

TURNING CENTER
ST200/250
INSTRUCTION MANUAL
64 OPERATION

SEICOS - pcFlexi
Version 1.01 BO-1782-1-0300-E-1-01



Hitachi Seiki Deutschland
Werkzeugmaschinen GmbH

Introduction

Thank you for your having purchased the machine, favoring our product lines for your use.

This manual contains fundamental information on the machine operation. Please read and fully understand the contents for your safe machine operation.

In particular, the contents of the items concerning safety in this manual and the descriptions on the “caution plates” attached to the machine are important. Please follow the instructions contained and keep them always in mind to ensure safe operation.

The reference record papers on adjusting setting values such as a parameter list are attached to the machine unit and enclosed in the packing. These are necessary for maintenance and adjustment of the machine later on. Please keep them safely not to be mislaid.

The design and specifications of this machine may be changed to meet any future improvement. As the result, there may arise some cases where explanations in this manual could become partly inconsistent with the actual machine. Please note this point in advance.

In this manual, items on the standard and optional specifications are handled indiscriminately. Please refer to the “delivery note” for the detailed specification of your machine confirmation.

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1 OPERATION OF MACHINE

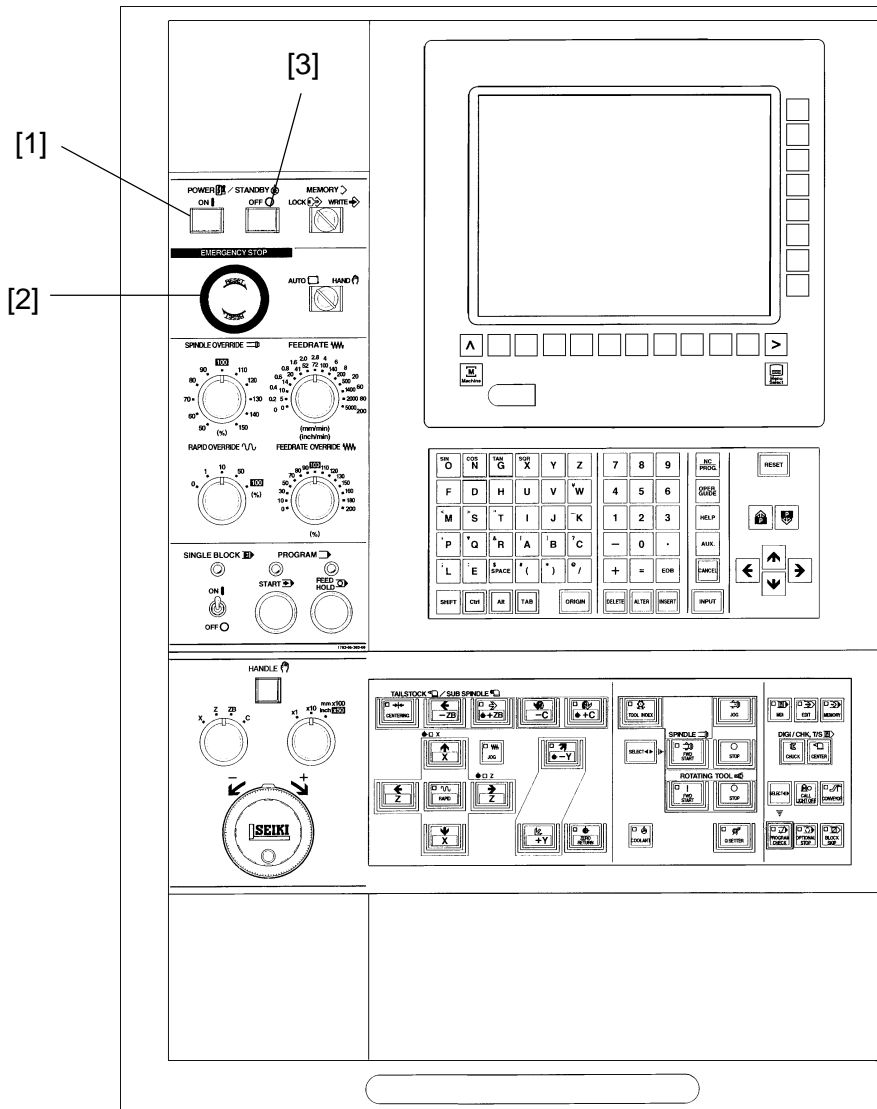
1. Daily Maintenance

To keep the machine in the good condition any time, taking precautions against the machine troubles, it is the most important to maintain and check the machine periodically as well as to check daily.

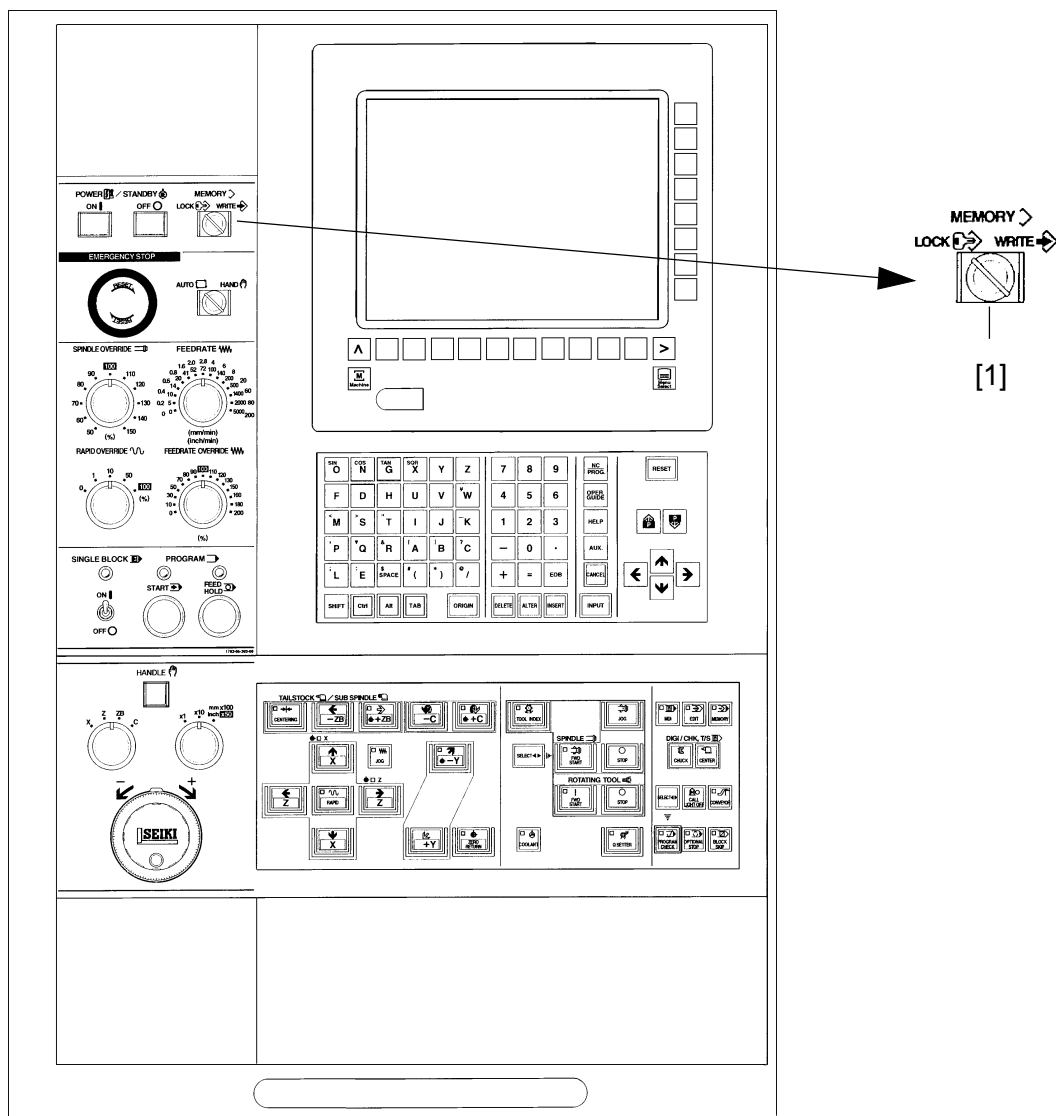
Checking servicing should be done based on the chapter 2 “Daily checking Items List” of “Maintenance Manual”

2. Explanation of Outline of Main and NC Operation Panel

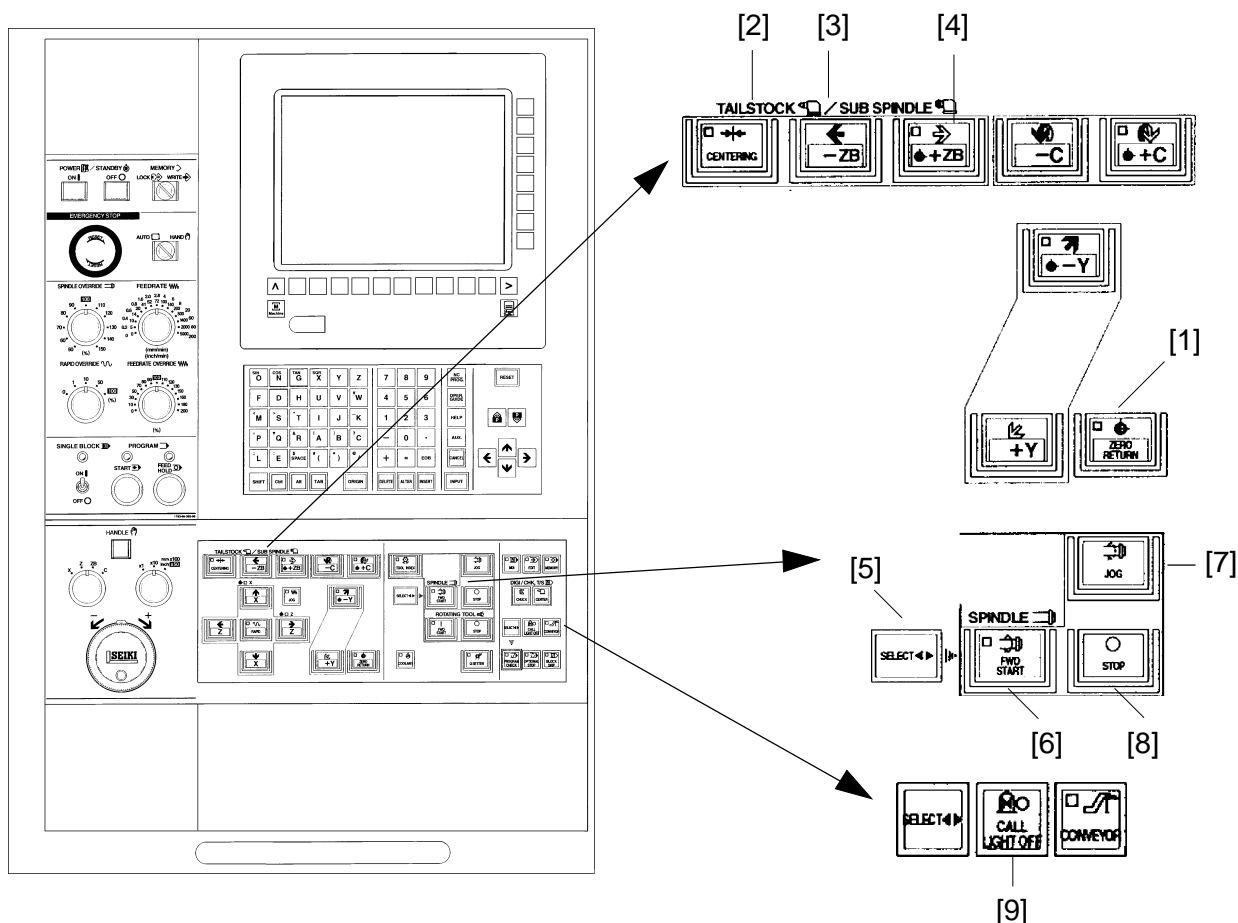
2-1 Main Operation Panel



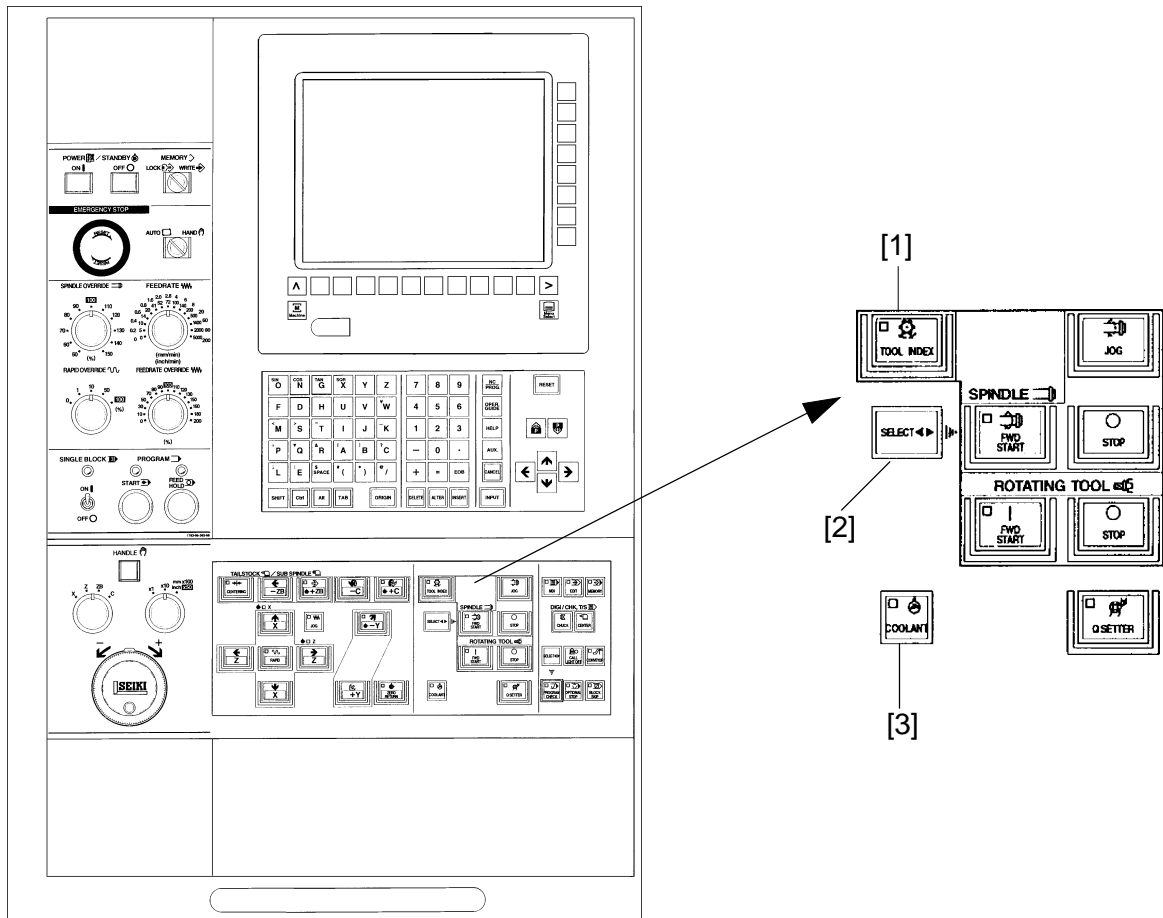
No.	Name	Function	Remarks
[1]	POWER ON/ STANDBY	The power of NC unit is ON./Make the machine condition ready to operate.	The power ON lamp lights.
[2]	EMERGENCY STOP BUTTON	Make the machine condition impossible to operate. (However, the hydraulic pump does not stopped.) Stop a section under operation. (Clear or discontinue the contents.)	Emergency stop is displayed on the upper left of the screen.
[3]	POWER OFF	The power of NC unit is OFF.	



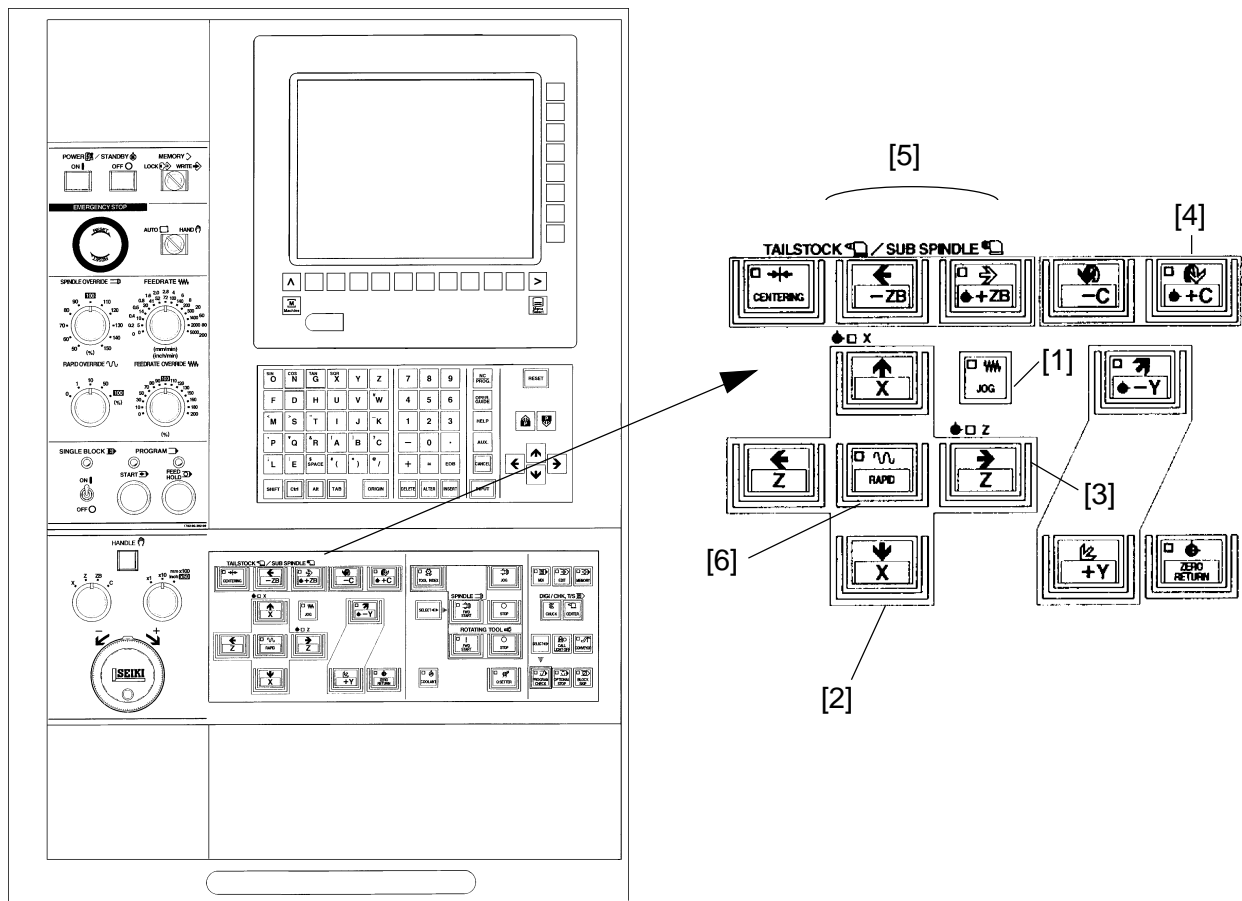
No.	Name	Function	Remarks
[1]	MEMORY	Select the effective or ineffective of editing operation of program and parameter.	Set to the lock and pullout the key after edition.



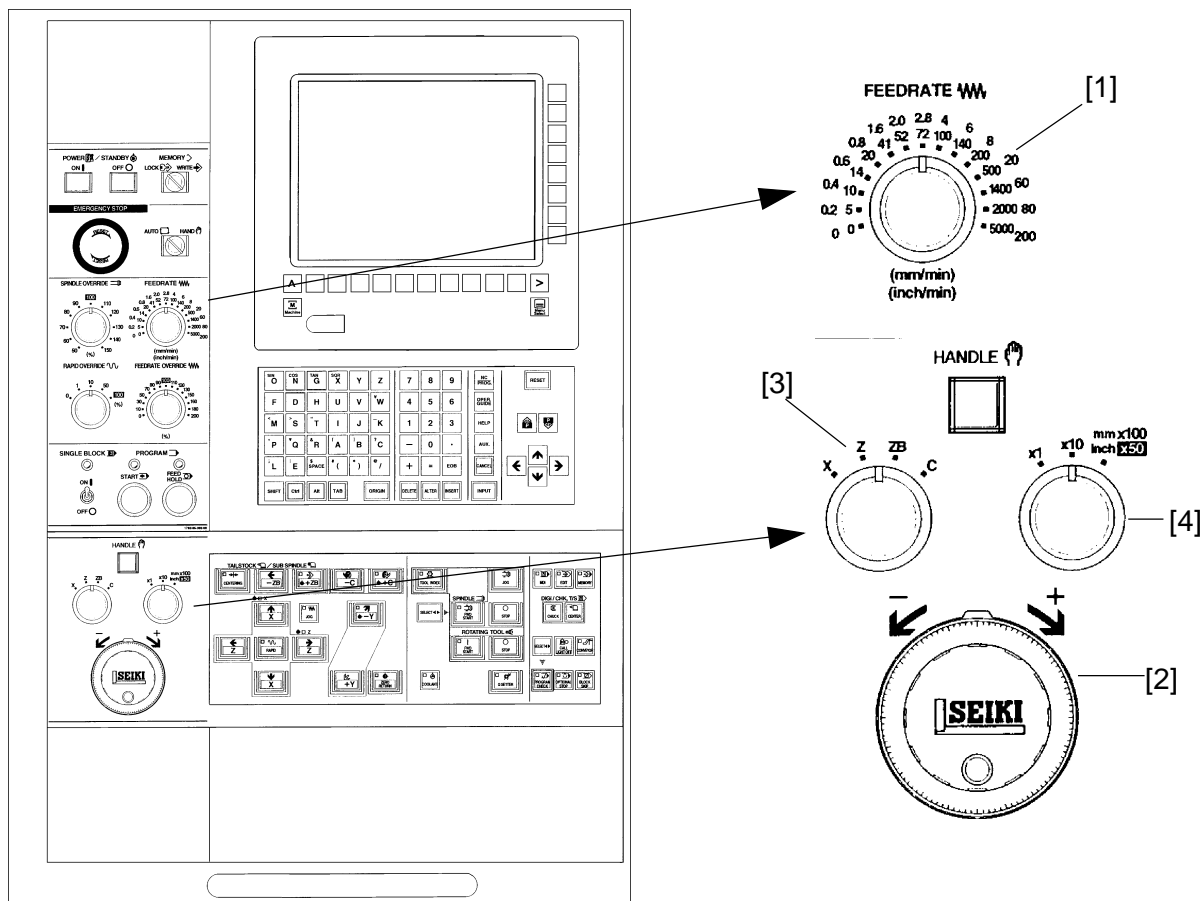
No.	Name	Function	Remarks
[1]	ZERO RETURN KEY	Return to the reference point in the order of X and Z axes.	At the time of power on, please be sure to perform a return to the reference point.
[2]	CENTER FORWARD KEY	Advance the tailstock continuously.	When the spindle is stopped.
[3]	CENTER JOG KEY	Advance the tailstock while pressing.	Effective in manual and memory mode.
[4]	CENTER RETRACT KEY	Retract the tailstock while pressing.	Effective in manual and memory mode.
[5]	SPINDLE SELECT KEY	Press this key simultaneously when forward or reverse the spindle.	
[6]	SPINDLE FWD START KEY	The spindle rotates forward by pressing with the SPINDLE SELECT key simultaneously when manual mode.	There are interlocks of the door and chuck and tailstock.
[7]	SPINDLE JOG ON KEY	The spindle rotates while pressing.	The function interlocked with tailstock.
[8]	SPINDLE STOP KEY	The spindle stops when manual mode	
[9]	CALL LIGHT OFF KEY	Turn off the call light.	



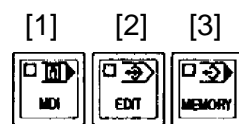
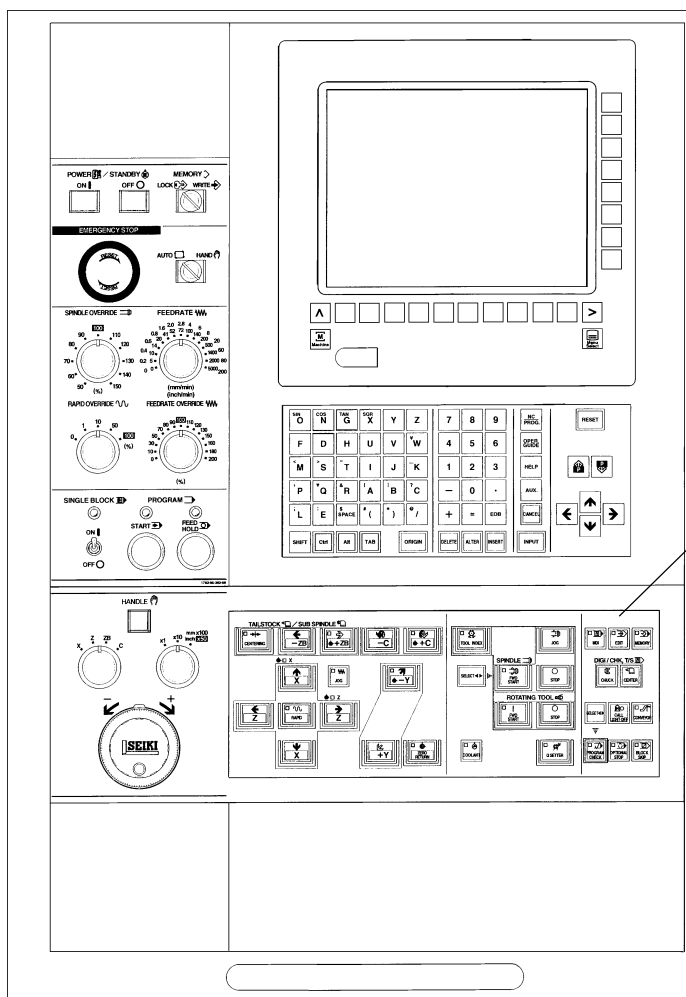
No.	Name	Function	Remarks
[1]	TOOL INDEX START KEY	In the manual mode: By pressing this key and the SELECT key simultaneously, the tool rest starts rotation.	
[2]	SELECT KEY		
[3]	COOLANT MANUAL KEY	To direct coolant supply manually ON/OFF	



No.	Name	Function	Remarks
[1]	JOG KEY	Select when executing the operation of the manual continuous feed.	Under manual mode.
[2]	+X, -X KEY	The manual continuous feed is available at the JOG mode. Move continuous in the selected direction by pressing any one of +X or -X key.	Set the feedrate by the feedrate switch. When the +X key is kept pressing, it is stopped at the machine reference point.
[3]	+Z, -Z KEY	The manual continuous feed is available at the JOG mode.	Set the feedrate by the feedrate switch. When the +Z key is kept pressing, it is stopped at the machine reference point.
[4]	+C, -C KEY	The manual continuous feed is available at the JOG mode.	
[5]	+ZB, -ZB KEY	The manual continuous feed is available at the JOG mode.	
[6]	RAPID KEY	Move by the rapid traverse with setting % value of override while pressing under the manual continuous feed.	

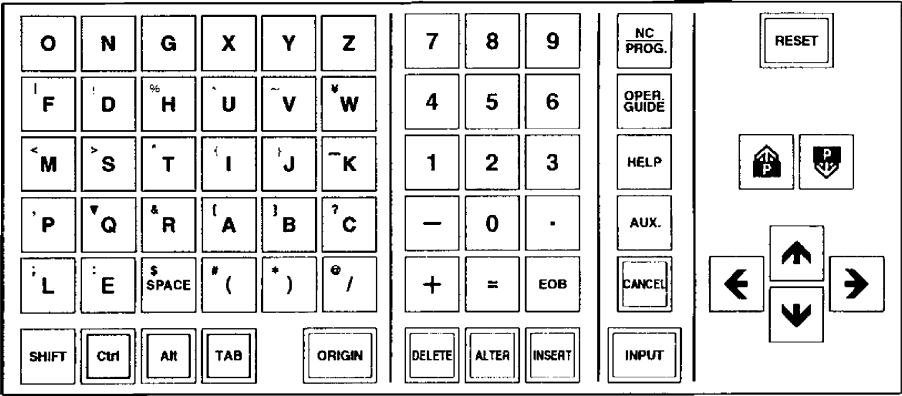
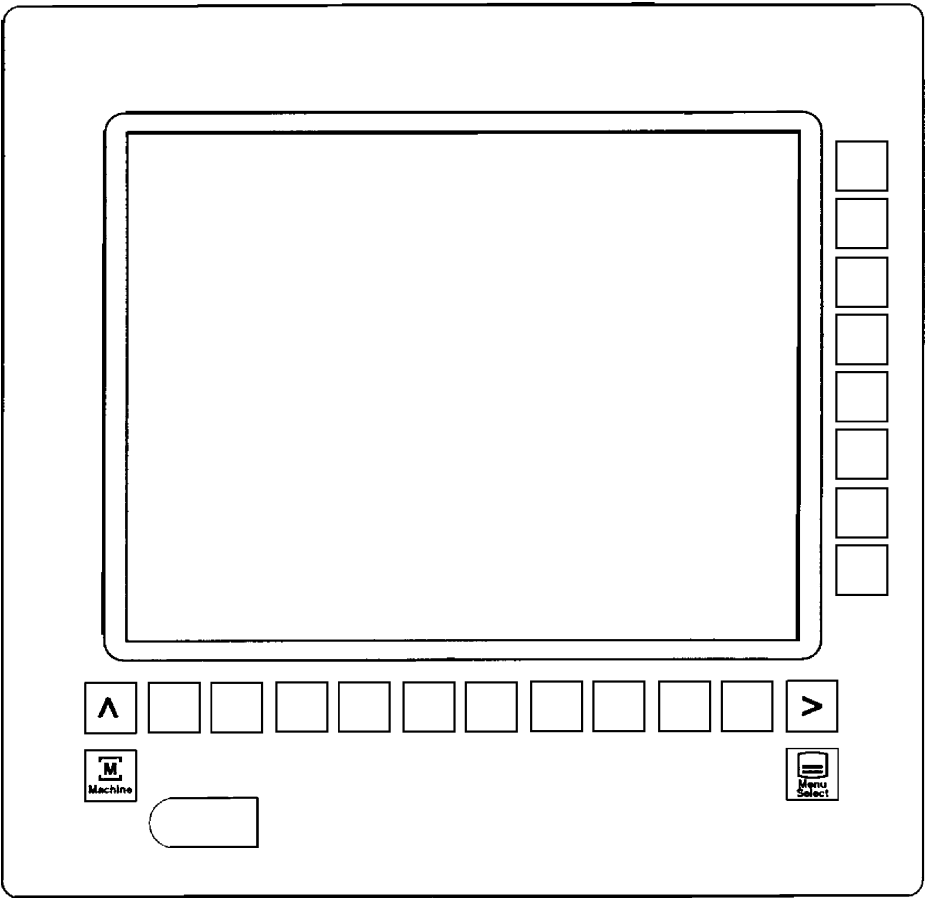


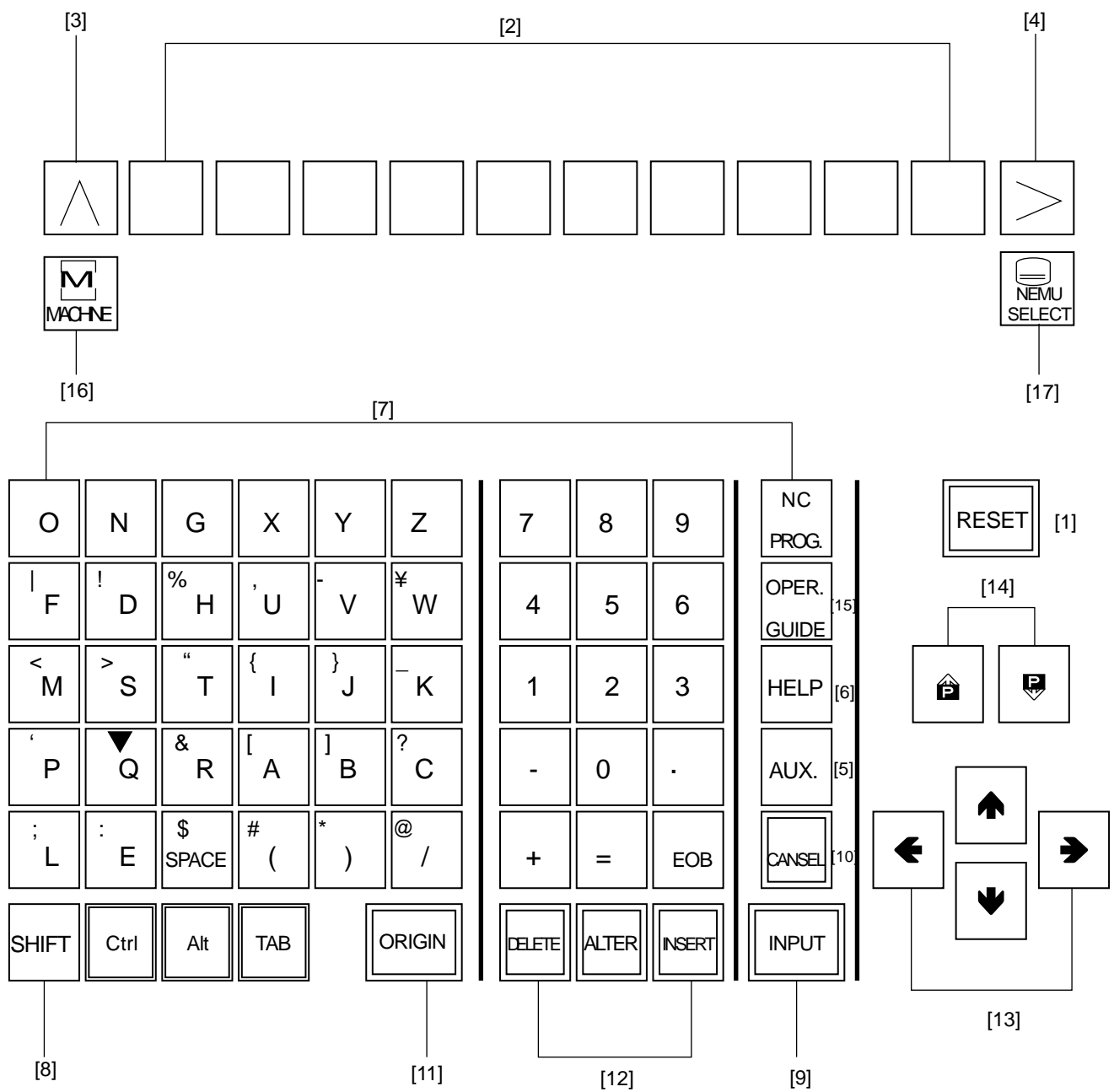
No.	Name	Function	Remarks																																
[1]	FEEDRATE SWITCH	Select the feedrate when execution of the manual continuous feed or program check operation (dry run).	0~5000mm/min 15 steps																																
[2]	HANDLE	Execute the handle feed (a fine feed of the machine), when one of the X, Z, ZB or C axes under feed mode.	100div./ rev. A feed amount per division is according to the setting of magnification [4].																																
[3]	FEED AXIS KEY	Select one of the X, Z, ZB or C when moving by the handle.	Under manual mode.																																
[4]	HANDLE FEED MAGNIFICATION CHANGE KEY	Select an amount per division of the handle.																																	
		<table><tr><th>Feed magnification key</th><th>Axis</th><th>Indication amount μ</th><th>Axis</th><th>Indication amount</th></tr><tr><td rowspan="2">1/1</td><td>X</td><td>1</td><td>ZB</td><td>1μ</td></tr><tr><td>Z</td><td>1</td><td>C</td><td>0.001°</td></tr><tr><td rowspan="2">10/1</td><td>X</td><td>10</td><td>ZB</td><td>10μ</td></tr><tr><td>Z</td><td>10</td><td>C</td><td>0.01°</td></tr><tr><td rowspan="2">100/1</td><td>X</td><td>100</td><td>ZB</td><td>100μ</td></tr><tr><td>Z</td><td>100</td><td>C</td><td>0.1°</td></tr></table>	Feed magnification key	Axis	Indication amount μ	Axis	Indication amount	1/1	X	1	ZB	1μ	Z	1	C	0.001°	10/1	X	10	ZB	10μ	Z	10	C	0.01°	100/1	X	100	ZB	100μ	Z	100	C	0.1°	
Feed magnification key	Axis	Indication amount μ	Axis	Indication amount																															
1/1	X	1	ZB	1μ																															
	Z	1	C	0.001°																															
10/1	X	10	ZB	10μ																															
	Z	10	C	0.01°																															
100/1	X	100	ZB	100μ																															
	Z	100	C	0.1°																															



No.	Name	Function	Remarks
[1]	MDI	Select when MDI input by the CRT operation panel of NC unit.	Automatic mode
[2]	EDIT	Select when editing program stored.	Automatic mode
[3]	MEMORY	Select when execution of program stored.	Automatic mode

2-2 NC Operation Panel



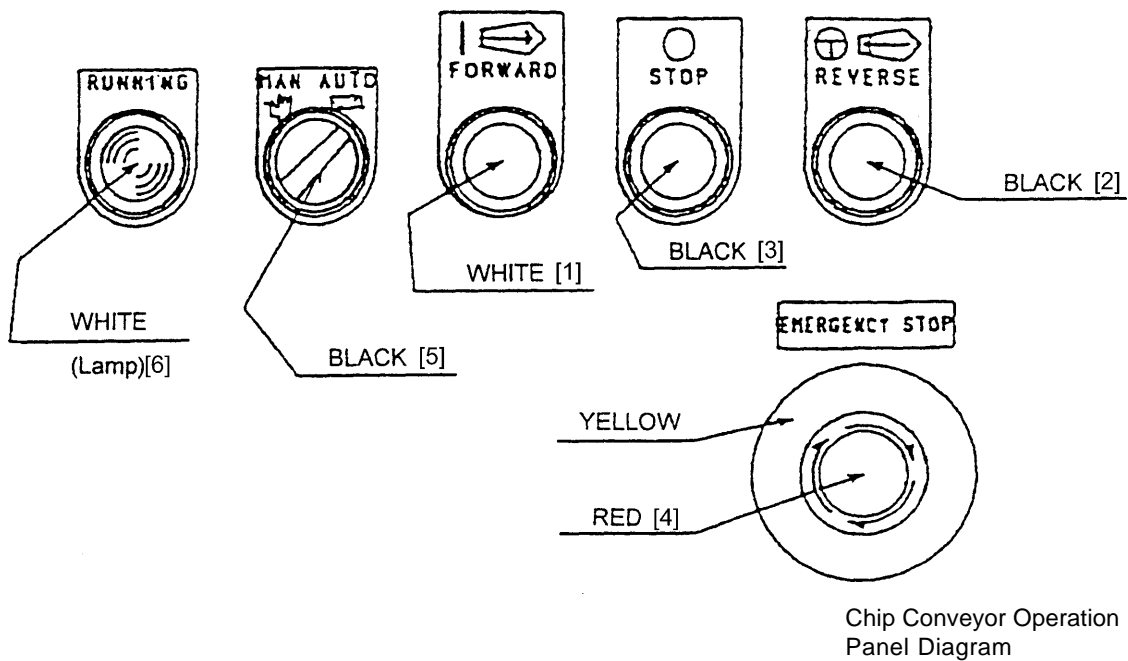


NC Operation Key

No.	Name	Description
[1]	RESET key	Press this key when resetting the CNC unit in order to reset an alarm, and so on.
[2]	Function keys	When the function menu is displayed at the bottom of the CRT, there are the keys to select the menu.
[3]	Maintenance Menu Display key	Pressing this key in the overall screen switches to the maintenance menu.
[4]	RETURN key	Press this key when you want to return to the Overall screen.
[5]	AUX. key	Press this key when you want to move the cursor of the overall screen to another window.
[6]	HELP key	
[7]	Address and Numerical keys	Used to input the alphabet, numbers, etc.
[8]	SHIFT key	There are some address keys which have 2 characters marked on them. If you press the address key after the SHIFT key, upper left character is input.
[9]	INPUT key	If the address or numerical key is pressed, it is input into the key input buffer once, and then, displayed on the CRT. Press the INPUT key when actually setting the data input into the key input buffer.
[10]	CANSEL key	Press this key when deleting the characters or symbols input into the key input buffer.
[11]	ORIGIN key	This key is used to clear the Plot screen.
[12]	DELETE, ALTER and INSERT keys	Used to perform deletion, alteration and insertion in editing the program.
[13]	Cursor key	There are 4 keys which are used to move the cursor up/down and right/left.
[14]	Page key	There are 2 keys which are used to page in the forward and backward directions.
[15]	OPER. GUIDE	Press this key when you want to display in the Operation Guide screen.
[16]	MACHINE key	In case of a multiple series machine, use this key to switch the series to be displayed.
[17]	MENU SELECT key	Pressing this key in the overall screen switches to the menu to display a small screen.

2-3 Chip Conveyor Operation Panel

1) Chip Conveyor Operation Panel



2) Function

No.	Name	Type	Function
[1]	FORWARD	Push Button	Forward switch is valid in manual mode only. The action is kept on.
[2]	REVERSE	Push Button	Reverse switch is valid in manual mode only. Inching operation.
[3]	STOP	Push Button	Stop switch is valid regardless of the mode.
[4]	EMERGENCY STOP	Mushroom Type	Emergency stop switch is valid for stopping both chip conveyor/main machine, regardless of the mode.
[5]	MAN/AUTO	Switching	In manual mode: Buttons [1] [2] are valid. In auto mode: By command from the main machine, forward operation is stopped. Buttons [1] [2] are invalid. Do not switch man/auto during operation.
[6]	RUNNING	Lamp	Lamp lights while the chip conveyor is in operation.

3. Procedure of Machine Operation

3-1 At the Time of Start

- [1] Turn on the power source switch.
- [2] Supply air pressure.
- [3] Turn on the power switch of the power control cabinet.
- [4] Press the POWER/STANBY [ON] on the left corner of the main control panel.

Caution

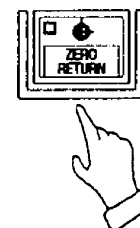
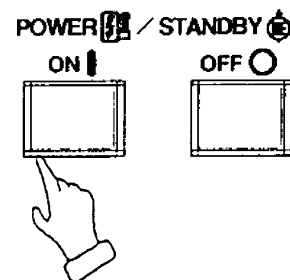
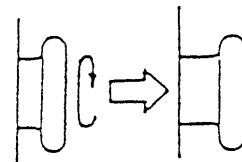
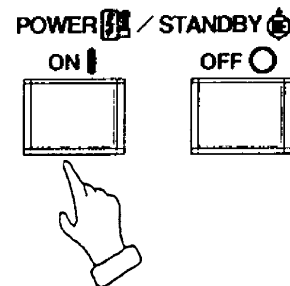
Main panel and NC unit is sealed type construction and avoid a mixture of outer air directly. Therefore, don't keep open the door long time of period during power on.

Check on the display and that fan motors heat exchanger are started.

- [5] Once the Overall screen is displayed, turn [EMERGENCY STOP] to the right to unlock it.
- [6] Press the POWER/STANBY [ON] on the left corner of the main operation panel.
(Lamp lights.)
Check a setting pressure of hydraulic unit is 3.5Mpa{35kgf/cm²}as fixed value.
- [7] Move X and Z axes several times to lubricate each slide way before starting operation.
(Pay attention to avoid over travel.)
- [8] Press the [ZERO RETURN] .
(Refer to "Procedure of zero return")
This will return the turret head to the machine zero point.
- [9] Turn on the switch for chip conveyor.

Caution

Do not operate the machine with plenty of chip in the trough of chip conveyor.



3-2 Warming-up Operation of Spindle

Caution

It is important to keep status of bearing in good condition by lubrication, etc., to make the spindle rotate normally. Sudden rotation of the spindle may cause sticking of the bearings because of shortage of lubricating oil at the bearing section. To get the best performance of the spindle function by correct operation, warming-up operation as below-mentioned is necessary.

Warming-up operation for every starting (30 minutes)

[1] 10 minutes at 30% of the maximum spindle rotation

[2] 10 minutes at 50% of the maximum spindle rotation

[3] 10 minutes at 80% of the maximum spindle rotation

Conduct warming-up operation in the above order, [1], [2], [3]

3-3 Procedure of Zero Return

This function is conveniently designed to return the turret head to the machine zero point in order of the X- and Z-axis in single-touch operation.

Method 1 of zero return

- [1] Make a mode to [JOG].

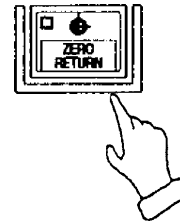
Move the X- and Z-axis about 100 mm in the minus direction.

- [2] Press the [ZERO RETURN] key.

If a single-touch zero point return prohibited area alarm is issued, move the X- and Z-axis until the alarm has disappeared.

- [3] Move a tool head to zero point by rapid traverse (10% override). The tool head stops at zero point and a confirmation lamp of zero point of the axis turns on.

Return the X- and Z-axis to the zero point in that order.



Method 2 of zero return

- [1] Make a mode to [JOG].

- [2] If the X and Z axes locate near the zero point, move it opposite direction (Minus) from zero point about 100mm.

- [3] Press [X+] and [Z+] in that order to return the X- and Z-axis to the zero point.

- [4] Release a finger from the switch after the confirmation lamp of zero point turned on.

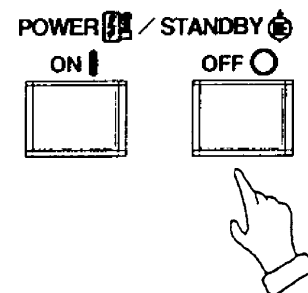
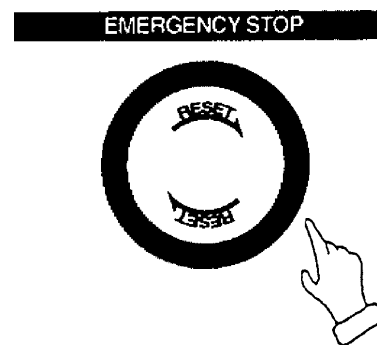
Execute zero point return of each axis by the operations above.

Caution

1. Execute zero return of axis one by one for safety.
(At first, do it from X-axis.)
2. Pay attention of interference with the tailstock at the time of zero return.
3. The turret head does not move when rapid traverse override is 0 %. Set it to 1 % or 10 %.
4. When rapid traverse override is 1 %, it moves at override of 1 %.

3-4 At the End of Operation

- [1] Clean up the machine.
Stop the chip conveyor after all chips carried out from the conveyor.
- [2] Confirm the machine stopped completely.
 - Spindle rotation
 - Program
 - X and Z axes
 - Coolant
 - Chip conveyor
- [3] Press the [EMERGENCY STOP] button on the main operation panel.
- [4] Press power [OFF] button at the main operation panel and control power off.
- [5] Turn off the power switch of the power control cabinet.
- [6] Cut out supply air pressure.
- [7] Set the main power switch [OFF].



4. Manual Operation

4-1 Feed of Each Axis

— In case of manual feed —

- [1] Press the [JOG] for mode select push button switch.

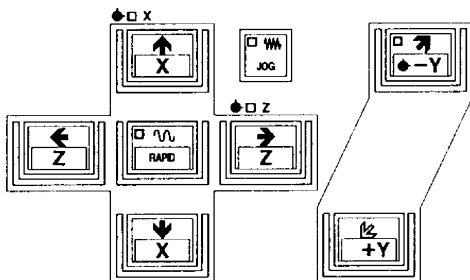
You may select the [HANDLE] either.

- [2] Set the manual federate rotary switch to suitable speed.

Move the machine to desired direction by the manual feed direction push button switch.

Take a finger off from the switch when reach to the fixed position.

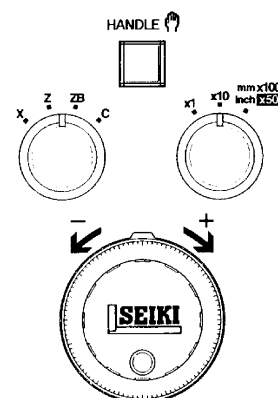
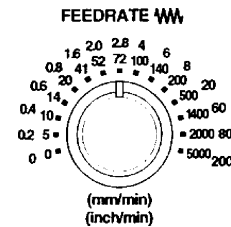
(The machine moves only when pressing the switch.)



In case of a feed by the HANDLE, it can be operated the same about it.

(Example of use)

- Warm up running
- In case of approach near the zero position.
- In case of cutting manually
- Setting work



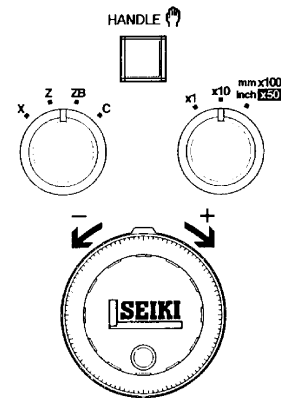
— In case of the handle feed —

[1] Select the axis by the axis push button switch.

[2] Fine feed can be done by the manual handle.

- When select 1/1: One division is 0.001mm
- When select 10/1: One division is 0.01mm
- When select 100/1: One division is 0.1mm

In case of the spindle indexing C axis, the unit becomes a degree.



4-2 Operating Method of Q-setter

A tool position compensating value can be get easily, since a tool position compensation is inputted automatically by touching a tool tip to the Q-setter.

In case of the turret rotates, a cursor changes automatically due to a tool face number correspond an offset number.

- [1] Confirm the zero return condition of the X and Z axes.

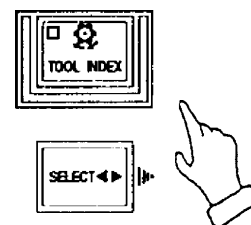
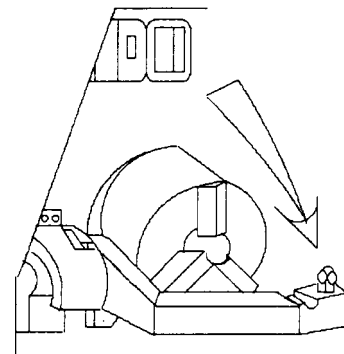
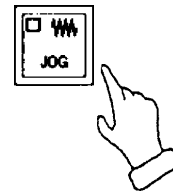
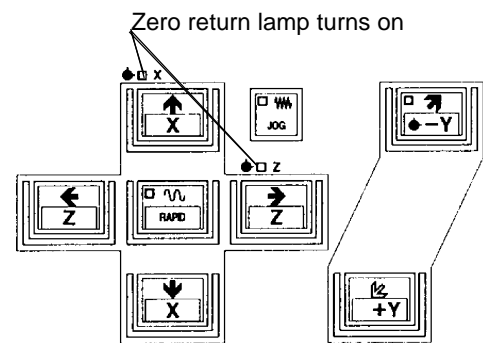
If confirmation lamp is not lit, execute manual zero return.

- [2] Make a mode to manual mode [HANDLE] or [JOG].

- [3] Pull out the Q setter

A screen changes to the offset screen automatically and display the "Q-setter" and inform a ready of complete condition of preparation.

- [4] Call a tool compensation required.



Press the [TOOL INDEX] and [SELECT] at the same time.

- [5] Confirm a tool face on the turret and offset number.

A tool face selected at this moment is recognized by a cursor position.

TOOL (OFFSET)			
Sharp		Wears	
01			
X	1.000 U	0.000	
Z	3.000 W	0.000	
R	0.000 Q	0.000	
T	3		
H	0.000 J	0.000	

- [6] Approach a tool tip to the tool setter (Q setter)

Procedure (1) Handle magnification key 100/1
(2) Rotate a handle to minus direction.

- [7] Position a tool tip to the center of the sensor by [HANDLE].

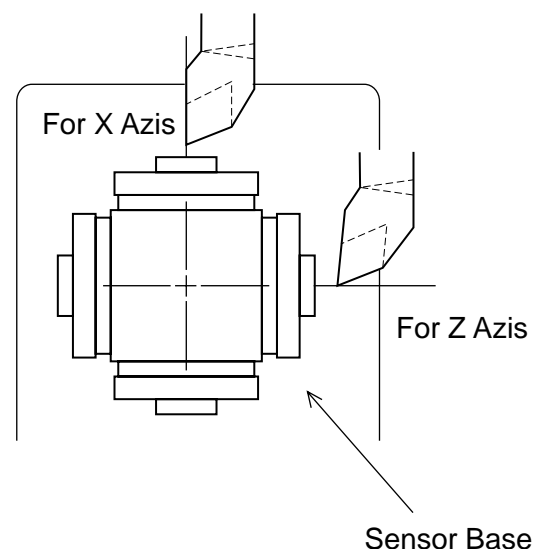
- [8] When a tool tip touches the sensor by JOG mode, a compensating value is inputted automatically. At this time, the feed rate is fixed, disabling speed selection.

Caution

If it is executed by operating the [HANDLE], the accuracy will not be stabilized. (Reason: When having the tool nose touch the Q setter, the accuracy is stabilized by having it touched at a constant speed.)

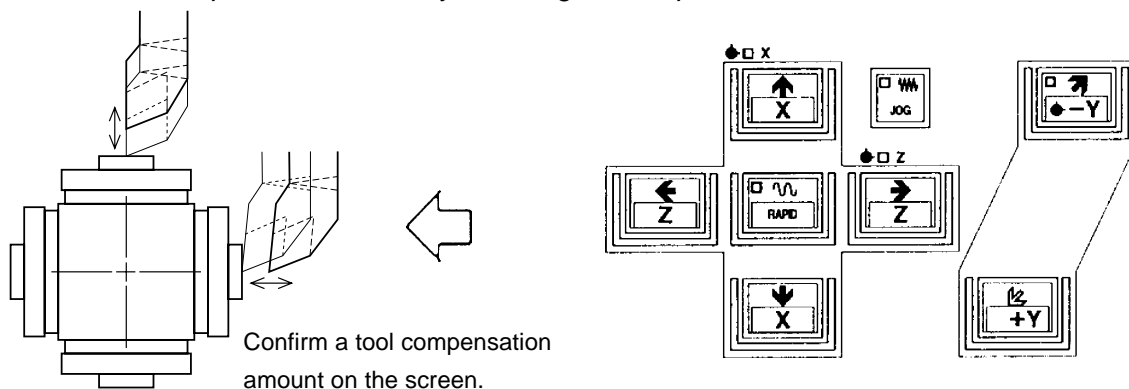
When a tool tip touch to the sensor, sound beep and stop the tool head and input a compensation value.

The wear offset amount of the axis touched by the tool nose is made 0 (zero).



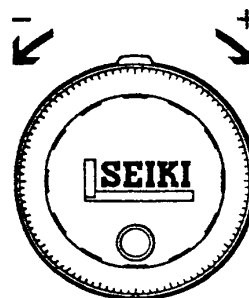
TOOL (OFFSET)			
Sharp		Wears	
01			
X	35.000 U	0.000	
Z	0.125 W	0.000	
R	0.000 Q	0.000	
T	3		
H	0.000 J	0.000	

[9] Execute a tool tip measurement by touching a tool tip to the sensor twice or so.



[10] Retract a tool tip from the sensor to safety zone by [HANDLE] mode. A safety zone is a position which is not interfered a tool and sensor even if the turret rotates.

When retracting the cutting edge in the [HANDLE] mode from the beginning, retract it slowly up to about 1 mm. If retracted abruptly in the [HANDLE] mode, the cutting edge direction may be misconceive, disabling an entry of a correct compensation value.



[11] Get a compensation amount for the other tool in turn as the same method.

OTHERS

Reference In case of thread cutting tool

In case of thread cutting tool, a tool compensation value of Z value is obtained by the side of insert as described by Fig. 1 and 2, effective length of thread becomes short by "Width T" due to position of cutting edge is different. Therefore, get a tool compensation amount by the Q setter as Fig. 1 then execute incremental compensation input to minus side (In case of Fig. 2, plus side), so correct effective length of thread can be get as Fig. 3.

The incremental amount you can input at a time is up to 1mm. If it exceeds 1mm, divide the input into several times, with the amount less than 1mm each time.

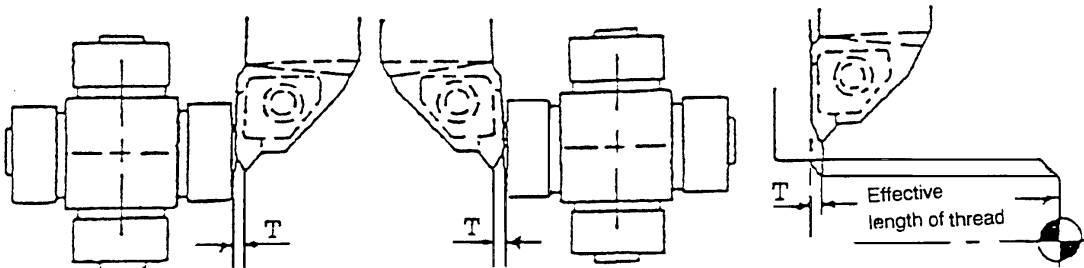
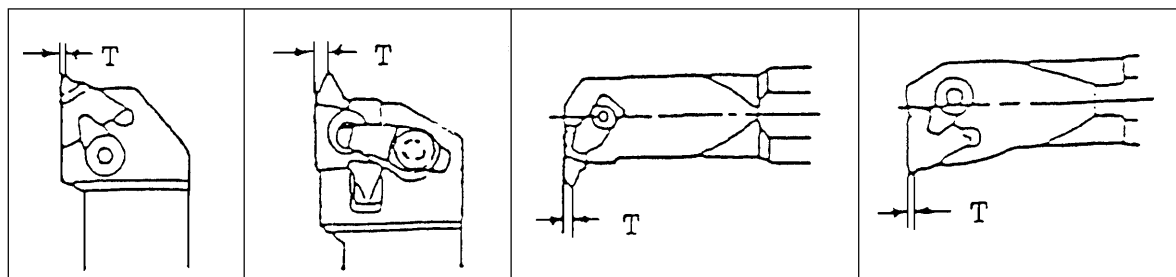


Fig.1(Right hand thread)

Fig.2(Left hand thread)

Fig.3



How to get a tool compensating amount for a tool tip may not be touch the Q-setter

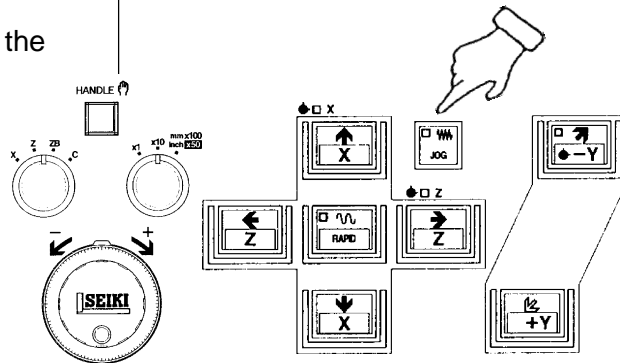
A work coordinate system setting should be done before executing this operation.

A correct compensating amount can not be found without a work shift operation.

1. "How to get a tool compensating amount for a longitudinal direction (Z)"

[1] Call a tool by index the turret.

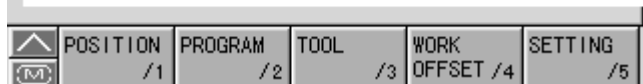
Select the mode switch either the [HANDLE] or [JOG].



Press the [TOOL INDEX] and [SELECT] at the same time.

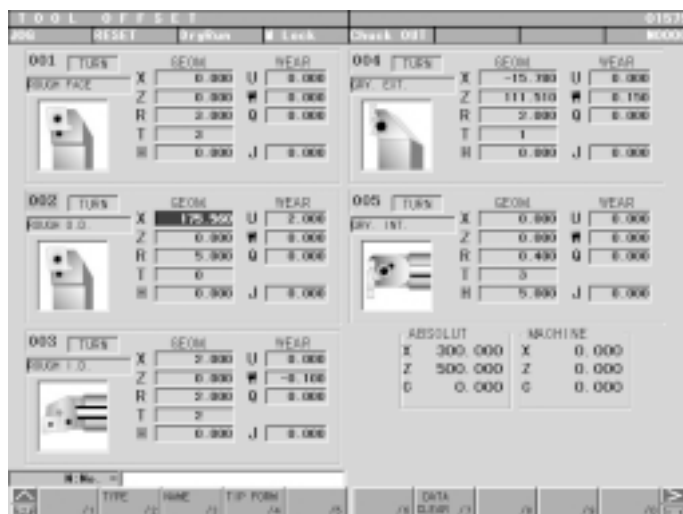
[2] Call the tool offset screen and confirm a tool compensating amount (Z) is zero. Set zero if it is not zero.

Press [F3/TOOL].

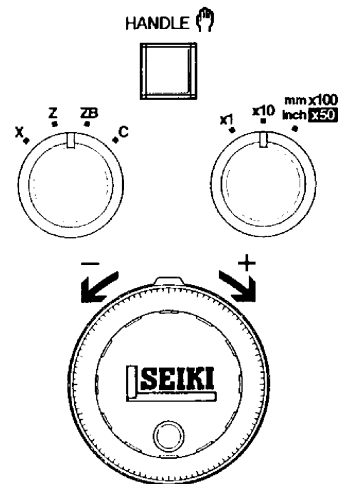


Example: In case of T0200

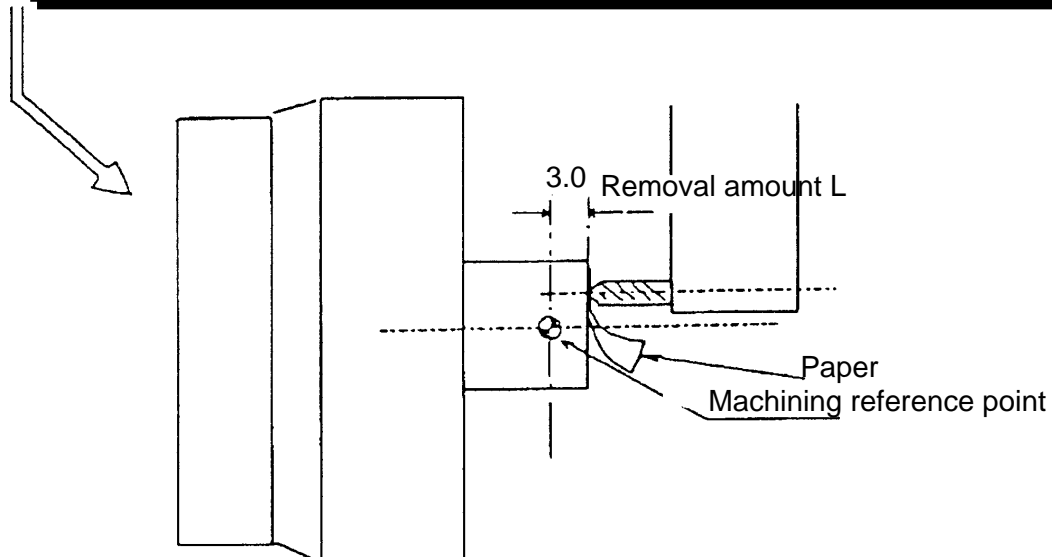
Set the tool (offset) No. 02.



-



Reduce a magnification of the handle to avoid a breakage of tool and apply a paper between a workpiece and tool.



- | 0001 OFFSET | | | | 01531 | | | |
|---|------|---------|-------|---|---|----------|-------|
| HANDLE | | RESET | Bytun | Lock | Check OUT | | 00000 |
| 001 | TURN | | GEOM | VEAR | | | |
| KISH TAIL | X | 0.000 | U | 0.000 | | | |
| | Z | 0.000 | N | 0.000 | | | |
| | R | 0.000 | Q | 0.000 | | | |
| | T | 0 | | | | | |
| | H | 0.000 | J | 0.000 | | | |
|  | | | | | | | |
| 002 | TURN | | GEOM | VEAR | | | |
| KISH C.2 | X | 175.500 | U | 0.000 | | | |
| | Z | 0.000 | N | 0.000 | | | |
| | R | 0.000 | Q | 0.000 | | | |
| | T | 0 | | | | | |
| | H | 0.000 | J | 0.000 | | | |
|  | | | | | | | |
| 003 | TURN | | GEOM | VEAR | | | |
| KISH I.2 | X | 0.000 | U | 0.000 | | | |
| | Z | 0.000 | N | -0.100 | | | |
| | R | 0.000 | Q | 0.000 | | | |
| | T | 0 | | | | | |
| | H | 0.000 | J | 0.000 | | | |
|  | | | | | | | |
| 004 | | | | 005 | | | |
| TURN | | | GEOM | VEAR | TURN | | |
| SP. INT. | X | -15.700 | U | 0.000 |  | X | 0.000 |
| | Z | 111.510 | N | 0.150 | | Z | 0.000 |
| | R | 0.000 | Q | 0.000 | | R | 0.000 |
| | T | 1 | | | | T | 0 |
| | H | 0.000 | J | 0.000 | | H | 0.000 |
| SP. INT. | | | |  | | | |
| RESOLUT | | | | MACHINE | | | |
| X | | 85.000 | | X | | -235.000 | |
| Z | | 150.000 | | Z | | -350.000 | |
| 0 | | 0.000 | | 0 | | 0.000 | |
| GEOMETRIC : Z 0 | | | | | | | |

○ Tool compensating amount

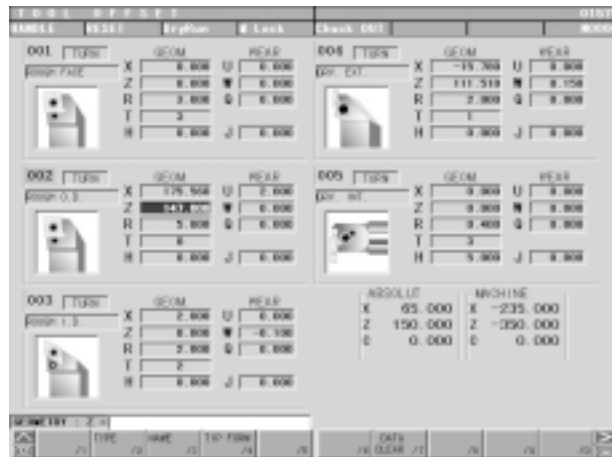
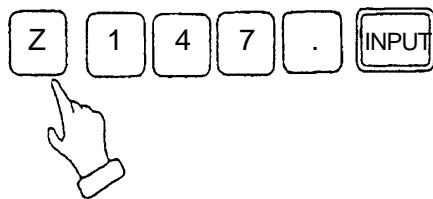
A value subtract a removal amount (L) from a tool position (Z).

Tool compensating amount (Z) = Tool position (Z) - Removal amount (L)

Example: Tool compensating amount = (150.0) - (3.0) = 147.0

147.0 is a tool compensating amount of the longitudinal direction.

[5] Input a tool compensating amount.



Caution

Execute it with confirmation, if the setting of shift amount (machining original position) of Z-axis work coordinate system is correct or not before this

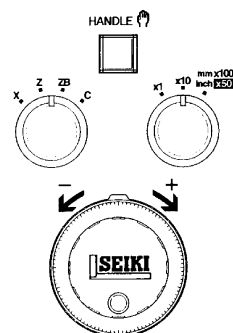
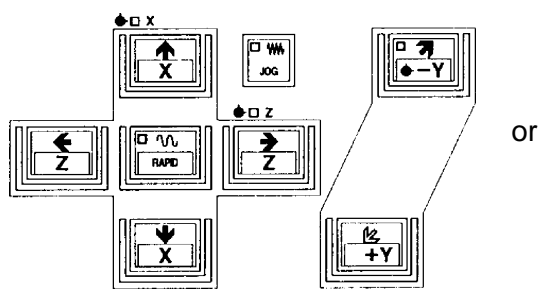
Besides, a tool tip position should be same as a removal amount when a tool touches end face is has touched the Q-setter.

How to get a tool compensating amount for a tool tip may not be touched the Q-setter.

2. “How to get a tool compensating amount for a radial direction (X)”

It is the same as longitudinal direction from the item [1] to [3]. Refer it to them.

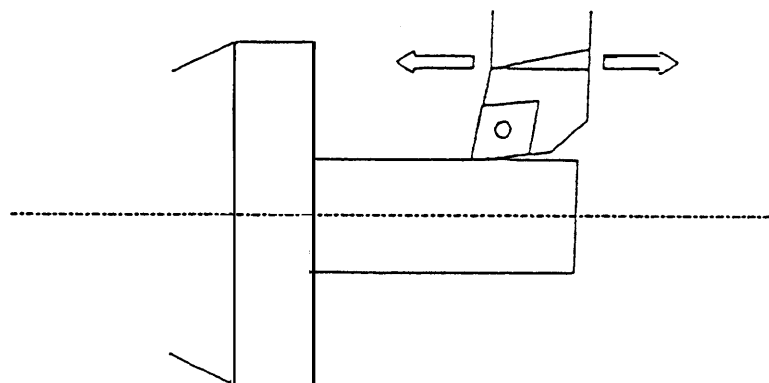
- [4] Cut a workpiece.



Feed level




Caution

To avoid a defective parts, it is enough a skin cut. Never move on the X-axis after OD turning.



- [5] Watch a position “X” of tool position.

Example: In case of T0300
Set the tool (offset)
No.03.

TOOL OFFSET										0157
HANDLE					CHECK OFF					0000
RESET	Brk/Hes	Lock								
001 TURN										
ROUGH FACE										
X	0.000	U	0.000		X	-15.780	U	0.000		
Z	0.000	W	0.000		Z	111.510	W	0.150		
R	0.000	Q	0.000		R	0.000	Q	0.000		
T	3				T	1				
H	0.000	J	0.000		H	0.000	J	0.000		
										
002 TURN										
ROUGH 2D										
X	175.560	U	0.000		X	0.000	U	0.000		
Z	147.000	W	0.000		Z	0.000	W	0.000		
R	5.000	Q	0.000		R	0.400	Q	0.000		
T	0				T	0				
H	0.000	J	0.000		H	5.000	J	0.000		
										
003 TURN										
ROUGH 1D										
X	0.000	U	0.000		ABSOLUTE		MACHINE			
Z	0.000	W	-8.100		X	65.000	X	-235.000		
R	0.000	Q	0.000		Z	150.000	Z	-250.000		
T	3				C	0.000	C	0.000		
H	0.000	J	0.000							
										
GEOMETRY : 0.00										
TYPE NAME TIP FORM DATA CLEAR										

4-3 Q-setter Repeat Function

Through a simple operation, you can repeatedly perform measurement on tip changing of a tool which has already been subject to measurement in Q setter.

4-3-1 Procedures

- [1] Push **F6/Q-SETTER REPEAT** on Tool (Compensation) page, Window page for Q setter repeat is displayed.
- [2] Set Feed mode.
- [3] Changing a tip, perform indexing of the turret to a measurement position. At this time both the cursor inside Turret State on the left side of the page and the compensation data at the top right-hand corner of the page change as linking to the turret face.
- [4] Bring out the Q setter arm.
- [5] Push **F4/START** .

If the tool has been already subject to measurement in Q setter (with the data already existing in the measurement position on the page), measurement by Q setter repeat is started. When the tool touches the sensor, a measured value is written in compensation data. The touch mark is displayed on the picture indicating a measurement position.

If measurement has not yet been performed in Q setter, alarm takes place.

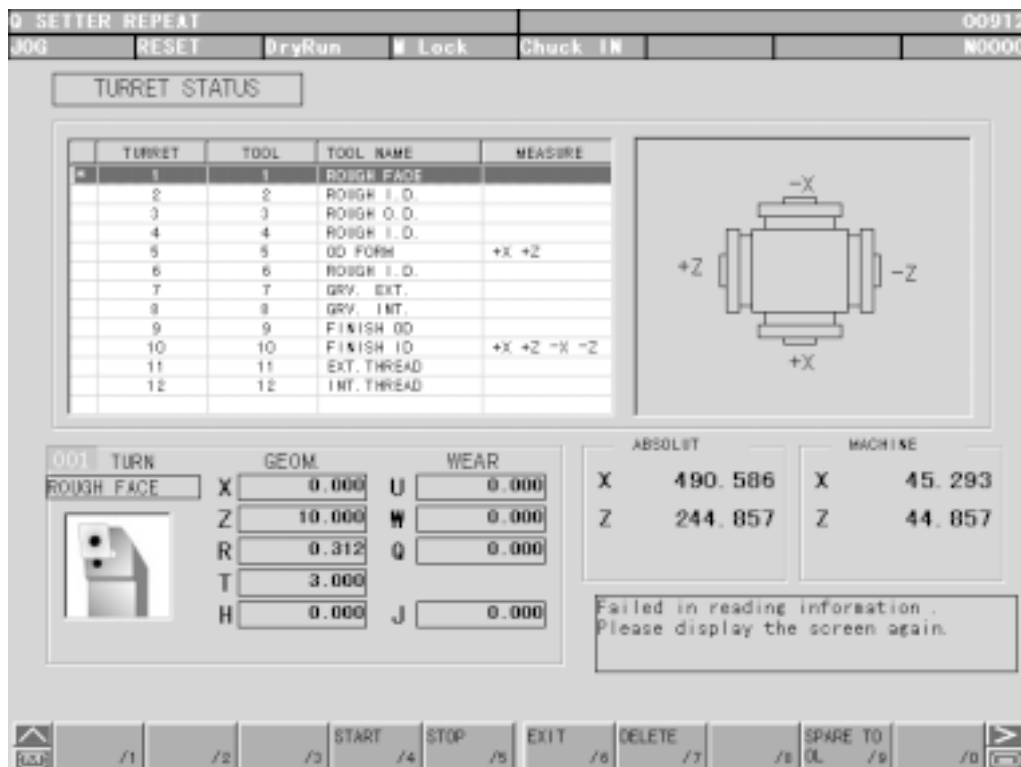


Fig. 7-2 Q Setter Repeat Screen

4-3-2 Function Key

- F4/ Repeat Measurement Start : “OK? Y- Yes N- No” message appears. With , measurement starts.
- F5/ Repeat Measurement Halt : Measurement operation is stopped.
- F6/ Function Return : Screen display returns to Tool Compensation.
- F7/ Data Delete : On appearance of a window, select either “One Meas. Spot” or “Whole Meas. Spot” and push . “OK? Y- Yes, N- No” message appears. With , the measurement spots are deleted.

4-3-3 Working

The working patterns, as shown in Fig. 7-3(c) can be divided into 8 kinds according to the virtual nose points.

When Virtual Point 1, 2, 3, or 4 being assigned, both X and Z axes are subject to measurement. The order for measurement, in that case, is always Z to X axis.

When Virtual Point 0, 5, 6, 7, 8, or 9 being assigned, X or Z axis alone is subject to measurement. In this case, for compensation of the axis not being measured, compensation needs to be input manually beforehand. As for virtual nose points of tools, see Fig. 7-3(a).

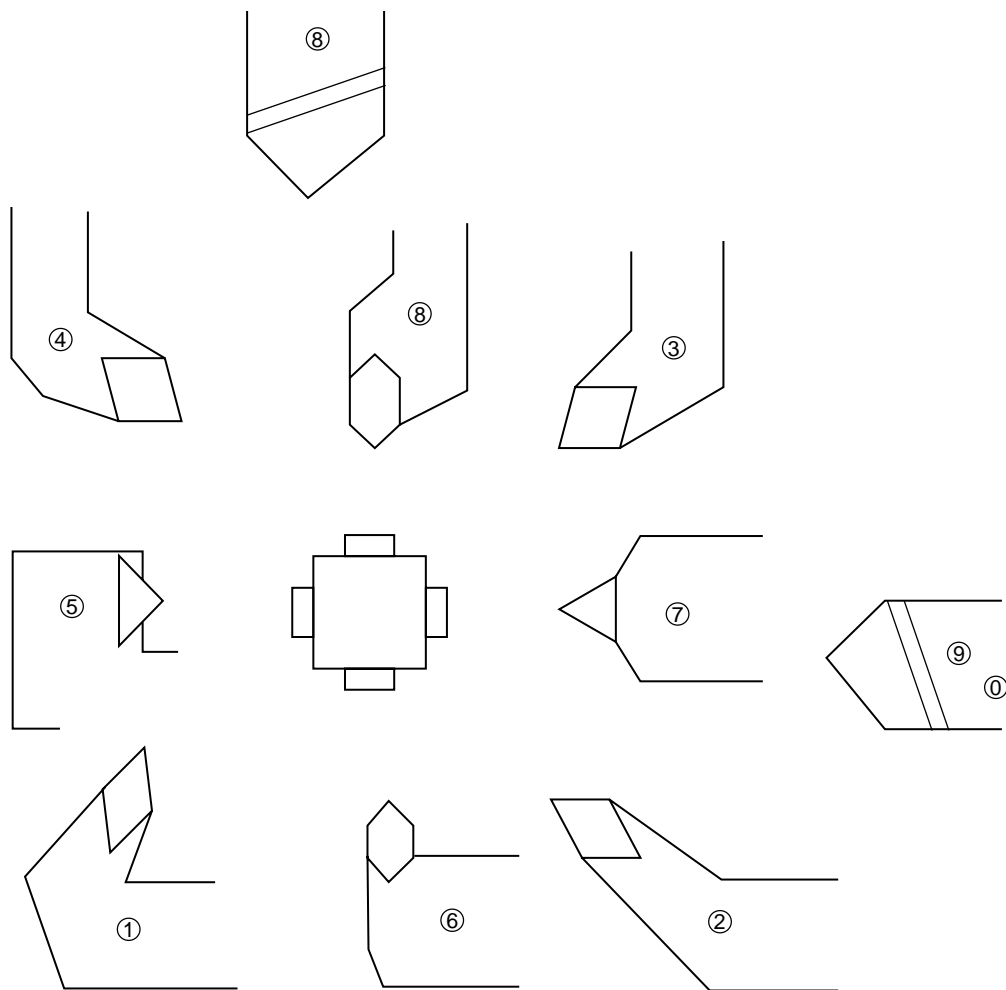


Fig. 7-3(a) Virtual Nose Points of Tools

The following example describes the case when the virtual nose point is 1:(See Fig. 7-3(b))

- [1] Shifted in rapid traverse from Start Point (P0) to Point 1 (P0).
- [2] Shifted in rapid traverse from P1 to P2.
- [3] Shifted in rapid traverse from P2 to P3.
- [4] Shifted in feed speed from P3 to the end position (P4) to be touched.
- [5] Shifted in feed speed from the point where touching and stopping have taken place.
- [6] Shifted from P5 to P6 in rapid traverse.
- [7] Shifted from P6 to P7 in rapid traverse.
- [8] Shifted in feed speed from P7 to the end position (P8) to be touched.
- [9] Shifted in feed speed from the touch-and-stop position to P9.
- [10] Shifted from P9 to P10 in rapid traverse.
- [11] Shifted from P10 to the start point (P11) in rapid traverse.

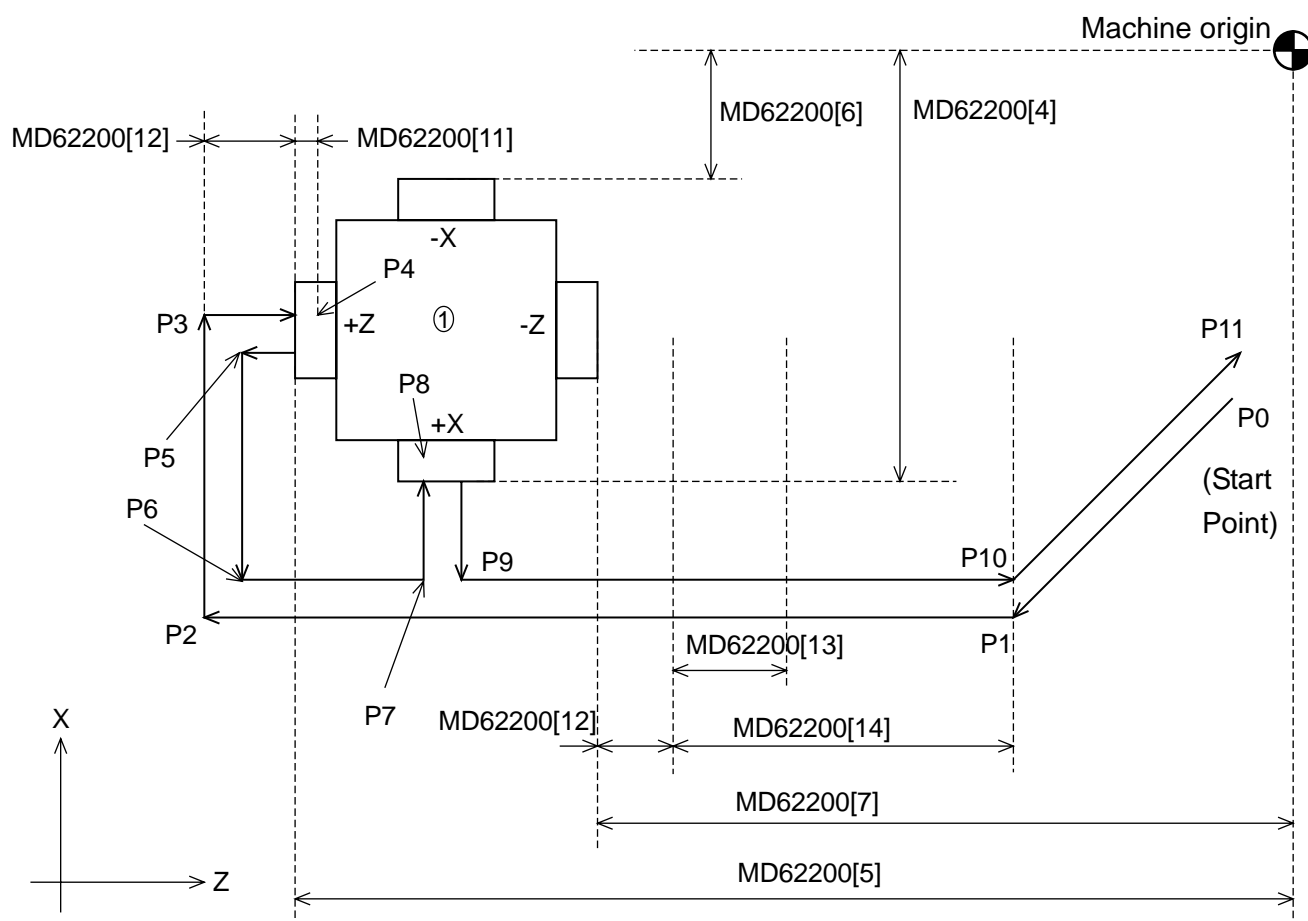


Fig. 7-3(b) Working with Virtual Nose Point 1

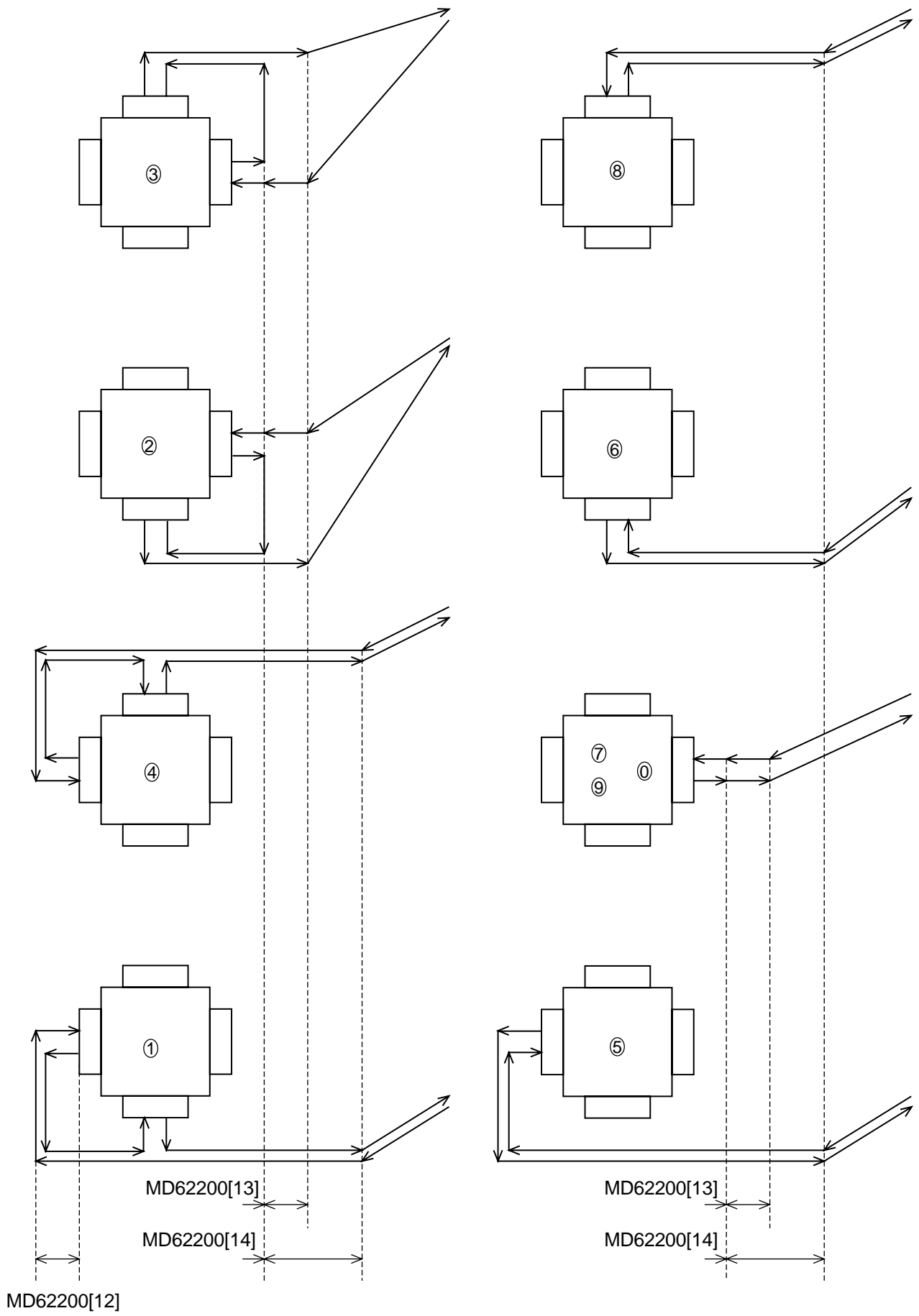


Fig. 7-3(c) Working PatternsFig.

Caution

1. When a tool has been changed, be sure to manually apply it to Q setter.
2. Apply it to Q setter only once.
3. Approaching, in rapid traverse, from the sensor to the place just before the clearance amount on approach, touch the sensor in the feed rate (mm/min).
4. Single block is held valid while in measurement operation.
(Re-started with F4/REPEAT START.)
5. When the measurement start point can touch the sensor, alarm takes place.
6. When the sensor has not been touched in measurement, alarm takes place after operation is over.
7. Threading tools, tip changing type drills, end mills, and other tools which are similar to these cannot be subject to measurement.
8. The measurement start point is any one position free from danger or touching the sensor.
9. When, in some operation patterns, an interference exists with a work, remove the work from the chuck.
10. When a large difference exists between the Q setter measurement and the work measurement dimension, adjust Q setter position on Maintenance page.
11. When the machine is provided with the Y-axis, it must be in the following conditions when starting Q-setter repeat.
 - The Y-axis is at the origin. (The ORIGIN lamp is ON)
 - The tool offset amount for the Y-axis is 0. (Both shape and Wear are 0)
12. The measuring spots are deleted in the following cases:
 - When Data Delete on the screen is effectuated.
 - When shape data for tool compensation volume and nose T have been input.

4-3-4 Relevant Parameters

- No. 8003, #0=0 Does not check the door close in the Q setter repeat.
 =1 Checks the door close in the Q setter repeat.
- #1=0 Measurement time of the Q setter repeat is 1 time.
 =1 Measurement times of the Q setter repeat are 3 times.
- #2=0 The touch signal check in the Q setter repeat is valid.
 =1 The touch signal check in the Q setter repeat is invalid.
- #3=0 Measurement of a rotation tool in the Q setter repeat is not possible.
 =1 Measurement of a rotation tool in the Q setter repeat is possible.

#4 =0 The Q setter interlock is invalid.

=1 The Q setter interlock is valid.

#7 =0 The Q setter barrier check is invalid.

=1 The Q setter barrier check is valid.

MD62200[4] Q setter contact area + Side coordinate value X (mm) (set by the radius)

MD62200[5] Q setter contact area + Side coordinate value Z (mm)

MD62200[6] Q setter contact area - Side coordinate value X (mm) (set by the radius)

MD62200[7] Q setter contact area - Side coordinate value Z (mm)

MD62200[11] Thrusting amount of the Q setter repeat (mm)

MD62200[12] Clearance amount on approaching for Q setter repeat (mm)

MD62200[13] Clearance amount for right-handed machine tool for Q setter repeat (mm)

MD62200[14] Clearance amount for left-handed machine tool for Q setter repeat (mm)

MD62210[0] The feed rate when having the Q setter repeat touch (mm/min).

MD62210[1] The return rate from the position the Q setter repeat touched (mm/min).

4-3-5 Relevant Alarms

No.67100 An error occurred in the Q setter repeat.

No.67124 No measurement has been performed in Q setter.

No.67138 The touch signal was not entered in the Q setter repeat.

No.67139 Measurement start point of Q setter repeat is not correct.

No.67149 Cannot measure the rotary tool with Q-setter repeat.

4-4 How to Shape Soft Jaw

In order to manufacture precision products of high commercial value, without flaws on workpiece, a soft jaw is formed. By forming a soft jaw matching with the chuck, cutting work can be performed safely and steadily thus the accuracy of processed goods will improve. For shaping a soft jaw, there are two methods; one is to utilize the simple soft jaw forming function, the other is to form one by manual operation.

4-4-1 Simple Jaw Edge Forming Function

(1) Outline

With “Edge shape” “Working Conditions” being input according to the guidance on the page and the start button being pushed, raw edge machining starts.

(2) Operation

- [1] Index the tool used for raw edge forming to the machining position.
- [2] Pushing **F6/JAW** on the page of the work coordinate system
(General → **F4/WORK OFFSET**), display Window page for raw edge forming.
- [3] Select either outer jaw or inner jaw forming by using **F4/OUTER JAW** or **F5/INNER JAW**.
- [4] Prepare the section where a core bar is fitted and mount it properly.
- [5] Input an edge configuration and working conditions.
- [6] Turning the spindle in Manual mode, shift the tool to the edge position.
With **F3/JAW END SURFACE** pushed, “Jaw end surface position setting? Y-Yes/N-No” is displayed. With **Y**, set the jaw end position.
- [7] Pushing **F9/SHAPE CHECK** in MDI mode, check the shape of a working program. If not in MDI mode, “Set MDI mode” message is displayed. While in shape checking, Dry-Run and Machine Lock ON state are held effective. The operation panel lamps, however, do not lit up. Also, no MST code is output.

The coordinate system (tip position) is brought to presetting on completion of shape checking or by resetting while in checking.
- [8] Perform zero returning as paying attention not to cause interference.
- [9] Pushing the start button in MDI mode, execute a working program of raw edge forming.

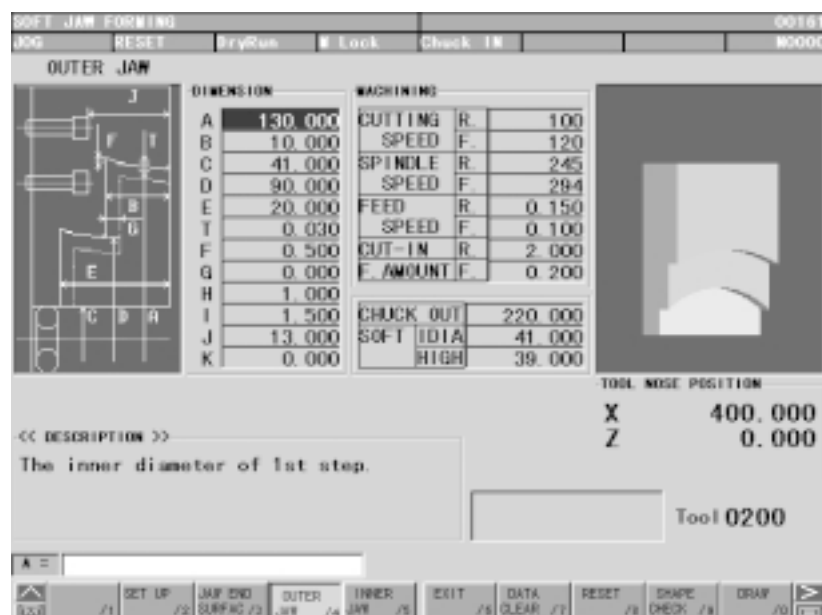
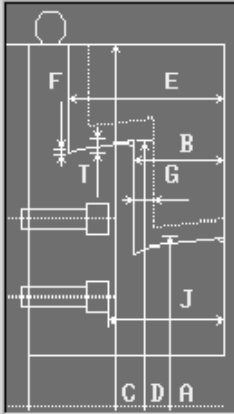


Fig. 8-2(a) Jaw Edge Forming (Outer Jaw)

SOFT JAW FORMING					00161				
JOG	RESET	DryRun	Lock	Chuck IN				N0000	

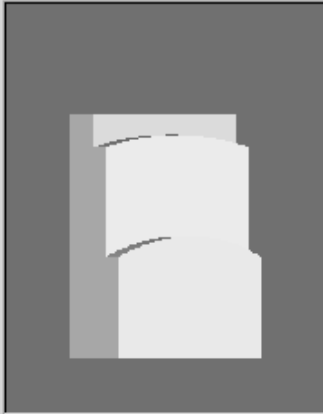
INNER JAW



DIMENSION	
A	130.000
B	10.000
C	220.000
D	205.000
E	20.000
T	0.030
F	0.500
G	0.000
H	1.000
I	1.500
J	13.000
K	0.000

MACHINING	
CUTTING R.	100
SPEED F.	120
SPINDLE R.	245
SPEED F.	294
FEED R.	0.150
SPEED F.	0.100
CUT-IN R.	2.000
F. AMOUNT F.	0.200

CHUCK OUT	
SOFT IDIA	220.000
HIGH	41.000
	39.000



<< DESCRIPTION >>

The outer diameter of 1st step.

TOOL NOSE POSITION

X 400.000

Z 0.000

Tool 0200

A =

		SET UP /1	JAW END SURFAC /3	OUTER JAW /4	INNER JAW /5	EXIT /6	DATA CLEAR /7	RESET /8	SHAPE CHECK /9	DRAW /0	
--	--	-----------	-------------------	--------------	--------------	---------	---------------	----------	----------------	---------	--

Fig. 8-2(b) Jaw Edge Forming (Inter Jaw)

(3) Function Key

- F2/SET UP : The Setup window appears and allows you to specify the spindle speed and turret indexing.
- F3/JAW END SURFAC : "Jaw End Surface Position Setting? Y-Yes/N-No" message is displayed. Set with .
The Z coordinate value of the (soft jaw) tool nose position is cleared to 0. (The Z coordinate value for the relative coordinate system.)
- F4/OUTER JAW : Outer Jaw Forming page is selected.
- F5/INNER JAW : Inner Jaw Forming page is selected.
- F6/EXIT : Work Coordinate System page is returned.
- F7/DATA CLEAR : "Edge Configuration and Working Condition Erased? Y-Yes/N-No" message appears. Select to clear.
- F8/RESET : Soft jaw forming is ended. Push this to return to normal work. The jaw end surface setting position is cleared.
- F9/SHAPE CHECK : A shape of a working program is drawn.
- F0/JAW CONTOUR DRAWING: You can turn, enlarge and contract the picture of the jaw contour.

(4) Jaw Configuration And Machining Conditions

The meaning of each symbol of the jaw shape is as follows:

- A: I.D./O.D of the first step.
- B: Depth of the first step
- C: Diameter of the ring (core metal) used
- D: I.D./O.D of the second step (If value 0 is set, the shape of jaw formed is a single step jaw.)
- E: Depth of the second step (If value 0 is set, the shape of jaw formed is a single step jaw.)
- T: Taper amount of the gripping portion
- F: Necking depth
- G: The maximum amount of cutting margin (If value 0 is set, cutting proceeds to Z direction in rough cutting (See Note 1). If value larger than 0 is set, copy cutting is performed in rough cutting (See Note 1))
- I: Setting of necking width (relieving width)
- J: Bolt position 1
- K: Input the amount of the jaw protruding from the chuck diameter with +/- sign.
(based on the chuck diameter)

Cutting speed, Revolution: The condition relevant to spindle revolution. Input appropriate values either in cutting speed or revolution.

Feed speed: The feed speed for rough and finish cutting.

Cut-in amount: Cut-in amount in the rough cutting.

The cut-in amount in the X axis direction, when rough-cutting is performed in the Z direction.

The cut-in amounts in the X and Z axis directions, when performing copy cutting.

If value 0 is set, will perform finish cutting only.

Finish margin: If value 0 is set, will perform rough cutting only.

Chuck O.D.

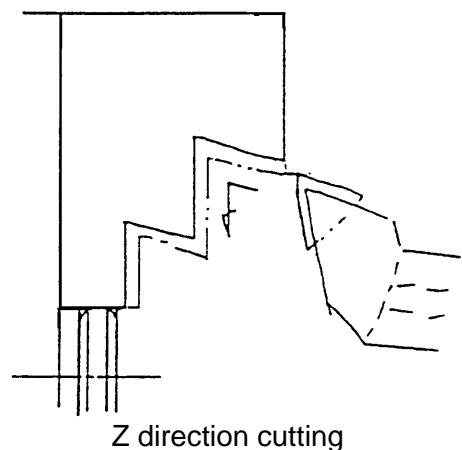
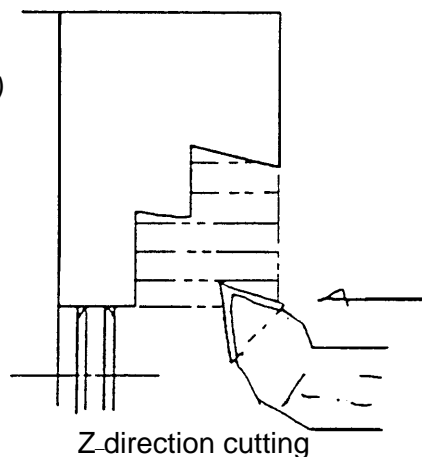
Soft jaw I.D.

Soft jaw O.D.

} The dimension data necessary for jaw locus drawing.

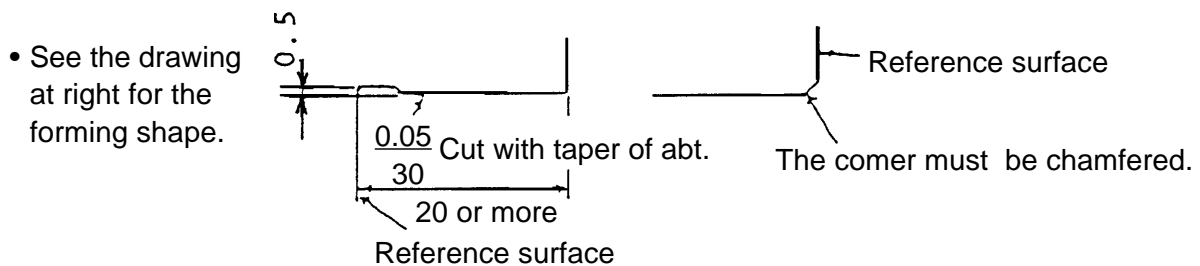
} These data have no direct connection with the machine action.

(Note 1)



Caution

1. Before starting soft jaw forming, make jaw end face position setting. A warning is issued, If shape check or soft jaw forming is executing without making the end face position setting.
2. Clamp the maximum spindle revolution during the soft jaw forming with the parameter setting value.
3. Attention should be paid to the tool tip shape, when executing copy cutting and necking processing.
4. The maximum value of the margin (G) is the value where the margin is considered to be uniform both directions of diameter and lengthwise. When the margin in two directions are different, the larger value should be taken as the maximum value of the margin for the setting.
5. Use decimal point, for inputting the value of dimensions.
6. When attaching a jaw, make sure that the jaw does not protrude beyond the outside diameter of the chuck.
7. For jaws, always use the standard soft jaw.
8. When processing a thin workpiece, chucking pressure may be lowered for avoiding deformation of the workpiece, In such cases, take care not to set the spindle revolution speed too high.



(5) Relevant Parameters

(GUD)		(Reference Values)
2075	Feed rate magnification in unload cutting of soft jaw forming	
2074	Max. spindle rpm of soft jaw forming	(1000rpm)
2071	Approach amount on finishing in soft jaw forming	(10.000mm)
2073	Relieving amount of soft jaw forming	(2.000mm)
2072	Clearance amount of soft jaw forming	

(6) Relevant Alarms

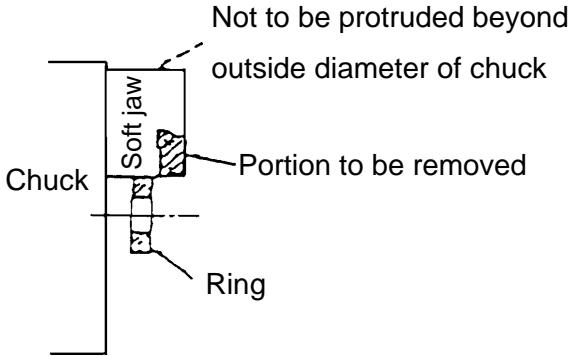
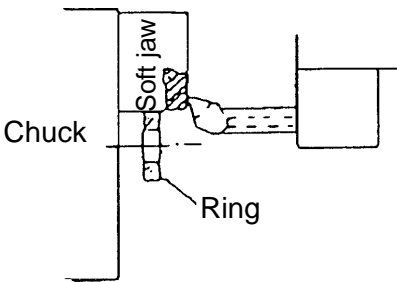
No. 66270 Soft Jaw Forming Error

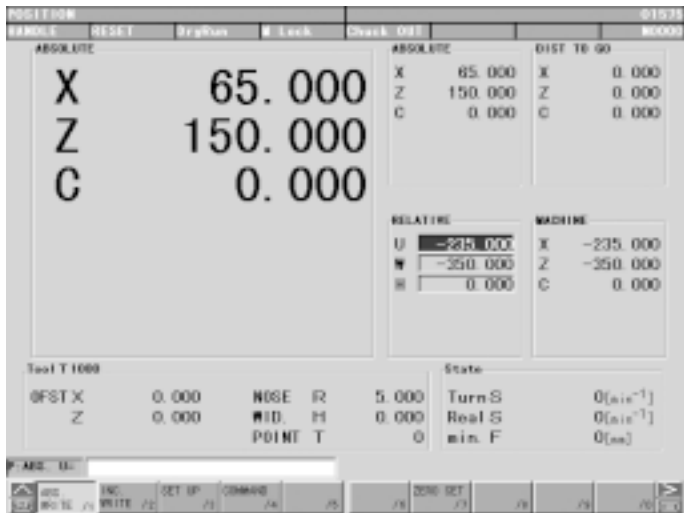
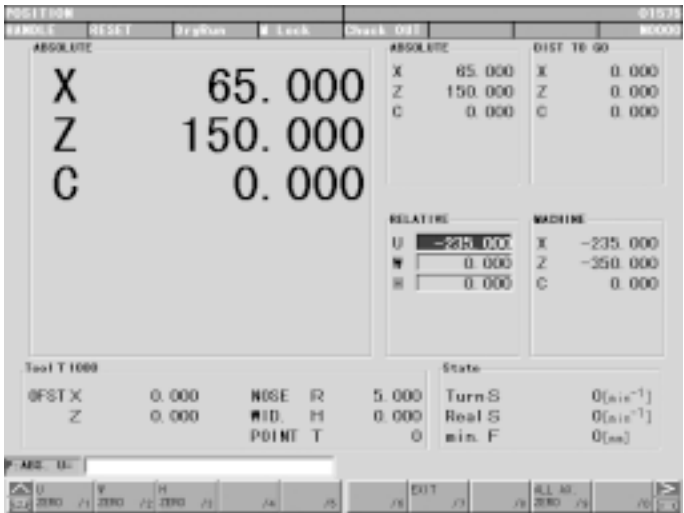
The detail of the alarm can be known by the numeral subsequent to # mark, the meaning of which is as per list below.

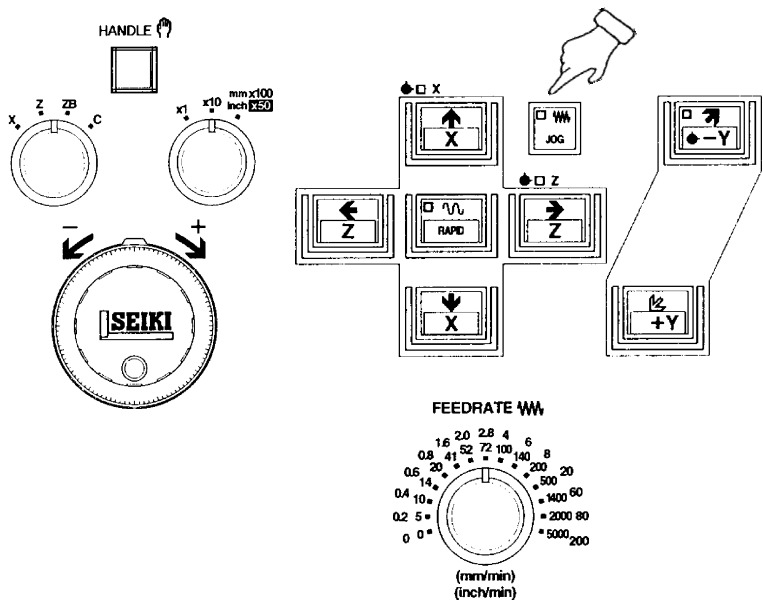
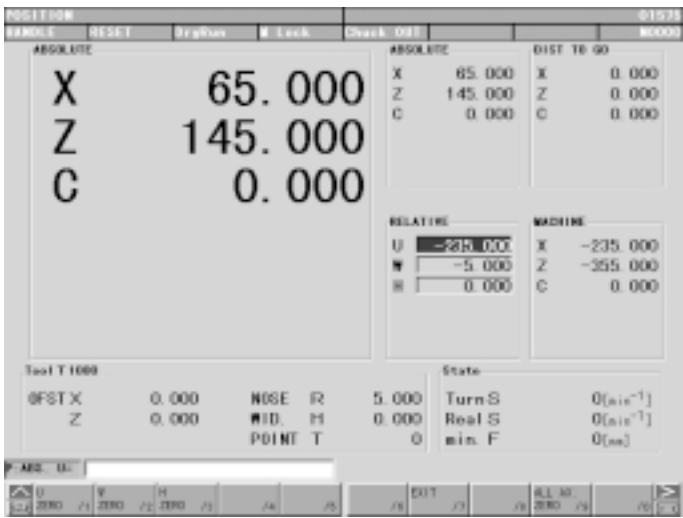
#001	$A \leq 0$ (A: 1st step inside/outside dia.)
#002	$B \leq 0$ (B: 1st step depth)
#003	$C \leq 0$ (C: Mandrel diameter used)
#004	$D \leq 0$ (D: 2nd step inside/outside dia.)
#005	$E \leq 0$ (E: 2nd step depth)
#006	$T < 0$ (T: Taper amount at holding part)
#007	$F < 0$ (F: Necking depth)
#008	$G < 0$ (G: Maximum value of cut margin)
#009	$H < 0$ (H: Chamfering amount)
#010	$I < 0$ (I: Necking width)
#011	$C \geq A$ (Mandrel dia. \geq 1st step I/D)
#012	$C \leq A$ (Mandrel dia. \leq 1st step O/D)
#013	$D \geq A$ (2nd step \geq 1st step I/D)
#014	$D \leq A$ (2nd step \leq 1st step O/D)
#015	$C \geq D$ (Mandrel dia. \geq 2nd step I/D)
#016	$C \leq D$ (Mandrel dia. \leq 2nd step O/D)
#017	$B \geq E$ (1st step \geq 2nd step depth)
#018	Chamfering is too large.
#019	Necking width is too large.
#020	Interferes with bolt .
#101	Cutting speed (roughing) ≤ 0
#102	Cutting speed (finishing) ≤ 0
#103	Feed speed (roughing) ≤ 0
#104	Feed speed (finishing) ≤ 0
#105	Cut-in ≤ 0

#106	Finish margin < 0
#107	Chuck outside dia. < 0
#108	Bolt barrier: Jaw bolt hole pitch < 0
#109	Bolt barrier: Bolt hole center < 0
#110	Bolt barrier: Counter bore dia. < 0
#111	Approach amount < 0
#112	Clearance amount < 0
#113	Relieving amount < 0
#114	Spindle clamp revolution < 0
#901	Jaw form is not decided.
#902	Start from screen other than that for soft jaw forming.

4-4-2 Soft jaw forming by manual operation

Steps	Operation method	Movement / Display
1	As shown figures in the right, insert a ring (core metal) on the front side of a jaw. Adjust chuck pressure to the same value of the actual operation.	
2	Obtain tool compensation amount of the tool used for soft jaw forming.(Refer Q-setter operation method)	This operation allows you to accurately cut an inner diameter dimension, viewing the “Position” screen, without using a measuring instrument.
3	Move the tool rest, and apply the soft jaw forming tool to the soft jaw. Have the spindle rotate in advance.	

Steps	Operation method	Movement / Display
4	<p>Set "W" of relative coordinates at 0.</p> <p>(1) Press the key F1/POSITION</p> <p>Then, screen displays as shown in the right column.</p> <p>(2) Press F7/ZERO-SET</p> <p>(3) Press F2/W ZERO-SET</p> <p>Then, the value of W becomes 0.</p>	 

Steps	Operation method	Movement / Display
	<p>Scrape the jaw by [HANDLE] operation, or in the [JOG] mode.</p> <ul style="list-style-type: none"> For this process: Recommend separate stages of course and finish processings, as it improves accuracy of the cutting. Accuracy improves by cutting the portion chucking the ring beforehand. When soft jaw is re-attached, make adjust cutting for maintaining chucking accuracy. 	 <p>The diagram illustrates the SEIKI control interface. It includes a 'HANDLE' section with X, Z, and C axis buttons, each with '+' and '-' directional indicators. A central 'SEIKI' logo is present. To the right, a 'JOG' section features a hand icon and buttons for X, Z, and a combined X+Y movement. Below these is a 'FEEDRATE' dial with settings for 0.2, 0.4, 0.6, 0.8, 1.6, 2.0, 4.0, 6.3, 10, 16, 20, 25, 32, 40, 50, 63, 80, 100, 125, 160, 200, 250, 315, 400, 500, 630, 800, 1000, 1250, 1600, 2000, 2500, 3150, 4000, 5000, and 6300 mm/min (inch/min). A cross-section diagram shows a tool cutting a workpiece, with labels for '5.0 Current depth of Claw', 'Diameter', 'Direct of cutting', and 'Core metal'.</p>  <p>The screenshot shows the SEIKI control display. The top section displays 'POSITION' with 'ABSOLUTE' and 'RELATIVE' modes. The 'ABSOLUTE' section shows coordinates for X (65.000), Z (145.000), and C (0.000). The 'RELATIVE' section shows coordinates for U (-28.000), V (-5.000), and W (0.000). The 'DIST TO GO' section shows distances for X (-235.000), Z (-355.000), and C (0.000). The bottom section displays 'Tool T1000' and 'State' information, including 'OFST X' (0.000), 'NOSE R' (5.000), 'Turn S' (0[mic^-1]), 'Z' (0.000), 'WID. H' (0.000), 'Real S' (0[mic^-1]), and 'POINT T' (0). The 'min. F' (0[mm]) is also shown.</p>

4-5 Manual Type Tailstock

Operating method of Tailstock and items for attention

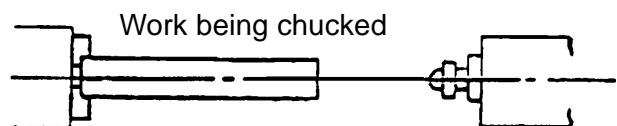
- Retreat the tailstock to the back end on the base, when the center is not used for chuck work and others.
- Do not use fixed center for the tailstock.

Procedures for tailstock operation

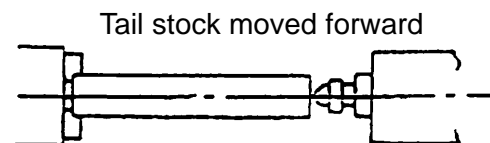
- [1] Set the oil pressure or air pressure of tailstock.

(Refer to Specifications Manual
"Tailstock pressure - Thrust Diagram".)

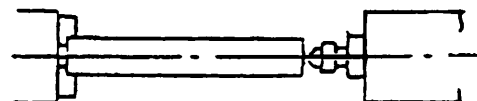
- [2] Chuck the work



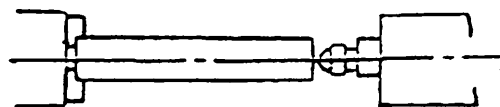
- [3] Stop the tail stock forward side of the retreat end by forwarding inching operation.



- [4] Press the forward key to have the tailstock moved forward.



- [5] After the position is taken as above, first remove the pins for traversing, then tighten 2 fixing bolts.



Chucking being readjusted



Application method of tailstock

Re: One-touch Tailstock

<<Operation>>

1) Manual key

- | | |
|--------------|---|
| Forward key | Pressing this key, the tailstock moves forward until the forward end. When it comes into contact with the work, the hydraulic power works. (To suspend the forward move, press the backward key. While pressing the SELECT key, high-speed forward movement will continue.) |
| Inching key | While this key is kept pressed, the tailstock moves on forward. Even when it presses the workpiece, the hydraulic power does not work. (While pressing the SELECT key, high-speed forward movement will continue.) |
| Backward key | While this key is kept pressed, the tailstock moves backward. (High-speed) |

2) M Function

M25 (Tailstock low speed forward)

Moves forward to the forward end with low speed. When the tailstock presses the workpiece, hydraulic power works and the action completes. When the action does not complete within the time of the timer setting, an alarm is issued.

M26 (Tailstock high speed backward)

Moves backward with high speed until the designated time set by the timer setting table expires, thereby the action completes.

M27 (Tailstock high speed forward)

Moves forward with high-speed until the designated time set by the timer setting table expires, thereby the action completes. In high speed forward command, do not let the tailstock come into contact with the workpiece.


M28 (Tailstock high speed return to the stroke end)

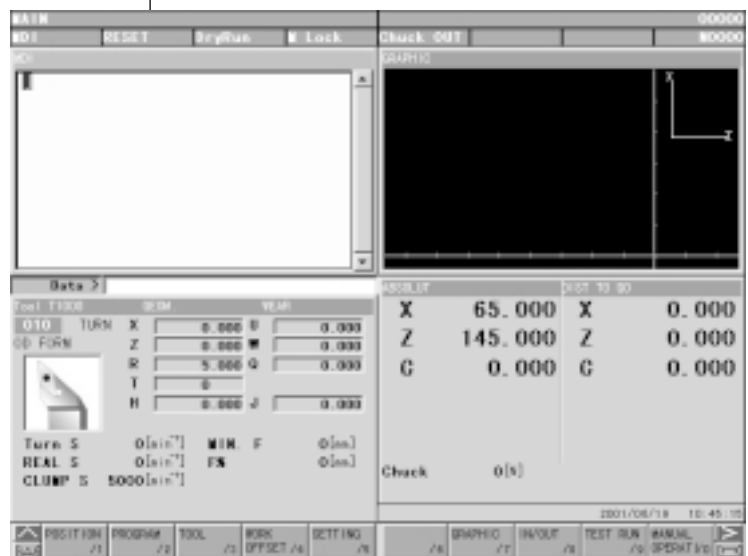
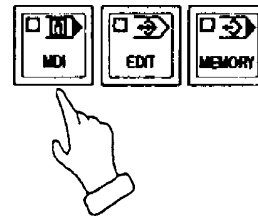
Moves backward to the stroke end, thereby action completes.

5. Operation by Manual Data Input (MDI)

5-1 Program input by MDI

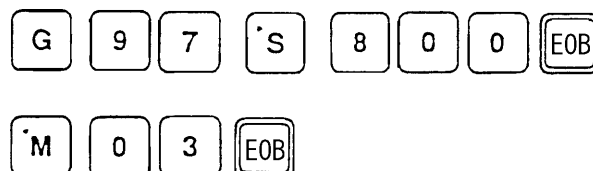
A MDI program can be executed by the following operation.

- [1] Select [MDI] mode on the operation panel of the machine.
- [2] Press the  key.

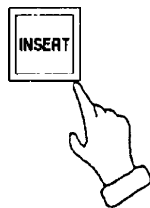


- [3] Key in a MDI program by the address and the data key.

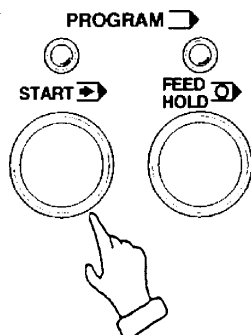
Example: When the spindle rotates 800 min^{-1} .



- [4] When the **INSERT** key is pressed, a commanded value moves upper section of the screen.



- [5] A command executes when pressing the PROGRAM [START] key.



- ※1 If wrong key are inputted by mistake, key in again after pressing the **CANCEL** key required number.
- ※2 When a mistake is found on an inputted command, release a command by pressing the **RESET** key.

Caution

Pay full attention to the safety, since the machine moves.

5-2 Edition of MDI program

An inputted MDI program can be edited the same as a part program stored in the memory.

1. The cursor moves back or forth at a MDI program by a block unit when the up and down **CURSOR** key is pressed.
2. The cursor moves back or forth by a word unit when the left and right **CURSOR** key is pressed.
3. A MDI program moves back or forth by a page unit when the **PAGE** key is pressed.
4. Insert a data after the current position of cursor by the **INSERT** key.
5. Alter a word, the cursor located currently, to the inputted one by the **ALTER** key.
6. A word, the cursor located currently, deletes by the **DELETE** key.
7. A MDI buffer is cleared by the **RESET** key. Key in the command value again.



Caution

1. Editing is not available while executing a MDI program, however, it is possible when a condition of the single block stop.
Execute the cycle start as it is, after editing is finished.
2. In this case, please note that regardless of the cursor position, the program starts running from the beginning.

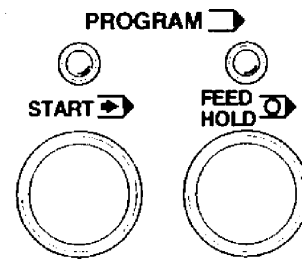
5-3 Operation of MDI program

1. Keep a mode of operation panel of the machine a MDI, execute an inputted MDI program by pressing the [START] button.

Caution

Put the cursor at the head of the program, because it executes from the current position of the cursor.

2. When a MDI program executes sequentially, the cursor moves at the head of the block currently executing.
3. The MDI program is deleted after an operation of MDI program is completed.



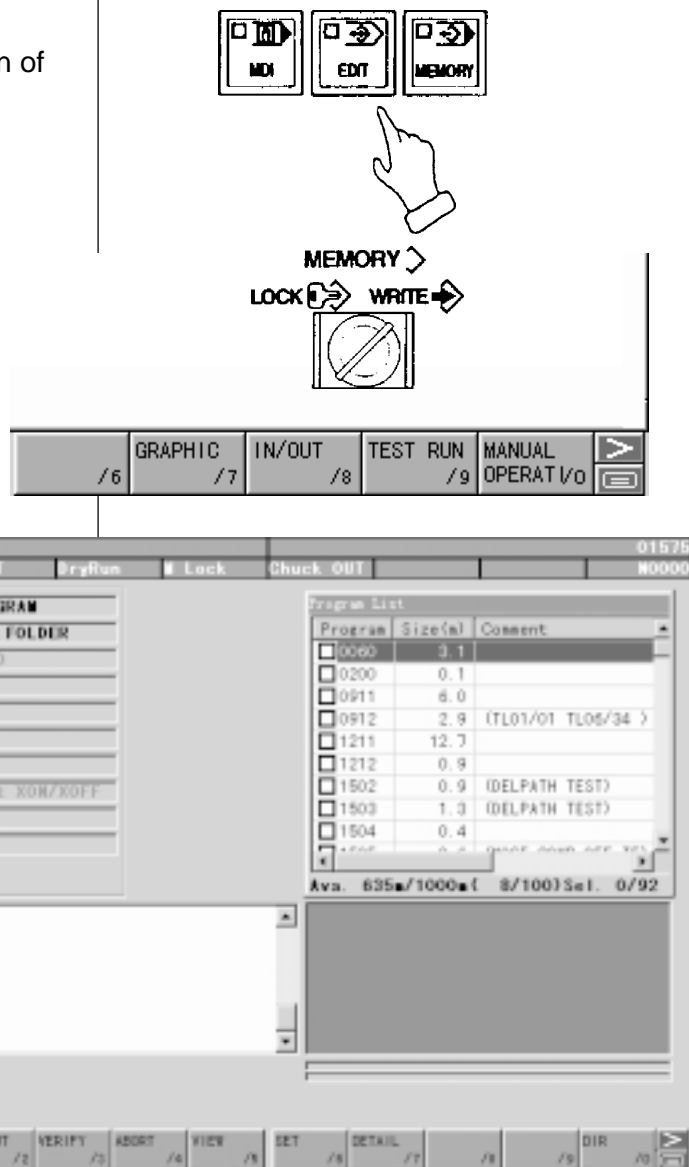
6. Registration of Program

There are following two methods to register a program into the NC unit.

1. Registration from an external input device
2. Manual registration by the address/numeral keys

6-1 Registration from an external device

- [1] Connect an input device RS-232-C terminal and make a possible condition of transmission.
- [2] Set a mode to [EDIT].
- [3] Set the memory key to [WRITE].
- [4] Press the **[F8/IN/OUT]** key.



Aright sketch is displayed.

- [5] Press the **[F1/INPUT]** key.

- Start reading from the first EOB of the NC program and continue until the % code.
- The program No. is registered the 0 No. registered in the input device.
- Display at the program No. list after completion of reading.
- At the time of input, the ISO/EIA information is recognized automatically.

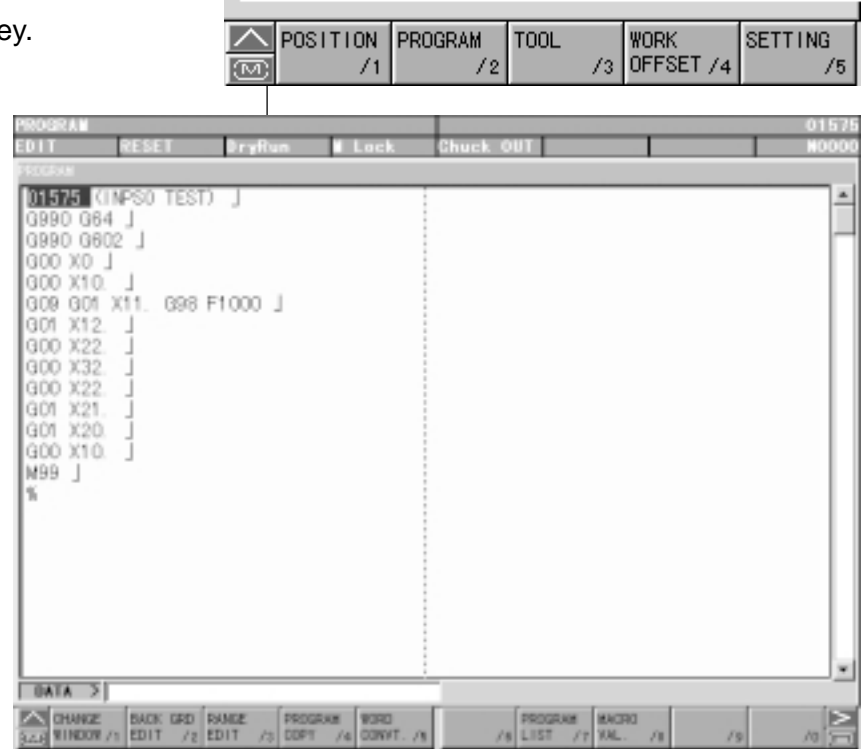
Note) If the program No. already registered is inputted, it becomes an alarm condition. The program numbers in the 8000s or 9000s are to be enabled or disabled in the Setting screen. Confirm their setting prior to inputting/outputting them.(See Setting)

6-2 Manual registration by the address/numeral keys

[1] Set a mode [EDIT].

[2] Set the memory key to [WRITE].

[3] Press the **F2/PRGRM** key.



[4] Key in a desired program No. and press the **INSERT** key.

Example: **0** **1** **2** **3** **4** **INSERT**



[5] Set the cursor to ; by the cursor key.



- [6] Input a program according to the order of the NC program.

Example:

Data>G28 U0 ▮

G 2 8 U 0

EOB INSERT

- The **EOB** key must be inputted at the end of one block.
- Press the **CANCEL** key when the data which has inputted want to be deleted.

A word deletes one by one.

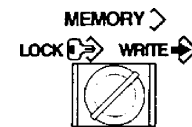
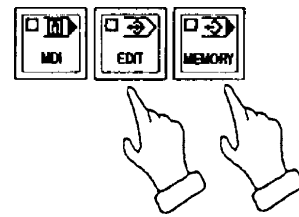


- [7] Press the **>** key and return to the initial screen after input of all program is completed.

7. Program No. Search

There are following two methods to search a program.

1. Search by key in a program No.
2. Search to utilize the program list.

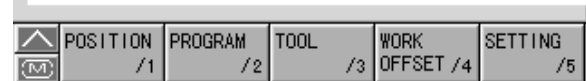



7-1 Search by key in a program No.

- [1] Set a mode to the [MEMORY] or [EDIT].

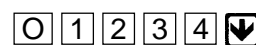
- [2] Set the memory key to [WRITE].

- [3] Press the **F2/PRGRM** key.



- [4] key in the program No. to be searched and press the  key.

Example: 0 1 2 3 4



Calling up program is displayed.

7-2 Search to utilize the program list.

[1] Set a mode to the [MEMORY] or [EDIT].

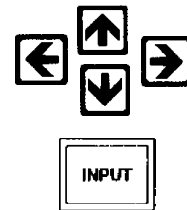
[2] Set the memory key to [WRITE].

[3] Press the **F2/PRGRM** key.

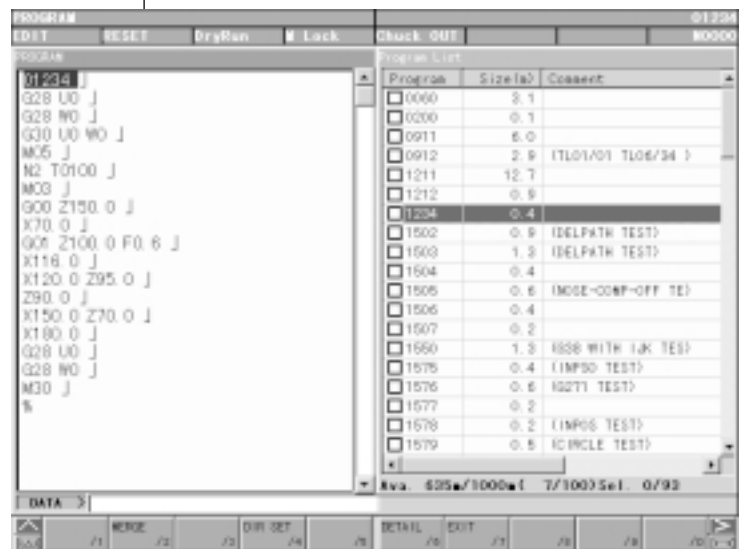
[4] Press the **F7/PROGRAM LIST** key.



[5] Set the cursor to the program No. to be searched by the cursor key and press **INPUT** key.



Calling up program is displayed.



8. Edition of Program

The keys to edit a program are as follows;

INSERT : Insert a content of key input after the cursor.

ALTER : Alter a content of key input at a section of the cursor.

DELETE : Delete a section of the cursor.

Use it deletion of program as well.

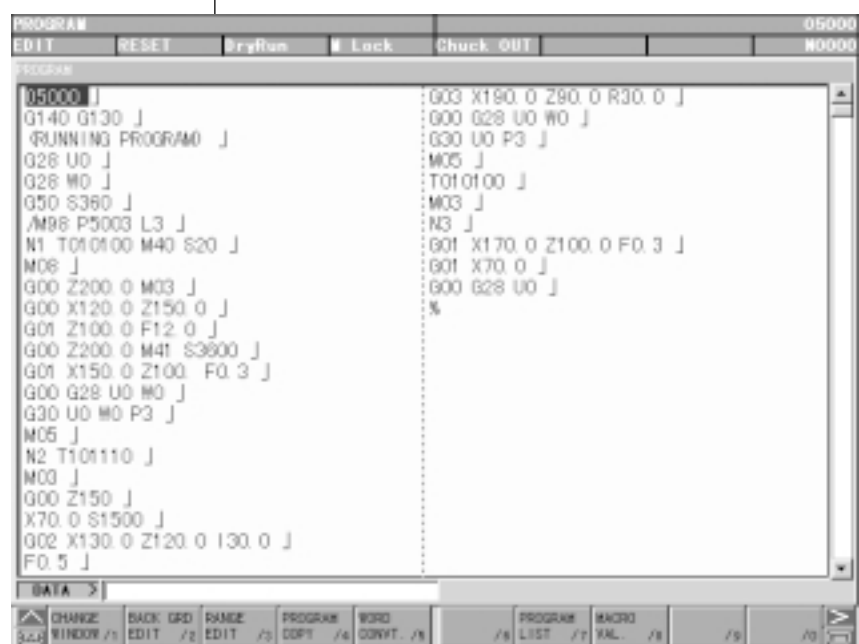
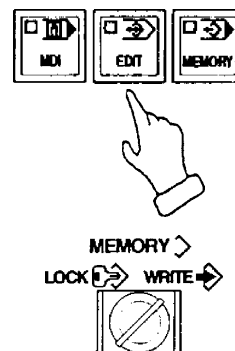
8-1 Preparation in Advance at the Time of the Edition of Program.

To edit a program, the following conditions should be made.

[1] Set a mode [EDIT].

[2] Set the memory key to [WRITE].







[3] Press the **F2/PRGRM** key.



8-2 Search of Word


A word can be searched by the following method.

- 1) A method by means of the page and cursor keys.
 - [1] Press the page key and display the page to be edited.




 - [2] Press the cursor key and move the cursor to the word to be edited.
 - The cursor moves at a block unit by the   keys.
 - The cursor moves at a word unit by the   keys.
- 2) A method by means of word or address search.

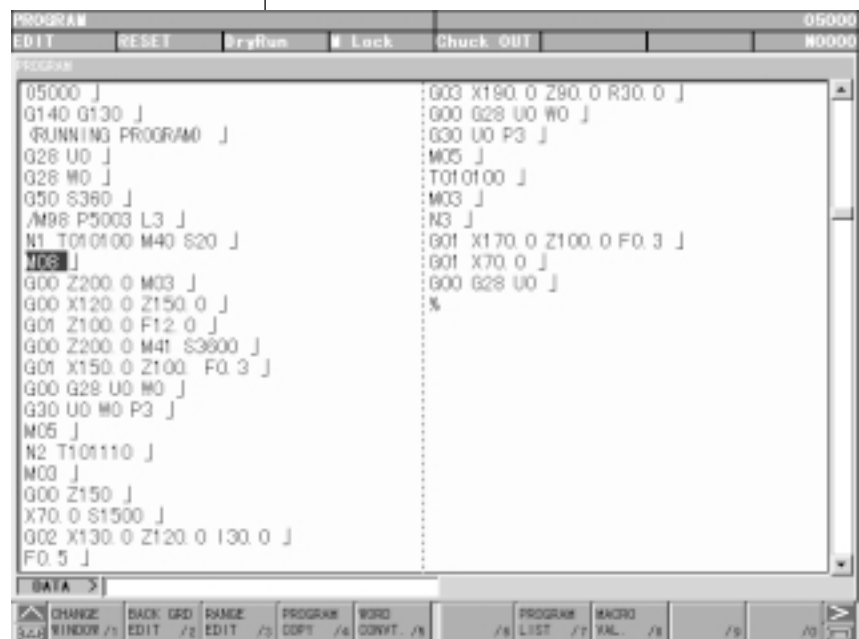
Since a message is displayed as “Not found” if it is not found, try it again.

- [1] Word search, No. search

Key in the address and numerals to be searched and press  key.

Example: M08

M 0 8 



When searching a section above the current position of cursor, press the

 key

[2] Block search

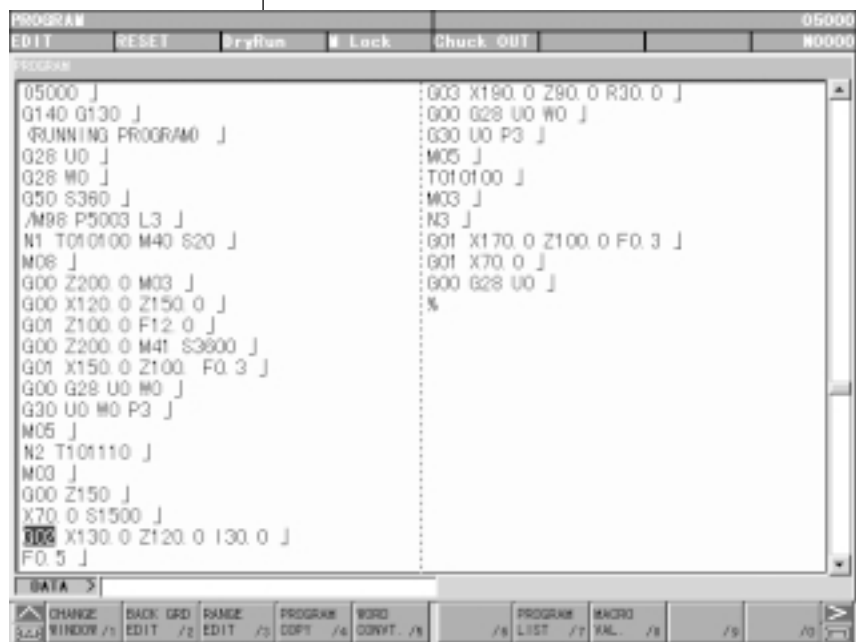
Check a word in a block and search a block which contains a relevant word only.

Key in all address and numerals of one block then press **EOB** and **↓** key.

Example: When searching a block of
G02 X130.0 Z120.0 I30.0 F0.5

G 0 2 X 1
3 0 . 0 Z
1 2 0 . 0
I 3 0 . 0
F 0 . 5
EOB ↓

Note) The **EOB** should be inputted at the end of a block.



8-3 Edition of Program

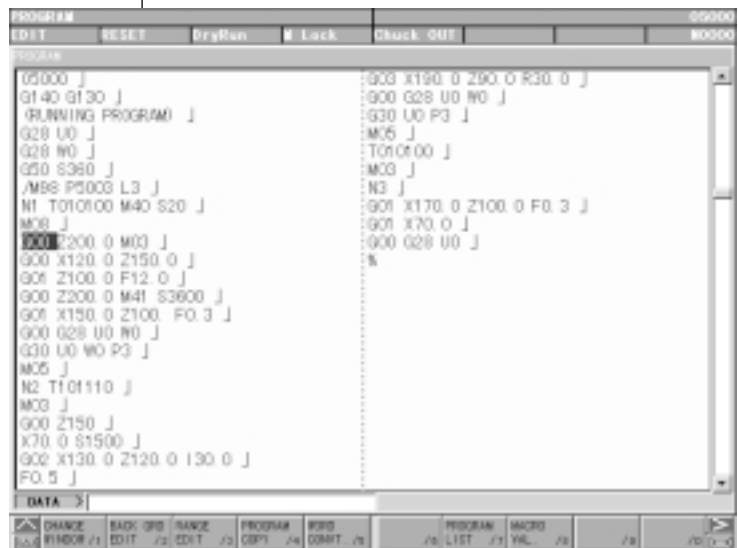
(1) Insertion of word, block

New word is inserted just after the word currently located the cursor.

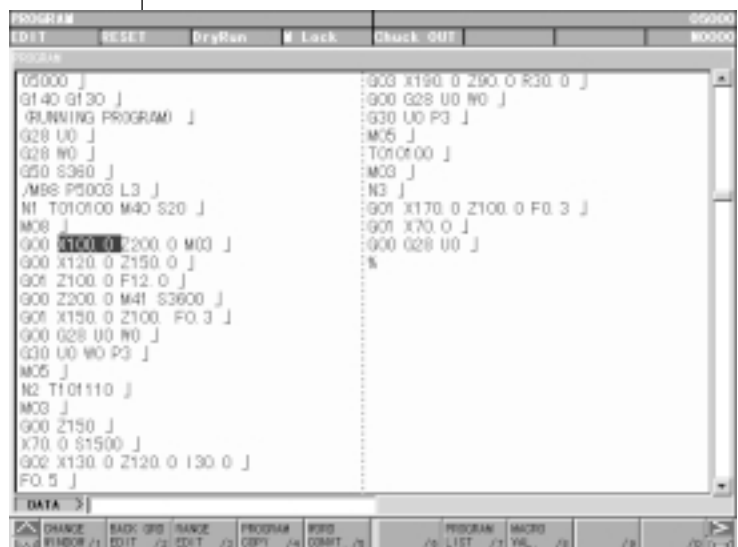
- [1] Designate a word immediately before a section to be inserted.
- [2] Key in a new data to be inserted then press the **INSERT** key.

Example: When inserting X100.0 after G00

X 1 0 0 .
0 INSERT



After insertion



- [3] When inserting one block, key in data of one block and press **EOB** and **INSERT** key.

(2) Alteration of word

Alter a word, the cursor located currently, to the new word.

Alteration is done by a word unit.

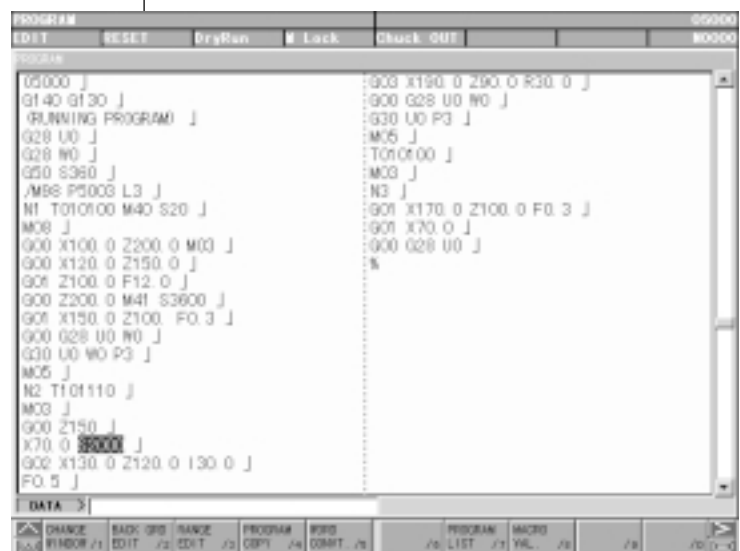
[1] Set the cursor to the word to be altered.

[2] Key in the new word then press the **ALTER** key.

Example: Alter S1500 to S2000.

S 2 0 0 0

ALTER



After alteration

S1500 replaces S2000.

(3) Deletion of word, block

A word currently located the cursor or a certain boundary of a program can be deleted.

(a) Deletion of word

[1] Set the cursor to a word to be deleted.

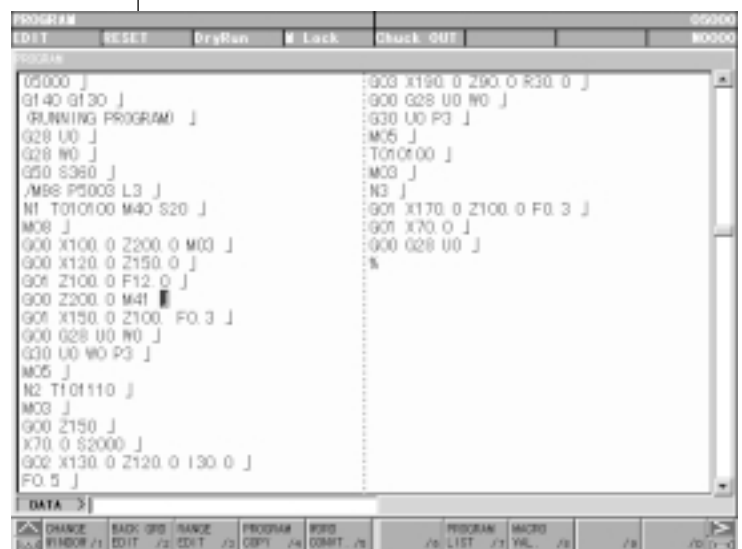
[2] Press the **DELETE** key.

Example: When deleting S3600
Set the cursor to S3600 then
press the **DELETE** key.



After deletion

S3600 is deleted.



(b) Deletion of block

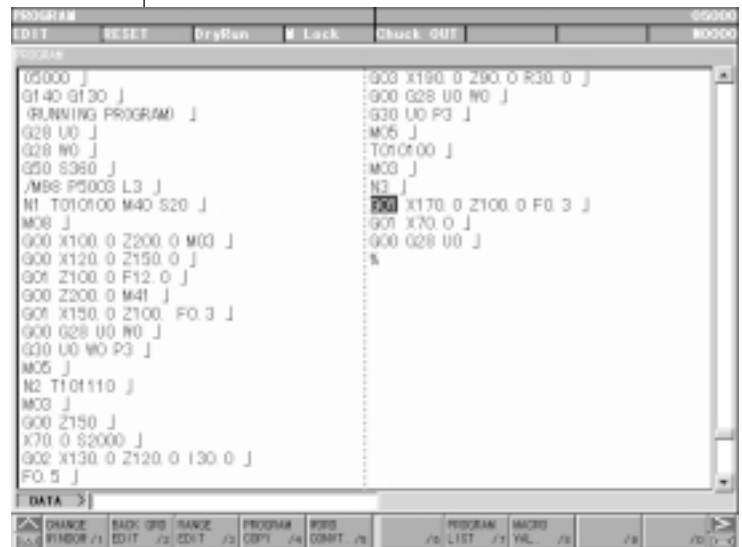
It can be deleted one block at a time.

[1] Set the cursor to the head of the block to be deleted.

[2] Press the **EOB** and **DELETE** .

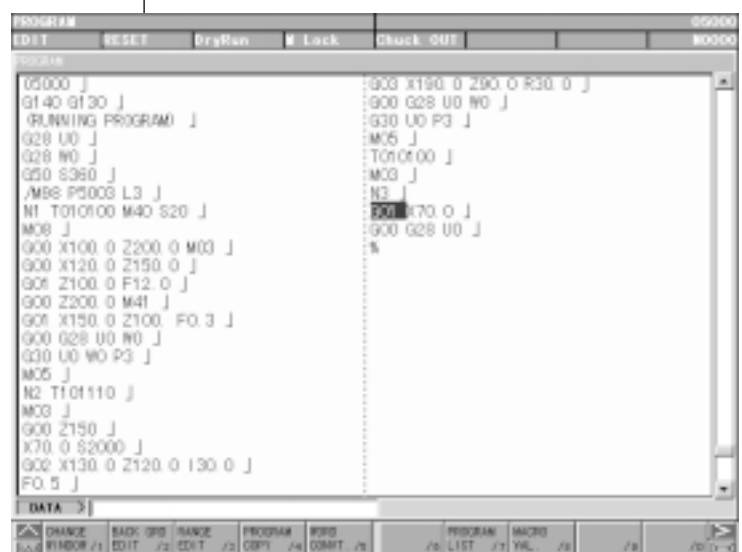
Example: When deleting a block
G01 X170.0 Z100.0 F0.3 J

Set the cursor to G01 and
Press the **EOB** and
DELETE key.



After deletion

The block G01 ... is deleted and
program moves upward.



(c) Boundary deletion

Delete blocks after the cursor to before the designated sequence No.

- [1] Set the cursor to the head word to be deleted.
- [2] Key in the sequence No. just after the last block to be deleted and press the **DELETE** key.

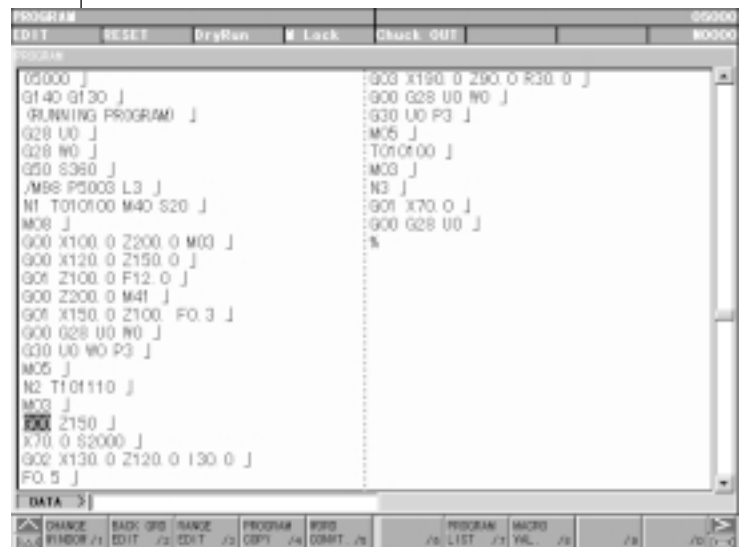
Note) Search the sequence No. before deletion and check how far is it deleted.

Example: When deleting

```
G00 Z150.0 J  
}  
M03 J
```

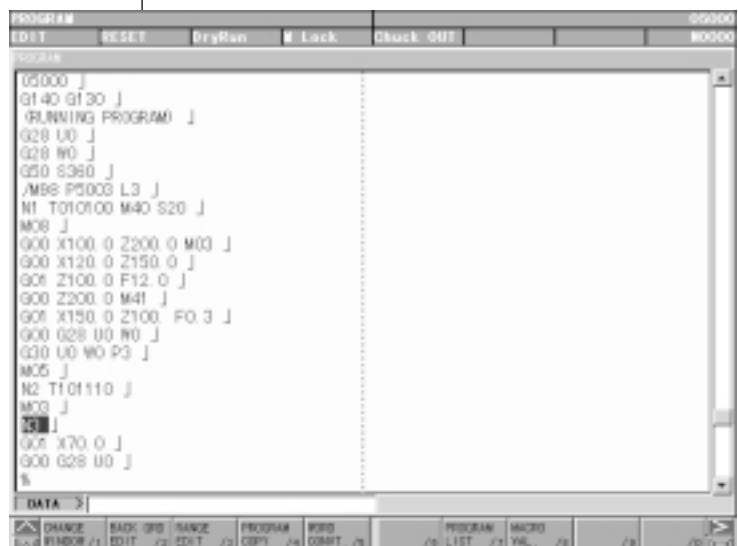
Set the cursor to G00 and press **N** **3** **DELETE** key.

The blocks starting from the one where the cursor is positioned up to the one just before the sequence No. N3 are deleted.



After alteration

The program moves upward.



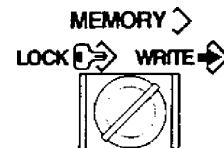
8-4 Back Ground Editing

Generally, "Editing" means front side editing, however this editing could not watch contents of program and also edition is not available while executing a program.

In fact, giving a possibility to edit a program while executing a program is a back ground editing.

- An editing is available to other than currently executing program.
- A program under back ground editing can not execute.
- Editing can be done both manual and automatic mode.

[1] Turn the memory key to [WRITE].



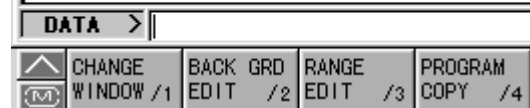
[2] Press the **F2/PRGRM** key.



[3] Press the

F2/BACK GRD EDIT key.

A title of the screen becomes a "Back ground editing"



[4] Search a program wanted to edit.

A procedure of search is exactly same as a (front) editing.

Caution

Never execute a reset operation, since the machine will stops if reset is done during machine operation at the time of back ground editing.

- [5] Execute edition of program.

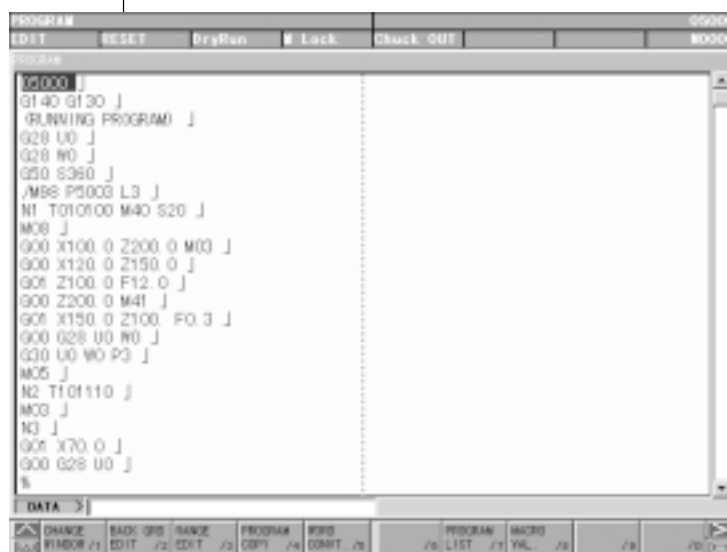
A procedure of edition is exactly same as a (front) editing.

- [6] End of back ground editing

- 1) Press the F2/FORE GRD EDIT key.

A title of screen becomes a "PROGRAM".

It becomes normal editing screen.



8-5 Copy of Program

A program being displayed can be copied on the other number and displayed.

- [1] Display a program wanted to be copied.
[2] Key in a new program No. and press INPUT key.

Example: When altering to O2001

O 2 0 0 1 INPUT

- [3] The program will be copied and the new program will be displayed in the screen.

8-6 Range Assignment Edit Operation (Program Screen Only)

Two or more blocks of a program in display are collectively deleted or copied into another program.

(1) Starting Range Edit

Range editing is started.

[1] Push **F3/RANGE EDIT** .

Function menu changes into the one for range editing.

(2) Assigning Range

assign a program for range editing.

[1] Push **F4/RANGE SET** .

The cursor changes into the framed one.

[2] Assign a range.

As in ordinary cursor shifting, a range for the framed cursor can be extended with the cursor key or the page key. The area inside the frame indicate programs under range assignment.

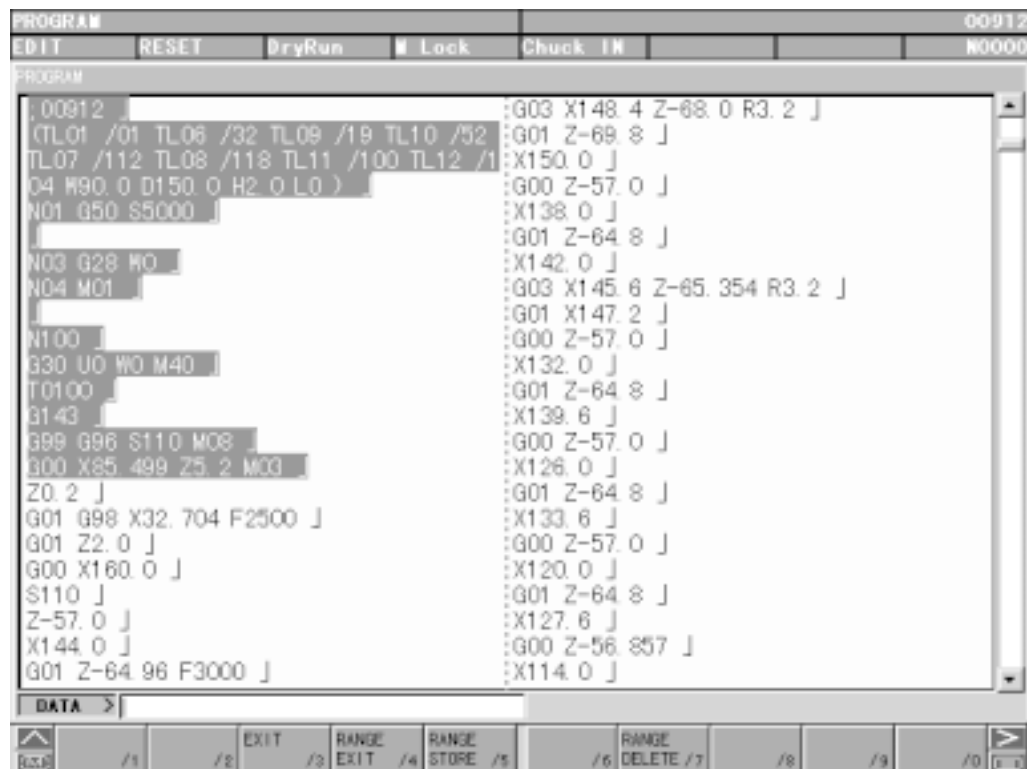


Fig. 13-11 Range Assignment

Note) The block inside the frame indicates the scope assigned. Assignment can extend over two or more pages.

(3) Canceling Range Assignment

Range editing is interrupted. Range in assignment is made invalid.

- [1] Push **F4/RANGE SET** or **F3/EXIT** .

A framed cursor is changed into an ordinary cursor, canceling a range.

(4) Storing Range

A program having been assigned in range is stored.

- [1] Push **F5/RANGE STORE** .

A program indicated by the framed cursor is put in memory, which is stored until power is cut off. However, only the last block subject to range assignment can be stored.

(5) Inserting Range

a range stored program is inserted immediately after the cursor.

- [1] Shift the cursor to the insertion place.

- [2] Push **F6/STORE → INSERT** .

The part having been stored in Range Store is inserted after the cursor. The cursor position stays the same.

(6) Deleting Range

A range assigned program is deleted.

- [1] Push **F7/RANGE DELETE** .

A program enclosed with the framed cursor is deleted. A program having been deleted is stored until power is cut off. Only the block having been lastly subject to range deletion can be stored.

(7) Recovering Deleted Data

A range deleted program is inserted immediately after the cursor.

- [1] Shift the cursor to the insertion place.

- [2] Push **F8/DELETE → INSERT** .

The part having been stored in Range Delete is inserted immediately after the cursor. The cursor position stays the same.

Note) Remind that insertion takes place after the cursor.

8-7 Word Convert (Program Screen Only)

Words not yet being converted are searched in a program, which are rewritten into the converted words. Converting methods include the following two:

- (1) The applicable words are searched one by one which are converted as being confirmed.
- (2) The applicable words are converted collectively while the conversion state is displayed.

As the word searching system is the same as that for Word Search, it is either Number Search or Word Search depending on pre-converted words.

For example, conversion from "X.1" into "X.5" numerically corresponds each other. Those applicable to conversion includes character strings such as "X0.1", "X0.100", "X00.10", "X.1", "X.100", etc., all of which are each converted into "X.5".

- [1] Pushing **F5/WORD CONV**, start Word Conversion.
- [2] Input, with keys, the word before being converted and push **INPUT**.
- [3] Input, with keys, the word after being converted and push **INPUT**.

If **INPUT** is pushed without any key input for the word after conversion, the word before conversion is deleted.

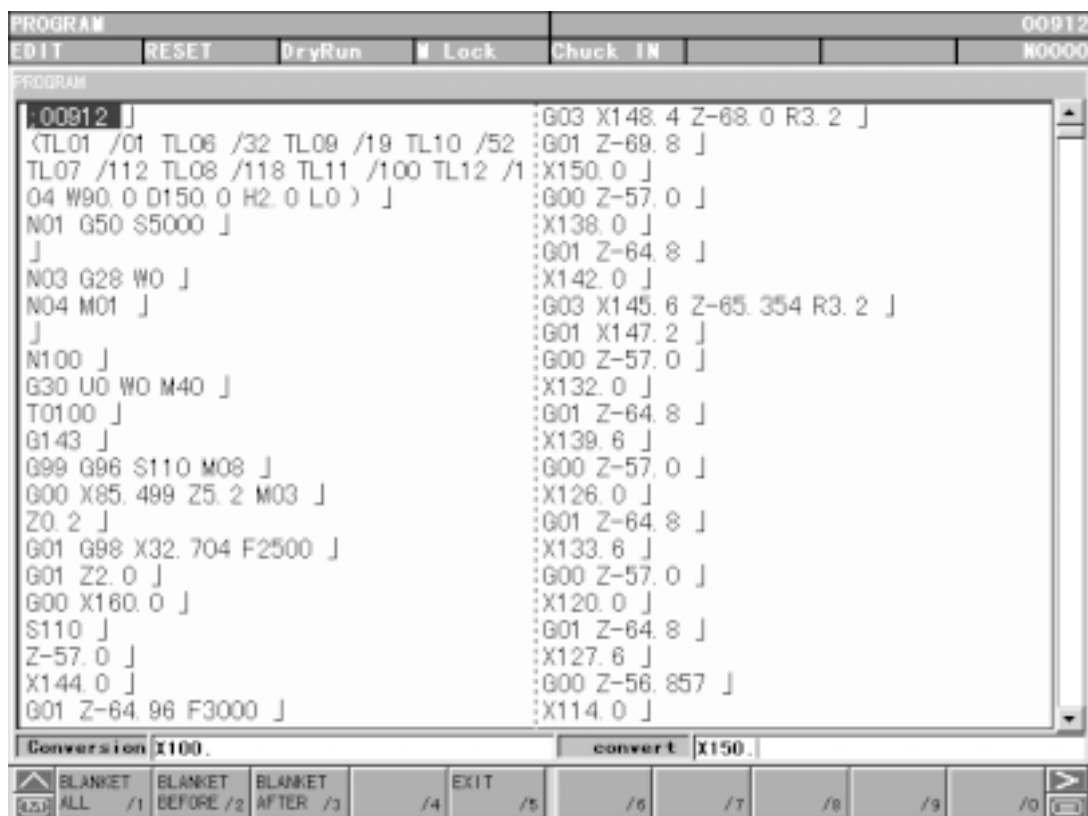


Fig.13-12 Word Convert

[4] Assign a search method for conversion.

(a) For individual search:

- Indicate, with / , the search direction from the cursor position.
- When a pre-converted word has been found, "Convert? Y-Yes N-No" appears.
- To convert, push . Not to convert, push any other except .
- Repeat the above steps until searching is ended.

(b) For collective convert:

- Indicate the search direction on Function menu.

Table. 12-12 Search Direction of Word Conversion

F1/BLANKET ALL	Regardless of cursor position, searching starts with the program head.
F2/BLANKET BEFORE	Searching takes place in the forward part following the cursor including the word with the cursor.
F3/BLANKET AFTER	Searching takes place in the backward part preceding the cursor including the word with the cursor.

- "OK? Y-Yes N-No" appears.
- To collectively convert here, push . If not, push any other except .

[5] On completion of conversion, the number of words having been converted is indicated in the message "X words have been converted."

- Word conversion, once started, lasts till it reaches the beginning or the end of a file. To stop halfway, push .

8-8 Deletion of Program

There are following two methods to delete a program.

1. Delete it by the program list screen.
2. Delete it by key input at the program screen.

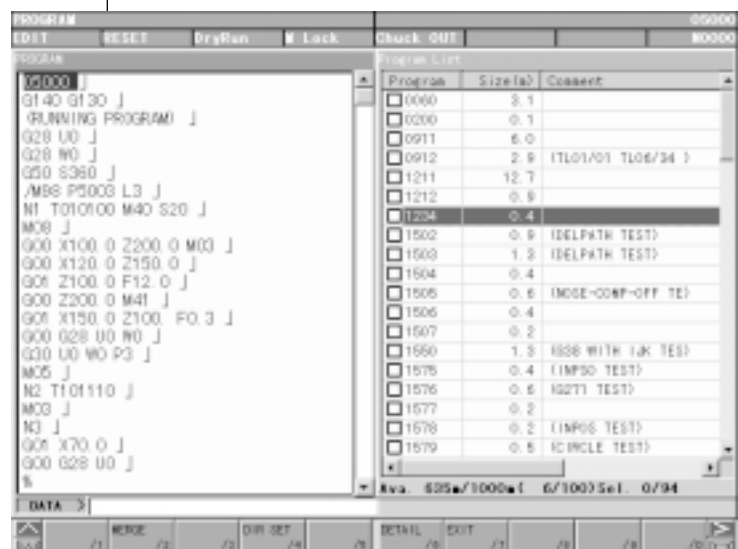
- 1) Deleting method by the program list screen.

- [1] Press the **F7/PROGRAM LIST** key at the program screen.



- [2] Set the cursor at the program to be deleted by the program list.

Press the cursor  key.



- [3] Press the **DELETE** key.
- [4] Against a message "Is it all right to delete ?", press the **Y** key if you agree.

A program which is designated by the cursor is deleted.

2) Deleting method by key input

- [1] Display the program screen.
- [2] Key in the program No. to be deleted and press the **DELETE** key.

Example: In case of deleting O100

O 1 0 0 DELETE

- [3] Against a message "Is it all right to delete?", press the **Y** key if you agree.

A program keyed in is deleted.

3) Continuous deletion by Program No.

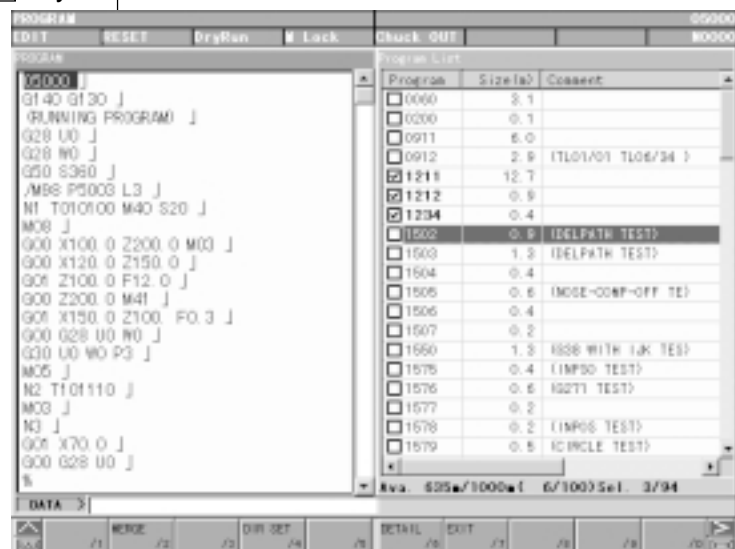
- [1] Press **F7/PROGRAM LIST**.
- [2] Place the cursor at the Program No. to be deleted then press the space bar.

An asterisk marked at the head of the Program No. selected.

Example: Screen display shown below is the case of deleting Program

No.O100, O111, O169, O200.

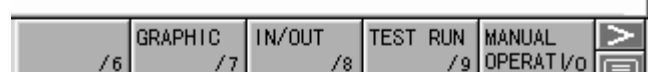
- [3] Press the **DELETE** key.
- For deleting the entire program, press **ORIGIN** and **DELETE** keys.



8-9 Process After Edition

Press the **>** key.

Return to the initial screen.

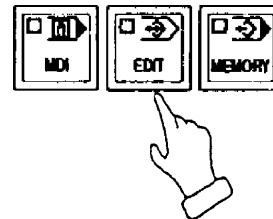


9. Output of Program

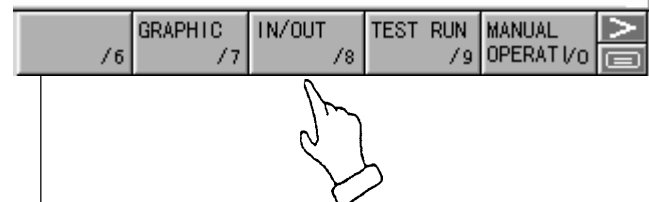
NC program can be outputted to the external in/output equipment.

- [1] Connect an output device to the RS-232-C terminal and make it ready.
- [2] Make a mode selection to [EDIT] mode.

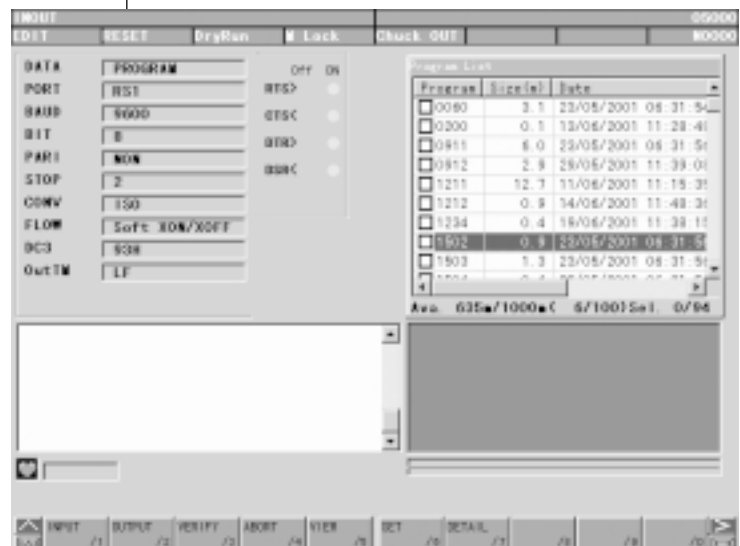
Refer to the instruction manual of output device.



- 3) Press the **F8/IN/OUTPUT** key.



A right sketch is displayed.



- [4] By pressing **F7/ALTER LIST** key, The display of Program No. List is switched over to that of Program No. Detail.

O Select Program No.

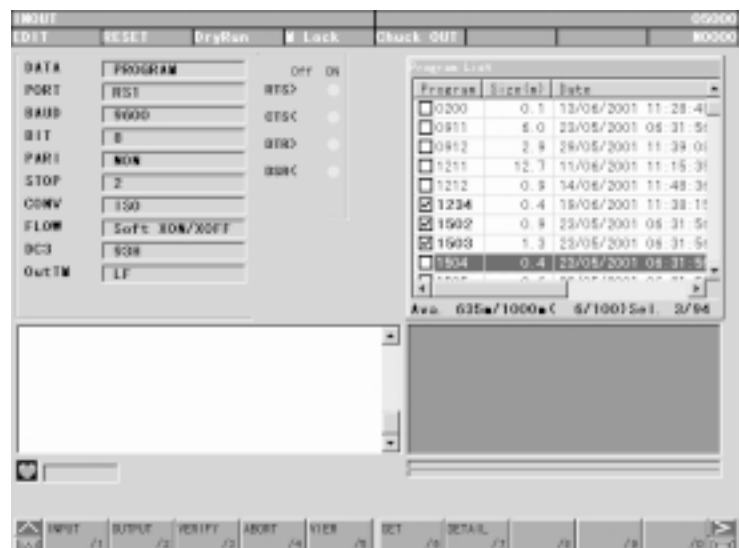
Place the cursor at the Program No. to be selected, and press **SPACE**.

An asterisk is marked at the head of the Program No. selected.

When selecting all programs, repeat pressing **ORIGIN** several times until the mark "*" is displayed.

Example: O5, O6, O7.

- [5] Press **F2/OUTPUT**, then the program selected is outputted.



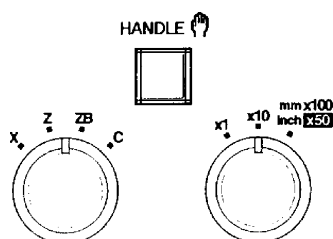
- [6] Press the **>** key after completion of output and return to the original screen.

10. Setting of Tool Compensating Amount

A tool compensating amount is set automatically by touching a tool tip to the sensor of Q-setter. In this chapter explains a setting method of tool compensating amount by manually.

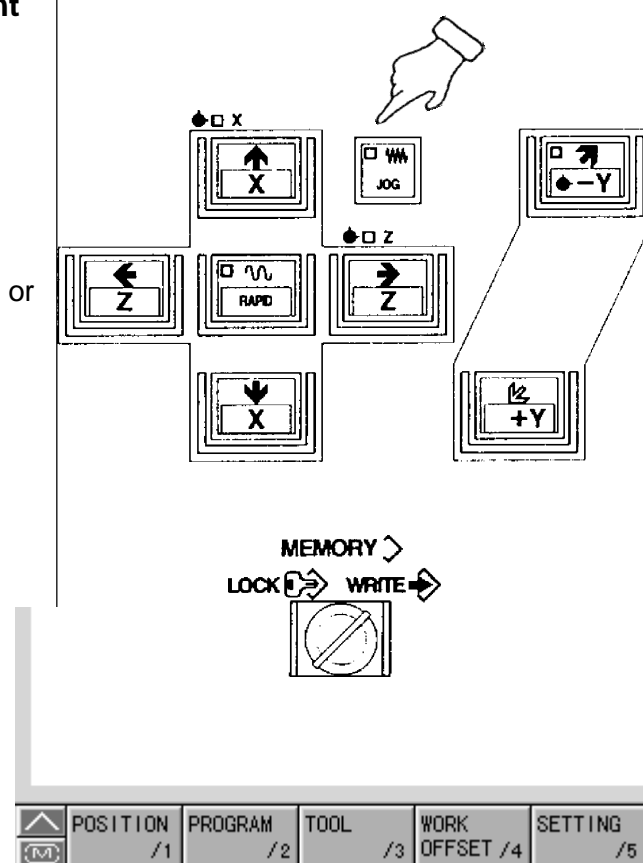
10-1 Setting of Tool Compensating Amount

- [1] Select the manual mode.

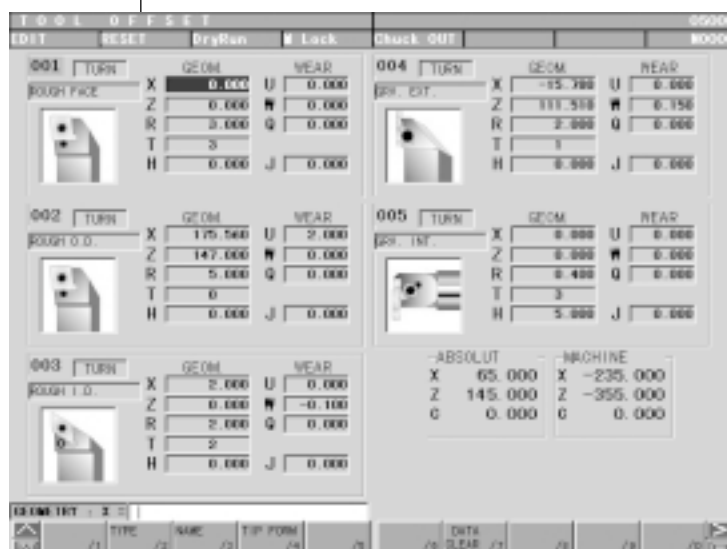


- [2] Set the memory key to [WRITE].

- [3] Press the function key **F3/TOOL** at the initial screen.



A right sketch is displayed.



- a) Tool offset data has geometry and wear offset for each offset No. respectively.

Tool compensating amount by the Q-setter is inputted in the column of geometry offset.

- b) A cursor moves up and down every time of pressing the cursor key.

- c) Each address is as follows;

X : Compensating amount of diametrical direction

Z : Compensating amount of longitudinal direction

R : Size of nose R

T : Nose point

H : Compensating amount of groove width

U : Incremental compensating amount of diametrical direction

W : Incremental compensating amount of longitudinal direction

Q : Incremental amount of nose R

J : Incremental compensating amount of groove width

- [4] Set the cursor to the tool No. to be set a tool compensating amount and address.

- [5] Key in a compensating amount (setting amount) and press the **INPUT** key.

Compensating amount (setting amount) has a decimal point and minimum unit is 1/1000mm.

If a geometry offset is inputted, a wear offset amount being stored so far becomes zero.

- Note** 1. A wear offset amount beyond 1mm can not be inputted at one time.

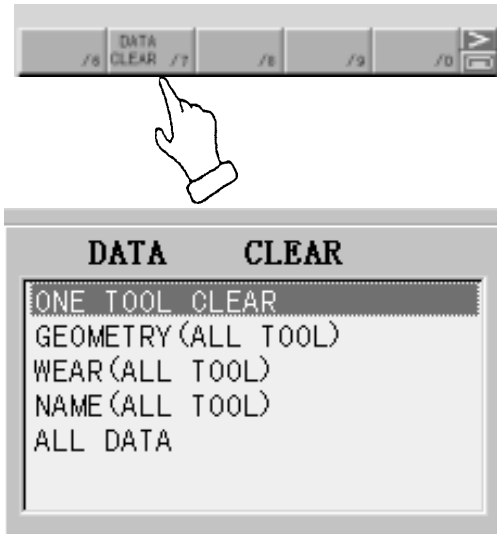
divide a compensating amount within 1mm and input it by several times.

2. Wear compensating amount can be inputted at any mode.
3. Wear compensating amount adds every input.

10-2 Deletion of Tool Compensating (Setting Amount)

- [1] Select the manual mode.
- [2] Set the memory key to [write].
- [3] Set the cursor to the offset No. to be deleted.
- [4] Press the **F7/ DATA CLEAR** key.

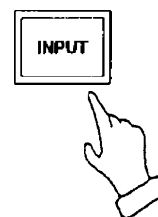
Deleting items are displayed on the screen.



- ONE TOOL CLEAR : Delete whole setting amount of offset No. designated by the cursor.
- GEOMETRY (ALL TOOL) : Delete geometry setting amount of all offset No.
- WEAR (ALL TOOL) : Delete wear setting amount of all offset No.
- NAME (ALL TOOL) : Delete name of all offset No.
- ALL DATA : Delete all setting amount.

- [5] Set the cursor any of deleting item.
- [6] Press the **INPUT** key.
Asking a question whether delete or not.

- [7] Press the **Y** key when deleting.
(Press the **N** key when not deleting.)
A setting amount to be deleted is deleted.



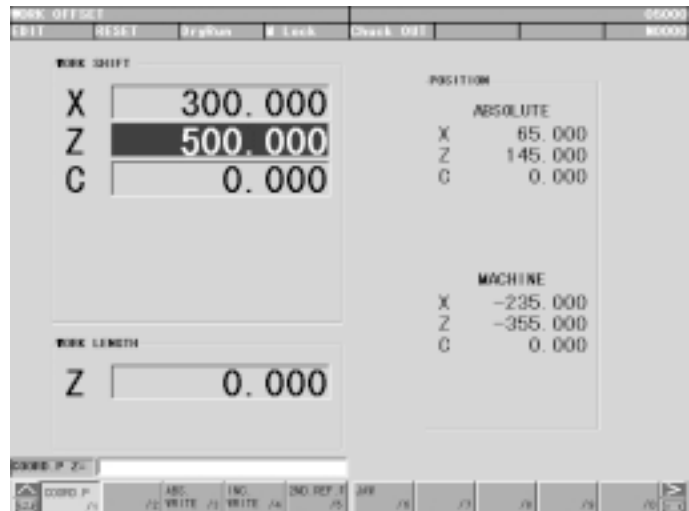
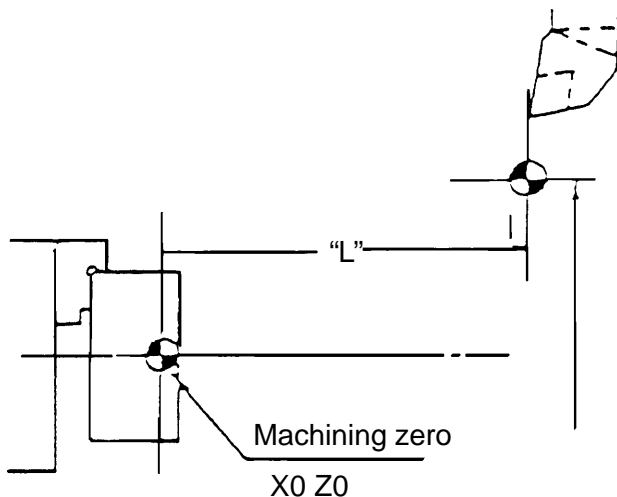
Note) In case of execution of one tool deletion, it is required to set the cursor to the Offset No. to be deleted before pressing the **F7/DATE CLEAR** key.

To change an offset No. after display a deleting item, press the **F7/DATE CLEAR** key once and return a previous screen then set the cursor to the No. to be deleted again.

11. Setting of Work Offset

11-1 Tool Tip Position Setting of Standard Tool at Machine Zero Point.

Must be obtained a tool tip position by setting of the Z axis work shift amount, how much apart a tool tip position of the standard tool at the machine zero point from machining zero point (X0, Z0) before execute a program check or machining by a program, and input it to the NC unit.



Shift amount setting procedure of Z axis work shift coordinate system.

- [1] Chuck a workpiece and turn an end surface of workpiece by manual mode.

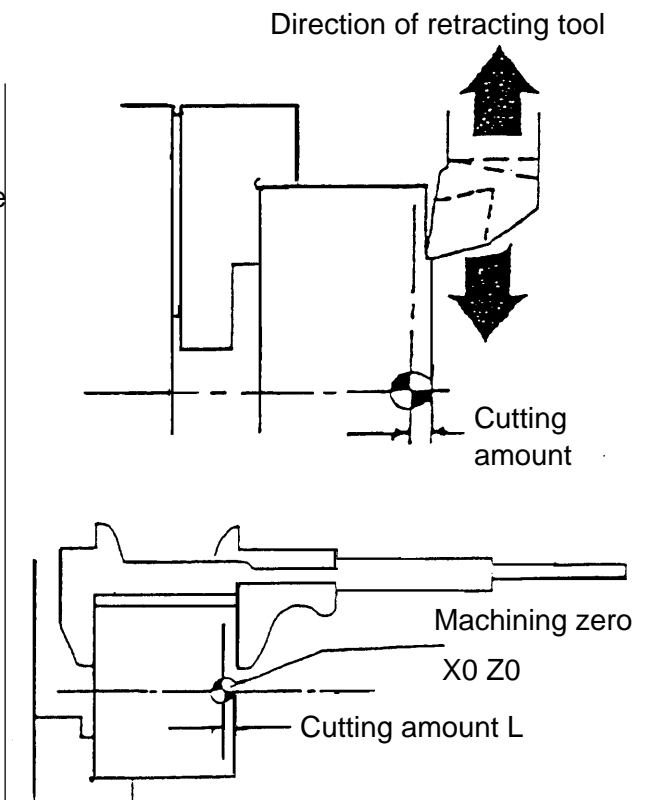
Note) Never move on the Z axis at the time of retracting a tool.

- [2] Stop the spindle.
- [3] Display a WORK OFFSET screen.



- [4] Measure a total length of a work-piece and get a cutting amount L .

Example : L = 1.35



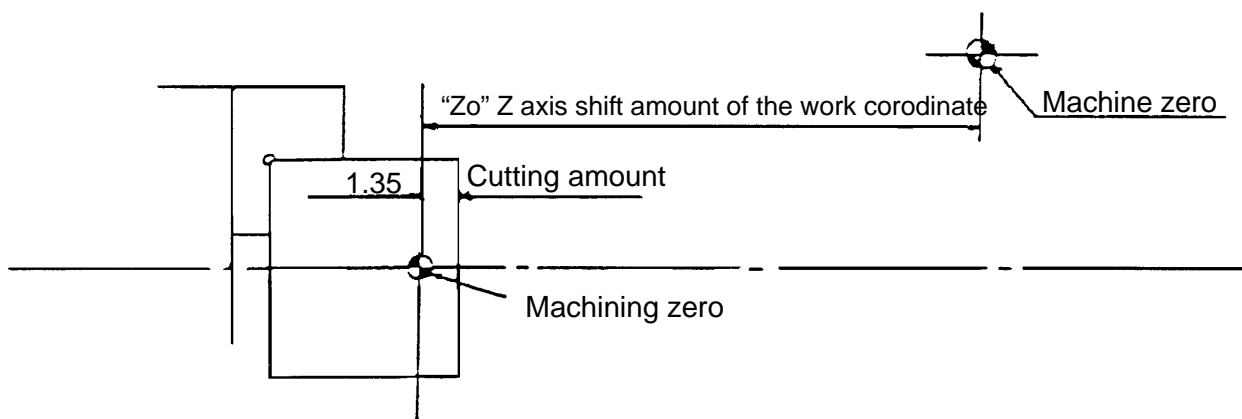
[5] Press the function key **F1/COORD.P** .

"COORD.P Z = " is displayed on the lower left of the screen.



[6] Input the cutting allowance (Allowance).

It is written at the "Z" of the machining reference point shift automatically.



[7] Execute zero return.

Note 1. The following operation must be executed if execute input or alteration of cutting amount (Measured value).

Set up is done by executing the following operation, the distance from machine zero to the tool tip point is displayed properly.

a) Manual zero return.

b) Manual index.

c) Command and execution of T $\Delta\Delta\Delta\Delta$ by a program (MDI is available as well.).

2. Direct input (Z $\Delta\Delta\Delta\Delta$) or addition and reduction (I = Incremental input Z= $\Delta\Delta$) are available.

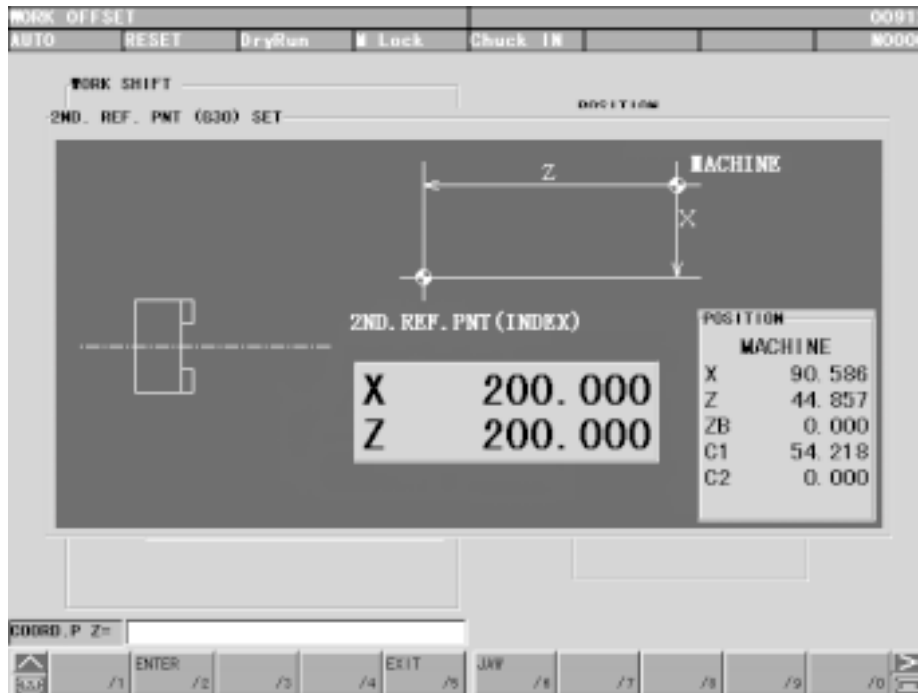
3. A work shift amount of X axis has set by the parameter already.

See the display of the machining reference point of the work coordinate system screen to confirm.

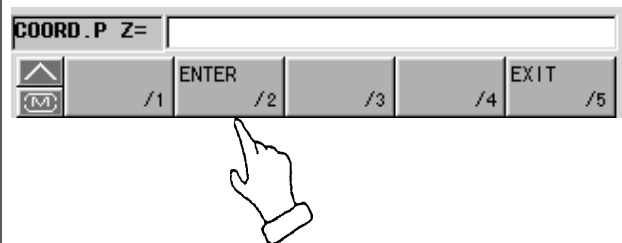
11-2 Setting of 2nd Reference Point

A 2nd Reference Point is easily set as follows.

- [1] Press the **F5/2ND REF. P** key.



- [2] Move the tool rest to the position where the 2nd Reference Point is to be set, by handle operation or jog feeding.
- [3] Press the **F2/ENTER** key.
- Answering the query "OK? Y-YES N-NO", if affirmative, press **Y** key.
- Setting of 2nd Origin Point now completes.
- [4] Press the **F5/EXIT** key to return the initial screen display.



12. Automatic Operation

12-1 In Case of Machining of the First Workpiece with Confirmation of Newly Produced Program

1) Program Check Operation

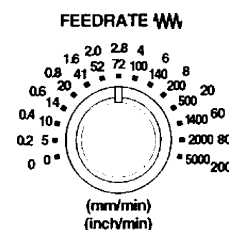
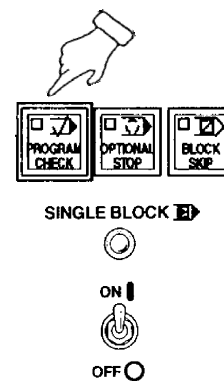
Move the machine by a program without the spindle rotation and check a tool movement, interference of tool and contents of a program.

Preparation before program operation

- [1] Call a program.
- [2] [LOCK] the memory key.
- [3] Check the input of tool position offset, tool tip point and tool nose R properly.
- [4] A workpiece should be off.
- [5] Set the switch of the operation panel as shown the right sketch.
 - [PROGRAM CHECK] mode
 - Single block [ON]

Operation

- [1] Set a mode key to [MEMORY].
- [2] Press the **F2/PRGRM** key.
- [3] Press the **RESET** key.
- [4] Program start (After checking of motion of one block, preys the [START] again and proceed a program consecutively).
- [5] Adjust a [FEEDRATE] by a feed speed dial.
- [6] Check a motion until end of a program.
- [7] Press a [PROGRAM CHECK] and release if all motion is correct.



2) Test Cutting

Cut a workpiece by single block mode if no trouble is found by program check.

[1] Press key set as right sketch.

- Single Block [ON].
- Optional stop [ON].
- Rapid traverse override at 10%

[2] Chuck a workpiece and check run out of a workpiece by pressing the spindle [JOG] key.

[3] Close the door.

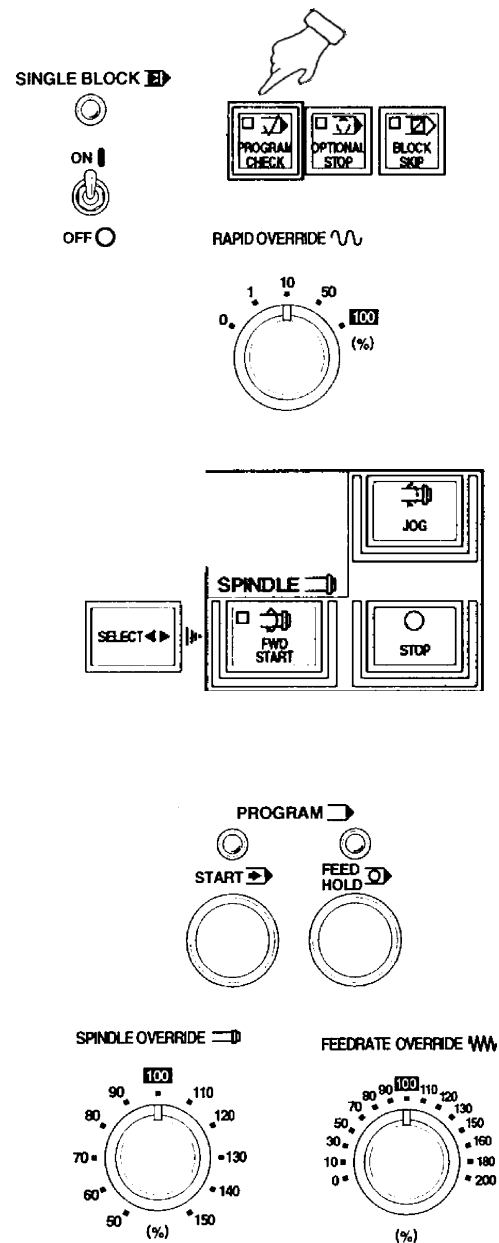
[4] Press a program [START].

(Press the [START] button again after checking of motion of one block then proceed a program consecutively.)

[5] Adjust a spindle override and federate override by watching a cutting condition. (After that modify a program.)

[6] In case of motion of axis want to be stopped, press a [FEED HOLD] button.

[7] At the time of completion of machining of one tool, stop the machine by "M01" then check a dimension.



12-2 Start from Middle of a Program

Operation method in case of program edit and restart when a program is stopped by an alarm etc..

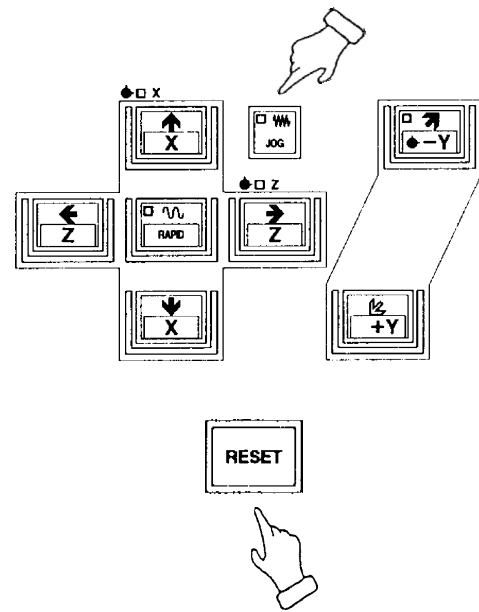
- [1] Retract the tool from the workpiece by [HANDLE] or [JOG].
- [2] Stop spindle rotation and coolant and press **RESET** button. Reset a program.
- [3] Check a cause of an alarm and treat it.
- [4] Set a mode to the [MEMORY].
- [5] Heading the program on the “Program” screen.
(Press the **RESET** button.)
- [6] Search a sequence number of a tool to be restarted.

Restart from the beginning of process.

Restart should always be done from the beginning of tool arrangement. Never restart midway of machining process, as it is dangerous.

WARNING

1. Don't touch the tool by hand during spindle rotation.
2. Press program [FEED HOLD] or [EMERGENCY STOP] button if the machine moves unexpected direction or unexpected condition is occurred.



12-3 Continuous Machining Operation

1) Set each switch on the operation panel.

[1] Turn [OFF] the single block switch.

[2] Set the rapid traverse override at 100%.

[3] Set the override switch of federate and spindle at 100%

[4] Turn [OFF] program check. (Lamp is turned off)

[5] Set the switch of optional stop or block skip if necessary.

2) Press program [START] button.

WARNING

In case of temporary stop is required during operation, press program [FEED HOLD] button or turn [ON] single block switch.

Also, if unexpected condition occurs, press [EMERGENCY STOP] button and stop the machine immediately.

Caution

1. When rotating the spindle, the command should initially be adjusted at a low speed (min^{-1} abt. 100) and, by operating the [JOG] key, confirm the sway condition of the workpiece.
2. In all circumstances, for safe cutting, the upper limit of spindle min^{-1} is set in the program. Especially when special jaws such as high jaw or some special fixing device are attached to spindle, a safe revolving speed should be programmed for the spindle rotation.

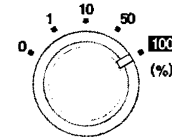
SINGLE BLOCK 



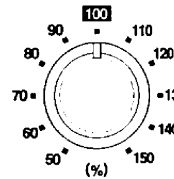
ON 

OFF 

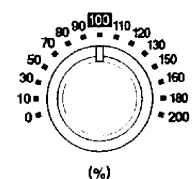
RAPID OVERRIDE 



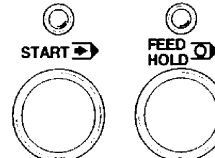
SPINDLE OVERRIDE 



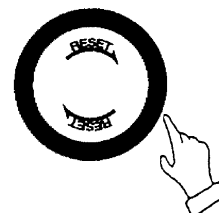
FEEDRATE OVERRIDE 



PROGRAM 

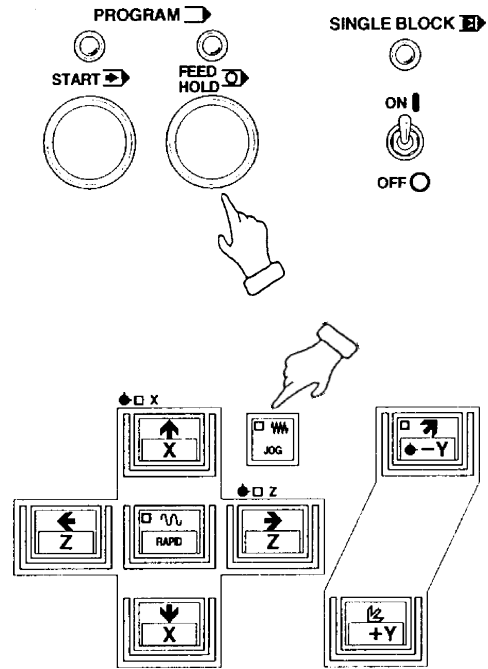
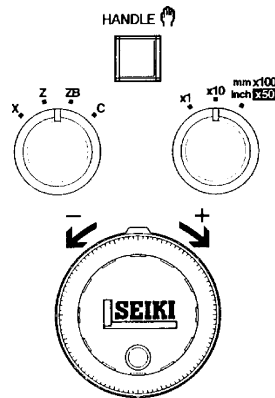


EMERGENCY STOP

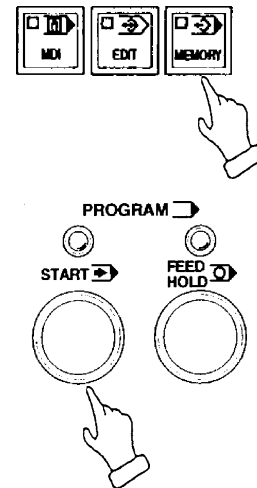


12-4 In Case of Insertion of Manual Operation During Automatic Operation

- [1] Press program [FEED HOLD] and stop the machine temporarily (Red lamp, upper right of [FEED HOLD], is it) or stop by turn [ON] single block switch.
- [2] Shift a mode switch to [HANDLE] or [JOG] and execute manual operation.



- [3] Return mode to [MEMORY] after completion of manual operation.
- [4] If pressing the program [START] button, the program restart.

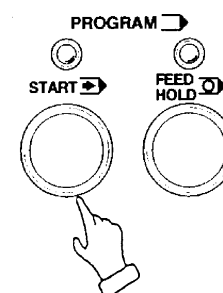
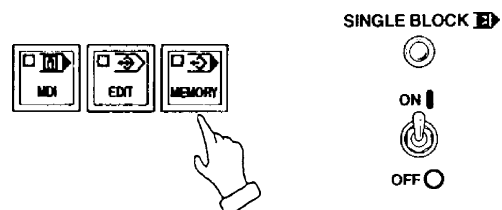
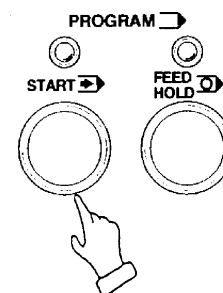
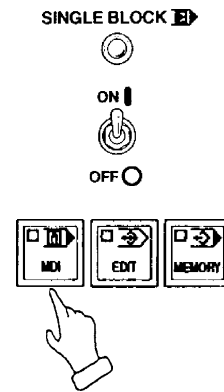


Caution

1. At first, execute an automatic operation by the single block. Enter the continuous operation after confirmation of motion of the tool head etc. are correct.
2. [FEED HOLD] button, action of M, S and T function is continued until end of the motion. If motion is not completed, manual operation is not available.

12-5 In Case of MDI Operation in Middle of Automatic Operation

- [1] Turn [ON] the single block switch on operation panel.
- [2] Shift a mode to [MDI] after machine motion is stopped.
- [3] Display the program operation screen by pressing the **F2/PRGRM** key.
- [4] Input a required action by address keys and numeral keys and press the **INSERT** key.
- [5] Press the program [START] button after confirmation of input data of MDI.
- [6] To restart automatic operation, shift a mode to [MEMORY] and turn [ON] single block switch.
- [7] Press the program [START] button.



Caution

At first, execute an automatic operation by the single block.

Enter the continuous operation after confirmation of motion of the tool head etc. are correct.

WARNING

If continue an automatic operation after inputting only by MDI and not executed it, unexpected motion may occur due to contents of buffer by automatic operation is replaced with unexecuted buffer contents of MDI. Pay attention to danger.

13. Setting (Data)

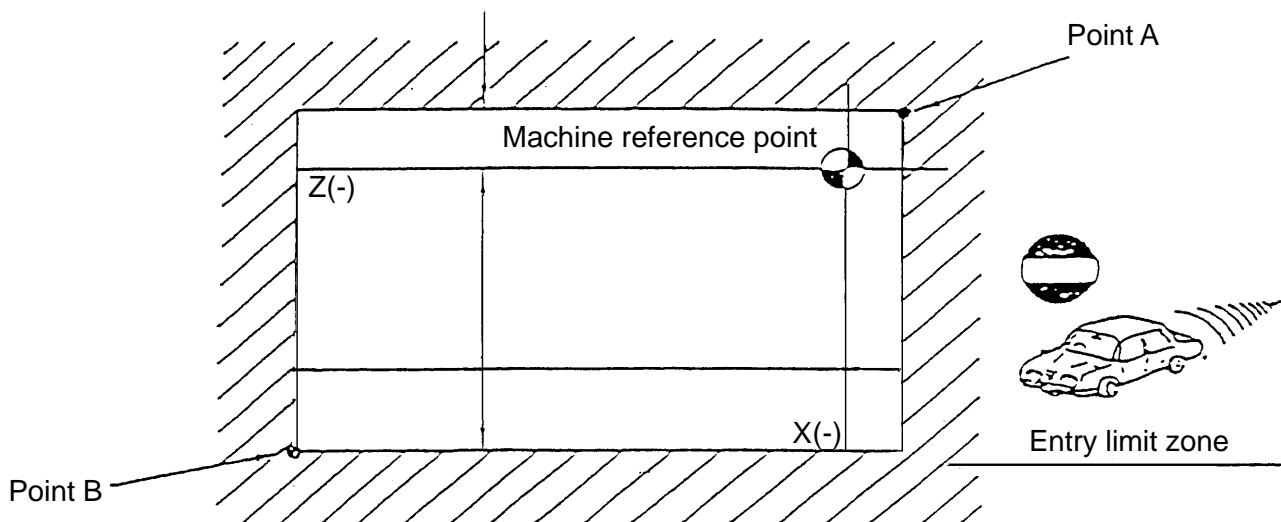
13-1 Stored Stroke Limit

This machine has a stored stroke limit which can be set an entry prohibition of a tool in the movable zero of the machine (in the stroke of the machine) for more safety either automatic or manual operation. This function differ from a mechanical stroke end and there are following three types.

1) The 1st stroke limit

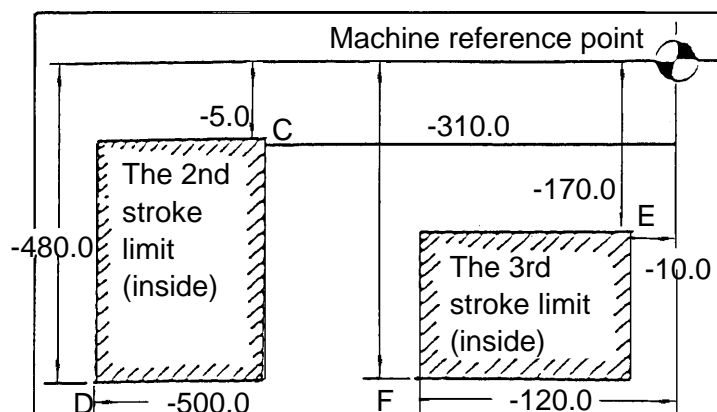
This is set at the maximum stroke of the machine by the parameter and is not changeable.

Outside of rectangular always prohibit an entry by the parameter setting of the point A and B by the distance from the machine reference point as following sketch. Generally, this parameter is not allow an alteration.



2) The 2nd and 3rd stroke limit

Set the 2nd and 3rd stroke limit at any places without restraint by commanding a distance and direction from the machine reference point. The 2nd stroke limit is selected inside or outside. The 3rd stroke limit is always "inside".



(1) Selection of forbidden area

Of the 2nd area, to define whether the “inside” or the “outside” be the forbidden area, you can select by the parameter No.8004. Normally, the “inside” is set as the forbidden area (0 selection).

Of the 3rd area, the forbidden area is always “inside”.

No.8004–0 bit (rightmost bit)	In case of 0	Inside of stroke limit 2 is forbidden area
	In case of 1	Outside of stroke limit 2 is forbidden area

(2) Setting of limit by setting data and check

Prohibited zone	No.	Setting position	Setting example
The 2nd limit	MD62200 [15]	X of point C	-5.000
	MD62200 [17]	Z of point C	-310.000
	.		0.000
	.		
	MD62200 [18]	X of point D	-480.000
	MD62200 [20]	Z of point D	-500.000
	.		0.000
The 3rd limit	.		
	MD62200 [21]	X of point E	-170.000
	MD62200 [23]	Z of point E	-10.000
	.		0.000
	.		
	MD62200 [24]	X of point F	-490.000
	MD62200 [26]	Z of point F	-120.000
	.		0.000
	.		

Note) The value of X-axis is diametrical value command.

- Note)** 1. When source power is switched ON and manual zero return is executed, invasion of the area is forbidden instantly.
2. When invasion takes place by manual operation, evasion from forbidden area can be arranged by moving it to the reverse direction.
After evasion, make sure to press the **RESET** button.
3. During automatic operation, when the end point of the movement is within the forbidden area, an alarm is issued before the movement and the automatic operation stops. The alarm can be released by pressing the **RESET** button.
When the midway path to the end point invades into the forbidden area, an alarm is issued the moment the invasion takes place and the automatic operation stops.

14. Operation status, Date and Time

14-1 Operation status

Select the overall screen and press the **MENU SELECT** key, then press the **F7/OPERATION STATUS** key. The setting screen comes on in a window screen.

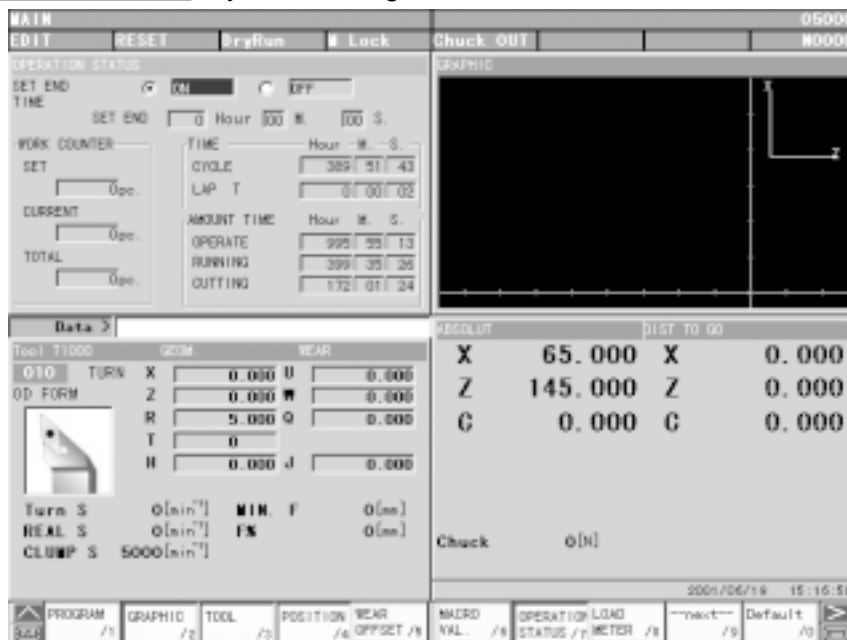


Fig. 2-7 Running Status

The running status is displayed in the window screen. Input is done by moving the cursor.

(Example) (Hour/minute/second) = 0 (set to 0)
 (Hour/minute/second) = 1 (1:00:00 is entered)
 (Hour/minute/second) = 1/2 (1:02:00 is entered)
 (Hour/minute/second) = 1/2/3 (1:02:03 is entered)

(1) Scheduled ending

Notice of ending is made effective when End Notice on the page is held "valid".

The scheduled ending time is equal to the time length from auto operation start to the ending notice. If the operator enters the scheduled ending time for a program, the call light tells when the machining time reaches the scheduled ending time.

(2) Machining time

Time for machining is summed up (time when the start lamp is ON).

(3) Lap T

Lap time among tools is measure. This is automatically set to 0 on tool changing. No measurement is conducted while NC is held in stand-by state.

(4) Work Count

Under the M12 command, NC counts up the number of cutting and the total number of works cut.

14-2 Date and Time

Press the Δ key, and then, **F4/SYSTEM** the maintenance menu. The System screen appears. Set the cursor to "22. Time-Data" on System screen and push **INPUT**.

Date and Time screen appears. The date and time can be set. Input them, seeing the description.

Setting at date 00912
JOG RESET DryRun Lock Chuck IN NO000

Date

May 2001

Sun	Mon	Tue	Wed	Thu	Fri	Sat
29	30	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	1	2
3	4	5	6	7	8	9

NC Date 2001/5/22

Time

NC Time 10:57:12

GUIDE

Please input the Christian era by four digits.
Please delimit by '/' . Example 2000/11/27

DATE> /1 /2 /3 /4 /5 /6 /7 /8 /9 /0

Fig. 12-5 Date and Time Setting

15. Plot

15-1 Plot

Pressing the **F7/GRAPHIC** key displays the Graphic screen (PREVIEW EXIT) (Fig. 7-0) This screen plots the tool path and also displays the following data for reference to plotting.

- ☐ Parameter plotting plane
- ☐ Tool nose position
- ☐ Spindle speed S, feed rate F, tool command T
- ☐ Machining time, cutting time
- ☐ Program list in execution

A locus is drawn in the values of the work coordinate system. As too many lines can confuse movement, the tip is expressed in a small dot. To erase the graphic page, push **ORIGIN**.



Fig. 7-0 Graphic Screen (PREVIEW EXIT)

The following settings are allowed for plotting. For details, refer to the next section.

- ☐ Selection of plotting plane
- ☐ Specification of angle or rotation (horizontal, vertical)
- ☐ Plotting range (maximum, minimum)
- ☐ Scale width indication
- ☐ Specification of plots per tool (color specification)
- ☐ Selection of cutting feed line
- ☐ Selection of rapid traverse line
- ☐ Color assignment for drawing point

15-2 Plotting Parameters

With the **F1/GRAPHIC PARAM** menu of the **F7/GRAPHIC**, the plotting Parameter screen (Fig. 9-0(a) or Fig. 9-0(b)) appears over the Plot screen.

This screen allows you to set the plotting parameters.

Pressing the **F2/RANGE** key displays the Range Set screen (Fig. 9-0(a)) and pressing the **F3/PLANE** key displays the Plant Set screen (Fig. 9-0(b)).

GRAPHIC PARAMETER					00912				
Jog	RESET	DryRun	Lock	Chuck IN				M0000	

1st. PLANE



2nd. PLANE



RANGE	X	170.000	~	0.000
	Z	10.000	~	-100.000
	ZB	0.000	~	0.000
	C1	0.000	~	0.000
	C2	0.000	~	0.000

SCALE	10			
EACH TOOL	?	VALD		INVL
CUT. LINE	?	LINE		DOT
RAPID LINE		LINE		DOT
LINE	1	2	3	4
POINT	5	6		

Info

Graphic range.

Fig.9-0(a) Plotting Parameter (Range Set)

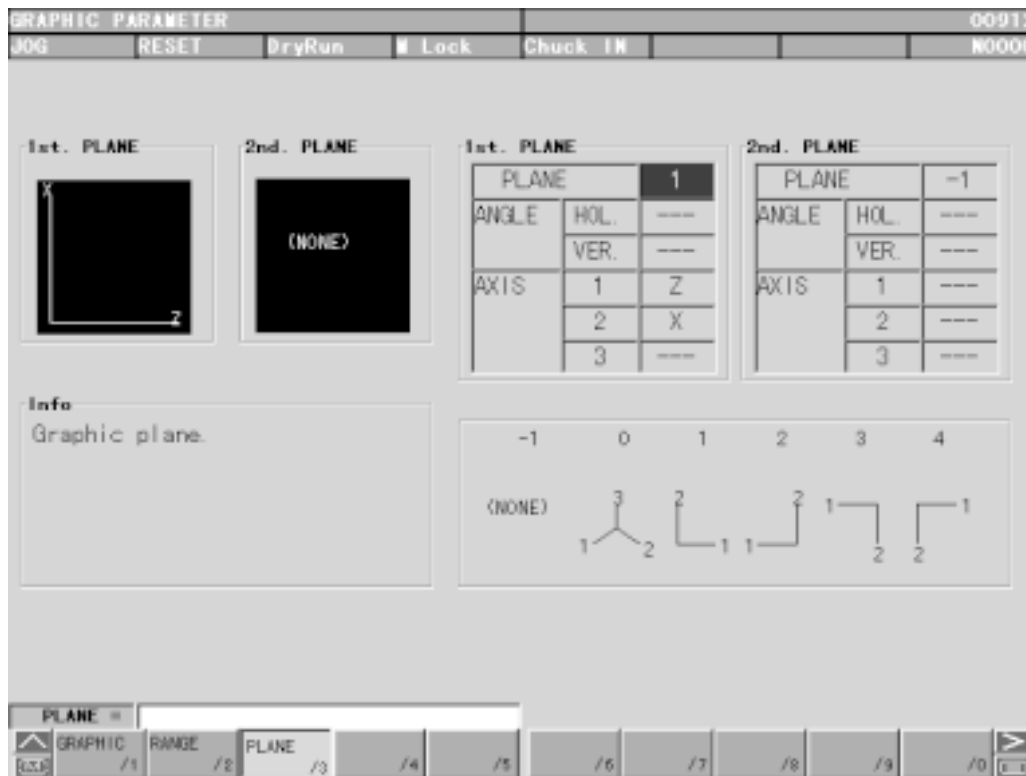


Fig.9-0(b) Plotting Parameter (Plans Set)

○ Setting plotting parameters

First move the frame cursor to the column of the parameter to be set using the cursor key



At that time, a simple explanation is displayed in the explanation column.

Range set

(1) RANGE

Set the maximum and minimum plotting values of each axis. The center coordinate (middle of the maximum and minimum values) and magnification factor (at which the maximum and minimum values stay within the screen) for plotting are decided. Input a coordinate value (work coordinate) in the key input area and press the **INPUT** key to decide. The maximum value and the minimum value can be set at left or right at that time.

(2) SCALE

A Scale width is set here.

(3) EACH TOOL

Every time the tool is changed, a plotting color is changed. Up to 6 colors are available. After the 6th color, it returns to the first one. Make setting at "LINE"

The set one is marked with ●. To after, select with the cursor key (**→** or **←**) and press the **INPUT** key to decide.

(4) CUT. LINE

Specify a type of cutting feed line. The set one is marked with ●. To alter, select with the cursor key (**→** or **←**) and press the **INPUT** key to decide.

(5) RAPID LINE

Specify a type of rapid traverse lines. The set one is marked with ●. To alter, select with the cursor key and press the key to decide.

(6) LINE

When Plot per Tool is effective, set the changed-to color. To make setting, select color designation with the cursor key. Then, specify the tool with the cursor key.

In accordance with the description, set numerical value 0-7 and press the key to determine.

(7) POINT

Specify a color of plotting point.

To make setting, select color designation with the cursor key.

In accordance with the description, set a numerical value 0-7 and press the key to determine.

Plane Set

(1) PLANE

Specify the plotting plane. You can select out of the following 6 types.

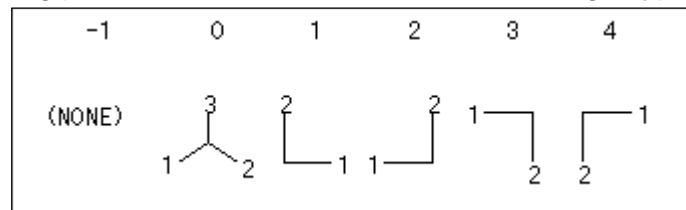


Fig. 9-0 (c) PLANE

In accordance with the description, set a numerical value -1 to 4 and press the key to determine. The selected plane is displayed. The plane setted a numerical value -1 is not displayed.

Note) No scale is displayed when the plotting plane is equal to 0 (in 3 axes display)

(2) ANGLE

This is effective only when the plotting plane is 0 (3 axes display).

Input the angel in the key input area and press the key to decide.

(a) HOL. ANGLE

Specify the horizontal plane rotation angle within a range of ± 180 in an increment of 1°

Example) When the plotting plane is (XYZ) and the vertical rotation angle is 90°

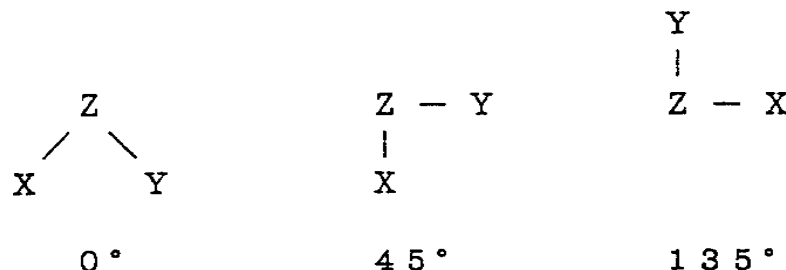


Fig. 8-0 (d) Rotation Angle

(b) VER. ANGLE

Adjust the slope angle of the vertical axis.

Example) When the plotting plane is (XYZ) and the horizontal rotation angle is 0°

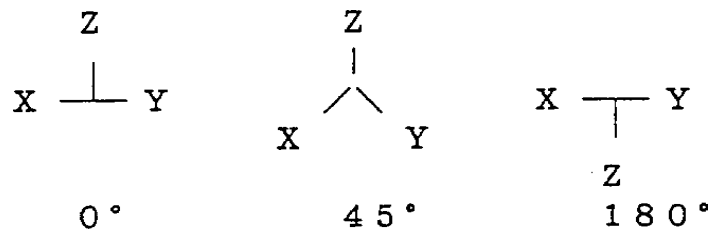




Fig. 9-0 (e) Vertical Rotation Angle

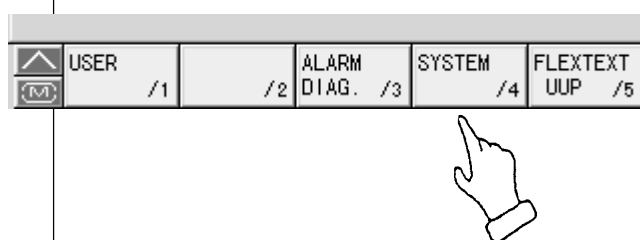
(3) AXIS

Set the axis name which you want to specify. Minus ("-") can be added to it.

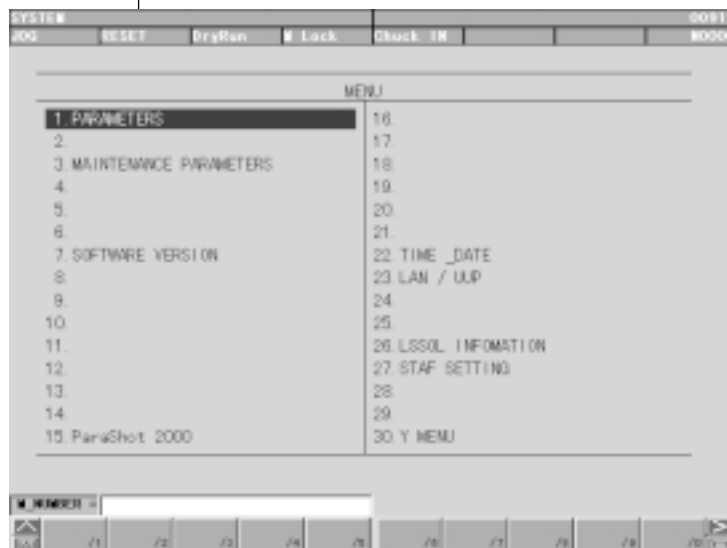
16. Parameter Setting



The parameter setting is executed by the following procedure.

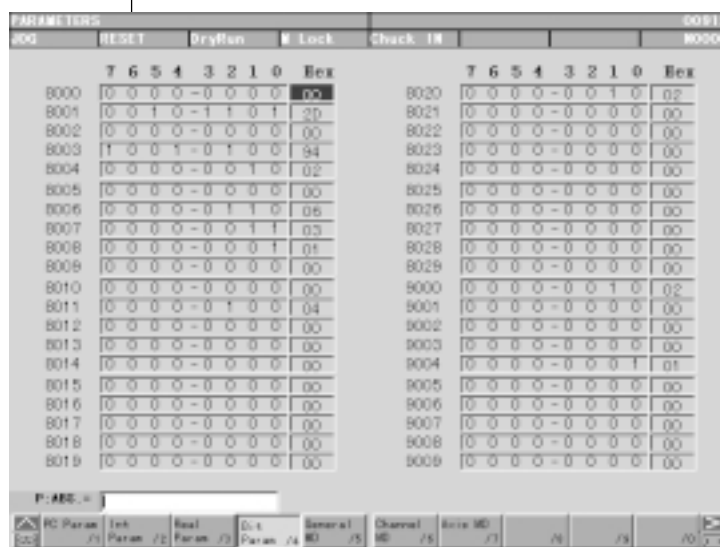
- [1] Set the mode to the [MDI].
- [2] Set the memory key to the [WRITE].
- [3] Press the  key and make the initial screen.
- [4] Press the  key and then the **F4/SYSTEM** key.



It becomes the menu screen.








- [5] Set the cursor to “1. PARAMETERS” by cursor key   and press the **INPUT** key.



PARAMETERS										00012									
JOG										Check IN									
RESET DryRun Lock										80000									
	7	6	5	4	3	2	1	0	Hex		7	6	5	4	3	2	1	0	Hex
8000	0	0	0	0	0	0	0	0	00	8020	0	0	0	0	0	0	1	0	02
8001	0	0	1	0	0	1	0	1	20	8021	0	0	0	0	0	0	0	0	00
8002	0	0	0	0	0	0	0	0	00	8022	0	0	0	0	0	0	0	0	00
8003	1	0	0	1	0	1	0	0	94	8023	0	0	0	0	0	0	0	0	00
8004	0	0	0	0	0	0	1	0	02	8024	0	0	0	0	0	0	0	0	00
8005	0	0	0	0	0	0	0	0	00	8025	0	0	0	0	0	0	0	0	00
8006	0	0	0	0	0	1	1	0	06	8026	0	0	0	0	0	0	0	0	00
8007	0	0	0	0	0	0	1	1	03	8027	0	0	0	0	0	0	0	0	00
8008	0	0	0	0	0	0	0	1	01	8028	0	0	0	0	0	0	0	0	00
8009	0	0	0	0	0	0	0	0	00	8029	0	0	0	0	0	0	0	0	00
8010	0	0	0	0	0	0	0	0	00	9000	0	0	0	0	0	0	1	0	02
8011	0	0	0	0	0	1	0	0	04	9001	0	0	0	0	0	0	0	0	00
8012	0	0	0	0	0	0	0	0	00	9002	0	0	0	0	0	0	0	0	00
8013	0	0	0	0	0	0	0	0	00	9003	0	0	0	0	0	0	0	0	00
8014	0	0	0	0	0	0	0	0	00	9004	0	0	0	0	0	0	0	1	01
8015	0	0	0	0	0	0	0	0	00	9005	0	0	0	0	0	0	0	0	00
8016	0	0	0	0	0	0	0	0	00	9006	0	0	0	0	0	0	0	0	00
8017	0	0	0	0	0	0	0	0	00	9007	0	0	0	0	0	0	0	0	00
8018	0	0	0	0	0	0	0	0	00	9008	0	0	0	0	0	0	0	0	00
8019	0	0	0	0	0	0	0	0	00	9009	0	0	0	0	0	0	0	0	00

P: ABS. =


RC Param /1, 1st Param /2, Real Param /3, G-1 Param /4, General /5, Channel /6, Servo MD /7, /8, /9, /0

- [6] Set the cursor to the parameter No. to be changed by the page key   or cursor key   or direct call by N $\Delta\Delta$  etc.


- [7] Change the parameter.

The parameter has two types as a data indicates by 0 or 1 and numerical data.

- (a) A data indicated by 0 or 1.

1. Set the cursor to a bit to be changed by .
2. Key in “0” or “1” and press the **INPUT** key at the condition of display as “P: ABS. =” the lower left of the screen.

Move the cursor display for each bit to set.

3. Return the cursor display to the “Number” column by  after completion of setting.

The parameter can be changed by direct input of hexadecimal number.

(b) A data indicated by numerals.

1. Key in the new numerals and press the **INPUT** key at the condition of display as "P: ABS. =" the lower left of the screen.

[8] Procedure after setting

1. Press the **>** key and make the initial screen.
2. Set the memory key to [LOCK].



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