmove" = "1"  
A program error will not occur by T command.
  - (3) When "#1100 Tmove" = "2"  
T command that selects a tool with different wear amount than the tool selected by the program
- (Note 8)** After restart search had been completed, if the handle interruption is performed before the searched program has been started, always the same operation as manual absolute ON is executed regardless of "Manual absolute" signal. When manual interruption is executed to the automatic restart position return completed axis, the axis never returns the automatic restart position again.
- (Note 9)** When an axis moved to return is operated manually, the axis cannot return to correct position.



### 2.3.11 Executing the MSTB Commands

If the MSTB history menu is pressed after restart search is completed, the MSTB commands used for machining program appear.





When the cursor is moved to the listed M, S, T, B commands and the **INPUT** key is pressed, that command will be executed.

Up to 35 M commands, 3 commands each for S1 to S4, 3 T commands and 3 B commands are displayed. If many MSTB commands are used for machining, the MSTB commands used at first will not appear.

#### Operation method

- (1) Press the submenu **MSTB history**.

➔

The pop-up window changes to the MSTB history window.  
 The MSTB commands used for machining program are listed.
- (2) Using the , ,  and  keys, move the cursor to the position of the data to set.
- (3) Press the **INPUT** key.

➔

The designated command is executed. A value, which has been commanded once, is displayed in gray. The cursor will move to the next item.
- (4) Repeat steps (2) and (3).
- (5) When completed with all settings, press the **Close** or **MSTB history** menu.

➔

The MSTB history pop-up window closes and the restart search main window appears as a pop-up window.

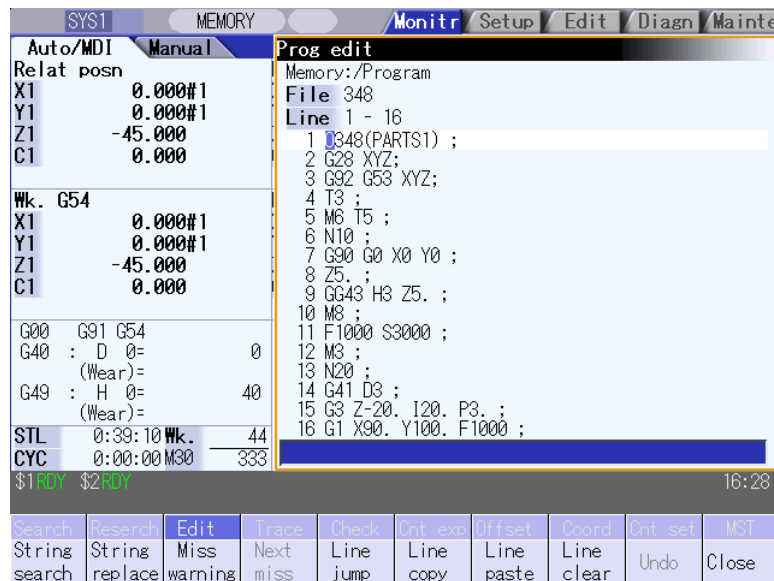
## 2.4 Program Edit

The machining programs are edited. When the main menu **Edit** is pressed, the operation searched program (MDI program for MDI mode) appears.

If no program has been searched or tape operation has been executed, the edit window will not open.

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. "Editing" appears on the right side of the file name display when the input starts. When the  key is pressed, the program is saved in the NC memory and the "Editing" message disappears.

Refer to "4.2 Program edit" for details.



## 2.5 Trace

This function illustrates the actual machine's movement path or tool center point movement path, and draws the actual machine movement.

This allows the machine operation to be monitored during machining.

The programs that can be traced are operation searched machining programs (MDI program for MDI mode).

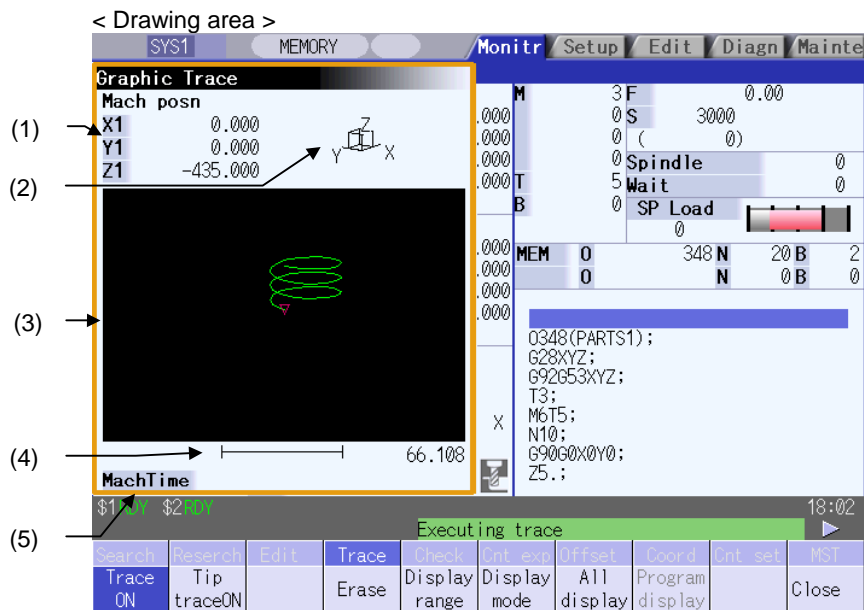
If no program has been operation searched, the trace window will not open.

Using **All display** menu, normal display and whole display modes can be switched.

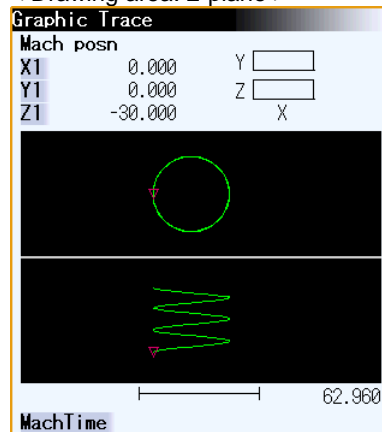
**(Note 1)** The trace function is an additional specification. The graphic trace option is required.

**(Note 2)** The tool center point trace function is an additional specifications. The 5-axis related options (tool center point control, tool length compensation along the tool axis, tool handle feed & interrupt) are required.

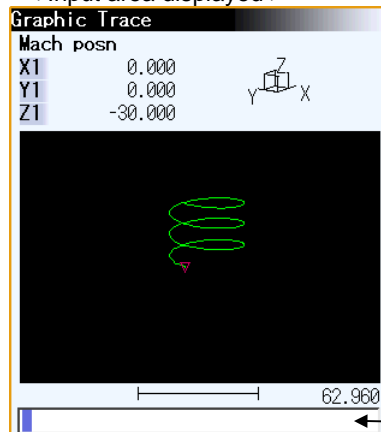
■ Normal display (full-screen display mode is OFF)



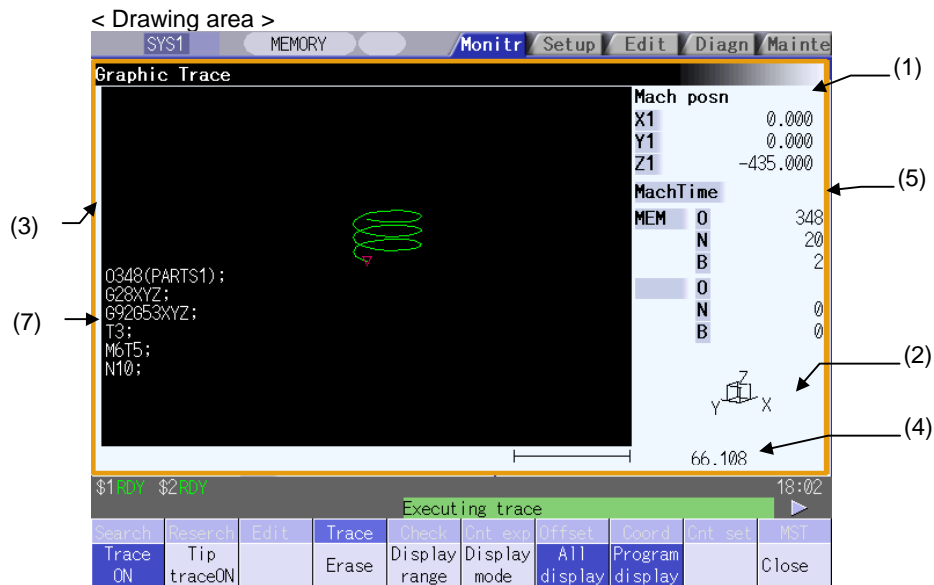
< Drawing area: 2-plane >



< Input area displayed >



■ Full-screen display (full-screen display mode is ON)



### Display items

Display item	Details
(1) Counter	The counter of the axis targeted for the trace drawing is displayed. The three axes which are displayed are set with the parameters. [Trace] The machine position is displayed. [Tip trace] The machine position of the tool center point is displayed.
(2) Display mode	The plane currently being drawn is displayed.
(3) Trace drawing area	This area is used to draw the tool path as graphics. The zero point to be displayed can be switched between the machine position zero point and workpiece coordinate position zero point with parameter "#1231 set03".
(4) Scale	The display range scale is displayed.
(5) Machining time display	The time required for machining is calculated and displayed. Nothing is displayed during tracing.
(6) Input area	The input area appears when the menu <b>Display range</b> and <b>Display mode</b> are pressed. The scale value and display mode are set. The input area is hidden when the <b>INPUT</b> key is pressed.
(7) Buffer display	This displays the contents of the machining program currently being executed. The block being executed is highlighted.

### Counter display conditions

	5-axis related specifications disabled	5-axis related specifications enabled
Machine position trace mode	Machine position	Machine position
Tool center point trace mode	-	Machine position of tool center point

## Menus

Menu	Details	Type	Reference
Trace ON	This activates the machine position trace mode. If any program is currently running, the machine position path is traced from the current position. If this menu is pressed during the machine position trace mode, the trace mode will be turned OFF.	B	2.5.1 Displaying the Machine Position Trace
Tip traceON	This activates the tool center point trace mode. If any program is currently running, the path of tool center point machine position path is traced from the current position. If this menu is pressed during the tool center point trace mode, the trace mode will be turned OFF. Note that this menu does not appear if the 5-axis related option is OFF.	B	2.5.3 Displaying the Tool Center Point Trace
Erase	This erases the data in graphic drawing area displayed on the screen.	C	
Display range	This changes the graphic drawing display range. When this menu is pressed, the menu changes to the display range change menu. When the display range is changed, the graphic data displayed on the screen is erased.	C	2.5.5 Changing the Display Range
Display mode	This changes the drawing plane. When this menu is pressed, the menu changes to the display mode change menu. There are three types of graphic display modes: 1-plane, 2-plane and 3D. When the drawing plane is changed, the graphic data displayed on the screen is erased.	C	2.5.6 Changing the Display Mode
All display	This switches the normal display mode and the full-screen display mode.	B	2.5.8 Switching the Full-screen Display Mode
Program display	This displays the machining program being executed on the graphic drawing area. This menu can be selected only when the full-screen display mode is applied.	B	
Rotate	This sets the viewpoint angle for the 3D display mode. When the viewpoint angle is changed, the graphic data displayed on the screen is erased. Note that this menu can be used only in the 3D display mode.	C	2.5.7 Changing the Display Angle
Std range	The display range (scale and display position) is automatically set from the machine movable area. The machine movable area is set with the parameters "#2013 OT-" and "2014 OT+" (software limit). When the display range is changed, the graphic data displayed on the screen is erased.	C	
Close	This closes the pop-up window and quits this function.	C	

## 2.5.1 Displaying the Machine Position Trace

## Operation method

(1) Press the main menu Trace ON.



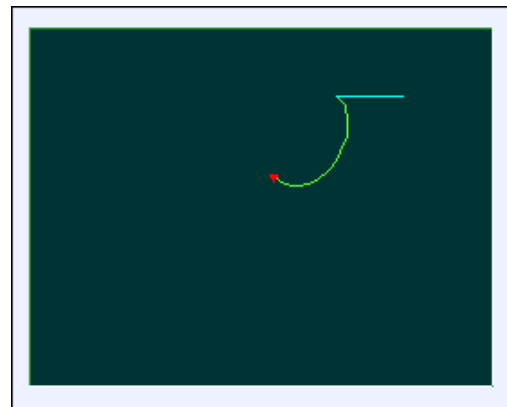
- The Trace ON menu is highlighted.
- If Tip TraceON is highlighted, unhighlight it.
- The machine position appears in the drawing area as a tool mark.
- The machine position counter is displayed at the counter.
- The message "Tracing" appears.

After this, the machine position path is drawn with graphics in the machine position trace mode.

**(Note)** If graphic check (2D) is executed, the "Trace ON" status is cancelled.



The machine position path is drawn with graphics.



The machine position path is drawn with a solid green line.

## 2.5.2 Canceling the Machine Position Trace

## Operation method

- (1) Start tracing with the machine position.
- (2) Press the main menu **Trace ON**. ➔
  - The **Trace ON** menu is unhighlighted.
  - The tool mark in the drawing area is erased.
  - The message "Tracing" is erased.

## 2.5.3 Displaying the Tool Center Point Trace

## Operation method

- (1) Press the main menu **Tip TraceON**. ➔
  - The **Tip TraceON** menu is highlighted.
  - If **Trace ON** is highlighted, unhighlight it.
  - The tool center point appears in the drawing area as a tool mark.
  - The tool center position is displayed at the counter.
  - The message "Tracing Tip Position" appears.

After this, the tool center point path is drawn with graphics in the tool center point trace mode.

**(Note)** If graphic check (2D) is executed, the "Tip Trace ON" status is cancelled.

## 2.5.4 Canceling the Tool Center Point Trace

## Operation method

- (1) Start tracing with the tool center point.
- (2) Press the main menu **Tip TraceON**. ➔
  - The **Tip TraceON** menu is unhighlighted.
  - The tool mark in the drawing area is erased.
  - The message "Tracing Tip Position" is erased.

### 2.5.5 Changing the Display Range

The graphic drawing's scale can be enlarged or reduced, and the position moved or centered.

#### Operation method (Enlarging the and reducing the drawing)

- (1) Press the **Display range** key. ➔ A white frame indicating the display range appears on the screen.  
The display range input mode is activated, and the following menu appears.

Zoom in	Zoom out	Up	Down	Left	Right	Centering			
---------	----------	----	------	------	-------	-----------	--	--	--

- (2) Press the menu **Zoom in** or **Zoom out**. ➔ The size of the white frame changes according to the key operations.

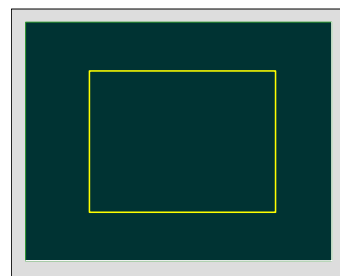
To enlarge the figure:

Press the menu **Zoom In** or the **-** key.

To reduce the figure:

Press the menu **Zoom out** or the **+** key.

A solid-line frame appears with respect to the original scale when enlarging, and a dotted-line frame appears when reducing.



- (3) Press the **INPUT** key. ➔ The display scale is changed.  
By changing the display scale, the graphic data displayed on the screen is erased.  
It is also possible to change the display scale by setting a scale value in the input area.

**(Note)** The changed scale value is held even after the power is turned OFF and ON.







## Operation method (Changing the drawing display position)

- (1) Press the **Display range** key.




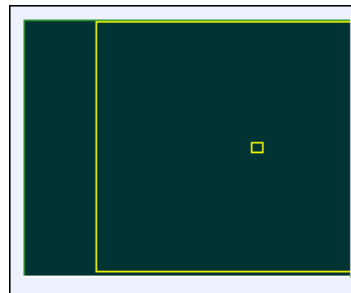
A white frame indicating the display range appears on the screen.  
The display range input mode is activated, and the following menu appears.

Zoom in	Zoom out	Up	Down	Left	Right	Centering			
---------	----------	----	------	------	-------	-----------	--	--	--

- (2) Press the **Up**, **Down**, **Left**, **Right** menu or cursor movement keys , , , .




The cursor () indicating the center of the display and the frame line move up, down, left and right according to the key operations.

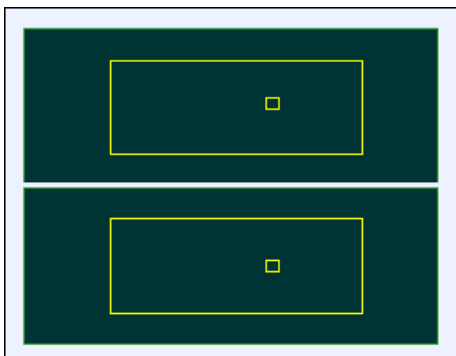


- (3) Press the **INPUT** key.



The display position changes so that the cursor position () is the center of the area.  
By changing the display position, the graphic data displayed on the screen is erased, however, the scale value is not changed.

**(Note 1)** When changing the display range in the 2-plane display mode such as "XY/XZ", the display range (scale and display position) for the upper and lower areas changes in the same manner.  
The operation method is the same as the 1-plane display mode.



The white-framed display range in the upper and lower areas simultaneously move to the left/right when the **Left**, **Right** keys are pressed.

The white-framed display range of either upper or lower areas moves up and down when the **Up**, **Down** keys are pressed.

Which frame to be moved up/down can be changed with the page key.

**Operation method (Centering)**

- (1) Press the
- Display range
- key.



A white frame indicating the display range appears on the screen.

The display range input mode is activated, and the following menu appears.

Zoom in	Zoom out	Up	Down	Left	Right	Center- ing			
------------	-------------	----	------	------	-------	----------------	--	--	--

- (2) Press the
- Centering
- key.



The display position is changed so that the current machine position appears in the center of the drawing area.

When display position is changed, the graphic data displayed on the screen is erased.

**(Note 1)** In the 2-plane display mode such as "XY/XZ", centering is applied for the upper and lower areas.  
The operation method is the same as the 1-plane display mode.

### 2.5.6 Changing the Display Mode

The graphics display mode includes the 1-plane, 2-plane and 3D mode. When the menu **Display mode** is pressed and the following display mode menu is selected, the axis configuration of each plane changes, and the menu display returns to the original state. It is also possible to change the display mode by setting the axis name to the input area.

**(Note 1)** When display mode is changed, the graphic data displayed up to that point are erased.

**(Note 2)** The set display mode is held even after the power is turned OFF and ON.

**(Note 3)** The display mode can be set independently for the trace function and program check function. These settings are not sequenced.

**(Note 4)** The menu axis names XYZ correspond to the base axis IJK. X = base axis I, Y = base axis J, and Z = base axis K.

#### Display mode menus

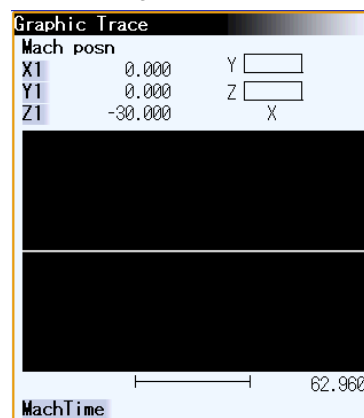
Menu	Details	Type
XY	This changes to the 1-plane display mode configured of X-Y. The X axis is displayed as the horizontal axis, and the Y axis is displayed as the vertical axis.	C
YZ	This changes to the 1-plane display mode configured of Y-Z. The Y axis is displayed as the horizontal axis, and the Z axis is displayed as the vertical axis.	C
XZ	This changes to the 1-plane display mode configured of X-Z. The X axis is displayed as the horizontal axis, and the Z axis is displayed as the vertical axis.	C
XY/XZ	This changes to the 2-plane display mode configured of X-Y and X-Z. The X axis is displayed as the horizontal axis, and the Y axis and Z axis are displayed as the vertical axis.	C
YX/YZ	This changes to the 2-plane display mode configured of Y-X and Y-Z. The Y axis is displayed as the horizontal axis, and the X axis and Z axis are displayed as the vertical axis.	C
XYZ	This changes to the 3D display mode. A cube is displayed on the lower right of the screen.	C

#### Operation method (Changing the display mode)

(1) Press the menu **Display mode**. ➡ The menus for the selectable display modes appear. The input area appears.

(2) Select the mode to display and press the menu. ➡ The display mode and drawing area appear as a 2-plane image.

**(Example)** XY/XZ




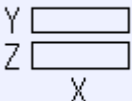

## Operation method (Changing the display axis name)

- (1) Press the menu . → The menus for the selectable display modes appear. The input area appears.
- (2) Set the axis name, and press the  key. → XYZ appears as the axis name in the display mode. The X axis, Y axis and C axis are the three axes for drawing.  

XYZ

The display mode includes the 1-plane, 2-plane and 3D display modes. The display mode currently selected is shown with an image. The selected axis names are displayed in the image.

## Display example

<1-plane> (XY)	<2-plane> (XY/XZ)	<3D> (XYZ)
		

## 2.5.7 Changing the Display Angle

Set the graphics display angle for the 3D display mode.

Press the menu key or the cursor movement keys, and rotate the cube displayed at the upper right of the screen. Set the angle by pressing the  key.

**(Note 1)** When the display angle is changed, the graphics displayed up to that point are erased.

**(Note 2)** The set display angle is held even if the power is turned ON and OFF.

**(Note 3)** The display angle can be set independently for the trace function and program check function. These settings are not sequenced.

## Operation method

- (1) Press the menu key . → The rotation mode is activated, and the following menu appears.  

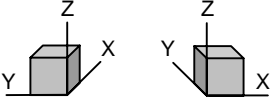
Up

Down

Left

Right
- (2) Use the , , ,  menu to adjust the display angle. → The cube displayed at the lower right of the screen rotates according to the key operations.  

The cursor movement keys (, , , ) can also be used to rotate.


- (3) Press the  key. → The display angle is changed. When display angle is changed, the graphic data displayed on the screen is erased.

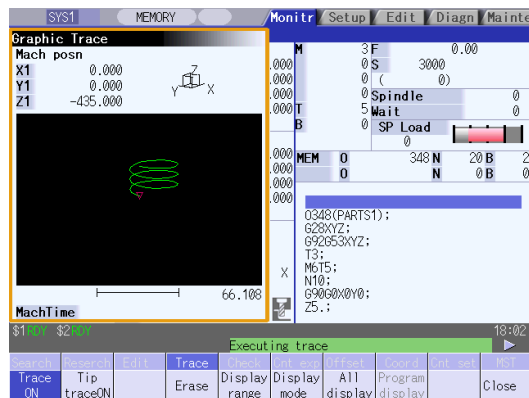
**(Note 1)** The set display angle is held even after the power is turned OFF and ON.

### 2.5.8 Switching the Full-screen Display Mode

Press the **All display** menu key to display the trace window on the whole screen. (full-screen display mode).

Press this menu again to return the normal display.

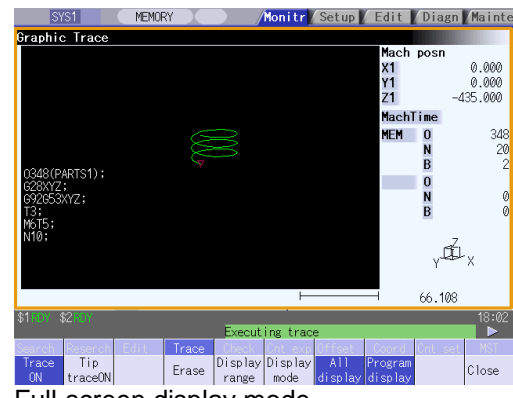
#### Switching the display mode



Normal display mode

**All display**  
menu : ON

**All display**  
menu : OFF



Full-screen display mode

**(Note 1)** The selected display mode is maintained even after rebooting the machine.

**(Note 2)** The full-screen display mode is applied to the trace function and program check (2D/3D solid) function commonly.

**(Note 3)** The full-screen display mode is applied commonly to all part systems.

#### Displaying a program

When pressing the **Program display** menu key, the contents of the machining program currently being checked is displayed on the drawing area.

When pressing the **Program display** again, the displayed program is erased.

Note that this menu can be used only when the full-screen display mode is selected.

**(Note 1)** The selected display mode is maintained even after rebooting the machine.

**(Note 2)** The program display mode is applied to the trace function and program check (2D) function commonly.

**(Note 3)** The **Program display** menu key cannot be selected while the normal display mode is selected. Program display mode is valid only when the full-screen display mode is selected.

**(Note 4)** The program display mode is applied commonly to all part systems.

### 2.5.9 Precautions for Tracing

- (1) When the command speed increases in the trace mode, the shape being drawn with graphics will become distorted. Especially, correct graphic drawing is not possible during machine lock.
- (2) If program check (2D) is executed during the trace mode, the trace mode will be canceled.
- (3) If trace is executed during program check mode, the program check will be canceled.

Refer to section "4.3.11 Precautions for Program Check Function (2D)" for other precautions.

## 2.6 Program Check (2D)

Program check (2D) is a function that draws the machining program movement path without executing automatic operation. The machining program can be checked with graphic data drawn at a high speed.

Using All display menu, normal display and full-screen display modes can be switched.

The programs that can be checked are operation searched machining programs (MDI program for MDI mode).

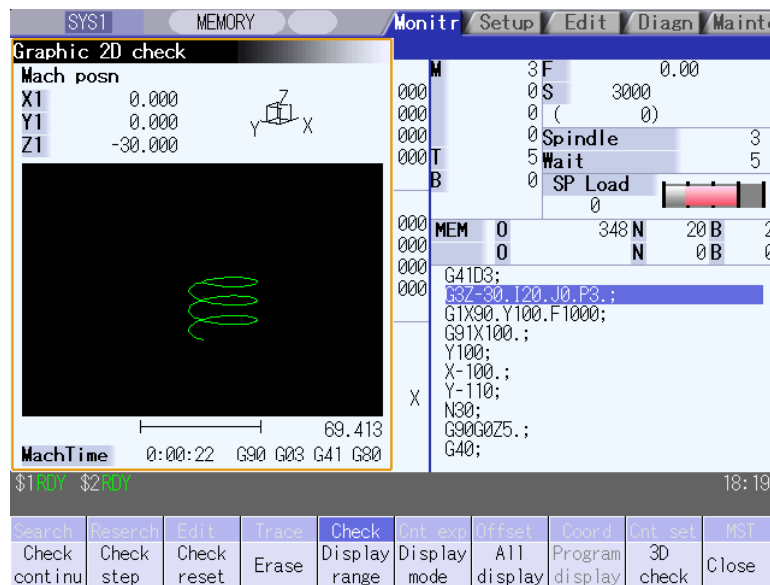
If no machining program has been operation searched, the program check window will not be opened.

Refer to "4.3 Program Check (2D)" for details.

**(Note)** The program check (2D) function is an additional specification. The graphic check option is required.

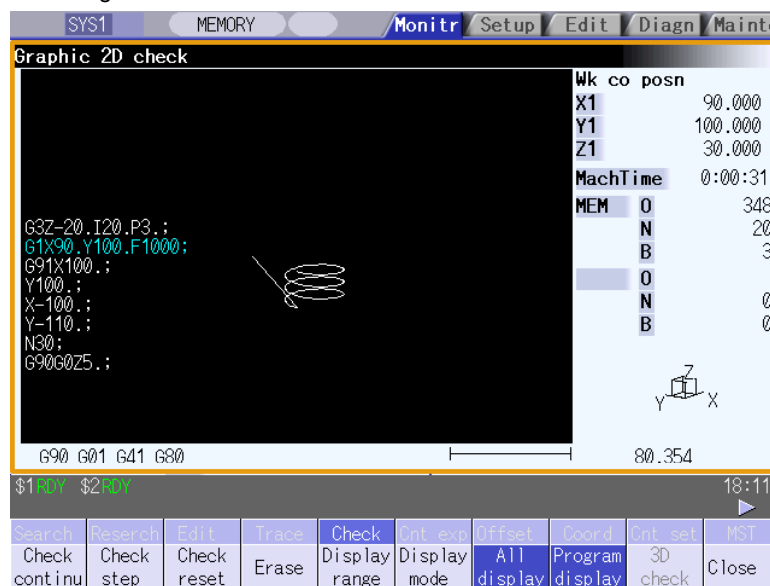
### ■ Normal display (full-screen display mode is OFF)

<Drawing area>



### ■ Full-screen display (full-screen display mode is ON)

<Drawing area>



## 2.7 Program Check (3D)

Program check (3D) is a function that draws the workpiece shape and tool movement in the cutting process of the machining program as a solid image without executing automatic operation. The machining program can be checked with graphic data drawn at a high speed.

Using All display menu, normal display and full-screen display modes can be switched.

The operation searched machining program (MDI program for MDI mode) can be checked.

The Program Check window will not open if no machining program has been searched.

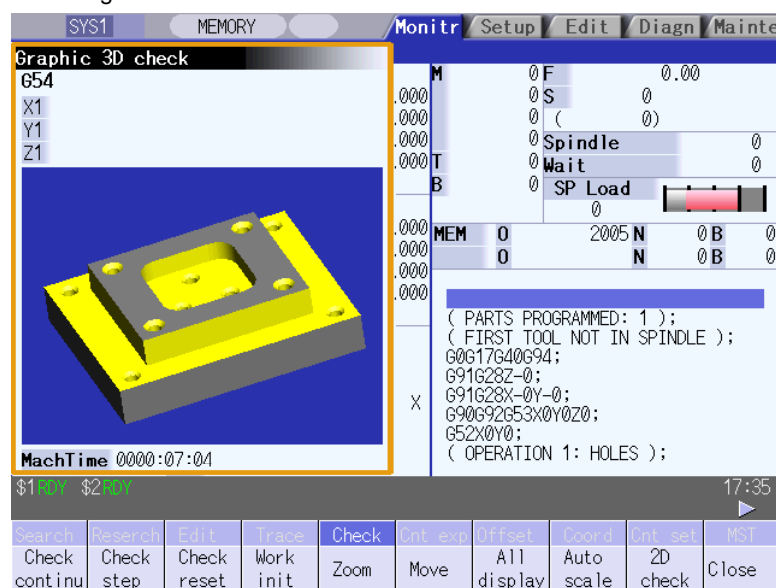
The workpiece shape and tool shape used with this function can be set on the Edit screen.

Refer to section "4.4 Program Check (3D)" for details.

**(Note)** The program check (3D) function is an additional specification. The graphic check and 3D solid graphic check options are required.

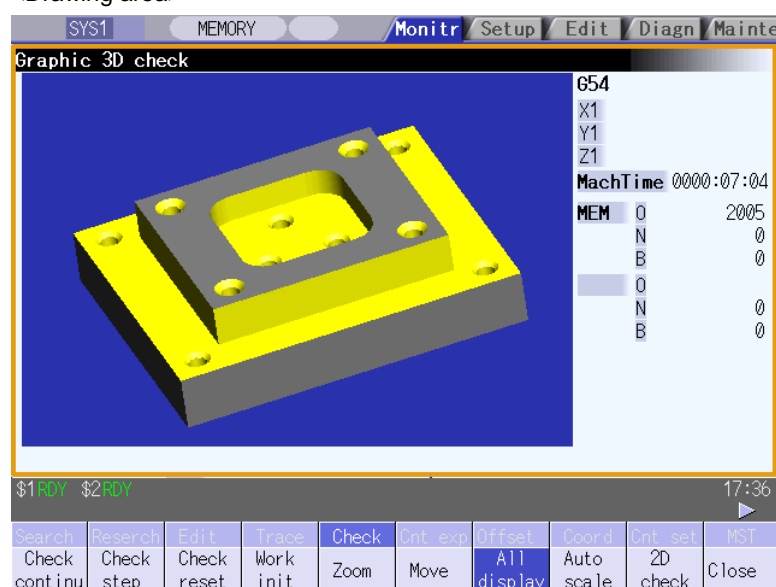
### ■ Normal display (full-screen display mode is OFF)

<Drawing area>



### ■ Full-screen display (full-screen display mode is ON)

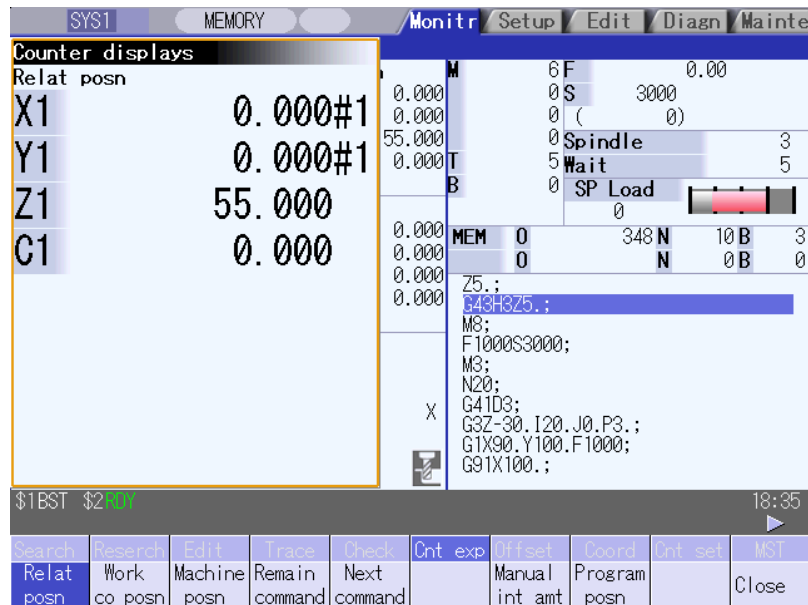
<Drawing area>



## 2.8 Counter All-axis Display

A counter for all axes opens as a pop-up display.

The type of displayed counter can be selected with the menu.





## Menus

Menu	Details	Type
Relat posn	This displays the currently executed position	B
Work co posn	This displays the G54 to G59 workpiece coordinate system modal No. and the workpiece coordinate position in that workpiece coordinate system.	B
Machine posn	This displays the coordinate position of each axis in the basic machine coordinate system having a characteristic position, specified by the machine, as a zero point.	B
Remain command	This displays the remaining distance of the movement command being executed during automatic start or automatic halt. (The remaining distance is the incremental distance from the current position to the end point of that block.)	B
Next command	This displays the details of the command in the block executed after the block currently being executed.	B
Manual int amt	This displays the amount moved with the manual mode while the manual absolute switch was OFF.	B
Program posn	This displays the value obtained by subtracting the tool compensation amount compensated for that axis from the position actually being executed for each axis.	B
Close	This closes the pop-up window and quits this function.	C
Tip wk posn	This displays the position of the tool end from the workpiece coordinate reference point in the selected workpiece coordinate system.	B
Tip machine	This displays the position of the tool end from the machine coordinate system reference point in the machine coordinate system.	B
Pulse	This displays the amount moved in the selected axis direction using the manual pulse generator in the hypothetical machine coordinate system. Basically this is updated only when manual ABS is OFF. If "#7905 NO_ABS" is set to "1", this will be updated regardless of the manual ABS ON/OFF.	B

**(Note 1)** The type of counter displayed first when the pop-up display appears is the relative position. If the 5-axis related option is ON, the counter will be the "Tip wk posn".

The counter which appears next is the type selected previously.

**(Note 2)** The menus Tip wk posn, Tip machine and Tip axis movement appear when the 5-axis related option is ON.

## 2.9 Tool Compensation Amount

The tool compensation data can be set and displayed.

The tool compensation data screen configuration differs according to the tool compensation type.

The number of tool compensation sets to be set or shown differs according to the option.

Refer to section "3.2 Tool Compensation Amount" for details.

### [Tool compensation type I (M system)] Parameter "#1037 cmdtyp" = 1

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

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

Tool No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Value	0.000	0.000	-500.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

### [Tool compensation type II (M system)] Parameter "#1037 cmdtyp" = 2

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

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

Tool No.	Length	L wear	Radius	R wear
1	0.000	0.000	10.000	0.000
2	0.000	0.000	0.000	0.000
3	-500.000	0.000	0.000	0.000
4	0.000	0.000	0.000	0.000
5	0.000	0.000	0.000	0.000
6	0.000	0.000	0.000	0.000
7	0.000	0.000	0.000	0.000
8	0.000	0.000	0.000	0.000
9	0.000	0.000	0.000	0.000
10	0.000	0.000	0.000	0.000
11	0.000	0.000	0.000	0.000
12	0.000	0.000	0.000	0.000
13	0.000	0.000	0.000	0.000
14	0.000	0.000	0.000	0.000
15	0.000	0.000	0.000	0.000

**[Tool compensation type III (L system)] Parameter "#1037 cmdtyp" = 3**

The wear data, tool length data and tool nose data are set separately. These are changed with the sub-menu.

**(a) Wear data**

Set the tool nose wear amount for each tool used. When the tool compensation No. is designated by the tool command (T command), compensation is carried out matching the tool length data and tool nose data.

**(b) Tool length data**

Set the tool length in respect to the program basic position of each tool used.

When the tool compensation No. is designated by the tool command (T command), compensation is carried out matching the wear data and the tool nose data.



## (c) Tool nose data

Set the tool nose radius value (tool nose R), wear radius value (R wear) and tool nose point (tool nose point P) of the tool nose mounted on the tool for each tool used. When the tool offset No. is designated by the tool command (T command), offset is carried out matching the tool length data and tool nose data.

The image shows a CNC control interface with several panels. At the top, there are tabs for 'SYS1', 'MEMORY', 'Monitor', 'Setup', 'Edit', 'Diagn', and 'Maintenance'. The 'Monitor' tab is active.

The main panel displays 'Tool offset' data for 15 tools. The columns are 'Nose R', 'R-wear', and 'Point'. Tool 3 is highlighted in blue.

Tool	Nose R	R-wear	Point
1	2.000	0.000	1
2	1.000	0.000	2
3	0.000	0.000	0
4	0.000	0.000	0
5	0.000	0.000	0
6	0.000	0.000	0
7	0.000	0.000	0
8	0.000	0.000	0
9	0.000	0.000	0
10	0.000	0.000	0
11	0.000	0.000	0
12	0.000	0.000	0
13	0.000	0.000	0
14	0.000	0.000	0
15	0.000	0.000	0

Below the tool offset table, there is a status bar showing '\$1.07' and '\$2.07'.

On the right side, there is a 'Machine Status' panel showing various parameters:

- 6F: 0.00
- 0S: 0
- 0 ( : 0)
- 0 Spindle: 3
- 0 Wait: 5
- 0 SP Load: 0
- 348 N: 10 B 2
- N: 0 B 0

Below the machine status panel, there is a 'Program' panel showing the following text:

```

ARTS1);
XYZ;
py0;


```

At the bottom, there is a 'Search' panel with the following buttons: 'Search', 'Reserch', 'Edit', 'Trace', 'Check', 'Cnt exp', 'Offset', 'Coord', 'Cnt set', and 'MST'. The 'Offset' button is highlighted in blue.

Below the search panel, there is a table with the following columns: 'Line copy', 'Line paste', 'Undo', and 'Close'.

Line copy	Line paste	Undo	Close
=Input	+Input	Wear data	Length data
Nose data	Offset No.		

# CAUTION

 If the tool offset amount or workpiece coordinate system offset amount is changed during automatic operation (including during single block stop), the changes will be valid from the command in the next block or after several subsequent blocks.


## 2.10 Workpiece Coordinate System Compensation

The coordinate system offset controlled by the NC can be set and displayed.  
48 or 96 sets of coordinate system offset sets can be added according to the option.  
Refer to "3.6 Workpiece Coordinate System Offset" for details.

**(Note)** The G92/G52 coordinate system offset cannot be set.

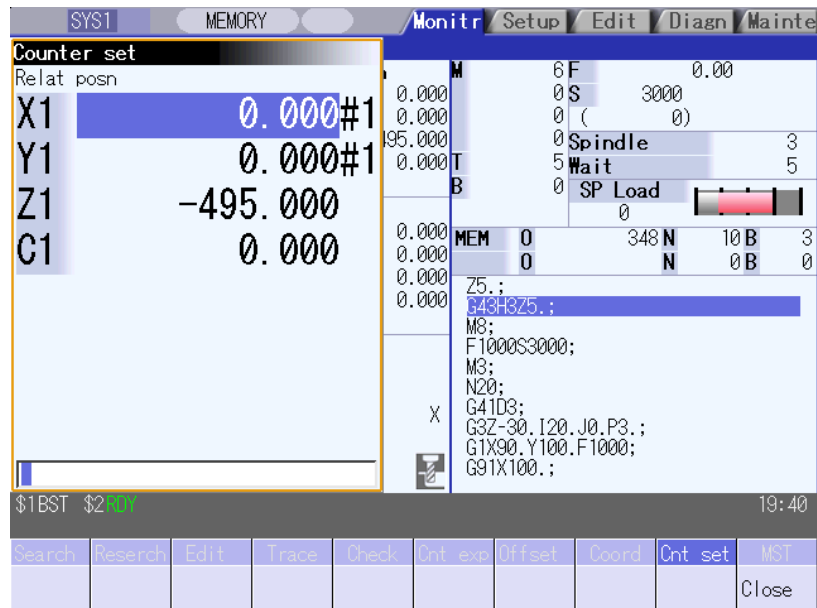
SYS1		MEMORY		Monitor		Setup	Edit	Diagn	Mainte
Auto/MDI		Manual							
Relat posn									
X1	0.000#1								
Y1	0.000#1								
Z1	-495.000								
C1	0.000								
Wk. G54									
X1	0.000#1								
Y1	0.000#1								
Z1	-495.000								
C1	0.000								
G00 G90 G54									
G41	: D 3= 0.000								
	(Wear)= 0.000								
G43	: Z H 3= -500.000								
	(Wear)= 0.000								
STL	0:46:13 Wk. 44								
CYC	0:00:00 M30 333								
\$1BST \$2		19:39							
G00		G52=30.120.00.P3.; G1X90.Y100.F1000; G91X100.;							
Search	Research	Edit	Trace	Check	Ont exp	Offset	Coord	Ont set	MST
=Input	+Input	Easy setting	G54-G59	G54.1 P	Coord G92/G52	ALL clear	All axis clear	Next axis	Close

### CAUTION

 If the tool offset amount or workpiece coordinate system offset amount is changed during automatic operation (including during single block stop), the changes will be valid from the command in the next block or after several subsequent blocks.

## 2.11 Counter Set

An arbitrary value can be set in the relative position counter which opens as a pop-up window.



### Menus

Menu	Details	Type	Reference
Close	This closes the pop-up window and quits this function.	C	

## Operation method

- (1) Press the main menu .



The relative position counter opens as a pop-up window.  
The cursor appears at the 1st axis of the relative position counter.

Relat posn	
X1	0.000#1
Y1	0.000#1
Z1	-495.000
C1	0.000

Instead of the operation above, the axis name address key can be pressed to set the counter.

(Example)



The relative position counter opens as a pop-up window.  
The cursor appears at the designated axis (Z axis).

Relat posn	
X1	0.000#1
Y1	0.000#1
Z1	-495.000
C1	0.000

- (2) Input a numeric value.

(Example) 100.000



If the  key is pressed without inputting a value, zero (0) will be set.

The set value "100.000" appears at the cursor position. The cursor moves to the next axis.

Relat posn	
X1	100.000#1
Y1	0.000#1
Z1	-495.000
C1	0.000

- (3) Repeat step (2) for each axis.

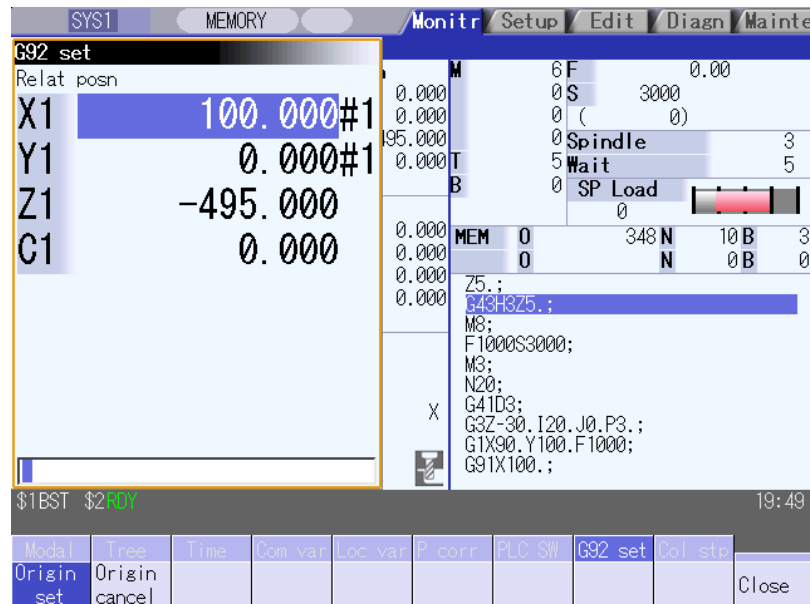


For axes that are not to be operated, press the  key and move the cursor.

The pop-up window closes when the counter has been set for the last axis.

## 2.12 Origin Set, Origin Cancel

Origin set and origin cancel can be executed.



### Menus

Menu	Details	Type	Reference
Origin set	The origin is set. When main menu <b>G92 set</b> is pressed, the menu <b>Origin set</b> is highlighted and the origin set mode is activated.	A	
Origin cancel	The origin is canceled. The origin cancel mode is activated when this menu is pressed.	A	
Close	This closes the pop-up window and quits this function.	C	

### Differences between origin set and origin cancel

	Origin set	Origin cancel
Function	The coordinate system is shifted so the current position becomes the designated position 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 relative position counter and workpiece coordinate counters become "0".	The relative position counter matches the machine coordinate counter.
Offset	The G92 shift amount is updated.	The G92 shift amount and the G52 shift amount for the G54 to G59 coordinate system becomes "0".



**Operation method (Setting the origin)**

- (1) Press the main menu
- G92 set**
- .



The relative position counter opens as a pop-up window.  
The menu **Origin set** is highlighted.  
The cursor appears at the 1st axis of the relative position counter.

Relat posn	
X1	90.000
Y1	100.000
Z1	-530.000
C1	0.000

- (2) Input 0, and then press the
- INPUT**
- key.




If the **INPUT** key is pressed without inputting a value, zero (0) will be set.  
(Origin zero)

"0.000" appears at the cursor position.  
The cursor moves to the next axis.

Relat posn	
X1	0.000
Y1	100.000
Z1	-530.000
C1	0.000

- (3) Repeat step (2) for each axis.



For axes that are not to be operated, press the  key and move the cursor.

The pop-up window closes when the origin has been set for the last axis.

**(Note)** An error will occur if a value other than 0 is set.

**Operation method (Canceling the origin)**

- (1) Press the main menu
- G92 set**
- , and then press the menu
- Origin cancel**
- .



The relative position counter opens as a pop-up window.  
The menu **Origin cancel** is highlighted.  
The cursor appears at the 1st axis of the relative position counter.


- (2) Press the
- INPUT**
- key.



The same value as the machine position appears at the cursor position.  
The cursor moves to the next axis.

- (3) Repeat step (2) for each axis.



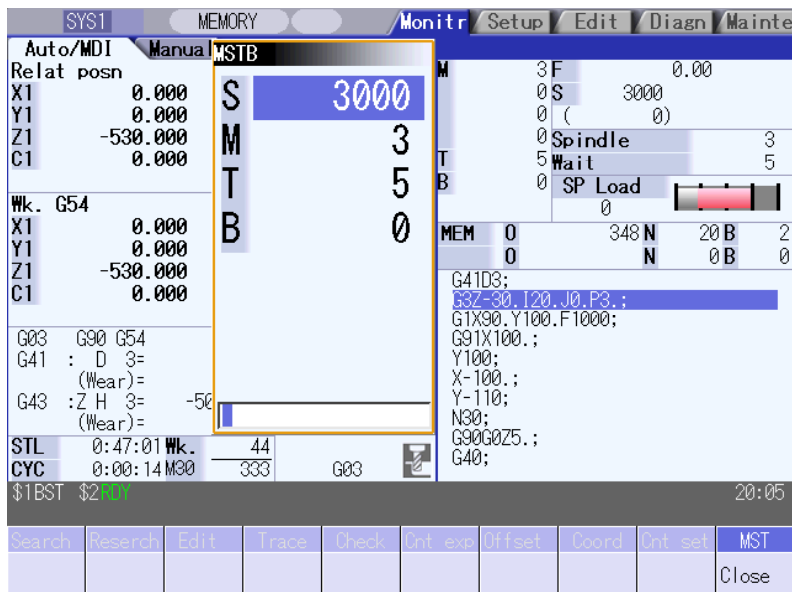
For axes that are not to be operated, press the  key and move the cursor.

The pop-up window closes when the origin has been canceled for the last axis.

## 2.13 Manual Numerical Value Command

The spindle function (S), miscellaneous function (M), tool function (T) and 2nd miscellaneous function (B) commands can be executed.

The manual numerical value command can be executed by inputting an address such as S, M, T or B, as well.



### Menus

Menu	Details	Type	Reference
Close	This closes the pop-up window and quits this function.	C	

## Operation method (Executing T31 with a manual numerical value command)

- (1) Press the main menu **MST**. → The S, M, T, B display opens as a pop-up window.
- |   |      |
|---|------|
| S | 100  |
| M | 50   |
| T | 4    |
| B | 1000 |
- Using the **↑** and **↓** keys, move the cursor to the position to be set. → The cursor moves.
- (2) The manual numerical value command can also be issued by using the address keys instead of the operation above.  
(Example) **T** → The S, M, T, B display opens as a pop-up window. The cursor appears at T.
- |   |      |
|---|------|
| S | 100  |
| M | 50   |
| T | 4    |
| B | 1000 |
- (3) Input a value.  
31 **INPUT** → The input value is set.

**(Note)** The cursor moves to the first line when the part system is changed while displaying the manual numeric command window.

## Operation method (Canceling the manual numerical value command)

The manual numerical value command mode is canceled by carrying out one of the following operations before pressing the **INPUT** key.

- Press the menu **Close**
- Press the **◀** key
- Change the screen

## Setting/output range of manual numerical value command

The manual numerical value command setting range is shown below.

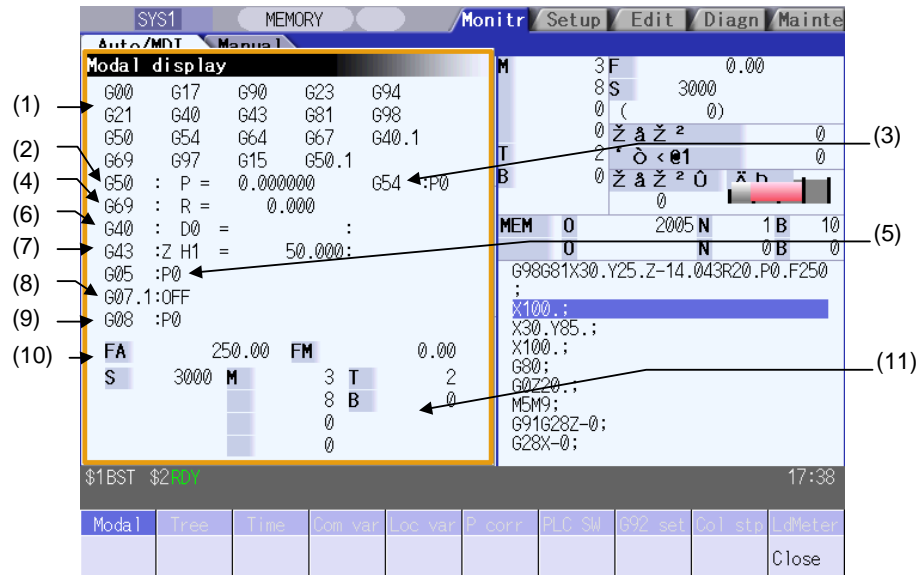
	BCD	Signed binary
S	-	-99999999 to 99999999
M	0 to 99999999	-
T	0 to 99999999	-
B	0 to 99999999	-

- Add a "-" sign before the value to set a negative value. The display will be a positive value.
- A value larger than "#3001 slimt1" to "#3004 slimt4" or "#3005 smax1" to "#3008 smax4" cannot be output for S.

## 2.14 Modal Display

The state of each modal during automatic operation is displayed.  
The displayed details differ for the M system and L system.

### <M system>

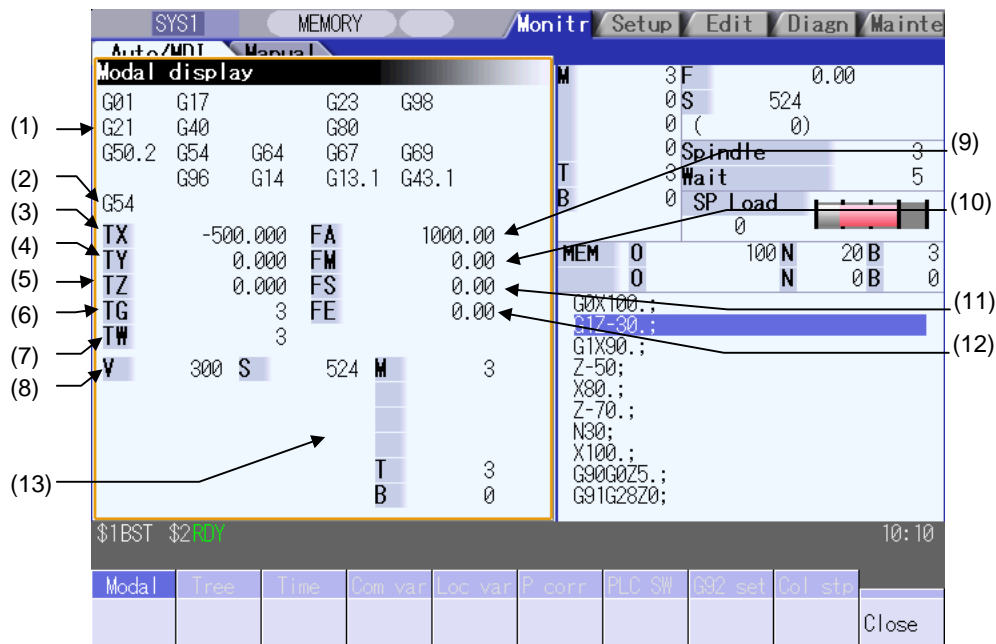


### Display items

This displays each modal state.

Display item	Details
(1) G00...G94 : G69...G42.1	Status of currently executed G command modal
(2) G50:P=0.000000	Scaling magnification
(3) G54.1:P0	Extended workpiece coordinate system
(4) G69:R=0.000	Coordinate rotation angle (Displays within a $\pm 360^\circ$ range)
(5) G05:P0 Q1 Q2 P10000 P1 P2 P3 SSS	High-speed machining mode High-speed high-accuracy control 1 Spline interpolation High-speed high-accuracy control 2 (SSS control OFF) High-speed machining mode I High-speed machining mode II High-speed machining mode III SSS valid
(6) G40: D0 = 100.000000: 10.000000	Tool radius compensation modal Compensation No. Shape compensation amount in respect to tool radius Tool radius wear amount
(7) G49: Z H0 = 0.000000: 0.000000	Tool length compensation modal Compensation axis name Compensation No. Compensation amount Tool length wear amount
(8) G07.1:OFF	Cylindrical interpolation modal
(9) G08: P0 P1	High-accuracy control mode High-accuracy control mode OFF High-accuracy control mode ON
(10) FA FM	F modal value of currently executed program command Manual federate
(11) S1 to S4 M1 to M4 T B	Program command modal value of each currently executed command S command M command T command 2nd miscellaneous function (B) command

## &lt;L system&gt;



## Display items

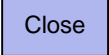
This displays each modal state.

Display item	Details
(1) G01...G94 : G69...G42.1	Status of currently executed G command modal
(2) G54.1:P10	Extended workpiece coordinate system
(3) TX : -12.345	The total value of the first axis' tool length and wear compensation amount for the tool being used
(4) TZ : 12.345	The total value of the second axis' tool length and wear compensation amount for the tool being used
(5) TY : 10.000	The total value of the additional axis' tool length and wear compensation amount for the tool being used
(6) TG : 123	Tool length compensation No.
(7) TW : 123	Wear compensation No.
(8) V 12345678	Modal value for constant surface speed spindle rotation speed (V1 to V4)
(9) FA 24000.00	F modal value of currently executed program command
(10) FM 1200.00	Manual federate
(11) FS 0.0000	Program command synchronous feedrate modal value
(12) FE 0.0000	Thread lead command synchronous feedrate modal value
(13) S1 to S4 M1 to M4 T1 to T2 B	Program command modal value of each currently executed command S command M command T command 2nd miscellaneous function (B) command

**(Note)** Fixed cycle programs

When a fixed cycle command is executed, the G command in the fixed cycle subprogram is not affected by the G modal in the called program.

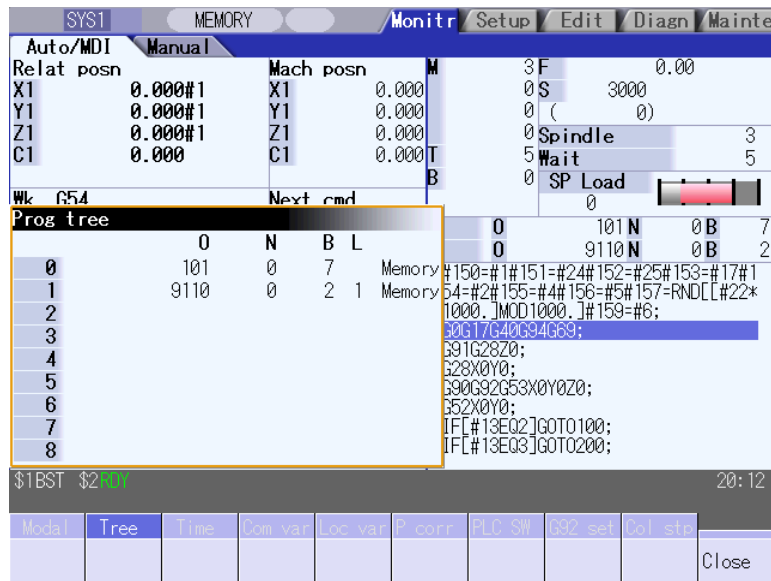
**Menus**

Menu	Details	Type	Reference
	This closes the pop-up window and quits this function.	C	

**(Note)** The menu is common for the M system and L system.

## 2.15 Program Tree Display

This displays the main program, subprogram, MDI interrupt and user macro call nesting structure.



### Display items

Display item	Details
(1) 0	Program No. (0 to 15 characters) If the program No. (program name) exceeds 15 characters, "*" will appear at the 15th character.
(2) N	Sequence No. (0 to 99999)
(3) B	Block No. (0 to 99999)
(4) L	Remaining number of subprogram repetitions (0 to 99)
(5) Mode	Operation mode (0 to 7 characters)
(6) Main	Main program
(7) 1 to 8	Called subprogram, user macro call and MDI interrupt

### Menus

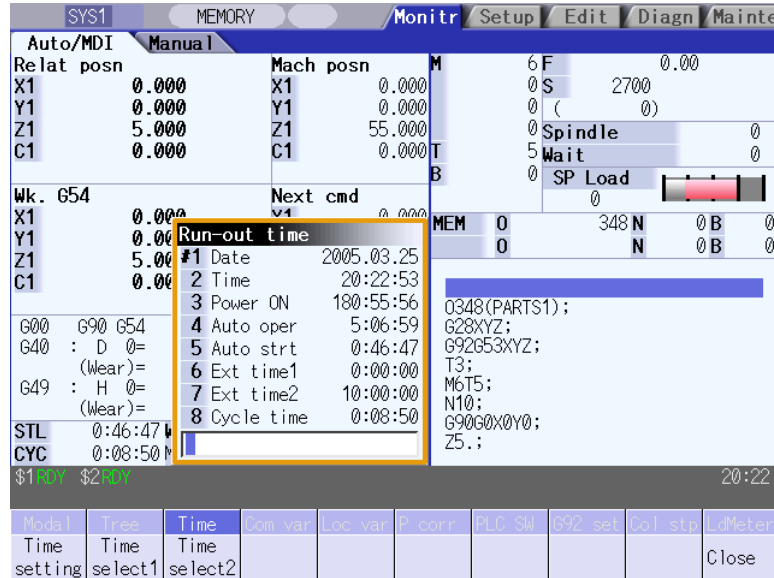
Menu	Details	Type	Reference
Close	This closes the pop-up window and quits this function.	C	

## 2.16 Integrated Time Display

The integrated time (date, time, power ON time, automatic operation time, automatic start time, external integrated time 1, external integrated time 2, cycle time) controlled by the NC can be set and displayed.

Note that the cycle time cannot be set. (Cycle time is display only.)

The integrated times displayed in cycle time display area on "Auto/MDI" tag can be set.



### Display items

Display item	Details
(1) #1 Date	The current date set in the NC is displayed. Year: 4 digits, Month: 2 digit, Date: 2 digit (YYYY.MM.DD)
(2) 2 Time	The current time set in the NC is displayed with the 24-hour system. (HH:MM:SS)
(3) 3 Power ON	This displays the total integrated time of the time from NC power ON to OFF. (HHHH:MM:SS)
(4) 4 Auto oper	This displays the total integrated time of the work time from automatic start button pressing in the memory (tape) mode to M02/M30 or reset button pressing (HHHH:MM:SS)
(5) 5 Auto strt	This displays the total integrated time during automatic starting from automatic start button pressing in the memory (tape) mode or MDI to feed hold stop, block stop, or reset button pressing. (HHHH:MM:SS)
(6) 6 Ext time1	This content differs depending on machine tool builder specification. (HHHH:MM:SS)
(7) 7 Ext time2	This content differs depending on machine tool builder specification. (HHHH:MM:SS)
(8) 8 Cycle time	This displays the time that automatic operation is started from when the automatic start button is pressed in the memory (tape) mode or MDI to when feed hold stop or block stop is applied or the reset button is pressed.

**(Note)** When the #3 Power ON to #8 Cycle time displays reach the maximum value (9999:59:59), the count stops, and the maximum value remains displayed.



## Menus

Menu	Details	Type	Reference
Time setting	This sets the integrated time.	A	2.16.1 Setting the Integrated Time
Time select1	The time that is displayed in upper line on cycle time display area is selected.	C	2.16.2 Setting the Time Display Selection
Time select2	The time that is displayed in bottom line on cycle time display area is selected.	C	
Close	This closes the pop-up window and quits this function	C	

## 2.16.1 Setting the Integrated Time

## Operation method

- (1) Press the menu . ➡ The time setting mode is entered.  
The cursor appears at the "#1 Date" position in the integrated time display.
- (2) Input today's date.  
(Example) 2003/8/19  ➡ "2003.08.19" appears at "#1 Date", and the cursor moves to "#2 Time".
- (3) Set the data for each item, and press the  key. ➡ When "#7 External integrated time 2" has been set, the cursor disappears, and the time setting menu highlight is turned OFF.
- If the item does not need to be set, press the  key and move the cursor.  
Note that #8 Cycle time cannot be set, so the cursor will not move.

(Note 1) The data delimiters are as shown below.

Item	Valid delimiters during setting	Delimiters in display
#1 Date	" . " or " / "	" . "
#2 Time to #7 Ext time2	" : " or " / "	" : "
#8 Cycle time		" : "

(Note 2) If the  or  key is pressed again during the time setting mode, the time setting mode will be canceled.

## Setting range

Display item	Range
#1 Date	1980.1.1 to 2069.12.31
2 Time	00:00:00 to 23:59:59
3 Power ON	00:00:00 to 59999:59:59
4 Auto oper	
5 Auto strt	
6 Ext time 1	
7 Ext time 2	

## 2.16.2 Setting the Time Display Selection

The displayed time is set on cycle time display area.

## Operation method

- (1) Press the menu "Time select1" ➡ The time selection mode is activated, and the following menu appears.

Date	Time	Power ON	Auto oper	Auto strt	Ext time1	Ext time2	Cycle time
------	------	----------	-----------	-----------	-----------	-----------	------------
- (2) Press the time type for the mode to display.  
(Example) "Auto oper" ➡ The automatic operation time is displayed in upper line on cycle time display area. The menu display returns to integrated time sub-menu.
- (3) Press the menu "Time select2" ➡ The time selection mode is activated, and the following menu appears.

Date	Time	Power ON	Auto oper	Auto strt	Ext time1	Ext time2	Cycle time
------	------	----------	-----------	-----------	-----------	-----------	------------
- (4) Press the time type for the mode to display.  
(Example) "Power ON" ➡ The automatic operation time is displayed in bottom line on cycle time display area. The menu display returns to integrated time sub-menu.

**(Note 1)** The displayed time is held even after the power is turned OFF and ON.

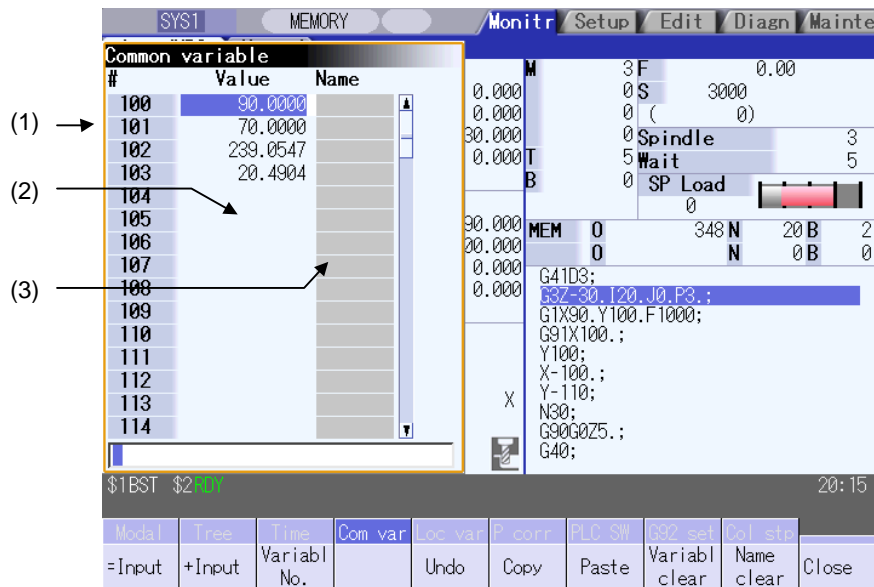
## 2.17 Common Variables

The details of the common variables can be set and displayed on this screen.

If there is a common variable command (Note) in the machining program, the variable value (variable name) set when the block is executed is displayed.

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

**(Note)** The variable names can be set for common variables #500 to #519.



### Display items

Display item	Details
(1) Variable No.	<p>This is the common variable No. There are address #100 and address #500 variables.</p> <p>The #100 variables appear at the head when the power is turned ON.</p> <p>If "#1052 MemVal" is set to "1" (Designate No. of common variable for common part system), "*" is attached to the part system common variable. (Note that if there is only one part system, "*" will not appear.)</p>
(2) Variable value	<p>The setting range is -999,999,999 to 999,999,999 or blank.</p> <p>An exponential is displayed when a 7 digits are set in the integer section and 5 digits or more as set in the decimal section.</p> <p><b>(Example)</b> 1234567 → 1.2346E+006, 0.00001 → 1.0000E-005</p> <p>The minimum setting unit that can be set is 1.0000E-099 (99 digits below decimal point).</p> <p><b>(Note)</b> When the setting is "blank", the setting will be handled as "0" in the calculations. However, when the conditional expressions EQ or NE are used, the blank will not be handled as "0".</p>
(3) Variable name	<p>A variable name can be assigned for #500 to #519.</p> <p>Up to seven alphanumeric characters, starting with an alphabet character, can be set for the variable name.</p>

## Menus

Menu	Details	Type	Reference
=Input	This executes an absolute input.	C	2.17.1 Setting Common Variables
+Input	This executes an addition input.	C	
Variabl No.	This designates the variable No. to be displayed at the head.	A	
Undo	This returns the last rewritten data to its original value. This menu key is valid for "Data Input", "Paste" and "Undo" operations. Note that return to the original value is not possible after variable clear and comment clear operations.	C	
Copy	This copies the variable value and variable name at the cursor position.	A	2.17.2 Copying/Pasting Common Variables
Paste	This pastes the copied variable value and variable name.	C	
Variabl clear	This clears the contents of the variable No. at the cursor position or continuous variable Nos. <b>(Note)</b> The contents are not cleared to "0". The state with no data is entered.	A	2.17.3 Erasing Common Variables
Name clear	This clears the variable No. at the cursor position or the continuous variable number's variable name (Variable name: variable No. 500 to 519).	A	
Close	This closes the pop-up window and quits this function.	C	

## 2.17.1 Setting Common Variables

## Operation method (Setting "135.000" in variable No. 102)

- (1) Press the menu Variabl No. ➡ The menu is highlighted.
- (2) Designate the variable No.  
102 INPUT ➡ The common variable for the set No. appears at the head.
- The cursor can be moved to 102 using the ↑, ↓, ▲ and ▼ keys.
- (3) Input a value.  
135 INPUT ➡ The set value appears.
- The value can also be set by pressing the menu =INPUT instead of the INPUT key.  
The value can also be input as an exponential.  
(1.35E2 INPUT or 1.35E2 =INPUT.)

## Operation method (Adding "1.234" to variable No. 102)

- (1) Select common variable 102 with the same procedure as steps (1) and (2) above.
- (2) Input a value.  
1.234 +INPUT ➡ The value obtained by adding the input value to the original value appears.  
**(Example)** If the original value is 135.000, 136.234 appears. ( $135.000 + 1.234 = 136.234$ )

## Operation method (Setting "COUNTER" as the variable name for variable No. 509)

- (1) Select common variable 509 with the same procedure as steps (1) and (2) above. ➡ The cursor appears at the cursor 509 variable position.
- (2) Press the →| key. ➡ The cursor moves to the 509 variable name.
- (3) Input the variable name.  
COUNTER INPUT ➡ "COUNTER" appears.

**(Note)** The variable name can be set only for variable Nos. 500 to 519.

## 2.17.2 Copying/Pasting Common Variables

## Operation method

- (1) Select the variable to be copied. ➡ The cursor moves to the selected variable.
- One of the following methods can be used to select the variable.
- Using the cursor movement keys  
↓ and ↑, move the cursor to the variable to be selected.
  - Press Variabl No. and set the variable No. in the input area, and press the INPUT key.
- (2) Press the menu Copy . ➡ One line of the copied variable is highlighted.
- (3) Select the variable to be pasted, and press the menu Paste. ➡ The copied variable is pasted, and the highlight returns to normal.  
The copied variable is held until a variable is newly copied.

## 2.17.3 Erasing Common Variables

## Operation method (Erasing the variable value for variable number 102 to 104)

- (1) Press the menu Variabl clear . ➡ The menu is highlighted.
- (2) Input the No. (range) of the variable to be erased.  

102/104 INPUT

 ➡ A message confirming the erasing appears.  
 The background color of the erase range (variable value) changes to light blue.  
 To erase only one variable, input one variable No.  
 (102 INPUT)
- (3) Press the Y key. ➡ The selected variable is erased.

## Operation method (Erasing the variable name for variable No. 509)

- (1) Press the menu Comment clear . ➡ The menu is highlighted.
- (2) Select the variable , and press the INPUT key  

509 INPUT

 ➡ A message confirming the erasing appears.  
 The background color of the erase range (variable name) changes to light blue.
- (3) Press the Y key. ➡ The variable name for 509 only is erased.  
 The variable value is not erased.

## Precautions regarding erasing the variable value and variable name

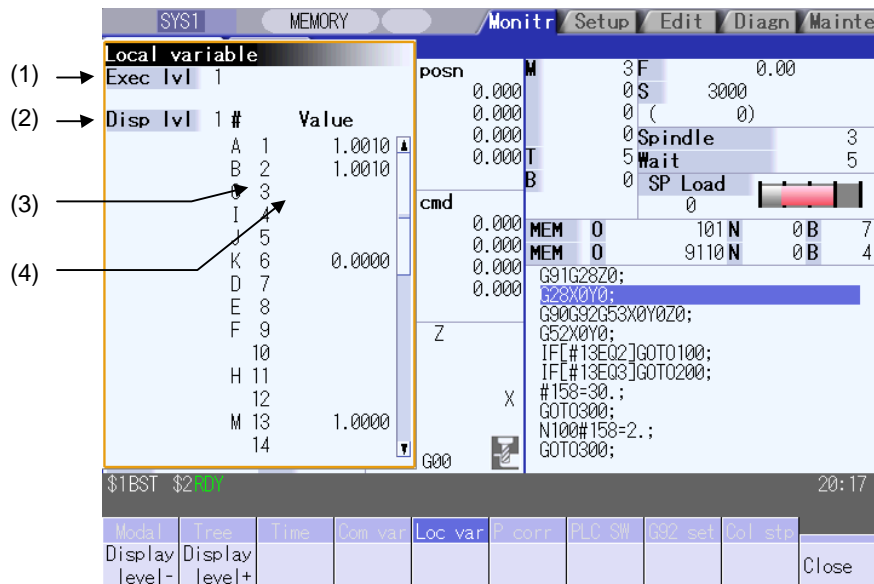
The variable at the cursor position will become the target of the erasing if the INPUT key is pressed without designating a variable No.



## 2.18 Local Variables

The details of the local variables are displayed

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 5-level configuration from level 0 to level 4 is used in page order. If there is a local variable command or an argument designation called by the user macro subprogram in the block, and that block is executed first, the set variable value (variable name) will be displayed.



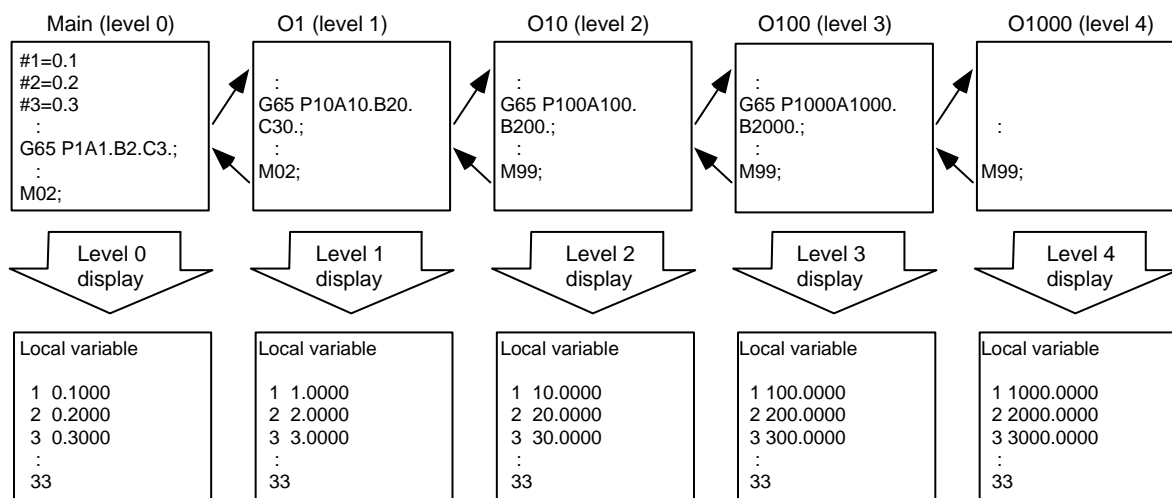
### Display items

Display item	Details
(1) 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
(2) Display level	This displays the nest level of the local variable displayed in the area.
(3) Variable No.	This displays the local variable No. 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 not displayed. There are 33 local variables (1 to 33) for each user macro subprogram call level.
(4) Variable value	This displays the local variable value. If the variable data is "blank", the display will be blank. An exponential is displayed when a 7 digits are set in the integer section and 5 digits or more as set in the decimal section. <b>(Example)</b> 1234567 → 1.2346E+006, 0.00001 → 1.0000E-005 <b>(Note)</b> When the setting is "blank", the setting will be handled as "0" in the calculations. However, when the conditional expressions EQ or NE are used, the blank will not be handled as "0".

## Menus

Menu	Details	Type	Reference
Display level-	This lowers the local variable display level one by one. If this menu is pressed when the display level is 0, the level changes to display level 4.	C	2.18.1 Displaying the Arbitrary Local Variables
Display level+	This increases the local variable display level one by one. If this menu is pressed when the display level is 4, the level changes to display level 0.	C	
Close	This closes the pop-up window and quits this function.	C	

## Relation of user macro subprogram call execution level and display level



## Precautions

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

## 2.18.1 Displaying the Arbitrary Local Variables

## Operation method (Displaying the next level)

When the current display level is 0

(1) Press the menu Display level +. ➡ The level 1 local variables appear from the head.

When the menu Display level + is pressed again, the display level changes in the order of 2 → 3 → 4 → 0 → 1 → 2 → ... and so forth.

## Operation method (Displaying the previous level)

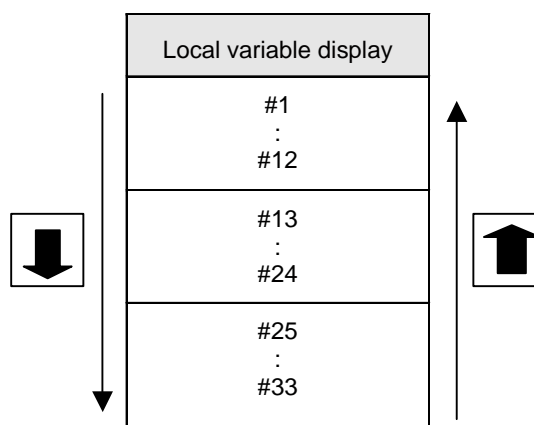
When the current display level is 2

(1) Press the menu Display level -. ➡ The level 1 local variables appear from the head.

When the menu Display level - is pressed again, the display level changes in the order of 0 → 4 → 3 → 2 → 1 → 0 ... and so forth.

## Operation method (Changing the displayed variable No.)

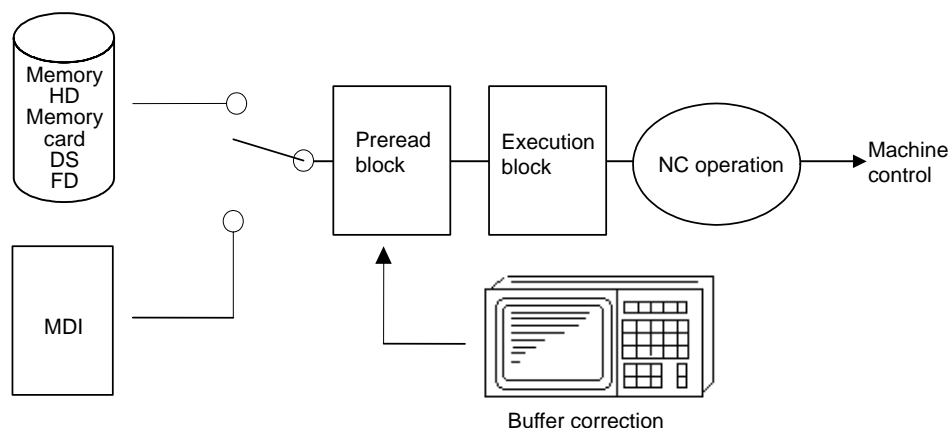
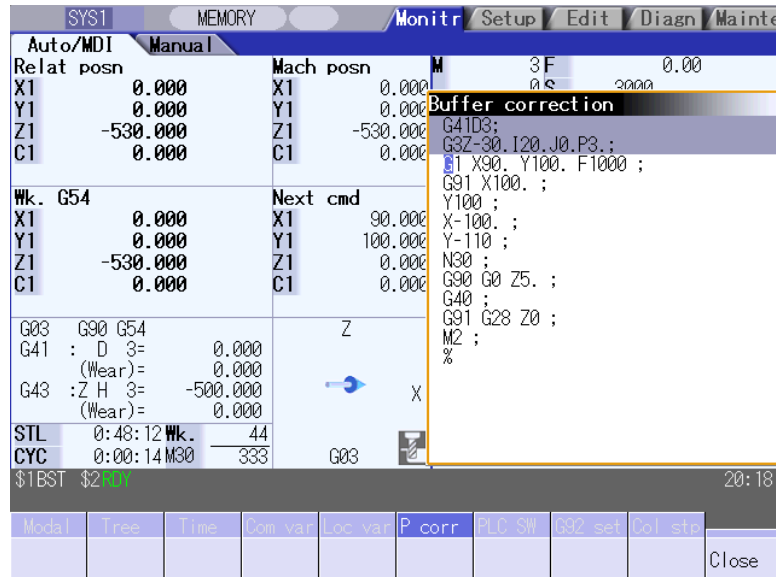
The displayed local variable No. changes when the page changeover keys (previous page ⬆, next page ⬇) are pressed.



## 2.19 Buffer Correction

During automatic operation (Memory, HD, FD, DS, memory card) 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.



- (1) The next command can be corrected in the following two cases.
  - When single block stop is applied, and there is a command block to be corrected in the next command.
  - When there is an error (program error) in the next command and automatic operation is stopped.
- (2) Not only the displayed buffer data but also the contents in the device are corrected with the buffer corrections. (The corrected data is reflected.)
- (3) Several blocks following the next command can be corrected simultaneously.

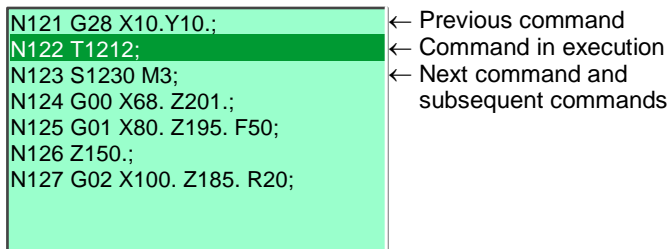
### Menus

Menu	Details	Type	Reference
Close	This closes the pop-up window and quits this function.	C	

## 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.

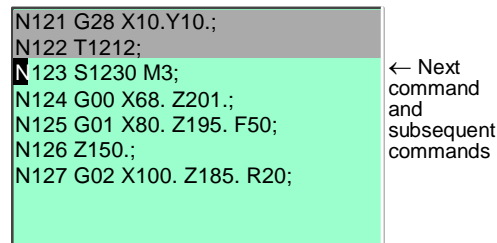
The normally executed program appears in the buffer correction area.



- (1) Press the main menu .



The buffer correction mode is entered.



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.

- (2) Correct the program with the same method as a normal program editing.

- (3) Press the  key.



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

If a program error has occurred, the error display is erased.

- (4) Confirm that the corrected data is correct, and then restart.



The program execution resumes from the currently stopped position.

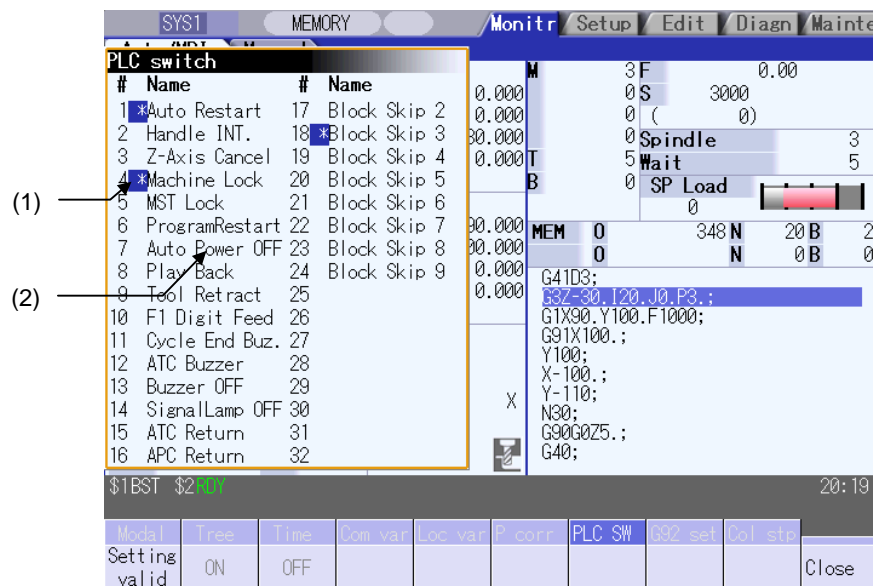
## Precautions

- (1) Buffer correction mode will not be applied in the following cases.
  - (a) Machining program for buffer corrections is in edit lock or program display lock state.
  - (b) Data protection key 3 is enabled.
  - (c) Machining program for the device in write-protection state
  - (d) Machining program in read-only state
- (2) Starting and ending buffer corrections
  - (a) If automatic operation is started or there is no next command data, the buffer correction mode is not entered even if the menu key is pressed.
  - (b) To stop or to cancel the buffer corrections, press the menu Close again, or press the ◀ key.
  - (c) If another menu key, etc., is pressed before pressing the INPUT key, the corrected buffer contents return to the original data.
  - (d) If changing to another screen or resetting the NC during buffer correction, the buffer correction is canceled. In this case, the corrected contents are not saved, and the buffer correction mode ends.
- (3) Display data during buffer correction
  - (a) The key operations used for corrections in the buffer correction mode are the same as the operations when editing a program.  
Up to 16 blocks can be displayed. Even when a block is displayed over several lines, all 16 blocks can be displayed by scrolling the buffer correction area.
  - (b) Number of characters in one block is max. 256.  
If exceeds 256 characters, the block will be split into two.
  - (c) Up to 4096 characters can be edited with buffer corrections.
- (4) Operations during buffer correction
  - (a) If there is no ";" (EOB) at the data in the last block corrected when the INPUT key is pressed, it is added automatically.
  - (b) 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.
    - 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.
    - If one block is deleted by pressing the C.B key, the block is deleted up to the section following the incomplete display (up to the ";").
  - (c) Operation cannot be started during buffer correction. An alarm occurs.
  - (d) If NC is reset during buffer correction, buffer correction mode will be canceled, although buffer correction window is left opened. At this time, editing operation is not possible. Close the correction window.
  - (e) Buffer correction writing is not interrupted by NC reset.
- (5) For multi-part system
  - (a) When a machining program under buffer correction is called by another part system, a file input/output error occurs to the caller-side part system, and restart of the operation will be disabled.
  - (b) If the same program is executed in another part system after a buffer correction, there may be some changes in paths, etc. So, please be careful.
- (6) Previous command and command in execution
  - (a) When the buffer is corrected following the operation mode change at single block stop, nothing will be displayed in previous command and command in execution.
  - (b) When there is no block after sub program call or user macro call, a program error occurs at the last block of the destination program. If a buffer correction is made in this state, the destination program will be displayed in the buffer correction window, but the actual correction result will be reflected on the source program.

## 2.20 PLC Switch Function

The various control signals for NC operation can be turned ON and OFF.

Refer to the instruction manual issued by the machine tool builder for details.



### Display items

Display item	Details
(1) Mark indicating switch ON	This is displayed for switches that are turned ON
(2) Switch name	The display contents differ depending on machine tool builder specification.

### Menus

Menu	Details	Type	Reference
Setting valid	Setting of the PLC switch is started.	A	2.20.1 Turning PLC Switches ON/OFF
ON	This turns ON the switch currently indicated by the cursor.	C	
OFF	This turns OFF the switch currently indicated by the cursor.	C	
Close	This closes the pop-up window and quits this function.	C	

## 2.20.1 Turning PLC Switches ON/OFF

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

- (1) Press the menu Setting valid . ➡ The menu Setting valid will be highlighted.  
A message confirming the start of PLC switch setting will appear.
- (2) Press "Y" or INPUT ➡ The PLC switch setting mode will be entered.  
The cursor will appear at the PLC switch No. position.  
The menu keys ON and OFF 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 | Handle INT.    |
| 3 | Z-Axis Cancel  |
| 4 | *Machine Lock  |
| 5 | MST Lock       |
| 6 | ProgramRestart |
| 7 | Auto Power OFF |
- (4) Press the menu key ON. ➡ The "#6 Program restart" switch turns ON, and a   mark appears.  
To turn OFF, press the menu key OFF.
- | # | Name            |
|---|-----------------|
| 1 | *Auto Restart   |
| 2 | Handle INT.     |
| 3 | Z-Axis Cancel   |
| 4 | *Machine Lock   |
| 5 | MST Lock        |
| 6 | *ProgramRestart |
| 7 | Auto Power OFF  |
- ↖ a   mark appears.

**(Note 1)** If the Setting valid 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 is canceled when the PLC switch's pop-up window is closed.

**(Note 3)** The cursor will not appear in modes other than the PLC switch setting mode.

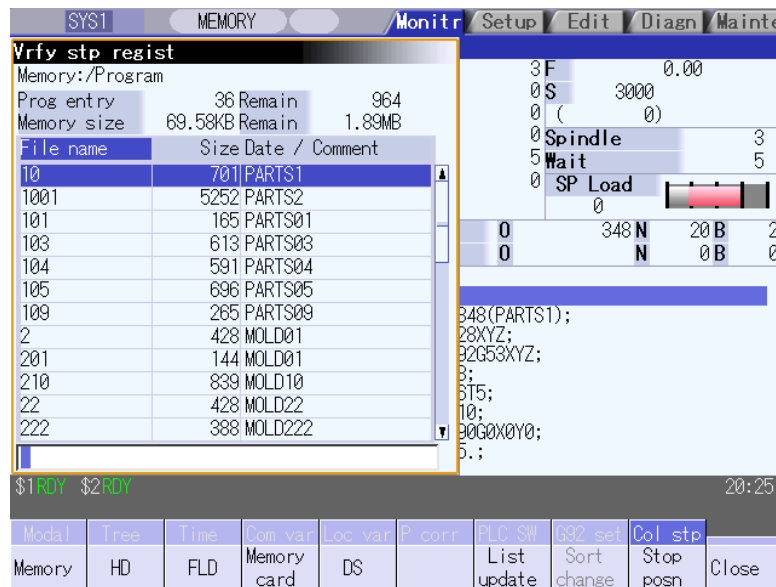


## 2.21 Verify Stop

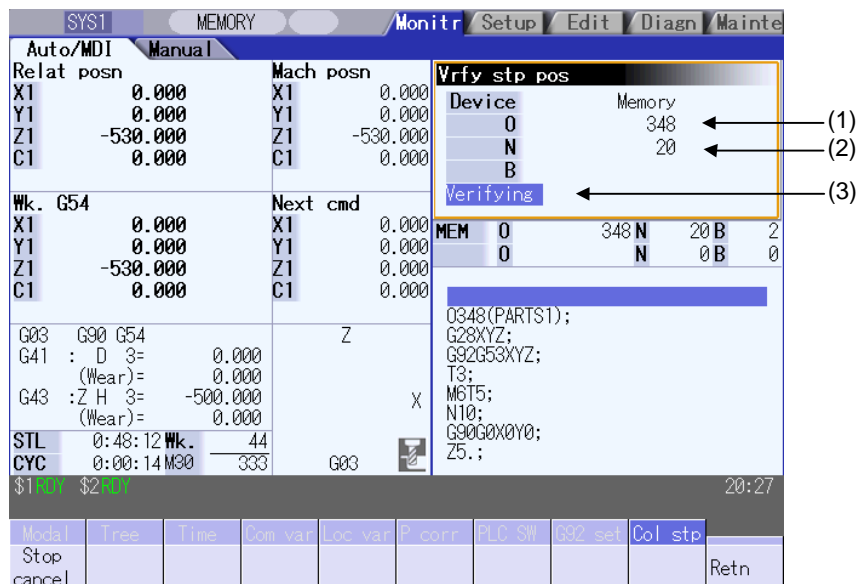
The machining program operation can be block stopped at a registered verify stop position. The registered verify stop position can be canceled.

**(Note)** Verify stop is an additional specification. The verify stop option is required.

**[When verify stop is registered]**



**[When verify stop position is displayed]**



## Display items

Display items	Details
(1) Verify stop device name	This is the name of the device for which verify stop is to be executed.
(2) Verify stop position	This is the position of the program where verify stop is to be executed. This display is cleared when program stop is completed, or NC is reset or canceled. If the program No. (program name) exceeds 24 characters, "***" will appear as the 24th character.
(3) Display during verification	This is displayed during verification.









## Menus (When verify stop is registered)

Menu	Details	Type	Reference
Memory	This selects the device to be stopped for verification. If a device with a directory is selected, the root is selected first.	C	"Registering the verify stop"
HD		C	
NC serial		C	
Memory card		C	
DS		C	
FD		C	
List update	This updates the list contents. (The latest contents of the currently selected device and directory are listed.)	C	2.2.3 Changing the Sorting Method
Sort change	This changes the method of sorting the list.	C	
Stop posn	This opens the verify stop position display window as a pop-up window.	C	
Comment nondisp	This changes whether to show or hide the list comment field. The file name field is increased when the comment field is hidden.	B	
Close	This closes the pop-up window and quits this function.	C	

## Menus (When verify stop position is displayed)

Menu	Details	Type	Reference
Stop cancel	This cancels the verify stop setting. Note that automatic operation is not reset.	C	"Canceling the verify stop"
Retn	This returns the list to the <When verify stop is registered>.	C	

## Operation method (Registering the verify stop)




- (1) Select the part system for executing verify stop with the  $\$ \leftrightarrow \$$  key.  The currently selected part system is displayed at the upper left of the screen.
- (2) Press the main menu **Verify stop**.  The verify stop submenu appears.  
The list appears as a pop-up window.
- (3) Select the device.  
(Example) **HD**  The device name and root directory (HD:/) selected in the device name and directory display fields are displayed.
- (4) Using the , ,  and  keys, move the cursor to the directory containing the file to be set.  The following is displayed.

```

.          DIR
..         DIR
ABC        DIR
SRAM.BIN   1019904 Mar 06 14:54 2003

```

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

- (5) Press the **INPUT** key.  The cursor moves within the directory.
- (6) Input the program No., sequence No. and block No. using / as a delimiter.  
(Example) 1001/1/2 **INPUT**  The verify stop position is displayed, and the program No. ("MDI" for MDI mode), sequence No., block No. and [Verifying] appear.
- (7) Start the automatic operation.  When the verify stop is completed, a message indicating the end appears.  
The stop position displayed on the screen is cleared, and the [Verifying] display is erased.

```

.          DIR
..         DIR
123.PRG    62 Dec 20 15:24 2002
68.PRG     62 Dec 20 15:24 2002
69.PRG     166 Dec 20 15:24 2002

```

```

Device      HD
O           1001
N           1
B           2
Verifying

```

```

Device
O
N
B
Verifying

```

**Operation method (Canceling the verify stop)**

- (1) Carry out the operations in "Operation method (Registering verify stop)".  
 If the verify stop position is not displayed, press the menu **Stop position**.  
 → The verify stop position appears.
- (2) Press the menu **Stop cancel**.  
 → The stop position displayed on the screen is cleared, and the [Verifying] display is erased.

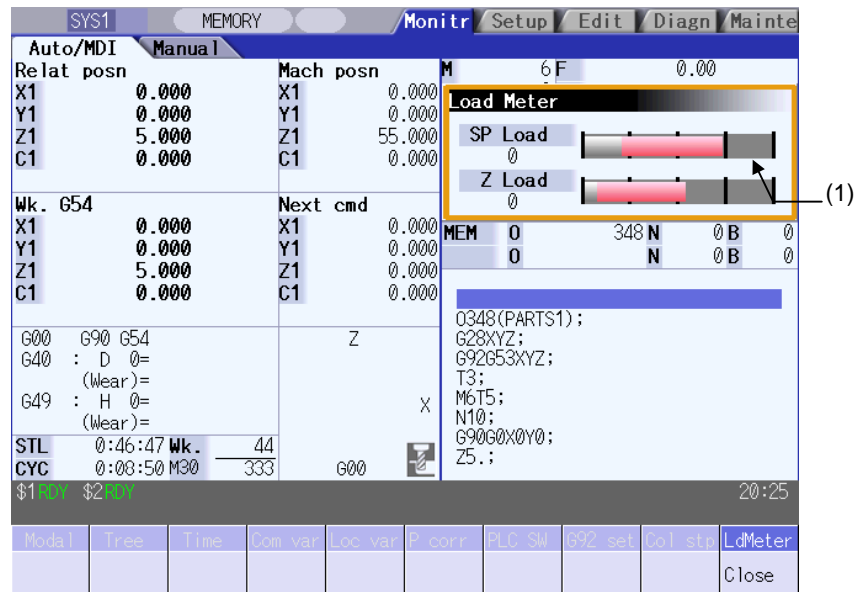
**(Note)** Verify stop can also be canceled during operation.

**Precautions**

- (1) When registering the stop position (O, N, B values), confirm that the block exists in the searched program. Verify stop will not be executed if the corresponding block is not found at the registered stop position.
- (2) Always set one of the O, N or B numbers. If nothing is set, a setting error will occur.
- (3) If the O No. is not set, the O No. used during operation search will be used.
- (4) If the N and B numbers are not set, the block will be searched using the O No.
- (5) If there are several sequences and blocks with the same number in one program, verify stop will be executed after executing the first block that matches in the execution order.
- (6) The settings are canceled when verify stop is executed.
- (7) The settings are canceled when reset is executed.
- (8) If only the program number is set, verify stop will take place at the head of the program only when there is a program number at the first line.
- (9) Verify stop / Verify stop cancel cannot be performed for blocks being executed or blocks already read into the prered buffer.
- (10) Verify stop is not performed in the tapping mode.
- (11) Verify stop is possible in a subprogram, but is not possible in a machine tool builder macro program.
- (12) If verify stop is set for a fixed cycle block, verify stop will be executed after the positioning block is completed.
- (13) Verify stop is possible even when editing is locked.
- (14) Verify stop is executed after executing the block set for the verify stop position. If the verify stop position is set in a program call (M98) block, verify stop will be executed before the subprogram is called.
- (15) If the set block is set to be skipped, verify stop will not be executed.
- (16) The verify stop position can be registered for each part system.
- (17) The stop position cannot be registered during verification.
- (18) Registration of verify stop position is not possible for a program with 33 or more file name characters.
- (19) In the case where the device is HD, memory card, DS, or FD at the time of verify stop position registration, inputting "0/" will be resulted in a setting error.

## 2.22 Load Meter Display

The spindle load and Z axis load, etc., are displayed.



### Display items

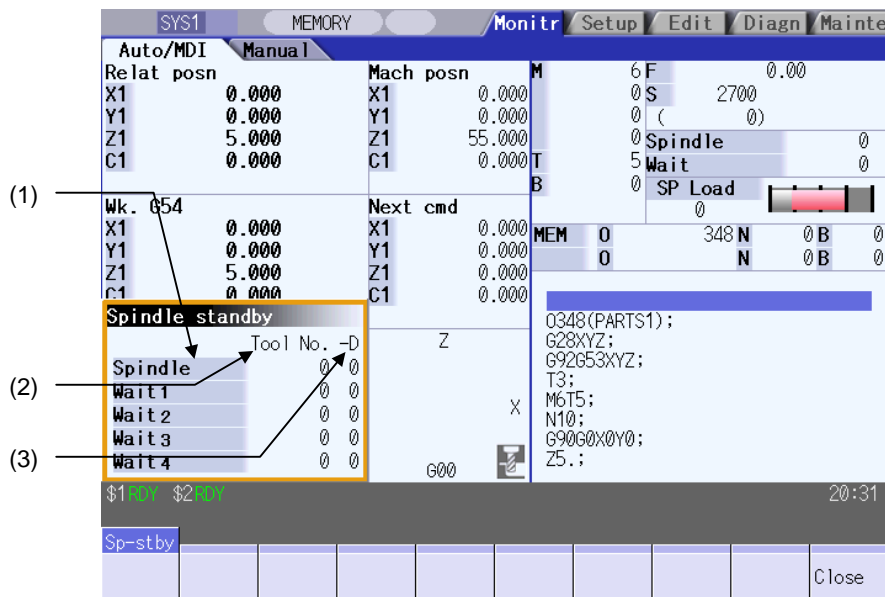
Display item	Details
(1) Load meter 1 Load meter 2	The spindle load and Z axis load, etc., are displayed in a bar graph. These displayed contents differ according to the machine tool builder.

### Menus

Menu	Details	Type	Reference
Close	This closes the pop-up window and quits this function.	C	

## 2.23 Spindle, Standby Display

The current spindle tool No. and the standby tool No. are displayed.



### Display items

Display item	Details
(1) Spindle standby	The display contents differ depending on machine tool builder specification.
(2) Tool No.	This displays No. of tool that is attached to the spindle or standby position in the magazine 1
(3) -D	For D data function and purpose, refer to the instruction manual issued by the machine tool builder.

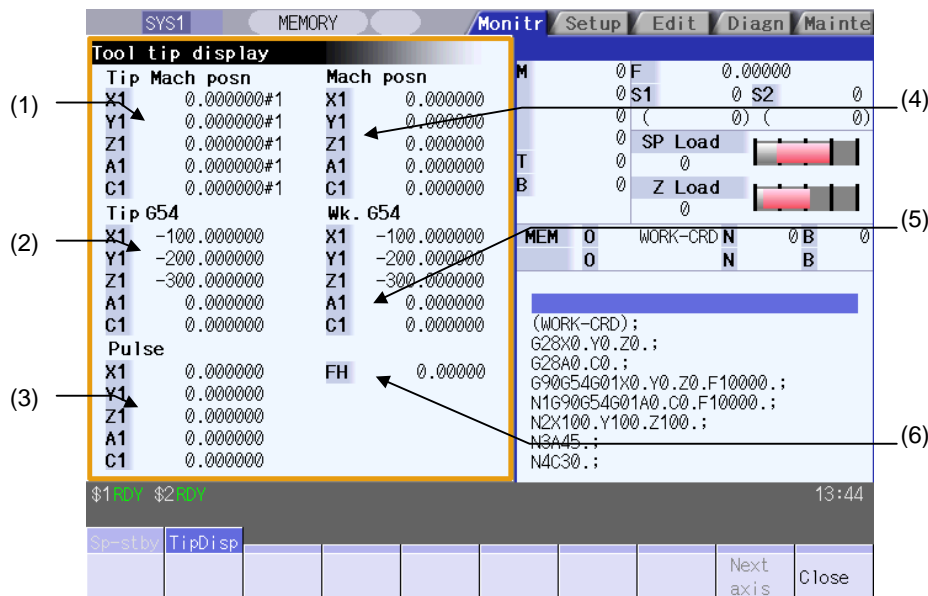
### Menus

Menu	Details	Type	Reference
Close	This closes the pop-up window and quits this function.	C	

## 2.24 Tool Center Coordinate Display

The tool center coordinates, handle interrupt amount (tool axis movement) and tool center point speed are displayed during the tool center point control function, tool length compensation along tool axis function, and tool handle feed & interrupt function (handle feed along the tool axis, tool handle interrupt, tool diameter direction handle feed, nose center rotation handle feed).

This function is an additional specification. The 5-axis related options (tool center point control, tool length compensation along the tool axis, tool handle feed & interrupt) are required.



### Display items

Display item	Details
(1) Tip Mach posn	This displays the position of the tool center from the machine coordinate system reference point in the machine coordinate system.
(2) Tip G54	This displays the position of the tool center from the workpiece coordinate reference point in the selected workpiece coordinate system.
(3) Pulse	This displays the amount moved in the selected axis direction using the manual pulse generator in the hypothetical machine coordinate system. Basically this is updated only when manual ABS is OFF. If "#7905 NO_ABS" is set to "1", this will be updated regardless of the manual ABS ON/OFF.
(4) Mach posn	This displays the coordinate position of each axis in the basic machine coordinate system having a characteristic position, specified by the machine, as a zero point.
(5) Wk. G54	This displays the selected workpiece coordinate system (G54 to G59)/external workpiece coordinate system (G54.1 Pn) and the workpiece coordinate position in that workpiece coordinate system.
(6) Movement speed of tool center	This displays the movement speed of tool center. By the parameter "#1125 real_f", actual feedrate and command speed can be switched.

## Menus

Menu	Details	Type	Reference
Next axis	<p>This changes the displayed axes each counter. The displayed axes are changed to axes 1 to 5, and axis 6 and over.</p> <p>This menu cannot be selected when applying to the following condition.</p> <ul style="list-style-type: none"> <li>When the number of enabled axes is 5 or less.</li> <li>Even if the number of enabled axes is 6 or over, the number of displayed axes is 5 or less according to the parameter "#1069 no_dsp" setting.</li> </ul>	C	
Close	This closes the pop-up window and quits this function.	C	

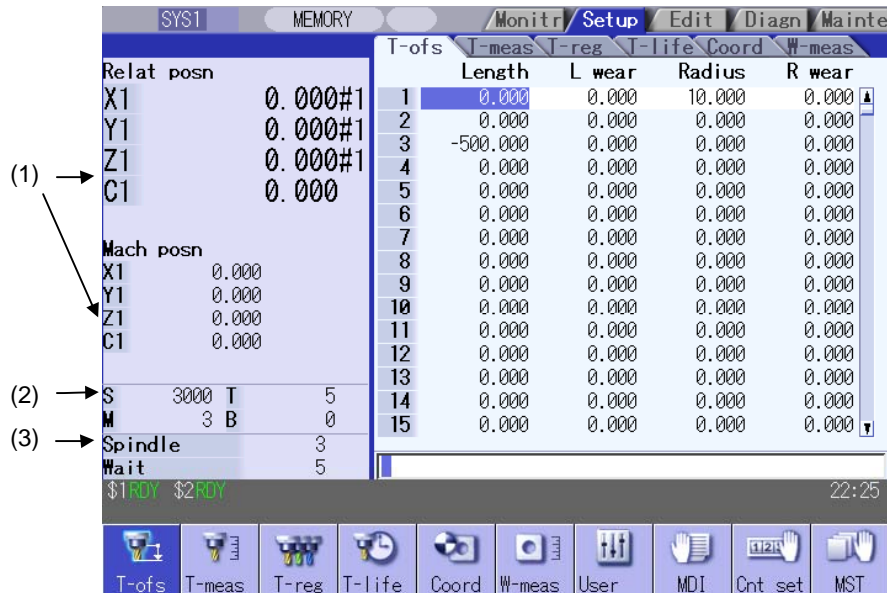


### 3. Setup Screen

The setup screen is used to make tool and workpiece related settings, set user parameters, edit the MDI, set the counter, and perform manual numerical value commands.

#### 3.1 Screen Configuration













The setup screen is configured as shown below.



#### Display items

Display item	Details
(1) Counter display	<p>This displays the relative position and machine position counter. Up to 5 axes can be simultaneously displayed.</p> <p>The following status symbols display if each of the axes are in a set position or status.</p> <ul style="list-style-type: none"> <li>#1 to 4 : Reference position 1 to 4</li> <li>   : Servo OFF status</li> <li>MR : Mirror image</li> <li>&gt;&lt; : Axis removed</li> </ul> <p>It is possible to set whether to consider the tool length and diameter compensation using parameter "#1287 ext23/bit4".</p>
(2) M,S,T,B Command	<p>This displays all command values for M (support function command value), S (spindle command rotation speed), T (tool command value) and B (2nd miscellaneous function command value). The spindle command rotation speed displays only 1st spindle.</p> <p>The presence (absence) of the 2nd miscellaneous function command value is designated using parameter "#1170 M2name".</p> <p>Refer to "3.11 Manual Numerical Value Commands" for details.</p>
(3) Spindle/Wait display	<p>The current spindle tool number and standby tool number can be displayed according to the PLC program specifications. (The numbers do not display in the screen if not created with the PLC program.)</p> <p>The contents of this display differ based on the machine tool builder specifications.</p>

## Menus

Menu	Details	Reference
 T-ofs	This sets the tool compensation amount. There are three types of tool compensation, and the display differs for each type. The number of tool compensation combinations set/displayed differs depending on the options.	3.2 Tool Compensation amount
 T-meas	This performs the tool measurement. By manually moving the tool to the measurement point, the movement distance from the basic point to the measurement point is measured, and this can be set as the tool compensation amount. This menu displays if the option is enabled.	3.3 Tool Measurement
 T-reg	This registers tools. A tool number is allocated to the tool to allow the NC to recognize the tool attached to the machine. The tool number is registered based on the magazine pot, spindle, and standby location to which the tool is attached.	3.4 Tool Registration
 T-life	This performs the tool life management. The life management data containing information such as the tool usage status is set and displayed. Two management methods are used for tool life management. This menu displays if the option is enabled.	3.5 Tool Life Management
 Coord	This sets the workpiece coordinate system offset amount. This sets and displays the coordinate system offset amount controlled by the NC.	3.6 Workpiece Coordinate System Offset
 W-meas	This performs the workpiece measurement. This menu displays if the option is enabled.	3.7 Workpiece Measurement
 User	This sets the user parameters. This screen is used to switch between, set, and display eleven different parameter types.	3.8 User Parameters
 MDI	This edits the MDI program. Press this menu to show the MDI program contents in a pop-up display.	3.9 MDI Program Editing
 Cnt set	This sets an arbitrary value for the relative position counter.	3.10 Counter Setting
 MST	This performs the manual numerical value commands.	3.11 Manual Numerical Value Commands
 T-list	This searches T code among the designated program (including the subprograms) and lists in order that it was found. This menu is displayed only when the T code list option is valid.	3.12 T Code List
 APC Pallet	This registers machining programs to the pallet of automatic pallet changer (hereinafter APC). This menu displays if the option is enabled.	3.13 Pallet Program Registration

### 3.2 Tool Compensation Amount

The tool compensation data can be set and displayed.

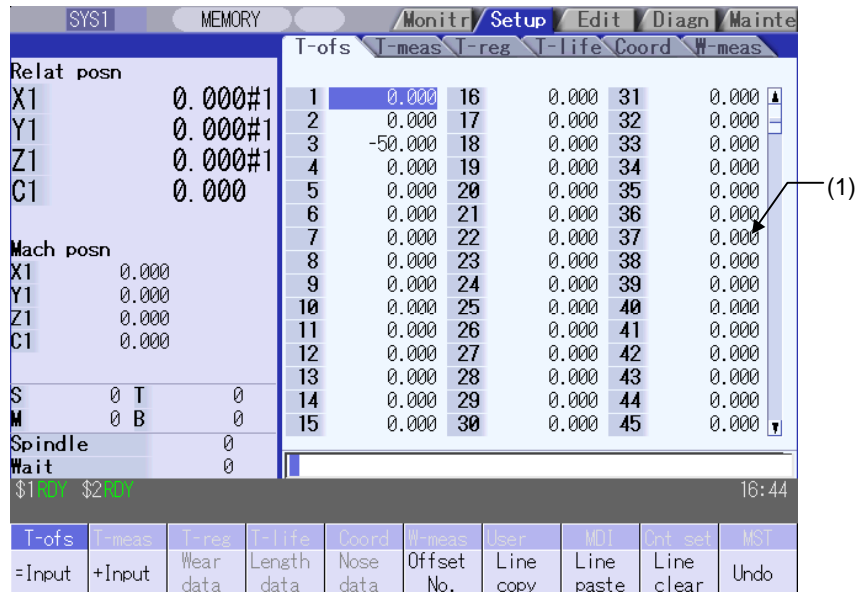
The tool compensation data screen configuration differs according to the tool compensation type.

The number of tool compensation sets to be set or shown differs according to the option.

#### [Tool compensation type I (M system)] : Parameter "#1037 cmdtyp" = 1

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

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

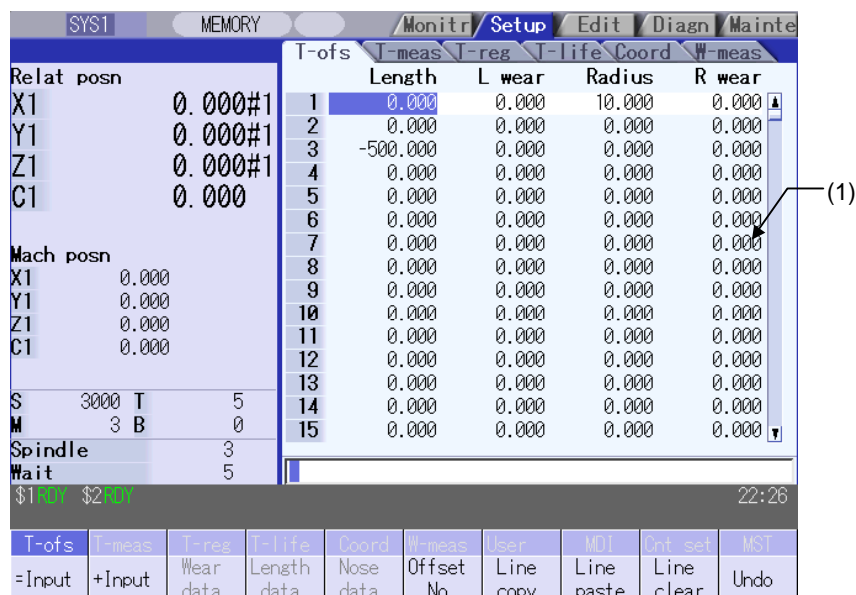


SYS1		MEMORY		Monitr/Setup		Edit		Diagn		Mainte	
				T-ofs	T-meas	T-reg	T-life	Coord	W-meas		
Relat posn				1	0.000	16	0.000	31	0.000		
X1	0.000#1			2	0.000	17	0.000	32	0.000		
Y1	0.000#1			3	-50.000	18	0.000	33	0.000		
Z1	0.000#1			4	0.000	19	0.000	34	0.000		
C1	0.000			5	0.000	20	0.000	35	0.000		
				6	0.000	21	0.000	36	0.000		
				7	0.000	22	0.000	37	0.000		
Mach posn				8	0.000	23	0.000	38	0.000		
X1	0.000			9	0.000	24	0.000	39	0.000		
Y1	0.000			10	0.000	25	0.000	40	0.000		
Z1	0.000			11	0.000	26	0.000	41	0.000		
C1	0.000			12	0.000	27	0.000	42	0.000		
				13	0.000	28	0.000	43	0.000		
S	0 T	0		14	0.000	29	0.000	44	0.000		
M	0 B	0		15	0.000	30	0.000	45	0.000		
Spindle		0									
Wait		0									
\$1 14.0 \$2 17.0				16:44							
T-ofs	T-meas	T-reg	T-life	Coord	W-meas	User	MDI	Cnt set	MST		
=Input	+Input	Wear data	Length data	Nose data	Offset No.	Line copy	Line paste	Line clear	Undo		

#### [Tool compensation type II (M system)] : Parameter "#1037 cmdtyp" = 2

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

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



SYS1		MEMORY		Monitr/Setup		Edit		Diagn		Mainte	
				T-ofs	T-meas	T-reg	T-life	Coord	W-meas		
				Length	L wear	Radius	R wear				
Relat posn				1	0.000	0.000	10.000	0.000			
X1	0.000#1			2	0.000	0.000	0.000	0.000			
Y1	0.000#1			3	-500.000	0.000	0.000	0.000			
Z1	0.000#1			4	0.000	0.000	0.000	0.000			
C1	0.000			5	0.000	0.000	0.000	0.000			
				6	0.000	0.000	0.000	0.000			
				7	0.000	0.000	0.000	0.000			
Mach posn				8	0.000	0.000	0.000	0.000			
X1	0.000			9	0.000	0.000	0.000	0.000			
Y1	0.000			10	0.000	0.000	0.000	0.000			
Z1	0.000			11	0.000	0.000	0.000	0.000			
C1	0.000			12	0.000	0.000	0.000	0.000			
				13	0.000	0.000	0.000	0.000			
S	3000 T	5		14	0.000	0.000	0.000	0.000			
M	3 B	0		15	0.000	0.000	0.000	0.000			
Spindle		3									
Wait		5									
\$1 14.0 \$2 17.0				22:26							
T-ofs	T-meas	T-reg	T-life	Coord	W-meas	User	MDI	Cnt set	MST		
=Input	+Input	Wear data	Length data	Nose data	Offset No.	Line copy	Line paste	Line clear	Undo		

**[Tool compensation type III (L system) ] : Parameter "#1037 cmdtyp" = 3**

The wear data, tool length data and tool nose data are set separately. These are changed with the sub-menu.

**(a) Wear data**

Set the tool nose wear amount for each tool used. When the tool compensation No. is designated by the tool command (T command), compensation is carried out matching the tool length data and tool nose data.

Relat posn		T-ofs	X	Y	Z
X1	0.000#1	1	0.000	0.000	0.000
Y1	0.000#1	2	0.000	0.000	0.000
Z1	0.000#1	3	0.000	0.000	0.000
C1	0.000	4	0.000	0.000	0.000
		5	0.000	0.000	0.000
		6	0.000	0.000	0.000
		7	0.000	0.000	0.000
		8	0.000	0.000	0.000
		9	0.000	0.000	0.000
		10	0.000	0.000	0.000
		11	0.000	0.000	0.000
		12	0.000	0.000	0.000
		13	0.000	0.000	0.000
		14	0.000	0.000	0.000
		15	0.000	0.000	0.000

Mach posn  
X1 0.000  
Y1 0.000  
Z1 0.000  
C1 0.000

S 0 T 0  
M 6 B 0  
Spindle 3  
Wait 5

\$1:48 \$2:48 15:48

T-ofs T-reg T-life Coord User MDI Cnt set MST  
=Input +Input Wear data Length data Nose data Offset No. Line copy Line paste Line clear Undo

**(b) Tool Length Data**

Set the tool length in respect to the program basic position of each tool used.

When the tool compensation No. is designated by the tool command (T command), compensation is carried out matching the wear data and the tool nose data.

Relat posn		T-ofs	X	Y	Z
X1	0.000#1	1	0.000	0.000	0.000
Y1	0.000#1	2	0.000	0.000	0.000
Z1	0.000#1	3	-500.000	0.000	0.000
C1	0.000	4	0.000	0.000	0.000
		5	0.000	0.000	0.000
		6	0.000	0.000	0.000
		7	0.000	0.000	0.000
		8	0.000	0.000	0.000
		9	0.000	0.000	0.000
		10	0.000	0.000	0.000
		11	0.000	0.000	0.000
		12	0.000	0.000	0.000
		13	0.000	0.000	0.000
		14	0.000	0.000	0.000
		15	0.000	0.000	0.000

Mach posn  
X1 0.000  
Y1 0.000  
Z1 0.000  
C1 0.000

S 0 T 0  
M 6 B 0  
Spindle 3  
Wait 5

\$1:48 \$2:48 15:48

T-ofs T-reg T-life Coord User MDI Cnt set MST  
=Input +Input Wear data Length data Nose data Offset No. Line copy Line paste Line clear Undo

## (c) Tool Nose Data

Set the tool nose radius value (tool nose R), wear radius value (R wear) and tool nose point (tool nose point P) of the tool nose mounted on the tool for each tool used. When the tool compensation No. is designated by the tool command (T command), compensation is carried out matching the tool length data and tool nose data.






		T-ofs	T-reg	T-life	Coord	Nose R	R-wear	Point
Relat posn	X1	0.000#1				2.000	0.000	1
	Y1	0.000#1				1.000	0.000	2
	Z1	0.000#1				0.000	0.000	0
	C1	0.000				0.000	0.000	0
Mach posn	X1	0.000				0.000	0.000	0
	Y1	0.000				0.000	0.000	0
	Z1	0.000				0.000	0.000	0
	C1	0.000				0.000	0.000	0
S	0	T	0			0.000	0.000	0
M	6	B	0			0.000	0.000	0
Spindle			3			0.000	0.000	0
Wait			5			0.000	0.000	0

At the bottom of the screen, there are buttons for T-ofs, T-reg, T-life, Coord, User, MDI, Cnt set, and MST. The T-ofs button is highlighted.

### CAUTION

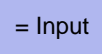
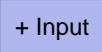
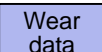
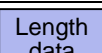
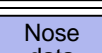
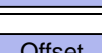

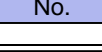
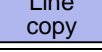
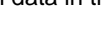

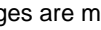
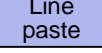
- ⚠ If the tool compensation amount or workpiece coordinate system offset amount is changed during automatic operation (including during single block stop), the changes will be valid from the command in the next block or after several subsequent blocks.

## Display items

Display item	Details																																			
(1) Display area (continued on next page)	<p>Displays the tool compensation data. The displayed cursor can be moved and data set. Data that cannot be displayed in the display area can be displayed using the keys below.</p> <p> ,  : Scroll one line at a time.</p> <p> ,  : Change the display contents one page at a time.</p> <p>Compensation number : This is the compensation data number. Compensation data : The display items differ depending on the tool compensation type.</p> <p>Type I : Compensation data Type II : Length dimension, length wear, radius dimension, radius wear Type III: (Wear, tool length data) 1st axis, 2nd axis, additional axes (Tool nose data) Tool nose R, R wear, tool nose point R</p> <p>The standard settings and display ranges are as follows.</p> <table><tr><th>Type</th><th>Settings</th><th>Details</th><th>Setting/display range</th></tr><tr><td>Type I</td><td>Compensation data</td><td>This sets the shape and wear combined compensation amounts.</td><td>-999.999 to 999.999</td></tr><tr><td rowspan="4">Type II</td><td>Length dimension</td><td>This sets the tool length compensation amount.</td><td rowspan="2">Length/Radius dimension: -999.999 to 999.999</td></tr><tr><td>Length wear</td><td>This sets the tool length wear compensation amount.</td></tr><tr><td>Radius dimension</td><td>This sets the tool radius compensation amount.</td><td rowspan="2">Length/Radius wear: -99.999 to 99.999</td></tr><tr><td>Radius wear</td><td>This sets the tool radius wear compensation amount.</td></tr><tr><td rowspan="5">Type III</td><td>Wear data</td><td>This sets the 1st axis, 2nd axis and additional axis tool nose wear compensation amount. (Note 2) (Note 3) (Note 6) (Note 7)</td><td>-9999.999 to 9999.999</td></tr><tr><td>Tool length data</td><td>This sets the 1st axis, 2nd axis and additional axis tool length compensation amount. (Note 2) (Note 3)</td><td>-999.999 to 999.999</td></tr><tr><td>Tool nose R (Note 4)</td><td>This sets the tool radius (nose R).</td><td>-999.999 to 999.999</td></tr><tr><td>R wear (Note 4) (Note 6)</td><td>This sets the tool radius (nose R) wear amount.</td><td>-99.999 to 99.999</td></tr><tr><td>Tool nose point P (Note 5)</td><td>This sets the tool nose point (number).</td><td>0 to 9</td></tr></table> <p>(Note 1) The display range is when the minimum command unit is 1μm ("#1003 iunit" = B, "#1041 I_inch" = 0). (Note 2) Set whether to set the additional axis tool nose wear compensation amount for 3rd or 4th axis at parameter "#1520 Tch34". (Note 3) Displays only for the number of valid axes if only 1st axis or 2nd axis are valid. (Note 4) Set at the radius value if parameter "#1019 dia" is "0", or at the diameter value if this parameter value is "1". (Note 5) An absolute setting is applied even if the tool nose point is entered by pressing the  Input menu and entering a value. (Note 6) Depending on the setting of parameter #8010(Max. value), the setting/display range may be different from the above. (Note 7) Depending on the setting of parameter #8011(Max. additional value), the setting/display range may be different from the above.</p>	Type	Settings	Details	Setting/display range	Type I	Compensation data	This sets the shape and wear combined compensation amounts.	-999.999 to 999.999	Type II	Length dimension	This sets the tool length compensation amount.	Length/Radius dimension: -999.999 to 999.999	Length wear	This sets the tool length wear compensation amount.	Radius dimension	This sets the tool radius compensation amount.	Length/Radius wear: -99.999 to 99.999	Radius wear	This sets the tool radius wear compensation amount.	Type III	Wear data	This sets the 1st axis, 2nd axis and additional axis tool nose wear compensation amount. (Note 2) (Note 3) (Note 6) (Note 7)	-9999.999 to 9999.999	Tool length data	This sets the 1st axis, 2nd axis and additional axis tool length compensation amount. (Note 2) (Note 3)	-999.999 to 999.999	Tool nose R (Note 4)	This sets the tool radius (nose R).	-999.999 to 999.999	R wear (Note 4) (Note 6)	This sets the tool radius (nose R) wear amount.	-99.999 to 99.999	Tool nose point P (Note 5)	This sets the tool nose point (number).	0 to 9
Type	Settings	Details	Setting/display range																																	
Type I	Compensation data	This sets the shape and wear combined compensation amounts.	-999.999 to 999.999																																	
Type II	Length dimension	This sets the tool length compensation amount.	Length/Radius dimension: -999.999 to 999.999																																	
	Length wear	This sets the tool length wear compensation amount.																																		
	Radius dimension	This sets the tool radius compensation amount.	Length/Radius wear: -99.999 to 99.999																																	
	Radius wear	This sets the tool radius wear compensation amount.																																		
Type III	Wear data	This sets the 1st axis, 2nd axis and additional axis tool nose wear compensation amount. (Note 2) (Note 3) (Note 6) (Note 7)	-9999.999 to 9999.999																																	
	Tool length data	This sets the 1st axis, 2nd axis and additional axis tool length compensation amount. (Note 2) (Note 3)	-999.999 to 999.999																																	
	Tool nose R (Note 4)	This sets the tool radius (nose R).	-999.999 to 999.999																																	
	R wear (Note 4) (Note 6)	This sets the tool radius (nose R) wear amount.	-99.999 to 99.999																																	
	Tool nose point P (Note 5)	This sets the tool nose point (number).	0 to 9																																	

Display item	Details							
Display area (Continued from previous page)	Furthermore, the display and setting ranges are as follows based on the "#1003 iunit" and "#1041 I_inch" setting combination.							
	(Type I, Type II, Type III wear and tool length data)							
	#1003 iunit	#1041 I_inch	Setting/display range					
			Type II Length wear Radius wear Type III Wear data	Type I Type II Length dimension Radius dimension Type III Length data				
	B	0	-99.999	to 99.999	-999.999	to 999.999		
		1	- 9.9999	to 9.9999	-99.9999	to 99.9999		
	C	0	-99.9999	to 99.9999	-999.9999	to 999.9999		
		1	- 9.99999	to 9.99999	-99.99999	to 99.99999		
	D	0	-99.99999	to 99.99999	-999.99999	to 999.99999		
		1	- 9.999999	to 9.999999	-99.999999	to 99.999999		
	E	0	-99.999999	to 99.999999	-999.999999	to 999.999999		
		1	- 9.9999999	to 9.9999999	-99.9999999	to 99.9999999		
	(Type III tool nose R, R wear)							
	#1003 iunit	#1041 I_inch	Setting/display range					
			Tool nose R		R wear			
	B	0	-999.999	to 999.999	-99.999	to 99.999		
		1	- 99.9999	to 99.9999	- 9.9999	to 9.9999		
	C	0	-999.9999	to 999.9999	-99.9999	to 99.9999		
		1	- 99.99999	to 99.99999	- 9.99999	to 9.99999		
	D	0	-999.99999	to 999.99999	-99.99999	to 99.99999		
		1	- 99.999999	to 99.999999	- 9.999999	to 9.999999		
	E	0	-999.999999	to 999.999999	-99.999999	to 99.999999		
		1	- 99.9999999	to 99.9999999	- 9.9999999	to 9.9999999		

## Menus

Menu	Details	Type	Reference
	This executes an absolute input.	C	3.2.1 Setting the Tool Compensation Data
	This executes an addition input.	C	
	This changes to the wear data display. <b>(Note)</b> This menu displays for Type III.	B	
	This changes to the tool length data display. <b>(Note)</b> This menu displays for Type III.	B	
	This changes to the tool nose data display. <b>(Note)</b> This menu displays for Type III.	B	
	Set the compensation number and press  to put that number to the top and display the tool compensation data. The cursor moves to the contents of that first line.	A	3.2.1 Setting the Tool Compensation Data
	This copies the contents of the tool compensation data in the selected line (one line).	C	3.2.3 Copying/Pasting the Tool Compensation Data
	The contents (one line) of the copied tool compensation data are written to the line where the cursor is. If changes are made to the data in that line after  is selected from the menu, the data prior to the changes is written when pasting. The data in the copied line can be pasted as many times as is required until new data is copied.	C	
	This erases the compensation data in the selected line (multiple lines can be erased). Selection method: Select the first and the last compensation number to be erased. <b>[Ex.]</b> 1/E: Set all compensation data to "0". If the  key is pressed without selecting a line, the compensation data in the line where the cursor is currently positioned is erased.	A	3.2.2 Erasing the Tool Compensation Data
	This undoes the last changes to the tool compensation data. (This menu is valid for the "Data Input", "Paste Line" and "Undo" operations.)	C	

For Type III, the wear data displays when the power is turned ON.  
Following that, the wear data, tool length data, and tool nose data selection is stored.



## 3.2.1 Setting the Tool Compensation Data

## Operation method (Setting "10.000" in the length wear data of compensation No. (102))

- (1) Press the menu key

- (2) Designate the Compensation No.  
102

It is possible to use the , ,  and  keys as well to move the cursor to the offset No.102.



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

	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	0.000	0.000	0.000	0.000

- (3) Use the  key to move the cursor to the length wear position.

- (4) Input the length wear value.  
10



The set value displays.

Settings can be made by pressing the  key instead of the  key.

## Operation method ("0.012" is calculated and set in the length wear data for compensation number (102).)

- (1) Use the same procedure as (1) above to move the cursor to the compensation No. 102 length wear position.

- (2) Enter a value.  
0.012







The input value is added to the original value and displays.

**[Ex.]** 10.012 displays if the original value is 10.000.  
(10.000 + 0.012 = 10.012)

## 3.2.2 Erasing the Tool Compensation Data

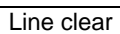

## Operation method (Erasing one line of tool compensation data at the cursor position)

- (1) Move the cursor to the line to be erased with the , ,  and  keys.







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

	Length	L wear	Radius	R wear
102	0.000	0.000	0.000	0.000
103	-280.028	0.000	10.000	0.000
104	-272.083	0.000	0.000	0.000
105	-220.068	0.000	12.000	0.000
106	-290.456	0.000	8.000	0.000
107	-280.001	0.000	0.000	0.000
108	0.000	0.000	0.000	0.000

- (2) Press the  and  menu.



The menu keys are highlighted and a message displays confirming whether it is okay to erase. The background color of the data to be erased displays in light blue.

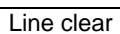
- (3) Press the  or  key.  
To cancel the erasing, press a key other than  or .



The selected line of data (one line amount) is cleared to zero.  
The data erased to zero displays at the top of the compensation data.


	Length	L wear	Radius	R wear
102	0.000	0.000	0.000	0.000
103	-280.028	0.000	10.000	0.000
104	-272.083	0.000	0.000	0.000
105	-220.068	0.000	12.000	0.000
106	-290.456	0.000	8.000	0.000
107	-280.001	0.000	0.000	0.000
108	0.000	0.000	0.000	0.000

## Operation method (Erasing the compensation data from compensation number 122 to 125.)

- (1) Press the  menu.







The menu is highlighted.

- (2) Input the compensation number of the data range to be erased.  
122/125 




A message box displays to confirm whether it is okay to erase the data. The background color of the data to be erased displays in light blue.

- (3) Press the  or  key.  
Press a key other than  or  in order not to erase the data.







The compensation data for the selected compensation number is erased, and the menu highlight returns to normal.  
The data cleared to zero displays at the top of the compensation data.

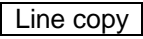
	Length	L wear	Radius	R wear
122	0.000	0.000	0.000	0.000
123	0.000	0.000	0.000	0.000
124	0.000	0.000	0.000	0.000
125	0.000	0.000	0.000	0.000
126	-220.068	0.000	12.000	0.000
127	-290.456	0.000	8.000	0.000
128	-280.001	0.000	0.000	0.000

**(Note)** If the  key is pressed without selecting an compensation number, the line where the cursor is located is erased.

## 3.2.3 Copying/Pasting the Tool Compensation Data

## Operation method (Copying/pasting one line of tool compensation data)

- (1) Move the cursor to the line to be copied with the , ,  and  keys

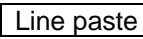
- (2) Press the  menu.



The background color of the copied data changes to light blue.

	Length	L wear	Radius	R wear
100	0.000	0.000	0.000	0.000
101	-255.123	0.000	0.000	0.000
102	-250.008	0.000	10.000	0.000
103	-280.028	0.000	10.000	0.000
104	-272.083	0.000	0.000	0.000
105	-220.068	0.000	12.000	0.000
106	-290.456	0.000	8.000	0.000

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

- (4) Press the  menu.

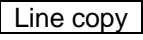


The copied compensation data is written in the line where the cursor is.

The background color returns to normal.

The copied compensation data is held until another line is copied.

	Length	L wear	Radius	R wear
105	-220.068	0.000	12.000	0.000
106	-290.456	0.000	8.000	0.000
107	-280.001	0.000	0.000	0.000
108	0.000	0.000	0.000	0.000
109	-250.008	0.000	10.000	0.000
110	0.000	0.000	0.000	0.000
111	0.000	0.000	0.000	0.000

**(Note 1)** If the compensation data for the copied line is changed after the menu  is pressed, the data prior to the change is written when pasted.

**(Note 2)** When copied at Type III, it is not possible to paste the data to a different display (wear data, tool length data, tool nose data).

### 3.3 Tool Measurement

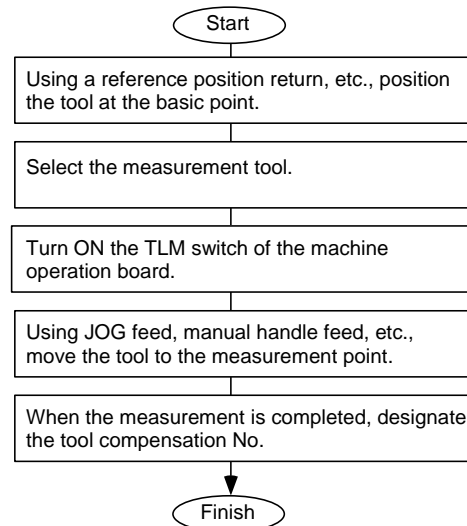
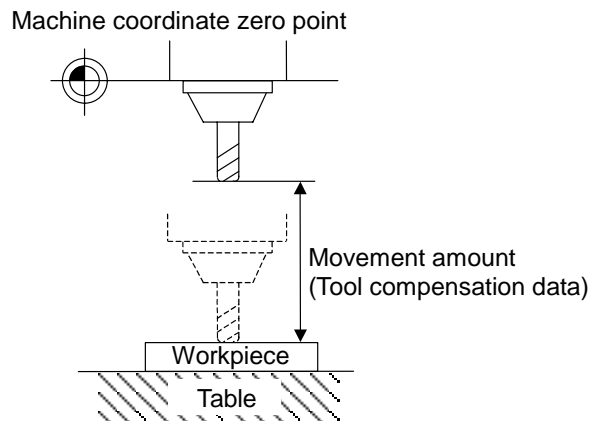
#### 3.3.1 Tool Measurement (M system)

By manually moving the tool to the measurement point, the movement distance from the basic point to the measurement point is measured, and this can be set as the tool compensation amount.

There are two types of tool measurement: Tool length measurement I, Tool length measurement II

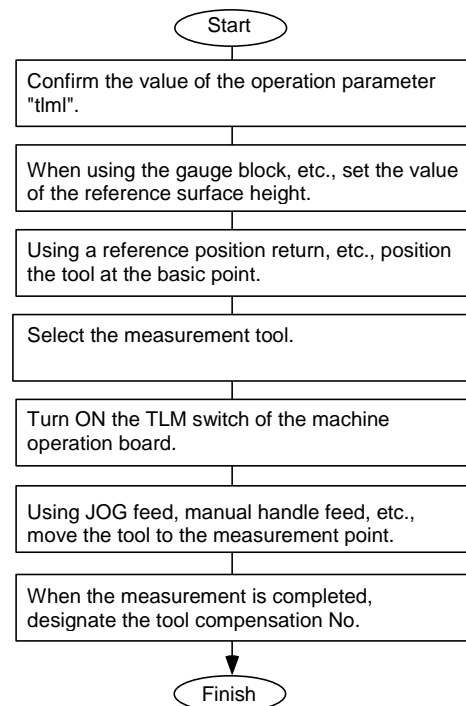
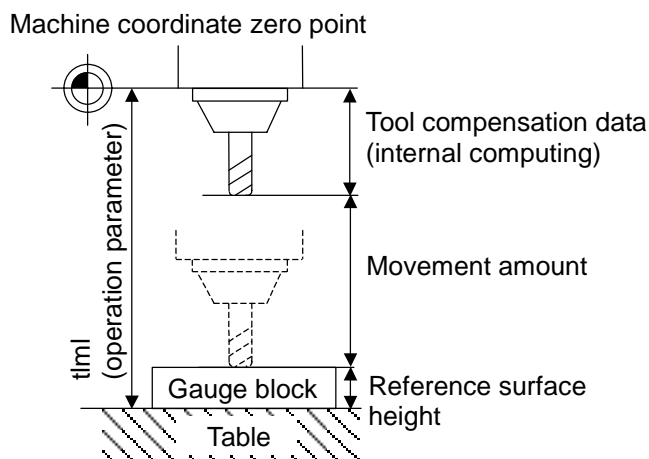
##### ■ Tool length measurement I

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



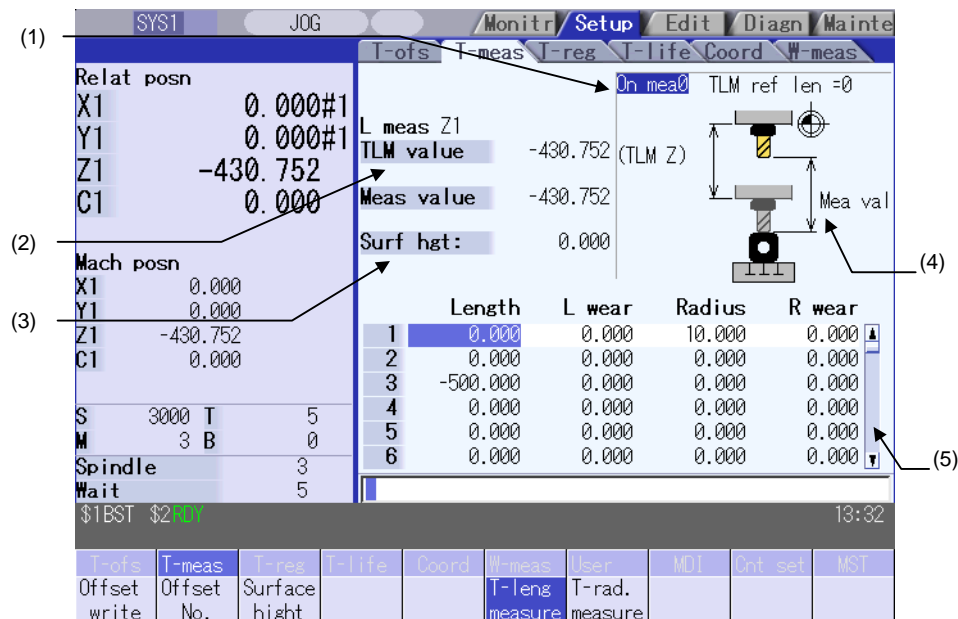
##### ■ Tool length measurement II

When the tool is at the machine coordinate zero point, the distance from the machine coordinate zero point to the tool tip is measured, and can be set as tool compensation data.



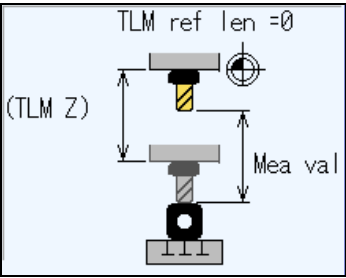
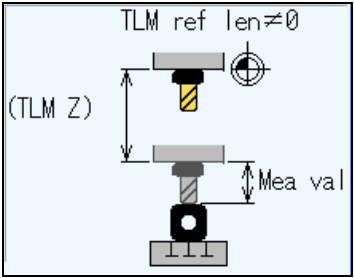
**(Note)** Changing of the tool measurement type is determined based on the measurement axis (tool length measurement axis, tool radius measurement axis) TLM reference length (parameter "#2016 tliml+") at each measurement mode. When parameter "#2016 tliml+" is "0", the tool measurement type is tool length measurement I.

## ■ Screen image



## Display items

Display item	Details
(1) Manual measurement status display	This displays the manual measurement status. Refer to the "Manual measurement status display" section for further details.
(2) Counter display	<p>TLM value : This displays the value during measurement. This will be the same as the machine position until the sensor is contacted. This will be the skip coordinate position after the sensor is contacted.</p> <p>Measurement value : For tool length measurement type I : TLM value – Reference surface height For tool length measurement type II : TLM value – Reference surface height + TLM reference length For tool radius measurement, measurement result is displayed in absolute value.</p> <p><b>(Note)</b> The TLM value counter differs according to the parameter "#1328 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.</p>
<div>L meas : Z (Axis name)</div> <div>R meas : X (Axis name)</div>	The axis selected in the parameters "#8711 TLM L meas axis" and "#8712 TLM D meas axis" is the target axis for the measurement.
(3) Reference surface height	This displays a value for the reference surface height. The setting range is from -99999.999 to 99999.999(mm)

Display item	Details
(4) Guide drawing	<p>This displays the measurement image. The contents of the guide drawing will differ depending on the tool measurement type.</p> <p>Tool length measurement I guide drawing      Tool length measurement II guide drawing</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div>
(5) Tool compensation data	<p>This displays the tool compensation data. Depending on the tool compensation type (I/II), the display details of the displayed tool compensation data will differ.</p>

## Menus

Menu	Details	Type	Reference
<b>Offset write</b>	<p>This writes the value displayed in "Mea value" as the tool compensation amount.</p> <p>The wear amount is cleared to "0" for the tool compensation type II.</p> <p>The tool compensation amount cannot be written in when the menu <b>Offset No.</b> or <b>Surface hight</b> is highlighted.</p>	C	
<b>Offset No.</b>	<p>When the compensation No. is set and the <b>INPUT</b> key is pressed, the tool compensation data with that number at its head appears.</p> <p>The cursor moves to the length dimension data of the top line of that data.</p>	A	3.2.1 Setting the Tool Compensation Data
<b>Surface hight</b>	<p>This sets the reference surface height data. (The cursor moves to the reference surface height.)</p> <p>When the data is set in the input area and the <b>INPUT</b> key is pressed, the reference surface height is set.</p>	A	
<b>T-leng measure</b>	<p>This changes the mode to the tool length measurement mode.</p> <p>This mode is enabled when turning ON the power.</p> <p>(The cursor moves to the length dimension position for tool compensation type II.)</p>	B	Carrying Out Tool Length Measurement
<b>T-rad. measure</b>	<p>This changes the mode to the tool radius measurement mode.</p> <p>(The tool measurement type is valid only for tool length measurement II.)</p> <p>(The cursor moves to the radius dimension position for tool compensation type II.)</p>	B	Carrying Out Tool Radius Measurement

## Carrying out tool length measurement

- (1) Turn ON the measurement switch. ➡ The message "On mea 0" appears.

Refer to the PLC Interface Manual for details on measurement switch signals.
  - (2) Press the T-leng measure menu. ➡ 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. ➡ The cursor appears.

Offset No. 12 INPUT

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 Offset write menu. ➡ The measurement values are written as a tool compensation amount. The wear amount is cleared to "0" for the tool compensation 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 not to move the axis after that. If the axis moves after contacting the sensor, the distance that was actually moved will be added to the measurement values counter, and the skip position will not be held.
- (6) Turn OFF the measurement switch to finish measuring. ➡ The message "On mea 0" disappears.

**Manual measurement status display**

The display will change as shown below during manual measurement.

Display	Meaning
On mea 1	This state is entered if a skip signal is input during manual measurement. The "On mea 2" state is shifted to after deceleration stop is confirmed.
On mea 2	This is the state during the first retract operation. The "On mea 3" state is shifted to after retracting the retract amount.
On mea 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 mea 0" state is shifted to when this state is reset.
On mea 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 mea 0" state is shifted to when this state is reset
On mea 5	This state is entered when the skip signal is input during the second measurement. The "On mea 6" state is shifted to after deceleration stop is confirmed.
On mea 6	This is the state during the second return operation. The "On mea 0" state is shifted to after retracting the retract amount.
On mea 0	This state is entered when not in the "On mea 1" to "On mea 6" states.

**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 "Carrying out tool length measurement" for details.



### 3.3.2 Tool Measurement (L system)

This is used to carry out manual tool length measurement I or II. Either one is selected depending on the setting of measurement switch and operation mode.

#### ■ Manual tool length measurement I

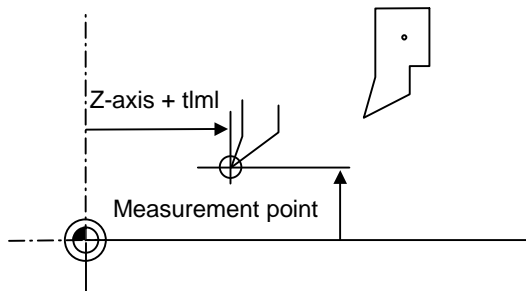
This is the function to calculate the tool length compensation amount automatically by moving the tool to the measurement point with manual feed. There are two types of measurement methods in manual tool length measurement I: the basic point method and the measurement value input method. The method is selected by setting parameter "#1102 tlm".

##### (1) Basic point method (#1102 tlm = 0)

Obtain the tool length with the tool nose placed on the measurement point.

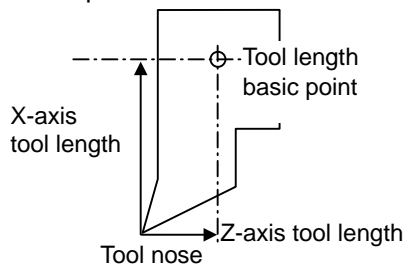
To carry out the basic point method, a point to place the tool nose on (measurement point) is required.

Set the measurement point in parameter "#2015 tlm1-" beforehand.



Tool length = Machine position – Measurement basic point (#2015 tlm1-)

The expression above is used for automatic calculation in the basic point method.



**(Note)** Always set the measurement point in radius value, regardless of the diameter/radius command.

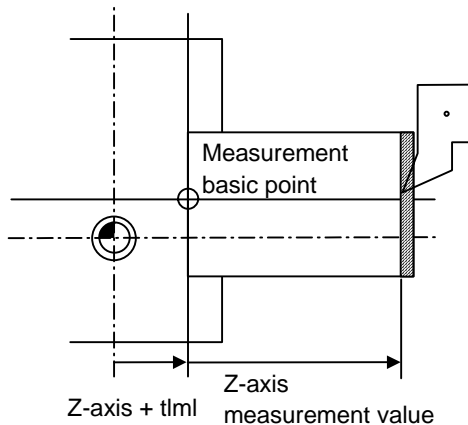
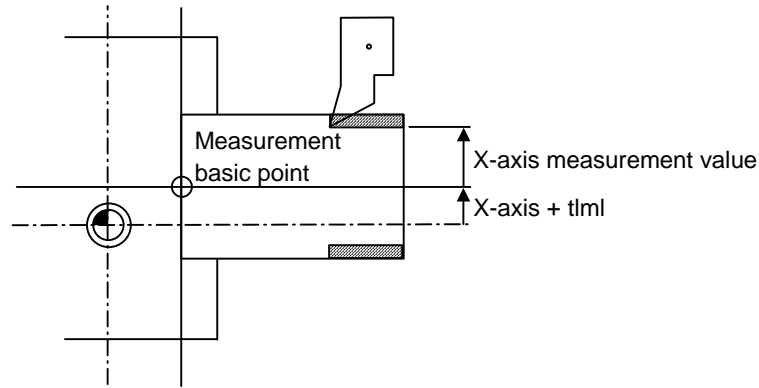
**(2) Measurement value input method (#1102 tlm = 1)**

Actually cut the workpiece. Measure its dimensions, and obtain the tool length from the measured values.

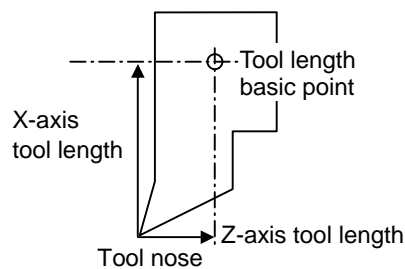
The measurement basic point is characteristic for each machine (the center of the chuck face, etc.)

To carry out the measurement value input method, a workpiece for measuring is required.

To measure the workpiece, set the basic point (measurement basic point) in parameter "#2015 tlmI-" beforehand.



Tool length = Machine position - Measurement basic point (#2015 tlmI-) - Measurement value  
The expression above is used for automatic calculation in the measurement value input method.

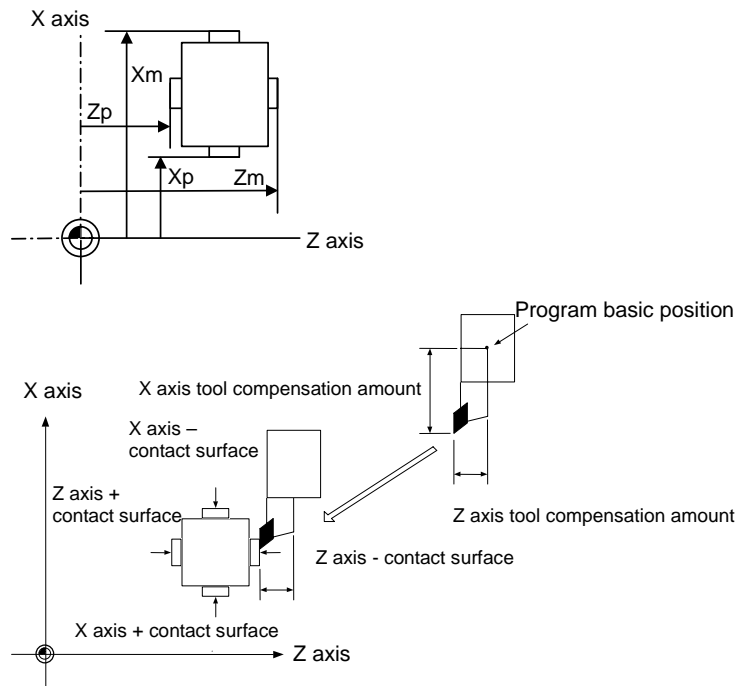


**(Note)** Always set the measurement basic point in radius value, regardless of the diameter/radius command.

### ■ Manual tool length measurement II

By using a device having a touch sensor, the tool compensation amount can be calculated just by contacting the tool nose against the touch sensor with manual feed.

Set the measurement basic position (sensor position) with the parameter "#2015 tlmI-" and "#2016 tlmI+" when using the main spindle side, "#2097 tlmI-" and "#2098 tlmI+" when using the sub spindle side.



When measured at the main spindle side:

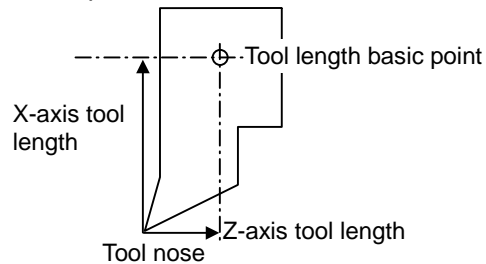
Xm: - sensor machine coordinate position	X axis (position measured by moving in - direction)
→ #2015 tlmI- X axis	
Zm: - sensor machine coordinate position	Z axis (position measured by moving in - direction)
→ #2015 tlmI- Z axis	
Xp: + sensor machine coordinate position	X axis (position measured by moving in + direction)
→ #2016 tlmI+ X axis	
Zp: + sensor machine coordinate position	Z axis (position measured by moving in + direction)
→ #2016 tlmI+ Z axis	

When measured at the sub spindle side:

Xm: - sensor machine coordinate position	X axis (position measured by moving in - direction)
→ #2097 tlmI2- X axis	
Zm: - sensor machine coordinate position	Z axis (position measured by moving in - direction)
→ #2097 tlmI2- Z axis	
Xp: + sensor machine coordinate position	X axis (position measured by moving in + direction)
→ #2098 tlmI2+ X axis	
Zp: + sensor machine coordinate position	Z axis (position measured by moving in + direction)
→ #2098 tlmI2+ Z axis	

Tool compensation amount = Machine coordinate position (machine coordinate position at the time of skip input) - Measurement basic position (sensor position)

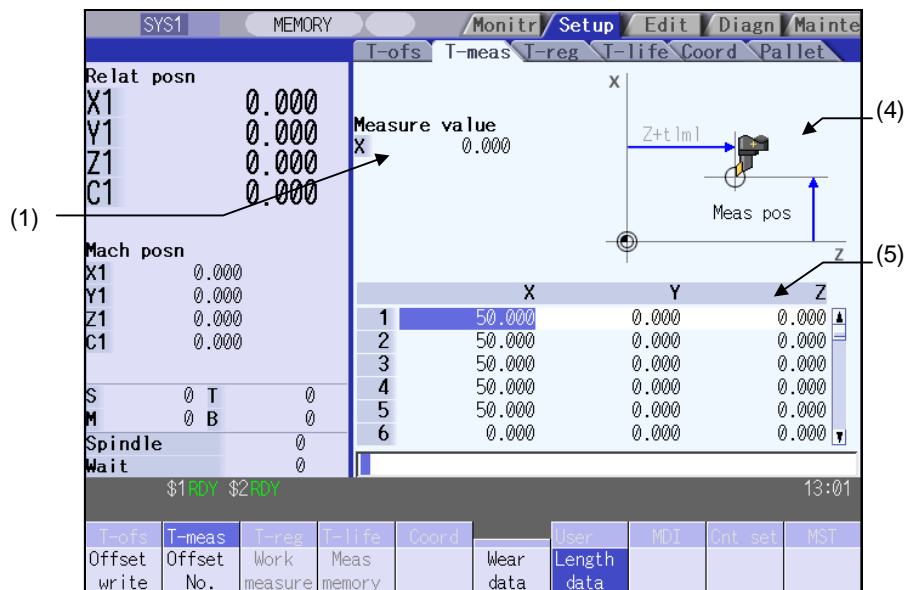
The expression above is used for automatic calculation in Manual tool length measurement II.



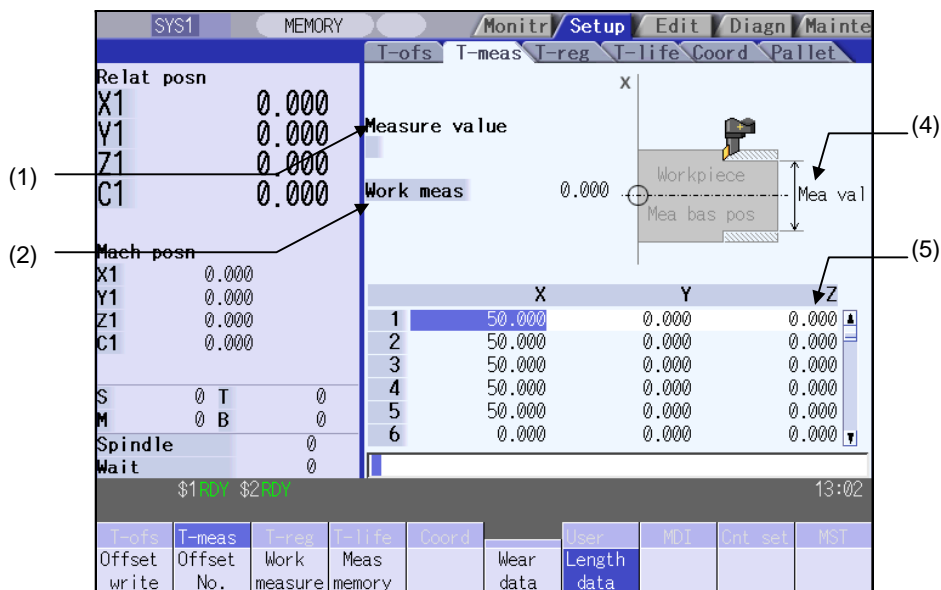
When the tool touches the touch sensor while measurement switch is ON, the calculation result is set in the tool data of the compensation No. specified with "Tool No. (Tool length measurement 2)" (PLC device), and the wear data of the compensation No. set in "Wear compensation No. (Tool presetter)" (PLC device) is cleared.

### ■ Screen image

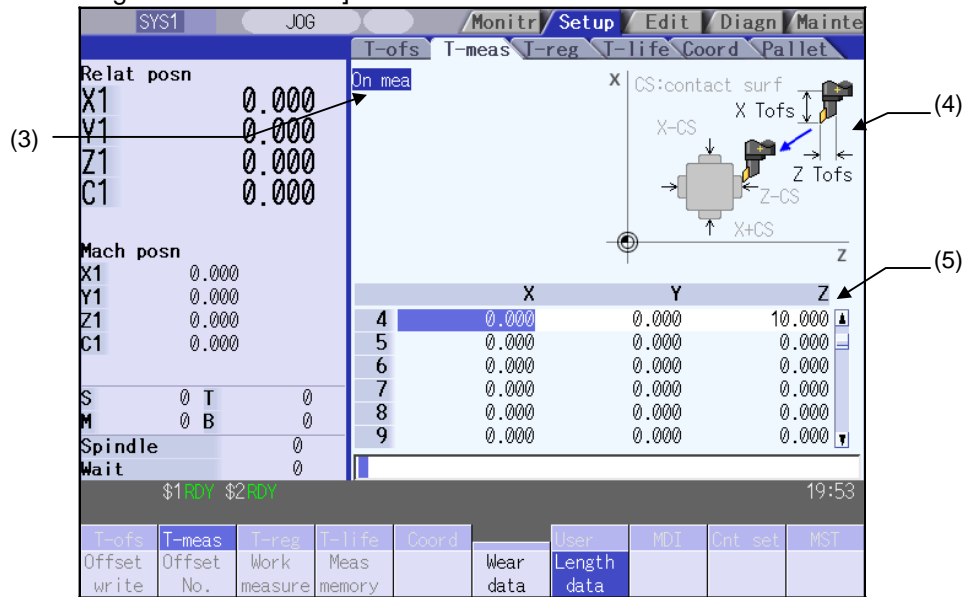
[Manual tool length measurement I: Basic point method]



[Manual tool length measurement I: Measurement value input method]

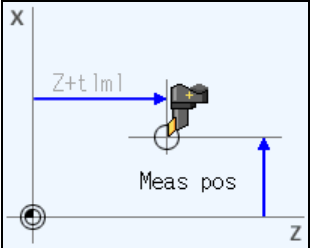
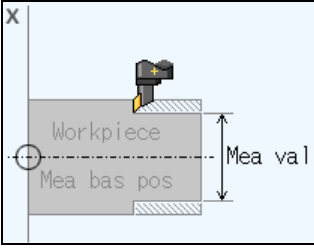
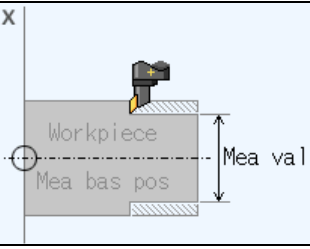






[Manual tool length measurement II]



## Display items

Display item	Details
(1) Measure value	<p>Measurement result and measurement axis are displayed. Displayed timing and measurement result differ, depending on basic point method or measurement value input method.</p> <ul style="list-style-type: none"> <li>Basic point method Measurement result for the axis at the cursor position is displayed at all time. Displayed data: Machine position - Measurement point (#2015 tImI-)</li> <li>Measurement value input method Measurement result is displayed when the <b>Meas memory</b> menu is pressed. Displayed data: Machine position - Measurement basic point (#2015 tImI-)</li> </ul> <p><b>(Note)</b> This is displayed only in "Manual tool length measurement I".</p>
(2) Work meas	<p>Workpiece measurement result is set and displayed. Setting is possible by pressing the <b>Work measure</b> menu or touching the value area of the workpiece measurement value. Setting range: -99999.999 to 99999.999(mm) <b>(Note)</b> This is displayed only in "Manual tool length measurement I: Measurement value input method".</p>
(3) On mea	<p>"On mea" is displayed when the measurement switch is ON. <b>(Note)</b> This is displayed only in "Manual tool length measurement II".</p>

Display item	Details
(4) Guide drawing	<p>This displays the measurement image. The contents of the guide drawing will differ depending on the tool measurement type.</p> <div style="display: flex; justify-content: space-around;"> <div style="width: 45%;"> <p>&lt;Manual tool length measurement I: Basic point method&gt;</p>  </div> <div style="width: 45%;"> <p>&lt;Manual tool length measurement I: Measurement value input method&gt;</p>  </div> </div> <p>&lt;Manual tool measurement II&gt;</p> 
(5) Tool compensation data	<p>This displays the tool compensation data.</p> <p><b>(Note 1)</b> Cursor movement and part system changing operation are same as "Tool compensation type III (L system)".</p> <p><b>(Note 2)</b> Automatically jumps to the compensation No. registered in "Tool No. (Tool length measurement 2)" (PLC device) during manual tool length measurement II. (Jumps even when the wear data is being displayed.) Note that the , , ,  keys are disabled.</p>

**(Note)** Measurement result and workpiece measurement value will be cleared when changing of part systems, screens and measurement modes are carried out.

## Menus

Menu	Details	Type	Reference
Offset write	<p>Depending on the mode, the following value is input as the tool compensation amount at the cursor position, and the wear amount is cleared to "0".</p> <ul style="list-style-type: none"> <li>Manual tool length measurement I: Basic point method "Measure value" value</li> <li>Manual tool length measurement I: Measurement value input method "Measure value" value - "Work meas" value</li> </ul> <p>In "Manual tool length measurement I: Measurement value input method", "Measure value" and "Work meas" will be cleared after compensation amount is written.</p> <p><b>(Note 1)</b> Tool compensation amount cannot be written in the following cases:</p> <ul style="list-style-type: none"> <li>When the menu <b>Offset No.</b> and <b>Work measure</b> are highlighted</li> <li>When the wear data is being displayed</li> <li>When the measurement result exceeds the setting range</li> </ul> <p><b>(Note 2)</b> If "Manual tool length measurement II", this is displayed in gray and cannot be selected.</p>	C	<p>Carrying out tool measurement (Manual tool length measurement I: Basic point method)</p> <p>Carrying out tool measurement (Manual tool length measurement I: Measurement value input method)</p>
Offset No.	<p>This sets the compensation No. and press the <b>INPUT</b> key. The tool compensation data is displayed, placing the No. at the top.</p> <p><b>(Note)</b> If the measurement switch is turned ON, this is displayed in gray and cannot be selected.</p>	A	3.2.1 Setting the Tool Compensation Data
Work measure	<p>This sets the workpiece measurement value. If this menu is pressed, the cursor moves to the workpiece measurement value. Point the cursor to the axis to be set, and set the data in the data setting area. Press the <b>INPUT</b> key to set the workpiece measurement value.</p> <p><b>(Note)</b> If not "Manual tool length measurement I: Measurement value input method", this is displayed in gray and cannot be selected.</p>	A	Carrying out tool measurement (Manual tool length measurement I: Measurement value input method)
Meas memory	<p>Measurement result is calculated from the current machine position and displayed.</p> <p><b>(Note)</b> If not "Manual tool length measurement I: Measurement value input method", this is displayed in gray and cannot be selected.</p>	C	<p>Carrying out tool measurement (Manual tool length measurement I: Basic point method)</p> <p>Carrying out tool measurement (Manual tool length measurement I: Measurement value input method)</p>
Wear data	Wear data is displayed in tool compensation data.	B	
Length data	Tool length data is displayed in tool compensation data. This is the default mode when the power is initially turned ON.	B	

**(Note)** The data displayed on the tool compensation amount screen and the data displayed on "Tool compensation data" in the tool measurement screen are not linked one another. (The wear data is not necessarily displayed when the tool measurement screen has opened while the wear data is displayed on the tool compensation amount screen.)



## Carrying out tool length measurement (Manual tool length measurement I: Basic point method)

**(Example)** Carrying out tool measurement for compensation No.2, Z axis

- (1) Select the tool to be measured with manual numerical value command. (Refer to "3.11 Manual Numerical Value Command" for details.)



The tool to be measured is selected.

**(Note)** Select a tool without specifying compensation No. If compensation No. is specified, measurement result may not be obtained correctly.

- (2) Point the cursor to the position (compensation No. 2, Z axis) where the measurement result are to be set.



The cursor is displayed at compensation No.2, Z axis. Calculation result of Z axis is displayed in "Measure value".

Measure value
Z 10.000

**(Note)** In order to measure a different axis, point the cursor to the axis to be measured and perform the following operations.

- (3) Press the **Offset write** menu.



The value displayed in "Measure value" is set in compensation No.2, Z axis.

	X	Z	C
1	0.000	0.000	0.000
2	0.000	10.000	0.000
3	0.000	0.000	0.000
4	0.000	0.000	0.000
5	0.000	0.000	0.000
6	0.000	0.000	0.000

**(Note 1)** Compensation amount is written in diameter value for diameter command, in radius value for radius command.

## Carrying out tool measurement (Manual tool length measurement I: Measurement value input method)

**(Example)** Carrying out tool measurement for compensation No.3, X axis

- (1) Select the tool to be measured with manual numerical value command. (Refer to "3.11 Manual Numerical Value Command" for details.)



The tool to be measured is selected.

**(Note)** Select a tool without specifying compensation No. If compensation No. is specified, measurement result may not be obtained correctly.

- (2) Point the cursor to the position (compensation No. 3, X axis) where the measurement result are to be set.



The cursor is displayed at compensation No.3, X axis.

**(Note)** In order to measure a different axis, point the cursor to the axis to be measured and perform the following operations.

- (3) Cutting is executed in the longitudinal direction. (For the Z axis, face turning is executed.)



- (4) The **Meas memory** menu is pressed without retracting the tool at the end of cutting operation.



Measurement result is displayed.

Measure value
X 20.000

- (5) Retract the tool and measure the workpiece. And then press the **Work measure** menu.
- The **Work measure** menu is highlighted and the cursor moves to the workpiece measurement value.
- (6) Set the workpiece measurement result. 10 **INPUT**
- 10 is set for the workpiece measurement value. Highlight of the **Work measure** menu is canceled and the cursor moves to the tool compensation data.
- (7) Press the **Offset write** menu.
- "Measurement result - workpiece measurement value" is set to compensation No.3, X axis.
- |   | X      | Y      | Z     |
|---|--------|--------|-------|
| 1 | 0.000  | 0.000  | 0.000 |
| 2 | 0.000  | 10.000 | 0.000 |
| 3 | 10.000 | 0.000  | 0.000 |
| 4 | 0.000  | 0.000  | 0.000 |
| 5 | 0.000  | 0.000  | 0.000 |
| 6 | 0.000  | 0.000  | 0.000 |

**(Note 1)** Compensation amount is written in diameter value for diameter command, in radius value for radius command.

### Carrying out tool measurement (Manual tool length measurement II)

- (1) Select the tool to be measured with manual numerical value command. (Refer to "3.11 Manual Numerical Value Command" for details.)
- The tool to be measured is selected.
- (2) Set the compensation No. of the compensation data to be set in "Tool No. (Tool length measurement 2)" (PLC device).
- The compensation No. of the compensation data to be set is selected.
- (3) Set the compensation No. of the wear data to be cleared in "wear compensation No. (tool presetter)" (PLC device).
- The compensation No. of the wear data to be cleared is selected.
- (4) Turn the measurement switch ON.
- "On meas" is displayed. Guide drawing for manual tool length measurement II is displayed. Tool compensation data is displayed, placing the compensation No. set in "Tool No. (Tool length measurement 2)" (PLC device) at the top.
- |   | X     | Y     | Z     |
|---|-------|-------|-------|
| 4 | 0.000 | 0.000 | 0.000 |
| 5 | 0.000 | 0.000 | 0.000 |
| 6 | 0.000 | 0.000 | 0.000 |
- (Note)** The row at the cursor position will not be changed.

- (5) Move the additional axis in the minus direction by manual feed and have the tool nose contact with the touch sensor.



Measurement value is set for the additional axis of the compensation No. set in "Tool No. (Tool length measurement2)" (PLC device)

	X	Y	Z
4	0.000	0.000	10.000
5	0.000	0.000	0.000
6	0.000	0.000	0.000

- (6) Turn the measurement switch OFF.



"On meas" disappears.

**(Note 1)** When entering the sensor area, the axis can be moved only in one direction selected from +X, -X, +Z, -Z, (+Y, -Y). If two axes are moved simultaneously, measurement will not be carried out. At this time, "E78 AX UNMATCH (TLM)" is displayed and the axis movement stops.

**(Note 2)** If the tool nose is contacting the sensor, the axis can be moved only in the direction moving away from the sensor. Whether or not the tool nose is detached from the sensor can be judged by the following conditions.

- The sensor signal has been turned OFF for 500ms or more.
- The tool nose is moved 100μm or more after the sensor signal has turned OFF.

The above conditions are set with parameter "#1227 aux11/bit2".

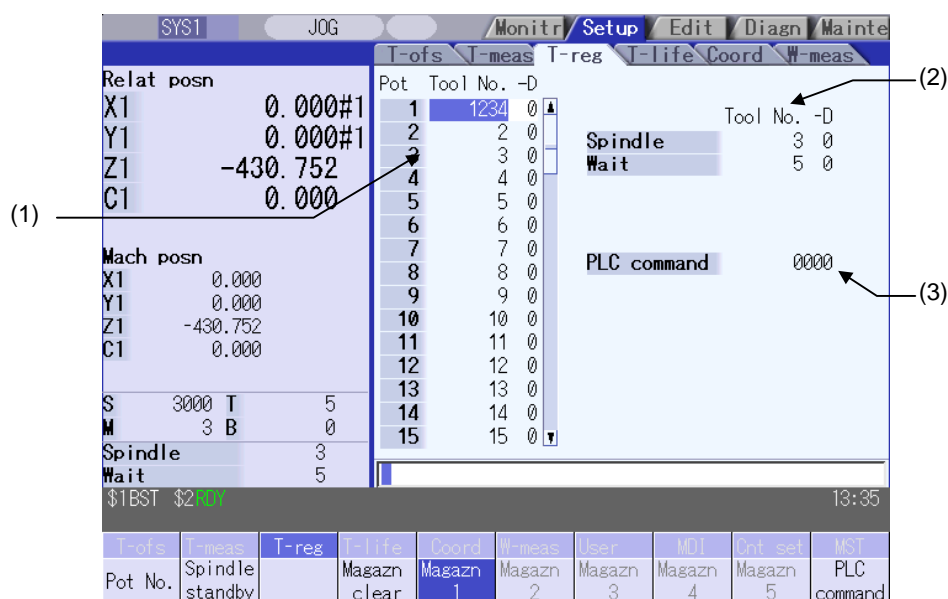
### 3.4 Tool Registration

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

When not making an arbitrary setting for the number of registered tools, there are maximum 3 magazines, and up to 120 tools can be registered for each magazines. When making an arbitrary setting, there are a maximum of 5 magazines, and up to 360 tools can be registered for all magazines.

This function differs depending on the specifications of the machine tool builder. Refer to the instruction manual issued by the machine tool builder for details.



#### Display items

Display item	Details
(1) Magazine	This displays the currently selected magazine No.
(2) Tool No.-D	A maximum of 8 digits of data can be input for a tool No. (Refer to the instruction manual issued by the machine tool builder for D functions and purposes.) When the "Tool No." column is blank, confirm the tool first, since the tool could not be mounted, or the tool could not match the spindle. Setting "0" erases the registered tool.
(3) Spindle/Wait (used by PLC program)	This displays the magazine 1 spindle or standby tool No. (The name of this area differs depending on the output from the PLC program.) <b>(Note)</b> Displayed contents depend on the ATC parameter setting.
(4) PLC command	This command is used to input data and perform sequence processing using the PLC program.

## Menus

Menu	Details	Type	Reference
Pot No.	Set the magazine pot number and press the <b>INPUT</b> key to position that pot number at the top and display the tool number. The cursor moves to the tool number for that pot number.	A	3.4.1 Registering a Tool in the Magazine Pot
Spindle standby	This sets or erases the tool No. of spindle and standby tools. The cursor will move to the top tool No. of the spindle and standby tools and the setting mode will be entered.	A	3.4.3 Setting/Erasing the Tool No. of Spindle/Standby Tools
Magazn clear	This erases all the currently selected magazine tool data (tool number and D). <b>(Note 1)</b> Unselected magazine tool data is not erased. <b>(Note 2)</b> The spindle and standby data cannot be erased.	A	3.4.3 Setting/Erasing the Tool No. of Spindle/Standby Tools
Magazn 1 : : Magazn 5	This designates the magazine No. to be displayed on the screen. The displayed menu differs according to the machine specifications. [Ex.] When there are two magazines, only the menu <b>Magazine 1</b> and <b>Magazine 2</b> keys display.	B	3.4.1 Registering 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.	B	3.4.2 Setting the PLC Command

## 3.4.1 Registering a Tool in the Magazine Pot

## Operation method (Selecting a magazine No.)

- (1) Press the menu . ➡ The tool data of the set magazine No. appears.

Pot	Tool No.	-D
1	12345678	32
2	2	0
3	3	0

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

## Operation method (Registering the tool in the magazine pot)

- (1) Designate the pot No.  
 21  ➡ The tool data appears with the designated pot No. at the head.  
 The cursor moves to the tool No. setting column.

Pot	Tool No.	-D
21	5678	2
22	2	0
23	3	0

- (2) Input the tool number.  
  ➡ The input tool number displays and the cursor moves to the next tool number.
- When the  key is pressed without setting a value, the tool number does not change and the cursor moves to the "tool number" for the next pot number.

Pot	Tool No.	-D
21	50	2
22	2	0
23	3	0

**(Note)** To set "D", use the  key to move the cursor.  
 Refer to the manual issued by the machine tool builder for details on the "D" functions and purposes.

## 3.4.2 Setting the PLC Command

## Operation method (Setting the PLC command)

- (1) Set the value after the  menu.  
 12  ➡ The set value displays in the PLC command setting field, and the PLC command setting mode is enabled.  
 The function of the command depends on the machine tool builder's specifications.




0012

**(Note)** Select the  menu again before pressing the  key, then the menu highlight returns to normal, and the PLC command setting mode becomes disable.

- (2) Press the menu , or the  key again to finish setting. ➡ The PLC command setting mode is released, and the menu highlight returns to normal.

## 3.4.3 Setting/Erasing the Tool No. of Spindle/Standby Tools



## Operation method (Setting the tool No. of spindle/standby tools)

- (1) Press the Spindle standby menu.  The cursor appears at the top tool No. of spindle/standby.  
In addition, the first "D" column is highlighted.
- (2) Move the cursor to the data to be set using the ↑ and ↓ keys.
- (3) Input a new tool No.  
50 INPUT (Note1)  The tool No. changes. The cursor moves to the next tool No.
- (4) Press the Spindle standby menu again or ◀ key to quit the spindle/standby setting mode.  The spindle/standby setting mode is cancelled.

**(Note 1)** When the Spindle standby menu again or ◀ key is pressed before pressing the INPUT key, the spindle/standby setting mode will be cancelled and the set data will be ignored.

**(Note 2)** Move the cursor with → key to set the "D" data.




## Operation method (Erasing the tool No. of spindle/standby tools)

- (1) Press the Spindle standby menu.  The cursor appears at the top tool No. of spindle/standby.  
In addition, the first "D" column is highlighted.
- (2) Move the cursor to the tool No. to be erased and input "0".  
0 INPUT  The tool No. of spindle/standby changes to "0".

**(Note 1)** Move the cursor with → key and set "0" to erase the "D" data as the same manner as the tool No.

## 3.4.4 Erasing the Tool Registration Data

## Operation method (Selecting a magazine number and erasing the tool registration data.)

- (1) Press the menu Magazn 2.  The tool registration data of the selected magazine No. appears.
- (2) Press the menu Magazn clear.  A message displays confirming whether it is okay to erase.
- (3) Press the Y or INPUT key.  All selected magazine tool data (tool number and D) is erased.  
Spindle/standby tool data is not erased.

### 3.5 Tool Life Management

The life management data of the tool usage conditions, etc., is set and displayed.  
The tool life management specifications differ for the M and L system.

#### <M system>

##### ■ Tool life management I

The usage time or No. 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 compensation (tool length compensation and tool radius compensation) is carried out for the selected tool.

The tool life management related parameters (basic common parameters) include the following.

#	Item	Setting	Details
1103	T_Life T-life manage valid	0	This ignores the tool life management data.
		1	This controls the tool life management.
1104	T_Com2 Tool com 2 (When tool life management is valid.)	0	This treats the program tool command as a group No. Search for the group No. that matches with the tool No. in the tool registration data, and select the spare tool from there.
		1	This treats the program tool command as a tool No.
1105	T_sel2 Tool com 2 (When tool life management is valid.)	0	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.
		1	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.



## &lt;L system&gt;

## ■ Tool life management I ..... Tool life data display

The tool usage time and usage count indicated in the program is accumulated, and the usage status for that tool is monitored. Tool life management can be performed for a maximum of 80 tools (tool Nos. 1 to 80).

## (a) Time based control

The cutting time (G01, G02, G33 etc.) after performing the tool selection command (T) is calculated in the tool usage time corresponding to the designated tool.

A warning is issued if the usage time at the time the tool selection command is performed reaches the life time.

## (b) Usage count based control

The tool usage count corresponding to the designated tool No. increases each time the tool selection command (T) is performed.

A warning is issued if the usage count at the time the tool selection command is performed exceeds the life time.

## ■ Tool life management II ..... Tool life data display / registration group list display

The life (usage time, usage count) of each tool is controlled, and if the life is reached, the same spare tools are selected and used one by one from the group to which that tool belongs.

- Group count : Multi-part system spec. : max. 40 groups for each part system

Single part system spec.: max. 80 groups

- No. of tools in group : Max. 16

The tool life management related parameters (basic shared parameters) are shown below.

#	Name	Setting	Details
1096	T_Ltyp (For L system only) Tool life management type	1	Tool life management I
		2	Tool life management II
1103	T_Life Enable tool life management	0	The tool life management is not performed.
		1	The tool life management is performed.
1107	TlIfsc (For L system only) Tool life management Display screen division	Set the no. of groups displayed at the tool life management II (L series) screen.	
		0	Displayed no. of groups: 1, Max. No. of registered tools: 16
		1	Displayed no. of groups: 2, Max. No. of registered tools: 8
		2	Displayed no. of groups: 4, Max. No. of registered tools: 4

The tool life management screen is made up of the group list display screen and the life management data screen.

(There is no group list display screen in L system tool life management 1. Only the life management data screen exists.)

Refer to the following sections for details of the display contents, menus, and an explanation of the operations for each screen.

"3.5.1 Displaying the Group List"

"3.5.2 Displaying the Life Management Data in Group Units (M system)"

"3.5.3 Displaying the Life Management Data (L system: Tool life management I)"

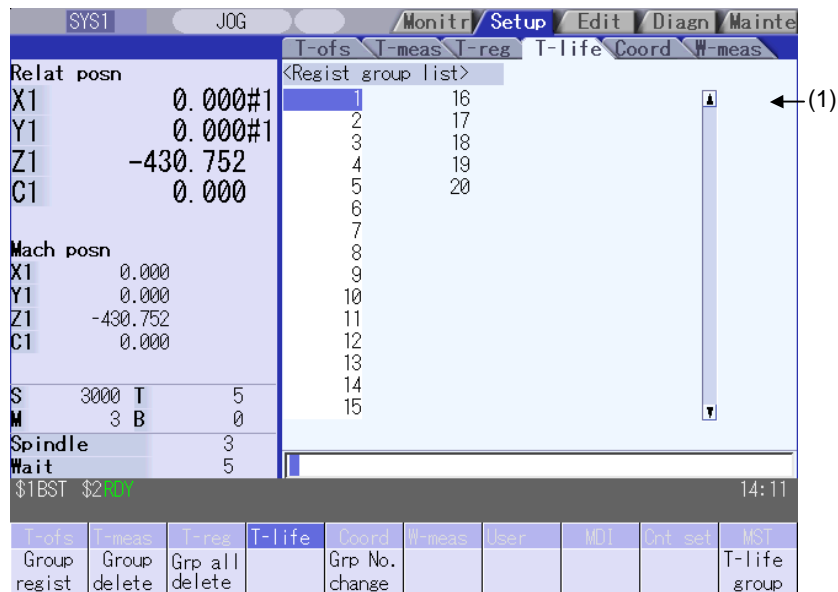
"3.5.4 Displaying the Tool Life Management Data in Group Units (L system: Tool life management II)"

## 3.5.1 Displaying the Group List

Tool life management data groups can be registered and erased.



## &lt;M system&gt;

When changing from a group unit display to the group list display, the cursor displays at the group No. at the group unit display.



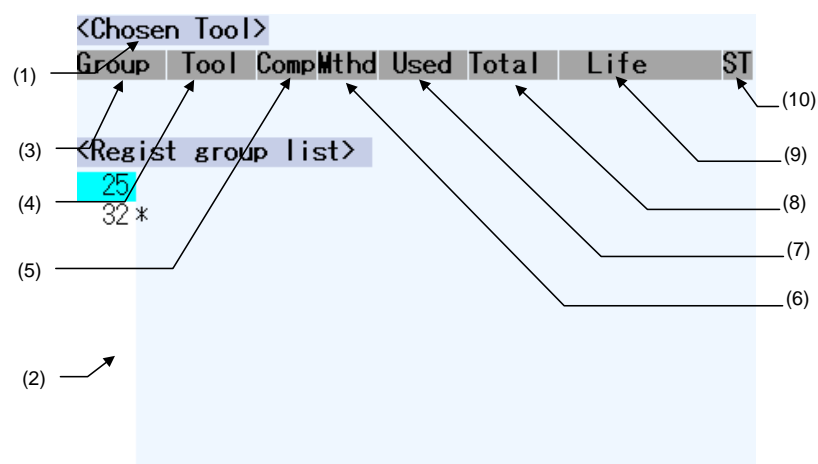
## Display items

(M system)

Display item	Details
(1) Regist group list	<p>The group Nos. registered as the tool life management data are listed in ascending order.</p> <p>Group Nos. can be set from 1 to 99999999, and maximum 1000 groups <sup>(Note)</sup> can be set.</p> <p>Maximum 60 groups can be displayed at a time. Use the  /  keys to change the display if the No. of registered groups exceeds 60.</p> <p>An asterisk will be added to the No. of the group in which all tools have reached their lives.</p> <p>(Note) The maximum number of the registered groups depends on the option.</p>

## &lt;L system&gt;

This screen is enabled only for tool life management type II (parameter "#1096 T\_Ltyp" = 2).  
The tool life management data currently being used and the group list display.



## Display items

(L system)

Display item	Details
(1) Chosen Tool	The life management information of the tool currently being used appears here.
(2) Regist group list	The group Nos. registered as the tool life management data are displayed in a list. Group Nos. can be set from 1 to 9999, and maximum 80 groups can be set. An asterisk will be added to the No. of the group in which all tools have reached their lives. (Note) The maximum number of the registered groups depends on the option.


## [CHOSEN TOOL]

Display item	Details	Display range
(3) Group	Displays the life management group No. currently being used.	1 to 9999
(4) Tool No.	Displays the tool No. currently being used.	1 to 999999
(5) Comp No.	Displays the compensation No. currently being used.	1 to 80
(6) Mthd	Displays whether the group currently being used is controlled by the usage time or usage count.	0: Time 1: Count
(7) Used	Displays the usage data for the tool currently being used.	Usage time: 0 to 99999999 (s) Usage count: 0 to 999999 (set)
(8) Total	Displays the total usage data for the tool currently being used. In the case of tools using multiple compensation Nos., the total usage data for all compensation Nos. displays. In the case of only one compensation No., the same value as "Used" displays.	Usage time: 0 to 99999999 (s) Usage count: 0 to 999999 (set)
(9) Life	Displays the life value for the tool currently being used.	Usage time: 0 to 99999999 (s) Usage count: 0 to 999999 (set)
(10) ST	Displays the status of the tool currently being used.	0: Unused tool 1: Used tool 2: Normal life tool 3: Skipped tool

## Menus (M system/L system)

Menu	Details	Type	Reference
Group regist	Creates a new group and adds the group No. to the list.	A	"Registering a group"
Group delete	This erases all of the tool life management data included in the designated group No. If the group No. is not designated, the tool life management data for the group No. indicated by the cursor will be erased.	A	"Erasing a group"
Grp all delete	This erases all groups and their tool life management data registered in the part system which is currently selected.	A	"Erasing all groups"
Group change	Changes the group No.. Specify a new group No. and press the <input type="text" value="INPUT"/> key to change the group No. and then change the contents of the list. An error occurs if an existing group No. is specified.	A	"Changes the group No."
T-life group	The tool life data for the group No. indicated by the cursor will be displayed. This changes to the mode enabling tool life management data to be set and displayed with group unit Nos.	C	"Changing to the group unit display"


## Operation method (Registering a group) (M system/L system)

- (1) Press the menu .
- (2) Designate the group No. to be registered.    The life management data for the selected group No. displays empty.  
 The group No., method, and life value is set at the L system.  
 (Example) 25/1/3000

**(Note 1)** An error occurs if the group No. duplicates a pre-existing group No.

- (Note 2)** The group is not registered if the following operations are performed after newly registering a group No..
- The application is exited without registering even 1 item of tool life data.
  - The screen is changed to that of other than the group unit display.
  - The part system is changed.

## Operation method (Erasing a group) (M system/L system)

- (1) Press the menu .
- (2) Designate the group to be erased.    The selected group No. is erased.

If nothing is input in the input area, the group at the cursor location is erased.

## Operation method (Erasing all groups)

(M system/L system)

- (1) Press the menu . → The confirmation message appears.
- (2) Designate the group to be erased.  
72  → All the registered groups and their tool life management data is erased.

**(Note 1)** If no group has been registered, the operation message "Can't delete all groups" will appears.

## Operation method (Changing the group No.)

(M system/L system)

**(Ex.)** Changing the group No. from 5 to 20

- (1) Use the , ,  and  keys to move the cursor to group No. 5.
- (2) Press the menu  key. → The menu is highlighted.
- (3) Set the new group No..  
20  → The group No. changes to "20".

## Operation method (Changing to the group unit display)

(M system/L system)

**(Ex.)** Displaying the group No. 5 tool life data.

- (1) Use the , ,  and  keys to move the cursor to group No. 5.
- (2) Press the menu  or  keys. → The screen changes to the group unit display and the group No. "5" tool life management data displays.



<M system>

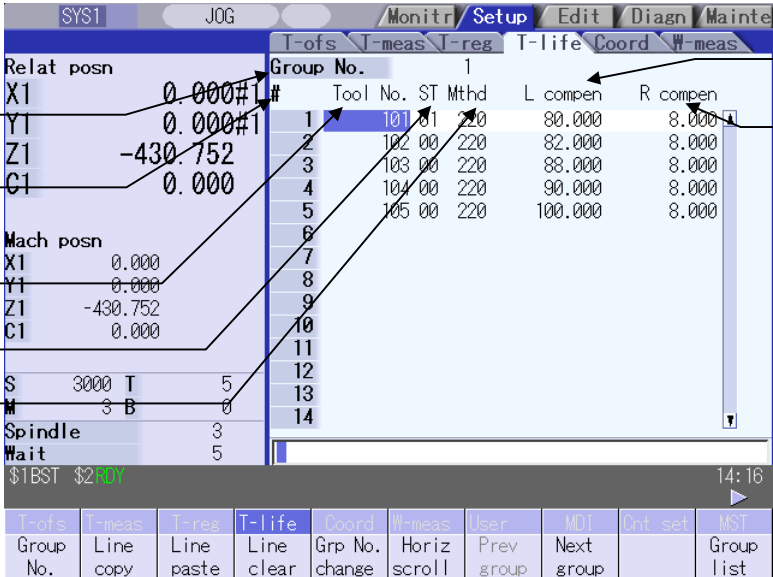
Group No.		5				
#	Tool No.	ST	Mthd	L compen	R compen	
1	301	00	000	0	0	
2	302	00	000	0	0	
3	303	00	000	0	0	
4	304	00	000	0	0	
5	305	00	000	0	0	

<L system>

Group:		5		Form: 1		Life: 3000 (set)	
#	Tool	Comp	Used (set)	ST			
1	1	2	0	0			
2	2	2	2	1			
3	5	5	5	1			
4	6	6	6	1			
5	7	7	7	1			
6	8	8	8	1			
7	9	9	9	1			
8	10	10	10	1			

## 3.5.2 Displaying the Life Management Data in Group Units (M system)

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



(1) Relat posn X1 0.000#1  
Y1 0.000#1  
Z1 -430.752  
C1 0.000

(2) Mach posn X1 0.000  
Y1 0.000  
Z1 -430.752  
C1 0.000

(3) S 3000 T 5  
M 3 B 0

(4) Spindle 3  
Wait 5

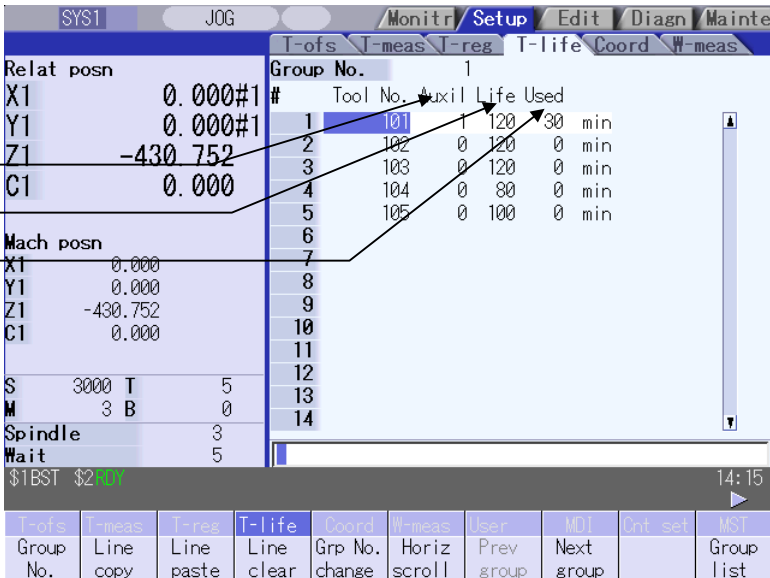
(5) \$1BST \$2

(6) T-ofs T-meas T-reg T-life Coord W-meas

(7) Tool No. ST Mthd L compen R compen

Group No.	Tool No.	ST	Mthd	L compen	R compen
1	101	01	220	80.000	8.000
2	102	00	220	82.000	8.000
3	103	00	220	88.000	8.000
4	104	00	220	90.000	8.000
5	105	00	220	100.000	8.000
6					
7					
8					
9					
10					
11					
12					
13					
14					

T-ofs T-meas T-reg T-life Coord W-meas User MDI Cnt set MST  
Group No. Line copy Line paste Line clear Grp No. Horiz scroll Prev group Next group Group list



(8) Relat posn X1 0.000#1  
Y1 0.000#1  
Z1 -430.752  
C1 0.000

(9) Mach posn X1 0.000  
Y1 0.000  
Z1 -430.752  
C1 0.000

(10) S 3000 T 5  
M 3 B 0

Spindle 3  
Wait 5

\$1BST \$2

T-ofs T-meas T-reg T-life Coord W-meas


Tool No. Auxil Life Used

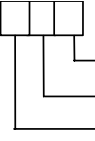
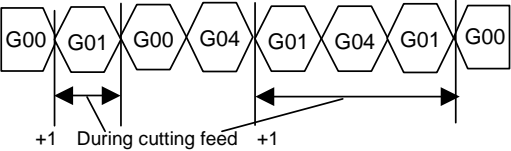
Group No.	Tool No.	Auxil	Life Used
1	101	1	120 30 min
2	102	0	120 0 min
3	103	0	120 0 min
4	104	0	80 0 min
5	105	0	100 0 min
6			
7			
8			
9			
10			
11			
12			
13			
14			

T-ofs T-meas T-reg T-life Coord W-meas User MDI Cnt set MST  
Group No. Line copy Line paste Line clear Grp No. Horiz scroll Prev group Next group Group list

## Display items

(M system)

Display item	Details	Display range
(1) Group No.	This is the group No. of the tool for which tool life management is performed. Tools with the same group No. are regarded as spare tools.	1 to 99999999
(2) #	This is the data setting No.. This is not the magazine pot No.	
(3) Tool No.	This is the No. corresponding to the each individual tool. Maximum 1000 tools can be registered. This is a fixed tool No. actually output for the tool command and so on.	1 to 99999999
(4) ST	 <p>Tool status</p> <p>Machine manufacturer release</p> <p>Tool status</p> <p>0 : Unused tool Normally set to "0" when the tool is replaced with a new tool.</p> <p>1 : Used tool This becomes "1" when the cutting actually starts.</p> <p>2 : Normal life tool This becomes "2" when the usage data (usage time and No. of uses) exceeds the life data.</p> <p>3 : Tool abnormality 1 tool</p> <p>4 : Tool abnormality 2 tool</p> <p><b>(Note)</b> Item 3 and 4 differ depending on the machine tool builder specifications.</p>	

Display item	Details	(M system) Display range
(5) Mthd	 <p>(a) Tool life management method (b) Tool radius compensation data format (c) Tool length compensation data format</p> <p>(a) Tool life management method            0 : Usage time            This manages by the cutting execution time.            1 : No. of mounting times            This manages by the No. of times the tool became the spindle tool in tool replacement, etc.            However, in the case where the cutting feed command (G01, G02, G03 etc.) is not executed even once after becoming the spindle tool, the No. of times is not counted.            2 : Usage count            This is counted when the rapid traverse command (G00 etc.) is changed to the cutting feed command (G01, G02, G03 etc.). However, this is invalid in the case of a rapid traverse or cutting feed command with no movement.</p>  <p>(b) Tool radius compensation data format (c) Tool length compensation data format            0 : Compensation No.            The tool life management data compensation data is handled as a compensation No., this No. replaces the compensation No. designated in the process program, and compensation is performed.            1 : Added compensation amount            The tool life management data compensation data is handled as the added compensation amount, an addition is made to the compensation amount shown with the compensation No. designated in the process program, and compensation is performed.            2 : Direct compensation amount            The tool life management data compensation data is handled as the direct compensation amount, this No. replaces the compensation amount shown for the compensation No. designated in the process program, and compensation is performed.</p>	
(6) L compen	This depends on the data format designated in "Mthd".	Compensation No. : 1 to 400 Added compensation amount Direct Compensation amount <b>(Note 1)</b>
(7) R compen		
(8) Auxil	This depends on the machine tool builder specifications.	0 to 65535
(9) Life	Set the usage time (minutes), attachment count (No. of times attached to the spindle), or usage count (No. of holes drilled) for the life for each tool based on the data format set for "Method". The life is infinite when "0" is set.	Usage time: 0 to 4000 (min) No. of mounting times: 0 to 65000 (set) No. of uses: 0 to 65000 (set)



(M system)		
Display item	Details	Display range
(10) Used	<p>This displays the usage data for individual tools based on the method specified for the tool life management method.</p> <p><b>(Note)</b> This data is not counted during machine lock, auxiliary function lock, dry run or for a single block.</p>	<p>Usage time: 0 to 4000 (min)</p> <p>No. of mounting times: 0 to 65000 (set)</p> <p>No. of uses: 0 to 65000 (set)</p>

**(Note 1)** The "Length compensation" and "Radius compensation" calculation/direct compensation amount setting/display range are as follows based on a combination of settings of "#1003 iunit (input unit)" and "#1041 I\_inch (initial inch)".

#1003 iunit	#1041 I_inch	Setting/display range
B	0	-999.999 to 999.999
	1	-99.9999 to 99.9999
C	0	-999.9999 to 999.9999
	1	-99.99999 to 99.99999
D	0	-999.99999 to 999.99999
	1	-99.999999 to 99.999999
E	0	-999.999999 to 999.999999
	1	-99.9999999 to 99.9999999

## Menus

(M system)

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 <b>INPUT</b> key is pressed. The group No. can be referred to in the group list.	A	"Designating a group No."
Line copy	Copies one line of tool life management data where the cursor is located.	C	"Copying/pasting the tool life data"
Line paste	The copied tool life management data is written to the data in the line where the cursor is located. If the copied data is changed after the menu <b>Line copy</b> is pressed, the data before changing is written when pasted. The data in the copied line can be pasted as many times as is required until new data is copied.	C	
Line clear	This erases a designated line (multiple lines possible) of tool life management data. The first and the last line No. of the data to be erased is specified with a "/" separating the Nos. If the <b>INPUT</b> key is pressed without specifying a line, the data in the line where the cursor is located is erased.	A	"Erasing one line of tool life management data" "Designating and erasing a line"
Group change	This changes a group No. If a new group No. is set and the <b>INPUT</b> key pressed, the group No. changes. An error occurs if a pre-existing group No. is set.	A	"Changing a group No."
Horiz scroll	This scrolls the display of the tool life management data to the left and right. The items below display alternately each time the menu is pressed. 1. Tool No., ST, Mthd, L compen, R compen 2. Tool No., Auxil, Life, Used	C	
Prev group	Displays the previous group No. data.	C	
Next group	Displays the next group No. data.	C	
Group list	This displays the list of tool life data groups.	C	
Group regist	This creates a new group.	A	"Registering a group"
Group delete	This erases all tool life management data contained in the currently displayed group No.	A	"Erasing a group"

## Operation method (Designating a group No.)

(M system)

- (1) Press the  menu. ➡ The menu is highlighted.
- (2) Designate the group No. to be displayed.  
12  ➡ The tool life data of the designated group No. appears, and the cursor moves to the head of the data.

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

## Operation method (Changing a group No.)

(M system)

- (1) Press the  menu. ➡ The menu is highlighted.
- (2) Designate the group No. after changing.  
112  ➡ The group No. changes to "112".

**(Note)** An error occurs if the group No. duplicates a pre-existing group No.

## Operation method (Setting the tool life data)

(M system)

- (1) Move the cursor to the data to be set using the , , , , , and  keys. ➡ The menu is highlighted.  
It is possible to move to the line after the registered line.  
Set a tool No. for this line to newly register tool life management data.
- (2) Set a value.  
20  ➡ The set value displays.  
The cursor moves one position to the right.

**(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 registered in more than one group.

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

**(Note 4)** Change the "Method" to initialize the related items.

Change the tool life management method (the 1st digit) to clear the "Life" and "Usage", and also change the units.

Change the tool radius compensation data (the 2nd digit) to clear the "Radius Compensation".

Change the tool length compensation data (the 3rd digit) to clear the "Length Compensation".

Figures after the decimal point are also changed in line with the specifications.

## Operation method (Copying/pasting the tool life data)

(M system)

- (1) Move the cursor to the line to be copied.
- (2) Press the menu Line copy. ➔ The menu is highlighted.  
The background color of the copied data changes to light blue.  
(The color changes even when scrolling horizontally.)
- (3) Move the cursor to the line where the data is to be pasted. ➔

Group No.	5				
#	Tool No.	ST	Mthd	L compen	R compen
1	87654321	0	110	-123456.789	-123456.789
2	101	1	101	123.456	123
3	102	2	012	100	123.456
4	103	3	020	1	-123.456
5					
- (4) Press the Line paste menu. ➔ The copied tool life management data is written to the data (excluding the tool No.) in the line where the cursor is located.  
The background color returns to normal.  
The cursor moves to "ST".

**(Note 1)** Once copied, the data is held until a new data item is copied.**(Note 2)** It is not possible to paste into a line for which a tool No. has not been set.

## Operation method (Erasing one line of tool life management data)

(M system)

- (1) Move the cursor to the line to be erased.
- (2) Press the menu Line clear and INPUT keys. ➔ The menu is highlighted.  
A message displays confirming whether it is okay to erase the data.  
The background color of the area to be erased changes to light blue.
- (3) Press the Y or INPUT key. ➔ One line of the selected life management data is erased and the menu highlight returns to normal.  
The next line moves up after erasing.  
Press a key other than Y or INPUT in order not to erase the data.

## Operation method (Designating and erasing the multiple lines)

(M system)

- (1) Press the menu . ➡ The menu is highlighted.
- (2) Set the range to be erased by marking the first and last # Nos. with a "/", and press  key.  
122/125  ➡ A message appears to confirm the erasing.  
The background color of the area to be erased changes to light blue.
- (3) Press the  or  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 moves up.  
Press a key other than  or  in order not to erase the data.

## Operation method (Registering a group)

(M system)

- (1) Press the  menu.
- (2) Set the No. of the group to be registered. ➡ A new group is created and the life management data  
25  displays containing no data.

**(Note 1)** An error occurs if the same group No. already exists.**(Note 2)** The group is not registered if one of the operations below is performed after registering a new group No..



- If the application is exited without registering even 1 item of tool life data.
- If the screen is changed to that of other than the group unit display.
- The part system is changed.

## Operation method (Erasing a group)

(M system)

- (1) Move the cursor to the group No. to be erased.
- (2) Press the  menu. ➡ A message appears to confirm the erasing.
- (3) Press the  or  key. ➡ All the tool life management data for the displayed  
group No. is erased and the previous group No. data  
displays.  
Returns to the group list displays if all groups are  
erased.

## 3.5.3 Displaying the Life Management Data (L system: Tool life management I)

The tool life management data can be set and displayed. Use the  /  keys to scroll between screens if all of the registered tools cannot be displayed on one screen.

#	[Time]		[Count]		[Status]	
	Used	Life	Used	Life	A	B
1	46:36:12	0: 0	3000	0	0	0
2	46:47: 7	0: 0	3000	0	2	0
3	46:47: 7	0: 0	3000	0	5	0
4	46:47: 7	0: 0	3000	0	6	0
5	46:47: 7	0: 0	3000	0	7	0
6	46:47: 7	0: 0	3000	0	8	0
7	46:47: 7	0: 0	3000	0	9	0
8	46:47: 7	0: 0	3000	0	10	0
9	0:21:51	0: 0	3232	0	-95	12
10	0: 0: 0	0: 0	0	0	0	0
11	0: 0: 0	0: 0	0	0	0	0
12	0: 0: 0	0: 0	0	0	0	0
13	0: 0: 0	0: 0	0	0	0	0

## Display items

(L system)

Display item		Details	
(1) #		Tool No. The # No. is highlighted if the usage time reaches the life time or if the usage count exceeds the life count.	
(2) Time	Used	The integrated time the tool is used. This timer value is incremented during cutting.	0:0:0 to 99:59:59 (h:min:s)
	Life	Tool life time Set the service lifetime.	0:0 to 99:59(h:min) (0:0 = no warning given)
(3) Count	Used	The integrated count the tool is used. The count goes up when a tool is selected.	0 to 9999 (times)
	Life	Tool life count Set the service life count.	0 to 9999 (times) (0:0 = no warning given)
(4) Status	A (left side)	The tool life management status is indicated. 0: Not used 1: Current tool (tool being used) 2: Service lifetime (service life count) is exceeded.	0 to 2
	B (right side)	(Used by machine tool builder)	0 to 99







## Menus

(L system)

Menu	Details	Type	Reference
Line copy	Copies one line of tool life management data where the cursor is located.	C	"Copying/pasting the tool life data"
Line paste	The copied tool life management data is written to the data in the line where the cursor is located. If the copied data is changed after the menu key <b>Line copy</b> is pressed, the data before changing is written when pasted. The copied data can be pasted as many times as is required until new data is copied.	C	
Line clear	This erases a designated line (multiple lines possible) of tool life management data. The first and the last line No. of the data to be erased is specified with a "/" separating the Nos.. If the <b>INPUT</b> key is pressed without specifying a line, the data in the line where the cursor is located is erased.	A	"Erasing one line of tool life management data" "Designating and erasing a line"

## Operation method (Setting the tool life data)

(L system)

- (1) Move the cursor to the data to be set using the , , , ,  and  keys.

It is possible to move to the line after the registered line.

- (2) Set a value.

20 **INPUT**



The set value displays.  
The cursor moves one position to the right.

## Operation method (Copying/pasting the tool life data)

(L system)

- (1) Move the cursor to the line to be copied.

- (2) Press the menu **Line copy**.



The background color of the copied data changes to light blue.

- (3) Move the cursor to the line where the data is to be pasted.

- (4) Press the **Line paste** menu.



The copied tool life management data is written to the data in the line where the cursor is located.  
The background color returns to normal.

**(Note 1)** Once copied, the data is held until a new data item is copied.

## Operation method (Erasing one line of tool life management data)

(L system)

- (1) Move the cursor to the line to be erased.
- (2) Press the menu  and  keys.
 

➡

 The menu is highlighted.  
 A message displays confirming whether it is okay to erase the data.  
 The background color of the area to be erased changes to light blue.
- (3) Press the  or  key.
 

➡

 One line of the selected life management data is erased and the menu highlight returns to normal.  
 The next line moves up after erasing.
 

Press a key other than  or  in order not to erase the data.

## Operation method (Designating and erasing the multiple lines)

(L system)

- (1) Press the menu .
- (2) Set the erasing range by marking the first and last # Nos. with a "/", and press  key.
 

➡

 A message displays confirming whether it is okay to erase the data.  
 The background color of the area where the data is erased changes to light blue.
 

122/125
- (3) Press the  or  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 moves up.
 

Press a key other than  or  in order not to erase the data.

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



### 3.5.4 Displaying the Tool Life Management Data in Group Units (L system: Tool life Management II)

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

This screen is enabled only for tool life management II ("#1096 T\_Ltyp" = 2).

(1) **Group:** 1 **Form:** 1 **Life:** 300 (set)

(2) #	Tool	Comp	Used (set)	ST
(4) 1	101	11	28	1
2	102	12	0	0
(5) 3	103	13	0	0
4	104	14	0	2
(6) 5	105	15	0	0
6				
7				
8				

(3) (7) (8)

By setting parameter "#1107 TlIfsc", it is possible to select the life management data display mode for multiple groups.

"#1107 TlIfsc" setting value	0	1	2
No. of display groups	1	2	4
Max. No. of registered tools	16	8	4

#### <Group 1 display mode> (#1107 TlIfsc = 0)

Group: 1 Form: 1 Life: 300 (set)					Group: 2 Form: 1 Life: 200 (set)				
#	Tool	Comp	Used (set)	ST	#	Tool	Comp	Used (set)	ST
1	101	11	28	1	9				
2	102	12	0	0	10				
3	103	13	0	0	11				
4	104	14	0	2	12				
5	105	15	0	0	13				
6					14				
7					15				
8					16				

#### <Group 2 display mode> (#1107 TlIfsc = 1)

Group: 1 Form: 1 Life: 300 (set)					Group: 2 Form: 1 Life: 200 (set)				
#	Tool	Comp	Used (set)	ST	#	Tool	Comp	Used (set)	ST
1	101	11	28	1	1	201	21	11	1
2	102	12	0	0	2	202	22	0	0
3	103	13	0	0	3	203	23	0	0
4	104	14	0	2	4				
5	105	15	0	0	5				
6					6				
7					7				
8					8				

## &lt;Group 4 display mode&gt; (#1107 TlIfsc = 2)

Group: 1 Form:1Life: 300 (set)					Group: 2 Form:1Life: 200 (set)				
#	Tool	Comp	Used (set)	ST	#	Tool	Comp	Used (set)	ST
1	101	11	28	1	1	201	21	11	1
2	102	12	0	0	2	202	22	0	0
3	103	13	0	0	3	203	23	0	0
4	104	14	0	2	4				

Group: 3 Form:0Life: 30 s					Group: 4 Form:0Life: 50 s				
#	Tool	Comp	Used (s)	ST	#	Tool	Comp	Used (s)	ST
1	301	31	5	1	1	401	41	5	1
2	302	32	0	0	2	402	42	0	0
3	3030	33	0	0	3	403	43	0	0
4					4				

## Display items

(L system)

## &lt;Group information&gt;

Display item	Details	Setting range
(1) Group	Life management group No.	1 to 9999
(2) Form	This displays whether to control the currently displayed group in usage hours or usage count.	0 : Hours 1 : Times
(3) Life	This sets the tool life data for the currently displayed group. The following tool life data units display based on the control method. Usage time : (s) Usage count : (set)	Usage time: 0 to 99999999 (s) Usage count: 0 to 999999 (set)

## &lt;Life management data within group&gt;

Display item	Details	Setting range
(4) #	This displays whether the tool for which the # No. is highlighted is a life tool (ST=2) or a skip tool (ST=3).	
(5) Tool No.	This sets the tool No.	1 to 999999
(6) Comp No.	This sets the compensation No.	1 to 80
(7) Used	This sets the usage data at such times as when the tool is not an unused tool. This becomes "0" when the usage data is not set. The following usage data units display based on the control method. Usage time : (s) Usage count : (set)	Usage time: 0 to 99999999 (s) Usage count: 0 to 999999 (set)  Setting can be omitted.
(8) ST	This sets the tool status. This becomes "0" when the tool status is not set. 0: Unused tool 1: Used tool 2: Normal life tool 3: Skipped tool	0 to 3  Setting can be omitted.

## Menus

(L system)

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 type="text" value="INPUT"/> key is pressed. The group No. can be referred to in the group list.	A	"Designating a group No."
Line copy	Copies one line of tool life management data where the cursor is located.	C	"Copying/pasting the tool life data"
Line paste	The copied tool life management data is written to the data in the line where the cursor is located. If the copied data is changed after the menu key <input type="text" value="Line copy"/> is pressed, the data before changing is written when pasted. The copied data can be pasted as many times as is required until new data is copied.	B	
Line clear	This erases a designated line (multiple lines possible) of tool life management data. The first line No. and the last line No. of the data to be erased is specified with a "/" separating the Nos. If the <input type="text" value="INPUT"/> key is pressed without specifying a line, the data in the line where the cursor is located is erased.	A	"Erasing one line of tool life management data" "Designating and erasing a line"
Grp No. change	This changes a group No. If a new group No. is specified and the <input type="text" value="INPUT"/> key pressed, the group No. changes. An error occurs if a pre-existing group No. is set.	A	"Changing a group No."
Group change	The group active area is changed if parameter "#1107 TlIfsc" is set to 1 or 2.	C	"Changing the active area for multiple group displays"
Multi group	Changes to the multiple group life management data display mode based on the parameter "#1107 TlIfsc" setting value.	C	
Group regist	This creates a new group and displays the life management data containing no data.	A	"Registering a group"
Group list	This displays the list of tool life data groups.	C	
Close	The multiple group life management data display mode is cancelled.	C	

## Operation method (Designating a group No.)

(L system)

- (1) Press the  menu. ➡ The menu is highlighted.
- (2) Designate the group No. to be displayed.  
12  ➡ The tool life data of the designated group No. appears, and the cursor moves to the head of the data.

**(Note)** If a group No. that does not exist is set, a message appears to confirm the creation of a new No.. A new group is created if  or  is pressed.  
When creating a new group, set the method and life data at the end of the group No., separating the data with a "/". If the method and life data are omitted, a new group is created with method = 0 (usage time), and life data = 0.

## Operation method (Changing a group No.)

(L system)

- (1) Press the  menu. ➡ The menu is highlighted.
- (2) Designate the group No. after changing.  
112  ➡ The group No. changes to "112".

**(Note)** An error occurs if the group No. duplicates a pre-existing group No.

## Operation method (Setting the tool life data)

(L system)

- (1) Move the cursor to the data to be set using the , , , , , and  keys.  
It is possible to move to the line after the registered line.  
Set a tool No. for this line to newly register tool life management data.
- (2) Set a value.  
20  ➡ The set value displays.  
The cursor moves one position to the right.

**(Note 1)** It is not possible to set any other data if the tool No. and compensation No. have not been set.

## Operation method (Copying/pasting the tool life data)

(L system)

- (1) Move the cursor to the line to be copied.
- (2) Press the menu . ➡ The background color of the copied data changes to light blue.
- (3) Move the cursor to the line where the data is to be pasted.
- (4) Press the  menu. ➡ The copied tool life management data is written to the data in the line where the cursor is located.  
The background color returns to normal.  
The cursor moves to "Tool No.".

**(Note 1)** Once copied, the data is held until a new data item is copied.

## Operation method (Erasing one line of tool life management data)

(L system)

- (1) Move the cursor to the line to be erased.
- (2) Press the menu  and  keys.
 

➡

 The menu is highlighted.  
 A message displays confirming whether it is okay to erase the data.  
 The background color of the area where the data is erased changes to light blue.
- (3) Press the  or  key.
 

➡

 One line of the selected life management data is erased and the menu highlight returns to normal.  
 The next line moves up after erasing.
 

Press a key other than  or  in order not to erase the data.

## Operation method (Designating and erasing the multiple lines)

(L system)

- (1) Press the menu .
- (2) Set the erasing range by marking the first and last # Nos. with a "/", and press  key.
 

➡

 A message displays confirming whether it is okay to erase the data.  
 The background color of the area where the data is erased changes to light blue.
 

1/5
- (3) Press the  or  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 moves up.
 

Press a key other than  or  in order not to erase the data.

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

## Operation method (Registering a group)

(L system)

- (1) Press the  menu.
- (2) Set the No. of the group to be registered.
 

➡

 A new group is created and the life management data displays containing no data.
 

25/1/3000

**(Note 1)** If the method and life data are omitted, a new group is created with method = 0 (usage time), and life data = 0.

**(Note 2)** An error occurs if the same group No. already exists.

**(Note 3)** The group is not registered if one of the operations below is performed after registering a new group No.

- If the application is exited without registering even 1 item of tool life data.
- If the screen is changed to that of other than the group unit display.
- The part system is changed.

## Operation method (Changing the active area for multiple group displays)

(L system)

- (1) Press the Group change menu.



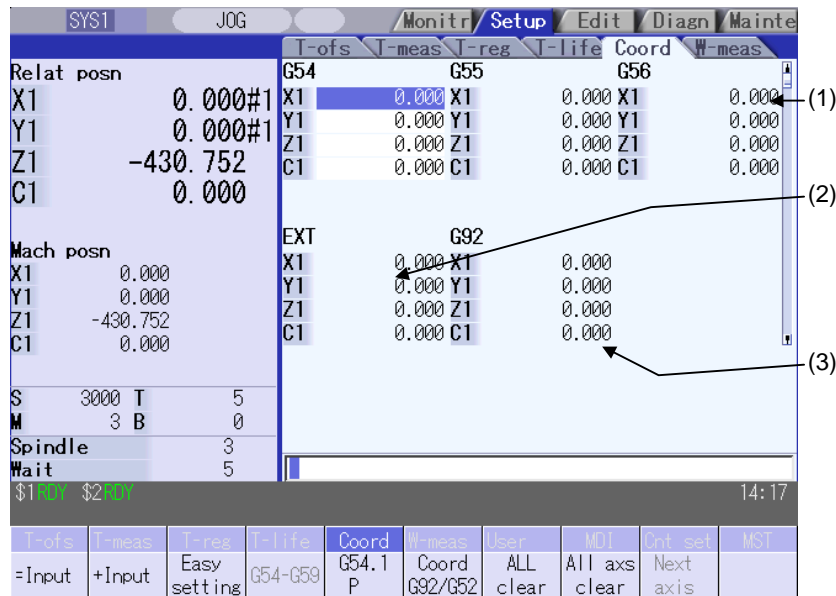
The cursor indicating the active status moves to the next group.

Group: 1 Form: 1 Life: 300 (set)						Group: 2 Form: 1 Life: 200 (set)					
#	Tool	Comp	Used (set)	ST		#	Tool	Comp	Used (set)	ST	
1	101	11	28	1		1	201	21	11	1	
2	102	12	0	0		2	202	22	0	0	
3	103	13	0	0		3	203	23	0	0	
4	104	14	0	2		4					
5	105	15	0	0		5					
6						6					
7						7					
8						8					

### 3.6 Workpiece Coordinate System Offset

This function allows the user to set and display the coordinate system offset controlled by the NC. Using the option, the number of coordinate system offset sets can be increased by 48 or 96 sets.

**(Note)** The G92/G52 coordinate system offset cannot be set.



#### Display items

Display item	Details
(1) Coordinate system offset area	<p>This sets and displays the offset amount for the workpiece coordinate system (G54 - G59), or the extension workpiece coordinate system (G54.1Pn). Use the menu operation or page change key to specify which workpiece coordinate system offset to display or set. The workpiece coordinate system offset amount data can be set in absolute or additional mode.</p>
(2) EXT offset area	This displays or sets the offset amount for the external workpiece system.
(3) G92/G52 offset area	<p>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.</p>

#### CAUTION

If the tool compensation amount or workpiece coordinate system offset amount is changed during automatic operation (including during single block stop), the changes will be valid from the command in next block or after several subsequent blocks.



## Menus

Menu	Details	Type	Reference
= Input	This inputs the offset amount with the absolute mode.	C	3.6.1 Setting the Coordinate System Offset
+ Input	This inputs the offset amount with the additional mode.	C	
Easy setting	This sets the workpiece coordinate system offset so that the current machine coordinate becomes the workpiece coordinate zero point. Only the axis at the cursor position is set.	C	3.6.3 Setting the Work Piece Coordinate Origin
G54-G59	This displays the G54 - G59 workpiece coordinate system offset amount. The cursor moves to the G54 offset. This menu can be used when the G54 – G59 offsets are not displayed.	C	3.6.1 Setting the Coordinate System Offset
G54.1 P	Enter the P number displayed at the screen to display the extension workpiece coordinate (G54.1 Pn) offset in the coordinate system offset area. This menu is not displayed if the extension workpiece coordinate system offset option is disabled. If the local coordinate system offset (G52) displays in the G92/G52 area, the display changes to G92.	A	
Coord G92/G52	This displays the G92 or G52 coordinate system offset amount. The G92 offset data is always displayed when the cursor is not at the G54 to G59 offset data.	C	
All clear	All coordinate system offset amounts for all axes are erased with the exception of G92 and EXT.	A	3.6.2 Erasing the Coordinate System Offset Amount
All axis clear	This erases the local offset data for all axes corresponding to the offset data of the coordinate system where the cursor is located.	A	
Next axis	This can be selected when the number of enabled axes is 6 or over. The displayed axes are changed to axes 1 – 5, and axis 6 and over. <b>(Note)</b> This displays when there are 6 or more axes.	C	



## 3.6.1 Setting the Coordinate System Offset

## Operation method (Setting the workpiece coordinate system G54 - G59 offset amount)

- (1) Press the G54-G59 menu.  The G54 - G59 workpiece coordinate system offset displays.
- (2) Use the (←, →) keys to move the cursor to the workpiece coordinate system offset to be set.  
Use the ↑, ↓ page keys to change the coordinate system display.  
Refer to the "Changing the offset amount using the page change keys (previous page: ↑, next page: ↓)" section in "3.6.4 Changing the coordinate system display" for further details.
- (3) Use the ↑, ↓ keys to move the cursor to the axis for which data is to be set.
- (4) Set the offset amount.  
122 INPUT  The set data displays and the cursor moves to the next data.  
This setting can be made by pressing the menu =INPUT key instead of the INPUT key.
- (5) Set other data using the same method.

**(Note)** It is possible to perform additional input by pressing the menu +INPUT key instead of the INPUT or menu =INPUT keys.

**[Ex.]** If the original data is 122.000:

$$1.234 [+INPUT] \rightarrow 122.000 + 1.234 = 123.234$$

## Setting the external coordinate system offset amount



Set the external coordinate system offset amount to keep the current workpiece coordinate system offset amounts from G54 to G59, and also apply an offset to the entire system.

Furthermore, it is also possible to use the data transfer function to write data directly to the external coordinate system offset (EXT).



(Refer to "6.2 Input/output screen" for details of the data transfer function.)

## 3.6.2 Erasing the Coordinate System Offset Amount

**Operation method (Erasing the coordinate system (excluding G92) offset amount where the cursor is displayed for all axes.)**

- (1) Press the menu All axis clear menu.  The menu is highlighted.  
A message displays confirming whether it is okay to erase the data.
- (2) Press the Y key.  All of the coordinate system indicated by the cursor is cleared to zero.  
In addition, all axes data of the local offset (G52) for the coordinate system will be erased.

**Operation method (Erasing all axis offset data of all coordinate systems (excluding G92 and EXT))**

- (1) Press the menu All clear menu.  The menu is highlighted.  
A message displays confirming whether it is okay to erase the data.
- (2) Press the Y key.  All coordinate system data is erased.  
In addition, all axes data of the local offset (G52) for the G54 to G59 coordinate systems will be erased.

**(Note)** G92 data cannot be erased.

## 3.6.3 Setting the Workpiece Coordinate Origin

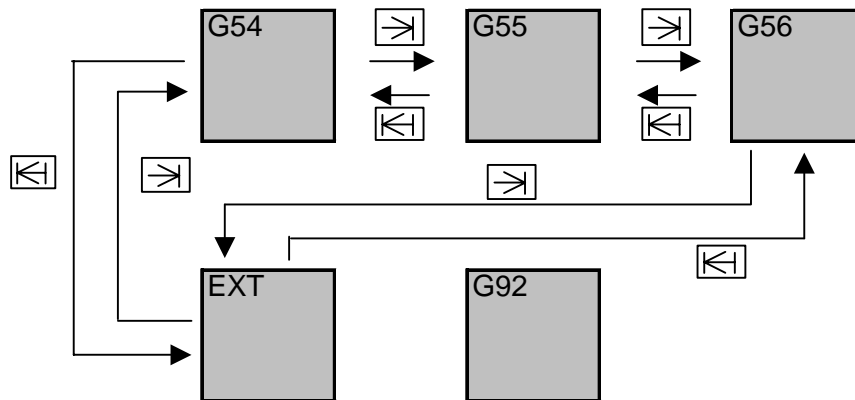
Press the menu Simple settings key to set the coordinate system offset so that the current machine position (for all axes) becomes the workpiece coordinate origin. It is only possible to set those axes where the cursor is located.

If the menu Easy setting is pressed when there is the cursor in coordinate system offset (G54 to G59), the local offset (G52) data of the axis will be also erased.

## 3.6.4 Changing the Coordinate System Display

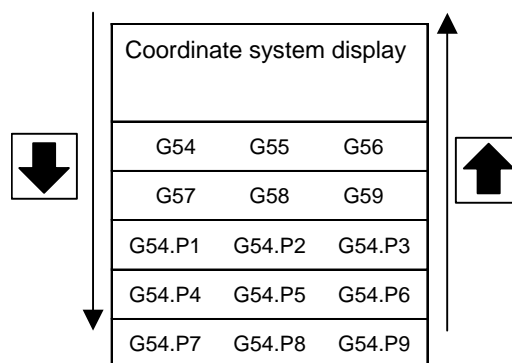
Use the   tab keys to change the coordinate system offset cursor position.

Press the Tab key to change the cursor position.



Changing the coordinate system offset using the page change keys (previous page: , next page: )

Use the page change keys to change the coordinate system offset display as shown below.



An option is required for the G54.P1 - P96 workpiece coordinate system offset display.

### 3.7 Workpiece Measurement

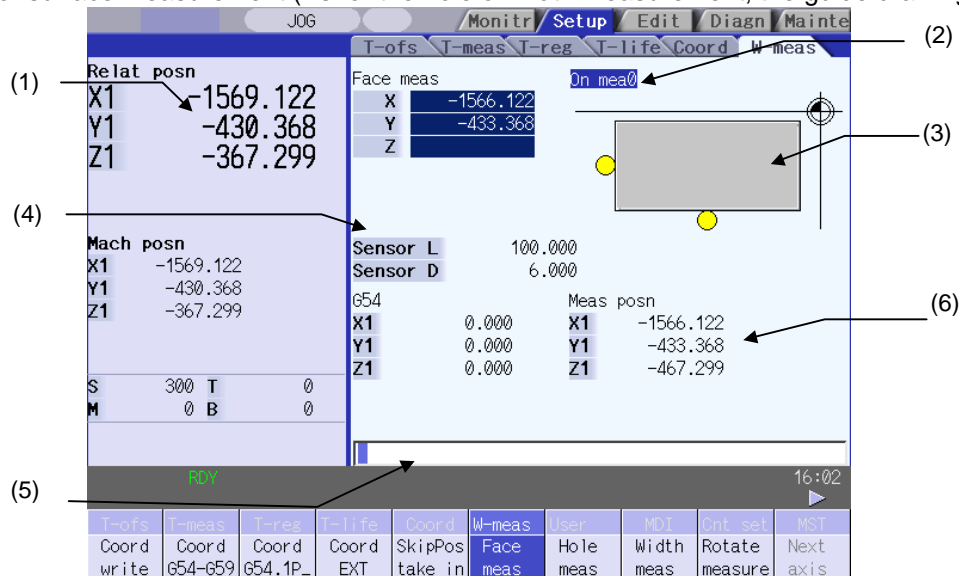
Move the sensor attached to the spindle using manual feed or handle feed to contact the workpiece, measure the coordinate position, and then set that measurement result for the workpiece coordinate system offset amount.

There are three measurement patterns: surface measurement, hole measurement, width measurement, and rotation measurement.

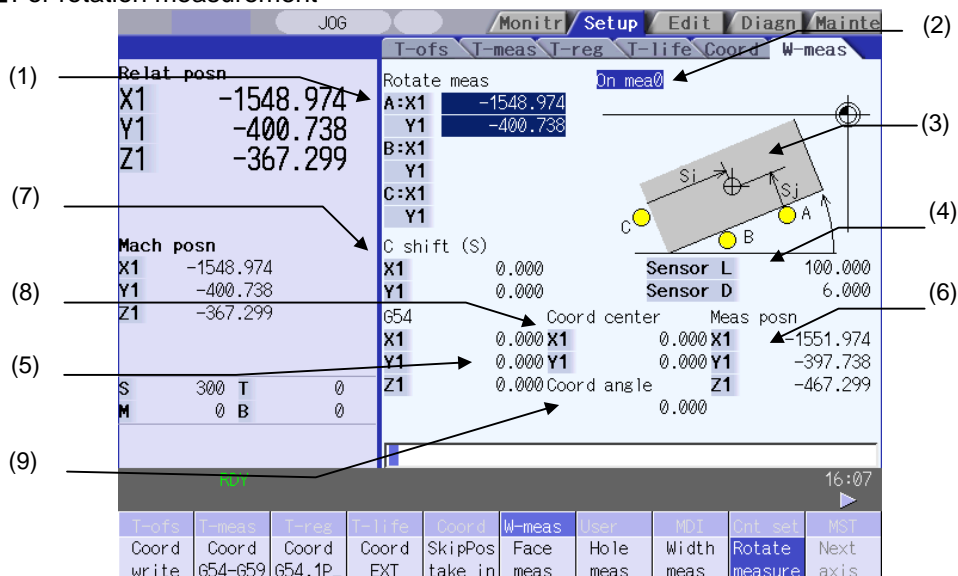
For the rotation measurement, the measurement result is set in the workpiece offset (rotation center) and parameters "#8624 Coord rot centr(V)", "#8626 Coord rot vctr(H)", and "#8627 Coord rot angle".

**(Note)** The M system is equipped with the workpiece measurement function. A workpiece position measurement option is required.

■ For surface measurement (As for the hole or width measurement, the guide drawing differ.)



■ For rotation measurement



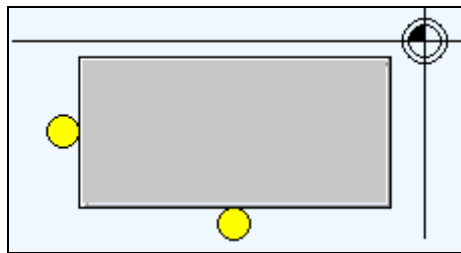
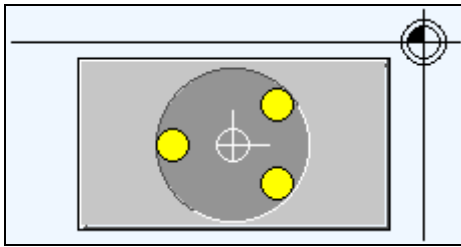
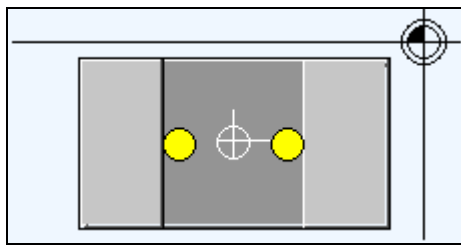
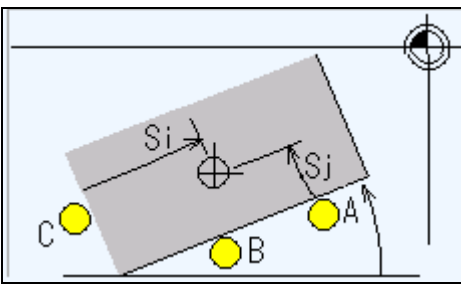
## Display items

Display item	Details
(1) Measurement counter	<p>Displays the measurement position. The measurement axis is compatible with base system parameters "#1026 base_I", "#1027 base_J", and "#1028 base_K". (Hereafter indicated as I=X, J=Y, and K=Z axes in this manual.) The measurement position becomes blank when setting the coordinate system offset amount, resetting the NC, or changing the measurement mode (when <b>face meas</b>, <b>hole meas</b>, <b>width meas</b>, or <b>rotate meas</b> menu is selected). The display contents differ depending on the measurement pattern (surface measurement, hole measurement, width measurement, or rotation measurement).</p>
Surface measurement counter	Displays the calculated measurement position from the skip position for each axis (X-, Y-, Z-axes).
Hole measurement counter	Displays 3 (A, B, C) measurement positions (X-, Y-axes).
Width measurement counter	Displays 2 (A, B) measurement positions (X-, Y-, Z-axes).
Rotation measurement counter	Displays 3 (A, B, C) measurement positions (X-, Y-axes).
(2) Manual measurement status display	<p>Displays the manual measurement status. Refer to the "Manual measurement status display" section in "3.3.1 Tool Measurement (M system)" for further details.</p>
(3) Guide drawing	<p>Displays the measurement image. The contents of the guide drawing differ depending on the measurement pattern (surface measurement, hole measurement, width measurement, or rotation measurement).</p>
(4) Sensor length and diameter	<p>Sensor length : Displays the length to the tip of the touch sensor. ("8701 Tool Length" setting value) Sensor diameter : Displays the diameter of the ball at the tip of the touch sensor. ("8702 Tool Dia" setting value)</p>
(5) Coordinate system offset	Displays the currently selected coordinate system offset.
(6) Measurement position counter	<p>Displays the measurement position for all axes. X axis : X axis machine position + sensor radius +center compensation (Horizontal) Y axis : Y axis machine position + sensor radius +center compensation (Vertical) Z axis : Z axis machine position - sensor length 4th axis and over : Respective machine position</p> <div style="border-left: 1px solid black; border-right: 1px solid black; padding: 0 10px; margin-top: 10px;"> <p>Sensor length : "#8701 Tool Length" Sensor radius : "#8702 Tool Dia"/2 Center compensation (H) : "#8703 OFFSET X" Center compensation (V) : "#8704 OFFSET Y"</p> </div>
(7) Center shift amount	Displays the shift amount of the coordinate rotation center.
(8) Coordinate rotation center	Displays the coordinates that are the center during coordinate rotation.This is the setting value of "#8623 Coord rot centr (H)" and "#8624 Coord rot centr (V)".
(9) Coordinate rotation angle	Displays the rotation angle during coordinate rotation.This is the setting value of "#8627 Coord rot angle".

## Menus

Menu	Details	Type	Reference
<b>Coord write</b>	The results calculated from the measurement counter are set in the displayed workpiece coordinate system offset. Only the axis for which a value is displayed in the measurement counter can be set. <b>(Note)</b> If the workpiece coordinate system to be set is G54 to G59, the local coordinate system offset value will be zero. (Only for the measured axis.)	C	
<b>Coord G54-G59</b>	This selects the displayed workpiece coordinate system from the sub-menu (G54 - G59). Select the workpiece coordinate system to display the selected workpiece coordinate system offset in the coordinate system offset section. (Perform the offset amount setting at the menu <b>Coord write</b> key.)	C	
<b>Coord G54.1 P</b>	Input the P number to display the selected extension workpiece coordinate system (G54.1 Pn) offset in the coordinate system offset section. (Perform the offset amount setting at the menu <b>Coord write</b> key.) This menu does not display if the extension workpiece coordinate system offset option is disabled.	A	
<b>Coord EXT</b>	This displays the external workpiece coordinate system offset in the coordinate system offset section. (Perform this setting at the menu <b>Coord write</b> key.)	C	
<b>SkipPos take in</b>	This creates a false signal when performing simple measurement (measurement without using the touch sensor) and reads the skip position. Press this menu to display the measurement position measured from the machine position of the axis moved last (axis 1 or 2) at the measurement counter.	B	
<b>Face meas</b>	This enables surface measurement. Surface measurement is possible when the power is turned ON.	B	3.7.1 Carrying Out Surface Measurement
<b>Hole meas</b>	This enables hole measurement. (The cursor moves to the measurement counter point A.)	B	3.7.2 Carrying Out Hole Measurement
<b>Width meas</b>	This enables width measurement. (The cursor moves to the measurement counter point A.)	B	3.7.3 Carrying Out Width Measurement
<b>Rotate meas</b>	This enables rotation measurement. (The cursor moves to the measurement counter point A.)	B	3.7.4 Carrying Out Rotation Measurement
<b>Next axis</b>	This changes the axes displayed at the coordinate system offset and measurement position counter from axis 1 - 5, and axis 6 and over. <b>(Note)</b> This displays when the number of enabled axes is 6 or over.	C	
<b>Center shift</b>	This sets the center shift amount. (The cursor moves to the 1st axis of "center shift (S)" when this is selected.)	A	3.7.4 Carrying Out Rotation Measurement
<b>Rotate center</b>	This sets the coordinate rotation center. (The cursor moves to the 1st axis of "coordinate rotation center" when this is selected.)	A	
<b>Rotate angle</b>	This sets the coordinate rotation angle. (The cursor moves to the "coordinate rotation angle" when this is selected.)	A	

## Details of the "Measurement counter" and "Guide drawing" display areas

Menu	Measurement counter	Guide drawing
Face meas	Face meas X -1566.122 Y -433.368 Z	
Hole meas	Hole meas A:X -1566.122 Y -433.368 B:X Y C:X Y	
Width meas	Width meas A:X -1566.122 Y -433.368 Z B:X Y Z	
Rotate meas	Rotate meas A:X1 -1566.122 Y1 -433.368 B:X1 Y1 C:X1 Y1	

## 3.7.1 Carrying Out Surface Measurement

## Outline

When carrying out surface measurement, the position of each axis is measured and the measurement results are set in the workpiece coordinates system offset. The measurement position displays at the measurement counter.

## &lt;Measurement using the touch sensor&gt;

Measurement counter X = X axis skip position + sensor radius **(Note)**

Measurement counter Y = Y axis skip position + sensor radius **(Note)**

Measurement counter Z = Z axis skip position - sensor length

**(Note)** The sign (+ and -) changes depending on the direction of the axis moved last.

Item	Reference
Sensor radius	"#8702 Tool Dia"/2
Sensor length	"#8701 Tool Length "

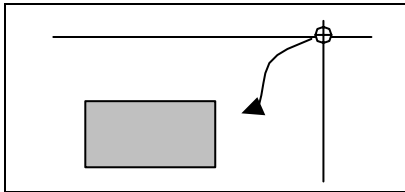
## &lt;Simple measurement (measurement without using touch sensor)&gt;

Measurement counter X : X axis measurement position

Measurement counter Y : Y axis measurement position

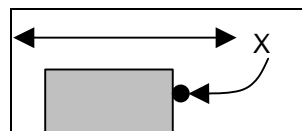
Measurement counter Z : Z axis measurement position

## Operation method




- (1) Press the Face meas menu. ➡ The menu is highlighted.
- (2) Perform the reference position return command, etc. to position the tool at the basic point.
- (3) Turn ON the measurement switch on the machine operation board. ➡ The message "On meas" appears.
- (4) Move the tool near the workpiece using manual feed and manual handle feed. ➡ 

<With the touch sensor>

- (5) Move the tool in the X-direction until the sensor contacts the workpiece. ➡ Upon contact, the axis automatically contacts the workpiece again. The measurement position measured from the skip position displays in the measurement counter X axis section.





- <Without the touch sensor (simple measurement)>
- (5) Move the tool in the X-direction to the arbitrary position and press the menu SkipPos take in .  
 The skip position is calculated and the result displays in the measurement counter X axis section.
  - (6) Select the workpiece coordinate system offset in which the measurement data will be set.  
**(Example)** Press the menus Coord G54-G59 G55 to select G55.
  - (7) Press the Coord write menu.  
 The value achieved by adding or subtracting the external workpiece offset to or from the X axis measurement position based on the "#1237 set09 BITO" value (external workpiece offset symbol conversion) is set in workpiece coordinate system selected at (6).  
 The measurement counter displays blank.
  - (8) Carry out the operations in steps (4) to (7) in the same way for the Y and Z axes.
  - (9) Return the tool to the reference position, and turn the measurement switch OFF.  
 The message "On meas" disappears.

### 3.7.2 Carrying Out Hole Measurement

#### Outline

When carrying out hole measurement, three positions (A, B, and C) are measured, and the hole center position calculated from the three measured positions is set in the workpiece coordinate system offset. The measurement position displays at the measurement counter.

#### <Measurement using the touch sensor>

Measurement counter X = X axis skip position  
 Measurement counter Y = Y axis skip position



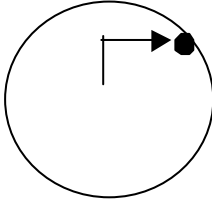
#### <Simple measurement (measurement without using touch sensor)>

Measurement counter X = X axis machine position + center compensation (H) + skip past amount (Horizontal axis) **(Note)**  
 Measurement counter Y = Y axis machine position + center compensation (V) + skip past amount (Vertical axis) **(Note)**

**(Note)** The skip past amount is added for only the axis that moved last.  
 The sign ( + or - ) of the past amount depends on the movement direction of the axis.

Item	Reference
Center compensation (H)	"#8703 OFFSET X"
Center compensation (V)	"#8704 OFFSET Y"
Skip past amount (horizontal axis)	"#8707 Skip past amount (H)"
Skip past amount (vertical axis)	"#8708 Skip past amount (V)"

## Operation method

- (1) Press the **Hole meas** menu. ➡ The menu is highlighted and the cursor displays at point A.  
Use the ,  keys to move to points B and C.
- (2) Perform the reference position return command, etc. to position the tool at the basic point.
- (3) Turn ON the measurement switch on the machine operation board. ➡ The message "On meas" appears.
- (4) Move the tool into the hole using manual feed and manual handle feed.
- <With the touch sensor>
- (5) Position the tool against the inner wall of the hole. Contact is performed by moving a single axis. ➡   
Upon contact, the axis automatically contacts the hole wall again. The skip position displays in the measurement counter point A, X and Y axis section. The cursor moves to point B. For point C, the cursor moves to point A.
- <Without the touch sensor (simple measurement)>
- (5) Move the tool in the X-direction to the arbitrary position and press the menu **SkipPos take in**. ➡ The skip position is calculated and the result displays in the measurement counter X axis section.  
The cursor moves to point B. For point C, the cursor moves to point A.
- (6) Measure points B and C in the same way.
- (7) Select the workpiece coordinate system offset in which the measurement data will be set.  
**(Example)** Press the menus **Coord G54-G59** **G55** to select G55.
- (8) Press the **Coord write** menu. ➡ The hole center position is measured, and based on the "#1237 set09 BIT0" value (external workpiece offset symbol conversion), value achieved by adding or subtracting the external workpiece to or from the measurement result is set in workpiece coordinate system selected at (7). The measurement counter displays blank.
- (9) Return the tool to the reference position, and turn the measurement switch OFF. ➡ The message "On meas" disappears.

## 3.7.3 Carrying Out Width Measurement

## Outline

When carrying out width measurement, two positions (A, and B) are measured, and the width center position calculated from the two measured positions is set in the workpiece coordinate system offset. The measurement position displays at the measurement counter.

## &lt;Measurement using the touch sensor&gt;

Measurement counter X = X axis skip position

Measurement counter Y = Y axis skip position

Measurement counter Z = Z axis skip position - sensor length

## &lt;Simple measurement (measurement without using touch sensor)&gt;

Measurement counter X = X axis machine position + center compensation (H) + skip past amount  
(Horizontal axis) **(Note)**

Measurement counter Y = Y axis machine position + center compensation (V) + skip past amount  
(Vertical axis) **(Note)**

Measurement counter Z = Z axis machine position - sensor length

**(Note)** The skip past amount is added for only the axis that moved last.

The sign ( + or - ) of the past amount depends on the movement direction of the axis.

Item	Reference
Sensor length	"#8701 Tool Length"
Center compensation (H)	"#8703 OFFSET X"
Center compensation (V)	"#8704 OFFSET Y"
Skip past amount (horizontal axis)	"#8707 Skip past amount (H)"
Skip past amount (vertical axis)	"#8708 Skip past amount (V)"

## Operation method

- (1) Press the Width meas menu.

➡

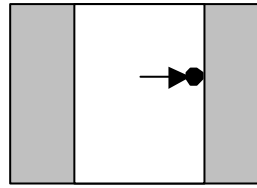
The menu is highlighted and the cursor displays at point A.  
 Use the ↑, ↓ keys to move to points A and B.
- (2) Perform the reference position return command, etc. to position the tool at the basic point.
- (3) Turn ON the measurement switch on the machine operation board.

➡

The message "On meas" appears.
- (4) Move the tool to the center of the groove using manual feed or manual handle feed.

<With the touch sensor>

- (5) Position the tool against the inner wall of the groove. Contact is performed by moving a single axis.



Upon contact, the axis automatically contacts the groove wall again. The skip position displays in the measurement counter point A.  
The cursor moves to point B. For point B, the cursor moves to point A.

<Without the touch sensor (simple measurement)>

- (5) Move the tool to the arbitrary position and press the menu **SkipPos take in**.



The skip position is calculated and the results displays in the measurement counter X axis and Y axis section.  
The cursor moves to point B. For point B, the cursor moves to point A.

- (6) Similarly, position the tool against the opposite side.



Upon contact, the axis automatically contacts the groove wall again. The skip position displays in the measurement counter point B.

- (7) Select the workpiece coordinate system offset in which the measurement data will be set.

**(Example)** Press the menus

**Coord G54-G59** **G55** to select G55.

- (8) Press the **Coord write** menu.



The width center position is measured, and based on the "#1237 set09 BIT0" value (external workpiece offset symbol conversion), value achieved by adding or subtracting the external workpiece offset to or from the measurement result is set in workpiece coordinate system offset G55 (coordinate system selected at (7)).  
The measurement counter displays blank.

- (9) Carry out the operations in steps (4) to (8) in the same way for the Y and Z axes.

- (10) Return the tool to the reference position, and turn the measurement switch OFF.



The message "On mea" disappears.

## 3.7.4 Carrying Out Rotation Measurement

## Outline

When carrying out rotation measurement, the offset (rotation center and rotation angle) of the rotary coordinate system is measured, and the results are set to the workpiece coordinate system offset (rotation center) and the parameters "#8623 Coord rot centr(H)", "#8624 Coord rot centr(V)", and "#8627 Coord rot angle".

## &lt;Measurement using touch sensor&gt;

Measurement counter X = X axis skip position (Machine position)

Measurement counter Y = Y axis skip position (Machine position)

## &lt;Simple measurement (measurement without using touch sensor)&gt;

Measurement counter X = X axis machine position + center compensation (H) + skip past amount (Horizontal axis) **(Note)**

Measurement counter Y = Y axis machine position + center compensation (V) + skip past amount (Vertical axis) **(Note)**

**(Note)** The skip past amount is added for only the axis that moved last.

The sign ( + or - ) of the skip past amount depends on the movement direction of the axis.

Item	Reference
Center compensation (H)	"#8703 OFFSET X"
Center compensation (V)	"#8704 OFFSET Y"
Skip past amount (horizontal axis)	"#8707 Skip past amount (H)"
Skip past amount (vertical axis)	"#8708 Skip past amount (V)"

## Operation method (Setting the center shift amount)

- (1) Press the Rotate meas menu. ➡ The pop-up window for the rotation measurement appears.  
The measurement counter becomes active and the cursor appears at the 1st axis.
- (2) Press the Center shift menu. ➡ The menu is highlighted.  
"C shift (S)" column becomes active and the cursor appears at the 1st axis.  
The measurement counter active display returns to normal.
- (3) Input the center shift amount (Si).  
10.000 INPUT ➡ The value is input and the cursor moves to the 2nd axis.
- (4) Input the center shift amount (Sj).  
-5.000 INPUT ➡ The value is input, however, the cursor does not move.
- (5) Press the Center shift menu. ➡ The menu highlight returns to normal.  
The measurement counter becomes active and the cursor appears at the 1st axis.  
"C shift (S)" column active display returns to normal.

**Operation method (Setting the center and angle of the coordinate rotation)**

The setting of the parameters "#8623 Coord rot centr(H)", "#8624 Coord rot centr(V)", and "#8627 Coord rot angle" can be changed.

- (1) Press the Rotate meas menu. ➡

The pop-up window for the rotation measurement appears.  
The measurement counter becomes active and the cursor appears at the 1st axis.
- (2) Press the Rotate center menu. ➡

The menu is highlighted.  
"Coord center" column becomes active and the cursor appears at the 1st axis.  
The measurement counter active display returns to normal.
- (3) Input data in the 1st axis of "Coord center" column.  
0 INPUT ➡

The value is input and the cursor moves to the 2nd axis.
- (4) Input data in the 2nd axis of "Coord center" column.  
0 INPUT ➡

The value is input, however, the cursor does not move.
- (5) Press the Rotate center menu. ➡

The menu highlight returns to normal.  
The measurement counter becomes active and the cursor appears at the 1st axis.  
"Coord center" column active display returns to normal.

**(Note)** Set the angle of the coordinate rotation in the same manner.

### Operation method (Carrying out the rotation measurement using touch sensor to set the measurement results to the workpiece coordinate offset)

- (1) Press the Rotate meas menu. ➡ The menu is highlighted and the cursor appears at point A.  
The cursor can be moved to A, B, or C, using ↑ and ↓ keys.

- (2) Set the parameter "#8116 Coord rot para invd" to "1" (invalid).

- (3) Set the following parameters to "0". ➡ The value is input, however, the cursor does not move.  
#8623 Coord rot centr(H)  
#8624 Coord rot centr(V)  
#8627 Coord rot angle

**(Note)** These parameter should be set to "0" to set the measured value to them.  
If the value other than "0" has been set, an error occurs when writing to the coordinate system.

- (4) Turn the manual absolute switch ON. ➡ The value is input and the cursor moves to the 2nd axis.

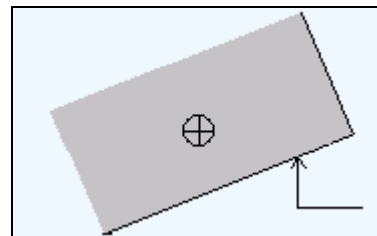
- (5) Perform the reference position return command, etc. to position the tool at the basic point.

- (6) Turn ON the measurement switch on the machine operation board. ➡ The message "On meas" appears.

- (7) Referring to "Setting the center shift amount", set the center shift amount. ➡ The menu highlight returns to normal.  
This setting is not necessary if the coordinate rotation center is served as the workpiece coordinate zero point.  
The measurement counter becomes active and the cursor appears at the first axis.  
"Coord center" column active display returns to normal.

<Measurement using touch sensor>

- (8) Make the spindle contact the workpiece using manual feed or manual handle feed. ➡



Upon contact, the skip position displays in the measurement counter point A.  
The cursor moves to point B. For point C, the cursor moves to point A.

<Simple measurement (without using touch sensor)>

- (8) Move the spindle to the arbitrary position and press the SkipPos take in menu.

➡ The skip position is calculated and the results appear in the measurement counter point A.

The cursor moves to point B. For point C, the cursor moves to point A.
  
- (9) Measure points B and C in the same way.
  
- (10) Select the workpiece coordinate system offset in which the measurement data will be set.

**(Example)** To select G55, press the Coord G54-G59 G55 menus.
  
- (11) Press the Coord write menu.

➡ The hole center position is measured, and based on the "#1237 set09/Bit0" value (external workpiece offset symbol conversion), value achieved by adding or subtracting the external workpiece to or from the measurement result is set in workpiece coordinate system selected at (7). The measurement counter displays blank.
  
- (12) Return the tool to the reference position, and turn the measurement switch OFF.

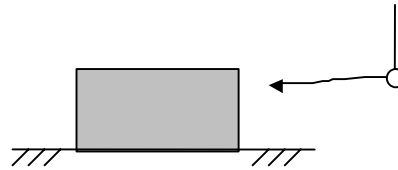
➡ The message "On meas" disappears.



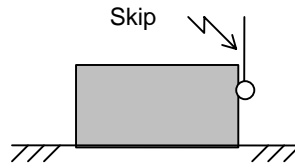
### 3.7.5 Performing Automatic Recontact When Contacting the Workpiece

When performing workpiece position measurement in either the JOG or handle mode, the following operations (automatic recontact) are performed after contacting the workpiece.

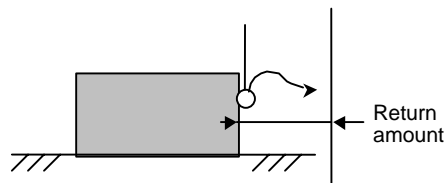
- (1) Moves to the measurement point using either the JOG or handle mode. ➡



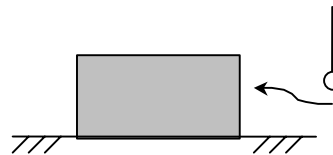
- (2) Stops at the measurement point. ➡



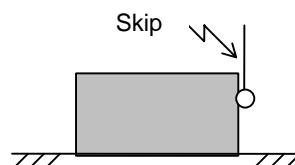
- (3) Returns by the measurement parameter return amount (#8705). ➡



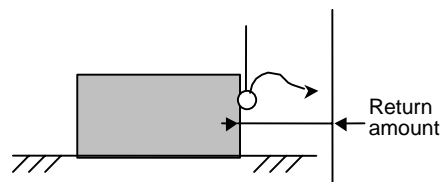
- (4) Moves to measurement point again at the measurement parameter feedrate (#8706). ➡



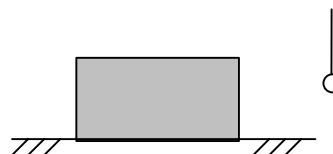
- (5) Stops at the measurement point. (The skip position is read.) ➡



- (6) Returns by the measurement parameter return amount (#8705). ➡



- (7) The next measurement can be performed after automatically contacting the workpiece again. ➡



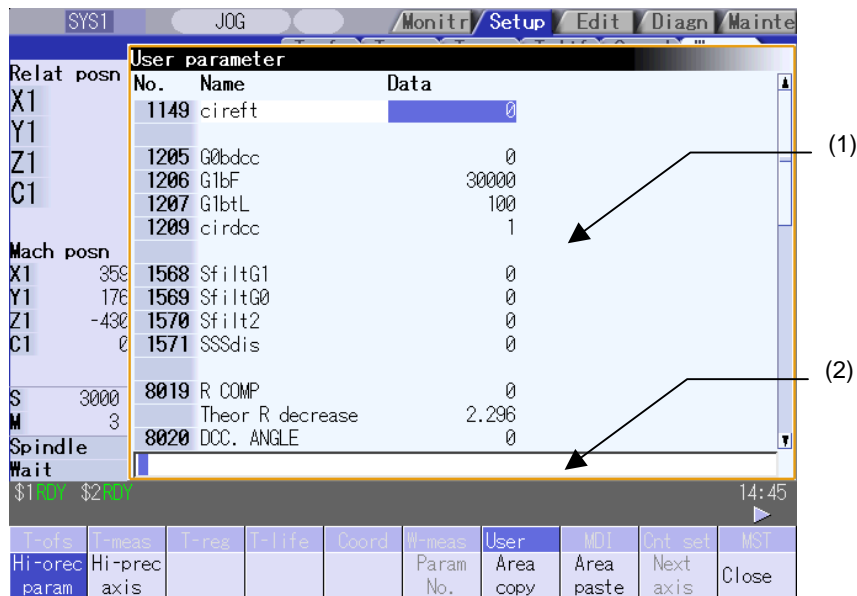
The return speed for (3) and (6) is 40 times the measurement parameter feedrate (#8706). However, if the return speed is faster than rapid feedrate (override 100%), the rapid feedrate will become the return speed.

### 3.8 User Parameters

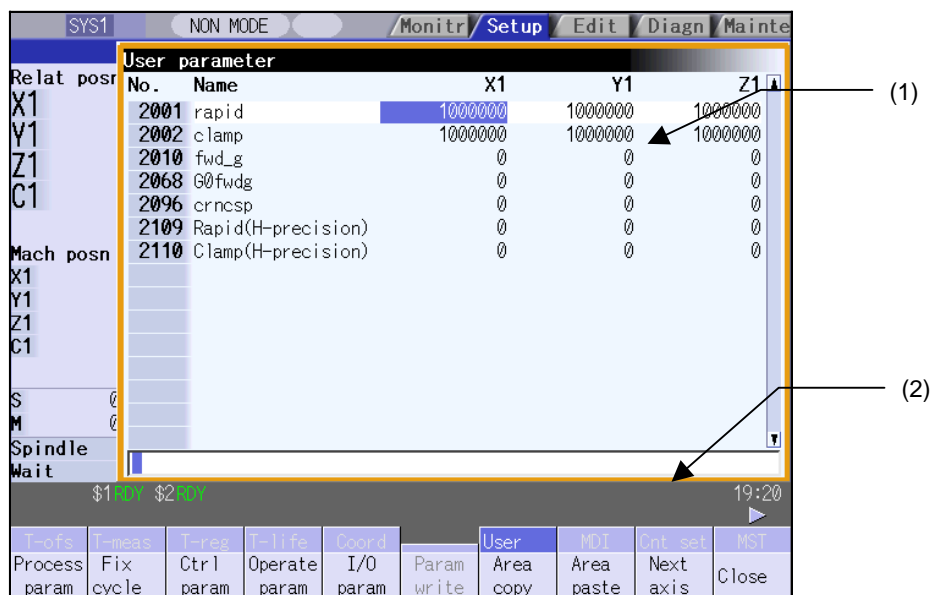
The parameters contain the user and machine parameters.

This chapter explains the details and operations for the user parameters.

#### <High-accuracy parameters>: Part system based



#### <High-accuracy parameters>: Axis based



## Display items

Display item	Details
(1) Parameter display area	Press the parameter selection menu <b>Process param</b> or <b>Hi-prec param</b> keys etc. to change the parameter display contents.
(2) Input section	The set key displays. Press the <b>INPUT</b> key to set the display data in the parameter where the cursor is located.

## Menus

Menu	Details	Type	Reference
<b>Process param</b> <b>Fixed cycle</b> <b>Control param</b> <b>Operate param</b> <b>I/O param</b> <b>Ethernet param</b> <b>Link param</b> <b>Subpro stor</b> <b>Axis param</b> <b>Barrier data</b> <b>Hi-prec param</b> <b>Hi-prec axis</b>	This changes the display of each parameter type. <b>(Note)</b> The barrier data only displays for the L system.	B	3.8.2 Setting the Parameters
<b>Param No.</b>	This selects an arbitrary parameter number. Set the parameter number and press the <b>INPUT</b> key to move that number to the top and display the parameter. The cursor also moves to that number.	A	3.8.1 Selecting the Parameter Number
<b>Area copy</b>	This copies the parameter setting values in the designated range. The range is designated with numbers.	A	3.8.3 Copying/Pasting Parameters
<b>Area paste</b>	This pastes the range of parameters designated in area copy. They are pasted in a parameter corresponding to the axis or part system where the cursor is. Once copied, a parameter can be pasted any number of times until a new parameter is copied.	A	
<b>Next axis</b>	This can be selected if the total number of part system display axes is 5 or more. This is used at the parameter screen with the array structure for each axis.	C	
<b>Close</b>	This closes the pop-up window and quits this function.	C	

### 3.8.1 Selecting the Parameter Number

Press the menu  key to select an arbitrary parameter number.

### 3.8.2 Setting the Parameters

The method of setting the parameters is explained. Refer to "3.8.8 User Parameters" for details of each parameter setting range.

#### Operation method (Normal setting: Set "100" for X1 axis of "#8204 OT-" parameter)

- (1) Press the  menu. ➡ The axis parameter displays.
- (2) Use the , , , and  keys to move the cursor to the setting position. ➡ The cursor moves to the position where the data is to be set (X1 axis).
- (3) Enter a value.  
100  ➡ The set value displays and the cursor moves one position downwards.

#### Operation method (Batch data setting: Set "200" for Y1 axis and "250" for Z1 axis of "#8204 OT-")

- (1) Press the  menu. ➡ The axis parameter displays.
- (2) Use the ,  keys to move the cursor to the setting position. ➡ The cursor moves to the position where the data is to be set.
- (3) Enter a value.  
Input format:  
1st column/2nd column/3rd column  
/200 /250  ➡ The set value displays and the cursor moves one position downwards.

**(Note 1)** When a parameter is changed and  displays at the top of the screen, reboot the machine to enable that parameter change.

**(Note 2)** When the  key is pressed without inputting a value, the parameter setting value is not changed, and the cursor moves.



**(Note 3)** Parameters that can be set simultaneously must display within the currently displayed three columns.

**(Note 4)** If parameter values are simultaneously input in multiple columns, settings are made from the currently displayed column on the left side, no matter which column the cursor is positioned.



## 3.8.3 Copying/Pasting Parameters

Parameters can be copied and pasted in a parameter with the same number for another axis or part system.

## Operation method (Specifying and copying the parameter where the cursor is located)

- (1) Press the Area copy menu.  The menu is highlighted.
- (2) Move the cursor to the position of the parameter to be copied and press the INPUT key.  The copy position displays in the selected area color. The menu highlight returns to normal.

## Operation method (Copying parameter numbers in a specific range)

- (1) Move the cursor to the display area of the axis or part system to be copied.
- (2) Press the Area copy menu.  The menu is highlighted.
- (3) Designate the copy range.  
Format: First No./Last No.  
8701/8705 INPUT  The range to be copied displays in the selected area color. The menu highlight returns to normal.

An "E" can be used if the last number to be copied is the last number in the currently displayed parameter type.

(Ex.) 8701/E

No.	Name	Data
	<TLM>	
8701	Tool Length	100.000
8702	Tool Dia	0.000
8703	OFFSET X	5.000
8704	OFFSET Y	10.000
8705	RETURN	5.000
8706	FEED	100
8707	Skip past amount(H)	0.000

**(Note 1)** The selected area color of the copied area returns to normal when the copied data is pasted.

However, the copied range can still be pasted until the parameter type display is changed.

**(Note 2)** Only the currently displayed parameter type can be copied.

**Operation method (Pasting the copied parameters)**

(1) Move the cursor to the axis or part system display area where the data will be pasted.

(2) Press the  menu.



The menu is highlighted and a confirmation message displays.

(3) Press the  or  key.



The copied data is written to the parameter where the cursor is located.

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

The menu highlighted returns to normal.

**(Note)** If the relevant parameter is changed after specifying the range to be copied, the value after the change is pasted.

## 3.8.4 Parameter Configuration

The parameter number range and permissible operations for all parameter types are shown below.

○: Can be used, △: Operable under certain conditions (Refer to the section below for conditions.)

Parameter type	Parameter No.	Next axis menu	System change Key	Area copy menu	Area paste menu
Process parameter	8001 to 8011 8041, 8042 8071 to 8075 8701 to 8706	-	△ (Note 3)	△ (Note 3)	△ (Note 3)
Fixed cycle	8012 to 8018 8051 to 8059 8083 to 8086	-	△ (Note 3)	△ (Note 3)	△ (Note 3)
Control parameter	8101 to 8124	-	-	-	-
Operation parameter	8501 to 8506	-	-	-	-
I/O parameter	9001 to 9014 9101 to 9130 9201 to 9230 9301 to 9330 9401 to 9430 9501 to 9530	-	-	-	-
Ethernet parameter	9701 to 9706 9711 to 9721 9731 to 9741 9751 to 9761 9771 to 9781	-	-	-	-
Computer link parameter	9601 to 9630	-	-	-	-
Subprogram storage designation parameter	8800 to 8889	-	△ (Note 3)	△ (Note 3)	△ (Note 3)
Axis parameter	8201 to 8212	△ (Note 1)	-	△ (Note 2)	△ (Note 2)
Barrier data (Note 4)	8300 to 8319	-	△ (Note 3)	○	○
High precision parameter	1149, 1150 1205 to 1207 1209 1568 to 1571 8019 to 8023 8025 to 8030 8033 to 8037 8090 to 8094	-	△ (Note 3)	△ (Note 3)	△ (Note 3)
High precision axis parameter	2001, 2002 2010	△ (Note 1)	-	△ (Note 2)	△ (Note 2)

**(Note 1)** This is valid only when the total number of valid NC axes and PLC axes in the entire part system is four or more.

**(Note 2)** This is valid only when the total number of valid NC axes and PLC axes in the entire part system is two or more.

**(Note 3)** This is valid only when the number of valid part systems is two or more.

**(Note 4)** The barrier data appears only for the L system specifications

### 3.8.5 Echoback

When the cursor moves to a parameter with 16 or more characters, all of the set value is echoed back to the input area. The value of such parameter is displayed with "..." displays in the data field.

No.	Name	Data
9701	IP addr auto set	1
9702	IP address	100.97.12.1
9703	Subnet mask	255.255.255.0
9704	Gateway	100.97.12.254
9705	Timeout	0
9706	Host No.	1
9711	Host1 host name	MELCO
9712	Host1 user name	USER1
9713	Host1 password	*****
9714	Host1 directory	/MITSUBISHI/...
9715	Host1 host type	1
9716	Host1 Wrd pos:name	9
9717	Host1 Wrd pos:size	5
9718	Host1 Wrd pos:Dir	1

#### Echoback parameters

Parameter type	Parameter number, name
Ethernet parameter	#9714 Host 1 directory (The same for hosts 2 to 4)
Subprogram storage destination parameter	#8881 Subpro stor D0:dir (The same for devices 1 to 4)

### 3.8.6 Ethernet Parameter Password

If the Ethernet parameter "Host 1 password" to "Host 4 password" is set, "\*\*\*\*\*" displays regardless of the password characters set in that data field.





### 3.8.7 Machine Parameter Password Setting Method

The "High-accuracy parameters" and "High-accuracy axis parameters" contain machine parameters other than the user parameter. It is possible to reference these machine parameters, however, if a machine tool builder password is not set, it is not possible to set any data.

Move the cursor to the machine parameters to display a "Input a password." message, and the system waits for the password to be input. Input the machine tool builder password as required. Once input, the password remains valid until the power is turned OFF.

#### Operation method (In the case where the password has not been input even once after turning ON the power.)


- (1) Display the High-accuracy Parameters screen.

When the ,  keys are used to move the cursor to a position other than the machine parameters, the awaiting password status is cleared along with the message.




When the cursor is positioned at the machine parameters, the "Input a password." message displays. (System awaits password)

No.	Name	Data
1149	ci reft	0
1205	G0bdcc	0
1206	G1bF	30000
1207	G1btL	100
1209	cirdcc	1
1568	SfiltG1	0
1569	SfiltG0	0
1570	Sfilt2	0
1571	SSSdis	0
8019	R COMP	0
	Theor R decrease	2.296

- (2) Input the machine parameter password and press the  key.



"\*\*\*\*\*" displays at the input area while the password is being input.

Press the  key to clear the awaiting password status, and enable machine parameter settings to be made.

**(Note)** If the password is input incorrectly, the awaiting password status remains cleared and a "The password is incorrect." message displays.

## 3.8.8 Parameter List

## 3.8.8.1 Process Parameters

## &lt;WRK COUNT&gt; (No. of workpieces machined)

#	Item	Contents	Setting range (unit)
8001	WRK COUNT M	Set the M code that counts the No. of workpiece repeated machining. The No. will not be counted when set to 0.	0 to 99
8002	WRK COUNT	The current machining No. is displayed. Set the initial value.	0 to 999999
8003	WRK COUNT LIMIT	Set the maximum No. of workpieces machined. A signal is output to PLC when the No. of machining times is counted to this limit.	0 to 999999

## &lt;AUTO TLM&gt; (Automatic tool length measurement)

#	Item	Contents	Setting range (unit)
8004	SPEED	Set the feedrate during automatic tool length measurement.	1 to 1000000 (mm/min)
8005	ZONE r	Set the distance between the measurement point and deceleration start point.	0 to 99999.999 (mm)
8006	ZONE d	Set the tolerable zone of the measurement point. If the sensor signal turns ON in front of d before the measurement point, or if the signal does not turn ON after d is passed, an alarm will occur.	0 to 99999.999 (mm)

## &lt;AUTO CORNER OVR.&gt; (Automatic corner override)

#	Item	Contents	Setting range (unit)
8007	OVERRIDE	Set the override value for automatic corner override.	0 to 100 (%)
8008	MAX ANGLE	Set the max. corner opening angle where deceleration should start automatically. If the angle is larger than this value, deceleration will not start.	0 to 180 (°)
8009	DSC. ZONE	Set the position where deceleration starts at the corner. Designate at which length point before the corner deceleration should start.	0 to 99999.999 (mm)

## &lt;T-TIP OFFSET&gt; (Wear data input)

#	Item	Contents	Setting range (unit)
8010	ABS. MAX. (For L system only)	Set the max. value when inputting the tool wear compensation amount. A value exceeding this setting value cannot be set. Absolute value of the input value is set. (If a negative value is input, it is treated and set as a positive value.) If "0" is input, this parameter will be invalid.	0 to 99.999 (mm)
8011	INC. MAX. (For L system only)	Set the max. value for when inputting the tool wear compensation amount in the incremental mode. Absolute value of the input value is set. (If a negative value is input, it is treated and set as a positive value.) If "0" is input, this parameter will be invalid.	0 to 99.999 (mm)

## &lt;C-MODAL&gt; (C axis normal line)

#	Item	Contents	Setting range (unit)
8041	C-rot.R	This is valid with normal line control type II. Set the length from the center of the normal line control axis to the end of the tool. This is used to calculate the turning speed at the block joint.	0.000 to 99999.999 (mm)
8042	C-ins.R	This is valid with normal line control type I. Set the radius of the arc to be automatically inserted into the corner during normal line control.	0.000 to 99999.999 (mm)

#	Item	Contents	Setting range (unit)
8043	Tool HDL FD OFS	Set the length from the tool holder to the tool tip.	0.000 to 99999.999 (mm)
8044	UNIT*10	Set the command increment scale. • The scale is 1 when 0 is set.	0 to 10000 (fold)

## &lt;3-dimensional tool radius compensation&gt;

#	Item	Contents	Setting range (unit)
8071	3-D CMP (for M system only)	Set the value of the denominator constants for 3-dimensional tool radius compensation. Set the value of p in the following formula. $V_x = i \times r/p$ , $V_y = j \times r/p$ , $V_z = k \times r/p$ $V_x, V_y, V_z$ : X, Y, and Z axes or vectors of horizontal axes $i, j, k$ : Program command value $r$ : Offset $p = \sqrt{i^2 + j^2 + k^2}$ when the set value is 0.	0 to 99999.999

## &lt;Scaling&gt;

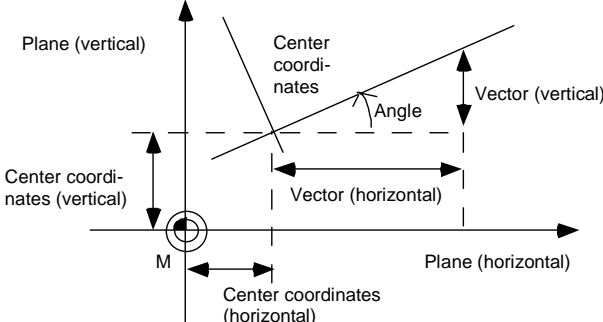
#	Item	Contents	Setting range (unit)
8072	SCALING P (for M system only)	Set the scale factor for reduction or magnification for the machining program for which the G50 or G51 command is issued. This parameter is effective when the program specifies no scale factor.	0 to 99.999999

## &lt;Spiral interpolation&gt;

#	Item	Contents	Setting range (unit)
8075	SpiralEndErr (for M system only)	Designate the tolerable error range (absolute value) when the end point position commanded with the command format type 2 spiral interpolation or conical interpolation command differs from the end point position obtained from the speed and increment/decrement amount.	0 to 99999.999 (mm)

#	Item	Contents	Setting range (unit)
8078	Screen Saver Timer	When not using, set to "0".	0

## &lt;Coord rotation&gt;

#	Item	Contents	Setting range (unit)
8621	Coord rot plane (H)	<p>This sets the plane, center coordinates, vector components and angle.</p> <p>Plane (horizontal axis): This sets the name of the 1st axis when measuring the rotation. When not set, the name will be the X axis.</p> <p>Plane (vertical axis): This sets the name of the 2nd axis when measuring the rotation. When not set, the name will be the Y axis.</p>  <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>	Axis name
8622	Coord rot plane (V)		
8623	Coord rot centr (H)		-999999.999 to 999999.999 (mm)
8624	Coord rot centr (V)		
8625	Coord rot vctr (H)		
8626	Coord rot vctr (V)		
8627	Coord rot angle		-360.000 to 360.000 (°)

## &lt;TLM&gt;

#	Item	Contents	Setting range (unit)
8701	Tool length	This sets the length to the touch tool tip.	±99999.999 (mm)
8702	Tool Dia	This sets the diameter of the sphere at the touch tool tip.	±99999.999 (mm)
8703	OFFSET X	This sets the deviation amount (X direction) from the touch tool center to the spindle center.	±99999.999 (mm)
8704	OFFSET Y	This sets the deviation amount (Y direction) from the touch tool center to the spindle center.	±99999.999 (mm)
8705	RETURN	This sets the one-time return distance for contacting again.	0 to 99999.999 (mm)
8706	FEED	This sets the feedrate when contacting again.	1 to 60000 (mm/min)
8707	Skip past amout (H)	This sets the difference (horizontal axis direction) of the skip read value and actual skip position.	±99999.999 (mm)
8708	Skip past amout (V)	This sets the difference (vertical axis direction) of the skip read value and actual skip position.	±99999.999 (mm)
8709	EXT work sign rvs	This is set when using the external workpiece coordinate system with Z shift. 0: External workpiece offset (Z shift) no sign reversal (Conventional) 1: External workpiece offset (Z shift) sign reversal	0/1
8710	EXT work ofs invld	This sets whether external workpiece offset subtraction is valid when setting the workpiece coordinate offset. 0: Do not subtract external workpiece offset. (Conventional) 1: Subtract the external workpiece offset.	0/1
8711	TLM L meas axis	This designates the tool length measurement axis. This sets the #1022 axname2 axis name.	Axis name <b>(Note 1)</b>
8712	TLM D meas axis	This designates the tool diameter measurement axis. This sets the #1022 axname2 axis name.	Axis name <b>(Note 2)</b>

**(Note 1)** If the axis name is illegal or not set, the 3rd axis name will be set as a default.

**(Note 2)** If the axis name is illegal or not set, the 1st axis name will be set as a default.

## &lt;Surface speed control&gt;

#	Item	Contents	Setting range (unit)
19425	ManualB Std R1	This sets a radius used as reference for the rotation axis speed.	0 to 99999.999 (mm)
19426	ManualB Std F1	This sets the rotation axis speed for surface speed control reference radius 1.	1 to 1000000 (°/min)
19427	ManualB Std R2	This sets a radius used as standard for the rotary axis speed. When the same value is set as "#19425 ManualB Std R1", the surface speed control standard speed 1 (ManualB Std F1) will be selected as the rotary axis speed if the radius is less than that value. The surface speed control standard speed 2 (ManualB Std F2) is selected if larger than the set value.	0 to 99999.999 (mm)
19428	ManualB Std F2	This sets the rotary axis speed for surface speed control standard radius 2 (ManualB Std R2).	1 to 1000000 (°/min)

**(Note)** The relation of the parameter settings is as follows.

When #19425 setting > #19427 setting : #19425 setting is used as surface speed control standard radius 2 (ManualB Std R2). Similarly, #19427 setting is used as surface speed control standard radius 1 (ManualB Std R1).

When #19426 setting > #19428 setting : #19426 setting is used as surface speed control standard speed 2 (ManualB Std F2). Similarly, #19428 setting is used as surface speed control standard speed 1 (ManualB Std F1).

## 3.8.8.2 Fixed Cycle

#	Item	Contents	Setting range (unit)
8012	G73 n (For M system only)	Set the return amount for G73 (step cycle).	0 to 99999.999 (mm)
8013	G83 n	Set the return amount for G83 (deep hole drilling cycle).	0 to 99999.999 (mm)
8014	CDZ-VALE (For L system only)	Set the screw cut up amount for G76, G78 (thread cutting cycle).	0 to 127 (0.1 lead)
8015	CDZ-ANGLE (For L system only)	Set the screw cut up angle for G76, G78 (thread cutting cycle).	0 to 89 (°)
8016	G71 MINIMUM (For L system only)	The end of cutting in the rough cutting cycle (G71, G72) is the remainder cutting amount. If the amount is smaller than the value set with this parameter, the last cycle will not be executed.	0 to 999.999 (mm)
8017	G71 DELTA-D (For L system only)	The rough cutting cycle (G71, G72) cutting amount repeats $d+\Delta d$ , $d$ , $d-\Delta d$ using the value (d) commanded with D as a reference. Set the change amount $\Delta d$ .	0 to 999.999 (mm)
8018	G84/G74 n (For M system only)	This is not used. Set it to "0".	0

#	Item	Contents	Setting range (unit)
8051	G71 THICK	Set the amount of cut-in by the rough cutting cycle (G71, G72)	0 to 99999.999 (mm)
8052	G71 PULL UP	Set the amount of pull-up when returning to the cutting start point for the rough cutting cycle (G71, G72).	0 to 99999.999 (mm)
8053	G73 U	Set the X-axis cutting margin of the forming rough cutting cycle (G73).	-99999.999 to 99999.999 (mm)
8054	G73 W	Set the Z-axis cutting margin of the forming rough cutting cycle (G73).	-99999.999 to 99999.999 (mm)
8055	G73 R	Set the number of times cutting is performed by the forming rough cutting cycle (G73).	0 to 99999 (times)
8056	G74 RETRACT	Set the amount of retract (amount of cut-up) of the push-cut cycle (G74, G75).	0 to 999.999 (mm)
8057	G76 LAST-D	Set the amount of final cut-in by the compound type thread cutting cycle (G76).	0 to 999.999 (mm)
8058	G76 TIMES	Set the number of times the amount of final cut-in cycle (G76 finish margin) is divided in the compound type thread cutting cycle (G76).	0 to 99 (times)
8059	G76 ANGLE	Set the angle (thread angle) of the tool nose in the compound type thread cutting cycle (G76).	0 to 99 (°)

## &lt;Deep hole drilling cycle&gt;

#	Item	Contents	Setting range (unit)
8083	G83S modeM (for M system only)	Set the M command code for changing to the small diameter deep hole drilling cycle mode.	1 to 99999999
8084	G83S Clearanse (for M system only)	Set the clearance amount for the small diameter deep hole drilling cycle (G83).	0 to 999.999 (mm)
8085	G83S Forward F (for M system only)	Set the feedrate from the R point to the cutting start position in the small diameter deep hole drilling cycle (G83).	0 to 99999 (mm/min)
8086	G83S Back F (for M system only)	Set the speed for returning from the hole base during the small diameter deep hole drilling cycle (G83).	0 to 99999 (mm/min)

## 3.8.8.3 Control Parameters

#	Items		Details	Setting range (unit)
1103	T_life	Validate life management	Select the usage of the tool life management function. 0: Do not manage tool life. 1: Execute tool life management function control.	0/1
1104	T_Com2	Tool command method 2	Select the command method for when #1103 T_Life is set to 1. 0: Handle the program tool command as the group No. 1: Handle the program tool command as the tool No.	0/1
1105	T_Sel2	Tool selection method 2	Select the tool selection method for when #1103 T_Life is set to 1. 0: Select in order of registered No. from the tools used in the same group. 1: Select the tool with the longest remaining life from tools used in the same group and the unused tools.	0/1
1106	Tcount (For L system only)	Life management count	Specify the function when address N is omitted when inputting data (G10 L3 command) for tool life management function II.	0: Time specified input 1: No. of times specified input



#	Item	Contents	Setting range (unit)
8101	MACRO SINGLE	Select the control of the blocks where the user macro command continues. 0: Do not stop while macro block continues. 1: Stop every block during signal block operation.	0/1
8102	COLL. ALM OFF	Select the interference (bite) control to the workpiece from the tool diameter during tool radius compensation and nose R compensation. 0: An alarm is output and operation stops when an interference is judged. 1: Changes the path to avoid interference.	0/1
8103	COLL. CHK OFF	Select the interference (bite) control to the workpiece from the tool diameter during tool radius compensation and nose R compensation. 0: Performs interference check. 1: Does not perform interference check.	0/1
8105	EDIT LOCK B	Select the edit lock for program Nos. 8000 to 9999 in the memory. 0: Program can be edited. 1: Editing of above program is prohibited. The file cannot be opened.	0/1
8106	G46 NO REV-ERR (For L system only)	Select the control for the compensation direction reversal in G46 (nose R compensation). 0: An alarm is output and operation stops when the compensation direction is reversed (G41 → G42' G42 → G41). 1: An alarm does not occur when the compensation direction is reversed' and the current compensation direction is maintained.	0/1
8107	R COMPENSATION	0: In arc cutting mode, the machine moves to the inside because of a delay in servo response to a command, making the arc smaller than the command value. 1: In arc cutting mode, the machine compensates the movement to the inside because of a delay in servo response to a command	0/1
8108	R COMP Select	Select whether to perform arc radius error compensation over all axes or axis by axis. 0: Perform compensation over all axes. 1: Perform compensation over axis by axis. <b>(Note)</b> This parameter is effective only when "#8107 R COMPENSATION" is 1.	0/1
8109	HOST LINK	Select whether to enable computer link B instead of the RS-232C port. 0: Disable computer link B to enable normal RS-232C communication. 1: Enable computer link B to disable normal RS-232C communication.	0/1
8110	G71/G72 POCKET	Set the pocket machining if there is a dimple (pocket) in the rough cutting cycle (G71, G72) finishing program. 0: Pocket machining OFF 1: Pocket machining ON	0/1

#	Item	Contents	Setting range (unit)														
8111	Milling Radius	Select the diameter and radius of the linear axis for milling (cylindrical/pole coordinate) interpolation. 0: All axes radius command 1: Each axis setting (follows “#1019 dia”) <b>(Note)</b> This parameter is valid only in the milling (cylindrical/pole coordinate) interpolation mode.	0/1														
8112	DECIMAL PNT-P	0: The decimal point command for G04 address P is invalidated. 1: The decimal point command for G04 address P is validated.	0/1														
8113	Milling Init G16	Designate which plane to use for milling machining after the power is turned ON or reset. <table border="1"><thead><tr><th>#8113</th><th>#8114</th><th>Plane</th></tr></thead><tbody><tr><td>0</td><td>0</td><td>G17 plane</td></tr><tr><td>0</td><td>1</td><td>G19 plane</td></tr><tr><td>1</td><td>0</td><td rowspan="2">G16 plane</td></tr><tr><td>1</td><td>1</td></tr></tbody></table>	#8113	#8114	Plane	0	0	G17 plane	0	1	G19 plane	1	0	G16 plane	1	1	0: Plane other than G16 1: Select G16 plane
#8113	#8114	Plane															
0	0	G17 plane															
0	1	G19 plane															
1	0	G16 plane															
1	1																
8114	Milling Init G19	<b>(Note)</b> This parameter is valid for the G code system 2, 3 (“#1037 cmdtyp”=3, 4).	0: Plane other than G19 1: Select G19 plane														
8116	Coord rot para invd	Select the validity of coordinate rotation by the parameters. 0: Valid 1: Invalid	0/1														
8117	OFS Diam DESIGN	Select whether tool radius compensation amount is designated with tool radius or tool diameter. 0: Tool radius compensation amount 1: Tool diameter compensation amount	0/1														
8145	Validate F1 digit	Specify whether to execute the F command with a 1-digit code command or with a direct numerical command. 0: Direct numerical command (command feedrate during feed per minute or rotation) 1: 1-digit code command (feedrate specified with #1185 spd_F1 - #1189 F5)	0/1														

## 3.8.8.4 Operation Parameters

#	Item	Contents	Setting range (unit)
8901	Counter type 1	This sets the type of counter displayed at the upper left of the AUTO/MDI display on the Monitor screen.	0 to 255 1: Current position 2: Work coordinate position 3: Machine position 4: Program position 8: Remain command 9: Manual interrupt amount 10: Next command 11: Restart position 12: Remain distance 16: Tip work coordinate position 18: Tool axis movement 19: Tip machine position 20: Relative position
8902	Counter type 2	This sets the type of counter displayed at the lower left of the AUTO/MDI display on the Monitor screen.	
8903	Counter type 3	This sets the type of counter displayed at the upper right of the AUTO/MDI display on the Monitor screen.	
8904	Counter type 4	This sets the type of counter displayed at the lower right of the AUTO/MDI display on the Monitor screen.	
8905	Counter type 5	This sets the type of counter displayed at the left of the Manual display on the Monitor screen.	
8906	Counter type 6	This sets the type of counter displayed at the right of the Manual display on the Monitor screen.	
8910	Edit undo	This sets whether to validate the Undo function during program edit on the Monitor screen or Edit screen. 0: Invalid 1: Valid	0/1
8914	Auto Top search	This sets the operation method for restart search type 2. 0: It is necessary to set the top search position arbitrarily. 1: The restart search is executed from O No. that is designated as head.	0/1
8915	Auto backup day 1	When the NC power is ON after the designated date was passed over, the automatic backup is executed.	-1 to 31 (-1 can be set for "Auto backup day 1" only.)
8916	Auto backup day 2	When -1 is set to "Auto backup day 1", the automatic backup is executed every turning NC power ON.	
8917	Auto backup day 3		
8918	Auto backup day 4	When 0 is set to all on "Auto backup day 1" to "4", the automatic backup is not executed. It is possible to specify the designated date up to 4 days for a month.	

#	Item	Contents	Setting range (unit)
8919	Auto backup device	This sets the automatic backup target device.	0: DS 1: HD 2: Memory card
8920	3D tool ofs select	This designates the method to calculate the drawing position when drawing a solid. With 3D drawing, the drawing position (tool tip position) is calculated with the method designated with this parameter, and the image is drawn. 0: Drawing position = Tool center path information (machine position) - Tool length offset + wear 1: Drawing position = Tool center path information (machine position) - tool length set on 3D Tool Setting screen.	0/1
8921	Mass Edit select	This sets the editing mode for the machining programs saved in HD, FD, and memory card. 0: Regular editing mode If the program size is 1.0MB (When #8910 Edit Undo is invalid, 2.0MB) or more, mass-editing will be applied. 1: Mass-editing mode	0/1

## 3.8.8.5 I/O Parameters

There are basically two types of input/output parameters which must be set when inputting, outputting or referring to data, or when performing tape operation.

9001 to 9018 parameters:

Set which channel to connect which device to for each I/O application.

901 to 9528 parameters:

Set the transmission speed, etc., for each input/output device.

Up to five types of input/output device parameters can be set in device 0 to 4.

<I/O>	#	<PORT No.>	#	<DEV. No.> <DEV. NAME>
		Specify the board No. to which the serial input/output device is connected. • Set "1" to use ch1. • Set "2" to use ch2.		Set the input/output device No. for each application. The device Nos. are 0 to 4 and correspond to the input/output device parameters. The device name set in the input/output device parameter is also displayed for identification.
DATA IN	9001	Specify the port for inputting the data such as machine program and parameters.	9002	Specify the device No. that inputs the data.
DATA OUT	9003	Specify the port for outputting the data such as machine program and parameters.	9004	Specify the device No. that outputs the data.
TAPE MODE	9005	Specify the input port for running with the tape mode.	9006	Specify the device No. to be run with the tape mode.
MACRO PRINT	9007	Specify the output port for the user macro DPRINT command.	9008	Specify the device No. for the DPRINT command.
PLC IN/OUT	9009	Specify the port for inputting/outputting various data with PLC.	9010	Specify the device No. for the PLC input/output.
REMOTE PRG IN	9011	Specify the port for inputting remote programs.	9012	Specify the device No. used to input remote programs.
EXT UNIT	9013	Specify the port for communication with an external unit.	9014	Specify the unit No. used for communication with an external unit
HANDY TERMINAL	9017	Specify the port for communication with a handy terminal.	9018	9018 Specify the device No. used for communication with a handy terminal.

#	Item	Contents	Setting range (unit)
9101	DEV0 DEVICE NAME	Set the device name corresponding to the device No. Set a simple name for quick identification.	Use alphabet characters, numerals and symbols to set a name within 3 characters.
9102	DEV0 BAUD RATE	Set the serial communication speed.	0: 19200 (bps) 1: 9600 2: 4800 3: 2400 4: 1200 5: 600 6: 300 7: 150
9103	DEV0 STOP BIT	Set the stop bit length used in the start-stop system.	1: 1 (bit) 2: 1.5 3: 2
9104	DEV0 PARITY CHECK	Specify whether to add the parity check bit to the data during communication.	0: Parity bit not added 1: Parity bit added
9105	DEV0 EVEN PARITY	Specify the odd or even parity when it is added to the data.	0: Odd parity 1: Even parity
9106	DEV0 CHR. LENGTH	Set the length of the data bit.	0: 5 (bit) 1: 6 2: 7 3: 8
9107	DEV0 TERMINATR TYP	The code to terminate data reading can be selected.	0 and 3: EOR 1 and 2: EOB or EOR
9108	DEV0 HAND SHAKE	Specify the transmission control method. The method will be no procedure if a value except 1 to 3 is set.	1: RTS/CTS method 2: No procedure (No handshaking) 3: DC code method
9109	DEV0 DC CODE PRY	Specify the DC code when the DC code method is selected.	0: No parity to DC code (DC3 = 13H) 1: DC code with parity (DC3 = 93H)
9111	DEV0 DC2/4 OUTPUT	Specify the DC code handling when outputting data to the output device.	DC2 / DC4 0: None / None 1: Yes / None 2: None / Yes 3: Yes / Yes
9112	DEV0 CR OUTPUT	Specify whether to insert the (CR) code just before the EOB (L/F) code during output.	0: Do not add 1: Add
9113	DEV0 EIA OUTPUT	In data output mode, select the ISO or EIA code for data output. In data input mode, the ISO and EIA codes are identified automatically.	0: ISO code output 1: EIA code output
9114	DEV0 FEED CHR.	Specify the length of the tape feed to be output at the start and end of the data during tape output.	0 to 999 (characters)

#	Item	Contents	Setting range (unit)
9115	DEV0 PARITY V	Specify whether to check the parity of the No. of characters in block during data input. The No. of characters is factory-set so that the check is valid at all times.	0: Do not perform parity V check 1: Perform parity V check
9116	DEV0 TIME-OUT (sec)	Set the time out time to detect an interruption in communication. Time out check will not be executed when set to 0 to 30 seconds.	0 to 30 (s)
9117	DEV0 DR OFF	Specify whether to check the DR data at the data input/output.	0: DR valid 1: DR invalid
9118	DEV0 DATA ASCII	0: Output in ISO/EIA code (Depends on whether #9113, #9213, #9313, #9413, or #9513 EIA output parameter is set up) 1: Output in ASC II code	0/1
9119	DEV0 INPUT TYPE	Specify the mode for input (collation). 0: Standard input (Data from the very first EOB is handled as significant information.) 1: EOBs following the first EOB of the input data are skipped until data other than EOB is input.	0/1
9121 9122 9123 9124 9125 9126 9127 9128	DEV0 EIA CODE [ ] # * = : \$ !	When output with EIA code, data can be output using the alternate code in which the special ISO code not included in EIA is specified. Specify the codes which do not duplicate the existing EIA codes by hexadecimal for respective special codes.	0 to FF (hexadecimal)

9201 to	Set the same settings for device 1.	
9301 to	Set the same settings for device 2.	
9401 to	Set the same settings for device 3.	
9501 to	Set the same settings for device 4.	

## 3.8.8.6 Ethernet Parameters

Set the parameters related to Ethernet input/output.

After setting up the parameter (PR) listed in the table, turn OFF the NC power. To validate the parameter, turn ON the power again.

9701 to 9706 parameters:

When several TCP/IP drivers are installed and the IP address is set manually ("9701 IP address automatic setting" is set to 0), the same setting will be made for all parameters.

9711 to 9781 parameters:

Set the server information required for using the Ethernet function.

Server information for up to four units can be set.

#	Item	Contents	Setting range (unit)
9701 (PR)	IP addr auto set	The IP address is automatically assigned from the DHCP server. <b>(Note)</b> When this setting is validated, the following parameters "9702 IP address", "9703 Sub-net address" and "9704 Gateway setting" will be invalid.	0: Manual setting 1: Automatic setting
9702 (PR)	IP address	Set the IP 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
9703 (PR)	Subnet 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.	15 characters or less Dot notation numeric value train
9704 (PR)	Gateway	This sets the gateway of the TCP/IP assigned to the NC (Windows) computer.	15 characters or less Dot notation numeric value train
9705	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)
9706	Host No.	This selects the number of the host to be used from host 1 to host 4.	1 to 4 : Host No.
9711	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 <b>(Note)</b> Set the host computer's TCP/IP address if communication is not carried out correctly.	15 characters (alphanumeric) or less
9712	Host1 user name	This sets the user name when logging into the host computer.	15 characters (alphanumeric) or less
9713	Host1 password	This sets the password when logging into the host computer.	15 characters (alphanumeric) or less
9714	Host1 directory	This sets the directory name of the host computer. Refer to <b>(Note 4)</b> for details.	31 characters (alphanumeric) or less



#	Item	Contents	Setting range (unit)
9715	Host1 host type	This sets the type of host computer. <b>(Note)</b> When "0" is set, the settings for the following parameters will be invalid. <ul style="list-style-type: none"> <li>• Wrd pos: name</li> <li>• Wrd pos: size</li> <li>• Wrd pos: Dir</li> <li>• Wrd pos: cmnt</li> <li>• Wrd num: cmnt</li> </ul>	0: UNIX/PC automatic judgment 1: UNIX 2: PC (DOS)
9716	Host 1 Wrd pos: name	This sets the file name display position (nth word from left) of the list displayed when the ftp command "dir" is executed. <b>(Note)</b> One word designates a character string divided by one or more spaces.	0 to 100 0: Default value
9717	Host 1 Wrd pos: size	This sets the size display position (nth word from left) of the list displayed when the ftp command "dir" is executed. <b>(Note)</b> One word designates a character string divided by one or more spaces.	0 to 100 0: Default value
9718	Host 1 Wrd pos: Dir	This sets the <DIR> display position (nth word from left) of the list displayed when the ftp command "dir" is executed. <b>(Note)</b> One word designates a character string divided by one or more spaces.	0 to 100 0: Default value
9719	Host 1 Wrd pos: cmnt	This sets the comment (date, time, etc.) display position (nth word from left) of the list displayed when the ftp command "dir" is executed. <b>(Note)</b> One word designates a character string divided by one or more spaces.	0 to 100 0: Default value
9720	Host 1 Wrd num: cmnt	This sets the number of words to be displayed as a comment. <b>(Note)</b> One word designates a character string divided by one or more spaces.	0 to 100 0: Default value
9721	Host 1 no total siz	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
9731 to 9741	Host 2 parameters	Set the same settings for host 1.	
9751 to 9761	Host 3 parameters	Set the same settings for host 2.	
9771 to 9781	Host 4 parameters	Set the same settings for host 3.	

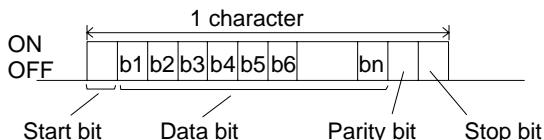
**(Note 1)** The user name and password are required when logging in.

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

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

**(Note 4)** The directory released to the client (NC unit) with the host computer's server is handled as the root directory by the NC unit.

## 3.8.8.7 Computer Link Parameters

#	Item	Contents	Setting range (unit)
9601	BAUD RATE	Specify the rate at which data is transferred.	0: 19200 (bps) 1: 9600 2: 4800 3: 2400 4: 1200 5: 600 6: 300 7: 110 8: 38400
9602	STOP BIT	Specify stop bit length used in start-stop mode. See "PARITY EFFECTIVE" in #9603. The number of characters is adjusted in output mode so that no problems occur if the parity check is enabled.	1: 1 2: 1.5 3: 2
9603	PARITY EFFECTIVE	<p>This parameter is set when using a parity bit separately from the data bit.</p>  <p>ON OFF</p> <p>Start bit      Data bit      Parity bit      Stop bit</p> <p>Set this to match the input/output device specifications.</p>	0: No parity bit used in I/O mode 1: Parity bit used in I/O mode
9604	EVEN PARITY	Specify whether even or odd parity is used when parity is used. This parameter is ignored when no parity is used.	0: Odd parity 1: Even parity
9605	CHR. LENGTH	Specify data bit length. See "PARITY EFFECTIVE" in #9603.	2: 7 3: 8
9606	HAND SHAKE	Select RS-232C transmission control mode."3" (DC control mode) should be set for computer link B.	0: No control 1: RTS/CTS method 2: No handshaking 3: DC control mode
9607	TIME-OUT SET	Specify time-out time at which an interruption of data transfer during data input/output should be detected. If 0 is set, time infinity is specified.	0 to 999 (1/10s)
9608	DATA CODE	Specify the code to be used. See "PARITY EFFECTIVE" in #9603.	0: ASCII code 1: ISO code
9609	LINK PARAM. 1	Bit 1: DC1 output after NAK or SYN Specify whether to output the DC1 code after the NAK or SYN code is output.	0: Don't output the DC1 code. 1: Output the DC1 code.
		Bit 7: Enable/disable resetting Specify whether to enable resetting in the computer link.	0: Enable resetting. 1: Disable resetting.

#	Item	Contents	Setting range (unit)
9610	LINK PARAM. 2	Bit 2: Specify the control code parity (even parity for the control code). Set the parity in accordance with the I/O device specifications.	0: No control code parity added 1: Control code parity added
		Bit 3: Parity V Specify whether to enable checking of parity V in one block in data input mode.	0: Disable 1: Enable
9611	LINK PARAM. 3	Not used	
9612	LINK PARAM. 4	Not used	
9613	LINK PARAM. 5	Not used	
9614	START CODE	Specify the code by which file data transfer begins at first. This parameter is used for a specific user, and set 0 in this parameter for normal operation.	0: DC1 (11H) 1: BEL (07H)
9615	CTRL. CODE OUT	Bit 0: NAK output Specify whether to send the NAK code to the host if a communication error occurs in computer link B.	0: Do not output the NAK code. 1: Output the NAK code.
		Bit 1: SYN output Specify whether to send the SYN code to the host if NC resetting or an emergency stop occurs in computer link B.	0: Do not output the SYN code. 1: Output the SYN code.
		Bit 3: DC3 output Specify whether to send the DC3 code to the host when communication ends in computer link B.	0: Do not output the DC3 code. 1: Output the DC3 code.
9616	CTRL. INTERVAL	Not used	
9617	WAIT TIME	Not used	
9618	PACKET LENGTH	Not used	
9619	BUFFER SIZE	Not used	
9620	START SIZE	Not used	
9621	DC1 OUT SIZE	Not used	
9622	POLLING TIMER	Not used	
9623	TRANS. WAIT TMR	Not used	
9624	RETRY COUNTER	Not used	

## 3.8.8.8 Subprogram Storage Destination Parameters

#	Item	Contents	Setting range (unit)														
8880	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><b>(Example)</b> 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><b>(Note 1)</b> If the called subprogram is not found in the designated storage destination, a program error will occur.</p> <p><b>(Note 2)</b> If D0 to D4 is not designated when the subprogram is called, the subprogram will be searched from the memory.</p> <p><b>(Note 3)</b> The following values are set in the device name.</p> <table><tr><th>Setting value</th><th>Display name</th></tr><tr><td>M</td><td>Memory</td></tr><tr><td>G</td><td>HD</td></tr><tr><td>F</td><td>FD</td></tr><tr><td>R</td><td>Memory card</td></tr><tr><td>D</td><td>Data server</td></tr><tr><td>E</td><td>Ethernet</td></tr></table>	Setting value	Display name	M	Memory	G	HD	F	FD	R	Memory card	D	Data server	E	Ethernet	Device name <b>(Note 3)</b>
Setting value	Display name																
M	Memory																
G	HD																
F	FD																
R	Memory card																
D	Data server																
E	Ethernet																
8881	Subpro stor D0: dir		Directory 48 characters														
8882	Subpro stor D1: dev	Device name <b>(Note 3)</b>															
8883	Subpro stor D1: dir	Directory 48 characters															
8884	Subpro stor D2: dev	Device name <b>(Note 3)</b>															
8885	Subpro stor D2: dir	Directory 48 characters															
8886	Subpro stor D3: dev	Device name <b>(Note 3)</b>															
8887	Subpro stor D3: dir	Directory 48 characters															
8888	Subpro stor D4: dev	Device name <b>(Note 3)</b>															
8889	Subpro stor D4: dir	Directory 48 characters															

## 3.8.8.9 Axis Parameters

Set up the parameter required for each axis.

#	Item	Contents	Setting range (unit)
8201	AX. RELEASE	Select the function to remove the control axis from the control target. 0: Control as normal. 1: Remove from control target.	0/1
8202	OT-CHECK OFF	Select the stored stroke limit II function set in #8204 and #8205. 0: Stored stroke limit II valid 1: Stored stroke limit II invalid	0/1
8203	OT-CHECK-CANCEL	When the simple absolute position method (#2049 type is 9) is selected, the stored stroke limits I, II (or IIB) and IB will be invalid until the first reference position return is executed after the power is turned ON. 0: Valid (according to #8202) 1: Temporary cancel <b>(Note)</b> "#8203 OT-CHECK-CANCEL" affects all the stored stroke limits.	0/1
8204	OT-CHECK-N	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. If the sign and value are the same as #8205, the stored stroke limit II (or IIB) will be invalid. If the stored stroke limit IIB function is selected, the prohibited range will be between two points even when #8204 and #8205 are set in reverse. When II is selected, the entire range will be prohibited if #8204 and #8205 are set in reverse.	±99999.999 (mm)
8205	OT-CHECK-P	This sets the coordinates of the (+) direction in the moveable range of the stored stroke limit II or the upper limit coordinates of the prohibited range of stored stroke limit IIB.	±99999.999 (mm)
8206	TOOL CHG. P	Set the coordinates of the tool change position for G30. n (tool change position return). Set with coordinates in the basic machine coordinate system.	±99999.999 (mm)
8207	G76/87 IGNR (For M system only)	Select the shift operation at G76 (fine boring) and G87 (back boring). 0: Shift effective 1: No shift	0/1
8208	G76/87 (-) (For M system only)	Specifies the shift direction at G76 and G87. 0: Shift to (+) direction 1: Shift to (-) direction	0/1
8209	G60 SHIFT (For M system only)	Set the last positioning direction and distance for a G60 (unidirectional positioning) command.	±99999.999 (mm)
8210	OT INSIDE	The stored stroke limit function to be set in #8204 and #8205 prevents the machine from moving to the inside or outside of the specified range. 0: Inhibits outside area (Select stored stroke limit II.) 1: Inhibits inside area (Select stored stroke limit II B.)	0/1

#	Item	Contents	Setting range (unit)
8211	MIRR. IMAGE	Enable or disable the parameter mirror image function. 0: Disable 1: Enable	0/1
8213 (PR)	Rotation axis type	This designates the rotation type (short-cut valid/invalid) or linear type (workpiece coordinate linear type/all coordinate linear type). This parameter is valid only when „#1017 rot“ is set to 1. <b>(Note)</b>	0: Short-cut invalid 1: Short-cut valid 2: Workpiece coordinate linear type 3: All coordinate linear type
8215	TLM standard length	This sets the TLM standard length. TLM standard length is the distance from a tool replacement point (reference position) to the measurement basic point (surface) which is used to measure the tool length.	-99999.999 to 99999.999 (mm)
8216	Type in G28 return	Define the performance after establishing the reference position in automatic reference position return command when the reference position has not been established with the distance-coded reference position detection. 0: Move to reference position 1: Won't move to reference position	0/1

**(Note)** The movement method is as follows by the specified rotation axis type.

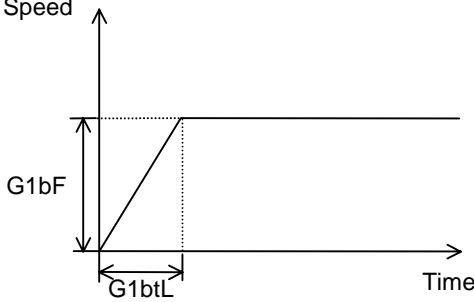
The movement method is as follows by the specified rotation axis type.				
Setting value	0	1	2	3
Workpiece coordinate value	Display range: 0° to 359.999°		Display range: 0° to ±99999.999°	
Machine coordinate value/relative position	Display range: 0° to 359.999°			Display range: 0° to ±99999.999°
ABS command	The incremental amount from the end point to the current position is divided by 360, and the axis moves by the remainder amount according to the sign.	Moves with a short-cut to the end point.	In the same manner as the normal linear axis, moves according to the sign by the amount obtained by subtracting the current position from the end point.	
INC command	Moves in the direction of the commanded sign by the commanded incremental amount starting at the current position.			
Reference position return	The movement to the middle point applies to the ABS command or the INC command.			
	Returns with movement within 360 degrees from the middle point to reference position.			Moves and returns in the reference position direction for the difference from the current position to the reference position.

## 3.8.8.10 Barrier Data (For L system only)

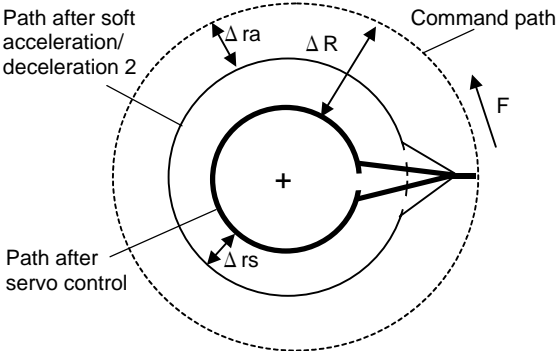
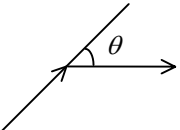
#	Item	Contents	Setting range (unit)
8300	P0	Set the reference X-coordinates of the chuck and the tail stock barrier. Set the center coordinate (radius value) of workpiece by the basic machine coordinate system.	±99999.999 (mm)
8301	P1	Set the area of the chuck and tail stock barrier.	±99999.999 (mm)
8302	P2	Set the coordinate from the center of workpiece for X-axis. (radius value)	
8303	P3	Set the coordinate value by basic machine coordinate system for Z-axis.	
8304	P4		
8305	P5		
8306	P6		
8311	P7	Set the area of the left spindle section. • X axis: Set the coordinate from the workpiece center (P0). (radius value)	±99999.999 (mm)
8312	P8	• Z axis: Set the coordinates in the basic machine coordinate system.	
8313	P9	Set the area of the right spindle section. • X axis: Set the coordinate from the workpiece center (P0). (radius value)	±99999.999 (mm)
8314	P10	• Z axis: Set the coordinates in the basic machine coordinate system.	
8310	Barrier ON	Select the validity of the chuck and tailstock barrier. 0: Invalid (Setting from special display unit valid) 1: Valid	0/1
8315	Barrier Type (L)	Set the shape of the left chuck and tailstock barrier. 0: No area 1: Chuck 2: Tailstock	0/1/2
8316	Barrier Type (R)	Set the shape of the right chuck and tailstock barrier. 0: No area 1: Chuck 2: Tailstock	0/1/2
8317	ELIV. AX. Name	When the right chuck and tailstock barrier is movable, set the name of the delivery axis. When using the multi-part system method and the delivery axis is an axis in the other part system, designate the axis including the part system as 1A, 1B or 2A, 2B. If the part system is not designated as A and B, the set part system will be used.	A/B/.. : (axis address) 1A/1B/.. 2A/2B/.. : (part system designation) 0 : cancel
8318	Stock Angle (L)	Set the angle for the left tailstock end section. The angle will be interpreted as 90° if there is no setting (when 0 is set).	0 to 180 (°) 0: 90° default
8319	Stock Angle (R)	Set the angle for the right tailstock end section. The angle will be interpreted as 90° if there is no setting (when 0 is set).	0 to 180 (°) 0: 90° default

## 3.8.8.11 High Accuracy Parameters

After setting up the parameter (PR) listed in the table, turn OFF the NC power. To validate the parameter, turn ON the power again.

#	Item		Contents	Setting range (unit)
1149	cireft	Arc deceleration speed change	Specify whether to enable deceleration at the arc entrance or exit. 0: Disable 1: Enable	0/1
1205	G0bdcc	Acceleration and deceleration before G0 interpolation	0: G00 acceleration and deceleration are selected as those after interpolation. 1: The G00 acceleration/deceleration is the acceleration/decelerate before interpolation regardless of whether the mode is the high accuracy control mode. (Note) "1" cannot be set for the 2nd system onwards.	0/1
1206	G1bF	Maximum speed	Set up a cutting feedrate when selecting acceleration and deceleration before interpolation.	1 to 999999 (mm/min)
1207	G1btL	Time constant	Set up a cutting feed time constant when selecting acceleration and deceleration before interpolation. 	1 to 5000 (ms)
1209	cirdcc	Arc deceleration speed	Specify the deceleration speed at the arc entrance or exit.	1 to 999999 (mm/min)
1568	SfiltG1	G01 software acceleration/deceleration speed filter	This is a filter time constant used to smoothen changes in the acceleration speed for the cutting feed acceleration/deceleration speed when accelerating/decelerating before interpolation.	0 to 200 (ms)
1569	SfiltG0	G00 software acceleration/deceleration speed filter	This is a filter time constant used to smoothen changes in the acceleration speed for the rapid traverse acceleration/deceleration speed when accelerating/decelerating before interpolation.	0 to 200 (ms)
1570	Sfilt2	Software acceleration/deceleration speed filter 2	This is a filter time constant used to further smoothen changes in the acceleration speed when accelerating/decelerating before interpolation. When setting "0" or "1", this parameter is invalid.	0 to 50 (ms)
1571	SSSdis	SSS control adjustment coefficient fixed value selection	The shape recognition range for SSS control is fixed.	0/1



#	Item	Contents	Setting range (unit)
8019	R COMP	<p>Set up a compensation coefficient for reducing a control error in the reduction of a corner roundness and arch radius.</p> <p>The larger the setup value, the smaller the theoretical error will be. However, since the speed at the corner goes down, the cycle time is extended.</p> <p>Coefficient = 100 - setting value</p> <p><b>(Note)</b> This is valid when "#8021 COMP CHANGE" is set to "0".</p>	0 to 99 (%)
	Theor R decrease	<p>The value calculated with the following data is displayed for the theoretical radius reduction error amount <math>\Delta R</math> (mm).</p> <p><math>\Delta R</math> is the value when the high accuracy control mode is valid.</p> <p>This data is calculated using the following parameters.</p> <ul style="list-style-type: none"> <li>• #2203 SV003(PGN1) (Position loop gain 1st axis (1/s))</li> <li>• #2010 fwd_g (Feed forward gain 1st axis (%))</li> <li>• #1570 Sfilt2 (Soft acceleration/deceleration filter 2)</li> <li>• #8019 R COMP (When "#8021 COMP_CHANGE" is "0".)</li> <li>• #8023 CURVE COMP (When "#8021 COMP_CHANGE" is "1".)</li> </ul>  <p>Theoretical radius reduction amount at arc center</p>	
8020	DCC. ANGLE	<p>Set up the minimum value of an angle (external angle) that should be assumed to be a corner.</p> <p>When an inter-block angle (external angle) in high-accuracy mode is larger than the set value, it is determined as a corner and the speed goes down to sharpen the edge.</p>  <p>If the set value is smaller than <math>\theta</math>, the speed goes down to optimize the corner.</p> <p><b>(Note)</b> If "0" is set, it will be handled as 5 degrees.</p>	<p>0 to 89 (degrees)</p> <p>0: The angle will be 5°.</p>

#	Item	Contents	Setting range (unit)
8021	COMP_CHANGE	<p>Select whether to share or separate the compensation coefficient at the corner/curve during the high-accuracy control mode.</p> <p>0: Share ("#8019 R COMP" is applied.) 1: Separate</p> <ul style="list-style-type: none"> <li>• Corner : #8022 CORNER COMP</li> <li>• Curve : #8023 CURVE COMP</li> </ul> <p><b>(Note)</b> Set "1" when using SSS control.</p>	0/1
8022	CORNER COMP	<p>Set the compensation coefficient to further reduce or increase the roundness at the corner during the high-accuracy control mode.</p> <p>Coefficient = 100 - setting value</p> <p><b>(Note)</b> This is valid when "#8021 COMP CHANGE" is set to "1".</p>	-1000 to 99 (%)
8023	CURVE COMP	<p>Set the compensation coefficient to further reduce or increase the radius reduction amount at the curve (arc, involute, spline) during the high-accuracy control mode.</p> <p>Coefficient = 100 - setting value</p> <p><b>(Note)</b> This is valid when "#8021 COMP CHANGE" is set to "1".</p>	-1000 to 99 (%)
	Theor R decrease	Refer to "Theor R decrease" for "#8019 R COMP".	

## &lt;High-accuracy spline&gt;

#	Item	Contents	Setting range (unit)
8025	SPLINE ON (for M system only)	Specify whether to enable the spline function. 0: Disable the spline function. 1: Enable the spline function.	0/1
8026	CANCEL ANG. (for M system only)	When the angle made by blocks exceeds the set value, spline interpolation is canceled temporarily. In consideration of the pick feed, set a value a little smaller than the pick feed angle.	0 to 180 (°) 0: 180 (°)
8027	Toler-1 (for M system only)	Specify the maximum chord error (tolerance) in a block that includes an inflection point. Set the tolerance applicable when the applicable block is developed to fine segments by CAM. (normally about 10 μm) When 0.000 is set, the applicable block is linear.	0.000 to 100.000 (mm)
8028	Toler-2 (for M system only)	Specify the maximum chord error (tolerance) in a block that includes no inflection point. Set the tolerance applicable when the applicable block is developed to fine segments by CAM. (normally about 10 μm) When 0.000 is set, the applicable block is linear.	0.000 to 100.000 (mm)
8029	FairingL (for M system only)	Set the length of the block subject to fairing. (Valid when "#8033 Fairing ON" is set to 1.)	0 to 100.000 (mm)
8030	MINUTE LENG (for M system only)	When the length of one block exceeds the set value, spline interpolation is canceled temporarily and linear interpolation is performed. Set a value a little smaller than one block length of the program. If - 1 is set, spline interpolation is performed regardless of block length.	-1 to 127 (mm) 0: 1 (mm)

## &lt;Fairing&gt;

#	Item	Contents	Setting range (unit)
8033	Fairing ON (for M system only)	Set whether to use the fairing function. 0: Fairing invalid 1: Fairing valid	0/1
8034	AccClamp ON (for M system only)	Set the method for clamping the cutting speed. 0: Clamp with parameter "#2002 clamp" or the corner deceleration function. 1: Clamp the cutting speed with acceleration judgment. (Valid when "#8033 Fairing ON" is set to 1.)	0/1
8036	CordecJudge (for M system only)	Change the conditions for judging a corner. 0: Judge the corner from the angle of the neighboring block. 1: Judge the corner from the angle of the neighboring block, excluding minute blocks. (Valid when "#8033 Fairing ON" is set to 1.)	0/1
8037	CorJudgeL (for M system only)	Set the length of the block to be excluded. (Valid when "#8036 CordecJudge" is set to 1.)	0 to 99999.999 (mm)

## &lt;SSS control&gt;

#	Item	Contents	Setting range (unit)
8090	SSS ON (for M system only)	Set whether to validate SSS control with G05 P10000. 0: Invalid 1: Valid	0/1
8091	StdLength (for M system only)	Adjust the maximum value of the range for recognizing the shape. To eliminate the effect of steps or errors, etc., set a large value. To enable sufficient deceleration, set a small value. If "0.000" is set, the standard value (1.000mm) will be applied.	0 to 100.000 (mm)
8092	ClampCoeff (for M system only)	Adjust the clamp speed at the curved section configured of fine segments. Coefficient = $\sqrt{\text{setting value}}$	1 to 100
8093	StepLeng (for M system only)	Set the width of the step at which the speed is not to be decelerated. (Approximately the same as the CAM path difference [Tolerance].) If 0 is set, the standard value (5 $\mu$ m) will be applied. If a minus value is set, the speed will decelerate at all minute steps.	-0.001 to 0.100 (mm)
8094	DccWaitAdd (for M system only)	Set the time to wait for deceleration when the speed FB does not drop to the clamp speed.	0 to 100 (ms)

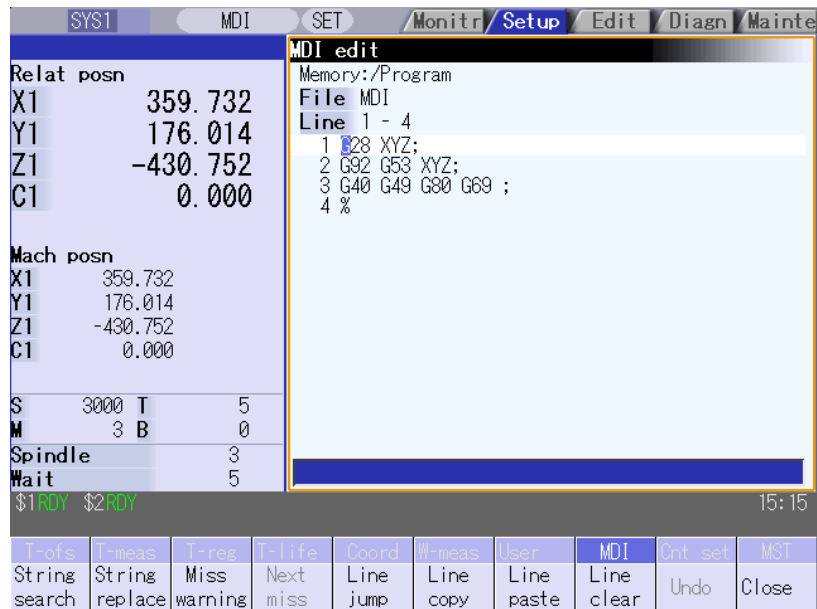
## 3.8.8.12 High-accuracy Axis Parameters

#	Item		Contents	Setting range (unit)
2001	rapid	Rapid traverse rate	Set up the rapid traverse feedrate for each axis. The maximum value to be set differs with mechanical systems.	1 to 1000000 (mm/min)
2002	clamp	Cutting feedrate for clamp function	Set the maximum cutting feedrate for each axis. Even if the feedrate in G01 exceeds this value, the clamp will be applied at this feedrate.	1 to 1000000 (mm/min)
2010	fwd_g	Feed forward gain	Set up a feed forward gain for pre-interpolation acceleration and deceleration. The larger the set value, the smaller the theoretical control error will be. However, if a mechanical vibration occurs, the set value must be reduced.	0 to 200 (%)
2068	G0fwdg	G00 feed forward gain	Specify the feed forward gain applicable to acceleration/deceleration before G00 interpolation. The greater the set value, the shorter the positioning time during in-position checking. If machine vibration occurs, decrease the set value.	0 to 200 (%)
2096	crncsp	Minimum corner deceleration speed	Set the minimum clamp speed for corner deceleration during the high-accuracy control mode. Normally set "0". <b>(Note)</b> This parameter is invalid during SSS control.	0 to 1000000 (mm/min)
2109	Rapid (H-precision)	Rapid traverse rate during high-accuracy control mode	Set the rapid traverse rate for each axis during high-accuracy control mode. When "0" is set, "#2001 rapid" is valid.	0 to 1000000 (mm/min)
2110	Clamp (H-precision)	Cutting feed rate during high-accuracy control mode for clamp function	Define the maximum cutting feed rate for each axis during high-accuracy control mode. When "0" is set, "#2002 clamp" is valid.	0 to 1000000 (mm/min)

### 3.9 MDI Program Editing

Press the main menu [MDI] key to display the contents of the MDI program in a pop-up window. When the parameter “#1144 mdlkof” is “0” (MDI setting impossible), switch to the MDI mode once to press the menu “MDI”.

Refer to "4.2 Program Editing" for further details.



### 3.10 Counter Setting

This function is used to display the relative position counter in a pop-up window and set the counter.

Function : Used to set an arbitrary value in the relative position counter.

Counter display change : The set data displays only at the relative position counter.

Offset : There is no change.

Refer to "2.11 Counter Setting" for further details.

**Counter set**

Relat posn

X1	359.732
Y1	176.014
Z1	-430.752
C1	0.000

\$1 100 \$2 100

### 3.11 Manual Numerical Value Commands

This function is used to set and display all the Spindle function (S), Miscellaneous function (M), Tool function (T), and No. 2 miscellaneous function (B) commands.

Input the address for S, M, T, and B to set and display the manual numerical value commands.

Refer to "2.13 Manual Numerical Value Commands" for further details.

T-ofs	Length	L wear	Radius	R wear
1	0.000	0.000	10.000	0.000
2	0.000	0.000	0.000	0.000
3	-500.000	0.000	0.000	0.000
4	0.000	0.000	0.000	0.000
5	0.000	0.000	0.000	0.000
6	0.000	0.000	0.000	0.000
7	0.000	0.000	0.000	0.000
8	0.000	0.000	0.000	0.000
9	0.000	0.000	0.000	0.000
10	0.000	0.000	0.000	0.000
11	0.000	0.000	0.000	0.000
12	0.000	0.000	0.000	0.000
13	0.000	0.000	0.000	0.000
14	0.000	0.000	0.000	0.000
15	0.000	0.000	0.000	0.000

Spindle 3  
Wait 5

\$1: 15:12

Close

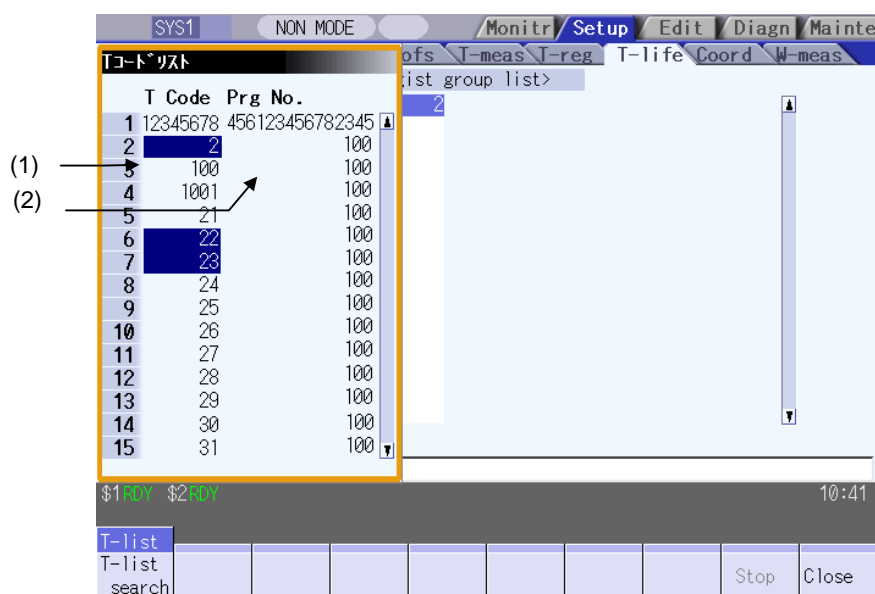


### 3.12 T Code List

This function searches the T code in designated machining program (including the subprograms) and lists it in the order the T codes are commanded. (Max. 100 codes)

As for the T code of the tool that has not been registered, it is indicated with text color and background color changed.

This window is displayed only when the graphic check option is provided.



#### Display items

Display item	Details
(1) T code	T codes are listed in the order that the T code is commanded in the designated machining program (including subprogram). As for the T code of the tool that has not been registered, it is indicated with text color and background color changed.
(2) Program No.	This shows designated program No. When the number of characters exceeds 15, the excess is indicated as "***".

#### Menus (T code list display window)

Menu	Details	Type	Reference
T-list search	This displays T code list search window. This menu is invalid while getting the T codes.	C	
Halt	This interrupts getting the T codes. This menu is valid only while getting the T codes.	C	
Close	This closes the pop-up window and quits this function.	C	

## Menus (T code list search window)

Menu	Details	Type	Reference
Memory	This selects the device for searching for the program to get T codes. When a device with directory is selected, the root directory is selected first.	C	
HD		C	
Memory card		C	
DS		C	
FD		C	
List update	This updates the list contents. (The latest contents of the currently selected device and directory are listed.)	C	
Sort change	This changes the method that the list is sorted.	C	2.2.3 Changing the Sorting Method
Comment nondisp	This changes whether to show or hide the comment field in the list. When the comment field is hidden, the file name field will be enlarged.	B	2.2.2 Changing Whether to Show or Hide the Comment Field
Retn	This closes the pop-up window and starts getting T codes.	C	

## Operation method (Display the T code list)

- (1) Press the menu T-list. ➡ The menu appears.  
The T code list created last appears as a pop-up window. The Halt menu becomes invalid.
- (2) Press the menu T-list search. ➡ The submenu appears. The list to select a file appears as a pop-up window.
- (3) Select the device.  
[EX.] HD ➡ The selected device name and its root directory (HD:/) appears in the directory display area.
- (4) Use the ↑, ↓, ↶, ↷ keys to align the cursor with the directory of target machining program, and press INPUT. ➡ T code list appears as a pop-up window.  
Getting T code and listing starts.  
The Halt menu becomes valid.  
The T-list search is invalid.

T code list cannot be displayed when INPUT key is pressed with the following programs selected;

- The program that does not exist.
- The program that is waiting to be restarted.
- The program during automatic operation.
- The program being checked.

The list window will not change.

**(Note 1)** When switching to the other screen, getting T code is interrupted automatically.

**(Note 2)** When the Close menu is pressed, getting T code is interrupted automatically.

**(Note 3)** T code list for MDI program cannot be displayed.

**(Note 4)** T code list acquisition is not possible for a program with 33 or more program name characters.

### 3.13 Pallet Program Registration

Machining programs can be registered per each pallet of the automatic pallet changer (hereinafter APC) and the indexing plane.

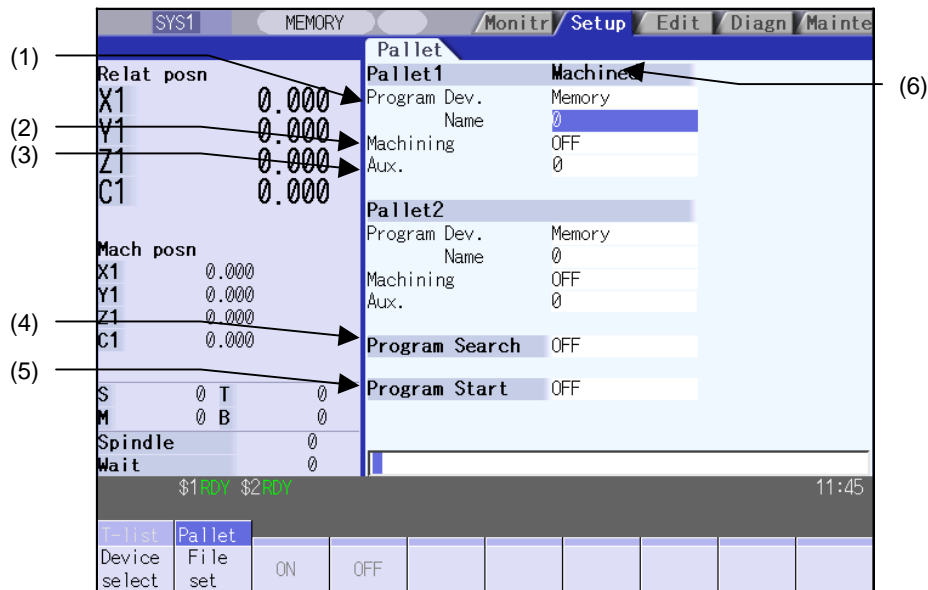
The Pallet Program Registration screens include "Standard Pallet Registration screen" and "Pallet 4 Page Registration screen", and those two screens can be switched by the parameters.

Screen		Function
Standard Pallet Registration screen		Registration of machining programs for pallet 1 & 2 is carried out. Pallet 1 & 2 can be registered at once.
Pallet 4 Page Registration screen	Pallet list screen	Machining program device, file name, machining status, and index planes under machining for 4 planes of the pallet 1 to 12 are displayed. Information of 2 pallets can be displayed at once.
	Pallet details screen	Machining program device, file name, machining status, and external workpiece coordinates for each plane of the pallet 1 to 12 are set. Information of one pallet's 2 indexing planes can be set at once.

**(Note)** The number of pallets is determined by the parameter "#11002 Valid pallet num".

#11001 APC type	Screen
0	Standard Pallet Registration
1	Pallet 4 Page Registration

## 3.13.1 Standard Pallet Registration







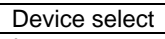









## Display items

Display item	Details
(1) Program Dev./Name	The machining program device and file 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 tool builder 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 started for the pallet in the machine. This setting is valid only when Pallet Program Search is set to ON.
(6) Machined	"Machined" is displayed for the pallet in the machine.





## Menus

Menu	Details	Type	Reference
Device select	Device menu is displayed. If selected, the device name of the pallet currently indicated by the cursor is changed.	C	Registering a machining program for the pallet
File set	The file name to be registered can be selected from the list. A list of files of the currently selected device is displayed. This menu can be used only when the cursor is at file name.	C	Selecting a file name from the list
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	Registering a machining program for the pallet
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	

## Operation method (Registering a machining program for the pallet)

- (1) Using the , , ,  keys, move the cursor to the area of the pallet for which a program is to be registered.
- (2) Press the  menu and select a device.  The cursor is moved to "Device". The device menu (Memory, HD, DS, FD, Memory card) is displayed. If selected, the device selected in "Device" is displayed.
- (3) Move the cursor to "File name" and input the program No.  The contents set in "File name" is displayed.
- (4) Move the cursor to "Machining" and press the  or  menu.  The contents set in "Machining" is displayed.
- (5) Move the cursor to "Program Search" and press the  or  menu.  The contents set in "Program Search" is displayed.
- (6) Move the cursor to "Program Start" and press the ON or OFF menu.  The contents set in "Program Start" is displayed.

## Operation method (Selecting a file from the list)

- (1) Move the cursor to "File name" and press the  menu.  A list of files for the specified device is displayed.
- (2) Move the cursor to an arbitrary file and press the  key.  The selected file name is displayed in "File name". The cursor is moved to "Machining". An arbitrary file name can be directly entered, as well.

**(Note 1)** When a file name is directly entered, whether or not the file exists is not checked.

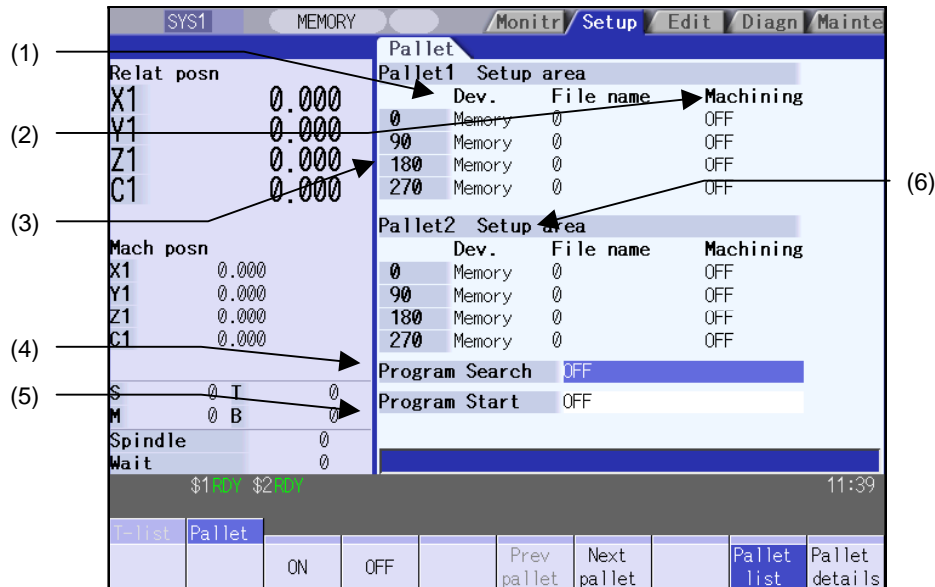
**(Note 2)** When a file name is directly entered, if other than character strings or values within the setting range (1 to 99,999,999) is set, an error occurs.

**(Note 3)** If a directory is specified, a setting error occurs.

## 3.13.2 Pallet List Screen

Machining program device, file name, machining status, and index planes under machining for 4 planes of the pallet 1 to 12 are displayed.



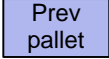
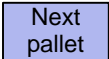

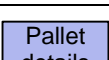
**(Note)** The number of pallets is determined by the parameter "#11002 Valid pallet num".



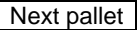
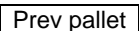
## Display items

Display item	Details
(1) Dev./File name	Machining program device name and file name to be registered in each pallet's index plane are displayed.
(2) Machining ON/OFF	Whether machining for each pallet's index plane is valid or invalid is displayed.
(3) Machining index plane	0°, 90°, 180°, 270° are displayed. An asterisk (*) is displayed with the angle of the index plane.
(4) Program Search ON/OFF	Whether search for the registered machining program is valid or invalid is displayed. When valid, the next program registered will be searched automatically as soon as the currently machining program finishes. The next program is one of the valid index plane programs after the pallet in the machine. External workpiece coordinate set in the pallet detailed screen during search is set in the external workpiece coordinate shift (EXT). Auto restart is disabled. If auto restart is turned ON by PLC switch, it will be automatically turned OFF.
(5) Program Start ON/OFF	Whether continuous start of the registered program is valid or invalid is displayed. When valid, run the searched program for a pallet in the machine. This setting is valid only when pallet program search is valid.
(6) Pallet information in the machine	Whether pallet is in the machine is displayed. • Mach. area: When pallet is in the machine • Setup area: When pallet is not in the machine







## Menus

Menu	Details	Type	Reference
	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	Setting pallet program search
	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	Setting continuous start
	Information on the previous two pallets is displayed.	C	Changing display pallet
	Information on the next two pallets is displayed.	C	
	A list of pallets is displayed.	B	
	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.	B	3.13.3 Pallet Details Screen







## Operation method (Changing display pallet)





- (1) When the pallet 1 and 2 are displayed, press the  menu or next page key. ➡ Pallet 3 and 4 are displayed.
- (2) Press the  menu or previous page key. ➡ Pallet 1 and 2 are displayed.

## Operation method (Setting pallet program search)

- (1) Using the , , ,  keys, move the cursor to "Program Search" and press the  or  menu. ➡ The contents set in "Program Search" is displayed. The cursor moves to "Program Start".

## Operation method (Setting continuous start)

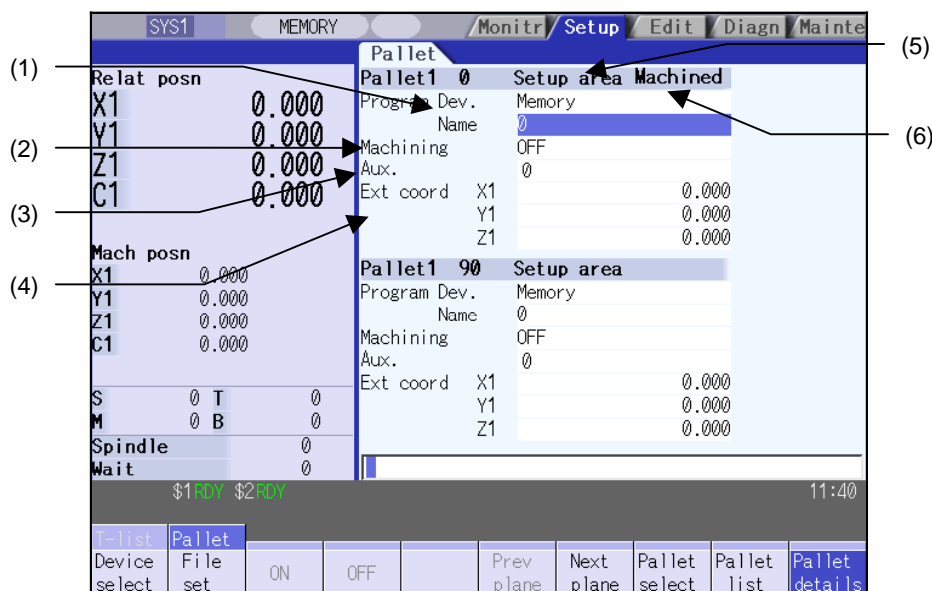
- (1) Using the , , ,  keys, move the cursor to "Program Start" and press the  or  menu. ➡ The contents set in "Program Start" is displayed. The cursor moves to "Program Search".

Every time the , , , or  key is pressed, the cursor switches between "Program Search" and "Program Start".

## 3.13.3 Pallet Details Screen

Machining program device, file name, machining status, Aux. and external workpiece coordinates for each plane of the pallet 1 to 12 are set.

**(Note)** The number of pallets is determined by the parameter "#11002 Valid pallet num".



## Display items

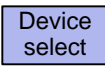


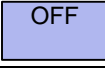
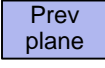
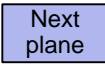
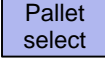


Display item	Details																					
(1) Program Dev./Name	Machining program device name and file name to be registered in each pallet's index plane are displayed.																					
(2) Machining ON/OFF	Whether machining for each pallet's index plane is valid or invalid is displayed.																					
(3) Aux.	If auxiliary function is available, data concerning auxiliary function for each pallet is displayed. Refer to the instruction manual issued by the machine tool builder for details on this function.																					
(4) Ext coord	<p>External workpiece coordinate for each pallet's index plane is set. The value set in the external workpiece coordinate is written into the external workpiece coordinate shift (EXT) according to the command from PLC. When the external workpiece coordinate for the machining surface of a pallet in machine is changed, only the changed axis data is written into the external workpiece coordinate shift (EXT). The set data (X to Z axis) is set in the pallet No. and extended workpiece coordinate offset corresponding to the index plane. X to Z axis: External workpiece coordinate data</p> <p><b>(Example)</b></p> <table><tr><td>Pallet 1 0°</td><td>: Extended workpiece coordinate offset</td><td>49 sets</td></tr><tr><td>Pallet 1 90°</td><td>: Extended workpiece coordinate offset</td><td>50 sets</td></tr><tr><td>Pallet 1 180°</td><td>: Extended workpiece coordinate offset</td><td>51 sets</td></tr><tr><td>Pallet 1 270°</td><td>: Extended workpiece coordinate offset</td><td>52 sets</td></tr><tr><td>Pallet 2 0°</td><td>: Extended workpiece coordinate offset</td><td>53 sets</td></tr><tr><td colspan="3">:</td></tr><tr><td>Pallet 12 270°</td><td>: Extended workpiece coordinate offset</td><td>96 sets</td></tr></table>	Pallet 1 0°	: Extended workpiece coordinate offset	49 sets	Pallet 1 90°	: Extended workpiece coordinate offset	50 sets	Pallet 1 180°	: Extended workpiece coordinate offset	51 sets	Pallet 1 270°	: Extended workpiece coordinate offset	52 sets	Pallet 2 0°	: Extended workpiece coordinate offset	53 sets	:			Pallet 12 270°	: Extended workpiece coordinate offset	96 sets
Pallet 1 0°	: Extended workpiece coordinate offset	49 sets																				
Pallet 1 90°	: Extended workpiece coordinate offset	50 sets																				
Pallet 1 180°	: Extended workpiece coordinate offset	51 sets																				
Pallet 1 270°	: Extended workpiece coordinate offset	52 sets																				
Pallet 2 0°	: Extended workpiece coordinate offset	53 sets																				
:																						
Pallet 12 270°	: Extended workpiece coordinate offset	96 sets																				



Display item	Details
(5) Pallet information in the machine	Whether pallet is in the machine is displayed. <ul style="list-style-type: none"> <li>• Mach. area: When pallet is in the machine</li> <li>• Setup area: When pallet is not in the machine</li> </ul>
(6) Machined	"Machined" is displayed on the index plane of a pallet in the machine.

**(Note 1)** The operation message "Pallet running" appears when the setting of "Program Dev.", "Program Name", "Machining", or "Aux." is executed to the index plane under machining of a pallet in machine. The "Program Dev.", "Program Name", "Machining", or "Aux." can be set when the index plane of a pallet in machine is not under machining.  
Even if the index plane of a pallet in machine is under machining, the external workpiece coordinate can be set.

### Menus

Menu	Details	Type	Reference
	The device menu is displayed. When selected, device name of the pallet at the cursor position is changed. When a device other than memory is selected, the route is displayed first.	C	Setting values in each index plane
	File name to be registered can be selected from a list. A list of files of the currently selected device is displayed. When the cursor is pointing at file name, this menu is operatable.	C	3.13.1 Standard Pallet Registration (Selecting a file from the list)
	The state (Machining) indicated by the cursor is validated. This menu can be used only when the cursor is at Machining.	C	Setting values in each index plane
	The state (Machining) indicated by the cursor is invalidated. This menu can be used only when the cursor is at Machining.	C	
	Previous index plane is displayed. When 0° or 90° index plane is being displayed, this menu displays the previous pallet, 180° or 270° index plane. When 180° or 270° index plane is being displayed, this menu displays 0° or 90° index plane. When 0° or 90° index plane of the pallet 1 is displayed, this menu cannot be selected.	C	Changing index planes
	Next index plane is displayed. When 0° or 90° index plane is being displayed, this menu displays 180° or 270° index plane. When 180° or 270° index plane is being displayed, this menu displays the next pallet, 0° or 90° index plane. When 180° or 270° index plane of the last pallet is displayed, this menu cannot be selected.	C	
	An arbitrary pallet can be selected. When the pallet No. is set and the <b>INPUT</b> key is pressed, the 0° or 90° pallet details data for that pallet will be displayed. The cursor will move to the 0° machining program file name.	A	Changing display pallets
	The Pallet list screen will open. A list of pallets, including the pallet displayed on the Pallet details screen will appear.	B	3.13.1 Standard Pallet Registration
	This displays the pallet details.	B	

**Operation method (Changing display pallets)**

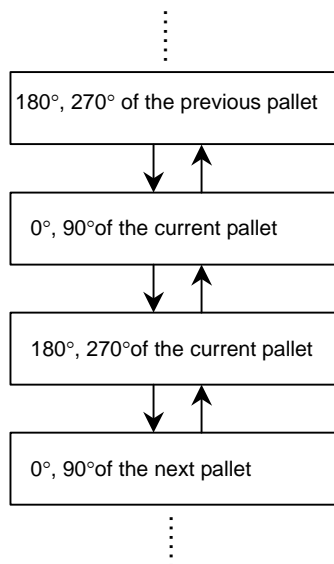
- (1) Press the **Pallet select** menu. Input pallet No. and press the **INPUT** key. ➡ The pallet 5's 0° and 90° index plane will appear.

**Operation method (Changing index planes)**





**(Example)** When the screen display status acquired after the above (Changing display pallets) operation

- (1) Press the **Next plane** menu or next page key. ➡ The pallet 5's 180° and 270° index plane will appear.
- (2) Press the **Prev plane** or previous page key. ➡ The pallet 5's 0° and 90° index plane will appear.

The display of pallet and index plane changes as follows.



## Operation method (Setting values in each index plane)

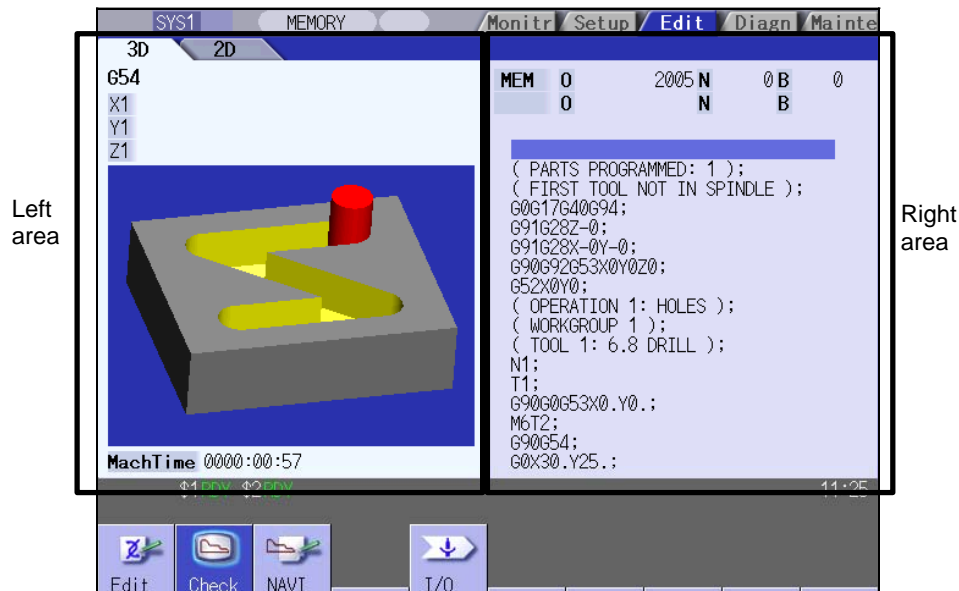
- (1) An arbitrary index plane is displayed using the operation method above.
- (2) Press the Device select menu and select a device.  The cursor moves to "Device". The device menu (Memory, HD, DS, FD, Memory card) is displayed. If selected, the device selected in "Device" is displayed. After setting, the cursor moves to "File name".
- (3) Enter program No. in "File name".  Contents set in "File name" is displayed. The cursor moves to "Machining".  
A file can be selected from the list, as well.
- (4) Press the ON or OFF menu for "Machining".  The contents set in "Machining" is displayed. The cursor moves down.
- (5) Move the cursor to "Ext coord" and input values for 3 axes.  Values for 3 axes are set. The cursor moves to the "Program File name" above.

## 4. Edit Screen

The Edit screen is used to edit the machining program (adding, erasing and changing), perform checks, and input/output data.

### 4.1 Screen Configuration

The Edit screen is configured as shown below.



Left area :The contents differ depending on the display type.





Use the **Display change** menu or **←**, **→** key to switch the display type.

The tab at the upper section of the area depends on the option validity.

Right area: Displays the program searched to be edited.

When the multi-program display type is applied, use **<--> change** menu key to switch the active area.

## Menus

Menu	Details	Type	Reference
 Edit	This edits the machining program.		4.2 Program Editing
 Check	<p>This checks the program. This is used to check the machining program without performing automatic operation.</p> <p>(1) Program check (2D) This displays a graphic drawing of the machining program movement path.</p> <p>(2) 3D solid graphic check This displays a solid graphic drawing of the workpiece shape and tool movement during the cutting process in the machining program.</p> <p>This menu does not display if there is no program check function option.</p>		4.3 Program Check (2D) 4.4 Program Check (3D)
 NAVI	<p>This creates the part program simply. Refer to the following manuals for detail.</p> <p>700 Series Simple Programming Function NAVI MILL Instruction Manual (IB-1500144(ENG))</p> <p>700 Series Simple Programming Function NAVI LATHE Instruction Manual (IB-1500146(ENG))</p>		
 I/O	This performs the machining program input and output between the NC internal memory and the external input/output device.		4.5 Program Input/Output

## 4.2 Program Editing

This is used to edit (add, erase, change) the machining programs in the NC memory, HD, memory card (front IC card), DS (compact flash) or FD, and to create new programs.

This function is used for three types of program: machining program, MDI program and fixed cycle program. Press the main menu **Edit** key to display the program found when performing an operation search (MDI program in MDI mode).

The contents of the left area depends on the display type:

Check display type	:Enables to edit a program confirming the program check screen.
Multi-program display type	:Enables to edit two programs using left and right editing areas.
G-code guidance display type	:Enables to edit a program referring to the G code guidance.
Playback display type	:Enables to edit program trying sample machining.

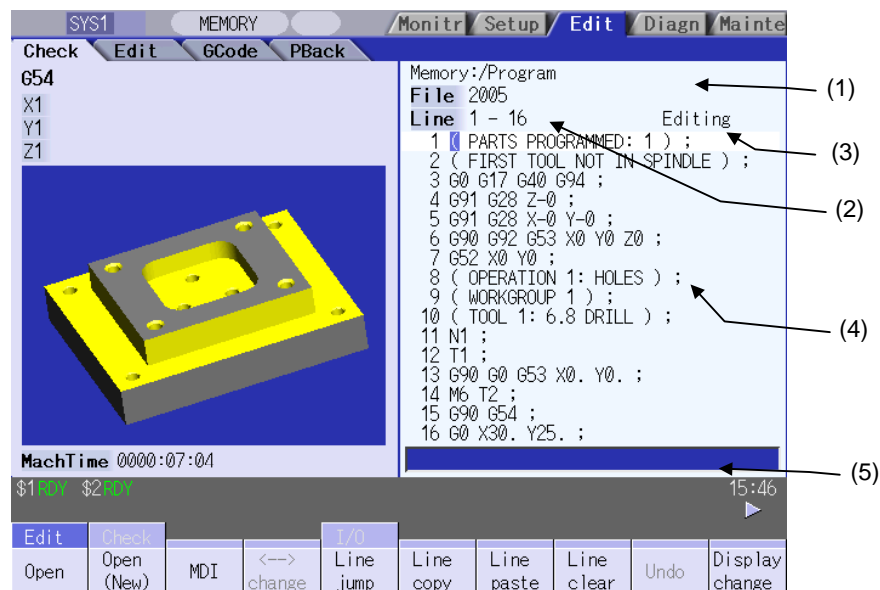
There are two types of editing available: regular editing and mass-editing.

With mass-editing, up to 20MB can be edit for FCU7-DA2-xx, or up to 1GB can be edit for FCU7-DA3-xx/DA4-xx.

The specification and restrictions are different from those with the regular editing.

Mass-editing is applied when the following conditions are satisfied.
















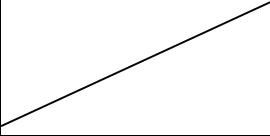












- When the storage destination for the program to be opened is either HD, FD, memory card or DS.
- When a file size is 1.0MB or larger. (When the parameter "#8910 Edit Undo" is set to "0", 2.0MB or larger.)



## Display items

Display item	Details
(1) Path display	This displays the path for the open program file. <b>(Ex.)</b> Memory: /program When the path is too long, the characters exceeding the 37 characters (1-byte code) can not be displayed.
(2) Program name  Top display line Last display line	<b>[Program name (file)]</b> This displays the file name of the program currently being edited. This displays "MDI" when the MDI program name is being edited. <b>[Top display line, Last display line]</b> This displays the line number for the first and last line of the currently displayed program. Proving an entire program is regarded as 100%, the position of the page currently displayed is shown in percentage during mass-editing.
(3) N No. additional value display Edit type display  Current edit display "Editing"  Insert mode display "INS"	<b>[N No. additional value display]</b> This displays an automatic additional value of sequence No. <b>[Edit type display]</b> This displays "EX" in mass-editing. <b>[Current edit display "Editing"]</b> This displays when performing edit operations after displaying the program. <b>[Insert mode display "INS"]</b> This displays when pressing the <input type="button" value="INSERT"/> key and changing to the insert mode.
(4) Line number    Program display	<b>[Line number]</b> This displays the last 3 digits of the program line number. The line No. attaches only to the first line when over two or more lines are displayed on the screen because one line is long. The line No. does not attach during mass-editing. <b>[Program display]</b> This displays the contents of the program (machining program, MDI program) currently being edited. The line with the cursor is emphasized. The line is not emphasized during mass-editing.
(5) Input area	This inputs the program line number and search character string.

## Menus

Menu	Details	Type	Reference
	This edits and references the existing programs. When the program number is designated and the  key is pressed, the program contents appear and can be edited.	A	4.2.2 Editing a Machining Program
	This creates a new program. When the program number is set and the  key is pressed, a new program is created.	A	4.2.1 Creating a New Machining Program
	This edits the MDI program. When this menu key is pressed, the MDI program appears and can be edited.	A	4.2.3 Editing MDI Program
	This switches the active area between left and right editing areas. Editing can be done in the active area. This menu can be used with the multi-program display type.	C	4.2.7 Changing the Display
	With regular editing, when the line number is set and the  key is pressed, the cursor moves to that line number.	A	4.2.8 Designating an Arbitrary Line
	With mass-editing, proving an entire program is regarded as 100%, designate the position of the page to be displayed in percentage and press the  key. The program data of the designated display position is displayed on the screen. The cursor jumps to the top line of the displayed program.		
	This copies the designated line (multiple lines can be copied.) This menu cannot be selected during mass-editing.	A	4.2.14 Copying/Pasting Data
	This inserts the copied line at the line before the cursor. This menu cannot be selected during mass-editing.	C	
	This erases the designated line (multiple lines can be erased.) This menu cannot be selected during mass-editing.	A	4.2.11 Deleting Data
	This returns the contents of the program to that prior to saving and display. This menu cannot be selected when parameter "#8910 Edit Undo" is set to "0". This menu cannot be selected during mass-editing.	C	4.2.15 Undoing Program Changes
	This switches the display type.	C	
	This changes whether to show or hide the comment field in the list. When the comment field is hidden, the file name field will be enlarged.	B	
	When the character string is designated and the  key is pressed, that character string is searched for. This menu cannot be selected during mass-editing.	A	4.2.12 Searching for Character Strings
	If the character string to be searched for and the character string to be replaced are separated with a "/" and designated, when the  key is pressed, the character string is replaced. This menu cannot be selected during mass-editing.	A	4.2.13 Replacing Character Strings
	This enables the input mistake check for the program being edited. This menu cannot be selected during mass-editing.	B	4.2.16 Correcting/Displaying Input Mistakes
	This moves the cursor to the next input mistake warning location. This menu cannot be selected during mass-editing.	C	
	The sequence No. can be added automatically by pressing the  key after designating an additional value. This menu cannot be selected during mass-editing.	A	4.2.17 Adding Sequence No. (N No.) Automatically
	This registers the MDI program in the memory. This can be performed only when the MDI program is displayed.	A	4.2.3 Editing MDI Program
	This deletes the programs. When the name of the program to be erased is designated and the  key is pressed, the designated file is deleted.	A	4.2.5 Deleting a File



## 4.2.1 Creating a New Machining Program

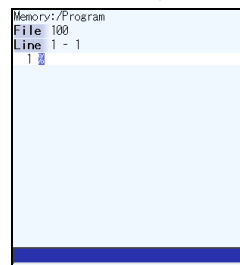
## Operation method

- (1) Press the menu . ➡ The following menu appears.  
The list appears as a pop-up window.

Memory	HD		Memory card	DS	FD		List update	Sort change	Close
--------	----	--	-------------	----	----	--	-------------	-------------	-------

- (2) Select a device.  
(Ex.) Menu  ➡ The selected device name and directory (Memory: /Program) appear in the Device name, Directory display column.  
For the devices other than memory, root directory is selected.

- (3) Input the file name for the program to be newly created and press the  key.  
(Ex.) 100  ➡ If a program can be newly created, a program containing only EOR is created.  
The list display is closed.



- (4) Edit a machining program. ➡ Refer to "4.2.6 Edit Operations" and later.

- (5) Press the  key. ➡ The created machining program is saved to the device.

**(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)** The existing file cannot be set.

**(Note 4)** The characters that can be used for the file name and directory path are 1-byte number, 1-byte capital alphabetical letters, and 1-byte symbols recognized by the system.

Note that the following characters cannot be used.

|, /, :, ", " (comma), \*, ?, ", <, >, a to z (small letters)

In addition, the following cases cannot be treated as the file name.

- When the extension is such as "\$\$\$", "\$\$0", "\$\$1", "\$\$2", "\$\$3", "\$\$4", "\$\$5", "\$\$6", "\$\$7", "\$\$8", "\$\$9".
- When the file name is 1-byte character "0" (zero).

**(Note 5)** Creation of a program is not possible for a program with 33 or more file name characters.

## 4.2.2 Editing a Machining Program

## Operation method

- (1) Press the
- 
- menu.



The following menu appears.  
The list appears as a pop-up window.

Memory	HD		Memory card	DS	FD		List update	Sort change	Close
--------	----	--	----------------	----	----	--	----------------	----------------	-------

- (2) Select a device.

(Ex.) Menu 

The selected device name and directory (memory:  
/program) appear in the Device name, Directory  
display column.  
For the devices other than memory, root directory is  
selected.

- (3) Use the
- 
- ,
- 
- ,
- 
- ,
- 
- keys to align
- 
- the cursor with target machining program.

The name of the machining program to be  
edited can be input in the input area.

- (4) Press the
- 
- key.



The program appears at the top if the file can be  
opened.  
The cursor moves to the head character of the  
program. The mode enters the overwrite mode.  
The list display is closed.

```
Memory:/Program
File 348
Line 1 - 16
1 G340(PARTS1) ;
2 G28 XYZ;
3 G92 G53 XYZ;
4 T3 ;
5 M3 T5 ;
6 N10 ;
7 G90 G0 X0 Y0 ;
8 Z5 ;
9 G343 H3 Z5. ;
10 M5 ;
11 F1000 S3000 ;
12 M3 ;
13 N20 ;
14 G41 D3 ;
15 G3 Z-20, I20, P3. ;
16 G1 X90, Y100, F1000 ;
```

- (5) Edit a machining program.



Refer to "4.2.6 Edit Operations" and later.

- (6) Press the
- 
- key.



The edited machining program is saved to the device.

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

**(Note 2)** If the selected program is running or program restarting, it can be displayed but not edited.  
An error occurs when the data is set or the  key is pressed.

**(Note 3)** The fixed cycle program list displays when basic common parameter "#1166 fixpro" is set to "1".

**(Note 4)** Editable size differs depending on each device. When the editable size is exceeded, the  
message "Can't edit because of size over" appears.

**(Note 5)** "Loading" is displayed in flickering until the file is opened.

**(Note 6)** Editing is not possible for a program with 33 or more file name characters.

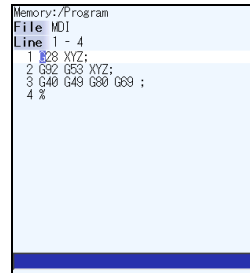
**(Note 7)** When the program in search was edited, the program is searched again as follows depending  
on the last operation.

Search -> Edit	: The position in which ONB is displayed is searched again.
Search -> Reset 1-> Edit	: The program top is searched again.
Search -> Reset 2-> Edit	: The search is not executed. If a program was added or deleted, the search position may shift.
Search -> Restart & Search -> Edit	: The program top is searched again.

## 4.2.3 Editing MDI Program

## Operation method

- (1) Press the menu . ➡ The menu is highlighted.  
The MDI program is displayed from the head of the active editing area. The cursor moves to the head character of the program.  
The mode enters the overwrite mode.



- (2) Edit the MDI program. ➡ Refer to "4.2.6 Edit Operations" and later.

**(Note 1)** 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.

**(Note 2)** If the  key is pressed when the number of MDI program characters including EOB (;) and EOR (%) exceeds 2000, "Memory capacity over" message will appear and the MDI program will not be searched for execution.

Note that the contents edited after the MDI program is saved last will not be saved in the NC memory.

## 4.2.4 Registering MDI Program in NC Memory

## Operation method

- (1) Press the menu . ➡ The menu is highlighted and turned to the program No. input wait status.  
The cursor appears in the input area.
- (2) Set the program No. to be registered and press the  key. ➡ MDI program is registered in the memory. The operation message "MDI entry complete" is displayed.  
The menu highlight returns to normal. The cursor returns to the program display area.

**(Note 1)** When the  key is pressed without entering the program name, a setting error occurs.

**(Note 2)** When the entered program name already exists in the NC memory, the operation message "Overwrite this file?(Y/N)" is displayed.

**(Note 3)** MDI programs cannot be registered in the NC memory in the following cases.

- When the setting is made for other than programs with the parameter "#1166 fixpro".
- During "Editing" is displayed.
- When the remaining size of program is smaller than the MDI program to be registered.
- When the remaining number of programs that can be registered is "0".
- Entered program name already exists in the NC memory, and the status is in automatic operation or program restarting.

## 4.2.5 Deleting a File

## Operation method

- (1) Press the menu  ➡ The following menu appears.  
The list appears as a pop-up window.
- |        |    |  |             |    |    |  |             |             |       |
|--------|----|--|-------------|----|----|--|-------------|-------------|-------|
| Memory | HD |  | Memory card | DS | FD |  | List update | Sort change | Close |
|--------|----|--|-------------|----|----|--|-------------|-------------|-------|
- (2) Select a device.  
(Ex.) Menu  ➡ The selected device name and directory (memory: /program) appear in the Device name, Directory display column.  
For the devices other than memory, root directory is selected.
- (3) Use the , , ,  keys to align the cursor with target machining program.  
The name of the machining program to be deleted can be input in the input area.
- (4) Press the  key. ➡ The operation message "Erase? (Y/N)" appears.
- (5) Press the  or  key. ➡ The file is deleted.  
Press the  key not to delete. The list display is closed.

**(Note)** The file is not deleted in the following cases.

- The file that is to be deleted is currently being used in automatic operation.
- The file that is to be deleted is subject to edit lock B or C.
- Data protection key 3 is enabled.
- The file to be deleted is in the "program restarting" state.

## 4.2.6 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. "Editing" appears on the right side of the file name display once input is started.

Press the  key to save the program to the device and clear the "editing" message.

The editing operations from when the file is actually opened are explained in the following sections.

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

## ! CAUTION



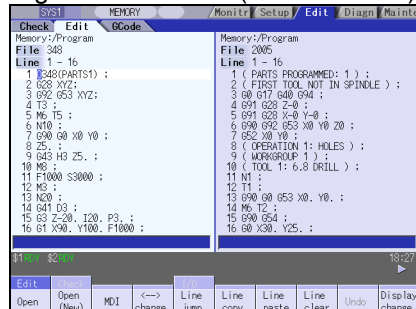
If "there is no value after the G" command, the operation will be the "G00" operation when the program is run due to key chattering, etc., during editing.

## 4.2.7 Changing the Display

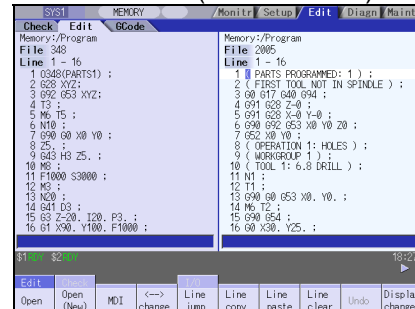
## Switching the active area

Switching the active area is possible only when the multi-program display type is selected. Press the **<--> change** key to switch the active area between the left and right window.

Right side is active (can be edited)



Left side is active (can be edited)



**<--> change**

### Changing the display using the page changeover keys (**▲**: Previous Page, **▼**: Next Page)

- ▲** key: This displays one page of preceding lines of the current top line. When there is less than one page of data, a page of data will be displayed including the data currently displayed. (The cursor moves to the last line of the screen. Cursor does not move in mass-editing.)
- ▼** key: This displays one page of following lines of the current bottom line. (The cursor moves to the top line of the screen. Cursor does not move in mass-editing.)

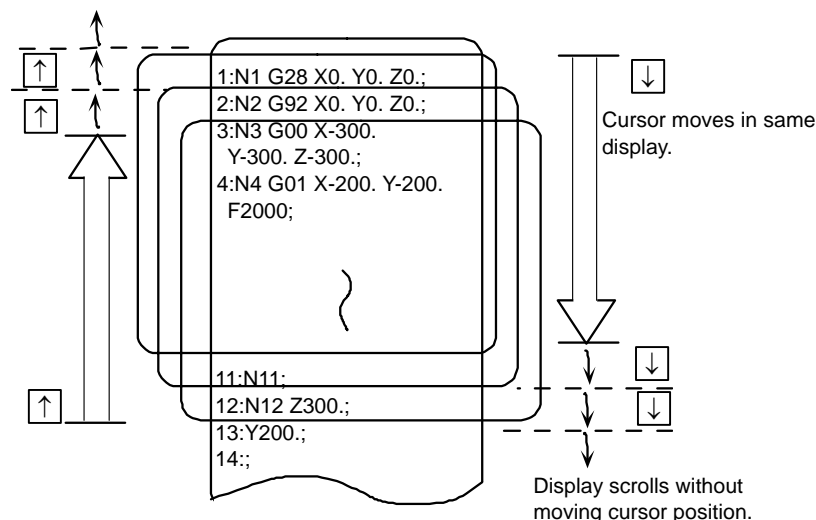
### Changing the display with the cursor key

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.

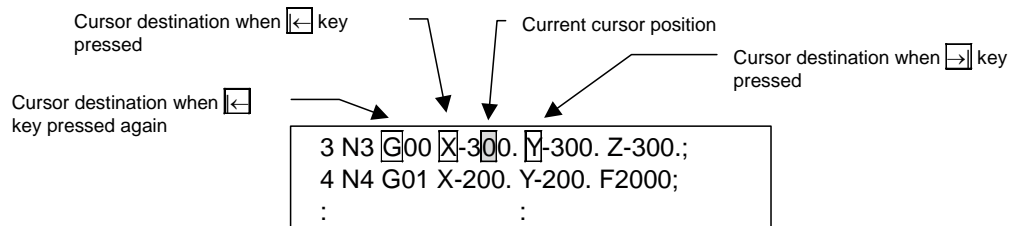
When a block is displayed over 2 or more lines, **↑**, **↓** keys move the cursor by block unit during regular editing and by line unit during mass-editing.







Move the cursor using the tab keys (  : back tab/  : tab).

 key : Moves to the start of the word where the cursor is currently positioned.  
If the cursor is at the start of a word, it moves to the start of the previous word.

 key : Moves to the word after the word where the cursor is currently positioned.



(Note) Pressing   keys or   keys does not make any difference in mass-editing.

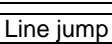
### Split display by word unit

In regular editing, program is split by word unit and displayed.

In mass-editing, program is not split by word unit and displayed as text data.

### 4.2.8 Displaying an Arbitrary Line

#### Operation method

- (1) Press the menu .




The menu is highlighted.

The cursor appears at the lower input area.

```
Memory/Program
File 348
Line 1 - 16
1 G348(PARTS1);
2 G28 XYZ;
3 G92 G53 XYZ;
4 T3;
5 M6 T5;
6 N10;
7 G30 G0 X0 Y0;
8 Z5;
9 G643 H3 Z5;
10 M3;
11 F1000 S3000;
12 M3;
13 N20;
14 G41 D3;
15 G3 Z-20. I20. P3;
16 G1 X90. Y100. F1000;
```

- (2) Input the line No.

(Ex.) 6 



The program appears with the set line No. at the head.

The cursor moves to the head.

The menu highlight returns to normal.

```
Memory/Program
File 348
Line 6 - 21
6 N10;
7 G30 G0 X0 Y0;
8 Z5;
9 G643 H3 Z5;
10 M3;
11 F1000 S3000;
12 M3;
13 N20;
14 G41 D3;
15 G3 Z-20. I20. P3;
16 G1 X90. Y100. F1000;
17 G91 X100.;
18 Y100;
19 X-100.;
20 Y-110;
21 N30;
```

(Note 1) When "0" is input, the cursor moves to the first line.

(Note 2) When "E" is input, the cursor moves to the end.

## 4.2.9 Rewriting Data

## Operation method

- (1) Move the cursor to the position of the data to be rewritten.

The cursor can be moved to one place to the right of EOB (;).

- (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 (character) at a time 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)** Up to 255 characters can be input in one block in regular editing and 127 characters in mass-editing.
- (Note 2)** When the cursor is on or one place to the right of EOB ( ; ), input data is inserted even if not in input mode (refer to "4.2.10 Inserting Data".)
- (Note 3)** When changing to another function such as the program check, or to another screen such as the operation screen when "Editing" displays, the operation message "Save current file? (Y/N)" displays. If **[N]** key is pressed changing to the other screen once, and the Edit screen is selected again, the program before editing operation will be displayed. (Edited contents will be invalid.)
- (Note 4)** "Saving" is displayed in flickering during saving.

## 4.2.10 Inserting Data

## Operation method

- (1) Move the cursor to the position where data is to be inserted.
- (2) Press the **INSERT** key.  The insertion mode is entered. "INS" and "Editing" appear to the right of the file name.
- (3) Set the data.  The data is inserted before the cursor position. Data after the cursor moves to the right.
- (4) When the setting is completed, press the **INPUT** key.  The set data is fixed. The cursor does not move, but if there is no EOB ( ; ) at the end of the line, it will be added. Then, the cursor moves to the next line. The mode returns to the overwrite mode, and the message "Editing" disappears.

**(Note 1)** Up to 256 characters can be set in one line.

**(Note 2)** The insertion mode will be finished if a key such as **DELETE**, **C.B.**, **CAN**, **INPUT**, , , , , , ,  or  pressed.

**(Note 3)** During regular editing, EOB ( ; ) is added to the line without EOB ( ; ) before moving to the next line; EOB ( ; ) is not added to the line with EOB ( ; ). (No cursor movement.)

**(Note 4)** During mass-editing, linefeed is inserted every time EOB ( ; ) is input. (Cursor moves to the head of next line.)



## 4.2.11 Deleting Data

## Operation method (Deleting one character)

- (1) Move the cursor to the character to be deleted.
- (2) Press the  key. ➡ 1 character is deleted at the cursor position, and "Editing" appears. The data from the cursor position moves to the left. When this key is held down, the characters can be deleted one at a time.
- (3) Press the  key. ➡ The edited machining program is saved to the device and "Editing" disappears.

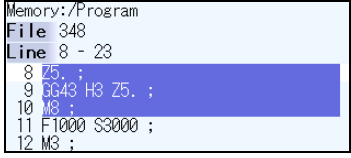
## Operation method (Deleting one line)

- (1) Move the cursor to the line to be deleted.
- (2) Press the  key. ➡ 1 line is deleted at the cursor position, and "Editing" appears. The lines following the cursor position are shifted upward. The cursor position does not change. When this key is held down, the line can be deleted one at a time.
- (3) Press the  key. ➡ The edited machining program is saved to the device and "Editing" disappears.

**(Note 1)** In the case where the block for the deleted line covers multiple lines, these lines are also deleted.

**(Note 2)** Last line only with "%" cannot be deleted.

## Operation method (Deleting designated lines)

- (1) Press the  menu. ➡ The menu is highlighted.  
The cursor appears at the lower input area.
- (2) Designate the deletion range.  
(Ex.) From line 8 to line 10  
8/10  ➡ The background color for the range to be deleted turns light blue.  
The message "Erase? (Y/N) " appears.
- When deleting 1 line, it is also possible to make a selection using the ,  keys and designate by pressing the  key.
- 
- (3) Press the  or  key. ➡ The data in the range with the blue background is deleted and the menu highlight returns to normal.  
Press the  key not to delete. The lines following the deleted data are shifted upward.  
The cursor position and top line No. do not change.

**(Note 1)** If the  key is pressed without setting a line No., the line where the cursor is will be 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  
From 1st line to last line: /E

**(Note 3)** Mass-editing has restrictions below.

- The range has to be within 100 lines.
- Last line designation switch "/E" is invalid.

**(Note 4)** "Executing" is displayed in flickering during line clear.

## Operation method (Deleting several lines (one screen of data) displayed on a screen)

- (1) Press the  key. ➡ Data (machining program) for 1 screen is deleted, and "Editing" appears.
- (2) Press the  key. ➡ The edited machining program is saved to the device and "Editing" disappears.

## 4.2.12 Searching for Character Strings




## Operation method

- |     |  |   |   |
|-----|--|---|---|
| (1) | Press the <span style="border: 1px solid black; padding: 2px 5px;">String search</span> menu.  | ➡ | The menu is highlighted.<br>The cursor appears at the lower input area.   |
| (2) | Set the character string to be searched for, and press the <span style="border: 1px solid black; padding: 2px 5px;">INPUT</span> key.<br>(Ex.) G20 <span style="border: 1px solid black; padding: 2px 5px;">INPUT</span> | ➡ | A search for a character string is made from the character after the cursor position downwards.<br>If the character string is discovered, the cursor moves to the start of that character string.<br>A message appears if there is no character string applicable to the program.<br>Marking can be performed by adding an option to the character string being searched for.<br>(Ex.) G20/MR :G20 are marked in red.<br>(Refer to the "Marking function" for further details.) |
| (3) | To continue searching, press the <span style="border: 1px solid black; padding: 2px 5px;">INPUT</span> key again.  | ➡ | The next corresponding character string is searched for.<br>The search finishes when the end of the program is reached.<br><b>(Note)</b> 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 top line 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 input area disappears.<br>The search mode is held until the menu key is pressed.<br>(The character string remains in the input area.)   |

**(Note 1)** "Executing" is displayed in flickering during string search.

## Marking function

Marking can be performed by adding an option to the character string being searched for.

Argument character string format	Details	Marking color
"Search character string"	The cursor moves to the character string searched for.	None
"Search character string/MR"	The cursor moves to the character string searched for. All displayed searched character strings are marked in red.	Red 
"Search character string/MB"	The cursor moves to the character string searched for. All displayed searched character strings are marked in blue.	Blue 
"Search character string/MG"	The cursor moves to the character string searched for. All displayed searched character string are marked in green.	Green 
"/MC"	The marking for all marked character strings is cleared.	-
"/MCR"	The marking for character strings marked in red is cleared.	-
"/MCB"	The marking for character strings marked in blue is cleared.	-
"/MCG"	The marking for character strings marked in green is cleared.	-

**(Note 1)** The marking status is maintained when another program is opened while character strings are still marked.

**(Note 2)** If the input mistake check warning function is enabled while character strings are still marked, the marking is given priority in the case where the input mistake location and the marked display overlap.

**(Note 3)** In the case where the search marking and input mistake check warning function are displayed simultaneously, the marking is cleared and the input mistake warning display remains.

**(Note 4)** With the multi-program display type, the search and marking is valid only in the area where the search and marking is carried out.

**(Note 5)** The marked status is maintained until the NC power is turned OFF.

**(Note 6)** Marking function is invalid in mass-editing.

## Important points when performing search

- (1) If the designated character string cannot be found, a "Designated character string not found" message displays.
- (2) A search is performed for a character string containing the designated character string, irrespective of the characters before and after. As a result, if "G2" is designated, G20 - G29 and G200 etc. will also be the subject of a search.

## Character string data setting example

Designated character string	Search character string example
N10	Character strings that include "N10" such as "N10" and "N100".
N10 X100.	Character string "N10 X100".
x-012.34	Character string "X-012.34" (A search is not performed for "X-12.34".)

## 4.2.13 Replacing Character Strings

A character string in a program can be searched for and replaced.  
The following two methods can be used.

- The applicable character string is searched for and replaced one by one. (To search for the next character string, press the  key.)
- All applicable character strings in the program are replaced in a batch. (Designate "/G" when setting.)

## Operation method

- |   |   |   |
|---|---|---|
| (1) Press the menu <input type="text" value="String replace"/> .  | ➡ | The menu is highlighted.<br>The cursor appears at the lower input area.   |
| (2) Designate the search character string and the replace character string.<br>( <b>(Ex.)</b> Search character string: G02<br>Replace character string: In the case of G03<br>G02/G03 <input type="text" value="INPUT"/> ( <b>Note 1</b> )) | ➡ | The character string is searched downward from the character after the current cursor position.<br>If a character string is discovered, the cursor moves to the start of that character string, and a "Replace? (Y/N) " message appears.<br>If any character string is not found in the program, the cursor does not move.                              |
| (3) Press the <input type="text" value="Y"/> or <input type="text" value="INPUT"/> key.<br>Press the <input type="text" value="N"/> key not to replace.   | ➡ | The character string is replaced, and a search is performed for the next applicable character string. (If a batch replacement is performed, a search is not made as the replace has been completed.)<br>A "Designated character string not found" message appears when the end of the program is reached.<br>"Editing" appears if replace is performed. |
| (4) Press the <input type="text" value="Y"/> or <input type="text" value="INPUT"/> key again if continuing the search/replace.  | ➡ | The same operation as above is performed.   |
| (5) To end search/replace, press the <input type="text" value="String replace"/> .  | ➡ | The menu highlight returns to normal, and the character string in the input area disappears.<br>The replacement mode is held until the menu key is pressed.<br>(The character string remains in the setting area.)  |

**(Note 1)** When batch replacing for all the character strings in the program, add "/G" to the above setting.  
Search character string/replace character string/G (**(Ex.)** G02/G03/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 input 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.

Search character string/replace character string/E (**(Ex.)** G02/G03/E)

**(Note 3)** "Executing" is displayed in flickering during string replace.

## 4.2.14 Copying/Pasting Data

## Operation method (Copying)

- (1) Press the  menu. ➡ The menu is highlighted.  
The cursor appears at the lower input area.
- (2) Designate the range to be copied.  
(Ex.) From line 8 to line 10  
8/10  ➡ The background color for the range to be copied turns light blue.  
The menu highlight returns to normal.
- When copying 1 line, it is also possible to make a selection using the ,  keys and designate by pressing the  key.

```

Memory:/Program
File 348
Line 8 - 23
8 Z5. ;
9 G643 H3 Z5. ;
10 M3 ;
11 F1000 S3000 ;
12 M3 ;

```

## Notes when copying

- (1) If  key 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 Line copy 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
- (5) The copied data is maintained while the copy source file is opened even if the display type or editing area is switched to another one.
- (6) Up to 100 lines can be copied in mass-editing.

## Operation method (Pasting the copied data)

- (1) Move the cursor to the line where the data is to be pasted.
- (2) Press the  menu. ➡ The copied data is inserted in the line before the cursor position, and "Editing" appears.
- (3) Press the  key. ➡ The edited machining program is saved to device, and "Editing" disappears.

**(Note 1)** With multi-program display type, data can be copied and pasted between both left and right areas.

**(Note 2)** Copy/paste is not possible in between regular editing and mass-editing.

**(Note 3)** "Executing" is displayed in flickering during line paste.

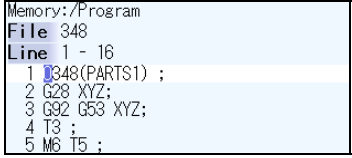
## 4.2.15 Undoing Program Changes

This is used to return the program to the form when **INPUT** was last pressed to save. This operation is valid for the operation of "Rewriting program", "Insert", "Delete", "Line Paste", "Line Clear", "Character String Replace" and "Undo" functions.

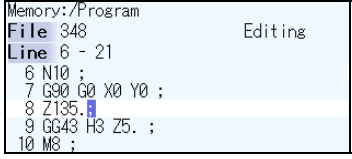
## Operation method (Pasting the copied data)

- (1) Change to memory mode and press the main menu **Edit** key.

➡ The searched program appears from the top.


- (2) Move the cursor to the position to be corrected, and input a character.  
(Ex.) 135

➡ The data is replaced with input data and "Editing" appears.


- (3) Press the **INPUT** key.

➡ The edited machining program is saved to the device and "Editing" disappears.
- (4) Press the menu **Undo**.

➡ The contents of the file return to the same condition as when the editing was started in the procedure (1). These contents of the file are saved to the device.
- (5) Press the menu **Undo** again.

➡ The contents of the file return to the same condition as when the file was saved in the procedure (3). These contents of the file are saved to the device.

**(Note1)** This function is only valid when parameter "#8910 Edit Undo" is set to "1".

**(Note2)** When returned to the previous status, the cursor will move to the head line.

**(Note3)** With the multi-program display type, returning to the previous contents is valid only in the active area.

**(Note 4)** Undoing is not possible in mass-editing mode.

**(Note 5)** "Executing" is displayed in flickering during undoing.

## 4.2.16 Correcting/Displaying Input Mistakes

The input mistake check warning function regards the following cases as input mistakes and displays a warning.

Check Item	Warning display range	Details
No decimal point input	Applicable address and data	The decimal point was omitted from the data. (Ex.) N01 G0 X100 Y50.; "X100" displayed as warning

The addresses to check no decimal point input are shown below.

(○: Check performed, -: No check performed)

Address	Decimal point command	Application	M/L	Decimal point check
A	Enabled Disabled Enabled Disabled Disabled Disabled Enabled	Coordinate position data Miscellaneous function code Geometric linear angle data Rotation table MRC program number Data settings, axis number Deep hole drilling cycle (2) Safety distance	M L L L	○ Only for axis name
B	Enabled Disabled Disabled	Coordinate position data Miscellaneous function code Rotation table	M	○ Only for axis name
C	Enabled Disabled Enabled Disabled Enabled	Coordinate position data Miscellaneous function code Corner chamfering amount (.C) Rotation table Program tool compensation input Nose R compensation amount (increment)	M L	○ Only for axis name
D	Disabled Enabled Enabled Disabled	Compensation number (tool position, tool radius compensation) Auto tool length measurement, deceleration range d Data settings Sub-program storage device number (.D)	M L L M	-
E	Enabled	N number of threads per inch, precision thread lead		-
F	Enabled Enabled	Feedrate Thread lead		-
G	Enabled	Preparation function code		-
H	Disabled Disabled	Sequence number in sub-program Compensation number (tool position, tool length compensation)	M	-
I	Enabled Enabled  Enabled Enabled	Circular center coordinates Vector component for tool radius compensation/nose R compensation Custom fixed cycle hole pitch 1st cut amount for deep hole drilling cycle (2)	M L	○
J	Enabled Enabled  Enabled Disabled	Circular center coordinates Vector component for tool radius compensation/nose R compensation Custom fixed cycle hole pitch, angle Dwell at deep hole drilling cycle (2) return point	M L	○



Address	Decimal point command	Application	M/L	Decimal point check
K	Enabled	Circular center coordinates		○
	Enabled	Vector component for tool radius compensation/nose R compensation		
	Disabled	Custom fixed cycle hole count	M	
	Disabled	Hole drilling cycle repeat count	L	
	Enabled	2nd cut amount for deep hole drilling cycle (2)	L	
	Disabled	Fixed cycle repeat count	M	
L	Disabled	Sub-program repeat count	M L L	-
	Disabled	Fixed cycle repeat count		
	Disabled	Program tool compensation input type selection (L2, L10, L11)		
	Disabled	Data setting selection (L70)		
M	Disabled	Miscellaneous function code		-
N	Disabled	Sequence number	L	-
	Disabled	Data setting, data number		
O	Disabled	Program number		-
P	Enabled/Disabled	Dwell time (parameter)	M M M M M L L L L L L L L L L	-
	Disabled	Sub-program call program number		
	Disabled	Program tool compensation input compensation number		
	Disabled	Custom fixed cycle hole count		
	Disabled	Helical pitch count		
	Disabled	Surface speed radius		
	Enabled	Scaling factor		
	Disabled	High-speed mode type		
	Disabled	2nd reference position number		
	Disabled	Constant surface speed control axis number		
	Disabled	MRC finished shape start sequence number		
	Enabled	Cut-off cycle, shift amount/cut amount		
	Disabled	Compound thread cutting cycle cut count, chamfering, nose angle		
	Enabled	Compound thread cutting cycle thread height		
	Disabled	Data settings large division number		
	Disabled	Restore sequence number fro sub-program		
	Enabled	Coordinate position data		
Q	Enabled	Deep hole drilling cycle cut amount	M	-
	Enabled	Back boring shift amount	M	
	Enabled	Fine boring shift amount	M	
	Disabled	Spindle minimum clamp rotation speed	L	
	Disabled	MRC finished shape end sequence number	L	
	Enabled	Cut-off cycle cut amount/shift amount	L	
	Enabled	Compound thread cutting cycle minimum cut amount	L	
	Enabled	Compound thread cutting cycle 1st cut amount	L	
	Enabled	Cut amount each time for deep drilling cycle 1	L	
	Disabled	Program tool compensation input hypothetical nose point number	L	
	Disabled	Dwell at cut point for deep drilling cycle 2	L	

Address	Decimal point command	Application	M/L	Decimal point check
R	Enabled	R-designated circular radius	M M L L L L L L L L L L L	○
	Enabled	Corner rounding circular radius (.R)		
	Enabled	Program tool compensation input compensation amount		
	Enabled	Fixed cycle R point		
	Disabled	Synchronous tap/asynchronous tap change		
	Enabled	Auto tool length measurement deceleration area r		
	Enabled	MRC longitudinal, edge, and escape amount		
	Disabled	MRC molding division amount		
	Enabled	Cut-off cycle return amount		
	Enabled	Cut-off cycle escape amount		
	Enabled	Compound thread cutting cycle finishing allowance		
	Enabled	Compound thread cutting cycle, cutting cycle taper difference		
	Enabled	Distance to R point for hole drilling cycle, deep hole drilling cycle 2		
	Enabled	Coordinate position data		
S	Disabled	Spindle function code	L L	-
	Disabled	Spindle maximum clamp rotation speed		
	Disabled	Constant surface speed control surface speed		
T	Disabled	Tool function code		-
U	Enabled	Coordinate position data	L L	○ Only for axis name
	Disabled	2nd Miscellaneous function code		
	Enabled	Program tool compensation input		
V	Enabled	Coordinate position data	L L	○ Only for axis name
	Disabled	2nd miscellaneous function code		
	Enabled	Program tool compensation input		
W	Enabled	Coordinate position data	L L	○ Only for axis name
	Disabled	2nd miscellaneous function code		
	Enabled	Program tool compensation input		
X	Enabled	Coordinate position data	L L	○ Only for axis name
	Enabled	Dwell time		
	Disabled	2nd miscellaneous function code		
	Enabled	Program tool compensation input		
Y	Enabled	Coordinate position data	L L	○ Only for axis name
	Disabled	2nd miscellaneous function code		
	Enabled	Program tool compensation input		
Z	Enabled	Coordinate position data	L L	○ Only for axis name
	Disabled	2nd miscellaneous function code		
	Enabled	Program tool compensation input		

**Performing a consecutive input mistake check when creating a program**

- (1) Press the menu , input a new file name, and press the  key.



Only an EOR program is created.

- (2) Press the  menu.



The menu is highlighted.

- (3) Edit the program.



A warning is displayed at the moment the  key is pressed.

```
Memory:/Program
File 100
Line 1 - 3
1 G28 XYZ;
2 G00 X1 ;
3 %
```

- (4) Correct the input mistake and continue with program creation.

## Performing a batch input mistake check for an existing program

- (1) Change the operation to memory mode or MDI mode and perform a machining program operation search.

- (2) Press the **Edit** menu.



Machining programs appear from the top.

- (3) Press the **Miss warning** menu.



A warning displays the position where an input mistake occurred. The cursor moves from its current position to the first input mistake that was found.

```
Memory:/Program
File 348 Editing
Line 11 - 26
11 F1000 S3000 ;
12 M3 ;
13 N20 ;
14 G41 D3 ;
15 G3 Z-20. I20. P3. ;
16 G1 X90. Y100. F1000 ;
17 G91 X100. ;
18 Y100 ;
19 X-100 ;
20 Y-110 ;
21 N30 ;
22 G90 G0 Z5. ;
23 G40 ;
24 G91 G28 Z0 ;
25 M2 ;
```

- (4) Press the **Next miss** menu.



The cursor moves to the next input mistake position.

```
Memory:/Program
File 348 Editing
Line 11 - 26
11 F1000 S3000 ;
12 M3 ;
13 N20 ;
14 G41 D3 ;
15 G3 Z-20. I20. P3. ;
16 G1 X90. Y100. F1000 ;
17 G91 X100. ;
18 Y100 ;
19 X-100 ;
20 Y-110 ;
21 N30 ;
22 G90 G0 Z5. ;
23 G40 ;
24 G91 G28 Z0 ;
25 M2 ;
```

- (5) Correct the input mistake and continue with program creation.

## Precautions

- (1) The input mistake check timing is outlined in the following table.

Timing	Check range	Check item	Example
When an edit key (alphabet, numbers, symbols, [Delete] etc.) is pressed (Does not include the cursor key and [Page Up/Down] keys).	1 block where the cursor is located	Decimal point	A warning is displayed upon pressing <input type="button" value="INPUT"/> when "X10;" is input.
			A warning is displayed upon pressing <input type="button" value="INPUT"/> when the "X10.Y" "." is inserted in the case where "X10Y" is input.

If the  menu is pressed again when the input mistake check warning function is enabled, this function is then disabled.

The character color of the location of an input mistake then returns to normal.

- (2) The  menu is grayed out and cannot be selected when the  menu is not highlighted.
- (3) An input mistake check warning function can be performed even when editing a MDI program.
- (4) An input mistake check warning function can also be performed for a comment block.
- (5) If the data in an address that is subject to a decimal point input mistake is "0", no warning is issued regardless of the presence of a decimal point.  
 ((Ex.) No warning is issued for "X0")  
 If the data in an address that is subject to a decimal point input mistake has been omitted, no warning is issued.  
 ((Ex.) No warning is issued for "G28XYZ")
- (6) Blocks with " [" , "]" are not subject to an input mistake check warning function.
- (7) The input mistake status is held in the operation screen edit window, setup screen MDI edit window, and edit screen edit area.
- (8) If an input mistake is found after the current cursor position, the "Input miss was detected" message appears. If no input mistake is found, the "Input miss was not detected" message appears.
- (9) With the multi-program display type, the input mistake check is performed also in the non-active area. Note that the messages "Input miss was detected" and "Input miss was not detected" will be displayed by judging the input mistake referring to the cursor position in the active area.
- (10) Input mistake check warning function is disabled in mass-editing.
- (11) "Executing" is displayed in flickering during checking input mistakes.

## 4.2.17 Adding Sequence No. (N No.) Automatically

When the sequence No. (N No.) is input once, the sequence No. to which a constant value is added can be automatically added to each block of the machining program.

The added sequence No. data is to N2 to N999999.

This function is disabled during mass-editing.

## Operation method

- (1) Press the menu **N auto add**. ➡ The menu key is highlighted and turned to the additional value input wait status. The cursor appears in the input area.

- (2) Input the additional value.  
(Ex.) 10 **INPUT** ➡ "N+10" is displayed in N No. additional value display column. The cursor moves from the input area to the edit area.

<When creating a new program>

- (3) Press the menu **Open (New)**, then press the menu **Memory**. ➡ The list appears as a pop-up window. The machining programs in memory are displayed.

- (4) Input a file name not used, then press the **INPUT** key.  
(Ex.) 100 ➡ "O100" is created in edit area.

- (5) Input a program with N No.  
(Ex.) N100G28XYZ ➡

```
Memory:/Program
File 101
Line 1 -      N+10  Editing
1 N100G28XYZ
```

<When editing an existing program>

- (3) Press the menu **Open**, then press the menu **Memory**. ➡ The list appears as a pop-up window. The machining programs in memory are displayed.

- (4) Select a file, then press the **INPUT** key. ➡ The selected file is opened in edit area.

- (5) Move the cursor to the position where data is to be inserted. Press the **INSERT** key. ➡

```
Memory:/Program
File 102
Line 1 -      N+10  Editing INS
1 N10 G28 XYZF1000 ;
2 N20 G00 Z-500. ;
3 N30 G00 X50. Y50. ;
4 M02 ;
5 %
```

- (6) Input " ; " (EOB). ➡ "N110" (previous block N No. "N100" + an additional value "10") is added after a " ; " (EOB).

```
Memory:/Program
File 101
Line 1 -      N+10  Editing
1 N100G28XYZ
```

- (7) Input the second block data and " ; " (EOB).  
(Ex.) G92X0.Y0.Z0.;



"N120" is added behind " ; ".

```
Memory:/Program
File 101
Line 1 - N+10 Editing
1 N100G28XYZ:N110G92X0.Y0.Z0.:N120
```

- (8) Press the **INPUT** key.



The message "Editing" disappears. The program is saved.

```
Memory:/Program
File 101
Line 1 - N+10
1 N100 G28 XYZ;
2 N110 G92 X0. Y0. Z0. ;
3 N120 ;
4
```

The N No. data is automatically generated until the edit is interrupted with the **INPUT** key.

- (Note 1)** When the menu **N auto add** is pressed again while the menu is highlighting, N No. additional value display column is cleared, and N No. automatic addition is canceled.
- (Note 2)** The setting range is 1 to 1000. When "01" is input, "1" is set. When "0" is input, this function is canceled. When an illegal value or 9 characters or more is input, an error will occur.
- (Note 3)** The additional value can be set even when the machining program has been not opened. Even if the machining program is opened again, the additional value is not invalid.
- (Note 4)** This function is enabled only during regular editing of edit screen.
- (Note 5)** This function is disabled during mass-editing. However, the set N No. additional value in regular editing is not cleared, and the additional value is valid during regular editing again.
- (Note 6)** Even if the same N No. exists by automatic addition, an error will not occur.
- (Note 7)** The system separately has N No. in a right area and left area of the edit screen.
- (Note 8)** When the previous block is leading zero like "N010", N No. automatic addition can be executed. However, "0" is not added, and "N10" is displayed.

**Example when N No. is added**

- (1) When the previous block has N No. (When the cursor is located at the last character in the overwrite mode.)

N100 G28 X0 Y0 Z0 ; -> Input ";" -> N100 G28 X0 Y0 Z0;N110;  
 N100 G28 X0 Y0 Z0 ; -> Input ";" -> N100 G28 X0 Y0 Z0 ;N110;  
 N100 G28 X0 Y0 Z0 ; -> Input ";" -> N100 G28 X0 Y0 Z0 ;N110;

- (2) When the previous block has N No. (When the insertion mode)

N100 G2 8 X0 Y0 Z0 ; -> Input ";" -> N100 G2;N110 8 X0 Y0 Z0 ;  
 N100G28X0Y0Z0;N200G90X20.Y20.Z20.;  
 -> Input ";" -> N100G28X0Y0Z0;N110N200G90X20.Y20.Z20.;

**Example when N No. is not added**

- (1) When the previous block has no N No.

G00X10.% -> Input ";" -> G00X10.;%

- (2) When the head of previous block has no N No.

Usually

G00N100X10.% -> Input ";" -> G00N100X10.;%

When comment

(N100)G00N100X10.% -> Input ";" -> (N100)G00N100X10.;%

When the previous block has a space

N100G00N100X10.% -> Input ";" -> N100G00N100X10.;%

- (3) When the N No. of previous block is over 9 characters.

N000001000% -> Input ";" -> N000001000;%

- (4) When limits of total characters display per block is exceeded.

- (5) When the N No. is over 1000000.

- (6) When the N No. automatic additional value is not set.

- (7) When the display character string in overwrite mode is interrupted.

N100 G28 X0 Y0 Z0 ; -> Input ";" -> N100 G28 X0;Y0 Z0 ;

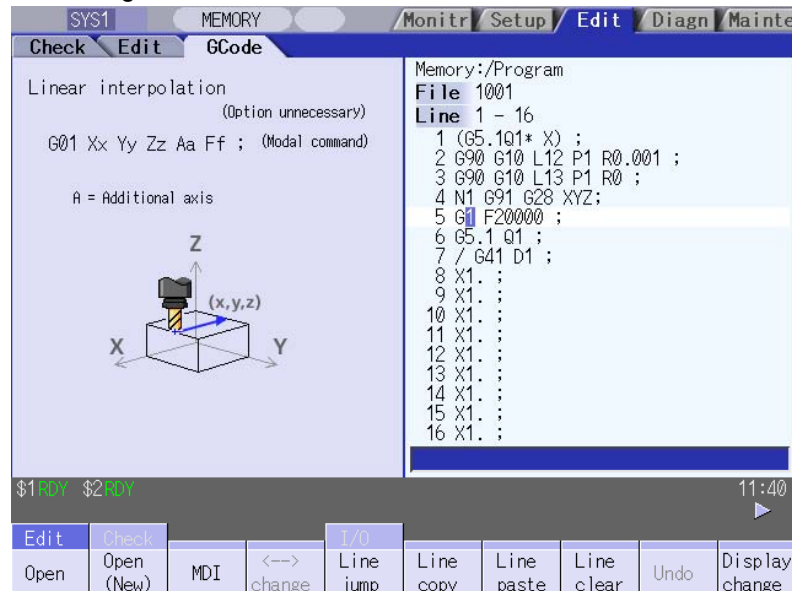


## 4.2.18 G Code Guidance

G code guidance is a function that shows the command format details or the outline of its operation for the G code being edited while creating or editing the machining program. With this function, the G code format can be confirmed immediately. G code guidance is also displayed in the same manner even when MDI program is displayed.

G code guidance function is valid for the M system.

## &lt;G code guidance&gt;



The contents displayed on the G code guidance area depends on the cursor position on the Edit screen, and is refreshed when moving the cursor.

The G code that meets following conditions are displayed in this area.

- G code that exists between the head of block and cursor position including the cursor position.
- G code that exists immediately before the cursor if multiple G codes meet the above condition.

## Specific example

G91 G17 ; █	➡	The guidance will not be refreshed because the cursor is out of the block.
G91 G17 █	➡	The guidance for G17 will be displayed.
G91█G17 ;	➡	The guidance for G91 will be displayed.
G91 G00 X100. █Y100. ;	➡	The guidance for G00 will be displayed because G00 is the nearest G code to the cursor.

**G codes displayed in the G code guidance area**

With G code guidance function, the commands having "G" followed by 1 or more numbers are regarded as the G code. Thus, when "G" that is located immediately before the cursor is within the comment, the guidance will not be refreshed. In the same manner, when a G code is commanded using variables such as "G#100" or "G#500", etc. but numbers, the guidance will not be refreshed.

The G code that can be displayed in the guidance area is as follows.

**Gnnnnnnnn.m L l ("n", "m", and "l" are arbitrary number.)**

Commanded value	Number of valid digits	Remarks
n (integer)	1 to 8	When including "0" before integer command value, unnecessary "0" is ignored.
m (decimal places)	0, 1	
l (value commanded using "L")	0 to 2	This is valid when "L" exists immediately after the integer command value or decimal command value and is followed by a command value. If the command with "L" address precedes G code, the "L" command will not be described in the guidance.

**(Note 1)** As for the G codes not included in the specifications, the guidance will not be displayed even if the above condition is met.

<b>G00 X100. (GCODE) ;</b>	➡	"G" included in the comment "GCODE" is ignored, thus, G code guidance will not be refreshed.
<b>N11 GOTO12 ;</b>	➡	"G" included in the command "GOTO" is ignored, thus, G code guidance will not be refreshed.
<b>G91 G120 X100 Y100. ;</b>	➡	G code "G120" is not included in the specifications, thus, G code guidance will not be refreshed.
<b>G00000031.1</b>	➡	The guidance for G31.1 will be displayed.
<b>G00000031.10</b>	➡	Commanded value exceeds the number of valid digits, thus, G code guidance will not be refreshed.
<b>L50 G10</b>	➡	The guidance not for "G10 L50" but "G10" will be displayed.

## Precautions for G code guidance

- (1) G code guidance may be refreshed when the cursor is located near the comment.

[Ex.] `( PROG01 )`; ➡ The guidance for G01 will be displayed.

- (2) When the cursor is located at the axis address, etc., the guidance for the nearest G code will be displayed even if the address has no relationship with the G code.

[Ex.] `G01 G90 X100`; ➡ G code that has a relationship with "X100." is "G01", however, G code guidance for "G90" will be displayed.

- (3) When moving the cursor to the block with no G code as follows, the contents of guidance will differ depending on the cursor's route even if the cursor is in the same block.

[Ex.]

<pre> N01 G91 G01 X100. F1000       ↓ N02 Y100. Z100. ← ... a       ↑ b N03 G02 X50. Y50. R50. ;           </pre>	<p>➡ When the cursor is moved by the route "a", the guidance for G01 which is displayed last in N01 block will also be displayed in N02 block.</p> <p>When the cursor is moved by the route "b", the guidance for G02 which is displayed last in N03 block will also be displayed in N02 block.</p>
---	---

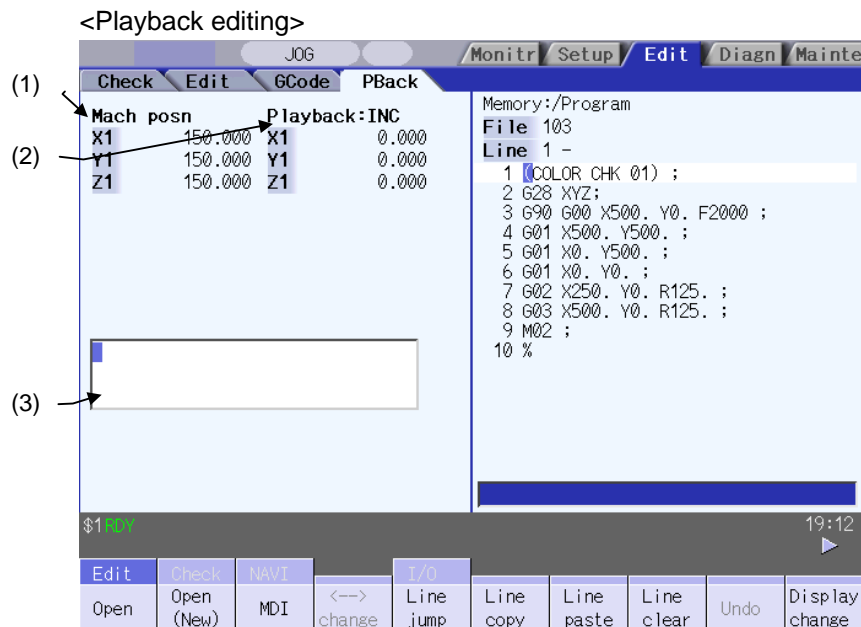
- (4) G code guidance will be refreshed even if an option of the G code is not valid. Thus, G code could not function though the guidance is displayed.
- (5) Basically, G code format in the guidance is displayed using the format of 3-axis specifications of X, Y, and Z.
- (6) Whichever plane is selected among the plane selection functions G17 to G19, the display data in the guidance is displayed using X-Y plane (G17) format.
- (7) When the G code command includes an address which have two or more meanings, both contents will be displayed.
- (8) G code guidance will not be refreshed while the character string is searched or replaced.
- (9) G code guidance cannot be displayed in mass-editing.

## 4.2.19 Playback Editing

The playback function enables creation of a program while trying sample machining by manual (handle or jog) feed or mechanical handle feed.

A machining program can be created with movement distance data obtained by manual operation used as programmed command values.

**(Note)** The M system is equipped with this function.




## Display items

Display item	Details		
(1) Machine position counter	This displays the path for the open program file. <b>(Ex.)</b> Memory: /program When the path is too long, the characters exceeding the 37 characters (1-byte code) can not be displayed.		
(2) Playback counter	This displays the playback movement amount (axis movement value). The title and playback movement amount will differ according to the parameter "#1126 PB_G90".		
	Parameter	Title	Playback movement amount
	0 (Incremental value)	Playback:INC	Playback movement amount before axis moves + axis movement amount
	1 (absolute value)	Playback:ABS	The program position + manual interrupt amount
	Up to max. number of axes in a part system can be displayed. (Max. eight axes)		
(3) Playback editing area	The contents of playback editing is input. When the axis address keys such as X and Y are input, the playback counter value currently displayed is input after the axis address.		

## Operation method

- (1) Set "#1126 PB\_G90" to "0" on the parameter screen. ➡ Incremental value mode is set.

- (2) The menu **Display change** or  key is press several times on the edit screen. ➡ The "playback display type" is displayed.  
The menu **<--> change** cannot be used.

Mach	posn	P layback:INC
X1	150.000	X1 0.000
Y1	150.000	Y1 0.000
Z1	150.000	Z1 0.000

When the incremental value is set, the initial value is "0".

- (3) Open the program pressing **Edit** and **Open** on the edit screen. ➡ The selected program is displayed in right area.

Check	Edit	GCode	PBack
Mach	posn	P layback:INC	Memory:/Program
X1	150.000	X1 0.000	File 103
Y1	150.000	Y1 0.000	Line 1 -
Z1	150.000	Z1 0.000	1 G00 X0. Y0. ;
			2 G01 X500. Y500. ;
			3 G01 X500. Y500. ;
			4 G01 X0. Y500. ;
			5 G01 X0. Y0. ;
			6 G01 X250. Y0. R125. ;
			7 G01 X500. Y0. R125. ;
			8 M02 ;
			9 %
			10 %



- (4) Move the axis during manual mode. ➡ The axis movement amount is displayed in playback movement amount.

Mach	posn	P layback:INC
X1	100.000	X1 -50.000
Y1	190.000	Y1 40.000
Z1	180.000	Z1 30.000

In the incremental value mode, the axis movement amount by manual mode is added to currently playback movement amount.

- (5) Input the data such as the G codes in the area for playback editing.





The alphanumeric characters, , , and **DELETE** keys can be input in the area for playback editing.

Mach	posn	Playback:INC
X1	100.000	X1 -50.000
Y1	190.000	Y1 40.000
Z1	180.000	Z1 30.000

F3000G01

- (6) Press the axis address key such as  or .



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.

Mach	posn	Playback:INC
X1	100.000	X1 -50.000
Y1	190.000	Y1 40.000
Z1	180.000	Z1 30.000

F3000G01X-50.

**(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 **INPUT** key.



The program in the playback editing area will be inserted at the block before the cursor position in the right area, and the program is saved.

When there is no "EOB" (;) at the end of the character string, it is added automatically.

The cursor moves to the line head being cleared the content of the playback edit.



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.

**(Note)** If the program is not displayed on right area, the operation message "Can't execute playback edit" appears.

**(Note 1)** When the program is not displayed on the right area, a playback editing cannot be executed.

**(Note 2)** When the **C.B** key is pressed, all data in the playback editing area will be erased.

**(Note 3)** When the  and  keys are pressed, the program cursor on the right area will move.

**(Note 4)** When the page-switching key is pressed, the program on the right area will scroll.

**(Note 5)** When the menu key is pressed, the process corresponding to the right area will run.

**Notes for playback editing**

- (1) Playback editing of a program in automatic operation or program restart is not possible.
- (2) Up to 95 characters can be edited in the playback editing area.
- (3) If the screen/part system is changed or the program file is opened when the input program is in the playback edit area, the program being edited will be aborted.
- (4) Other files can be opened during playback editing. Playback editing can be continued even when other 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.
- (6) The playback movement amount after playback editing will differ according to the parameter "#1126 PB\_G90" state and the commanded G code. The playback movement amount after **INPUT** is pressed is calculated for each block that has been playback edited.

X axis playback movement amount before editing	Details to be playback edited	X axis playback movement amount after <b>INPUT</b>	
		For an absolute value	For an incremental value
X 100.000	G01 X10.;	X 100.000 The program position + manual interrupt amount is inserted as the playback movement amount.	X 90.000 The difference of the axis command value (X10.) and playback movement amount before <b>INPUT</b> (X100.) is inserted as the playback movement amount.
	G92 X10.;	X 10.000 The command value (X10.) following G92 is inserted as the playback movement amount.	X 0.000 Regardless of the command value following G92, 0 is inserted as the playback movement amount.

- (7) The playback editing is disabled during mass-editing.

### 4.3 Program Check (2D)

The program check function (2D) is used to graphically draw the machining program movement path without performing auto operation.

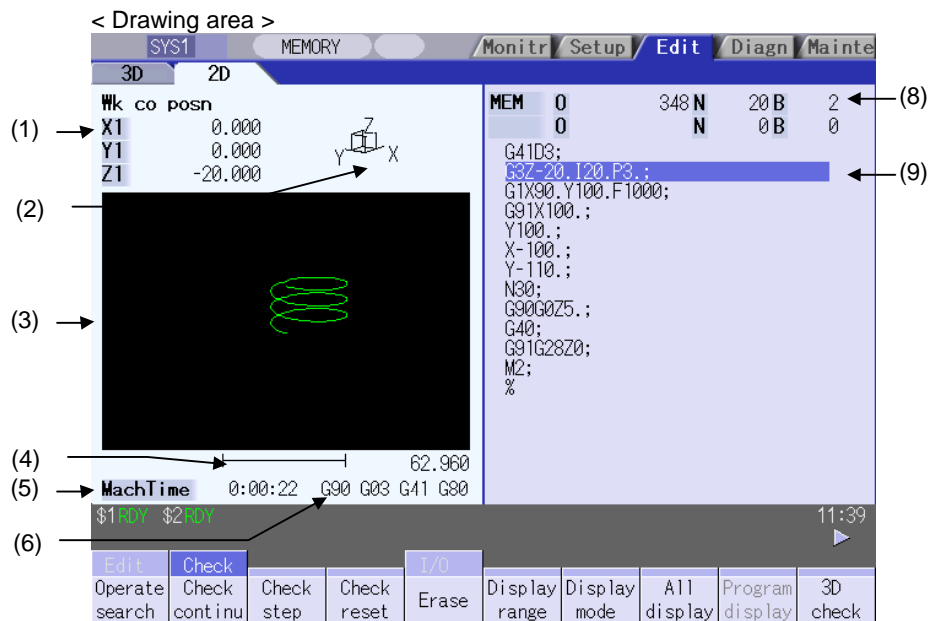
The machining program can be checked with graphic data drawn at a high speed.

Using **All display** menu, normal display and full-screen display modes can be switched.

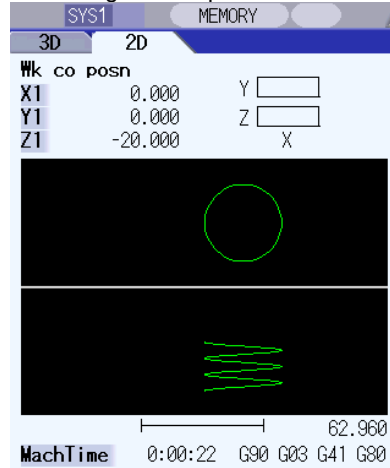
**(Note1)** The program check (2D) function is an additional specification. The graphic check option is required.

**(Note2)** When changing the screen to the edit screen, display depends on the previous checking type (2D/3D). Note that when selecting this screen during graphic trace, 3D solid program check will apply. If the 3D solid check option is not valid in this time, the area of "Check" tag will not be blank.

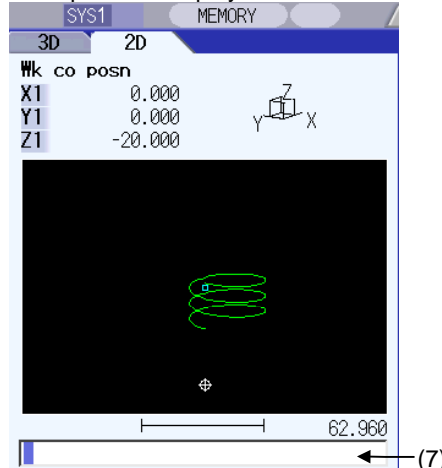
■ Normal display (full-screen display mode is OFF)



< Drawing area: 2-plane >

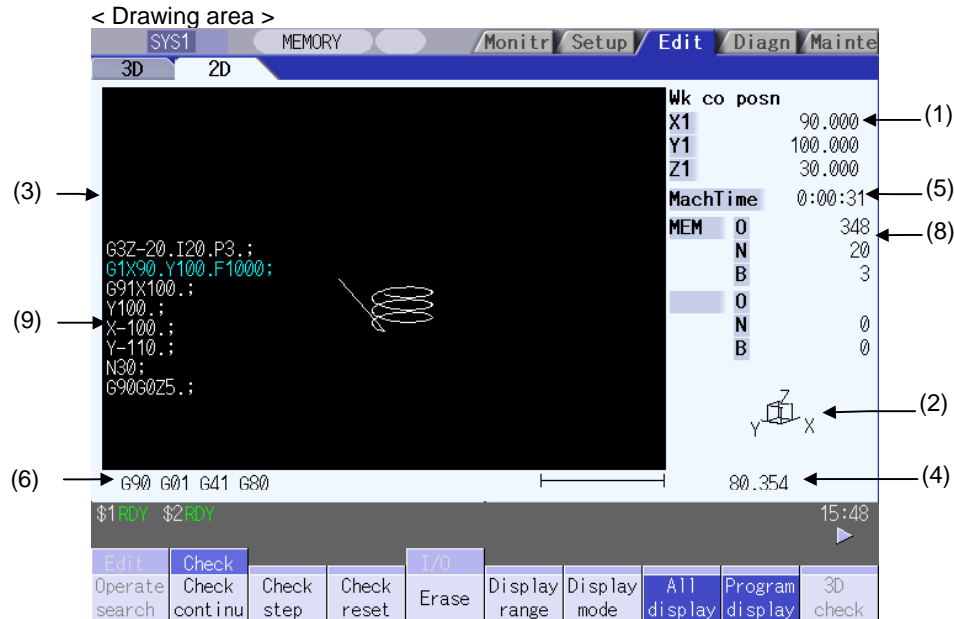


< Input area displayed >





■ Full-screen display (full-screen display mode is ON)

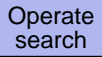
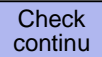
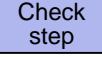
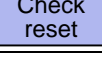
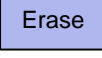

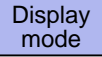

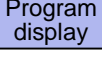

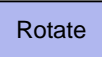
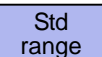


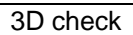
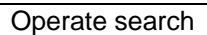
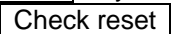
### Display items

Display item	Details
(1) Check counter	<p>This displays the axis counter for the check drawing. The displayed counter type and axis name (3 axes) are set in the parameters.</p> <p><b>[Counter]</b>            #1231 set03 (bit5)      0: Machine position counter,                                             1: Workpiece coordinate position counter</p> <p><b>[Axis name]</b>            #1026 to #1028      base_I, base_J, base_K</p> <p><b>(Note)</b> When the setting values of #1026 to #1028 have been changed, the changed values will be reflected in the check counter display when the power is turned ON again.</p>
(2) Display mode	This shows the plane for drawing.
(3) 2D drawing area	<p>This is the area where the tool path is drawn when performing a program check. The drawing viewpoint can be moved, and the drawing size can be enlarged and reduced.</p> <p>Select the zero point to be displayed with following parameter:            #1231 set03/bit4      0: Basic machine coordinate system zero point                                             1: Workpiece coordinate system zero point</p>
(4) Scale	This shows the display range scale. Use <b>Zoom in</b> or <b>Zoom out</b> menu to change the scale value.
(5) Machining time display	This calculates and displays the machining time.
(6) G modal display for check	<p>This displays the following modals.</p> <ul style="list-style-type: none"> <li>• Absolute/incremental (G90, G91: Group 3)</li> <li>• Operation mode (G00, G01, G02, G03 etc.: Group 1)</li> <li>• Tool radius compensation (G40, G41, G42: Group 7)</li> <li>• Fixed cycle (G80, G81 etc.: Group 9)</li> </ul>
(7) Input area	<p>This displays details of the key input when setting the scale value and display axis name.</p> <p>Press the menu <b>Display range</b>, <b>Display mode</b> keys to display the input area.</p>

Display item	Details
(8) Currently executed machining program	
Main O10...	This displays the device name, program number, sequence number, and block number currently being executed.
Sub O1234...	This displays the sub-program device name, program number, sequence number, and block number for the sub-program currently being accessed.
(9) Buffer display	This displays the contents of the machining program currently being checked. The block being executed is highlighted.

## Menus

Menu	Details	Type	Reference
	This performs an operation search and a check search. Select a program to perform a check for from the program file list displayed in the pop-up window.	C	4.3.1 Checking Continuously
	This checks the program continuously.	B	
	This checks the program per block.	B	4.3.2 Checking One Block at a Time
	This resets the program check.	C	4.3.3 Cancelling the Program Check
	This erases the graphics displayed on the screen. Each time this menu is pressed, the graphic data is erased in the order of rapid traverse and cutting feed.	C	4.3.5 Changing the Display Range
	This changes the graphic drawing display range. Press this menu to display the menu for changing the display mode. This changes the display range and erases the graphic data displayed on the screen.	C	
	This changes the drawing plane. Press this menu to display the menu for changing the display mode. There are 3 types of graphic drawing display mode: 1-plane, 2-plane, and 3-dimension. This changes the drawing plane and erases the graphic data displayed on the screen.	C	4.3.6 Changing the Display Mode
	This switches the normal display mode and the full-screen display mode.	B	4.3.8 Switching to Full-screen Display Mode
	This displays the machining program being checked on the graphic drawing area. This menu can be selected only when the full-screen display mode is applied.	B	
	This changes the program check (3D) display. (This menu does not display if the 3D solid graphic check option is disabled.) This menu cannot be selected while the check is performed or interrupted.	C	4.4 Program Check (3D)
	This sets the viewpoint angle for the 3-dimension display mode. This changes the viewpoint angle and erases the graphic data displayed on the screen. However, this menu cannot be used for other than the 3-dimension display mode.	C	4.3.7 Changing the Display Angle
	The display range (scale and display position) is automatically set from the machine movable area. The machine movable area is set with the parameters "#2013 OT-" and "2014 OT+" (software limit). When the display range is changed, the graphic data displayed on the screen is erased.	C	

(Note) The menu  and  keys cannot be selected while the check is performed or interrupted. Menu can be selected after  is pressed.

## 4.3.1 Checking Continuously

## Operation method

- (1) Press the main menu **Check**. ➡ The program check screen becomes active.

Press the menu **2D Check** when the program check (3D) appears.

- (2) Press the **Operate search** key. ➡ The following menu appears.  
The list appears in a pop-up window.

Memory	HD		Memory card	DS	FD	List update	Sort change		Close
--------	----	--	-------------	----	----	-------------	-------------	--	-------

- (3) Select a device.  
(Ex.) Menu **Memory** ➡ The selected device name and directory (memory: /program) appear in the device name and directory display columns.

- (4) Use the **↑**, **↓**, **↶**, **↷** keys to align the cursor with the target machining program.

The name of the machining program to be edited can be input in the input area.

**(Note)** When the number of characters of directory path (full path) exceeds 48, changing directories cannot be performed.

- (5) Press the **INPUT** key. ➡ The check search is started.  
A "Search complete" message appears when the search is completed.  
After performing the search, the device and program position appear in the current machining program display column.  
The list is then closed.  
The system distinguishes between the presence or lack of an extension, and therefore due care should be taken.

**(Ex.)**

```
1001/1/2      O1001 N1 B2
1001.PRG/1/2 O1001.PRG N1 B2
/1/2         (current O number) N1 B2
1001//2      O1001 N0 B2
1001/1       O1001 N1 B0
1001         O1001 N0 B0
/1           (current O number) N1 B0
//2          (current O number) N0 B2
```

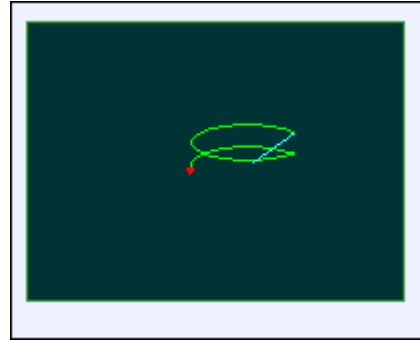
MEM	0	348	N	0	B	0
	0		N	0	B	0
0348(PARTS1);						
G28XYZ;						
G92G53XYZ;						
T3;						
M0T5;						
N10;						
G90G0X0Y0;						
Z5.;						
GG43H3Z5.;						
M8;						
F1000S3000;						
M3;						

- (6) Press the  key. ➡

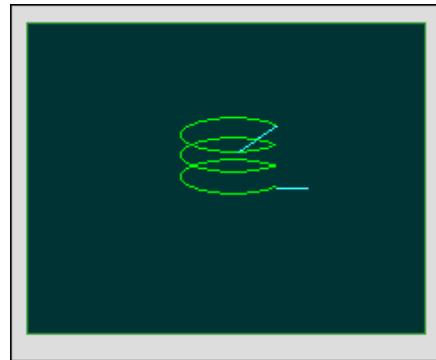
A block stoppage occurs when performing a program check if the  or  keys are pressed while performing a continuous check. Furthermore, the program check is restarted if the  key is pressed during the block stoppage.

The program check is reset if the  key is pressed while performing a continuous check.

A program check is executed and that path is drawn. A "Checking" message appears and the menu is highlighted. The check counter display is updated. The check G modal does not display. The machining time is updated.



A "Program check completed" message appears when the continuous check is completed. The  menu highlight returns to normal.

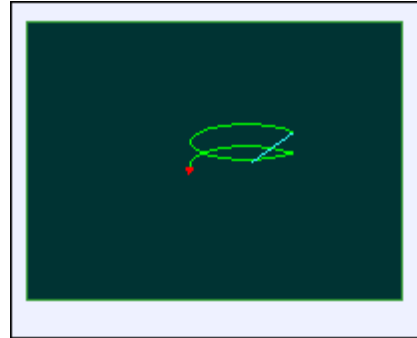


## 4.3.2 Checking One Block at a Time

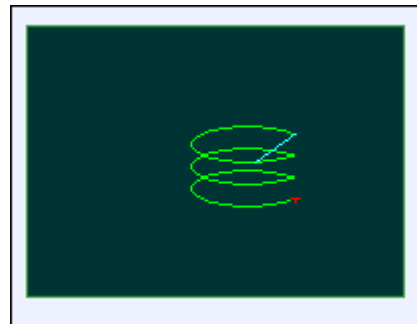
## Operation method

- (1) Press the main menu **Check**.  
Press the menu **2D check** key when the program check (3D) appears.  
➡ The program check screen becomes active.
- (2) A check search is performed using the same method as for "4.3.1 Checking Continuously".
- (3) Press the menu **Check step**.  
➡ The program check is executed for one block, and a graphic drawing of the machining program movement path is made.  
The check counter display is updated.  
The check G modal display is updated.

## &lt;State during one block check&gt;



## &lt;State when one block check is completed&gt;

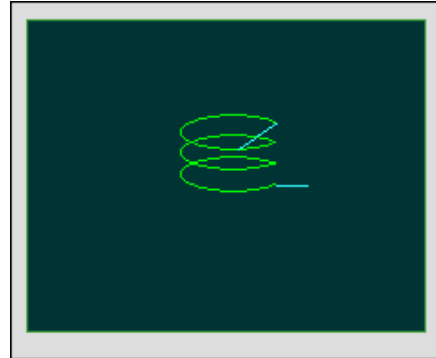


- (4) Press the menu **Check step**.



The program check is continued from the next block if the **Check continu** key is pressed during block stoppage.

The program check is executed for the next block.  
The menu returns to normal state.



### 4.3.3 Canceling the Program Check

#### Operation method

- (1) Press the menu **Check reset**.



The program check is reset and a "Reset complete" message appears.

### 4.3.4 Drawing during a Program Check

During the program check, the machine position (tool center) path is drawn. However, if a radius compensation is applied on the program being checked, the program path and tool center are drawn. The colors of the lines displayed during the program check are expressed as follows.

		With radius compensation	Without radius compensation
Manual feed		-	-
Rapid traverse	Programmed path	White	-
	Tool center move path	Blue	Blue
Cutting feed	Programmed path	White	-
	Tool center move path	Green	Green

## 4.3.5 Changing the Display Range

The graphic drawing's scale can be enlarged or reduced, and the position moved or centered.

## Operation method (Enlarging the and reducing the drawing)

- (1) Press the menu  ➡ A white frame indicating the display range appears on the screen.  
The display range input mode is activated, and the following menu appears.

Zoom in	Zoom out	Up	Down	Left	Right	Centering			
---------	----------	----	------	------	-------	-----------	--	--	--

- (2) Press the menu  or  ➡ The size of the white frame can be changed by using key operations.

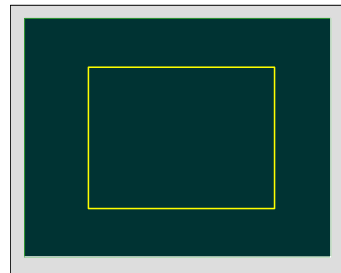
To enlarge the drawing size:

Press the menu  or  key.

To reduce the drawing size:

Press the menu  or  key.

A solid-line frame appears with respect to the original scale when enlarging, and a dotted-line frame appears when reducing.



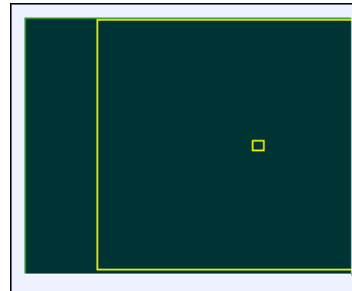
- (3) Press the  key. ➡ The display scale changes.  
By changing the display scale, the graphic data displayed on the screen is erased.  
It is also possible to change the display scale by setting a scale value in the input area.

## Operation method (Changing the drawing display position)

- (1) Press the menu Display range. ➡ A white frame indicating the display range appears on the screen.  
The display range input mode is activated, and the following menu appears.

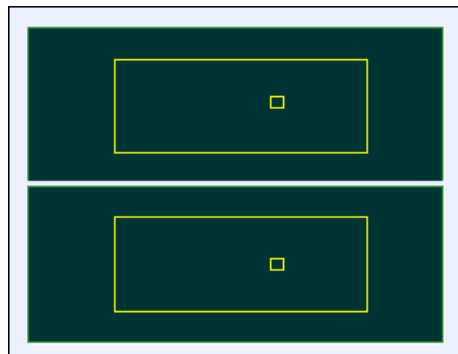
Zoom in	Zoom out	Up	Down	Left	Right	Centering			
---------	----------	----	------	------	-------	-----------	--	--	--

- (2) Press the Up, Down, Left, Right menu or cursor movement keys ↑, ↓, ←, →. ➡ The cursor (□) indicating the center of the display and the frame line move up, down, left and right according to the key operations.



- (3) Press the INPUT key. ➡ The display position changes so that the cursor position (□) is the center of the area.  
By changing the display position, the graphic data displayed on the screen is erased, however, the scale value is not changed.

**(Note 1)** When changing the display range while the 2-plane display mode such as "XY/XZ", the display range (scale and display position) for the upper and lower areas changes in the same manner. The operation method is the same as the 1-plane display mode.



The white-framed display range in the upper and lower areas simultaneously move to the left/right when the Left, Right keys are pressed.

The white-framed display range of either upper or lower areas moves up and down when the Up, Down keys are pressed.

Which frame to be moved up/down can be changed with the page key.

**(Note 2)** The set displayed position will be held even after the power is turned OFF and ON again.



## Operation method (Centering)

- (1) Press the menu Display range. ➡ A white frame indicating the display range appears on the screen.  
The display range input mode is activated, and the following menu appears.

Zoom in	Zoom out	Up	Down	Left	Right	Center- ing			
------------	-------------	----	------	------	-------	----------------	--	--	--

- (2) Press the Centering. ➡ The display position is changed so that the current machine position appears in the center of the drawing area.

**(Note 1)** In the 2-plane display mode such as "XY/XZ", centering is applied for the upper and lower areas.  
The operation method is the same as the 1-plane display mode.

**(Note 2)** When the Centering menu key is pressed after the display scale has changed, only the centering is applied without changing the scale value.

### 4.3.6 Changing the Display Mode

There are three types of graphic drawing mode: 1-plane, 2-plane, and 3-dimension. Press the menu  key, and by selecting one of the following display mode menus, the axis configuration for each plane changes, and the menu display returns to normal. It is also possible to change the display mode by setting the axis name in the input area.

**(Note 1)** When the display mode is changed, the graphics displayed up to that point are erased.

**(Note 2)** These set display mode is maintained even after rebooting the machine.


**(Note 3)** The display mode can be set independently at the trace function and program check function. These settings are not linked with one another.

**(Note 4)** The menu axis names XYZ are compatible with the basic axes IJK. X = base axis I, Y = base axis J, and Z = base axis K.

#### Display mode menu

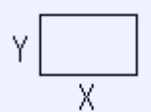
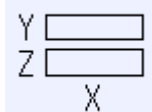
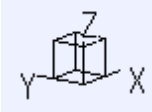
Menu	Details	Type
<input type="text" value="XY"/>	This changes to the 1- plane display mode configured of X-Y. The X-axis display in the horizontal axis, and the Y-axis displays in the vertical axis.	C
<input type="text" value="YZ"/>	This changes to the 1- plane display mode configured of Y-Z. The Y-axis display in the horizontal axis, and the Z-axis displays in the vertical axis.	C
<input type="text" value="XZ"/>	This changes to the 1- plane display mode configured of X-Z. The X-axis display in the horizontal axis, and the Z-axis displays in the vertical axis.	C
<input type="text" value="XY/XZ"/>	Changes to 2-plane display mode composing X-Y, and X-Z. The X-axis display in the horizontal axis, and the Y-axis and Z-axis display in the vertical axis.	C
<input type="text" value="YX/YZ"/>	Changes to 2-plane display mode composing Y-X, and Y-Z. The Y-axis display in the horizontal axis, and the X-axis and Z-axis display in the vertical axis.	C
<input type="text" value="XYZ"/>	This changes to the three-dimensional display mode. A cube is displayed on the lower right of the screen.	C

#### Changing the display axis name

- (1) Set the axis name and press the  key.  XYZ appears the graphic display mode name. There are 3 drawing axes: X, Y, and C.
- XYC

There are three types of display mode: 1- plane, 2- plane, and 3D. An image displays which display mode is currently selected. The selected axis name displays for the image axis name.

#### Display example

<1-plane> (XY)	<2-plane> (XY/XZ)	<3-dimension> (XYZ)
		

## 4.3.7 Changing the Display Angle

This is used to set the graphic drawing display angle when in 3-dimension display mode.

Press the menu key or cursor keys to rotate the cubic displayed at the screen upper right and press the **INPUT** to set.

**(Note 1)** When the display angle is changed, the graphics displayed up to that point are erased.

**(Note 2)** The set display angle is maintained even after rebooting the machine.

**(Note 3)** The display angle can be set independently at the trace function and program check function. These settings are not linked with one another.

## Operation method

- (1) Press the menu **Rotate**.

➡ The mode changes to the rotation mode and the following menu appears.

Up



Down

Left

Right
- (2) Use the **Up**, **Down**, **Left**, **Right** menu to adjust the display angle.

➡ Rotate the cubic display in the lower right of the screen using the operation keys.

The cursor movement keys (**↑**, **↓**, **←**, **→**) can also be used to rotate.



- (3) Press the **INPUT** key.

➡ The display angle changes. By changing the display angle, the graphic data displayed on the screen is erased.

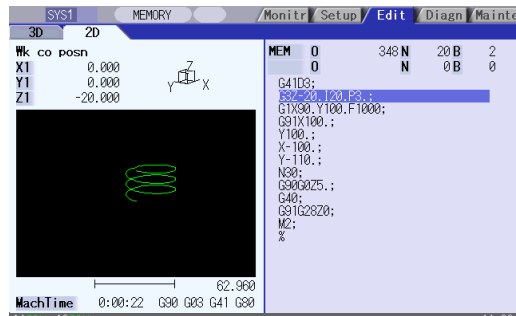
**(Note 1)** The set display angle is maintained even after rebooting the machine.

## 4.3.8 Switching to Full-screen Display Mode

Press the **All display** menu key to display the program check window on the whole screen. (full-screen display mode).

Press this menu again to return the normal display.

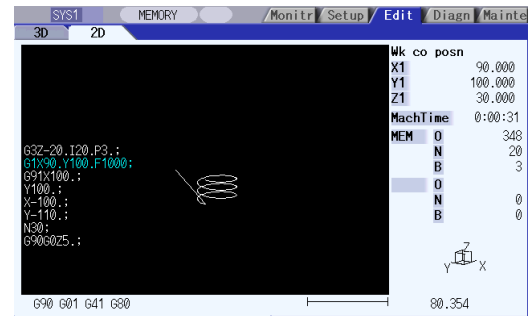
## Switching the display mode



Normal display mode

**All display**  
menu : ON

**All display**  
menu : OFF



Full-screen display mode

**(Note 1)** The selected display mode is maintained even after rebooting the machine.

**(Note 2)** The full-screen display mode is applied to the trace function and program check (2D/3D solid) function commonly.

**(Note 3)** The full-screen display mode is applied commonly to all part systems.

## Displaying a program

When pressing the **Program display** menu key, the contents of the machining program on checking is displayed on the drawing area.

When pressing the **Program display** again, the displayed program is erased.

Note that this menu can be used only when the full-screen display mode is selected.

**(Note 1)** The selected display mode is maintained even after rebooting the machine.

**(Note 2)** The program display mode is applied to the trace function and program check (2D) function commonly.

**(Note 3)** The **Program display** menu key cannot be selected while the normal display mode is selected. Program display mode is valid only when the full-screen display mode is selected.

**(Note 4)** The program display mode is applied commonly to all part systems.

**4.3.9 Availability of Check Mode with Other Functions**

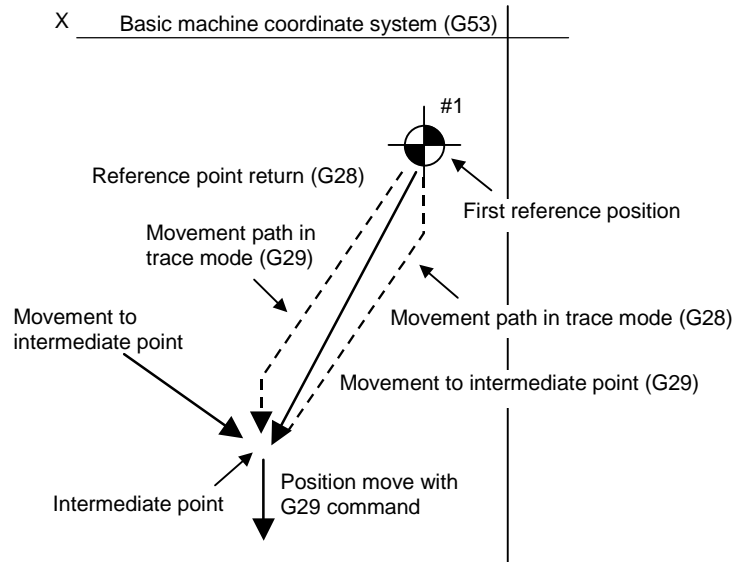
It is important to be aware that certain NC parameters, program commands, and machine operation panel switches cannot be used while performing a program check.

Function name	Remarks
Decimal point programming	Both decimal point input type I and II are valid.
Mirror image (Parameters, external input)	A mirror image is applied and a check drawing is made at the setting status prior to starting the check.
Z-axis command cancel	Signals are ignored and a check drawing is made.
Interlock	Signals are ignored and a check drawing is made.
External deceleration	Signals are ignored and a check drawing is made.
Override	Signals are ignored and a check drawing is made.
Auto operation pause (feed hold)	Signals are ignored and a check drawing is made.
Auto operation start-up (cycle start)	"M01 Operation alarm (0112)" occurs if automatic operation is started up while the check drawing is being made.
Auto-restart	The check is completed at M02/M30 and is not restarted.
Manual mode/handle	The mode can be changed to manual or handle mode and the machine can be moved even during the check. However, this is not reflected to the check drawing position.
F1-digit feed	The speed command does not influence the check drawing.
User macro I-II	Basic variable calculations, decisions and branch functions are all enabled. However, the following functions are ignored, or indefinite values are input. Macro interface input/output, Single block stoppage, Miscellaneous function complete signal waiting control, Feed hold, Feedrate override, G09 enabled/disabled control, Reading of position information for other than the previous block end point coordinates
M-S-T-2nd miscellaneous function commands	M-S-T-2nd miscellaneous function command signals commanded by the program during the check are not output. Neither do they display on the Operation screen etc.
G command modal	G modal displays on the modal display screen while the check drawing is being made.
Tool compensation amount	The check drawing is made with the tool compensation amount set when starting the check drawing.
Workpiece coordinate system offset amount	The check drawing is made with the workpiece coordinate system offset amount set when starting the check drawing. The display data is not changed when changes are made with G10 or system variables.
Parameter	The setting values when starting the check drawing are used. Parameters are changed to command values when changing the parameters using G10.
Optional block skip	The setting status when starting the check drawing are used.

**(Note) Reference position return and start position return**

The reference position return command and start position return command are valid, but actual machine motion (trace display) is partially different from the drawing by program check. As shown in the figure below, when returning to the reference position 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 position is done by each axis independently.

With the G29 command, positioning to the intermediate point is done by each axis 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.



#### 4.3.10 Handling of Variable Commands, Parameter Input by Program, and Compensation Data Input by Program

If a program check is performed for a machining program for which the variable command data etc. is rewritten, all data types are treated as shown in the following table after completion.

Data type	Saving data before program check	Explanation
Parameter	×	The program parameter input commands are set as actual data. (The data before the check is not saved.)
Local variable	○ / ×	It is possible to return to the status prior to starting the program check based on the "#1231 set03(bit0) " graphic check interchangeable parameter value. 0: Returns to original status after check completion 1: Does not return to original status after check completion
Common variable	○ / ×	
Workpiece coordinate system offset	○ / ×	
Tool compensation amount	○ / ×	

## 4.3.11 Notes for Program Check (2D)

**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 pause. The operation message "Executing automatic operation" appears.
- (3) Operation search is possible for a program with 32 or less file name characters.
- (4) Graphic check is not available for MDI program.

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

- (1) When the menu **Zoom in**, **Zoom out**, **Display mode**, **Rotate** or **Display range** key is pressed while checking, the graphic data is erased, however, the program check is not interrupted.
- (2) Drawing is continued even after changing to another screen while checking.
- (3) Automatic operation cannot be performed even if the automatic operation button is pressed while checking. "M01 Operation Alarm (0112)" occurs.
- (4) Execute automatic start after the check is completed or after the check is interrupted by pressing the **Check reset**.
- (5) Refer to "4.3.10 Handling of Variable Commands, Parameter Input by Program, and Compensation Data Input by Program " for further details on all types of data set in the program while checking.
- (6) Checking the program stops if there is a M00/M01 command. However, when executing the M01 command, drawing is stopped regardless of the ON/OFF status of the optional stop switch signal.
- (7) When switching part systems during checking, drawing will be erased. When the displayed part system is undone, check operation will be continued from the previous state (program position before part systems were switched).
- (8) Status during checking (in "Check continu"/in "Check step") is held per part system.
- (9) 2D graphic check drawing begins from the actual coordinate value used for the program operation (coordinate value of the machine position).
- (10) The contents of ONB display and buffer display in the check screen during automatic operation are the contents of the program during automatic operation. The contents of ONB display and buffer display in the operation screen during check execution are the contents of the program during check execution.
- (11) When operation search or check operation ("Check continu" or "Check step") is performed during program restarting, the operation message "in program restarting" is displayed, and the program will not be searched or graphically checked.

**Notes for ending check**

- (1) If an M02/M30 command is found, "Program check completed" occurs.
- (2) By performing commands such as a check reset or turning the trace display ON, the check mode is exited. Clear the errors with these operations in the case of a program error. When the NC has been reset while the check screen is displayed, graphic check will be completed, but the menu for changing from 3D to 2D graphic check will remain disabled. Press the check reset menu to enable the switching operation.
- (3) Check reset is available only for the displayed part systems.
- (4) When a NC reset is performed during check operation, all the part systems will be reset. When a part system not being displayed is in checking and if switching to that part system, check will be executed from the head of the program.

**Notes for switching between trace mode and check mode**

- (1) The checking mode is released when the trace mode becomes ON.
- (2) Graphic check (2D) cannot be performed during the trace mode.
- (3) When displaying Edit screen during the graphic trace mode, graphic check 3D will be applied regardless of the previous check type. If the 3D solid check option is not valid, the area of Check tag will be blank.
- (4) When trace window is displayed during check, check will be terminated. (This applies for all the part systems under checking.)



### 4.4 Program Check (3D)

Program check (3D) is a function that draws the workpiece shape and tool movement in the cutting process of the machining program as a solid image without executing automatic operation. The machining program can be checked with graphic data drawn at a high speed.

This function requires workpiece and tool shape settings.

Program check (3D) can draw a solid image in the basic machine coordinate system or the workpiece coordinate system.

The coordinate system used to draw can be switched on "Work set" screen.

In the workpiece coordinate system, a solid image is drawn by using the workpiece coordinate system designated by the program.

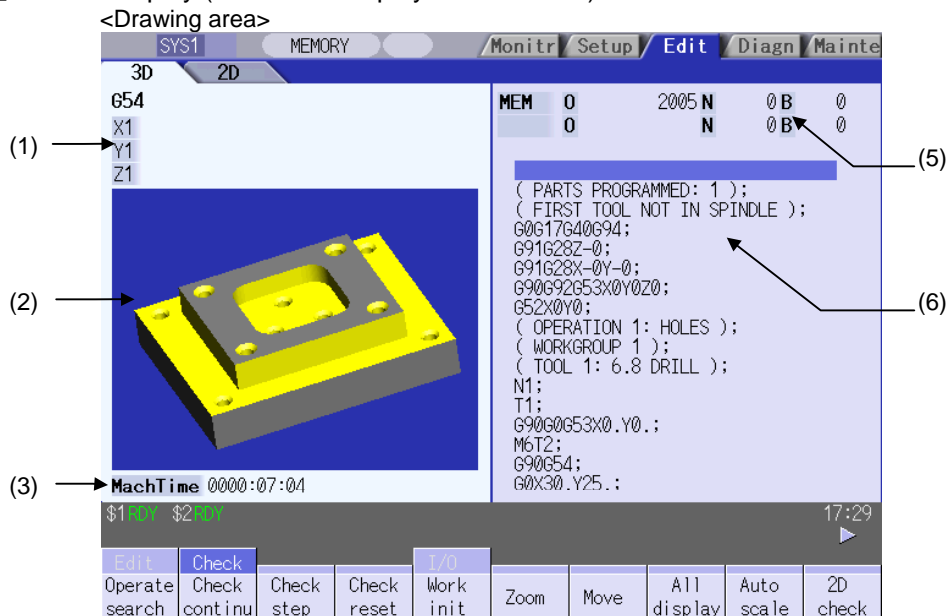
Using **All display** menu, normal display and full-screen display modes can be switched.

**(Note 1)** The program check (3D) function is an additional specification. The graphic check and 3D solid graphic check option is required.

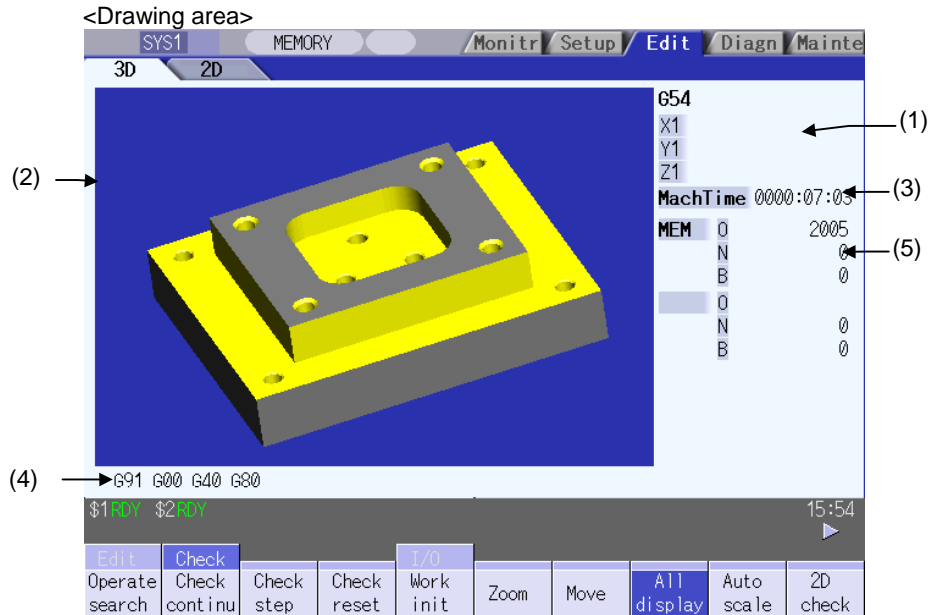
**(Note 2)** When changing the screen to the edit screen, display depends on the previous checking type (2D/3D). Note that when selecting this screen during graphic trace, 3D solid program check will apply.

If the 3D solid check option is not valid in this time, the area of Check tag will not be blank.

#### ■ Normal display (full-screen display mode is OFF)



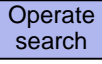
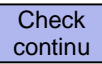
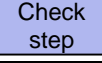
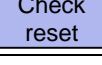
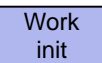
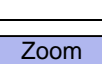
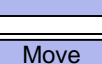
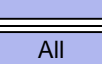
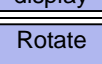
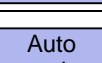
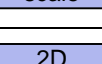
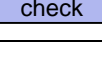
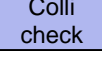
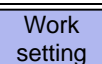
■ Full-screen display (full-screen display mode is ON)

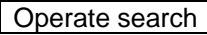
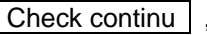
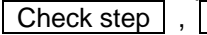
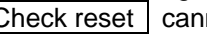


### Display items

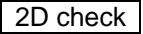



Display item	Details
(1) Check counter	<p>This displays the axis counter for check drawing.</p> <p>As for the counter, the machine position or workpiece coordinate position is displayed according to setting the drawing coordinate system on "Work set" screen.</p> <p>As for the axes name, system common axis name ("#1022 axname2") based on the basic axis name set to "#1026 base_I", "#1027 base_J", and "#1028 base_K" are displayed.</p> <p><b>(Note)</b> When the setting values of #1026 to #1028 have been changed, the changed values will be reflected in the check counter display when the power is turned ON again.</p>
(2) 3D drawing area	<p>This area is used to display a solid graphic drawing of the workpiece shape and tool movement during the cutting process in the machining program.</p> <p>The drawing viewpoint can be moved, and the drawing size can be enlarged and reduced.</p> <p>The coordinate system used to draw switches the basic machine coordinate system or a workpiece coordinate system according to setting the drawing coordinate system on "Work set" screen.</p>
(3) Machining time display	This calculates and displays the time taken for machining.
(4) Check G modal display	<p>This displays the following modals:</p> <ul style="list-style-type: none"> <li>• Absolute/incremental (G90, G91: Group 3)</li> <li>• Operation mode (G00, G01, G02, G03 etc.: Group 1)</li> <li>• Tool radius compensation (G40, G41, G42: Group 7)</li> <li>• Fixed cycle (G80, G81 etc.: Group 9)</li> </ul>
(5) Currently executed machining program	
Main O10...	This displays the device name, program No., sequence No., and block No. currently being executed.
Sub O1234...	When sub-program is being executed, the sub-program device name, program No., sequence No., and block No. are displayed.
(6) Buffer display	This displays the contents of the machining program currently being executed. The block being executed is highlighted.

## Menus

Menu	Details	Type	Reference
	This performs an operation search and a check search. Select a program to be checked from the program file list displayed in the pop-up window.	C	4.4.1 Checking Continuously
	This checks a program continuously.	B	
	This checks a program per block.	B	4.4.2 Checking One Block at a Time
	This resets a program check.	C	4.4.3 Canceling the Program Check
	This initializes the workpiece shape. Displays the pre-machining workpiece shape set at the "Work set" window (workpiece shape setting). At this time, the cross-section status is cancelled.	C	
	This enlarges/reduces the displayed workpiece shape.	C	4.4.4 Enlarging and Reducing the Workpiece Shape
	This moves the displayed workpiece shape.	C	4.4.5 Moving the Workpiece Shape
	This switches the normal display mode and the full-screen display mode.	C	
	This rotates the displayed workpiece shape.	C	4.4.6 Rotating the Workpiece Shape
	The scale is automatically set so that the pre-machining workpiece shape set at the "Work set" window (workpiece shape setting) takes up approximately 90% of the drawing area.	C	
	This changes the program check (2D) display. This menu cannot be selected while the check is performed or interrupted.	C	4.3 Program Check (2D)
	This enables or disables the interference check. When the interference check is enabled, if the tool and workpiece contact each other when performing rapid traverse (G0) movement, the contact location is drawn in a color highlighting the interference.	B	4.4.7 Performing an Interference Check
	This sets the workpiece shape used at the solid display.	C	4.4.9 Setting the Workpiece Shape
	This sets the tool shape used at the solid display.	C	4.4.10 Setting the Tool Shape

**(Note 1)** When the graphic trace mode is entered and automatic operation is running, the menu  ,  ,  ,  cannot be selected and the 3D solid program check cannot be performed.

Only the 3D solid program check can be performed unless the automatic operation is running.

**(Note 2)** The menu  ,  ,  ,  cannot be selected while the check is performed or interrupted.

## 4.4.1 Checking Continuously

## Operation method

- (1) Press the main menu **Check**. ➡ The program check screen becomes active.

Press the menu **3D Check** key when the program check (2D) appears.

- (2) Press the **Operate search** key. ➡ The following menu appears.  
The list appears in a pop-up window.

Memory	HD		Memory card	DS	FD	List update	Sort change		Close
--------	----	--	-------------	----	----	-------------	-------------	--	-------

- (3) Select a device.  
(Ex.) Menu **Memory** ➡ The selected device name and directory (memory: /program) appear in the device name and directory display columns.

- (4) Use the **↑**, **↓**, **↶**, **↷** keys to align the cursor with the target machining program.

The name of the machining program to be edited can be input in the input area.

**(Note)** When the number of characters of directory path (full path) exceeds 48, changing directories cannot be performed.

- (5) Press the **INPUT** key. ➡ The check search is started.  
A "Search completed" message appears when the search is completed.  
After performing the search, the function and program position appear in the current machining program display column.  
The list is then closed.  
The system distinguishes between the presence or lack of an extension, and therefore due care should be taken.

**(Ex.)**

```
1001/1/2      O1001 N1 B2
1001.PRG/1/2  O1001 N1 B2
/1/2          (current O number) N1 B2
1001//2       O1001 N0 B2
1001/1        O1001 N1 B0
1001          O1001 N0 B0
/1            (current O number) N1 B0
//2           (current O number) N0 B2
```

MEM	0	348	N	0	B	0
	0		N	0	B	0
0348(PARTS1);						
G28XYZ;						
G92G53XYZ;						
T3;						
M0T5;						
N10;						
G90G0X0Y0;						
Z5.;						
GG43H3Z5.;						
M8;						
F1000S3000;						
M3;						

- (6) Press the **Check continu** key. ➡
- A block stoppage occurs when performing a program check if the **Check continu** or **Check step** keys are pressed while performing a continuous check. Furthermore, the program check is restarted if the **Check continu** key is pressed during the block stoppage.
- The program check is reset if the **Check reset** key is pressed while performing a continuous check.
- A program check is performed, and a solid drawing is made for the cutting process workpiece shape and tool movement.  
A "Checking" message appears and the **Check continu** menu is highlighted.  
The check counter display is updated.  
The check G modal does not appear.  
The machining time is updated.
- A "Program check completed" message appears when the continuous check is completed.  
The **Check continu** menu highlight returns to normal.

#### 4.4.2 Checking One Block at a Time

##### Operation method

- (1) Press the main menu **Check**. ➡
- Press the menu **3D check** key when the program check (2D) appears.
- (2) A check search is performed using the same method as for "4.4.1 Checking Continuously".
- (3) Press the menu **Check step**. ➡
- The program check is executed for one block, and a solid drawing of the workpiece shape and tool movement during the cutting process is made.  
The check counter display is updated.  
The check G modal display is updated.  
The machining time is updated.
- (4) Press the menu **Check step**. ➡
- The program check is continued from the next block if the **Check continu** key is pressed during block stoppage.
- The program check is executed for the next block.

#### 4.4.3 Canceling the Program Check

##### Operation method

- (1) Press the menu **Check reset**. ➡
- The program check is reset and a "Reset complete" message appears.

## 4.4.4 Enlarging and Reducing the Workpiece Shape

## Operation method

- (1) Press the menu **Zoom**. ➡ The mode changes to the enlargement/reduction mode, and the following menu appears.
- Zoom in
Zoom out
- (2) Press the menu **Zoom in**. ➡ The drawing area center position is set in the center, and the enlarged workpiece is redisplayed.
- To enlarge the drawing:  
Press the menu **Zoom in** or **-** key.
- To reduce the drawing size:  
Press the menu **Zoom out** or **+** key.

## 4.4.5 Moving the Workpiece Shape

## Operation method

- (1) Press the menu **Move**. ➡ The mode changes to the movement mode and the following menu appears.
- Up
Down
Left
Right
- (2) Use the **Up**, **Down**, **Left**, **Right** keys to adjust the display position. ➡ The workpiece shape moved in the designated direction is redisplayed.
- The cursor movement keys ( **↑**, **↓**, **←**, **→** ) can also be used for moving.

## 4.4.6 Rotating the Workpiece Shape

## Operation method

- (1) Press the menu **Rotate**. ➡ The mode changes to rotation mode and the following menu appears.
- Up
Down
Left
Right
- (2) Use the **Up**, **Down**, **Left**, **Right** keys to adjust the display angle. ➡ The workpiece shape rotated in the designated direction is redisplayed.
- The cursor movement keys ( **↑**, **↓**, **←**, **→** ) can also be used to rotate.

**(Note 1)** The set display angle is maintained even after rebooting the machine.

### 4.4.7 Performing an Interference Check

If the tool and workpiece contact when performing rapid traverse (G0) movement, the contact location is drawn in a color highlighting the interference.

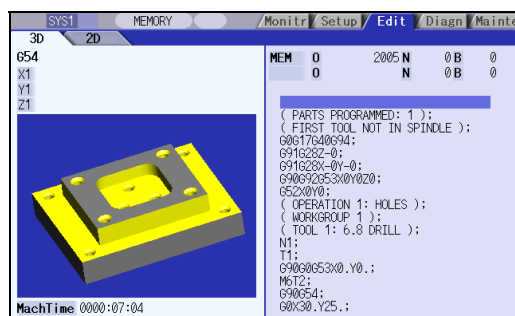
#### Operation method

- (1) Press the menu Colli check. → The menu is highlighted.
- (2) Press the menu Check step or Check continu. → A program check is performed, and a solid drawing of the workpiece shape and tool movement during the cutting process is performed. A "Checking" message is displayed and the menu Check step or Check continu key is highlighted. The workpiece and tool contact, this is drawn in a color highlighting the interference.

### 4.4.8 Switching to Full-screen Display Mode

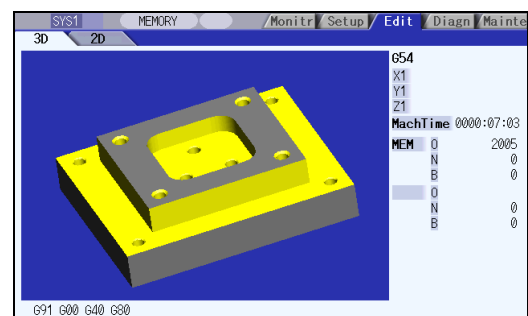
Press the All display menu key to enlarge the program check window (full-screen display mode). Press this menu again to return the normal display.

#### Switching the display mode



Normal display mode

All display  
menu : ON  
→  
←  
All display  
menu : OFF



Full-screen display mode

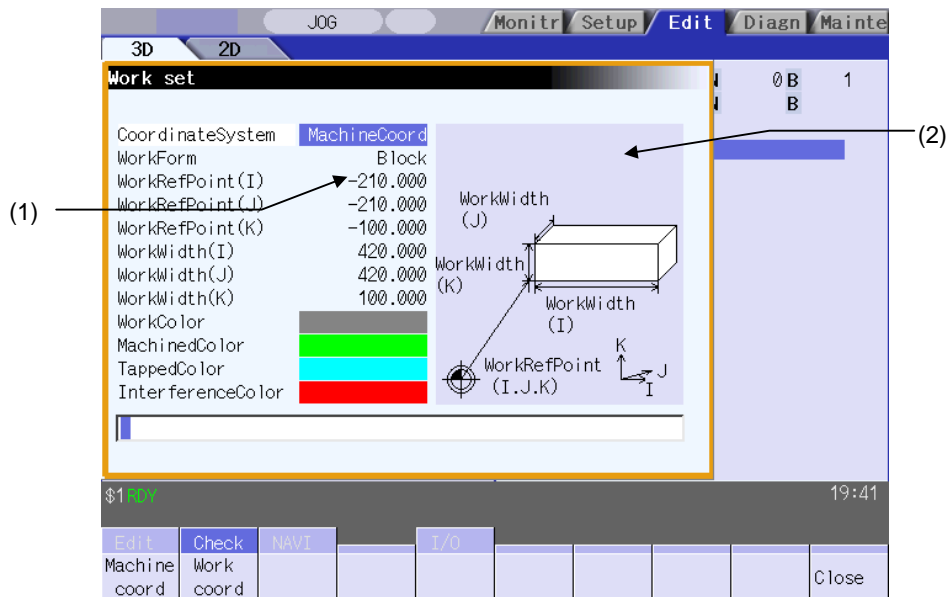
**(Note 1)** The selected display mode is maintained even after rebooting the machine.

**(Note 2)** The full-screen display mode is applied to the trace function and program check (2D/3D solid) function commonly.

**(Note 3)** The full-screen display mode is applied commonly to all part systems.

## 4.4.9 Setting the Workpiece Shape

Press the menu **Work setting** key to display a pop-up window similar to the following, and set the workpiece shape used in the solid display.



## Display items

Display item	Details
(1) Workpiece shape setting area	This sets all workpiece shape items.
(2) Guide drawing	This displays a material shape guide drawing. The displayed guide drawing is changed according to the coordinates set on "Work set" screen.

## Menus (the cursor is at CoordinateSystem (drawing coordinate system))

Menu	Details	Type	Reference
Machine coord	This specifies the coordinate system used to 3D drawing. The name and value of the check counter displayed on 3D check screen are switched to the machine position and the workpiece coordinates counter position. Default is the "Machine coord" (machine position).	C	Setting the drawing coordinate system (CoordinateSystem)
Work coord			
Close	This closes the pop-up window and quits this function.	C	

## Menus (the cursor is at WorkForm (material shape))

Menu	Details	Type	Reference
Default shape	This sets the material shape. The drawings are made as a block when the default shape is selected.	C	"Setting the material shape"
Block			
Close	This closes the pop-up window and quits this function.	C	



**Menus (the cursor is at WorkRefPoint(I,J,K) (material basic point), or WorkWidth (material width))**

Menu	Details	Type	Reference
Close	This closes the pop-up window and quits this function.	C	

**Menus (the cursor is at the WorkColor, MachinedColor, TappedColor, InterferenceColor, SectionColor in the window)**

Menu	Details	Type	Reference
Default color	<p>This sets the material color (WorkColor), machining surface color (MachinedColor), tap surface color (TappedColor), interference surface color (InterferenceColor), and cross section color (SectionColor).</p> <p>The drawings are made using the following colors when the default colors are selected.</p> <p>Material color : Gray  Machining surface color : Yellow  Tap machining surface color : Light blue  Interference surface color : Red  Cross section color : Green</p>	C	"Setting the material color"
Gray			
Red			
Yellow			
Blue			
Green			
Light blue			
Purple			
Pink			
Close	This closes the pop-up window and quits this function.	C	

**Setting the drawing coordinate system (CoordinateSystem)**

- (1) Use the ,  keys to move the cursor to the drawing coordinate settings column.
- (2) Press the menu  ➡ "Work coord" appears at the cursor position.  
The cursor moves one place down.  
A guide drawing with workpiece coordinate origin appears in the guide drawing area.  
It is also possible to set input values.  
0  : Machine coord  
1  : Work coord

**Setting the material shape (WorkForm)**

- (1) Use the ,  keys to move the cursor to the material shape settings column.
- (2) Press the menu  ➡ "Block" appears at the cursor position.  
The cursor moves one place down.  
A block guide drawing appears in the guide drawing area.  
It is also possible to set input values.  
0  : Default shape  
1  : Block

**Setting the material basic point (WokRefPoint (I)) and size (WrkWidth (I,J,K))**

Enter the material basic point and size. Specify the material basic point with the specified coordinate on "Work set" screen.

- (1) Use the ,  keys to move the cursor to the material basic point or width (I) setting column.
- (2) Input data.  
(Ex.) 100  ➡ "100.000" appears at the cursor position.  
The cursor moves one place down.
- (3) Other basic points and width data are set in the same way.

**(Note 1)** The workpiece will not be displayed if two or more size data are "0".

**(Note 2)** The setting range of the material basic point and width is as follows.  
However, the value of less than 0 cannot be set to width.

#1003 iunit	#1041 I_inch	
	0 (mm)	1 (inch)
B	-99999.999 to 99999.999	-9999.9999 to 9999.9999
C	-99999.9999 to 99999.9999	-9999.99999 to 9999.99999
D	-99999.99999 to 99999.99999	-9999.999999 to 9999.999999
E	-99999.999999 to 99999.999999	-9999.9999999 to 9999.9999999

## Setting the material color (WorkColor)

- (1) Use the ,  keys to move the cursor to the material color setting column.

- (2) Press the material color menu.  
(Ex.) Menu



The cell where the cursor is located appears in gray.  
The cursor moves one place down. (The cursor does not move when at the cross section color.)

It is also possible to set input values.

- 0  : Default color
- 1  : Gray
- 2  : Red
- 3  : Yellow
- 4  : Blue
- 5  : Green
- 6  : Light blue
- 7  : Purple
- 8  : Pink

- (3) Other color data is set in the same way.

**(Note)** The following colors are used if the default colors are designated.

Material color	: Gray
Machining surface color	: Yellow
Tap machining surface color	: Light blue
Interference surface color	: Red
Cross section color	: Green

## 4.4.10 Setting the Tool Shape

Press the menu Tool setting key to display a pop-up window similar to the following, and set the tool shape used in the solid display.



## Display items

Display item	Details
(1) Tool shape setting area	This sets all tool shape items.
(2) Guide drawing	This displays a tool shape guide drawing.
(3) Tool clear guidance area	This displays a guidance concerning the area of tool clear.

## Menus (when the cursor is at the tool number)

Menu	Details	Type	Reference
<span style="border: 1px solid black; padding: 2px;">Tool clear</span>	This clears the tool shape data where the cursor is located. Specification method: Tool No. to start/end tool clear <b>(Example)</b> 10/30: Data in the lines of tool No.10 to 30 will be cleared. 10/E: Data in the lines of tool No.10 and after will be cleared. When the <span style="border: 1px solid black; padding: 0 2px;">INPUT</span> key is pressed without specifying tool No., the data in the line at the current cursor position will be cleared.	A	"Clearing the tool number"
<span style="border: 1px solid black; padding: 2px;">Close</span>	This closes the pop-up window and quits this function.	C	

**Menus (when the cursor is at Kind (tool type))**

Menu	Details	Type	Reference
Default tool	This sets the tool type. A drill displays if the default tool is selected.	C	"Setting the tool type"
Ball endmill			
Flat endmill			
Drill			
Bulnosed endmill			
Chamfer			
Tap			
Close	This closes the pop-up window and quits this function.	C	

**Menus (when the cursor is at Radius (tool radius), Length (tool length), or ToolData1,2 (shape data))**

Menu	Details	Type	Reference
Close	This closes the pop-up window and quits this function.	C	

**Menus (when the cursor is at CL (tool color))**

Menu	Details	Type	Reference
Default color	This sets the tool color. This displays in red if the default color is selected.	C	"Setting the tool color"
Gray			
Red			
Yellow			
Blue			
Green			
Light blue			
Purple			
Pink			
Close	This closes the pop-up window and quits this function.	C	

**Registering the tool data**

A maximum of 80 tools can be registered.

- (1) Use the cursor keys to move the cursor to the tool number setting. column.

The cursor can be moved freely from the 1st to the 80th line regardless of the number of tools being registered.

- (2) Input the Tool No.  
(Ex.) 10



"10" appears at the cursor position.  
The cursor moves one place to the right.

**(Note 1)** Register a new tool data to set the default value for the tool type, tool radius, tool length, and shape data 1,2, and tool color.

**(Note 2)** If two or more of the same tool number is registered, the tool shape data that is registered first is selected.

**(Note 3)** When an unregistered tool is selected, the previously used tool is used as is.

**Clearing the tool data (Clearing tool data for one line at the cursor position)**

<When inputting directly>

- (1) Use the cursor keys to move the cursor to the tool number setting column.

- (2) Input as shown below.  
0



The contents of the line where the cursor is located are all cleared.  
The cursor does not move.

<When using menu operations>

- (1) Use the cursor keys to move the cursor to the tool number setting column.

- (2) Press the menu .



The menu is highlighted.

- (3) Press the  key.



Background color of the line at the cursor position is turned to light blue.  
The operation message "Erase?(Y/N)" is displayed.



- (4) Press the  or  key.



Press any key other than  and  to cancel.

The contents of the line where the cursor is located are all cleared.  
Background color of the line at the cursor position is returned.  
The cursor does not move.  
The menu highlight is returned to normal.

**Clearing the tool data (Clearing tool data for multiple lines)**

- (1) Press the menu . The menu is highlighted.
- (2) Set the first and last tool No. of the area to be cleared by dividing by "/" and press the  key.  The background color of the lines for tool No. 20 to 50 is highlighted in light blue. The operation message "Erase? (Y/N)" appears. When the tool data to be cleared does not exist within the page currently being displayed, the cursor is moved to the first line of the area to be cleared, making it the top of the display area. Specify the last line "E" to make it the end of the clearance range. (Example) 10/E
- 
- (3) Press the  or  key.  The contents of the line highlighted in light blue are all cleared. Background color is returned. The menu highlight is returned to normal.
- Press any key other than  and  to cancel.


**(Note 1)** A setting error occurs when the specified tool No. does not exist.

**(Note 2)** A setting error occurs when the specified ending tool No. does not exist in the lower line than the starting tool No.

**(Note 3)** When the area to be cleared ranges over 2 pages, tools in the specified area in the second page and after will be cleared, as well.

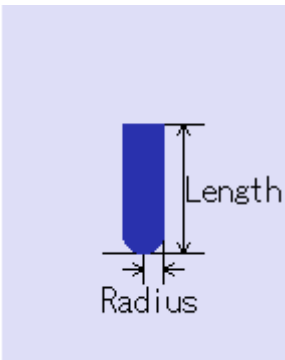
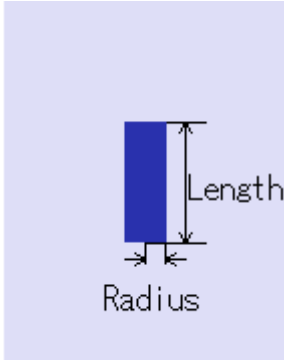
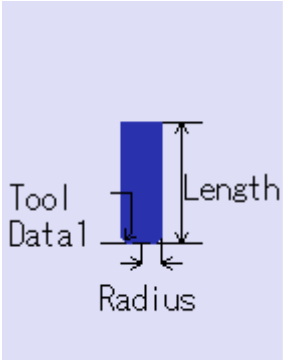
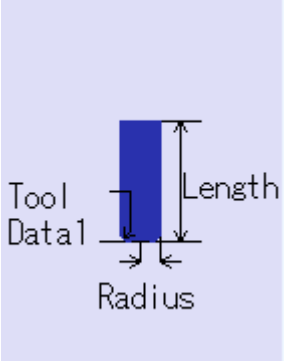
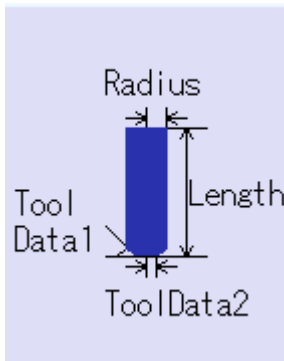
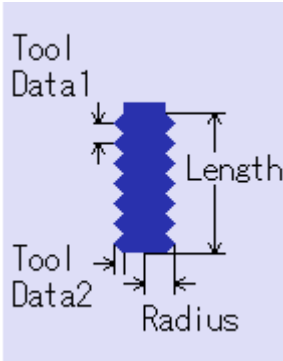
**(Note 4)** When two or more of the same tool Nos. are specified, tool data of the tool number registered first is cleared.

**Setting the tool type (Kind)**

- (1) Use the cursor keys to move the cursor to the tool type setting column.
- (2) Press the tool type menu.  "Ball endmill" appears at the cursor position. The cursor moves one place to the right. The ball end mill guide drawing (note) appears in the guide drawing area.
- (Ex.) Menu
- It is also possible to set input values.
- 0  : Default tool
  - 1  : Ball end mill
  - 2  : Flat end mill
  - 3  : Drill
  - 4  : Bull nose end mill
  - 5  : Chamfer
  - 6  : Tap

**(Note)** The drill appears in the guide drawing area when the default tool is designated.

## Tool type guide drawing

1: Ball end mill	2: Flat end mill	3: Drill
		
4: Bull nose end mill	5: Chamfer	6: Tap
		

## Setting the tool color (CL)

Set the tool color for each tool.

- (1) Use the cursor keys to move the cursor to the tool color setting column.

- (2) Press the tool color menu.

(Ex.) Menu



The cell where the cursor is located appears in green.  
The cursor moves to the tool number column one line below.

It is also possible to set input values.

- 0  : Default color
- 1  : Gray
- 2  : Red
- 3  : Yellow
- 4  : Blue
- 5  : Green
- 6  : Light blue
- 7  : Purple
- 8  : Pink

**(Note)** The tool appears in red when the default color is designated.



**4.4.11 Availability of Check Mode with Other Functions**

Refer to "4.3.9 Availability of Check Mode with Other Functions".

**4.4.12 Handling of Variable Commands, Parameter Input by Program, and Compensation Data Input by Program**

Refer to "4.3.10 Handling of Variable Commands, Parameter Input by Program, and Compensation Data Input by Program".

**4.4.13 Notes for Program Check (3D)****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 pause. The operation message "Executing automatic operation" appears.
- (3) Operation search is possible for a program with 32 or less file name characters.
- (4) Graphic check is not available for MDI program.

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

- (1) The drawing is not initialized and the program check is not interrupted even if the menu Zoom, Move, or Rotate key is pressed while checking.
- (2) Check reset is applied when changing to another screen while checking.
- (3) Automatic operation cannot be performed even if the automatic operation button is pressed while checking. An operation alarm ("Program check mode") occurs.  
Execute automatic start after completing the check or after stopping the check by pressing the Check reset
- (4) Refer to "4.3.10 Handling of Variable Commands, Parameter Input by Program, and Compensation Data Input by Program" for further details on all types of data set in the program while checking.
- (5) The program stops if there is a M00/M01 command. However, when executing the M01 command, drawing is stopped regardless of the ON/OFF status of the optional stop switch signal.
- (6) The tool shape is drawn using the value set in "Tool set" window (Radius, Length, ToolData1,2).  
As for the tool moving path, select with the parameter "#8920 3D tool Ofs Select", whether the tool compensation amount (radius dimension/length dimension) in Tool compensation screen is added to the path or not.  
When the compensation amount is added, pay an attention so that the compensation No. during tool length/radius compensation and T command value is the same number. Failure to observe this could result in over cutting or insufficient cutting because the tool shape does not match the machine position.
- (7) If the following data for new tool is "0" or no setting when changing the tool, the new tool is drawn with the default setting.
  - Type : "Drill" is selected when "Kind" is not set.
  - Length : 150mm (5.90 inch) when "Length" is "0".
  - Radius : 20mm (0.79 inch) when "Radius" is "0".
  - Color : "Red" is selected when "CL" is not set.
- (8) When the parameter "8920 3D tool Ofs Select" is set to "0" or "1", tool is drawn with its radius the default value (20mm) if the tool radius to be displayed is "0" or less.

- (9) The menu related to graphic function cannot be selected during the automatic operation with the trace mode ON.
- (10) The zero point mark is not drawn.
- (11) The contents of ONB display and buffer display in the check screen during automatic operation are the contents of the program during automatic operation. The contents of ONB display and buffer display in the operation screen during check execution are the contents of the program during check execution.
- (12) When operation search or check operation ("Check continu" or "Check step") is performed during program restarting, the operation message "in program restarting" is displayed, and the program will not be searched or graphically checked.

#### Notes for ending check

- (1) If an M02/M30 command is found, "Program check completed" occurs.
- (2) The check mode ends when check reset, the trace display is turned ON, etc.  
Use these operations to clear the error when a program error occurs.  
When the NC has been reset while the check screen is displayed, graphic check will be completed, but the menu for changing from 2D to 3D graphic check will be remained invalid. Press the Check reset menu to validate the switching operation.

#### Tool replacement method

- (1) Set the standby tool count in the parameters "#1327 3D ATC type". The tool replacement method with each parameter is as follows. (Tool replacement commands other than M6 (M22, etc.) are not supported.)

#1327 3D ATC type		0	1	2
Machining program	Header section	T1;	T1; T2;	
	Machining process section	M6T2; <div>Drawing by tool T1</div> M6T3; <div>Drawing by tool T2</div> M6TXX; (Note 1) <div>Drawing by tool T3</div>	M6T3; <div>Drawing by tool T1</div> M6TXX; <div>Drawing by tool T2</div> M6; <div>Drawing by tool T3</div>	M6T1; <div>Drawing by tool T1</div> M6T2; <div>Drawing by tool T2</div> M6T3; <div>Drawing by tool T3</div>
	End section	M6;	M6;	M6TXX;

**(Note 1)** TXX is the T number for the empty pot.

## Drawing position

- (1) Set the drawing position with the parameter "#8920 3D tool Ofs Select".

With the parameter "#8920 3D tool Ofs Select", select which data is used for calculation of the drawing position (tool center point), the tool compensation amount stored in the NC memory or the data set in the "Work set" window. In the table below;

"NC memory data" indicates "the compensation amount stored in the NC memory".

"3Ddata" indicates "the data set in the "Tool set" window".

Setting of #8920	Tool shape data used for display		Tool center position (Z axis)
0 (Tool measurement type I)	Radius compensation	NC memory data	In G43 modal: Machine position - 3Ddata
	Length compensation	3D data	In G44 modal: Machine position + 3Ddata
1 (Tool measurement type II)	Radius compensation	NC memory data	In G43 modal: Machine position - NC memory data
	Length compensation		In G44 modal: Machine position + NC memory data <b>(Note)</b> This setting cannot be used with tool measurement type I.
2 (Tool measurement type I)	Radius compensation	3D data	In G43 modal: Machine position - 3Ddata
	Length compensation		In G44 modal: Machine position + 3Ddata
3 (Tool measurement type II)	Radius compensation	3D data	In G43 modal: Machine position - 3Ddata
	Length compensation		In G44 modal: Machine position - 3Ddata <b>(Note)</b> This setting cannot be used with tool measurement type I.

**(Note 1)** As for the 1st and 2nd axis (basic axis I,J) and the 3rd axis (basic axis K) during G49 (tool compensation cancel mode), the machine position is applied to the drawing position.

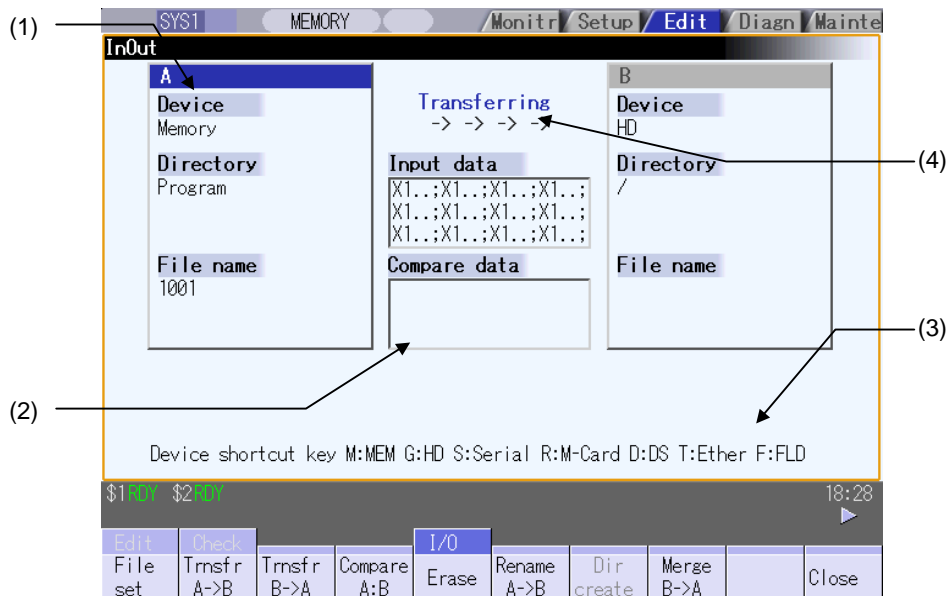
### 4.5 Program Input/Output

The machining program can input/output between the NC internal memory and the external input/output device. The hard disk inside the NC unit is also treated as an external device.

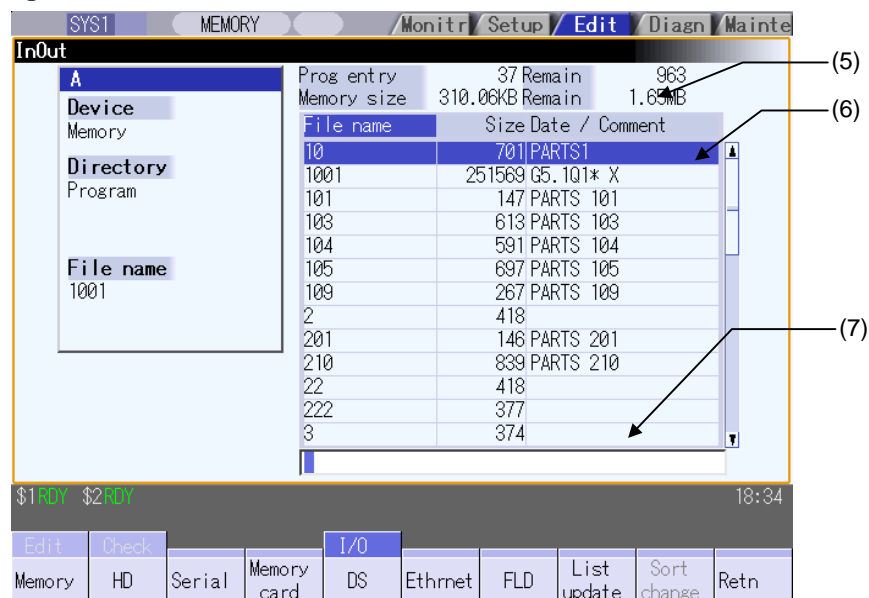
This function applies to the following devices.

- (1) Memory (NC internal memory)
- (2) HD
- (3) Serial
- (4) Memory card (front IC card)
- (5) DS (compact flash at NC)
- (6) Ethernet
- (7) FD

#### <During file transmission>



#### <During file setting>



## Display items

<b>Display item</b>	<b>Details</b>
(1) Device, directory, file name setting area	This sets the device, directory, and file name for which the transmission, compare, and erase functions are used. When the number of characters exceeds the display possible number (directory:63, file name:42), the excess is not displayed.
(2) Input/compare data display	This displays data that is being transferred or compared. If an error occurs while comparing data, the block for which the error occurred displays.
(3) Guidance display area	This displays the device name shortcut key.
(4) Process progress display section	This displays the details and data input/output direction for the process currently being performed.
(5) Capacity display section <b>(Note 1)</b>	This displays the file (machining program) registration count information and memory capacity information for the selected device. Number of programs registered : This displays the file (machining program) registration count. Remainder : This displays the remaining file registration count. This displays only when the memory is selected. Number of memory characters : This displays the memory character count. Remainder : This displays the remaining character count.
(6) List display section	This displays the device A or B directory contents list (directory and file name). File name : This displays the file (machining program) name. Size : This displays the file size. <DIR> displays in the case of the directory. Date/comment : The file comment (max. 17 characters) displays in the case of the memory device. The file update data displays in the case of the HD, memory card, DS, FD, or Ethernet devices.
(7) Input area	This displays the input key.

**(Note 1)** Some items may not be displayed depending on the device.

<b>Device</b> <b>Display item</b>	<b>Memory</b>	<b>HD</b>	<b>Serial</b>	<b>Memory card</b>	<b>DS</b>	<b>Ethernet</b>	<b>FD</b>
Number of programs registered	○	○	×	○	○	○	○
Remainder	○	×	×	×	×	×	×
Number of memory characters	○	○	×	○	○	○ *	○
Remainder	○	○	×	○	○	×	○
List	○	○	×	○	○	○	○

○ : Displayed      × : Not displayed

- When the Ethernet parameter "#97\*1 Host n no total siz" is set to 1, the number of host memory characters will not appear.

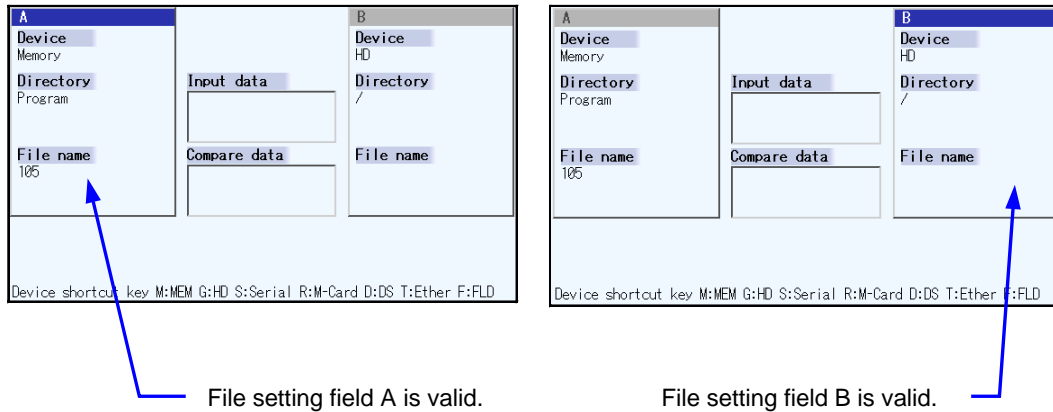
## Menus

Menu	Details	Type	Reference
File set	This sets the device, directory and file name for which input/output operations are performed.	A	4.5.2 Selecting a Device, Directory, and File
Transfr A→B	This copies the file in file setting column A file to file setting column B. (The originally transferred file is not affected.)	A	4.5.3 Transferring a File
Transfr B→A	This copies the file in file setting column B file to file setting column A. (The originally transferred file is not affected.)	A	
Compare A:B	This compares the files in file setting column A and file setting column B.	B	4.5.4 Comparing Files (Compare)
Erase	This erases the selected file in file setting column.	A	4.5.5 Erasing a File
Rename A→B	This changes the name of the file in file setting column A to that of in file setting column B. <b>(Note)</b> The same device must be selected for A and B.	A	4.5.6 Changing a File Name (Rename)
Dir create	This creates a new directory in the selected file setting column. The directory can be created when HD, memory card, DS or FD is selected for the device.	A	4.5.7 Creating a Directory
Merge B→A	This adds the file contents of file setting column B to file setting column A. (The file setting column B file is not affected.)	A	4.5.8 Merging a File
Close	This closes the pop-up window and quits this function.	C	
MemCrd format	The formats the memory card (front IC card).	A	4.5.9 Formatting an External Device
DS format	This formats the DS.	A	
FD format	This formats the FD.	A	
Stop	This interrupts the process (transfer, compare, etc.) during its execution.	C	

## 4.5.1 Changing the Valid Area

It is necessary to enable the areas including device, directory, and file name in the file setting column A or B in order to set those items.

Change the display area using the ,  direction cursor keys or the ,  tab keys.



## Changing file setting column B to a valid area (refer to upper right diagram)

- (1) Press the  or  key. ➡ File setting column B changes to a valid area.

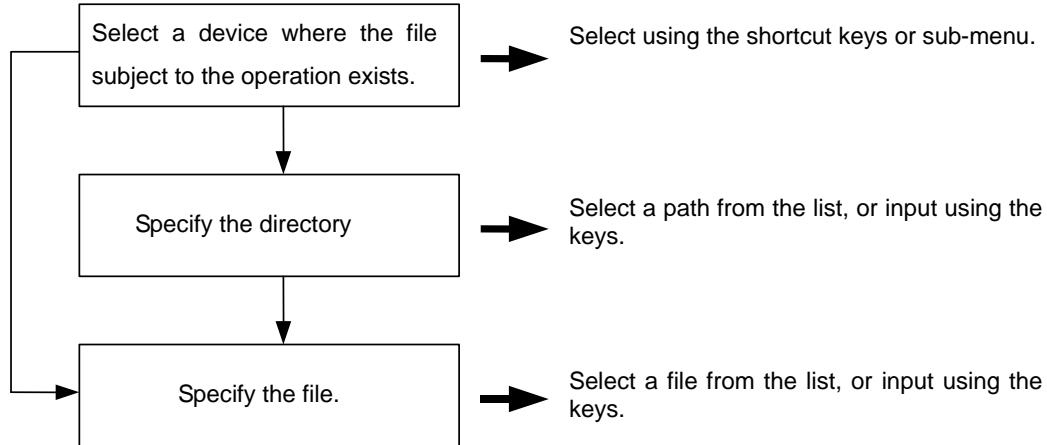
## Changing file setting column A to a valid area (refer to upper left diagram)

- (1) Press the  or  key. ➡ File setting column A changes to a valid area.

### 4.5.2 Selecting a Device, Directory, and File

This section explains the file device, directory, and file name specification methods for the file transfer and erase commands etc. performed on this screen.

#### File operation procedure



#### Outline of device, directory, and file name designating methods

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

- (1) The device can be selected using the sub-menu or shortcut keys.  
(The devices that can be used will differ depending on the specifications.)
- (2) One of the following methods can be used to designate the directory (for devices other than the NC memory) and file name.
  - Designate the directory path or file name in the input area and press the  key.
  - Move the cursor in the list display section to the target directory or file name and press the  key.

A wildcard (\*) can be used for the file name.

**(Note)** When the number of characters of directory path (full path) exceeds 128, changing directories cannot be performed.

#### Notes when selecting a file

- (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.
- (2) When selecting a fixed cycle program, it is necessary to set the basic common parameter "#1166 fixpro". Furthermore, select "Memory" for the device, and "Program" for the directory.



### Operation method (Selecting an NC memory program)

- (1) Press the **M** short cut key.



The device name changes to "Memory".  
"Program" appears in the directory.

- (2) Press the menu File set.



The NC memory program list and input area appear.

<b>A</b>	Prog. entry	37	Remain	963
<b>Device</b>	Memory size	310,060KB	Remain	1.65MB
Memory	<b>File name</b>	<b>Size</b>	<b>Date</b>	<b>Comment</b>
	10	701 PARTS	1	
	1001	251569 G5, 101*	X	
<b>Directory</b>	101	147 PARTS	101	
Program	103	613 PARTS	103	
	104	591 PARTS	104	
<b>File name</b>	105	631 PARTS	105	
1001	109	267 PARTS	109	
	2	418		
	201	146 PARTS	201	
	210	839 PARTS	210	
	22	418		
	222	377		
	3	374		

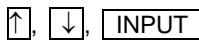
The menu appears as follows.

Memory	HD	Serial	Memory card	DS	Ethernet	FD	List update	Sort change	Retn
--------	----	--------	-------------	----	----------	----	-------------	-------------	------

By pressing the operation menu at this point, it is possible to change the device.

When selecting the file name from the list

- (3) Move the cursor to the file name to be selected, and fix.



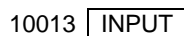
The selected file name appears.  
The list and input area are cleared, and the screen returns to the original display.  
The menu returns to its original display.

A		B
Device Memory		Device HD
Directory Program	Input data <div></div>	Directory /
File name 105	Compare data <div></div>	File name

Device: shortcut key M:MEM G:HD S:Serial R:M-Card O:DS T:Ether F:FLD

When inputting the file name from the input area:

- (3) Input the file name.



The input file name appears.  
The list and input area are cleared, and the screen returns to the original display.  
The menu returns to its original display.

## Designating multiple files

A wildcard (\*) can be used for the file name.

By using a wildcard, multiple files can be transferred, compared, and erased at one time.

**[Ex. 1] When programs 1 to 1000 exist in the NC memory.**

Designate "\*" in the file name : The target program is "1 to 1000".

Designate "\*. \*" in the file name : There is no target program.

Designate "1\*" in the file name : The target program is "1, 10 to 19, 100 to 199, 1000".

Designate "1\*.\*" in the file name: There is no target program.

Designate "\*1" in the file name : The target program is that where the position of the 1 is "1".  
(1, 11, 21, 31, .....101, 111, .....981, 991)

Designate "\*1\*" in the file name : The target program is all of the programs containing "1".

(1, 10 to 19, 21, 31, .....100 to 199, 201, 210, .....981, 991, 1000)

Designate "1\*1" in the file name: The target program is "11, 111, 121, 131, 141, 151, 161, 171, 181, 191".

**[Ex. 2] When programs 1.PRГ to 1000.PRГ, and 1 to 1000 exist in the HD.**

Designate "\*" in the file name : The target program is "1 to 1000".

Designate "\*. \*" in the file name : The target program is "1.PRГ to 1000.PRГ".

Designate "1\*" in the file name : The target program is "1, 10 to 19, 100 to 199, 1000".

Designate "1\*.\*" in the file name: The target program is "1.PRГ, 10.PRГ to 19.PRГ, 100.PRГ to 199.PRГ, 1000.PRГ".

## Operation method (Selecting a file from a device other than the NC memory)

- (1) Press a device selection shortcut key.

(Example)



The device name changes to "HD".

The root directory (/) appears in the directory.

- (2) Press the menu .



The HD program list and input area appear.

A		Prog. entry	28	Remain.
Memory size		16,01MB	Remain.	3,40GB
Device	File name	Size	Date	Comment
HD	DIR			
Directory	DIR			
/				
	1001	251572	Aug 01 18:28	2004
	2	421	Jun 22 09:44	2004
	22	421	Jun 22 09:36	2004
	222	388	Apr 23 16:21	2004
	3	377	Jun 07 13:09	2004
	348	163	Jul 08 15:26	2004
	4	385	Jun 22 09:36	2004
	5	393	Jun 22 09:37	2004
	51	1575	May 21 11:33	2003
	777	4911	Jul 22 10:49	2004
	888	4958	Jul 22 10:53	2004

A menu similar to the following appears.

Memory	HD	Serial	Memory card	DS	Ethernet	FD	List update	Sort change	Retn
--------	----	--------	-------------	----	----------	----	-------------	-------------	------

By pressing the operation menu at this time, the device can be changed.

When selecting a directory from the list.

- (3) Move the cursor to the directory to be selected and fix.

, ,



The directory selected in the directory column appears.

The contents of the selected directory appear in the list.

Select ".." to move to one directory above.

There is no change when "." is selected.

Repeat this operation until the cursor arrives at the target directory.

Next, refer to operation (4).

When inputting a directory from the input area:

- (3) Input the directory path.

(Example) /PRG/PRECU



The input directory path appears in the directory column.

When selecting the file name from the list.

- (4) Move the cursor to the file name to be selected and fix.

, ,



The file name selected in the file name column appears.

The list and input area are cleared, and the screen returns to the original display.

The menu display returns to normal.

A		B
Device HD		Device Memory
Directory /PRG/PRECU/	Input data <input type="text"/>	Directory Program
File name 5	Compare data <input type="text"/>	File name

Device shortcut key M:MEM G:HD S:Serial R:M-Card D:DS T:Ether F:FLD

When inputting a file name from the input area:

- (4) Input the file name.

10013.PR



The file name input in the file name column appears.

The list and input area are cleared, and the screen returns to the original display.







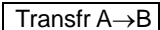

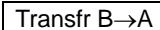



The menu display returns to normal.

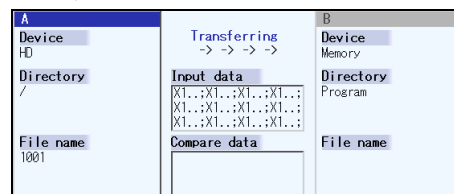
### 4.5.3 Transferring a File

This section explains the method used to transfer files between different devices, or between the same device.

Refer to "4.5.2 Selecting a Device, Directory, and File" for details of the device, directory, and file specification method.

#### Operation method

- (1) Use the  or  key to select file setting column A.
- (2) Designate the transfer source device, directory and file name.  The designated file displays in file setting column A. A wildcard "\*" can be used for the file name to designate multiple files.
- (3) Use the  or  key to select file setting column B.
- (4) Designate the transfer destination device, directory and file name.  The designated file appears in file setting column B.
- (5) Press the menu .  A message appears to confirm the transfer.  
Press the menu  when transferring from device B to device A.
- (6) Press the  or  key.  File transfer is commenced. The process progress display area displays message indicating that transfer is in progress, and also indicates the transfer direction. Furthermore, the data being transferred appears in the input/comparison data display area of the input data display column.



A message appears indicating a transfer completion after transfer has been completed.

### CAUTION



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

The programs created on the Edit screen are stored in the NC memory in a "CR, LF" format, however, the programs created with external devices such as the FD 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.

**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 occur.
- (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 matching 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 FD's root directory.

**Notes (Notes when transferring machining program files)**







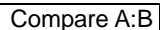

- (1) For the serial, always set both ends of the "EOR" code at the head and end to feed (NULL). If "EOB" etc., is directly after "EOR", the operation may not be executed normally due to the input buffer influence during the next input operation.
- (2) The transfer speed is slower if there are many registrations.
- (3) The size of one block of the machining program to be transferred should be 250 characters or less.
- (4) When using tape, carry out parity V adjustment to improve the reliability of the tape format. Then use it with the input/output parameter "Parity V" validated.
- (5) When the machine tool builder macro and fixed cycle program are input, change the program type with the parameter (#1166 fixpro). Also, set the device and directory as follows.  
 Device: Memory, Directory: Program
- (6) Transferring or verifying the multiple files between the external device connected serially and that other than the serial connection.
- (7) With machining program created by the MELDAS500 Series or earlier model, "EOB" is registered as "LF". However, when these programs are stored in the 700 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 model, having the same specifications as the maximum memory capacity, are stored in the 700 Series NC memory, the memory capacity may be exceeded.

### 4.5.4 Comparing Files (Compare)

This chapter explains method used compare files after transferring.

Refer to "4.5.2 Selecting a Device, Directory, and File" for details of the device, directory, and file specification method.

#### Operation method

- (1) Use the  or  key to select file setting column A.
- (2) Designate the device, directory and file name to be compared.  The designated file name appears in file setting column A.
- (3) Use the  or  key to select file setting column B.
- (4) Designate the other device, directory and file name to be compared.  The designated file name appears in file setting column B.
- (5) Press the menu .  The file comparison starts.  
The input data and comparison data appear in the input/comparison data display area.  
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.

Input data				
.	;X1.	;X1.	;X1.	;X1
.	;X1.	;X1.	;X1.	;X1
.	;X1.	;X1.	;X1.	;X1
Compare data				
.	;X1.	;X1.	;X1.	;X1
.	;X1.	;X1.	;X1.	;X1
.	;X1.	;X1.	;X1.	;X1

**(Note)** Files that can be compared are text files only.  
Correct outcome will not be obtained through binary file comparison.

### 4.5.5 Erasing a File

This chapter explains the method used to delete files.

Refer to "4.5.2 Selecting a Device, Directory, and File" for details of the device, directory, and file specification method.

#### Operation method (Deleting a file in file setting column A)

- (1) Use the  or  key to select file setting column A.
- (2) Designate the device, directory and file name to be erased. ➡ The designated file appears in file setting column A.
- (3) Press the menu . ➡ A message to confirm the erasing appears.
- (4) Press the  or  key. ➡ 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.

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

#### Operation method (Deleting a file in file setting column B)

Use the  or  key to select file setting column B, and designate the device, directory, and file name for file setting column B. Following this, the operation method is same as for "Deleting a file in file setting column A".

### 4.5.6 Changing a File Name (Rename)

This section explains the method used to change the file name.

Refer to "4.5.2 Selecting a Device, Directory, and File" for details of the device, directory, and file specification method.

#### (1) Changing a file name

- (1) Use the  or  key to select file setting column A.
- (2) Designate the device, directory and file name before the change. ➡ The designated file appears in file setting column A.
- (3) Use the  or  key to select file setting column B.
- (4) Designate the device, directory, and file name after the change. ➡ The designated file appears in file setting column B.
- (5) Press the  menu.
- (6) Press the  or  key. ➡ 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 or program restarting, an error will occur, and the name will not be 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.

**(Note 4)** The directory where the file in operation search/check search is stored cannot be renamed. The operation message "Can't rename designated file" appears.



### 4.5.7 Creating a Directory

This section explains the method used to newly create a directory.

Refer to "4.5.2 Selecting a Device, Directory, and File" for details of the device, directory, and file specification method.

#### Operation method

- (1) Use the  or  key to select file setting column A.

- (2) Designate the device



The designated device name appears.  
The devices that can create a directory are HD, FD, Memory card and DS.

- (3) Select a directory to be newly created from the list, or designate by inputting from the input area.



The designated details appear.

A		Prog entry	6 Remain
Device	HD	Memory size	1.54KB Remain 3.40GB
Directory		File name	Size Date / Comment
/PRG/PRCUT/		1	DIR
		2	DIR
		3	421 Jun 22 09:44 2004
		4	377 Jun 07 13:09 2004
		5	385 Jun 22 09:36 2004
		6	393 Jun 22 09:37 2004

- (4) Set the new directory in the input area and press  key.



The set directory name appears.

- (5) Press the  menu.



The directory is created.

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

**(Note1)** Up to 223 files, including the directory, can be registered in the FD's root directory.

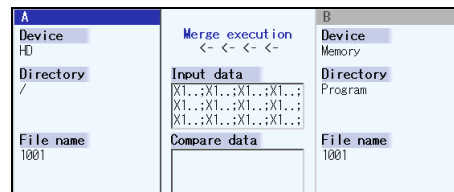
**(Note2)** Make sure that the directory path is less than 100 characters. When the path exceeds 100 characters, it cannot be recognized as a path.

### 4.5.8 Merging a File

This section explains the method used to add a file in file setting column B to a file in file setting column A. Refer to "4.5.2 Selecting a Device, Directory, and File" for details of the device, directory, and file specification method.

#### Operation method

- (1) Use the  or  key to select file setting column A.
- (2) Designate the merge destination device, directory, and file name. ➡ The designated file name appears in file setting column A.
- (3) Use the  or  key to select file setting column B.
- (4) Designate the merge source device, directory, and file name. ➡ The designated file name appears in file setting column B.
- (5) Press the menu  Merg B→A. ➡ A message confirming the merge appears.
- (6) Press the  Y or  INPUT key. ➡ The file merge starts.  
The data being merged appears in the input/comparison data display area input data display column.  
Furthermore, a message indicating that merging is being performed, and an arrow from the merge source (file setting column B) to the merge destination (file setting column A) display in the process progress display area.



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.

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

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, FD, memory card and DS.

### 4.5.9 Formatting an External Device

This section explains the method to format the external devices.



#### Operation method (Formatting an FD)

- (1) Insert a floppy disk in the FD drive, and press the menu **FD format**  A message confirming the formatting appears.
- (2) Press the **Y** or **INPUT** key.  The FD is formatted.  
A message appears when the formatting is completed.

**(Note 1)** The FD is formatted with FAT (1.44MB).

**(Note 2)** The volume label is set when formatting the FD.

#### Operation method (Formatting a memory card)

- (1) Press the menu **MemCrd format**  A message confirming the formatting appears.
- (2) Press the **Y** or **INPUT** key.  The memory card is formatted.  
A message appears when the formatting is completed.

**(Note 1)** The memory card and data server are formatted with FAT16.

**(Note 2)** The volume label is set when the memory card is formatted.

#### Operation method (Formatting a DS)

First, press the menu **DS format**. The following operations are the same as "Formatting a memory card".

**(Note 1)** Only the DS formatted with FAT16 can be used. The DS with NTFS cannot be used.

**(Note 2)** As for the DS formatted with NTFS, reformat it with FAT formatted by Windows to use.  
(NC cannot convert NTFS partition to FAT formatted.)

**(Note 3)** The volume label is not set even when the DS is formatted.

### 4.5.10 List of File Names

There is a directory for each type of data in the NC memory.

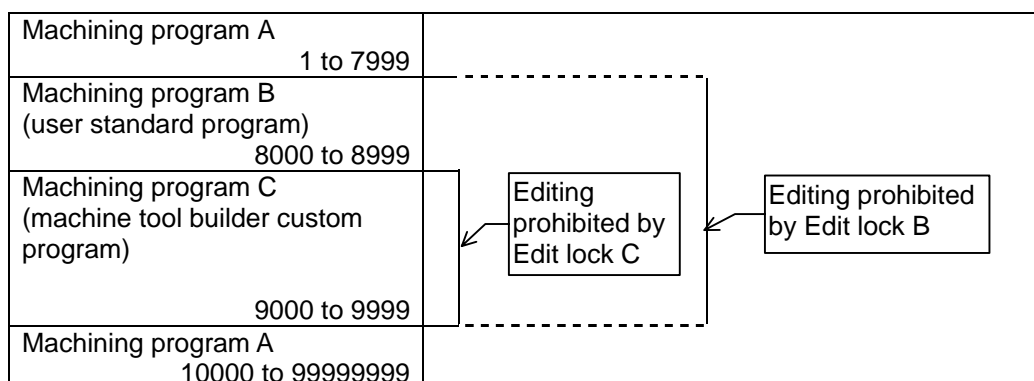
The NC memory directory and file name handled on this screen is as follows.

Furthermore, when storing the NC memory file in a device other than the NC memory, be careful not to change the file extension (.XXX).

Data type	NC memory directory path	File name
Machining program	/PRG/USER	(Program No.)
Fixed cycle program	/PRG/FIX	(Program No.)

## 4.5.11 Edit Lock B and C

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



The operations below in the Edit MDI and the Input/Output screens are influenced by the edit lock setting. An error will occur 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	○	×	×	○	○	×
Edit (Input/Output)	Transfer	○	×	×	○	○	×
	Compare	○	×	×	○	○	×
	Copy	○	×	×	○	○	×
	Merge	○	×	×	○	○	×
	Rename	○	×	×	○	○	×
	Erase	○	×	×	○	○	×
Operation	Buffer correction	○	×	×	○	○	×

**(Note)** When the multiple part system specification is valid, the machining programs of all the part systems are protected by edit lock B and C.

## 4.5.12 Program Display Lock C

This function prohibits display and search for machining program C (machine tool builder custom program). The following influences are received on each screen according to parameter "#1122 pglk\_c".

## Influences of program display lock parameter on operation screen

#1122 pglk_c Screen operation	1 (Display:○ Search:×)	2 (Display:× Search:×)
Buffer display of operating program	The program contents are not displayed. Only "%" is displayed.	
Display when <b>Program display</b> highlights on 2D check full-screen		
When the menu <b>Edit</b> was pressed	The operation message "Program display lock C" appears. The window is opened. (When the edit lock B or C is valid, edit lock B or C is given to priority.)	
When the main menu <b>P corr</b> was pressed		
Search from the operation search window	The search can be executed.	The search cannot be executed. The operation message "Program display lock C" appears. The window is not closed. The contents of input area are not cleared.
Search from the restart search window		
Search from the top search window (of restart search)		

## Influences of program display lock parameter on operation screen

#1122 pglk_c Screen operation	1 (Display:○ Search:×)	2 (Display:× Search:×)
The file is automatically opened when changing the edit screen (Note 1)	The program contents are not displayed. Only "%" is displayed.	- (It is not possible to search, so the file is never automatically opened when changing the edit screen.)
When the file is opened by the menu <b>Open</b> .	The operation message "Program display lock C" appears. The window is not closed. (When the edit lock B or C is valid, edit lock B or C is given to priority.)	
When the main menu <b>P corr</b> was pressed	The program contents are not displayed. Only "%" is displayed.	
Right side program display when check main menu is selected		
Search from the operation search window of 2D/3D check	The search can be executed.	The search cannot be executed. The operation message "Program display lock C" appears. The window is not closed.

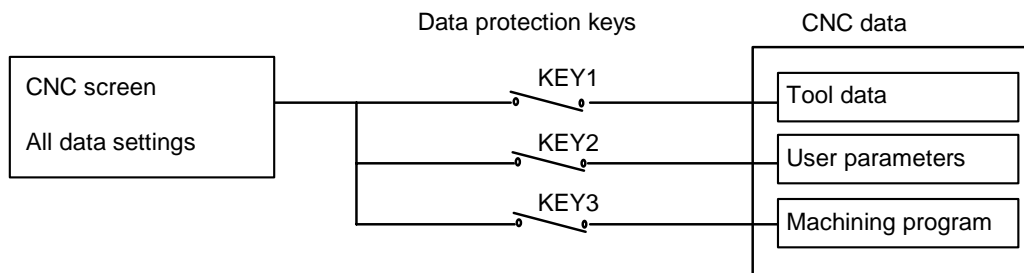
**(Note 1)** When changing the edit screen, the file opened immediately before or operation searched/check searched is automatically opened.

### 4.5.13 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 tool builder. For further details, refer to the instruction manual issued by the machine tool builder.)

- (1) KEY1: Provides general protection for tool data and protection of the coordinate system preset using the origin set.
- (2) KEY2: Protects user parameters and common variables.
- (3) KEY3: Protects the machining program.

Data settings and deletion is stopped if any of the data protection keys is OFF.



### Machining program protection (KEY3)

When the KEY3 is OFF, the following operations are stopped.

No.	Operation details	Screen
1	MDI data memory registration	Edit
2	Machining program editing	Edit
3	New machining program creation	Edit
4	Comment setting for programs being registered	Edit
5	Machining program registration to memory, verification, input/output	Edit
6	Machining program deletion (1 program, all)	Edit
7	Comment setting for programs being registered	Edit
8	Machining program copy, file name change, merge	Edit
9	Machining program buffer correction	Operation

**(Note 1)** If editing or settings, etc. are performed on the screens shown above when KEY3 is OFF, a "Data protect" message appears.

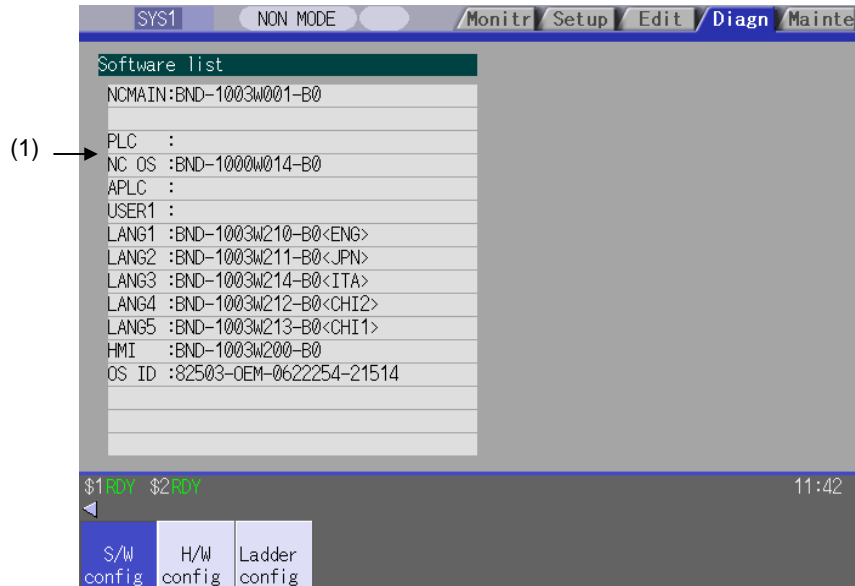
**(Note 2)** When the multiple part system specification is valid, editing and input/output of the machining programs of all the part systems are prohibited by KEY3.

## 5. Diagnosis Screens

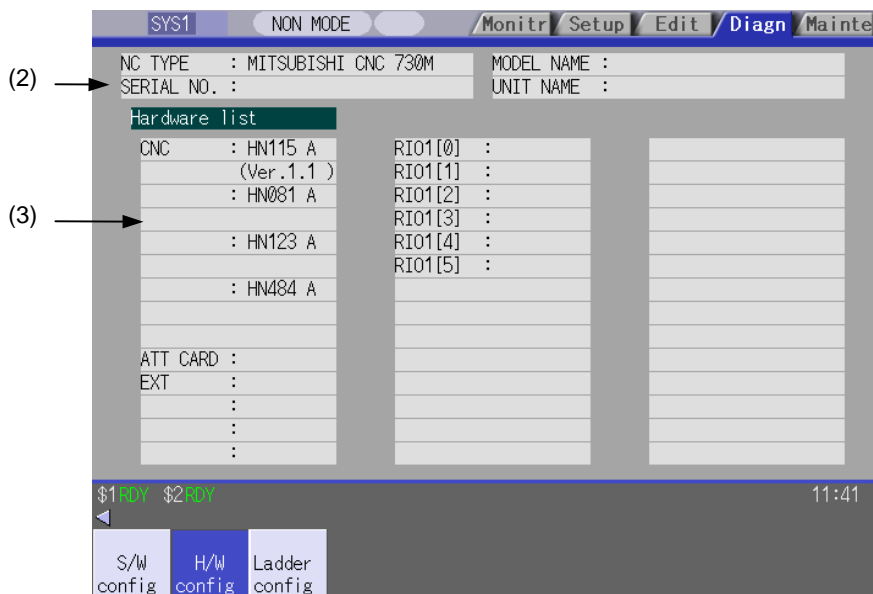
### 5.1 System Configuration Screen

The hardware configuration (card name and sub-number), software configuration (software number and sub-number), and PLC program configuration (file name, file label, and execution type) are displayed in this screen.

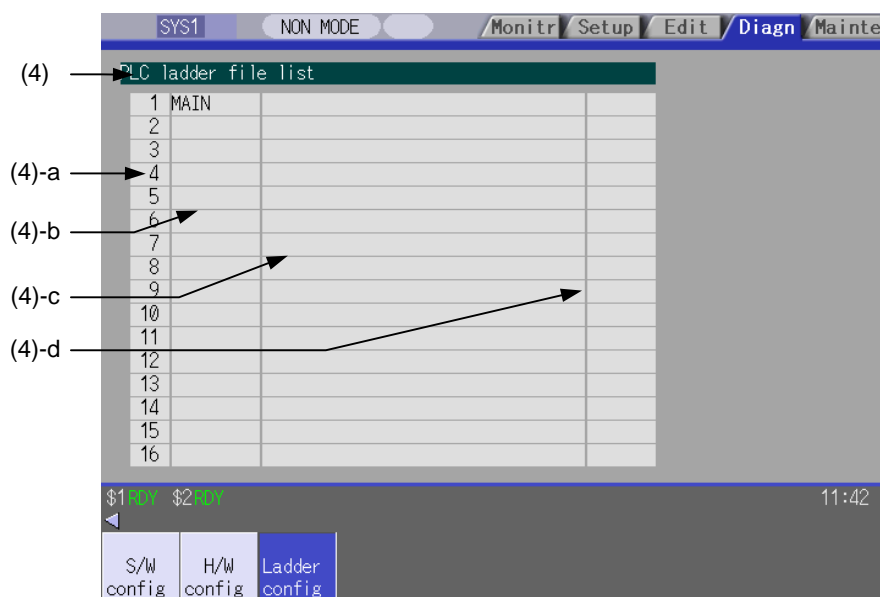
#### ■ Software configuration



#### ■ Hardware configuration



## ■PLC program configuration





## 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 model name, serial No, model type, and unit type.	
	NC TYPE: MITSUBISHI CNC 75XL	NC type (The model names include 730M, 735M, 750L and 755L.)
	MODEL NAME: FCA730	Model name (The model names include FCA720, FCA730 and FCA750.)
	SERIAL NO.: M7123456789	Serial No.
	UNIT NAME: FCU7-MU011	Unit type (The unit type differs according to the model.)
(3) Hardware list (to the next page)	This displays each hardware name.	
	CNC : HN115A : HN081A : HN122A : HN48xA	Main card with LANCPU Power card CPU card (Differs between M720, M730, M750) Memory card (Differs between M720, M730, M750 (hardware option)) The CNC unit is composed of four PCBs. Bus connections are used with all cards.
	ATT CARD : HN392A	Card enclosed with CNC card. The operation board I/O unit are connected to it. The operation board I/O unit uses a remote IO connection.
	EXT : EX891 : HR553 : HR577	Back panel Extension unit Extension unit The extension unit is a hardware option. The PLC high-speed engine or PROFIBUS card, etc. is connected. The back panel + up to three cards are displayed.


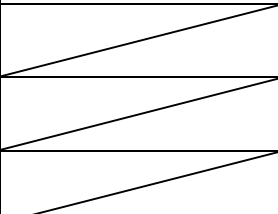




## 5. Diagnosis Screens

### 5.1 System Configuration Screen

Display item	Details															
(from the previous page)	RI01 [n] : RI02 [n] : RI03 [n] :	Remote IO unit 1 (n = 1 to 8) Remote IO unit 2 (n = 1 to 8) Remote IO unit 3 (n = 1 to 6)  There are up to three channels. The 7th and 8th station of the RIO3 channel is fixed for use with the handle I/F and is not displayed.														
(4) PLC ladder file list	This displays the file name, file label, execution type for each PLC ladder program. Use  ,  keys to change the pages and refer it.															
	(a) Registration No.	This displays the registration No. of each PLC program file. Registration size is max. 32 files. The target file to be executed is max. 20 files.														
	(b) File name	This displays the file name of PLC program file. (data of GX Developer) Max. 8 characters.														
	(c) File label	This displays this file label of PLC program file. (data of GX Developer) Max. 32 characters.														
	(d) Execution type	This displays the execution type of PLC program. <table><tr><th>Display</th><th>Meaning</th></tr><tr><td>HIGH</td><td>High-speed PLC program</td></tr><tr><td>MIDDLE</td><td>Middle-speed PLC program</td></tr><tr><td>INITIAL</td><td>Initial state of PLC program</td></tr><tr><td>WAIT</td><td>Standby PLC program</td></tr><tr><td>LOW</td><td>Low-speed PLC program</td></tr><tr><td>(blank)</td><td>Not the target of the execution.</td></tr></table>	Display	Meaning	HIGH	High-speed PLC program	MIDDLE	Middle-speed PLC program	INITIAL	Initial state of PLC program	WAIT	Standby PLC program	LOW	Low-speed PLC program	(blank)	Not the target of the execution.
	Display	Meaning														
HIGH	High-speed PLC program															
MIDDLE	Middle-speed PLC program															
INITIAL	Initial state of PLC program															
WAIT	Standby PLC program															
LOW	Low-speed PLC program															
(blank)	Not the target of the execution.															

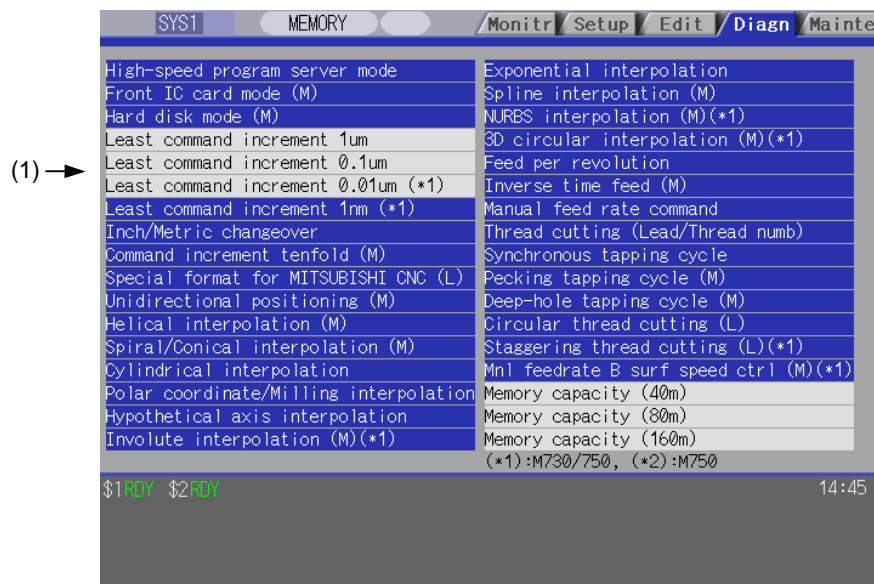
### Menus

Menu	Details	Type	Reference
	This displays the software list.	C	
	This displays the hardware list.	C	
	This displays the PLC program list (file name, file label, and execution type)	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.



### Display items

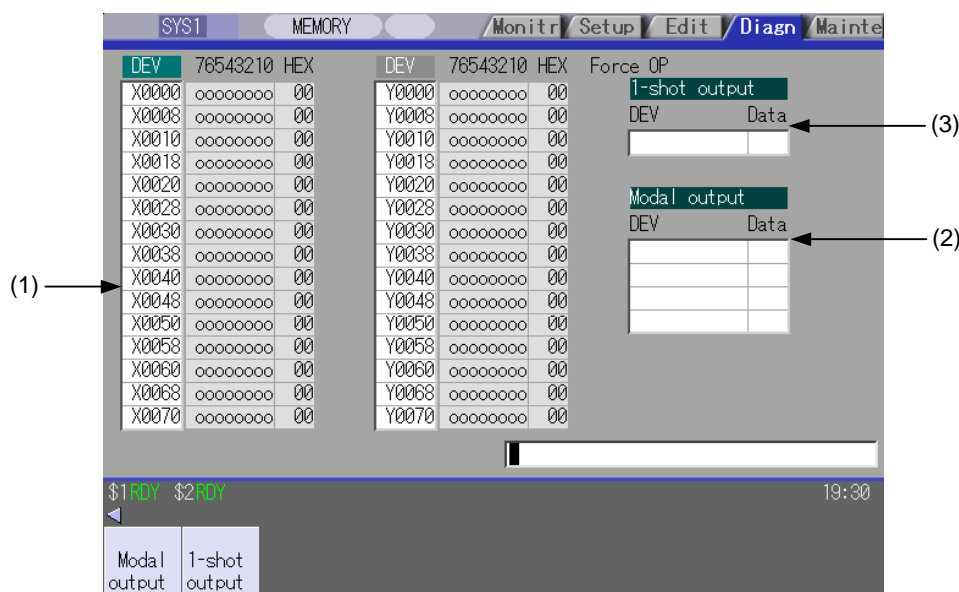
Display item	Details
(1) Option items	The list of currently usable options are displayed. As for the currently usable options, the background color is displayed in blue. The option set when the power supply was turned ON can be currently used.

### 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.



#### Display items

Display item	Details
(1) Device No. and input/ output signal value (binary/ hexadecimal display)	<p>This displays the data from the device Nos. designated in the setting area in numerical order.</p> <p>The data is displayed as binary (bit units) and hexadecimal values.</p> <p>Individual device Nos. can be displayed separately in the left area and right area.</p> <p>Select the valid area with the and <math>\leftarrow</math> key when <math>\rightarrow</math> operations such as display changeover and data setting are carried out.</p> <p>Each X, Y, M, F, L, SM, TI, TO, TS, TA, STI, STO, STS, STA, CI, CO, CS, CA, D, R, SB, B, V, SW, SD, W, P, K, and H data is the target data.</p>
(2) Modal output	<p>This displays the data and device to carry out modal output.</p> <p>The details to be defined are set here when carrying out the modal type forced output of PLC interface signals.</p> <p>Refer to "5.3.2 Carrying Out Modal Output" for details.</p>
(3) 1-shot output	<p>This displays the data and device to carry out one-shot output.</p> <p>The details to be defined are set here when carrying out the one-shot type forced output of PLC interface signals.</p> <p>Refer to "5.3.3 Carrying Out One-shot Output" for details.</p>

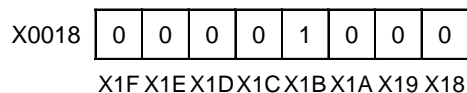
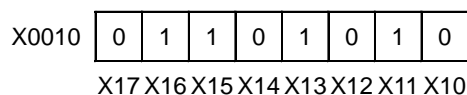
### Menus

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

### How to read the device No. and display data

A device is an address for classifying a signal handled in the PLC. A device No. is a series of numbers attached to that device.

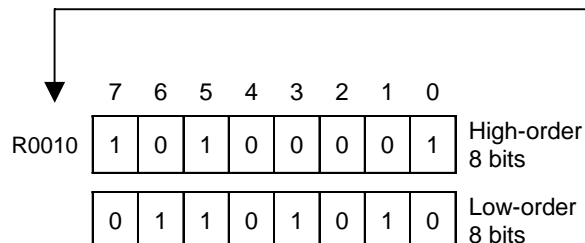
Device No. (bit-type)



DEV	76543210	HEX
X0000	00000000	00
X0008	10100001	A1
X0010	01101010	6A
X0018	00001000	08
X0020	01111100	7C
X0028	00001111	0F
X0030	00000010	02

Signal status display corresponding to each device No. (I/O)

Device No. (word-type)



DEV	76543210	HEX
R00010	10100001	A1
	01101010	6A
R00011	00001001	09
	00001011	05
R00012	00010010	12
	00001100	06
R00013	00001010	0A
	00010101	15

## List of devices for PLC uses

Device	Device No.	No. of points	Units	Details
X (*)	X0 to X1FFF	8192	1-bit	Input signals to the PLC. Machine input, etc.
Y	Y0 to Y1FFF	8192	1-bit	Output signals to the PLC. Machine output, etc.
M	M0 to M10239	10240	1-bit	For temporary memory
F	F0 to F1023	1024	1-bit	For temporary memory. Alarm message interface.
L	L0 to L511	512	1-bit	Latch relay (Backup memory)
SM (*)	SM0 to SM127	128	1-bit	Special relay
TI	TI0 to TI703	704	1-bit	Timer contact
TO	TO0 to TO703	704	1-bit	Timer output
TS	TS0 to TS703	704	16-bit	Timer setting value
TA	TA0 to TA703	704	16-bit	Timer current value
STI	STI0 to STI63	64	1-bit	Integrated timer contact
STO	STO0 to STO63	64	1-bit	Integrated timer output
STS	STS0 to STS63	64	16-bit	Integrated timer setting value
STA	STA0 to STA63	64	16-bit	Integrated timer current value
CI	CI0 to CI255	256	1-bit	Counter contact
CO	CO0 to CO255	256	1-bit	Counter output
CS	CS0 to CS255	256	16-bit	Counter setting value
CA	CA0 to CA255	256	16-bit	Counter current value
D	D0 to D2047	2048	16-bit	Data register
R (*)	R0 to R13311	13312	16-bit	File register
SB	SB0 to SB1FF	512	1-bit	MELSEC NET/10 link special relay
B	B0 to B1FFF	8192	1-bit	MELSEC NET/10 link relay
V	V0 to V255	256	1-bit	MELSEC NET/10 edge relay
SW	SW0 to SW1FF	512	16-bit	MELSEC NET/10 link special register
SD	SD0 to SD127	128	16-bit	MELSEC NET/10 special register
W	W0 to W1FFF	8192	16-bit	MELSEC NET/10 link register

**(Note)** The use of devices marked with a \* mark in the device column has 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.

## Displaying the data of a arbitrary 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  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.

## Changing the display with the page keys

The valid area device Nos. change in page units when / is pressed. Changing of the pages stops within the range of device numbers of which the device has.

- (1) Press the  key.



The data is displayed from the next number currently displayed.

DEV	76543210	HEX	DEV	76543210	HEX
X0000	10000001	81	Y0000	00000000	00
X0008	00000010	02	Y0008	00000001	01
X0010	00001111	0F	Y0010	00000000	00
X0018	10011111	9F	Y0018	00000000	00



DEV	76543210	HEX	DEV	76543210	HEX
X0080	11111111	FF	Y0000	00000000	00
X0088	01000000	40	Y0008	00000001	01
X0090	00001111	0F	Y0010	00000000	00
X0098	00000000	00	Y0018	00000000	00

### 5.3.2 Carrying Out Modal Output

Modal type forced output of PLC interface signals is carried out. Once set, this data is held until cancelled, 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.

#### Menus used in modal output

Menu	Details	Type	Reference
Modal clear	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	"Releasing the modal output"

#### 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. ➔ 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 cancelled by pressing the ◀ key.  

X0048/1 INPUT

**(Note 1)** The data of the modally output device is displayed in order in the selected area.


This modal output is held until the output is cancelled or the power is turned OFF.

**(Note 2)** When no data is set (Ex. "X0048/", "X0048"), the operation message "Setting Data not found" is displayed.

#### 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 cancelled 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 during machine operation.

### 5.3.3 Carrying Out One-shot Output

The one-shot type PLC interface signal forced output is forcibly output only once during the screen operations. Thus, it may not be possible to confirm the PLC interface signals updated with the PLC on the screen.


#### One-shot outputting data "1" to device "X0042"

- |   |   |   |
|---|---|---|
| (1) Press the menu key <span style="border: 1px solid black; padding: 2px;">1-shot output</span> .  | ➔ | 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 <span style="border: 1px solid black; padding: 2px;">INPUT</span> key.<br><div style="border: 1px solid black; padding: 5px; margin-top: 5px; width: fit-content;">           X0042/1 <span style="border: 1px solid black; padding: 2px;">INPUT</span> </div> | ➔ | 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.<br>The data of the one-shot output device is displayed in order in the selected area.<br>The one-shot output mode is cancelled by pressing the <span style="border: 1px solid black; padding: 2px;">◀</span> key. |

**(Note 1)** 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.

**(Note 2)** When no data is set (Ex.: "X0048/", "X0048"), the operation message "Setting Data not found" is displayed.

### Caution

-  Pay close attention to the sequence operation when carrying out forced data setting (forced output) in the I/F diagnosis screen during mach



### 5.4 Drive Monitor Screen

The diagnosis information from the drive section can be monitored with this screen.

Servo axis unit, spindle unit, power supply unit and synchronous error information is displayed.

SYS1		NON MODE		Monitr	Setup	Edit	Diagn	Mainte
	X1	Y1	Z1	C1				
(1) → Gain (1/s)	0	0	0	0				
Droop (i)	0	0	0	0				
Speed (r/min)	0	0	0	0				
Feedrate (mm/s)	0	0	0	0				
Load current (%)	0	0	0	0				
Max current 1 (%)	0	0	0	0				
Max current 2 (%)	0	0	0	0				
Max current 3 (%)	0	0	0	0				
Overload (%)	0	0	0	0				
Regen load (%)	0	0	0	0				
Est disturb torq(%)	0	0	0	0				
Max disturb torq(%)	0	0	0	0				
(2) → Load inertia R. (%)	0	0	0	0				
AFLT frequency (Hz)	0	0	0	0				
AFLT gain (dB)	0	0	0	0				
LED display	00	00	00	00				
Alarm	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00				
\$1EMG \$2EMG						18:41		
Servo unit		Spindle unit		Power unit		AUX unit		
						Synchro error		
						Alarm his clr		
						Next axis		

#### Display items



Display item	Details
(1) Monitoring items	This displays each item being monitored. The display is changed using the page changeover keys.
(2) Data of each axis and unit	This displays the data of each axis or each unit being monitored.

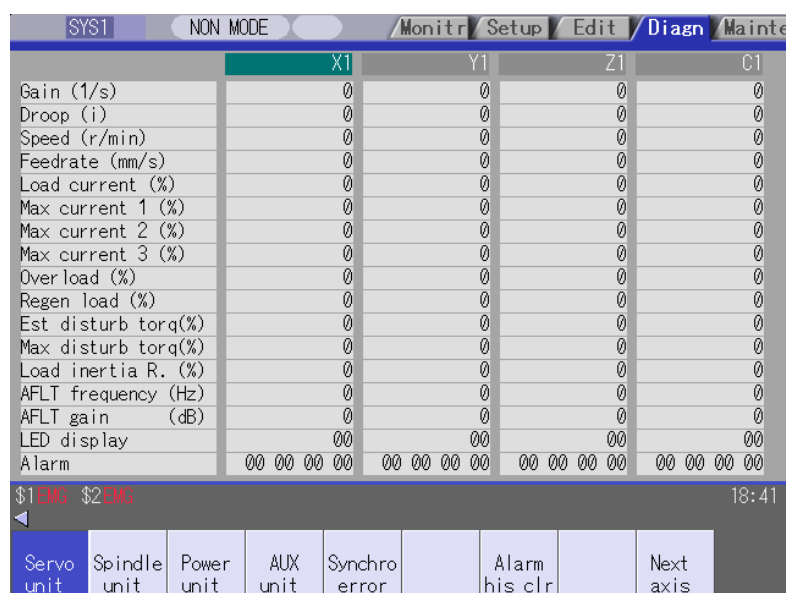
## Menus

Menu	Details	Type	Reference
Servo unit	This displays the diagnosis information of the servo unit in the data display area.	B	5.4.1 Servo axis unit display items
Spindle unit	This displays the diagnosis information of the spindle unit in the data display area.	B	5.4.2 Spindle unit display items
Power unit	This displays the diagnosis information of the power supply unit in the data display area.	B	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. The menu appears and operation is possible only when there is one or more valid auxiliary axes in the auxiliary axis control.	B	5.4.4 Display items for the auxiliary axis unit
Synchro error	This displays the diagnosis information of the synchronous error in the data display area. The menu appears and operation is possible only when the synchronous control axis option is valid.	B	5.4.5 Display items for the synchronous error
Alarm his clr	This clears the diagnosis information alarm history.	A	5.4.6 Clearing the alarm history
Next axis	This displays the data for the next four axes. The menu appears and operation is possible only when diagnosis information for five or more axes is displayed.	C	

## 5.4.1 Servo Axis Unit Display Items

The various data related to the servo axis (NC axis, PLC axis) is monitored.

To reference, change the display items using the  key and  key.



	X1	Y1	Z1	C1
Gain (1/s)	0	0	0	0
Droop (i)	0	0	0	0
Speed (r/min)	0	0	0	0
Feedrate (mm/s)	0	0	0	0
Load current (%)	0	0	0	0
Max current 1 (%)	0	0	0	0
Max current 2 (%)	0	0	0	0
Max current 3 (%)	0	0	0	0
Overload (%)	0	0	0	0
Regen load (%)	0	0	0	0
Est disturb torq(%)	0	0	0	0
Max disturb torq(%)	0	0	0	0
Load inertia R. (%)	0	0	0	0
AFLT frequency (Hz)	0	0	0	0
AFLT gain (dB)	0	0	0	0
LED display	00	00	00	00
Alarm	00 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00

\$1EMG \$2EMG 18:41

Servo unit Spindle unit Power unit AUX unit Synchro error Alarm his clr Next axis

The axis name set in the base axis specification parameter "#1022 axname2" appears at the axis name.

## 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.
Speed (r/min)	This displays the actual rotation speed of motor.
Feedrate (mm/s)	This displays the feedrate detected by the detector mounted on the machine end.
Load current (%)	This displays the FB value of the motor current in terms of continuous current during stalling.
Max current 1 (%)	This displays the motor current command in terms of continuous current during stalling. An absolute value of the current command peak value sampled after the power ON is displayed.
Max current 2 (%)	This displays the motor current command in terms of continuous current during stalling. An absolute value of the current command peak value sampled in most recent 2 seconds is displayed.
Max current 3 (%)	This displays the FB value of the motor current in terms of continuous current during stalling. An absolute value of the current FB peak value sampled in most recent 2 seconds is displayed.
Overload (%)	This is the data used to monitor the motor overload.
Regen Load (%)	This is the data used to monitor the resistance overload state when the resistance regenerative power supply is connected.
Est disturb torq (%)	This displays the estimated disturbance torque in terms of stall rated torque when the disturbance observer is valid.

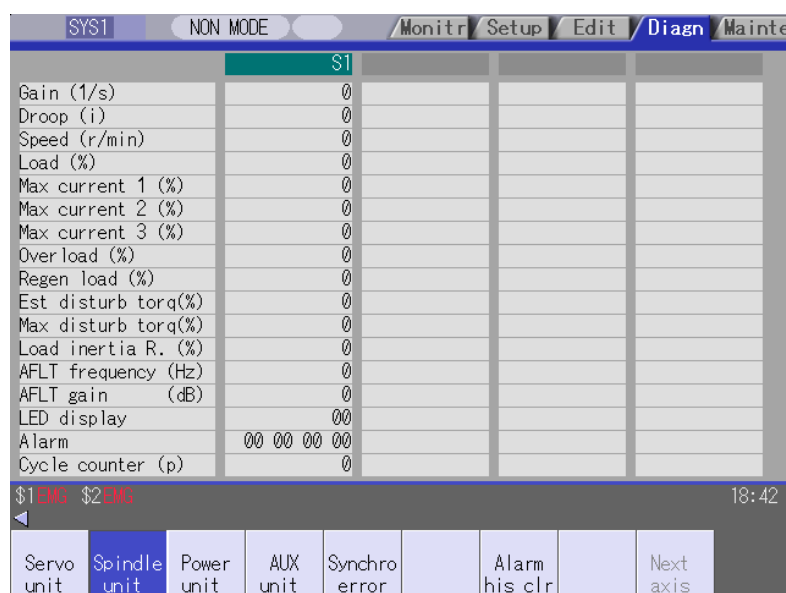
Display item	Details
Max disturb torq (%)	This displays the estimated disturbance torque in terms of stall rated torque when the collision detection function is adjusted. An absolute value of the estimated disturbance torque peak value sampled in most recent 2 seconds is displayed.
Load inertia R. (%)	This displays the estimated load inertia ratio when the collision detection function is adjusted.
AFLT frequency (Hz)	This displays the present operation frequency of the adaptive filter.
AFLT gain (dB)	This displays the present filter depth of the adaptive filter.
LED display	This displays the 7-segment LED of the driver.
Alarm	This displays the alarms and warnings other than the LED display (displayed on drive unit side).
Cycle counter (p)	This displays the position within one rotation of the encoder detector. The position is displayed as a grid point value as "0", within one rotation in the range of "0" to "RNG (movement units) × 1000".
Grid space	This displays the grid space for the reference position return. (Command unit)
Grid amnt	This displays the distance from the dog-off point to the grid point when the dog-type reference position return is displayed. The grid mask amount is not included. (Command unit)
Machine posn	This displays the NC basic machine coordinate system position. (Command unit)
Motor end FB	This displays the feedback value of the speed detector. (Command unit)
Machine end FB	This displays the feedback position of the machine end position detector. (Command unit)
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.
Remain command	The remaining movement distance of one block is displayed. (Command unit)
Currnt posn (2)	The value of the tool compensation amount subtracted from the current position is displayed. (Command unit)
Man int amt	The amount of interrupt movement in the manual absolute OFF state is displayed. (Command unit)
Abs pos command	This displays the coordinates of absolute position excluding the machine error compensation amount. (Command unit)
Mach err comp val	This displays the machine error compensation amount. (Command unit)
Control input 1L 1H : 6L 6H	This indicates the control signal input from NC. This is used by the system.
Control output 1L 1H : 6L 6H	This indicates the control signal output to NC. This is used by the system.
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

Display item	Details
Power OFF posn	This displays the coordinate at NC power OFF in the basic machine coordinate system. (Command unit)
Power ON posn	This displays the coordinate at NC power ON in the basic machine coordinate system. (Command unit)
Current posn	This displays the current coordinate in the basic machine coordinate system. (Command unit)
R0	This displays the multi-rotation counter value of the detector stored in the memory during basic point setting.
P0	This displays the position within one rotation of the detector stored in the memory during basic point setting.
E0	This displays the absolute position error stored in the memory during basic 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.
ABS0	This displays the absolute position reference counter.
ABS <sub>n</sub>	This displays the current absolute position.
MPOS	This displays the offset amount of the MP scale when the power is turned ON.
Unit type	This displays the servo driver type.
Unit 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.
Motor end detect No	This displays the motor end detector serial No.
Machine end detector	This displays the machine end detector type. The type is displayed when the control method is CLOSED or DUAL. * is displayed when the method is SEMI.
Mach. end detect No	This displays the machine end detector serial No.
Motor	This displays the motor type.
Work time	This displays the READY ON work time. (Units: 1hr)
Alarm hist 1: Time 1: Alarm : 8: Time 8: Alarm	This displays servo alarms that occurred in latest order with the following formats. Time : Work time when the alarm occurred. Alarm No. : Number of the servo alarms that occurred.
Maint hist 1 to 4	This displays the maintenance dates. Year : One digit Month : 1 to 9, X (Oct.), Y (Nov.), Z (Dec.)
Maint status	This displays the maintenance 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.



## Display items

Display items	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.
Speed (r/min)	This displays the actual rotation speed of motor.
Load (%)	This displays the motor load.
Max current 1 (%)	This displays the motor current command in terms of continuous current during stalling. An absolute value of the current command peak value sampled after the power ON is displayed.
Max current 2 (%)	This displays the motor current command in terms of continuous current during stalling. An absolute value of the current command peak value sampled in most recent 2 seconds is displayed.
Max current 3 (%)	This displays the FB value of the motor current in terms of continuous current during stalling. An absolute value of the current FB peak value sampled in most recent 2 seconds is displayed.
Overload (%)	This is the data used to monitor the motor overload.
Regen load (%)	This is the data used to monitor the resistance overload state when the resistance regenerative power supply is connected.
Est disturb torq (%)	This displays the estimated disturbance torque in terms of stall rated torque when the disturbance observer is valid.
Max disturb torq (%)	This displays the estimated disturbance torque in terms of stall rated torque when the collision detection function is adjusted. An absolute value of the estimated disturbance torque peak value sampled in most recent 2 seconds is displayed.
Load inertia R. (%)	This displays the estimated load inertia ratio when the collision detection function is adjusted.

Display items	Details
AFLT frequency (Hz)	This displays the current operation frequency of the adaptive filter.
AFLT gain (dB)	This displays the current filter depth of the adaptive filter.
LED display	This displays the 7-segment LED of the driver.
Alarm	This displays the alarms and warnings other than the LED 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".
Grid space	This displays the grid space for the reference position return. (Command unit)
Grid amnt	This displays the distance from the dog-off point to the grid point when the dog-type reference position return is displayed. The grid mask amount is not included. (Command unit)
Machine posn	This displays the NC basic machine coordinate system position. (Command unit)
Motor end FB	This displays the feedback value of the speed detector. (Command unit)
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.
Sync tap err (mm)	This displays the synchronous error width between the spindle and the drilling axis during the synchronous tapping. (mm) (Note 1) (When the parameter "#1041 I_Inch" is set to "1", "Sync tap err (inch)" is displayed.)
Sync tap err (deg)	This displays the synchronous error angle between the spindle and the drilling axis during the synchronous tapping. (degree) (Note 1)

**(Note)** Synchronous tapping error

This displays the maximum values of the synchronous tapping error that occur during the synchronous tapping.

The synchronous tapping error means the motor tracking delay for the commanded positions of the spindle and the tapping axis.

The positive synchronous tapping error means that the tapping axis is delayed responding to the spindle, and the negative synchronous tapping error means that the spindle is delayed responding to the tapping axis.

Data name	Details
Synchronous tapping error width (Max value)	<ul style="list-style-type: none"> <li>This outputs the data of which absolute value is the largest among the synchronous tapping error width (-99999.999 to 99999.999 mm) during the synchronous tapping modal.</li> <li>This data will be initialized to "0" when entering the synchronous tapping modal or restoring the power. Other than that, the data continues to display the maximum value.</li> </ul>
Synchronous tapping error angle (Max value)	<ul style="list-style-type: none"> <li>This outputs the data of which absolute value is the largest among the synchronous tapping error angle (-99999.999 to 99999.999 °) during the synchronous tapping modal.</li> <li>This data will be initialized to "0" when entering the synchronous tapping modal or restoring the power. Other than that, the data continues to display the maximum value.</li> </ul>

Display item	Details		
Control input 1L	This displays the control input signals from the NC.		
Control input 1H			
		Bit	Details
	1L	0	READY ON command
		1	Servo ON command
		2	
		3	
		4	
		5	
		6	
		7	Alarm reset command
	1H	8	Torque limit selection command 1
		9	Torque limit selection command 2
		A	Torque limit selection command 3
		B	
		C	
		D	
		E	
F			
Control input 2L	This displays the control input signals from the NC.		
Control input 2H			
		Bit	Details
	2L	0	
		1	
		2	
		3	
		4	
		5	
		6	
		7	
	2H	8	
		9	Speed observation command valid
		A	Door closed (controller)
		B	Door closed (all drive units)
		C	
		D	
		E	
F			



Display item	Details																																						
Control input 3L	This displays the control input signals from the NC.																																						
Control input 3H		<table><tr><td></td><td>Bit</td><td>Details</td></tr><tr><td rowspan="8">3L</td><td>0</td><td></td></tr><tr><td>1</td><td></td></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td></td></tr><tr><td>4</td><td></td></tr><tr><td>5</td><td></td></tr><tr><td>6</td><td></td></tr><tr><td>7</td><td></td></tr><tr><td rowspan="8">3H</td><td>8</td><td></td></tr><tr><td>9</td><td></td></tr><tr><td>A</td><td></td></tr><tr><td>B</td><td></td></tr><tr><td>C</td><td></td></tr><tr><td>D</td><td></td></tr><tr><td>E</td><td></td></tr><tr><td>F</td><td></td></tr></table>		Bit	Details	3L	0		1		2		3		4		5		6		7		3H	8		9		A		B		C		D		E		F	
			Bit	Details																																			
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			3																																				
			4																																				
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			6																																				
			7																																				
		3H	8																																				
			9																																				
			A																																				
			B																																				
			C																																				
D																																							
E																																							
F																																							
Control input 4L	This displays the control input signals from the NC.																																						
Control input 4H		<table><tr><td></td><td>Bit</td><td>Details</td></tr><tr><td rowspan="8">4L</td><td>0</td><td rowspan="3">Spindle control mode selection command 1, 2, 3</td></tr><tr><td>1</td></tr><tr><td>2</td></tr><tr><td>3</td><td></td></tr><tr><td>4</td><td></td></tr><tr><td>5</td><td>Gear selection command 1</td></tr><tr><td>6</td><td>Gear selection command 2</td></tr><tr><td>7</td><td></td></tr><tr><td rowspan="8">4H</td><td>8</td><td></td></tr><tr><td>9</td><td></td></tr><tr><td>A</td><td></td></tr><tr><td>B</td><td></td></tr><tr><td>C</td><td>M-coil switch command</td></tr><tr><td>D</td><td>L-coil switch command</td></tr><tr><td>E</td><td>Sub-motor selection command</td></tr><tr><td>F</td><td></td></tr></table>		Bit	Details	4L	0	Spindle control mode selection command 1, 2, 3	1	2	3		4		5	Gear selection command 1	6	Gear selection command 2	7		4H	8		9		A		B		C	M-coil switch command	D	L-coil switch command	E	Sub-motor selection command	F			
			Bit	Details																																			
		4L	0	Spindle control mode selection command 1, 2, 3																																			
			1																																				
			2																																				
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			7																																				
		4H	8																																				
			9																																				
			A																																				
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E	Sub-motor selection command																																						
F																																							

Display item	Details																																							
Control input 5L	This displays the control input signals from the NC.																																							
Control input 5H	<table><tr><td></td><td>Bit</td><td>Details</td></tr><tr><td rowspan="8">5L</td><td>0</td><td></td></tr><tr><td>1</td><td></td></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td></td></tr><tr><td>4</td><td></td></tr><tr><td>5</td><td></td></tr><tr><td>6</td><td></td></tr><tr><td>7</td><td></td></tr><tr><td rowspan="8">5H</td><td>8</td><td></td></tr><tr><td>9</td><td></td></tr><tr><td>A</td><td></td></tr><tr><td>B</td><td></td></tr><tr><td>C</td><td></td></tr><tr><td>D</td><td></td></tr><tr><td>E</td><td>Spindle holding force up</td></tr><tr><td>F</td><td></td></tr></table>				Bit	Details	5L	0		1		2		3		4		5		6		7		5H	8		9		A		B		C		D		E	Spindle holding force up	F	
	Bit	Details																																						
5L	0																																							
	1																																							
	2																																							
	3																																							
	4																																							
	5																																							
	6																																							
	7																																							
5H	8																																							
	9																																							
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	B																																							
	C																																							
	D																																							
	E	Spindle holding force up																																						
	F																																							
Control input 6L	This displays the control input signals from the NC.																																							
Control input 6H	<table><tr><td></td><td>Bit</td><td>Details</td></tr><tr><td rowspan="8">6L</td><td>0</td><td></td></tr><tr><td>1</td><td></td></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td></td></tr><tr><td>4</td><td></td></tr><tr><td>5</td><td></td></tr><tr><td>6</td><td></td></tr><tr><td>7</td><td></td></tr><tr><td rowspan="8">6H</td><td>8</td><td></td></tr><tr><td>9</td><td></td></tr><tr><td>A</td><td></td></tr><tr><td>B</td><td></td></tr><tr><td>C</td><td></td></tr><tr><td>D</td><td></td></tr><tr><td>E</td><td></td></tr><tr><td>F</td><td></td></tr></table>				Bit	Details	6L	0		1		2		3		4		5		6		7		6H	8		9		A		B		C		D		E		F	
	Bit	Details																																						
6L	0																																							
	1																																							
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	3																																							
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	5																																							
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	7																																							
6H	8																																							
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	A																																							
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	C																																							
	D																																							
	E																																							
	F																																							

Display item	Details																																					
Control output 1L	This displays the control output signals to the NC.																																					
Control output 1H																																						
	<table><tr><td></td><td>Bit</td><td>Details</td></tr><tr><td rowspan="8">1L</td><td>0</td><td>In READY ON</td></tr><tr><td>1</td><td>In Servo ON</td></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td></td></tr><tr><td>4</td><td></td></tr><tr><td>5</td><td></td></tr><tr><td>6</td><td></td></tr><tr><td>7</td><td>In alarm occurrence</td></tr><tr><td rowspan="8">1H</td><td>8</td><td>In torque limit selection 1</td></tr><tr><td>9</td><td>In torque limit selection 2</td></tr><tr><td>A</td><td>In torque limit selection 3</td></tr><tr><td>B</td><td></td></tr><tr><td>C</td><td>In-position</td></tr><tr><td>D</td><td>In torque limitation</td></tr><tr><td>E</td><td></td></tr><tr><td>F</td><td>In warning occurrence</td></tr></table>		Bit	Details	1L	0	In READY ON	1	In Servo ON	2		3		4		5		6		7	In alarm occurrence	1H	8	In torque limit selection 1	9	In torque limit selection 2	A	In torque limit selection 3	B		C	In-position	D	In torque limitation	E		F	In warning occurrence
	Bit	Details																																				
1L	0	In READY ON																																				
	1	In Servo ON																																				
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	3																																					
	4																																					
	5																																					
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	7	In alarm occurrence																																				
1H	8	In torque limit selection 1																																				
	9	In torque limit selection 2																																				
	A	In torque limit selection 3																																				
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	C	In-position																																				
	D	In torque limitation																																				
	E																																					
	F	In warning occurrence																																				
Control output 2L	This displays the control output signals to the NC.																																					
Control output 2H																																						
	<table><tr><td></td><td>Bit</td><td>Details</td></tr><tr><td rowspan="8">2L</td><td>0</td><td>Z-phase passed</td></tr><tr><td>1</td><td></td></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td>In zero speed</td></tr><tr><td>4</td><td></td></tr><tr><td>5</td><td></td></tr><tr><td>6</td><td></td></tr><tr><td>7</td><td>In external emergency stop</td></tr><tr><td rowspan="8">2H</td><td>8</td><td></td></tr><tr><td>9</td><td>In speed observation</td></tr><tr><td>A</td><td>Door closed (controller)</td></tr><tr><td>B</td><td>Door closed (local drive units)</td></tr><tr><td>C</td><td></td></tr><tr><td>D</td><td></td></tr><tr><td>E</td><td></td></tr><tr><td>F</td><td></td></tr></table>		Bit	Details	2L	0	Z-phase passed	1		2		3	In zero speed	4		5		6		7	In external emergency stop	2H	8		9	In speed observation	A	Door closed (controller)	B	Door closed (local drive units)	C		D		E		F	
	Bit	Details																																				
2L	0	Z-phase passed																																				
	1																																					
	2																																					
	3	In zero speed																																				
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	5																																					
	6																																					
	7	In external emergency stop																																				
2H	8																																					
	9	In speed observation																																				
	A	Door closed (controller)																																				
	B	Door closed (local drive units)																																				
	C																																					
	D																																					
	E																																					
	F																																					

Display item	Details		
Control output 3L	This displays the control output signals to the NC.		
Control output 3H			
		Bit	Details
	3L	0	
		1	
		2	
		3	
		4	
		5	
		6	
		7	
	3H	8	
		9	
		A	
		B	
		C	
		D	
		E	
		F	
Control output 4L	This displays the control output signals to the NC.		
Control output 4H			
		Bit	Details
	4L	0	Spindle control mode selected 1, 2, 3
		1	
		2	
		3	
		4	
		5	Gear selected 1
		6	Gear selected 2
		7	
	4H	8	
		9	
		A	
		B	
		C	M-coil switched
		D	L- coil switched
		E	Sub-motor selected
		F	

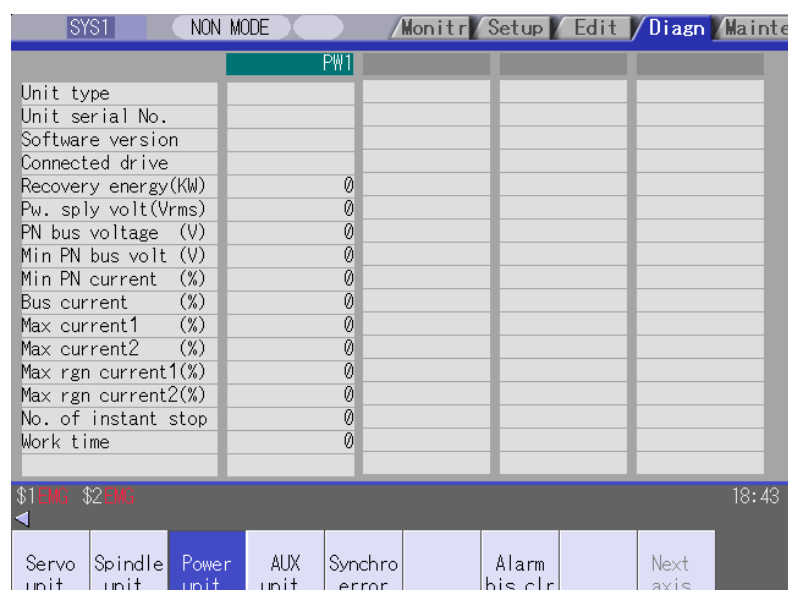
Display item	Details		
Control output 5L	This displays the control output signals to the NC.		
Control output 5H			
		Bit	Details
	5L	0	Current detection
		1	Speed detection
		2	
		3	
		4	
		5	
		6	In coil changeover
		7	
	5H	8	1-amplifire 2-motor switching
		9	2nd speed detection
		A	
		B	
		C	
		D	
		E	In spindle holding force up
F		2nd in-position	
Control output 6L	This displays the control output signals to the NC.		
Control output 6H			
		Bit	Details
	6L	0	
		1	
		2	
		3	
		4	
		5	
		6	
		7	
	6H	8	
		9	
		A	
		B	
		C	
		D	
		E	
F			

Display item	Details
Unit type	This displays the spindle type.
Unit serial No.	This displays the spindle serial No.
Software version	This displays the software No. and version on the spindle side.
Motor end detect No	This displays the motor end detector serial No.
Mach. end detect No	This displays the machine end detector serial No.
Work time	This displays the READY ON cumulative time. (Units: 1hr)
Alarm hist 1: Time 1: Alarm : 8: Time 8: Alarm	This displays servo alarms that occurred in latest order with the following formats. Time : Work time when the alarm occurred. Alarm No. : Number of the servo alarms that occurred.
Maint hist 1 to 4	This displays the maintenance dates. Year : One digit Month : 1 to 9, X (Oct.), Y (Nov.), Z (Dec.)
Maint status	This displays the maintenance status.

## 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.



PW1	
Unit type	
Unit serial No.	
Software version	
Connected drive	
Recovery energy(KW)	0
Pw. sply volt(Vrms)	0
PN bus voltage (V)	0
Min PN bus volt (V)	0
Min PN current (%)	0
Bus current (%)	0
Max current1 (%)	0
Max current2 (%)	0
Max rgn current1(%)	0
Max rgn current2(%)	0
No. of instant stop	0
Work time	0

\$1EMG \$2EMG 18:43

Servo unit Spindle unit **Power unit** AUX unit Synchro error Alarm his clr Next axis

## Display items

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 I/F channel No. (mcp_no, smcp_no) of the drive unit connected to each power supply unit.
Recovery energy(KW)	This displays the regenerative power every two seconds. (0 to 999kW)
Pw. sply volt (Vrms)	This displays the effective value of the power supply voltage. (0 to 999Vrms)
PN bus voltage (V)	This displays PN bus voltage. (0 to 999V)
Min PN bus volt (V)	This displays the minimum PN bus voltage after the NC power ON. (0 to 999V)
Min PN current (%)	This displays the bus current when PN bus voltage is at minimum. (driving: +, regenerative: -) (0 to 999%)
Bus current (%)	This displays the bus current. (driving: +, regenerative: -) (0 to 999%)
Max current1 (%)	This displays the maximum driving current after the NC power ON. (0 to 999%)
Max current2 (%)	This displays the maximum driving current in most recent 2 seconds. (0 to 999%)
Max rgn current1(%)	This displays the maximum regenerative current after the NC power ON. (0 to 999%)
Max rgn current2(%)	This displays the maximum regenerative current in most recent 2 seconds. (0 to 999%)
No. of instant stop	This displays the number of instantaneous stop exceeding 1 cycle of the power. (0 to 9999 times)
Work time	This displays the READY ON cumulative time. (Units: 1hr)



Display item	Details
Alarm hist 1: Time 1: Alarm : 8: Time 8: Alarm	This displays servo alarms that occurred in latest order with the following formats. Time : Work time when the alarm occurred Alarm No. : Number of the servo alarms that occurred
Maint hist 1 to 4	This displays the maintenance dates. Year : One digit Month : 1 to 9, X (Oct.), Y (Nov.), Z (Dec.)
Maint status	This displays the maintenance status.

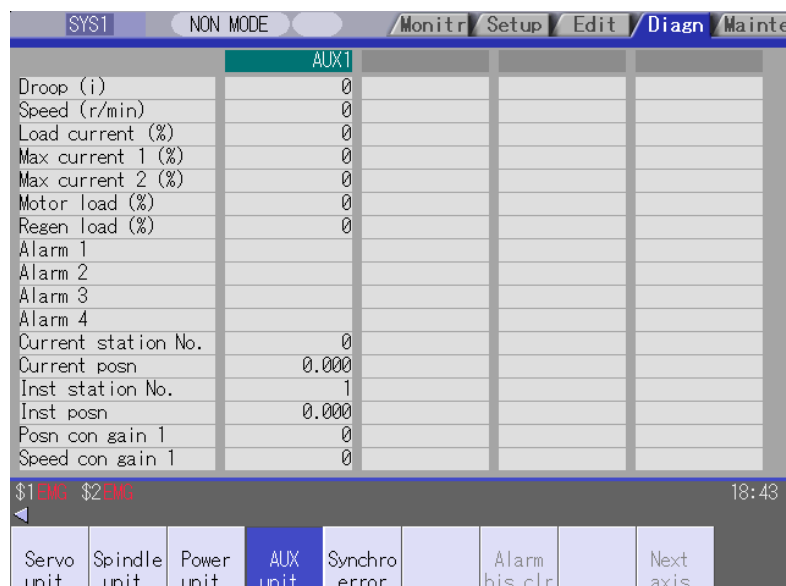


## 5.4.4 Display Items for the Auxiliary Axis Unit

"Auxiliary axis unit" appears only when there is one or more valid auxiliary axis. (Base common parameter "#1044 auxno" is "1" or more).

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.



Display item	Value
Droop (i)	0
Speed (r/min)	0
Load current (%)	0
Max current 1 (%)	0
Max current 2 (%)	0
Motor load (%)	0
Regen load (%)	0
Alarm 1	
Alarm 2	
Alarm 3	
Alarm 4	
Current station No.	0
Current posn	0.000
Inst station No.	1
Inst posn	0.000
Posn con gain 1	0
Speed con gain 1	0

Data for the number of axes (up to six) set with the base common parameter "#1044 auxno (No. of connected MR-J2-CT units)" is displayed.

## Display items

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 executable load 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.
Alarm 1 to 4	This displays the system alarm, servo alarm, system warning, servo warning, operation alarm No. and alarm information.
Current station No.	This displays the number of the currently stopped station.
Current posn	This displays the coordinate of current position. (Unit: °)
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: °)

Display item	Details
Posn con gain 1	This displays the position control gain 1.
Speed con gain 1	This displays the speed control gain 1.
Posn con gain 2	This displays the position control gain 2.
Speed con gain 2	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 ratio value in respect to the motor's rotor inertia.
Unit type	This is the unit type.
Software version	This is the servo drive unit software version.
Motor type	This is the motor type.
Unit serial No.	This displays the unit serial No.
Alarm hist 1: No. 1: State : 6: No. 6: State	Alarm history : Alarm number Alarm history : Alarm details information

The "Synchronous error" appears only when the synchronous control axis option is valid. The various data related to the synchronous error is monitored.

## Display items

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## 5.4.6 Clearing the Alarm History

## Operation method

- (1) Press the menu **Servo unit** or **Spindle unit**.
- (2) Using the menu **Next axis**, tab keys **←** and **→**, select the axis (device) from which to clear the alarm history.
- (3) Press the menu **Alarm his clr**.



The menu is highlighted, and a message appears to confirm the erasing.  
The alarm history1: Time appears at the head.

SYS1 NON MODE / Monitr / Setup / Edit / Diagn / Mainte					
	X1	Y1	Z1	C1	
Alarm hist 1:Time	1	1	0	0	
1:Alarm	12	11	00	00	
2:Time	2	1	0	0	
2:Alarm	23	22	00	00	
3:Time	1	2	0	0	
3:Alarm	34	33	00	00	
4:Time	2	2	0	0	
4:Alarm	45	44	00	00	
5:Time	0	3	0	0	
5:Alarm	00	55	00	00	
6:Time	0	0	0	0	
6:Alarm	00	00	00	00	
7:Time	0	0	0	0	
7:Alarm	00	00	00	00	
8:Time	0	0	0	0	
8:Alarm	00	00	00	00	
Maint hist 1					
\$1:00 \$2:00 18:48					
Erase? (Y/N)					
Servo unit	Spindle unit	Power unit	AUX unit	Synchro error	Alarm his clr
					Next axis

- (4) Press the **Y** key.



The alarm history data for the selected axis (device) is cleared to zero.

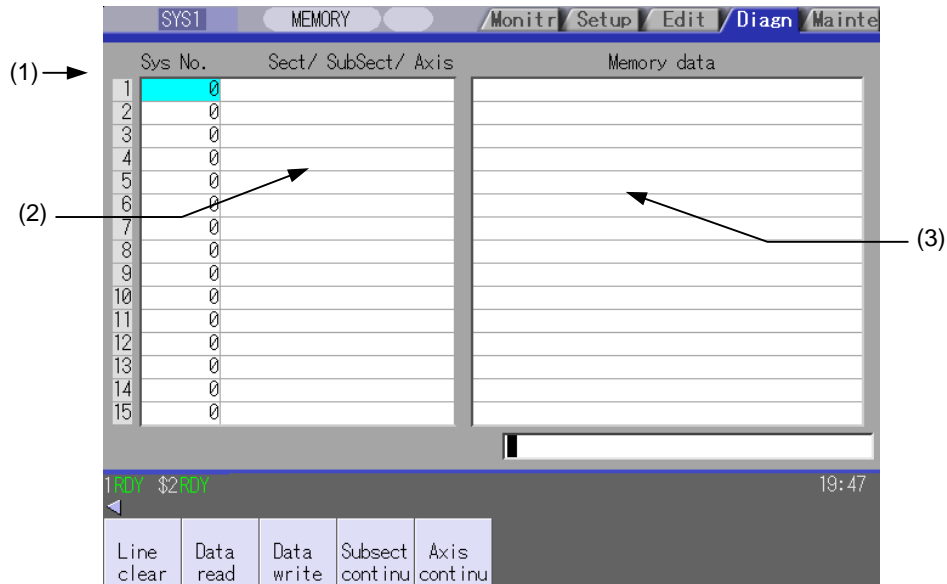
SYS1 NON MODE / Monitr / Setup / Edit / Diagn / Mainte					
	X1	Y1	Z1	C1	
Alarm hist 1:Time	1	0	0	0	
1:Alarm	12	00	00	00	
2:Time	2	0	0	0	
2:Alarm	23	00	00	00	
3:Time	1	0	0	0	
3:Alarm	34	00	00	00	
4:Time	2	0	0	0	
4:Alarm	45	00	00	00	
5:Time	0	0	0	0	
5:Alarm	00	00	00	00	
6:Time	0	0	0	0	
6:Alarm	00	00	00	00	
7:Time	0	0	0	0	
7:Alarm	00	00	00	00	
8:Time	0	0	0	0	
8:Alarm	00	00	00	00	
Maint hist 1					
\$1:00 \$2:00 18:48					
Servo unit	Spindle unit	Power unit	AUX unit	Synchro error	Alarm his clr
					Next axis

## 5. Diagnosis Screens

### 5.5 NC Memory Diagnosis Screen (NC Memory Diagn Screen)

#### 5.5 NC Memory Diagnosis Screen (NC Memory Diagn Screen)

The NC internal data can be displayed and rewritten on the screen. The custom API library's NC data read/write interface is used to display and rewrite the NC's internal data. The contents of the NC data can be displayed by designating the part system No., section No., sub-section No. and axis No. on this screen.



#### 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>Part system No.:</p> <p>Designate the part system No. Designate "0" to designate the data common for the part systems.</p> <p>Section/sub-section/axis:</p> <p>Designate the section No., sub-section No. and axis No. of the data to be set and displayed. The setting format is, section No./sub-section No./axis No.</p> <p><b>(Note)</b> The axis No. "1" is handled as the first axis. Designate "0" for the data which does not require an axis designation.</p>
(3) Memory data	This displays the contents of the data.

## 5. Diagnosis Screens

### 5.5 NC Memory Diagnosis Screen (NC Memory Diagn Screen)

#### Menus

Menu	Details	Type	Reference
Line clear	This erases the information in the line where the cursor is. (One entire line becomes blank.) The cursor does not move at this time.	C	5.5.1 Writing/Reading the Data Using the NC Data Designation
Data read	The contents of the set address data (Part system No, Section/sub-section/axis) for all the lines are constantly displayed. The Index No. highlight (indicating data is being set) is released. The cursor appears in "Part system No" of that line.	C	
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 "Part system No" of the next line.	A	
Subsect continu	Based on the data of the address data where the cursor is, this displays the continuous data to which the sub-section No. has been added to the address data from the line where the cursor is. The cursor moves to "Part system No " of that line.	C	
Axis continu	Based on the data of the address data where the cursor is, this displays the continuous data to which the axis No. has been added to the address data from the line where the cursor is. The cursor moves to "Part system No " of that line.	C	

**(Note)** Decimal, hexadecimal, floating point data and character string data writing is possible.  
Note that hexadecimal, floating point data and character strings may not be settable depending on the data.

Decimal : Integers without decimal points ..... (Example) -1234  
Hexadecimal : An "H" is necessary at the end ..... (Example) 1234H  
Floating point data : Data with a decimal point ..... (Example) -12.3  
Character string data : Character string ..... (Example) X

## 5. Diagnosis Screens

### 5.5 NC Memory Diagnosis Screen (NC Memory Diagn Screen)

#### 5.5.1 Writing/Reading the Data Using the NC Data Designation

When reading the Process parameter "#8007 Auto corner override", the following data is set.

**(Example)** Part system No. : 1  
Section No. : 126  
Sub-section No. : 8007  
Axis name : 0

#### Setting the data

- (1) Using the menu cursor keys, move the cursor to the "Part system No." position. ➡ The cursor moves to the "Part system No." position.
- (2) Set the part system No.  
1  ➡ The index No. is highlighted, and the set value is displayed.  
The cursor moves to the right item position.  

	Sys No.	Sect/	SubSect/	Axis
1	1	37/	1/	1
2	1	37/	1/	2
3	1			
4	0			
5	0			
- (3) Separate the section No., sub-section No., axis No. with a "/", and set. ➡ The set value appears.  
The cursor moves to the right item position.  
126/8007/0
- (4) Press the menu key .
- (5) Set the data, and press the  key. ➡ Write processing is executed.  
The Index No. highlight returns to normal.

#### Reading the data

- (1) Set the part system No., section No., sub-section No., axis No. in the same way as step "Setting the data".
- (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 part system No. area, section/sub-section/axis area.

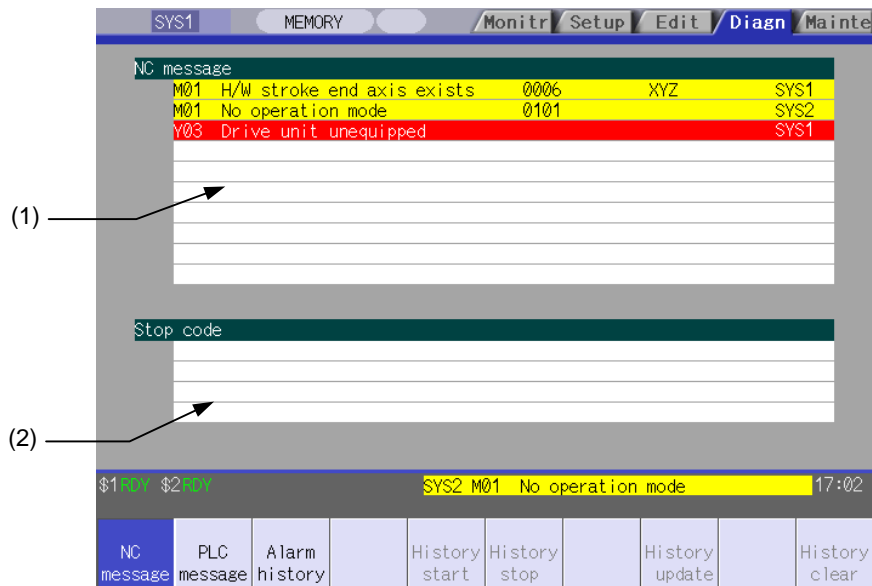
## 5.6 Alarm Screen

A list of currently occurring alarms or messages can be displayed on this screen.

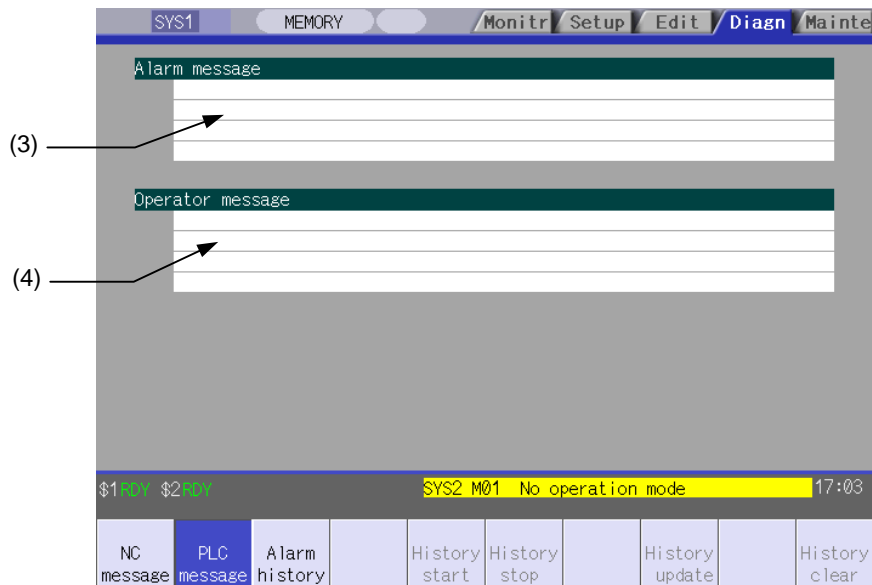
The displayed messages include the NC alarms, stop codes, alarm messages, operator messages, etc.

A history of alarm information can be displayed also.

### ■ NC message



### ■ PLC message





**Display items**

Display item	Details
(1) NC alarm	This displays the operation alarms, program errors, MCP alarms, servo alarms, system alarms, etc. Up to 10 messages are displayed in order of priority.
(2) Stop code	This displays the automatic operation status or stop status during automatic operation. Up to 4 messages are displayed in order of priority.
(3) Alarm message	Using the PLC programs, this displays messages such as details of machine abnormalities. Up to 4 messages are displayed.
(4) Operator message	Using the PLC programs, this displays operator information messages. Macro alarm messages are also displayed in this field. Up to 4 messages are displayed.

**Message display colors**

The messages are color-coded in the following manner.

Message type		Character color	Background color
NC message	Alarm	White	Red
	Warning	Black	Yellow
Stop code		Black	Yellow
Alarm message		White	Red
Operator message		Black	Yellow

**Axis name display**

The axis name is displayed in messages for each axis. The axis name is displayed as shown below according to the axis type.

Axis type	Axis name display	Display example	Remarks
NC axis	Control axis name (Name of axis in part system)	XYZ	If the same message occurs for each part system, several NC axes are displayed together.
Spindle	'S' + spindle No.	S1S2	If the same message occurs, several spindles are displayed together.
PLC axis	'P' + PLC axis No.	P1P2	If the same message occurs, several PLC axes are displayed together.
Auxiliary axis	'A' + auxiliary axis No.	A1A2	If the same message occurs, several auxiliary axes are displayed together.

If the same message occurs for different axis types, they will appear as separate messages.

**Part system display**

The part system name is also displayed if the message is output for each part system. The part system name set in "#1169 system name" is displayed. The part system name does not appear for the 1-part system.



## 5.6.1 Alarm History

When an alarm occurs, the alarm information is recorded. When the NC power is ON, an alarm is automatically recorded in alarm history. Alarm information is recorded from the latest alarm to 512. Alarm information recorded in the history is NC message and a stop code displayed on "NC message" screen. The range etc. of record are shown as follows.

- Record condition : When an alarm occurs (Up to five at the same time)  
 With multi-part system, 1st part system is given priority and recorded.  
 (Following 2nd part system, 3rd part system...)
- Number of history : 512 alarms (Whole)
- Range of record : NC alarm (alarm, warning), stop code

SYS1 MEMORY Monitr Setup Edit Diagn Mainte									
Alarm history									Page 1
0221	16:59:07	M01	No operation mode	0101					SYS2
0221	16:58:30	M01	H/W stroke end axis exists	0006	XYZ				SYS1
0221	16:58:30	N005	Invalid net communication	-103					SYS1
0221	16:58:30	M01	H/W stroke end axis exists	0006	C				SYS2
0221	16:52:46	M01	No operation mode	0101					SYS2
0221	16:52:09	M01	H/W stroke end axis exists	0006	XYZ				SYS1
0221	16:52:09	N005	Invalid net communication	-103					SYS1
0221	16:52:09	M01	H/W stroke end axis exists	0006	C				SYS2
0221	16:46:11	T01	H/W stroke end axis exists	0105					SYS1
0221	16:44:49	M01	No operation mode	0101					SYS2
0221	16:44:13	M01	H/W stroke end axis exists	0006	XYZ				SYS1
0221	16:44:13	N005	Invalid net communication	-103					SYS1
0221	16:44:13	M01	H/W stroke end axis exists	0006	C				SYS2
0221	16:42:06	M01	H/W stroke end axis exists	0006	XYZ				SYS1
0221	16:42:06	N005	Invalid net communication	-103					SYS1
0221	15:13:12	M01	No operation mode	0101					SYS2
\$1 NEW \$2 NEW SYS2 M01 No operation mode 17:03									
NC message	PLC message	Alarm history	History start	History stop		History update		History clear	

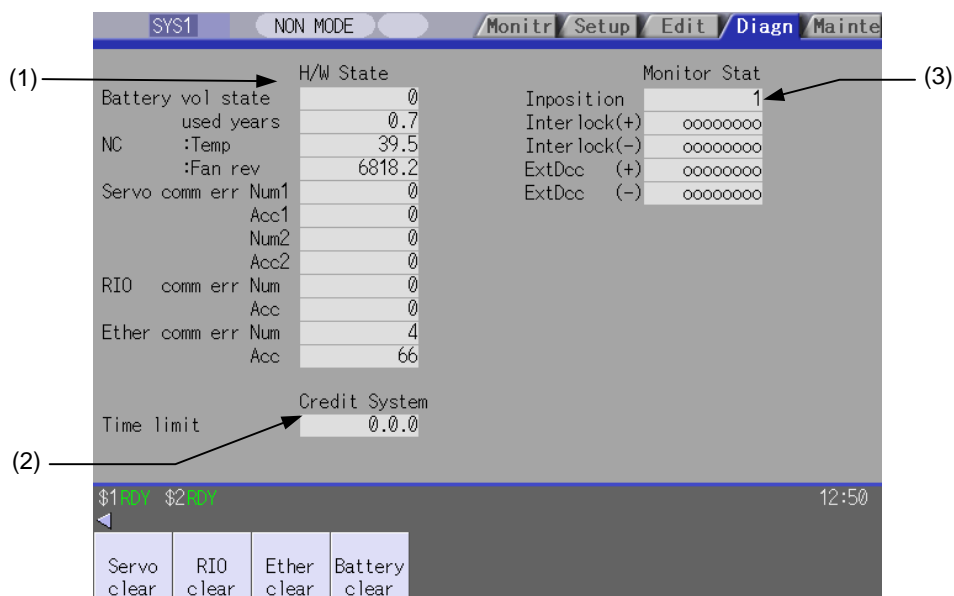
## Menus

Menu	Details	Type	Reference
Alarm history	This displays the first page of the alarm history. The history sequentially displays 16 alarms per page from the latest alarm. If there are two or more NC alarms of same day and time, the alarms are sequentially displayed from the alarm and warning of 1st part system. Page is changed by  , and older histories are displayed. Page is changed by  , and newer histories are displayed.	B	
History start	The data collection of the alarm history is started. The operation message "The collection begin? (Y/N)" appears. When the Y or <b>INPUT</b> key is pressed, the data collection is started after the operation message "The collection begin" appears. Press the N or other than <b>INPUT</b> key when the data collection will be not started/restarted.	C	
History stop	The data collection of the alarm history is stopped. The operation message "The collection stop? (Y/N)" appears. When the Y or <b>INPUT</b> key is pressed, the data collection is started after the operation message "The collection stop" appears. Press the N or other than <b>INPUT</b> key when the data collection will be not stopped.	C	
History update	The alarm information of history is updated. When the history is updated, the page with latest alarm information (first page) is displayed. The history is updated even if changing to another screen, and returning to the alarm history screen.	C	
History clear	The alarm information of history is cleared. The operation message "Execute the collection data clear?(Y/N)" appears. When the Y or <b>INPUT</b> key is pressed, the alarm information of history is cleared after the operation message "Data clear complete" appears. The first page is displayed when the history is cleared.	C	

**(Note)** History start, History stop, History update and History clear menus are valid when the alarm history function is valid and Alarm history menu is selected.

## 5.7 Self Diagnosis Screen

The H/W state and NC operation state can be confirmed on this screen.



## Display items

Display item	Details		
(1) H/W state (common for part systems)	This displays H/W state of NC unit and display unit. As for the NC unit, the contents are as follows.		
	Display item	Details	
	NC		
	Battery vol state	This displays the current state of the battery voltage as 0 to 3 below.	
		Condition	Classification
		0 (normal state)	--
		1 (battery drop)	Cautions (gray)
		2 (detector error)	Warning (yellow)
	used years	3 (no battery)	
		This displays approximate time of the battery used from the last replacement.	
		Condition	Classification
		Recommended battery use (5 years) ≤ Time for the battery used	Warning (yellow)
	NC :Temp	This displays the current temperature of the control unit.	
		Condition	Classification
		-8°C<Control unit temp.≤-3°C	Cautions (gray)
		63°C≤ Control unit temp.<68°C	
Control unit temp.≤-8°C		Warning (yellow)	
68°C≤ Control unit temp.			
:Fan rev	This displays the current fan rotation speed of the control unit.		
	Condition	Classification	
	Fan rot. speed ≤ 4000 r/min	Warning (yellow)	

(Continues to the next page)

Display item	Details	
(Continued from the previous page)	Communication between NC unit and display unit	
	Servo comm err Num1	This displays the count of occurrence for "Y02 SV commu er: Recv frame No. 0051 xx04" after the power ON.
	Acc1	This displays the cumulated count of occurrence for " Y02 SV commu er: Recv frame 0051 xx04". Press the <b>Servo clear</b> menu to clear the cumulated count to "0".
	Servo comm err Num2	This displays the count of occurrence for "Y02 SV commu er: Data ID error 0051 xx03" after the power ON.
	Acc2	This displays the cumulated count of occurrence for "Y02 SV commu er: Data ID error 0051 xx03". Press the <b>Servo clear</b> menu to clear the cumulated count to "0".
	RIO comm err Num	This displays the count of occurrence for RIO communication error after the power ON.
	Acc	This displays the cumulated count of occurrence for RIO communication error. Press the <b>RIO clear</b> menu to clear the cumulated count to "0".
	Ether comm err Num	This displays the count of occurrence for "Ether communication error" after the power ON.
	Acc	This displays the cumulated count of occurrence for " Ether communication error ". Press the <b>Ether clear</b> menu to clear the cumulated count to "0".

Display item	Details												
(2) Operation state (Depends on part system)	<p>This displays the state when the operation seems to be stopped in spite that the alarm does not occur. The following state can be confirmed.</p> <table border="1"> <thead> <tr> <th>State</th><th>Details</th></tr> </thead> <tbody> <tr> <td>In-position</td><td> <p>This displays "1" (in-position state) when the following conditions are satisfied for even one axis.</p> <ul style="list-style-type: none"> <li>• No acceleration/deceleration delay for all axes</li> <li>• Within the in-position width set in the parameter for all axes</li> </ul> </td></tr> <tr> <td>Interlock(+)</td><td> <p>When the auto interlock +n-th axis signal or the manual interlock +n-th axis signal is OFF, "1" appears for the n-th axis. (Explanation of the display)</p> <p style="text-align: center;">o o o o o 1 o                   ↑                  ↑           8th axis   ...   1st axis</p> <p>In the above case, the 2nd axis is interlocked. Even when the number of usable axes is less than 8 in 1 part system, this displays 8 axes fixed.</p> </td></tr> <tr> <td>Interlock(-)</td><td> <p>When the auto interlock -n-th axis signal or the manual interlock -n-th axis signal is OFF, "1" appears for the n-th axis. The explanation of the display is same as for the "Interlock (+)".</p> </td></tr> <tr> <td>ExtDcc (+)</td><td> <p>When the control axis is moving in (+) direction, "1" appears for the axis if the external deceleration speed is valid, and the feedrate is clamped, exceeding the set value of the external deceleration speed. (Explanation of the display)</p> <p style="text-align: center;">o o o o o 1 o 1                   ↑                  ↑           8th axis   ...   1st axis</p> <p>In the above case, the 1st axis and the 3rd axis are in external deceleration speed. Even when the number of usable axes is less than 8 in 1 part system, this displays 8 axes fixed.</p> </td></tr> <tr> <td>ExtDcc (-)</td><td> <p>When the control axis is moving in (-) direction, "1" appears for the axis if the external deceleration speed is valid, and the feedrate is clamped, exceeding the set value of the external deceleration speed. The explanation of the display is same as for the "ExtDcc" (+).</p> </td></tr> </tbody> </table>	State	Details	In-position	<p>This displays "1" (in-position state) when the following conditions are satisfied for even one axis.</p> <ul style="list-style-type: none"> <li>• No acceleration/deceleration delay for all axes</li> <li>• Within the in-position width set in the parameter for all axes</li> </ul>	Interlock(+)	<p>When the auto interlock +n-th axis signal or the manual interlock +n-th axis signal is OFF, "1" appears for the n-th axis. (Explanation of the display)</p> <p style="text-align: center;">o o o o o 1 o                   ↑                  ↑           8th axis   ...   1st axis</p> <p>In the above case, the 2nd axis is interlocked. Even when the number of usable axes is less than 8 in 1 part system, this displays 8 axes fixed.</p>	Interlock(-)	<p>When the auto interlock -n-th axis signal or the manual interlock -n-th axis signal is OFF, "1" appears for the n-th axis. The explanation of the display is same as for the "Interlock (+)".</p>	ExtDcc (+)	<p>When the control axis is moving in (+) direction, "1" appears for the axis if the external deceleration speed is valid, and the feedrate is clamped, exceeding the set value of the external deceleration speed. (Explanation of the display)</p> <p style="text-align: center;">o o o o o 1 o 1                   ↑                  ↑           8th axis   ...   1st axis</p> <p>In the above case, the 1st axis and the 3rd axis are in external deceleration speed. Even when the number of usable axes is less than 8 in 1 part system, this displays 8 axes fixed.</p>	ExtDcc (-)	<p>When the control axis is moving in (-) direction, "1" appears for the axis if the external deceleration speed is valid, and the feedrate is clamped, exceeding the set value of the external deceleration speed. The explanation of the display is same as for the "ExtDcc" (+).</p>
State	Details												
In-position	<p>This displays "1" (in-position state) when the following conditions are satisfied for even one axis.</p> <ul style="list-style-type: none"> <li>• No acceleration/deceleration delay for all axes</li> <li>• Within the in-position width set in the parameter for all axes</li> </ul>												
Interlock(+)	<p>When the auto interlock +n-th axis signal or the manual interlock +n-th axis signal is OFF, "1" appears for the n-th axis. (Explanation of the display)</p> <p style="text-align: center;">o o o o o 1 o                   ↑                  ↑           8th axis   ...   1st axis</p> <p>In the above case, the 2nd axis is interlocked. Even when the number of usable axes is less than 8 in 1 part system, this displays 8 axes fixed.</p>												
Interlock(-)	<p>When the auto interlock -n-th axis signal or the manual interlock -n-th axis signal is OFF, "1" appears for the n-th axis. The explanation of the display is same as for the "Interlock (+)".</p>												
ExtDcc (+)	<p>When the control axis is moving in (+) direction, "1" appears for the axis if the external deceleration speed is valid, and the feedrate is clamped, exceeding the set value of the external deceleration speed. (Explanation of the display)</p> <p style="text-align: center;">o o o o o 1 o 1                   ↑                  ↑           8th axis   ...   1st axis</p> <p>In the above case, the 1st axis and the 3rd axis are in external deceleration speed. Even when the number of usable axes is less than 8 in 1 part system, this displays 8 axes fixed.</p>												
ExtDcc (-)	<p>When the control axis is moving in (-) direction, "1" appears for the axis if the external deceleration speed is valid, and the feedrate is clamped, exceeding the set value of the external deceleration speed. The explanation of the display is same as for the "ExtDcc" (+).</p>												
(3) Credit system	<p>This displays the valid term by the credit system when the credit system is valid. This does not display when the credit system specification is invalid.</p>												

## Menus

Menu	Details	Type	Reference
<b>Servo clear</b>	This clears the cumulated count of the servo communication error 1 and 2 to "0".	A	Clearing the cumulated counter to zero
<b>RIO clear</b>	This clears the cumulated count of the RIO communication error to "0".	A	
<b>Ether clear</b>	This clears the cumulated count of the Ether communication error to "0".	A	
<b>Battery clear</b>	This clears the time the battery has been used to "0".	A	

## Clearing the cumulated counter to zero

**(Example)** Clearing the cumulated count of the servo communication error

- (1) Press the menu **Servo clear**. ➡ A confirmation message will be displayed.
- (2) Press **Y** or **INPUT**. ➡ The cumulated count of the servo communication error 1 and 2 will be cleared to "0".  
When other keys are pressed, it will not clear to "0".

This also applies to **RIO clear**, **Ether clear** and **Battery clear** menu.

When using the multi-part system specification, switch the displayed part system by **Next system** menu or the part system switching key **\$⇌\$**.

## 5.8 Data Sampling Screen

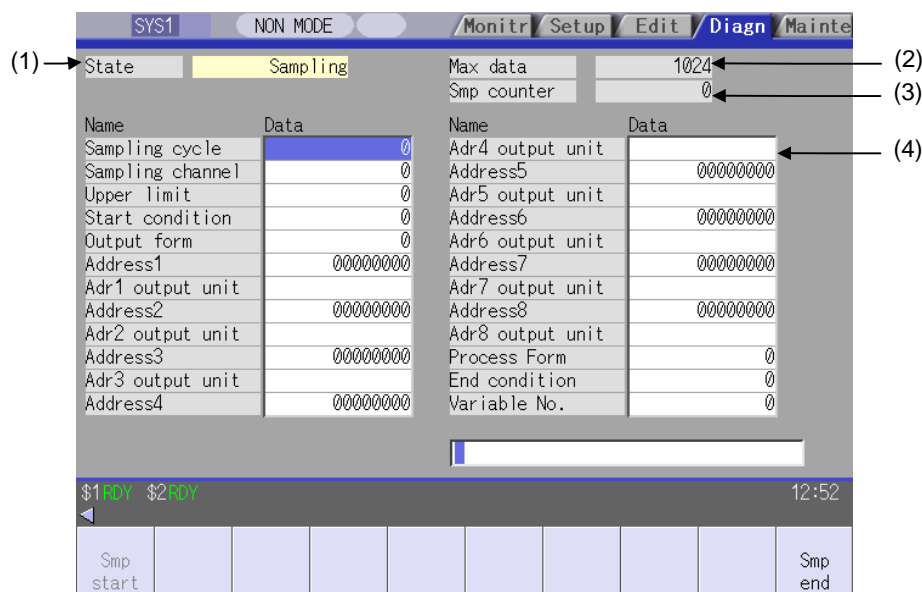
Sampling start/stop, sampling state display, setting the sampling parameters necessary for sampling are performed in the data sampling screen. The NC internal data (speed output from NC to the drive unit, or feedback data from the drive unit, etc.) can be sampled.

Also, the sampling data can be output externally on the I/O screen under the [Mainte] tag.

Sampling specifications

- Sampling cycle : 1.7ms \* magnification
- Number of sampled axes : 1 to 20 axes  
(Servo axis 1 to 16 + Spindle 1 to 4)
- Number of sampling channels : 1 to 8 points
- Number of sampled data items : Max. 1,310,720 points

**(Note 1)** The maximum number of sampled data items is the total number of data. When the number of sampled channels is increased, the number of data per channel will decrease.



### Display items

Display item	Details								
(1) State	<p>This displays the current sampling status. (The displays, "Sampling" and "Trigger wait" are highlighted.)</p> <table border="1"> <thead> <tr> <th>Display</th><th>State</th></tr> </thead> <tbody> <tr> <td>Sampling</td><td>Sampling is being executed.</td></tr> <tr> <td>Sampling stop</td><td>Sampling is not being executed, or the sampling process has completed.</td></tr> <tr> <td>Trigger wait</td><td>When the "Start condition" is not set to "0" (manual start), this indicates a state waiting for the sampling to start, detecting the trigger, after the menu <b>Samp start</b> is pressed.</td></tr> </tbody> </table>	Display	State	Sampling	Sampling is being executed.	Sampling stop	Sampling is not being executed, or the sampling process has completed.	Trigger wait	When the "Start condition" is not set to "0" (manual start), this indicates a state waiting for the sampling to start, detecting the trigger, after the menu <b>Samp start</b> is pressed.
Display	State								
Sampling	Sampling is being executed.								
Sampling stop	Sampling is not being executed, or the sampling process has completed.								
Trigger wait	When the "Start condition" is not set to "0" (manual start), this indicates a state waiting for the sampling to start, detecting the trigger, after the menu <b>Samp start</b> is pressed.								



Display item	Details						
(2) Maximum data	This displays the maximum number of data possible for sampling. Normally, the number of data calculated from the setting value of "Upper limit" is displayed. The maximum number is 50% of the DRAM available memory.						
(3) Sampling counter	<div><div>This displays the position of the sampling buffer during the sampling process. When the sampling buffer is valid, the head of the buffer can be seen with the value of the counter at the end of sampling.</div><div><div>Sampling buffer</div><div><table><tr><td>0</td></tr><tr><td>1</td></tr><tr><td>:</td></tr><tr><td>n-1</td></tr><tr><td>n</td></tr><tr><td>:</td></tr></table></div><div><div>Sampling counter (n)→</div><div><div>End of buffer (newest data)</div><div>Head of buffer (oldest data)</div></div></div></div></div>	0	1	:	n-1	n	:
0							
1							
:							
n-1							
n							
:							
(4) Sampling parameter	This displays and sets the parameters necessary for sampling.						

## Menus

Menu	Details	Type	Reference
<b>Samp start</b>	<p>This starts sampling. This menu cannot be selected under the "Sampling" state. When the trigger is set (the "Start condition" is not set to "0"), the state will be "Trigger wait" until the trigger is detected. The sampling will not stop even if transferred to another screen during sampling.</p> <p>If this menu is pressed when the parameter "#1224 aux08/bit0" is set to "0", the operation message "Can't start sampling" is displayed, and the operation will not start.</p>	C	
<b>Samp end</b>	<p>This stops sampling, and the state will be "sampling stop". The menu <b>Samp start</b> can be selected.</p>	C	

## Sampling parameter

Parameter	Details	Setting range (unit)
Sampling cycle	<p>Set the sampling cycle.</p> <p>Cycle = 1.7ms * setting value</p> <p>(Example) When the setting value is 1: 1.7ms cycle When the setting value is 2: 3.5ms cycle</p>	1 to 255
Sampling channel	<p>Set the number of sampling channel.</p> <p>(Note) The sampling buffer will be divided by the set number of channels. When the number of sampling channels is increased, the number of data per channel will decrease.</p>	1 to 8
Upper limit	<p>Set the capacity of the buffer to be used for sampling.</p> <p>Buffer capacity = (setting value + 1) * 1024 items</p> <p>(Note) When the setting value is 0: 1024 items When the setting value is 1: 2048 items</p>	0 to 1279

Parameter	Details	Setting range (unit)																														
Start condition	<p>Select the condition for starting sampling.</p> <table><tr><td>0</td><td>Manual start Sampling starts when <input type="text" value="Smp start"/> menu is pressed.</td></tr><tr><td>1</td><td>Variable No. Sampling starts when the variable set in "Variable No." is 0 or a value other than null. (Note 2)</td></tr><tr><td>2</td><td>PLC device Sampling starts at the rising edge of the signal set in "PLC device". (Note3)</td></tr><tr><td>3</td><td>Address condition, true Sampling starts when "Address", "Data" and "Data mask" conditions are true. (Note1)</td></tr><tr><td>4</td><td>Address condition, false Sampling starts when "Address", "Data" and "Data mask" conditions are false. (Note1)</td></tr></table>	0	Manual start Sampling starts when <input type="text" value="Smp start"/> menu is pressed.	1	Variable No. Sampling starts when the variable set in "Variable No." is 0 or a value other than null. (Note 2)	2	PLC device Sampling starts at the rising edge of the signal set in "PLC device". (Note3)	3	Address condition, true Sampling starts when "Address", "Data" and "Data mask" conditions are true. (Note1)	4	Address condition, false Sampling starts when "Address", "Data" and "Data mask" conditions are false. (Note1)	0 to 4																				
0	Manual start Sampling starts when <input type="text" value="Smp start"/> menu is pressed.																															
1	Variable No. Sampling starts when the variable set in "Variable No." is 0 or a value other than null. (Note 2)																															
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4	Address condition, false Sampling starts when "Address", "Data" and "Data mask" conditions are false. (Note1)																															
Output form	<p>Select the data format when outputting the sampling data in text style.</p> <table><tr><td>0</td><td>Outputs in decimal figure</td></tr><tr><td>1</td><td>Outputs in hexadecimal figure with 8 digits</td></tr></table> <p><b>(Note 1)</b> When "Output form" is set to "1", and "#1004 ctrlunit" is "E (1nano)", the data larger than 1m will not be output correctly. When the output data exceeds 1m, the low-order 32bits of the sampling data will be output.</p> <p><b>(Note 2)</b> Refer to the section "5.8.2 Outputting sampling data" for details on sampling data output.</p>	0	Outputs in decimal figure	1	Outputs in hexadecimal figure with 8 digits	0, 1																										
0	Outputs in decimal figure																															
1	Outputs in hexadecimal figure with 8 digits																															
Address1 : Address8	<p>Set the sampling address.</p> <p>(a) Index No. method The index No. is fixed regardless of the axis configuration. The low-order six digits of the address are explained below. (If the high-order two digits are not set, the setting will be interpreted as 00.)</p> <p>Setting range (Index No.)</p> <table><tr><td>Servo axis</td><td>1stAX</td><td>2ndAX</td><td>...</td><td>16thAX</td></tr><tr><td>Feedback position</td><td>000100</td><td>000200</td><td>...</td><td>000F00</td></tr><tr><td>Commanded position</td><td>000101</td><td>000201</td><td>...</td><td>000F01</td></tr></table> <table><tr><td>Spindle</td><td>1stSP</td><td>2ndSP</td><td>...</td><td>4thSP</td></tr><tr><td>Feedback position</td><td>010000</td><td>020000</td><td>...</td><td>040000</td></tr><tr><td>Commanded position</td><td>010001</td><td>020001</td><td>...</td><td>040001</td></tr></table> <p>Examples of setting for each purpose are shown below.</p> <ul style="list-style-type: none"><li>• Synchronized tapping setting: 3rd servo axis FB (000300) - 1st spindle FB (010000)</li><li>• High-accuracy setting (roundness): 1st servo axis FB (000100) - 2nd servo axis FB (000200)</li><li>• Spindle synchronization setting: 1st spindle FB (010000) - 2nd spindle FB (020000)</li></ul>	Servo axis	1stAX	2ndAX	...	16thAX	Feedback position	000100	000200	...	000F00	Commanded position	000101	000201	...	000F01	Spindle	1stSP	2ndSP	...	4thSP	Feedback position	010000	020000	...	040000	Commanded position	010001	020001	...	040001	-
Servo axis	1stAX	2ndAX	...	16thAX																												
Feedback position	000100	000200	...	000F00																												
Commanded position	000101	000201	...	000F01																												
Spindle	1stSP	2ndSP	...	4thSP																												
Feedback position	010000	020000	...	040000																												
Commanded position	010001	020001	...	040001																												

Parameter	Details	Setting range (unit)												
Adr1 output unit : Adr8 output unit	<p>Set output unit for the sampling data of the each address.</p> <table><tr><td>0</td><td>No unit conversion</td></tr><tr><td>B</td><td>Outputs in micrometre</td></tr><tr><td>C</td><td>Outputs in sub-micrometre</td></tr><tr><td>D</td><td>Outputs in 10 nanometre</td></tr><tr><td>E</td><td>Outputs in 1 nanometre</td></tr><tr><td>S</td><td>Outputs in conventional interchangeable pulse of the spindle</td></tr></table> <p><b>(Note)</b> For other than "0", set only data that internally complies with "#1004 ctrlunit (control unit)". However, this does not apply if the "address1 to 8" is set in the index No.method.</p>	0	No unit conversion	B	Outputs in micrometre	C	Outputs in sub-micrometre	D	Outputs in 10 nanometre	E	Outputs in 1 nanometre	S	Outputs in conventional interchangeable pulse of the spindle	0,B,C,D,E,S
0	No unit conversion													
B	Outputs in micrometre													
C	Outputs in sub-micrometre													
D	Outputs in 10 nanometre													
E	Outputs in 1 nanometre													
S	Outputs in conventional interchangeable pulse of the spindle													
Process Form	<p>Set the sampling process type.</p> <table><tr><td>0</td><td>One-shot The sampling stops when buffer is full.</td></tr><tr><td>1</td><td>Repeat valid After the process ends (the buffer is full), the "Trigger wait" state will be entered again.</td></tr><tr><td>2</td><td>Sampling buffer valid Sampling is executed as a ring buffer.</td></tr></table> <p><b>(Note)</b> If a value other than "0" is set, the "End condition" must also be set. If not, the sampling process will not end until it is forcibly ended.</p>	0	One-shot The sampling stops when buffer is full.	1	Repeat valid After the process ends (the buffer is full), the "Trigger wait" state will be entered again.	2	Sampling buffer valid Sampling is executed as a ring buffer.	0 to 2						
0	One-shot The sampling stops when buffer is full.													
1	Repeat valid After the process ends (the buffer is full), the "Trigger wait" state will be entered again.													
2	Sampling buffer valid Sampling is executed as a ring buffer.													
End condition	<p>Select the condition for ending the sampling process. (Note 4)</p> <table><tr><td>0</td><td>Sampling completed When the buffer is full, the sampling ends.</td></tr><tr><td>1</td><td>Variable No. Sampling ends when the variable set in "variable No." is 0 or a value other than null (Note 2)</td></tr><tr><td>2</td><td>PLC device Sampling ends at the rising edge of the signal set in "PLC device". (Note 3)</td></tr><tr><td>3</td><td>Address condition, true Sampling ends when "address", "data" and "data mask" conditions are true. (Note 1)</td></tr><tr><td>4</td><td>Address condition, false Sampling ends when "address", "data" and "data mask" conditions are false. (Note 1)</td></tr></table>	0	Sampling completed When the buffer is full, the sampling ends.	1	Variable No. Sampling ends when the variable set in "variable No." is 0 or a value other than null (Note 2)	2	PLC device Sampling ends at the rising edge of the signal set in "PLC device". (Note 3)	3	Address condition, true Sampling ends when "address", "data" and "data mask" conditions are true. (Note 1)	4	Address condition, false Sampling ends when "address", "data" and "data mask" conditions are false. (Note 1)	0 to 4		
0	Sampling completed When the buffer is full, the sampling ends.													
1	Variable No. Sampling ends when the variable set in "variable No." is 0 or a value other than null (Note 2)													
2	PLC device Sampling ends at the rising edge of the signal set in "PLC device". (Note 3)													
3	Address condition, true Sampling ends when "address", "data" and "data mask" conditions are true. (Note 1)													
4	Address condition, false Sampling ends when "address", "data" and "data mask" conditions are false. (Note 1)													

Parameter	Details	Setting range (unit)				
Variable No.	<p>This sets the variable No. that functions as the start/end trigger. If a number that does not exist is input, an error will occur.</p> <table><tr><td>0</td><td>System variable (#1299)</td></tr><tr><td>Other than 0</td><td>Designated common variable (#100 or more, #500 or more)</td></tr></table> <p><b>(Note)</b> If both "Start condition" and "End condition" are set to other than "1" (variable No.), the value will be ignored even if set.</p>	0	System variable (#1299)	Other than 0	Designated common variable (#100 or more, #500 or more)	0 to 999
0	System variable (#1299)					
Other than 0	Designated common variable (#100 or more, #500 or more)					
PLC device	<p>This sets the PLC device that functions as the start/end trigger. When "*" is added at the head, the device will be a b contact. If a device that does not exist is input or the device No. is not within the setting range, an error will occur.</p> <table><tr><td>0</td><td>Data sampling trigger signal (Y72C)</td></tr><tr><td>Other than 0</td><td>Designated device</td></tr></table> <p><b>(Note)</b> If both "Start condition" and "End condition" are set to other than "2" (PLC device), the value will be ignored even if set.</p>	0	Data sampling trigger signal (Y72C)	Other than 0	Designated device	(*)X0000 to (*)X1FFF (*)Y0000 to (*)Y1FFF
0	Data sampling trigger signal (Y72C)					
Other than 0	Designated device					
Address	<p>This sets the address targeted for applying "Data mask". (Note 1) However, if an illegal address (highest-order bit 0) is input, an error will occur.</p> <p><b>(Note)</b> If both "Start condition" and "End condition" are set to other than "3" or "4" (address conditions, true/false), the value will be ignored even if set. This item can be set with the same methods as "address 1 to 8".</p>	-				
Data	<p>This sets the data for judging the results of applying "Data mask" on "Address".</p> <p><b>(Note)</b> If both "Start condition" and "End condition" are set to other than "3" or "4" (address conditions, true/false), the value will be ignored even if set.</p>	-				
Data mask	<p>This sets the data mask to be applied on "Address".</p> <p><b>(Note)</b> If both " Start condition " and " End condition" are set to other than "3" or "4" (address conditions, true/false), the value will be ignored even if set.</p>	-				

**(Note1)** When "3" or "4" is set in "Start condition", be sure to set the address, the data, and the data mask. This applies to "End condition" as well. If these are not set, sampling may not start. When the same values are set in both "Start condition" and "End condition", sampling will not take a place.

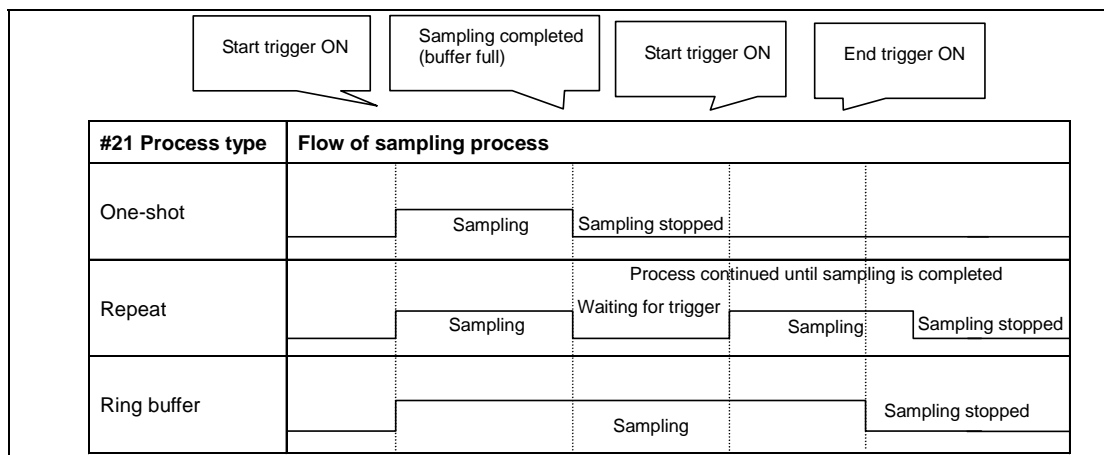
	Example of "End condition" by setting address
Setting	End condition : 3 Address : 12345678 Data : 00000100 Data mask : 0000FFFF
Meaning of setting	The trigger for sampling end turns ON when the results obtained by applying data mask "0000FFFF" on the data of which address is "12345678" matches "00000100".

**(Note 2)** When "1" is set in "Start condition"/"End condition", the common variable uses the floating decimal point type. Thus, if the calculation results are used, an error will occur, and the value may not be recognized as "0" because of its calculation error.

When using a multi-part system, the trigger will turn ON when the conditions are satisfied even if only one part system is used.

**(Note 3)** The variable data settings are validated immediately only from the program. These will not be validated immediately with settings from the screen or an external input.

**(Note 4)** Even if "End condition" is satisfied, the subsequent flow will differ according to the value set in "Process type". (This also applies when ending manually.)



### 5.8.1 Executing NC Data Sampling

Sampling is started when the menu **Samp start** is pressed.

#### Operation method (Executing NC data sampling)

(1) Set sampling condition and data.

(2) Press the menu **Samp start**.



The sampling starts and the menu cannot be selected. When the sampling end condition is satisfied, the state will be "Sampling stop". The menu **Samp start** can be selected.

**(Note 1)** The sampling will not end even if transferred to another screen in sampling.

**(Note 2)** The data set in this function will not be output to the parameter.

**(Note 3)** The contents of "State" is returned to "Sampling stop". (The parameters related to NC data sampling is maintained.)

**(Note 4)** The data is displayed in 16 digits. However, the data can be set up to 8 digits.

## 5.8.2 Outputting Sampling Data

Sampling can be output on the data I/O screen under [Mainte] tag.

The screenshot shows the 'Mainte' screen with the following data:

<Program>	<Char>	<Comment>
123	0	
12345678	0	
123456789012	1574	
2	74	
3	65	
51	1574	
51A	1574	
7	74	
abc	1574	
abcdefghijkl	1574	

Other fields include: Prog entry (10), Remain (390), Character (9.50K), Remain (226.75K), Device (Memory), A:Dev (Memory), Dir (Program), File (-), B:Dev (Memory), Dir (Program), File (-), INP data, and CMP data.

Bottom status bar: \$1 EMS, \$2 EMS, 20:07.

Bottom menu: Area change, Device select, Dir, File name, List update, Trnsfr A->B, Compare A:B, Erase A, Erase B, Rename A->B.

## Operation method (Outputting the sampling data)

- (1) Select the data I/O screen under [Mainte] tag.
- (2) Set the following items in the file setting column A.  

A:Dev:	Memory
Dir:	/LOG
File:	NCSAMP.CSV
- (3) Set the destination device, directory, file name in the setting column B.
- (4) Press the menu Trnsfr A->B. ➡ Sampling file will be output.

**(Note 1)** The data can not be output when the sampling is not executed.

**(Note 2)** The data can be output only when the sampling output valid parameter (#1224 aux08/bit0) is valid.

**(Note 3)** The output format differs depending on the sampling parameter "Output form".

**(Note 4)** The header information is not added to output sampling data.

**Output file format (when output in decimal figure)**

Sampling data is output in decimal figure when the sampling parameter "Output form" is set to "0".

**(Example)** When the number of channel is 3, the address is 1 to 3, and the output unit is E, it stops when 1ch is 100mm, 2ch is -100mm and 3ch is 50mm.

	Output format		
	1ch	2ch	3ch
1st data	200000000	-200000000	100000000
2nd data	200000000	-200000000	100000000
3rd data	200000000	-200000000	100000000
:	:	:	:

**Output file format (when output in hexadecimal figure)**

Sampling data is output in hexadecimal figure with 8 digits when the sampling parameter "Output form" is set to "1".

The output data is the sampling buffer dumped in the length of the long type data (32bits).

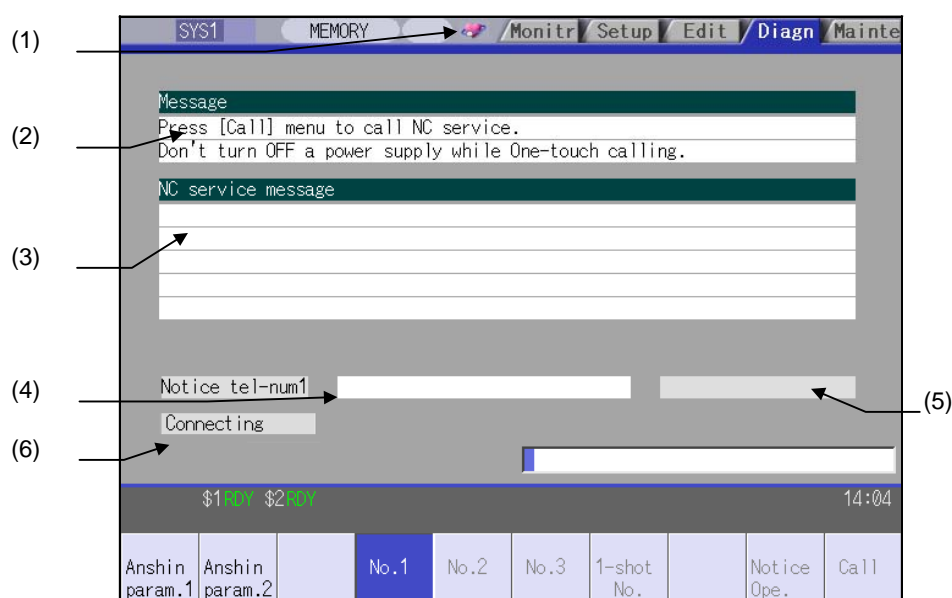
**(Example)** When the number of channel is 3, the address is 1 to 3, and the output unit is C, it stops when 1ch is 100mm, 2ch is -100mm and 3ch is 50mm.

Channel		Output format
1st data	1ch	0001E840
	2ch	FFE17B80
	3ch	000F4240
2nd data	1ch	0001E840
	2ch	FFE17B80
	3ch	000F4240
3rd data	1ch	0001E840
	2ch	FFE17B80
	3ch	000F4240
:	:	:

## 5.9 Anshin-net Screen

## 5.9.1 Message Display Screen

Anshin-net connection status and message from NC service are displayed on this screen. Operator can make one-touch calls; validate operator notification; and change the notifying party's telephone No.



## Display items

Display item	Details
(1) Anshin-net connection status	Flickers during Anshin-net communications. No displays during off-line state.
(2) Message	Message (Anshin-net connection status, etc.) is displayed.
(3) NC service message	Message from NC service is displayed. Up to 5 lines with 71 characters in each line can be displayed. <b>(Note 1)</b> If a message does not fit in the display area, the overflowed message is truncated. <b>(Note 2)</b> The message will be held until the server is connected again; the power is turned OFF; or operator notification operation is validated. <b>(Note 3)</b> When a message is received while Anshin-net screen is not displayed, the message will be displayed as soon as the screen is opened.
(4) Notice tel-num	Telephone No. of the notifying party is displayed.
(5) Comment	Comment concerning the notifying party is displayed.
(6) Communication status message	Message on communication status is displayed. "Transmission completed" and "Reception completed" displays will go out at screen transitions.



## Menus

Menu	Details	Type	Reference
Anshin param.1	Jumps to the Anshin-net parameter1 screen.	C	"Setting the parameter"
Anshin param.2	Jumps to the Anshin-net parameter 2 screen when a password is set by the machine tool builder.	C	"Setting the parameter"
No.1	This changes the notifying party's telephone No. to the number at Notice tel-num1 in the Anshin-net parameter 1 screen.	B	
No. 2	This changes the notifying party's telephone No. to the number at Notice tel-num2 in the Anshin-net parameter 1 screen.	B	
No. 3	This changes the notifying party's telephone No. to the number at Notice tel-num3 in the Anshin-net parameter 1 screen.	B	
1-shot No.	This changes the notifying party's telephone No. to the number set arbitrarily.	A	"Setting the arbitrary telephone No."
Notice Ope.	This validates/invalidates the operator notification.	B	"Making the operator notification valid"
Call	This makes a one-touch call.	B	"Making a one-touch call"

## 5.9.2 Anshin-net Parameter 1, 2 Screen

The notifying party's telephone No. and comments are set in this screen.

No.	Name	Data
10801	Notice tel num 1	
10802	Comment 1	
10803	Notice tel num 2	
10804	Comment 2	
10805	Notice tel num 3	
10806	Comment 3	
10812	Anet enable	0

(1)

\$1: \$2: 14:06

## Display items


Display item	Details
(1) Data setting area	Input the data to be set for the parameter.

## Anshin-net parameter 1

#	Item	Details	Setting range (unit)
10801	Notice tel num 1	Set the call-back telephone No. (1) used for one-touch call and operator notification. Enter from the area code for domestic calls, and from the communication company No. for international calls. Hyphens "-" can be used as a delimiting character.	Within 28 characters
10802	Comment 1	Set a comment, such as the party's name, for the notification party telephone number 1.	Within 20 alphanumerical characters (excluding spaces)
10803	Notice tel num 2	Set the call-back telephone No. (2) used for one-touch call and operator notification. Enter from the area code for domestic calls, and from the communication company No. for international calls. Hyphens "-" can be used as a delimiting character.	Within 28 characters
10804	Comment 2	Set a comment, such as the party's name, for the notification party telephone number 2.	Within 20 alphanumerical characters (excluding spaces)
10805	Notice tel num 3	Set the call-back telephone No. (3) used for one-touch call and operator notification. Enter from the area code for domestic calls, and from the communication company No. for international calls. Hyphens "-" can be used as a delimiting character.	Within 28 characters
10806	Comment 3	Set a comment, such as the party's name, for the notification party telephone number 3.	Within 20 alphanumerical characters (excluding spaces)
10812	Anshin-net valid	Set valid/invalid of the Anshin-net function.	0: Invalid 1: Valid

## 5.9.3 Operation Method

## Operation method (Executing NC data sampling)

- (1) Set sampling condition and data.  **Notice Ope.** menu key is highlighted and the other menus will be disabled.  
"Operator notice effective" is displayed.

When the **Notice Ope.** menu key is pressed again while operator notification is valid, menu's highlight and disabled state will be canceled, and the operator notification will be disabled.

If machining ends normally/abnormally while operator notification is valid, system is connected to the NC service.



("Dialing" → "Waiting for dialing" → "Verifying the user registration" → "Connecting" → "Sending" → "Connecting" → "Transmission completed")

The message from NC service is displayed.



After data has been sent, menu's highlight and disabled state is canceled, and operator notification will be disabled.

A call is made to the currently displayed notifying party's telephone No. from the call center.

## Making a one-touch call

- (1) Press the **Call** menu key.  **Call** menu is highlighted and the other menus will be disabled.  
"Carry out one-touch call? (Y/N)" is displayed.
- (2) Press "Y" or the **INPUT** key.  Connects to NC service. Connection status is displayed in order.  
("Dialing" → "Waiting for dialing" → "Verifying the user registration" → "Connecting" → "Sending" → "Connecting" → "Transmission completed")  
Diagnosis data is sent to NC service after connection has been established.  
After diagnosis data has been sent, menu's highlight and disabled state is canceled, and the message from NC service is displayed.

## Setting the arbitrary telephone No.

- (1) Press the **1-shot No.** menu key.  1-shot No. menu is highlighted and the other menu will be disabled.  
The mode for setting the arbitrary No. is entered.  
The cursor is displayed at the notifying party's telephone No. column.
- (2) Enter numerical value.  
012-345-6789 **INPUT**  Menu's highlight and disabled state are canceled, and "012-345-6789" is displayed at the cursor position.  
The notifying party's telephone No. is changed to the number entered.

If the **1-shot No.** menu key is pressed again after an arbitrary telephone No. has been set, the notifying party's telephone No. will be the number already selected (No. 1, 2, or 3).

**(Note 1)** If the No.1, No.2, or No.3 menu key is pressed after an arbitrary telephone No. has been input, the displayed arbitrary telephone No. will be cleared and the notifying party's telephone No. will be changed to the number 1, 2, or 3 on the Anshin-net parameter 1 screen.

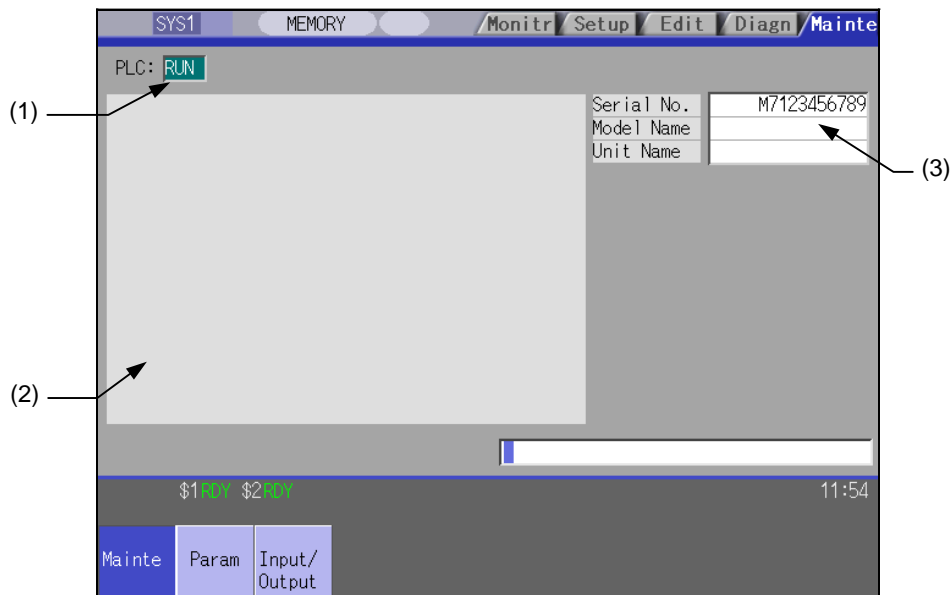
**Setting the parameter**

- (1) Press the Anshin param.1 menu key in the message display screen. ➡ Anshin-net parameter 1 screen is displayed.  
(Press the Anshin param.2 menu key to set the parameter for Anshin-net parameter 2 screen.)
- (2) Move the cursor to the item to be set with the ↑ and ↓ keys. ➡ The cursor is moved to the item to be set, and the value currently set in the data setting area is displayed.
- (3) Enter a value and press the INPUT key. ➡ The input value is reflected at the cursor position.

Press the cancel key to return to the message display screen.

## 6. Maintenance Screens

The NC memory can be formatted, the absolute position parameters setting, the SRAM backup, etc. are possible on this screen. Important operations are protected with a password.



### 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.
(3) Serial No.	Currently set NC information (serial No., model name and unit name) is displayed.

## 6. Maintenance Screens

### Menus

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	
All backup	This backs up (saves) or restores (reloads) the file such as SRAM etc. to designated device.	C	
System setup	This automatically executes necessary parameter setting for driving servomotor only by setting necessary minimum item.	C	
Adjust S-ana	This changes the screen to that for adjusting the spindle analog output.	C	
To Abs pos	This sets the absolute position for servo axis (arbitrary NC axis, PLC axis).	C	
AUX test	This carries out absolute position setting or test operation by the auxiliary axis forward run/reverse run.	C	
Collect set	This executes the followings. Setting to collect the diagnosis data Confirming the diagnosis data collection status Starting/Stopping to collect the diagnosis data Clearing the diagnosis data	C	
Option setting	This sets the options.	C	
Format	This formats the NC memory.	B	
T-life format	This formats the tool life management data.	B	
Serial No.Set	This changes the NC serial No.	A	
Console exec	The console is executed. The MS-DOS window will appear.	C	
To In/out	This changes the screen to the Data Input/Output screen.	C	
To param	This changes the screen to the Parameter screen.	C	
SRAM backup	This backs up the NC SRAM information on the HD.	B	
HMI Quit	This quits the screen operation.	B	

### Backing up the NC SRAM information

- (1) Press the menu SRAM backup.  A message appears to confirm the backup execution.
- (2) Press Y or INPUT.  The backup is executed.  
The data is backed up into "D:\ NCFILE \ SRAM.BIN" on the HD.  
(If SRAM.BIN already exists, the original file will be saved as SRAM.BAK.)  
Press a key other than Y or INPUT to cancel the backup.

## 6.1 Parameter Screens

The various parameters can be displayed and set on this screen.

The configuration of the all parameter screens is applied to one of the following five patterns.

**<Pattern 1>** This is the screen for setting the common parameters for the axis, device, etc.  
(Process param, etc.)

SYS1 MEMORY			/Monitr/Setup/Edit/Diagn/Mainte		
No.	Name	Data	No.	Name	Data
	<WRK COUNT>			<FIXED C.>	
8001	WRK COUNT M	30	8012	G73 n	0.000
8002	WRK COUNT	44	8013	G83 n	0.000
8003	WRK COUNT LIMIT	333	8014	CDZ-VALE	0
	<AUTO TLM>		8015	CDZ-ANGLE	0
8004	SPEED	0	8016	G71 MINIMUM	0.000
8005	ZONE r	0.000	8017	G71 DELTA-D	0.000
8006	ZONE d	0.000	8018	G84/G74 n	0.000
	<AUTO CORNER OVR.>			<PRECISION>	
8007	OVERRIDE	0	8019	R COMP	0
8008	MAX ANGLE	0		Theor R decrease	2.296
8009	DSC.ZONE	0.000	8020	DCC. ANGLE	0
	<T-TIP OFFSET>		8021	COMP CHANGE	0
8010	ABS.MAX	0.000	8022	CORNER COMP	0
8011	INC.MAX	0.000	8023	CURVE COMP	0

\$1 \$2 20:37

Process param Ctrl param Axis param Operate param Area copy Area paste

**<Pattern 2>** This is the screen for setting the parameters having an array structure for each axis  
(Axis param, etc.)

SYS1 MEMORY			/Monitr/Setup/Edit/Diagn/Mainte		
No.	Name	X1	Y1	Z1	C1
8201	AX. RELEASE	0	0	0	0
8202	OT-CHECK OFF	1	1	1	1
8203	OT-CHECK-CANCEL	0	0	0	0
8204	OT-	1.000	1.000	1.000	1.000
8205	OT+	1.000	1.000	1.000	1.000
8206	TOOL CHG.P	0.000	0.000	0.000	0.000
8207	G76/87 IGNR	0	0	0	0
8208	G76/87 (-)	0	0	0	0
8209	G60 SHIFT	0.000	0.000	0.000	0.000
8210	OT INSIDE	0	0	0	0
8211	MIRR. IMAGE	0	0	0	0
8212					
8213	Rotation axis type	0	0	0	0

\$1 \$2 20:37

Process param Ctrl param Axis param Operate param Area copy Area paste Next axis



- <Pattern 3>** This is the screen for setting parameters common for the axis and device, etc.  
The parameter names are not displayed  
(Machine error data, PLC constant, etc.)

No.	Data	No.	Data	No.	Data	No.	Data
18001	0	18016	0	18031	0	18046	0
18002	0	18017	0	18032	0	18047	0
18003	0	18018	0	18033	0	18048	0
18004	0	18019	0	18034	0	18049	0
18005	0	18020	0	18035	0	18050	0
18006	0	18021	0	18036	0	18051	0
18007	0	18022	0	18037	0	18052	0
18008	0	18023	0	18038	0	18053	0
18009	0	18024	0	18039	0	18054	0
18010	0	18025	0	18040	0	18055	0
18011	0	18026	0	18041	0	18056	0
18012	0	18027	0	18042	0	18057	0
18013	0	18028	0	18043	0	18058	0
18014	0	18029	0	18044	0	18059	0
18015	0	18030	0	18045	0	18060	0

\$1: 0000 \$2: 0000 20:38

PLC timer PLC inc timer PLC counter PLC constnt

- <Pattern 4>** This is the screen for setting parameters having an array structure for each part system  
(Base system parameters, etc.)

No.	Name	\$1	\$2	\$3	\$4
1001	SYS_ON	1	1	0	0
1002	axisno	4	3	0	0
1003	iunit	E	E	D	E
1004	ctrl_unit	E	E	E	E
1005	plcunit	B	B	D	E
1006	mcpunit	B	B	D	E
1025	I_plane	1	1		
1026	base_I	X	X		
1027	base_J	Y	Y		
1028	base_K	Z	Z		
1029	aux_I				
1030	aux_J				
1031	aux_K				

\$1: 0000 \$2: 0000 20:39

BaseSys param BaseAx spec BaseCom param Axis spec Zp-rtn param Area copy Area paste Next system

<Pattern 5> This is the screen for setting the subprogram storage destination parameters

No.	Name	Data
8880	Subpro stor D0:dev	
8881	:dir	
8882	Subpro stor D1:dev	
8883	:dir	
8884	Subpro stor D2:dev	
8885	:dir	
8886	Subpro stor D3:dev	
8887	:dir	
8888	Subpro stor D4:dev	
8889	:dir	

Input the following value of dev.  
M:Memory G:HD R:M-Card D:DS T:Ethernet F:FLD

\$1: 20:40

I/O param	Ethnet param	Link param	Subpro stor			Area copy	Area paste		
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## Menus

Menu	Details	Type	Reference
Param No.	A arbitrary parameter No. can be selected. When the parameter No. is set and the <b>INPUT</b> key is pressed, the parameters will appear with that No. at the head. The cursor will also move to that No.	A	6.1.2 Selecting the Parameter No.
Area copy	This copies the parameter setting values in the designated range. The range is designated with numbers.	A	6.1.4 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 part system where the cursor is. Once copied, a parameter can be pasted any number of times until a new parameter is copied.	B	
Next axis	This can be selected when there are five or more display axes in the selected part system. This is used in the screen for the parameters having an array structure for each axis.	C	-
Next system	This can be selected when there are two or more screen display part systems. Use this with the parameter screen for each parameter.	C	-
	This can always be selected when the base part system parameter screen is open. The display changes to the PLC axis display when this menu is pressed.		6.1.6 Machine Parameters
Process param	This changes the screen to the user parameter screen. <b>(Note)</b> The barrier data is displayed only for the L specifications.	C	6.1.5 User Parameters
Control param			
Axis param			
Operate param			
Barrier data			
I/O param			
Ethernet param			
Link param			
Subpro stor			

Menu	Details	Type	Reference
BaseSys param	This changes the screen to the Machine parameter screen. <b>(Note 1)</b> Normally, the machine parameters can be referred to, but cannot be set. <b>(Note 2)</b> This menu displays when the rotary axis parameter, auxiliary axis parameter, and open parameter 1/2 are enabled.	C	6.1.6 Machine Parameters
BaseAx spec			
BaseCom param			
Axis spec			
Zp-rtn param			
Abs pos param			
Servo param			
Spindle spec			
Spindle param			
RotAxis param			
PLC timer			
PLC inc timer			
PLC counter			
PLC constnt			
Bit select			
Er Comp param			
Er Comp data			
Macro list			
Posn switch			
AUX param			
Open param1			
Open param2			

## 6.1.1 Changing the Parameter Display

## Changing to the computer link parameters

- (1) Press the menu change key until the menu **Link param** appears. ➡ The menu **Link param** appears.
- (2) Press the menu **Link param**. ➡ The computer link parameters appears.  
The menu **Link param** is highlighted.

SYS1 MEMORY /Monitr/Setup/ Edit /Diagn/ Mainte					
No.	Name	Data	No.	Name	Data
9601	BAUD RATE	0	9616	CTRL. INTERVAL	0
9602	STOP BIT	0	9617	WAIT TIME	0
9603	PARITY EFFECTIVE	0	9618	PACKET LENGTH	0
9604	EVEN PARITY	0	9619	BUFFER SIZE	0
9605	CHR. LENGTH	0	9620	START SIZE	0
9606	HAND SHAKE	0	9621	DC1 OUT SIZE	0
9607	TIME-OUT SET	0	9622	POLLING TIMER	0
9608	DATA CODE	0	9623	TRANS. WAIT TMR	0
9609	LINK PARAM. 1	00	9624	RETRY COUNTER	0
9610	LINK PARAM. 2	00	9625		
9611	LINK PARAM. 3	00	9626		
9612	LINK PARAM. 4	00	9627		
9613	LINK PARAM. 5	00	9628		
9614	START CODE	0	9629		
9615	CTRL. CODE OUT	00	9630		

\$1.00 \$2.00 20:41

I/O param	Ethnet param	<b>Link param</b>	Subpro stor			Area copy	Area paste	
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## 6.1.2 Setting the Parameters

The method of setting the parameters is explained in this section. For the setting range of each parameter, refer to "3.8.8 Parameter list".

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

**"8201 Axis removal" Setting Y1 axis to "1"**

- (1) Press the menu .

- (2) Use the , , , and  keys to move the cursor to the position to be set.

The cursor can also be moved with the menu .  
Refer to "6.2.2 Selecting the parameter No.".

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

No.	Name	X1	Y1
8201	AX. RELEASE	0	0
8202	OT-CHECK OFF	1	1
8203	OT-CHECK-CANCEL	0	0
8204	OT-	1.000	1.000
8205	OT+	1.000	1.000
8206	TOOL CHG.P	0.000	0.000

The current setting value is displayed in the input area.

- (3) Input the value.

1

The setting value appears, and the cursor moves.

No.	Name	X1	Y1
8201	AX. RELEASE	0	1
8202	OT-CHECK OFF	1	1
8203	OT-CHECK-CANCEL	0	0
8204	OT-	1.000	1.000
8205	OT+	1.000	1.000
8206	TOOL CHG.P	0.000	0.000

**"8205 OT+" Setting X1 axis to "100.0" and Z1 axis to "200.0"**

(1) Press the menu .

(2) Use the  and  keys to move the cursor to the position to be set.  
(The row does not need to be designated with the  and  keys.)



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

No.	Name	X1	Y1	Z1
8201	AX. RELEASE	0	1	0
8202	OT-CHECK OFF	1	1	1
8203	OT-CHECK-CANCEL	0	0	0
8204	OT-	1.000	1.000	1.000
8205	OT+	1.000	1.000	1.000
8206	TOOL CHG.P	0.000	0.000	0.000

The current setting value is displayed in the input area.

(3) Input the value.  
(Format: 1st row/2nd row/3rd row/4th row)  
100//200



The setting value appears, and the cursor moves.

No.	Name	X1	Y1	Z1
8201	AX. RELEASE	0	1	0
8202	OT-CHECK OFF	1	1	1
8203	OT-CHECK-CANCEL	0	0	0
8204	OT-	1.000	1.000	1.000
8205	OT+	100.000	1.000	1.000
8206	TOOL CHG.P	0.000	0.000	0.000

**(Note 1)** If  appears at the lower right of the screen when the parameter value is changed, the parameter value will be validated when the power is turned ON again.

**(Note 2)** If the  key is pressed without inputting a value, the cursor will move without changing the parameter setting value.

**(Note 3)** If a character string, such as an axis name or input/output device name, is set in the parameter, the setting will be cleared when 0 is input and the  key is pressed.

**(Note 4)** Parameters for up to four rows, which are as currently displayed, can be set at once.

**(Note 5)** If the parameter value for several rows is input simultaneously, the values will be set from the currently displayed left end no matter which row the cursor is currently at.

## 6.1.3 Copying/Pasting Parameters

## Designating the cursor position and copying

(1) Move the cursor to the parameter to be copied.

(2) Press the menu **Area copy** and **INPUT**.



The menu is highlighted.  
The setting value of the parameter at the cursor position highlighted.

No.	Name	X1
8201	AX. RELEASE	0
8202	OT-CHECK OFF	1
8203	OT-CHECK-CANCEL	0
8204	OT-	1.000
8205	OT+	100.000
8206	TOOL CHG.P	0.000

**(Note)** When the screen has an array structure for each axis or each part system, an error will occur if different rows (axis or part system) are designated for the copy start position and end position.



## Copying by designating the parameter No. with key inputs

- (1) Move the cursor to the display area of the axes or part system to be copied.

- (2) Press the menu .

➡ The menu is highlighted.

- (3) Designate the copy range.  
Format: First No./Last No.  
8203/8205

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

If the last No. to be copied is the last No. of the currently displayed parameter type, "E" can be designated. **(Example)** 8201/E  
If only one parameter is being copied, input only the No. of the parameter to copy, and then press the  key.

No.	Name	X1
8201	AX. RELEASE	0
8202	OT-CHECK OFF	1
8203	OT-CHECK-CANCEL	0
8204	OT-	1.000
8205	OT+	100.000
8206	TOOL CHG.P	0.000

**(Note 1)** The copy target range highlight returns to the normal display by pasting. The copy target range is valid until the parameter type display is changed.

**(Note 2)** Only the currently displayed parameter types can be copied.

**(Example)** If the parameter numbers #1001 to #1028 of the base system parameter are designated as the copy target range, the base axis specification parameters #1013 to #1024 cannot be copied.

## Pasting the copied data

- (1) Move the cursor to the display area of the axes or part system 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.  
The menu highlight returns to normal.

The copied data will not be written in when the  key is pressed.

**(Note)** If the corresponding parameter is changed after the copy target range is designated, the changed value will be pasted.

## 6.1.4 User Parameters

The user parameter configuration is as shown below.

Parameter type	Parameter No.	Next axis menu	Next system menu	Area copy menu Area paste menu
Process Parameter	8001 to 8094 8621 to 8627 8701 to 8712 19425 to 19428	-	$\Delta$ (Note 3)	$\Delta$ (Note 3)
Control Parameter	8101 to 8124	-	-	-
Axis Parameter	8201 to 8215	$\Delta$ (Note 1)	-	$\Delta$ (Note 2)
Operation Parameter	8901 to 8921	-	-	-
Barrier data (Note 5)	8300 to 8319	-	$\Delta$ (Note 3)	○
Input/Output Parameter	9001 to 9530	-	-	-
Ethernet Parameter	9701 to 9781	-	-	-
Computer Link Parameter	9601 to 9630	-	-	-
Sub-program storage destination parameter	8880 to 8889	-	$\Delta$ (Note 3)	$\Delta$ (Note 3)

**(Note 1)** This is valid only when the total number of valid NC axes and PLC axes in the entire part system is five or more.

**(Note 2)** This is valid only when the total number of valid NC axes and PLC axes in the entire part system is two or more.

**(Note 3)** This is valid only when the number of valid part systems is two or more.

**(Note 4)** The barrier data appears only for the L specifications.

## Operation methods (Subprogram storage destination parameters) Example 1

Setting the device (Example: Assign FD to D1)

(1) Set the cursor to the "#8882 Subpro stor  
D1: dev" (D1 device).

(2) Input , and press the  key.



"FD" appears at "#8882 D1: dev".  
The cursor moves down one line.

**(Note)** Input the following values for the device name.

M: Memory, G: HD, R: Memory card, D: DS (Data server), T: Ethernet, F: FD

## Operation methods (Sub program storage destination parameter) Example 2

Setting the directory (Example: Setting "/TEMP1/TEMP12/TEMP123" to D1)

(1) Set the cursor to "#8883 dir" (D1 directory)



The current "#8883 D1: dir" contents are echoed back to the input area.

(2) Set "/TEMP1/TEMP12/TEMP123", and press the  key.



The value is set, and the cursor moves down one line.

## 6. Maintenance Screens

## 6.1 Parameter Screens

### 6.1.5 Echo Back

If more than 14 characters can be set for the parameter, or for bit-related parameters, the parameter setting value at the cursor position appears at the input area. If more than 14 characters are set in the parameter, "... " will appear in the data field.

### < Target parameters>

Parameter screen name	Parameter No., parameter name
Base Common Param	#1217 aux01 to #1228 aux12 #1229 set01 to #1240 set12 #1265 ext01 to #1300 ext36 #1926 IP address #1927 Sub-net mask #1928 Gateway #1930 Host Address #1934 Local IP address #1935 Local Subnet mask #11005 PC IP address
Base System Param	#1204 TmirS2 #1210 RstGmd #1573 Ret1 #1574 Ret2
Bit Selection Param	#6401 to #6596
Ethernet Param	#9702 IP address #9703 Sub-net mask #9704 Gateway #9711 Host 1 host name #9712 Host 1 user name #9714 Host 1 directory * These also apply for hosts 2 to 4.
Sub-pro Storage Destination Param	#8881 Subpro stor D0:dir * This also applies for devices 1 to 4.

SYS1		MEMORY		/Monitor/ Setup / Edit / Diagn / Maint	
No.	Name	Data	No.	Name	Data
9701	IP addr auto set	0	9719	Host1 Wrđ pos:cmnt	0
9702	IP address	0.0.0.0	9720	Host1 Wrđ num:cmnt	0
9703	Subnet mask	0.0.0.0	9721	Host1 no total siz	0
9704	Gateway	0.0.0.0			
9705	Timeout	0	9731	Host2 host name	
9706	Host No.	0	9732	Host2 user name	
			9733	Host2 password	*****
9711	Host1 host name		9734	Host2 directory	/bnc59/user...
9712	Host1 user name		9735	Host2 host type	0
9713	Host1 password	*****	9736	Host2 Wrđ pos:name	0
9714	Host1 directory		9737	Host2 Wrđ pos:size	0
9715	Host1 host type	0	9738	Host2 Wrđ pos:Dir	0
9716	Host1 Wrđ pos:name	0	9739	Host2 Wrđ pos:cmnt	0
9717	Host1 Wrđ pos:size	0	9740	Host2 Wrđ num:cmnt	0
9718	Host1 Wrđ pos:Dir	0	9741	Host2 no total siz	0
				/bnc59/user/program	

### Parameters for which 14 or more characters can be set

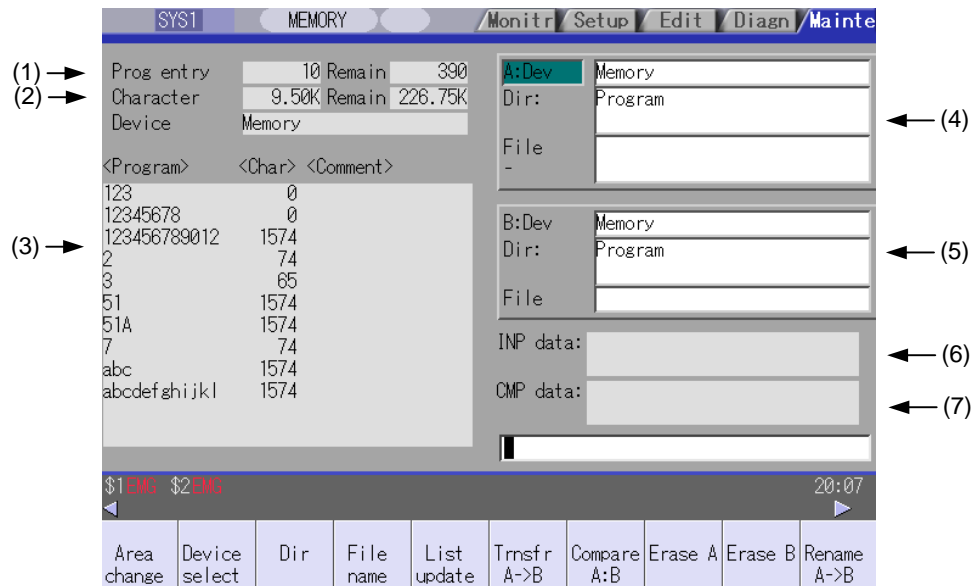
[illegible]

### Bit-related parameters

## 6.2 Input/Output Screen

The Input/Output screen is used to carry out NC data input/output between the NC internal memory and the external input/output devices.

Here, the hard disk built into the NC device is also treated as external devices.



### 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 :</p> <p>This displays the number of programs previously registered as user machining programs.</p> <p>Remainder :</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 :</p> <p>This displays the number of characters previously registered as user machining programs.</p> <p>Remainder :</p> <p>This displays the remaining number of characters that can be registered. The total of the number of memory characters and the remainder is the maximum number of memory characters set in the specifications.</p>

Display items	Details
(3) List <b>(Note 2)</b>	<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 :</p> <p>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>When the number of characters exceeds 12, the excess is indicated as "***".</p> <p>Character :</p> <p>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 :</p> <p>This displays the comment (up to 17 alphanumeric characters and symbols) of each file.</p> <p>The date which the file is updated is displayed for the HD, FD, memory card, DS or Ethernet.</p> <p>When the number of characters exceeds 17, the excess is not displayed.</p>
(4) File setting column A	This sets the device, directory, and file name of the target file for transfer, compare, erasing, etc., operations.
(5) File setting column B	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. When the number of characters exceeds 28, the excess is not displayed.
(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	Memory	HD	Serial	Memory card	DS	Ethernet	FD
Display item							
Number of programs registered	○	○	×	○	○	○	○
Remainder	○	×	×	×	×	×	×
Number of memory characters	○	○	×	○	○	○ *	○
Remainder	○	○	×	○	○	×	○
List	○	○	×	○	○	○	○

○ : Displayed    × : Not displayed

\* : When the Ethernet parameter "#97\*1 Host n no total siz" is set to 1, the number of host memory characters will not appear.

**(Note 2)** The list does not appear when using serial.

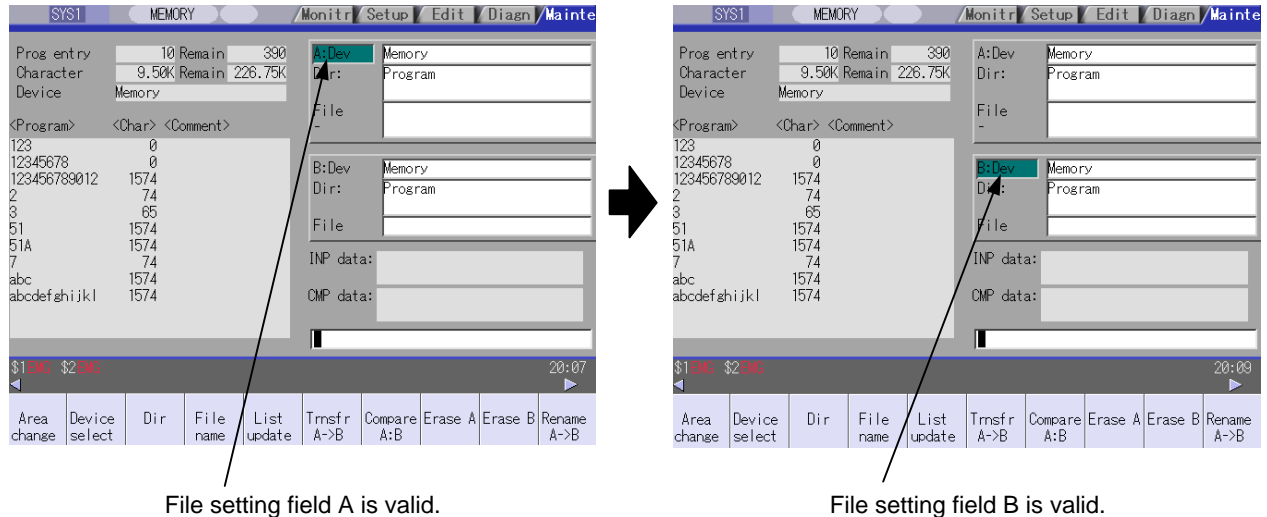
## Menus

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	6.2.1 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	6.2.2 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	-
Transfr 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	6.2.3 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	6.2.4 Comparing Files (Compare)
Erase A	This erases the file in file setting column A. <b>(Note)</b> The NC memory (excluding programs), serial and Ethernet (host file) cannot be erased.	B	6.2.5 Erasing a File
Erase B	This erases the file in file setting column B. <b>(Note)</b> The NC memory (excluding programs), serial and Ethernet (host file) cannot be erased.	B	
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). <b>(Note)</b> The same device must be selected for A and B. The NC memory (excluding programs) and serial cannot be renamed.	B	6.2.6 Changing a File Name
Comment nondisp	This changes whether to show or hide the comment field.	B	
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, FD, memory card or DS is selected for the device.	A	6.2.7 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>(Note)</b> The NC memory (excluding programs), serial and Ethernet (host file) cannot be merged.	B	6.2.8 Merging a File
FD format	This formats the FD.	A	6.2.9 Formatting an External Device
MemCrd format	The formats the front IC card.	A	
DS format	This formats the NC compact flash memory.	A	
Stop	This interrupts the process (transfer, compare, etc.) during execution.	C	-

## 6.2.1 Changing the Valid Area

When setting the file setting field A or B device, directory and file name on this screen, the area containing these must be valid.

The display area can be changed by pressing the menu key (Area change) or the cursor key  $\uparrow$  and  $\downarrow$ . After changing, the data setting operation is valid in that area.



## Changing the valid file setting field

When file setting field A (top) is valid

- (1) Press the menu **Area change**.

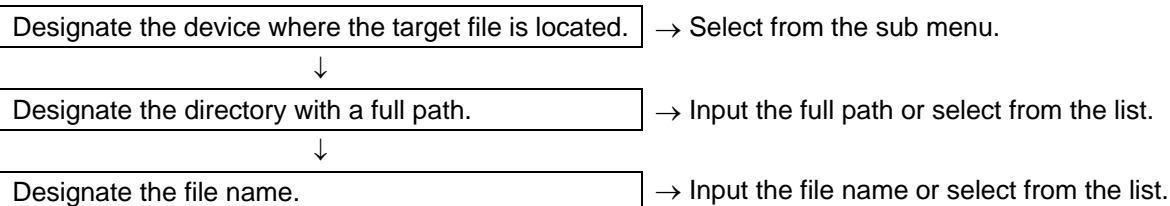
This can also be changed with the cursor key  $\downarrow$ .



The file setting field B (bottom) is validated.

## 6.2.2 Selecting a Device, Directory and File

## File selection sequence



## Menu used

**Device select** menu's submenus

Menu	Details	Type	Reference
Memory	This selects the NC memory (program, parameter, user PLC, NC data).	C	-
HD	This selects the hard disk.	C	-
Serial	This selects the RS-232C device (PC, tape, etc.).	C	-
Memory card	This selects the front IC card.	C	-
DS	This selects the NC compact flash memory.	C	-
Ethernet	This selects the Ethernet-connected host computer.	C	-
FD	This selects the floppy disk.	C	-

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

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



## Selecting methods for device, directory, and file name

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

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

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

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

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

## Notes when selecting a file

- (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.
- (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.)
- (3) When a file name is selected from the menu, it first is displayed in the input area. However, at this time the file name has not yet been fixed. Press the  key again to fix the file name.
- (4) When the  key is pressed when setting a file name, the file name in the input area is erased.
- (5) When a fixed cycle program is designated, the basic common parameters "#1166 fixpro" must be set. Select "Memory" for the device, and "Program" for the directory.

## Selecting an NC memory program

- (1) Press the menu
- Device select**
- .



The following menu appears.

Memory	HD	Serial	Memory card	DS	Ethnet	FLD
--------	----	--------	-------------	----	--------	-----

- (2) Press the menu
- Memory**
- .



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

A:Dev	Memory
Dir:	Program
File	-

- (3) Press the menu
- File name**
- .



The following menu appears.

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

&lt;When inputting the file name from the input area&gt;

- (4) Input the file name

10013

**INPUT**

A:Dev	Memory
Dir:	Program
File	10013

&lt;When selecting the file name from the list&gt;

- (4)-1 Press the menu
- From list**
- .



The cursor appears in the list.

<Program>	<Char>	<Comment>
101	73	MAIN
102	53	SUB1
103	54	SUB2
10011	519	
10012	139	
10013	100	

- (4)-2 Move the cursor to file name to be selected, and fix.

**INPUT**

The selected file name appears in the input area.

10013
-------

- (4)-3 Press the
- INPUT**
- key.



The selected file name appears.

A:Dev	Memory
Dir:	Program
File	10013

## Designating multiple files

## (1) 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.

File : First file name  
- : Last file name



A:Dev	Memory
Dir:	Program
File	10013
-	10050

## (2) Using a wild card

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

File : \*  
-



All files will be selected.

A:Dev	Memory
Dir:	Program
File	*
-	

## Selecting an NC memory file other than a program

(1) Press the menu Device select.



The following menu appears.

Memory	HD	Serial	Memory card	DS	Ethnet	FLD
--------	----	--------	-------------	----	--------	-----

(2) Press the menu Memory.



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

A:Dev	Memory
Dir:	Program
File	
-	

(3) Select the menu Dir..



The following menu appears.

Program	Tool offset	Variabl		Tool life	System config	Param	AUX param	Decrypt Code	System param
---------	-------------	---------	--	-----------	---------------	-------	-----------	--------------	--------------

(4) Press the menu Tool offset.



The directory and file name appear.

A:Dev	Memory
Dir:	Tool offset
File	TOOL.OFS
-	

**(Note)** The file name for each directory is fixed. Refer to "6.2.10 List of file names" for the file names.

## Selecting a device file other than the NC memory

- (1) Press the menu
- Device select**
- .



The following menu appears.

Memory	HD	Serial	Memory card	DS	Ethnet	FLD
--------	----	--------	-------------	----	--------	-----

- (2) Select a device.



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

A:Dev	HD
Dir:	/
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
-----------

&lt;When inputting the directory from the input area&gt;

- (4) Input the directory path as a full path.
- 
- /PRG/PRECUT
- INPUT**



A:Dev	HD
Dir:	/PRG/PRECUT
File	-

&lt;When selecting the directory from the list &gt;

- (4)-1 Press the menu
- From list**



The cursor appears in the list.

<Program>	<Char>	<Comment>
.	DIR	
..	DIR	
NCDATA	DIR	
PRG	DIR	

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


 , , **INPUT**

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.

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

A:Dev	HD
Dir:	/PRG/PRECUT
File	-

- (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 input area>

- (6) Input the file name  
10013.PRГ **INPUT**
- ➡

A:Dev	HD
Dir:	/PRG/PRECUT
File	10013.PRГ
-	

<When selecting the file name from the list>

- (6)-1 Press the menu **From list**.
- ➡

The cursor appears in the list.

<Program>	<Char>	<Comment>
.	DIR	
..	DIR	
10011.PRГ	521 Oct 02 13:18 2002	
10012.PRГ	141 Oct 02 13:19 2002	
10013.PRГ	102 Oct 02 13:19 2002	
10014.PRГ	163 Oct 02 13:20 2002	
10015.PRГ	90 Oct 02 13:21 2002	

- (6)-2 Move the cursor to file name to be selected, and fix.
- ➡

↑, ↓, **INPUT**

The selected file name appears in the input area.

10013.PRГ
-----------

- (6)-3 Press the **INPUT** key.
- ➡

The selected file name appears.

A:Dev	HD
Dir:	/PRG/PRECUT
File	10013.PRГ
-	

## Canceling the input mode

- (1) Press the  ,  or . ➡ The submenu appears.

To cancel the data input at this time, press the  key.

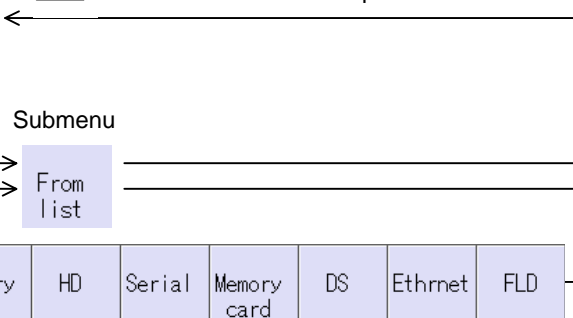
- (2) Press the  key. ➡ The details in the input area are erased, and the main menu appears.

## Main menu

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



The details in the data input area are erased.



Memory	HD	Serial	Memory card	DS	Ethnet	FLD
--------	----	--------	-------------	----	--------	-----



## 6.2.3 Transferring a File

## Operating method

- (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.

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

### Caution

-  " ; ", "EOB", "%", and "EOR" are symbols used for explanation. The actual codes for ISO are "CR, LF" ("LF") and "%".  
The programs created on the Edit screen are stored in the NC memory in a "CR, LF" format, however, the programs created with external devices such as the FD 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.

## Notes

**(1) Notes related to transferring in general**

- (a) Depending on the type of file, some data cannot be transferred during automatic operation. Do not transfer during automatic operation.
- (b) 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.
- (c) 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.)
- (d) Up to 223 files, including the directory, can be registered in the FD's root directory.

**(2) Notes when transferring machining program files**

- (a) For the serial, 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.
- (b) The transfer speed is slower if there are many registrations.
- (c) The size of one block of the machining program should be 250 characters or less.
- (d) 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.
- (e) When the machine tool builder macro and fixed cycle program are input to NC memory, change the program type with the parameter "#1166 fixpro". Also, set in the Input/Output screen as follows.  
Device: Memory, Directory: Program
- (f) With machining program created before the MELDAS500 Series, "EOB" is registered as "LF". However, when these programs are stored in the 700 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 700 Series NC memory, the memory capacity may be exceeded.
- (g) When the file to be transferred (input) is running or in "program restarting" mode, the operation message "Executing automatic operation" or "Program restarting" is displayed and file will not be transferred (input).

**(3) Notes when transferring tool offset data files**

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

**(4) Notes when transferring parameter files**

- (a) 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.
- (b) When a parameter file is transferred to the NC memory, the setting value of the input/output parameters is also changed. Before transferring next time, set the input/output parameters again.
- (c) 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.



**(5) Notes when transferring common variable data files**

- (a) 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.

**(6) Notes when transferring tool life data files**

- (a) 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

**(7) Notes when transferring auxiliary axis parameter files**

- (a) When the auxiliary axis parameters are input to the NC memory, the same parameter data is simultaneously transferred to the drive unit. If transferred errors by some causes occur, the parameter data may be not matched between NC memory data and drive unit.

**(8) Notes when transferring sampling data file**

- (a) When the output form is set as 8-digit hexadecimal number and the parameter "#1004 ctrlunit" is set to "E (1nm)", accurate data can be output just within 1m.  
 When the output data length exceeds 1m, lower 32 bits of the sampling data will be output.

**6.2.4 Comparing Files (Compare)****Operation method**

- (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: (MAIN);G28XYZ;G00X10.;N1X20.
          ;X30.;X40.;N2X50.;M98P102H1;
CMP data: (MAIN);G28XYZ;G00X10.;N1X20.
          ;X30.;X40.;N2X50.;M98P103H1;
  
```

**(Note)** Files that can be compared are text files only.  
 Correct outcome will not be obtained through binary file comparison.

## 6.2.5 Erasing a File

Erasing a file **Erase A**

- (1) Press the menu **Area change** , and select file setting column A.
- (2) Designate the device, directory and file name to be erased. ➡ The designated file appears.
- (3) Press the menu **Erase A**. ➡ A message to confirm the erasing appears.
- (4) Press **Y** or **INPUT**. ➡ The file is erased.  
A message appears when the erasing is completed. The number of programs registered, number of memory characters and remainder reappear. Press the **List update** menu to update the list.

**(Note)** If the file to be erased is running or in "program restarting" mode, the operation message "Executing automatic operation" or "Program restarting" is displayed, and the file will not be erased.

Erasing a file **Erase B**

The operations are the same as method "Erasing a file **Erase A**" above. Designate the target device, directory and file name in the file setting column B, and press the menu **Erase B**.

## 6.2.6 Changing a File Name (Rename)

## Operation method

- (1) Press the menu **Area change** , and select file setting column A.
- (2) Designate the original device, directory and file name. ➡ The designated file name appears.
- (3) Press the menu **Area change** , 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 **Rename A -> B**.
- (6) Press **Y** or **INPUT**. ➡ Renaming of the file starts.  
A message appears when the renaming is completed.

**(Note 1)** Select the same device for original and new devices.

**(Note 2)** If the file to be renamed is running or in "program restarting" mode, the operation message "Executing automatic operation" or "Program restarting" is displayed, and the name will not be 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.

## 6.2.7 Creating a Directory

## Operation method

- (1) Press the menu Area change, and select file setting column A.
- (2)  ➡ The designated details appear.  
The devices that can create a directory are HD, FD, Memory card and DS.
- (3)  ➡ The designated details appear.
- (4)  ➡ The designated details appear.
- (5)  ➡ 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 FD's root directory.

## 6.2.8 Merging a File

## Operation method

- (1) Press the menu Area change, 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 Area change, 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 Merge B ->A. ➡ A message confirming the merge appears.
- (6) Press Y or INPUT. ➡ The file merge starts. The data being merged will appear in the Input Data display column.  
A message appears when the merge is completed.

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

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

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

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 or in "program restarting" mode, the operation message "Executing automatic operation" or "Program restarting" is displayed, and the files will not be merged.

**(Note 2)** The devices that can be merged are the memory, HD, FD, memory card and DS.

## 6.2.9 Formatting an External Device

## Operation method (Formatting an FD)

- (1) Insert a floppy disk in the FD drive, and press **FD format**. ➡ A message confirming the formatting appears.
- (2) Press **Y** or **INPUT**. ➡ The FD is formatted.  
A message appears when the formatting is completed.

**(Note 1)** The FD is formatted with FAT (1.44MB).

**(Note 2)** The volume label is set when formatting the FD.

## Operation method (Formatting a memory card)

- (1) Press the menu **MemCrd format**. ➡ A message confirming the formatting appears.
- (2) Press **Y** or **INPUT**. ➡ The memory card is formatted.  
A message appears when the formatting is completed.

**(Note 1)** The memory card and data server are formatted with FAT32.

**(Note 2)** The volume label is set when the memory card is formatted.

## Operation method (Formatting a DS)

First, press the menu **DS format**. Refer to "Formatting a memory card" for following operations.

**(Note 1)** Only the DS formatted with FAT or FAT32 can be used. The DS with NTFS cannot be used.

**(Note 2)** As for the DS formatted with NTFS, reformat it with FAT or FAT32 by Windows to use.  
(NC cannot convert NTFS partition to FAT or FAT32.)

**(Note 3)** The volume label is not set even when the DS is formatted.

## 6.2.10 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.

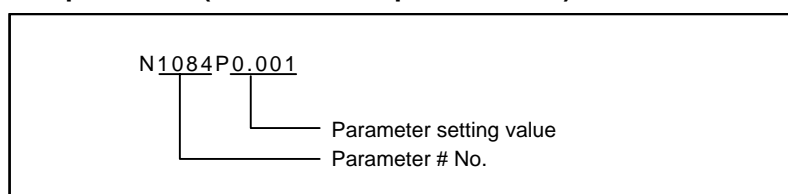
Data type	NC memory directory path	Fixed file name
Machining program	/PRG/USER	(Program No.)
Fixed cycle program	/PRG/FIX	(Program No.)
Parameters Parameters [User, machine] (Text format) Auxiliary axis parameter	/PRM	ALL.PRM AUXAXIS.PRM
User PLC	/LAD	USERPLC.LAD
NC data Tool compensation amount data Tool life management data Common variable data SRAM data	/DAT	TOOL.OFS TLIFE.TLF COMMON.VAR SRAM.BIN
System configuration data	/DGN	ASSEMBLY.INF
Decryption code	/RLS	PASSCODE.DAT
Sampling data	/LOG	NCSAMP.CSV
Machine data	/DGN	COMPO.STA

**Data format (Parameter)**

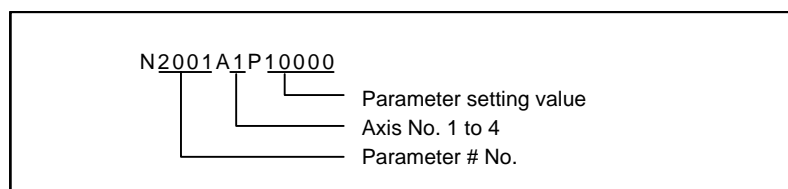
Parameter data format is as follows.

Address	Definition	Details
N	Parameter No.	The parameter No. is shown with the value following N.
A	Axis No.	For axis data, the axis No. is shown with the value following A. The first axis will be A1.
T	Part system No.	For data per part system, the part system No. is shown with the value following T. (\$1: T1, \$2: T2, PLC axis: T3)
C	Spindle No.	For spindle data, spindle No. is displayed with a numerical value following C. Thus, 1st spindle is displayed as C1.
K	Split data No.	For the parameter with which data is split and set, each split data is displayed. (Ex. IP address)
P	Parameter data	The parameter data is shown with the value following P.

The following types of data format are used according to parameter type and display method.  
(The address order in one block must use the following format.)

**(1) Common parameter (One data item per one # No.)**

(a) The output parameter setting value is the same format as the screen display.

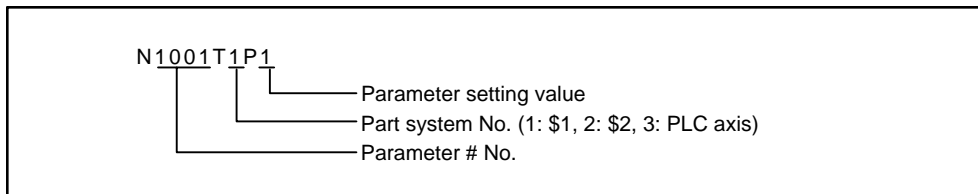
**(2) Axis parameter**

(a) When multiple axes are displayed on one screen

The parameter data for the screen in which multiple axes are displayed on one screen is output per axis.

[Output example]

:	
N2001A1P120000	} 1st axis data
N2002A1P4000	
N2003A1P21	
:	
N2001A2P12000	} 2nd axis data
N2002A2P4000	
N2003A2P21	
:	

**(3) Part system parameter**

- (a) The parameter data for the screen in which parameters per part system are displayed on one screen is out put as follows.

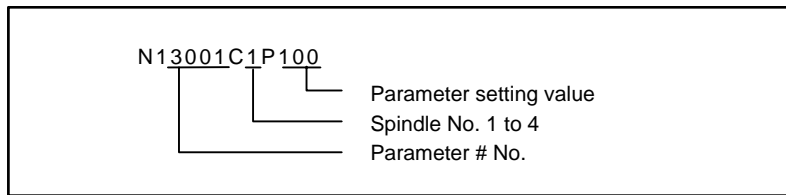
[Output example]

:  
 N1001T1P1  
 N1001T2P1  
 N1001T3P0  
 N1002T1P2  
 N1002T2P1  
 N1002T3P0

- (b) If parameters are displayed per part system upon switch of the part system (when  key is pressed), the parameter data is output per part system.

[Output example]

:  
 N8001T1P99  
 N8002T1P0  
 N8003T1P10000  
 :  
 N8001T2P30  
 N8002T2P1  
 N8003T2P20000  
 :

**(4) Spindle parameter****(a) When multiple spindles are displayed in one screen**

The parameter setting value for the screen in which multiple spindles parameters are displayed in one screen is output per spindle.

[Output example]

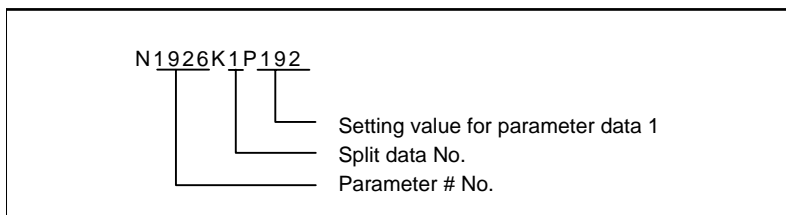
```

:
N13001C1P100
N13002C1P100
N13003C1P15
:
N13001C2P100
N13002C2P100
N13003C2P15
:

```

1st spindle data

2nd spindle data

**(5) IP address**

[Output example]

(Example) When "#1926 Global IP address" setting value is "192.168.200.1"

```

:
N1926K1P192
N1926K2P168
N1926K3P200
N1926K4P1
:

```



**Data format (Tool compensation amount data)**

## (1) M type

Tool compensation amount data format is as follows.

Address	Definition	Details
G	-	Fixed to G10.
L	Type	L10 for tool compensation memory I. See below for tool wear compensation memory II. L10 : Tool length shape compensation L11 : Tool length wear compensation L12 : Tool radius shape compensation L13 : Tool radius wear compensation
P	Compensation No.	The compensation No. is shown with the value following P.
R	Compensation amount	The compensation No. is shown with the value following R.

[Output example]

%

\$1

G10L10P1R0.000

G10L10P2R0.000

:

\$2

G10L10P1R0.000

G10L10P2R0.000

:

%

## (2) L type

Tool compensation amount data format is as follows.

Address	Definition	Details
G	-	Fixed to G10.
L	Type	L10 for tool length compensation input. L11 for tool nose wear compensation input.
P	Compensation No.	The compensation No. is shown with the value following P.
X	X axis compensation amount (Absolute)	The X axis compensation amount data is shown with the value following X. (Absolute)
U	X axis compensation amount (Incremental)	The X axis compensation amount data is shown with the value following U. (Incremental)
Z	Y axis compensation amount (Absolute)	The Y axis compensation amount data is shown with the value following Z. (Absolute)
W	Y axis compensation amount (Incremental)	The Y axis compensation amount data is shown with the value following W. (Incremental)
R	Nose R compensation amount (Absolute)	The nose R compensation amount data is shown with the value following R. (Absolute)
C	Nose R compensation amount (Incremental)	The nose R compensation amount data is shown with the value following C. (Incremental)
Q	Hypothetical tool nose point	The hypothetical tool nose point is shown with the value following Q.

[Output example]

%

G10L10P1X0.000Z0.000R1.000Q3

G10L11P1X0.000Z0.000R0.000Q3

G10L10P2X0.000Z0.000R1.000Q2

:

G10L11P80X0.000Z0.000R0.000Q0

%

**Data format (Tool life management data)**

## (1) M type

Tool life management data format is as follows.

Address	Definition	Details
G	Group No.	The group No. for tool life management is shown with the value following G.
D	Tool no.	The tool No. is shown with the value following D.
S	Status	The tool status is shown with the value following S.
M	Method	The tool life management method is shown with the value following M.
L	Length compensation	The length compensation data is shown with the value following L.
R	Radius compensation	The radius compensation data is shown with the value following R.
B	AUX.	The auxiliary data is shown with the value following B.
E	Service lifetime	The service lifetime is shown with the value following E.
P	Used time	The used time is shown with the value following P.

[Output example]

```
%
LIFEDM()
$1
G100 D1000 S1 M101010 L100 R100 B11 E0 P0
G200 D2000 S2 M000000 L200 R200 B22 E0 P0
G300 D3000 S3 M201020 L300 R300 B33 E0 P0
:
G999999 D9999 S1 M202020 L999 R999 B99 E0 P0
%
```

## (2) L type

## (a) Tool life management I

Tool life management I format is as follows.

Address	Definition	Details
N	Tool No.	The tool No. is shown with the value following N.
P	Time-used	The time-used is shown with the value following P.
E	Time-max	The time-max is shown with the value following E.
Q	Count-used	The count-used is shown with the value following Q.
F	Count-max	The count-max is shown with the value following F.
S	Status	The status of tool life management is shown with the value following S.
B	AUX.	The auxiliary data is shown with the value following B.

[Output example]

```
%
LIFEL1( TOOL LIFE DATA)
$1
N1 P12.34.56 E45.56 Q6 F7 S1 B0
N2 P2.3.4 E5.6 Q7 F8 S1 B1
N3 P99.59.59 E99.59 Q9999 F9999 S2 B99
N4 P0.0.0 E0.0 Q0 F0 S0 B0
:
N80 P0.0.0 E0.0 Q0 F0 S0 B0
%
```

## (b) Tool life management II

Tool life management II format is as follows.

Address	Definition	Details
G	Group No.	The group No. for tool life management is shown with the value following G.
M	Method	The tool life management method is shown with the value following M. 0: Life management is carried out using the time of cutting feed execution. 1: Life management is carried out using the number of usages. Counting the number of usages is executed when changing from rapid traverse command (G00, etc.) to cutting feed command (G01,G02,G03, etc.). Note that if rapid traverse command or cutting feed command that does not involve any movement is executed, usage will not be counted.
E/F	Service life	The life data (service lifetime) is shown with the value following E. The life data (service life count) is shown with the value following F. <b>(Note 1)</b> When the combination of the setting of tool life management method and address is illegal, error occurs at data input. <b>(Note 2)</b> The USED data will be incremented when the LIFE data is "0", but no judgment if the service life is reached will be made.
A/B	Remaining life	[Tool life prediction function valid (#1277 ext13 bit1 is "1")] The tool life prediction data (remaining lifetime) is shown with the value following A. The tool life prediction data (remaining life count) is shown with the value following B. <b>(Note 1)</b> When the value greater than the tool life data is set, tool life prediction signal is not output. <b>(Note 2)</b> When the combination of the setting of tool life management method and address is illegal, error occurs at data input. [Tool life prediction function invalid (#1277 ext13 bit1 is "0")] A and B are not used.
D	Tool No.	The tool No. is shown with the value following D.
H	Compensation No.	The compensation No. is shown with the value following H.
P/Q	Used	The used data (used time) is shown with the value following P or Q. The used data (used count) is shown with the value following P or Q. <b>(Note 1)</b> When the combination of the setting of tool life management method and address is illegal, error occurs at data input.
S	Status	The tool status is shown with the value following S. 0: Not used tool 1: Current tool (tool being used) 2: Normal life-reached tool 3: Tool skip tool

[Output example]

%

LIFEL2( TOOL LIFE DATA)

\$1

G100 M0 E1000 A50 D123456 H1 P321 S1

G100 M0 E1000 A50 D888888 H2 P0 S0

G111 M1 F2000 B80 D777777 H20 Q2000 S2

G1234 M0 E1000 A50 D123 H30 P100 S1

G9999 M1 F999999 B9 D999999 H80 Q999999 S2

%

#### Data format (Common variable data)

Common variable data format is as follows.

Address	Definition	Details
N	Variable No.	The common variable # No. is shown with the value following N.
T	Part system No.	For data per part system, the part system No. is shown with the value following T. (\$1: T1, \$2: T2, PLC axis: T3)
P	Common variable data	The common variable data is shown with the value following P. An exponential is displayed when 7 digits are set in the integer section and 5 digits or more are set in the decimal section. (Example) 1234567 → 1.2346E+006, 0.00001 → 1.0000E-005

[Output example]

%

COMN()

N100T1P123.0000

N101T1P1.0000E7

:

N100T2P1.0000E7

:

%

**Data format (System configuration data)**

System configuration data format is as follows.

Contents of the data are same as that of displayed in the system configuration screen and drive monitor screen of the diagnosis screen.

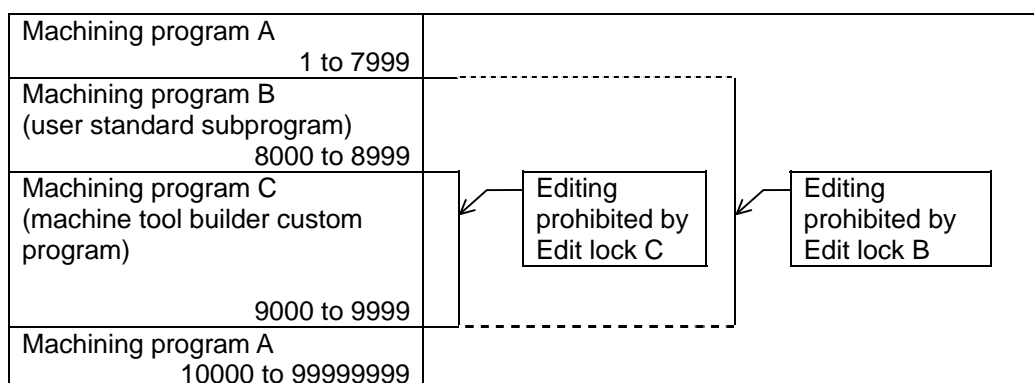
[COMMON] FILE=ASSEMBLY DATE=04.11.01 TIME=15:30:00 NC_TYPE=MITSUBISHI CNC 750M (1) NC unit configuration (2) H/W configuration (3) Servo drive unit information (4) Spindle drive unit information (5) Power supply unit information (6) Auxiliary axis information (7) S/W configuration (8) Ladder configuration [F_END]	
	Data & time of system configuration data output
	NC type
	Same as "H/W config" screen
	Same as "H/W config" screen
	Same as "Servo unit" screen
	Same as "Spindle unit" screen
	Same as "Power unit" screen
	Same as "AUX unit" screen
	Same as "S/W config" screen
	Same as "Ladder config" screen

[Output example]

[COMMON] FILE=ASSEMBLY DATE=04.11.01 TIME=15:30:00 NC_TYPE=MITSUBISHI CNC 750M [FILE] TYPE=NC_UNIT NC_NAME=FCA750MN UNIT_NAME=FCA7-MA001 NC_SN=M1234567890 [END] [FILE] TYPE=HARDWARE [DATA1] HW_NAME=HN145 REVISION=A [DATA2] : [DATA <sub>n</sub> ] HW_NAME=HN081 REVISION=A [END] : [FILE] : [END] [F_END]	Tag described at the top of the file Header information of the file (file type) File output date File output time NC type and Lathe(L)/Machining center(M) Tag described at the top of the data Data type (NC unit configuration) Describe items and data  Tag described at the end of the data  Data type (H/W configuration) Repetitive data No. tag (1st) Describe items and data  Repetitive data No. tag (2nd)  Repetitive data No. tag (n-th) Describe items and data   Tag indicating file end
---	--

## 6.2.11 Edit Lock B and C

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



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

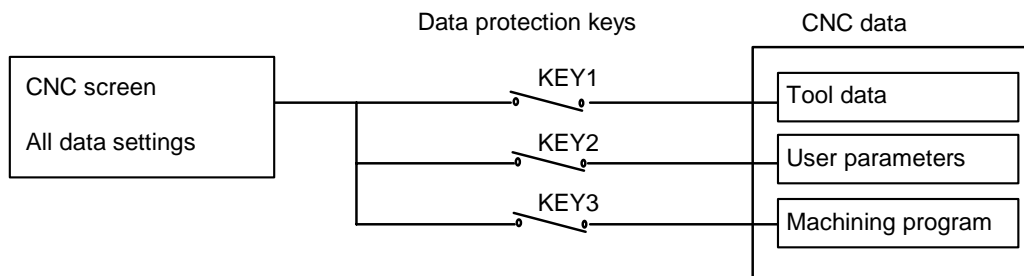
Screen	Operation	Edit lock B			Edit lock C		
		Machining program			Machining program		
		A	B	C	A	B	C
Edit	Search	○	○	×	○	○	×
	Edit	○	×	×	○	○	×
	MDI registration	○	×	×	○	○	×
Input/Output	Transfer	○	×	×	○	○	×
	Compare	○	×	×	○	○	×
	Copy	○	×	×	○	○	×
	Merge	○	×	×	○	○	×
	Rename	○	×	×	○	○	×
	Erase	○	×	×	○	○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

### 6.2.12 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 tool builder. For further details, refer to the instruction manual issued by the machine tool builder.)

- (1) KEY1: Provides general protection for tool data and protection of the coordinate system preset using the origin set.
- (2) KEY2: Protects user parameters and common variables.
- (3) KEY3: Protects the machining program.

Data settings and deletion is stopped if any of the data protection keys is OFF.



**(Note 1)** When using the multi-part system, the settings for various types of data in all part systems are prohibited with the data protection keys.

#### Tool data protection (KEY 1)

The operations listed in the table below are prohibited when KEY 1 is OFF.

##### <Data protected by KEY1 >

No.	Operation	Screen
1	Origin set	Monitor
2	Tool compensation amount setting/erasing	Tool compensation 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 input/output	Input/Output
7	Tool compensation 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 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 **INPUT** key is pressed, the origin set is not executed, and the message "Origin set not possible" appears.

If the operations shown in No. 6 to 10 are attempted and the **INPUT** key is pressed, the message "Data protect" appears, and the input and output are disabled.

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

The operations listed in the table below are prohibited when KEY 2 is OFF.

**<Data protected by KEY 2>**

No.	Operation	Screen
1	Control parameter ON/OFF	Setup/User/Control param
2	Axis parameter setting	Setup/User/Axis param
3	Operation parameter setting	Setup/User/Operation param
4	Machining parameter setting	Setup/User/Process param, Rotate meas
5	Common variable setting	Monitr/Position display/Common variable
6	I/O basic parameter setting	Mainte/Parameter
7	Parameter input/output	Mainte/I/O
8	Common variable input/output	Mainte/I/O

**(Note)** If setting of data in the screens shown above is attempted when the KEY2 is OFF, the message "Data protect" appears.

If the operations shown in No. 7 and 8 are attempted and the  key is pressed, the message "Data protect" appears, and the input and output are disabled.

**Machining program protection (KEY 3)**

The operations listed in the table below are prohibited when KEY 3 is OFF.

**<Data protected by KEY3>**

No.	Operation	Screen
1	MDI data memory entry	MDI
2	Machining program editing	Edit
3	New program editing	Edit
4	Registered program comment setting	Edit
5	Machining program memory registration, compare, input/output	Input/Output
6	Machining program erasing (single, all)	Input/Output
7	Registered program comment setting	Input/Output
8	Machining program copy, marge, name change	Input/Output
9	Machining program buffer correction	Monitr

**(Note)** If editing or setting, etc., is attempted on the screens shown above when the KEY3 is OFF, the message "Data protect" appears.

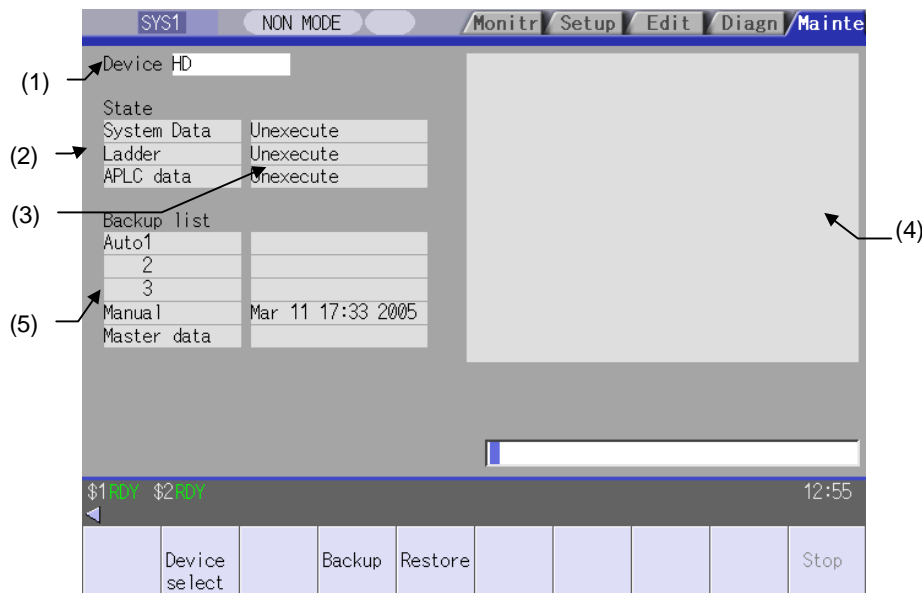


### 6.3 All Backup Screen

This screen is used to perform batch backups of NC memory data to an external device, and batch restoration of that data to the NC memory.

Data backed up by the automatic backup function can also be restored.

Data which has been automatically backed up can be selected only when the device set by the "#8919 Auto backup device" parameter setting is selected.



#### Display items

Display item	Details														
(1) Device name	This displays the selected device name.														
(2) Data name	This displays the data name being backed up/restored. System data, ladder, and APLC data are displayed.														
(3) Execution status	This displays the processing execution status. Processing is executed in the system data, ladder, and APLC data order. <b>(Note 1)</b>														
(4) Warning message	This displays messages at the start and end of backup/restore processing.														
(5) Backup list	<div>This displays the backup date list. This date is the system data time stamp.</div> <table><tr><th>Backup area</th><th>Explanation</th><th>Backup format</th></tr><tr><td>Auto 1 2 3</td><td>Data that was automatically backed up. Display in the backup date descending order. The latest three generations of data are displayed.</td><td>Auto</td></tr><tr><td>Manual</td><td>Data that was backed up on this screen.</td><td>Manual</td></tr><tr><td>Master data</td><td>Data that was backed up on this screen. Generally, this is the factory settings data.</td><td>Manual</td></tr></table> <div>The above data can be selected at restore processing. <b>(Note 2)</b></div>			Backup area	Explanation	Backup format	Auto 1 2 3	Data that was automatically backed up. Display in the backup date descending order. The latest three generations of data are displayed.	Auto	Manual	Data that was backed up on this screen.	Manual	Master data	Data that was backed up on this screen. Generally, this is the factory settings data.	Manual
Backup area	Explanation	Backup format													
Auto 1 2 3	Data that was automatically backed up. Display in the backup date descending order. The latest three generations of data are displayed.	Auto													
Manual	Data that was backed up on this screen.	Manual													
Master data	Data that was backed up on this screen. Generally, this is the factory settings data.	Manual													

**(Note 1)** "APLC data" cannot be backed up/restored if the optional "APLC" is disabled.




**(Note 2)** The "Auto 1 to 3" data display when the device set by the "#8919 Auto backup device" parameter is selected.

## Menus

Menu	Detail	Type	Reference
Device select	This displays the sub-menu for "Device" selection.	C	
Backup	This executes backup processing.	A	6.3.1 Performing a Backup Operation
Restore	This executes restore processing.	A	6.3.2 Performing a Restore Operation
Stop	This stops processing.	C	




### 6.3.1 Performing a Backup Operation

#### Operation methods

- (1) Press the menu .  The menu is highlighted.  
An operation message "Select directory to backup" appears.
- (2) Move the cursor to select the area.  
Press the  key.  An operation message "OK? (Y/N)" appears.  
(Note) Auto 1 to 3 cannot be selected.
- (3) Press  or  key.  Backup operation begins.  
An operation message "Backupper" appears.  
  
When the backup is completed without error, an operation message "Backup complete" appears.

### 6.3.2 Performing a Restore Operation

#### Operation methods

- (1) Press the menu .  The menu is highlighted.  
An operation message "Select directory to restore" appears.
- (2) Move the cursor to select the file.  
Press the  key.  An operation message "OK? (Y/N)" appears.
- (3) Press  or  key.  Restore operation begins.  
An operation message "Restoring" appears.  
  
When the restoration is completed without error, an operation message "Restore complete" appears.

### 6.4 System Setup Screen

The essential data required for the NC's initial startup is automatically set by inputting the minimum requirement item only on this screen.

This function allows setting data required to drive the motors (servomotors, spindle motor, auxiliary axis motor) to be specified quickly and easily, resulting in a faster initial startup of the tool machine.

The screenshot displays the 'System Setup' screen with the following sections and items:

- Common setting:**
  - language displayed: 0
  - Number of spindles: 0
  - Number of MR-J2-CT: 0
- Setting by system:**
  - Number of axes: 1 (for \$1, \$2, \$3, \$4)
  - Command type: 1 (for \$1, \$2, \$3, \$4)
- Setting by spindle:**
  - Ch / Rotary SW No.:
- Setting by servo:**
  - Ch / Rotary SW No.:
- Motor type:** 0
- Detector type:** 0
- Power Supply type:** 0

On the right side, a list of languages is shown under '<Language disp>':

- Related param: #1043 lang
- Setting value:
  - 0:English
  - 1:Japanese
  - 11:German
  - 12:French
  - 13:Italian
  - 14:Spanish
  - 15:trad Chinese
  - 16:Korean
- Menu[Next guide]→

At the bottom, there are buttons for 'Param setting', 'Ladder setting', 'Next guide', 'Next axis', and 'Next system'.

#### Display items

Display item	Details
(1) Common setting area	
Language displayed	Set the display language for system setup and after setup (after the power is turned ON again). This setting is registered at the "#1043 lang".
Number of spindles	Set the number of spindles connected to the NC. This setting is registered at the "#1039 spinno".
Number of MR-J2-CT	Set the number of auxiliary axes (MR-J2-CT) connected to the NC. This setting is registered at the "#1044 auxno".
(2) Setting by system area	
Number of axes	Set the number of axes for each part system and PLC. This setting is registered at the "#1002 axisno". A setting error occurs if a setting of "1 or higher" is specified for the Nos.2 to 4 part systems when the setting for the previous part system is "0".
Command type	Set the command type for each part system. This setting is registered at the "#1037 cmdtyp". <b>(Note)</b> Although this setting can be set individually for each part system, it will be shared by the entire part system if specified for the machining center.

Display item		Details
(3)	Setting by spindle area	
	Ch / Rotary SW No.	Set the servo I/F connection channel and the rotary switch No. (2-digit value) for each spindle drive unit. This setting is registered at the "#3031 smcp_no". 1st digit : Servo I/F connection channel. 2nd digit : Rotary switch No.
	Power Supply type	Set the power supply types that are connected to each spindle drive unit. Input the values as indicated at the guidance display area. The input values are then converted to, and display as, power supply types. If "0" is displayed, it means "No connection".
(4)	Setting by servo area	
	Ch / Rotary SW No.	Set the servo I/F connection channel and the rotary switch No. (2-digit value) for each servo drive unit. This setting is registered at the "#1021 mcp_no". 1st digit : Servo I/F connection channel. 2nd digit : Rotary switch No.
	Motor type	Set the motor types that are connected to each servo axis. Input the values as indicated at the guidance display area. The input values are then converted to, and displayed as, motor types.
	Detector type	Set the encoder types that are connected to each servomotor. Input the values as indicated at the guidance display area. The input values are then converted to, and displayed as, encoder types.
	Power Supply type	Set the power supply types that are connected to each servo drive unit. Input the values as indicated at the guidance display area. The input values are then converted to, and displayed as, power supply types. If "0" is displayed, it means "No connection".
(5)	Guidance display area	Indicate the setting content and setting range for the setting item where the cursor is positioned.

## Menus

Menu	Details	Type	Reference
Param setting	This writes the parameters based on settings on system setup screen to NC system.	A	6.4.2 Writing Initial Parameters
Ladder setting	This writes the minimum required setup PLC ladder for manual operation (JOG mode) to NC system.	A	6.4.3 Writing Sample PLC Ladders
Next guide	This displays the next page when guidance display content extends through multiple pages.	C	
Next system	This displays the PLC axis setting area at the setting by system area.	C	
Next axis	This displays the 5th axis and following in setting by servo area when the total number of part system exceeds 5.	C	

## 6.4.1 Preparation for Spindle Parameter Setting

A spindle parameter setting file (INITSP.PRM) must be prepared in advance in order to set all the spindle parameter settings at once.

## Operation methods

- (1) Save the spindle parameter setting file at the memory card's root directory.

➔




Assuming that personal computer recognizes the memory card as the E drive, the spindle parameter setting file is saved as "E: \INITSP.PRM".
- (2) Insert the memory card into the front IC card holder.

➔

At the input/output screen, verify that the "INITSP.PRM" file has been saved on the memory card.

## 6.4.2 Writing Initial Parameters

## Operation methods

- (1) Enter all the required settings on the system setup screen.
- (2) Press the menu .  The menu is highlighted.  
An operation message "Set up parameter? (Y/N)" appears.
- (3) Press the  or  key.  Parameter setting begins, and an operation message appears as follows.  
"Initial parameter creating" → "Initial parameter transferring" → "Spindle initial parameter transferring" (This operation message is displayed only if a spindle parameter setting file exists.)  
When parameter settings are completed, an operation message "Param set ended. Format NC memory? (Y/N)" appears.
- (4) Press the  or  key.  File formatting begins, and an operation message "Executing format" appears.  
When file formatting is completed, an operation message "Format complete" appears.

**(Note 1)** When the "data protect key 2" is enabled, an operation message "Data protect" appears, and processing is interrupted.

**(Note 2)** In the automatic operation mode, an operation message "Executing automatic operation" appears, and processing is interrupted.



**(Note 3)** If all the required settings have not been input on the system setup screen, an operation message "Setting error" appears, and processing is interrupted.

**(Note 4)** Processing is interrupted if a key other than the  or  key is pressed, or if switching to another screen occurs. (Processing is interrupted even if switching to another screen occurs during data transfers.)

**(Note 5)** The menu is displayed in gray during data transfers.

## 6.4.3 Writing Sample PLC Ladders

## Operation methods

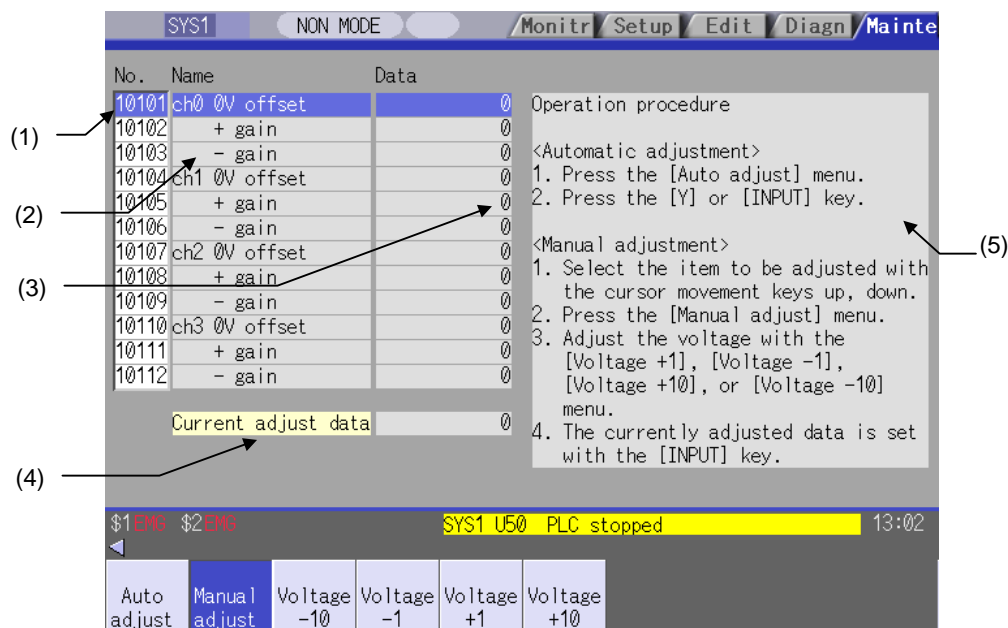
- (1) Press the menu .  An operation message "Write sample ladder? (Y/N)" appears.
- (2) Press the  or  key.  Sample PLC ladder writing begins, and an operation message "Transferring" appears. When sample PLC ladder writing is completed, an operation message "Transfer complete" appears.

- (Note 1)** In the automatic operation mode, an operation message "Executing automatic operation" appears, and processing is interrupted.
- (Note 2)** In the "PLC RUN" mode, an operation message "PLC running" appears, and processing is interrupted.
- (Note 3)** If there is no sample PLC ladder, an operation message "Sample ladder not found" appears, and processing is interrupted.
- (Note 4)** Processing is interrupted if a key other than the  or  key is pressed, or if switching to another screen occurs. (Processing is interrupted even if switching to another screen occurs during data transfers.)
- (Note 5)** The menu is displayed in gray during data transfers.



## 6.5 Adjust S-analog Screen

The spindle analog output adjustment is carried out on this screen.



### Display items

Display item	Details
(1) Parameter No.	For manual adjustments, this uses the <input type="button" value="↑"/> <input type="button" value="↓"/> keys to move the cursor to the setting item to be adjusted. The cursor does not display during automatic adjustments.
(2) Adjustment item name	This displays the names of the spindle analog adjustment items.
(3) Adjustment data	This displays the setting data for each adjustment item.
(4) Current adjust data	This displays data which is being adjusted manually. (Display only during a manual adjustment.)
(5) Operation procedure	This displays the operation procedures for automatic and manual adjustments.

## Menus

Menu	Details	Type	Reference
Auto adjust	This carries out automatic adjustment of the spindle analog output.	A	6.5.2 Performing Automatic Adjustments
Manual adjust	This carries out manual adjustment of the spindle analog output.	B	6.5.3 Performing Manual Adjustments
Voltage -10	This is used during manual adjustments to adjust downward in decrements of 10.	C	
Voltage -1	This is used during manual adjustments to adjust downward in decrements of 1.	C	
Voltage +1	This is used during manual adjustments to adjust upward in increments of 1.	C	
Voltage +10	This is used during manual adjustments to adjust upward in increments of 10.	C	

## 6.5.1 Adjustment Preparations

## Operation methods

The PLC must be stopped when performing spindle analog output adjustments.

- |     |   |   |                                   |
|-----|---|---|-----------------------------------|
| (1) | Press the function key <span style="border: 1px solid black; padding: 0 5px;">MAINTE</span> . | ➔ | The maintenance screen appears.   |
| (2) | Press the menu <span style="border: 1px solid black; padding: 0 5px;">Psswd input</span> .    | ➔ | The menu is highlighted.          |
| (3) | Enter the machine tool builder password.  | ➔ | The menu highlighting is cleared. |
| (4) | Press the menu <span style="border: 1px solid black; padding: 0 5px;">PLC STOP</span> .       | ➔ | The PLC is stopped.               |

## 6.5.2 Performing Automatic Adjustments

Automatic adjustment will execute "0V offset adjustment" and "+ gain adjustment" for the remote I/O analog outputs (max. 4ch) connected to the main unit. The - gain will be handled as the + gain.

## Operation methods

- |     |   |   |  |
|-----|---|---|--|
| (1) | Press the menu <span style="border: 1px solid black; padding: 0 5px;">Auto adjust</span> .  | ➔ | The menu is highlighted.<br>An operation message "Execute? (Y/N)" appears.<br>The cursor display clears from the screen.   |
| (2) | Press the <span style="border: 1px solid black; padding: 0 5px;">Y</span> or <span style="border: 1px solid black; padding: 0 5px;">INPUT</span> key. | ➔ | Automatic adjustment begins, and an operation message "Auto adjust execution" appears.<br>The manual adjustment related menu is displayed in gray during the automatic adjustment, and manual adjustments are disabled.<br>Switching to other screens is also disabled at this time.<br>When the automatic adjustment is completed, an operation message "Auto adjust complete" appears. |

## 6.5.3 Performing Manual Adjustments

## Adjusting the ch0 0V offset

- (1) Use the   keys to move the cursor to item #10101, then press the  menu button.

→ The menu and the selected line are highlighted. The current setting value is displayed at "Current adjust data". A 0V analog voltage is output to ch0 at this time.
- (2) Monitor the analog voltage.

→ Adjust the 0V offset until the analog voltage is 0V  $\pm$ 3.5mV. The setting range -999 to 999.
- (3) <For plus-voltage>  
Press the menu  or .

→ "Current adjust data" is adjusted downward in decrements of 1 each time the menu  is pressed.  
"Current adjust data" is adjusted downward in decrements of 10 each time the menu  is pressed.

<For minus-voltage>  
Press the menu  or the .

→ "Current adjust data" is adjusted upward in increments of 1 each time the menu  is pressed.  
"Current adjust data" is adjusted upward in increments of 10 each time the menu  is pressed.

"Current adjust data" range is -999 to 999.
- (4) Press the  key.

→ "Current adjust data" is set as "ch0 0V offset", and the 0V offset result is enabled. The menu  highlighting is cleared.

## Adjusting the ch0 + gain

- (1) Use the   keys to move the cursor to item #10102, then press the menu .

→ The menu and the selected line are highlighted. The current setting value is displayed at "Current adjust data". A ch0 +10V analog voltage is output at this time.
- (2) Monitor the analog voltage.

→ Adjust the + gain until the monitor voltage is 10V  $\pm$ 3.5mV. The setting range -999 to 999.
- (3) <For 10V or higher>

Press the menu  or the .

<For less than 10V>

Press the menu  or the .
- (4) Press the  key.

→ "Current adjust data" is set as "ch0 + gain", and the adjustment result is enabled. The menu  highlighting is cleared.

## Adjusting the ch0 - gain

- (1) Use the   keys to move the cursor to item #10103, then press the menu .

→ The menu and the selected line are highlighted. The current setting value is displayed at "Current adjust data". A ch0 -10V analog voltage is output at this time.
- (2) Monitor the analog voltage.

→ Adjust the - gain until the monitor voltage is -10V  $\pm$ 3.5mV. The setting range -999 to 999.
- (3) <For -10V or higher>

Press the menu  or .

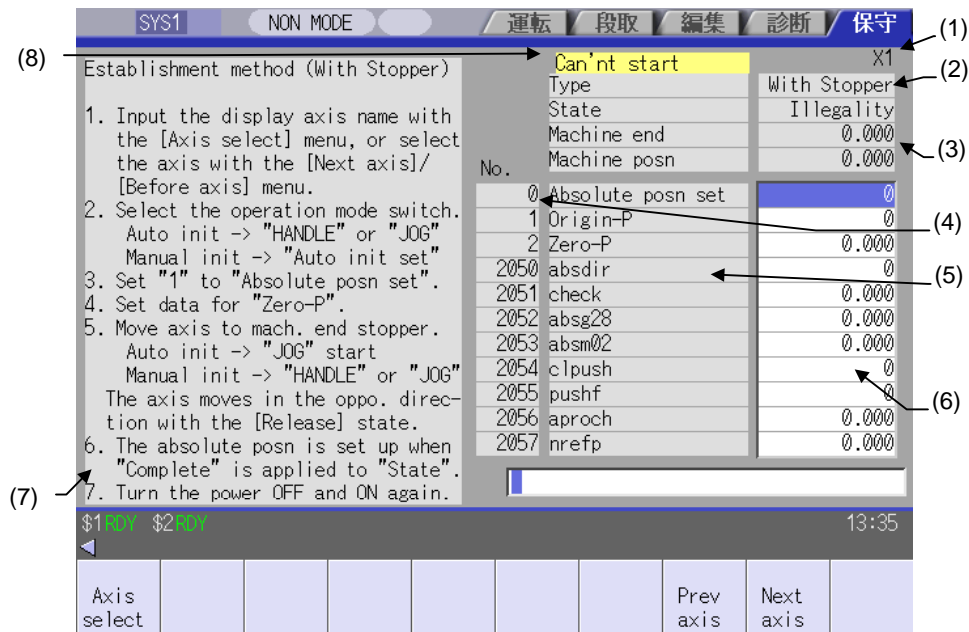
<For less than -10V>

Press the menu  or .
- (4) Press the  key.

→ "Current adjust data" is set as "ch0 - gain", and the adjustment result is enabled. The menu  highlighting is cleared.

### 6.6 Absolute Position Setting Screen

The Absolute position setting screen is used to set the data for the absolute position of servo axes including arbitrary NC axes and PLC axes.



#### Display items

Display item	Details				
(1) Axis name	This displays the axis name set with the parameter "#1022 axname2". The axis name can be switched by <u>Axis select</u> , <u>Next axis</u> , or <u>Prev axis</u> .				
(2) Type of zero point initialization	This displays the type of zero point initialisation for the selected axis. The shortened expression of the zero point initialization method selected with the parameter "#2049 type (type of absolute position detection system)".				
		Displayed expression	Type of zero point initialization for absolute position		Setting value
	1	Inc.	Incremental position detection system		Other than 1,2,3,4,
	2	With Stopper	Dogless-type absolute position detection system	Machine end stopper method	1
	3	No Stopper		Marked point alignment method	2
	4			Marked point alignment method II	4
	5	Dog-type	Dog-type absolute position detection system		3
(3) Progress state	State				This displays the progress state of zero point initialisation. <b>(Note)</b>
	Machine end				This displays the distance from the mechanical basic position to the first grid point.
	Machine posn				This displays the current machine position. "Not passed" will appear until the axis passes a grid point for the first time.
	(4) Data No.				This displays the No., name, and data used to establish the absolute position.
(5) Name				• 0 to 2 : Internal data	
(6) Data				• 2050 to 2059 : Absolute position parameters	
				These can be set also in Absolute position parameter screen. Refer to "Setup Manual" for explanation and setting range of the parameters #2050 to #2059.	

Display items	Details
(7) Procedures	This shows the procedures to establish the coordinate system by zero point initialization. The contents differ depending on the type of zero point initialisation.
(8) Initialization message	This displays a message with the background yellow if an illegal value has been set for the zero point initialization. Refer to the section "Appendix 6. Alarms" for details.

**(Note)** [Type of zero point initialization] indicates the progress state of zero point initialization as shown below.

1. Dogless-type absolute position detection system Machine end stopper method (manual initialization)		
Order	Display	Details of progress
1	Illegality	While the absolute position is lost.
2	Stopper	From when the menu "Abs pos set" is pressed to when the axis pushes against the machine end stopper.
3	Release	From when the axis pushes against the machine end stopper to when axis starts to move in the counter direction.
4	Ret. Ref. P.	From when the axis moves in the counter direction to when it reaches the grid point immediately before the stopper.
5	Complete	The axis has reached the grid point immediately before the stopper. The absolute position has been established.
2. Dogless-type absolute position detection system Machine end stopper method (automatic initialization)		
Order	Display	Details of progress
1	Illegality	While the absolute position is lost.
2	Jog Start	From when the menu "Abs pos set" is pressed to when a value is set in "Zero-P".
3	Stopper1	From when JOG operation starts to when the axis pushes against the machine end stopper.
4	Zero-P. Rel.	From when the axis pushes against the machine end stopper to when axis reaches the approach point.
5	Stopper2	From when the axis reaches the grid point immediately before the stopper to when it pushes against the machine end stopper.
6	Ret. Ref. P.	From when the axis pushes against the machine end stopper second time to when axis reaches the grid point immediately before the stopper.
7	Complete	The axis has reached the grid point immediately before the stopper. The absolute position has been established.
3. Dogless-type absolute position detection system Marked point alignment method		
Order	Display	Details of progress
1	Illegality	While the absolute position is lost.
2	Origin Set	From when the menu "Abs pos set" is pressed to when "1" is set in "Origin-P".
3	Ret. Ref. P.	While moving in the direction designated with the absolute position parameter #2050.
4	Complete	The axis has reached the grid point immediately before the marked point. The absolute position has been established.
4. Dogless-type absolute position detection system Marked point alignment method II		
Order	Display	Details of progress
1	Illegality	While the absolute position is lost.
2	Origin Set	From when the menu "Abs pos set" is pressed to when "1" is set in "Origin-P".
3	Complete	With the sequence above, the absolute position is established.
5. Dog-type absolute position detection system		
Order	Display	Details of progress
1	Illegality	While the absolute position is lost.
2	Zero-P. Rel.	After dog-type manual or automatic reference position return is started.
3	Complete	Axis has returned to the reference position.

## Menus

Menu	Details	Type	Reference
Axis select	After selecting this menu, set the axis name, and press the <b>INPUT</b> key to display the axis name and related data.	A	6.6.1 Selecting an Axis
Prev axis	This switches the data display to the previous axis' data When the first data is displayed, the last axis data will be displayed.	A	
Next axis	This switches the data display to the next axis' data When the last data is displayed, the first axis data will be displayed.	C	

## 6.6.1 Selecting the Axis

## Procedures

- (1) Press the menu **Axis select**.

➔

The menu is highlighted.  
 The cursor appears in the input area.
  
- (2) Set the axis name (which was set with "#1022 axname2") and press **INPUT** key.

➔

The axis name and data change.  
 Procedures displays according to the selected initialization type.







## 6.6.2 Carrying Out Dogless-type Zero Point Initialization





## Procedures (Machine end stopper method : manual method)

Set the following parameter beforehand in the "Abs.Posit.Param." screen.

Parameter	Setting value
#2049 type (absolute position detection type)	1 (machine end stopper method is selected)
#2054 clpush (current limit)	0 to 100
#2059 zerbas (zero point return parameter)	1 (on the grid point immediately before the stopper)

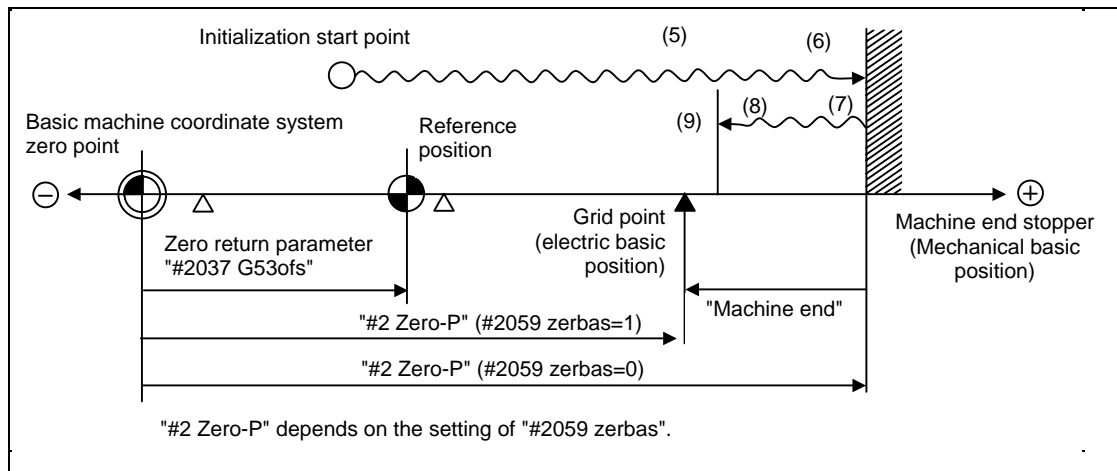
The parameters other than "#2049 type" can be set in the "Zero point set" screen.

- (1) Select the axis that "#2049 type" is "1".  Refer to "6.6.1 Selecting the Axis" for procedures to select the axis.
- (2) Select the HANDLE mode or JOG mode.
- (3) Input "1" to "Absolute posn set".  The input value appears at "Absolute posn set".
- (4) Input an arbitrary value to "#2 Zero-P".  The input value appears at "#2 Zero-P".
- (5) Move the axis toward the machine end stopper.  
-> a 

State : [Stopper]  
Machine end : Distance between stopper and grid point  
Machine posn : [Not passed] -> current machine position
- (6) Hit against the machine end stopper.  
-> b  State : [Stopper]
- The current has reached its limit for given time.  
-> c  State : [Release]
- (7) Move the axis in the counter direction.  
-> d  State : [Ret. Ref. P.]
- The axis has reached the grid point immediately before the stopper.  
-> e  State : [Complete]

This completes zero point initialization. Turn the power OFF and ON after the initialization for all axes.

If "#2059 zerbas" is "0" (absolute position origin point = mechanical basic position), axis will stop automatically at this point without moving in the opposite direction and "Complete" appears at [State] and "0.000" at [Machine end].







- (Note1)** To change just the basic machine coordinate zero point, set "#0 Absolute posn set" and "#2 Zero-P", and then turn the power OFF and ON.
- (Note2)** If pressing against the machine end is attempted without passing the grip point once after turning the power ON, the operation message "Not passed on grid" will appear. Return to a point before the last grid, and then repeat from step of pressing against the machine end stopper.
- (Note3)** If the first grid point is covered by the grid mask (#2028 grmask) as a result of return to the electric basic position, the axis stops at the next grid point.  
Note that zero-point shift amount (#2027 G28sft) is invalid.

**Procedures (Machine end stopper method : automatic method)**

Set the following parameter beforehand in the "Abs.Posit.Param." screen.


Parameter	Setting value
#2049 type (absolute position detection type)	1 (machine end stopper method is selected)
#2054 clpush (current limit)	0 to 100
#2055 pushf (push speed)	1 to 999
#2056 aproch (approach point)	0 to 999.999
#2059 zerbas (zero point return parameter)	1 (on the grid point immediately before the stopper)

The parameters other than "#2049 type" can be set in the "Zero point set" screen.

- (1) Select the axis that "#2049 type" is "1".  Refer to "6.6.1 Selecting the Axis" for procedures to select the axis.
- (2) Select the "Auto init set" mode.
- (3) Input "1" to "Absolute posn set".  The input value appears at "Absolute posn set".
- (4) Input an arbitrary value to "#2 Zero-P".  The input value appears at "#2 Zero-P".
- (5) Start JOG operation. 


State : [Stopper1]  
Machine posn : [Not passed] -> current machine position

The axis moves toward the machine end stopper at the push speed (#2055).  
-> a




State : [Stopper1]

The axis pushes against the machine end stopper. After the current reached its limit for given time, the axis returns toward the approach point at the "push speed".  
-> b




State : [Zero-P. Rel.]

After arrived at the approach point, the axis moves toward the machine end stopper at the "push speed".  
-> c




State : [Stopper2]

The axis pushes against the machine end stopper. After the current reached its limit for given time, the axis returns toward the grid point immediately before the stopper at the "push speed".  
-> d



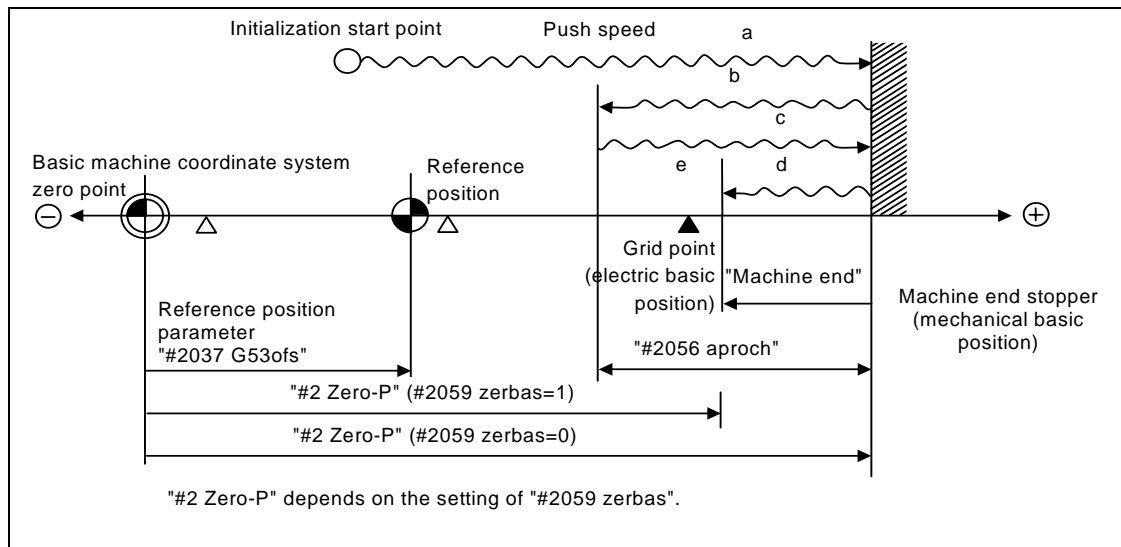
State : [Ret. Ref. P.]

The axis has reached the grid point immediately before the stopper.  
-> e



State : [Complete]  
Machine end : Distance between stopper and grid point  
This completes zero point initialization. Turn the power OFF and ON after the initialization for all axes.

If "#2059 zerbas" is "0" (absolute position origin point = mechanical basic position), axis will stop automatically at this point without moving in the opposite direction and "Complete" appears at [State] and "0.000" at [Machine end].



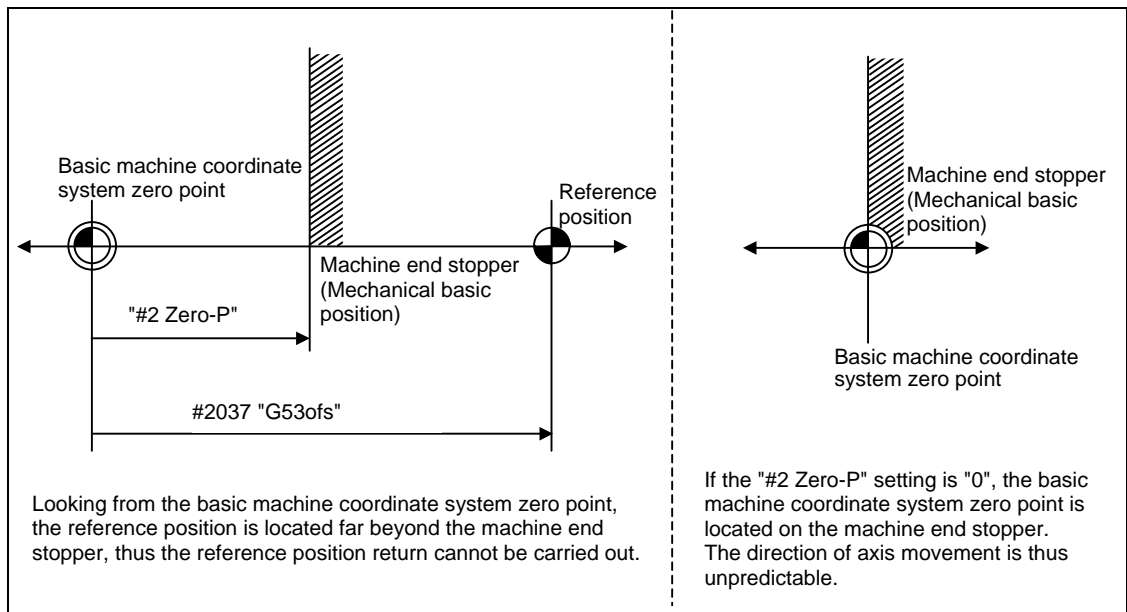
- (Note1)** To change just the basic machine coordinate zero point, set "#0 Absolute posn set" and "#2 Zero-P", and then turn the power OFF and ON.
- (Note2)** If pressing against the machine end is attempted without passing the grip point once after turning the power ON, the operation message "Not passed on grid" will appear. Return to a point before the last grid, and then repeat from step of pressing against the machine end stopper.
- (Note3)** If the first grid point is covered by the grid mask (#2028 grmask) as a result of return to the electric basic position, the axis stops at the next grid point.  
Note that zero-point shift amount (#2027 G28sft) is invalid.
- (Note4)** Acceleration/deceleration during movement at the specified push speed is performed in smoothing-off (step feed) mode.
- (Note5)** If "0" is specified for "#2056 aproch" of the absolute position parameters, the machine zero point is regarded as the approach point.
- (Note6)** Automatic initialization is interrupted if one of the following events occurs. If it is interrupted, [State] indicates "Jog Start" (after selecting the "Auto init set" mode if it is caused by mode change), so restart operation from the step of JOG-start.
- An absolute position detection alarm occurs.
  - Operation preparation signal turns OFF.
  - The mode is changed.
  - The system is reset.

If [State] is "Complete" before automatic initialization is started, "State" returns to "Complete" when power is turned OFF and ON again without restarting the operation.

**(Note7)** Automatic initialization cannot be started in the following cases. The operation message "Can't start" will appear if starting is attempted.

- When "#0 Absolute posn set" is not set.
- When the "#2 Zero-P" setting is inappropriate.
- When "#2055 pushf" is not set.
- When "Z71 Abs encoder failure 0005" has occurred.

In the above cases, if the "#2 Zero-P" setting is inappropriate, this means that the relation of "#2 Zero-P" and "#2037 G53ofs" is inappropriate. That is, if "#2 Zero-P" is smaller than the "#2037 G53ofs", the machine end stopper will be located between the basic machine coordinate system zero point and reference position; this disables automatic initialization. (Refer to the following left figure.) If "#2 Zero-P" is set to "0", the machine end stopper direction is unpredictable; this also disables automatic initialization. (Refer to the following right figure.)



**Procedures (Marked point alignment method)**

Set the following parameter beforehand in the "Abs.Posit.Param." screen.

Parameter	Setting value
#2049 type (absolute position detection type)	2 (marked point alignment method is selected)
#2050 absdir (basic Z - direction)	0/1

The parameters can be set in the "Zero point set" screen.

- (1) 

Select the axis that "#2049 type" is "2".

 ➡ Refer to "6.6.1 Selecting the Axis" for procedures to select the axis.
  - (2) 

Select the HANDLE mode, HANDLE-AX mode, or JOG mode.
  - (3) 

Input "1" to "#0 Absolute posn set".

 ➡ The input value appears at "#0 Absolute posn set".
  - (4) 

Input an arbitrary value to "#2 Zero-P".

 ➡ The input value appears at "#2 Zero-P".
  - (5) 

Move the axis toward the mechanical basic position and align it to the marked point.  
-> a

 ➡ State : [Origin Set]  
Machine posn : [Not passed] -> current machine position
  - (6) 

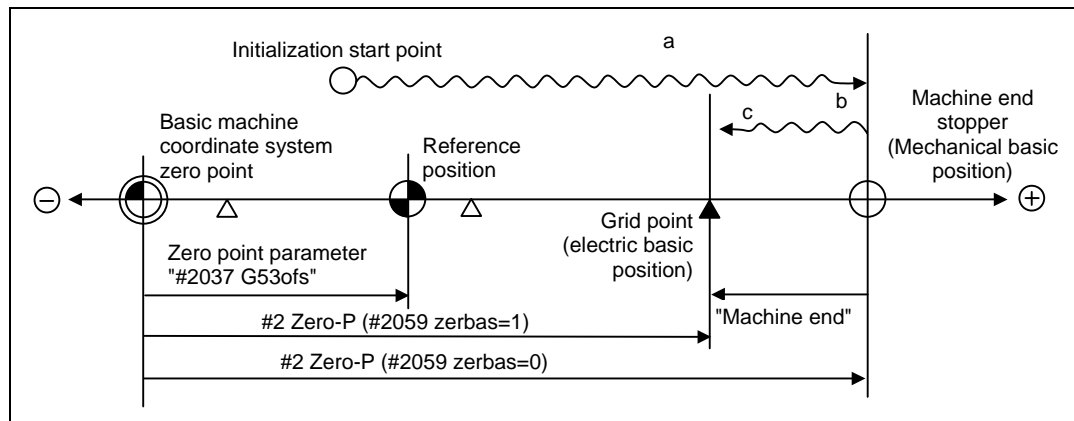
Input "1" to "#1 Origin-P".

 ➡ The input value appears at "#1 Origin-P".
  - (7) 

Move the axis in the direction designated with the parameter "#2050 absdir".  
-> b

 ➡ State : [Ret. Ref. P.]  
Machine end : Distance between machine basic point (marked point) and the first grid point
  - The axis reaches the first grid point.  
-> c

 ➡ State : [Complete]
- This completes zero point initialization. Turn the power OFF and ON after the initialization for all axes.



- (Note 1)** To change just the basic machine coordinate zero point, set "#0 Absolute posn set" and "#2 Zero-P", and then turn the power OFF and ON.
- (Note 2)** If aligning axis on the marked point is attempted without passing the grip point once after turning the power ON, the operation message "Not passed on grid" will appear. Return to a point before the last grid, and then repeat from step of aligning the axis on the marked point.
- (Note 3)** If the first grid point is covered by the grid mask (#2028 grmask) as a result of return to the electric basic position, the axis stops at the next grid point.  
Note that zero-point shift amount (#2027 G28sft) is invalid.
- (Note 4)** Reconfirm the "absdir" setting if the machine does not move in the direction of "#2050 absdir". The machine will move only in the positive direction when set to "0", and the negative direction when set to "1".

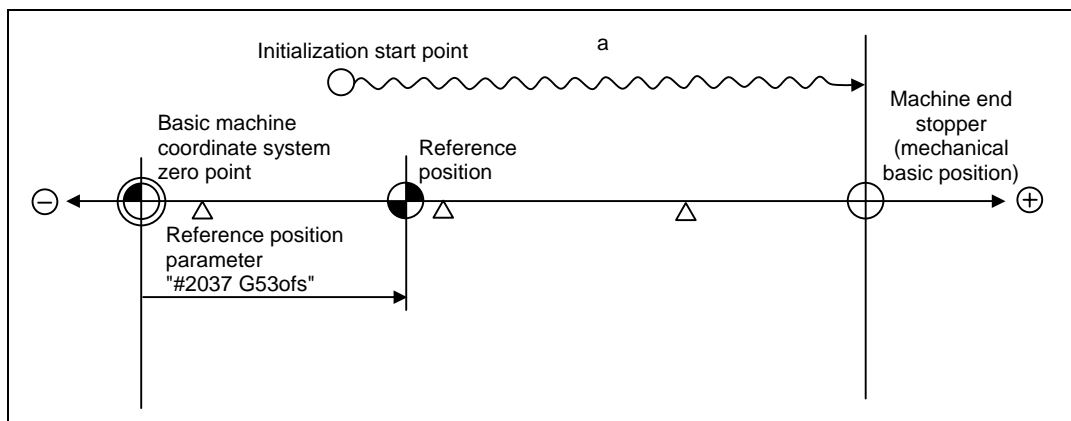
**Procedures (Marked point alignment method II)**

Set the following parameter beforehand in the "Abs.Posit.Param." screen.

Parameter	Setting value
#2049 type (absolute position detection type)	4 (marked point alignment method II is selected)

The parameters other than "#2049 type" can be set in the "Zero point set" screen.

- (1) Select the axis that "#2049 type" is "4". ➡ Refer to "6.6.1 Selecting the Axis" for procedures to select the axis.
  - (2) Select the HANDLE mode, HANDLE FEED AXIS SELECT mode, or JOG mode.
  - (3) Input "1" to "#0 Absolute posn set". ➡ The input value appears at "#0 Absolute posn set".
  - (4) Input an arbitrary value to "#2 Zero-P". ➡ The input value appears at "#2 Zero-P".
- Move the axis toward the mechanical basic position and align it to the marked point.  
-> a ➡ State : [Origin Set]
- Input "1" to "#1 Origin-P". ➡ The input value appears at "#1 Origin-P".  
State : [Complete]  
Machine end : 0.000  
Machine posn : The value set in "#2 ZERO"



- (Note1)** To change just the basic machine coordinate zero point, set "#0 Absolute posn set" and "#2 Zero-P", and then turn the power OFF and ON.
- (Note2)** If aligning axis on the marked point is attempted without passing the grip point once after turning the power ON, the operation message "Not passed on grid" will appear. Return to a point before the last grid, and then repeat from step of aligning the axis on the marked point.
- (Note3)** If the first grid point is covered by the grid mask (#2028 grmask) as a result of return to the electric basic position, the axis stops at the next grid point.  
Note that zero-point shift amount (#2027 G28sft) is invalid.





## 6.6.3 Carrying Out Dog-type Zero Point Initialization

## Procedures (Marked point alignment method II)

Set the following parameter beforehand in the "Abs.Posit.Param." screen.

Parameter	Setting value
#2049 type (absolute position detection type)	3 (dog-type method is selected)

- (1) Select the axis that "#2049 type" is "3".  Refer to "6.6.1 Selecting the Axis" for procedures to select the axis.
- (2) Carry out the manual or automatic dog-type reference position return.  State : [Zero-P. Rel.]  
Machine posn : Current machine position
- Reference position return completes. State : [Complete]  
Machine end : 0.000  
This completes zero point initialization. Turn the power OFF and ON after the initialization for all axes.

**(Note1)** If the dog-type reference position return is interrupted by resetting, the previous state ("Complete" or "Illegality") will display in the [State] column.

**(Note2)** With dog-type zero point return, reference position return can be executed again even if the [State] is "Complete".

## 6.6.4 Precautions

## Precautions common for the initialization operation

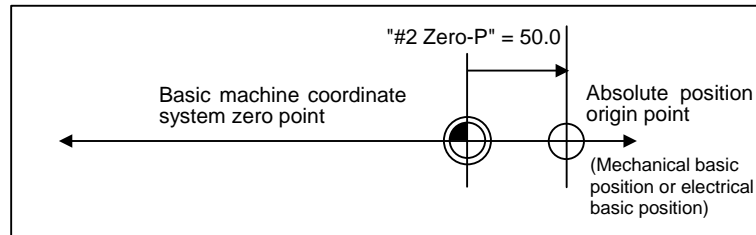
- (1) The "#0 Absolute posn set" parameter (axis for which zero point is to be initialized) can be set simultaneously for all axes or individually for each axis.
- (2) The "#0 Absolute posn set" parameter cannot be turned OFF with the keys. It is turned OFF when the power is turned ON again.
- (3) "#2 ZERO-P" can be set at any time as long as "#0 Absolute posn set" is set to "1".
- (4) The grid point must be passed at least once after turning the power ON before initializing the zero point. If the grid point has not been passed, the operation message "Not passed on grid" will appear at the "Machine posn".
- (5) When the absolute position is established, the required data will be stored in the memory.

## Precautions common for the dogless-type absolute position detector

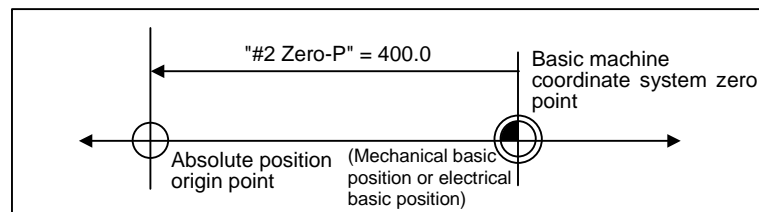
## (1) Example of setting "#2 Zero-P" parameter

For the "#2 Zero-P" parameter, set the coordinate value of the absolute position origin point (mechanical basic position or electrical basic position) looking from the basic machine coordinate system zero point.

**(Example 1)** To set the zero point at 50.0mm before absolute position origin point on + end



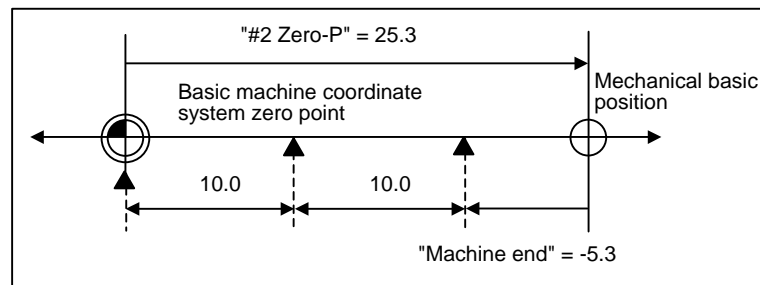
**(Example 2)** To set the zero point at 400.0mm before the machine basic position or absolute position origin point on - end.



**(Example 3)** To set the basic machine coordinate system zero point on the grid point, calculate the "#2 Zero-P" parameter setting value as shown below using the value displayed at "Machine end". "Machine end" shows the distance from the mechanical basic position to the previous grid point.

(Note that when setting the electrical basic position coordinate value in "#2 Zero-P", the "Machine end" value does not need to be considered.)

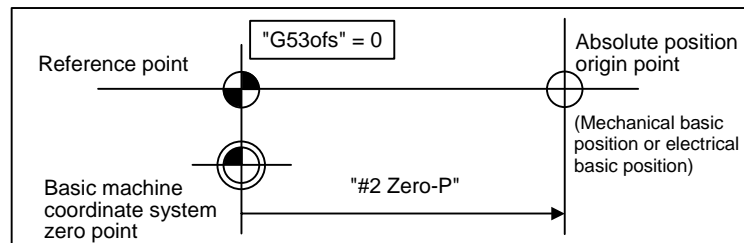
To set the third grid point as the zero point when the "Machine end" display is -5.3 at the + end basic position. (Example of 10.0mm grid interval.)



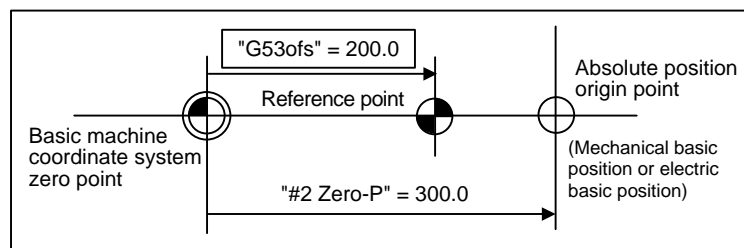
**(2) Setting the reference point**

The reference point can be set as shown below by setting the "#2037 G53ofs".

**(Example 1)** To set the reference point to the same position as the basic machine coordinate system zero point.

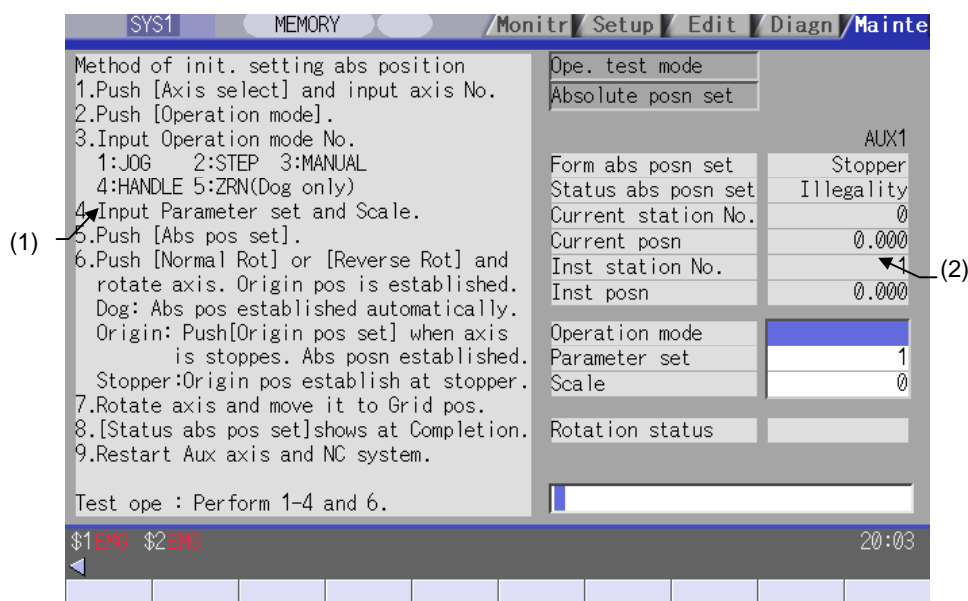


**(Example 2)** To set the reference point at a position 200.0mm to the + side from the basic machine coordinate zero point.  
(To set the basic machine coordinate system zero point 300.0mm front of the absolute position origin point.)



## 6.7 Auxiliary Axis Test Screen

The absolute position setting and test operations can be carried out by separating the auxiliary axis control from the PLC.



### Display items

Display item	Details	Display items/setting range
(1) Operation explanation area	The operation method is displayed. Refer to "MR-J2-CT Series SPECIFICATIONS AND INSTRUCTION MANUAL" (BNP-B3944) for details.	
(2) 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 "#50120 ABS Type".	Dog/Stopper/Origin
Status abs posn set	This displays the initialization state of the absolute position. Refer to "Display of "Status abs posn set" " in 6.7.2 for details.	Complete/Illegality/Stopper/Release/Ret. Ref. P./Origin Set/Zero-P. Rel.
Current station No.	This displays the number of the currently stopped station.	This follows the "#50100 station" setting.
Current posn	This displays the current coordinate position.	0 to 360°
Inst station No.	This displays the commanded station No. for automatic operation, or the nearest station No. to be stopped at for manual operation.	This follows the "#50100 station" setting.
Inst posn	This displays the coordinate position corresponding to the target station No.	0 to 360°

Display items	Details	Display items/setting range
(Continued from the previous page)		
Operation mode	This displays the currently selected operation mode.	1: JOG 2: STEP 3: MANUAL 4: HANDLE 5: ZRN (Dog only)
Parameter set	This displays the No. of the currently selected operation parameter group.	1: Parameter set 1 2: Parameter set 2 3: Parameter set 3 4: Parameter set 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

## Menus

Menu	Details	Type	Reference
Axis select	This designates the auxiliary axis No. for which initialization or test operation is to be carried out. After pressing this menu, set the auxiliary axis No. (1 to 6).	A	
OpeTest mode	This switches ON/OFF for the operation adjustment mode. When absolute position initialization set and test operation are carried out, select the operation adjustment mode. (Note) The operation adjustment mode cannot be selected in the following cases. J2CT operation adjustment mode valid signal (R9998/bit0) is OFF. The auxiliary axis is being executed.	C	
Abs pos set	This turns ON absolute position initialization set mode. This turns OFF absolute position initialization set mode after the absolute position initialization set is completed. 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", press this menu at the position to be used as the origin point. The absolute position will then be set at this position.	C	
Normal Rot	The axis is started with forward run. (1) For HANDLE A forward run cannot be started by pressing this menu. (2) For MANUAL/JOG operation When this menu is pressed in forward run, the axis stops. When this menu is pressed in reverse run, the axis is started with forward run after it stops at once. (3) For STEP Whenever this menu is pressed, forward run is executed by each feed amount. This menu can be selected in operation adjustment mode only.	B	
Reverse Rot	The axis is started with reverse run. (1) For HANDLE A reverse run cannot be started by pressing this menu. (2) For MANUAL/JOG operation When this menu is pressed in reverse run, the axis stops. When this menu is pressed in forward run, the axis is started with reverse run after it stops at once. (3) For STEP Whenever this menu is pressed, reverse run is executed by each feed amount. This menu can be selected in operation adjustment mode only.	B	

## 6.7.1 Preparation

Before the screen is switched to auxiliary axis test screen, prepare the following things.

## (1) Parameter settings

Set the following parameters.





No.	Name		Details																						
50102	Cont2	Control parameter 2	bit7 = 1 (Absolute position detection) Turn the NC power ON again after this parameter is set. <b>(Note)</b> The alarm "Z70 Abs data error" occurs after the power ON again.																						
50120	ABS Type	Absolute position detection parameter	bit1/bit2 : Select the absolute position detection method. <table border="1"><thead><tr><th>Method</th><th>bit2</th><th>bit1</th><th>Detail</th></tr></thead><tbody><tr><td>Dog-type method</td><td><b>(Note)</b></td><td>1</td><td>This decides the reference position by the near point dog.</td></tr><tr><td>Mechanical end stopper method</td><td>0</td><td>0</td><td>This decides the basic point by pushing an axis to machine end etc. when the torque (current) limit is set.</td></tr><tr><td>Marked point alignment method</td><td>1</td><td>0</td><td>This decides the basic point by aligning an axis to machine origin point.</td></tr></tbody></table> <b>(Note)</b> When bit1 is "1", dog-type method is selected regardless of bit2 setting.  bit3 : Select the electrical basic position direction at marked point alignment method. <table border="1"><thead><tr><th>Direction</th><th>bit3</th></tr></thead><tbody><tr><td>Electrical basic position direction +</td><td>0</td></tr><tr><td>Electrical basic position direction -</td><td>1</td></tr></tbody></table>	Method	bit2	bit1	Detail	Dog-type method	<b>(Note)</b>	1	This decides the reference position by the near point dog.	Mechanical end stopper method	0	0	This decides the basic point by pushing an axis to machine end etc. when the torque (current) limit is set.	Marked point alignment method	1	0	This decides the basic point by aligning an axis to machine origin point.	Direction	bit3	Electrical basic position direction +	0	Electrical basic position direction -	1
Method	bit2	bit1	Detail																						
Dog-type method	<b>(Note)</b>	1	This decides the reference position by the near point dog.																						
Mechanical end stopper method	0	0	This decides the basic point by pushing an axis to machine end etc. when the torque (current) limit is set.																						
Marked point alignment method	1	0	This decides the basic point by aligning an axis to machine origin point.																						
Direction	bit3																								
Electrical basic position direction +	0																								
Electrical basic position direction -	1																								

## (2) Release servo OFF/interlock for auxiliary axis.

## (3) Turn J2CT operation adjustment mode valid signal (R9998/bit0) ON.

## 6.7.2 Selecting a Device, Directory and File

## Operation method (dog type)

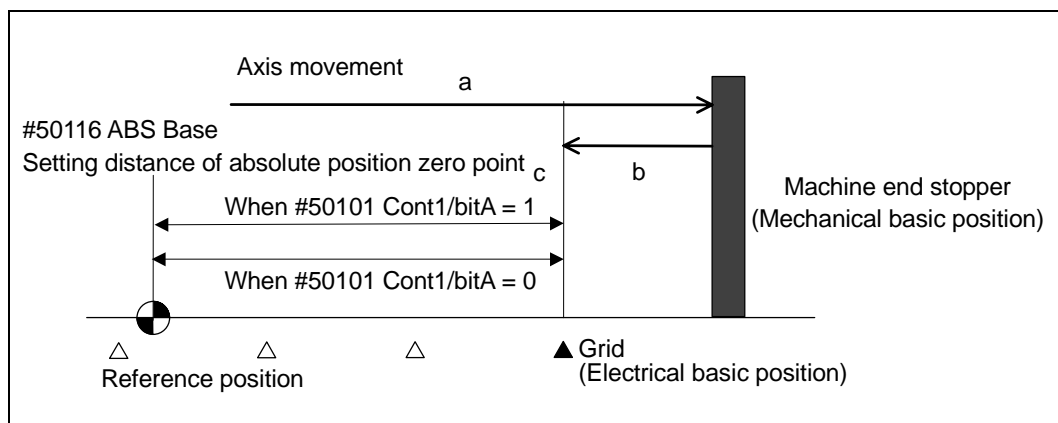
- (1) Press the menu Axis select, input the axis No.  If the axis No. that does not exist is designated, an error will occur.
- (2) Press the menu OpeTestmode.  When the J2CT operation adjustment mode valid signal from PLC is only turning ON while an auxiliary axis is stopping, the menu OpeTestmode can be turned ON.
- (3) Operation mode is changed to "Zero-P. Rel."
- (4) Set the "Parameter set" No.  If the value other than 1 to 4 is set to "Parameter set", a setting error will occur.
- (5) Press the menu Normal Rot or Reverse Rot, start the axis.  The absolute position is set automatically.
- (6) Power ON again.



## Operation methods (Stopper method)

- (1) Press the menu Axis select, input the axis No. ➡ If the axis No. that does not exist is designated, an error will occur.
- (2) Press the menu OpeTestmode. ➡ When the J2CT operation adjustment mode valid signal from PLC is only turning ON while an auxiliary axis is stopping, the menu OpeTestmode can be turned ON.
- (3) Press the menu Abs pos set. ➡ Status abs posn set : "Stopper"
- (4) Operation mode is changed to "HANDLE" or "JOG".
- (5) Set the "Parameter set" No. ➡ If the value other than 1 to 4 is set to "Parameter set", a setting error will occur.
- (6) When the operation mode is HANDLE, set the feed amount per pulse to "Scale". ➡ If the value other than 0 to 3 is set to "Scale", a setting error will occur.
- (7) The axis is traveled to machine end stopper.  
JOG : Press the menu Normal Rot  
or Reverse Rot  
HANDLE: Turn the handle.  
-> a ➡ Status abs posn set : " Stopper" -> "Release"
- (8) The axis travels in the opposite direction for stopper direction.  
-> b
- Reach the first grid.  
-> c
- (9) Power ON again.

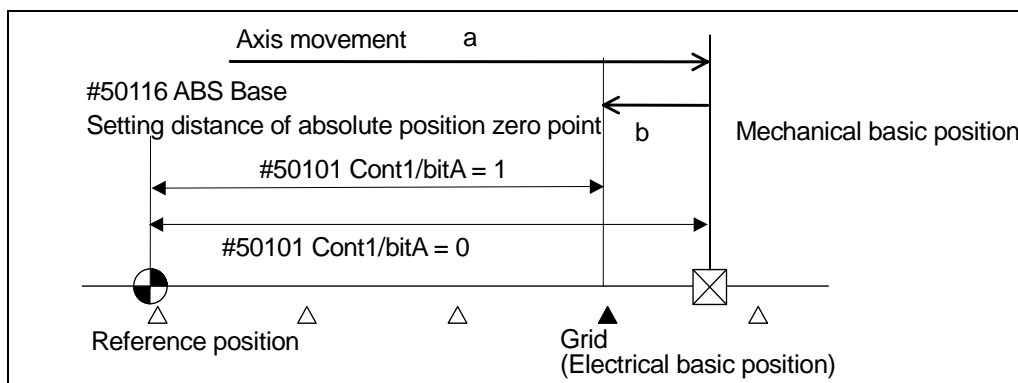
When "#50101 Cont1/bitA" is "0" (absolute position basic point = mechanical basic position), the axis will automatically stop without traveling. When absolute position coordinate zero point is set to mechanical basic position or other than electrical basic position, the reference position is moved with "#50116 ABS Base (absolute position zero point)".



## Operation methods (Marked point alignment method)

- (1) Press the menu Axis select, input the axis No. ➡ If the axis No. that does not exist is designated, an error will occur.
- (2) Press the menu OpeTestmode. ➡ When the J2CT operation adjustment mode valid signal from PLC is only turning ON while an auxiliary axis is stopping, the menu OpeTestmode can be turned ON.
- (3) Press the menu Abs pos set. ➡ Status abs posn set : "Origin Set"
- (4) Operation mode is changed to "HANDLE", "STEP" or "JOG".
- (5) Set the "Parameter set" No. ➡ If the value other than 1 to 4 is set to "Parameter set", a setting error will occur.
- (6) When the operation mode is STEP or HANDLE, set the feed amount per pulse to "Scale". ➡ If the value other than 0 to 3 is set to "Scale", a setting error will occur.
- (7) Press the menu Origin pos set, designate the basic point. ➡ Status abs posn set : "Ret. Ref. P."
- (8) The axis is traveled to mechanical basic position, aligned origin point.  
JOG/STEP: Press the menu Normal Rot or Reverse Rot  
HANDLE: Turn the handle.  
-> a
- Reach the first grid.  
-> c ➡ Status abs posn set : "Complete"
- (9) Power ON again.

When "#50101 Cont1/bitA" is "0" (absolute position basic point = mechanical basic position), the axis will automatically stop without traveling. When absolute position coordinate zero point is set to mechanical basic position or other than electrical basic position, the reference position is moved with "#50116 ABS Base (absolute position zero point)".



## Display of "Status abs posn set"

Depending on the state during operation, the display will change as shown below. Refer to the following table for details on each display item.

State/operation	Display of "Status abs posn set"		
	Dog	Stopper	Origin
Absolute position lost	Illegality	Illegality	Illegality
Absolute posn set ON		↓	↓
Start Normal Rot or Reverse Rot	↓	Stopper	Origin Set
Zero-P. Rel.	Zero-P. Rel.	↓	
Stopper		Release	
Stop Normal Rot or Reverse Rot			↓
Origin pos set ON			Ret. Ref. P.
Start Normal Rot or Reverse Rot	↓	↓	↓
Absolute position established	Complete	Complete	Complete

With operation —→

Without operation - - - ->

Display item of "Status abs posn set"	Details
Illegality	This appears when the absolute position has been lost.
Stopper	This appears after the absolute position initialization set is started and the machine end is pushed against.
Release	This appears after the machine end is pushed against, and the current limit is reached continuously for a set time.
Origin Set	This appears after the absolute position initialization set is started, and the origin point is designated moving to the mechanical basic position.
Ret. Ref. P.	This appears after the basic point is designated, and the nearest grid is reached with the "#50120 ABS TYPE" basic point direction movement.
Zero-P. Rel.	This appears when the reference position has been returned to with the dog-type initialization.
Complete	This appears when the absolute position initialization set has been completed. This displays the state that the absolute position has been established.

**(Note)** When using position setting methods other than the dog-type method, mechanical end stopper method, marked point alignment method, the initialization state will be blank.

## 6.7.3 Test Operation

## Operation methods

The test operation can be carried out with menu **Normal Rot/Reverse Rot** by separating the auxiliary axis control from the PLC.

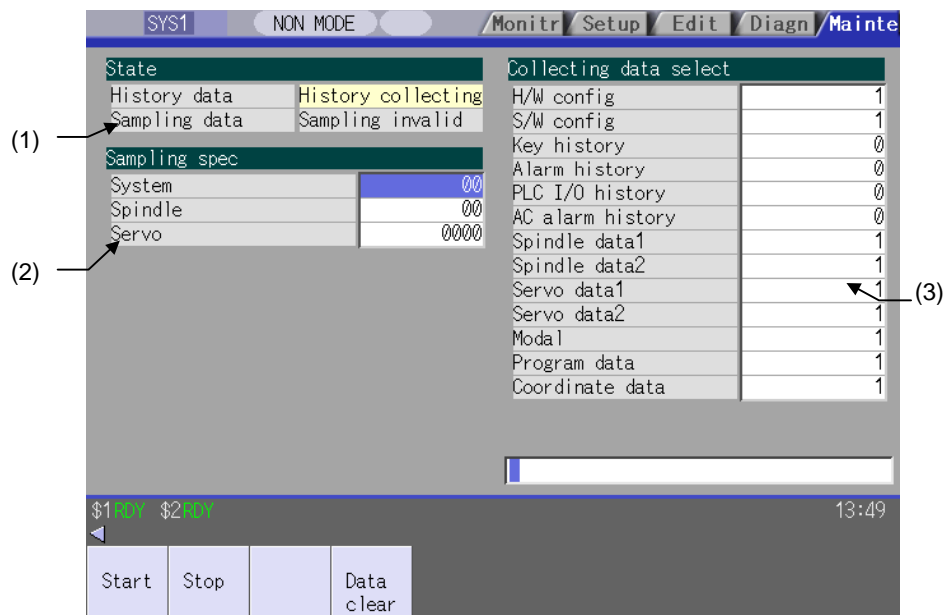
- |   |   |  |
|---|---|--|
| (1) Press the menu <b>Axis select</b> , input the axis No.  | ➡ | If the axis No. that does not exist is designated, an error will occur.  |
| (2) Press the menu <b>OpeTestmode</b> .   | ➡ | When the J2CT operation adjustment mode valid signal from PLC is only turning ON while an auxiliary axis is stopping, the menu <b>OpeTestmode</b> can be turned ON.  |
| (3) Select the "Operation mode".  | ➡ | If the value other than 1 to 5 is set to "Operation mode", a setting error will occur.   |
| (4) When the operation mode is STEP or HANDLE, set the feed amount per pulse to "Scale".              | ➡ | If the value other than 0 to 3 is set to "Scale", a setting error will occur.  |
| (5) Set the "Parameter set" No.   | ➡ | If the value other than 1 to 4 is set to "Parameter set", a setting error will occur.  |
| (6) Rotate the auxiliary axis. (Start by pressing the menu <b>Normal Rot</b> or <b>Reverse Rot</b> .) |   | <p>&lt;JOG&gt;<br/>Rotation will start in the commanded direction.<br/>When the same menu is pressed again, the axis will immediately decelerate and stop.<br/>If the Normal Rot menu is pressed during reverse run, the rotation will stop, and then forward run will start.</p> <p>&lt;MANUAL&gt;<br/>Rotation will start in the commanded direction.<br/>When the same menu is pressed again, the axis will be positioned to the nearest station, and will stop.<br/>If the <b>Reverse Rot</b> 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.</p> <p>&lt;INCREMENTAL&gt;<br/>Each time the movement is started, the axis will rotate by the amount set in the Scale.<br/>Other operations are disabled during movement.</p> <p>&lt;HANDLE&gt;<br/>The axis is fed with handle rotation.</p> |

## 6.7.4 Precaution

- (1) Do not turn "Auto operation "start" command signal (ST) " ON during Ope. test mode.
- (2) If the screen shifts other screen, the auxiliary axis mode (Ope. test mode, Absolute posn set) is held.  
However, the axis stops if the axis is rotating.

### 6.8 Diagnosis Data Collection Setting Screen

The NC automatically collects diagnosis data based on the "Sampling spec" and "Collecting data select" settings specified at this screen.

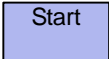
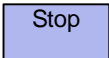
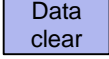


#### Display items

Display item		Details
(1)	State	Display the history data and sampling data collection status.
	History data	Display the history data collection status. History collecting : History data collection is in progress. History stop : History data collection is stopped.
	Sampling data	Display the sampling data collection status. Sampling : Sampling data collection is in progress. Sampling stop : Sampling data collection is stopped. Sampling invalid : Sampling data collection is disabled.
(2)	Sampling spec	Specify the part system, spindle, and servo axes where sampling data is to be collected.
	System	Specify the part systems where sampling data is not to be collected. When "0" is set, sampling is carried out for all part systems. This setting is ignored if a non-existent part system is specified.
	Spindle	Specify the spindle where sampling data is not to be collected. When "0" is set, sampling is carried out for all spindles. This setting is ignored if a non-existent spindle is specified.
	Servo	Specify the servo axes where sampling data is not to be collected. This setting is not system-specific. When "0" is set, sampling is carried out for all axes. This setting is ignored if a non-existent servo axis is specified.



Display item	Details
(3) Collecting data select	This selects the diagnosis data to be collected. (0 : Collected. 1 : Not collected.)
H/W config	This selects whether or not H/W configuration data is collected.
S/W config	This selects whether or not S/W configuration data is collected.
Key history	This selects whether or not key history data is collected.
Alarm history	This selects whether or not alarm history data is collected.
PLC I/O history	This selects whether or not PLC input/output signal history data is collected.
AC alarm history	This selects whether or not AC input power error history data is collected.
Spindle data 1	This selects whether or not spindle current waveform (speed FB, current FB, current command, position FB, position command, droop) data is collected.
Spindle data 2	This selects whether or not spindle current waveform (driver statuses 1,3,4) data is collected.
Servo data 1	This selects whether or not servo current waveform (speed FB, current FB, current command, position FB, position command, droop) data is collected.
Servo data 2	This selects whether or not servo current waveform (detector position Rn, Pn) data is collected.
Modal	This selects whether or not modal information (information for each running block (block data, G-command modal, workpiece coordinate offset)) data is collected.
Program data	This selects whether or not program data (information for each running block (program coordinate position, manual interruption amount, command termination)) data is collected.
Coordinate data	This selects whether or not coordinate data (information for each running block (relative position, machine FB position, machine command position)) data is collected.

## Menus

Menu	Details	Type	Reference
	This begins collecting sampling data and history data.	A	6.8.1 Performing a Data Collection Operation
	This stops the sampling data and history data collection operation.	A	6.8.2 Stopping a Data Collection Operation
	This stops the sampling data and history data collection operation, and clears the collected data.	A	6.8.3 Clearing a Collected Data



## 6.8.1 Performing a Data Collection Operation

## Operation methods

- (1) Press the menu Start.  An operation message "The collection begin?" appears.
- (2) Press Y or INPUT key.  Data collection begins, and "History collecting" and "Sampling" appears in the status column.



## 6.8.2 Stopping a Data Collection Operation

## Operation methods

- (1) Press the menu Stop.  An operation message "The collection stop?" appears.
- (2) Press Y or INPUT key.  Data collection stops, and "History stop" and "Sampling stop" appears in the status column. To resume data collection, press the menu Start.

## 6.8.3 Clearing a Collected Data

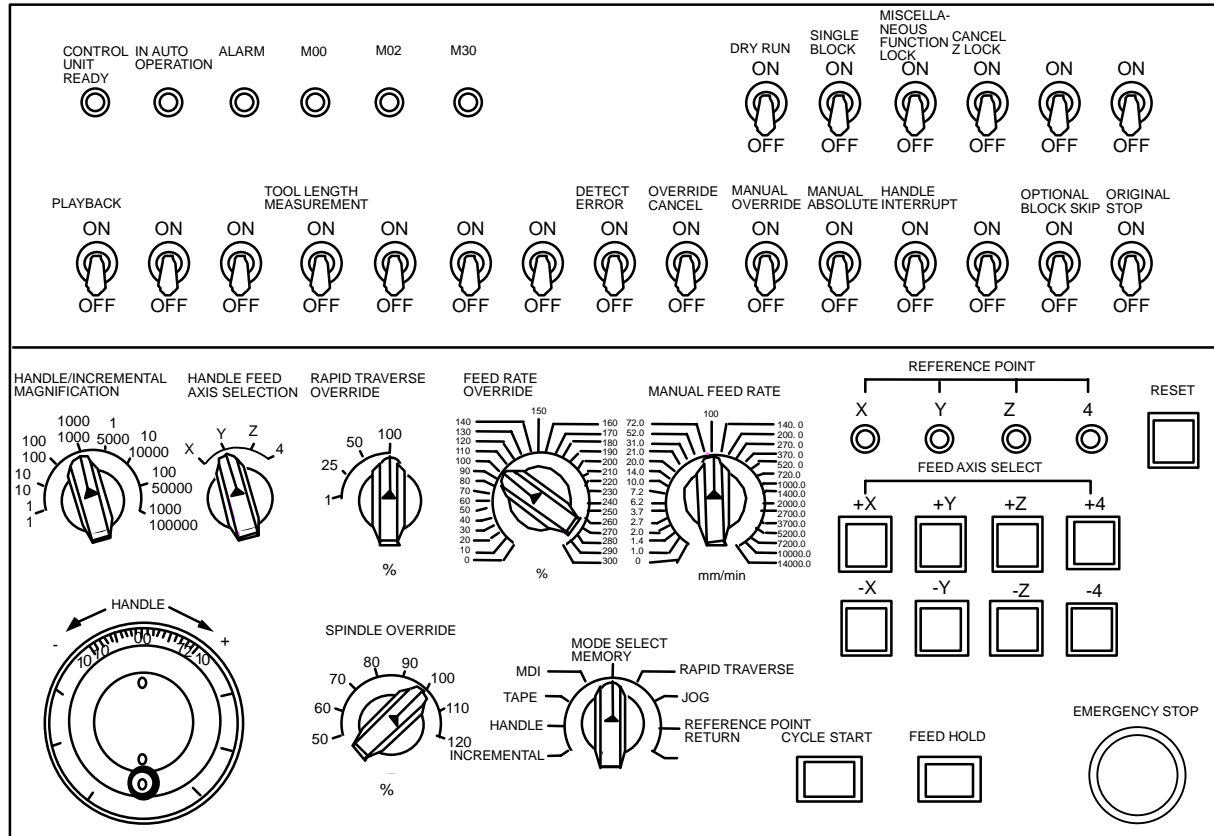
## Operation methods

- (1) Press the menu Data clear.  An operation message "Execute the collection data clear?" appears.
- (2) Press Y or INPUT key.  The collected data is cleared. "Stop" appears in the status column. To resume data collection, press the menu Start.

## **II. 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 by machine specification. Refer to the operation manual issued by the machine tool builder. Use this chapter for reference.





### 1.3 Operations Not Ready

The operation not ready state means that the system is not ready to run because of the controller itself or the machine, even though power is supplied to the NC unit control circuit. The RUN READY lamp on the setting and display unit is OFF.

- (1) From power OFF to not ready (Transition of operation state correlation diagram (b))
  - When POWER ON signal is input from the machine.
- (2) From ready to not ready (Transition of operation state correlation diagram (c))
  - When EMG (emergency stop) is displayed on the setting and display unit; or
  - When any of the following alarms is displayed on the setting and display unit; Servo alarm, feedback alarm, excessive error alarm, watch dog, MCP alarm.

### 1.4 Operations Ready

The operations 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 controller is reset.

- (1) From not ready to reset (Transition of operation state correlation diagram (d))
 

This state is also called initial state.

  - When about four seconds has passed after the power is turned ON.
- (2) From another ready state to reset (Transition of operation state correlation diagram (e))
  - 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 in Progress

The automatic operation in progress state means running operations in automatic mode. The IN-AUTO OPERATION lamp on the machine operation panel is ON.

- (1) From another ready state to automatic operation in progress (Transition of operation state correlation diagram (f))
  - When the CYCLE START switch on the machine operation panel is pressed in automatic mode.

#### 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 of operation state correlation diagram (g))
  - 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 in progress to automatic operation stop (Transition of operation state correlation diagram (h))
  - When the SINGLE BLOCK switch on the machine operation panel is turned ON and execution of the block is completed; or
  - When automatic mode input is changed to another automatic mode input.



### CAUTION



Stay out of the moveable range of the machine during automatic operation. Keep hands, feet and face away from the rotating spindle.

## **2. Indicator Lamps**

### **2.1 Control Unit Ready**

The CONTROL UNIT READY lamp indicates that the control 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 In Automatic Operation**

The IN AUTO OPERATION lamp is ON from CYCLE START switch turning ON in the automatic operation mode (memory, tape, 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 controller 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 (tape, memory, 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 AUTO PAUSE switch turning on to AUTO 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 Position**

Output is executed when the controlled axis arrives at the reference position when manual reference point return, automatic reference point return, or reference point collation (check).

### **2.6 Alarm**

The ALARM lamp goes ON when an alarm occurs during NC running.

### **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 controller 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 following states are to be observed.

- (1) If a movement command is being executed, movement 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 is being occurred, the program error state is cleared and the ALARM lamp goes OFF.
- (5) If the reset switch is turned ON while the input/output device is running, the power will be cut off.
- (6) When the reset switch is turned ON, the modal state will return to its original state.

#### 3.2 Emergency Stop Button

The EMERGENCY STOP button is a red mushroom-shaped pushbutton. The unready state is set by pressing the EMERGENCY STOP button. During emergency stop, the READY lamp goes OFF and automatic operation and manual operation do not work. The controller is reset at that time.

If the EMERGENCY STOP button is pressed when a movement command is executed, the moving axis stops and all other machine motions also stop.

When the EMERGENCY STOP button is released, the READY lamp goes ON in about one second and operation enable state (READY state) is entered.

When parameter is emergency stop hold type, even if the EMERGENCY STOP button is released, the emergency stop state is held. To release the emergency stop state, turn ON the RESET switch.

When the EMERGENCY STOP LIMIT switch of each axis works, the same state as when 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 Selection Switch

The MODE SELECT switch is used to determine the controller 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 for a given distance.

Handle feed mode:

Select the mode to move the controlled axis by using the manual handle.

Memory Mode:

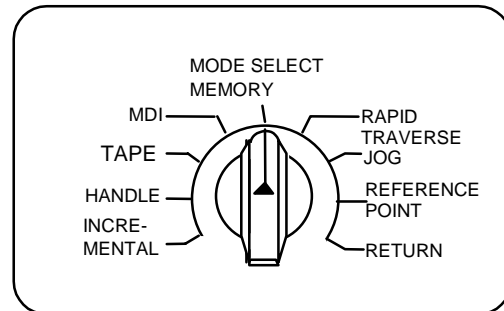
Select the mode for memory operation.

Tape mode:

Select the mode for tape operation.

MDI mode:

Select the mode for MDI operation.



**(Note 1)** Refer to the section 1.4 for the running state when a mode is changed to another one during automatic operation.

### 4.2 Jog Feed Mode

The jog feed mode enables the machine to be moved by hand consecutively at the feedrate set by using the MANUAL FEED RATE switch. The jog feed mode is started by using the FEED AXIS SELECT switch. Refer to the section 5 for the MANUAL FEED RATE switch.

#### Operation procedure

Using the MODE SELECT switch, select the jog mode.

Using the MANUAL FEED RATE 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 FEED RATE OVERRIDE switch takes precedence over the feedrate set by using the MANUAL FEED RATE 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 its speed 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 tool builder for the rapid traverse feedrate.

**(Note 2)** Refer to the section 5 for the RAPID TRAVERSE OVERRIDE switch.

#### Operation procedure

Using the MODE SELECT switch, select the rapid traverse feed mode.

Using the RAPID TRAVERSE OVERRIDE switch, set arbitrary override value.

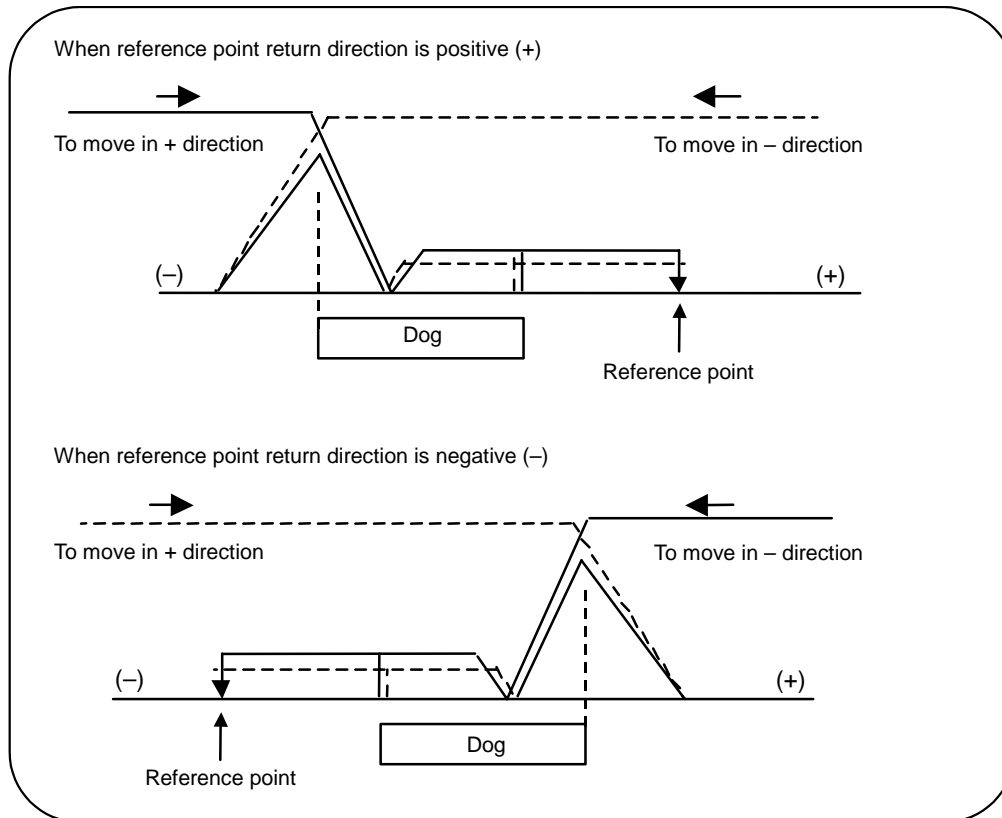
To move the controlled axis, turn ON the FEED AXIS SELECT switch. The controlled axis is moved while the switch is turned ON.  
When the switch is turned OFF, the controlled axis stops with deceleration.

**(Note 1)** 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 controlled axis to be returned manually to the defined position unique to the machine (reference point).

The first reference point return after the NC power is turned ON becomes the dog mode. For 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 as shown below.



#### Dog mode reference point return

The steps below describe what happens to the controlled axis when it returns to the reference point for the first time with the power ON and with the machine in an "operations not ready state" (emergency stop is engaged or the servo alarm is ON) or when the parameters are selected in the dog mode.

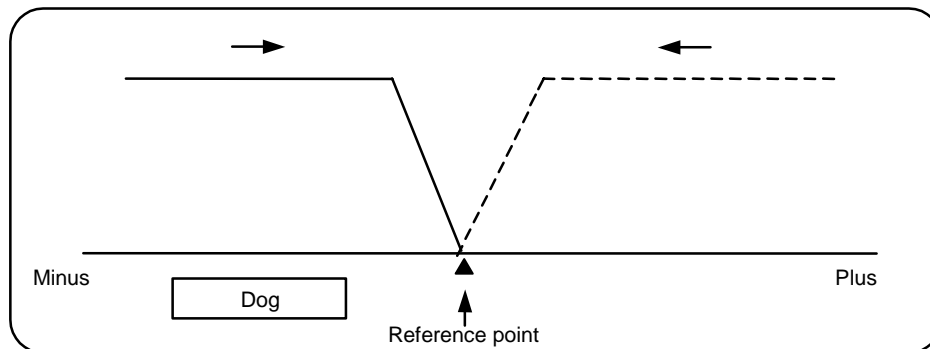
- (1) The controlled axis is moved in the direction where the near point detection limit switch and dog approach each other in the reference point return mode.
- (2) When the limit switch kicks the dog, the controlled axis once stops with deceleration.
- (3) Next, the controlled axis moves to the reference point at the approach rate set in the parameter.
- (4) When it arrives at the reference point, the reference point arrival signal is output.
- (5) The reference position establishment signal is output.

#### High-speed reference point return

If high-speed return is set in a given parameter after dog mode reference point return is executed, then high-speed reference point return will be made.



If the return direction is erroneous in high-speed reference point return, an alarm occurs. A return is made to the reference point at the rapid traverse feedrate.

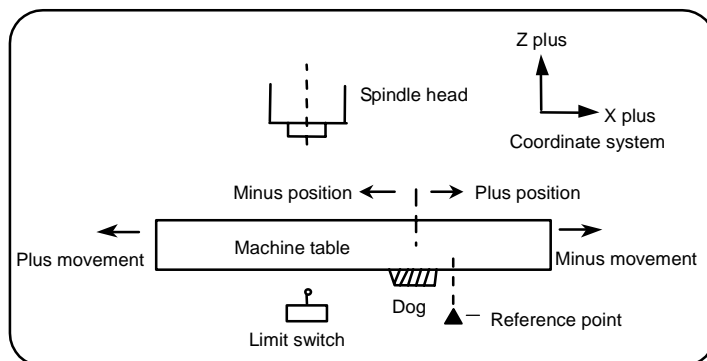


### Operation procedure

Using the MODE SELECT switch, select the reference point return mode.

Using the RAPID TRAVERSE OVERRIDE switch, set arbitrary override value.

Check the current machine position.



The machine position depends on whether the near point detection limit switch is on the plus or minus side with the near point dog on the machine table as illustrated above as the 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 return until the machine passes by the dog (dog mode) or the REFERENCE POSITION ARRIVAL lamp goes ON (high speed return).

### 4.5 Incremental Feed Mode

The incremental feed mode enables the controlled axis to be moved at 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.

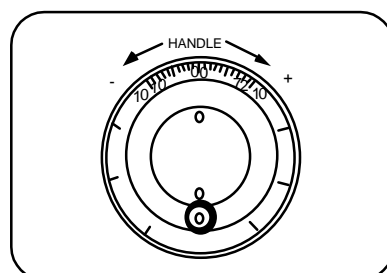
#### Operation procedure

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 arbitrary direction.



## 4.7 Memory Mode

In the memory mode, a work program registered in memory is called and automatic operation is executed.

### Operation procedure

Call the work program for memory operation by using the setting and display unit.

Check whether or not the work program is called normally.

Using the MODE SELECT switch, select the memory mode.

Set an arbitrary override value by using the switch RAPID TRAVERSE OVERRIDE, FEED RATE 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.

When machine motion is stopped by using the FEED HOLD switch, automatic operation will be restarted by turning ON the CYCLE START switch.

Memory operation terminates when M02 or M30 in the program is executed. The M02 or M30 lamp on the machine operation panel is turned ON.

To repeat executing the same program, input the rewind signal by reset & rewind with user PLC.

To forcibly terminate automatic operation, turn ON the RESET switch.

### CAUTION



Carry out dry run operation before actually machining, and confirm the machining program, tool offset amount and workpiece coordinate system offset amount.

## 4.8 MDI Operation Mode

In the MDI operation mode, automatic operation is executed by using a program set on the setting and display unit MDI program editing screen.

### Operation procedure

The MDI operation follows the memory operation.

Set data on the setting and display unit MDI program editing screen.

Using the MODE SELECT switch, select the MDI mode.

The following steps are the same as the memory operation steps. Refer to 4.7.

**(Note 1)** When using a 2-part system, the MDI data operation can be switched with the parameters.

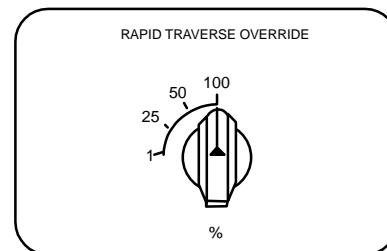
#1050 MemPrg	Details
0, 2, 4, 6	The common MDI program for the part system is run in each part system.
1, 3, 5, 7	MDI programs for each part system are run in each part system.

## 5. Operation Panel Switches in Operation Mode

### 5.1 Rapid Traverse Override

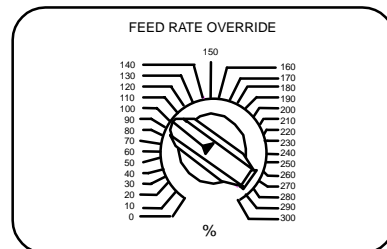
Use the RAPID TRAVERSE OVERRIDE switch to override the rapid traverse feedrate in automatic or manual operation.  
RAPID TRAVERSE OVERRIDE is applicable to the following:

Automatic operation: G00, G27, G28, G29, G30  
Manual operation: Rapid traverse,  
reference point return,  
incremental feed



### 5.2 Cutting Feed Override

Use the FEED RATE OVERRIDE switch to override the feedrate in automatic operation (G01, G02, or G03 F command) or the manual feedrate of jog feed in manual operation in 10% units in the range of 0% to 300%. FEED RATE 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 FEED RATE switch by overriding the programmed feedrate in automatic operation.

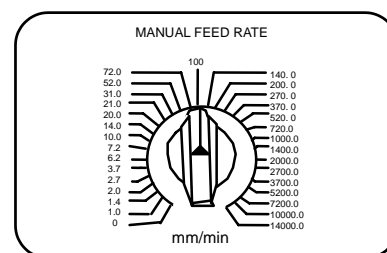
**(Note 2)** Refer to the section 6.5 for feedrate override applied to manual feedrate.

### 5.3 Manual Feedrate

Use the MANUAL FEED RATE 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 FEED RATE OVERRIDE switch takes precedence over the value set by using the MANUAL FEED RATE 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	



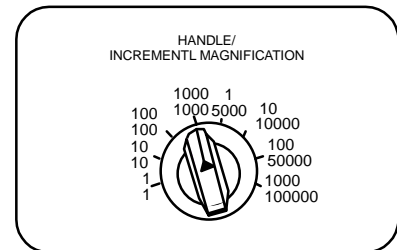
#### 5.4 Handle/Incremental Feed Magnification

Use the HANDLE/INCREMENTAL MAGNIFICATION switch to set the travel distance commanded when manual handle feed or incremental feed is made.

The travel distances for each axis are listed below.

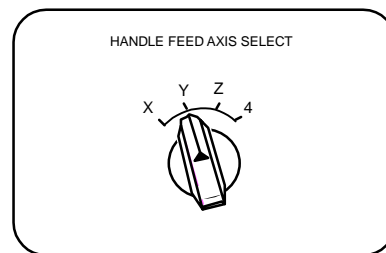
When B or C is set to the parameter "#1003 iunit", up to 1000 only can be validated.

Movement amount ("#1003 iunit"=B or C)	Movement amount (Other than "#1003 iunit"=B or C)
1	1
10	10
100	100
1000	1000
5000	5000
10000	10000
50000	50000
100000	100000



#### 5.5 Handle Feed Axis Selection

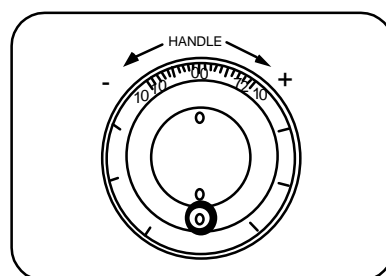
Use the HANDLE FEED AXIS SELECT switch to select the axis moved by handle operation when the handle mode is selected.



#### 5.6 Manual Pulse Generator

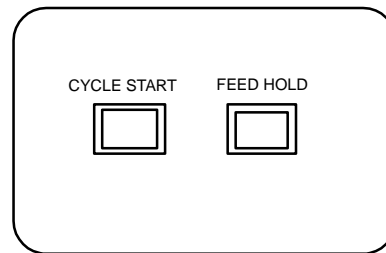
In the manual handle mode, fine feed of the machine can be made by turning the manual pulse generator.

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

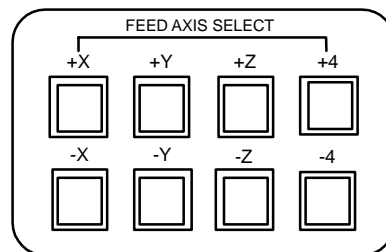
Use the CYCLE START switch to start automatic operation (memory, tape, or MDI). Automatic operation is executed by turning ON the switch. Use also the switch for restart from stop by the FEED HOLD switch or the automatic operation stop state.



The CYCLE START switch becomes effective 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 held ON, the selected controlled axis is moved. When the switch is turned OFF, the controlled axis movement stops.



## 6. Operation Panel Switch Functions

### 6.1 Chamfering

Chamfering in the thread cutting cycle can be validated/invalidated using an external switch.

### 6.2 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 or B function BCD output 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.

### 6.3 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.

### 6.4 Dry Run

- (1) When the DRY RUN switch is turned ON, the feedrate set by using the MANUAL FEED RATE switch takes precedence over the programmed feedrate (F).

### 6.5 Manual Override

- (1) When the MANUAL OVERRIDE switch is turned ON, the override value set by using the FEED OVERRIDE switch takes precedence over the value set by using the MANUAL FEED RATE switch.
- (2) The override value set by using the FEED OVERRIDE switch also takes precedence over the dry run during automatic operation.
- (3) Manual override becomes effective immediately when the switch is turned ON.



### 6.6 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 FEED RATE OVERRIDE switch.
- (2) It is not effective for manual override.

### 6.7 Optional Stop

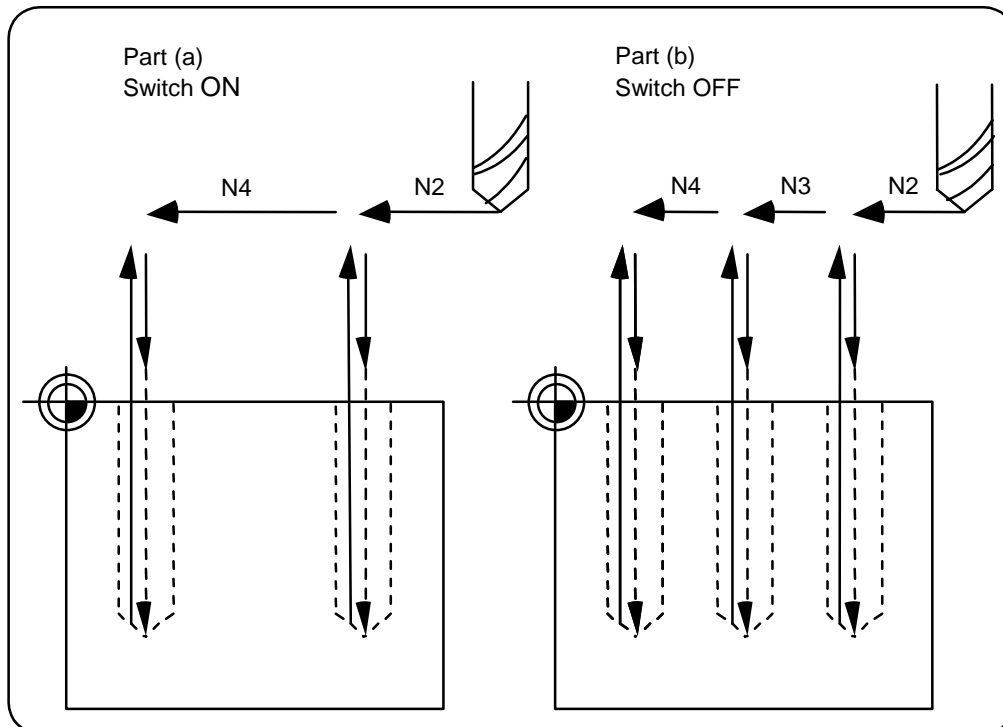
- (1) If M01 is programmed, the machine automatically stops by turning ON the OPTIONAL STOP switch. When the switch is OFF, M01 is ignored and the machine does not stop.
- (2) The machine stops after the M01 block is executed.

### 6.8 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.

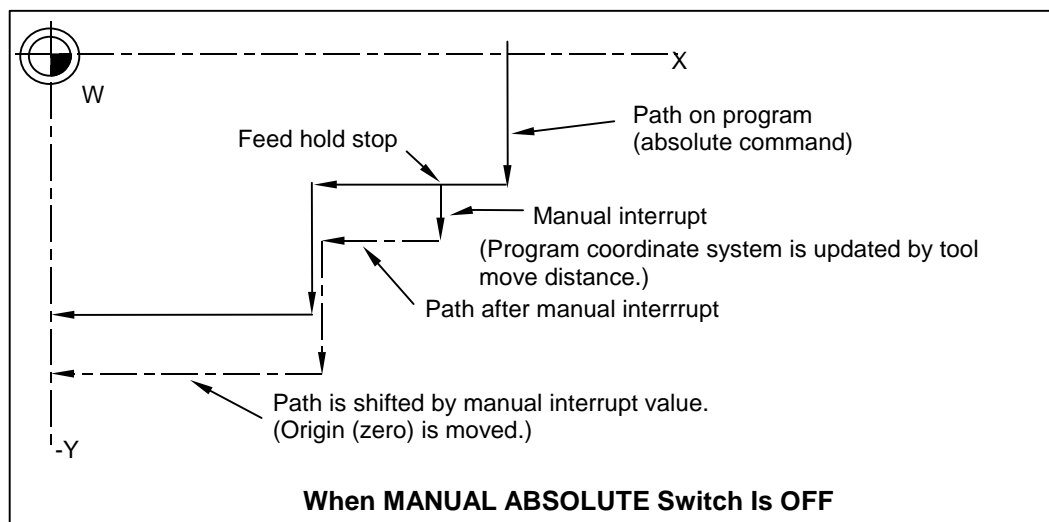
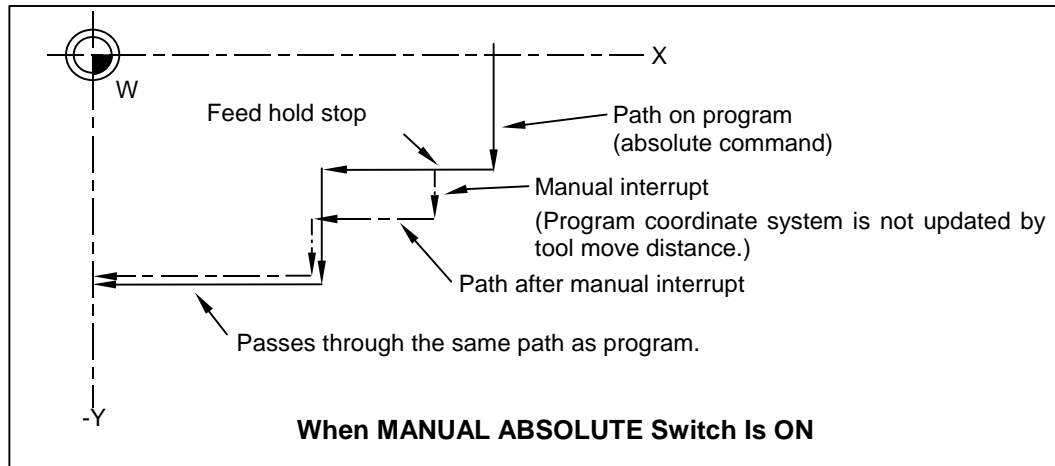
**(Example)** When machining two parts as illustrated below, if the following program is prepared and the machining is done by turning ON the OPTIONAL BLOCK SKIP switch, part (a) is provided; if the machining is done by turning OFF the switch, part (b) is provided:

Program    N1G54 ;  
              N2G90G81X50. Z-20. R3. F100 ;  
              /N3X30. ;  
              N4X10. ;  
              N5G80 ;  
              M02 ;



### 6.9 Manual Absolute

When the MANUAL ABSOLUTE switch is turned ON, while the program coordinate system is not updated, the coordinate position is updated by the distance in which the tool has been moved manually. If the switch is OFF, the program coordinate system is updated when the tool is manually moved.

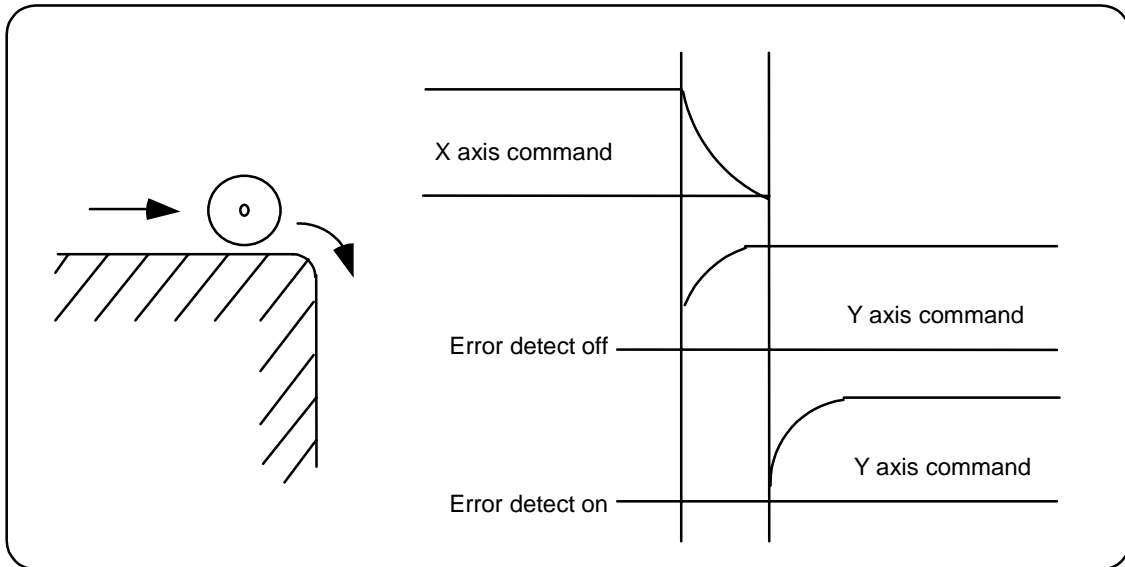


### 6.10 Error Detect

For positioning (G00), machine deceleration check is made before next block movement 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 setting and display unit.



### 6.11 Follow-up Function

The follow-up function monitors machine motion in the emergency stop state and reflects it in the current position and workpiece coordinates. Thus, the work program can be continued without re-executing a reference point return after emergency stop.

### 6.12 Axis Removal

When the machine receives the axis removal signal, that axis no longer becomes the controlled axis. Accordingly, the alarm related with axis, such as 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.

**(Note)** This cannot be used for the absolute position detector specification axis.

### 6.13 Manual/Automatic Synchronous Feed

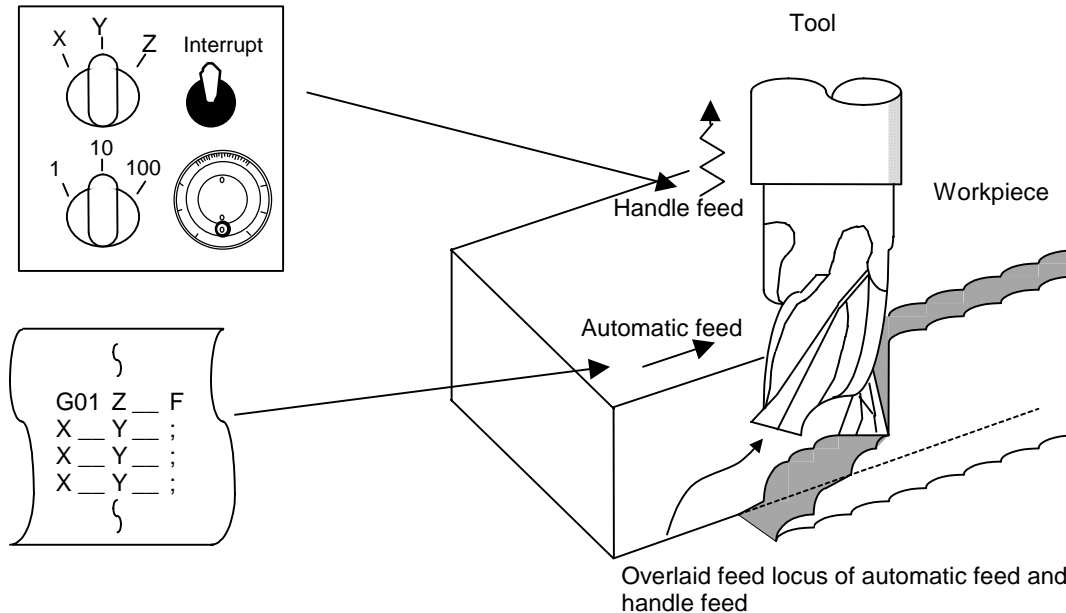
While you are using the automatic operation in the automatic operation mode (tape, memory, MDI), you can simultaneously operate the machine manually (jog, reference point return, incremental feed, handle).

To select the manual mode and automatic mode, refer to the instruction manual issued by the machine tool builders.

## 6.14 Handle Interruption

### 6.14.1 Outline

Section 6.14 explains automatic handle interruption, which enables the operator to interrupt movement using the manual handle in automatic modes (tape, memory, MDI).



### 6.14.2 Interruptible Conditions

- (1) The automatic handle interrupt function allows you to interrupt the program manually by selecting the manual handle mode in automatic mode selection (tape, memory, MDI, etc.). However the interrupt cannot be executed by the manual handle when an automatic reference point return command (G28, G29, G30), the thread cutting (G33), or the skip command (G31) has been executed or when tapping in the tapping cycle.
- (2) If automatic operation mode such as tape, memory, 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 the completion of the axis movement, 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 of which interruption direction is the soft limit.

### 6.14.3 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.)

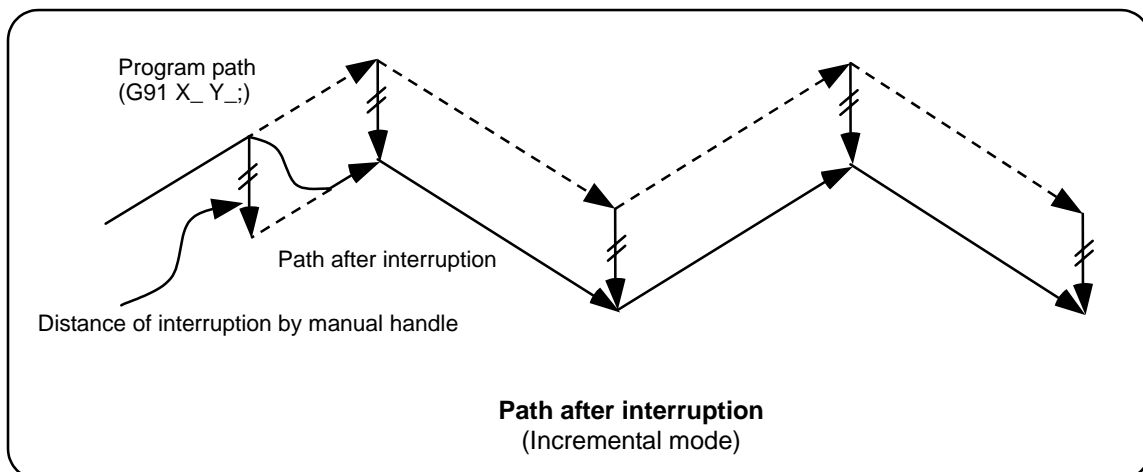
#### 6.14.4 Axis Movement Speed Resulting From Interruption

- (1) The movement speed (Automatic-start movement speed + Speed resulting from manual handle interruption.) 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.
- (2) The movement speed (Automatic start movement speed + Speed resulting from manual handle interruption.) of the axis for which handle interruption is executed, may exceed the cutting feed speed during cutting feed command (G01, G02, G03) processing in automatic start. To prevent this, clamp the axis.
- (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 (Automatic start movement speed + Speed resulting from manual handle interruption.) may exceed the external decelerating speed. To prevent this, clamp the axis.
- (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.

#### 6.14.5 Path Resulting After Handle Interruption

##### (1) For incremental (G91) mode

The locus deviates from the program path by the distance of interruption. (See the figure below.)



##### (2) For absolute (G90) mode

If program absolute position 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.

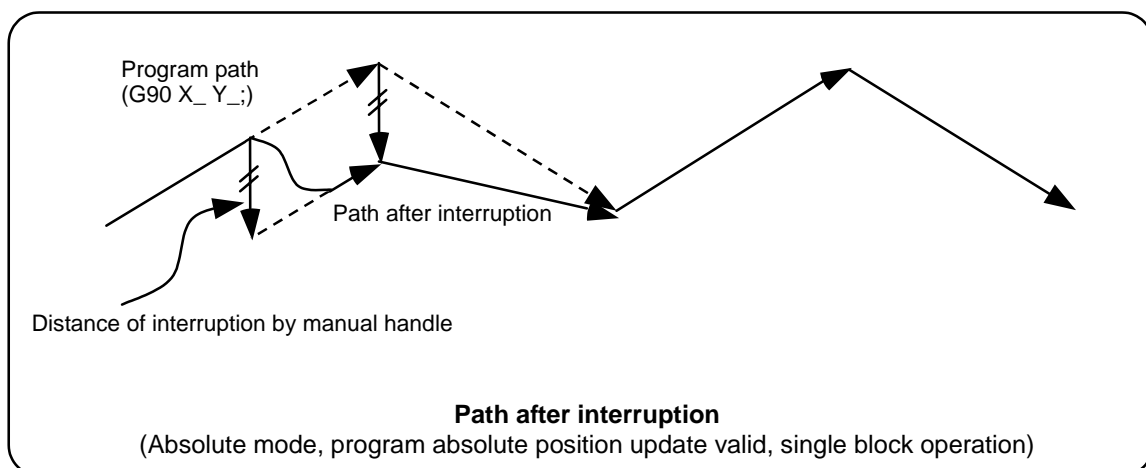
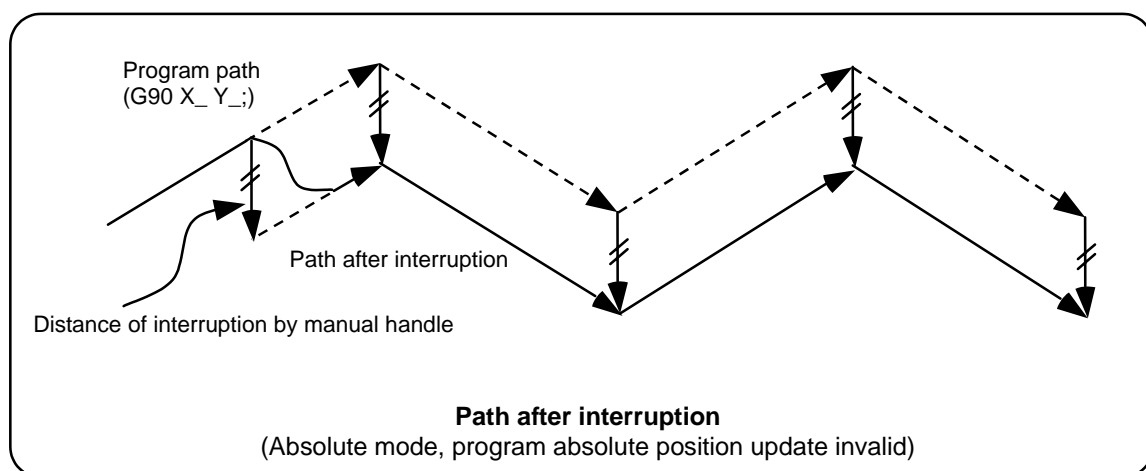
**(Note)** Both POSITION and MACHINE display include the distance of handle interruption.

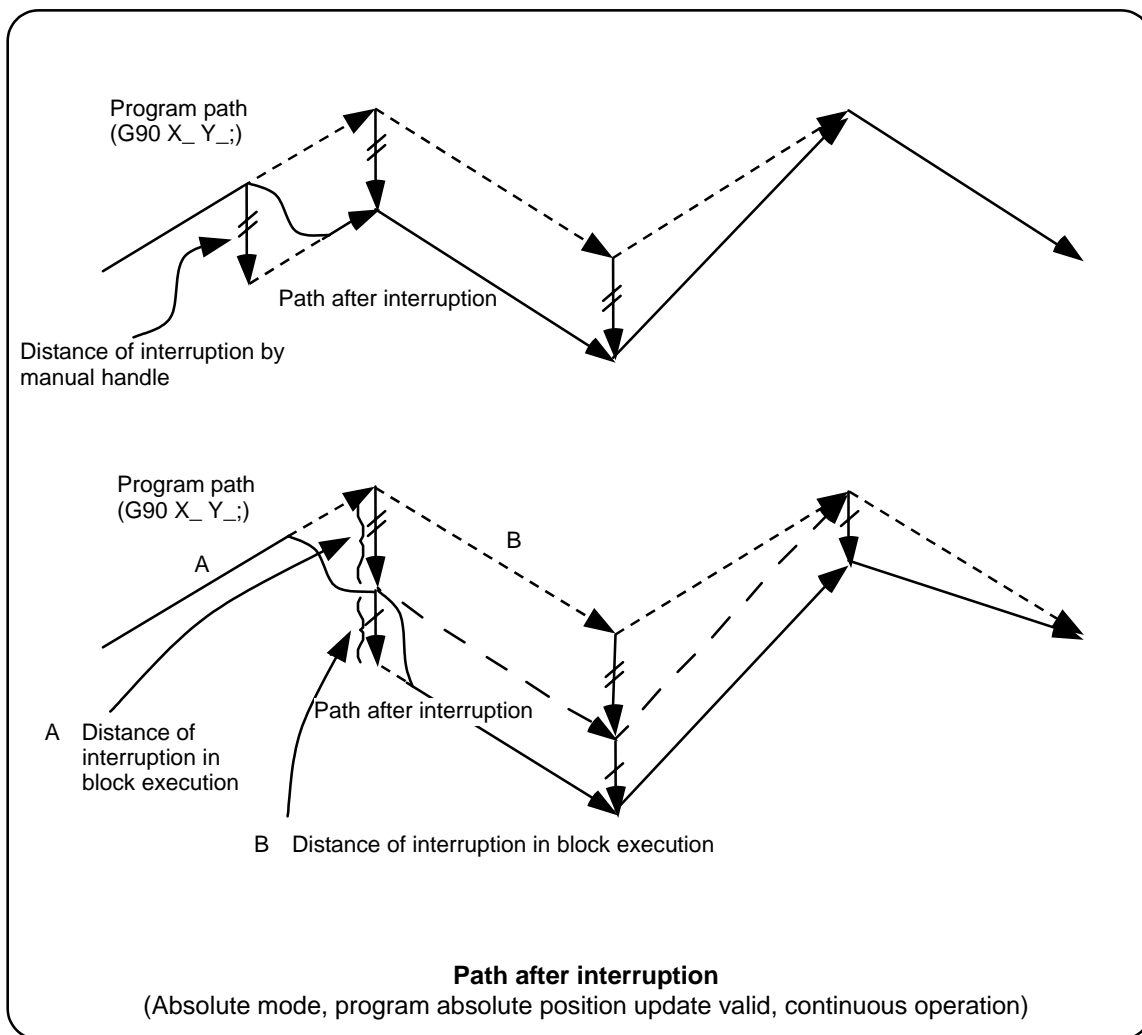
For automatic handle interruption, select whether absolute mode is updated or not, as follows:

- (a) Using machine parameters, set whether the manual absolute changeover switch or parameters are used.
- (b) If the parameters are used, set whether or not absolute position data is updated for each axis, by using machine parameters other than those in item.
- (c) If the manual absolute changeover switch is used, use the machine operation panel switch for selection.

## Absolute position update conditions for automatic handle interruption

			Absolute data update		Drive monitor screen manual interruption distance display
Parameter #1145 I_abs	ON "1"	Parameter "#1061 intabs" (Every axis)	ON "1"	Absolute position is updated.	Not updated.
			OFF "0"	Absolute position is not updated.	Updated.
	OFF "0"	PLC interface manual absolute switching	ON	Absolute position is updated.	Not updated.
			OFF	Absolute position is not updated.	Updated.





#### 6.14.6 Handle Interruption in Tool Radius Compensation

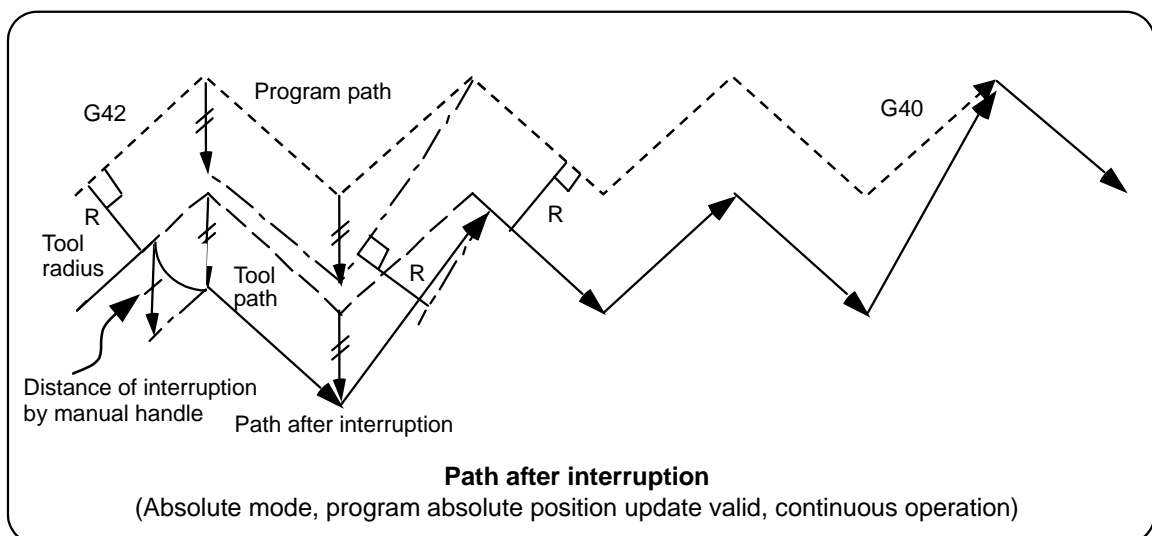
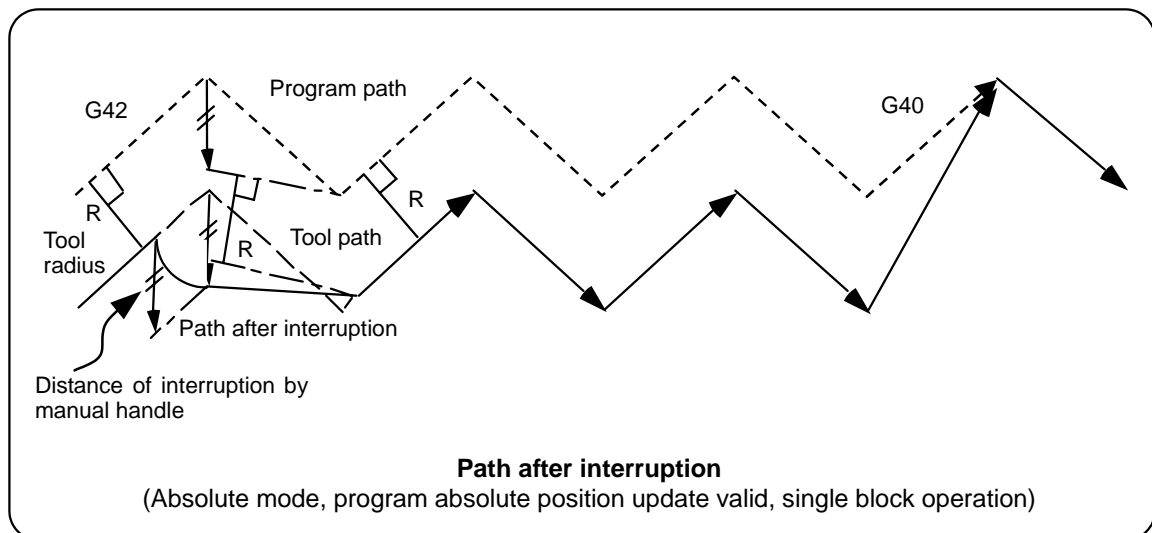
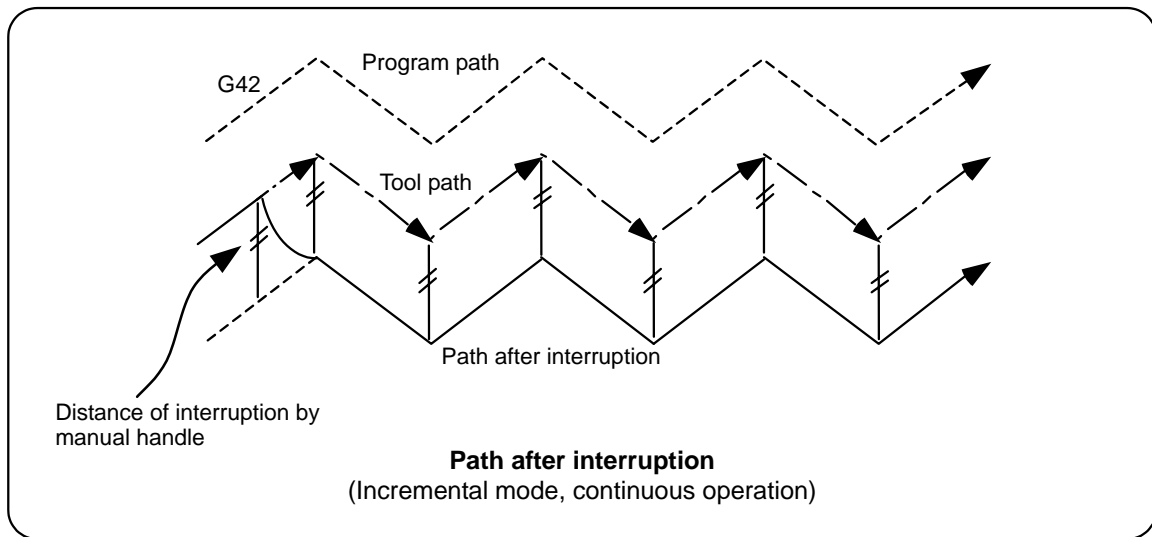
Special movement described below relates only to the tool radius compensation plane axis. It has no influence on the other axes.

At time of tool radius compensation (G41, G42):

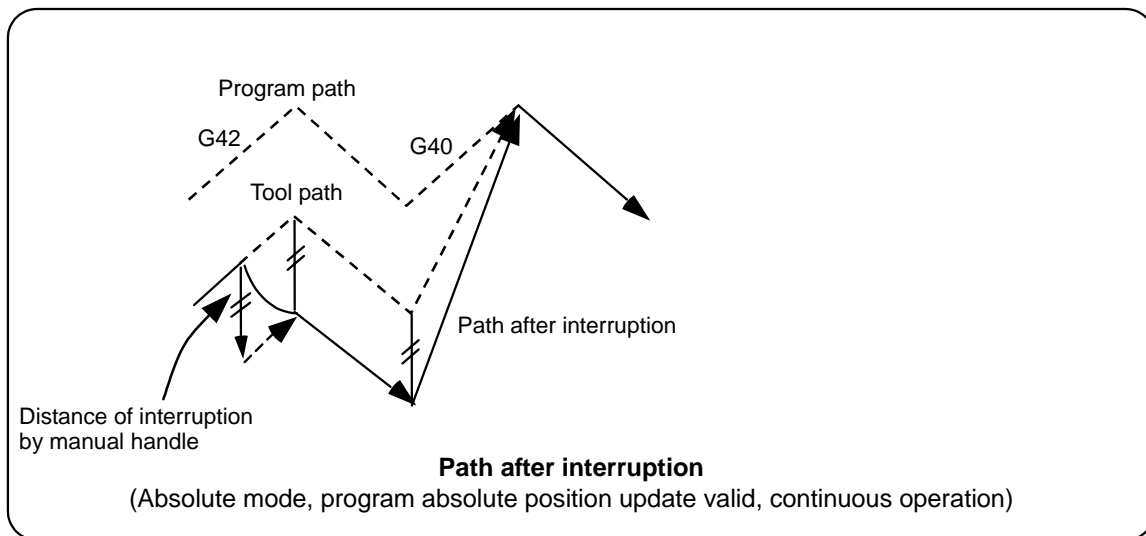
In incremental mode (G91) - The quantity of deviation equals the distance of interruption.

In absolute 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 position update is valid during single block running. If program absolute position update is valid during continuous running, the proper tool path will return at the fourth block after the one where the interruption has been completed.

If there is no G block existed between the block where the interruption has been completed and the block that contains the tool radius compensation cancel command (G40), the proper tool path will return at the block next to the tool radius compensation cancel command (G40).







### 6.14.7 Interrupt Amount Reset

Interrupt amount is reset when

- (1) Dog reference point return is executed;
- (2) Emergency stop is released;
- (3) Reset rewind or reset 2 is executed; or
- (4) Reset 1 is executed when the setup parameter "#1151 rstint" is ON.

### 6.14.8 Operation Procedure

An operation example is given on the assumption that auto operation of XYZ axes is executed in the memory operation mode and the Z axis is used as a handle interrupt axis.

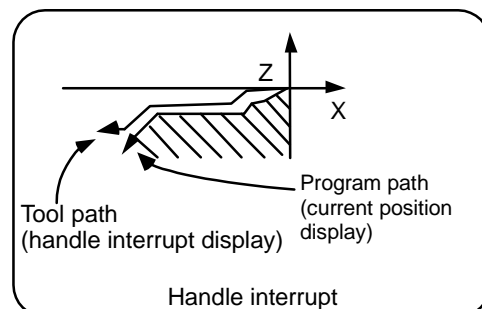
Perform automatic operation.

Turn ON the HANDLE INTERRUPT switch on the machine operation panel.

Select interrupt axis by setting the HANDLE AXIS SELECTION 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.

### 6.15 Machine Lock

- (1) When the "ALL AXES MACHINE LOCK" switch is turned ON, the NC commands for the manual operation or automatic operation movement can be executed without moving the machine.  
The current position display on the setting and display unit will be counted.
- (2) The automatic operation speed during machine lock can be selected as the commanded speed or machine lock speed using the parameters.
  - Commanded speed - The movement is executed at the feedrate commanded in the program.  
Thus, the time is the same as actual machining.
  - Machine lock speed - The movement commands are processed at the rapid traverse rate, and the dwell time, etc., is ignored. Thus, the program check, etc., can be carried out faster.
- (3) If the "ALL AXES MACHINE LOCK" switch is changed during automatic operation, the automatic operation will stop after the block currently being executed is completed, and then the setting will be validated.
- (4) During reference point return (G28, G30), the movement will be controlled with the machine lock status up to the middle point. The machine lock status will be ignored from the middle point to the reference point.
- (5) If the "MACHINE LOCK" switch is changed during manual operation, the setting will be validated after the feed is stopped once.
- (6) The M, S, T and B commands are executed according to the program.
- (7) When the "MACHINE LOCK" is turned OFF after the axis is moved in the "MACHINE LOCK" ON state, the current position display and the machine position will not match.  
If AUTO START is pressed in this state, the difference between the current position and the machine position will be added to the movement amount.  
If RESET is pressed, the current position display will be changed to match the machine position. Thus, after turning "MACHINE LOCK" OFF, press RESET before starting operation.

## 6.16 Deceleration Check

### 6.16.1 Functions

The purpose of the deceleration check is to reduce the machine shock that occurs when the control axis feedrate is suddenly changed, and prevent corner roundness. The check is carried out at block joints.

#### (1) Deceleration check during rapid traverse

The deceleration check is always carried out at the block joints (before executing the next block) during rapid traverse.

#### (2) Deceleration check during cutting feed

The deceleration check is carried out at the block joints (before executing the next block) during cutting feed when any one of the following conditions is valid.

- (a) When the error detect switch is ON.
- (b) When G09 (exact stop check) is commanded in the same block.
- (c) When G61 (exact stop check mode) has been selected.

#### (3) Designating deceleration check

The deceleration check by designating a parameter includes "deceleration check specification type 1" and "deceleration check specification type 2". The setting is selected with the parameter "#1306 InpsTyp".

- (a) Deceleration check specification type 1 ("#1306 InpsTyp" = 0)

The G0 and G1 deceleration check method can be selected with the base specification parameter deceleration check method 1 "#1193 inpos" and deceleration check method 2 "#1223 aux07/bit1".

Parameter	Rapid traverse command	Parameter	Other than rapid traverse command (G1 : other than G0 command)	
#1193 Inpos	G0→XX (G0+G9→XX)	#1223 AUX07 (BIT-1)	G1+G9→XX	G1→XX
0	Command deceleration check	0	Command deceleration check	No deceleration check
1	In-position check	1	In-position check	

(Note 1) XX expresses all commands.

(Note 2) "#1223 aux07" is the part system common parameter.

- (b) Deceleration check specification type 2 ("#1306 InpsTyp" = 1)

Rapid traverse and cutting feed in-position are designated with the parameter "#1193 inpos".

Parameter	Command block		
#1193 Inpos	G0	G1+G9	G1
0	Command deceleration check	Command deceleration check	No deceleration check
1	In-position check	In-position check	No deceleration check

(Note 1) "#1193 inpos" is the parameter per part system.

(Note 2) "G0" means the rapid traverse, and "G1" means the cutting feed.

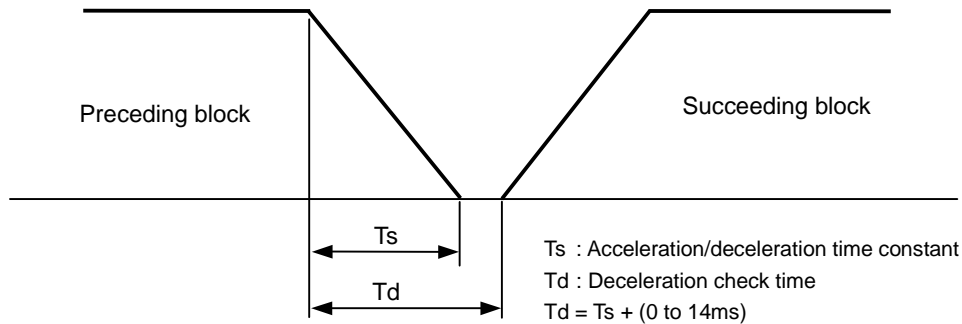
## 6.16.2 Deceleration Check Method

## (1) Command deceleration check

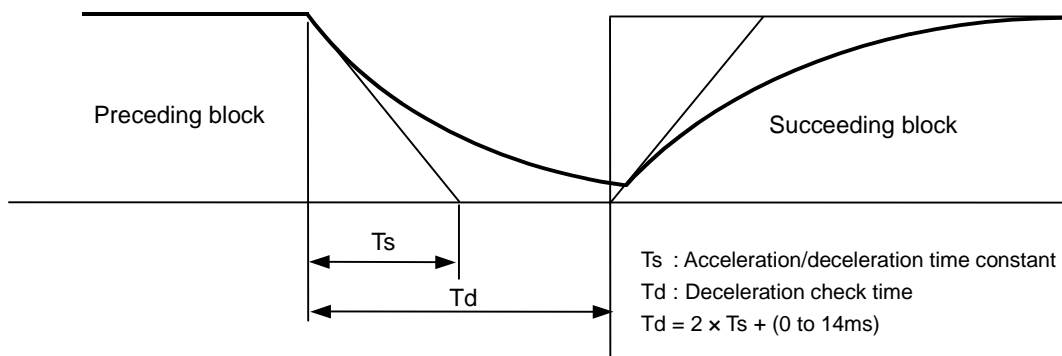
After interpolation for one block has been completed, the completion of the command system deceleration is confirmed before execution of the next block.

The time required for the deceleration check is determined according to the acceleration/deceleration mode and acceleration/deceleration time constant.

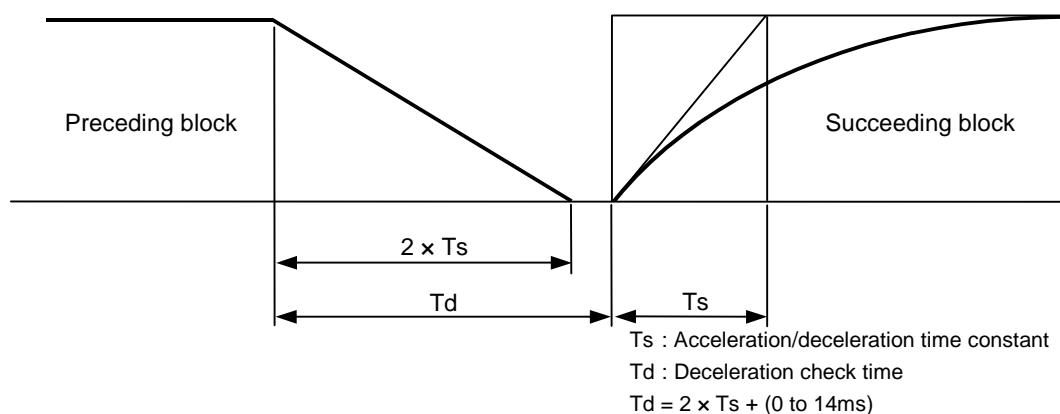
## (a) For linear acceleration/deceleration



## (b) For exponential acceleration/deceleration



## (c) For exponential acceleration and linear deceleration



The deceleration check time required during rapid traverse is the longest rapid traverse deceleration check time of all axes. This check time is determined by the rapid traverse acceleration/deceleration mode and rapid traverse acceleration/deceleration time constant of simultaneously commanded axes.

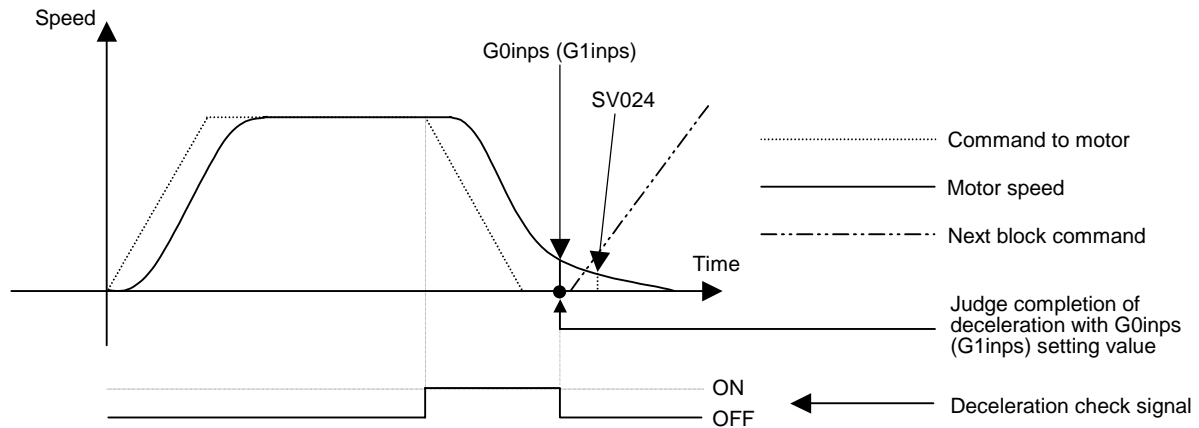
The deceleration check time required during cutting feed is determined in the same manner. It is the longest cutting feed deceleration check time of all axes. This check time is determined by the cutting feed acceleration/deceleration mode and cutting feed acceleration/deceleration time constant of simultaneously commanded axes.

**(2) In-position check**

When the in-position check is valid, the command deceleration check is carried out. After that, it is confirmed that the servo system positional error is less than the parameter setting value, and the next block is executed.

The in-position check width can be designated with the servo parameter in-position width (SV024).

Note that G0 and G1 can be designated independently with the axis specification parameter G0 in-position check width (G0inps) and G1 in-position check width (G1inps). If both the servo parameter and axis specification parameter are set, the larger value will have the priority.



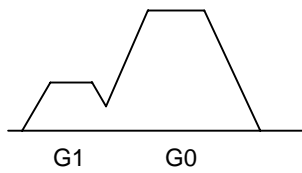
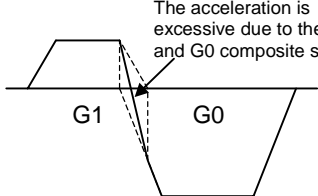
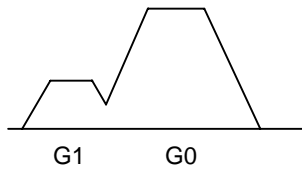
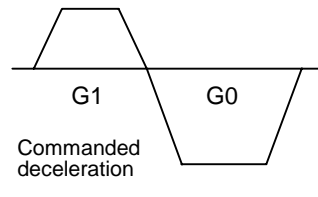
If the SV024 setting value is larger, in-position check will end when the SV024 setting value is established.

### 6.16.3 Deceleration Check When Opposite Direction Movement Is Reversed

Deceleration check cannot be designated for G1 → G0 or G1 → G1, but it can be designated in the following manner only when the movement reverses to the opposite direction in successive blocks. Deceleration check can also be executed if even one axis is moving in the opposite direction while several axes are interpolating.

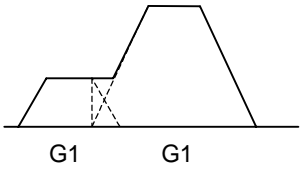
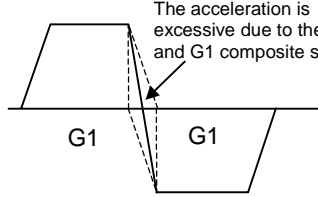
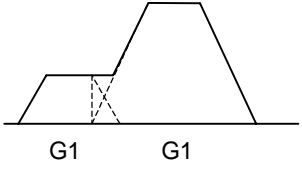
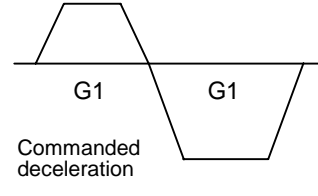
#### (1) Designating deceleration check for G1 → G0 opposite direction movement reversal

If the axis movement reverses to the opposite direction in a G1 to G0 successive block, the deceleration check for the movement in the opposite direction can be changed with the base specification parameter G1 → G0 deceleration check (#1502 G0lpfg).

	Same direction	Opposite direction
G0lpfg:0		
G0lpfg:1		

#### (2) Designating deceleration check for G1 → G1 opposite direction movement reversal

If the axis movement reverses to the opposite direction in a G1 to G1 successive block, the deceleration check for the movement in the opposite direction can be changed with the base specification parameter G1 → G1 deceleration check (#1503 G1lpfg).

	Same direction	Opposite direction
G0lpfg:0		
G0lpfg:1		

## 6.16.4 Parameters

## (1) Designation of deceleration check

## Base specification parameters

#	Items		Details	Setting range
1193	inpos		Change with the "#1306 InpsType" (deceleration check designation type). 0: Deceleration check method1 1: Validate in-position check	
		Deceleration check method 1	Select the G0 deceleration check method. 0: Command deceleration check 1: In-position check	0/1
		Validate in-position check	Designate the deceleration confirmation method for the positioning and cutting command. 0: G0, G1+G9 Command deceleration check 1: G0, G1+G9 In-position check	0/1
1223	aux07 (bit1)	Deceleration check method 2	Select the deceleration check method for G1 + G9. 0: Command deceleration check when G1+G9 1: In-position check when G1+G9 Deceleration check is executed only for G1+G9. If the "#1306 InpsType" (deceleration check designation type) is "1" (deceleration check designation type 2), this parameter will be invalid.	0/1
1306	InpsType	Deceleration check designation type	Select the parameter designation type for the G0 or G1 deceleration check. 0: Deceleration check designation type 1 G0 is specified with "#1193 inpos", and G1+G9 with "#1223 aux07/BIT1". 1: Deceleration check designation type 2 G0 or G1+G9 is specified with "#1193 inpos".	0/1

## (2) Deceleration check during opposite direction travel

## Base specification parameters

#	Items		Details	Setting range
1502	G0lpfg	G1 → G0 deceleration check	0: Do not perform a deceleration check when the movement direction is changed from G1 to G0. 1: Perform a deceleration check when the movement direction is changed from G1 to G0.	0/1
1503	G1lpfg	G1 → G1 deceleration check	0: Do not perform a deceleration check when the movement direction is changed from G1 to G1. 1: Perform a deceleration check when the movement direction is changed from G1 to G1.	0/1

**(3) Designation of in-position check width****(a) Servo parameter**

#	Items		Details	Setting range
2224	SV024 INP	In-position detection width	Set the in-position detection width value. Set the accuracy required of the machine. The positioning accuracy increases when the setting value is lowered, but the cycle time will increase. Set "50" for the standard value.	0 to 32767 (μm)

**(b) Axis specification parameter**

#	Items		Details	Setting range
2077	G0inps	G0 in-position width	When an in-position check is performed for G0, this parameter is valid. (Comparison of SV024 and this parameter, the parameter that the in-position width is wider is applied.) When 0 is set, this parameter is invalid. (Applicable only to SV024)	0.000 to 99.999 (mm)
2078	G1inps	G1 in-position width	When an in-position check is performed for G1, this parameter is valid. (Comparison of SV024 and this parameter, the parameter that the in-position width is wider is applied.) When 0 is set, this parameter is invalid. (Applicable only to SV024)	0.000 to 99.999 (mm)

**6.16.5 Precautions****(1) Designating deceleration check**

- When in-position check is valid, set the in-position width in the servo parameters.

**(2) Deceleration check for opposite direction movement reversal**

- When deceleration check is valid (G0lpfg=1), deceleration check will be executed when the axis reverses its movement to the opposite direction at the G1 → G0 successive block regardless of whether G0 non-interpolation is ON or OFF.
- When deceleration check is valid (G0lpfg=1), deceleration check will be executed when the axis reverses its movement to the opposite direction at the G1 → G0 successive block even in the fixed cycle.
- In the G1 → G28, G1 → G29 or G1 → G30 successive blocks, deceleration check will always be executed when the G1 movement is completed, when movement to the intermediate point is completed and when movement to the return point is completed. Note that if the base specification parameter's simple zero point return "#1222 aux06/bit7" is valid, the base specification parameter G1 → G0 deceleration check (G0lpfg) will be followed when the G1 movement is completed and when movement to the intermediate point is completed. (Deceleration check will always be executed when movement to the return point is completed even in this case.)

**(3) Designating in-position width**

- The in-position width (programmable in-position check width) designated in the machining program has a priority over the in-position width set in the parameters (SV024, G0inps, G1inps).
- When error detect is ON, in-position check will be forcibly carried out.



**(4) Deceleration check in G1 → G0, G1 → G1 opposite direction movement reversal during high-speed machining mode**

- When the axis movement reverses to the opposite direction in a G1 → G1 successive block during the high-speed machining mode, the commanded deceleration will not take place even if G1lpfg is set to 1. Note that the G0lpfg setting will be followed if the axis direction reverses to the opposite direction in a G1 → G0 successive block.

**(5) Deceleration check in movement including spindle/C-axis**

- The deceleration check for spindle/C-axis movement command is as described in the table below. That is because a vibration and so on occurs in the machine when the position loop gain (#13002 PGN) is changed during the axis movement.

Parameter	Rapid traverse command	Parameter	Other than rapid traverse command (G1 : other than G0 command)	
#1193 Inpos	G0→XX (G0+G9→XX)	#1223 AUX07 (BIT-1)	G1→G0 (G1+G9→XX)	G1→G1
0	Command deceleration check	0	In-position check (Applicable only to SV024)	No deceleration check
1	In-position check	1		

**(Note 1)** When G1 command is issued, the in-position check is performed regardless of the deceleration check parameter.

**(Note 2)** XX expresses all commands.

**(6) Deceleration check in polar coordinate interpolation / milling interpolation / cylindrical start / cancel command**

- The deceleration check in polar coordinate interpolation / milling interpolation / cylindrical start / cancel command are as follows.

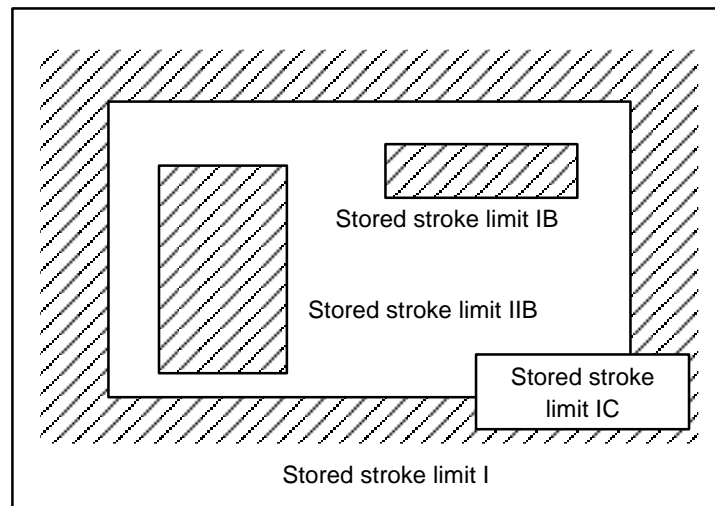
Parameter: #1223 aux07 BIT1	Deceleration check method
0	Command deceleration check
1	In-position check

### 7. Stored Stroke Limit

#### Outline

Three tool entry prohibited ranges can be set with stored stroke limit I, stored stroke limit II, IIB and stored stroke limit IB. Part of the prohibited range on the outside of soft limit I can be validated with stored stroke limit IC.

The stored stroke limit II and IIB select the outer side (II) and inner side (IIB) of the entry prohibited range with parameters.



If the tool tries to move over the set range, an alarm will appear, 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.

#### [Valid Conditions of Stored Stroke Limit]

When using the relative position detection system, the stored stroke limit is invalid until the reference point return is completed after the power is turned ON.

The stored stroke limit can be validated even if the reference point return is not yet completed, by setting parameter #2049 type = 9.

If the absolute position detection is valid when using the absolute position detection system, the stored stroke limit will be validated immediately after the power is turned ON.

#### [Stored stroke limit coordinates]

The stored stroke limit check is carried out in the basic machine coordinate system established by the reference point return. To validate the stored stroke limit even when the reference point return is not yet completed, check the stored stroke limit using the temporary basic machine coordinate system (basic coordinate system defined when the power was previously turned OFF).

When the 1st dog-type reference point return is completed after the power is turned OFF, the correct coordinate system is established.



#### CAUTION



Always set the stored stroke limit. Failure to set this could result in collision with the machine end.

**(Note)** The axis movement possible when the reference point return has not yet completed is limited to manual and handle feed only. Automatic operation is validated after the reference point return is completed.

## 7. Stored Stroke Limit

### Detailed explanation

The stored stroke limit sets a prohibited range with the parameters or program command. The maximum and minimum values of the prohibited range are set as coordinate values (radius values) on the basic machine coordinate system for each axis. If the parameters (#8204 OT-CHECK-N and #8205 OT-CHECK-P), for setting the prohibited range, are set to the same value, the stroke will not be checked. This function is valid only for the axis for which the reference point is established.

If the machine enters the prohibited range, an operation error 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 will always stop at a position before the prohibited range. The distance between the prohibited range and stop position will depend on the feedrate.

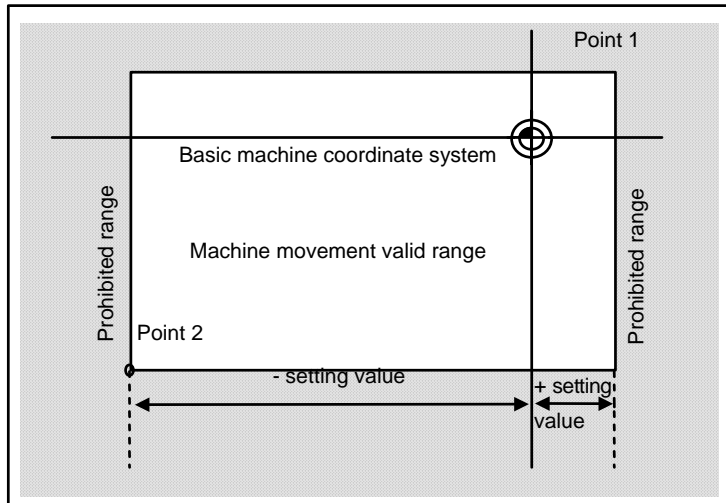
The stored stroke limits I, II, IIB, IB and IC are handled as follows.

Type	Prohibited range	Explanation		Range setting parameter	Validating conditions
I	Outside	<ul style="list-style-type: none"> <li>Set by the machine maker.</li> <li>When used with II, the narrow range designated by the two types becomes the movement valid range.</li> </ul>		#2013 OT- #2014 OT+	<ul style="list-style-type: none"> <li>Zero point return is completed.</li> <li>#2013 and #2014 are not set to the same value.</li> </ul>
II	Outside	<ul style="list-style-type: none"> <li>Set by the user.</li> <li>Select II or IIB with the parameters.</li> </ul>	<ul style="list-style-type: none"> <li>#8210 OT-INSIDE:0</li> <li>Used with I.</li> </ul>	#8204 OT-CHECK-N #8205 OT-CHECK-P	<ul style="list-style-type: none"> <li>Zero point return is completed.</li> <li>#8204 and #8205 are not set to the same value.</li> <li>#8202 OT-CHECK OFF: 0</li> </ul>
IIB	Inside		<ul style="list-style-type: none"> <li>#8210 OT-INSIDE: 1</li> </ul>		
IB	Inside	<ul style="list-style-type: none"> <li>Set by the machine maker.</li> </ul>		#2061 OT_1B- #2062 OT_1B+	<ul style="list-style-type: none"> <li>Zero point return is completed.</li> <li>#2061 and #2062 are not set to the same value.</li> </ul>
IC	Outside	<ul style="list-style-type: none"> <li>Set by the machine tool builder.</li> </ul>		#2061 OT_1B- #2062 OT_1B+	<ul style="list-style-type: none"> <li>#2061 and #2062 are not set to the same value.</li> <li>#2063 OT_1C type: 2</li> </ul>

## 7.1 Stored Stroke Limit I

This is a stroke limit function used by the machine maker. The boundary is set with the parameters (axis specification parameters "#2013 OT-" and "#2014 OT+"). The outside of the set boundary is the prohibited range.

When used with the stored stroke limit II function, the narrow range designated by the two types becomes the movement valid range.



The following values are set with the coordinate values in the basic machine coordinate system.

Point 1: #2014 OT+

Point 2: #2013 OT-

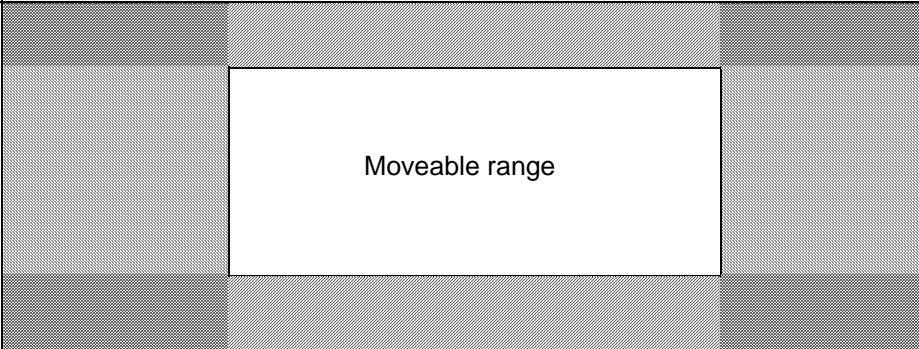
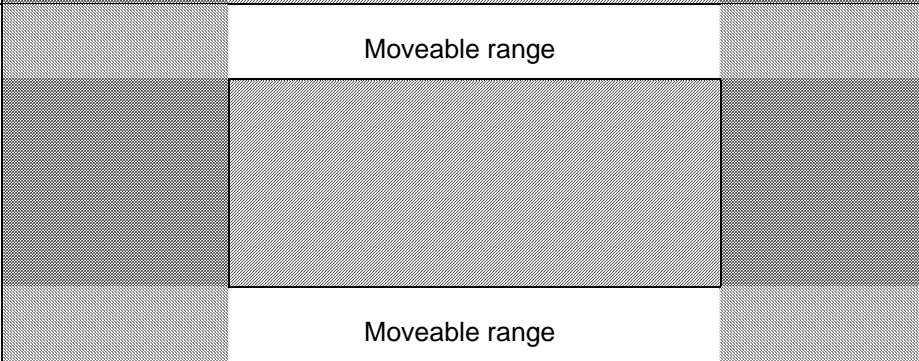
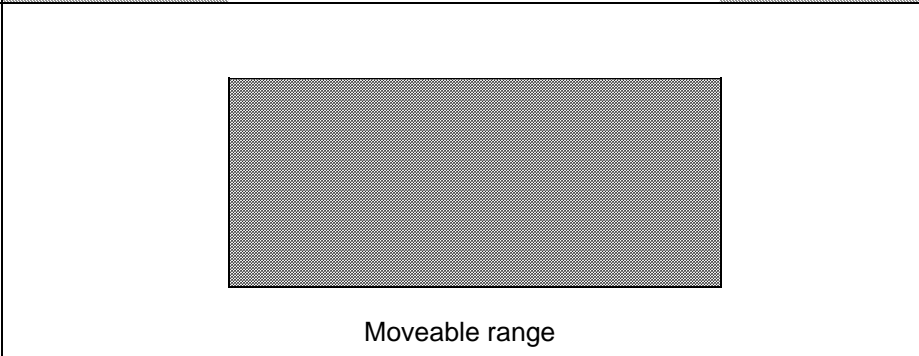
## 7.2 Stored Stroke Limit II

The boundary is set with the parameters (axis parameters #8204 OT-CHECK-N, #8205 OT-CHECK-P) 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 (#8210 OT-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.

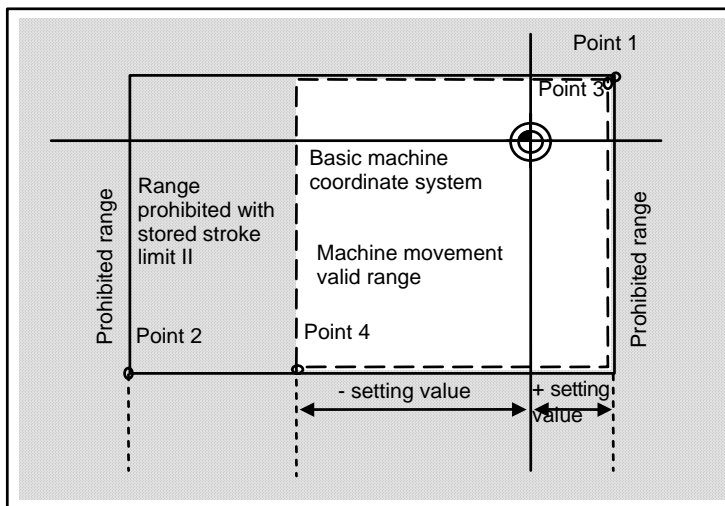
The stored stroke limit II function can be invalidated for each axis with the parameter setting (#8202 OT-CHECK OFF: 1).

"#8210 OT-INSIDE" can be set for each axis, but when used in combination, the following type of operation is possible.

X	Z	Movement prohibited range
Outside	Outside	
	Inside	
Inside	Inside	

**Stored stroke limit II (When prohibited range is on outside)**

When used with the stored stroke limit I function, the narrow range designated by the two types becomes the movement valid range.



The following values are set with the coordinate values in the basic machine coordinate system.

Point 3 and 4:

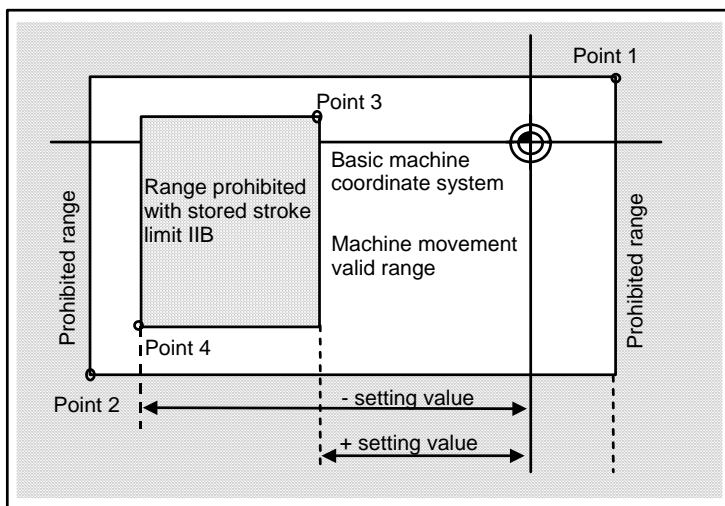
#8205 OT-CHECK-P

#8204 OT-CHECK-N

Points 1 and 2 are the prohibited range set with stored stroke limit I.

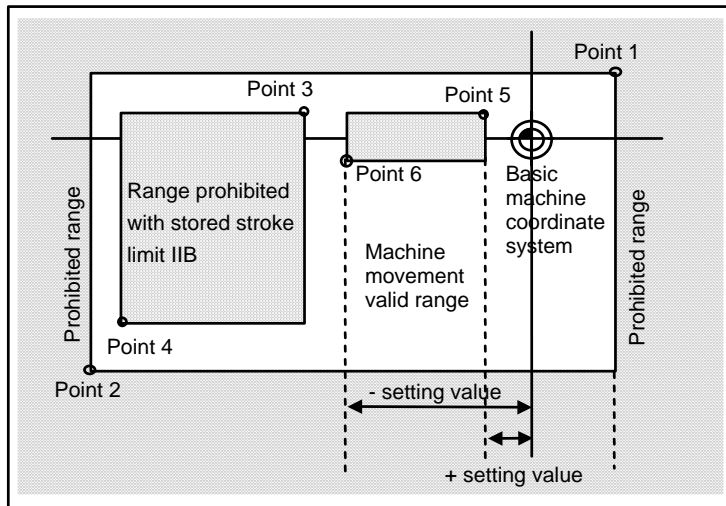
**Stored stroke limit IIB (When prohibited range is on inside)**

A range except for that of the stored stroke limit I becomes the movement prohibited range.



### 7.3 Stored Stroke Limit IB

The boundary is set for each axis with the parameters (axis parameters "#2061 OT\_1B-" and "#2062 OT\_1B+"). The inside of the set boundary is the prohibited range.



The following values are set with the coordinate values in the basic machine coordinate system.

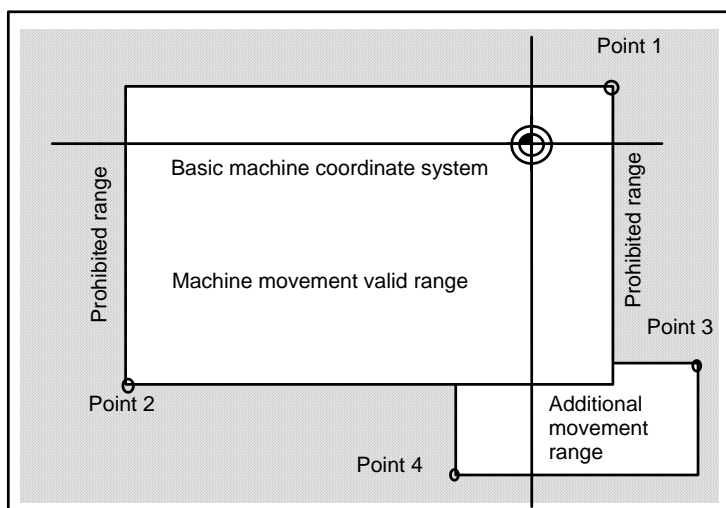
Point 3 : #2062 OT\_1B+  
Point 4 : #2061 OT\_1B-

Points 1 and 2 are the prohibited range set with stored stroke limit I, and points 3 and 4 are the prohibited range set with stored stroke limit II.

### 7.4 Stored Stroke Limit IC

The boundary is set for each axis with the parameters (axis parameters "#2061 OT\_1B-" and "#2062 OT\_1B+"). The inside of the set boundary is the machine movement valid range.

This is valid when the axis parameter #2063 is set to 2, and cannot be used with soft limit IB.



The following values are set with the coordinate values in the basic machine coordinate system.

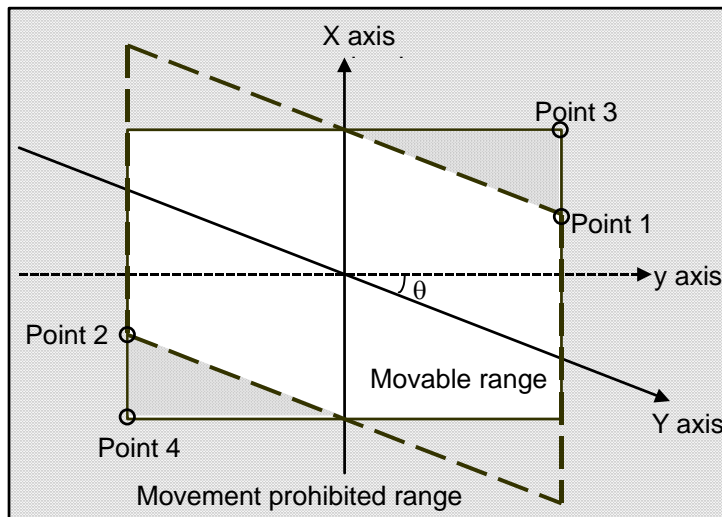
Point 3 : #2062 OT\_1B+  
Point 4 : #2061 OT\_1B-

Points 1 and 2 are the prohibited range set with stored stroke limit I.

## 7.5 Movable Range during Inclined Axis Control

By setting #2063 OT\_1Btype to "3", the inclined axis control axis can be checked with the program coordinates using the stored stroke limit IB/IC range setting (#2061, #2062). The stored stroke limit IB and IC cannot be used together at this time.

By using this function with stored stroke limit I, the check can be carried out simultaneously with the actual axis and program coordinate value. In this case, the range that does not fit into either of the following two prohibited ranges will be the movable range.



The following values are set with the coordinate values in the basic machine coordinate system.

Point 3: #2062 OT\_1B+

Point 4: #2061 OT\_1B-

Points 1 and 2 are the prohibited range set with stored stroke limit I.



## 7.6 Stored Stroke Limit for Rotation Axis

Stored stroke limits I and II are used as the stored stroke limit for the rotation axis. The area between the maximum and minimum values of the prohibited range's parameters, which does not contain the 0 point of the basic machine coordinate system, is the entry prohibited range.

The prohibited range parameters for the rotation axis can be set to establish "maximum value < minimum value". This will be handled in the same manner as if "maximum value > minimum value".

### (Example)

Stored stroke limit I (maximum value and minimum value of prohibited range parameter)

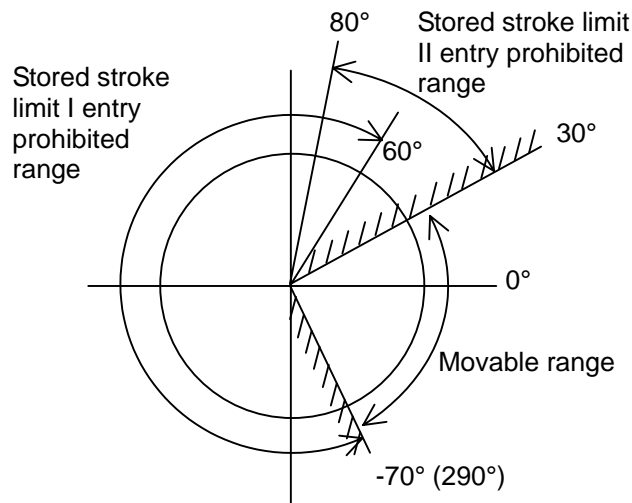
#2013 OT- : -70.000°

#2014 OT+ : 60.000°

Stored stroke limit II (maximum value and minimum value of prohibited range parameter)

#8204 Soft limit - : 30.000°

#8205 Soft limit + : 80.000°



**(Note)** Do not use stored stroke limits IB, IIB or IC. Invalidate stored stroke limits IB, IIB and IC by setting the parameters as shown below.

#8210 OT INSIDE: 0 (stored stroke limit II valid, IIB invalid)

#2061, #2062 set to same value (stored stroke limits IB and IC invalid)

**7.7 Precautions**

- (1) If the maximum value and minimum value of the stored stroke limit's prohibited range are set to the same value, the following will occur.
  - When the maximum value and minimum value are set to 0, 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.
  - If data other than 0 is set for the maximum value and minimum value, the entire range will be the moveable range.
- (2) The stored stroke limit IC is valid when the axis parameter #2063 is changed.  
If changed during automatic operation, the function will be validated after the smoothing for all axes reaches 0.
- (3) Make sure that the lower limit value of the stored stroke limit IC setting value is "smaller than the upper limit value".

### **III. MAINTENANCE**

# 1. Daily Maintenance and Periodic Inspection and Maintenance

## 1.1 Maintenance Items

Maintenance is categorized into daily maintenance items (items to be carried at set intervals) and periodic maintenance items (replacement of parts when life is reached).

Some parts will not function in a hardware manner when the life is reached, so these should be replaced before the life is reached.

Class	Name	Life	Inspection/replacement	Remarks
Daily maintenance	Escutcheon		Once/two months (Accordingly when dirty)	
Periodic maintenance	Battery (lithium battery)	Cumulative data holding time: 45,000 hr	When battery voltage drop caution alarm occurs (Guideline: approx. 5 years)	Refer to "Control unit battery" in "1.2.1 Durable Parts"
	Cooling fan	Control unit: 60,000 hr Display unit: 50,000 hr	Refer to left.	
	Back light	8.4-type: 30,000 hr 10.4-type: 50,000 hr	Refer to left.	
	Hard disk unit	20,000 hr or 5 years (Shorter one is applied.)	Refer to left.	
Other consumable parts	Operation board	10 <sup>6</sup> punches	Refer to left.	

### 1.1.1 Escutcheon

#### (1) Cleaning the escutcheon

- Prepare the rear side of the escutcheon to clean.
- 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.

#### 1.1.2 LCD Panel

##### (1) Handling the LCD panel

###### (a) Precautions for use

- The polarizing plate (display surface) of the LCD panel surface can be easily scratched, so be careful during handling.
- 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.
- 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.
- Wipe off any dirt, dust, etc., on the polarizing plate using absorbent cotton or other soft cloth.
- A CMOS LSI is used in the LCD panel, so be careful of static electricity when handling.
- Never disassemble the LCD panel. Doing so will damage the panel.

###### (b) Precautions for storage

- Do not store the LCD panel in locations having a high temperature or humidity. (Store within the storage temperature range.)
- When storing the LCD panel as an individual unit, be sure that other objects do not touch or hit the polarizing plate (display surface).
- When storing the LCD panel for long 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 30,000 hours for the 8.4-type and 50,000 hours for the 10.4-type (ambient temperature 25°C). (Time for luminance to drop 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

Due to the characteristics of the backlight, the luminance could drop slightly at lower temperatures. It will take approx. 10 to 15 minutes for the luminance to reach the rated value after the power is turned ON.

###### (c) Unevenness, luminescent spots and irregularities

Uneven brightness, small luminescent spots or small dark spots may appear on LCD panel, but this is not a fault.

##### (3) Replacing the backlight

Replacement should be commissioned to the Mitsubishi Service Center.

#### 1.1.3 Compact Flash/IC card

##### (1) Handling the compact flash/IC card

The general handling methods for the compact flash/IC card are described below.

Refer to the instruction manual of the compact flash/IC card used for details.

###### (a) Precautions for use

- Insert the card in the correct direction.
- Do not touch the connector area with hands or metal.
- Do not apply excessive force to the connector area.
- Do not subject the card to bending or strong impacts.
- Do not open the cover or disassemble the card.
- Do not use the card in dusty locations.

###### (b) Precautions for storage

- Do not store the card in locations having a high temperature or humidity.
- Do not store the card in dusty locations.

## 1.2 Replacement Methods

### 1.2.1 Durable Parts

#### Control unit battery

All data, such as the parameters and machining programs that need to be backed up when the power is turned OFF, are saved by a lithium battery installed in the control unit's battery holder.

<b>Battery</b>	Q6BAT BKO-C10811H03 (SANYO CR17335SE-R with Mitsubishi specifications)
<b>Battery cumulative data holding time</b>	45,000 hours (At room temperature. The life will be shorter if the temperature is high.)
<b>Battery life</b>	Approx. 5 years (from date of battery manufacture)

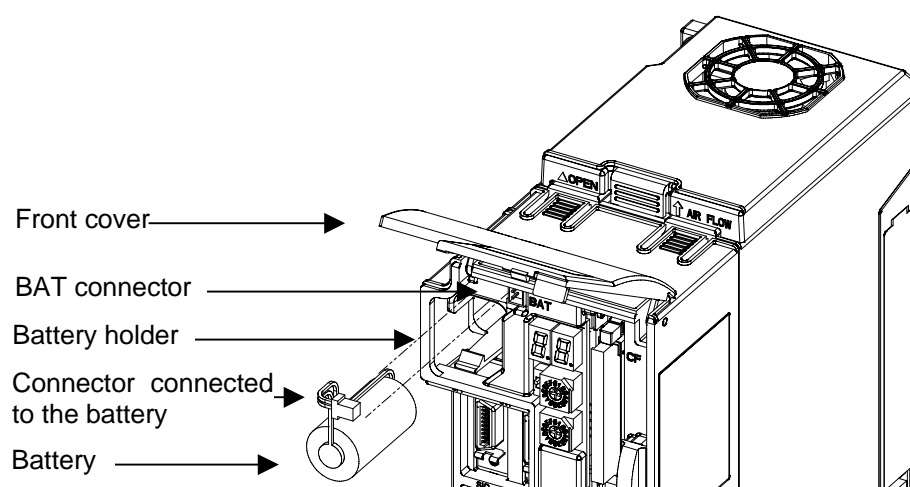
**(Note)** Replace the battery when the alarm "Z52 Battery drop 0001" appears on the NC screen. The internal data could be damaged if the alarm "Z52 Battery drop 0003" appears.

#### [Replacement procedures]

Always replace the battery with the control unit (machine) power turned OFF.

Complete the replacement within 30 minutes after turning the power OFF. (If the battery is not connected within 30 minutes, the data being backed up will be destroyed.)

- (1) Check that the machine power is turned OFF. (If the power is not OFF, turn it OFF.)
- (2) Open the electric cabinet door, and confirm that the control unit LED, 7-segment display, etc., are all OFF.
- (3) Open the front cover of the control unit by pulling on the right side of the door.
- (4) Pull the connector connected to the battery out from the BAT connector.
- (5) Remove the battery from the battery holder.
- (6) Fit the new battery into the battery holder.
- (7) Insert the connector connected to the new battery into the BAT connector. Pay attention to the connector orientation, being careful not to insert backwards.
- (8) Close the front cover of the control unit. At this time, confirm that the cover is closed by listening for the "click" sound when the latch catches.
- (9) Close the door of the electric cabinet.



#### [Precautions for handling battery]

- (1) Always replace the battery with the same type.
- (2) Do not disassemble the battery.
- (3) Do not place the battery in flames or water.
- (4) Do not pressurize and deform the battery.
- (5) This is a primary battery so do not charge it.
- (6) Dispose of the spent battery as industrial waste.



#### **CAUTION**



If the battery low warning is issued, save the machining programs, tool data and parameters in an input/output device, and then replace the battery. When the battery alarm is issued, the machining programs, tool data and parameters may be destroyed. Reload the data after replacing the battery.



Do not short circuit, charge, overheat, incinerate or disassemble the battery.



Dispose the spent battery according to the local laws.

#### Cooling fan for control unit

Type .....109P0412H731

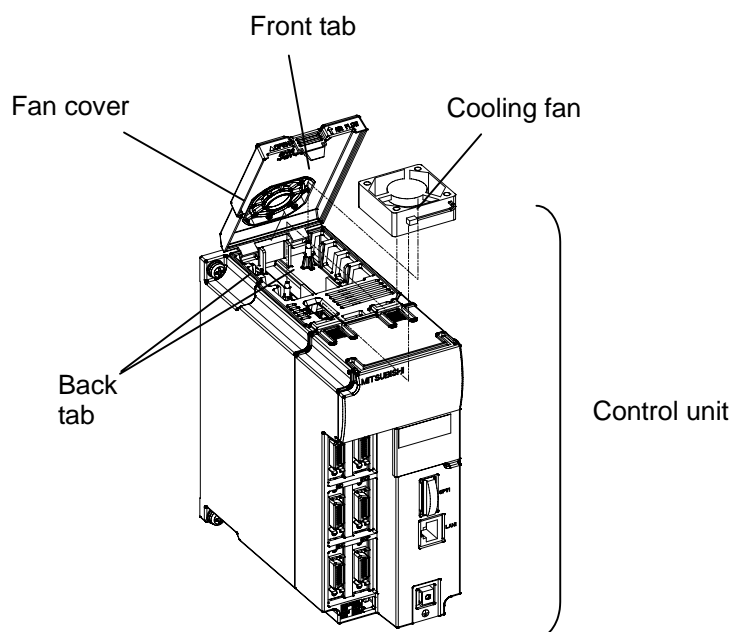
Life .....60,000 hours (When the rotary speed decreased 30% less than the initial values)

Life is a presumption value in 60°C environment, not guaranteed value.



#### [Replacement procedures]

Always replace the cooling fan with the control unit (machine) power turned OFF.

- (1) Check that the machine power is turned OFF. (If the power is not OFF, turn it OFF.)
- (2) Open the electric cabinet door.
- (3) Remove the fan cover on the top center of the control unit. (Remove the fan cover by pushing up the front tab.)
- (4) Pull out the cooling fan from the control unit cooling fan housing.
- (5) Pull the connector connected to the cooling fan out from the control unit PCB.
- (6) Replace the cooling fan with the new one. Insert the connector connected to the new cooling fan into the control unit PCB.
- (7) Put the cooling fan into the control section cooling fan housing. (Be sure the label side is on the top.)
- (8) Arrange the cooling fan wiring neatly in the control unit cooling fan housing.
- (9) Install the fan cover. (First install the back tabs in the control unit. Then install the front tabs in the control unit.)
- (10) Check the cables and wires for leaks of connection, faulty connections, etc., then close the electric cabinet door.



#### **Caution**

-  Do not replace the control unit while the power is ON.
-  Collect and dispose of the spent cooling fan according to the local laws.



**Cooling fan for display unit (XP terminal)**

Type .....MMF-06D24DS-RP3

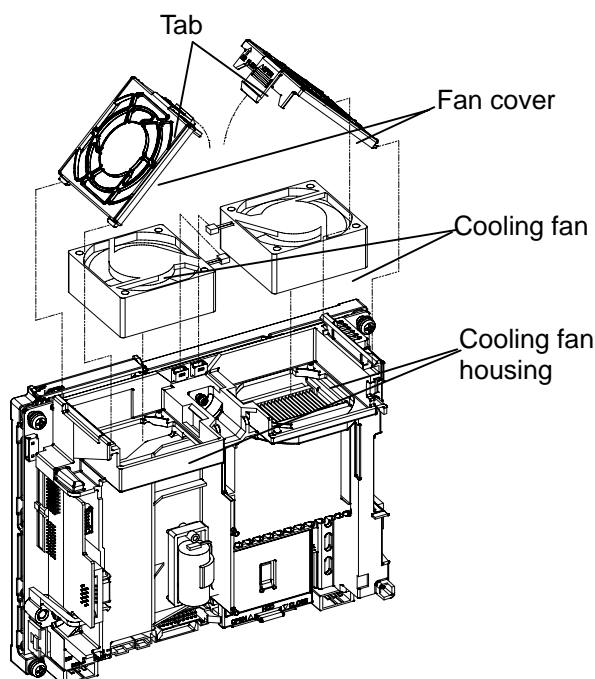
Life .....50,000 hours (When the rotary speed decreased 20% less than the initial values)

Life is a presumption value in 60°C environment, not guarantee value.

**[Replacement procedures]**

Always replace the cooling fan for display unit with the control unit (machine) power turned OFF.

- (1) Check that the machine power is turned OFF. (If the power is not OFF, turn it OFF.)
- (2) Open the electric cabinet door.
- (3) Remove the fan cover of cooling fan housing (2 parts) that is installed to PCB on back of display unit. (Remove the fan cover by pushing up the front tab.)
- (4) Pull out the cooling fan from the control unit cooling fan housing.
- (5) Pull the connector connected to the cooling fan out from the control unit PCB.
- (6) Replace the cooling fan with the new one. Insert the connector connected to the new cooling fan into the control unit PCB.
- (7) Put the cooling fan into the control section cooling fan housing. (Be sure the label side is on the top.)
- (8) Arrange the cooling fan wiring neatly in the control unit cooling fan housing.
- (9) Install the fan cover.
- (10) Check the cables and wires for leaks of connection, faulty connections, etc., then close the electric cabinet door.

**! Caution**

- ! Do not replace the control unit while the power is ON.
- ! Collect and dispose of the spent cooling fan according to the local laws.

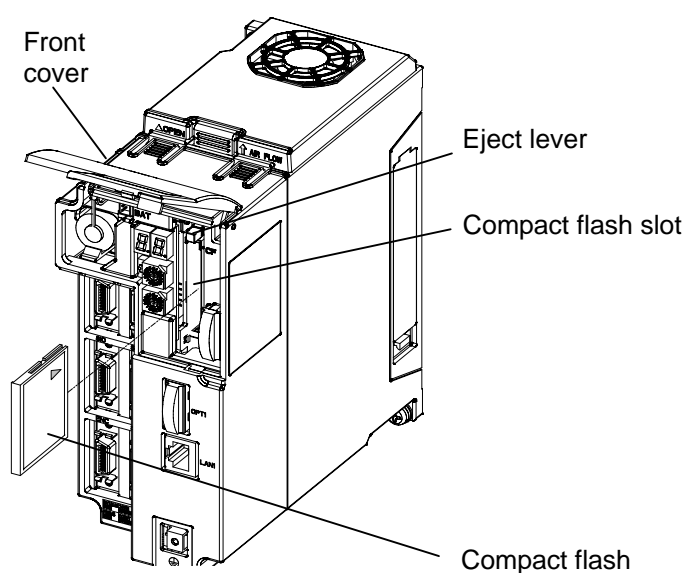
#### 1.2.2 Compact Flash

##### Control unit compact flash

##### [Replacement procedures]

Always replace the compact flash with the control unit (machine) power turned OFF.

- (1) Check that the machine power is turned OFF. (If the power is not OFF, turn it OFF.)
- (2) Open the electric cabinet door, and confirm that the control unit LED, 7-segment display, etc., are all OFF.
- (3) Open the front cover of the control unit.
- (4) Press the eject lever twice to eject the compact flash.
- (5) Insert the new compact flash. (The surface is faced on the observers' right.)
- (6) Close the front cover of the control unit. At this time, confirm that the cover is closed by listening for the "click" sound when the latch catches.
- (7) Close the door of the electric cabinet.



**(Note 1)** There may be a compatibility problem between devices a commercially available compact flash memory, so illegal operations may occur.

#### 1.2.3 IC Card

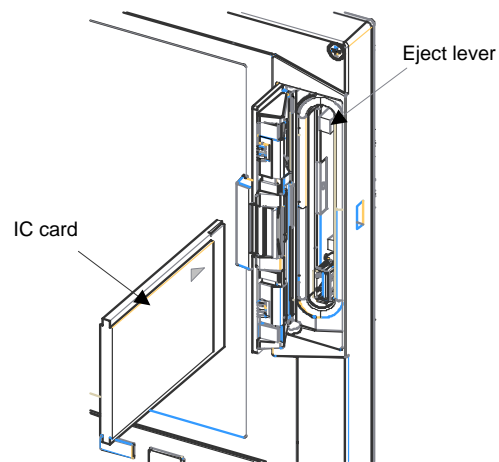
##### Front IC card

###### [Card insertion procedures]

- (1) Open the card slot door on display unit right end.
- (2) Insert the IC card. (The surface is faced on the observers' right.)

###### [Card replacement procedures]

- (1) Open the card slot door on display unit right end.
- (2) Press the eject lever twice to eject the IC card.



**(Note 1)** Do not eject an IC card during the data reading/writing.

**(Note 2)** There may be a compatibility problem between devices a commercially available IC card, so illegal operations may occur.

## **IV. APPENDIXES**

## Appendix 1. List of Function Codes

Function code ISO	Control unit recognition	Subject to parity V count	Screen display	Setting and display unit key-in	Stored in memory	Punch-out output ISO	Internal NC system function
0 to 9	Yes	Counted	Displayed	Key-in	Stored	0 to 9	Numerical data
A to Z	Yes	Counted	Displayed	Key-in	Stored	A to Z	Addresses
+	Yes	Counted	Displayed	Key-in	Stored	+	Sign, variable operator (+)
-	Yes	Counted	Displayed	Key-in	Stored	-	Sign, variable operator (-)
.	Yes	Counted	Displayed	Key-in	Stored	.	Decimal point
,	Yes	Counted	Displayed	Key-in	Stored	,	
/	Yes	Counted	Displayed	Key-in	Stored	/	Block delete (optional block skip) Variable operator (÷)
%	Yes	Counted	Displayed (%)	No key-in (automatically inserted)	Stored	%	End of record (tape storage end) Rewind start & stop during tape search
LF/NL	Yes	Counted	Displayed (:)	Key-in ;/EOB	Stored	LF	End of block
(	Yes	Counted	Displayed	Key-in	Stored	(	Control out (comment start)
)	Yes	Counted	Displayed	Key-in	Stored	)	Control in (comment end)
:	Yes	Counted	Displayed	No key-in	Stored	:	Program number address (instead of O.)
#	Yes	Counted	Displayed	Key-in	Stored	#	Variable number
*	Yes	Counted	Displayed	Key-in	Stored	*	Variable operator (X)
=	Yes	Counted	Displayed	Key-in	Stored	=	Variable definition
[	Yes	Counted	Displayed	Key-in	Stored	[	Variable operator
]	Yes	Counted	Displayed	Key-in	Stored	]	Variable operator
BS	No		Not displayed	No key-in	Stored		
HT	No		Not displayed	No key-in	Stored		
SP	No		Not displayed	Key-in	Stored	SP (T-V automatic adjustment)	
CR	No		Not displayed	No key-in	Stored		
DEL	No	Not counted	Not displayed	No key-in	Not stored		
NULL	No	Not counted	Not displayed	No key-in	Not stored		
Any other	No	Counted	(Note 2)	No key-in	Stored		

**(Note 1)** Codes not listed in the above table are stored on tape, but an error will result during operation if they are not comments.

**(Note 2)** This denotes characters (including blanks) which are stored inside and which correspond to the command codes. "@" is not displayed.

## Appendix 2. Table of Command Value Ranges

<Table of command values and setting value ranges>

### (1) Linear axis: Input increment [mm] (M system)

Least command increment	0.001	0.0001	0.00001	0.000001
Maximum stroke (value for machine coordinate system)	±99999.999 mm	±99999.9999 mm	±99999.99999 mm	±99999.999999 mm
Maximum programmable dimension	±99999.999 mm	±99999.9999 mm	±99999.99999 mm	±99999.999999 mm
Rapid traverse rate (including dry run)	1 to 1000000 mm/min	1 to 1000000 mm/min	1 to 1000000 mm/min	1 to 1000000 mm/min
Cutting feed rate (including dry run) Asynchronous feed (feed per minute)	0.001 to 1000000.000 mm/min	0.0001 to 1000000.0000 mm/min	0.00001 to 1000000.00000 mm/min	0.000001 to 1000000.000000 mm/min
Synchronous feed (feed per revolution)	0.001 to 999.999 mm/rev	0.0001 to 999.9999 mm/rev	0.00001 to 999.99999 mm/rev	0.000001 to 999.999999 mm/rev
2nd to 4th reference position compensation (value for machine coordinate system)	±99999.999 mm	±99999.9999 mm	±99999.99999 mm	±99999.999999 mm
Tool compensation amount (shape)	±99999.999 mm	±99999.9999 mm	±99999.99999 mm	±99999.999999 mm
Tool compensation amount (wear)	±99999.999 mm	±99999.9999 mm	±99999.99999 mm	±99999.999999 mm
Incremental feed amount	0.001 mm/pulse	0.0001 mm/pulse	0.00001 mm/pulse	0.000001 mm/pulse
Handle feed amount	0.001 mm/pulse	0.0001 mm/pulse	0.00001 mm/pulse	0.000001 mm/pulse
Soft limit range (value with machine coordinate system)	±99999.999 mm	±99999.9999 mm	±99999.99999 mm	±99999.999999 mm
Dwell time	0 to 99999.999 s	0 to 99999.9999 s	0 to 99999.99999 s	0 to 99999.999999 s
Backlash compensation amount	±9999999 pulse	±9999999 pulse	±9999999 pulse	±9999999 pulse
Pitch error compensation amount	-32768 to 32767 pulse	-32768 to 32767 pulse	-32768 to 32767 pulse	-32768 to 32767 pulse
Thread lead (F)	0.001 to 999.999 mm/rev	0.0001 to 999.9999 mm/rev	0.00001 to 999.99999 mm/rev	0.000001 to 999.999999 mm/rev
Thread lead (precision E)	0.00001 to 999.99999 mm/rev	0.000001 to 999.999999 mm/rev	0.0000001 to 999.9999999 mm/rev	0.00000001 to 999.99999999 mm/rev
Thread lead (ridges/inch)	0.03 to 999.99	0.026 to 999.999	0.0255 to 999.9999	0.02541 to 999.99999

## Appendix 2. Table of Command Value Ranges

### (2) Linear axis: Input increment [inch] (M system)

Least command increment	0.0001	0.00001	0.000001	0.0000001
Maximum stroke (value for machine coordinate system)	±9999.9999 inch	±9999.99999 inch	±9999.999999 inch	±9999.9999999 inch
Maximum programmable dimension	±9999.9999 inch	±9999.99999 inch	±9999.999999 inch	±9999.9999999 inch
Rapid traverse rate (including dry run)	1 to 100000 inch/min	1 to 100000 inch/min	1 to 100000 inch/min	1 to 100000 inch/min
Cutting feed rate (including dry run) Asynchronous feed (feed per minute)	0.0001 to 100000.0000 inch/min	0.00001 to 100000.00000 inch/min	0.000001 to 100000.000000 inch/min	0.0000001 to 100000.0000000 inch/min
Synchronous feed (feed per revolution)	0.0001 to 999.9999 inch/rev	0.00001 to 999.99999 inch/rev	0.000001 to 999.999999 inch/rev	0.0000001 to 999.9999999 inch/rev
2nd to 4th reference position compensation (value for machine coordinate system)	±9999.9999 inch	±9999.99999 inch	±9999.999999 inch	±9999.9999999 inch
Tool compensation amount (shape)	±9999.9999 inch	±9999.99999 inch	±9999.999999 inch	±9999.9999999 inch
Tool compensation amount (wear)	±9999.9999 inch	±9999.99999 inch	±9999.999999 inch	±9999.9999999 inch
Incremental feed amount	0.0001 inch/pulse	0.00001 inch/pulse	0.000001 inch/pulse	0.0000001 inch/pulse
Handle feed amount	0.0001 inch/pulse	0.00001 inch/pulse	0.000001 inch/pulse	0.0000001 inch/pulse
Soft limit range (value with machine coordinate system)	±9999.9999 inch	±9999.99999 inch	±9999.999999 inch	±9999.9999999 inch
Dwell time	0 to 99999.999 s	0 to 99999.9999 s	0 to 99999.99999 s	0 to 99999.999999 s
Backlash compensation amount	±9999999 pulse	±9999999 pulse	±9999999 pulse	±9999999 pulse
Pitch error compensation amount	-32768 to 32767 pulse	-32768 to 32767 pulse	-32768 to 32767 pulse	-32768 to 32767 pulse
Thread lead (F)	0.0001 to 99.9999 inch/rev	0.00001 to 99.99999 inch/rev	0.000001 to 99.999999 inch/rev	0.0000001 to 99.9999999 inch/rev
Thread lead (precision E)	0.000001 to 39.370078 inch/rev	0.0000001 to 39.3700787 inch/rev	0.00000001 to 39.37007874 inch/rev	0.000000001 to 39.370078740 inch/rev
Thread lead (ridges/inch)	0.0101 to 9999.9999	0.01001 to 9999.99999	0.010001 to 9999.999999	0.0100001 to 9999.9999999

## Appendix 2. Table of Command Value Ranges

### (3) Rotation axis: degree [°] (M system)

Least command increment	0.001	0.0001	0.00001	0.000001
Maximum stroke (value for machine coordinate system)	±99999.999 °	±99999.9999 °	±99999.99999 °	±99999.999999 °
Maximum programmable dimension	±99999.999 °	±99999.9999 °	±99999.99999 °	±99999.999999 °
Rapid traverse rate (including dry run)	1 to 1000000 °/min	1 to 1000000 °/min	1 to 1000000 °/min	1 to 1000000 °/min
Cutting feed rate (including dry run) Asynchronous feed (feed per minute)	0.001 to 1000000.000 °/min	0.0001 to 1000000.0000 °/min	0.00001 to 1000000.00000 °/min	0.000001 to 1000000.000000 °/min
Synchronous feed (feed per revolution)	0.001 to 999.999 °/rev	0.0001 to 999.9999 °/rev	0.00001 to 999.99999 °/rev	0.000001 to 999.999999 °/rev
2nd to 4th reference position compensation (value with machine coordinate system)	±99999.999 °	±99999.9999 °	±99999.99999 °	±99999.999999 °
Incremental feed amount	0.001 °/pulse	0.0001 °/pulse	0.00001 °/pulse	0.000001 °/pulse
Handle feed amount	0.001 °/pulse	0.0001 °/pulse	0.00001 °/pulse	0.000001 °/pulse
Soft limit range (value with machine coordinate system)	±99999.999 °	±99999.9999 °	±99999.99999 °	±99999.999999 °
Backlash compensation amount	±9999999 pulse	±9999999 pulse	±9999999 pulse	±9999999 pulse
Pitch error compensation amount	-32768 to 32767 pulse	-32768 to 32767 pulse	-32768 to 32767 pulse	-32768 to 32767 pulse



## Appendix 2. Table of Command Value Ranges

### <Table of command values and setting value ranges>

#### (1) Linear axis: Input increment [mm] (L system)

Least command increment	0.001	0.0001	0.00001	0.000001
Maximum stroke (value for machine coordinate system)	±99999.999 mm	±99999.9999 mm	±99999.99999 mm	±99999.999999 mm
Maximum programmable dimension	±99999.999 mm	±99999.9999 mm	±99999.99999 mm	±99999.999999 mm
Rapid traverse rate (including dry run)	1 to 1000000 mm/min	1 to 1000000 mm/min	1 to 1000000 mm/min	1 to 1000000 mm/min
Cutting feed rate (including dry run) Asynchronous feed (feed per minute)	0.001 to 1000000.000 mm/min	0.0001 to 1000000.0000 mm/min	0.00001 to 1000000.00000 mm/min	0.000001 to 1000000.000000 mm/min
Synchronous feed (feed per revolution)	0.0001 to 999.9999 mm/rev	0.00001 to 999.99999 mm/rev	0.000001 to 999.999999 mm/rev	0.0000001 to 999.9999999 mm/rev
2nd to 4th reference position compensation (value for machine coordinate system)	±99999.999 mm	±99999.9999 mm	±99999.99999 mm	±99999.999999 mm
Tool compensation amount (shape)	±99999.999 mm	±99999.9999 mm	±99999.99999 mm	±99999.999999 mm
Tool compensation amount (wear)	±99999.999 mm	±99999.9999 mm	±99999.99999 mm	±99999.999999 mm
Incremental feed amount	0.001 mm/pulse	0.0001 mm/pulse	0.00001 mm/pulse	0.000001 mm/pulse
Handle feed amount	0.001 mm/pulse	0.0001 mm/pulse	0.00001 mm/pulse	0.000001 mm/pulse
Soft limit range (value with machine coordinate system)	±99999.999 mm	±99999.9999 mm	±99999.99999 mm	±99999.999999 mm
Dwell time	0 to 99999.999 s	0 to 99999.9999 s	0 to 99999.99999 s	0 to 99999.999999 s
Backlash compensation amount	±9999999 pulse	±9999999 pulse	±9999999 pulse	±9999999 pulse
Pitch error compensation amount	-32768 to 32767 pulse	-32768 to 32767 pulse	-32768 to 32767 pulse	-32768 to 32767 pulse
Thread lead (F)	0.001 to 999.999 mm/rev	0.0001 to 999.9999 mm/rev	0.00001 to 999.99999 mm/rev	0.000001 to 999.999999 mm/rev
Thread lead (precision E)	0.00001 to 999.99999 mm/rev	0.000001 to 999.999999 mm/rev	0.0000001 to 999.9999999 mm/rev	0.00000001 to 999.99999999 mm/rev
Thread lead (ridges/inch)	0.03 to 9999.99	0.026 to 9999.999	0.0255 to 9999.9999	0.02541 to 9999.99999

## Appendix 2. Table of Command Value Ranges

### (2) Linear axis: Input increment [inch] (L system)

Least command increment	0.0001	0.00001	0.000001	0.0000001
Maximum stroke (value for machine coordinate system)	±9999.9999 inch	±9999.99999 inch	±9999.999999 inch	±9999.9999999 inch
Maximum programmable dimension	±9999.9999 inch	±9999.99999 inch	±9999.999999 inch	±9999.9999999 inch
Rapid traverse rate (including dry run)	1 to 100000 inch/min	1 to 100000 inch/min	1 to 100000 inch/min	1 to 100000 inch/min
Cutting feed rate (including dry run) Asynchronous feed (feed per minute)	0.0001 to 100000.0000 inch/min	0.00001 to 100000.00000 inch/min	0.000001 to 100000.000000 inch/min	0.0000001 to 100000.0000000 inch/min
Synchronous feed (feed per revolution)	0.000001 to 99.999999 inch/rev	0.0000001 to 99.9999999 inch/rev	0.00000001 to 99.99999999 inch/rev	0.000000001 to 99.999999999 inch/rev
2nd to 4th reference position compensation (value for machine coordinate system)	±9999.9999 inch	±9999.99999 inch	±9999.999999 inch	±9999.9999999 inch
Tool compensation amount (shape)	±9999.9999 inch	±9999.99999 inch	±9999.999999 inch	±9999.9999999 inch
Tool compensation amount (wear)	±9999.9999 inch	±9999.99999 inch	±9999.999999 inch	±9999.9999999 inch
Incremental feed amount	0.0001 inch/pulse	0.00001 inch/pulse	0.000001 inch/pulse	0.0000001 inch/pulse
Handle feed amount	0.0001 inch/pulse	0.00001 inch/pulse	0.000001 inch/pulse	0.0000001 inch/pulse
Soft limit range (value with machine coordinate system)	±9999.9999 inch	±9999.99999 inch	±9999.999999 inch	±9999.9999999 inch
Dwell time	0 to 99999.999 s	0 to 99999.9999 s	0 to 99999.99999 s	0 to 99999.999999 s
Backlash compensation amount	±9999999 pulse	±9999999 pulse	±9999999 pulse	±9999999 pulse
Pitch error compensation amount	-32768 to 32767 pulse	-32768 to 32767 pulse	-32768 to 32767 pulse	-32768 to 32767 pulse
Thread lead (F)	0.0001 to 99.9999 inch/rev	0.00001 to 99.99999 inch/rev	0.000001 to 99.999999 inch/rev	0.0000001 to 99.9999999 inch/rev
Thread lead (precision E)	0.000001 to 39.370078 inch/rev	0.0000001 to 39.3700787 inch/rev	0.00000001 to 39.37007874 inch/rev	0.000000001 to 39.370078740 inch/rev
Thread lead (ridges/inch)	0.0101 to 9999.9999	0.01001 to 9999.99999	0.010001 to 9999.999999	0.0100001 to 9999.9999999

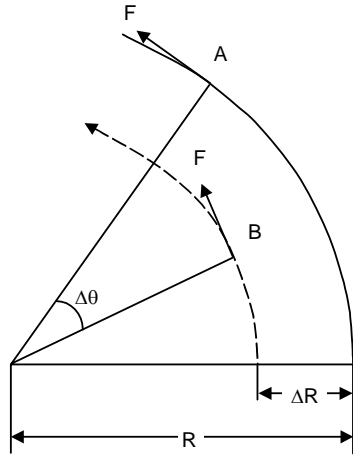
## Appendix 2. Table of Command Value Ranges

### (3) Rotation axis: degree [°] (L system)

Least command increment	0.001	0.0001	0.00001	0.000001
Maximum stroke (value for machine coordinate system)	±99999.999 °	±99999.9999 °	±99999.99999 °	±99999.999999 °
Maximum programmable dimension	±99999.999 °	±99999.9999 °	±99999.99999 °	±99999.999999 °
Rapid traverse rate (including dry run)	1 to 1000000 °/min	1 to 1000000 °/min	1 to 1000000 °/min	1 to 1000000 °/min
Cutting feed rate (including dry run) Asynchronous feed (feed per minute)	0.001 to 1000000.000 °/min	0.0001 to 1000000.0000 °/min	0.00001 to 1000000.00000 °/min	0.000001 to 1000000.000000 °/min
Synchronous feed (feed per revolution)	0.0001 to 999.9999 °/rev	0.00001 to 999.99999 °/rev	0.000001 to 999.999999 °/rev	0.0000001 to 999.9999999 °/rev
2nd to 4th reference position compensation (value with machine coordinate system)	±99999.999 °	±99999.9999 °	±99999.99999 °	±99999.999999 °
Incremental feed amount	0.001 °/pulse	0.0001 °/pulse	0.00001 °/pulse	0.000001 °/pulse
Handle feed amount	0.001 °/pulse	0.0001 °/pulse	0.00001 °/pulse	0.000001 °/pulse
Soft limit range (value with machine coordinate system)	±99999.999 °	±99999.9999 °	±99999.99999 °	±99999.999999 °
Backlash compensation amount	±9999999 pulse	±9999999 pulse	±9999999 pulse	±9999999 pulse
Pitch error compensation amount	-32768 to 32767 pulse	-32768 to 32767 pulse	-32768 to 32767 pulse	-32768 to 32767 pulse

### Appendix 3. Circular Cutting Radius Error

When circular cutting is performed, an error is caused between the command coordinate and the tracking coordinate due to the tracking delay in the smoothing circuit and servo system, and the workpiece ends up with a radius smaller than the commanded value. The method for obtaining this error (radius error) is shown below.



A : Command coordinate  
 B : Tracking coordinate  
 R : Command radius (mm)  
 $\Delta R$ : Radius error (mm)  
 $\Delta\theta$  : Angle error (rad)  
 F : Cutting feed rate (m/min)

The radius error  $\Delta R$  and angle error  $\Delta\theta$  are calculated from the following formula.

Exponential acceleration/ deceleration	$\Delta R = \frac{1}{R} \cdot \left( \frac{1}{2} Ts^2 + \frac{1}{2} Tp^2 \right) \cdot \left( \frac{F \times 10^3}{60} \right)^2$ (mm)
Linear acceleration/ deceleration	$\Delta R = \frac{1}{R} \cdot \left( \frac{1}{24} Ts^2 + \frac{1}{2} Tp^2 \right) \cdot \left( \frac{F \times 10^3}{60} \right)^2$ (mm)

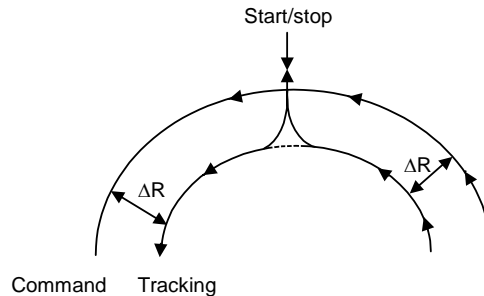
$$\Delta\theta = \tan^{-1} \left( Ts \cdot \frac{F}{R} \right) + \tan^{-1} \left( Tp \cdot \frac{F}{R} \right) \text{ (rad)}$$

Ts: Time constant (s) of specified smoothing circuit

Tp: Position loop time constant

**(Note 1)** When the  $\Delta R$  radius error applying with circular cutting does not come within the allowable value, proceed to reduce the cutting feed rate F, set Ts to a lower value or review the program.

**(Note 2)** In the steady state,  $\Delta R$  is constant. However, it is not constant with command start and stop transitions. Under command start and stop conditions, therefore, the tracking coordinate should be as shown in the figure below.



## **Appendix 4. Registering/Editing the Fixed Cycle Program**

The subprogram for the fixed cycle can be input, output and edited.



### **CAUTION**



Do not change the fixed cycle program without prior approval from the machine maker.

### **4.1 Fixed Cycle Operation Parameters**

To input/output or edit the data of each fixed cycle subprogram, use the Data I/O and Edit screens in the same way as when creating usual user-created work programs. In this case, the parameters must have been set. Set "1" in parameter "#1166 fixpro". If this parameter is valid, the IN/OUT and Edit screens are usable only for operating a fixed cycle control subprogram. During this period, program file displays only fixed cycle programs. Thus, after fixed cycle program operation, return parameter to "0".

**(Note)** Parameter "#1166 fixpro" will be set to 0 when the power is turned OFF.

### **4.2 Transmitting/Erasing the Fixed Cycle Program**

Transmit/erase the fixed cycle program from the Data I/O screen. Check that fixed cycle operation parameter "#1166 fixpro" is valid.

The operating procedure is the same as a user machining program.

### 4.3 Standard Fixed Cycle Subprogram (For L system)

G37 (O370)	Automatic tool length measurement
------------	-----------------------------------

```
G31 Z #5 F #3 ;
1F [ROUND [ ABS [#2 - [ ##10 * #11 - #12 ] ] ] GT #8 ] GOTO 1 ;
1F [ROUND [ ##10 * #11 - #12 ] EQ #4 ] GOTO 1 ;
##9 = #10 - #12/#11 - #2/#11 + ##9 ;
#3003 = #1 ;
N2 ;
M99 ;
N1 # 3901 = 126 ;
```

G74 (O740)	End face cutoff cycle
------------	-----------------------

```
G. 1 ;
1F [ ABS [ #2 ] GT 0 ] GOTO 10 ;
#14 = 1 ;
N10 #13 = #3 ;
IF [ #15 NE 0 ] GOTO 11 ;
#13 = #3 - #5 ;
N11 #16 = 0 ;
D0 1 ;
#10 = 0 ;
#11 = #4 ;
D0 2 ;
#10 = #10 + #4 ;
IF [ ABS [ #10 ] GE [ ABS [ #1 ] ] ] GOTO 1 ;
G01 X #11 ;
G00 X #6 ;
#11 = #4 - #6 ;
END 2 ;
N1 G01 X#1 - #10 + #11 ;
IF [ #15 EQ 0 ] GOTO 20 ;
IF [ #16 EQ 0 ] GOTO 21 ;
N20 G00 Y#5 ;
N21 #16 = 1 ;
G00X - #1 ;
IF [ #14 ] GOTO 3 ;
#12 = #12 + #3 ;
IF [ ABS [ #12 ] LT [ ABS [ #2 ] ] ] GOTO 2 ;
#14 = 1 ;
#13 = #2 - #12 + #13 ;
N2 G00 Y #13 ;
#13 = #3 - #5 ;
END 1 ;
N3 G00 Y - #2 - #5 ;
M99 ;
```

## Appendix 4. Registering/Editing the Fixed Cycle Program

### 4.3 Standard Fixed Cycle Subprogram (For L system)

G75 (O750)	Longitudinal cutting cycle
------------	----------------------------

```
G. 1 ;  
1F [ ABS [ #1 ] GT 0 ] GOTO 10 ;  
#14 = 1 ;  
N10 #13 = #4 ;  
IF [ #15 NE 0 ] GOTO 11 ;  
#13 = #4 - #5 ;  
N11 #16 = 0 ;  
D0 1 ;  
#10 = 0 ;  
#11 = #3 ;  
D0 2 ;  
#10 = #10 + #3 ;  
IF [ ABS [ #10 ] GE [ ABS [ #2 ] ] ] GOTO 1 ;  
G01 Y #11 ;  
G00 Y #6 ;  
#11 = #3 - #6 ;  
END 2 ;  
N1 G01 Y#2 - #10 + #11 ;  
IF [ #15 EQ 0 ] GOTO 20 ;  
IF [ #16 EQ 0 ] GOTO 21 ;  
N20 G00 X#5 ;  
N21 #16 = 1 ;  
G00Y - #2 ;  
IF [ #14 ] GOTO 3 ;  
#12 = #12 + #4 ;  
IF [ ABS [ #12 ] LT [ ABS [ #1 ] ] ] GOTO 2 ;  
#14 = 1 ;  
#13 = #1 - #12 + #13 ;  
N2 G00 X #13 ;  
#13 = #4 - #5 ;  
END 1 ;  
N3 G00 X - #1 - #5 ;  
M99 ;
```

## Appendix 4. Registering/Editing the Fixed Cycle Program

### 4.3 Standard Fixed Cycle Subprogram (For L system)

G75.1 (O751)	Groove cutting cycle
--------------	----------------------

```
G. 1 ;
#3003 = #8 OR 1 ;
G0 X #1 ;
G1 Y #2 ;
G0 Y - #2 ;
X #5 ;
1F [ #3 EQ 0 ] GOTO 1 ;
G1 X - #3 Y #4 ;
N1 G1 Y#6 ;
X - #7 ;
G0Y - #2 ;
X - #5 ;
1F [ #3 EQ 0 ] GOTO 2 ;
G1 X #3 Y #4 ;
N2 G1 Y#6 ;
X #7 ;
#3003 = #8 ;
G0Y - #2 ;
M99 ;
```

G76 (O760)	Compound thread cutting cycle
------------	-------------------------------

```
G. 1 ;
#12 = 1 ;
#13 = #9 ;
1F [ ABS [ #13 ] GE [ ABS [ #8 ] ] ] GOTO 1 ;
#16 = 1 ;
#13 = #8 ;
N1 #11 = #13 ;
1F [ ABS [ #11 ] LT [ ABS [ #4 - #5 ] ] ] GOTO 2 ;
#11 = #4 - #5 ;
#14 = 1 ;
N2 #17 = #11 ;
#18 = ROUND [ [ #4 - #11 - #5 ] * #7 ] ;
IF [ [ #18 XOR #1 ] GE 0 ] GOTO 10 ;
#18 = - #18 ;
N10 #19 = #18 ;
#10 = ROUND [ [ #11 + #5 ] * #7 ] ;
IF [ [ #10 XOR #1 ] GE 0 ] GOTO 20 ;
#10 = - #10 ;
N20 G00 X#10 ;
#20 = #10
D0 1 ;
#15 = ROUND [ #10 * #3/#1 ] ;
G00 Y #2 + #3 - #4 - #15 + #11 ;
G33 X#1 - #10 - #18 Y -#3 + #15 ;
G00 Y - #2 + #4 - #11 ;
IF [ #14 GT 0 ] GOTO 3 ;
IF [ #16 GT 0 ] GOTO 7 ;
#12 = #12 + 1 ;
#13 = ROUND [ #9 * SQRT [ #12 ] ] ;
```



```

IF [ ABS [ #13 - #11 ] GE [ ABS [ #8 ] ] ] GOTO 8 ;
#16 = 1 ;
N7 #13 = #11 + #8 ;
N8 #11 = #13 ;
IF [ ABS [ #11 ] LT [ ABS [ #4 - #5 ] ] ] GOTO 9 ;
#11 = #4 - #5 ;
#14 = 1 ;
N9 #10 = ROUND [ [ #17 - #11 ] * #7 ] ;
IF [ [ #10XOR#1 ] GE 0 ] GOTO 6 ;
#10 = -#10 ;
N6 #10 = #10 + #20 ;
G00 X - #1 + #10 + #18 ;
IF [ #14 LT 0 ] GOTO 11 ;
#18 = 0 ;
GOTO 12 ;
N11 #18 = #19 - #10 + #20 ;
N12 END 1 ;
N3 IF [ ABS [ #6 ] LT 1 ] GOTO 5 ;
#14 = 0 ;
#13 = 0 ;
D0 2 ;
IF [ #14 GT 0 ] GOTO 5 ;
#13 = #13 + #6 ;
IF [ ABS [ #13 ] LT [ ABS [ #5 ] ] ] GOTO 4 ;
#13 = #5 ;
#14 = 1 ;
N4 G00 X #10 - #1 ;
G00 Y #2 + #3 - #4 + #13 - #15 + #11 ;
G33 X #1 - #10 Y - #3 + #15 ;
G00 Y - #2 + #4 - #13 - #11 ;
END 2 ;
N5 G00 X - #1 ;
M99 ;

```

G76.1 (O761)	2-part system simultaneous compound thread cutting cycle
--------------	--

```

G. 1 ;
N761 !L10
#12 = 1 ;
#13 = #9 ;
1F [ ABS [ #13 ] GE [ ABS [ #8 ] ] ] GOTO 1 ;
#16 = 1 ;
#13 = #8 ;
N1 #11 = #13 ;
1F [ ABS [ #11 ] LT [ ABS [ #4 - #5 ] ] ] GOTO 2 ;
#11 = #4 - #5 ;
#14 = 1 ;
N2 #17 = #11 ;
#18 = ROUND [ [ #4 - #11 - #5 ] * #7 ] ;
IF [ [ #18 XOR #1 ] GE 0 ] GOTO 10 ;
#18 = - #18 ;
N10 #19 = #18 ;
#10 = ROUND [ [ #11 + #5 ] * #7 ] ;

```

## Appendix 4. Registering/Editing the Fixed Cycle Program

### 4.3 Standard Fixed Cycle Subprogram (For L system)

```
IF [ [ #10 XOR #1 ] GE 0 ] GOTO 20 ;
#10 = - #10 ;
N20 G00 X#10 ;
#20 = #10
D0 1 ;
#15 = ROUND [ #10 * #3/#1 ] ;
G00 Y #2 + #3 - #4 - #15 + #11 ;
!L11 ;
G33 X#1 - #10 - #18 Y -#3 + #15 ;
G00 Y - #2 + #4 - #11 ;
!L12 ;
IF [ #14 GT 0 ] GOTO 3 ;
IF [ #16 GT 0 ] GOTO 7 ;
#12 = #12 + 1 ;
#13 = ROUND [ #9 * SQRT [ #12 ] ] ;
IF [ ABS [ #13 - #11 ] GE [ ABS [ #8 ] ] ] GOTO 8 ;
#16 = 1 ;
N7 #13 = #11 + #8 ;
N8 #11 = #13 ;
IF [ ABS [ #11 ] LT [ ABS [ #4 - #5 ] ] ] GOTO 9 ;
#11 = #4 - #5 ;
#14 = 1 ;
N9 #10 = ROUND [ [ #17 - #11 ] * #7 ] ;
IF [ [ #10XOR#1 ] GE 0 ] GOTO 6 ;
#10 = -#10 ;
N6 #10 = #10 + #20 ;
G00 X - #1 + #10 + #18 ;
IF [ #14 LT 0 ] GOTO 11 ;
#18 = 0 ;
GOTO 12 ;
N11 #18 = #19 - #10 + #20 ;
N12 END 1 ;
N3 IF [ ABS [ #6 ] LT 1 ] GOTO 5 ;
#14 = 0 ;
#13 = 0 ;
D0 2 ;
IF [ #14 GOTO ] GOTO 5 ;
#13 = #13 + #6 ;
IF [ ABS [ #13 ] LT [ ABS [ #5 ] ] ] GOTO 4 ;
#13 = #5 ;
#14 = 1 ;
N4 G00 X #10 - #1 ;
G00 Y #2 + #3 - #4 + #13 - #15 + #11 ;
!L11 ;
G33 X #1 - #10 Y - #3 + #15 ;
G00 Y - #2 + #4 - #13 - #11 ;
!L12 ;
END 2 ;
N5 G00 X - #1 ;
M99 ;
```

G76.2 (O762)	2-system simultaneous compound thread cutting cycle
--------------	--

```

G. 1 ;
N762 !L10 ;
#12 = 1 ;
#13 = #9 ;
1F [ ABS [ #13 ] GE [ ABS [ #8 ] ] ] GOTO 1 ;
#16 = 1 ;
#13 = #8 ;
N1 #11 = #13 ;
1F [ ABS [ #11 ] LT [ ABS [ #4 - #5 ] ] ] GOTO 2 ;
#11 = #4 - #5 ;
#14 = 1 ;
N2 #17 = #11 ;
#18 = ROUND [ [ #4 - #11 - #5 ] * #7 ] ;
IF [ [ #18 XOR #1 ] GE 0 ] GOTO 10 ;
#18 = - #18 ;
N10 #19 = #18 ;
#10 = ROUND [ [ #11 + #5 ] * #7 ] ;
IF [ [ #10 XOR #1 ] GE 0 ] GOTO 20 ;
#10 = - #10 ;
N20 IF [# 27 NE 1 ] GOTO 21 ;
G00 X#10 ;
N21 #20 = #10 ;
#28 = 1 ;
D01 ;
#15 = ROUND [ #10 * #3/#1 ] ;
#29 = #28 MOD 2 ;
IF [ [ #27 EQ 1 ] AND [ #29 EQ 0 ] ] GOTO 22 ;
IF [ [ #27 EQ 2 ] AND [ #29 EQ 1 ] ] GOTO 22 ;
G00 Y #2 + #3 - #4 - #15 + #11 ;
!L11 ;
G33 X#1 - #10 - #18 Y -#3 + #15 ;
G00 Y - #2 + #4 - #11 ;
#21 = #18 ;
!L12 ;
N22 IF [ #14 GT 0 ] GOTO 3 ;
IF [ #16 GT 0 ] GOTO 7 ;
#12 = #12 + 1 ;
#13 = ROUND [ #9 * SQRT [ #12 ] ] ;
IF [ ABS [ #13 - #11 ] GE [ ABS [ #8 ] ] ] GOTO 8 ;
#16 = 1 ;
N7 #13 = #11 + #8 ;
N8 #11 = #13 ;
IF [ ABS [ #11 ] LT [ ABS [ #4 - #5 ] ] ] GOTO 9 ;
#11 = #4 - #5 ;
#14 = 1 ;
N9 #10 = ROUND [ [ #17 - #11 ] * #7 ] ;
IF [ [ #10XOR#1 ] GE 0 ] GOTO 6 ;
#10 = -#10 ;
N6 #10 = #10 + #20 ;
IF [ [ #27 EQ 1 ] AND [ #29 EQ 1 ] ] GOTO 24 ;
IF [ [ #27 EQ 2 ] AND [ #29 EQ 0 ] ] GOTO 24 ;
IF [ [ #27 EQ 2 ] AND [ #28 EQ 1 ] ] GOTO 23 ;
G00 X - #1 + #10 + #21 ;

```

## Appendix 4. Registering/Editing the Fixed Cycle Program

### 4.3 Standard Fixed Cycle Subprogram (For L system)

```
GOTO 24 ;
N23 G00 X#10 ;
N24 IF [ #14 LT 0 ] GOTO 11 ;
#18 = 0 ;
GOTO 12 ;
N11 #18 = #19 - #10 + #20 ;
N12 #28 = #28 + 1 ;
END 1 ;
N3 IF [ ABS [ #6 ] LT 1 ] GOTO 5 ;
#14 = 0 ;
#13 = 0 ;
D0 2 ;
IF [ #14 GT 0 ] GOTO 5 ;
#13 = #13 + #6 ;
IF [ ABS [ #13 ] LT [ ABS [ #5 ] ] ] GOTO 4 ;
#13 = #5 ;
#14 = 1 ;
N4 #29 = #28 MOD 2 ;
IF [ [ #27 EQ 1 ] AND [ #29 EQ 1 ] ] GOTO 25 ;
IF [ [ #27 EQ 2 ] AND [ #29 EQ 0 ] ] GOTO 25 ;
G00 X #10 - #1 + #21 ;
#21 = 0 ;
G00 Y #2 + #3 - #4 + #13 - #15 + #11 ;
!L11 ;
G33 X #1 - #10 Y - #3 + #15 ;
G00 Y - #2 + #4 - #13 - #11 ;
!L12 ;
N25 #28 = #28 + 1 ;
END 2 ;
N5 G00 X - #1 ;
M99 ;
%
```

G77 (O770)	Longitudinal cutting cycle
------------	----------------------------

```
G. 1 ;
1F [ [ #1 EQ 0 ] OR [ #2 EQ 0 ] ] GOTO 1 ;
Y #2 + #7 ;
G1 X #1 Y - #7 ;
Y - #2 ;
G0 X - #1 ;
N1 M99 ;
```

G78 (O780)	Thread cutting cycle
------------	----------------------

```
G. 1 ;
1F [ [ #1 EQ 0 ] OR [ #2 EQ 0 ] ] GOTO 1 ;
Y #2 + #7 ;
G33 X #1 Y - #7 F #9 E #10 ;
G0 Y - #2 ;
X - #1 ;
N1 M99 ;
```

## Appendix 4. Registering/Editing the Fixed Cycle Program

### 4.3 Standard Fixed Cycle Subprogram (For L system)

G79 (O790)	End face cutoff cycle
------------	-----------------------

```
G. 1 ;  
1F [ [ #1 EQ 0 ] OR [ #2 EQ 0 ] ] GOTO 1 ;  
X #1 + #7 ;  
G1 X - #7 Y #2 ;  
X - #1 ;  
G0 Y - #2 ;  
N1 M99 ;
```

G83 G87 (O830)	Deep hole drilling cycle B
-------------------	----------------------------

```
G. 1 ;  
1F [ #30 ] GOTO 2 ;  
M #24 ;  
#29 = #11 #28 = 0 ;  
Z #2 ;  
#2 = ##5 #3003 = #8 OR 1 ;  
D0 1 ;  
#28 = #28 - #11 #26 = - #28 - #29 ;  
Z #26 ;  
IF [ ABS [ #28 ] GE [ ABS [ #3 ] ] ] GOTO 1 ;  
G1 Z #29 ;  
G0 Z #28 ;  
G29 = #11 + #14 ;  
END 1 ;  
N1 G1 Z #3 - #26 ;  
G4 P #4 ;  
#3003 = #8 ;  
G0Z - #3 - #2 ;  
IF [ #24 EQ #0 ] GOTO 2 ;  
M #24 + 1 ;  
G4 P #21 ;  
N2 M99 ;
```

## Appendix 4. Registering/Editing the Fixed Cycle Program

### 4.3 Standard Fixed Cycle Subprogram (For L system)

G83 G87 (O831)	Deep hole drilling cycle A
-------------------	----------------------------

```
G. 1 ;  
1F [ #30 ] GOTO 2 ;  
M #24 ;  
#29 = #0 #28 = #11 ;  
Z #2 ;  
  
#2 = ##5 #3003 = #8 OR 1 ;  
D0 1 ;  
#29 = #29 + #11 ;  
IF [ ABS [ #29 ] GE [ ABS [ #3 ] ] ] GOTO 1 ;  
G1 Z #28 ;  
G0 Z - #14 ;  
#28 = #11 + #14 ;  
END 1 ;  
N1 G1 Z #3 - #29 + #28 ;  
G4 P #4 ;  
#3003 = #8 ;  
G0Z - #3 - #2 ;  
IF [ #24 EQ #0 ] GOTO 2 ;  
M #24 + 1 ;  
G4 P #21 ;  
N2 M99 ;
```

G83.2 (O832)	Deep hole drilling cycle 2
--------------	----------------------------

```
G. 1 ;  
1F [ #30 ] GOTO 3 ;  
#3003 = #8 OR 1 ;  
#29 = #12 #28 = 0 ;  
G0 Z #2 ;  
IF [ #12 NE #0 ] GOTO 1 ;  
IF [ #11 EQ #0 ] GOTO 2 ;  
N1 #28 = #28 - #12 #26 = - #28 - #29 ;  
IF [ ABS [ #28 ] GE [ ABS [ #3 ] ] ] GOTO 2 ;  
G1 Z #12 ;  
G4 P #4 ;  
G0 Z #28 - #2 ;  
G4P # 13 ;  
G29 = #11 + #15 ;  
D0 1 ;  
#28 = #28 - #11 #26 = - #28 - #29 ;  
G0 Z #26 + #2 ;  
IF [ ABS [ #28 ] GE [ ABS [ #3 ] ] ] GOTO 2 ;  
G1 Z #29 ;  
G4 P #4 ;  
G0 Z #28 - #2 ;  
G4 P # 13 ;  
END 1 ;  
N2 G1 Z #3 - #26 ;  
G4 P #4 ;  
#3003 = #8 ;  
G0Z - #3 - #2 ;  
N3 M99 ;
```

## Appendix 4. Registering/Editing the Fixed Cycle Program

### 4.3 Standard Fixed Cycle Subprogram (For L system)

G84 G88	(O840)	Tap cycle
------------	--------	-----------

```
G. 1 ;  
1F [ #30 ] GOTO 2 ;  
M #24 ;  
Z #2 ;  
#2 = ##5 #3003 = #8 OR 1 #3004 = #9 OR 3 ;  
G1 Z #3 ;  
G4 P #4 ;  
M4 ;  
#3900 = 1 ;  
G1 Z - #3 ;  
#3004 = #9 ;  
M3 ;  
#3003 = #8 ;  
IF [#24 EQ #0 ] GOTO 1 ;  
M #24 + 1 ;  
G4 P #21 ;  
N1 G0 Z - #2 ;  
N2 M99 ;
```

G85 G89	(O850)	Boring cycle
------------	--------	--------------

```
G. 1 ;  
1F [ #30 ] GOTO 2 ;  
M #24 ;  
Z #2 ;  
#2 = ##5 #3003 = #8 OR 1 ;  
G1 Z #3 ;  
G4 P #4 ;  
#3003 = #8 ;  
Z - #3 F #23 ;  
F #22 ;  
IF [#24 EQ #0 ] GOTO 1 ;  
M #24 + 1 ;  
G4 P #21 ;  
N1 G0 Z - #2 ;  
N2 M99 ;
```

### 4.4 Standard Fixed Cycle Subprogram (For M system)

G81 (O810)	Drill, spot drill
------------	-------------------

```
G. 1 ;
1F [#30] GOTO1 ;
Z#2 G#6 H#7 ;
#2 = ##5
#3003 = #8 OR 1 ;
G1 Z#3 ;
#3003 = #8 ;
G0 Z - #3 - #2 ;
N1 M99%
```

Fixed cycle block 1 movement command  
Check for fixed cycle invalidity.

Inhibit single block stop.

Return.

G82 (O820)	Drill, counter boring
------------	-----------------------

```
G. 1 ;
1F [#30] GOTO1 ;
Z#2 G#6 H#7 ;
#2 = ##5
#3003 = #8 OR 1 ;
G1 Z#3 ;
G4 P#4 ;
#3003 = #8 ;
G0 Z - #3 - #2 ;
N1 M99%
```

Fixed cycle block 1 movement command  
Check for fixed cycle invalidity.

Inhibit single block stop.

Dwell.

Return.

G83 (O830)	Deep hole drill cycle
------------	-----------------------

```
G. 1 ;
1F [#30] GOTO2 ;
#29 = #11
#28 = 0
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 ;
```

Fixed cycle block 1 movement command  
Check for fixed cycle invalidity.  
Define the cutting amount.  
Initialize the return amount (total cutting amount).

Inhibit single block stop.

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



## Appendix 4. Registering/Editing the Fixed Cycle Program

### 4.4 Standard Fixed Cycle Subprogram (For M system)

```
G0 Z#28 ;
#29 = #11 + #14 ;
END1 ;
N1 G1 Z#3 - #26 ;
#3003 = #8 ;
G0 Z - #3 - #2 ;
N2 M99%
```

Return.  
Define the cutting amount for block 2 and after.  
  
Cutting feed  
  
Return.

G84 (O840)	Tap cycle
------------	-----------

```
G. 1 ;
1F [#30] GOTO1 ;
Z#2 G#6 H#7 ;
#2 = ##5
#3003 = #8 OR 1 ;
#3004 = #9 OR 3 ;
G1 Z#3 ;
G4 P#4 ;
M4 ;
#3900 = 1 ;
G1 Z - #3 ;
#3004 = #9 ;
G4 P#4 ;
M3 ;
#3003 = #8 ;
G0 Z = #2 ;
N1 M99%
```

Fixed cycle block 1 movement command  
Check for fixed cycle invalidity.

Inhibit single block stop.  
Invalidate feed hold/override.

Dwell.  
Rotate the spindle reversely.

Dwell.  
Rotate the spindle forward.

Return.

G85 (O850)	Boring 1
------------	----------

```
G. 1 ;
1F [#30] GOTO1 ;
Z#2 G#6 H#7 ;
#2 = ##5
#3003 = #8 OR 1 ;
G1 Z#3 ;
#3003 = #8 ;
Z - #3 ;
G0 Z - #2 ;
N1 M99%
```

Fixed cycle block 1 movement command  
Check for fixed cycle invalidity.

Inhibit single block stop.

Return.

## Appendix 4. Registering/Editing the Fixed Cycle Program

### 4.4 Standard Fixed Cycle Subprogram (For M system)

G86 (O860)	Boring 2
------------	----------

```

G. 1 ;
1F [#30] GOTO1 ;
Z#2 G#6 H#7 ;
#2 = ##5
#3003 = #8 OR 1 ;
G1 Z#3 ;
G4 P#4 ;
M5 ;
G0 Z - #3 - #2 ;
#3003 = #8 ;
M3 ;
N1 M99%
```

Fixed cycle block 1 movement command  
Check for fixed cycle invalidity.

Inhibit single block stop.

Dwell.  
Stop the spindle.  
Return.

Rotate the spindle forward.

G87 (O870)	Back boring
------------	-------------

```

G. 1 ;
1F [#30] GOTO1 ;
#3003 = #8 OR 1 ;
M19 ;
X#12 Y#13 ;
#3003 = #8 ;
Z#2 G#6 H#7 ;
#3003 = #8 OR 1 ;
G1 X - #12 Y - #13 ;
#3003 = #8 ;
M3 ;
#3003 = #8 OR 1 ;
Z#3 ;
M19 ;
G0 X#12 Y#13 ;
Z - #2 - #3 ;
#3003 = #8 ;
X - #12 Y - #13 ;
M3 ;
N1 M99%
```

Fixed cycle block 1 movement command  
Check for fixed cycle invalidity.  
Inhibit single block stop.  
Orient the spindle.

Cancel single block stop inhibition.

Inhibit single block stop.

Cancel single block stop inhibition.  
Rotate the spindle forward.  
Inhibit single block stop.

Orient the spindle.  
Shift.  
G87 is not affected by the G98 or G99 modal.  
Cancel single block stop inhibition.  
Shift.  
Rotate the spindle forward.

## Appendix 4. Registering/Editing the Fixed Cycle Program

### 4.4 Standard Fixed Cycle Subprogram (For M system)

G88 (O880)	Boring 3
------------	----------

```
G. 1 ;
1F [#30] GOTO1 ;
Z#2 G#6 H#7 ;
#2 = ##5
#3003 = #8 OR 1 ;
G1 Z#3 ;
G4 P#4 ;
#3003 = #8 ;
M5 ;
#3003 = #8 OR 1 ;
G0 Z - #3 - #2 ;
#3003 = #8 ;
M3 ;
N1 M99 ;
```

Fixed cycle block 1 movement command  
Check for fixed cycle invalidity.

Inhibit single block stop.

Dwell.  
Cancel single block stop inhibition.  
Rotate the spindle forward  
Inhibit single block stop.  
Return.  
Cancel single block stop inhibition.  
Rotate the spindle forward.

G89 (O890)	Boring 4
------------	----------

```
G. 1 ;
1F [#30] GOTO1 ;
Z#2 G#6 H#7 ;
#2 = ##5
#3003 = #8 OR 1 ;
G1 Z#3 ;
G4 P#4 ;
#3003 = #8
Z - #3 ;
G0 Z - #2 ;
N1 M99%
```

Fixed cycle block 1 movement command  
Check for fixed cycle invalidity.

Inhibit single block stop.

Dwell.

Return.

G73 (O831)	Step cycle
------------	------------

```
G. 1 ;
1F [#30] GOTO2 ;
#29 = 0
#28 = #11 ;
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 ;
```

Fixed cycle block 1 movement command  
Check for fixed cycle invalidity.  
Initialize the total cutting amount.  
Define the cutting amount.

Single block stop command

Increment the total cutting amount counter.  
Does the total cutting amount exceed the cut  
amount Z?

## Appendix 4. Registering/Editing the Fixed Cycle Program

### 4.4 Standard Fixed Cycle Subprogram (For M system)

G1 Z#28 ;	Cutting feed
G4 P#4 ;	Dwell.
G0 Z - #14 ;	Return.
#28 = #11 + #14 ;	Define the cutting amount for block 2 and after.
END1 ;	
N1 G1 Z#3 - #29 + #28 ;	Cutting feed
G4 P#4 ;	Dwell.
#3003 = #8 ;	
G0Z - #3 - #2 ;	Return.
N2 M99%	

G74 (O841)	Reverse tap cycle
------------	-------------------

G. 1 ;	Fixed cycle block 1 movement command
1F [#30] GOTO1 ;	Check for fixed cycle invalidity.
Z#2 G#6 H#7 ;	
#2 = ##5	
#3003 = #8 OR 1 ;	Inhibit single block stop.
#3004 = #9 OR 3 ;	Invalidate feed hold/override.
G1 Z#3 ;	
G4 P#4 ;	Dwell.
M3 ;	Rotate the spindle forward.
#3900 = 1 ;	
Z - #3 ;	
#3004 = #9 ;	
G4 P#4 ;	Dwell.
M4 ;	Rotate the spindle reversely.
#3003 = #8 ;	
G0 Z - #2 ;	
N1 M99%	Return.

## Appendix 4. Registering/Editing the Fixed Cycle Program

### 4.4 Standard Fixed Cycle Subprogram (For M system)

G75 (O750)	Circle cutting cycle
------------	----------------------

```

G. 1 ;
IF [#30] GOTO 1 ;
#28=#18;
#2 = ##5
IF[#28GE0]GOTO2;
#27=3#28=-#28;
GOTO3;
N2 #27=2;
N3 #26=[#[16000+#4]+#[17000+#4]]*#99;
IF[#26GE#28]GOTO1;
Z#2G#6H#7;
#2=##5#3003=#8OR1;
G1Z#3;
#28=#28-#26#29=#28/2;
G#27X-#28I-#29;
I#28P1;
X#28I#29;
#3003=#8;
G0Z-#3-#2;
N1 M99%
```

Fixed cycle block 1 movement command.  
Check for fixed cycle invalidity.

Decide the circular direction.  
G03 circular

G02 circular

Check compensation amount

Inner circumference    half lap  
Outer circumference    one lap  
Inner circumference    half lap

Return.

G76 (O861)	Fine boring
------------	-------------

```

G. 1 ;
1F [#30] GOTO1 ;
Z#2 G#6 H#7 ;
#2 = ##5
#3003 = #8 OR 1 ;
G1 Z#3 ;
M19 ;
X#12 Y#13 ;
G0 Z - #3 - #2 ;
#3003 = #8 ;
X - #12 Y - #13 ;
M3 ;
N1 M99%
```

Fixed cycle block 1 movement command  
Check for fixed cycle invalidity.

Single block stop command

Orient the spindle.  
Shift.  
Return.

Shift.  
Rotate the spindle forward.

## Appendix 5. RS-232C I/O Device Parameter Setting Examples

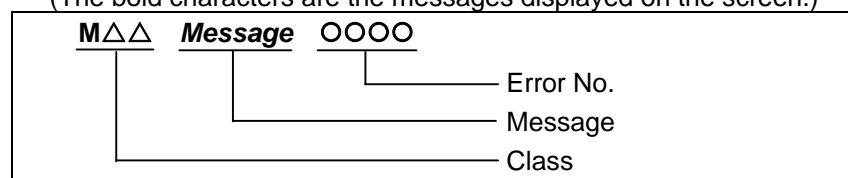
Cable connection  Parameter setting examples	NC	I/O	NC	I/O	NC	I/O	NC	I/O	NC	I/O	Follows communication protocol. (NC side)
	1 — 1 2 × 2 3 × 3 4 × 4 5 × 5 6 × 6 20 × 20 7 — 7		1 — 1 2 × 2 3 × 3 14 × 14 5 × 5 6 × 6 20 × 20 7 — 7		1 — 1 2 × 2 3 × 3 4 — 4 5 — 8 6 — 20 — 8 — 7 — 7		1 — 1 2 × 2 3 × 3 4 — 4 5 — 5 6 — 6 20 — 20 8 — 8 7 — 7		1 — 1 2 × 2 3 × 3 4 × 4 5 × 5 6 — 6 20 — 20 8 — 8 7 — 7		2 : SD 3 : RD 4 : RS 5 : CS 6 : DR 20 : ER 7 : GND
DEVICE NAME											Follows communication software.
BAUD RATE	2	2	2	2	2	2	2	2	2	2	
STOP BIT	3	3	3	3	3	3	3	3	3	3	
PARITY EFFECTIVE	0	0	0	0	0	0	0	0	0	0	
EVEN PARITY	0	0	0	0	0	0	0	0	0	0	
CHR. LENGTH	3	3	3	3	3	3	3	3	3	3	
HAND SHAKE	3	2	3	3	3	3	3	3	3	3	
DC CODE PARITY	1	0	1	1	1	1	1	1	1	1	
DC2/DC4 OUTPUT	0	0	1	0	0	1	0	1	0	1	
CR OUTPUT	0	0/1	0	0	0	0	0	0	0	0	
FEED CHR.	0	0	0	0	0	0	0	0	0	0	
PARITY V	0	0	0	0	0/1	0/1	0/1	0/1	0/1	0/1	
TIME-OUT SET	100	100	100	100	100	100	100	100	100	100	

## Appendix 6. Alarms

### 6.1 List of Alarms

#### 6.1.1 Operation Alarms

(The bold characters are the messages displayed on the screen.)



#### (1) Class: M01 Operation error

Alarms occurring due to incorrect operation by the operator during NC operation and those by machine trouble are displayed.

Error No.	Details	Remedy
<b>0001</b>	<b>Dog overrun</b> When returning to the reference position, the near-point detection limit switch did not stop over the dog, but overran the dog.	<ul style="list-style-type: none"> <li>• Increase the length of the near-point dog.</li> <li>• Reduce the reference position return speed.</li> </ul>
<b>0002</b>	<b>Some ax does not pass Z phase</b> One of the axes did not pass the Z-phase during the initial reference position return after the power was turned ON.	<ul style="list-style-type: none"> <li>• Move the detector one rotation or more in the opposite direction of the reference position, and repeat reference position return.</li> </ul>
<b>0003</b>	<b>R-pnt direction illegal</b> When manually returning to the reference position, the return direction differs from the axis movement direction selected with the AXIS SELECTION key.	<ul style="list-style-type: none"> <li>• The selection of the AXIS SELECTION key's +/- direction is incorrect. The error is canceled by feeding the axis in the correct direction.</li> </ul>
<b>0004</b>	<b>External interlock axis exists</b> 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"> <li>• As the interlock function has activated, release it before resuming operation.</li> <li>• Check the sequence on the machine side.</li> <li>• Check for broken wires in the interlock signal line.</li> </ul>
<b>0005</b>	<b>Internal interlock axis exists</b> The internal interlock state has been entered. The absolute position detector axis has been removed. A command for the manual/automatic simultaneous valid axis was issued from the automatic mode.	<ul style="list-style-type: none"> <li>• The servo OFF function is valid, so release it first.</li> <li>• An axis that can be removed has been issued, so perform the correct operations.</li> <li>• The command is issued in the same direction as the direction where manual skip turned ON, so perform the correct operations.</li> <li>• During the manual/automatic simultaneous mode, the axis commanded in the automatic mode became the manual operation axis. Turn OFF the manual/automatic valid signal for the commanded axis.</li> <li>• Turn ON the power again, and perform absolute position initialization.</li> </ul>
<b>0006</b>	<b>H/W stroke end axis exists</b> The stroke end function has activated (the input signal is "OFF") and one of the axes is in the stroke end status.	<ul style="list-style-type: none"> <li>• Move the machine manually.</li> <li>• Check for broken wires in the stroke end signal wire.</li> <li>• Check for trouble in the limit switch.</li> </ul>

Error No.	Details	Remedy
0007	<b>S/W stroke end axis exists</b> The stored stroke limit I, II, IIB or IB function has activated.	<ul style="list-style-type: none"> <li>Move it manually.</li> <li>If the stored stroke limit in the parameter is incorrectly set, correct it.</li> </ul>
0008	<b>Chuck/tailstock stroke end ax</b> The chuck/tail-stock barrier function turned ON, and an axis entered the stroke end state.	<ul style="list-style-type: none"> <li>Reset the alarm with reset, and move the machine in the reverse direction.</li> </ul>
0009	<b>Ref point return No. invalid</b> Return to the No. 2 reference position was performed before return to the No. 1 reference position was completed.	<ul style="list-style-type: none"> <li>Execute No. 1 reference position return.</li> </ul>
0019	<b>Sensor signal illegal ON</b> The sensor signal was already ON when the tool measurement mode (TLM) signal was validated. The sensor signal turned ON when there was no axis movement after the tool measurement mode (TLM) signal was validated. The sensor signal turned ON at a position within 100μm from the final entry start position.	<ul style="list-style-type: none"> <li>Turn the tool measurement mode signal input OFF, and move the axis in a safe direction.</li> <li>The operation alarm will turn OFF even when the sensor signal is turned OFF.</li> </ul> <p><b>(Note)</b> When the tool measurement mode signal input is turned OFF, the axis can be moved in either direction. Pay attention to the movement direction.</p>
0020	<b>Ref point retract invalid</b> Return to the reference position was performed before the coordinates had not been established.	<ul style="list-style-type: none"> <li>Execute reference position return</li> </ul>
0021	<b>Tool ofs invld after R-pnt</b> Reference position return was performed during tool retract return, and therefore the tool compensation amount became invalid after reference position return was completed.	<ul style="list-style-type: none"> <li>The error is cleared if the operation mode is changed to other than reference position return before the axis performs reference position return.</li> <li>The error is cleared when reference position return is completed.</li> <li>The error is cleared if reset 1 is input or the emergency stop button is pushed.</li> </ul>
0024	<b>R-pnt ret invld at abs pos alm</b> A zero point return signal was input during an absolute position detection alarm.	<ul style="list-style-type: none"> <li>Reset the absolute position detection alarm, and then perform zero point return.</li> </ul>
0025	<b>R-pnt ret invld at zero pt ini</b> A zero point return signal was input during zero point initialization of the absolute position detection system.	<ul style="list-style-type: none"> <li>Complete zero point initialization, and then perform zero point return.</li> </ul>
0030	<b>Now skip on</b> The skip signal remains input when the skip return operation changed to the measurement operation.	<ul style="list-style-type: none"> <li>Increase the skip return amount.</li> </ul>
0031	<b>No skip</b> Even though 1st skip was to the correct position, the 2nd skip could not be found.	<ul style="list-style-type: none"> <li>Check whether the measurement target has moved.</li> </ul>
0050	<b>Chopping axis R-pnt incomplete</b> The chopping axis has not completed zero point return before entering the chopping mode. All axes interlock will be applied.	<ul style="list-style-type: none"> <li>Reset or turn the chopping signal OFF, and then carry out zero point return.</li> </ul>



Error No.	Details	Remedy
0051	<b>Synchronous error excessive</b> The synchronization error of the master and slave axes exceeded the allowable value under synchronous control. A deviation exceeding the synchronization error limit value was found with the synchronization deviation detection.	<ul style="list-style-type: none"> <li>• Select the correction mode and move one of the axes in the direction in which the errors are reduced.</li> <li>• Increase the allowable value or reset it to 0 (check disabled).</li> <li>• When using simple C-axis synchronous control, set the contents of the R435 register to 0.</li> <li>• Check the parameter (#2024 synerr).</li> </ul>
0053	<b>No spindle select signal</b> Synchronous tapping command was issued when the spindle select signals (SWS) for all spindles were OFF in the multiple-spindle control II.	<ul style="list-style-type: none"> <li>• Turn ON the spindle select signal (SWS) responding to the tapping spindle before performing the synchronous tapping command.</li> </ul>
0054	<b>No spindle serial connection</b> Synchronous tapping command was issued when the spindle that the spindle select signal (SWS) was ON was not serially connected in the multiple-spindle control II.	<ul style="list-style-type: none"> <li>• Make sure the spindle select signal (SWS) for the responding spindle is ON.</li> <li>• When issuing a command, consider the machine construction.</li> </ul>
0055	<b>Spindle fwd/rvs run para err</b> Asynchronous tapping command was issued when M code of the spindle frd/rvs run command set by the parameter "#3028 sprcmm" was one of the followings in the multiple-spindle control II. <ul style="list-style-type: none"> <li>• One of M0, M1, M2, M30, M98, M99, M198</li> <li>• M code No. that commands macro interrupt signal valid/invalid</li> </ul>	<ul style="list-style-type: none"> <li>• Change the value of the parameter #3028 sprcmm.</li> </ul>
0056	<b>Tap pitch/thread number error</b> The command of the pitch/thread number is not correct in the synchronous tapping command of the multiple-spindle control II. The pitch is too small for the spindle rotation speed. Thread number is too large for the spindle rotation speed.	<ul style="list-style-type: none"> <li>• Check the pitch/thread number and rotation speed of the tapping spindle.</li> </ul>
0101	<b>No operation mode</b>	<ul style="list-style-type: none"> <li>• Check for a broken wire in the input mode signal wire.</li> <li>• Check for trouble in the mode selector switch.</li> <li>• Check the sequence program.</li> </ul>
0102	<b>Cutting override zero</b> The "cutting feed override" switch on the machine operation panel is set to zero. The override was set to "0" during a single block stop.	<ul style="list-style-type: none"> <li>• Set the "cutting feed override" switch to a value other than zero to clear the error.</li> <li>• When the "cutting feed override" switch is set to a value other than zero, check for a short circuit in the signal wire.</li> <li>• Check the sequence program.</li> </ul>

Error No.	Details	Remedy
<b>0103</b>	<b>External feed rate zero</b> "The manual feed speed" switch on the machine operation panel is set to zero when the machine is in the jog mode or automatic dry run mode. The "Manual feedrate B speed" is set to zero during the jog mode when manual feedrate B is valid. The "each axis manual feedrate B speed" is set to zero during the jog mode when each axis manual feedrate B is valid.	<ul style="list-style-type: none"> <li>• Set "the manual feed speed" switch to a value other than zero to release the error.</li> <li>• If "the manual feed speed" switch is set to a value other than zero, check for a short circuit in the signal wire.</li> <li>• Check the sequence program.</li> </ul>
<b>0104</b>	<b>F 1-digit feed rate zero</b> The F1-digit feedrate is set to zero when the F1-digit feed command is being executed.	<ul style="list-style-type: none"> <li>• Set the F1-digit feedrate on the setup parameter screen.</li> </ul>
<b>0105</b>	<b>Spindle stop</b> The spindle stopped during the synchronous feed command.	<ul style="list-style-type: none"> <li>• Rotate the spindle.</li> <li>• If the workpiece is not being cut, start dry run.</li> <li>• Check for a broken wire in the spindle encoder cable.</li> <li>• Check the connections for the spindle encoder connectors.</li> <li>• Check the spindle encoder pulse.</li> <li>• Reconsider the program. (Command, address)</li> </ul>
<b>0106</b>	<b>Handle feed ax No. illegal</b> An axis not found in the specifications was designated for handle feed or the handle feed axis was not selected.	<ul style="list-style-type: none"> <li>• Check for broken wires in the handle feed axis selection signal wire.</li> <li>• Check the sequence program.</li> <li>• Check the No. of axes listed in the specifications.</li> </ul>
<b>0107</b>	<b>Spindle rotation speed over</b> The spindle rotation speed exceeded the axis clamp speed during the thread cutting command.	<ul style="list-style-type: none"> <li>• Lower the commanded spindle rotation speed.</li> </ul>
<b>0108</b>	<b>Fixed pnt mode feed ax illegal</b> An axis not found in the specifications was designated for the fixed point mode feed or the fixed point mode feedrate is illegal.	<ul style="list-style-type: none"> <li>• Check for broken wires in the fixed mode feed axis selection signal wire and fixed point mode feedrate wire.</li> <li>• Check the fixed point mode feed specifications.</li> </ul>
<b>0109</b>	<b>Block start interlock</b> An interlock signal that locks the start of the block has been input.	<ul style="list-style-type: none"> <li>• Check the sequence program.</li> </ul>
<b>0110</b>	<b>Cutting block start interlock</b> An interlock signal that locks the start of the cutting block has been input.	<ul style="list-style-type: none"> <li>• Check the sequence program.</li> </ul>
<b>0111</b>	<b>Restart switch ON</b> The restart switch was turned ON before the restart search was completed, and the manual mode was selected.	<ul style="list-style-type: none"> <li>• Search the block to be restarted.</li> <li>• Turn OFF the restart switch.</li> </ul>
<b>0112</b>	<b>Program check mode</b> The automatic start button was pressed during program check or in program check mode.	<ul style="list-style-type: none"> <li>• Press the reset button to cancel the program check mode.</li> </ul>
<b>0113</b>	<b>Auto start in buffer correct</b> The automatic start button was pressed during buffer correction.	<ul style="list-style-type: none"> <li>• Press the automatic start button after buffer correction is completed.</li> </ul>

Error No.	Details	Remedy
0115	<b>In reset process</b> The automatic start button was pressed during resetting or tape rewinding.	<ul style="list-style-type: none"> <li>When rewinding the tape, wait for the winding to end, or press the reset button to stop the winding, and then press the automatic start button.</li> <li>During resetting, wait for resetting to end, and then press the automatic start button.</li> </ul>
0117	<b>Playback not possible</b> The playback switch was turned ON during editing.	<ul style="list-style-type: none"> <li>During editing, cancel the function by pressing the input or previous screen key, and then turn ON the playback switch.</li> </ul>
0118	<b>Turn stop in normal line ctrl</b> The turning angle at the block joint exceeded the limit during normal line control.  Normal line control type I The normal line control axis turning speed (#1523 C_feed) has not been set.  Normal line control type II When turning in the inside of the arc, the parameter "#8041 C-rot. R" setting value is larger than the arc radius.	<ul style="list-style-type: none"> <li>Check the program.</li> <li>Set the normal line control axis turning speed. (Parameter "#1523 C_feed")</li> <li>Set the C axis turning diameter smaller than the arc radius, or check the setting value of the C axis turning diameter. (Parameter "#8041 C rot. R")</li> </ul>
0120	<b>In synchronous correction mode</b> The synchronous correction mode switch was pressed in a non-handle mode.	<ul style="list-style-type: none"> <li>Select the handle or manual feed mode.</li> <li>Turn OFF the correction mode switch.</li> </ul>
0121	<b>No synchronous control option</b> The synchronous control system (register R2589) was set with no synchronous control option.	<ul style="list-style-type: none"> <li>Set 0 in register R2589.</li> </ul>
0123	<b>Computer link B not possible</b> The cycle start was attempted before resetting was completed. An attempt was made to perform computer link B operation at the second part system and following in a multi-part system.	<ul style="list-style-type: none"> <li>Perform the cycle start after resetting is completed.</li> <li>Set 0 in "#8109 HOST LINK", and then set 1 again before performing the cycle start.</li> <li>The computer link B operation cannot be performed at the second part system and following in a multi-part system.</li> </ul>
0124	<b>X/Z axes simultaneous prohibit</b> The basic axis corresponding to the inclined axis was started simultaneously in the manual mode while the inclined axis control was valid.	<ul style="list-style-type: none"> <li>Turn the inclined axis and basic axis start OFF for both axes. (This also applied for manual/automatic simultaneous start.)</li> <li>Invalidate the basic axis compensation, or command one axis at a time.</li> </ul>
0125	<b>Rapid override zero</b> The "rapid traverse override" switch on the machine operation panel is set to zero.	<ul style="list-style-type: none"> <li>Set the "rapid traverse override" switch to a value other than zero to clear the error.</li> <li>When the "rapid traverse override" switch is set to a value other than zero, check for a short circuit in the signal wire.</li> <li>Check the sequence program.</li> </ul>
0126	<b>Program restart machine lock</b> Machine lock was applied on the return axis while manually returning to the restart position.	<ul style="list-style-type: none"> <li>Release the machine lock before resuming operations.</li> </ul>

Error No.	Details	Remedy
<b>0127</b>	<b>Rot axis parameter error</b> The orthogonal coordinate axis name does not exist. The rotary axis name does not exist. The orthogonal coordinate axis name is duplicated. The number of axes that were selected to change tool length compensation along the tool axis amount exceeds the maximum number of axes. The orthogonal coordinate axis name is that of the rotary axis name.	<ul style="list-style-type: none"> <li>Review the rotational axis configuration parameters.</li> </ul>
<b>0150</b>	<b>Chopping override zero</b> The override became "0" while performing the chopping operation.	<ul style="list-style-type: none"> <li>Check the chopping override (R2530).</li> <li>Check the rapid traverse override (R2502).</li> </ul>
<b>0151</b>	<b>Command axis chopping axis</b> A chopping axis movement command was issued from the program during the chopping mode. (This alarm will not occur when the movement amount is commanded as 0.) (All axes interlock state will be applied.)	<ul style="list-style-type: none"> <li>Reset, or turn OFF the chopping signal. When the chopping signal is turned OFF, the axis will return to the reference position, and then the program movement command will be executed.</li> </ul>
<b>0153</b>	<b>Bottom dead center pos. zero</b> The bottom dead center position is set to the same position as the upper dead center position.	<ul style="list-style-type: none"> <li>Correctly set the bottom dead center position.</li> </ul>
<b>0154</b>	<b>Chopping disable for handle ax</b> Chopping was started when the chopping axis was selected as the handle axis.	<ul style="list-style-type: none"> <li>Select an axis other than the chopping axis as the handle axis, or start chopping after changing the mode to another mode.</li> </ul>
<b>0160</b>	<b>No speed set out of soft limit</b> Returned from the outside of the soft limit range for the axis with no maximum speed set for the outside of the soft limit range.	<ul style="list-style-type: none"> <li>Set the maximum speed for the outside of the soft limit range. (Parameter "#2021 out_f")</li> <li>Change the soft limit range. (Parameter "#2013 OT-" "#2014 OT+")</li> </ul>
<b>0170</b>	<b>Ill. op during T tip control</b> An attempt was made to perform an incorrect operation during tool tip center control.	<ul style="list-style-type: none"> <li>Change to the previous operation mode and reboot.</li> </ul>
<b>1005</b>	<b>G114.n command illegal</b> An attempt was made to execute G114.n during execution of G114.n. G51.2 was commanded when the G51.2 spindle-spindle polygon machining mode was already entered with a separate part system.	<ul style="list-style-type: none"> <li>Cancel with G113.</li> <li>Issue the spindle synchronous cancel signal (Y18B8: SPSYC).</li> <li>Cancel with G50.2.</li> <li>Cancel with the spindle-spindle polygon cancel signal (YCD1).</li> </ul>
<b>1007</b>	<b>Spindle in-use by synchro tap</b> The spindle is being used in synchronized tapping.	<ul style="list-style-type: none"> <li>Cancel synchronized tapping.</li> </ul>

Error No.	Details	Remedy
1026	<b>SP-C ax ctrl runs independntly</b> C axis mode command was issued for polygon machining spindle. C axis mode command was issued for synchronized tapping spindle. Polygon command was issued for synchronized tapping spindle. Spindle is being used as spindle/C axis.	<ul style="list-style-type: none"> <li>• Cancel the C axis command.</li> <li>• Cancel the polygon machining command.</li> <li>• Cancel the C axis with servo OFF.</li> </ul>
1030	<b>Synchronization mismatch</b> Different M codes were commanded in the two part systems as the synchronization M codes. Synchronization with the "!" code was commanded in another part system during M code synchronization. Synchronization with the M code was commanded in another part system during synchronization with the "!" code.	<ul style="list-style-type: none"> <li>• Correct the program so that the M codes match.</li> <li>• Correct the program so that the same synchronization codes are commanded.</li> </ul>
1031	<b>Multiple C axes select invalid</b> The C axis selection signal was changed when multiple C axes could not be selected. An axis that cannot be controlled as the multiple C axes selection was selected.	<ul style="list-style-type: none"> <li>• Check and correct the parameters and program.</li> </ul>
1032	<b>Tap retract Sp select illegal</b> Tap return was executed when a different spindle was selected. Cutting feed will wait until synchronization is completed.	<ul style="list-style-type: none"> <li>• Select the spindle for which tap cycle was halted before the tap return signal was turned ON.</li> </ul>
1033	<b>Sp-Sp polygon cut interlock</b> Cutting feed will wait until synchronization is completed.	<ul style="list-style-type: none"> <li>• Wait for synchronization to end.</li> </ul>
1034	<b>Cross machining cmnd illegal</b> Cross machining control exceeding the number of control axes was attempted. Cross machining control with duplicated axis addresses was attempted.	<ul style="list-style-type: none"> <li>• Check the parameter settings for cross machining control.</li> </ul>
1035	<b>Cross machining disable modal</b> Cross machining control was commanded for a part system in which cross machining control is disabled as shown below. <ul style="list-style-type: none"> <li>• During nose R compensation mode</li> <li>• During pole coordinate interpolation mode</li> <li>• During cylindrical interpolation mode</li> <li>• During balance cut mode</li> <li>• During fixed cycle machining mode</li> <li>• During facing turret mirror image</li> </ul>	<ul style="list-style-type: none"> <li>• Check the program.</li> </ul>

Error No.	Details	Remedy
1036	<b>Synchro ctrl setting disable</b> The synchronous control operation method selection (R2589 register) was set when the mode was not the C axis mode. The synchronous control operation method selection (R2589 register) was set in the zero point not set state.  Mirror image disable state The external mirror image or parameter mirror image was commanded during facing turret mirror image.	<ul style="list-style-type: none"> <li>Set the R2589 register to 0.</li> <li>Check the program and parameters.</li> </ul>
1037	<b>Synchro start/cancel disable</b> Synchronous control was started or canceled when synchronous control could not be started or canceled.	<ul style="list-style-type: none"> <li>Check the program and parameters.</li> </ul>
1038	<b>Move cmdnd invld to synchro ax</b> A movement command was issued to a synchronous axis in synchronous control.	<ul style="list-style-type: none"> <li>Check the program.</li> </ul>
1106	<b>Sp synchro phase calc illegal</b> The spindle synchronization phase alignment command was issued while the spindle synchronization phase calculation request signal was ON.	<ul style="list-style-type: none"> <li>Check the program.</li> <li>Check the sequence program.</li> </ul>

**(2) Class: M90 Message: Parameter set mode**

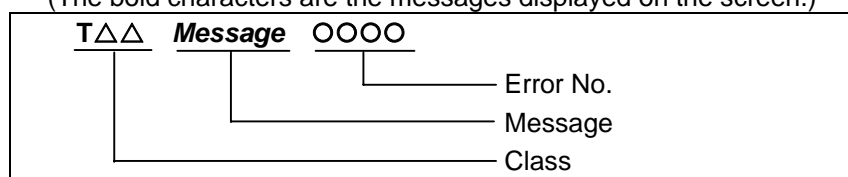
M90 Messages output when the setup parameter lock function is enabled are displayed.

Error No.	Details	Remedy
-	Setup parameter lock released The setup parameter lock is released. Automatic start is disabled when setup parameters can be set.	Refer to the manual issued by the machine tool builder.

## 6.1.2 Stop Codes

These codes indicate a status that caused the controller to stop for some reason.

(The bold characters are the messages displayed on the screen.)



## (1) Class: T01 Cycle start prohibit

This indicates the state where automatic operation cannot be started when attempting to start it from the stop state.

Error No.	Details	Remedy
0101	<b>Axis in motion</b> Automatic start is not possible as one of the axes is moving.	<ul style="list-style-type: none"> <li>Try automatic start again after all axes have stopped.</li> </ul>
0102	<b>NC not ready</b> Automatic start is not possible as the NC is not ready.	<ul style="list-style-type: none"> <li>Another alarm has occurred. Check the details and remedy.</li> </ul>
0103	<b>Reset signal ON</b> Automatic start is not possible as the reset signal has been input.	<ul style="list-style-type: none"> <li>Turn OFF the reset input signal.</li> <li>Check that the reset switch is not ON constantly due to trouble.</li> <li>Check the sequence program.</li> </ul>
0104	<b>Auto operation pause signal ON</b> The FEED HOLD switch on the machine operation panel is ON (valid).	<ul style="list-style-type: none"> <li>Check the FEED HOLD switch.</li> <li>The feed hold switch is the B contact.</li> <li>Check for broken wires in the feed hold signal wire.</li> <li>Check the sequence program.</li> </ul>
0105	<b>H/W stroke end axis exists</b> Automatic start is not possible as one of the axes is at the stroke end.	<ul style="list-style-type: none"> <li>If one of the axis' ends is at the stroke end, move the axis manually.</li> <li>Check for broken wire in the stroke end signal wire.</li> <li>Check for trouble in the stroke end limit switch.</li> </ul>
0106	<b>S/W stroke end axis exists</b> Automatic start is not possible as one of the axes is at the stored stroke limit.	<ul style="list-style-type: none"> <li>Move the axis manually.</li> <li>If an axis is not at the end, check the parameter details.</li> </ul>
0107	<b>No operation mode</b> The operation mode has not been selected.	<ul style="list-style-type: none"> <li>Select the automatic operation mode.</li> <li>Check for broken wires in the automatic operation mode (memory, tape, MDI) signal wire.</li> </ul>
0108	<b>Operation mode duplicated</b> Two or more automatic operation modes are selected.	<ul style="list-style-type: none"> <li>Check for a short circuit in the mode selection signal wire (memory, tape, MDI).</li> <li>Check for trouble in the switch.</li> <li>Check the sequence program.</li> </ul>
0109	<b>Operation mode changed</b> The automatic operation mode changed to another automatic operation mode.	<ul style="list-style-type: none"> <li>Return to the original automatic operation mode, and start automatic start.</li> </ul>

Error No.	Details	Remedy
0110	<b>Tape search execution</b> Automatic start is not possible as tape search is being executed.	<ul style="list-style-type: none"> <li>Begin automatic start after the tape search is completed.</li> </ul>
0112	<b>Restart pos. return incomplete</b> Automatic start is not possible as the axis has not been returned to the restart position.	<ul style="list-style-type: none"> <li>Manually return to the restart position.</li> <li>Turn the automatic restart valid parameter ON, and then execute automatic start.</li> </ul>
0113	<b>CNC overheat</b> Automatic start is not possible because a thermal alarm (Z53 CNC overheat) has occurred.	<ul style="list-style-type: none"> <li>The NC controller temperature has exceeded the specified temperature.</li> <li>Take appropriate measures to cool the unit.</li> </ul>
0115	<b>Cycle st. prohibit(Host comm.)</b> Automatic start cannot be executed as the NC is communicating with the host computer.	<ul style="list-style-type: none"> <li>Execute automatic start after the communication with the host computer is completed.</li> </ul>
0116	<b>Cycle st prohibit(Battery alm)</b> Automatic start cannot be executed because the voltage of the battery inserted in the NC control unit has dropped.	<ul style="list-style-type: none"> <li>Replace the battery of the NC control unit.</li> <li>Contact the service center.</li> </ul>
0138	<b>In absolute position alarm</b> A start signal was input during an absolute position detection alarm.	<ul style="list-style-type: none"> <li>Reset the absolute position detection alarm, and then input the start signal.</li> </ul>
0139	<b>In abs posn initial setting</b> A start signal was input while initializing the absolute position detector's zero point.	<ul style="list-style-type: none"> <li>Complete zero point initialization before inputting the start signal.</li> </ul>
0180	<b>Cycle start prohibit</b> Automatic start is disabled in servo auto turning valid.	<ul style="list-style-type: none"> <li>Set "0" to "#1164 ATS" when the servo auto turning is not executed.</li> </ul>
0190	<b>Cycle start prohibit</b> Automatic start is disabled because setup parameters can be set.	<ul style="list-style-type: none"> <li>Refer to the manual issued by the machine tool builder.</li> </ul>
0191	<b>Cycle start prohibit</b> Automatic start was caused during file deletion or writing.	<ul style="list-style-type: none"> <li>Cause automatic start after file deletion or writing is completed.</li> </ul>
0193	<b>Cycle st. prohibit (Term exp'd)</b> Automatic start is disabled because the valid term has been expired.	<ul style="list-style-type: none"> <li>Enter the decryption code and turn the power ON again.</li> </ul>



**(2) Class: T02 Feed hold**

The feed hold state been entered due to a condition in the automatic operation.

Error No.	Details	Remedy
<b>0201</b>	<b>H/W stroke end axis exists</b> An axis is at the stroke end.	<ul style="list-style-type: none"> <li>Manually move the axis away from the stroke end limit switch.</li> <li>The machining program must be corrected.</li> </ul>
<b>0202</b>	<b>S/W stroke end axis exists</b> An axis is at the stored stroke limit.	<ul style="list-style-type: none"> <li>Manually move the axis.</li> <li>The machining program must be corrected.</li> </ul>
<b>0203</b>	<b>Reset signal ON</b> The reset signal has been input.	<ul style="list-style-type: none"> <li>The program execution position has returned to the start of the program. Execute automatic operation from the start of the machining program.</li> </ul>
<b>0204</b>	<b>Auto operation pause signal ON</b> The FEED HOLD switch is ON.	<ul style="list-style-type: none"> <li>Resume automatic operation by pressing the "CYCLE START" switch.</li> </ul>
<b>0205</b>	<b>Operation mode changed</b> The operation mode changed to another mode during automatic operation.	<ul style="list-style-type: none"> <li>Return to the original automatic operation mode, and resume automatic operation by pressing the "CYCLE START" switch.</li> </ul>
<b>0206</b>	<b>Acc/dec time cnst too large</b> The acceleration and deceleration time constants are too large. (This problem occurs at the same time as system alarm Z59.)	<ul style="list-style-type: none"> <li>Increase the set value of the parameter "#1206 G1bF".</li> <li>Decrease the set value of the parameter "#1207 G1btL".</li> <li>Lower the cutting speed.</li> </ul>
<b>0215</b>	<b>Abs posn detect alarm occurred</b> An absolute position detection alarm occurred.	<ul style="list-style-type: none"> <li>Reset the absolute position detection alarm.</li> </ul>

**(3) Class: T03 Block stop**

This indicates that automatic operation stopped after executing one block of the program.

Error No.	Details	Remedy
<b>0301</b>	<b>Single block stop signal ON</b> The SINGLE BLOCK switch on the machine operation panel is ON. The single block or machine lock switch changed.	<ul style="list-style-type: none"> <li>Automatic operation can be resumed by turning the CYCLE START switch ON.</li> </ul>
<b>0302</b>	<b>Block stop cmnd in user macro</b> The block stop command was issued in the user macro program.	<ul style="list-style-type: none"> <li>Automatic operation can be resumed by turning the CYCLE START switch ON.</li> </ul>
<b>0303</b>	<b>Operation mode changed</b> The automatic mode changed to another automatic mode.	<ul style="list-style-type: none"> <li>Return to the original automatic operation mode, and resume automatic operation by turning the CYCLE START switch ON.</li> </ul>
<b>0304</b>	<b>MDI completed</b> The last block of MDI was completed.	<ul style="list-style-type: none"> <li>Set MDI again, and turn the CYCLE START switch ON to resume MDI operation.</li> </ul>
<b>0305</b>	<b>Block start interlock</b> The interlock signal that locks the block start is entered.	<ul style="list-style-type: none"> <li>Check the sequence program.</li> </ul>
<b>0306</b>	<b>Cutting blk start interlock</b> The interlock signal that locks the block cutting start is entered.	<ul style="list-style-type: none"> <li>Check the sequence program.</li> </ul>
<b>0310</b>	<b>Inclined Z offset change</b> Whether to validate the offset of the inclined Z-axis switched during program operation.	<ul style="list-style-type: none"> <li>Automatic operation can be restarted by turning ON the CYCLE START switch.</li> </ul>

**(4) Class: T04 Collation stop**

This indicates that collation stop was applied during automatic operation.

Error No.	Details	Remedy
<b>0401</b>	<b>Collation stop</b> Collation stop occurred.	<ul style="list-style-type: none"> <li>Automatic operation can be restarted with automatic start.</li> </ul>

**(5) Class: T10 Fin wait**

This indicates the operation state when an alarm did not occur during automatic operation, and nothing seems to have happened.

Error No.	Details																																																																																																																			
0□□□	<p>The error number is displayed while each of the completion wait modes listed in the table below is ON. It disappears when the mode is canceled.</p> <div><div><div>0□□□</div><div><div></div><div></div><div></div></div></div><div><div><div>Alarm No.</div><div>Unclamp signal wait</div><div>In dwell execution</div></div><div>(Note 2)</div><table><tr><td>0</td><td></td><td></td></tr><tr><td>1</td><td></td><td>×</td></tr><tr><td>8</td><td>×</td><td></td></tr><tr><td>9</td><td>×</td><td>×</td></tr></table></div></div> <div><table><tr><td>Alarm No.</td><td>Door open</td><td>Waiting for spindle position to be looped</td></tr><tr><td></td><td>(Note 1)</td><td></td></tr><tr><td>0</td><td></td><td></td></tr><tr><td>1</td><td></td><td>×</td></tr><tr><td>8</td><td>×</td><td></td></tr><tr><td>9</td><td>×</td><td>×</td></tr></table><table><tr><td>Alarm No.</td><td>Waiting for spindle orientation to complete</td><td>Waiting for cutting speed deceleration</td><td>Waiting for rapid traverse deceleration</td><td>Waiting for MSTB completion</td></tr><tr><td>0</td><td></td><td></td><td></td><td></td></tr><tr><td>1</td><td></td><td></td><td></td><td>×</td></tr><tr><td>2</td><td></td><td></td><td>×</td><td></td></tr><tr><td>3</td><td></td><td></td><td>×</td><td>×</td></tr><tr><td>4</td><td></td><td>×</td><td></td><td></td></tr><tr><td>5</td><td></td><td>×</td><td></td><td>×</td></tr><tr><td>6</td><td></td><td>×</td><td>×</td><td></td></tr><tr><td>7</td><td></td><td>×</td><td>×</td><td>×</td></tr><tr><td>8</td><td>×</td><td></td><td></td><td></td></tr><tr><td>9</td><td>×</td><td></td><td></td><td>×</td></tr><tr><td>A</td><td>×</td><td></td><td>×</td><td></td></tr><tr><td>B</td><td>×</td><td></td><td>×</td><td>×</td></tr><tr><td>C</td><td>×</td><td>×</td><td></td><td></td></tr><tr><td>D</td><td>×</td><td>×</td><td></td><td>×</td></tr><tr><td>E</td><td>×</td><td>×</td><td>×</td><td></td></tr><tr><td>F</td><td>×</td><td>×</td><td>×</td><td>×</td></tr></table></div>	0			1		×	8	×		9	×	×	Alarm No.	Door open	Waiting for spindle position to be looped		(Note 1)		0			1		×	8	×		9	×	×	Alarm No.	Waiting for spindle orientation to complete	Waiting for cutting speed deceleration	Waiting for rapid traverse deceleration	Waiting for MSTB completion	0					1				×	2			×		3			×	×	4		×			5		×		×	6		×	×		7		×	×	×	8	×				9	×			×	A	×		×		B	×		×	×	C	×	×			D	×	×		×	E	×	×	×		F	×	×	×	×
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<div><div><div>(Note 1)</div><div>This mode is enabled by the door interlock function.</div></div><div><div>(Note 2)</div><div>The system is waiting for the index table indexing unclamp signal to turn ON or OFF</div></div></div>																																																																																																																				

### 6.1.3 Servo/Spindle Alarms

This section describes alarms occurred by the errors in the servo system such as the drive unit, motor and encoder, etc. The alarm message, alarm No. and axis name will display on the alarm message screen. The axis where the alarm occurred and the alarm No. will also display on the servo monitor screen and the spindle monitor screen respectively. If several alarms have occurred, up to two errors per axis will display on the servo monitor screen and the spindle monitor screen respectively.

(Note 1) The alarm class and alarm reset class combinations are preset.

Alarm class	Alarm reset class	Resetting methods
S01	PR	After removing the cause of the alarm, reset the alarm by turning the NC power ON again.
S02	PR	After correcting the parameter, reset the alarm by turning ON the NC power again.
S03	NR	After removing the cause of the alarm, reset the alarm by inputting the NC RESET key.
S04	AR	After removing the cause of the alarm, reset the alarm by turning the drive unit power ON again.
S51	-	This is cleared if a correct value is set.
S52	-	-

(Note 2) The resetting method may change according to the alarm class.

For example, even if "S03 SERVO ALARM: NR" is displayed, it may be necessary to turn the NC power ON again.

(The bold characters are the messages displayed on the screen.)



#### (1) Class: S01/S03/S04 Servo alarm

Alarm No.	Message	Meaning
0010	<b>Insufficient voltage</b>	Insufficient PN bus voltage was detected in main circuit.
0011	<b>Axis selection error</b>	Setting of the axis No. selection switch is incorrect.
0012	<b>Memory error 1</b>	A CPU error or an internal memory error was detected during the power ON self-check.
0013	<b>Software processing error 1</b>	Software processing has not finished within the specified time.
0014	<b>Software processing error 2</b>	Software processing has not finished within the specified time.
0015	<b>Memory error 2</b>	A CPU error or an internal memory error was detected during the power ON self-check.
0016	<b>Magnet pole pos detect error</b>	An error was detected in the magnetic pole detection for controlling the motor.
0017	<b>A/D converter error</b>	An error was detected in the A/D converter for detecting current FB.
0018	<b>Motor side dtc: Init commu err</b>	Initial communication with the motor end detector failed.

Alarm No.	Message	Meaning
0019	Detector commu err in syn cont	Initial communication with the motor end detector on master axis failed when setting closed-loop current synchronous control. Or the communication was interrupted.
001A	Machine side dtc: Init comu er	Initial communication with the linear scale or the ball screw end detector failed.
001B	Machine side dtc: Error 1	The machine side detector detected an error. As details defer from detector to detector, refer to the separate table (1).
001C	Machine side dtc: Error 2	
001D	Machine side dtc: Error 3	
001E	Machine side dtc: Error 4	
001F	Machine side dtc: Commu error	An error was detected in communication data with the linear scale or the ball screw end detector. Or the communication was interrupted.
0020	Motor side dtc: No signal	When an excessive error alarm occurred, no signal from the motor side detector was detected.
0021	Machine side dtc: No signal	When an excessive error alarm occurred, no signal from the machine side detector was detected.
0023	Excessive speed error	A difference between the speed command and speed feedback was continuously exceeding 50 r/min for longer than the setting time.
0024	Grounding	The motor power cable is in contact with FG (Frame Ground).
0025	Absolute position data lost	The absolute position was lost, as the backup battery voltage dropped in the absolute position detector.
0026	Unused axis error	A power module error occurred in the axis whose axis No. selection switch was set to "F"(free axis).
0027	Machine side dtc: Error 5	The machine side detector detected an error. As details defer from detector to detector, refer to the separate table (1).
0028	Machine side dtc: Error 6	
0029	Machine side dtc: Error 7	
002A	Machine side dtc: Error 8	
002B	Motor side dtc: Error 1	The motor side detector (linear scale in the case of linear motor) detected an error. As details defer from detector to detector, refer to the separate table (1).
002C	Motor side dtc: Error 2	
002D	Motor side dtc: Error 3	
002E	Motor side dtc: Error 4	
002F	Motor side dtc: Commu error	An error was detected in communication data with the motor end detector or with the linear scale of a linear servo system. Or the communication was interrupted.
0030	Over regeneration	Over-regeneration detection level became over 100%. The regenerative resistor is overloaded.
0031	Overspeed	The motor was detected to rotate at a speed exceeding the allowable speed. (In the case of linear motor, it was detected to move at a speed exceeding the allowable speed.)

Alarm No.	Message	Meaning
0032	Power module overcurrent	Overcurrent protection function in the power module has started its operation.
0033	Overvoltage	PN bus voltage in main circuit exceeded the allowable value.
0034	NC-DRV commu: CRC error	An error was detected in the data received from the CNC.
0035	NC command error	The travel command data that was received from the CNC was excessive.
0036	NC-DRV commu: Commu error	The communication with the CNC was interrupted.
0037	Initial parameter error	An incorrect parameter was detected among the parameters received from the CNC at the power ON.
0038	NC-DRV commu: Protocol error 1	An error was detected in the communication frames received from the CNC.
0039	NC-DRV commu: Protocol error 2	An error was detected in the axis information data received from the CNC.
003A	Overcurrent	Excessive current was detected in the motor drive current.
003B	Power module overheat	Thermal protection function in the power module has started its operation.
003C	Regeneration circuit error	An error was detected in the regenerative transistor or in the regenerative resistor.
003D	Spindle speed blocked	The spindle motor failed to rotate faster than 45 r/min, even when the max. torque command was given.
003E	Spindle speed overrun	1. The spindle motor speed feedback was detected to be accelerated exceeding the commanded speed. 2. The spindle motor was detected to be rotated at a speed exceeding the parameter value, while the speed command was "0" (including the case of operation stoppage during the position control).
0040	Detector select unit swtch err	An error was detected in the motor switching signals that were received from the detector selection unit, while controlling one drive unit and two motors.
0041	Detector select unit commu err	An error was detected in the communication with the detector selection unit, while controlling one drive unit and two motors.
0042	Feedback error 1	An error was detected in the feedback signals of the position detector in a servo system, or in PLG's feedback signals in a spindle system.
0043	Feedback error 2	Excessive difference was detected in position data between the motor end detector and the machine end detector in a servo system. In a spindle system, an error was detected in the encoder feedback signals.
0044	Inappropriate coil for C axis	When using a coil changeover motor, C-axis was controlled while the high-speed coil was selected.
0045	Fan stop	A cooling fan built in the drive unit stopped, and the loads on the unit exceeded the specified value.
0046	Motor overheat	Thermal protection function of the motor or in the detector, has started its operation.
0047	Regenerative resistor overheat	Thermal protection function of the regenerative resistor, has started its operation.

Alarm No.	Message	Meaning
0048	Motor side dtc: Error 5	The motor side detector (linear scale in the case of linear motor) detected an error.  As details defer from detector to detector, refer to the separate table (1).
0049	Motor side dtc: Error 6	
004A	Motor side dtc: Error 7	
004B	Motor side dtc: Error 8	
004C	Current err at mag pole detect	A current error was detected in the IPM spindle motor when the initial magnetic pole was being formed.
004E	NC command mode error	The mode outside the specification was input in spindle control mode selection.
004F	Instantaneous power interrupt	The power was momentarily interrupted.
0050	Overload 1	Overload detection level became over 100%. The motor or the drive unit is overloaded.
0051	Overload 2	Current command of more than 95% of the unit's max. current was being continuously given for longer than 1 second in a servo system. In a spindle system, current command of more than 95% of the motor's max. current was being continuously given for longer than 1 second.
0052	Excessive error 1	A difference between the actual and theoretical motor positions during servo ON exceeded the setting value.
0053	Excessive error 2	A difference between the actual and theoretical motor positions during servo OFF exceeded the setting value.
0054	Excessive error 3	When an excessive error 1 occurred, detection of the motor current failed.
0055	External emergency stop error	There is no contactor shutoff command, even after 30 seconds has passed since the external emergency stop was input.
0058	Collision detection 1: G0	When collision detection function was valid, the disturbance torque in rapid traverse (G0) exceeded the collision detection level.
0059	Collision detection 1: G1	When collision detection function was valid, the disturbance torque in cutting feed (G1) exceeded the collision detection level.
005A	Collision detection 2	When collision detection function was valid, the command torque reached the max. Motor torque.
005B	Sfty obsrvation: Cmd spd err	In safety monitoring mode, the command speed was detected to exceed the safe speed.
005C	Orientation feedback error	After orientation was achieved, a difference between the command and feedback exceeded the parameter setting.
005D	Sfty obsrvation: Door stat err	In safety monitoring mode, the door state signal from the NC and the same signal from the drive unit don't match. Otherwise, door open state was detected in normal mode.
005E	Sfty obsrvation: FB speed err	In safety monitoring mode, the motor speed was detected to exceed the safe speed.
005F	External contactor error	A contact of the external contactor is welding. Or the contactor fails to be ON during ready ON.
0060	Pw sply:Inst pw interpt(DC24V)	It was detected that the 24VDC power supply lowered.
0061	Pw sply: Pwr module overcurnt	Overcurrent protection function in the power module has started its operation.

Alarm No.	Message	Meaning
0062	Pw sply: Frequency error	The input power supply frequency increased above the specification range.
0063	Pw sply: Supplement regen err	The supplementary regenerative transistor is being ON.
0065	Pw sply: Rush relay error	A resistor relay for rush short circuit fails to be ON.
0067	Pw sply: Phase interruption	An open-phase condition was detected in input power supply circuit.
0068	Pw sply: Watchdog	The system does not operate correctly.
0069	Pw sply: Grounding	The motor power cable is in contact with FG (Frame Ground).
006A	Pw sply: Ext contactor weld	A contact of the external contactor is welding.
006B	Pw sply: Rush relay welding	A resistor relay for rush short circuit fails to be OFF.
006C	Pw sply: Main circuit error	An error was detected in charging operation of the main circuit capacitor.
006D	Pw sply: Parameter error	The capacity of the power supply unit and the regenerative resistor type that was set in the parameter are mismatched.
006E	Pw sply: Memory error/AD error	An error was detected in the internal memory or A/D converter.
006F	Power supply error	No power supply is connected to the drive unit, or a communication error was detected.
0070	Pw sply: Ext emergency stop err	A mismatch of the external emergency stop input and CNC emergency stop input continued for 30 seconds.
0071	Pw sply: Instant pwr interrupt	The power was momentarily interrupted.
0072	Pw sply: Fan stop	A cooling fan built in the power supply unit stopped, and overheat occurred in the power module.
0073	Pw sply: Over regeneration	Over-regeneration detection level became over 100%. The regenerative resistor is overloaded. This alarm cannot be reset for 15 min from the occurrence. Leave the drive system energized for more than 15 min, then turn the power ON to reset the alarm.
0074	Pw sply: Regen resist overheat	Thermal protection function of the regenerative resistor, has started its operation.
0075	Pw sply: Overvoltage	L+ and L- bus voltage in main circuit exceeded the allowable value. As the voltage between L+ and L- is high immediately after this alarm, another alarm may occur if this alarm is reset in a short time. Wait more than 5 min before resetting so that the voltage drops.
0076	Pw sply: Ext EMG stop set err	As for the external emergency stop settings, the setting on the rotary switch and the parameter setting are mismatched.
0077	Pw sply: Power module overheat	Thermal protection function in the power module has started its operation.
007F	Drv unit pw supply restart req	A mismatch of program mode selection was detected. Turn the drive unit power ON again.
0087	Drive unit communication error	Answers from a drive unit connected to the power supply stopped.
0088	Watchdog	The system does not operate correctly.

Separate table (1)

Alarm number when motor end is connected		002B	002C	002D	002E
Alarm number when machine end is connected		001B	001C	001D	001E
Detector type	OSA105	CPU error	LED error	Data error	-
	OSA166		-		-
	MDS-B-HR		-		-
Meaning of alarm		A CPU initial error was detected.	Deterioration of the LED was detected.	An error was detected in the data.	-

Alarm number when motor end is connected		0048	0049	004A	004B
Alarm number when machine end is connected		0027	0028	0029	002A
Detector type	OSA105	-	-	-	-
	OSA166	-	-	-	-
	MDS-B-HR	Connection error	Communication error	Judgment error	Magnetic error
Meaning of alarm		An error was detected in the connection with the analog output linear scale.	An error was detected in the communication with the serial output linear scale.	The linear scale analog frequency cycle could not be judged.	An error was detected in the magnetic data for the linear servo system.

Alarm number when motor end is connected		002B	002C	002D	002E
Alarm number when machine end is connected		001B	001C	001D	001E
Detector type	TS5690	Initialization error	Waveform error	-	-
	TS5691			-	-
Meaning of alarm		An initialization error was detected when the power was turned ON.	An error was detected in the A, B, Z analog signal waveform.	-	-

Alarm number when motor end is connected		0048	0049	004A	004B
Alarm number when machine end is connected		0027	0028	0029	002A
Detector type	TS5690	-	Overspeed	-	Relative position data error
	TS5691	-		-	
Meaning of alarm		-	The tolerable rotation speed was exceeded.	-	An error was detected in the relative position data.



Alarm number when motor end is connected		002B	002C	002D	002E
Alarm number when machine end is connected		001B	001C	001D	001E
Detector type	Manufacturer name				
AT342	Mitsutoyo	Initialization error	EEPROM error	Photo-electric type, static capacity data mismatch	ROM/RAM error
AT343					
AT543					
LC191M	Relative/absolute position data mismatch				
LC491M					
RCN723					
RCN223					
ERM280		-	-		
MJ831	Sony	-	-	-	-
ADB-20J60	MHI	Faulty mounting accuracy	-	Detection position deviated	Scale disconnected
FMD	Futaba Denshi Kogyo	-	-	-	-

Alarm number when motor end is connected		0048	0049	004A	004B
Alarm number when machine end is connected		0027	0028	0029	002A
Detector type	Manufacturer name				
AT342	Mitsutoyo	CPU error	Photo-electric type overspeed	Static capacity type error	Photo-electric type error
AT343					
AT543					
LC191M	Heidenhain		Overspeed	Absolute position data error	Absolute position data error
LC491M					
RCN723					
RCN223					
ERM280					
MJ831	Sony	-	-	-	Encoder error
ADB-20J60	MHI	-	-	Gain fault	Phase fault
FMD	Futaba Denshi Kogyo	-	-	Waveform error	Excessive speed

**(2) Class: S02 Message: Initial parameter error**

An error was found in the parameters transmitted from the controller to the drive unit when the power was turned ON.

Remove the cause of the alarm, and then reset the alarm by turning the controller power OFF once.

Alarm No.	Details	Remedy
<b>2201 to 2264</b>	The servo parameter setting data is illegal. The alarm No. is the No. of the servo parameter where the error occurred.	Check the descriptions for the appropriate servo parameters and correct them.
<b>2301</b>	The number of constants to be used in the following functions is too large: <ul style="list-style-type: none"> <li>• Electronic gears</li> <li>• Position loop gain</li> <li>• Speed feedback conversion</li> </ul>	Check that all the related parameters are specified correctly. sv001:PC1, sv002:PC2, sv003:PGN1 sv018:PIT, sv019:RNG1, sv020:RNG2
<b>2302</b>	When high-speed serial incremental detector (OSE104, OSE105) is connected, parameters for absolute position are set to ON. Set the parameters for absolute position detection to OFF. To detect an absolute position, replace the incremental specification detector with an absolute position detector.	Check that all the related parameters are specified correctly. sv017:SPEC, sv025:MTYP
<b>2303</b>	No servo option is found. The closed loop (including the ball screw-end detector) or dual feedback control is an optional function.	Check that all the related parameters are specified correctly. sv025:MTYP/pen sv017:SPEC/dfbx
<b>2304</b>	No servo option is found. The SHG control is an optional function.	Check that all the related parameters are specified correctly. sv057:SHGC sv058:SHGCsp
<b>2305</b>	No servo option is found. The adaptive filtering is an optional function.	Check that all the related parameters are specified correctly. sv027:SSF1/aflt
<b>13001 to 13256</b>	Parameter error The spindle parameter setting data is illegal. The alarm No. is the No. of the spindle parameter where the error occurred.	Check the descriptions for the appropriate spindle parameters and correct them. Refer to Alarm No.37 in Spindle Drive Maintenance Manual.

**(3) Class: S51 Message: Parameter error**

This warning is displayed if a parameter outside the tolerance range is set.

Illegal settings will be ignored.

This alarm will be reset when a correct value is set.

Alarm No.	Details	Remedy
<b>2201 to 2264</b>	Servo parameter setting data is illegal. The alarm No. is the No. of the servo parameter where the warning occurred.	Check the descriptions for the appropriate servo parameters and correct them.
<b>13001 to 13256</b>	Spindle parameter setting data is illegal. The alarm No. is the No. of the spindle parameter where the warning occurred.	Check the descriptions for the appropriate spindle parameters and correct them. Refer to Spindle Drive Maintenance Manual.

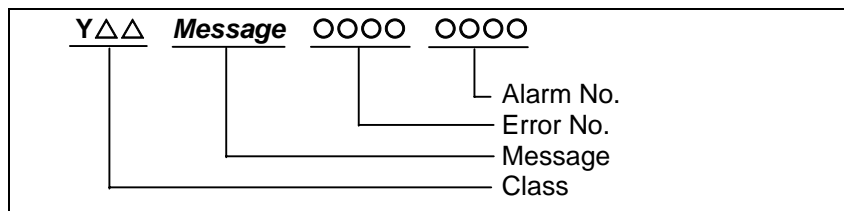
**(4) Class: S52 Servo warning**

Displays servo and spindle tool warnings.

<b>Alarm No.</b>	<b>Message</b>	<b>Meaning</b>
<b>0093</b>	<b>Init abs pos fluctuation</b>	The position data have fluctuated during the absolute position initializing.
<b>0096</b>	<b>Scale feedback error</b>	An excessive deviation was detected between the motor end detector and MP scale feedback data in a MP scale absolute position detection system.
<b>0097</b>	<b>Scale offset error</b>	An error was detected in the offset data received from the MP scale in a MP scale absolute position detection system.
<b>009B</b>	<b>Detector converting unit: Magnetic pole shift warning</b>	An error was detected in the shift distance of the magnetic pole in a linear servo system.
<b>009E</b>	<b>Absolute position detector: Revolution counter error</b>	An error was detected in the revolution counter of the absolute position detector. The absolute position data cannot be compensated.
<b>009F</b>	<b>Battery voltage drop</b>	The battery voltage that is supplied to the absolute position detector dropped. The absolute position data is retained.
<b>00A6</b>	<b>Fan stop warning</b>	A cooling fan built in the drive unit stopped.
<b>00A8</b>	<b>Turret indexing warning</b>	The designated position shift amount of turret indexing is outside the setting range.
<b>00A9</b>	<b>Orientation feedback warning</b>	As an orientation feedback error occurred, the retrial has been conducted.
<b>00E0</b>	<b>Overregeneration warning</b>	Over-regeneration detection level exceeded 80%.
<b>00E1</b>	<b>Overload warning</b>	Overload detection level exceeded 80%.
<b>00E2</b>	<b>Continuous high-speed revolution warning</b>	The motor was continuously rotated at a speed exceeding the rated speed.
<b>00E3</b>	<b>Absolute position counter warning</b>	Deviation between the absolute and relative position data was detected.
<b>00E4</b>	<b>Set parameter warning</b>	An incorrect parameter was detected among the parameters received from the CNC.
<b>00E6</b>	<b>Control axis detachment warning</b>	Control axis detachment was commanded.
<b>00E7</b>	<b>In NC emergency stop state</b>	Emergency stop was input from the CNC.
<b>00E8</b>	<b>Power supply: Over supplementary regeneration frequency</b>	Regeneration that are beyond the power supply limitation has frequently occurred.
<b>00E9</b>	<b>Instantaneous power interruption warning</b>	The power was momentarily interrupted.
<b>00EA</b>	<b>In external emergency stop state</b>	External emergency stop signal was input.
<b>00EB</b>	<b>Power supply: Over regeneration warning</b>	Over-regeneration detection level exceeded 80%.
<b>00EE</b>	<b>Pw sply: Fan stop warning</b>	A cooling fan built in the power supply unit stopped.

## 6.1.4 MCP Alarm

An error has occurred in the drive unit and other interfaces. (The bold characters are the messages displayed on the screen.)



## (1) Class: Y02 System alarm

An error occurred in the data transmitted between the MCP and drive unit after the power was turned ON.

Error No.	Details		Remedy
0050	<b>System alm: Process time over</b>		The software or hardware may be damaged. Contact the service center.
0051	<b>Alarm No.</b>		A communication error has occurred between the controller and drive unit. <ul style="list-style-type: none"> <li>Take measures against noise.</li> <li>Check that the communication cable connector between the controller and drive unit and one between the drive units are tight.</li> <li>Check whether the communication cable between the controller and drive unit and one between the drive units are disconnected.</li> <li>A drive unit may be faulty. Take a note of the 7-segment LED contents of each drive unit and report to the Service Center.</li> </ul>
	<input type="checkbox"/> <b>03</b>	<b>SV commu er: Data ID error</b> (4 continuous times) <input type="checkbox"/> : Channel No. (0 to) <input checked="" type="checkbox"/> : Drive unit rotary switch No. (0 to)	
	<input type="checkbox"/> <b>04</b>	<b>SV commu er: Recv frame No.</b> (4 continuous times) <input type="checkbox"/> : Channel No. (0 to) <input checked="" type="checkbox"/> : Number of reception frame -1 (0 to)	
	<input type="checkbox"/> 005	<b>SV commu er: Commu error</b> <input type="checkbox"/> : Channel No. (0 to)	
	<input type="checkbox"/> 006	<b>SV commu er: Connect error</b> <input type="checkbox"/> : Channel No. (0 to)	
	<input type="checkbox"/> <b>20</b>	<b>SV commu er: Init commu error</b> The drive unit could not shift to the initial communication run time and stopped. <input type="checkbox"/> : Channel No. (0 to) <input checked="" type="checkbox"/> : Drive unit rotary switch No. (0 to)	
	<input type="checkbox"/> <b>30</b>	<b>SV commu er: Node detect error</b> No response from drive unit to the request from NC when setting network configuration. <input type="checkbox"/> : Channel No. (0 to) <input checked="" type="checkbox"/> : Station No. (0 to)	

**(Note)** When two or more "Y02 System alarms" occur at the same time, only the alarm which occurs first is displayed.

**(2) Class: Y03 Message: Drive unit unequipped**

The drive unit is not correctly connected.

Error No.	Details	Remedy
<b>Alphabet (axis name)</b>	Servo axis drive unit not mounted	Check the drive unit mounting state. <ul style="list-style-type: none"> <li>• Check the end of the cable wiring.</li> <li>• Check the cable for broken wires.</li> <li>• Check the connector insertion.</li> <li>• The drive unit input power is not being input.</li> <li>• The drive unit axis No. switch is illegal.</li> </ul>
<b>1 to 4</b>	PLC axis drive unit not mounted	
<b>S</b>	No.1 spindle axis drive unit not mounted	
<b>T</b>	No.2 spindle axis drive unit not mounted	
<b>M</b>	No.3 spindle axis drive unit not mounted	
<b>N</b>	No.4 spindle axis drive unit not mounted	

**(3) Class : Y05 Message: Initial parameter error**

Details	Remedy
There is a problem in the value set for the number of axes or the number of part systems.	Check the value set for the corresponding parameters. #1001 SYS_ON #1002 axisno #1039 spinno, etc.

**(4) Class: Y06 Message: mcp\_no setting error**

There are differences in the MCP and axis parameters when the NC power is turned ON.

Error No.	Details	Remedy
<b>0001</b>	There is a skipped number in the channels.	Check the values set for the following parameters. #1021 mcp_no #3031 smcp_no
<b>0002</b>	The random layout setting is duplicated.	
<b>0003</b>	The drive unit fixed setting "0000" and random layout setting "****" are both set.	
<b>0004</b>	The spindle/C axis "#1021 mcp_no" and "#3031 smcp_no" are not set to the same values.	
<b>0005</b>	A random layout is set for the "#1154 pdoor" =1 two-part system.	
<b>0006</b>	The channel No. parameter is not within the setting range.	

**(5) Class: Y07 Message: Too many axes connected**

The number of connected axes exceeds the number allowed in the system.

(Alarm No.) <div style="display: flex; align-items: center; margin-bottom: 10px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">0</div> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">0</div> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;"></div> <div style="border: 1px solid black; padding: 2px 5px;"></div> </div> <div style="display: flex; align-items: center;"> <div style="border-left: 1px solid black; border-right: 1px solid black; height: 20px; margin-right: 10px;"></div> <div style="display: flex; flex-direction: column; align-items: center;"> <div style="width: 100%; border-bottom: 1px solid black; margin-bottom: 5px;"></div> <div style="width: 100%; border-bottom: 1px solid black;"></div> </div> <div style="margin-left: 10px;"> <p>Exceeded number of axes at drive unit interface channel 1</p> <p>Exceeded number of axes at drive unit interface channel 2</p> </div> </div>		
Alarm No.	Details	Remedy
0000 to 00FF	<p>The number of axes connected to each channel exceeds the maximum number of connectable axes.</p> <p>The exceeded number of axes per channel is displayed as alarm No.</p> <p>This alarm occurs when the drive unit is connected only with the 2nd channel without connecting with the 1st channel.</p>	Remove connected axes from the channel whose alarm No. is other than 0 for the number displayed as the alarm No. Keep the number of connected axes to or less than the maximum that can be connected.

**(Note 1)** The number of axes is limited per each drive unit interface channel.

**(Note 2)** Maximum number of axes that can be connected differs depending on whether or not an expansion unit is available or the setting of "#11012 16 axes for 1ch". The maximum number of connectable axes is as shown below.

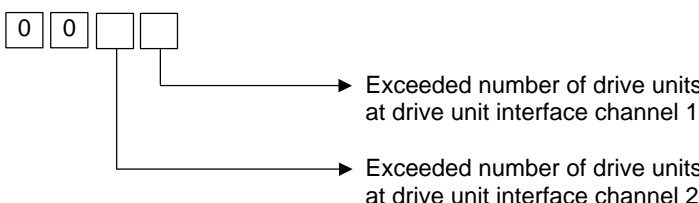
Extension unit	#11012 16 axes for 1ch	Maximum number of axes to be connected (Per 1 channel)
Yes	0/1	8 axes
No	0	
	1	16 axes

**(Note 3)** If this alarm occurs, the alarm "Y03 Message: Drive unit unequipped" will not occur.

**(Note 4)** This alarm is displayed taking precedence over the alarm "Y08 Too many drive units connected" and "Y09 Too many axisno connected".

**(6) Class: Y08 Message: Too many drive units connected**

The number of connected drive units exceeds the number allowed in the system.

(Alarm No.) 		
Alarm No.	Details	Remedy
0000 to 00FF	<p>The number of drive units connected to each channel exceeds 8.</p> <p>The exceeded number of drive units per channel is displayed as alarm No.</p>	Remove drive units from the channel whose alarm No. is other than 0 for the number displayed as the alarm No. Keep the number of connected drive units to 8 or less.

**(Note 1)** The number of the drive unit which can be connected with each channel is 8 regardless of the expansion unit (FCU7- EX891 + HN552). However, the drive unit is not counted when all the axes connected to it are invalid.

**(Note 2)** If this alarm occurs, the alarm "Y03 Message: Drive unit unequipped" will not occur.

**(Note 3)** The alarm "Y07 Too many axes connected" and "Y09 Too many axisno connected" are displayed taking precedence over this alarm.

**(7) Class: Y09 Message: Too many axisno connected**

The connected axes No. (drive unit's rotary switch No.) is bigger than the No. allowed in the system.

(Alarm No.) <div style="display: flex; align-items: center; margin-top: 10px;"> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">0</div> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;">0</div> <div style="border: 1px solid black; padding: 2px 5px; margin-right: 5px;"></div> <div style="border: 1px solid black; padding: 2px 5px;"></div> </div> <div style="margin-top: 10px;"> <div style="display: flex; align-items: center; margin-bottom: 10px;"> <div style="border-left: 1px solid black; height: 20px; margin-right: 5px;"></div> <div style="margin-left: 10px;">→ "1" when the axis No. at drive unit interface channel 1 is too big</div> </div> <div style="display: flex; align-items: center;"> <div style="border-left: 1px solid black; height: 20px; margin-right: 5px;"></div> <div style="margin-left: 10px;">→ "1" when the axis No. at drive unit interface channel 2 is too big</div> </div> </div>		
Alarm No.	Details	Remedy
0000 to 0011	The No. of the axis (drive unit's rotary switch No.) connected to each channel is bigger than the No. allowed.	For the channel whose alarm No. is 1, keep the axis No. (drive unit's rotary switch No.) not bigger than the No. allowed.

**(Note 1)** The axis No. is limited per each drive unit interface channel.

**(Note 2)** The biggest allowed connected axis No. differs depending on whether or not an expansion unit is available or the setting of "#11012 16 axes for 1ch". The biggest connectable axis No. is as shown below.

Extension unit	#11012 16 axes for 1ch	Highest allowed connected axis No. (Per 1 channel)
Yes	0/1	0 to 7
No	0	
	1	0 to F

**(Note 3)** If this alarm occurs, the alarm "Y03 Message: Drive unit unequipped" will not occur.

**(Note 4)** This alarm is displayed taking precedence over the alarm "Y08 Too many drive units connected".

**(Note 5)** The alarm "Y07 Too many axes connected" is displayed taking precedence over this alarm.



**(8) Class: Y20 Safety observation alarm**

When this alarm is output, emergency stop mode is applied.

Refer to "remedy" of each alarm as to how to cancel the alarm.

Error No.	Alarm No.	Details	Remedy
0001	Axis name	<b>Parameter compare error</b> The speed monitoring parameter in the NC and the parameter transmitted to the drive unit are not matched. The name of the axis with an error is displayed.	The NC or the servo drive unit may be damaged. Contact the service center.
0002	Axis name	<b>Sfty obsrvation: Cmd spd err</b> The speed exceeding the speed set with the parameter was commanded during the speed monitoring mode. The name of the axis with an error is displayed.	Check the speed monitoring parameter and the user PLC. Restart the NC.
0003	Axis name	<b>Sfty obsrvation: FB pos err</b> The commanded position transmitted to the servo drive unit from NC and the feedback position to be received from the servo drive unit are totally different during the speed monitoring mode. The name of the axis with an error is displayed.	The NC or the servo drive unit may be damaged. Contact the service center.
0004	Axis name	<b>Sfty obsrvation: FB speed err</b> Actual rotation speed of the motor is exceeding the speed set with speed monitoring parameter during the speed monitoring mode. The name of the axis with an error is displayed.	Check the speed observation parameter and the user PLC. Restart the NC.
0005	Door No.	<b>Door signal: Input mismatch</b> Door state signals on the NC side and the drive side do not match. It may be caused by the followings: <ul style="list-style-type: none"> <li>• Cable disconnection</li> <li>• Damaged door switch</li> <li>• Damaged NC or servo drive unit</li> </ul>	Check the cable. Check the door switch. Restart the NC.
0006	Door No.	<b>No spd obsv mode in door open</b> The door open state was detected when the speed monitoring mode was invalid. The causes may be same as the ones for 0005 (Door signal: Input mismatch). Also the user PLC may not be correct.	Check the user PLC. Restart the NC.

Error No.	Alarm No.	Details	Remedy
0007	Axis name	<b>Speed obsv: Para incompatible</b> Two speed monitoring parameters are not matched at the rising edge of the speed monitoring mode signal. The name of the axis with an error is displayed.	Change the relevant parameters so that the two speed monitoring parameters match. Restart the NC.
0008	Contact No.	<b>Contact welding detected</b> Contact welding was detected.	Make sure that contactor's auxiliary b contact signal is output correctly to the device set on "#1380 MC_dp1" and "#1381 MC_dp2". If welding, replace the contactor. Restart the NC.
0009	-	<b>No spec: Safety observation</b> The servo parameter and the spindle parameter of the speed monitor are set for a system with no safety observation option.	Turn OFF the servo parameter SV113/bitF, the spindle parameter SP229/bitF and the spindle type servo parameter SV113/bitF. Then, restart the NC.
0010	-	<b>SDIO connector input volt err</b> 24VDC power is not supplied to SDIO connector correctly. (SDIO 4A pin supply voltage was dropped to 16V or less, or 1ms or more instant power interrupt was detected.) In this case, "Pw sply:Inst pw interpt(DC24V)" alarm occurs because the contactor control output signal cannot be controlled. This state remains until restarting the NC even if the cause of the alarm has been removed.	Check the wiring. Supply 24VDC power to the SDIO connector. Restart the NC.

**(9) Class: y21 Safety observation warning**

The warning will be cancelled when the cause of the warning is removed.

Error No.	Alarm No.	Details	Remedy
0001	Axis name	<b>Speed obsv signal: Speed over</b> The speed exceeds the safety speed limit when the speed monitoring mode signal is ON. The name of the axis with an error is displayed.	When decelerated, the warning will be removed, and the speed monitor will be started.

**(10) Class: Y51 Parameter error**

An error occurred in a parameter that causes an alarm while the control axis was operating.

Error No.	Details	Remedy
<b>0001</b>	<b>Parameter G0tL illegal</b> The time constant has not been set or the setting exceeded the setting range.	• Check "#2004 G0tL".
<b>0002</b>	<b>Parameter G1tL illegal</b> The time constant has not been set or the setting exceeded the setting range.	• Check "#2007 G1tL".
<b>0003</b>	<b>Parameter G0t1 illegal</b> The time constant has not been set or the setting exceeded the setting range.	• Check "#2005 G0t1".
<b>0004</b>	<b>Parameter G1t1 illegal</b> The time constant has not been set or the setting exceeded the setting range.	• Check "#2008 G1t1".
<b>0009</b>	<b>Parameter grid space illegal</b>	• Check "#2029 grspc".
<b>0012</b>	<b>Parameter stapt1-4 illegal</b> The time constant has not been set or the setting exceeded the setting range.	• Check spindle parameters" #3017 stapt1" to "#3020 stapt4".
<b>0015</b>	<b>Parameter skip_tL illegal</b> The time constant has not been set or the setting exceeded the setting range.	• Check "#2102 skip_tL".
<b>0016</b>	<b>Parameter skip_t1 illegal</b> The time constant has not been set or the setting exceeded the setting range.	• Check "#2103 skip_t1".
<b>0017</b>	<b>Parameter G0bdcc illegal</b> "#1205 G0bdcc" for the 2nd part system is set to acceleration/deceleration before G0 interpolation.	• Check "#1205 G0bdcc".
<b>0018</b>	<b>OMR-II parameter error</b> The OMR-II related parameter settings are incorrect. In this case, the OMR-II is disabled.	• Check the related parameter settings.
<b>0101</b>	<b>Values of PC1/PC2 too large</b> The PC1 and PC2 settings used for the rotary axis are too large.	• Check "#2201 PC1" and "#2202 PC2".

**(11) Class: Y90 Message: No spindle signal**

0

0

No.1 spindle

No.2 spindle

No.3 spindle

No.4 spindle

Alarm No.	Z open phase	B open phase	A open phase
1			×
2		×	
3		×	×
4	×		
5	×		×
6	×	×	
7	×	×	×

Alarm No.	Details	Remedy
0001 to 0007	There is an error in the spindle encoder signal. The data transmission to the drive unit is stopped when this error occurs.	<ul style="list-style-type: none"> <li>Check the spindle encoder's feedback cable and the encoder.</li> </ul>

## 6.1.5 System Alarms

(The bold characters are the messages displayed on the screen.)

<div> <div>Z31</div> <div><b>DataServer error</b></div> <div>0000</div> </div> <div> <div></div> <div></div> <div>Warning No.</div> <div>Message</div> </div>	
Warning No.	Explanation
0001	Socket open error(socket)
0002	Socket bind error(bind)
0003	Connection wait queue error(listen)
0004	Connection request error(accept)
0005	Data recv error(socket error)
0006	Data recv error(data error)
0007	Data send error(socket error)
0008	Data send error(data error)
000A	Socket close error(close)

**(Note)** If warning No. 0001, 0002, 0003, or 000A is displayed, set the parameters, then turn power OFF and turn it ON again.

(The bold characters are the messages displayed on the screen.)

Message	Details	Remedy
<b>Z40 Format mismatch</b>	This appears when the parameter MemVal is formatted at 0, and MemVal is set to 1.	<ul style="list-style-type: none"> <li>• Either return the MemVal setting, or format and restart.</li> </ul>
<b>Z51 E2PROM error 00xx</b>	<Type> Z51 E2PROM error 0011: Read error Z51 E2PROM error 0012: Write error	<ul style="list-style-type: none"> <li>• If the same alarm is output by the same operation, the cause is an H/W fault. Contact the Service Center.</li> </ul>
<b>Z52 Battery fault 000x</b>	The voltage of the battery inserted in the NC control unit has dropped. (The battery used to save the internal data.) 0001: Battery warning 0002: Battery detecting circuit error 0003: Battery alarm <b>(Note 1)</b>	<ul style="list-style-type: none"> <li>• Replace the battery of the NC control unit.</li> <li>• Check for disconnection of the battery cable.</li> <li>• After treating the battery, check the machining program.</li> </ul>
<b>Z53 CNC overheat</b>	The controller or operation board temperature has risen above the designated value. <b>(Note 2)</b>	<ul style="list-style-type: none"> <li>• Cooling measures are required.</li> <li>• Turn OFF the controller power, or lower the temperature with a cooler, etc.</li> </ul>
<b>Z55 RIO communication stop</b>	This occurs when an error occurs in the communication between the controller and remote I/O unit. <ul style="list-style-type: none"> <li>• Cable breakage</li> <li>• Remote I/O unit fault</li> <li>• Power supply to remote I/O unit fault</li> </ul> <b>(Note 3)</b>	<ul style="list-style-type: none"> <li>• Check and replace the cables.</li> <li>• Replace the remote I/O unit.</li> <li>• Check the power supply. (existence of supply, voltage)</li> </ul>
<b>Z57 System warning</b>	The program memory capacity setting value cannot be formatted. The expansion cassette (HR437) is not mounted after formatting. An expansion cassette different from the expansion cassette (HR437) mounted during formatting is mounted.	Check the state of the following items. <ul style="list-style-type: none"> <li>• Program memory capacity</li> <li>• Status of expansion cassette (HR437) mounting</li> <li>• APLC open option</li> </ul>
<b>Z58 ROM write not completed</b>	The machine tool builder macro program was not written to the FROM after being registered, edited, copied, condensed, merged, the number changed, or deleted.	<ul style="list-style-type: none"> <li>• Write the machine tool builder macro program to the FROM.</li> <li>• If the operations, such as editing, done while the NC power was OFF can be invalidated, the program does not need to be written to the FROM.</li> </ul>
<b>Z59 Acc/dec time cnst too large</b>	Acceleration and deceleration time constants are too large. (This alarm is output at the same time as "T02 Acc/dec time cnst too large 0206.")	<ul style="list-style-type: none"> <li>• Increase the value specified as the "#1206 G1bF" parameter.</li> <li>• Decrease the value specified as the "#1207 G1btL" parameter.</li> <li>• Lower the feedrate.</li> </ul>
<b>Z60 Fieldbus communi- cation error</b>	Communication error has occurred on the Fieldbus communication using HN571/HN573/HN575.	<ul style="list-style-type: none"> <li>• Refer to (Note 4) for details.</li> </ul>
<b>Z64 Valid term soon to be expired xx</b>	The valid term will be expired in less than a week. Remaining valid term is xx more days.	<ul style="list-style-type: none"> <li>• Obtain a decryption code by making a payment. Enter the decryption code.</li> </ul>
<b>Z65 Valid term has been expired</b>	No decryption code was input before the valid term was expired.	<ul style="list-style-type: none"> <li>• Obtain a decryption code by making a payment. Enter the decryption code.</li> </ul>

## CAUTION

- |     |              |   |
|-----|--------------|---|
| Z53 | CNC overheat | 000x<br>↑   |
|     |              | 0001 : The temperature in the controller is high.   |
|     |              | 0002 : The temperature around the communication terminal<br>(setting and display unit) is high.                       |
|     |              | 0003 : The temperature in the controller and around the communication<br>terminal (setting and display unit) is high. |

PLC parameter bit selection #6449

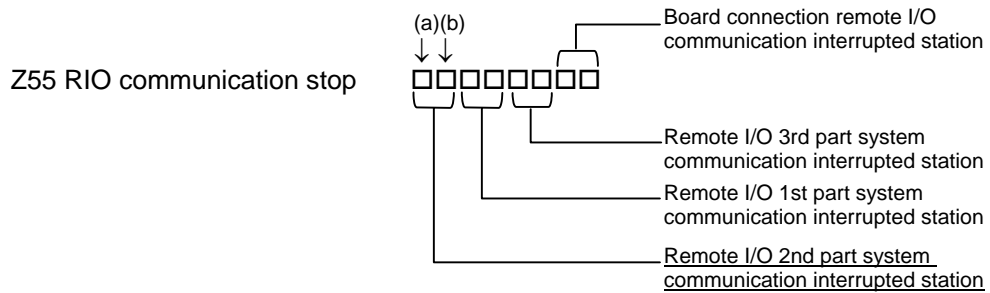
7	6	5	4	3	2	1	0
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Communication terminal  
(setting and display unit) { 0: Detection invalid  
1: Detection valid

Controller

**(Note 3) RIO communication interrupt**

If communication between the control unit and remote I/O unit fails, the alarm and remote I/O unit number are displayed.



(a) and (b) above indicate the following matters.

Alarm number	RIO (seventh station)	RIO (sixth station)	RIO (fifth station)	RIO (fourth station)
0				
1				×
2			×	
3			×	×
4		×		
5		×		×
6		×	×	
7		×	×	×
8	×			
9	×			×
A	×		×	
B	×		×	×
C	×	×		
D	×	×		×
E	×	×	×	
F	×	×	×	×

Alarm number	RIO (third station)	RIO (second station)	RIO (first station)	RIO (0th station)
0				
1				×
2			×	
3			×	×
4		×		
5		×		×
6		×	×	
7		×	×	×
8	×			
9	×			×
A	×		×	
B	×		×	×
C	×	×		
D	×	×		×
E	×	×	×	
F	×	×	×	×

This also applies for the remote I/O 1st part system communication interrupted station, remote I/O 3rd part system communication interrupted station and board connection remote I/O communication interrupted station.



(Note 4)

<b>Z60</b> Fieldbus communication error <b>n1 n2 n3 n4</b> <div style="display: flex; justify-content: space-between; align-items: center; margin-top: 10px;"> <div style="border-bottom: 1px solid black; width: 250px;"></div> <div>Classification No.</div> </div> <div style="display: flex; justify-content: space-between; align-items: center; margin-top: 10px;"> <div style="border-bottom: 1px solid black; width: 250px;"></div> <div>Message</div> </div>
--

Class. No.	Details																		
n1	Shows state of the master channel (shown in hexadecimal number) <table> <tr> <td>00: Offline</td><td>In initializing</td></tr> <tr> <td>40: Stop</td><td>Cutting I/O communication</td></tr> <tr> <td>80: Clear</td><td>Resetting output data of each slave by sending 0 data.</td></tr> <tr> <td>C0: In operation</td><td>In I/O communication</td></tr> </table>	00: Offline	In initializing	40: Stop	Cutting I/O communication	80: Clear	Resetting output data of each slave by sending 0 data.	C0: In operation	In I/O communication										
00: Offline	In initializing																		
40: Stop	Cutting I/O communication																		
80: Clear	Resetting output data of each slave by sending 0 data.																		
C0: In operation	In I/O communication																		
n2	Shows error state (shown in hexadecimal number) <div style="margin-top: 5px;">           Bit 7 6 5 4 3 2 1 0  <div style="display: flex; justify-content: space-around; width: 100px;"> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> </div> </div> <table> <tr> <th>BIT</th><th>Details</th></tr> <tr> <td>0</td><td>Control error: Parameter error</td></tr> <tr> <td>1</td><td>Auto clear error: Communication with all the slave channels was cut because a communication with one slave channel had an error.</td></tr> <tr> <td>2</td><td>Non exchange error: Slave channel with communication error is found</td></tr> <tr> <td>3</td><td>Fatal error: The communication cannot be continued because sever network failure exists.</td></tr> <tr> <td>4</td><td>Event error: Short-circuit was found on the network.</td></tr> <tr> <td>5</td><td>Not ready: CNC communication is not ready.</td></tr> <tr> <td>6</td><td>Time out error: Time out was detected in communication with each channel.</td></tr> <tr> <td>7</td><td>Not used</td></tr> </table>	BIT	Details	0	Control error: Parameter error	1	Auto clear error: Communication with all the slave channels was cut because a communication with one slave channel had an error.	2	Non exchange error: Slave channel with communication error is found	3	Fatal error: The communication cannot be continued because sever network failure exists.	4	Event error: Short-circuit was found on the network.	5	Not ready: CNC communication is not ready.	6	Time out error: Time out was detected in communication with each channel.	7	Not used
BIT	Details																		
0	Control error: Parameter error																		
1	Auto clear error: Communication with all the slave channels was cut because a communication with one slave channel had an error.																		
2	Non exchange error: Slave channel with communication error is found																		
3	Fatal error: The communication cannot be continued because sever network failure exists.																		
4	Event error: Short-circuit was found on the network.																		
5	Not ready: CNC communication is not ready.																		
6	Time out error: Time out was detected in communication with each channel.																		
7	Not used																		
n3	Shows error No. (shown in hexadecimal number) Refer to "(a) Error in master channel" and "(b) Error in slave channel" for details.																		
n4	Shows slave No. where communication error has occurred. (shown in hexadecimal number) "FF" means an error in master channel.																		

(a) Error in master channel (when remote address with an error is FF (hexadecimal number))

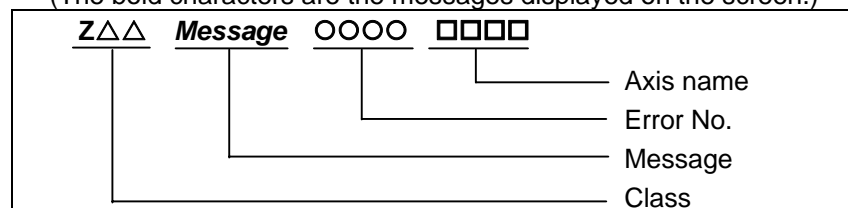
Value in n3	Details	Remedy
0	No error	Operating normally
32	No USR_INTF-task	Damage in <b>HN571</b> . Replace <b>HN571</b> .
33	No global data field	
34	No FDL-task	
35	No PLC-task	
37	Master parameter incorrect	
39	Slave parameter incorrect	
3C	Data offset exceeding allowable set value received	Check the configuration setting.
3D	Slave data send range overlap	
3E	Slave data receive range overlap	
3F	Not set data hand shake	Damage in <b>HN571</b> . Replace <b>HN571</b> .
40	RAM range exceeded	
41	Slave parameter data set illegal	
CA	No segment	
D4	Data base read illegal	Download the configuration data again.
D5	Operating system illegal	Damage in <b>HN571</b> . Replace <b>HN571</b> .
DC	Watch dog error	
DD	Hand shake mode No data communication by 0	
DE	Master auto clear mode	When setting auto clear mode, the auto clear mode was performed because one slave was not able to connect in run time.

(b) Error in slave channel (when remote address with an error is other than FF (hexadecimal number))

Value in n4	Details	Remedy
2	Station overflow reported	Check the configuration of slave channel in which error has occurred. Check if there is any short-circuit in wire to bus.
3	Station stopped responding to master command	
9	No slave required responding data	
11	No station respond	
12	No master to logical token ring	
15	Illegal parameter requested	

## 6.1.6 Absolute Position Detection System Alarms

(The bold characters are the messages displayed on the screen.)



## (1) Class: Z70 Abs data error

This error is displayed if the absolute position data is lost in the absolute position detection system.

Error No.	Details	Remedy	Zero point initialization	Alarm reset when power is turned OFF	Servo alarm No.
0001	<b>Abs posn base set incomplete</b> Zero point initialization is incomplete. Otherwise, the spindle was removed.	Complete zero point initialization.	Required	-	-
0002	<b>Absolute position lost</b> The absolute position reference point data saved in the NC has been destroyed.	Input the parameters. If the reference point data cannot be restored, perform zero point initialization.	(Required)	-	-
0003	<b>Abs posn param changed</b> The parameters used to detect the absolute position have been changed.  #1003 iunit      #2201 PC1 #1016 iout      #2202 PC2 #1017 rot      #2218 PIT #1018 ccw      #2219 RNG1 #1040 M_inch    #2220 RNG2 #2049 type      #2225 MTYP	Correctly set the parameters. Turn the power on again, and perform zero point initialization.	Required	-	-
0004	<b>Abs posn initial set illegal</b> The zero point initialization point is not at the grid position.	Reperform zero point initialization.	Required	-	-
0005	<b>Abs posn param restored</b> Restoration was possible with parameter input in the above No.0002 state.	Turn the power on again, and operation will be possible.	Not required	-	-
0080	<b>Abs posn data lost</b> The absolute value data was lost, because the multi-rotation counter data in the detector was incorrect, etc.	Replace the detector and complete zero point initialization.	Required	-	(9E) etc.

Error No.	Details	Remedy	Zero point initialization	Alarm reset when power is turned OFF	Servo alarm No.
0101	<b>Abs posn error(servo alm 25)</b> The power was turned ON again after the servo alarm No. 25 displayed.	Reperform zero point initialization.	Required	-	(25)
0106	<b>Abs posn error(servo alm E3)</b> The power was turned ON again after the servo alarm No. E3 displayed.	Reperform zero point initialization.	Required	-	(E3)

**(Note)** To release alarm "Z70 Abs data error", enter the parameter data output when establishing the absolute position and turn ON the power again. For the rotary axis, however, the alarm cannot be released by entering the parameter data.

**(2) Class: Z71 Abs encoder failure**

This alarm is displayed if an error is found in the detector for the absolute position detection system.

Error No.	Details	Remedy	Zero point initialization	Alarm reset when power is turned OFF	Servo alarm No.
0001	<b>AbsEncoder:Backup voltage drop</b> The backup voltage in the absolute position detector dropped.	Replace the battery, check the cable connections, and check the detector. Turn the power ON again, and perform zero point initialization.	Required	- (Z70-0101 displays after power is turned ON again.)	25
0003	<b>AbsEncoder: Commu error</b> Communication with the absolute position detector was not possible.	Check and replace the cables, card or detector. Turn the power ON again, and perform zero point initialization.	(Required) Only when detector is replaced.	Reset	91
0004	<b>AbsEncoder: Abs data changed</b> The absolute position data fluctuated when establishing the absolute position.	Check and replace the cables, card or detector. Turn the power ON again, and perform zero point initialization.	(Required) Only when detector is replaced.	Reset	93
0005	<b>AbsEncoder: Serial data error</b> An error was found in the serial data from the absolute position detector.	Check and replace the cables, card or detector. Turn the power ON again, and perform zero point initialization.	(Required) Only when detector is replaced.	Reset	92
0006	<b>AbsEncoder: Abs/inc posn diffr</b> Servo alarm E3 Absolute position counter warning	Operation is possible until the power is turned off.	(Required) When power is turned ON again.	Reset (Z70-0106 displays after power is turned ON again.)	E3
0007	<b>AbsEncoder: Initial commu err</b> Initial communication with the absolute position detector was not possible.	Check and replace the cables, card or detector. Turn the power ON again, and perform zero point initialization.	(Required) Only when detector is replaced.	Reset	18

**(3) Class: Z72 Message: Position check error**

This alarm is displayed if an error is detected when comparing the detector's absolute position and controller coordinate values in the absolute position system.

**(4) Class: Z73 Message: Absolute position data warning**

This warning is displayed for the absolute position detection system.

Alarm No.	Details	Remedy
0001	Battery for abs data fault Servo alarm 9F Low battery voltage	If the battery voltage is low or the cable is damaged, there is no need to initialize the absolute position.

**(Note)** When this alarm occurs, do not turn OFF the drive unit power to protect the absolute position data. Replace the battery while the drive unit power is ON.

## 6.1.7 Messages during Emergency Stop

(The bold characters are the messages displayed on the screen.)

<b>EMG</b>	<b>Emergency stop</b>	<b>□□□□</b>
		└─ Error items

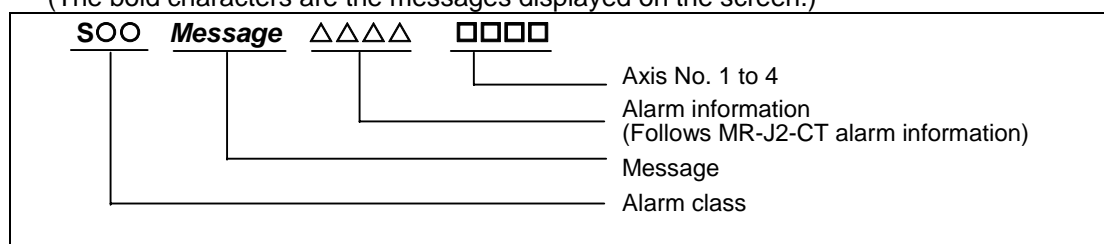
Error Item	Details	Remedy
<b>PLC</b>	The user PLC has entered the emergency stop state during the sequence process.	<ul style="list-style-type: none"> <li>Investigate and remove the cause of the user PLC emergency stop.</li> </ul>
<b>EXIN</b>	The emergency stop input signal for machine operation board or handy terminal is significant (open).	<ul style="list-style-type: none"> <li>Cancel the emergency stop input signal.</li> <li>Check the wiring to see if any wiring is broken.</li> </ul>
<b>SRV</b>	An alarm occurred in the servo system causing an emergency stop.	<ul style="list-style-type: none"> <li>Investigate and remove the cause of the servo alarm.</li> </ul>
<b>STOP</b>	The user PLC (ladder sequence) is not running.	<ul style="list-style-type: none"> <li>Check if the rotary switch CS2 on the top of the controller front panel is set to 1.</li> <li>Check if the PLC edit file save screen (onboard function) [4RUN/SP] (run/stop) switch is turned ON.</li> </ul>
<b>SPIN</b>	Spindle drive unit not mounted The spindle drive unit is not mounted.	<ul style="list-style-type: none"> <li>Cancel the causes of the other emergency stop.</li> <li>Check emergency stop signal input in the spindle drive unit.</li> </ul>
<b>PC_H</b>	High-speed PC processing abnormal	<ul style="list-style-type: none"> <li>Check the sequence program. (To stop monitoring the high-speed PC processing temporarily, set 1 in "#1219 aux03/bit1". Disable the monitoring function only as a temporary measure.)</li> </ul>
<b>PARA</b>	Setting of the door open II fixed device is illegal. The dog signal random assignment parameter setting is illegal.	<ul style="list-style-type: none"> <li>Specify the "#1155 DOOR_m" and "#1156 DOOR_s" parameters correctly. (When the door open II fixed device is not used, set "#1155 DOOR_m" and "#1156 DOOR_s" to "100".)</li> <li>Correctly set the "#2073 zrn_dog", "#2074 H/W_OT+", "#2075 H/W_OT-" and "#1226 aux10/bit5" parameters.</li> </ul>

Error No.	Details	Remedy
<b>LINK</b>	If the FROM/TO instruction is not executed within 500 ms, an emergency stop occurs.	<ul style="list-style-type: none"> <li>Try to execute the FROM or TO instruction one or more times every 500 ms.</li> <li>* Measure the time in which no interrupt request is issued from MELSEC and store the result in the R register. R10190: Current time-out counter R10191: Counter for maximum time-out after power-on R10192: Counter for maximum time-out after system start-up (backed up)</li> </ul>
	MELSEC is held in error and reset states.	<ul style="list-style-type: none"> <li>Check the MELSEC states.</li> </ul>
	The contents of MELSEC-specific code area in buffer memory have been destroyed.	<ul style="list-style-type: none"> <li>Check the MELSEC states.</li> </ul>
	PLC serial link communication has stopped.  <b>(Note)</b> When "WAIT" is entered for the PLC serial link, only the preparation sequence has been established before the communication stops. Therefore, it is supposed that the basic specification parameters related to serial link parameters #1902 and #1903 are incorrect or the #1909 set-time is too short.	<ul style="list-style-type: none"> <li>Check that HR571 card wiring and external sequencer transmission are normal.</li> <li>Check the diagnostic screen for link communication errors.</li> <li>Check whether the basic specification parameters related to serial link parameters are specified correctly.</li> </ul>
<b>WAIT</b>	The preparation sequence is not sent from the master station. Otherwise, the contents of the received preparation sequence are inconsistent with those of the parameters, so that the usual sequence cannot be started.  <b>(Note)</b> When "LINK" is also entered for the PLC serial link, refer to "Note" in the section, "LINK".	<ul style="list-style-type: none"> <li>Check that the HR571 card rotary switch and wiring and the external sequencer transmission are normal.</li> <li>Check the diagnostic screen for link communication errors.</li> </ul>
<b>XTEN</b>	The HR571 card operates abnormally or the rotary switch is set incorrectly.	<ul style="list-style-type: none"> <li>Check the HR571 card rotary switch and replace the HR571 card if required.</li> </ul>
<b>LAD</b>	The user PLC (ladder sequence) has an illegal code.	<ul style="list-style-type: none"> <li>Check the user PLC (ladder sequence) to see if it uses illegal device numbers or constants.</li> </ul>
<b>CVIN</b>	The external emergency stop function for power supply is valid. So, the emergency stop input signal for power supply is significant (open).	<ul style="list-style-type: none"> <li>Cancel the emergency stop input signal.</li> <li>Check the wiring to see if any wiring is broken.</li> </ul>
<b>MCT</b>	An emergency stop occurs because the contactor shutoff test is executing.	<ul style="list-style-type: none"> <li>Automatically cancel the emergency stop after the contactor shutoff is confirmed.</li> <li>When the contactor shutoff cannot be confirmed within 5 seconds after contactor shutoff test signal (Y742) is input, "Y20 Contactor welding detected" alarm will occur, and the emergency stop status remains.</li> <li>Turn the power ON again after confirming "contactor's auxiliary b contact" signal is correctly output to the device that is set with "#1330 MC_dp1" and "#1331 MC_dp2".</li> </ul>

## 6.1.8 Auxiliary Axis Alarms

Refer to "1.3 Servo/spindle alarms" for details of the alarm class and alarm clear class combination.

(The bold characters are the messages displayed on the screen.)



## (1) Class: S01 Aux ax servo alarm

Alarm information	Details	Remedy
<b>0011</b>	<b>Aux ax PCB err (Drive circuit)</b> An error occurred in the drive unit's internal PCB.	<ul style="list-style-type: none"> <li>Replace servo drive unit.</li> </ul>
<b>0013</b>	<b>Aux ax S/W processing error</b> An error occurred in the drive unit's internal reference clock.	<ul style="list-style-type: none"> <li>Replace servo drive unit.</li> </ul>
<b>0016</b>	<b>Aux ax motor/detector type err</b>	
	Motor type error.	<ul style="list-style-type: none"> <li>Use a correct drive unit and motor combination.</li> </ul>
	Detector initial communication error.	<ul style="list-style-type: none"> <li>Connect correctly.</li> <li>Replace the motor.</li> <li>Replace or repair cable.</li> </ul>
	Detector CPU error.	<ul style="list-style-type: none"> <li>Replace the motor (detector).</li> </ul>
<b>0017</b>	<b>Aux ax PCB error(A/D err)</b> An error occurred in the drive unit's internal A/D converter.	<ul style="list-style-type: none"> <li>Replace servo drive unit.</li> </ul>
<b>0025</b>	<b>Aux ax absolute posn lost</b> An error occurred in the detector's internal absolute position data.	<ul style="list-style-type: none"> <li>Turn the power ON for 2 to 3 minutes while the alarm is occurring, and then turn the power ON again.</li> <li>Replace the battery, and initialize the absolute position again.</li> </ul>
<b>0034</b>	<b>Aux ax CRC error</b> An error occurred in the communication with the NC.	<ul style="list-style-type: none"> <li>Take countermeasures against noise.</li> </ul>
<b>0036</b>	<b>Aux ax communication timeout</b> Communication with the NC was cut off.	<ul style="list-style-type: none"> <li>Connect correctly.</li> <li>Turn the NC power ON.</li> <li>Replace the drive unit or NC.</li> </ul>
<b>0037</b>	<b>Aux ax parameter error</b> The parameter setting value is incorrect.	<ul style="list-style-type: none"> <li>Set the parameter correctly.</li> </ul>
<b>0038</b>	<b>Aux ax frame error</b> An error occurred in the communication with the NC.	<ul style="list-style-type: none"> <li>Take countermeasures against noise.</li> </ul>
<b>0039</b>	<b>Aux ax commu INFO error</b> Undefined data was transferred from the NC.	<ul style="list-style-type: none"> <li>Change the NC software version to a compatible version.</li> </ul>



## (2) Class: S02 Aux ax servo alarm

Alarm information	Details	Remedy
0011	<b>Aux ax PCB err (Drive circuit)</b> An error occurred in the drive unit's internal PCB.	<ul style="list-style-type: none"> <li>• Replace servo drive unit.</li> </ul>
0013	<b>Aux ax S/W processing error</b> An error occurred in the drive unit's internal reference clock.	<ul style="list-style-type: none"> <li>• Replace servo drive unit.</li> </ul>
0015	<b>Aux ax EEROM error</b> A write error occurred to the EEROM in the drive unit.	<ul style="list-style-type: none"> <li>• Replace servo drive unit.</li> </ul>
0017	<b>Aux ax PCB error(A/D err)</b> An error occurred in the drive unit's internal A/D converter.	<ul style="list-style-type: none"> <li>• Replace servo drive unit.</li> </ul>
0018	<b>Aux ax PCB error(LSI err)</b> An error occurred in the drive unit's internal LSI.	<ul style="list-style-type: none"> <li>• Replace servo drive unit.</li> </ul>
0020	<b>Aux ax detector error</b> An error occurred in the communication between the servo drive unit and detector.	<ul style="list-style-type: none"> <li>• Connect correctly.</li> <li>• Replace or repair cable.</li> </ul>
0024	<b>Aux ax ground fault detection</b> A ground fault of the output was detected when the power was turned ON.	<ul style="list-style-type: none"> <li>• Repair the ground fault section.</li> <li>• Replace the cable or motor.</li> </ul>

## (3) Class: S03 Aux ax servo alarm

Alarm information	Details	Remedy
0010	<b>Aux ax under voltage</b> The power voltage is 160V or less.	<ul style="list-style-type: none"> <li>• Review the power supply.</li> <li>• Replace the servo drive unit.</li> </ul>
0030	<b>Aux ax regeneration error</b>	
	The tolerable regeneration power of the internal regenerative resistor or external regenerative option was exceeded.	<ul style="list-style-type: none"> <li>• Set the parameter #50002 correctly.</li> <li>• Connect correctly.</li> <li>• Lower the positioning frequency.</li> <li>• Change the regenerative option to a larger capacity.</li> <li>• Lower the load.</li> <li>• Review the power supply.</li> </ul>
	Regenerative transistor error	<ul style="list-style-type: none"> <li>• Replace the servo drive unit.</li> </ul>
0031	<b>Aux ax overspeed</b> The motor's rotation speed exceeded the tolerable momentary speed.	<ul style="list-style-type: none"> <li>• Increase the acceleration/ deceleration time constant.</li> <li>• Review the gear ratio.</li> <li>• Replace the detector.</li> </ul>
0032	<b>Aux ax overcurrent</b> A current exceeding the servo drive unit's tolerable current flowed.	<ul style="list-style-type: none"> <li>• Repair the wiring.</li> <li>• Replace the servo drive unit.</li> <li>• Take countermeasures against noise.</li> </ul>

Alarm information	Details	Remedy
<b>0033</b>	<b>Aux ax overvoltage</b> The voltage of the converter in the servo drive unit was 400V or more.	<ul style="list-style-type: none"> <li>• Wire correctly.</li> <li>• Replace the servo drive unit.</li> <li>• For the internal regenerative resistor, replace the drive unit.</li> <li>• For the external regenerative option, replace the regenerative option.</li> </ul>
<b>0046</b>	<b>Aux ax motor overheating</b> An operation state causing the motor to overheat continued.	<ul style="list-style-type: none"> <li>• Reduce the motor load.</li> <li>• Review the operation pattern.</li> </ul>
<b>0050</b>	<b>Aux ax overload 1</b> The servo drive unit or servomotor overload protection function activated.	<ul style="list-style-type: none"> <li>• Reduce the motor load.</li> <li>• Review the operation pattern.</li> <li>• Change to a motor or drive unit with large output.</li> <li>• Change the setting of the automatic tuning response characteristics.</li> <li>• Correct the connection.</li> <li>• Replace the servomotor.</li> </ul>
<b>0051</b>	<b>Aux ax overload 2</b> The max. output current flowed for several seconds due to a machine collision or overload.	<ul style="list-style-type: none"> <li>• Review the operation pattern.</li> <li>• Change the setting of the automatic tuning response characteristics.</li> <li>• Correct the connection.</li> <li>• Replace the servomotor.</li> </ul>
<b>0052</b>	<b>Aux ax excessive error</b> A position deflection exceeding the excessive error detection setting value occurred.	<ul style="list-style-type: none"> <li>• Increase the acceleration/ deceleration time constant.</li> <li>• Increase the torque limit value.</li> <li>• Review the power facility capacity.</li> <li>• Review the operation pattern.</li> <li>• Replace the servomotor.</li> <li>• Connect correctly.</li> <li>• Repair or replace the cable.</li> </ul>

## (4) Class: S52 Message: Aux ax servo warning

Alarm information	Details	Remedy
<b>0092</b>	<b>Aux ax battery voltage drop</b> The absolute position detection battery voltage dropped.	<ul style="list-style-type: none"> <li>• Mount a battery.</li> <li>• Replace the battery and initialize the absolute position.</li> </ul>
<b>00E0</b>	<b>Aux ax overregeneration warning</b> 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"> <li>• Lower the positioning frequency.</li> <li>• Change the regenerative option to a larger one.</li> <li>• Lower the load.</li> </ul>
<b>00E1</b>	<b>Aux ax overload warning</b> The overload alarm 1 could occur.	<ul style="list-style-type: none"> <li>• Refer to the items for S03 0050.</li> </ul>
<b>00E3</b>	<b>Aux ax abs position counter warning</b> There is an error in the absolute position detector internal data.	<ul style="list-style-type: none"> <li>• Take countermeasures against noise.</li> <li>• Replace the servomotor.</li> </ul>
<b>00E9</b>	<b>Aux ax main circuit OFF warning</b> The servo ON signal was input while the main circuit power was OFF. The contactor operation is faulty.	<ul style="list-style-type: none"> <li>• Turn ON the main circuit power.</li> </ul>

## (5) Class: Z70 Message: Aux ax abs position error

Alarm information	Details	Remedy
<b>0001</b>	<b>Aux ax abs posn base set incomplete</b> The zero point (reference point) has not been initialized in the absolute position system.	<ul style="list-style-type: none"> <li>• Initialize the zero point (reference point).</li> </ul>
<b>0002</b>	<b>Aux ax absolute position lost</b> The absolute position coordinate data in the drive unit has been lost.	<ul style="list-style-type: none"> <li>• Initialize the zero point (reference point).</li> </ul>
<b>0003</b>	<b>Aux ax abs posn param changed</b> The absolute position system related parameters have been changed or lost.	<ul style="list-style-type: none"> <li>• Correctly set the parameters and then initialize the zero point (reference point).</li> </ul>

## (6) Class: Z71 Message: Aux ax drop voltage

Alarm information	Details	Remedy
<b>0001</b>	<b>Aux ax abs encoder: back up voltage drop</b> The data in the detector has been lost. Battery voltage drop. Detector cable wire breakage or looseness.	<ul style="list-style-type: none"> <li>• Check the battery and detector cable and then initialize the zero point (reference point).</li> </ul>

## (7) Class: Z73 Message: Aux ax system warning

Alarm information	Details	Remedy
0001	<b>Aux ax battery for abs data fault</b> Battery voltage drop. Detector cable wire breakage or looseness.	<ul style="list-style-type: none"> <li>Check the battery and detector cable. The zero point does not need to be initialized.</li> </ul>
0003	<b>Aux ax absolute position counter warning</b> An error occurred in the detector's absolute position counter.	<ul style="list-style-type: none"> <li>Replace the detector.</li> </ul>

## (8) Class: M00 Aux ax operation error

Alarm information	Details	Remedy
0001	<b>Aux ax dog overrun</b> When executing dog-type reference position, the zero point return speed is too fast or the dog length is too short.	<ul style="list-style-type: none"> <li>Lower the zero point return speed or increase the dog length.</li> </ul>
0003	<b>Aux ax R-pnt direction illegal</b> When executing reference position return, the axis was moved in the opposite of the designated direction.	<ul style="list-style-type: none"> <li>Move the axis in the correct direction.</li> </ul>
0004	<b>Aux ax external interlock</b> The axis interlock function is valid.	<ul style="list-style-type: none"> <li>Cancel the interlock signal</li> </ul>
0005	<b>Aux ax internal interlock</b> An interlock was established by the servo OFF function.	<ul style="list-style-type: none"> <li>Cancel the servo OFF.</li> </ul>
0007	<b>Aux ax soft limit</b> The soft limit was reached.	<ul style="list-style-type: none"> <li>Check the soft limit setting and machine position</li> </ul>
0024	<b>Aux ax R ret invld at abs alm</b> Reference position return was executed during an absolute position alarm.	<ul style="list-style-type: none"> <li>Initialize the absolute position reference point and then fix the absolute position coordinates.</li> </ul>
0025	<b>Aux ax R ret invld at ini</b> Reference position return was executed while initializing the absolute position.	<ul style="list-style-type: none"> <li>Initialize the absolute position reference point and then fix the absolute position coordinates.</li> </ul>

## (9) Class: M01 Aux ax operation error

Alarm information	Details	Remedy
<b>0101</b>	<b>Aux ax no operation mode</b> The operation mode is not designated, or the operation mode was changed during axis movement.	<ul style="list-style-type: none"> <li>Correctly designate the operation mode.</li> </ul>
<b>0103</b>	<b>Aux ax feedrate 0</b> The operation parameter's feedrate setting is zero. The operation parameter feedrate setting is zero. Or, the override is valid, and the override value is zero.	<ul style="list-style-type: none"> <li>Set a value other than zero in the feedrate setting or override value.</li> </ul>
<b>0160</b>	<b>Aux ax sta No. illegal</b> A station No. exceeding the No. of indexed divisions was designated.	<ul style="list-style-type: none"> <li>Correctly designate the station No.</li> </ul>
<b>0161</b>	<b>Aux ax R-pnt ret incomplete</b> Automatic/manual operation was started before reference position return was executed with the incremental system.	<ul style="list-style-type: none"> <li>Execute the reference position return.</li> </ul>
<b>0162</b>	<b>Aux abs position initializing</b> The start signal was input while initializing the absolute position reference point.	<ul style="list-style-type: none"> <li>Complete the absolute position reference point initialization.</li> </ul>
<b>0163</b>	<b>Aux ax abs position error</b> The start signal was input during an absolute position alarm.	<ul style="list-style-type: none"> <li>Initialize the absolute position reference point and then fix the absolute position coordinates.</li> </ul>
<b>0164</b>	<b>Aux ax arbitrary positioning</b> The manual operation mode was started during the random positioning mode.	<ul style="list-style-type: none"> <li>Turn the random positioning mode OFF before switching to the manual operation mode.</li> </ul>
<b>0165</b>	<b>Aux uneven index sta No. ilgl</b> The commanded station No. was higher than 9 or the number of indexing stations during uneven indexing.	<ul style="list-style-type: none"> <li>Check the commanded station No. and the parameter "#50100 station" setting.</li> </ul>

**(10) Class: Y02 Auxiliary axis MCP alarms**

An error occurred during data transfer between the MCP and auxiliary axis drive unit after turning on the power.

Error No.	Details		Remedy
<b>0050</b>	<b>Aux ax sys alm: Proc time over</b>		The software or hardware may be damaged. Contact the service center.
<b>0051</b>	0000	<b>Aux ax commu er: CRC error 1</b> (10 times/910.2ms)	A communication error has occurred between the controller and drive unit. <ul style="list-style-type: none"> <li>• Take measures against noise.</li> <li>• Check that the communication cable connector between the controller and drive unit and one between the drive unit are tight.</li> <li>• Check whether the communication cable between the controller and drive unit and one between the drive units are disconnected.</li> <li>• A driving drive unit may be faulty. Take a note of the 7-segment LED contents of each driving drive unit and report to the Service Center.</li> </ul>
	0001	<b>Aux ax commu er: CRC error 2</b> (2 continuous times)	
	0002	<b>Aux ax commu er: Recv timing</b> (2 continuous times)	
	xx03	<b>Aux ax commu er: Data ID</b> (2 continuous times) xx: Axis No.	
	xx04	<b>Aux ax commu er: Recv frame no.</b> (2 continuous times) xx: Axis No.	

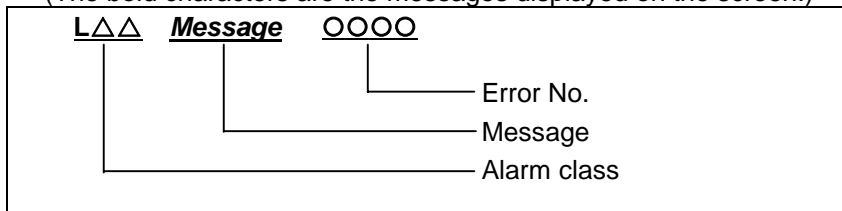
**(11) Class: Y03 Message: Aux ax drive unit unequipped**

The drive unit is not properly connected.

Error No.	Details	Remedy
<b>Axis No. 1 to 4</b>	bit correspondence (bit 0: 1st axis, bit 1: 2nd axis, bit 2: 3rd axis, bit 3: 4th axis)	Check the auxiliary axis drive unit mounting state. <ul style="list-style-type: none"> <li>• Check the end of the cable wiring.</li> <li>• Check the cable for broken wires.</li> <li>• Check the connector insertion.</li> </ul> The auxiliary axis drive unit input power is not being input. The auxiliary axis drive unit axis No. switch is illegal.

## 6.1.9 Computer Link Errors

(The bold characters are the messages displayed on the screen.)

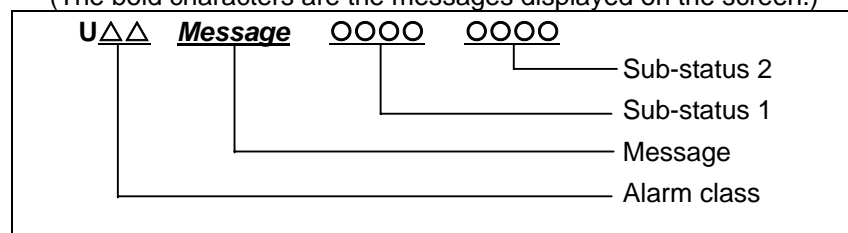


## (1) Class: L01 Computer link error

Error No.	Details	Remedy
0004	<b>Timeout error</b> Communication ends with timeout (CNC has a 248-byte receive buffer. The time during which CNC receives 248 bytes exceeds the "TIME-OUT" value set in the I/O device parameter.)	<ul style="list-style-type: none"> <li>Set a greater timeout value in the input/output device parameter.</li> <li>Recheck the HOST software as to whether or not the HOST transmits data in response to DC1 from CNC (data request).</li> <li>Check whether or not start code of computer link parameter is set to 0.</li> </ul>
0010	<b>Host ER signal OFF</b> HOST ER (CNC DR) signal is not turned ON.	<ul style="list-style-type: none"> <li>Check whether or not the cable is disconnected from the connector.</li> <li>Check whether or not the cable is broken.</li> <li>Check whether or not the HOST power is turned ON.</li> </ul>
0015	<b>Parity H error</b> Communication ends with parity H.	<ul style="list-style-type: none"> <li>Recheck the HOST software as to whether or not the data to be transmitted to CNC is ISO code.</li> </ul>
0016	<b>Parity V error</b> Communication ends with parity V.	<ul style="list-style-type: none"> <li>Recheck the data to be transmitted to CNC.</li> </ul>
0017	<b>Overrun error</b> Although CNC transmits DC3 (request to stop data transfer) to the HOST, it receives data of 10 bytes or more from the HOST, thus terminates communication. When CNC is transmitting data to the HOST, it receives data of 10 bytes or more from the HOST.	<ul style="list-style-type: none"> <li>Recheck the software as to whether or not the HOST stops transmitting data within 10 bytes after receiving DC3.</li> <li>Recheck the HOST software as to whether or not the HOST transmits data such as a command or header to CNC during receiving a work program.</li> </ul>

## 6.1.10 User PLC Alarms

(The bold characters are the messages displayed on the screen.)



Message	Sub-status		Details	Remedy
	1	2		
<b>U01</b> <b>No user PLC</b>	-	-	PLC program is not input. (Note) Emergency stop (EMG) will be applied.	Download the PLC program of the format selected with the PLC environment selection parameters (bit selection #51/bit 4).
<b>U10</b> <b>Illegal PLC</b>	<b>0x0010</b>	-	<b>PLC scan time error</b> The scan time is 1 second or longer.	Edit the PLC program size to a smaller size.
	<b>0x0040</b>	-	<b>PLC program operation mode illegal</b> PLC program different from the designated mode was downloaded. (Note) Emergency stop (EMG) will be applied.	Download the PLC program having the same format as when the power was reset or turned ON.
	<b>0x0080</b>	-	<b>GPPW ladder code error</b> (Note) Emergency stop (EMG) will be applied.	Download the correct GPPW format PLC program.
	<b>0x008x</b>	-	<b>PLC4B ladder code error</b> An illegal circuit was found in the PLC4B ladder. bit1: PC medium-speed circuit illegal bit2: PC high-speed circuit illegal (Note) Emergency stop (EMG) will be applied.	Download the correct PLC4B format PLC program.
	<b>0x0400</b>	<b>Number of ladder steps</b>	<b>Software illegal interrupt</b> The PLC program process stopped abnormally due to an illegal software command code. (Note) Emergency stop (EMG) will be applied.	Turn the power ON again. If the error is not reset, download the correct PLC program.



Message	Sub-status		Details	Remedy
	1	2		
<b>U10 Illegal PLC</b>	<b>0x800x</b>	<b>Number of PLC program steps</b>	<b>Software exception</b> The PLC program process stopped abnormally due to a bus error, etc.	
			bit 0: BIN command operation error bit 1: BCD command operation error	Refer to the methods for using the BCD and BIN function commands.
			bit6: CALL/CALLS/RET command error bit7: IRET command execution error (Note) Emergency stop (EMG) is applied for bit 6/7.	Turn the power ON again. If the error is not reset, download the correct PLC program.
<b>U50 PLC stopped</b>			The PLC program is stopped.	Start the PLC program.
<b>U55 PLC stopped / is not saved</b>			The PLC program is stopped and not written into ROM.	Write the PLC program into ROM.
<b>U60 Ladder is not saved</b>			The PLC program is not written into ROM.	Write the PLC program into ROM.

**(Note)** The number of PLC program steps displayed on the screen may not match the actual number of error occurrence steps because of the PLC program timing. Use this as a guideline of the occurrence place.

## 6.1.11 Network Service Errors

Message	Details	Remedy
<b>N001</b> <b>Modem initial error</b>	<ul style="list-style-type: none"> <li>There is an error in the modem connection when the power is turned ON.</li> </ul>	<ul style="list-style-type: none"> <li>Check the connection between the NC and modem, connection port and modem power.</li> </ul>
<b>N002</b> <b>Redial over</b>	<ul style="list-style-type: none"> <li>The dial transmission failed more than the designated No. of redial times.</li> </ul>	<ul style="list-style-type: none"> <li>Wait a while, and then transmit again.</li> </ul>
<b>N003</b> <b>TEL unconnect</b>	<ul style="list-style-type: none"> <li>The phone line is not connected.</li> </ul>	<ul style="list-style-type: none"> <li>Check the modem's phone line connection.</li> </ul>
<b>N004</b> <b>Net communication error</b>	<ul style="list-style-type: none"> <li>An error other than the above errors occurred during communication.</li> </ul>	<ul style="list-style-type: none"> <li>Note down the circumstances under which this error occurred, and contact the Service Center.</li> </ul>
<b>N005</b> <b>Invalid net communication</b>	<ul style="list-style-type: none"> <li>The modem connection port is being used for another function such as input/output.</li> <li>The modem connection port settings are incorrect.</li> </ul>	<ul style="list-style-type: none"> <li>Quit using the modem connection port with the other function, and then turn the power ON again.</li> <li>Check the modem connection port settings.</li> </ul>

## 6.2 Operation Messages

The following messages display on each screen.

### 6.2.1 Search-related Operation Messages

Message	Details
<b>Searching</b>	<ul style="list-style-type: none"> <li>The operation search is being executed.</li> </ul>
<b>Search completed</b>	<ul style="list-style-type: none"> <li>The operation search was completed correctly.</li> </ul>
<b>Verifying</b>	<ul style="list-style-type: none"> <li>The program is being verified.</li> </ul>
<b>Verifying stopped</b>	<ul style="list-style-type: none"> <li>The program verification stopped.</li> </ul>
<b>Search error</b>	<ul style="list-style-type: none"> <li>Could not find the designated ONB number. Review the ONB number or machining program settings.</li> <li>The operation search could not be completed correctly.</li> <li>When the parameter (#9005) of the tape mode port was set out of the range or when the port was not connected, an operation search of NC serial was performed.</li> <li>The T code list search failed. Review the program name.</li> <li>Could not find the machining program in HD or IC card.</li> </ul>
<b>Setting error</b>	<ul style="list-style-type: none"> <li>The directory name exceeded the display range. A directory path for which the entire directory cannot be displayed cannot be designated in the directory name area.</li> <li>The search is not possible because ONB number is not designated.</li> </ul>
<b>Restart search is completed</b>	<ul style="list-style-type: none"> <li>The restart search was completed.</li> </ul>
<b>Executing restart search</b>	<ul style="list-style-type: none"> <li>The restart search is being executed.</li> </ul>
<b>Execute operation search</b>	<ul style="list-style-type: none"> <li>The program is not searched. Execute the operation search.</li> </ul>
<b>Can't cancel verify stop</b>	<ul style="list-style-type: none"> <li>The compare stop cannot be canceled because the operation is not in a compare stop.</li> </ul>
<b>Executing top search</b>	<ul style="list-style-type: none"> <li>The top search is being executed correctly.</li> </ul>
<b>Top search completed</b>	<ul style="list-style-type: none"> <li>The top search was completed correctly.</li> </ul>
<b>Top search not completed</b>	<ul style="list-style-type: none"> <li>The restart search (type 2) was executed without the top search.</li> </ul>
<b>Can't input data</b>	<ul style="list-style-type: none"> <li>Data input was attempted during M, S, T, B history display.</li> </ul>
<b>Input some of ONB</b>	<ul style="list-style-type: none"> <li>Awaiting ONB number input</li> </ul>
<b>Verifying stop posn already registered</b>	<ul style="list-style-type: none"> <li>The verify stop position has already been registered.</li> </ul>
<b>No searched program</b>	<ul style="list-style-type: none"> <li>The program has not been searched.</li> </ul>
<b>Program restarting</b>	<ul style="list-style-type: none"> <li>The program is being restarted.</li> </ul>
<b>Program error</b>	<ul style="list-style-type: none"> <li>The restart search was executed in the program with an error.</li> </ul>
<b>N/B block not found</b>	<ul style="list-style-type: none"> <li>The restart search was executed, designating N or B No. not exist.</li> </ul>
<b>Restart search interrupted by reset</b>	<ul style="list-style-type: none"> <li>Reset was executed during the restart search.</li> </ul>
<b>No. of repetitions exceeded</b>	<ul style="list-style-type: none"> <li>The restart search was executed, designating the number of repetitions exceeding the number set in the program.</li> </ul>
<b>Program not found</b>	<ul style="list-style-type: none"> <li>The restart search was executed, designating a program No. not exist.</li> </ul>

## 6.2.2 Graphic Display-related Operation Messages

Message	Details
<b>Searching</b>	<ul style="list-style-type: none"> <li>The check search is being executed.</li> </ul>
<b>Search error</b>	<ul style="list-style-type: none"> <li>Could not find the designated ONB number. Review the ONB number or machining program settings.</li> <li>The check search could not be completed correctly.</li> <li>When the parameter (#9005) of the tape mode port was set out of the range or when the port was not connected, an operation search of NC serial was performed.</li> </ul>
<b>Executing automatic operation</b>	<ul style="list-style-type: none"> <li>An attempt was made to perform operations such as parameter, tool compensation amount data and coordinate system offset settings during auto operation. (Input/output also possible during auto operation)</li> <li>The machining program and MDI data that the operator is attempting to edit cannot be edited during auto operation.</li> <li>It is not possible to be executed a check search or check start-up during auto operation.</li> <li>An attempt was made to set the verify stop position during auto operation.</li> </ul>
<b>Setting error</b>	<ul style="list-style-type: none"> <li>The directory name exceeded the display range. A directory path for which the entire directory cannot be displayed cannot be designated in the directory name area.</li> <li>The check search is not possible because ONB number is not designated.</li> <li>A non-existent axis name or setting that does not exist in the format was made when making the display mode settings. Set using an existing axis name.</li> <li>Incorrect tool No. was specified at the execution of tool clear.</li> </ul>
<b>Execute operation search</b>	<ul style="list-style-type: none"> <li>The program is not searched. Execute the operation search.</li> </ul>
<b>Checking</b>	<ul style="list-style-type: none"> <li>The program check is being executed.</li> </ul>
<b>Check stopped</b>	<ul style="list-style-type: none"> <li>The program check is being stopped.</li> </ul>
<b>Work form is illegal</b>	<ul style="list-style-type: none"> <li>A workpiece is not drawn correctly because the two or more workpiece widths are set to "0".</li> </ul>
<b>Push [Check reset] menu</b>	<ul style="list-style-type: none"> <li>An error occurred in the graphic check. Press the [Check reset] menu key to reset the error.</li> </ul>
<b>Executing trace</b>	<ul style="list-style-type: none"> <li>The trace mode is valid.</li> </ul>
<b>Program check completed</b>	<ul style="list-style-type: none"> <li>The trace in the program check completed with an M02/M30 code.</li> </ul>
<b>Reset complete</b>	<ul style="list-style-type: none"> <li>The program check was reset.</li> </ul>
<b>Tool interfere with work</b>	<ul style="list-style-type: none"> <li>The tool contacted the workpiece when performing rapid traverse (G0) movement with the interference check enabled.</li> </ul>
<b>Program checking</b>	<ul style="list-style-type: none"> <li>The program check is being executed.</li> </ul>
<b>Executing reset operation</b>	<ul style="list-style-type: none"> <li>The program check is being reset.</li> </ul>
<b>Executing trace(tip posn)</b>	<ul style="list-style-type: none"> <li>The tip position trace mode is valid.</li> </ul>
<b>Executing BG simulation</b>	<ul style="list-style-type: none"> <li>The back ground simulation is being executed.</li> </ul>
<b>Draw library inside error (n)</b>	<ul style="list-style-type: none"> <li>Contact the service center.</li> </ul>

## 6.2.3 Variable (Common variables, local variables) - related Operation Messages

Message	Details
Erase? (Y/N)	<ul style="list-style-type: none"> <li>Message to confirm the line erase.</li> <li>[Y] or [INPUT] : Variables are deleted.</li> <li>[N] : Variables are not deleted.</li> </ul>

## 6.2.4 PLC Switch-related Operation Messages

Message	Details
Set up parameter ?(Y/N)	<ul style="list-style-type: none"> <li>Message to confirm the parameter setup.</li> <li>[Y] or [INPUT] : It will be possible to make settings.</li> <li>[N] : It will not be possible to make settings.</li> </ul>

## 6.2.5 Compensation-related (Tool compensation, coordinate system offset) Operation Messages

Message	Details
Erase? (Y/N)	<ul style="list-style-type: none"> <li>Message to confirm the erasing.</li> <li>[Y] or [INPUT] : Erase the data.</li> <li>[N] : Do not erase the data.</li> </ul>
Clear all axes? (Y/N)	<ul style="list-style-type: none"> <li>Message to confirm the all axes clear.</li> <li>[Y] or [INPUT] : Clear the data for all axes.</li> <li>[N] : Do not clear the data.</li> </ul>
Cannot return to origin	<ul style="list-style-type: none"> <li>Operations other than line paste, paste and data input cannot be undone.</li> <li>It is the initial state. Cannot undo.</li> <li>The last operation was performed in another part system. Cannot undo the operation.</li> </ul>
Clear all? (Y/N)	<ul style="list-style-type: none"> <li>Message to confirm the clearing the all data.</li> <li>[Y] or [INPUT] : Clear all data.</li> <li>[N] : Do not clear the data.</li> </ul>
Input P number	<ul style="list-style-type: none"> <li>The coordinate system [Coord G54.1 P] menu was pressed.</li> <li>The expansion workpiece coordinate system P No. was input.</li> </ul>
Data clear complete	<ul style="list-style-type: none"> <li>Clearing of the collection data is complete.</li> </ul>
Execute the collection data clear?	<ul style="list-style-type: none"> <li>Determines whether to clear the collection data. Press [Y] or [INPUT] to clear the data.</li> </ul>

## 6.2.6 Data Input/Output-related Operation Messages

Message	Details
Overwrite this file?(Y/N)	<ul style="list-style-type: none"> <li>Message to confirm the overwriting. [Y] or [INPUT] : Overwrite the file. [N] : Do not overwrite the file.</li> </ul>
Over run error	<ul style="list-style-type: none"> <li>The buffer overran or overflowed.</li> </ul>
Memory over	<ul style="list-style-type: none"> <li>The program cannot be written, because the memory capacity will be exceeded.</li> </ul>
Edit lock B	<ul style="list-style-type: none"> <li>It is not possible to change machining program B (8000 to 8999: user standard subprogram) or machining program C (9000 to 9999: machine tool builder custom program) as edit lock B is enabled.</li> </ul>
Edit lock C	<ul style="list-style-type: none"> <li>It is not possible to change machining program C (9000 to 9999: machine tool builder custom program) as edit lock C is enabled.</li> </ul>
Can't make directory on this device	<ul style="list-style-type: none"> <li>Creation of a directory was attempted for a device that cannot have a directory.</li> </ul>
Designated file does not exist	<ul style="list-style-type: none"> <li>The file specified in device A, and B does not exist.</li> <li>The applicable file does not exist in the specified directory.</li> </ul>
The file name is a directory	<ul style="list-style-type: none"> <li>A directory was designated for the file transfer. A directory cannot be transferred.</li> </ul>
Change complete	<ul style="list-style-type: none"> <li>The data conversion completed correctly.</li> </ul>
Changing	<ul style="list-style-type: none"> <li>The data is being converted.</li> </ul>
Erase complete	<ul style="list-style-type: none"> <li>The file has been erased.</li> </ul>
Erase ended. Some file not erased	<ul style="list-style-type: none"> <li>The file erasing completed, but there are some files that could not be erased.</li> </ul>
Verify error	<ul style="list-style-type: none"> <li>An error occurred when performing a file verification.</li> </ul>
Compare error. Compare next file?(Y/N)	<ul style="list-style-type: none"> <li>Message to confirm the comparison [Y] or [INPUT] : Compare the next file. [N] : Do not compare the next file.</li> </ul>
Compare complete	<ul style="list-style-type: none"> <li>The data comparison completed.</li> </ul>
Verifying	<ul style="list-style-type: none"> <li>The data is being compared.</li> </ul>
The file already exists	<ul style="list-style-type: none"> <li>The input file name already exists.</li> <li>The file name after renaming already exists.</li> </ul>
Can't erase designated file	<ul style="list-style-type: none"> <li>Erasing was attempted of a file that cannot be erased.</li> </ul>
Can't rename designated file	<ul style="list-style-type: none"> <li>An attempt was made to change the name of a file that cannot be renamed.</li> </ul>
Can't condense designated file	<ul style="list-style-type: none"> <li>Condensing of a file that cannot be condensed was attempted.</li> </ul>
Designated file is locked	<ul style="list-style-type: none"> <li>Changing was attempted of a locked file.</li> </ul>
Can't open file for dev A	<ul style="list-style-type: none"> <li>Could not find the file for device A. Or, the file is in a state in which it cannot be accessed.</li> </ul>
Can't open file for dev B	<ul style="list-style-type: none"> <li>Could not find the file for device B. Or, the file is in a state in which it cannot be accessed.</li> </ul>
Can't read file for dev A	<ul style="list-style-type: none"> <li>Could not read in the file for device A. Recheck the connection status for device A or the input/output parameter setting.</li> </ul>
Can't read file for dev B	<ul style="list-style-type: none"> <li>Could not read in the file for device B. Recheck the connection status for device B or the input/output parameter setting.</li> </ul>

Message	Details
Can't close file for dev A	• Contact the service center
Can't close file for dev B	• Contact the service center.
Can't write file for dev A	• Could not write in the file for device B. Recheck the connection status for device A or the input/output parameter setting.
Can't write file for dev B	• Could not write in the file for device B. Recheck the connection status for device B or the input/output parameter setting.
Can't seek file for dev A	• Contact the service center.
Can't seek file for dev B	• Contact the service center.
File name not designated for dev A	• A file name was not designated for device A.
File name not designated for dev B	• A file name was not designated for device B.
Can't open directory for dev A	• Could not find a directory corresponding to device A.
Can't open directory for dev B	• Could not find a directory corresponding to device B.
Different devices designated in A and B	• The same device must be designated for devices A and B, but differing devices were designated.
Timeout error	• A timeout error occurred when communicating with the external device.
Checking	• Cannot be executed during a check
Make directory complete	• Creation of the directory has been completed.
Dir create Complete	• Creation of the directory has been completed.
Can't make directory	• An error occurred while creating the directory.
The directory is not empty	• A file was found in the directory. Erase the file in the directory.
Directory pass is illegal	• The designated directory path name is illegal. Input a correct directory path name.
Data protect	• Setting, erasing, parameter setting, etc., of the various data is prohibited, because the data protect key is validated.
Transfer complete	• The data transfer completed correctly.
Transferring	• The data is being transferred.
Parity H error	• A parity H error was detected.
Parity V error	• A parity V error was detected.
File entry over	• The No. of registration files designated in the specifications was exceeded, so the file could not be registered.
Program No. not found in the file	• There is no program number in the selected file.
Executing format	• The formatting is being executed.
Format complete	• The formatting completed.
Format error	• The formatting failed.
Framing error	• An error occurred between the NC and the external device.
Variable conversion error	• An error occurred during the M2 macro conversion, and the conversion failed.

Message	Details
<b>Merge complete</b>	• The data merge completed.
<b>Merge execution</b>	• The data merge is being executed.
<b>Memory alloc error</b>	• Securing of the communication data range failed.
<b>Rename complete</b>	• The rename has been completed.
<b>OK? (Y/N)</b>	• Message to confirm the operation. [Y] or [INPUT] : Execute the operation [N] : Cancel the operation.
<b>I/O not ready</b>	• An error occurred between the NC and the external device.
<b>I/O parameter error</b>	• The external device settings and input/output parameters do not match.
<b>I/O port busy</b>	• Input/output was not possible as the I/O port is busy.
<b>FD write protect</b>	• The FD is write-protected. Release the write protection.
<b>PLC running</b>	• An attempt was made to input a user PLC during PLC RUN. • Stop the PLC on the maintenance screen.
<b>FD not ready</b>	• An attempt was made to perform an FD operation search with no FD. • An attempt was made to display the FD list with no FD.
<b>MemoryCard not ready</b>	• An attempt was made to perform operations with no memory card.
<b>DS not ready</b>	• An attempt was made to perform operations with no data server.
<b>Can't write in READ-ONLY file</b>	• Contact the service center.
<b>Condense complete</b>	• Condensing has been completed.
<b>A directory does not exist</b>	• The specified directory does not exist.
<b>Setting complete normally</b>	• Decryption code setting file of the credit system was set normally.



## 6.2.7 Parameter-related Operation Messages

Message	Details
<b>Designate copy end posn</b>	<ul style="list-style-type: none"> <li>The copy start position was specified using the cursor. Continue and specify the copy end position using the cursor.</li> </ul>
<b>Copy start posn and end posn reversed</b>	<ul style="list-style-type: none"> <li>When the copy range was designated, a position before the start position was designated as the end position.</li> </ul>
<b>Columns of copy start and end different</b>	<ul style="list-style-type: none"> <li>A different column (axis or part system) was specified for the copy start/end position at the screen with the arrangement configuration for each axis and part system.</li> </ul>
<b>Copy range is inadequate</b>	<ul style="list-style-type: none"> <li>Could not find the parameter No. for the copy start position.</li> <li>A value larger than the last parameter No. was designated as the copy end position parameter No. Check the designated copy range.</li> </ul>
<b>Setting error: column n</b>	<ul style="list-style-type: none"> <li>The nth column setting data is inappropriate when multiple axes were set at the same time (/ division). (Settings have been made up to the (n-1)th column.)</li> </ul>
<b>Password is illegal</b>	<ul style="list-style-type: none"> <li>The password designated for displaying the Machine Parameter screen is illegal.</li> </ul>
<b>Input the password</b>	<ul style="list-style-type: none"> <li>The menu key for first displaying the Machine Parameter screen was pressed after the power was turned ON.</li> </ul>
<b>Paste error</b>	<ul style="list-style-type: none"> <li>An attempt was made to paste in a different parameter from the copy parameter.</li> </ul>
<b>Paste? (Y/N)</b>	<ul style="list-style-type: none"> <li>Message to confirm the operation when pasting. [Y] or [INPUT]: Paste the data at the current cursor position. [N] : Do not paste the data.</li> </ul>
<b>Data protect</b>	<ul style="list-style-type: none"> <li>Setting, erasing, parameter settings, etc., of the various data is prohibit, because the data protect key is validated.</li> </ul>
<b>Executing automatic operation</b>	<ul style="list-style-type: none"> <li>An attempt was made to make parameter settings during auto operation.</li> </ul>
<b>Can't select</b>	<ul style="list-style-type: none"> <li>The password designated for displaying the machine parameters has not been input.</li> <li>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.</li> </ul>
<b>No odd number for R register start No.</b>	<ul style="list-style-type: none"> <li>An odd number cannot be used for R register start No. Use an even number.</li> </ul>

## 6.2.8 Measurement-related (Workpiece, rotation) Operation Messages

Message	Details
<b>TLM switch OFF</b>	<ul style="list-style-type: none"> <li>Measurement, retrieving of the skip position, writing the coordinates data etc. was attempted when the TLM switch was OFF.</li> </ul>
<b>Can't take-in skip posn</b>	<ul style="list-style-type: none"> <li>Could not retrieve the skip position. Check the following:</li> </ul> <p><b>&lt; When measuring the workpiece &gt;</b></p> <ol style="list-style-type: none"> <li>Is the name of the axis to be measured designated in the basic axis (I, J, K)?</li> <li>Is the axis that executed the axis movement a measurement axis?</li> </ol> <p><b>&lt; When measuring the rotation &gt;</b></p> <ol style="list-style-type: none"> <li>Is the name of the axis to be measured designated in the coordinate rotation plane (horizontal axis, vertical axis)?</li> <li>Is the axis that executed the axis movement a measurement axis?</li> </ol>
<b>Can't write coordinates data</b>	<ul style="list-style-type: none"> <li>Could not obtain the measured axis No.</li> <li>The measured angle was illegal.</li> <li>Could not write into the coordinate system offset. Measure again.</li> <li>The work coordinate offset data was attempted to set when the measurement counter does not have the necessary values.</li> <li>The work coordinate offset date was attempted to set in the slave axis.</li> </ul>
<b>Sensor take in not possible</b>	<ul style="list-style-type: none"> <li>Could not retrieve the position measured with the touch sensor. Measure again.</li> </ul>
<b>Can't measure</b>	<ul style="list-style-type: none"> <li>Measurement failed.</li> </ul>
<b>Sensor signal was illegally turned on</b>	<ul style="list-style-type: none"> <li>The sensor signal was already ON when the tool measurement mode (TLM) signal was validated.</li> <li>The sensor signal turned ON when there was no axis movement after the tool measurement mode (TLM) signal was validated.</li> <li>The sensor signal turned ON at a position within 100μm from the final entry start position.</li> <li>Move the axis in a safe direction after turning the sensor signal OFF or turning the tool measurement mode signal OFF.</li> </ul>
<b>Can't write compensation data</b>	<ul style="list-style-type: none"> <li>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.</li> </ul>
<b>Offset No. not found</b>	<ul style="list-style-type: none"> <li>During manual tool length measurement, the sensor was turned ON designating tool compensation No. not exist.</li> <li>During manual tool length measurement, the measurement method was switched to manual tool length measurement 2 designating tool compensation No. not exist.</li> <li>Correctly set the R register of compensation No.</li> </ul>
<b>TLM axis is illegal</b>	<ul style="list-style-type: none"> <li>During 2 or more axes movement, the tool length measurement was executed by turning the sensor ON. Keep the tool away from the sensor and execute the measurement by one axis.</li> </ul>
<b>TLM axis not returned to ref. position</b>	<ul style="list-style-type: none"> <li>The tool length measurement was executed by tuning the sensor ON for the axis in which dog-type reference point return has not been executed. Carry out reference point return for the measurement axis.</li> </ul>
<b>Can't write rotation parameter</b>	<ul style="list-style-type: none"> <li>The measured result cannot be set in the process parameter.</li> </ul>

Message	Details
<b>Can't calculate center &amp; angle for rot</b>	<ul style="list-style-type: none"> <li>Three points necessary for calculation are not retrieved.</li> <li>Center shift amount or sensor radius was failed to retrieve.</li> <li>Calculation of the center and the angle was failed.</li> </ul>
<b>Input 0 to coord center &amp; angle for rot</b>	<ul style="list-style-type: none"> <li>The center and the angle are not "0".</li> </ul> Set "0" in the parameter "#8623 Coord rot centr (H)", "#8624 Coord rot centr (V)" and "#8627 Coord rot angle".
<b>Can't calculate</b>	<ul style="list-style-type: none"> <li>Hole center cannot be determined.</li> </ul>
<b>Meas axis not returned to ref. position</b>	<ul style="list-style-type: none"> <li>The workpiece measurement was executed when dog-type reference point return has not been executed. Carry out reference point return for the measurement axis.</li> </ul>

### 6.2.9 Tool (Tool registration, tool life) -related Operation Messages

Message	Details
<b>Designated group already exists</b>	<ul style="list-style-type: none"> <li>An already existing group No. was designated when changing the group No. (Tool life screen (grp))</li> <li>An already existing group No. was designated when newly creating the group. (Tool life screen (grp list))</li> </ul> Designate a group No. that does not already exist.
<b>Designated group does not exist</b>	<ul style="list-style-type: none"> <li>Erasing was attempted on the Tool life screen (grp list) of a group that does not exist.</li> </ul>
<b>Can't register group</b>	<ul style="list-style-type: none"> <li>The group registration process on the Tool life screen (grp list) failed.</li> </ul>
<b>Can't delete group</b>	<ul style="list-style-type: none"> <li>The group deletion process on the Tool life screen (grp list) failed.</li> </ul>
<b>Erase? (Y/N)</b>	<ul style="list-style-type: none"> <li>Message to confirm the erasing.</li> </ul> [Y] or [INPUT] : Erase the data [N] : Do not erase the data.
<b>Delete all groups? (Y/N)</b>	<ul style="list-style-type: none"> <li>Message to confirm the erasing of all groups.</li> </ul> [Y] or [INPUT] : Erase all groups [N] : Do not erase all groups.
<b>Can't delete all groups</b>	<ul style="list-style-type: none"> <li>All groups' deletion cannot be executed because data protection key (KEY 1) is validated or automatic operation mode is validated, etc. during all groups' deletion. All groups' deletion cannot be executed because nothing has been registered to group, also.</li> </ul>
<b>Pot number not exist</b>	<ul style="list-style-type: none"> <li>The set pot number does not exist.</li> </ul> Check the pot number.
<b>Create new file? (Y/N)</b>	<ul style="list-style-type: none"> <li>Message to confirm the operation when newly creating data, files, etc.</li> </ul> [Y] or [INPUT] : Newly create. [N] : Cancel the operation.
<b>Input the tool number</b>	<ul style="list-style-type: none"> <li>Waiting tool number input.</li> </ul>
<b>Clear not possible</b>	<ul style="list-style-type: none"> <li>The clear range is incorrect.</li> </ul>
<b>Spindle/stdnby tool display not possible</b>	<ul style="list-style-type: none"> <li>The spindle standby cannot be displayed due to the user PLC setting.</li> </ul> Contact the machine tool builder.
<b>Format tool life data? (Y/N)</b>	<ul style="list-style-type: none"> <li>Determines whether to format the tool life management data. When [Y] is input, the formatting is executed.</li> </ul>
<b>Tool life format complete</b>	<ul style="list-style-type: none"> <li>The tool life management data formatting completed.</li> </ul>

## 6.2.10 Editing-related Operation Messages

Message	Details
Buffer correct not possible	• Buffer correction cannot be performed for this program.
Can't write into file	• Could not write the data to the memory with the buffer correction. Contact the service center.
Overwrite this file?(Y/N)	• Message to confirm when registering MDI [Y] or [INPUT] : Overwrite the file. [N] : Do not overwrite the file.
Memory over	• The program cannot be written, because the memory capacity will be exceeded.
Designated character string not found	• Could not find the search results and character string in the program.
Save current file?(Y/N)	• Message to confirm the saving. [Y] : Save the changes to the current file. [N] : Do not save the changes to the current file.
A file does not exist	• An attempt was made to select and edit a non-existent file.
Executing	• Following menu's process is executing now: "Line paste", "Line clear", "Undo", "String search", "String replace", "Miss warning", or "Next miss".
Designated file does not exist	• An attempt was made to select and erase a non-existent file.
Erase complete	• The data erasing completed.
Can't erase designated file	• The selected file cannot currently be erased.
Designated file does not exist	• A file that does not exist was designated when file editing.
Designated file already exists	• When creating a new file, a file name was designated that already exists.
Replace? (Y/N)	• Message to confirm the character string replacement. [Y] or [INPUT] : Replace the character string. [N] : Do not replace the character string.
File access error	• Contact the Service Center.
File open error	• The designated file is already open.
Editing	• A program is being edited on the screen. Save the program to write it into the memory.
Program entry over	• The program could not be registered in the memory when attempted, because the No. of registrations designated in the specifications would be exceeded.
Block char nos over	• The character number limitation in one block was exceeded.
Paste error	• Pasting was attempted within the copy range of the same file.
Copy range is inadequate	• The copy range designation is inadequate. Check whether the designated range exists. • The range was designated exceeding 100 lines during mass editing.
Area designation is inadequate	• The area designation is inadequate. Check whether the designated area exists.
Designated line is out of program range	• Designation was attempted of a line No. larger than the No. of lines in the entire program.

Message	Details
<b>MDI no setting</b>	<ul style="list-style-type: none"> <li>Editing of the MDI was started, but the MDI setting was incomplete.</li> </ul>
<b>Abs/Inc mode is illegal</b>	<ul style="list-style-type: none"> <li>During playback editing: G90 was set when control parameter "Playback G90" was OFF. G91 was set when control parameter "Playback G90" was ON.</li> </ul>
<b>MDI search complete</b>	<ul style="list-style-type: none"> <li>The MDI search completed.</li> </ul>
<b>Can't search in MDI mode</b>	<ul style="list-style-type: none"> <li>The restart search was attempted during MDI mode.</li> <li>Execute the restart search after switching other than MDI mode.</li> </ul>
<b>MDI Set ended</b>	<ul style="list-style-type: none"> <li>MDI setting cannot be executed.</li> </ul>
<b>MDI Setting error</b>	<ul style="list-style-type: none"> <li>MDI setting was completed.</li> </ul>
<b>MDI search error</b>	<ul style="list-style-type: none"> <li>Could not execute the MDI search.</li> </ul>
<b>MDI entry complete</b>	<ul style="list-style-type: none"> <li>MDI entry has been completed.</li> </ul>
<b>Can't edit except in MDI mode</b>	<ul style="list-style-type: none"> <li>"#1144 mdlkof" (MDI setting lock) is "0" and therefore it is not possible to edit the MDI program in a mode other than MDI mode.</li> </ul>
<b>Input miss was detected</b>	<ul style="list-style-type: none"> <li>An input miss was detected.</li> </ul>
<b>Input miss was not detected</b>	<ul style="list-style-type: none"> <li>A search was performed for an input miss, however, none was found.</li> </ul>
<b>Can't edit a file except in NC memory</b>	<ul style="list-style-type: none"> <li>Editing cannot be performed at the edit window for programs other than those in the NC memory.</li> </ul>
<b>Save it</b>	<ul style="list-style-type: none"> <li>The cursor was tried to move beyond the editable range during mass-editing. Save, then operate again.</li> </ul>
<b>Save not possible</b>	<ul style="list-style-type: none"> <li>A special file (history file etc.) that cannot be saved was edited and an attempt was made to save it. Perform an operation to quit editing.</li> <li>Failed saving due to file size over, etc. during mass-editing.</li> <li>Setting of "#1166 fixpro" was illegal. Use the settings for a regular program.</li> <li>MDI cannot be entered due to MDI editing mode. Press <b>INPUT</b> key and finish editing.</li> </ul>
<b>Save left side file? (Y/N)</b>	<ul style="list-style-type: none"> <li>Message to confirm whether saving the left side file of the multi-program display type [Y]: Save the change [N]: Do not save the change</li> </ul>
<b>Save right side file? (Y/N)</b>	<ul style="list-style-type: none"> <li>Message to confirm whether saving the right side file of the multi-program display type [Y]: Save the change [N]: Do not save the change</li> </ul>
<b>Can't edit because of size over</b>	<ul style="list-style-type: none"> <li>The program cannot be written, because the memory capacity will be exceeded.</li> <li>If the memory capacity of the transfer designation device is exceeded during the automatic backup, increase the available memory of the device.</li> </ul>
<b>Can't edit the searched file</b>	<ul style="list-style-type: none"> <li>The serial file cannot be edited.</li> </ul>
<b>DS not ready</b>	<ul style="list-style-type: none"> <li>Operation was attempted when a DS was not inserted.</li> <li>Creating or opening a program was attempted when a DS was not inserted.</li> </ul>
<b>FD not ready</b>	<ul style="list-style-type: none"> <li>The FD operation search was attempted when an FD was not inserted.</li> <li>The FD list display was attempted when an FD was not inserted.</li> <li>Creating or opening a program was attempted when an FD was not inserted.</li> </ul>

Message	Details
<b>MemoryCard not ready</b>	<ul style="list-style-type: none"> <li>Operation was attempted when a memory card was not inserted.</li> </ul>
<b>This cannot be specified</b>	<ul style="list-style-type: none"> <li>Invalid special characters (/E, etc.) were set.</li> </ul>
<b>Loading</b>	<ul style="list-style-type: none"> <li>Loading file.</li> </ul>
<b>Saving</b>	<ul style="list-style-type: none"> <li>Saving file.</li> </ul>
<b>Can't execute playback edit</b>	<ul style="list-style-type: none"> <li>The playback editing cannot be executed because the right side area is mass-editing mode.</li> <li>Playback editing was attempted while program file to be edited is not designated. Display a program file in the right side area.</li> </ul>
<b>Program display lock C</b>	<ul style="list-style-type: none"> <li>The program display or search cannot be executed. Review the parameter "#1121 pglk_c" (program display lock).</li> </ul>

### 6.2.11 Diagnosis-related Operation Messages

Message	Details
<b>Erase? (Y/N)</b>	<ul style="list-style-type: none"> <li>Message to confirm alarm history clear operation [Y] or [INPUT] : Erase the data [N] : Do not erase the data.</li> </ul>
<b>Can't write data</b>	<ul style="list-style-type: none"> <li>The data cannot be written.</li> </ul>
<b>Device is illegal</b>	<ul style="list-style-type: none"> <li>The designated device is inadequate.</li> </ul>
<b>Modal output not possible</b>	<ul style="list-style-type: none"> <li>The modal output process failed.</li> </ul>
<b>Modal clear not possible</b>	<ul style="list-style-type: none"> <li>The modal cancel process failed.</li> </ul>
<b>Continue display not possible</b>	<ul style="list-style-type: none"> <li>Continuous display is not possible because data is not set at the cursor position.</li> </ul>
<b>One-shot output not possible</b>	<ul style="list-style-type: none"> <li>The one-shot output process failed.</li> </ul>
<b>Setting data not found</b>	<ul style="list-style-type: none"> <li>The data has not been set.</li> </ul>
<b>Select a menu</b>	<ul style="list-style-type: none"> <li>A device No. was set without selecting a menu operation. Press any operation menu and input the device No. with a menu highlighted.</li> </ul>

## 6.2.12 Maintenance-related Operation Messages

Message	Details
<b>Password is illegal</b>	<ul style="list-style-type: none"> <li>The input password is incorrect.</li> </ul>
<b>Input password</b>	<ul style="list-style-type: none"> <li>The [Password] menu key was pressed, and the password input mode was entered. Input a password.</li> </ul>
<b>Now making back-up</b>	<ul style="list-style-type: none"> <li>Currently backing up system data and the user PLC program to a specified device.</li> </ul>
<b>Backupping</b>	<ul style="list-style-type: none"> <li>The SRAM data is being backed up on the HD.</li> </ul>
<b>Backup complete</b>	<ul style="list-style-type: none"> <li>Backup of the SRAM data on the HD has been completed.</li> <li>Back up of system data and user PLC program to a specified device has been completed.</li> </ul>
<b>Backup error</b>	<ul style="list-style-type: none"> <li>An error occurred while backing up the SRAM data on the HD.</li> </ul>
<b>Select directory to backup</b>	<ul style="list-style-type: none"> <li>Select area by moving cursor, using ↑ and ↓ keys. Press the "INPUT" key to confirm.</li> </ul>
<b>Select directory to restore</b>	<ul style="list-style-type: none"> <li>Select file by moving cursor, using ↑ and ↓ keys. Press the "INPUT" key to confirm.</li> </ul>
<b>Executing format</b>	<ul style="list-style-type: none"> <li>The formatting is being executed correctly.</li> </ul>
<b>Format complete</b>	<ul style="list-style-type: none"> <li>The formatting completed correctly.</li> </ul>
<b>Format error</b>	<ul style="list-style-type: none"> <li>The NC memory formatting failed. Contact the nearest service center.</li> </ul>
<b>Quit HMI ?(Y/N)</b>	<ul style="list-style-type: none"> <li>Message to confirm the HMI quitting [Y] or [INPUT] : Quit the HMI. [N] : Do not quit the HMI.</li> </ul>
<b>Format NC memory?(Y/N)</b>	<ul style="list-style-type: none"> <li>Message to confirm the NC memory formatting [Y] or [INPUT] : Start formatting the NC memory. [N] : Do not format the NC memory.</li> </ul>
<b>Execute SRAM backup ?(Y/N)</b>	<ul style="list-style-type: none"> <li>Message to confirm the SRAM back up [Y] or [INPUT] : The SRAM data is backed up to the HD. [N] : The SRAM data is not backed up to the HD.</li> </ul>
<b>PLC running. Does it stop? (Y/N)</b>	<ul style="list-style-type: none"> <li>Message to confirm the PLC STOP [Y] or [INPUT] : Backup the SRAM data on the HD. [N] : Do not backup the SRAM data on the HD.</li> </ul>
<b>Restoring</b>	<ul style="list-style-type: none"> <li>The system data and user PLC program are now being restored to the NC from a specified device.</li> </ul>
<b>Restore complete</b>	<ul style="list-style-type: none"> <li>Restoration of system data and user PLC program to the NC from a specified device has been completed.</li> </ul>
<b>Auto adjust error</b>	<ul style="list-style-type: none"> <li>The H/W status cannot be read properly, and therefore it is not possible to perform auto adjustments. Check the remote I/O unit. Perform manual adjustments.</li> <li>The unit is defective. Replace the unit.</li> </ul>
<b>Change Ope. test mode</b>	<ul style="list-style-type: none"> <li>Operation of the Operation test screen was attempted when the operation adjustment mode was not selected.</li> </ul>
<b>Test mode sig valid signal is now OFF</b>	<ul style="list-style-type: none"> <li>The operation adjustment mode cannot be selected because the operation adjustment mode valid signal (R9998/bit0) is 0.</li> </ul>

Message	Details
<b>Auto adjust complete</b>	<ul style="list-style-type: none"> <li>Analog output adjustment completed normally.</li> </ul>
<b>Auto adjust execution</b>	<ul style="list-style-type: none"> <li>Performing analog output adjustment normally.</li> </ul>
<b>Execute? (Y/N)</b>	<ul style="list-style-type: none"> <li>Message to confirm the operation  [Y] or [INPUT] : The currently selected operation is performed.  [N] : The currently selected operation is not performed.</li> </ul>
<b>Unit not equipped</b>	<ul style="list-style-type: none"> <li>The machine is not equipped with an analog output unit.</li> </ul>
<b>A serial number is inaccurate</b>	<ul style="list-style-type: none"> <li>The system data to be restored and the serial number in the NC do not match, and therefore it is not possible to restore.</li> <li>Check to ensure that the serial number in the NC has been set and that the system data to be restored matches.</li> </ul>
<b>Operating aux axis</b>	<ul style="list-style-type: none"> <li>It is not possible to set parameter and input/output data during auxiliary axis operation.</li> <li>It is not possible to change the display axis during auxiliary axis operation.</li> </ul>



## 6.2.13 Data Sampling-related Operation Messages

Message	Details
Executing sampling	<ul style="list-style-type: none"> <li>The waveform data is being sampled.</li> </ul>
Input the axis name	<ul style="list-style-type: none"> <li>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.</li> </ul>
Input axis name/signal No./bit	<ul style="list-style-type: none"> <li>This appears when the data type is selected in the Ch1 or Ch2 data setting area. Set the sampling conditions common for Ch1 and Ch2.</li> </ul>
Input device name/device No.	<ul style="list-style-type: none"> <li>Input device name/device No.</li> </ul>
Input file/sub-ID/item/data	<ul style="list-style-type: none"> <li>This appears when an NC file is selected in the Ch1 or Ch2 data setting area.</li> </ul>
Change the area	<ul style="list-style-type: none"> <li>Change the area.</li> </ul>
Sampling conditions are illegal	<ul style="list-style-type: none"> <li>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.</li> </ul>
Can't start sampling	<ul style="list-style-type: none"> <li>"#1224 aux08/bit0" is "0" and sampling start-up cannot be performed.</li> </ul>
The collection invalid	<ul style="list-style-type: none"> <li>The parameters are set to prevent data being collected. Check the parameters.</li> </ul>
The collection begin?	<ul style="list-style-type: none"> <li>Determines whether to start data collection. Press [Y] or [INPUT] to start data collection.</li> </ul>
The collection stop?	<ul style="list-style-type: none"> <li>Determines whether to stop data collection. Press [Y] or [INPUT] to stop data collection.</li> </ul>
The collection is being executed	<ul style="list-style-type: none"> <li>An attempt was made to start data collection while data collection was being performed.</li> </ul>
The collection is stopping	<ul style="list-style-type: none"> <li>An attempt was made to stop data collection while data collection was stopped.</li> </ul>
The collection invalid	<ul style="list-style-type: none"> <li>The data collection is set invalid in the parameter. Check the parameter.</li> </ul>
Scroll execution	<ul style="list-style-type: none"> <li>The waveform display is being scrolled.</li> </ul>
Refresh execution	<ul style="list-style-type: none"> <li>The waveform is being refreshed.</li> </ul>

## 6.2.14 Absolute Position Detection-related Operation Messages

Message	Details
Setting absolute position set	<ul style="list-style-type: none"> <li>Setting from the screen was attempted of absolute position detection data when the "Absolute Position Set" was not ON. Press the menu key [Absolute Position Set] to turn it ON.</li> </ul>
Not the abs position detection system	<ul style="list-style-type: none"> <li>An absolute position detection system has not been selected for the currently selected axis. The machine parameter (Axis specification parameter "#2049 type") must be set.</li> </ul>
Axis name inappropriate	<ul style="list-style-type: none"> <li>The set axis name is inappropriate. Check the axis name.</li> </ul>
Not passed on grid	<ul style="list-style-type: none"> <li>The absolute position basic point was set without passing the grid after the power ON in the dogless-type absolute position detection. Return one grid back and repeat the procedure.</li> </ul>
Can't start	<ul style="list-style-type: none"> <li>Settings of "#0 absolute posn set", "#2 Z-point" and "#2055 pushf" are not adequate.</li> <li>"AbsEncoder: Serial data error" alarm (Z71 0005) has occurred. Check the parameter and the alarm.</li> </ul>
Illegal direction	<ul style="list-style-type: none"> <li>JOG starting direction is illegal in the machine end stopper method of the dogless-type absolute position detection.</li> </ul>

## 6.2.15 System Setup-related Operation Messages

Message	Details
Initial parameter creating	<ul style="list-style-type: none"> <li>The initial parameter is being created.</li> </ul>
Initial parameter transferring	<ul style="list-style-type: none"> <li>The initial parameter is being transferred.</li> </ul>
Spindle initial parameter transferring	<ul style="list-style-type: none"> <li>The spindle initial parameter is being transferred.</li> </ul>
Can't write data	<ul style="list-style-type: none"> <li>The data cannot be written.</li> <li>Setting of the initial parameter failed.</li> <li>Contact the service center.</li> </ul>
Param set ended. Format NC memory? (Y/N)	<ul style="list-style-type: none"> <li>After completing the parameter setting, it determines whether executing the file format or not. Enter [Y] or [INPUT] to execute the file format.</li> </ul>
Write sample ladder? (Y/N)	<ul style="list-style-type: none"> <li>It determines whether executing writing the sample PLC program or not. Enter [Y] or [INPUT] to start writing the sample PLC program.</li> </ul>
Sample ladder not found	<ul style="list-style-type: none"> <li>The file to set the sample PLC program is lost. Contact the service center.</li> </ul>

## 6.2.16 Automatic Backup-related Operation Messages

Message	Details
<b>Auto backup disabled (Device illegal)</b>	<ul style="list-style-type: none"> <li>Set a correct value in the device No. of the automatic backup device.</li> </ul>
<b>Auto backup disabled (No DS)</b>	<ul style="list-style-type: none"> <li>When turning ON the power next time, insert DS.</li> </ul>
<b>Auto backup disabled (No memory card)</b>	<ul style="list-style-type: none"> <li>When turning ON the power next time, insert the memory card.</li> </ul>
<b>Auto backup proceeding</b>	<ul style="list-style-type: none"> <li>Wait for the automatic backup to complete.</li> </ul>
<b>Auto backup completed</b>	<ul style="list-style-type: none"> <li>The automatic back up is completed.</li> </ul>
<b>Memory over</b>	<ul style="list-style-type: none"> <li>The memory capacity of the transfer designation device was exceeded during the automatic backup. Increase the available memory of the transfer designation device.</li> </ul>
<b>File access error</b>	<ul style="list-style-type: none"> <li>A file access error occurred during the automatic backup. Contact the service center.</li> </ul>
<b>Can't make directory</b>	<ul style="list-style-type: none"> <li>The storage destination directory of the automatic backup data described in the custom definition file does not exist. Create the directory of the storage destination.</li> </ul>
<b>Write protect</b>	<ul style="list-style-type: none"> <li>The memory card is write-protected. Release the write protection.</li> </ul>

## 6.2.17 Alarm History-related Operation Messages

Message	Details
<b>The collection begin? (Y/N)</b>	<ul style="list-style-type: none"> <li>Determines whether to start alarm history. Press [Y] or [INPUT] to start alarm history.</li> </ul>
<b>The collection stop? (Y/N)</b>	<ul style="list-style-type: none"> <li>Determines whether to stop alarm history. Press [Y] or [INPUT] to stop alarm history.</li> </ul>
<b>The collection is being executed</b>	<ul style="list-style-type: none"> <li>An attempt was made to start alarm history while alarm history was being performed.</li> </ul>
<b>The collection is stopping</b>	<ul style="list-style-type: none"> <li>An attempt was made to stop alarm history while alarm history was being stopped.</li> </ul>
<b>Execute the collection data clear?(Y/N)</b>	<ul style="list-style-type: none"> <li>Determines whether to clear alarm history. Press [Y] or [INPUT] to clear alarm history.</li> </ul>
<b>Data clear complete</b>	<ul style="list-style-type: none"> <li>The alarm history cleared was completed.</li> </ul>
<b>The collection begin</b>	<ul style="list-style-type: none"> <li>The alarm history was started.</li> </ul>
<b>The collection stop</b>	<ul style="list-style-type: none"> <li>The alarm history was stopped.</li> </ul>

## 6.2.18 Anshin-net-related Operation Messages

## (1) Messages related to all Anshin-net screens

Message		Details
(None)	<b>Press one-touch call to call the NC service.</b> <b>Do not turn the power OFF during the one-touch call.</b>	<ul style="list-style-type: none"> <li>Communication has not been started.</li> <li>A call is being placed with automatic alarm notification or one-touch call, and a call is being received from the NC service.</li> </ul>

## (2) Messages related to automatic alarm notification

Message		Details
dialing	<b>Do not turn the power OFF until the automatic alarm notification ends.</b>	<ul style="list-style-type: none"> <li>A call is being placed with automatic alarm notification.</li> <li>Communication starts when an alarm occurs, but the line is not connected yet in this state.</li> <li>This state is also entered when standing by for transmission.</li> <li>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.</li> </ul>
Waiting for dialing	<b>Do not turn the power OFF until the automatic alarm notification ends.</b>	<ul style="list-style-type: none"> <li>Redialing since the NC service is using the line for other communication.</li> </ul>
Verifying the user registration	<b>Do not turn the power OFF until the automatic alarm notification ends.</b>	<ul style="list-style-type: none"> <li>User authentication is being executed by the NC service side.</li> </ul>
Connecting	<b>Do not turn the power OFF until the automatic alarm notification ends.</b>	<ul style="list-style-type: none"> <li>The line is connected with automatic alarm notification.</li> </ul>
Receiving	<b>Do not turn the power OFF until the automatic alarm notification ends.</b>	<ul style="list-style-type: none"> <li>The diagnosis data is being received with automatic alarm notification.</li> </ul>
Sending	<b>Do not turn the power OFF until the automatic alarm notification ends.</b>	<ul style="list-style-type: none"> <li>The diagnosis data is being sent with automatic alarm notification.</li> </ul>
Transmission completed	<b>Press one-touch call to call the NC service.</b> <b>Do not turn the power OFF during the one-touch call.</b>	<ul style="list-style-type: none"> <li>Automatic alarm notification has ended, and the line has been disconnected.</li> </ul>
Reception completed	<b>Press one-touch call to call the NC service.</b> <b>Do not turn the power OFF during the one-touch call.</b>	<ul style="list-style-type: none"> <li>Automatic alarm notification has ended, and the line has been disconnected.</li> <li>This is displayed when at least one file has been received.</li> </ul>
(Status of communication with NC service)	<b>Connecting with NC service.</b> <b>Wait for communication to end.</b>	<ul style="list-style-type: none"> <li>In connection standby state since line is being used by Anshin-net.</li> </ul>

## (3) Messages related to automatic alarm notification

Message		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"> <li>Operator notification is valid.</li> <li>If machining ends normally or abnormally in this state, communication with operator notification will start.</li> </ul>
Dialing	Do not turn the power OFF until the operator notification ends.	<ul style="list-style-type: none"> <li>Data is being transmitted with operator notification.</li> <li>Communication will start when machining ends normally or abnormally, but the line is not connected yet in this state.</li> <li>This state is also entered when standing by for transmission.</li> </ul>
Waiting for dialing	Do not turn the power OFF until the operator notification ends.	<ul style="list-style-type: none"> <li>Redialing since the NC service is using the line for other communication.</li> </ul>
Verifying the user registration	Do not turn the power OFF until the operator notification ends.	<ul style="list-style-type: none"> <li>User authentication is being executed by the NC service side.</li> </ul>
Connecting	Do not turn the power OFF until the operator notification ends.	<ul style="list-style-type: none"> <li>The line is connected with operator notification.</li> </ul>
Receiving	Do not turn the power OFF until the operator notification ends.	<ul style="list-style-type: none"> <li>The diagnosis data is being received with operator notification.</li> </ul>
Sending	Do not turn the power OFF until the operator notification ends.	<ul style="list-style-type: none"> <li>The diagnosis data is being sent with operator notification.</li> </ul>
Transmission completed	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"> <li>Operator notification has ended, and the line has been disconnected.</li> </ul>
Reception completed	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"> <li>Operator notification has ended, and the line has been disconnected.</li> <li>This is displayed when at least one file has been received.</li> </ul>
(Status of communication with NC service)	Connecting with NC service. Wait for communication to end.	<ul style="list-style-type: none"> <li>In connection standby state since line is being used by Anshin-net.</li> </ul>

## (4) Messages related to automatic alarm notification

Message		Details
Carry out one-touch call? (Y/N)	Press "Y" to make a one-touch call and "N" to cancel. If the line is being in use, a connection with NC service will be established as soon as the line becomes idle.	<ul style="list-style-type: none"> <li>A connection with NC service has not been established.</li> <li>The system is confirming whether to actually make a one-touch call.</li> <li>This is displayed when the Call menu is pressed. Press Y or INPUT to execute one-touch call.</li> </ul>

Message		Details
Dialing	Do not turn the power OFF until the one-touch call ends.	<ul style="list-style-type: none"> <li>Data is being transmitted with one-touch call.</li> <li>Communication will start when one-touch call is executed, but the line is not connected yet in this state.</li> <li>This state is also entered when standing by for transmission.</li> </ul>
Waiting for dialing	Do not turn the power OFF until the one-touch call ends.	<ul style="list-style-type: none"> <li>Redialing since the NC service is using the line for other communication.</li> </ul>
Verifying the user registration	Do not turn the power OFF until the one-touch call ends.	<ul style="list-style-type: none"> <li>User authentication is being executed by the NC service side.</li> </ul>
Connecting	Do not turn the power OFF until the one-touch call ends.	<ul style="list-style-type: none"> <li>The line is connected with one-touch call.</li> </ul>
Receiving	Do not turn the power OFF until the one-touch call ends.	<ul style="list-style-type: none"> <li>The diagnosis data is being received with one-touch call.</li> </ul>
Sending	Do not turn the power OFF until the one-touch call ends.	<ul style="list-style-type: none"> <li>The diagnosis data is being sent with one-touch call.</li> </ul>
Transmission completed	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"> <li>Communication with one-touch call has ended, and the line has been disconnected.</li> </ul>
Reception completed	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"> <li>Communication with one-touch call has ended, and the line has been disconnected.</li> <li>This is displayed when at least one file has been received.</li> </ul>
(Status of communication with NC service)	Connecting with NC service. Wait for communication to end.	<ul style="list-style-type: none"> <li>In connection standby state since line is being used by Anshin-net.</li> </ul>

## (5) Messages related to transmission request from NC service

Message		Details
Verifying the destination	Connecting with NC service. Wait for communication to end.	<ul style="list-style-type: none"> <li>User authentication is being executed by the NC system side.</li> </ul>
Connecting	Connecting with NC service. Wait for communication to end.	<ul style="list-style-type: none"> <li>The line is connected upon transmission request from NC service.</li> </ul>
Receiving	Connecting with NC service. Wait for communication to end.	<ul style="list-style-type: none"> <li>Data is being received upon transmission request from NC service.</li> </ul>
Sending	Connecting with NC service. Wait for communication to end.	<ul style="list-style-type: none"> <li>Data is being sent upon transmission request from NC service.</li> </ul>
Transmission completed	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"> <li>Transmission request from NC service has been completed, and the line has been disconnected.</li> </ul>
Reception completed	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"> <li>Transmission request from NC service has been completed, and the line has been disconnected.</li> <li>This is displayed when at least one file or message has been received.</li> </ul>

## (6) Messages related to number 1 to 3 menu operations

Message		Details
(None)	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"> <li>The selected telephone No. will be set as the telephone No. to be notified to the NC service.</li> <li>Hereafter, the telephone No. set with one-touch call or operator notification will be notified to the NC service.</li> </ul>

## (7) Messages related to arbitrary number setting

Message		Details
(None)	Input the telephone No. to be notified.	<ul style="list-style-type: none"> <li>The input telephone No. will be set as the telephone No. to be notified to the NC service.</li> <li>Hereafter, the telephone No. set with one-touch call or operator notification will be notified to the NC service.</li> </ul>

## 6.2.19 Other Operation Messages

Message	Details
<b>Executing automatic operation</b>	<ul style="list-style-type: none"> <li>Cannot be performed during automatic operation. Perform the operation again after automatic operation has been completed.</li> </ul>
<b>Setting error</b>	<ul style="list-style-type: none"> <li>The setting data is inadequate. (Alphabetic characters were set where only numeric characters can be set, etc.)</li> <li>The data has not been set.</li> <li>There is no specification.</li> </ul>
<b>Data range error</b>	<ul style="list-style-type: none"> <li>The input data exceeded the range. Set the value again within the range.</li> </ul>
<b>Data protect</b>	<ul style="list-style-type: none"> <li>Setting, erasing, parameter setting, etc., of the various data is prohibited, because the data protect key is validated. Reconsider the data protect key setting.</li> </ul>
<b>Write protect</b>	<ul style="list-style-type: none"> <li>Attempted to create a new program file in the write-protected device</li> <li>Opened the program file of the write-protected device</li> <li>Attempted to save the program file of the write-protected device</li> <li>Attempted to correct the buffer for the write-protected file.</li> <li>Attempted to edit or correct the buffer for the read-only program file.</li> </ul>
<b>Edit lock B</b>	<ul style="list-style-type: none"> <li>It is not possible to change machining program B (8000 to 8999: user standard subprogram) or machining program C (9000 to 9999: machine tool builder custom program) as edit lock B is enabled.</li> </ul>
<b>Edit lock C</b>	<ul style="list-style-type: none"> <li>It is not possible to change machining program C (9000 to 9999: machine tool builder custom program) as edit lock C is enabled.</li> </ul>
<b>Origin set not possible</b>	<ul style="list-style-type: none"> <li>The operation is in a state in which origin set is not possible. Check the parameter "#1123 origin (Origin set prohibited)" setting.</li> <li>Check that the axis has stopped.</li> <li>Check that idling (post-reset status) is currently being performed.</li> </ul>
<b>Can't command manual value</b>	<ul style="list-style-type: none"> <li>The manual numerical value protect is valid and therefore it is not possible to perform a manual numerical value command.</li> </ul>
<b>Getting T code list</b>	<ul style="list-style-type: none"> <li>T code list is being retrieved.</li> </ul>
<b>T code list complete</b>	<ul style="list-style-type: none"> <li>Retrieving T code list is completed.</li> </ul>
<b>Load meter display not possible</b>	<ul style="list-style-type: none"> <li>The load meter cannot be displayed. Contact the machine tool builder.</li> </ul>
<b>Pallet running</b>	<ul style="list-style-type: none"> <li>Each setting was executed during pallet running.</li> </ul>
<b>APC executing</b>	<ul style="list-style-type: none"> <li>Each setting was executed during automatic pallet changer executing.</li> </ul>



### 6.3 Program Error

(The bold characters are the message displayed in the screen.)

These alarms occur during automatic operation, and the causes of these alarms are mainly program errors which occur, for instance, when mistakes have been made in the preparation of the machining programs or when programs which conform to the specification have not been prepared.

Error No.	Details	Remedy
<b>P 10</b>	<b>No. of simultaneous axes over</b> The number of axis addresses commanded in the same block exceeds the specifications.	<ul style="list-style-type: none"> <li>• Divide the alarm block command into two.</li> <li>• Check the specifications.</li> </ul>
<b>P 11</b>	<b>Illegal axis address</b> The axis address commanded by the program and the axis address set by the parameter do not match.	<ul style="list-style-type: none"> <li>• Revise the axis names in the program.</li> </ul>
<b>P 20</b>	<b>Division error</b> An axis command which cannot be divided by the command unit has been issued.	<ul style="list-style-type: none"> <li>• Check the program.</li> </ul>
<b>P 29</b>	<b>Not accept command</b> The normal line control command (G40.1, G41.1, G42.1) has been issued during the modal in which the normal line control is not acceptable.	<ul style="list-style-type: none"> <li>• Check the program.</li> </ul>
<b>P 30</b>	<b>Parity H error</b> The number of holes per character on the paper tape is even for EIA code and odd for ISO code.	<ul style="list-style-type: none"> <li>• Check the paper tape.</li> <li>• Check the tape puncher and tape reader.</li> </ul>
<b>P 31</b>	<b>Parity V error</b> The number of characters per block on the paper tape is odd.	<ul style="list-style-type: none"> <li>• Make the number of characters per block on the paper tape even.</li> <li>• Set the parameter parity V selection OFF.</li> </ul>
<b>P 32</b>	<b>Illegal address</b> An address not listed in the specifications has been used.	<ul style="list-style-type: none"> <li>• Check and revise the program address.</li> <li>• Check and correct the parameters values.</li> <li>• Check the specifications.</li> </ul>
<b>P 33</b>	<b>Format error</b> The command format in the program is not correct.	<ul style="list-style-type: none"> <li>• Check the program.</li> </ul>
<b>P 34</b>	<b>Illegal G code</b> A G code not listed in the specifications has been used. An illegal G code was commanded during the coordinate rotation command (G68).	<ul style="list-style-type: none"> <li>• Check and correct the G code address in the program.</li> </ul>
	G51.2 or G50.2 was commanded when the rotary tool axis No. (#1501 polyax) was set to "0". G51.2 or G50.2 was commanded when the tool axis was set to the linear axis (#1017 rot "0").	<ul style="list-style-type: none"> <li>• Check the parameter setting values.</li> </ul>
<b>P 35</b>	<b>Setting value range over</b> The setting range for the addresses has been exceeded.	<ul style="list-style-type: none"> <li>• Check the program.</li> </ul>
<b>P 36</b>	<b>Program end error</b> "EOR" has been read during tape and memory mode.	<ul style="list-style-type: none"> <li>• Enter the M02 and M30 command at the end of the program.</li> <li>• Enter the M99 command at the end of the subprogram.</li> </ul>

Error No.	Details	Remedy
<b>P 37</b>	<b>O, N number zero</b> A zero has been specified for program and sequence Nos.	<ul style="list-style-type: none"> <li>The program Nos. are designated across a range from 1 to 99999999.</li> <li>The sequence Nos. are designated across a range from 1 to 99999.</li> </ul>
<b>P 39</b>	<b>No specifications</b> <ul style="list-style-type: none"> <li>A non-specified G code was specified.</li> <li>The selected operation mode is not used.</li> </ul>	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P 40</b>	<b>Pre-read block error</b> When tool radius compensation is executed, there is an error in the pre-read block and so the interference check is disabled.	<ul style="list-style-type: none"> <li>Reconsider the program.</li> </ul>
<b>P 48</b>	<b>Restart pos return incomplete</b> Movement command was executed before executing the block that is restart-searched.	<ul style="list-style-type: none"> <li>Carry out program restart again. Movement command cannot be executed before executing the block that is restart-searched.</li> </ul>
<b>P 49</b>	<b>Invalid restart search</b> <ul style="list-style-type: none"> <li>Restart search was attempted for the 3-dimensional circular interpolation.</li> <li>Restart search was attempted during the cylindrical interpolation, polar coordinate interpolation, and tool tip center control.</li> </ul>	<ul style="list-style-type: none"> <li>Reconsider the program.</li> <li>Reconsider the restart search position.</li> </ul>
<b>P 50</b>	<b>No spec: Inch/Metric change</b> Inch/Metric changeover (G20/G21) command was issued even though there is no inch/metric conversion specification.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P 60</b>	<b>Compensation length over</b> The commanded movement distance is excessive. (Over 2 <sup>31</sup> )	<ul style="list-style-type: none"> <li>Reconsider the axis address command.</li> </ul>
<b>P 61</b>	<b>No spec: Unidirectional posit.</b> Unidirectional positioning (G60) was commanded even though there is no unidirectional positioning specification.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P 62</b>	<b>No F command</b> <ul style="list-style-type: none"> <li>No feed rate command has been issued.</li> <li>There is no F command in the cylindrical interpolation or polar coordinate interpolation immediately after the G95 mode is commanded.</li> </ul>	<ul style="list-style-type: none"> <li>The default movement modal command at power ON is G01. This causes the machine to move without a G01 command if a movement command is issued in the program, and an alarm results. Use an F command to specify the feed rate.</li> <li>Specify F with a thread lead command.</li> </ul>
<b>P 63</b>	<b>No spec: High-speed machining</b> High-speed machining cancel (G5P0) was commanded even though there is no high-speed machining mode specification.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P 65</b>	<b>No spec: High speed mode 3</b>	<ul style="list-style-type: none"> <li>Check the high-speed mode III specifications.</li> </ul>
<b>P 70</b>	<b>Arc end point deviation large</b> <ul style="list-style-type: none"> <li>There is an error in the arc start and end points as well as in the arc center.</li> <li>The difference of the involute curve through the start point and the end point is large.</li> <li>When arc was commanded, one of the two axes configuring the arc plane was a scaling valid axis.</li> </ul>	<ul style="list-style-type: none"> <li>Check the numerical values of the addresses that specify the start and end points, arc center as well as the radius in the program.</li> <li>Check the "+" and "-" directions of the address numerical values.</li> <li>Check the scaling valid axis.</li> </ul>

Error No.	Details	Remedy
<b>P 71</b>	<b>Arc center error</b> <ul style="list-style-type: none"> <li>The arc center is not sought during R-specified circular interpolation.</li> <li>The curvature center of the involute curve cannot be obtained.</li> </ul>	<ul style="list-style-type: none"> <li>Check the numerical values of the addresses in the program.</li> <li>Check whether the start point or end point is on the inner side of the base circle for involute interpolation. When carrying out tool radius compensation, check that the start point and end point after compensation are not on the inner side of the base circle for involute interpolation.</li> <li>Check whether the start point and end point are at an even distance from the center of the base circle for involute interpolation.</li> </ul>
<b>P 72</b>	<b>No spec: Helical cutting</b> A helical command has been issued though it is not included in the specifications.	<ul style="list-style-type: none"> <li>Check the helical specifications.</li> <li>An Axis 3 command was issued by the circular interpolation command. If there is no helical specification, the linear axis is moved to the next block.</li> </ul>
<b>P 73</b>	<b>No spec: Spiral cutting</b> A spiral command was issued despite the fact that such a command does not exist in the specifications.	<ul style="list-style-type: none"> <li>The G02.1 and G03.1 commands are issued for circular interpolation.</li> <li>Check the spiral specifications.</li> </ul>
<b>P 74</b>	<b>Can't calculate 3DIM arc</b> The end block was not specified during 3-dimension circular interpolation supplementary modal, and therefore it is not possible to calculate the 3-dimension circular interpolation. Furthermore, it not possible to calculate the 3-dimension circular interpolation due to an interruption during 3-dimension circular interpolation supplementary modal.	<ul style="list-style-type: none"> <li>Reconsider the program.</li> </ul>
<b>P 75</b>	<b>3DIM arc illegal</b> An unusable G code was issued during 3-dimension circular interpolation modal. Or, a 3-dimension circular interpolation command was issued during a modal for which a 3-dimension circular interpolation command cannot be issued.	<ul style="list-style-type: none"> <li>Reconsider the program.</li> </ul>
<b>P 76</b>	<b>No spec: 3DIM arc interpolat</b> G02.4/G03.4 was commanded even though there is no 3-dimension circular interpolation specification.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P80</b>	<b>No spec: Hypoth ax interpolat</b> Hypothetical axis interpolation (G07) was commanded even though there is no hypothetical axis interpolation specification.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P 90</b>	<b>No spec: Thread cutting</b> A thread cutting command was issued even though there is no thread cutting command specification.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P 91</b>	<b>No spec: Var lead threading</b> Variable lead thread cutting (G34) was commanded even though there is no variable lead thread cutting specification.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>

Error No.	Details	Remedy
<b>P 93</b>	<b>Illegal pitch vaule</b> The thread lead (thread pitch) when performing the thread cutting command is incorrect.	<ul style="list-style-type: none"> <li>Set the correct thread lead command for the thread cutting command.</li> </ul>
<b>P100</b>	<b>No spec: Cylindric interpolat</b> A cylindrical interpolation command was issued even though there is no cylindrical interpolation specification.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P110</b>	<b>Plane select during figure rot</b> Plane selection (G17/G18/G19) was commanded during figure rotation.	<ul style="list-style-type: none"> <li>Check the machining program.</li> </ul>
<b>P111</b>	<b>Plane selected while coord rot</b> Plane selection commands (G17, G18, G19) were issued during a coordinate rotation command (G68).	<ul style="list-style-type: none"> <li>After command G68, always issue a plane selection command following a G69 (coordinate rotation cancel) command.</li> </ul>
<b>P112</b>	<b>Plane selected while R compen</b> <ul style="list-style-type: none"> <li>Plane selection commands (G17, G18, G19) were issued while tool radius compensation (G41, G42) and nose R compensation (G41, G42, G46) commands were being issued.</li> <li>Plane selection commands were issued after completing nose R compensation commands when there are no further axis movement commands after G40, and compensation has not been cancelled.</li> </ul>	<ul style="list-style-type: none"> <li>Issue plane selection commands after completing (axis movement commands issued after G40 cancel command) tool radius compensation and nose R compensation commands.</li> </ul>
<b>P113</b>	<b>Illegal plane select</b> The circular command axis differs from the selected plane.	<ul style="list-style-type: none"> <li>Issue a circular command after correct plane selection.</li> </ul>
<b>P120</b>	<b>No spec: Feed per rotation</b> Feed per rotation (G95) was commanded even though there is no feed per rotation specification.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P121</b>	<b>F0 command during arc modal</b> F0 (F 1-digit feed) was commanded during the arc modal (G02/G03).	<ul style="list-style-type: none"> <li>Check the machining program.</li> </ul>
<b>P122</b>	<b>No spec: Auto corner override</b> An auto corner override command (G62) was issued even though there is no auto corner override specification.	<ul style="list-style-type: none"> <li>Check the specifications.</li> <li>Delete the G62 command from the program.</li> </ul>
<b>P123</b>	<b>No spec: High-accuracy control</b> High-accuracy control command was issued even though there is no high-accuracy control specification	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P124</b>	<b>No spec: Inverse time feed</b> There is no inverse time option.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P125</b>	<b>G93 mode error</b> <ul style="list-style-type: none"> <li>A G code command that cannot be issued was issued during G93 mode.</li> <li>G93 command was issued during a modal for which inverse time feed cannot be performed.</li> </ul>	<ul style="list-style-type: none"> <li>Reconsider the program.</li> </ul>

Error No.	Details	Remedy
<b>P126</b>	<b>Invalid cmnd in high-accuracy</b> An illegal command was issued during the high-accuracy control mode. <ul style="list-style-type: none"> <li>A G code group 13 command was issued during the high-accuracy control mode.</li> <li>Milling, cylindrical interpolation or pole coordinate interpolation was commanded during the high-accuracy control mode.</li> </ul>	<ul style="list-style-type: none"> <li>Reconsider the program.</li> </ul>
<b>P127</b>	<b>No spec: SSS Control</b> The SSS control valid parameter was set to ON although there is no SSS control specification.	<ul style="list-style-type: none"> <li>Check the specifications. If there is no SSS control specification, set the parameter #8090 SSS ON to 0.</li> </ul>
<b>P130</b>	<b>2nd M function code illegal</b> The 2nd miscellaneous function address commanded in the program differs from the address set in the parameters. miscellaneous function.	<ul style="list-style-type: none"> <li>Check and correct the 2nd miscellaneous function address in the program.</li> </ul>
<b>P131</b>	<b>No spec: Cnst surface ctrl G96</b> A constant surface speed control command (G96) was issued even though there is no specification.	<ul style="list-style-type: none"> <li>Check the specifications.</li> <li>Change the constant surface speed control command (G96) to a rotation speed command (G97).</li> </ul>
<b>P132</b>	<b>Spindle rotation speed S=0</b> No spindle rotation speed command has been issued.	<ul style="list-style-type: none"> <li>Reconsider the program.</li> </ul>
<b>P133</b>	<b>Illegal P-No. G96</b> An invalid constant surface speed control axis has been specified.	<ul style="list-style-type: none"> <li>Reconsider the parameter specified for the constant surface speed control axis.</li> </ul>
<b>P140</b>	<b>No spec: Pos compen cmd</b> The position compensation command (G45 to G48) specifications are not available.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P141</b>	<b>Pos compen during rotation</b> Position compensation was commanded during the figure rotation or coordinate rotation command.	<ul style="list-style-type: none"> <li>Reconsider the program.</li> </ul>
<b>P142</b>	<b>Pos compen invalid arc</b> A position compensation invalid arc command was commanded.	<ul style="list-style-type: none"> <li>Reconsider the program.</li> </ul>
<b>P150</b>	<b>No spec: Nose R compensation</b> <ul style="list-style-type: none"> <li>Even though there were no tool radius compensation specifications, tool radius compensation commands (G41 and G42) were issued.</li> <li>Even though there were no nose R compensation specifications, nose R compensation commands (G41, G42, and G46) were issued.</li> </ul>	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P151</b>	<b>Radius compen during arc mode</b> A compensation command (G40, G41, G42, G43, G44, G46) has been issued in the arc modal (G02, G03).	<ul style="list-style-type: none"> <li>Issue the linear command (G01) or rapid traverse command (G00) in the compensation command block or cancel block. (Set the modal to linear interpolation.)</li> </ul>

Error No.	Details	Remedy
<b>P152</b>	<b>No intersection</b> In interference block processing during execution of a tool radius compensation (G41 or G42) or nose R compensation (G41, G42, or G46) command, the intersection point after one block is skipped cannot be determined.	<ul style="list-style-type: none"> <li>Reconsider the program.</li> </ul>
<b>P153</b>	<b>Compensation interference</b> An interference error has arisen while the tool radius compensation command (G41, G42) or nose R compensation command (G41, G42, G46) was being executed.	<ul style="list-style-type: none"> <li>Reconsider the program.</li> </ul>
<b>P154</b>	<b>No spec: 3D compensation</b> A three-dimensional compensation command was issued even though there are no three-dimensional compensation specifications.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P155</b>	<b>Fixed cyc exec during compen</b> A fixed cycle command has been issued in the radius compensation mode.	<ul style="list-style-type: none"> <li>The radius compensation mode is established when a fixed cycle command is executed and so the radius compensation cancel command (G40) should be issued.</li> </ul>
<b>P156</b>	<b>R compen direction not defined</b> At the start of G46 nose R compensation, the compensation direction is undefined if this shift vector is used.	<ul style="list-style-type: none"> <li>Change the vector to that with which the compensation direction is defined.</li> <li>Exchange with a tool having a different tip point No.</li> </ul>
<b>P157</b>	<b>R compen direction changed</b> During G46 nose R compensation, the compensation direction is inverted.	<ul style="list-style-type: none"> <li>Change the G command to that which allows inversion of the compensation direction (G00, G28, G30, G33, or G53).</li> <li>Exchange with a tool having a different tip point No.</li> <li>Turn ON the "#8106 G46 NO REV-ERR" parameter.</li> </ul>
<b>P158</b>	<b>Illegal tip point</b> During G46 nose R compensation, the tip point is illegal (other than 1 to 8).	<ul style="list-style-type: none"> <li>Change the tip point No. to a legal one.</li> </ul>
<b>P170</b>	<b>No offset number</b> The compensation No. (DOO, TOO, HOO) command was not given when the radius compensation (G41, G42, G43, G46) command was issued. Alternatively, the compensation No. is larger than the number of sets in the specifications.	<ul style="list-style-type: none"> <li>Add the compensation No. command to the compensation command block.</li> <li>Check the number of compensation No. sets a correct it to a compensation No. command within the permitted number of tool compensation sets.</li> </ul>
<b>P171</b>	<b>No spec:Comp input by prog G10</b> Compensation data input by program (G10) was commanded even though there is no specification of compensation data input by program.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P172</b>	<b>G10 L number error</b> (G10 L-No. error) The L address command is not correct when the G10 command is issued.	<ul style="list-style-type: none"> <li>Check the address L-No. of the G10 command and correct the No.</li> </ul>

Error No.	Details	Remedy
<b>P173</b>	<b>G10 P number error</b> (G10 compensation error) When the G10 command is issued, a compensation No. outside the permitted number of sets in the specifications has been commanded for the compensation No. command.	<ul style="list-style-type: none"> <li>First check the number of compensation sets and then set the address P designation to within the permitted number of sets.</li> </ul>
<b>P174</b>	<b>No spec:Comp input by prog G11</b> Compensation data input by program cancel (G11) was commanded even though there is no specification of compensation data input by program.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P177</b>	<b>Tool life count active</b> Registration of tool life management data with G10 was attempted when the used data count valid signal was ON.	<ul style="list-style-type: none"> <li>The tool life management data cannot be registered when counting the used data. Turn the used data count valid signal OFF.</li> </ul>
<b>P178</b>	<b>Tool life data entry over</b> The number of registration groups, total number of registered tools or the number of registrations per group exceeded the specifications range.	<ul style="list-style-type: none"> <li>Review the number of registrations.</li> </ul>
<b>P179</b>	<b>Illegal group No.</b> <ul style="list-style-type: none"> <li>When registering the tool life management data with G10, the group No. was commanded in duplicate.</li> <li>A group No. that was not registered was designated during the T□□□□99 command.</li> <li>An M code command must be issued as a single command but coexists in the same block as that of another M code command.</li> <li>The M code commands set in the same group exist in the same block.</li> </ul>	<ul style="list-style-type: none"> <li>The group No. cannot be commanded in duplicate. When registering the group data, register it in group units.</li> <li>Correct to the correct group No.</li> </ul>
<b>P180</b>	<b>No spec: Drilling cycle</b> A fixed cycle command was issued though there are not fixed cycle (G72 - G89) specifications.	<ul style="list-style-type: none"> <li>Check the specifications.</li> <li>Correct the program.</li> </ul>
<b>P181</b>	<b>No spindle command (Tap cycle)</b> The spindle rotation speed command has not been issued when the fixed cycle for drilling command is given. "S*****" type S command does not exist in the same block with the synchronous tapping cycle.	<ul style="list-style-type: none"> <li>Issue the spindle rotation speed command (S) when the fixed cycle for drilling command G84, G74 (G84, G88) is given.</li> <li>Enter "S*****" type S command.</li> </ul>
<b>P182</b>	<b>Synchronous tap error</b> <ul style="list-style-type: none"> <li>Connection to the main spindle unit was not established.</li> <li>The synchronous tapping was attempted with the spindle not serially connected under the multiple-spindle control I.</li> </ul>	<ul style="list-style-type: none"> <li>Check connection to the main spindle.</li> <li>Check that the main spindle encoder exists.</li> <li>Set 1 to the parameter #3024 (sout).</li> </ul>
<b>P183</b>	<b>No pitch/thread number</b> The pitch or thread number command has not been issued in the tap cycle of a fixed cycle for drilling command.	<ul style="list-style-type: none"> <li>Specify the pitch data and the number of threads by F or E command.</li> </ul>

Error No.	Details	Remedy
<b>P184</b>	<b>Pitch/thread number error</b> <ul style="list-style-type: none"> <li>The pitch or the number of threads per inch is illegal in the tap cycle of the fixed cycle for drilling command.</li> <li>The pitch is too small for the spindle rotation speed.</li> <li>The thread number is too large for the spindle rotation speed.</li> </ul>	<ul style="list-style-type: none"> <li>Check the pitch or the number of threads per inch.</li> </ul>
<b>P185</b>	<b>No spec: Sync tapping cycle</b> Synchronous tapping cycle (G84/G74) was commanded even though there is no synchronous tapping cycle specification.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P186</b>	<b>Illegal S cmdnd in synchro tap</b> S command was issued during synchronous tapping modal.	<ul style="list-style-type: none"> <li>Cancel the synchronous tapping before issuing the S command.</li> </ul>
<b>P190</b>	<b>No spec: Turning cycle</b> A lathe cutting cycle command was input although the lathe cutting cycle was undefined in the specification.	<ul style="list-style-type: none"> <li>Check the specification.</li> <li>Delete the lathe cutting cycle command.</li> </ul>
<b>P191</b>	<b>Taper length error</b> In the lathe cutting cycle, the specified length of taper section is illegal.	<ul style="list-style-type: none"> <li>The radius set value in the lathe cycle command must be smaller than the axis shift amount.</li> </ul>
<b>P192</b>	<b>Chamfering error</b> Chamfering in the thread cutting cycle is illegal.	<ul style="list-style-type: none"> <li>Set a chamfering amount not exceeding the cycle.</li> </ul>
<b>P200</b>	<b>No spec: MRC cycle</b> The compound type fixed cycle for turning machining I (G70 to G73) was commanded when the compound type fixed cycle for turning machining I specifications were not provided.	<ul style="list-style-type: none"> <li>Check the specification.</li> </ul>
<b>P201</b>	<b>Program error (MRC)</b> <ul style="list-style-type: none"> <li>When called with a compound type fixed cycle for turning machining I command, the subprogram contained at least one of the following commands: <ul style="list-style-type: none"> <li>Reference position return command (G27, G28, G29, G30)</li> <li>Thread cutting (G33, G34)</li> <li>Fixed cycle skip-function (G31, G31.n)</li> </ul> </li> <li>The first move block of the finish shape program in compound type fixed cycle for turning machining I contains an arc command.</li> </ul>	<ul style="list-style-type: none"> <li>Delete the following G codes from this subprogram that is called with the compound type fixed cycle for turning machining I commands (G70 to G73): G27, G28, G29, G30, G31, G33, G34, and fixed cycle G codes.</li> <li>Remove G2 and G3 from the first move block of the finish shape program in compound type fixed cycle for turning machining I.</li> </ul>
<b>P202</b>	<b>Block over (MRC)</b> The number of blocks in the shape program of the compound type fixed cycle for turning machining I is over 50 or 200 (this differs according to the model).	<ul style="list-style-type: none"> <li>Specify 50 or a less value. The number of blocks in the shape program called by the compound type fixed cycle for turning machining I commands (G70 to G73) must be decreased below 50 or 200 (this differs according to the model).</li> </ul>



Error No.	Details	Remedy
<b>P203</b>	<b>D cmnd figure error (MRC)</b> The compound type fixed cycle for turning machining I (G70 to G73) shape program could not cut the work normally because it defined an abnormal shape.	<ul style="list-style-type: none"> <li>Check the compound type fixed cycle for turning machining I (G70 to G73) shape program.</li> </ul>
<b>P204</b>	<b>E cmnd fixed cycle error</b> A command value of the compound type fixed cycle for turning machining (G70 to G76) is illegal.	<ul style="list-style-type: none"> <li>Check the compound type fixed cycle for turning machining (G70 to G76) command value.</li> </ul>
<b>P210</b>	<b>No spec: Pattern cycle</b> A compound type fixed cycle for turning machining II (G74 to G76) command was input although it was undefined in the specification.	<ul style="list-style-type: none"> <li>Check the specification.</li> </ul>
<b>P220</b>	<b>No spec: Special fixed cycle</b> No special fixed cycle specifications are available.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P221</b>	<b>No. of special fixed holes = 0</b> A 0 has been specified for the number of holes in special fixed cycle mode.	<ul style="list-style-type: none"> <li>Reconsider the program.</li> </ul>
<b>P222</b>	<b>G36 angle error</b> A G36 command specifies 0 for angle intervals.	<ul style="list-style-type: none"> <li>Reconsider the program.</li> </ul>
<b>P223</b>	<b>G12/G13 radius error</b> The radius value specified with a G12 or G13 command is below the compensation amount.	<ul style="list-style-type: none"> <li>Reconsider the program.</li> </ul>
<b>P224</b>	<b>No spec: Circular (G12/G13)</b> There are no circular cutting specifications.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P230</b>	<b>Subprogram nesting over</b> <ul style="list-style-type: none"> <li>A subprogram has been called 8 or more times in succession from the subprogram.</li> <li>The program in the data server contains the M198 command.</li> <li>The program in the IC card has been called more than once (the program in the IC card can be called only once at a time).</li> </ul>	<ul style="list-style-type: none"> <li>Check the number of subprogram calls and correct the program so that it does not exceed 8 times.</li> </ul>
<b>P231</b>	<b>No sequence No.</b> At subprogram call time, the sequence No. set at return from the subprogram or specified by GOTO, was not set.	<ul style="list-style-type: none"> <li>Specify the sequence Nos. in the call block of the subprogram.</li> </ul>
<b>P232</b>	<b>No program No.</b> <ul style="list-style-type: none"> <li>The machining program has not been found when the machining program is called.</li> <li>The file name of the program registered in IC card is not corresponding to O No.</li> </ul>	<ul style="list-style-type: none"> <li>Enter the machining program.</li> <li>Check the subprogram storage destination parameters.</li> <li>Ensure that the external device (including IC card) that contains the file is mounted.</li> </ul>
<b>P235</b>	<b>Program editing</b> Operation was attempted for the file under program editing.	<ul style="list-style-type: none"> <li>Execute the program again after completion of program editing.</li> </ul>
<b>P240</b>	<b>Program editing</b> Operation was attempted for the file under program editing.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>

Error No.	Details	Remedy
<b>P241</b>	<b>No variable No.</b> The variable No. commanded is out of the range specified in the specifications.	<ul style="list-style-type: none"> <li>Check the specifications.</li> <li>Check the program variable No.</li> </ul>
<b>P242</b>	<b>= not defined at vrble set</b> The "=" sign has not been commanded when a variable is defined.	<ul style="list-style-type: none"> <li>Designate the "=" sign in the variable definition of the program.</li> </ul>
<b>P243</b>	<b>Can't use variables</b> An invalid variable has been specified in the left or right side of an operation expression.	<ul style="list-style-type: none"> <li>Correct the program.</li> </ul>
<b>P244</b>	<b>Invalid set date or time</b> Date or time was set earlier than current date or time in the system variables (#3011, #3012) when the credit system was valid.	<ul style="list-style-type: none"> <li>Date or time cannot be changed.</li> <li>Reconsider the program.</li> </ul>
<b>P250</b>	<b>No spec: Figure rotation</b> Figure rotation (M98 I_J_P_H_L_) was commanded even though there is no figure rotation specification.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P251</b>	<b>Figure rotation overlapped</b> Figure rotation command was issued during figure rotation.	<ul style="list-style-type: none"> <li>Check the machining program.</li> </ul>
<b>P252</b>	<b>Coord rotate in fig. rotation</b> A coordinate rotation related command (G68, G69) was issued during figure rotation.	<ul style="list-style-type: none"> <li>Reconsider the program.</li> </ul>
<b>P260</b>	<b>No spec: Coordinates rotation</b> Even though there were no coordinate rotation specifications, a coordinate rotation command was issued.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P270</b>	<b>No spec: User macro</b> A macro specification was commanded though there are no such command specifications.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P271</b>	<b>No spec: Macro interrupt</b> A macro interruption command has been issued though it is not included in the specifications.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P272</b>	<b>NC and macro texts in a block</b> A statement and a macro statement exist together in the same block.	<ul style="list-style-type: none"> <li>Reconsider the program and place the executable statement and macro statement in separate blocks.</li> </ul>
<b>P273</b>	<b>Macro call nesting over</b> The number of macro call nests exceeded the specifications.	<ul style="list-style-type: none"> <li>Reconsider the program and correct it so that the macro calls do not exceed the limit imposed by the specification.</li> </ul>
<b>P275</b>	<b>Macro argument over</b> The number of macro call argument type II sets has exceeded the limit.	<ul style="list-style-type: none"> <li>Reconsider the program.</li> </ul>
<b>P276</b>	<b>Illegal G67 command</b> A G67 command was issued though it was not during the G66 command modal.	<ul style="list-style-type: none"> <li>Reconsider the program.</li> <li>The G67 command is the call cancel command and so the G66 command must be designated first before it is issued.</li> </ul>
<b>P277</b>	<b>Macro alarm message</b> An alarm command has been issued in #3000.	<ul style="list-style-type: none"> <li>Refer to the operator messages on the DIAG screen.</li> <li>Refer to the instruction manual issued by the machine tool builder.</li> </ul>

Error No.	Details	Remedy
<b>P280</b>	<b>Brackets [ ] nesting over</b> The number of parentheses "[" or "]" which can be commanded in a single block has exceeded five.	<ul style="list-style-type: none"> <li>Reconsider the program and correct it so the number of "[" or "]" is five or less.</li> </ul>
<b>P281</b>	<b>Brackets [ ] not paired</b> The number of "[" and "]" parentheses commanded in a single block does not match.	<ul style="list-style-type: none"> <li>Reconsider the program and correct it so that "[" and "]" parentheses are paired up properly.</li> </ul>
<b>P282</b>	<b>Calculation impossible</b> The arithmetic formula is incorrect.	<ul style="list-style-type: none"> <li>Reconsider the program and correct the formula.</li> </ul>
<b>P283</b>	<b>Divided by zero</b> The denominator of the division is zero.	<ul style="list-style-type: none"> <li>Reconsider the program and correct it so that the denominator for division in the formula is not zero.</li> </ul>
<b>P290</b>	<b>IF sentence error</b> There is an error in the IF conditional GOTO□ statement.	<ul style="list-style-type: none"> <li>Reconsider the program.</li> </ul>
<b>P291</b>	<b>WHILE sentence error</b> There is an error in the WHILE conditional DO□-END□ statement.	<ul style="list-style-type: none"> <li>Reconsider the program.</li> </ul>
<b>P292</b>	<b>SETVN sentence error</b> There is an error in the SETVN□ statement when the variable name setting was made.	<ul style="list-style-type: none"> <li>Reconsider the program.</li> <li>The number of characters in the variable name of the SETVN statement must be 7 or less.</li> </ul>
<b>P293</b>	<b>DO-END nesting over</b> The number of DO-END nesting levels in WHILE conditional DO□-END□ statement has exceeded 27.	<ul style="list-style-type: none"> <li>Reconsider the program and correct it so that the nesting levels of the DO - END statement does not exceed 27.</li> </ul>
<b>P294</b>	<b>DO and END not paired</b> The DO's and END's are not paired off properly.	<ul style="list-style-type: none"> <li>Reconsider the program and correct it so that the DO's and END's are paired off properly.</li> </ul>
<b>P295</b>	<b>WHILE/GOTO in tape</b> There is a WHILE or GOTO statement on the tape during tape operation.	<ul style="list-style-type: none"> <li>During tape operation, a program which includes a WHILE or GOTO statement cannot be executed and so the memory operation mode is established instead.</li> </ul>
<b>P296</b>	<b>No address (macro)</b> A required address has not been specified in the user macro.	<ul style="list-style-type: none"> <li>Review the program.</li> </ul>
<b>P297</b>	<b>Address-A error</b> The user macro does not use address A as a variable.	<ul style="list-style-type: none"> <li>Review the program.</li> </ul>
<b>P298</b>	<b>G200-G202 cmnd in tape</b> User macro G200, G201, or G202 was specified during tape or MDI mode.	<ul style="list-style-type: none"> <li>Review the program.</li> </ul>
<b>P300</b>	<b>Variable name illegal</b> The variable names have not been commanded properly.	<ul style="list-style-type: none"> <li>Reconsider the variable names in the program and correct them.</li> </ul>
<b>P301</b>	<b>Variable name duplicated</b> The name of the variable has been duplicated.	<ul style="list-style-type: none"> <li>Correct the program so that the name is not duplicated.</li> </ul>
<b>P310</b>	<b>Not use GMSTB macro code</b> G, M, S, T, or B macro code was called during fixed cycle.	<ul style="list-style-type: none"> <li>Review the program.</li> <li>Review the parameter.</li> </ul>

Error No.	Details	Remedy
<b>P350</b>	<b>No spec: Scaling command</b> The scaling command (G50, G51) was issued when the scaling specifications were not available.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P360</b>	<b>No spec: Program mirror</b> A mirror image (G50.1 or G51.1) command has been issued though the programmable mirror image specifications are not provided.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P370</b>	<b>No spec: Facing t-post MR</b> The facing turret mirror image specifications are not provided.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P371</b>	<b>Facing t-post MR illegal</b> Mirror image for facing tool posts was commanded to an axis for which external mirror image or parameter mirror image is valid. Mirror image for facing tool posts validating mirror image for a rotary axis was commanded.	<ul style="list-style-type: none"> <li>Check the program.</li> <li>Check the parameters.</li> </ul>
<b>P380</b>	<b>No spec: Corner R/C</b> The corner R/C was issued when the corner R/C specifications were not available.	<ul style="list-style-type: none"> <li>Check the specifications.</li> <li>Remove the corner chamfering/corner rounding command from the program.</li> </ul>
<b>P381</b>	<b>No spec: Arc R/C</b> Corner chamfering II /corner rounding II was specified in the arc interpolation block although corner chamfering/corner rounding II is unsupported.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P382</b>	<b>No corner movement</b> The block next to corner chamfering/corner rounding is not a movement command.	<ul style="list-style-type: none"> <li>Replace the block succeeding the corner chamfering/corner rounding command by G01 command.</li> </ul>
<b>P383</b>	<b>Corner movement short</b> In the corner chamfering/corner rounding command, the movement distance was shorter than the value in the corner chamfering/corner rounding command.	<ul style="list-style-type: none"> <li>Make the corner chamfering/corner rounding less than the movement distance since this distance is shorter than the corner chamfering/corner rounding.</li> </ul>
<b>P384</b>	<b>Corner next movement short</b> When the corner chamfering/corner rounding command was input, the movement distance in the following block was shorter than the length of the corner chamfering/corner rounding.	<ul style="list-style-type: none"> <li>Make the corner chamfering/corner rounding less than the movement distance since this distance in the following block is shorter than the corner chamfering/corner rounding.</li> </ul>
<b>P385</b>	<b>Corner during G00/G33</b> A block with corner chamfering/corner rounding was given during G00 or G33 modal.	<ul style="list-style-type: none"> <li>Recheck the program.</li> </ul>
<b>P390</b>	<b>No spec: Geometric</b> A geometric command was issued though there are no geometric specifications.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P391</b>	<b>No spec: Geometric arc</b> There are no geometric IB specifications.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>

Error No.	Details	Remedy
<b>P392</b>	<b>Angle &lt; 1 degree (GEOMT)</b> The angular difference between the geometric line and line is 1° or less.	<ul style="list-style-type: none"> <li>Correct the geometric angle.</li> </ul>
<b>P393</b>	<b>Inc value in 2nd block (GEOMT)</b> The second geometric block was specified by an incremental value.	<ul style="list-style-type: none"> <li>Specify this block by an absolute value.</li> </ul>
<b>P394</b>	<b>No linear move command (GEOMT)</b> The second geometric block contains no linear command.	<ul style="list-style-type: none"> <li>Specify the G01 command.</li> </ul>
<b>P395</b>	<b>Illegal address (GEOMT)</b> The geometric format is invalid.	<ul style="list-style-type: none"> <li>Recheck the program.</li> </ul>
<b>P396</b>	<b>Plane selected in GEOMT ctrl</b> A plane switching command was executed during geometric command processing.	<ul style="list-style-type: none"> <li>Execute the plane switching command before geometric command processing.</li> </ul>
<b>P397</b>	<b>Arc error (GEOMT)</b> In geometric IB, the circular arc end point does not contact or cross the next block start point.	<ul style="list-style-type: none"> <li>Recheck the geometric circular arc command and the preceding and following commands.</li> </ul>
<b>P398</b>	<b>No spec: Geometric1B</b> Although the geometric IB specifications are not included, a geometric command is given.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P420</b>	<b>No spec: Para input by program</b> Parameter input by program (G10) was commanded even though there is no specification of parameter input by program.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P421</b>	<b>Parameter input error</b> <ul style="list-style-type: none"> <li>The specified parameter No. or set data is illegal.</li> <li>An illegal G command address was input in parameter input mode.</li> <li>A parameter input command was input during fixed cycle modal or nose R compensation.</li> <li>G10L50, G10L70, G11 were not commanded in independent blocks.</li> </ul>	<ul style="list-style-type: none"> <li>Check the program.</li> </ul>
<b>P430</b>	<b>R-pnt return incomplete</b> <ul style="list-style-type: none"> <li>A command was issued to move an axis, which has not returned to the reference position, away from that reference position.</li> <li>A command was issued to an axis removal axis.</li> </ul>	<ul style="list-style-type: none"> <li>Execute reference position return manually.</li> <li>The command was issued to an axis for which axis removal is validated so invalidate axis removal.</li> </ul>
<b>P431</b>	<b>No spec: 2,3,4th R-point ret</b> A command for second, third or fourth reference position return was issued though there are no such command specifications.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P432</b>	<b>No spec: Start position return</b> Start position return (G29) was commanded even though there is no start position return specification.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P433</b>	<b>No spec: R-position check</b> Reference position check (G27) was commanded even though there is no reference position check specification.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>

Error No.	Details	Remedy
<b>P434</b>	<b>Compare error</b> One of the axes did not return to the reference position when the reference position check command (G27) was executed.	<ul style="list-style-type: none"> <li>Check the program.</li> </ul>
<b>P435</b>	<b>G27 and M commands in a block</b> An M command was issued simultaneously in the G27 command block.	<ul style="list-style-type: none"> <li>An M code command cannot be issued in a G27 command block and so the G27 command and M code command must be placed in separate blocks.</li> </ul>
<b>P436</b>	<b>G29 and M commands in a block</b> An M command was issued simultaneously in the G29 command block.	<ul style="list-style-type: none"> <li>An M code command cannot be issued in a G29 command block and so the G29 command and M code command must be placed in separate blocks.</li> </ul>
<b>P438</b>	<b>G52 invalid during G54.1</b> A local coordinate system command was issued during execution of the G54.1 command.	<ul style="list-style-type: none"> <li>Review the program.</li> </ul>
<b>P450</b>	<b>No spec: Chuck barrier</b> The chuck barrier on command (G22) was specified although the chuck barrier was undefined in the specification.	<ul style="list-style-type: none"> <li>Check the specification.</li> </ul>
<b>P451</b>	<b>No spec: Stroke chk bef travel</b> Stroke check before travel (G22/G23) was commanded even though there is no stroke check before travel specification.	<ul style="list-style-type: none"> <li>Check the specification.</li> </ul>
<b>P452</b>	<b>Limit before travel exists</b> An illegal command such as the start or end point of the traveling axis is inside the prohibited area or the axis passes through the prohibited area, was detected when Stroke check before travel (G22) was ON.	<ul style="list-style-type: none"> <li>Review the coordinate values of the axis address commanded in the program.</li> </ul>
<b>P460</b>	<b>Tape I/O error</b> An error has arisen in the tape reader or, alternatively, in the printer during macro printing.	<ul style="list-style-type: none"> <li>Check the power and cable of the connected devices.</li> <li>Check the I/O device parameters.</li> </ul>
<b>P461</b>	<b>File I/O error</b> A file of the machining program cannot be read. IC card has not been inserted.	<ul style="list-style-type: none"> <li>In memory mode, the programs stored in memory may have been destroyed. Output all of the programs and tool data once and format them.</li> <li>Ensure that the external device (including an IC card, etc) that contains the file is mounted.</li> <li>Check the parameters for HD operation or IC card operation.</li> </ul>
<b>P462</b>	<b>Computer link commu error</b> A communication error occurred during the BTR operation.	<ul style="list-style-type: none"> <li>"L01 Computer link error" is displayed simultaneously, so remedy the problem according to the error No.</li> </ul>
<b>P480</b>	<b>No spec: Milling</b> <ul style="list-style-type: none"> <li>Milling was commanded when the milling specifications were not provided.</li> <li>Polar coordinate interpolation was commanded when the polar coordinate interpolation specifications were not provided.</li> </ul>	<ul style="list-style-type: none"> <li>Check the specification.</li> </ul>

Error No.	Details	Remedy
<b>P481</b>	<b>Illegal G code (mill)</b> <ul style="list-style-type: none"> <li>• An illegal G code was used during the milling mode.</li> <li>• An illegal G code was used during cylindrical interpolation or polar coordinate interpolation.</li> <li>• The G07.1 command was issued during the tool radius compensation.</li> </ul>	<ul style="list-style-type: none"> <li>• Check the program.</li> </ul>
<b>P482</b>	<b>Illegal axis (mill)</b> <ul style="list-style-type: none"> <li>• A rotary axis was commanded during the milling mode.</li> <li>• Milling was executed even though an illegal value was set for the milling axis No.</li> <li>• Cylindrical interpolation or polar coordinate interpolation was commanded during mirror image.</li> <li>• Cylindrical interpolation or polar coordinate interpolation was commanded before the tool compensation was completed after the T command.</li> <li>• G07.1 was commanded when cylindrical interpolation was not possible (there is no rotary axis, or external mirror image is ON).</li> <li>• An axis other than a cylindrical coordinate system axis was commanded during cylindrical interpolation.</li> </ul>	<ul style="list-style-type: none"> <li>• Check the machining program, parameters and PLC I/F signal.</li> </ul>
<b>P484</b>	<b>R-pnt ret incomplete (mill)</b> <ul style="list-style-type: none"> <li>• Movement was commanded to an axis that had not completed reference position return during the milling mode.</li> <li>• Movement was commanded to an axis that had not completed reference position return during cylindrical interpolation or polar coordinate interpolation.</li> </ul>	<ul style="list-style-type: none"> <li>• Carry out manual reference position return.</li> </ul>

Error No.	Details	Remedy
<b>P485</b>	<b>Illegal modal (mill)</b> <ul style="list-style-type: none"> <li>The milling mode was turned ON during nose R compensation or constant surface speed control.</li> <li>A T command was issued during the milling mode.</li> <li>The mode was switched from milling to cutting during tool compensation.</li> <li>Cylindrical interpolation or polar coordinate interpolation was commanded during the constant surface speed control mode (G96).</li> <li>The command unacceptable in the cylindrical interpolation was issued.</li> <li>A T command was issued during the cylindrical interpolation or polar coordinate interpolation mode.</li> <li>A movement command was issued when the plane was not selected just before or after the G07.1 command.</li> <li>A plane selection command was issued during the polar coordinate interpolation mode.</li> <li>Cylindrical interpolation or polar coordinate interpolation was commanded during tool radius compensation.</li> <li>The G16 plane in which the radius value of a cylinder is 0 was specified.</li> <li>A cylindrical interpolation or polar coordinate interpolation command was issued during coordinate rotation by program (G68).</li> </ul>	<ul style="list-style-type: none"> <li>Check the program.</li> <li>Before issuing G12.1, issue G40 or G97.</li> <li>Before issuing G12.1, issue a T command.</li> <li>Before issuing G13.1, issue G40.</li> <li>Specify the radius value of a cylinder other than 0, or specify the X axis's current value other than 0 before issuing G12.1/G16.</li> </ul>
<b>P486</b>	<b>Milling error</b> <ul style="list-style-type: none"> <li>The milling command was issued during the mirror image (when parameter or external input is turned ON).</li> <li>Polar coordinate interpolation, cylindrical interpolation or milling interpolation was commanded during mirror image for facing tool posts.</li> <li>The start command of the cylindrical interpolation or polar coordinate interpolation was issued during the normal line control.</li> </ul>	<ul style="list-style-type: none"> <li>Check the program.</li> </ul>
<b>P511</b>	<b>Synchronization M code error</b> <ul style="list-style-type: none"> <li>Two or more synchronization M codes were commanded in the same block.</li> <li>The synchronization M code and "I" code were commanded in the same block.</li> <li>Synchronization with the M code was commanded in 3rd part system or more. (Synchronization with the M code is valid only in 1st part system or 2nd part system.)</li> </ul>	<ul style="list-style-type: none"> <li>Check the program.</li> </ul>
<b>P550</b>	<b>No spec: G06.2(NURBS)</b> There is no NURBS interpolation option.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>



Error No.	Details	Remedy
<b>P551</b>	<b>G06.2 knot error</b> The knot (k) command value is smaller than the value for the previous block.	<ul style="list-style-type: none"> <li>Reconsider the program.</li> <li>Specify the knot by monotone increment.</li> </ul>
<b>P552</b>	<b>Start point of 1st G06.2 err</b> The block end point immediately before the G06.2 command and the G06.2 first block command value do not match.	<ul style="list-style-type: none"> <li>Match the G06.2 first block coordinate command value with the previous block end point.</li> </ul>
<b>P554</b>	<b>Invld manual interrupt in G6.2</b> Manual interruption using a block was performed while in G06.2 mode.	<ul style="list-style-type: none"> <li>Perform for blocks other than G06.2 mode when manually interrupting.</li> </ul>
<b>P555</b>	<b>Invalid restart during G06.2</b> Restart was attempted from the block in G06.2 mode.	<ul style="list-style-type: none"> <li>Restart from the block other than in G06.2 mode.</li> </ul>
<b>P600</b>	<b>No spec: Auto TLM</b> An automatic tool length measurement command (G37) was execute though there are no such command specifications.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P601</b>	<b>No spec: Skip</b> A skip command (G31) was issued though there are no such command specifications.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P602</b>	<b>No spec: Multi skip</b> A multiple skip command (G31.1, G31.2 or G31.3) was issued though there are no such command specifications.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P603</b>	<b>Skip speed 0</b> The skip speed is 0.	<ul style="list-style-type: none"> <li>Specify the skip speed.</li> </ul>
<b>P604</b>	<b>TLM illegal axis</b> No axis or more than one axis was specified in the automatic tool length measurement block.	<ul style="list-style-type: none"> <li>Specify only one axis.</li> </ul>
<b>P605</b>	<b>T &amp; TLM command in a block</b> The T code is in the same block as the automatic tool length measurement block.	<ul style="list-style-type: none"> <li>Specify this T code before the block.</li> </ul>
<b>P606</b>	<b>T cmnd not found before TLM</b> The T code was not yet specified in automatic tool length measurement.	<ul style="list-style-type: none"> <li>Specify this T code before the block.</li> </ul>
<b>P607</b>	<b>TLM illegal signal</b> Before the area specified by the D command or decelerating area parameter d, the measurement position arrival signal went ON. The signal remains OFF to the end.	<ul style="list-style-type: none"> <li>Check the program.</li> </ul>
<b>P608</b>	<b>Skip during radius compen</b> A skip command was specified during radius compensation processing.	<ul style="list-style-type: none"> <li>Specify a radius compensation cancel (G40) command or remove the skip command.</li> </ul>
<b>P610</b>	<b>Illegal parameter</b> <ul style="list-style-type: none"> <li>The parameter setting is not correct.</li> <li>G114.1 was commanded when the spindle synchronization with PLC I/F command was selected.</li> <li>G113 was commanded when the spindle-spindle polygon machining option was OFF and the spindle synchronization with PLC I/F command was selected.</li> </ul>	<ul style="list-style-type: none"> <li>Check whether "#1549 lv0vR1" to "#1553 lv0vR5" are set in descending order (in order of large values).</li> <li>Check whether "#1554 lv0rd2" to "#1557 lv0rd5" are set in descending order.</li> <li>Check and correct "#1514 expLinax" and "#1515 expRotax".</li> <li>Check the program.</li> <li>Check the parameter.</li> </ul>

Error No.	Details	Remedy
<b>P611</b>	<b>No spec: Exponential function</b> Specification for exponential interpolation is not available.	<ul style="list-style-type: none"> <li>Check the specification.</li> </ul>
<b>P612</b>	<b>Exponential function error</b> A movement command for exponential interpolation was issued during mirror image for facing tool posts.	<ul style="list-style-type: none"> <li>Check the program.</li> </ul>
<b>P700</b>	<b>Illegal command value</b> Spindle synchronization was commanded to a spindle that is not connected serially.	<ul style="list-style-type: none"> <li>Check the program.</li> <li>Check the parameter.</li> </ul>
<b>P900</b>	<b>No spec: Normal line control</b> A normal line control command (G40.1, G41.1, G42.1) was issued when the normal line control specifications were not provided.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P901</b>	<b>Normal line control axis G92</b> A coordinate system preset command (G92) was issued to a normal line control axis during normal line control.	<ul style="list-style-type: none"> <li>Check the program.</li> </ul>
<b>P902</b>	<b>Normal line control axis error</b> <ul style="list-style-type: none"> <li>The normal line control axis was set to a linear axis.</li> <li>The normal line control axis was set to the linear type rotary axis II axis.</li> <li>The normal line control axis has not been set.</li> <li>The normal line control axis was the same as the plane selection axis.</li> </ul>	<ul style="list-style-type: none"> <li>Correct the normal line control axis.</li> </ul>
<b>P903</b>	<b>Plane chg in Normal line ctrl</b> The plane selection command (G17, G18, G19) was issued during normal line control.	<ul style="list-style-type: none"> <li>Delete the plane selection command (G17, G18, G19) from the program for normal line control.</li> </ul>
<b>P920</b>	<b>No spec: 3D coord conv</b> There is no specification for 3-dimensional coordinate conversion.	<ul style="list-style-type: none"> <li>Check the specifications.</li> </ul>
<b>P921</b>	<b>Illegal G code at 3D coord</b> A G code command that cannot be performed was made during 3-dimensional coordinate conversion modal.	<ul style="list-style-type: none"> <li>Refer to the "Programming Instruction Manual (Machining Center Series)" for further details of usable G commands.</li> <li>When the basic specification parameter "#1229 set01/bit3" is ON, turn the parameter OFF or specify the constant surface speed control cancel (G97).</li> </ul>
<b>P922</b>	<b>Illegal mode at 3D coord</b> A 3-dimensional coordinate conversion command was issued during a modal for which 3-dimensional coordinate conversion cannot be performed.	<ul style="list-style-type: none"> <li>Refer to the "Programming Instruction Manual (Machining Center Series)" for further details of usable G commands.</li> </ul>
<b>P923</b>	<b>Illegal addr in 3D coord blk</b> A G code for which G68 to combination could not be performed was specified for the same block.	<ul style="list-style-type: none"> <li>Refer to the "Programming Instruction Manual (Machining Center Series)" for further details of usable G commands.</li> </ul>

Error No.	Details	Remedy
<b>P930</b>	<b>No spec: Tool axis compen</b> A tool length compensation along the tool axis command was issued even though there is no tool length compensation along the tool axis specification.	<ul style="list-style-type: none"> <li>• Check the specifications.</li> </ul>
<b>P931</b>	<b>Executing tool axis compen</b> A G code that cannot be commanded exists during tool length compensation along the tool axis.	<ul style="list-style-type: none"> <li>• Reconsider the program.</li> </ul>
<b>P932</b>	<b>Rot axis parameter error</b> There is a mistake in the linear axis name and rotary axis name in the rotary axis configuration parameters.	<ul style="list-style-type: none"> <li>• Set the correct value and reboot.</li> </ul>
<b>P940</b>	<b>No spec: Tool tip control</b> There is no tool tip center control specification.	<ul style="list-style-type: none"> <li>• Check the specifications.</li> </ul>
<b>P941</b>	<b>Invalid T tip control command</b> A tool tip center control command was issued during a modal for which a tool tip center control command cannot be issued.	<ul style="list-style-type: none"> <li>• Reconsider the program.</li> </ul>
<b>P942</b>	<b>Invalid cmd during T tip ctrl</b> A G code that cannot be commanded was issued during tool tip center control.	<ul style="list-style-type: none"> <li>• Reconsider the program.</li> </ul>
<b>P943</b>	<b>Tool posture command illegal</b> In the case of tool tip center control type 1, if the signs at the tool-side rotary axis or table base-side rotary axis start and finish points differ, a tool base-side rotary axis or table workpiece-side rotary axis rotation exists for the same block, and does not pass a singular point. In the case of tool tip center control type 2, the posture vector command is incorrect.	<ul style="list-style-type: none"> <li>• Reconsider the program.</li> </ul>
<b>P990</b>	<b>PREPRO error</b> Combining commands that required pre-reading (nose R offset, corner chamfering/corner rounding, geometric I, geometric IB, and compound type fixed cycle for turning machining) resulted in eight or more pre-read blocks.	<ul style="list-style-type: none"> <li>• Reduce the number of commands that require pre-reading or delete such commands.</li> </ul>

## Appendix 7. G Code Guidance Display List

O: Modal, x: Unmodal

G code	Group	Function	Modal
00	01	Positioning	O
01	01	Linear interpolation	O
02	01	Circular interpolation CW (clockwise)	O
03	01	Circular interpolation CCW (counterclockwise)	O
02.1	01	Spiral interpolation CW (clockwise)	O
03.1	01	Spiral interpolation CCW (counterclockwise)	O
02.3	01	Exponential function interpolation positive rotation	O
03.3	01	Exponential function interpolation negative rotation	O
02.4	01	3-dimensional circular interpolation	O
03.4	01	3-dimensional circular interpolation	O
04	00	Dwell	x
05	00	High-speed machining mode I (P1)	O
05	00	High-speed machining mode II (P2)	O
05	00	High-speed high-accuracy control II (P10000)	O
05	00	High-speed machining mode I /High-speed machining mode II /High-speed high-accuracy control II OFF (P0)	-
05.1	00	High-speed high-accuracy control I (Q1)	O
05.1	00	Fine spline mode (Q2)	O
05.1	00	High-speed high-accuracy control I / Fine spline mode OFF (Q0)	-
06	-	-	-
06.2	01	NURBS interpolation	O
07	-	-	-
07.1/107	21	Cylindrical interpolation	O
08	00	High-accuracy control	O
09	00	Exact stop check	x
10	00	Coordinate rotation by parameter input	-
10	00	Program parameter input (L50)	-
10	00	Program parameter input (L70)	-
10	00	Tool compensation input (L10 to L13)	-
10	00	Workpiece offset input (L2,L20)	-
10	00	Tool life management data input (L3)	-
11	00	Program parameter input / Tool compensation input / Workpiece offset input / Inputting the tool life management data cancel	-
12	00	Circular cut CW (clockwise)	x
13	00	Circular cut CCW (counterclockwise)	x
12.1/112	21	Polar coordinate interpolation ON	O
13.1/113	21	Polar coordinate interpolation cancel	-
14	-	-	-
15	18	Polar coordinate command OFF	-
16	18	Polar coordinate command ON	O
17	02	Plane selection X-Y	O
18	02	Plane selection Z-X	O
19	02	Plane selection Y-Z	O
20	06	Inch command	O
21	06	Metric command	O
22	00	Stroke check before travel ON	-
23	00	Stroke check before travel OFF	-

## Appendix 7. G Code Guidance Display List

O: Modal, x: Unmodal

G code	Group	Function	Modal
24	-	-	-
25	-	-	-
26	-	-	-
27	00	Reference point check	x
28	00	Reference point return	x
29	00	Start point return	x
30	00	2nd to 4th reference point return	x
30.1	00	Tool change position return 1	x
30.2	00	Tool change position return 2	x
30.3	00	Tool change position return 3	x
30.4	00	Tool change position return 4	x
30.5	00	Tool change position return 5	x
30.6	00	Tool change position return 6	x
31	00	Skip/Multi-step skip function 2	x
31.1	00	Multi-step skip function 1-1	x
31.2	00	Multi-step skip function 1-2	x
31.3	00	Multi-step skip function 1-3	x
32	-	-	-
33	01	Thread cutting	O
34	00	Special fixed cycle (bolt hole circle)	x
35	00	Special fixed cycle (line at angle)	x
36	00	Special fixed cycle (arc)	x
37	00	Automatic tool length measurement	x
37.1	00	Special fixed cycle (grid)	x
38	00	Tool radius compensation vector designation	x
39	00	Tool radius compensation corner arc	x
40	07	Tool radius compensation cancel	-
41	07	Tool radius compensation left	O
42	07	Tool radius compensation right	O
40.1	15	Normal line control cancel	-
41.1	15	Normal line control left ON	O
42.1	15	Normal line control right ON	O
43	08	Tool length compensation (+)	O
44	08	Tool length compensation (-)	O
43.1	08	Tool length compensation along the tool axis	O
43.4	08	Tool center point control type 1	O
43.5	08	Tool center point control type 2	O
45	00	Tool position compensation (expansion)	x
46	00	Tool position compensation (reduction)	x
47	00	Tool position compensation (doubled)	x
48	00	Tool position compensation (halved)	x
49	08	Tool length compensation cancel/Tool center point control cancel	-
50	11	Scaling cancel	-
51	11	Scaling ON	O
50.1	19	G command mirror image cancel	-
51.1	19	G command mirror image ON	O
52	00	Local coordinate system setting	O
53	00	Machine coordinate system selection	x

## Appendix 7. G Code Guidance Display List

O: Modal, x: Unmodal

G code	Group	Function	Modal
54	12	Work coordinate system 1 selection	O
55	12	Work coordinate system 2 selection	O
56	12	Work coordinate system 3 selection	O
57	12	Work coordinate system 4 selection	O
58	12	Work coordinate system 5 selection	O
59	12	Work coordinate system 6 selection	O
54.1	12	Work coordinate system selection 48 sets expanded	O
60	00	Uni-directional positioning	x
61	13	Exact stop check mode	O
61.1	13	High-accuracy control	O
62	13	Automatic corner override	O
63	13	Tapping mode	O
63.1	13	Synchronous tapping mode (normal tapping)	O
63.2	13	Synchronous tapping mode (reverse tapping)	O
64	13	Cutting mode	O
65	00	User macro call	x
66	14	User macro modal call A	O
66.1	14	User macro modal call B	O
67	14	User macro modal call cancel	-
68	16	Programmable coordinate rotation mode ON /3-dimensional coordinate conversion mode ON	O
69	16	Programmable coordinate rotation mode OFF /3-dimensional coordinate conversion mode OFF	-
70	09	User fixed cycle	-
71	09	User fixed cycle	-
72	09	User fixed cycle	-
73	09	Fixed cycle (step)	O
74	09	Fixed cycle (reverse tap)	O
75	09	Fixed cycle (circle cutting cycle)	O
76	09	Fixed cycle (fine boring)	O
77	09	User fixed cycle	-
78	09	User fixed cycle	-
79	09	User fixed cycle	-
80	09	Fixed cycle cancel	-
81	09	Fixed cycle (drill/spot drill)	O
82	09	Fixed cycle (drill/counter boring)	O
83	09	Fixed cycle (deep drilling)	O
84	09	Fixed cycle (tapping)	O
85	09	Fixed cycle (boring)	O
86	09	Fixed cycle (boring)	O
87	09	Fixed cycle (back boring)	O
88	09	Fixed cycle (boring)	O
89	09	Fixed cycle (boring)	O
90	03	Absolute value command	O
91	03	Incremental command value	O
92	00	Machine coordinate system setting	O
93	05	Inverse time feed	O
94	05	Asynchronous feed (per-minute feed)	O
95	05	Synchronous feed (per-revolution feed)	O
96	17	Constant surface speed control ON	O
97	17	Constant surface speed control OFF	-
98	10	Fixed cycle Initial level return	O
99	10	Fixed cycle R point level return	O
100 to 225	00	User macro (G code call) Max. 10	-

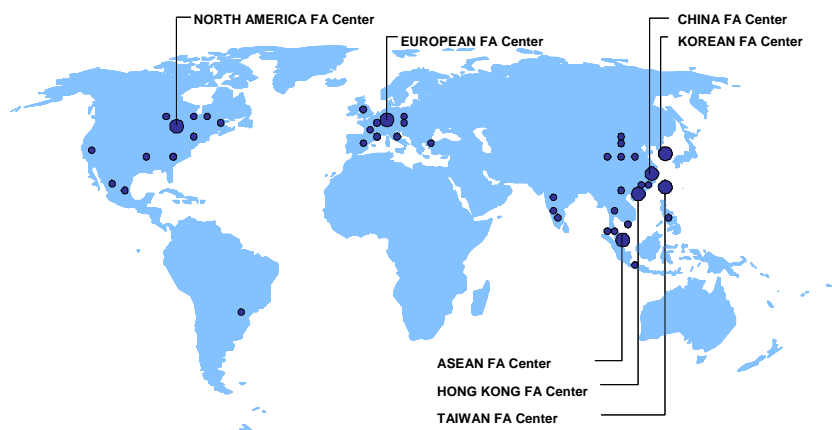
## Revision History

Date of revision	Manual No.	Revision details
Aug. 2004	IB(NA)1500042-A	First edition created.
Mar. 2005	IB(NA)1500042-B	<ul style="list-style-type: none"> <li>• Contents were revised to correspond to Mitsubishi CNC 700 Series software version B0.</li> <li>• The following sections were added to "I. SCREEN OPERATIONS": <ul style="list-style-type: none"> <li>1.1 Setting Display Unit Appearance</li> <li>1.3 Screen Transition Diagram</li> <li>1.4 Screen Selection Procedure</li> <li>1.5 Setting Data</li> <li>1.8 Guidance Function</li> <li>2.2.2 Changing Whether to Show or Hide the Comment Field</li> <li>2.3.5 Operation Sequence for Program Restart</li> <li>2.5.8 Switching Full-screen Display Mode</li> <li>2.16.2 Setting the Time Display Selection</li> <li>2.22 Load Meter Display</li> <li>2.23 Spindle, Standby Display</li> <li>3.4.4 Erasing the Tool Registration Data</li> <li>3.12 T Code List</li> <li>4.2.17 G Code Guidance</li> <li>4.3.8 Switching to Full-screen Display Mode</li> <li>4.4.8 Switching to Full-screen Display Mode</li> <li>5.7 Self Diagnosis Screen</li> <li>5.8 Data Sampling Screen</li> <li>6.3 All Backup Screen</li> <li>6.4 System Setup Screen</li> <li>6.5 Adjust S-analog Screen</li> <li>6.6 Absolute Position Setting Screen</li> <li>6.7 Auxiliary Axis Test Screen</li> <li>6.8 Diagnosis Data Collection Setting Screen</li> </ul> </li> <li>• The following section names were changed: <ul style="list-style-type: none"> <li>"2.3.3 Directory change screen" -&gt; "2.3.3 File Setting Screen"</li> <li>"5.1 Hardware and software configuration screen (H/W S/W config screen)" -&gt; "5.1 System Configuration Screen "</li> </ul> </li> <li>• The following sections were unified. <ul style="list-style-type: none"> <li>"4.5.9 Formatting an FLD" and "4.5.10 Formatting a Memory card and DS" -&gt; "4.5.9 Formatting an External Device "</li> <li>"6.2.9 Formatting an FLD" and "6.2.10 Formatting a Memory card and DS" -&gt; "6.2.9 Formatting an External Device "</li> </ul> </li> <li>• The configuration of "1. Operating the Setting and Display Unit" in "I. SCREEN OPERATIONS" was changed.</li> <li>• The following sections were added to " II. MACHINE OPERATIONS": <ul style="list-style-type: none"> <li>7. Stored Stroke Limit</li> </ul> </li> <li>• "III. MAINTENANCE" was added.</li> <li>• The following sections were added to " IV. APPENDIXES": <ul style="list-style-type: none"> <li>6.2.15 System setup-related operation messages</li> <li>6.2.16 Automatic backup-related operation messages</li> <li>Appendix 7. G Code Guidance Display List</li> </ul> </li> <li>• Mistakes were corrected.</li> </ul>

Date of revision	Manual No.	Revision details
Sept. 2005	IB(NA)1500042-C	<ul style="list-style-type: none"> <li>• Contents were revised to correspond to Mitsubishi CNC 700 Series software version B3.</li> <li>• The following sections were added to "I. SCREEN OPERATIONS":               <ul style="list-style-type: none"> <li>1.8.2 Alarm Guidance</li> <li>1.9 Touch Panel Functions</li> <li>1.10 Touch Panel S/W Key</li> <li>2.2.3 Changing the Sorting Method</li> <li>3.3.1 Tool Measurement (M system)</li> <li>3.3.2 Tool Measurement (L system)</li> <li>3.7.4 Carrying Out Rotation Measurement</li> <li>3.13 Pallet Program Registration</li> <li>5.9 Anshin-net Screen</li> </ul> </li> <li>• The following section was added to " IV. APPENDIXES":               <ul style="list-style-type: none"> <li>6.2.17 Messages Related to Anshin-net</li> </ul> </li> <li>• The following sections were changed to paragraph header:               <ul style="list-style-type: none"> <li>3.3.1 Carrying Out Tool Length Measurement</li> <li>3.3.2 Carrying Out Tool Radius Measurement</li> </ul> </li> <li>• The following sections were deleted:               <ul style="list-style-type: none"> <li>6.1.2 Selecting the Parameter No.</li> <li>6.1.6 Machine Parameters</li> </ul> </li> <li>• Mistakes were corrected.</li> </ul>
Mar. 2006	IB(NA)1500042-D	<ul style="list-style-type: none"> <li>• Contents were revised to correspond to Mitsubishi CNC 700 Series software version C0.</li> <li>• The following sections were added to "I. SCREEN OPERATIONS":               <ul style="list-style-type: none"> <li>4.2.17 Adding Sequence No. (N No.) Automatically</li> <li>4.2.19 Playback Editing</li> <li>4.5.12 Program Display Lock C</li> <li>5.6.1 Alarm History</li> </ul> </li> <li>• Mistakes were corrected.</li> </ul>



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**Illinois CNC Service Center**  
500 CORPORATE WOODS PARKWAY, VERNON HILLS, IL. 60061, U.S.A.  
TEL: +1-847-478-2500 (Se) FAX: +1-847-478-2650 (Se)

**California CNC Service Center**  
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**Michigan CNC Service Satellite**  
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**Ohio CNC Service Satellite**  
62 W. 500 S., ANDERSON, IN., 46013, U.S.A.  
TEL: +1-847-478-2608 FAX: +1-847-478-2690

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TEL: +1-817-251-7468 FAX: +1-817-416-1439

**Canada CNC Service Center**  
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TEL: +1-905-475-7728 FAX: +1-905-475-7935

**Mexico CNC Service Center**  
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TEL: +52-55-9171-7662 FAX: +52-55-9171-7698

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TEL: +55-15-3363-9900 FAX: +55-15-3363-9911

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**South Germany CNC Service Center**  
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TEL: +49-711-3270-010 FAX: +49-711-3270-0141

**France CNC Service Center**  
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TEL: +63-2-807-2416 FAX: +63-2-807-2417

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200233, CHINA  
TEL: +86-21-6120-0808 FAX: +86-21-6494-0178

**Shenyang CNC Service Center**  
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TEL: +86-10-8288-3030 FAX: +86-10-6518-8030

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TEL: +86-22-2653-9090 FAX: +86-22-2635-9050

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518005  
TEL: +86-755-2515-6691 FAX: +86-755-8218-4776

**Changchun Service Satellite**  
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TEL: +886-4-2359-0688 FAX: +886-4-2359-0689

**Taipei CNC Service Satellite**  
TEL: +886-4-2359-0688 FAX: +886-4-2359-0689

**Tainan CNC Service Satellite**  
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TEL: +82-2-3660-9607 FAX: +82-2-3663-0475

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Every effort has been made to keep up with software and hardware revisions in the contents described in this manual. However, please understand that in some unavoidable cases simultaneous revision is not possible.

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