

SEICOS-pcFLexi
INSTRUCTION MANUAL
OPERATION
60 Edition 1.01

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I. OUTLINE

SEICOS-pcFLexi are products that have integrated the latest device technology and realized down-sizing with high reliability.

The machine is designed by giving consideration to users standpoint in the operating system as the man-machine interface, thus offers a most easy-to-operate machine.

As for the subject of programming, refer to “SEIKI-SEICOS pcFLexi program part” and for subjects on alarms and maintenance to “SEIKI-SEICOS pcFLexi maintenance part” respectively.

1. Items requiring attention when reading this manual.

- (1) In this manual and the reference manual “program part”, explanations are made on all the functions that are applicable to these NC machines, including optional functions. The option function selected for adoption are different for each machine. Please confirm the specification of the machine beforehand, as there may be some functions referred to in the manual are not usable depending on the machine.
- (2) In this manual, those functions not specifically remarked “able” should be understood as “unable”.
- (3) The contents of this manual may be changed without notice to meet a future machine improvement.

Note) Programs, parameters, macro variables and tool compensation amounts, etc. are stored in the memory of NC unit. Generally, these data are not lost by switching the power ON/OFF.

Nevertheless, data could be lost inadvertently or by erroneous operation. Also a case may occur when you are compelled to have valuable data in the memory cleared for restoring the system from a trouble.

To cope with such an unexpected situation, we suggest that you take note of the important data and keep them separately. It facilitates quick restoration of working condition of the machine by re-entering the data.

Note) When processing a work, do not start the operation suddenly. Make a trial warm-up run first for fully confirming that the machine acts correctly, then proceed with subsequent operating procedures.

II. SPECIFICATIONS

1. CONTROLLED AXES

1-1 Controlled Axes

The 3 axes, X, Z and spindle are controllable. Optionally, additional axes can be added. 13 axes are controllable in total.

1-2 Simultaneous Controllable Axes

The 2 axes, X and Z, can be controlled simultaneously regardless of rapid traverse or cutting feed. Table 1-2 shows the configuration of the controlled axes.

Table 1-2

	No. of Axes	Axis Name	Remarks
Standard controlled axes	3 axes	X, Z, Spindle	
Additional axes control	10 axes	Select out of Y, A, B and C	Including other controllable
Simultaneous controllable axes	Standard 2 axes + additional axes	All the axes specified by the system	

Note 1) The number of controlled axes, and relations between the axis name and axes can be selected with parameters.

1-3 Setting Unit

It is determined by parameters of computing resolution. The display resolution is determined by other parameters. Switching between millimeter/inch is set by G codes.

1-4 Maximum Commandable Value

Table 1-3

mm (G21)	±999999.999 (mm, deg)
inch(G21)	±399999.999 (inch, deg)

1-5 Position Detector

The absolute encoder is provided as a standard position detector. Optionally, the pulse scale or the Inductosyn detecting function can be selected. When the Inductosyn detecting function is selected, however, you need a converter which serves as an interface equivalent to the pulse scale.

2. INTERPOLATING FUNCTIONS

2-1 Positioning (G00)

Can be fed at a rapid traverse rate independently by specifying G00.

2-2 Linear Interpolation (G01)

Linear interpolation is performed at the feed rate specified by an F-code in a G01 command.

2-3 ANGLE DESIGNATION LINEAR INTERPORATION (G01)

With G01, an angle from Z axis is specified where linear interpolation is commanded.

2-4 Circular Interpolation (G02, G03)

Circular interpolation can be performed arbitrarily at 0° to 360° at the feed rate specified by an F-code in a G02 or G03 command.

2-5 Radius Designation on Arc (G02, G03)

R can be directly specified as a circular arc radius value, assuming, I, J, and K to be a vector amount from a start point to the center in circular interpolation.

2-6 Helical Cutting

Another axis is linearly interpolated synchronously with circular interpolation.

2-7 Polar Coordinate Interpolation

A command programmed in the orthogonal coordinate system is converted into a linear axis move (tool) and rotary axis move (work rotation) to control a profile.

2-8 Cylindrical Interpolation

If a linear axis stroke and rotary axis angle are specified by a program command, the rotary axis stroke internally specified in terms of angle is converted into a distance on the circumference. As the distance on the circumference can be regarded a linear axis stroke on the circumference, linear interpolation and circular interpolation can be performed in combination with other linear axis.

3. THREADING

3-1 THREADING (G32)

With F code, a thread lead is directly commanded.

3-2 MULTIPLE THREADING (G32)

Use this to perform multiple thread cutting which has two or more thread ridges in a lead. With Address Q, command a threading start shift angle. be performed.

3-3 VARIABLE LEAD THREADING

By commanding the increase or decrease amount in lead per one screw thread turning, you can perform variable lead threading. With Address K, command a lead changing amount.

4. FEED FUNCTION

4-1 RAPID TRAVERSE RATE AND RAPID OVERRIDE

The maximum speed available in the axial direction is 999,999.999mm/min. Further, override can be applied to rapid traverse by rapid override.

4-2 CUTTING FEED RATE AND FEED OVERRIDE

The maximum feed rate range available for setting is 0.001~999,999.999mm/min. Override can be applied, by feed rate override, within a range of 0~200%.

4-3 Override Cancel

A cutting feed override rate can be fixed at 100 % by a signal from the machine.

4-4 Automatic Acceleration/Deceleration

When starting or stopping the axis travelling, it is automatically accelerated or decelerated.

4-5 Dwell (G04)

Migration to operation in the next program block can be delayed by a specified time by a G04 command. Use P, X, or U for an address.

4-6 Exact Stop Check (G09)

In the block where G09 is specified, an imposition check is made at the end of block execution.

4-7 Exact Stop Check Mode (G61)/Cutting Mode (G64)

Normally, the G64 mode is effected and the program proceeds to the next block immediately after interpolation is completed. If G61 is specified, the program will proceed to the next block after entering imposition at the end point of each block, in the subsequent move command. The G61 mode is cancelled by specifying G64.

5. REFERENCE POINT

5-1 Reference Point Return (G28)

Reference point return includes the following:

- (1) Manual reference point return.
- (2) Automatic reference point return (G28)

5-2 Second reference Point Return (G30)

Second reference point return (G30) returns the axes to the position set in a parameter.

5-3 Third/Fourth Reference Point Return (G30)

The axes can be returned to the 3rd/4th reference point preset by a G30 command (P3, P4).

6. COORDINATE SYSTEM

6-1 Tool Nose Coordinate System

At the time of turret indexing or manual zero point return, the tool nose position assuming the machining reference point to be zero (0) is automatically set in the coordinate system.

6-2 Coordinate System Setting (G50)

An axis command following G50 sets the coordinate system where a current tool coordinate value will be a specified value.

6-3 Machine Coordinate System Selection (G53)

A tool moves to a position in the machine coordinate system by a G53 command.

6-4 Plane Designation (G17, G18, G19)

A G-code is used to specify the plane where you want to perform circular interpolation,

tool diameter compensation, and so on.

G17: X-Y plane, G18: Z-X plane, G19: Y-Z plane

7. COORDINATES AND DIMENSIONS

7-1 Absolute/Incremental Programming

Absolute/incremental programming is switched by a G-code.

Absolute : X Y Z

Incremental : U V W

7-2 Decimal Point Input

A decimal point can be input to the command data associated with a distance (angle), speed, and dwell. A decimal point position is after the millimetric or inch units digit.

The addresses which can use decimal points are X, Y, Z, A, B, C, D, H, U, V, W, I, J, K, R, P, Q, E, and F.

Depending on conditions applies, however, a decimal point may not be usable.

7-3 Inch/Metric Conversion (G20, G21)

You can select the inch system/metric system as units of input by specifying G20/G21.

- G20: Inch input
- G21: Metric input

8. SPINDLE FUNCTIONS

8-1 Spindle Function

The rotating rate is specified by a numerical command following the address S.

8-2 Spindle Override

The override is applied by an external signal.

8-3 Constant Surface Speed Control (G96, G97)

With a surface speed directly assigned with S code, this function serves to continuously control the spindle motor rpm so that the circumferential speed is held constant to changes in tool position. Command to make this function valid or invalid is performed with G code.

G96: Constant surface speed control is performed.

G97: Constant surface speed control is not performed.

9. TOOL FUNCTIONS

9-1 Tool Function

Code signal is sent out by specifying an address T followed numerical command.

Use T code, tool rest indexing, setting of a work coordinate system (tip coordinate system), combined compensation, etc..

10. MISCELLANEOUS FUNCTIONS

10-1 Miscellaneous Function

The machine can be turned on/off by specifying an address M followed numerical value.

11. PROGRAM CONSTRUCTION

11-1 Command Tape

8-unit black paper tape

11-2 Tape Format

EIA/ISO (At input: Automatic recognition, At output: Selected by a parameter)

11-3 Input Format

A variable-block, word-address format with decimal point is used.

11-4 Command Tape Codes

Table 11-4

Address	Description
A	Additional axis coordinate value
B	Additional axis coordinate value
C	Additional axis coordinate value
F	Feed functions
G	Preparatory functions
H	Incremental coordinate value C axis
I	X-axis component of the circular arc center
J	Y-axis component of the circular arc center
K	Z-axis component of the circular arc center
L	Canned cycle times designation, Repeat times in a subprogram call
M	Miscellaneous function
N	Sequence number
O	Program number
P	Dwell, Program number in a subprogram call
Q	Fixed cycle
R	Radius command value for circular interpolation, Canned cycle
S	Spindle functions
T	Tool functions
U	Incremental coordinate value X axis, Dwell
V	Incremental coordinate value Y axis
W	Incremental coordinate value Z axis
X	X-axis coordinate value, Dwell
Y	Y-axis coordinate value
Z	Z-axis coordinate value

11-5 Command Words and Command Value Ranges

Table 11-5

Function	Address	Metric input.	Inch Input.
Program number #	O	0001~9999	0001~9999
Sequence number #	N	1~99999999	1~99999999
Preparatory function	G	0~999	0~999
Coordinate value	X, Y, Z,		
	U, V, W,	±999999.999(mm)	±39999.999(inch)
	I, J, K,		
	Q, R,	±999999.999(deg)	±999999.999(deg)
	A, B, C,		
Feed function	F		
Spindle function	S	0.001~999999.999	0.001~999999.999
Tool function	T		
Miscellaneous function	M	0~2147483647	0~2147483647
Dwell	P, X, U	0~999999.999(sec)	0~999999.999(sec)
Call program number	P	0001~9999	0001~9999
Repeat times	L	1~9999	1~9999

11-6 Subprogram (M98, M99)

A subprogram can be called in the MEMORY mode. A called subprogram can further call another subprogram.

11-7 Programmable Mirror Image (G501, G511)

A mirror image can be applied to each axis by a program command.

11-8 Optional Block Skip

A program block containing a slash code, “/”, in its beginning is ignored by turning on the OPTIONAL BLOCK SKIP switch provided on the part of the machine. This is valid only 1 pce. at the top of the block. You can add “/2” through “/5” as an option.

11-9 Control-in/-out

“(” : Control-out

)” : Control-in

This function is used when giving a program name to a program number or giving a comment halfway a program. All the information between control-out and control-in is ignored within a significant information section.

11-10 Command Data Input Methods

- (1) MDI (manual data input) through the keyboard
- (2) Inputting from an external input/output device via an RS-232C interface (Reading the NC tape)

11-11 Internal Data Output Methods

- (1) Displaying on the CRT
- (2) Outputting to an external input/output device via an RS-232C interface (Punching out the NC tape)

12. HOW TO FACILITATE PROGRAMMING

12-1 Canned Cycle for Drilling (G80~G87, G89, G831, G841, G861)

Drilling, tapping, and boring cycles can be specified in one program block.

12-2 Fixed Cycle (G90, G92, G94)

The following 3 kinds of fixed cycles can be commanded:

- ① Cutting cycle A (G90) → outside/inside diameter cutting
- ② Threading cycle (G92)
- ③ Cutting cycle B (G94) → end face cutting

12-3 Maltipul Fixed Cycle

Several kinds of fixed cycles are prepared beforehand to facilitate a program. With information of the finished configuration alone being given, the tool passage for rough cutting to the end is automatically fixed. A fixed cycle for threading is also available.

13. TOOL OFFSET FUNCTIONS

13-1 Automatic Tip R Compensation and Cutter Compensation

(1) Automatic Nose R Compensation (G143)

It is normally held at G143 (Automatic Nose R Compensation Valid Mode).

Therefore, without G code not being commanded, tip R compensation is automatically executed.

Nose R is set to tool compensation R and virtual nose points (1~8) to T.

(2) Cutter Nose R Compensation (G145 : G40~G42)

G145 command turns it to the Tool Diameter/Nose R Offset Valid Mode. If the tool type is a rotary tool, it turns to the tool diameter offset, if a cutting tool, it turns to the nose R offset.

During this mode, using G40~G42 commands, you can perform the Tool Diameter/Nose R Offset. Set the tool diameter/nose R to the R of the tool offset and the virtual nose point (9) to the T.

13-2 Groove Width Compensation (G150 to G152)

When a grooving tool is used, one virtual tool nose (for example, 3) is used to run the program to apply compensation. It is also necessary to compensate the other virtual tool nose (for example, 4) side. When this is done, this function compensates the groove width by specifying a G-code.

13-3 Addition of Tool Offsets

The number of tool offset pairs can be expanded up to 200.

Expansion of tool offset pairs: 64/99/200

14. ACCURACY COMPENSATING FUNCTIONS

14-1 Backlash Compensation

This function is to compensate the lost motions which the mechanical system has.

A compensation amount can be set as a parameter in the least command increment for each axis.

14-2 Stored Pitch Error Compensation

This function is to compensate a pitch error for feed screws. Compensation data is set as a parameter.

15. MEASURING FUNCTIONS

15-1 Skip Function

If a skip signal is input from an external device in the midst of an X-, Y-, or Z-command following G31, the next block will be executed, canceling the rest of this command. A skip signal input position can be read with a system macro variable.

15-2 Q SETTER

Through simple manual operation with the touch sensor, tool offset volume is automatically written.

15-3 Q-setter Repeat Function

By measuring the tool with the Q-setter once, automatic measurement with the Q-setter is activated by simple operation when changing tips.

16. CUSTOM MACRO

16-1 Custom Macro

A function peculiar to the user can be created. There are 100 common variables, but their number can be optionally extended up to 600.

17. AXIS CONTROL

17-1 Follow-up Function

In case of emergency stop or servo alarm, a machine travel amount is reflected on an NC unit internal position. For this reason, automatic operation is enabled after resetting the emergency stop or servo alarm, even if you do not have to perform zero point return.

In case of speed feedback or position feedback alarm, however, an actual machine position and the NC unit internal position do not match, because the follow-up function does not work properly.

18. MANUAL OPERATION

18-1 Manual Continuous Feed

With the axial feed switch being pressed in Jog mode, manual continuous feed is performed.

Feed rates are as follows:

(1) Jog feed

Jog feed rate can be changed over into 24 stages through use of the switch.

Speed in 24 stages is set with parameters.

(2) Manual rapid

When jog feed is executed as the rapid traverse button being pushed, manual rapid traverse is available.

18-2 Manual Pulse Generator

The machine is capable of fine feed by means of the pulse generator on the machine operation panel. One rotation of the pulse generator generates 100 pulses. You can select a scale factor of x 1, x 10, or x 100 by a signal from the machine.

19. AUTOMATIC OPERATION

19-1 Program Number Search

An 4-digit program number following O can be searched for from the data in the Program screen.

19-2 Sequence Number Search

A sequence number can be searched for in the program currently selected from the data in the Program screen.

19-3 Feedhold

All axes can be stopped temporarily. Pressing the CYCLE START button restarts feeding the axes. Prior to restarting axis feed, you can allow intervention by manual operation in the manual mode.

20. PROGRAM TEST FUNCTIONS

20-1 Machine Lock

In the machine lock mode, the machine does not move, but the position display is updated as if the machine were moving.

The machine lock ON/OFF is not possible during auto operation. If you dare do it, it causes an alarm.

20-2 Dry Run

If the DRY RUN switch is turned on, the machine operates at a dry run rate instead of a programmed cutting feed rate. The cutting feed rate or dry run rate, whichever maximum value is greater, is executed.

20-3 Single Block

Program commands can be executed block by block.

21. DISPLAY AND SETTING

21-1 Machining End Notice

Input a scheduled program end time. When the machining time reaches the scheduled end time, a signal is output to an external device.

21-2 Run Hour Display

Machine run hours are displayed in the format of hours:minutes:seconds. Display is made by each of the functions including the expected ending, working time, cutting time, lap T, and date/time.

21-3 Work Count Function

The number of machined workpieces can be counted by the M12 command. By setting the number of workpieces beforehand, a signal is output to the machine when reaching the prescribed number of workpieces.

22. PART PROGRAM STORAGE & EDITING

22-1 Part Program Storage & Editing

The contents of the NC tape can be stored and edited. Relevant operations include deletion, alteration, and insertion. Range editing is allowed by expanded part program editing. Use of backgrounding allows you to edit another program during automatic operation.

Tape storage length	: 1,000 m/directory
Registered programs	: 200 programs/directory
Directory	10 directorys, 100 directory (option)
Total	10000 m 2000 programs, 100000 m 20000 programs (option)

22-2 Part Program Comparison

The program registered in the memory is compared with the one in the tape.

23. DIAGNOSTIC FUNCTIONS

23-1 Self Diagnostic Function

This function makes various checks.

The signals exchanged between the machine and NC unit can be confirmed on the screen.

23-2 Alarm Diagnosis

If the CNC has any error, it displays its corresponding alarm number and message.

24. DATA INPUT AND OUTPUT

24-1 Input/Output Interface (RS-232C)

This function allows you to output the programs, tool offset amounts, parameters, etc. memorized in the memory to an external device, and input the data from the external device. A device equipped with the RS-232C interface is available as an external device.

25. SAFETY FUNCTIONS

25-1 Emergency Stop

An emergency stop cancels all the commands and stops the machine instantaneously.

25-2 Overtravel

When the machine reaches a stroke end, a relevant signal is received, the axes are stopped instantaneously, and an overtravel alarm is indicated.

25-3 Interlock

There are two kinds of axis interlocks; all axes interlock, individual axis interlock. If the interlock is applied while moving the axis, the machine will be decelerated to stop. If an interlock signal is canceled, the machine will be accelerated to resume operation.

25-4 Stored Stroke Limit 1

Stored stroke limit 1 assumes the outside of the area set by a parameter to be a prohibited area.

25-5 Stored Stroke Limit 2 and 3 (G22, G23)

Use this function when you want to ensure that a tool will not enter a non-cutting area. Set stored stroke limit-2 with a parameter whether the inside or outside of the set area should be prohibited. Stored stroke limit-3 assumes the inside of the set area to be a prohibited area.

Use a G-code to enable/disable stored stroke limit-2.

- G22: Enable
- G23: Disable

(Stored stroke limit-3 is enabled regardless of the G-code)

25-6 Stroke Check Before Move

This function checks whether or not specified end point coordinates enter a stored stroke limit area before a move command in the program block.

III. OPERATION

III. I Basic Machine Operation

III. II Screen Operation

III. I Basic Machine Operation

- 1. Manual Operation**
- 2. Automatic Operation**
- 3. Operation Related to Safety**
- 4. NC Operation keys**
- 5. Quick Tool Setter (Q Setter)**
- 6. Q Setter Barrier**
- 7. Q Setter Repeat Function**
- 8. Simple Jaw Edge Forming Function**

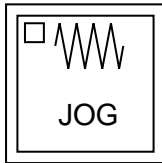
1. Manual Operation

The machine can be manually operated by using the switches on the machine operation panel.

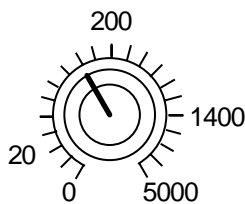
1-1 Jog Feed

The machine can be operated continuously by manual operation.

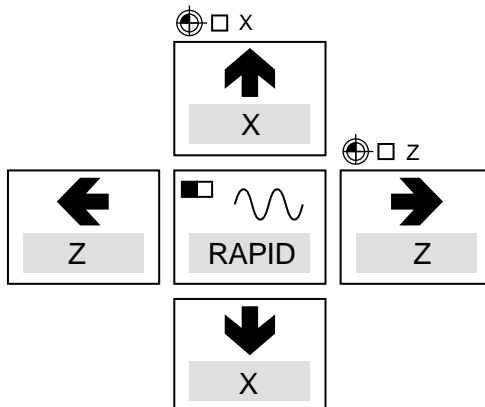
- (1) Select the mode selector switch "JOG".



- (2) Select the feed rate.



- (3) Select the axis you want to move.



The machine moves in the direction of the selected axis.

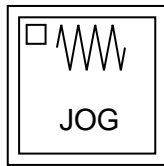
Note 1) When multiple axes are selected, those axes move all simultaneously.

Note 2) When the axis has been selected before selecting the JOG mode, the machine does not move even if the mode is changed to JOG. Select the axis newly.

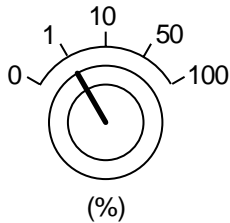
1-2 Manual Reference Point Return

The machine can be returned to the reference point by manual operation.

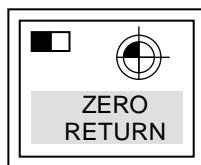
- (1) Select the mode selector switch "JOG".



- (2) Select the rapid traverse override.



- (3) Select "ZERO RETURN".



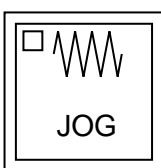
The machine moves at the rapid traverse rate toward the reference point for each axis.

- (4) When the machine returns to the reference point, the reference point return lamp gets illuminated.

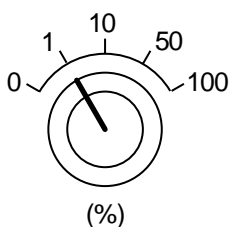
1-3 Rapid traverse

The machine can be rapid traversed continuously by manual operation.

- (1) Select the mode selector switch "JOG".



- (2) Select the rapid traverse override.



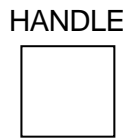
- (3) Select the axis you want to move, and "RAPID" simultaneously. The machine moves in the direction of the selected axis at the rapid traverse rate.

Note 1) Same as Notes for Jog Feed

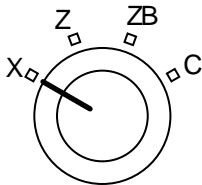
1-4 Manual Handle Feed

The machine can be finely fed by turning the manual pulse generator.

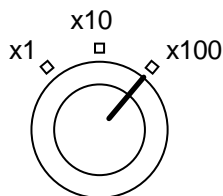
- (1) Select the mode selector switch "HANDLE".



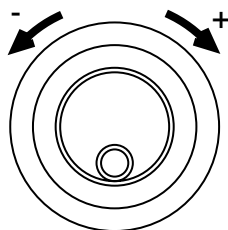
- (2) Select the handle axis.



- (3) Select a handle magnification.



- (4) Turn the handle.



Clockwise : "+" direction
Counterclockwise : "-" direction

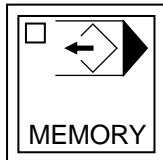
- Note 1) Do not turn the manual pulse generator so quickly. If so done, the machine may not stop immediately after turning the handle, or the scale and the travel amount may not coincide with each other.
- Note 2) If the magnification "x 100" is selected and the handle is turned very quickly, the machine moves at a rate close to the rapid traverse rate. If you then stop the machine suddenly, it may be shocked.
- Note 3) In some cases, the mode selector switch "HANDLE" of (1) may not be provided, where Handle mode is selected by handle axis selection of (2).

2. Automatic Operation

2-1 Automatic Mode

(1) Memory operation

- (a) Store the program in the memory in advance.
- (b) Select the program you want to run.
- (c) Select the mode selector switch "AUTO".



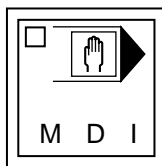
- (d) Press the CYCLE START button.



Pressing this button starts automatic operation and turns on the CYCLE START lamp.

(2) MDI operation




- (a) Select the mode selector switch "MDI".



- (b) Input the program into the MDI operation buffer memory. The commands for multiple blocks can be input into the MDI operation buffer memory from the CRT/MDI panel. The program can be edited in the same manner as editing that stored in the memory.
- (c) Press the CYCLE START button. Automatic operation starts and the CYCLE START lamp gets illuminated.

2-2 Selecting the Run Program

(1) Program No./Sequence No. search

- (a) Select the mode selector switch "MEMORY".
- (b) Display the Overall screen. (The Program screen will also do.) When any other screen than the Overall screen is displayed, press the  key to display the Overall screen.
- (c) Press the  key in case of program number search, and press the  key in case of the sequence number search.
- (d) Then, enter the program number or sequence number you want to search for, and press the cursor move key.
- (e) A program or sequence number search is executed.

- (2) Rewind
 - (a) Select the mode selector switch "EIDT".
 - (b) Display the Overall screen. (The Program screen will do.)
 - (c) Press the RESET key of the NC unit.
 - (d) Select the mode selector switch "MEMORY".
- (3) Part program storage length and registered programs

Tape storage length	1000m/directory
Registered programs	100 programs/ directory
Directory	10 directories
	100 directories (option)
Total	1000m 1000 programs
	100000m 10000 programs (option)

2-3 Stopping the Automatic Operation

There are two methods to stop automatic operation; one is to insert a stop instruction (M00, M01, M02, or M30) in the program in advance at which you want it to stop, and the other is to press the button (FEEDHOLD or RESET) on the operation panel.

- (1) Program stop (M00)

If the block where M00 has been specified is executed, automatic operation stops and execution does not proceed to the next block. The model information so far is all saved. Pressing the PROGRAM CYCLE START button restarts automatic operation.
- (2) Optional stop (M01)

If the block where M01 has been specified is executed, automatic operation stops and execution does not proceed to the next block. However, this is true only when the OPTIONAL STOP switch on the machine operation panel is turned on.
- (3) Program end (M02, M30)
 - (a) Indicates the end of the main program.
 - (b) Stops automatic operation and places the machine in the reset mode.
 - (c) M02 and M30 return the program to its beginning.

2-4 Dry Run

This function enables a dry run speed, ignoring the feed rate specified with the program. ON/OFF is done on the test run screen.

2-5 Single Block

The single block function stops the machine after executing one block. Turn on the SINGLE BLOCK switch.



This causes the machine to stop after executing one block. Pressing the PROGRAM CYCLE START button stops the machine after executing the next block.

2-6 Override

For details related to the override function, refer to the instruction manual for the machine.

(1) Feed rate override

With the switch on the machine operation panel, an override of 0 % to 200 % can be applied to feed per minute (G98) and feed per revolution (G99).

(2) Rapid traverse override

The override selected with the switch on the machine operation panel can be applied to the rapid traverse rate.

(3) Feed rate override cancel

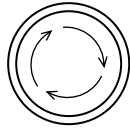
With a signal from the machine side, the feed rate override and automatic rapid traverse override can be fixed at 100 %.

3. Operation Related to Safety

3-1 Emergency stop

Pressing the EMERGENCY STOP button on the machine operation panel can stop the machine immediately.

EMERGENCY STOP



This switch is locked by pressing and released by turning the right.

Note 1) Emergency stop shuts off a current to the motor.

Note 2) The NC unit is reset to warn you of an emergency stop.

Note 3) Before releasing the EMERGENCY STOP switch, it is necessary to eliminate a trouble cause.

3-2 Overtravel

When the tool moves over the stroke end set by the limit switch of the machine or enters the disabled area of the set stored stroke limit, an alarm is displayed and the moving axis is decelerated to a stop.

In this case, move the tool manually in a safe direction, press the reset key, and cancel the alarm.

4. NC Operation keys

Table 4-0

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.

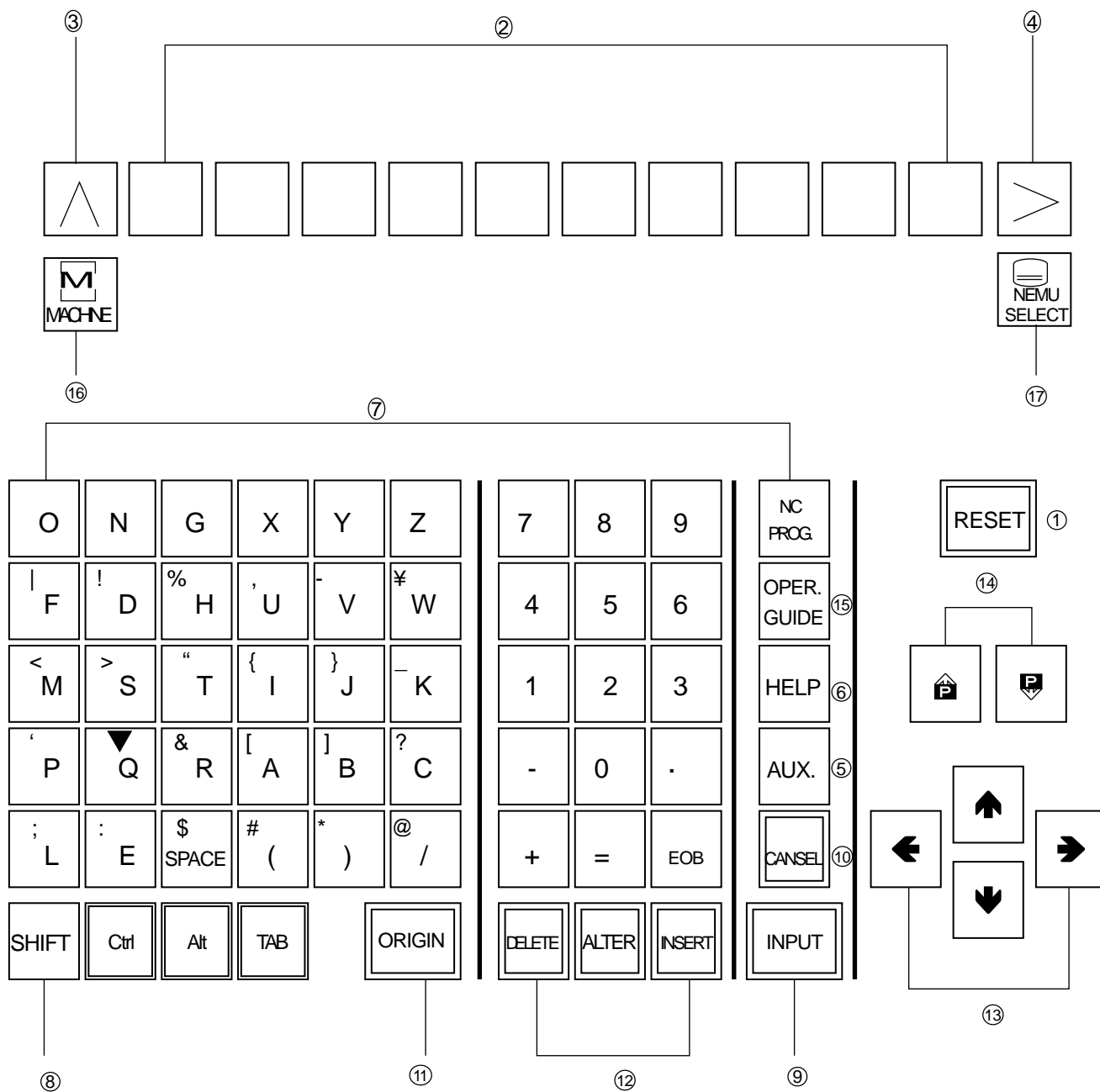


Fig. 4-1 NC Operation Panel

5. Quick Tool Setter (Q Setter)

5-1 Outline

A tool offset amount can be automatically written by simply bringing the tool nose into contact with the touch sensor manually.

5-2 Operation Method

(1) Set the quick tool setter.

(a) Set the tool setter. (Fig. 5-2(b))

(b) Select the MANUAL mode.

(c) A screen display is automatically switched to the Tool (Offset) screen; "Q SETTER" is displayed to inform you that the system is ready. (Fig. 5-2(a)) When initial reference point return has not been completed, setting the tool setter results in an alarm.

(2) Call the tool for which you want tool offset.

(3) Select and confirm the tool offset number.

The tool offset number is consistent with the called tool number, and the cursor moves automatically. When the cursor is moved with the key, the cursor-indicated tool offset number is selected.

(4) Bring the tool nose closer to the tool setter.

(a) When bringing it closer by jog feed, select the JOG mode and press the X- or Z-axis direction selector switch.

(b) When bringing it closer by handle feed, select the HANDLE mode, and then, the X or Z axis. Next, set a handle magnification to $\times 100$ and turn the handle.

(5) Position the tool nose to the center of the sensor by handle feed. (Fig. 5-2(c))

(6) Apply the tool tip to the touch sensor in jog feed.

The jog feed rate is held at the constant rate set with a parameter. Maintain the tool tip in continuous jog feed by not bringing it close to or keeping it away from the touch sensor.

(7) Bringing the tool nose into contact with the touch sensor inputs a tool offset amount automatically. When the tool nose comes into contact with the sensor, the axis stops, emitting a "beep" sound. (Fig. 5-2(d))

(8) Put away the tool nose from the touch sensor by more than a retouch return amount (parameter), and bring it into contact again. Repeating this, confirm the tool offset amount shown on the screen. (Fig. 5-2(e))

(9) Put away the tool nose to a safety position from the touch sensor. (Fig. 5-2(f))

(10) Put away the tool nose to the position where the tool can be called.

(11) Obtain the tool offset amount of the next tool.

Repeating the above steps (2) through (10), obtain the tool offset amount of each tool sequentially.

(12) House the tool setter. (Fig. 5-2(g)) The display of "Q SETTER" disappears.

While in axis shifting, do not store the tool setter.

TOOL OFFSET										00000	
JOG		RESET		DryRun		Lock		Chuck OUT		Q SETTER	
										N0000	
001		TURN		GEOM		WEAR					
G. INT. FACE		X	110.000	U	0.000						
		Z	110.000	W	0.000						
		R	0.000	Q	0.000						
		T	3								
		H	0.000	J	0.000						
002		TURN		GEOM		WEAR					
ROUGH FACE		X	0.000	U	0.000						
		Z	87.780	W	1.000						
		R	0.000	Q	0.000						
		T	4								
		H	0.000	J	0.000						
003		TURN		GEOM		WEAR					
ROUGH O.D.		X	2.000	U	0.000						
		Z	0.000	W	-0.100						
		R	2.000	Q	0.000						
		T	2								
		H	0.000	J	0.000						
004		TURN		GEOM		WEAR					
ROUGH I.D.		X	-15.780	U	0.000						
		Z	111.510	W	0.150						
		R	0.000	Q	0.000						
		T	1								
		H	0.000	J	0.000						
005		TURN		GEOM		WEAR					
NECKING OD		X	0.000	U	0.000						
		Z	0.000	W	0.000						
		R	0.400	Q	0.000						
		T	3								
		H	5.000	J	0.000						
				ABSOLUTE		MACHINE					
				X	298.000	X	0.000				
				Z	500.100	Z	0.000				
				C	246.933	C	246.933				
GEOMETRY : X =											
TYPE		NAME		TIP FORM							
/1		/2		/3		/4		/5			
Q-SETTER		DATA		REPEAT		CLEAR					
/6		/7		/8		/9		/0			

Fig. 5-2(a) Q Setter Screen

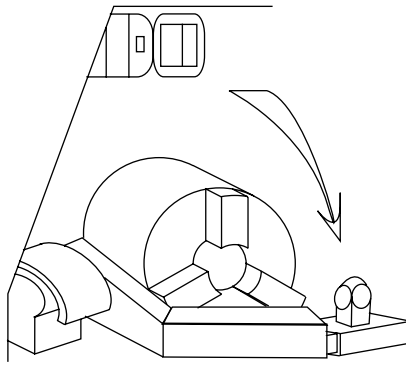


Fig. 5-2(b)

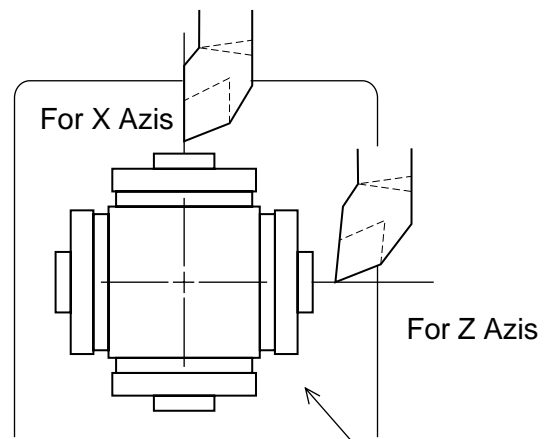


Fig. 5-2(c)

Sensor
Base

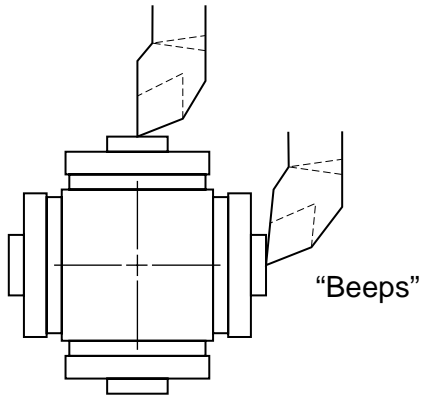


Fig. 5-2(d)

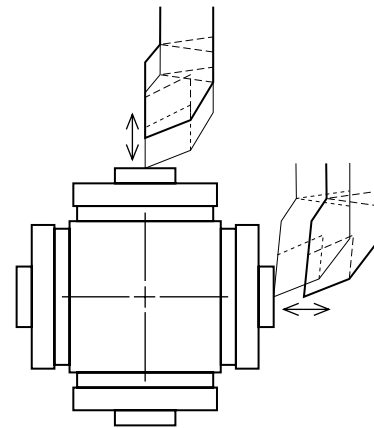


Fig. 5-2(e)

For Left-
handed O.D.
Tool

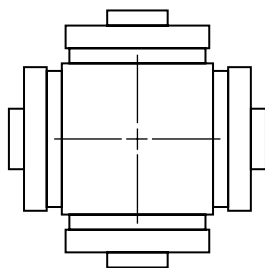
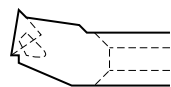


Fig. 5-2(f)



For Right-handed
O.D. Tool



For Boring
Bar

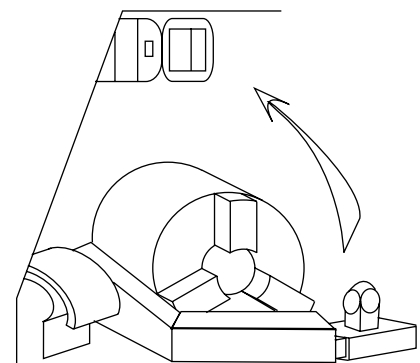


Fig. 5-2(g)

5-3 Tool Nose Point Interlock

Bringing the tool into contact with the sensor stops the axis and checks the tool nose point. When the contact directions and tool nose point conditions shown in the table below are not met, an interlock is applied to an input of tool offset amount to disable a write.

The tool nose point for tool nose point interlock is that for the offset number currently selected.

Table 5-3

Tool Nose Point Contact Direction	1	2	3	4	5	6	7	8	9	0
+ X	×	×	○	○	×	×	×	○	○	○
- X	○	○	×	×	×	○	×	×	○	○
+ Z	×	○	○	×	×	×	○	×	○	○
- Z	○	×	×	○	○	×	×	×	○	○

The contact
and move

○ : Write enabled

× : Write disabled

Note) To enable this interlock, it is necessary to set "1" in the bit 4 of H_PARA [3].

5-4 Related Parameters

(1) Parameters for the tool (offset) memory

With signed parameters, set the distances from the reference tool nose position to the respective contact surfaces at the machine origin.

MD62200[4], [5] Q setter contact surface amount on the "+" side (inside)

MD62200[6], [7] Q setter contact surface amount on the "-" side (outside)

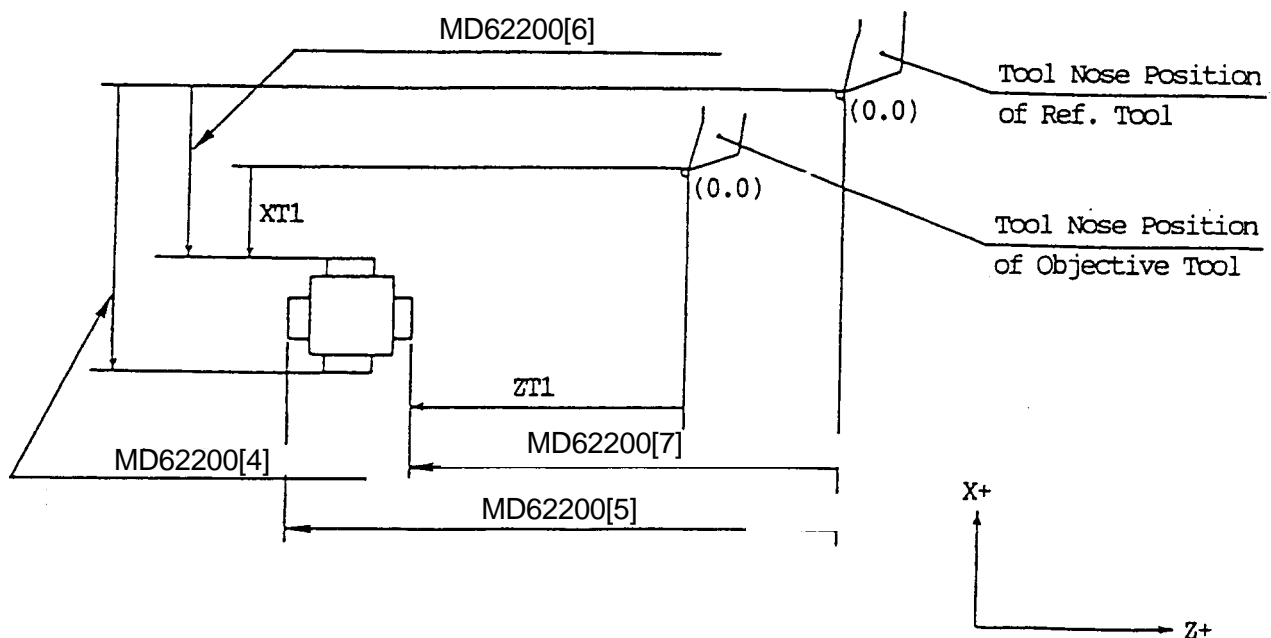


Fig. 5-4 Parameters for the Tool (offset) Memory

Calculate the tool offset amount by the following formula.

Tool offset amount = Skipped machine coordinate value – Q-setter contact surface amount parameter

(2) Tool nose point interlock

Bit 4 of No.8003 Q setter interlock

0: Disabled

1: Enabled

(3) Retouch return amount

MD6200[2] Retouch return amount of the setters

5-5 Related Alarms

No.67114 A tool nose point interlock is being applied with the Q setter.

6. Q setter barrier

6-1 Outline

After measuring the tool compensation amount using the quick tool setter function, if the tool is made to escape in the direction of the reference point, it may touch the touch sensor, depending on the tool diameter.

For instance, if the tool shape is as shown in Fig. 6-1, after measuring the tool compensation amount by means of the sensor in the X+ direction, if the tool is immediately returned to the reference point from this position, the tool nose may touch the touch sensor.

To prevent such occurrences, there is a function that sets up a barrier area near the touch sensor and prohibits motions such as return to the reference point when the nose position has entered this area. Thus, this function prevents damage to the touch sensor. However, it is based on the condition that the offset value is properly entered for both X and Y directions.

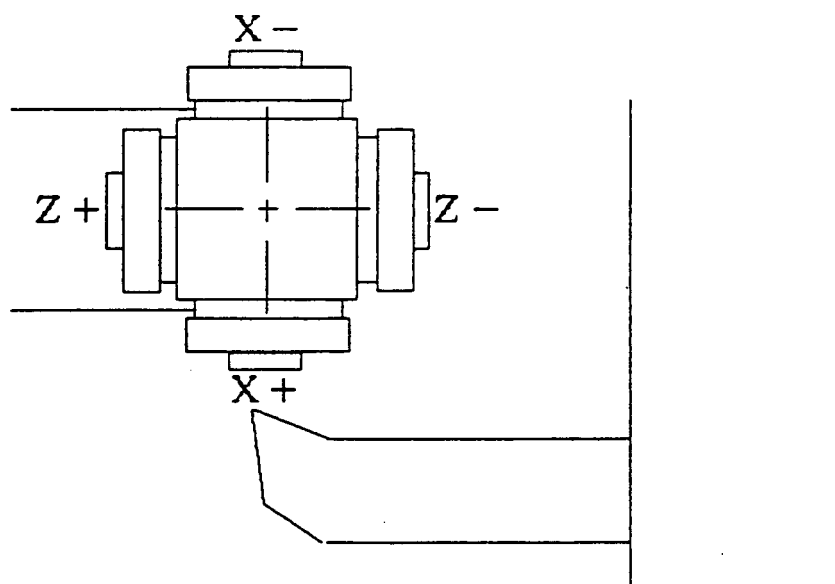


Fig. 6-1 Outline of Q Setter Barrier

6-2 Description of the function

- (1) When the tool setter arm descends and enters the Q setter mode, the control equipment checks whether the tool is within the Q setter barrier area by performing the calculations given below.

X value of machine coordinate system \leq MD6200[8] + Tool compensation amount X

AND

Z value of machine coordinate system \leq MD6200[9] + Tool compensation amount Z

when the above equations are satisfied, the control equipment judges the tool to be within the barrier area. (Fig. 6-2)

The tool compensation amount is calculated as the sum of the shape of compensation number currently selected and the wear.

- (2) When the tool is in the barrier area, the signal given below is output to the PLC.

PLC address

Q setter barrier area in-signal \$A_OUT[26] (DB10.DBX192.1)

Using this signal, process the reference point return interlock and message display with in the barrier area.

Return the arm of the tool setter. When the Q setter mode is terminated, this signal becomes "0" even if the tool is within the barrier area.

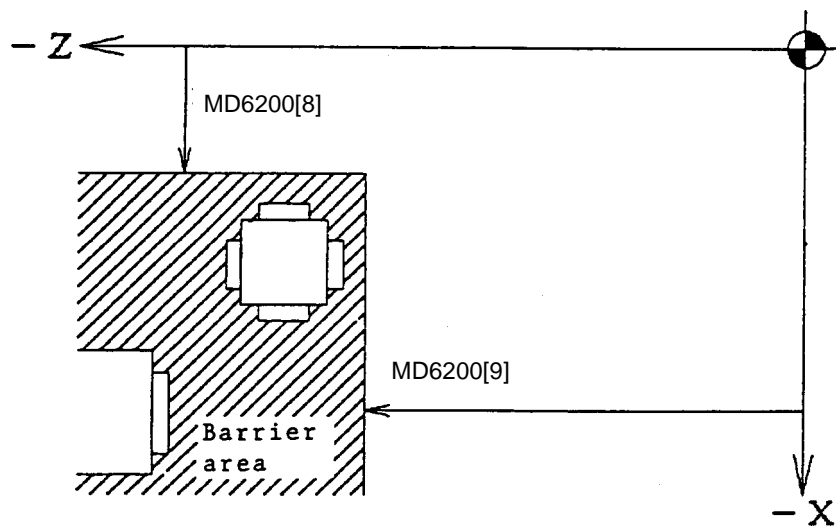


Fig. 6-2 Q Setter Barrier Area

6-3 Precautions

- (1) Positions above the barrier line is taken as positions within the barrier area.
- (2) After tool replacement, check will be performed using the previous tool compensation amount, until the new tool compensation amount is written.

6-4 Related parameters

- (1) Q setter barrier value
MD6200[8], [9] Q setter barrier value (X, Z)
- (2) Q setter barrier check
Bit 7 of No.8003
Q setter barrier check is an given below.
0: Ineffective
1: Effective

7. Q Setter Repeat Function

7-1 Outline

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.

7-2 Operation

- 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.

The screenshot displays the 'Q SETTER REPEAT' screen with a top status bar showing 'JOG', 'RESET', 'DryRun', 'Lock', 'Chuck IN', and 'N0000'. The main area is titled 'TURRET STATUS' and contains a table of turret and tool data, a diagram of the turret, and various measurement and wear data fields.

TURRET	TOOL	TOOL NAME	MEASURE
1	1	ROUGH FACE	
2	2	ROUGH I.D.	
3	3	ROUGH O.D.	
4	4	ROUGH I.D.	
5	5	OD FORM	+X +Z
6	6	ROUGH I.D.	
7	7	GRV. EXT.	
8	8	GRV. INT.	
9	9	FINISH OD	
10	10	FINISH ID	+X +Z -X -Z
11	11	EXT. THREAD	
12	12	INT. THREAD	

The diagram shows a top-down view of the turret with axes labeled: -X, +Z, -Z, and +X.

Below the table, there are fields for '001 TURN' (ROUGH FACE), 'GEOM.' (X: 0.000, Z: 10.000, R: 0.312, T: 3.000, H: 0.000), and 'WEAR' (U: 0.000, W: 0.000, Q: 0.000, J: 0.000). A small image of a tool tip is shown next to the 'GEOM.' fields.

On the right, 'ABSOLUTE' coordinates are shown: X 490.586, Z 244.857. 'MACHINE' coordinates are shown: X 45.293, Z 44.857.

A message box at the bottom right states: 'Failed in reading information. Please display the screen again.'

The bottom of the screen features a row of buttons: /1, /2, /3, START /4, STOP /5, EXIT /6, DELETE /7, SPARE TO /8, OL /9, and /0.

Fig. 7-2 Q Setter Repeat Screen

7-2-1 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.

7-3 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).

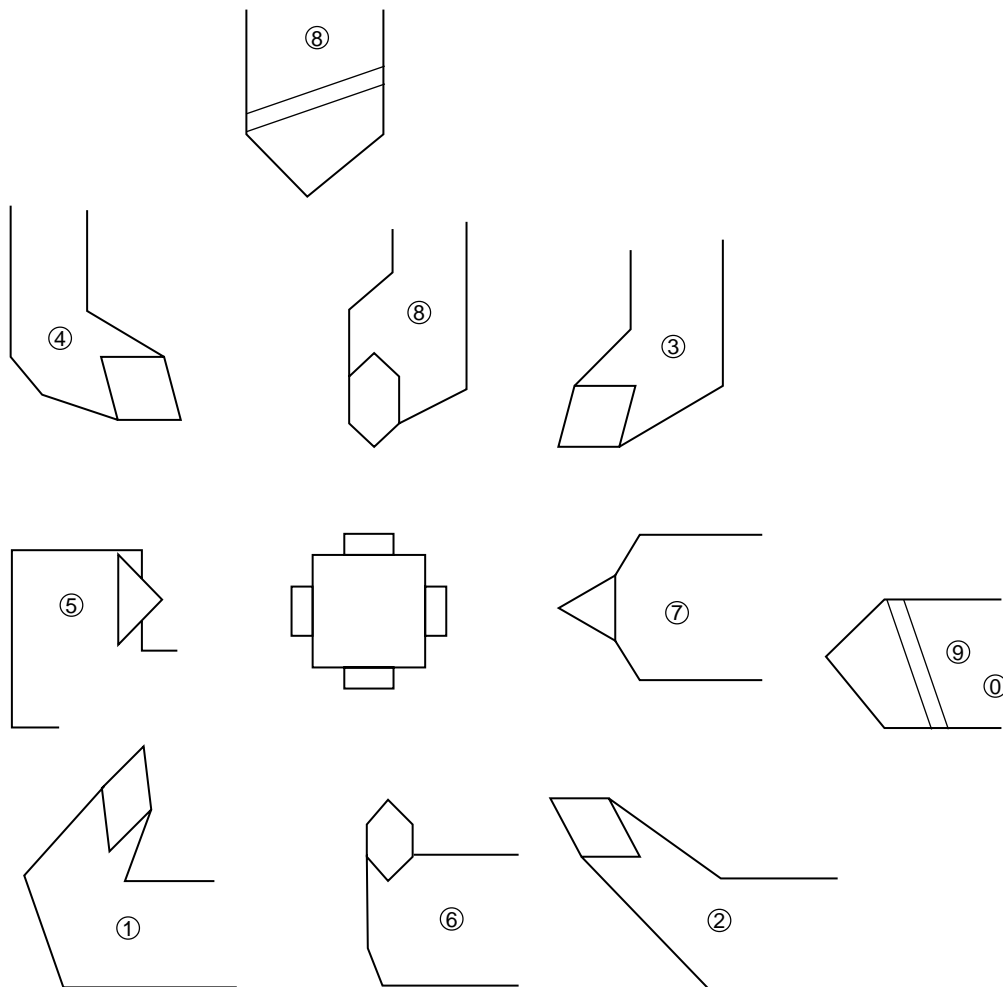


Fig. 7-3(a) Virtual Nose Points of Tools

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 (P1).
- (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.

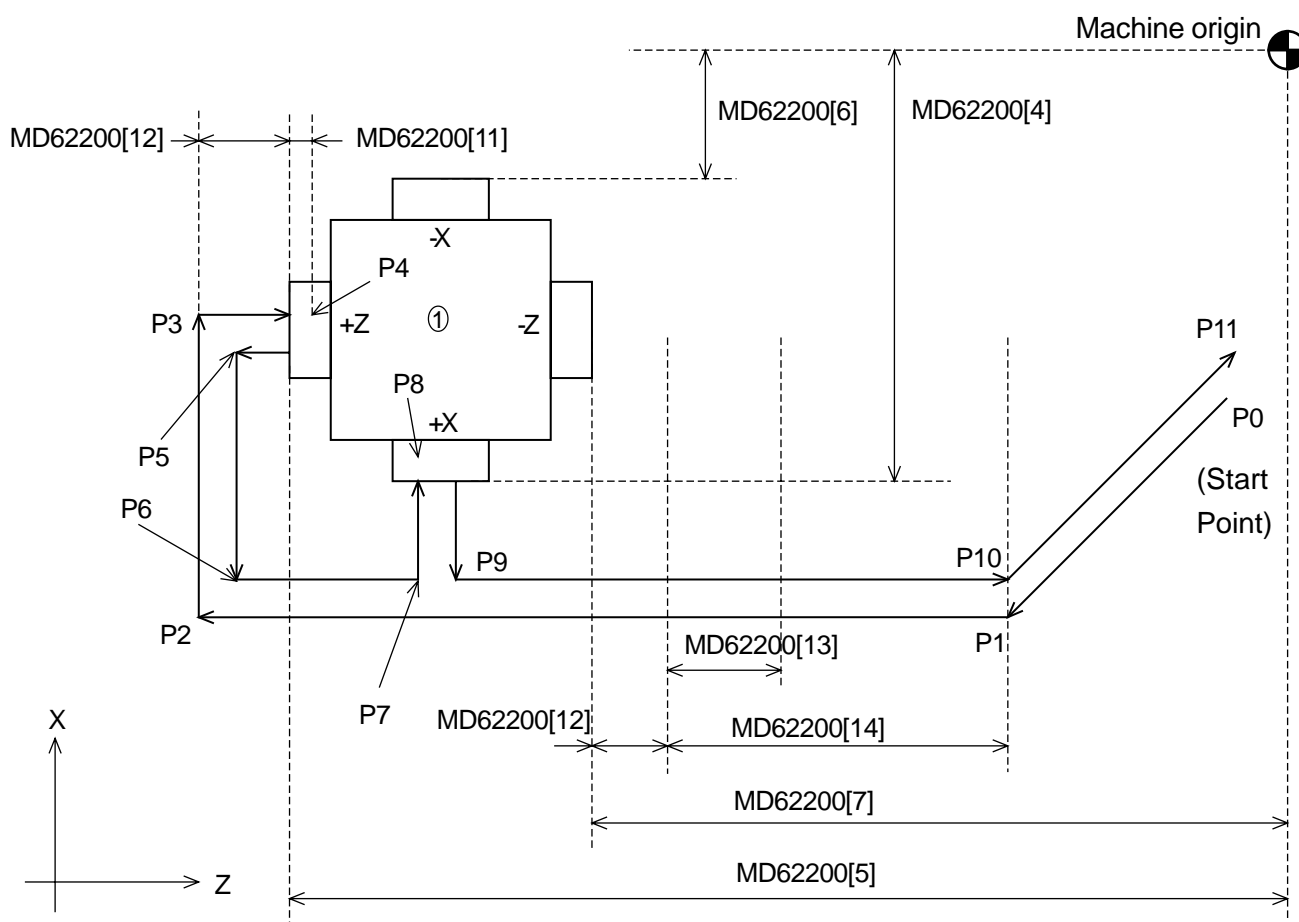


Fig. 7-3(b) Working with Virtual Nose Point 1

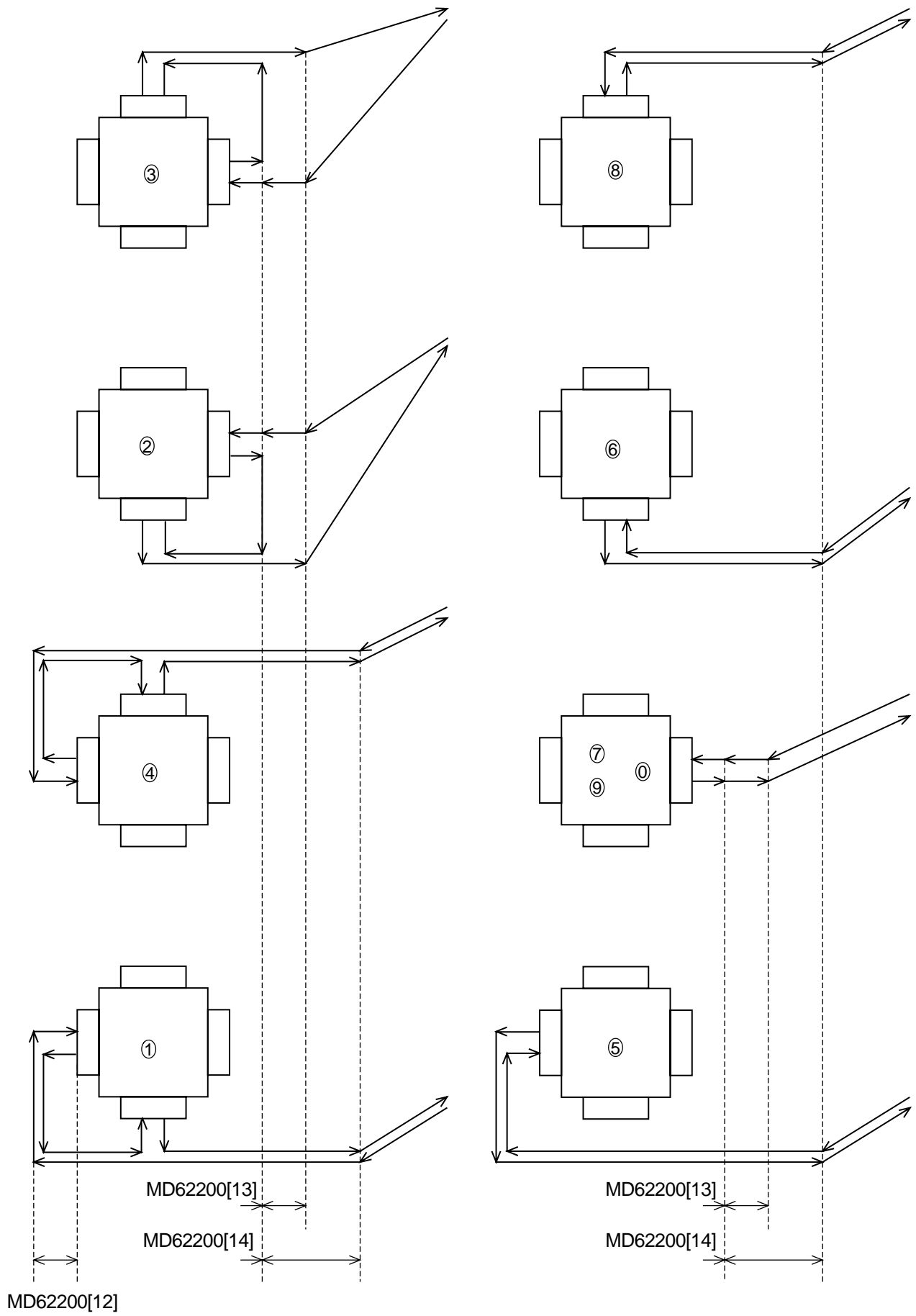


Fig. 7-3(c) Working PatternsFig.

7-4 Precaution

- (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.

7-5 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).

7-6 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.

8. Simple Jaw Edge Forming Function

8-1 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.

8-2 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/CUT PATH CHECK** in MDI mode, check the locus of a working program. If not in MDI mode, “Set MDI mode” message is displayed. While in locus 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 locus 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.

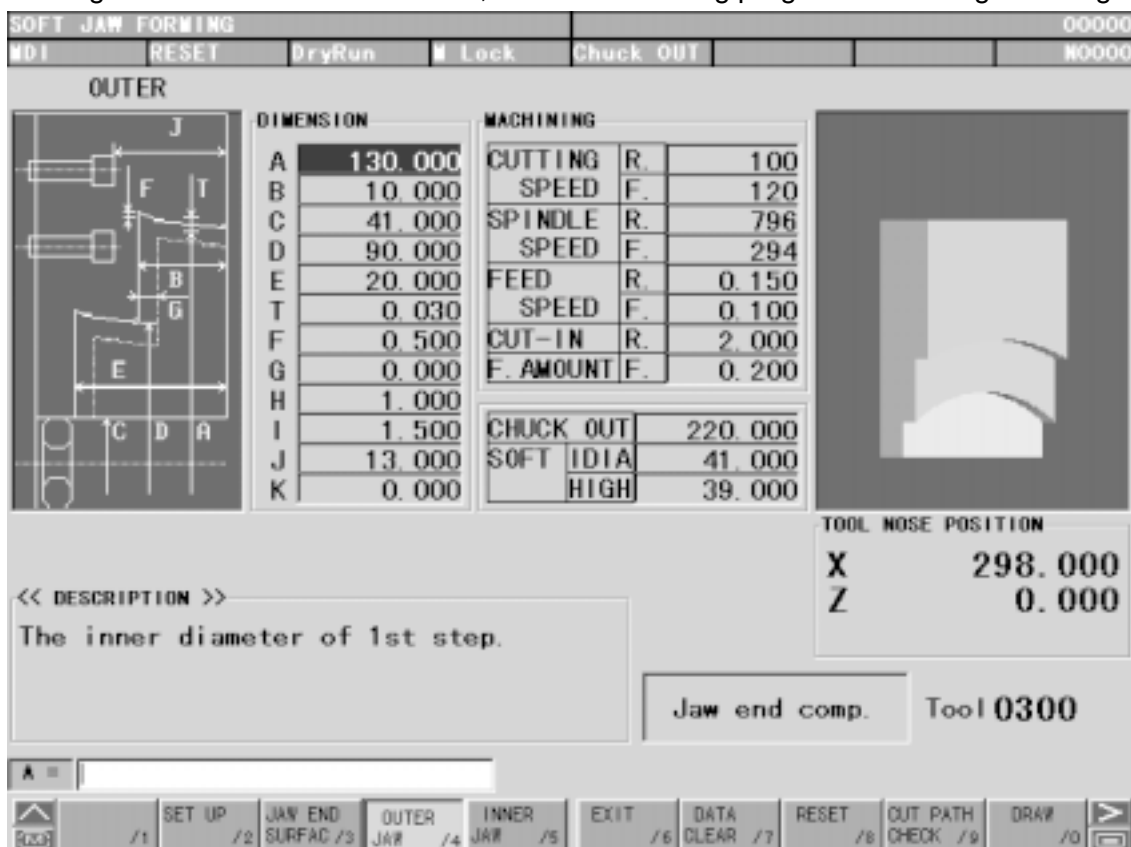
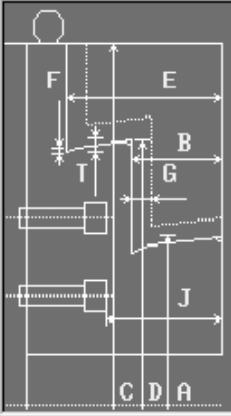


Fig. 8-2(a) Jaw Edge Forming (Outer Jaw)

SOFT JAW FORMING				00000			
MDI	RESET	DryRun	Lock	Chuck OUT			N0000


INNER



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	220.000
SOFT IDIA	41.000
HIGH	39.000



<< DESCRIPTION >>

The outer diameter of 1st step.

TOOL NOSE POSITION

X 298.000

Z 0.000

Jaw end comp.

Tool 0300

A =

/1	SET UP	/2	JAW END SURFAC	/3	OUTER JAW	/4	INNER JAW	/5	EXIT	/6	DATA CLEAR	/7	RESET	/8	CUT PATH CHECK	/9	DRAW	/0
----	--------	----	----------------	----	-----------	----	-----------	----	------	----	------------	----	-------	----	----------------	----	------	----

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

8-3 Function Keys

- 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/CUT PATH CHECK : A locus of a working program is drawn.
- F0/JAW CONTOUR DRAWING: You can turn, enlarge and contract the picture of the jaw contour.

8-4 Jaw Configuration And Machining Conditions

(1) JAW CONFIGURATION

The symbols of jaw configurations indicate the following:

- A : Inner diameter for 1st stage
- B : Depth for 1st stage
- C : Core metal diameter
- D : Inner diameter for 2nd stage
- E : Depth for 2nd stage (With 0 setting, one-stage jaw is obtained.)
- T : Grip part taper amount
- F : Necking depth
- G : Max. Value of stock allowance
- H : Setting of chamfering amount
- I : Setting of necking width (clearance)
- J : Bolt position 1
- K : Jaw extrusion from chuck outer face is input in +/- . (Chuck outer diameter taken as reference)

(2) MACHINING CONDITIONS

- | | |
|----------------------|---|
| Cutting speed | Rough: Cutting speed for rough cutting (m/min) |
| Cutting speed | Finish: Cutting speed for finishing (m/min) |
| Number of revolution | Rough: Number of revolution for rough cutting (rpm)
(Automatically calculated from cutting speed.) |
| Number of revolution | Finish: Number or revolution for finishing (rpm)
(Automatically calculated from cutting speed.) |
| Feed speed | Rough: Feed speed for rough cutting (mm/rev) |
| Feed speed | Finish: Feed speed for finishing (mm/rev) |
| Cut depth | Rough: Depth of cut for rough cutting (mm)
(With 0 setting, finishing alone is performed.) |
| Finishing Allowance | Finish: finishing allowance for finishing (mm)
(With 0 setting, finishing alone is performed.) |

8-5 Precaution

- (1) Before executing soft jaw forming, set a jaw end surface position. When locus checking or soft jaw forming is executed without a edge position being set, warning takes place.
- (2) Clamp max. spindle rpm is Soft Jaw Forming mode to the parameter set value.
- (3) When E and D value is 0, it gets 1-stage edge.
- (4) When a locus is not clearly displayed, reduce speed with the feed speed switch.
- (5) In order to perform necking, pay attention to the tip shape.
- (6) When the machine is provided with the Y-axis, it must be in the following conditions when starting soft jaw forming.
 - The Y-axis is at the origin. (The ORIGIN lamp is ON)
 - The Y-axis tool offset amount for the Y-axis is 0. (Both shape and Wear are 0)

8-6 Relevant Parameters

(GUD)	(Reference Values)
H_NAMA[35] Feed rate magnification in unload cutting of soft jaw forming	
H_NAMA[34] Max. spindle rpm of soft jaw forming	(1000rpm)
H_NAMA[31] Approach amount on finishing in soft jaw forming	(10.000mm)
H_NAMA[33] Soft jaw forming clearance	(2.000mm)
H_NAMA[32] Approach amount on clearance in soft jaw forming	

8-7 Relevant Alarms

No.66270 Soft jaw error

Numerals following “#” tells details of the alarm as follows:

Table 8-7 Relevant Alarms

#001	$A \leq 0$ (A: 1st stage inner dia./outer dia.)
#002	$B \leq 0$ (B: 1st stage depth)
#003	$C \leq 0$ (C: Core bar dia.)
#004	$D \leq 0$ (D: 2nd stage inner dia./outer dia.)
#005	$E \leq 0$ (E: 2nd stage depth)
#006	$T < 0$ (T: Grip part taper amount)
#007	$F < 0$ (F: Necking depth)
#008	$G < 0$ (G: Max. value of stock allowance)
#009	$H < 0$ (H: Chamfering amount)
#010	$I \geq 0$ (I: Necking width)
#011	$C \leq A$ (Core bar dia. \geq 1st stage inner dia.)
#012	$C \geq A$ (Core bar dia. \leq 1st stage outer dia.)
#013	$D \leq A$ (2nd stage \geq 1st stage inner dia.)
#014	$D \geq A$ (2nd stage \leq 1st stage outer dia.)
#015	$C \leq D$ (Core bar dia. \geq 2nd stage inner dia.)
#016	$C \geq D$ (Core bar dia. \leq 2nd stage outer dia.)
#017	$B \leq E$ (1st stage \geq 2nd stage depth)
#018	Chamfering is too large.
#019	Necking width is too large.
#020	Bolt interference has occurred.
#101	cutting rate (rough) ≤ 0
#102	cutting rate (finish) ≤ 0
#103	Feed rate (rough) ≤ 0
#104	Feed rate (finish) ≤ 0
#105	Depth of cut
#106	Finish amount < 0
#107	Chuck outer diameter < 0
#108	Bolt barrier: Jaw bolt hole pitch < 0
#109	Bolt barrier: Bolt hole center < 0
#110	Bolt barrier: Spot facing diameter < 0
#111	Approach amount < 0
#112	Clearance amount < 0
#113	Relief amount < 0
#114	Spindle clamp speed < 0
#901	Jaw contour not determined.
#902	Starting up from other than the soft jaw forming screen.

8-8 Set Values for Standard Soft Jaws

8-8-1 Metric Specifications

(1) ST200, ST250

Table 8-8-1 Set Values for Standard Soft Jaws (Metric Specifications)

Model Item			ST200		ST250			
			Outer Jaw	Inner Jaw	Outer Jaw	Inner Jaw	Outer Jaw	Inner Jaw
Jaw Configuration	A		130.0 mm	130.0 mm	150.0 mm	150.0 mm		
	B		10.0 mm	10.0 mm	10.0 mm	10.0 mm		
	C		41.0 mm	220.0 mm	68.0 mm	254.0 mm		
	D		90.0 mm	205.0 mm	100.0 mm	240.0 mm		
	E		20.0 mm	20.0 mm	20.0 mm	20.0 mm		
	T		0.03 mm	0.03 mm	0.03 mm	0.03 mm		
	F		0.5 mm	0.5 mm	0.5 mm	0.5 mm		
	G		0.0 mm	0.0 mm	0.0 mm	0.0 mm		
	H		1.0 mm	1.0 mm	1.0 mm	1.0 mm		
	I		1.5 mm	1.5 mm	1.5 mm	1.5 mm		
	J		13.0 mm	13.0 mm	15.0 mm	15.0 mm		
	K							
Working conditions	Cutting Speed	Rough	100m/min	100m/min	100m/min	100m/min		
		Finish	120m/min	120m/min	120m/min	120m/min		
	RPM	Rough	Automatically Calculated.	Automatically Calculated.	Automatically Calculated.	Automatically Calculated.		
		Finish	Automatically Calculated.	Automatically Calculated.	Automatically Calculated.	Automatically Calculated.		
	Feed Speed	Rough	0.15mm/rev	0.15mm/rev	0.15mm/rev	0.15mm/rev		
		Finish	0.10mm/rev	0.10mm/rev	0.10mm/rev	0.10mm/rev		
	Depth of Cut	Rough	2.0 mm	2.0 mm	2.0 mm	2.0 mm		
	Stock Allowance	Finish	0.2 mm	0.2 mm	0.2 mm	0.2 mm		
Soft Jaw		Outer Dia.	220.0 mm	220.0 mm	254.0 mm	254.0 mm		
		Inner Dia.	41.0 mm	41.0 mm	68.0 mm	68.0 mm		
		Height	39.0 mm	39.0 mm	41.0 mm	41.0 mm		
Jaw Bolt Hole Pitch H_NAMA[28]			25.0 mm		32.0 mm			
Bolt Center Pos. from Jaw Surface H_NAMA[29]			15.0 mm		16.0 mm			
Bolt Spot Facing Dia. H_NAMA[30]			19.5 mm		19.5 mm			

8-8-2 Inch Specifications

(1) ST200, ST250

Table 8-8-2 Set Values for Standard Soft Jaws (Inch Specifications)

Model Item			ST200		ST250			
			Outer Jaw	Inner Jaw	Outer Jaw	Inner Jaw	Outer Jaw	Inner Jaw
Jaw Configuration	A		5.00 inch	5.00 inch	6.00 inch	6.00 inch		
	B		0.40 inch	0.40 inch	0.40 inch	0.40 inch		
	C		1.60 inch	8.66 inch	2.68 inch	10.0 inch		
	D		3.50 inch	8.00 inch	4.00 inch	9.50 inch		
	E		0.80 inch	0.80 inch	0.80 inch	0.80 inch		
	T		0.001 inch	0.001 inch	0.001 inch	0.001 inch		
	F		0.02 inch	0.02 inch	0.02 inch	0.02 inch		
	G		0.00 inch	0.00 inch	0.00 inch	0.00 inch		
	H		0.04 inch	0.04 inch	0.04 inch	0.04 inch		
	I		0.06 inch	0.06 inch	0.06 inch	0.06 inch		
	J		0.51 inch	0.51 inch	0.59 inch	0.59 inch		
	K							
Working conditions	Cutting Speed	Rough Finish	300ft/min 400ft/min	300ft/min 400ft/min	300ft/min 400ft/min	300ft/min 400ft/min		
	RPM	Rough	Automatically Calculated.	Automatically Calculated.	Automatically Calculated.	Automatically Calculated.		
		Finish	Automatically Calculated.	Automatically Calculated.	Automatically Calculated.	Automatically Calculated.		
	Feed Speed	Rough Finish	0.006in/rev 0.004in/rev	0.006in/rev 0.004in/rev	0.006in/rev 0.004in/rev	0.006in/rev 0.004in/rev		
	Depth of Cut	Rough	0.08 inch	0.08 inch	0.08 inch	0.08 inch		
	Stock Allowance	Finish	0.008 inch	0.008 inch	0.008 inch	0.008 inch		
Soft Jaw		Outer Dia.	8.66 inch	8.66 inch	10.00 inch	10.00 inch		
		Inner Dia.	1.60 inch	1.60 inch	2.68 inch	2.68 inch		
		Height	1.54 inch	1.54 inch	1.60 inch	1.60 inch		
Jaw Bolt Hole Pitch H_NAMA[28]			1.00 inch		1.26 inch			
Bolt Center Pos. from Jaw Surface H_NAMA[29]			0.60 inch		0.63 inch			
Bolt Spot Facing Dia. H_NAMA[30]			0.77 inch		0.77 inch			

8-9 Operation Of Simple Soft Jaw Forming Function

(1) Outer 1 stage jaw

Table 8.9 (a) Operation of simple soft jaw forming function (outer 1 stage jaw)

Process	Command	Description
1	G18	Z-X plane selection.
2	G99 Fxx	Every revolution, feed speed of roughing.
3	G96 Sxx	Constant surface speed, cutting speed of roughing.
4	G50 Sxx	Spindle rpm clamp, soft jaw forming spindle max. rpm (H_NAMA[34])
5	M03	Spindle forward rotation.
6	G00 Xxx Zxx	Approach to the point immediately before the jaw end surface (Jaw end surface + H_NAMA[31])
7		When cut-in amount=0, no roughing → to process 21.
8		Roughing end position is reached in the next cut-in → to process 16.
9	G01 Xxx Fxx	Deepen the cut-in to X by 1 cut (D)/dry cutting speed.
10		No dry cutting section → to process 12.
11	G01 Zxx	Dry cutting.
12	G01 Zxx Fxx	Rough cutting/feed speed of roughing.
13	G01 Uxx Wxx Fxx	Relief (Relieve amount = H_NAMA[33])
14	G00 Zxx	Return.
15		→ to process 8.
16	G01 Xxx Fxx	To the roughing last X position.
17	G01 Zxx Fxx	To the jaw end surface/feed speed of roughing.
18	G01 Xxx Zxx	Cutting of taper.
19	G01 Uxx Wxx Fxx	Relief.
20	G00 Zxx	Return.
21	G99 Sxx	Surface speed constant control/cutting speed of finishing.
22	G01 Xxx Fxx	Approach to finishing.
23	G01 Zxx Fxx	To jaw end surface/feed speed of finishing.
24	G01 Xxx Fxx	Chamfering.
25	G01 Xxx Zxx	Cutting of taper.
26		No necking → to process 31.
27	G96 Sxx	Constant surface speed control/cutting speed of roughing.
28	G01 Xxx	Necking.
29	G01 Zxx	Necking.
30	G96 Sxx	Constant surface speed control/cutting speed of finishing.
31	G01 Uxx Wxx Fxx	Relief.
32	G01 Xxx	Relief.
33	G01 Zxx	Approach to cutting of end surface.
34	G01 Xxx Fxx	Cutting of end surface/feed speed of finishing.
35	G01 Uxx Wxx Fxx	Relief.
36	G00 Xxx Zxx	Return to front of jaw end surface.
37	G00 Xxx Zxx	Return to starting point.
38	M05	Spindle stop.
39	G97	Constant surface speed cancel.
40	M30	Soft jaw forming end.

(2) Outer 2 stage Jaw

Table 8-9 (b) Operation of simple soft jaw forming function (outer 2 stage jaw)

Process	Command	Description
1	G18	Z-X plane selection.
2	G99 Fxx	Every revolution, feed speed of roughing.
3	G96 Sxx	Constant surface, cutting speed of roughing.
4	G50 Sxx	Spindle rpm clamp, soft jaw forming spindle max. rpm (H\NAMA[34]).
5	M03	Spindle forward rotation.
6	G00 Xxx Zxx	Approach to the point immediately before the jaw end surface (Jaw end surface + H_NAMA[31]).
7		When cut-in amount=0, no roughing → to process 32.
8		Roughing end position is reached in the next cut-in → to process 22.
9	G01 Xxx Fxx	Deepen the cut-in to X by 1 cut (D)/dry cutting speed.
10		No dry cutting section → to process 12.
11	G01 Zxx	Dry cutting
12	G01 Xxx Fxx	Rough cutting/feed speed of roughing.
13		When X current position = D - finishing amount, → to process 18.
14		When X current position < D - finishing amount, → to process 19.
15		When cutting of 2nd stage taper is finished, → to process 19.
16	G01 Xxx	To the height of 2nd stage taper.
17	G01 Zxx	To the starting point of 2nd stage taper.
18	G01 Xxx Zxx	Cutting of 2nd stage taper.
19	G01 Uxx Wxx Fxx	Relief.
20	G00 Zxx	Return.
21		→ to process 8.
22	G01 Xxx Fxx	To the roughing last X position.
23	G01 Zxx Fxx	To jaw end surface/feed speed of roughing.
24	G01 Xxx Zxx	Cutting of taper.
25	G01 Uxx Wxx Fxx	Relief.
26		When cutting of 2nd stage taper is finished, → to process 31.
27	G01 Xxx	To the height of 2nd stage taper.
28	G01 Zxx	To the starting point of 2nd stage taper.
29	G01 Xxx Zxx	Cutting of 2nd stage taper.
30	G01 Uxx Wxx Fxx	Relief.
31	G01 Zxx	Return..
32	G96 Sxx	Constant surface speed control/cutting speed of finishing.
33	G01 Xxx Zxx	Approach to finishing.
34	G01 Zxx Fxx	To jaw end surface/feed speed of finishing.
35	G01 Xxx Zxx	Chamfering.
36	G01 Xxx Zxx	Cutting of taper.
37		No necking → to process 42.
38	G96 Sxx	Constant surface speed control/cutting speed of roughing.
39	G01 Xxx	Necking.
40	G01 Zxx	Necking.

41	G96 Sxx	Constant surface speed control/cutting speed of finishing.
42	G01 Uxx Wxx Fxx	Relief.
43	G01 Xxx	Relief.
44	G01 Zxx	Approach to end surface cutting.
45	G01 Xxx Fxx	End surface cutting/feed speed of finishing.
46	G01 Uxx Wxx Fxx	Relief.
47	G01 Xxx Fxx	Approach to 2nd stage chamfering.
48	G01 Zxx Fxx	To 2nd stage end surface/feed speed of finishing.
49	G01 Xxx Zxx	2nd stage chamfering.
50	G01 Xxx Zxx	Cutting of 2nd stage taper.
51		No necking → to process 56.
52	G96 Sxx	Constant surface speed control/cutting speed of roughing.
53	G01 Xxx	Necking.
54	G01 Zxx	Necking.
55	G96 Sxx	Constant surface speed control/cutting speed of finishing.
56	G01 Uxx Wxx Fxx	Relief.
57	G01 Xxx	Relief.
58	G01 Zxx	Approach to end surface cutting.
59	G01 Xxx Fxx	End surface cutting/feed speed of finishing.
60	G01 Uxx Wxx Fxx	Relief.
61	G00 Xxx Zxx	Return to the front of jaw end surface.
62	G00 Xxx Zxx	Return to the starting point.
63	M05	Spindle stop.
64	G97	Constant surface speed control cancel.
65	M30	Soft jaw forming end.

(3) Inner 1 stage Jaw

Table 8-9 (c) Operation of simple soft jaw forming function (inner 1 stage jaw)w)

Process	Command	Description
1	G18	Z-X plane selection.
2	G99 Fxx	Every revolution, feed speed of roughing.
3	G96 Sxx	Constant surface speed, cutting speed of roughing.
4	G50 Sxx	Spindle rpm clamp, soft jaw forming spindle max. rpm (H_NAMA[34])
5	M03	Spindle forward rotation.
6	G23	Stroke limit check 2,3 off.
7	G00 Xxx Zxx	Approach to the front of jaw end surface (Jaw end surface + H_NAMA[31])
8		When cut-in amount=0, no roughing → to process 22.
9		Roughing end position is reached in the next cut-in → to process 17.
10	G01 Xxx Fxx	Deepen the cut-in to X by 1 cut (D)/dry cutting speed.
11		No dry cutting section → to process 13.
12	G01 Zxx	Dry cutting.
13	G01 Zxx Fxx	Rough cutting/feed speed of roughing.
14	G01 Uxx Wxx Fxx	Relief (Relieve amount = H_NAMA[33])
15	G00 Zxx	Return.
16		→ to process 9.
17	G01 Xxx Fxx	To the roughing last X position.
18	G01 Zxx Fxx	To the jaw end surface/feed speed of roughing.
19	G01 Xxx Zxx	Cutting of taper.
20	G01 Uxx Wxx Fxx	Relief.
21	G00 Zxx	Return.
22	G99 Sxx	Constant surface speed control/cutting speed of finishing.
23	G01 Xxx Fxx	Approach to finishing.
24	G01 Zxx Fxx	To jaw end surface/feed speed of finishing.
25	G01 Xxx Zxx	Chamfering.
26	G01 Xxx Zxx	Cutting of taper.
27		No necking → to process 32.
28	G96 Sxx	Constant surface speed control/cutting speed of roughing.
29	G01 Xxx	Necking.
30	G01 Zxx	Necking.
31	G96 Sxx	Constant surface speed control/cutting speed of finishing.
33	G01 Uxx Wxx Fxx	Relief.
33	G01 Xxx	Relief.
34	G01 Zxx	Approach to cutting of end surface.
35	G01 Xxx Fxx	Cutting of end surface/feed speed of finishing.
36	G01 Uxx Wxx Fxx	Relief.
37	G00 Xxx Zxx	Return to the front of jaw end surface.
38	G00 Xxx Zxx	Return to starting point.
39	G22	Stroke limit check 2,3 on.
40	M05	Spindle stop.
41	G97	Constant surface speed cancel.
42	M30	Soft jaw forming end.

(4) Inner 2 stage Jaw

Table 8-9 (d) Operation of simple soft jaw forming function (inner 2 stage jaw)

Process	Command	Description
1	G18	Z-X plane selection.
2	G99 Fxx	Every revolution, feed speed of roughing.
3	G96 Sxx	Constant surface, cutting speed of roughing.
4	G50 Sxx	Spindle rpm clamp, soft jaw forming spindle max. rpm (H_NAMA[34]).
5	M03	Spindle forward rotation.
6	G22	Stroke limit check 2,3 off.
7	G00 Xxx Zxx	Approach to the point immediately before the jaw end surface (Jaw end surface + H_NAMA[31]).
8		When cut-in amount=0, no roughing → to process 33.
9		Roughing end position is reached in the next cut-in → to process 23.
10	G01 Xxx Fxx	Deepen the cut-in to X by 1 cut (D)/dry cutting speed.
11		No dry cutting section → to process 13.
12	G01 Zxx	Dry cutting
13	G01 Zxx Fxx	Rough cutting/feed speed of roughing.
14		When X current position = D - finishing amount, → to process 19.
15		When X current position < D - finishing amount, → to process 20.
16		When cutting of 2nd stage taper is finished, → to process 20.
17	G01 Xxx	To the height of 2nd stage taper.
18	G01 Zxx	To the starting point of 2nd stage taper.
19	G01 Xxx Zxx	Cutting of 2nd stage taper.
20	G01 Uxx Wxx Fxx	Relief.
21	G00 Zxx	Return.
22		→ to process 9.
23	G01 Xxx Fxx	To the roughing last X position.
24	G01 Zxx Fxx	To jaw end surface/feed speed of roughing.
25	G01 Xxx Zxx	Cutting of taper.
26	G01 Uxx Wxx Fxx	Relief.
27		When cutting of 2nd stage taper is finished, → to process 32.
28	G00 Xxx	To the height of 2nd stage taper.
29	G01 Zxx	To the starting point of 2nd stage taper.
30	G01 Xxx Zxx	Cutting of 2nd stage taper.
31	G01 Uxx Wxx Fxx	Relief.
32	G00 Zxx	Return.
33	G96 Sxx	Constant surface speed control/cutting speed of finishing.
34	G01 Xxx Fxx	Approach to finishing.
35	G01 Zxx Fxx	To jaw end surface/feed speed of finishing.
36	G01 Xxx Zxx	Chamfering.
37	G01 Xxx Zxx	Cutting of taper.
38		No necking → to process 43.

39	G96 Sxx	Constant surface speed control/cutting speed of roughing.
40	G01 Xxx	Necking.
41	G01 Zxx	Necking.
42	G96 Sxx	Constant surface speed control/cutting speed of finishing.
43	G01 Uxx Wxx Fxx	Relief.
44	G01 Xxx	Relief.
45	G01 Zxx	Approach to end surface cutting.
46	G01 Xxx Fxx	End surface cutting/feed speed of finishing.
47	G01 Uxx Wxx Fxx	Relief.
48	G01 Xxx Fxx	Approach to 2nd stage chamfering.
49	G01 Zxx Fxx	To 2nd stage end surface/feed speed of finishing.
50	G01 Xxx Zxx	2nd stage chamfering.
51	G01 Xxx Zxx	Cutting of 2nd stage taper.
52		No necking → to process 57.
53	G96 Sxx	Constant surface speed control/cutting speed of roughing.
54	G01 Xxx	Necking.
55	G01 Zxx	Necking.
56	G96 Sxx	Constant surface speed control/cutting speed of finishing.
57	G01 Uxx Wxx Fxx	Relief.
58	G01 Xxx	Relief.
59	G01 Zxx	Approach to end surface cutting.
60	G01 Xxx Fxx	End surface cutting/feed speed of finishing.
61	G01 Uxx Wxx Fxx	Relief.
62	G00 Xxx Zxx	Return to the front of jaw end surface.
63	G00 Xxx Zxx	Return to the starting point.
64	G22	Stroke limit check 2,3 on.
65	M05	Spindle stop.
66	G97	Constant surface speed control cancel.
67	M30	Soft jaw forming end.

III. II Screen Operation

- 1. Screen Layout and Basic Operation**
- 2. Operation of Overall Screen**
- 3. Position**
- 4. Work Coordinate (Offset)**
- 5. Set (Data)**
- 6. Macro Variable**
- 7. Plot**
- 8. Plot Parameters**
- 9. Tool (Offset)**
- 10. Alarm Diagnosis**
- 11. System**
- 12. Program**
- 13. Program List**
- 14. Input/Output**
- 15. Test Operation**
- 16. Manual Operation**
- 17. User Screen**
- 18. Q Setter Setting**
- 19. Ladder Live Line Display**

1. Screen Layout and Basic Operation

One screen fundamentally consists of the following (See Fig. 1-0):

- ① Main display area
- ② Machine status display area (including a screen title)
- ③ Program No. display area (No. O, No. N)
- ④ Key input area
- ⑤ Function menu display area

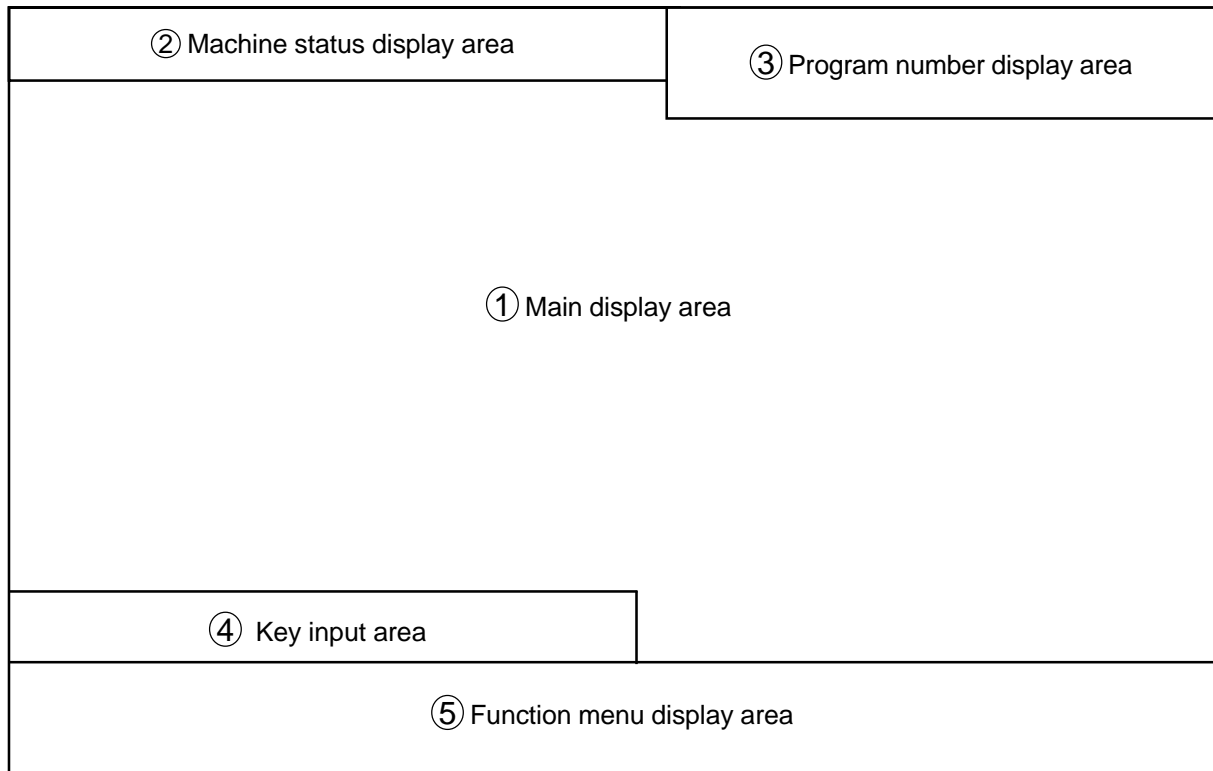




















Fig. 1-0 Configuration of basic screen

- In the overall screen, the tool data and command data are summarized.
- On certain screens, windows (small screens) may be overlapped and displayed, when a function menu key is pressed.
(As a rule, if the same key is pressed again, the window disappears.)
- By setting the time to transition to the Good Night screen, the screen can be blanked (darkened) if you do not operate any keys within that time.

1-1 Main Display Area

Although the design differs from one screen to another, the following describes a basic operating method.

-  /  (Cursor move keys)
Used to move the cursor up/down by one position. When the cursor is located at the top or bottom of the screen, the screen is scrolled by pressing them. The double-spread page such as parameters is not scrolled. They are also used to perform a search.
-  /  (Cursor move keys)
Used to move the cursor to the right/left by one position.
-  /  page keys)
Used to change pages when one page is not enough to display all. Here, the cursor refers to the character displayed in reverse video. Normally, it is surrounded by a yellow-frame guide line. The guide line is to indicate data connection; some screens do not have this. When the pages are changed, the cursor is moved to the beginning of the page. In addition, the following key combinations are available for special operations.
-   /  
Only the screen is scrolled without moving the cursor.
-  
Moves the page and cursor to the beginning of that screen.
-  
Moves the page and cursor to the end of that screen.
-   /  
Moves the cursor character by character in editing the program. This allows you to edit finely, not word by word.

1-2 Machine Status Display Area

Usually a screen title is displayed here, but once an alarm occurs when the program is running, its number and an abstract message are displayed. As it displays only one line, if several alarms occur at the same time, only the end one is displayed.

If you want to know the detailed information, turn the alarm diagnosis screen.

Besides, following status is also displayed.

- Dry run status.
- Machine lock status.
- Running mode.
- Running status.
- Chuck outer tightening, outer tightening.
- Q setter mode.

1-3 Program Number Display Area

Displayed in this area are the program number and sequence number being currently executed, and multiplicity and repeat frequency at subprogram call time.

Example) O1000 → O2000 → O3000

L = 10 N1234

O3000, N1234 is being executed.

O3000 repeats another 10 times.

O3000 returns to O2000.

O2000 returns to O1000.

1-4 Key Input Area

The entered characters are buffered in here once, and then, input.

Example) P: Absolute value = 1.234 (1.234 is entered)

Also, absolute/incremental value programming can be switched over and a number' search can be performed by switching over the mode. To switch over the mode, press the following character keys when nothing has been buffered.

- P (P: Absolute value =)
Absolute value programming. The entered numerical value is input as it is.
- I (I: Incremental value =)
Incremental value programming. The entered numerical value is added and input.
- N (N: Number =)
Number search. The cursor is moved to the entered number. However, the cursor key is used for execution (not the INPUT key). In addition, the following functions are provided for input.
- CANSEL
Deletes the character one before the cursor in the key input area.
- SHIFT CANSEL
Deletes the entire key input area.

1-5 Function Menu

On each screens, the lower part of the screen is the function menu. This menu differs depending on the screen. For details, refer to descriptions of individual screens.

- △ key
Pressing this key displays maintenance menu.
This menu allows you to select some screens. Generally, the screen with the function keys is called a operation menu and this one a maintenance menu, respectively.

1-6 Tree Chart

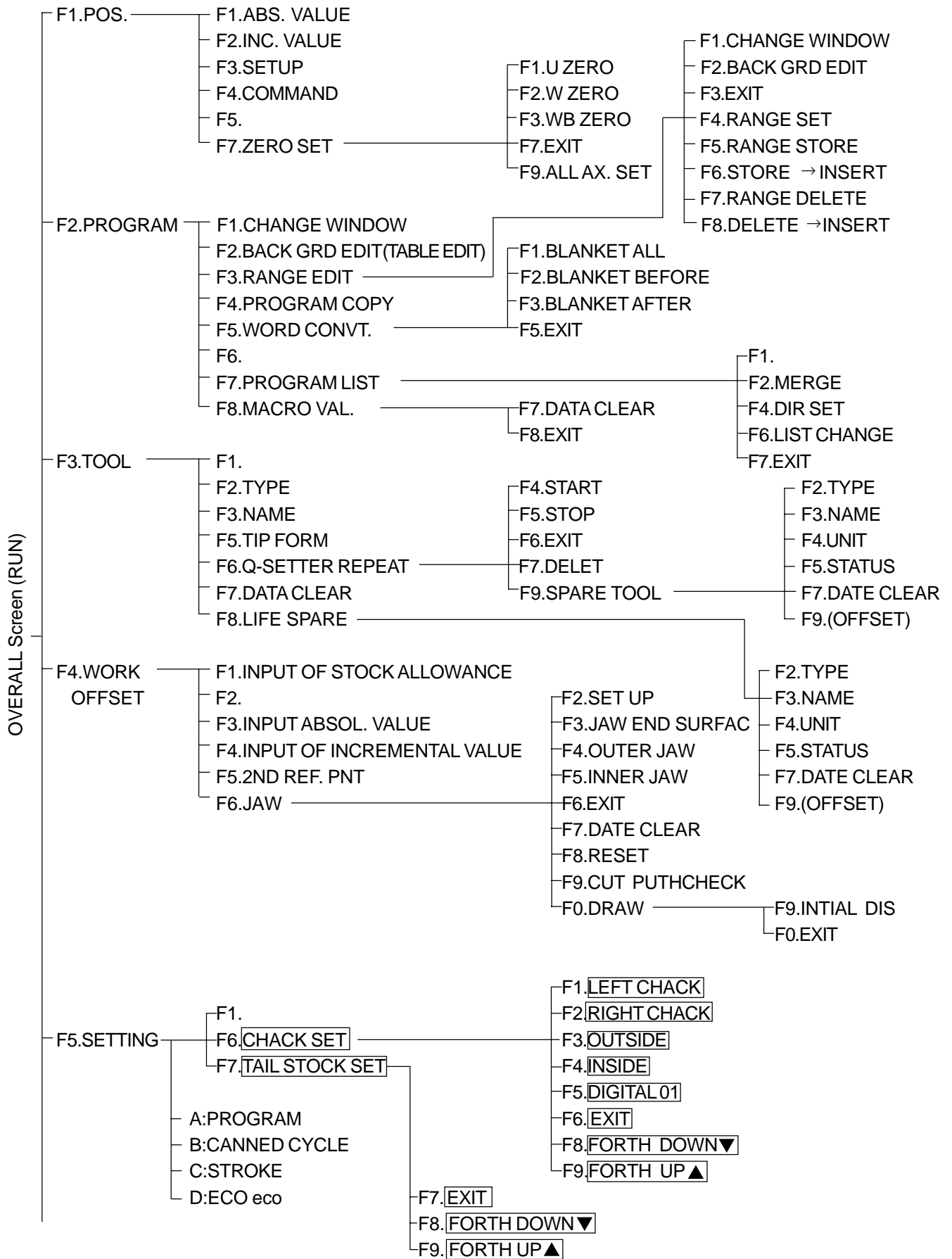


Fig. 1-7(a) OVERALL Screen (RUN) TREE CHART

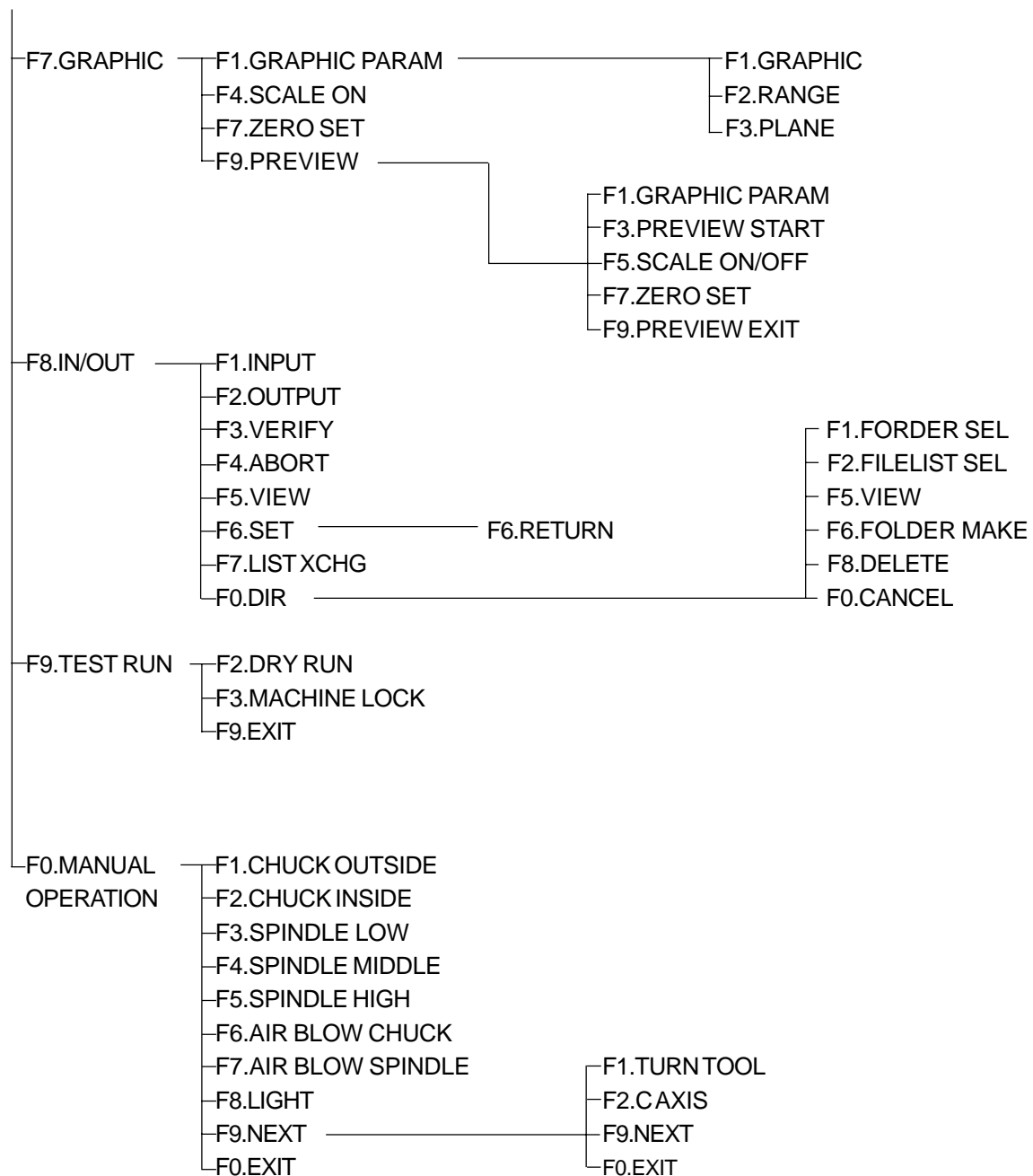


Fig. 1-7(a) OVERALL Screen (RUN) TREE CHART

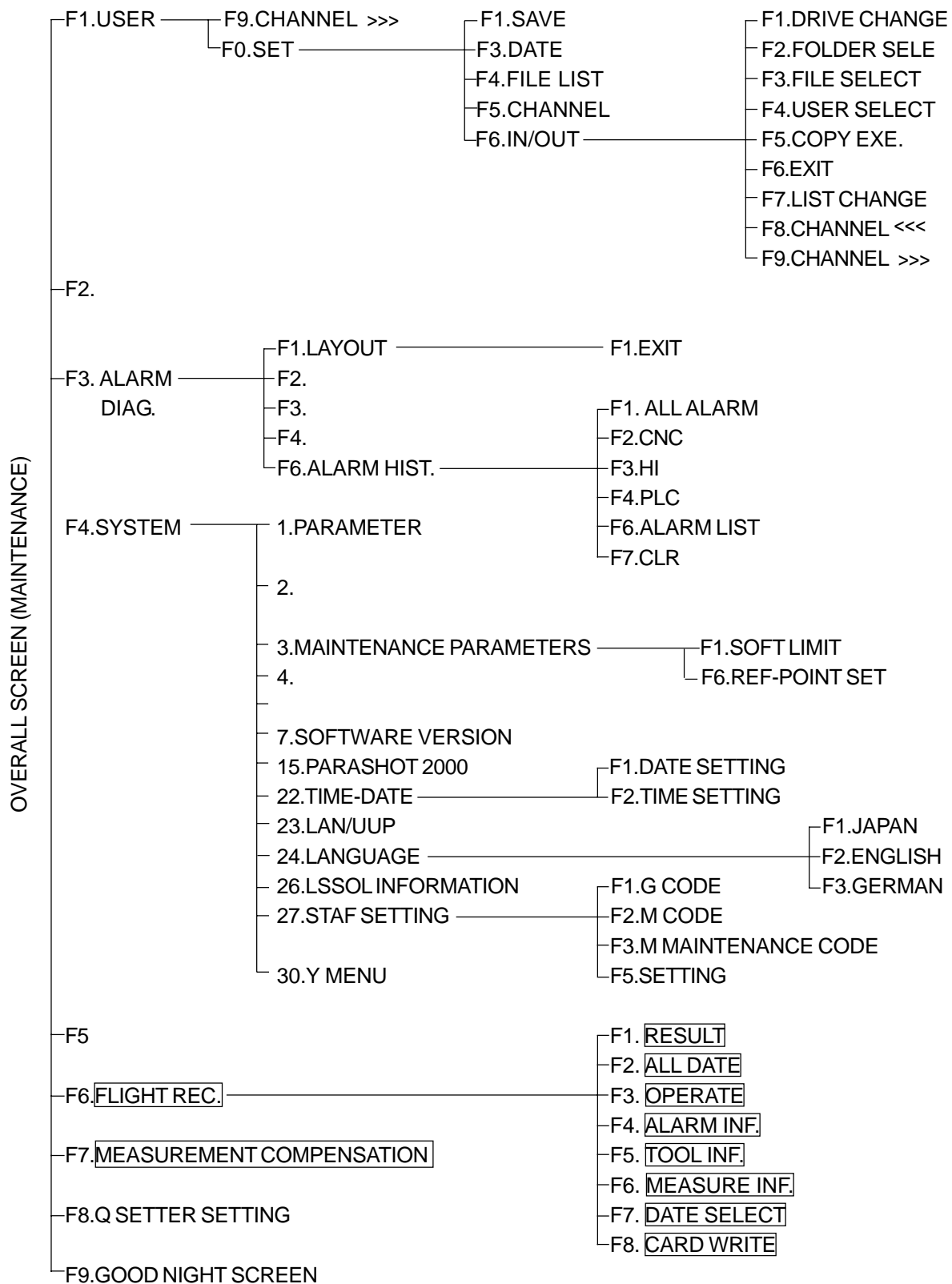
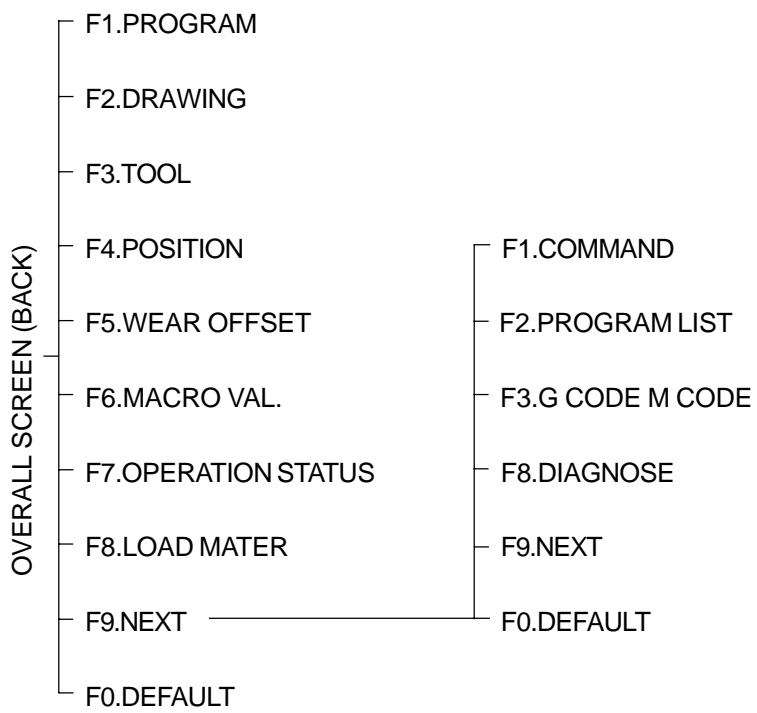



Fig. 1-7(b) OVERALL SCREEN (MAINTENANCE) TREE CHART




(Note) □ denotes an option

Fig. 1-7(c) OVERALL SCREEN (BACK) TREE CHART

2. Operation of Overall Screen

When the power is turned on or the  key is pressed, the Overall screen (Fig. 2-0a) is selected. It is very convenient because it displays many data required for operation. The data includes;

- Program window
 - Display and edit of the program.
 - Search of programs.
- Tool window
 - Tool data (tool number, tool compensation, tool nose R, tool nose width, tool nose point, tool picture)
 - Spindle data (speed specification/surface speed specification, actual speed)
 - Feed speed (every minute specification/every rotation specification)
 - Rotary tool speed
 - Spindle clamp speed
- Position window
 - Tool nose position, remaining travel amount, machine coordinate, relative coordinate
 - Pressure data (chuck pressure, tail stock pressure)
- Drawing window
 - Pressing  key changes the selection of each window and enables the key entry.

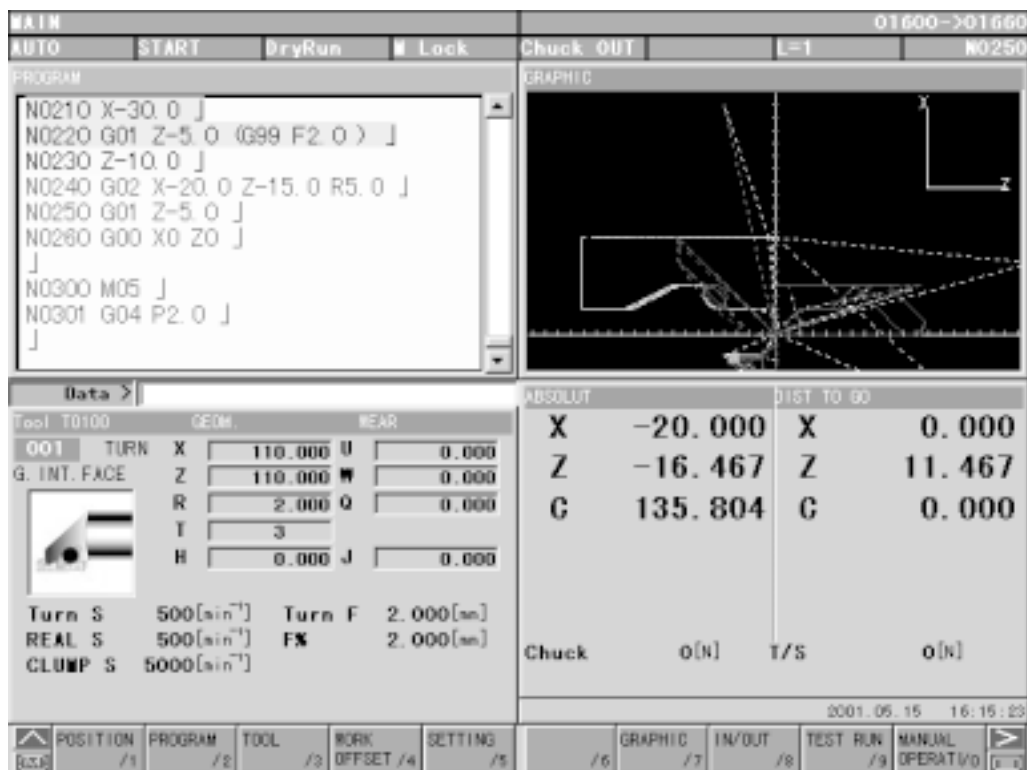


Fig. 2-0(a) Overall Screen

Press **AUX.** and moves the cursor to the window you want to change. Press **MENU SELECT** to change the function key. Pressing function keys described below can change the window screen which was made by dividing the overall screen into 4.



Fig. 2-0 (b) Function Menu

2-1 Program Window

This is located at the upper left part of the screen to display and edit the program. MDI input is also done here. However, expanded editing or background editing is not possible. When a program is running, the display color changes as follows.

Already executed block:	Background green, letters black
Executing or to be executed block:	Background yellow, letters black
Pre-read block:	None
Previous block:	Background white, letter black
Block to be executed next or part to be edited:	Background black, letters white.

The conditions for editing the program are given below.

- Write key has been pressed.
- In the edit mode and not in the automatic operation mode.
- For details of program operation, refer to section 12. Program.
- Here, one-fourth of the program screen is displayed.

2-2 Drawing Window

This is located at the upper right part of the screen to draw the tool track of the running program. As this is the contracted form of the drawing screen, the parameters for drawing are the same as the crawling screen.

2-3 Tool Window

2-3-1 Tool Data

This is located at the lower left of the screen to display the tool data for the cutting surface on the turret (number, type, name, compensation, tool nose R, tool nose width, tool nose point, tool picture).

2-3-2 Spindle Data

The spindle command rpm S and actual rpm are displayed.

During constant surface speed control, "Rotation S" is indicated as "Surface Speed V".

During the back mode, the data of each sub-spindle are displayed.

2-3-3 Feed Speed

The feed speed F is displayed.

Feeding per minute is indicated as "F per minute" and feeding per rotation is as "Rotation F".

2-3-4 Rotary Tool Speed(Optional)

Rotary tool rpm is indicated.

With a rotary tool being fitted, "Tool S" is indicated.

2-3-5 Spindle Clamp Speed

Spindle clamp rpm is displayed.

When the spindle clamp rpm indication is valid, "Clamp S" is indicated.

While in Back mode, clamp rpm of the sub-spindle is displayed.

2-4 Position Window

2-4-1 Position Data

From 4 coordinates of tool nose, relative, machine and remaining travel amount, a selected coordinate is displayed at the lower right of the screen, which can be selected with a page key.

When the relative coordinate is displayed, after pressing the axis name (U, V, W,...), the 0 setting can be done using the **INPUT** key.

Also, it is possible to enter the value by selecting an axis using the cursor key.

2-4-2 Pressure Data(Optional)

The chuck pressure and tail stock pressure are displayed.

2-4-3 Dwell

When executing the dwell, remaining seconds of the dwell are displayed. When it reaches zero, the dwell display disappears.

Items after this are displayed in the window screen which divides the screen into 4.

2-5 Wear Compensation

Wear compensation is displayed in the window screen.

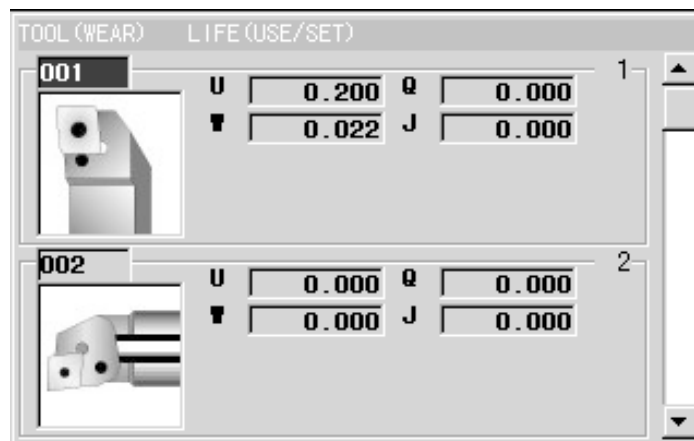


Fig. 2-5 Wear Compensation

2-6 Macro Variables

Macro variable data are displayed in the window screen.

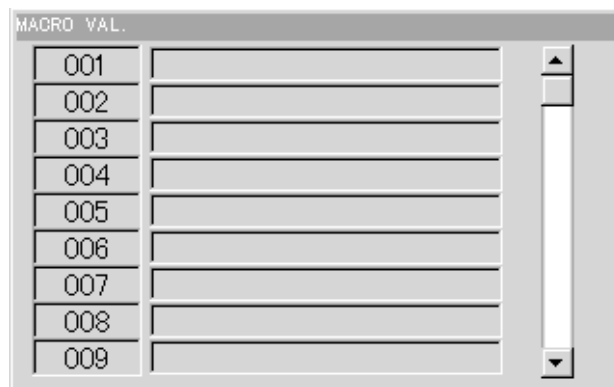


Fig. 2-6 Macro Variables

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.

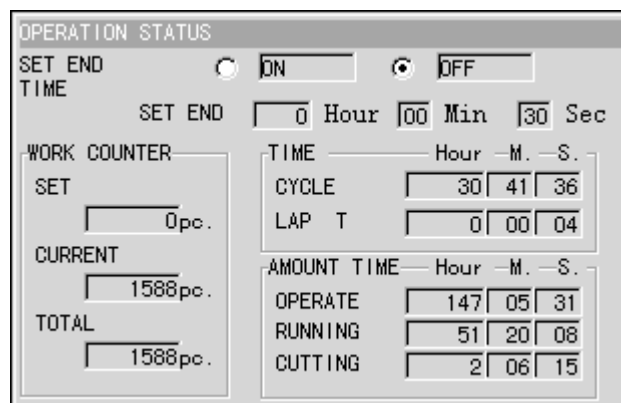


Fig. 2-7 Running Status

2-8 Axis Load Display

The axis load is displayed in the window screen.

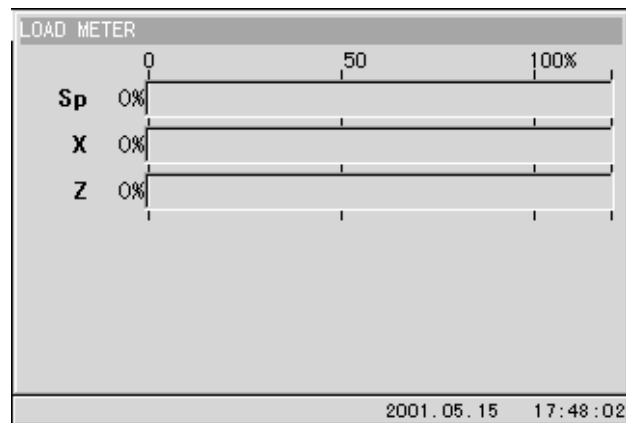


Fig. 2-8 Axis Load Display

2-9 Command Value

G code command values are displayed in the window screen.

COMMAND	
01 G01	02
03	06 G18
07 G40	08 G54
09	10 G64
11	12 G602
13 G710	14 G90
15 G95	21 BRISK
22 CUT2D	29 DIAMON
47 G290	31 G810

Fig. 2-9 (a) Command Value
(When G290, S mode)

COMMAND	
01 G00	02 G97
03	04 G69
05 G99	06 G21
07 G40	08
09 G23	10 G80
11	12 G67
13	14 G54
15	16 G18
17	31 G291

Fig. 2-9 (b) Command Value
(When G291, ISO compatible mode)

2-10 Program List

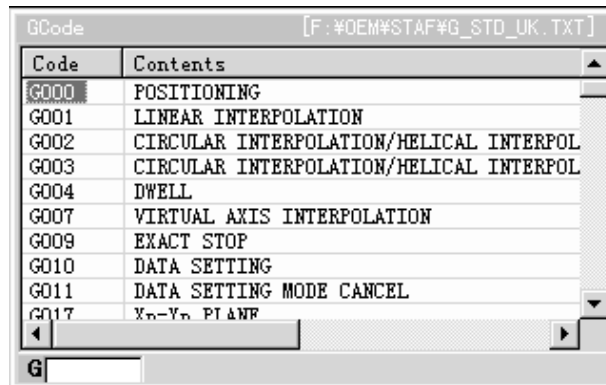
The Program list data are displayed in the window screen.

Program List		
Program	Size(m)	Comment
<input type="checkbox"/> 0060	3.1	
<input type="checkbox"/> 0911	6.0	
<input type="checkbox"/> 0912	2.8	(TL01/01 TL06/34)
<input type="checkbox"/> 1502	0.9	(DELPATH TEST)
<input type="checkbox"/> 1503	1.3	(DELPATH TEST)
<input type="checkbox"/> 1504	0.4	
<input type="checkbox"/> 1505	0.6	(NOSE-COMP-OFF TE)
<input type="checkbox"/> 1506	0.4	
Ava. 703m/1000m (29/100) Sel. 0/71		

Fig. 2-10 Program List

2-11 G Code M Code

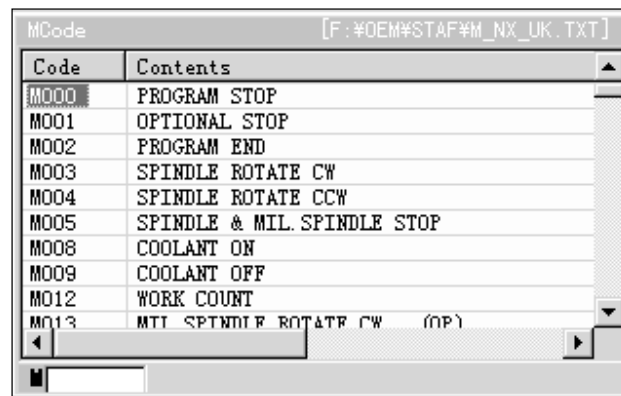
The list of G code and M code is displayed in the window screen. M code and MM code are changed by the function key.



The screenshot shows a window titled 'GCode' with a file path '[F:\#0EM#STAF#G_STD_UK.TXT]'. It contains a table with two columns: 'Code' and 'Contents'. The table lists various G codes and their functions. The 'G' key is highlighted at the bottom left.

Code	Contents
G000	POSITIONING
G001	LINEAR INTERPOLATION
G002	CIRCULAR INTERPOLATION/HELICAL INTERPOL
G003	CIRCULAR INTERPOLATION/HELICAL INTERPOL
G004	DWELL
G007	VIRTUAL AXIS INTERPOLATION
G009	EXACT STOP
G010	DATA SETTING
G011	DATA SETTING MODE CANCEL
G017	Xn-Yn PLANE

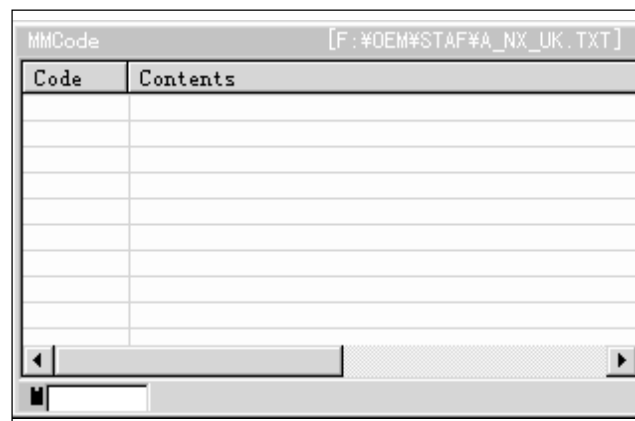
Fig. 2-11 (a) G Code



The screenshot shows a window titled 'MCode' with a file path '[F:\#0EM#STAF#M_NX_UK.TXT]'. It contains a table with two columns: 'Code' and 'Contents'. The table lists various M codes and their functions. The 'M' key is highlighted at the bottom left.

Code	Contents
M000	PROGRAM STOP
M001	OPTIONAL STOP
M002	PROGRAM END
M003	SPINDLE ROTATE CW
M004	SPINDLE ROTATE CCW
M005	SPINDLE & MIL. SPINDLE STOP
M008	COOLANT ON
M009	COOLANT OFF
M012	WORK COUNT
M013	MTI SPINDLE ROTATE CW (MP)

Fig. 2-11 (b) M Code



The screenshot shows a window titled 'MMCode' with a file path '[F:\#0EM#STAF#A_NX_UK.TXT]'. It contains a table with two columns: 'Code' and 'Contents'. The table is currently empty.

Code	Contents
------	----------

Fig. 2-11 (c) MM Code

2-12 Diagnose

The diagnose is displayed in the window screen. You can display and change DB signals of PC/NC, etc.

DIAGNOSE		
ADDRESS	STATUS	Hex
DB90. DBB6	0000-0000	00
DB21. DBB117	0000-0001	01
DB21. DBB118	0000-0000	00
DB21. DBB119	0000-0000	00
DB21. DBB120	0000-0000	00
DB21. DBB121	0000-0010	02
DB21. DBB124	0000-0000	00
DB21. DBB125	0000-0000	00

Fig. 2-12 Diagnose

2-13 Return to Standard Screen

Pressing **F0/DEFAULT** restores the standard screen of the program, drawing, position and tool.

2-14 Spare Tool (Option)

Spare tools are displayed in the window screen.

3. Position

If you press the **F1/POSITION** key, the position screen (Fig. 3-0) will be displayed.

Items related to position are displayed and these items can be re-written when this screen is displayed.

- Display of nose position, remaining shift amount, relative coordinate system, and machine coordinate system
- Rewriting of relative coordinate system
- Display of tool data
- Display of spindle data
- Display of feed rate



The tool data, spindle data, and feed rate are the same as the overall screen. The left half of the screen is a view of the four coordinate systems on the right that has been expanded for better understanding. The page keys   can be used for arbitrary selection.



Fig. 3-0 Position Screen

3-1 Reloading of Relative Coordinate System

Among the 4 coordinate systems, only the relative coordinate system is reloadable.

For 0 setting, first push **F7/ZERO SET** to change over the function.

When the function for the axis for zero setting being pushed, the value of the axis gets 0.

To zero-set all axes, push **F9/All Ax. ZERO**.

To end zero setting, push **F7/EXIT**.

To input numerals, push the key for the address to be input and display the input area.

Input, then, numerals and push **INPUT**. Absolute value/increment value input is available.

EX P: absolute value U = 1.234 **INPUT** (1.234 is placed in U)

I : increment value W = 10.0 **INPUT** (10.0 is added and placed in W)

3-2 Command Value Display

Pressing the F4/COMMAND displays the data specified by the program or MDI operation (Fig. 3-2).

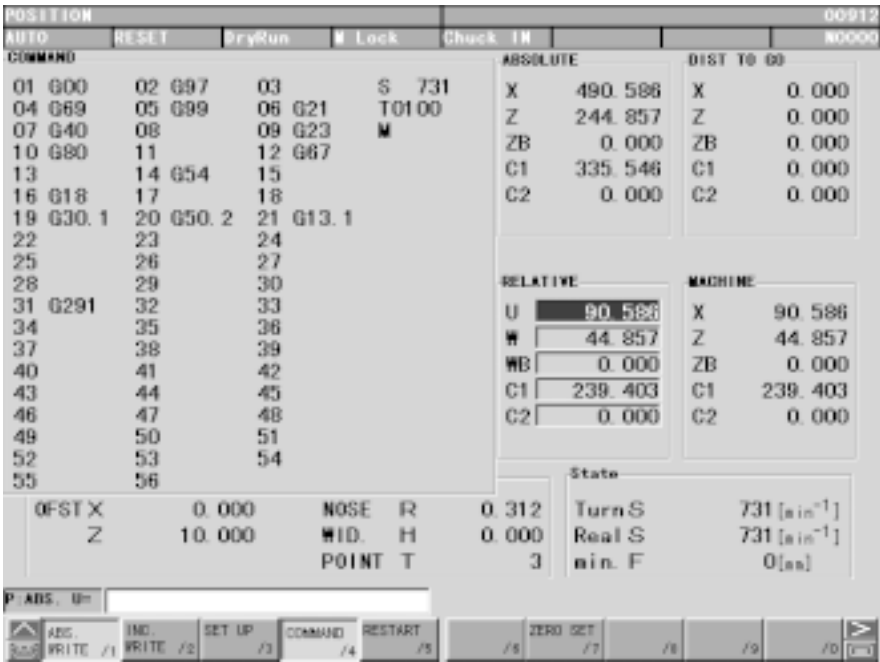


Fig. 3-2 Command Value Display

3-3 Set up

Pressing **F3/SETUP** allows you to input the data on the Setup side. (Fig. 3-3)

Use the cursor keys **↑** and **↓** to select the spindle speed and turret indexing, and input the data. You cannot input multiple data at one time. To execute the input data, select the MDI mode, input the data, and press **INPUT**. You will be inquired, "OK ? Y-YES N-NO." Pressing **Y** executes the input data. Pressing **F3/SETUP** returns the cursor to the Position side.

POSITION				00912			
AUTO	RESET	DryRun	Lock	Chuck IN			N0000
ABSOLUTE				ABSOLUTE		DIST TO GO	
X	490.586			X	490.586	X	0.000
Z	244.857			Z	244.857	Z	0.000
ZB	0.000			ZB	0.000	ZB	0.000
C1	55.995			C1	55.995	C1	0.000
C2	0.000			C2	0.000	C2	0.000
Tool T0100				RELATIVE		MACHINE	
OFST X	0.000	NOSE R	0.312	U	90.586	X	90.586
Z	10.000	WID. H	0.000	W	44.857	Z	44.857
		POINT T	3	WB	0.000	ZB	0.000
				C1	319.851	C1	319.851
				C2	SET UP		
SPINDLE SPEED=				TURRET INDEX =			
TurnS 731 [min ⁻¹]				RealS 731 [min ⁻¹]			
min. F 0 [mm]							
SPINDLE SPEED=							
▲	ABS. WRITE /1	INC. WRITE /2	SET UP /3	COMMAND /4	RESTART /5	ZERO SET /6	> /7

Fig. 3-3 Set up

4. Work Coordinates (Offset)

Pressing the **F4/WORK OFFSET** key displays the Work Coordinates screen (Fig. 4-0). This screen operation is used to shift the machining origin.

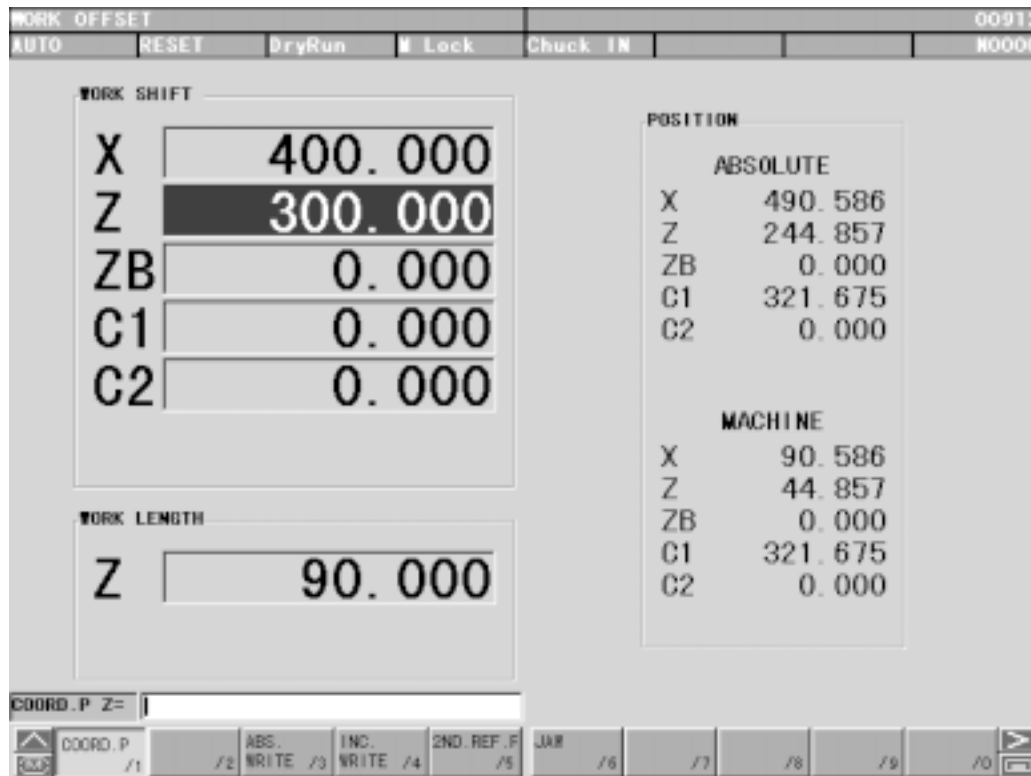


Fig. 4-0 Work Coordinates (Machining Reference Point Shift)

As described in the instruction manual (PROGRAMMING), Section 7-2 “Tool Nose Coordinate System”, the position of the tool nose serves as the reference position of the coordinate system. Shifting of the machining origin, there are three methods – machining reference point shift, machining allowance, and work length.

Pressing the function key changes the input mode as follows.

Each function key and the key input area are as follows.

Function key	<Key input area display>
F1/COORD. P	→ "Removal amount (P) Z ="
F3/ABS. WRITE	→ "P: Absolute value Z ="
F4/INC. WRITE	→ "I: Incremental value Z ="

4-1 Removal Amount

Machining allowance = Length from the chuck jaw face to work end face – work length.

First cut the work end face within the limits of cutting allowance, so that the black layer on the end face is removed and escape in the same condition in the direction of the positive X axis. (Do not move the Z axis.)

Next, stop the rotation of the spindle. Measure the overall length of the work and find the cutting allowance. Enter this measured value as the machining allowance.

(If the cut is excessive, the value becomes negative.)

4-2 Machining Reference Point Shift

The machining reference point is located at a length between the end faces of the chuck jaws (work shift amount) from the machine zero point. Press F3/ABS. WRITE or

F4/INC. WRITE to display “P:ABSOL. VALUE Z=” in the key input area, and press the curs or key ↑ or ↓ to adjust the cursor to the axis you want to change. Then, input a machining reference point shift amount. An X-axis shift amount cannot be changed.

4-3 Work Length

The work length is the length between the end face of the chuck jaw and the machining zero point. Press F3/ABS. WRITE (or F4/INC. WRITE) to display “P: ABSOL. VALUE Z =” in the key input area, and press the cursor key ↑ or ↓ to adjust the cursor to Work Length. Then, input the work length.

4-4 Setting of 2nd Reference Point

With **F5/2ND REF. P** pushed, 2nd Reference Point Set page (Fig. 4-1) appears. Use this page to set X and Z axes of the 2nd reference point (G30). When the machine X/Z axes have been positioned to the 2nd reference point and with **F2/ENTER** having been pushed, "Is this OK? Y-Yes, N-No" appears for confirmation. For OK, push **Y** key. With **F5/EXIT**, the original page is recovered.

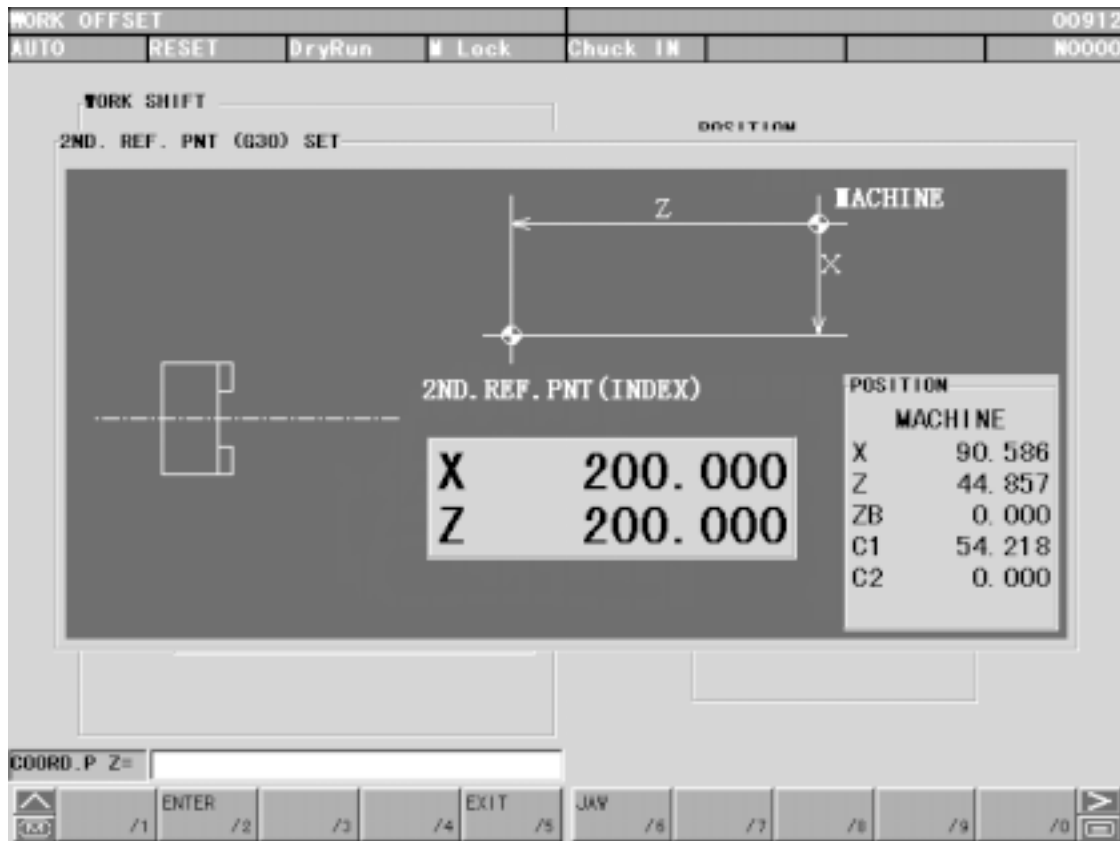


Fig. 4-4 2nd Reference Point

5. Set (Data)

If you press the **F5/SETTING** key, the setting (data) screen (see Fig. 5-0) is displayed.

There are four types of the screen.

A:PROGRAM

B:CANNED CYCLE

C:STROKE

D:ECO eco

To flip each tab, select from A~D on the keyboard.

5-1 PROGRAM

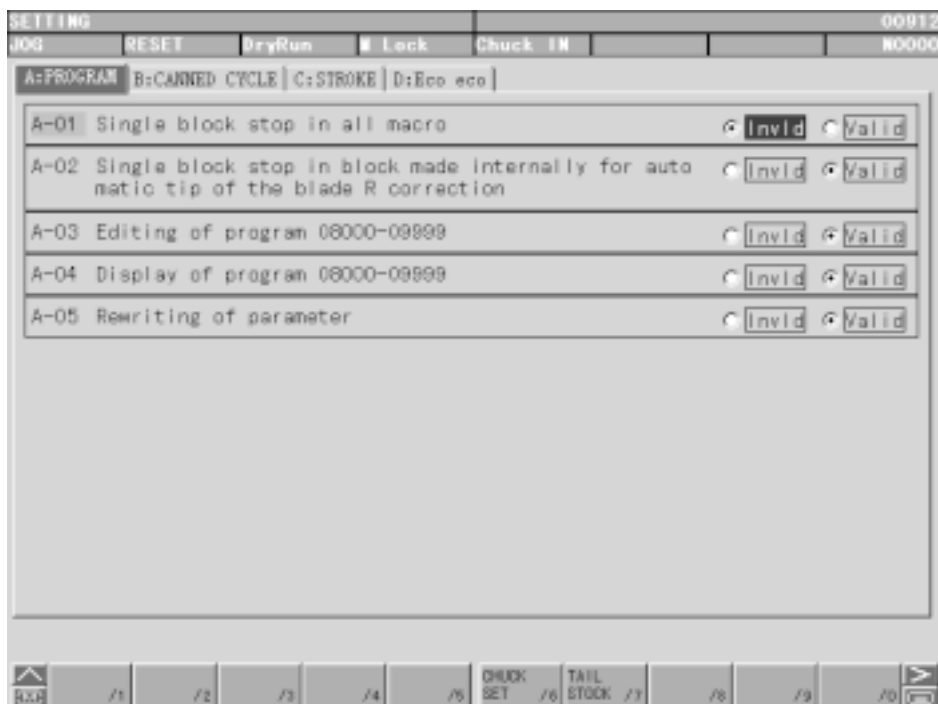


Fig. 5-1 PROGRAM

5-2 CANNED CYCLE

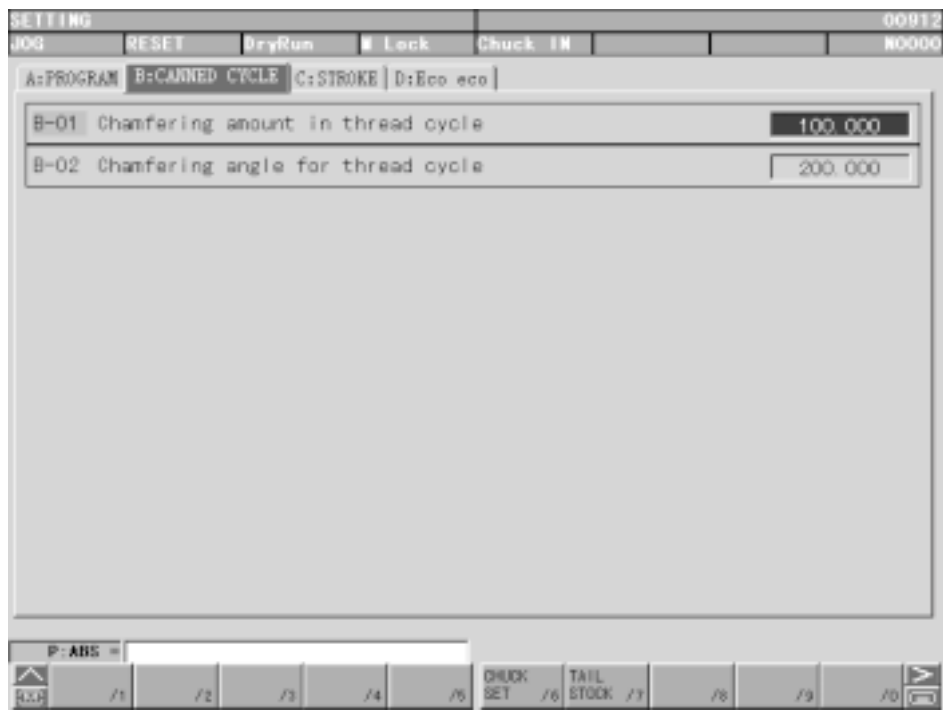


Fig. 5-2 CANNED CYCLE

5-3 STROKE

SETTING		00912
JOG	RESET	00000
DryRun	Lock	
Chuck IN		
A:PROGRAM B:CAMMED CYCLE C:STROKE D:Eco eco		
0-01	X-Axis coord value (limit 2, +)	9999.999
0-02	Y-Axis coord value (limit 2, +)	9999.999
0-03	Z-Axis coord value (limit 2, +)	9999.999
0-04	X-Axis coord value (limit 2, -)	-9999.999
0-05	Y-Axis coord value (limit 2, -)	-9999.999
0-06	Z-Axis coord value (limit 2, -)	-9999.999
0-07	X-Axis coord value (limit 3, +)	9999.999
0-08	Y-Axis coord value (limit 3, +)	9999.999
0-09	Z-Axis coord value (limit 3, +)	9999.999
0-10	X-Axis coord value (limit 3, -)	-9999.999
0-11	Y-Axis coord value (limit 3, -)	-9999.999
0-12	Z-Axis coord value (limit 3, -)	-99999.000
P:ABS =		
▲	/1	/2
▲	/3	/4
▲	/5	/6
▲	CHUCK SET	TAIL STOCK
▲	/7	/8
▲	/9	/0
▲		

Fig. 5-3 STROKE

5-4 ECO eco



Fig. 5-4 ECO eco

5-5 Chuck Setting(Optional)

Pressing **F6/CHUCK SET** displays the chuck setting screen (Fig. 5.5), where you can set and display the chuck pressure.



Fig. 5-5 Chuck Setting

5-6 Tail Stock Setting(Optional)

Pressing **F7/TAIL STOCK SET** displays the tail stock setting screen (Fig. 5.6) where you can set and display various tail stocks.

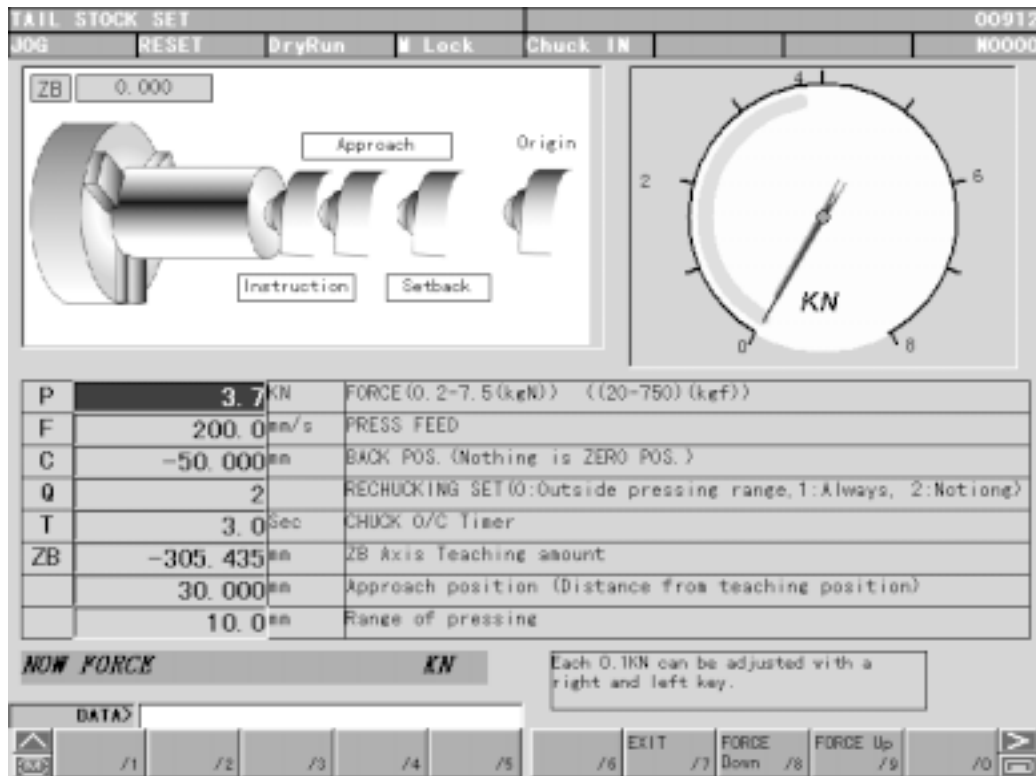


Fig. 5-6 Tail Stock Setting

6. Macro Variable

Press **F8/MACRO VAL.** in the PROGRAM screen **F2/PROGRAM**. The MACRO VARIABLE screen appears (Fig. 6-0 (a)). The cursor is moved by cursor keys **↑** **↓** **→** **←** or page keys **⏮** **⏭**.

6-1 Macro Variable and Data Display

The macro variable data is classified into the following:

- 1-33 Local variables (correspond to call multiplicity)
- 100-199 Common variables (turned to “null” at power-off time)
- 500-999 Common variables (with name, remembered if the power is turned off)

The number of significant digits of data is 8 (± 99999999 to ± 0.0000001). When the numerical value exceeding this limit has been input, the message “OVER FLOW” is output. Nothing is displayed in case of the “null” data (empty, not 0). The name can be input up to 12 characters, but it is given to the common variables 500-599.

(1) Data deletion

F7/DATA CLEAR appears. Pressing this menu displays the question at the center of the screen whether to erase with 0 or “null”. Select either of them with the cursor key (**↑** or **↓**) and press the **INPUT** key. Finally, the message “OK?” appears in the key input area for safety confirmation. Press the **Y** key.

(2) “Null” input

If you press the **CANSEL** key when the key input area contains nothing, the “null” characters are displayed. Then, pressing the **INPUT** key turns the data at the cursor position to “null”.

(3) Deleting the name

Set the cursor to the name you want to delete (common variable 500-599), press **SPACE**, followed by **INPUT**.



Fig. 6-0 (a) Macro Variable (Local Variable)

MACRO					00912																																																																	
JOG	RESET	DryRun	Lock	Chuck IN		N0000																																																																
<div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p>COMMON VALUE</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">NO</th> <th style="width: 85%;">DATA</th> </tr> </thead> <tbody> <tr><td>100</td><td></td></tr> <tr><td>101</td><td></td></tr> <tr><td>102</td><td></td></tr> <tr><td>103</td><td></td></tr> <tr><td>104</td><td></td></tr> <tr><td>105</td><td></td></tr> <tr><td>106</td><td></td></tr> <tr><td>107</td><td></td></tr> <tr><td>108</td><td></td></tr> <tr><td>109</td><td></td></tr> <tr><td>110</td><td></td></tr> <tr><td>111</td><td></td></tr> <tr><td>112</td><td></td></tr> <tr><td>113</td><td></td></tr> <tr><td>114</td><td></td></tr> </tbody> </table> </div> <div style="width: 48%;"> <p>COMMON VALUE</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">NO</th> <th style="width: 85%;">DATA</th> </tr> </thead> <tbody> <tr><td>115</td><td></td></tr> <tr><td>116</td><td></td></tr> <tr><td>117</td><td></td></tr> <tr><td>118</td><td></td></tr> <tr><td>119</td><td></td></tr> <tr><td>120</td><td></td></tr> <tr><td>121</td><td></td></tr> <tr><td>122</td><td></td></tr> <tr><td>123</td><td></td></tr> <tr><td>124</td><td></td></tr> <tr><td>125</td><td></td></tr> <tr><td>126</td><td></td></tr> <tr><td>127</td><td></td></tr> <tr><td>128</td><td></td></tr> <tr><td>129</td><td></td></tr> </tbody> </table> </div> </div>							NO	DATA	100		101		102		103		104		105		106		107		108		109		110		111		112		113		114		NO	DATA	115		116		117		118		119		120		121		122		123		124		125		126		127		128		129	
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Fig. 6-0 (b) Macro Variable (Common Variable)

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Fig. 6-0 (c) Macro Variable (Common Variable with name)

6-2 Number Search

The page and cursor can be moved at one time by searching the macro variable No. A search can be performed by pressing the cursor key () after inputting and a subsequent numerical value.

Example) N: No. = 12 (Moves to No. 12)

7. 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**.

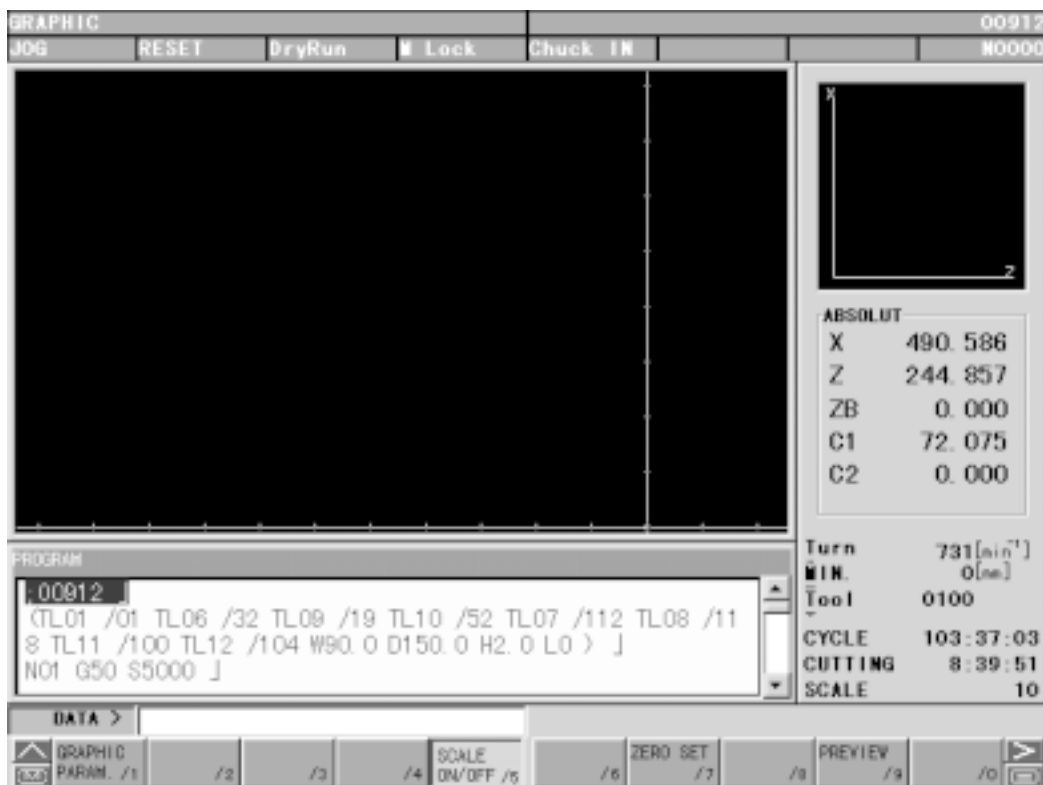


Fig. 7-0 Graphic Screen (PREVIEW EXIT)

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

8. Pre-machining Plotting

Pressing the **F9/PREVIEW** menu of the **F7/GRAPHIC** key displays the function key for pre-machining plotting.(Fig. 8-0)

Next, push **F3/PREVIEW START** key to start pre-machining plotting.

- Note 1) In order to start pre-machining plotting, first perform zero point return initialize other states of Machine such as mechanical clamp.
- Note 2) When Locus image is obscure in display, lower speed with the feed speed switch.
- Note 3) Any function whose conditions change by machine operation (macro program using skip function) cannot be executed in pre-machining plotting.

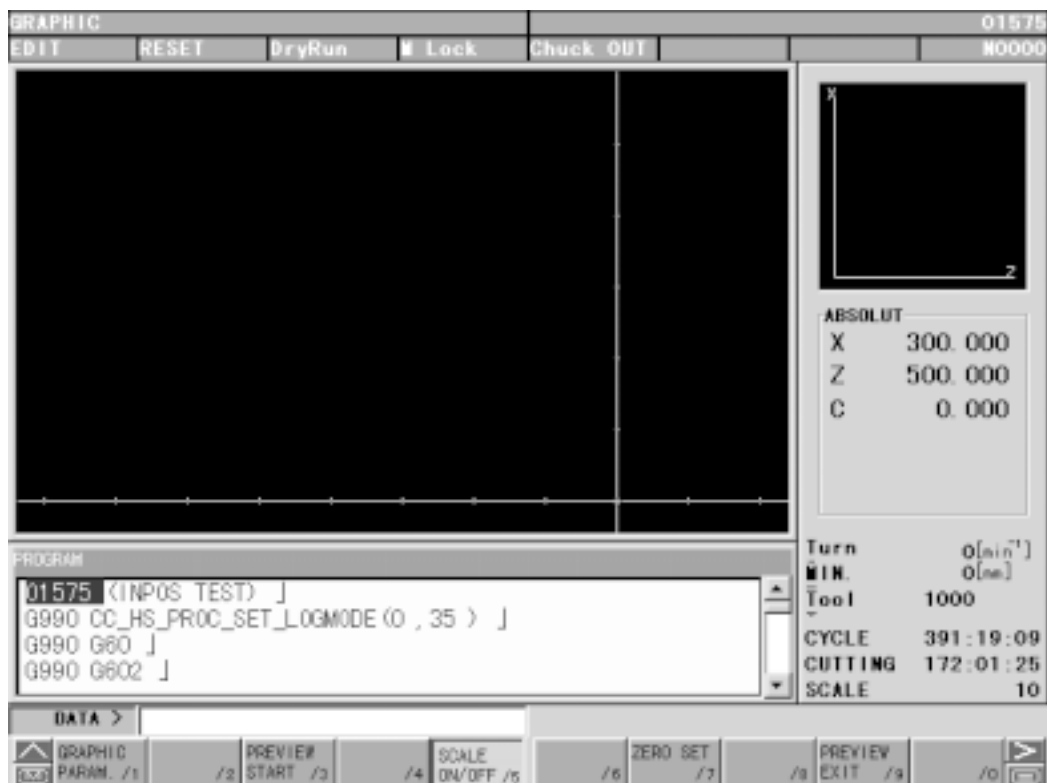


Fig.8-0 Pre-machining Plotting Screen



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) Plotting 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 the 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) Plot Per Tool

Every time the tool is changed, a plotting color is changed. However, this is ineffective when plotting the specified tool. Up to 6 colors are available. After the 6th color, it returns to the first one. Make setting at "Feed Line Color"

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

(4) Cutting Feed 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 Traverse 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) Feed Line Color

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) Plotting Point Color

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) Plotting Plane

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

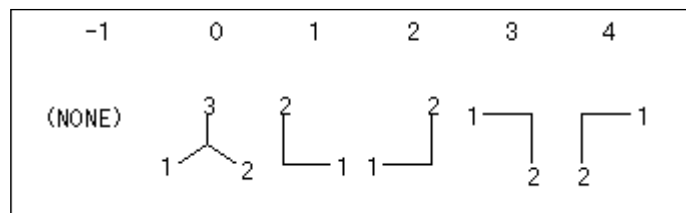


Fig. 9-0 (c) Plotting Plane

In accordance with the description, set a numerical value 0-4 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) Rotation 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) Horizontal rotation 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°

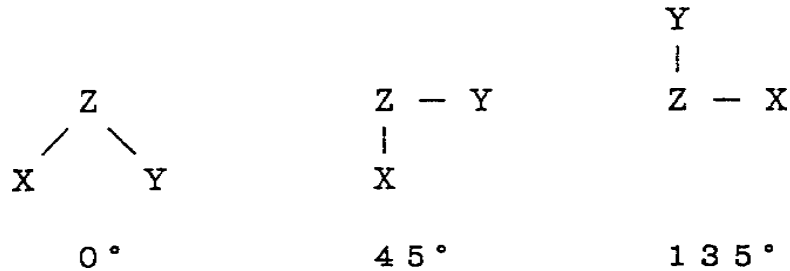


Fig. 8-0 (d) Rotation Angle

(b) Vertical rotation angle

Adjust the slope angle of the vertical axis.

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

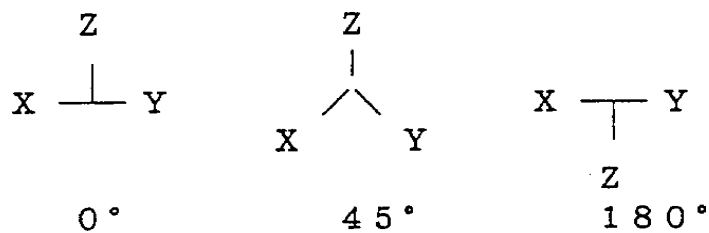


Fig. 9-0 (e) Vertical Rotation Angle

(3) Specified axis

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

10. Tool (offset)

Pressing the **F3/TOOL** key displays the Tool screen (Fig. 9-0).

The compensation data for each tool number is displayed and set as shown below.

Table 9-0 Tool Form / Wear

	Tool Size	Tool Nose Radius	Tool Nose Point	Tool width
Form	X Y Z	R	T	H
Wear	U V W	Q		J

In addition, the following functions are provided.

- Display of the tool nose position and machine coordinate system
- Data deletion
- Setting of the tool nose shape.

Fig. 10-0 Tool (offset) Screen

- Using tool compensation data
Tool compensation data is divided into form and wear data for each item.
Compensation using T in the program corresponds to the tool number of the tool (compensation) screen. For details refer to the section on Tool Function (T function) in Program Editing.

10-1 Setting of Offset Value

Offset values are classified into geometry and wear. To make setting, adjust the cursor and set through the key input area. The wear can be input any time, but to input the geometry, the manual mode must be selected and the write switch must be enabled.

When the geometry is input, the wear will become 0.

○ Data input method

The geometry is input as an absolute value and the wear is input as an increment value using **INPUT** key.

○ Wear input clamp

Values greater than the value set in the parameter (MD62200[1]) cannot be input. The message "Clamped value is exceeded" appears.

Note) If the wear is input during automatic operation, the wear data of the relevant tool will be reflected from the next T-command onward, because the coordinate system will not be set. (The coordinate system will be set in the manual mode.)

10-2 Tool Selection

10-2-1 Name Setting

To set the tool, usually the tool name is set. Type, tool nose shape and tool name are simultaneously set. To set the name, use the function menu. First press **F3/NAME**, which opens a window at the center of the screen (Fig. 9.1). Use cursor key **↑** **↓** or page key **⏴** **⏵** to select and press **INPUT** to determine.



Fig. 10-2-1 Tool Name

If you want to attach dimensions before the tool name, first determine the position of the tool name using the cursor, then enter the alphanumeric data and determine them by pressing **INPUT**.

The name is up to 12 characters. Input more than this is omitted.

Example: D45.0-3 / Chamfering → D45.0-3 Face
(Key input) (Cursor position) (Tool name)

10-2-2 Setting of Type

In case of special a special tool, set the type and picture of the tool.

Pressing **F2/TYPE** can change the tool type already selected. When a window appears at the center of the screen (Fig. 9-2-2), use the cursor key **↑** **↓** to select and press **INPUT** to determine.

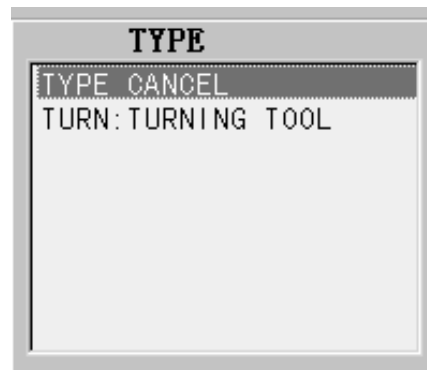


Fig. 10-2-2 Type

10-2-3 Setting of Tool Nose Shape

Pressing **F4/TIP FORM** can change the tool nose shape already selected.

When a window appears at the center of the screen (Fig. 9-2-3), use the cursor key **↑** **↓** **→** **←** to select and press **INPUT** to determine.

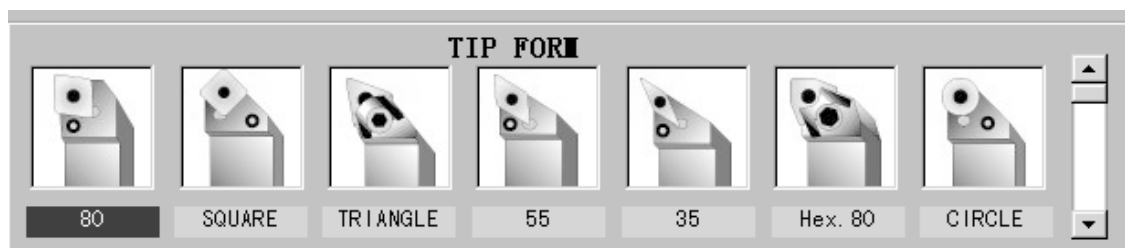


Fig. 10-2-3 Tool Nose Shape

10-3 Data Clear

This function is used when you want to start from the beginning, for example, to delete a line of the tool data indicated by a cursor or to make some data 0 altogether for all tools.

Pressing **F7/DATE CLEAR** opens a window at the center of the screen showing the data you can clear. Use the cursor key **↑** **↓** to select any and press **INPUT** to determine.

You are asked "Is it OK? Y-Yes, N-No". Press **Y** if it is OK with you.

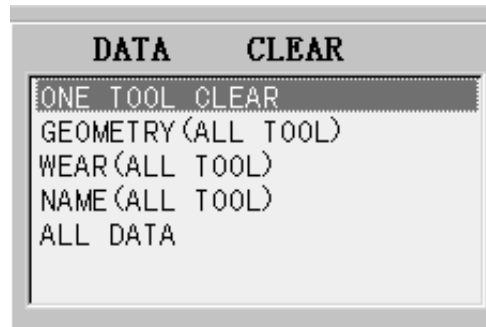


Fig. 10-3 Data Clear


10-4 Number Search

You can move the page and cursor at once by searching the tool number.



Press **N** and enter the following number, then press the cursor key **↑** **↓** **→** **←** to execute.

Example: N: Number = 12 **↓** (Move to No.12)

11. Alarm Diagnosis

Press the  key, and then, **F3/ALARM DIAG** key maintenance menu. The Alarm Diagnosis screen (Fig. 10-0) appears.

All the generated alarms are displayed, sorted into the CNC alarms and the PLC alarms (issued by ladder sequence software of the machine).

When one screen is not enough to display all the alarms, they will be extended over multiple pages. Use the page key  or  to change over the screen.

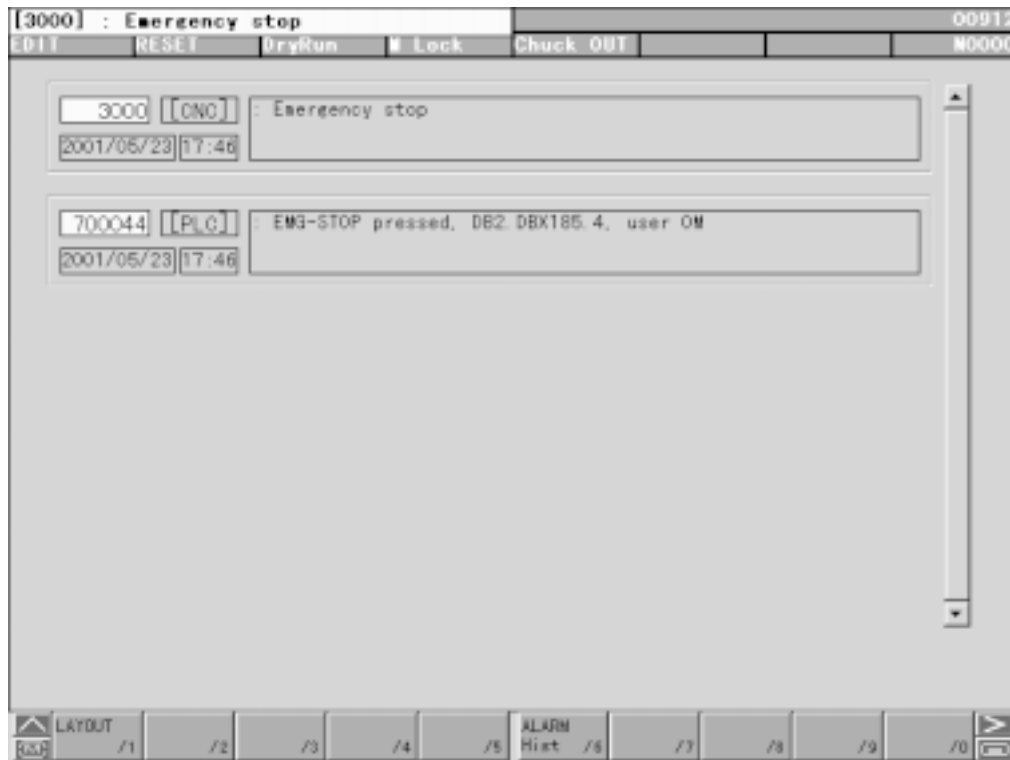


Fig. 11-0 Alarm Diagnosis Screen

11-1 Alarm History

Press **F6/ALARM HIST** in the ALARM DIAGNOSE screen. The ALARM HISTORY screen appears (Fig. 11-1). It lists the occurrence date and time, type, and description of each alarm in order of more recent ones. The screen can store up to 150 CNC and PLC alarms.

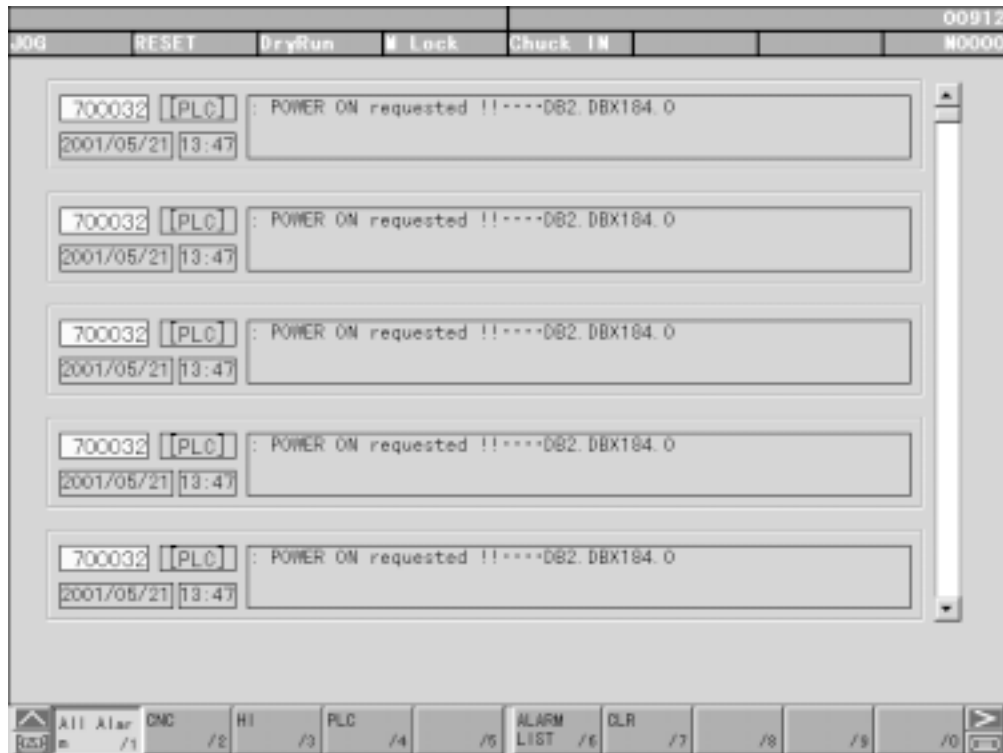


Fig. 11-1 Alarm History

12. System

Press the key, and then, the maintenance menu. The System screen (Fig. 11-0) appears. This is a collection of the screens used for maintenance by the maker. The collection of screens used for maintenance on the manufacture's side include the following:

- | | |
|---|---|
| <input type="radio"/> Parameter | <input type="radio"/> TIME & DATE |
| <input type="radio"/> Assembly Adjustment | <input type="radio"/> LAN/UUP |
| <input type="radio"/> Software Version | <input type="radio"/> LANGUAGE |
| <input type="radio"/> ParaShot 2000 | <input type="radio"/> LSSOL Information |
| <input type="radio"/> | <input type="radio"/> STAF Setting |
| <input type="radio"/> | <input type="radio"/> Y menu |

A menu is displayed on the screen. An item in reverse video indicates that it is being selected. To select a menu item, input an item number directly with the keys or select it with the cursor move keys, , keys. Then, press to change over the screen to the selected one.

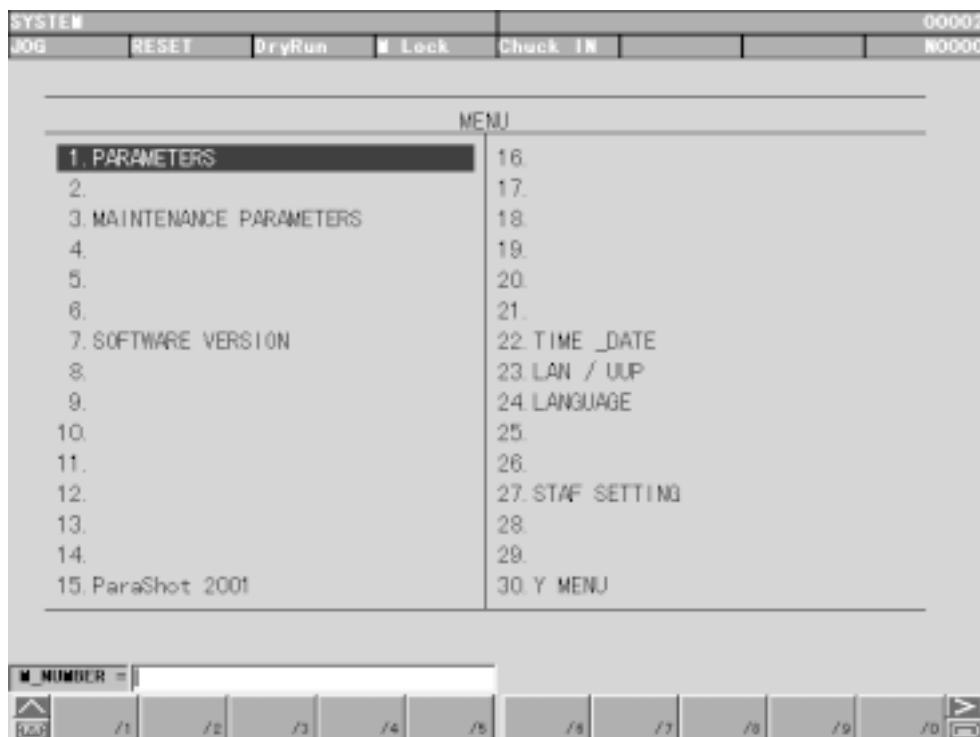


Fig. 12-0 System Screen

12-1 Parameter

Set the cursor to "Parameter" on the System screen and press the **INPUT** key. The Parameters screen appears.

Display and set the NC parameters.

PARAMETERS										00912									
JOG		RESET		DryRun		Lock		Chuck IN						N0000					
	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	00	8020	0	0	0	0	-	0	0	1	02
8001	0	0	1	0	-	1	1	0	2D	8021	0	0	0	0	-	0	0	0	00
8002	0	0	0	0	-	0	0	0	00	8022	0	0	0	0	-	0	0	0	00
8003	1	0	0	1	-	0	1	0	94	8023	0	0	0	0	-	0	0	0	00
8004	0	0	0	0	-	0	0	1	02	8024	0	0	0	0	-	0	0	0	00
8005	0	0	0	0	-	0	0	0	00	8025	0	0	0	0	-	0	0	0	00
8006	0	0	0	0	-	0	1	1	06	8026	0	0	0	0	-	0	0	0	00
8007	0	0	0	0	-	0	0	1	03	8027	0	0	0	0	-	0	0	0	00
8008	0	0	0	0	-	0	0	0	01	8028	0	0	0	0	-	0	0	0	00
8009	0	0	0	0	-	0	0	0	00	8029	0	0	0	0	-	0	0	0	00
8010	0	0	0	0	-	0	0	0	00	9000	0	0	0	0	-	0	0	1	02
8011	0	0	0	0	-	0	1	0	04	9001	0	0	0	0	-	0	0	0	00
8012	0	0	0	0	-	0	0	0	00	9002	0	0	0	0	-	0	0	0	00
8013	0	0	0	0	-	0	0	0	00	9003	0	0	0	0	-	0	0	0	00
8014	0	0	0	0	-	0	0	0	00	9004	0	0	0	0	-	0	0	0	01
8015	0	0	0	0	-	0	0	0	00	9005	0	0	0	0	-	0	0	0	00
8016	0	0	0	0	-	0	0	0	00	9006	0	0	0	0	-	0	0	0	00
8017	0	0	0	0	-	0	0	0	00	9007	0	0	0	0	-	0	0	0	00
8018	0	0	0	0	-	0	0	0	00	9008	0	0	0	0	-	0	0	0	00
8019	0	0	0	0	-	0	0	0	00	9009	0	0	0	0	-	0	0	0	00

P:ABS. =

PC Param /1	Int Param /2	Real Param /3	Bit Param /4	General MD /5	Channel MD /6	Axis MD /7	/8	/9	/0
-------------	--------------	---------------	--------------	---------------	---------------	------------	----	----	----

Fig. 12-1 Parameter

12-2 Assembly Adjustment

Set the cursor to “Assembly Adjustment” on System screen and push **INPUT** .

Assembly Adjustment screen appears.

Soft limit and Zero point setting are displayed and set.

The screenshot displays the 'Machine Adjust' screen with the following components:

- Machine Adjust** header with status indicators: JOG, RESET, DryRun, M Lock, Chuck IN, and a numeric display showing 00912 and N0000.
- Reference Set** section with a table for MACHINE and LOAD settings.
- Soft Stroke** section with a table for Stroke Limit 1, Stroke Limit 2, and Work Limit.
- TURRET** section with checkboxes for CLAMP and UNCLAMP.
- P:ABS.=** input field.
- Bottom navigation bar** with buttons for Soft Limit (1-5), Ref-Point SET (6-10), and a right arrow.

	MACHINE	LOAD
X	0.0000	0%
Z	0.0000	0%

	Stroke Limit 1		Stroke Limit 2		Work Limit	
	+ Direction	- Direction	+ Direction	- Direction	+ Direction	- Direction
X	12345.678	-12345.678	23456.789	-23456.000	100000.123	-123456.000
Z	34567.000	-34567.000	45678.000	-45678.000	234567.000	-234567.000

<input type="checkbox"/> CLAMP
<input type="checkbox"/> UNCLAMP

Soft Limit /1	/2	/3	/4	/5	Ref-Point SET /6	/7	/8	/9	/10	>
---------------	----	----	----	----	------------------	----	----	----	-----	---

Fig. 12-2 Assembly Adjustment Screen

As for details of the zero point, see “5.2 How to set zero point of absolute encoder” of the Maintenance Edition.

12-3 ParaShot2000

Set the cursor to "Parashot 2000" on System screen and push **INPUT**.
Parashot 2000 screen appears.

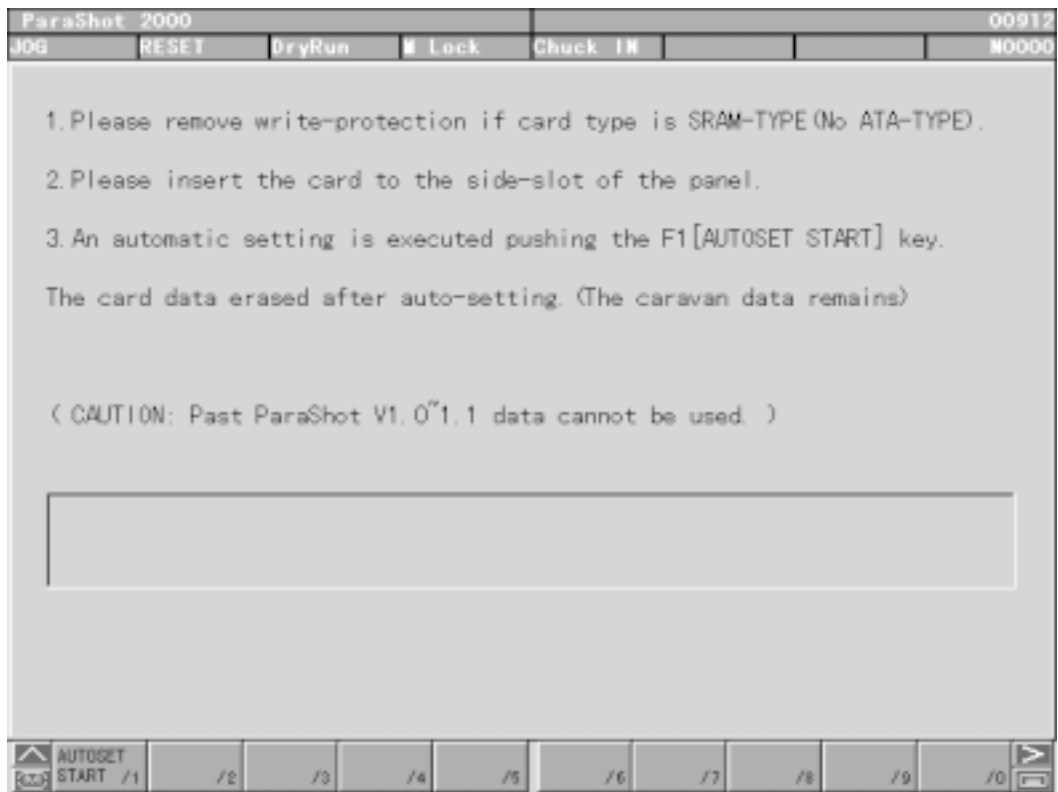


Fig. 12-3 ParaShot2000 Screen

12-4 Software Version

Set the cursor to "Software Version" on System screen and push **INPUT** .

Software Version screen appears.

Software Versions are displayed.

SOFTWARE VERSION				00912						
JOG	RESET	DryRun	M Lock	Chuck IN			N0000			
Function Name		Software Version		Function						
SYSTEM		01. 00. 09		CNC system						
NC		00. 06. 01		NC software						
		01. 00. 00								
HI		01. 05. 07		HI software						
PMC		denso1_00		Ladder program						
MULTI		L-V9R1_00		MULTI						
Machine Number		EARTH		Machine Number						
MMC103 06.01.08 2001/03/19										
.....										
WINDOWS VERSION: 4.0										
MS-DOS VERSION: 5.101										
'Maschine.exe 06.01.08 2001/03/07 06.01 ' "										
'param.exe 06.01.08 2001/03/07 06.01 ' "										
'dpth.exe 06.01.08 2001/03/07 06.01 ' "										
'dno.exe 06.01.08 2001/03/07 06.01 ' "										
'dg.exe 06.01.08 2001/03/07 06.01 ' "										
'lb.exe 06.01.08 2001/03/07 06.01 ' "										
'th32.exe 06.01.08 2001/03/07 06.01 ' "										
'w.exe 06.01.08 2001/03/07 06.01 ' "										
'AEDITOR.EXE 06.01.08 2001/03/07 06.01 ' "										
No. =										
NC	DETAIL /1	DETAIL /2	/3	/4	/5	/6	/7	/8	/9	/0

Fig. 12-4 Software Version

12-5 Date and Time

Set the cursor to “Date and Time” on System screen and push **INPUT** .

Date and Time screen appears.

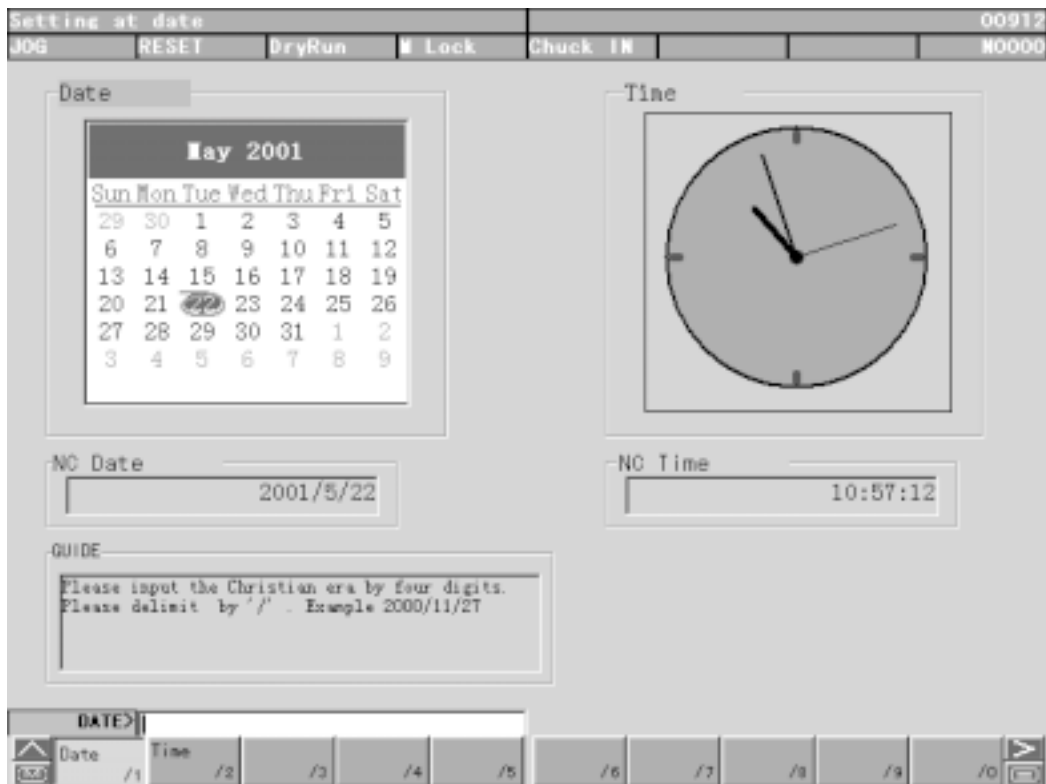


Fig. 12-5 Date and Time Setting

12-6 LAN/UUP

Set the cursor to “LAN/UUP” on System screen and push **INPUT**.

LAN/UUP screen appears.

IP Address, Default Gateway and User Setting are displayed and set.

LAN/UDP SETUP					00912				
JOG	RESET	DryRun	Lock	Chuck IN				W0000	

UUP OFF

IP Address 192.168.80.202

Subnet Mask 255.255.255.0

Gateway 192.168.80.80

IP SET										
/1	/2	USER	/4	/5	/6	/7	/8	/9	/0	
		MANAGE								

Fig. 12-6 LAN/UUP

12-7 LANGUAGE

Set the cursor to "LANGUAGE" on System screen and push **INPUT** .

LANGUAGE screen appears.

You can set the language to be displayed on the screen. After setting, when the power is turned on again, the language changes as you specified.

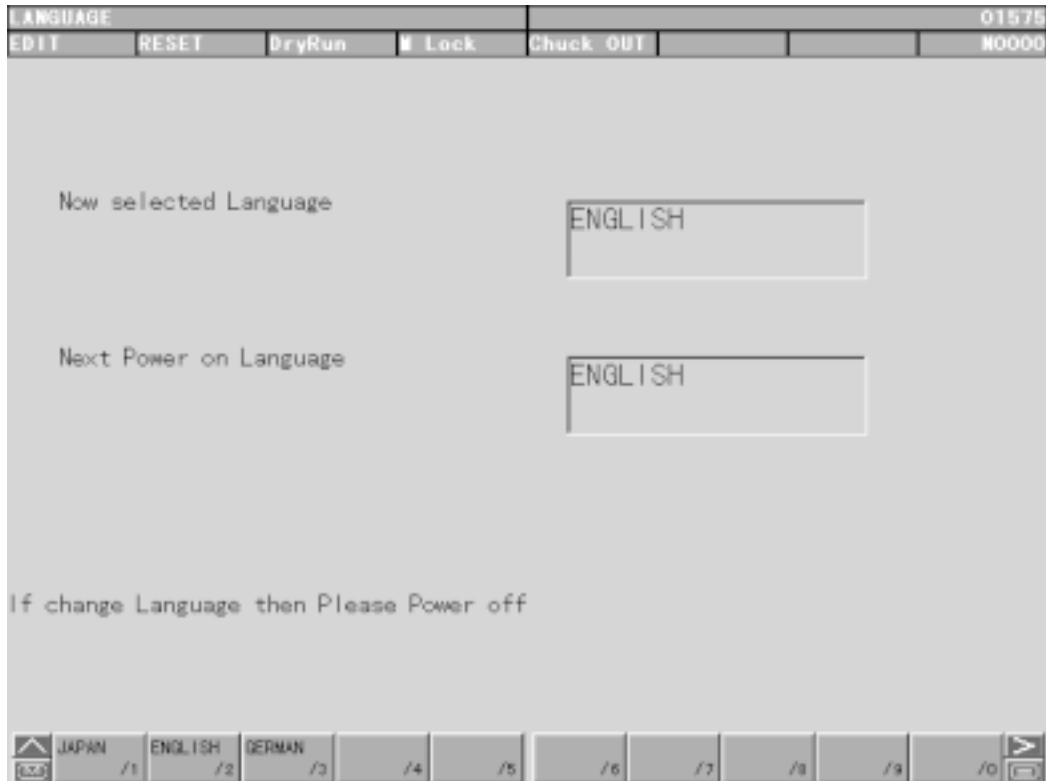


Fig. 12-7 LANGUAGE

12-8 LSSOL Infomation

Set the cursor to “Lssl Information” on System screen and push **INPUT**.
Lssl Information screen appears.

SYSTEM				00912			
JOG		RESET		DryRun		Chuck OUT	
						N0000	

INFORMATION DATA SET			I-Pex I-Pex		Comment	
No	unc_Lab	File Name				
1	LS-SOL1	ST_JP_1.JPG				
2	LS-SOL2	ST_JP_2.JPG				
3	LS-SOL3	ST_JP_4.JPG				
4	LS-SOL4	ST_JP_4.JPG				
5	LS-SOL1 CE	ST_CE_1.JPG				
6	LS-SOL2 CE	ST_CE_2.JPG				
7	LS-SOL3 CE	ST_CE_3.JPG				
8	LS-SOL4 CE	ST_CE_4.JPG				
9						

P: ???>

Fig. 12-8 LANGUAGE

12-9 STAF Setting

Bring the cursor onto the “STAF Setting” in the system screen and press the **INPUT** to display the “STAF Setting” screen.

Contents of C code, M code and M maintenance code can be displayed. Search is possible by key input.



Fig. 12-9 STAF Setting Screen

- F1/G code :
 - F2/M code :
 - F3/M maintenance code :
 - F6/SET :
-) Contents of each code are displayed.
- : Corresponding machine model name is set.

12-10 Y MENU

Bring the cursor onto the “ Menu” in the system screen and press **INPUT** to display the Y screen.

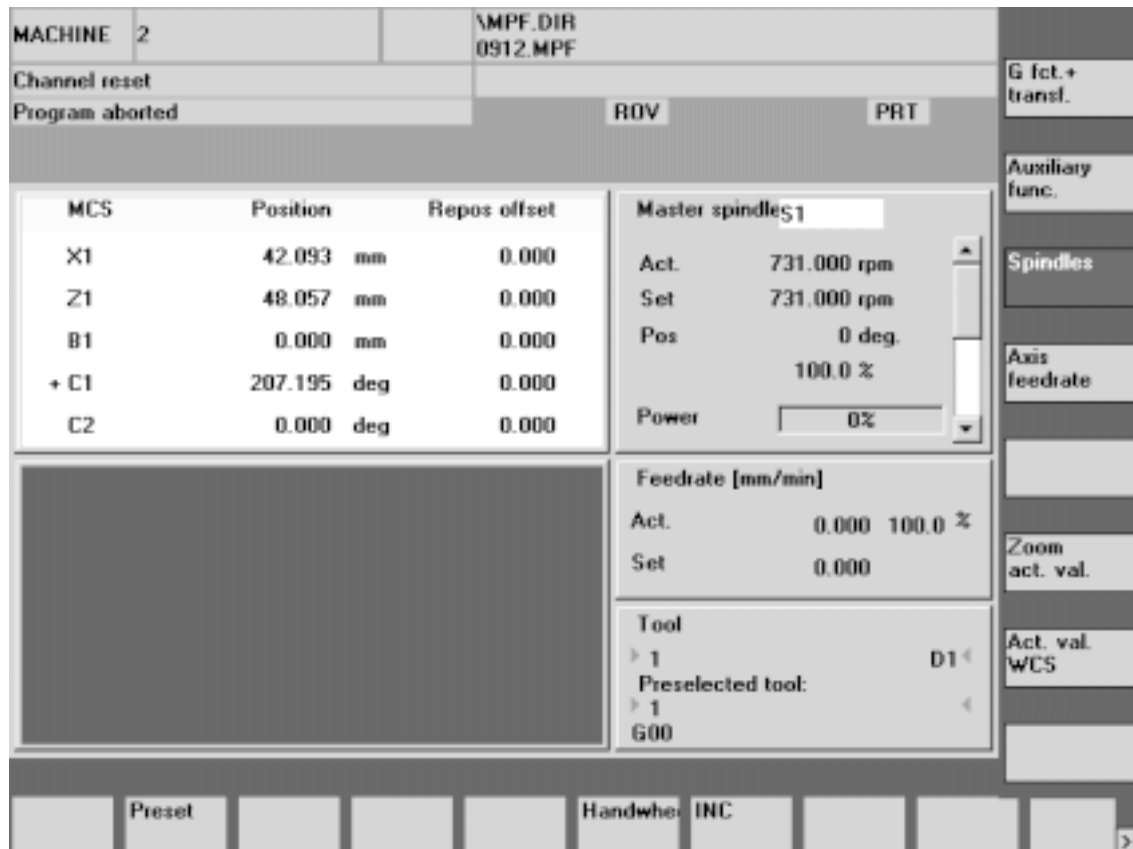


Fig. 12-10 Y Screen

13. Program

With **F2/PROGRAM** being pushed, Program page (Fig. 12-0) appears.

Program search, editing, creation, deletion, display of an execution block, and background editing can be performed here.

- Most of the operations explained here are valid also in the overall screen programs.

On program execution, display is changed.

Block having been executed	: Background green, letters black
Block either in execution or to be executed	: Background yellow, letters black
Block having been pre-read	: None
Previous block	: Background white, letter black
Block for next following executed or part for edition	: Background black, letters white

Program edit operation needs to satisfy the following conditions:

- (1) Write key needs to be included. (Not required while in background editing.)
- (2) Mode must be Edit. (Not necessary during background editing.)
- (3) It must not be while auto operation start (or hold). (Not necessary during background editing.)
- (4) No's O8000~O9999 should not be included in Edit Inhibit by parameters.

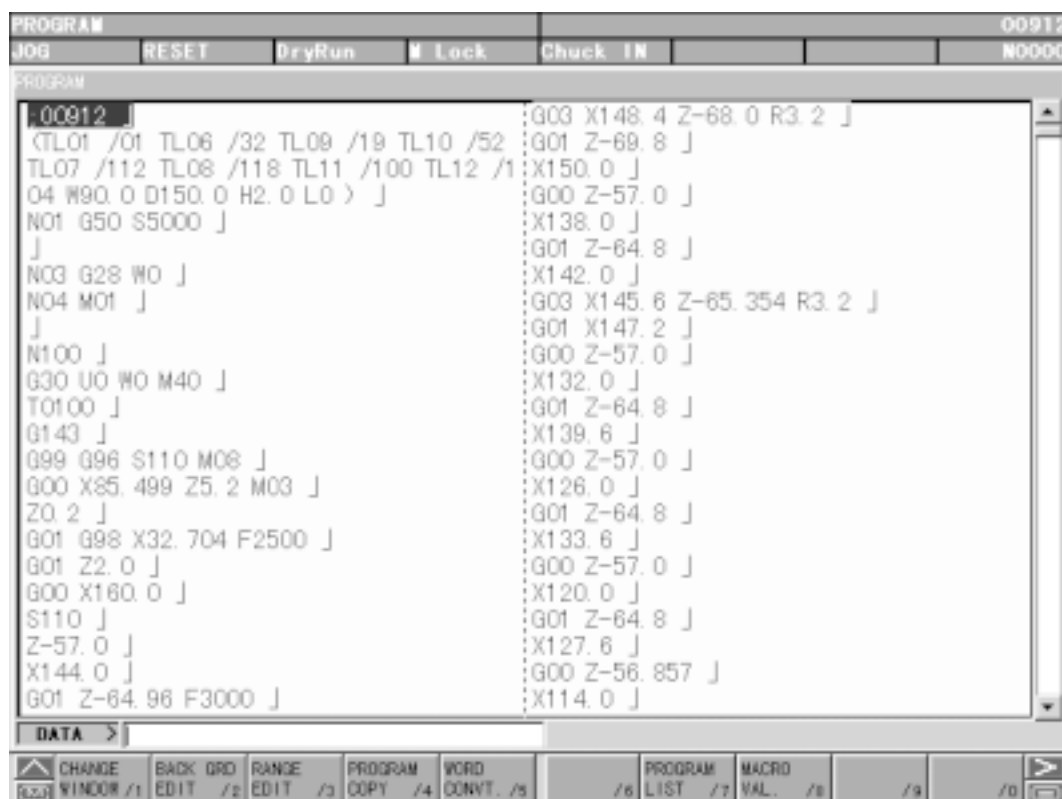


Fig. 13-0 Program

13-1 Operating Key Input Area On Screen

(1) Clearing key Input Area

The key input area and the warning message are deleted.

- ① Push **SHIFT** and, then, **CANCEL** .

13-2 Displaying Program

(1) Changing Width of Program Display (Only applicable to Program page)

Display on the screen is switched from two-column display into one-column display (or vice versa).

- ① Push **SHIFT** and, then, **ORIGIN** .

(2) Changing Half-Em/Em Character Display

Display on the screen is switched from half-em into em (or vice versa).

- ① Push **SHIFT** and, then, **HELP** .

(a) Character type displayed on supply of power is determined by the parameter.

13-3 Creating New Program

A new program is created.

A program immediately following creation consists of **O** , the input program No, “**]**” of line feed, and ‘%’.

- ① Input **O** .
② Input the number for the program to be created.
③ Push **INSERT** .

Note) When 0 exists at the beginning of the input number, the program number subject to creation and the program number displayed at the beginning of the program are not the same.

Table 12-3 Example of creating Program

KEY INPUT	PROGRAM NO.	PROGRAM CONTENT
O 0 0 0 1	1	O 0 0 0 1]
O 2	2	O 2]

13-4 Deleting Program

(1) Deleting Program

One program is deleted. However, a program under Edit Inhibit or while in starting cannot be deleted.

- ① Input .
- ② Input the program number subject to deletion.
- ③ Push .
- ④ "Delete? Y-Yes N-No" appears.
- ⑤ Push for deletion or any other key except not to delete.

(2) Deleting Two or More Programs

→ See 14-3 PROGRAM DELETION.

13-5 PROGRAM SEARCH

(1) Searching Assigned Program

A program assigned is searched. However, a p program under Display Inhibit cannot be searched.

- ① Input .
- ② Input the program number subject to search.
- ③ Push any of .
- ④ When it has been found, the program is displayed. When not, "NOT FOUND" message is displayed.

(2) Searching Before/After Displayed Program

Programs before/after the one in display are subject to search. When the program searched is under Display Inhibit, searching is continued until a program which can be displayed is finally found.

- ① Input .
- ② To search a number larger than the one in display, push .
- To search a number larger than the one in display, push .
- ③ A program found is displayed.

(3) Searching Out of Program list

→ See 14-2 PROGRAM SEARCH.

13-6 Program Copy

Contents of a program in display are copied into another program.

- ① Input .
- ② Input the program number subject to copying.
- ③ Push .
- ④ The program copied is displayed.

13-7 Changing Program Number

A program in display is changed into another program.

- ① Shift the cursor to the program number.
- ② Input .
- ③ Input the program number to be changed.
- ④ Push .
- ⑤ Delete the program in display and the new program is displayed.

13-8 Program Editing (Edit Mode or Background Editing)

13-8-1 Cursor Operation

The cursor normally displays a word in reverse video, which can move as follows:

- (1) Moving in Word Unit

Cursor is moved with or . When it comes to the end of the screen, display is scrolled.

- (2) Moving in Block Unit

With or , the cursor is moved. When it is at the end of the screen, display is scrolled.

Note) When a character exists in the key input area, Word Search is judged.

→ See 13-9 WORD SEARCH.

- (3) Switching Page

With or , page is changed. The cursor appears at the beginning of the page.

- (4) Moving to Beginning of Program

With and, then, pushed, the cursor is moved to the program head.

- (5) Moving to End of Program

With and, then, pushed, the cursor is moved to the program end.

13-8-2 Edit Operation

Use, at the cursor position, , , and for editing.

- (1)

Insert, after the cursor, the content of the key input area. When insertion takes place, the cursor moves to the last work having been inserted.

- (2)

The part inversely displayed by the cursor is replaced by the content of the key input area. The cursor does not make a move.

- (3)

The part inversely displayed by the cursor is deleted.

Note 1) Background editing cannot deal with the same program that can apply to ordinary editing. Choose ordinary editing.

→ See 12-11 BACKGROUND EDITING.

13-9 Word Search

As assigned number (numerical value) or work (character string) is searched.

Whether searching for a word or for a number is determined by input.

(1) Number Search

Number search includes searching with input data which consists of one alphabet (or '#') and numerals. Numerical values are identified as being differentiated between those with a decimal point and those without. Note, therefore, that "X1." and "X1000" both of which indicating the same shifting amount, are differentiated. "X0." and "X0", however, are not separated one from the other.

Example) When searching with "N10":



N10, N010, N00010, etc.

Example) When searching with "X0.1":

X0.1, X0.100, X00.10, X.1, X.100, etc.

(2) Word Search

Character string search includes all the others except number search.

- ① Input data for searching.
 - ② Assign the search direction with the cursor.
 -  Searching conducted before the cursor.
 -  Searching conducted after the cursor.
 - ③ When the target word is found, the cursor moves there. When it is not found, "NOT FOUND" message is displayed.
- To halt searching, push any one key.

13-10 Background Edit (Program Screen Only)

Normally, it is impossible to observe a program while it is in execution.

Background editing has enabled editing at this stage.

The background editing operation is completely the same as that of ordinary editing. NC execution is not affected when a program is searched, a cursor moved, or a page turned. The programs here become those dedicated to background edit where NC execution is not available. Therefore, it is possible neither to edit the program being executed nor to execute the program being background edited.

(1) Switching Screen

The edit programs are displayed along with the background edit programs. With

F1 / CHANGE WINDOW being pushed, the edit programs are displayed on the left side and the background edit programs on the right side. The active window (the title bar of which is the orange color) is the editable program. Pressing it again displays the editable program in full scale.

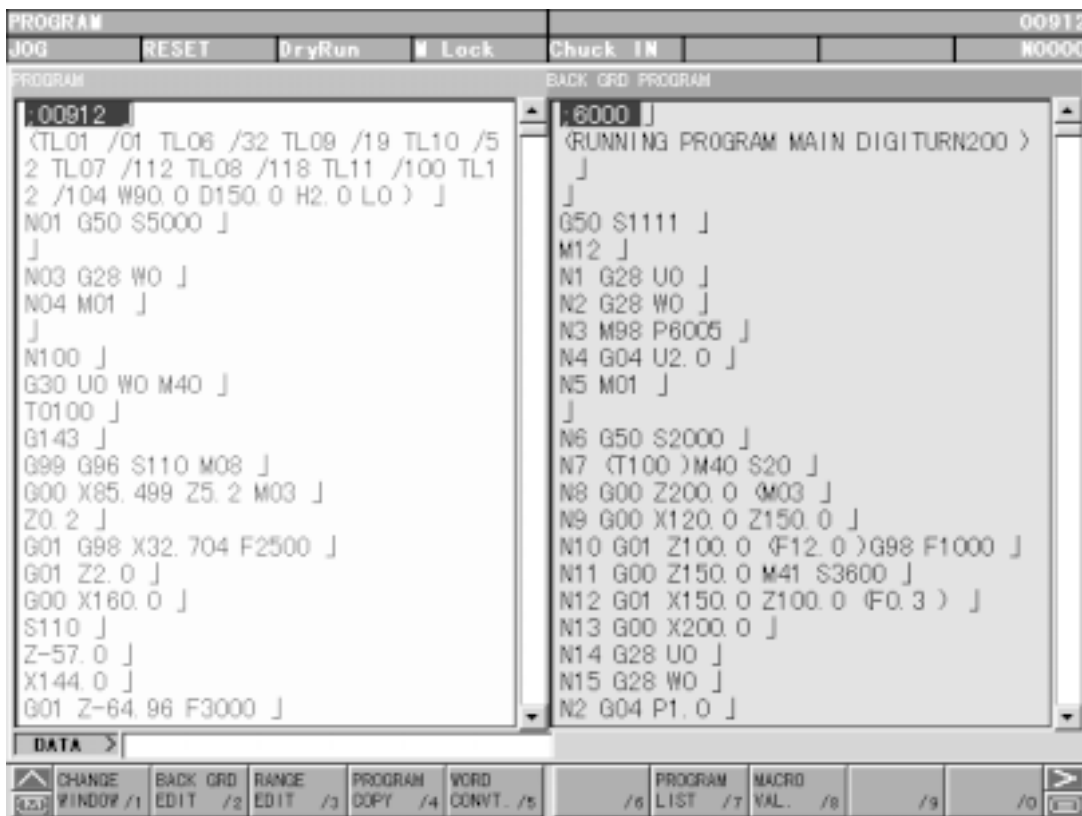


Fig. 13-10 (a) Switching Screen

Note) Then, if you press the **F2 / BACK GRD EDIT** function key, the selection shifts to the front program window or back program window, which enables you to use the key and edit.

(2) Selecting Edit Program

With **F2/BACK GRD EDIT** pushed while in ordinary edit, background edit is selected. And, with **F2/FOR GRD EDIT** being pushed while in background edit, ordinary edit is selected.

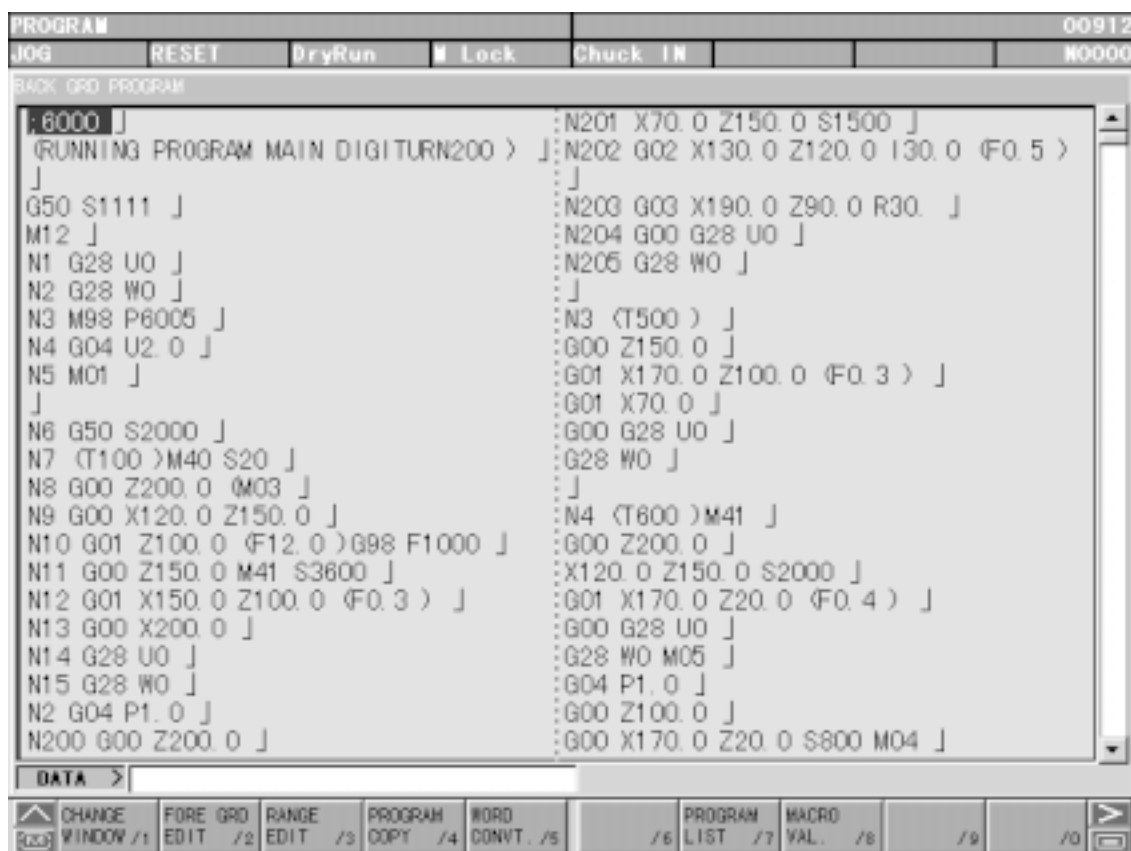


Fig. 13-10 (b) Background Programs Screen

- Ordinary edit is differentiated from background edit by its title. Ordinary edit used "Program" for its indication, while background edit uses "BG Program".

13-11 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.

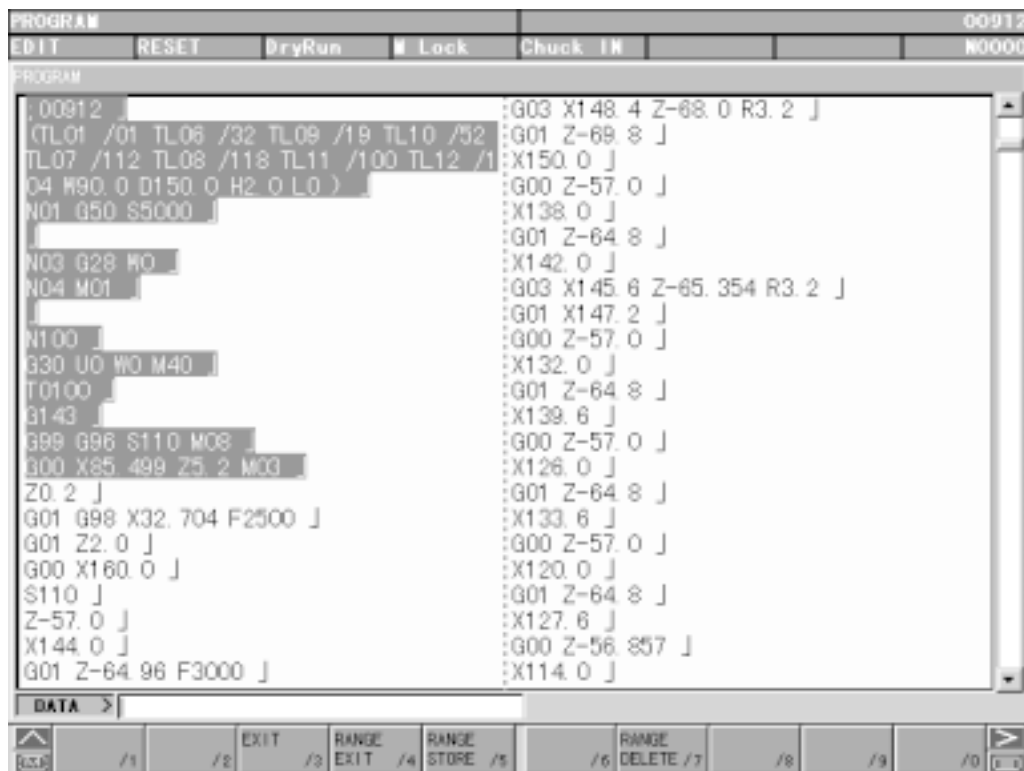


Fig. 13-11 Range Assignment

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.

13-12 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.

→ 13-9 WORD SEARCH.

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 CONVT**, 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.

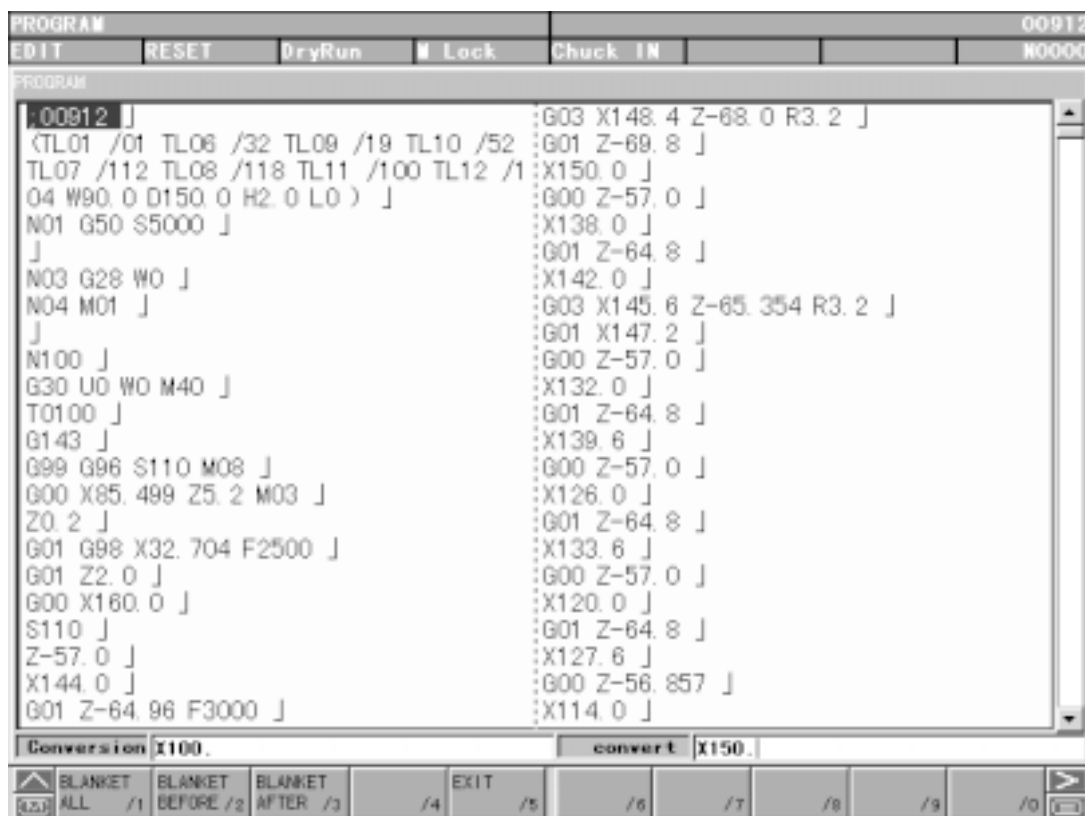


Fig.13-12 Word Convert

- 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 .

13-13 Macro Variables

Macro variables are displayed.

→ 6 MACRO VARIABLES.

14. Program List

The program list (Fig. 14-0) is displayed.

Not only reading the list, you can also perform searching and deletion of a program.

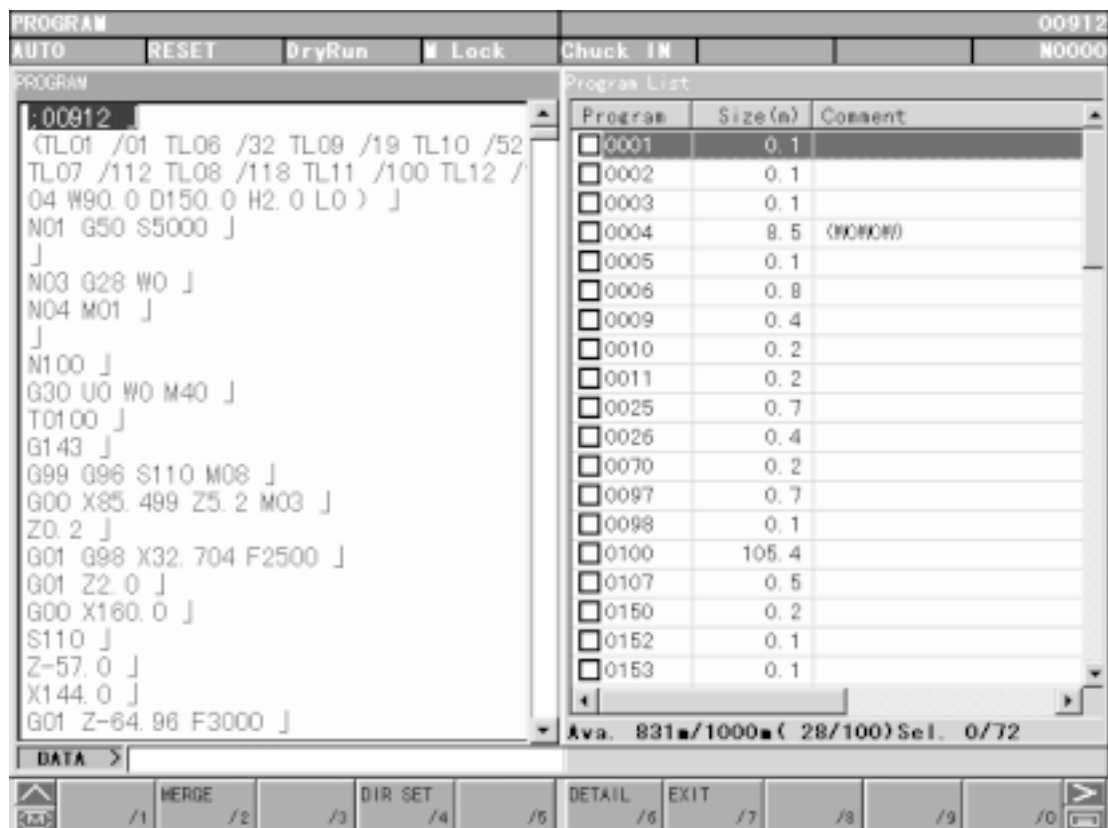


Fig. 14-0 Program List Screen

14-1 Program List

With **F7/PROGRAM LIST** pushed on Program page, the program list is displayed. With one more push, the list is erased.

As a display position differs by display method, the same operation applies.

When a list is displayed on the full screen, (Fig. 13-0) appears on the right side on the screen.

When not, (Fig. 13-1a) appears on the side opposite of the selected page.

Also, as the max. number of programs for registration and the memory amount still left unused are displayed, use them for program input and editing.

The cursor is moved with **↑** **↓** **→** **←** **⏮** **⏭**.

There are two kinds of program list, the one is the program list to display the program number, size and comment, the other is the program detail display 'Fig. 13-1b) to display the date instead of the comment.

Push **F6/DETAIL** to switch them.

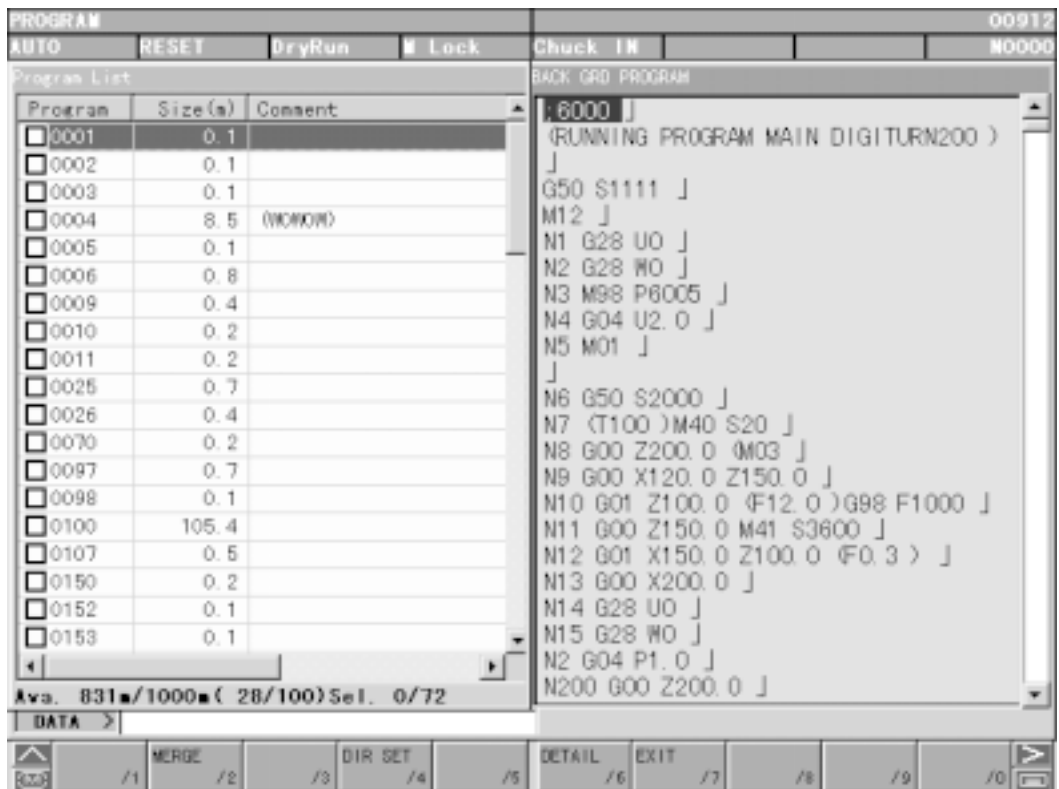


Fig. 14-1 (a) Program List Screen for Background Edit.

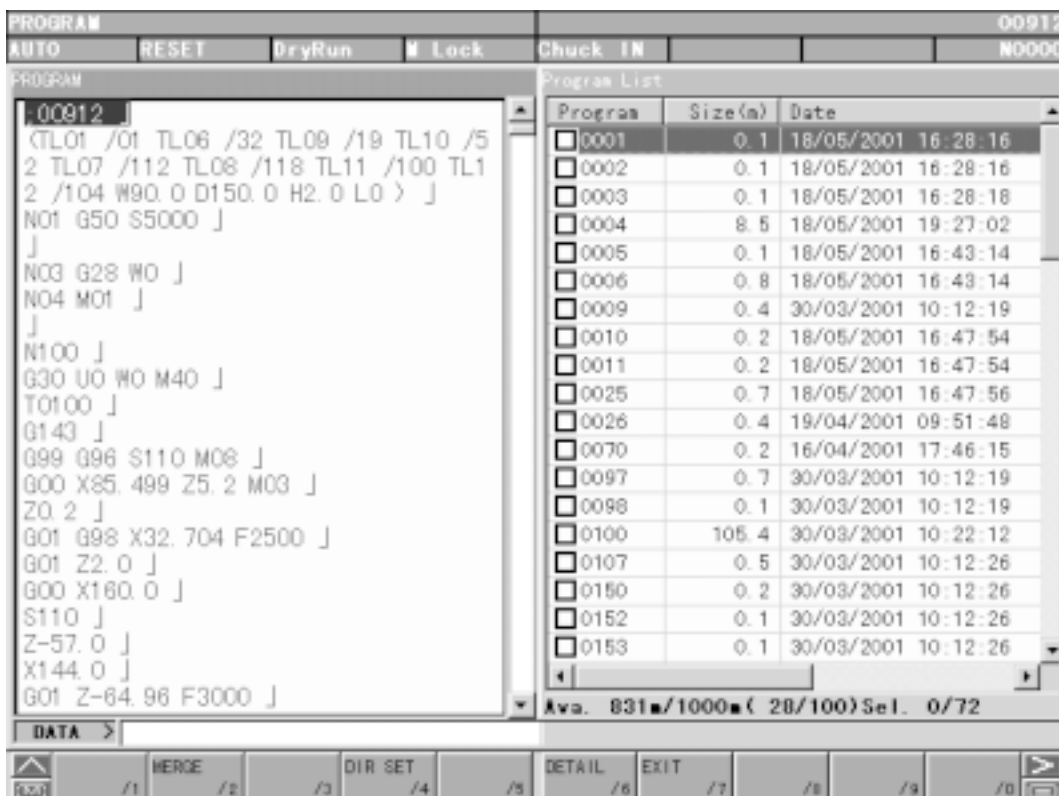


Fig. 14-1 (b) Program Change

The comment for the program detailed display indicates the one immediately following O number in a program. If not existing, no display takes place. Max. 16 characters can be displayed. The size for output is 0.1m each. However, depending on memory control, it may slightly differ from the actual tape length.

14-2 Program Search

Program search can be performed as follows while Program List or Program Detail is in display.

(1) Searching with Program List

- ① Empty the key input area.
- ② Move the cursor to the program number subject to search.
- ③ With **INPUT** pushed, a program is changed over.

(2) Searching by Key Input

- ① Input **O**.
- ② Input the program number subject to search.
- ③ Push one of **↑** **↓** **→** **←**.
- ④ On finding, the program is displayed. If not, "NOT FOUND" message appears.

14-3 Program Deletion

Program deletion can be performed as follows while Program List or Program Detail is in display, provided that the following conditions are satisfied.

- (a) Write key should be included.
- (b) It is in Edit mode. (Not necessary while in background editing.)
- (c) It is not in auto operation start (or halt). (Not necessary while in background editing.)
- (d) For O8000~O9999, it should not Edit Prohibit.

(1) Deletion from Program List

A program at the cursor position on the program list is deleted.

- ① Empty the key input area.
- ② Shift the cursor to the program number subject to deletion.
- ③ Push **DELETE**.
- ④ "Delete? Y-Yes N-No" appears.
- ⑤ Push **Y** for deletion. If not, push any other key except **Y**.

(2) Collective Deletion by Program Selection

A program selected on the program list is deleted.

- ① Select a program to be deleted and put "*" in front of the number.
To select the all programs, push **ORIGIN**. To select them one by one, move the cursor to a program to be selected and push **SPACE**.
To cancel it, push either **ORIGIN** or **SPACE**.
- ② Push **DELETE**.
- ③ "Delete? Y-Yes N-No" appears.
- ④ To delete, push **Y**. If not, push any other key except **Y**.

Note 1) Before deleting, search the program and confirm program content. A program having been deleted cannot be recovered.

Note 2) When a program in display has been deleted, the program of the next following program number is displayed.

14-4 Program Merging

Following the program displayed by the program list, another program indicated by the cursor on the program list can be merged.

- ① Search the program to which a program is merged.
- ② Shift the cursor to the program to be merged on the program list.
- ③ Push .
- ④ "Merge? Y-Yes N-No" appears.
- ⑤ To merge, push . If not, push any other key except .
- ⑥ Start merging.
- ⑦ On ending, the program is displayed all over again from the beginning. At the merging section, the numbers in the O-number of the merged program alone are left behind.
- ⑧ "Delete? Y-Yes N-No" appears.

To delete the program merged at the end, push . To leave it, push any other key except .

14-5 Directory Setting

The program memory is 1000m x100 lines, and you can hold several memories of the same memory on the hard disk. When the memory gets full or when you have to register a different NC program for different work, you can have a different memory without deleting all by changing to a different directory. If you want to restore the original state, you only have to select again the previous directory.

The program with a different directory cannot be called out bilaterally with M98, etc. However, O8000~O9999 always reside in any directory as macro programs, call-out or edit is possible. The file operation in the directory setting screen needs to be [Writing key - Writing] [Edit Mode]. Move the cursor to each list using function **F1**, **F2** and **F3**. In each list, you can delete the file/directory by attaching a check mark to them.

The screenshot shows the 'DIR SET' screen with the following components:

- Top Bar:** DIR SET (left), 00912 (right).
- Function Buttons:** EDIT, RESET, DryRun, Lock, Chuck OUT, NO000.
- SET:** YOSHI
- DIRECTORY LIST:**

DIRECTORY NAME	Date
<input type="checkbox"/> ASAHI	2001.05.10
<input type="checkbox"/> HIKOBOSI	2001.05.10
<input type="checkbox"/> HOSHISAN	2001.05.10
<input type="checkbox"/> KAMA	2001.05.10
<input type="checkbox"/> NONSAN	2001.05.23
<input type="checkbox"/> TUKISAMA	2001.05.10
<input type="checkbox"/> UMIYAMA	2001.05.10
<input type="checkbox"/> USER	2001.05.17
<input type="checkbox"/> YOSHI	2001.05.23
- FILE LIST:**

File name	Size	Date
<input type="checkbox"/> 0001	0.1	2001.05.18 16:28:16
<input type="checkbox"/> 0002	0.1	2001.05.18 16:28:16
<input type="checkbox"/> 0003	0.1	2001.05.18 16:28:18
<input type="checkbox"/> 0004	8.5	2001.05.18 19:27:02
<input type="checkbox"/> 0005	0.1	2001.05.18 16:43:14
<input type="checkbox"/> 0006	0.7	2001.05.18 16:43:14
<input type="checkbox"/> 0009	0.4	2001.03.30 10:12:19
<input type="checkbox"/> 0010	0.2	2001.05.18 16:47:54
<input type="checkbox"/> 0011	0.2	2001.05.18 16:47:54
<input type="checkbox"/> 0025	0.6	2001.05.18 16:47:56
<input type="checkbox"/> 0000	0.0	2001.05.18 16:47:56
- O8000~O9999 LIST:**

File name	Size	Date
<input type="checkbox"/> 8000	0.3	2001.05.21 14:54:14
<input type="checkbox"/> 9999	0.1	2001.05.21 14:46:44
- Bottom Bar:**
 - DIR NAME
 - Directories: DIRECTORY LIST /1
 - Files: FILE LIST /2
 - Macro Programs: 00000 LIST /3
 - EXIT /4
 - NEW /5
 - RENAME /6
 - COPY /7
 - /8
 - /9
 - /0

Fig.14-5

SET	: The directory name currently being selected is displayed.
DIRECTORY LIST	: All of the existing directories are displayed.
FILE LIST	: All of the programs that exist in the directory where the cursor is placed in the directory list are displayed.
O8000~O9999 LIST	: A list of the macro program is displayed.
F1/DIRECTORY LIST	: The cursor is moved to the directory list.
F2/FILE LIST	: The cursor is moved to the file list.
F3/O8000 LIST	: The cursor is moved to the O8000~O9999 list.
F4/EXIT	: Returns to the program list screen.
F5/NEW	: A directory is newly created.
F6/RENAME	: A directory name is changed.
F7/DIR COPY	: A directory is copied.
F8/FILE COPY	: A file is copied between different directories.
INPUT	: Directory setting is made.
DELETE	: A directory or file is deleted.
SPACE	: A Check mark is attached/removed.
ORIGIN	: Check marks are attached to/removed from all.

14-5-1 Directory setting

The directory to be used is selected.

- ① Press F1/DIRECTORY LIST and move the cursor to the directory list.
- ② Place the cursor on the directory to be used.
- ③ Press INPUT.
- ④ You are asked OK?, then press Y.

After the directory setting is completed, the screen is automatically changed to the program list screen. The program which has been searched so far becomes void, so search the program.

14-5-2 Directory Creation

A directory is newly created. Directories can be registered up to 10 (up to 100 at option). However, the "USER" directory is presumed to be always existing (cannot be deleted). The directory must be named with less than 8 alpha-numeric characters. The name consisting of numbers only like 1234 is not accepted, where alphabetical character must always be included like A1234. A decimal point cannot be used either.

- ① Press F1/DIRECTORY LIST and place the cursor on the directory list.
- ② Input the directory name from the keys.
- ③ Press F5/NEW.

14-5-3 Delete of Directory

Unnecessary directories can be deleted.

- ① Press **F1/DIRECTORY LIST** and place the cursor on the directory list.
- ② Place the cursor on the directory you want to delete.
- ③ Press **DELETE** .
- ④ "You are asked OK?", then press **Y** .

The USER directory cannot be deleted, as it is held as standard.

14-5-4 Change of Directory

The directory name can be changed.

- ① Press **F1/DIRECTORY LIST** and place the cursor on the directory list.
- ② Place the cursor on the directory for which you want to change the name.
- ③ Input the directory name from the keys.
- ④ Press **F6/RENAME** .

14-5-5 Copy of Directory

A directory is copied.

- ① Press **F1/DIRECTORY LIST** and place the cursor on the directory list.
- ② Place the cursor on the directory to be copied.
- ③ Input the directory name from the keys.
- ④ Press **F7/DIR COPY** .

14-5-6 Copy of File

A program can be copied between different directories.

- ① Press **F2/FILE LIST** and place the cursor on the file list.
- ② Attach a check mark to the file you want to copy.
Using **SPACE** attaches the check mark one by one, using **ORIGIN** attaches it to all.
- ③ Press **F8/FILE COPY** , which makes the O8000 list the file copy list.
The cursor is moved to the directory list.
- ④ Place the cursor on the directory which is the destination of the copying.
- ⑤ Press **F9/FILE COPY EXE** .
- ⑥ "You are asked OK?", then press **Y** .

15. Input / Output

With **F8/IN/OUT** pushed, the data I/O screen is displayed.

All the operations relating to I/O such as RS232C , PC Card and NetWork are performed here. The program list is displayed on the right side of the page, the data setting table (various data setting) on the left, and the monitor screen at the bottom left-hand corner.

As I/O state being displayed on the monitor screen, use it to confirm operation and to check collation errors.

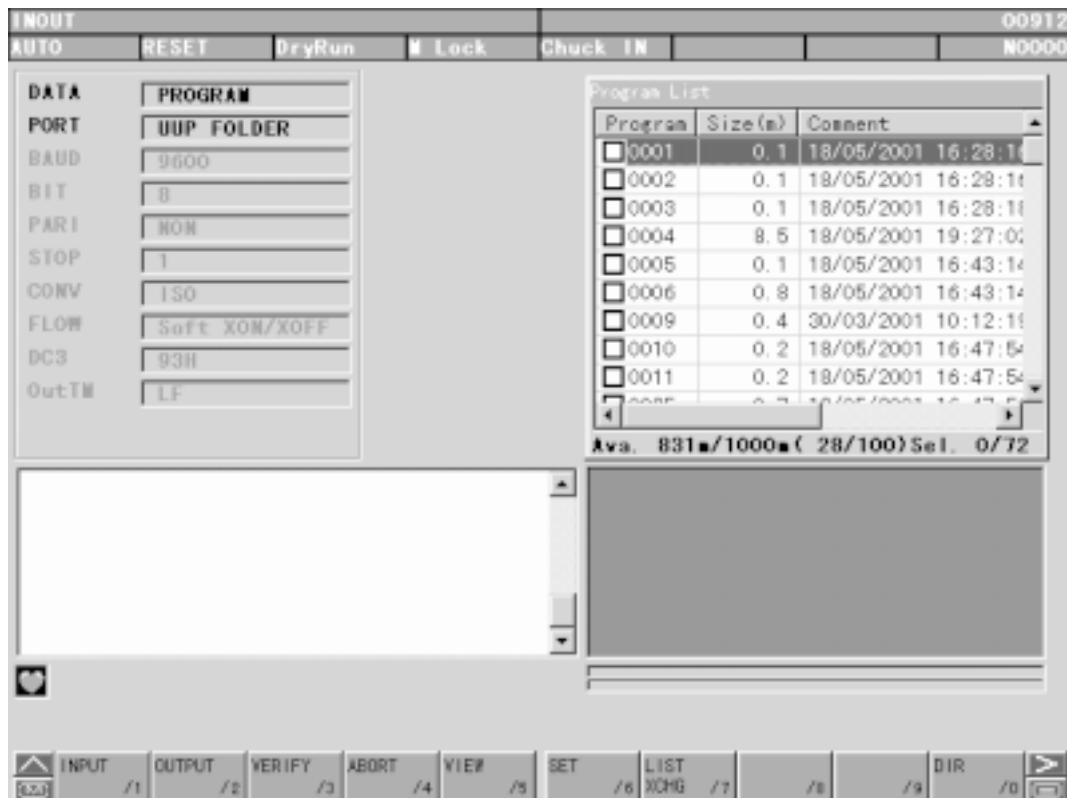


Fig. 15-0 I/O Screen

(1) F1/Input

Input the external unit data into NC main body.

- ① Connect the external unit.
- ② Set item on the data setting table to the setting of the external unit.
- ③ Set the external unit to Output Standby state. (Make sure that all the communication lamps are turned green.)
- ④ With **F1/INPUT** pushed, input is started.

(2) F2/Output

Data of the NC main body are output into the external unit.

- ① Connect the external unit.
- ② Set the item of the data setting table to the setting of the external unit.
- ③ Set the external unit to Output Standby state. (Make sure that all the communication lamps are turned green.)
- ④ With **F2/OUTPUT** pushed, output is started.

(3) F3/Verify

Data are verified between the external unit and the NC main body. Verification cannot be made depending on data. See applicable data.

- ① Connect the external unit.
- ② Set item of the data setting table to the setting of the external unit.
- ③ Set the external unit to Output Standby state.
- ④ With F3/VERIFY , collation is started.

(4) F4/Abort

Input, output, and collation are interrupted.

(5) F5/View

Displays the leading part of the O number indicated by the reversed cursor in the program list at the right of the screen.

Only NC program is valid.

(6) F6/Set

Sets the type of the data sent or received and the communication means.

See "14.2 Setting Data" for the details.

(7) F7/List Xchag

Alternately changes the comment display and the time stamp display in the program list.

(8) F0/DIR

Valid only when PC card and UUP folder are used.

You can confirm the content of the PC card and UUP folder as well as delete the folder or file.

When PC card is used, you can also create or delete a sub folder.

- File select window

The file select window is valid only when PC card and UUP folder are used.

Pressing **F0/DIR** opens the following file select window.

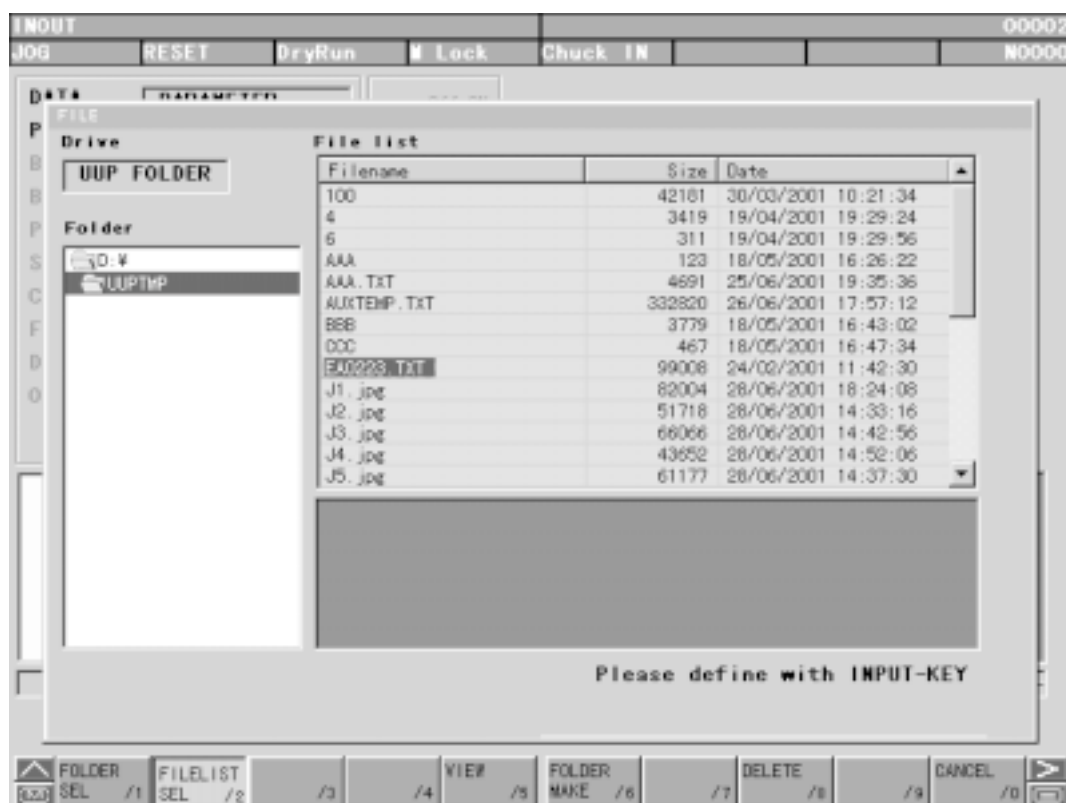


Fig. 15-0-1 File select window

- (1) F1/Folder Sel
Moves the cursor to the directory area.
After that, you can change the directory using the UP and DOWN key.
- (2) F2/File List Sel
Moves the cursor to the file list area. You can specify the file using the cursor UP and DOWN key.
- (3) F3/File Name Selection (Only when output)
Moves the cursor to the file name input area. Enter here a character string as a new file name.
- (4) F5/View
Displays the leading part of the file content indicated by the reversed cursor.
- (5) F6/Folder Make
Valid when the cursor is in the folder area.
You can add a folder when PC card is used.
- (6) F8/DELETE
Deletes a folder or file indicated by the cursor.
- (7) F0/CANCEL
Stops the operation of the file select window.

- To use UUP folder.

The UUP folder corresponds to the PC card slot in the virtual media where LAN is used in the place of the PC card. It is seen as a common virtual drive shared by an external personal computer via LAN, where you can directly transfer a file to this folder. After that, you can input/output by the same operation as the PC card. Meanwhile, to connect this to LAN as a virtual drive, you must both set the NC side and the personal computer side.

15-1 Program List

- (1) Program Selection (Used when inputting/outputting a program)

- ① Move the cursor to the program you want to select.

- ② Press .

A check mark appears in front of the program selected.

To select/cancel all programs, press .

- (2) Program Clear in the List

If you select a program and press , you are asked "Is it OK to clear? Yes (Y) No (N)". Press to clear.

15-2 Setting Data

Bring the cursor onto the item to be set and press , which displays the items to be selected.

Followings are the contents of the data to be set.

- (1) Data

Select from among program, multi, work coordinate, tool, common variable, etc.

- (2) Port

Select from among;

PC-CARD

UUP folder

RSI

- (3) Baud Rate

Select from among 1200, 2400, 4800, 9600, 19200, 38400 and 56000

- (4) Stop Bit

Select from:

8 bits

7 bits

- (5) Parity
Select from among:
None
Even (E)
Odd (O)
- (6) Stop Bit
Select from:
1 bit
2 bits
- (7) Cord Conversion
Select from among:
ASCII
ISO
EIA
- (8) Control
Select from among:
None
Hard RTS/CTS
Soft XON/XOFF
- (9) DC3
Select from:
13H
93H
- (10) Output Line Feed
Select from among:
CR + LF
LF
LF + CR

16. Test Operation

If you press **F9/TEST RUN** while the overall screen is displayed, the function keys to set the signals used for the test operation are displayed (Fig. 16.0).

If you press **F2/DRY RUN** , you are asked “Is it OK? Y-Yes N-No”. Pressing **Y** changed the dry run setting (ON, OFF alternately changes).

When executing the dry run, the **F2/DRY RUN** display looks like being sunk.

In the same way, you can change the setting of the machine lock using **F3/MACHINE LOCK** .

The color of Dry Run and Machine Lock at the top center of the screen changes.

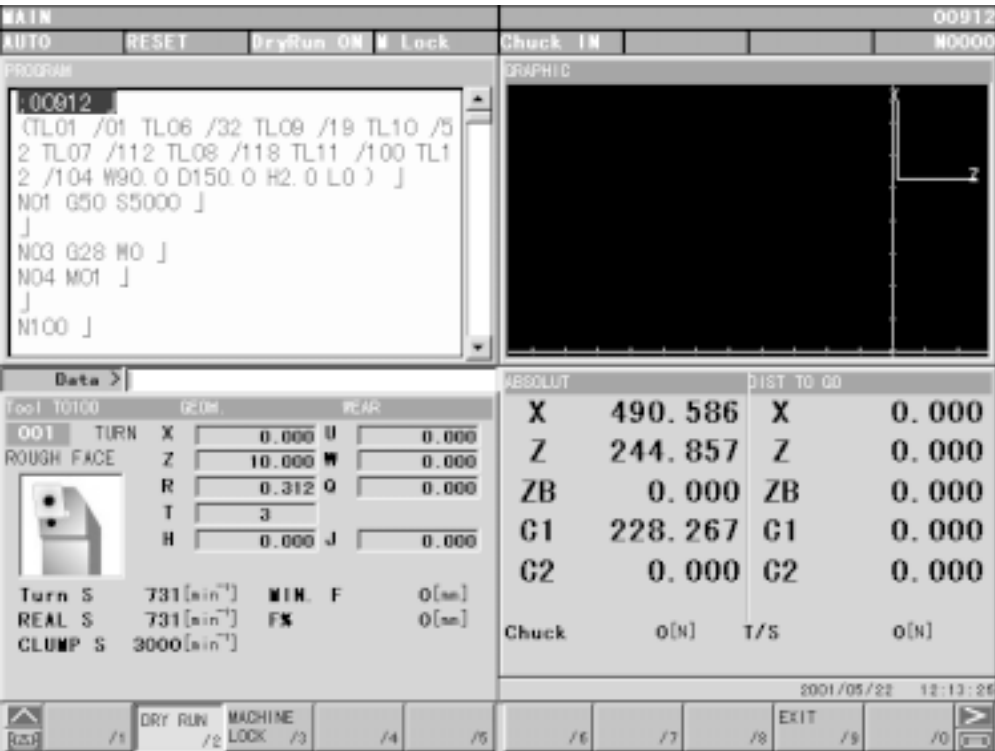


Fig. 16-0 Test Operation

17. Manual Operation

If you press **F0/MANUAL OPERATION** when the overall screen is displayed, the function keys to set various functions used for the manual operation are displayed(Fig. 17-0).

Pressing the various function keys, the setting of the selected function changes (ON OFF alternately changes). While the various functions are ON, the display of the selected function looks like being sunk.

Following manual operation is possible.

- F1/Chuck Outside
- F2/Chuck Inside
- F3/Spindle Low
- F4/Spindle Middle
- F5/Spindle High
- F6/Air Blow Chuck
- F7/Air Blow Spindle
- F8/Light
- F9/Next → (F1/Turn Tool, F2/C Axis)
- F0/EXIT

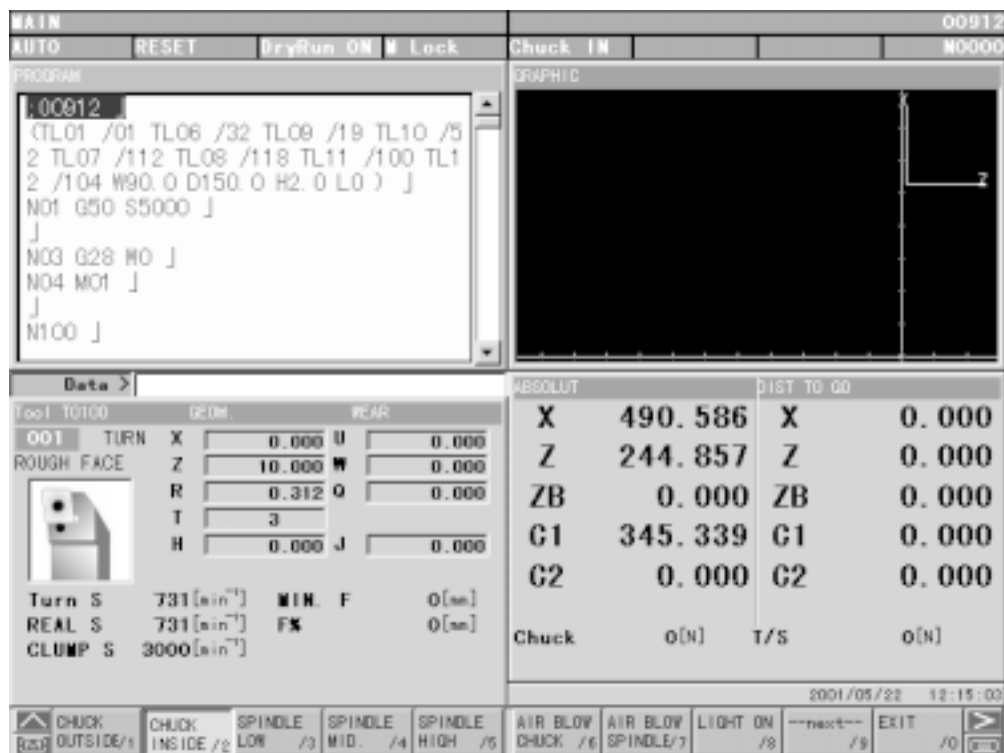




Fig. 17-0 Manual Operation

18. User Screen

Press  key to change the function key and press  to display the user screen in the window screen.

If you register photo or video data beforehand, you can display an arbitrary screen.

The user screen is a screen to register an image or animation on the NC and display them.

For registering the image and animation, 100M byte space is made free on the hard disk.

You can register one image or animation to each function key **F1** ~ **F8** and vertical function **VF1** ~ **VF8**, which makes 16 in total, and making them all one channel, up to 8 channels can be used for the registration, i.e. 16×8 channels = 128 can be registered.

The image that can be displayed is BMP format (.BMP) or JPEG format (.JPEG) and the animation that can be displayed is AVI format (.AVI).

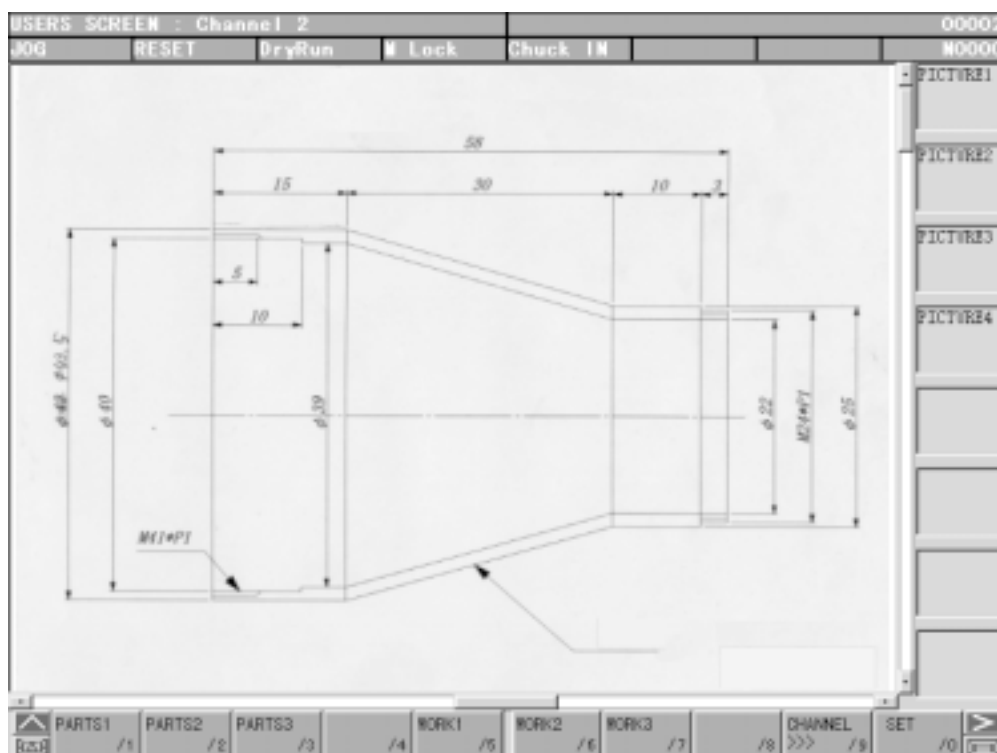


Fig. 18-0 User Screen

18-1 How to operate User Screen

The image and animation registered are displayed by only pressing the function keys.

- F1~F8 : The image and animation registered are displayed.
- VF1~VF8 : The image and animation registered are displayed.
- F9/CHANNEL>>> : Changes to the next channel.
- AUX : Changes to the previous channel.
- F0/SET : Moves to the screen to register the image and animation.

In case of an animation, the following function appears, which enables a pause or frame feed.



Fig. 18-1 Function Keys for Animation

- F1/Prev : Winds back the animation up to the start.
- F2/Next : Forward the animation up to the end.
- F3/Play : Starts playing from a stop state.
- F4/Pause : Enables/cancels a pause.
- F5/Back : Feeds frames backwards.
- F6/Step : Feeds frames.
- F7/Stop : Temporarily stops playing.
- F0/End : End the animation.

18-2 Setting Screen

This is a screen to set which image or animation is to be registered in the function keys of the user screen.

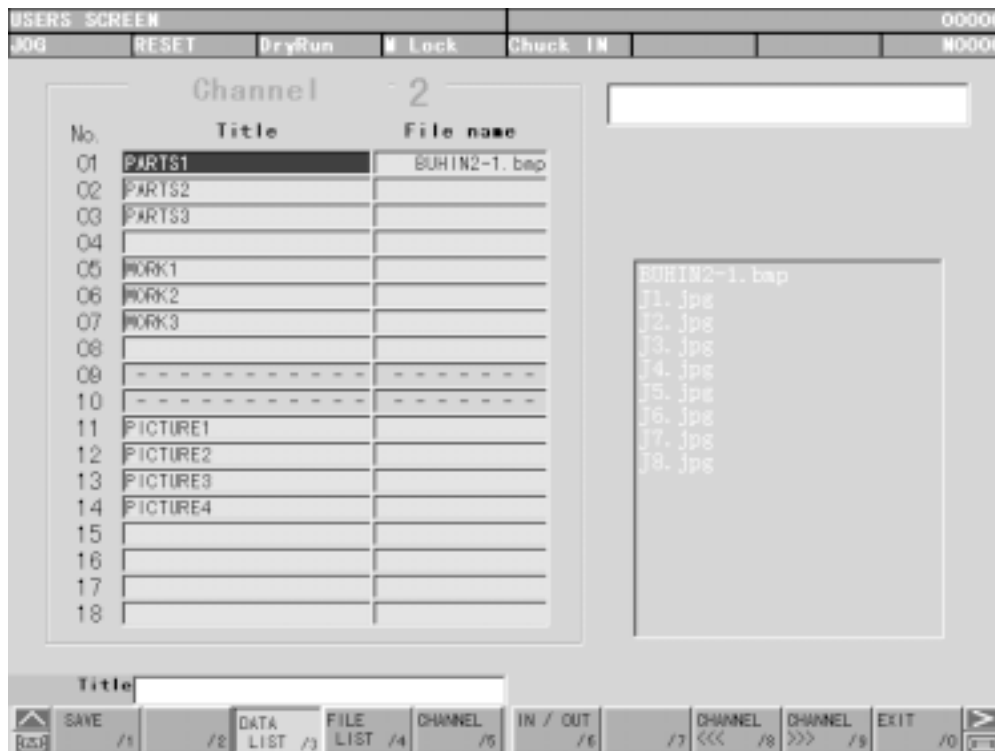


Fig. 18-2 Setting Screen

- F1/SAVE : Saves the data and enables the registration setting.
- F3/DATA : Moves the cursor to the function registration list.
- F4/FILE LIST : Moves the cursor to the file list screen for image and animation data.
- F5/CHANNEL : Moves the cursor to the channel name setting.
- F6/IN/OUT : Changes the screen to the one that inputs/outputs the image and animation data to be registered.
- F8/CHANNEL<<< : Changes the channel to the previous one.
- F9/CHANNEL>>> : Changes the channel to the next one.
- F0/EXIT : Returns to the user screen.
- SHIFT + INPUT : Copies the data in the table to the key input area.

18-2-1 How to register

Registration is made by setting the following items in the table for each channel.

(1) Number

Represents the number of functions.

01 ~ 08 correspond to the horizontal functions ~ .

11 ~ 18 correspond to the vertical functions ~ .

(2) Title

Registers the characters to be displayed in the function menu.

Input the name from keys and set it with .

(3) File name

Registers a file name for the image and animation which is displayed when the function is pressed. Input it directly from keys or select from the file list.

① Press the function and move the cursor to the file list.

② Using cursor keys , select the file and register it with .

As there are 8 channels, each channel name can be attached.

(4) Channel name

There is an area to set the channel name at the upper left corner of the screen. Move the cursor using , input the name from keys and set it with .

After the setting, pressing enables the registration.

If it is not saved, when you change the screen, you are asked "Do you save?". Then if you press , the result will be the same as you save it.

If you turn off the power without saving, or if you press when you are asked "Do you save?", the setting data become void.

18-3 Input/Output

Executes input/output of image and animation data.

The destination of the input/output is the “memory card” or “UUP folder”.

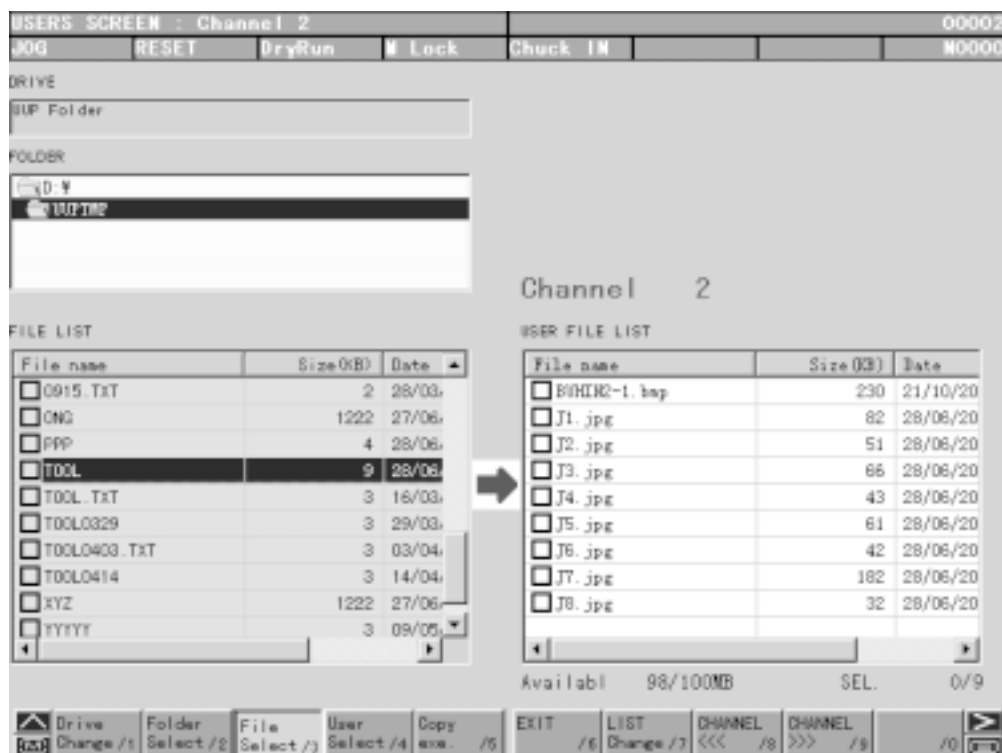


Fig. 18-3 Input/Output Screen

- | | | |
|------------------|---|--|
| F1/Drive Change | : | Changes between memory card/UUP folder. |
| F2/Folder Select | : | Changes the folder (directory) as the destination of input/output. |
| F3/File Select | : | Changes the direction of transmission as input/output destination
→ NC. |
| F4/User Select | : | Changes the direction of transmission as NC → input/output
destination. |
| F5/Copy Exe. | : | Copies the selected file towards the transmission direction. |
| F6/EXIT | : | Setting screen. |
| F7/LIST Change | : | Changes the list screen to size → date. |
| F8/CHANNEL<<< | : | Changes the screen to the previous one. |
| F9CHANNEL>>> | : | Changes the screen to the next one. |

18-3-1 How to Register

The left side of the screen is made the destination of input/output and the right side is made the pcFLexi side.

- (1) Using **F7/CHANNEL<<<** **F/8CHANNEL>>>** , select the channel of the user screen.

The image and animation files registered in each channel are displayed in the user screen list.

- (2) Press **F2/FOLDER SELECT** and move the cursor to the folder of the input/output destination.

Select the folder moving the cursor upward and downward and press **INPUT** , then the folder is selected.

The content of the folder selected is displayed in the file list.

- (3) Press **F3/FILE LIST** and move the cursor to the file list of the input/output destination.

Using **SPACE** , attach a check mark to the file you want to copy (**ORIGIN** can select all).

- (4) **F5/COPY EXE.** starts copying (If there is no check mark attached, the file where the cursor is positioned is copied).

18-3-2 File handling

When the cursor is positioned to the file list or user file list, the following keys are enabled.

In case of the user file list especially, as there is limitation that is 100M, delete redundant files.

The vacant capacity is displayed below the list.

SPACE : Attaches a check mark.

ORIGIN : Attaches or removes check marks to or from all files.

DELETE : Deletes the file with a check mark attached.

(If there are no check mark, the file where the cursor is positioned is deleted.)

19. Q Setter Setting

Press and , and the Q setter setting screen is displayed (Fig. 19.0), where you can change the sensor position of the Q setter.

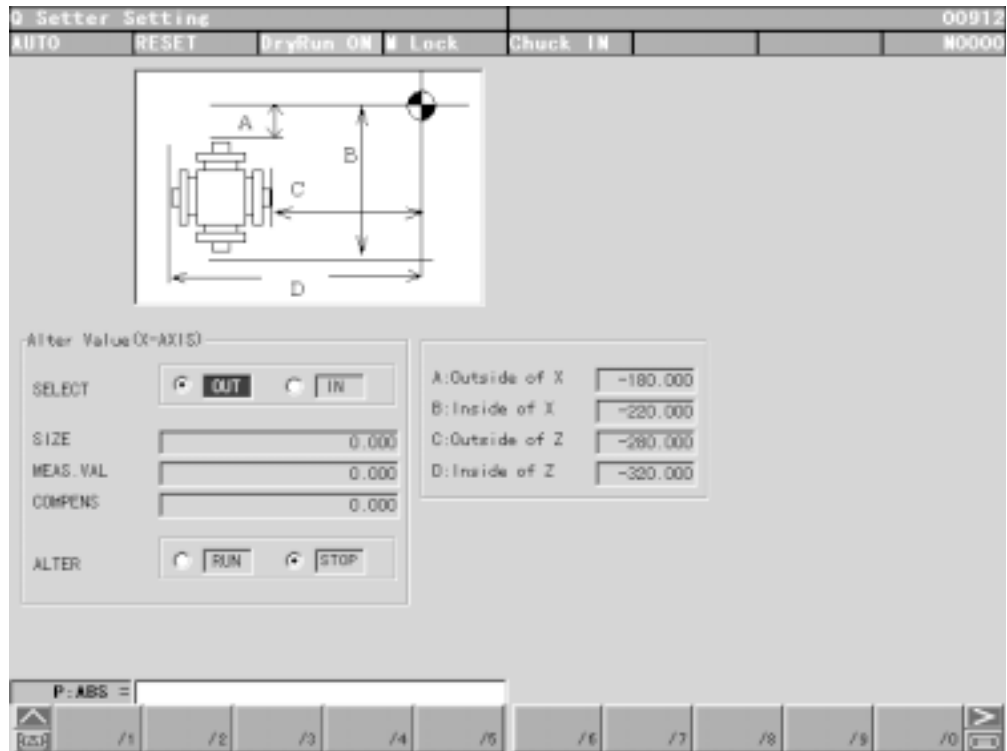


Fig. 19-0 Q setter setting

20. Ladder Live Line Display

20-1 Ladder Live Line Display Screen

(Explanation for the case there is no mouse)

- ① In the system screen, bring the cursor onto the [30. Y Menu] and press **INPUT** to display the Y screen, then press **MENU SELECT** in the operation panel and press **>** key to assign Step7 to the function key.
- ② Press the function key of Step7, and the SIMATIC Manager screen boots up.

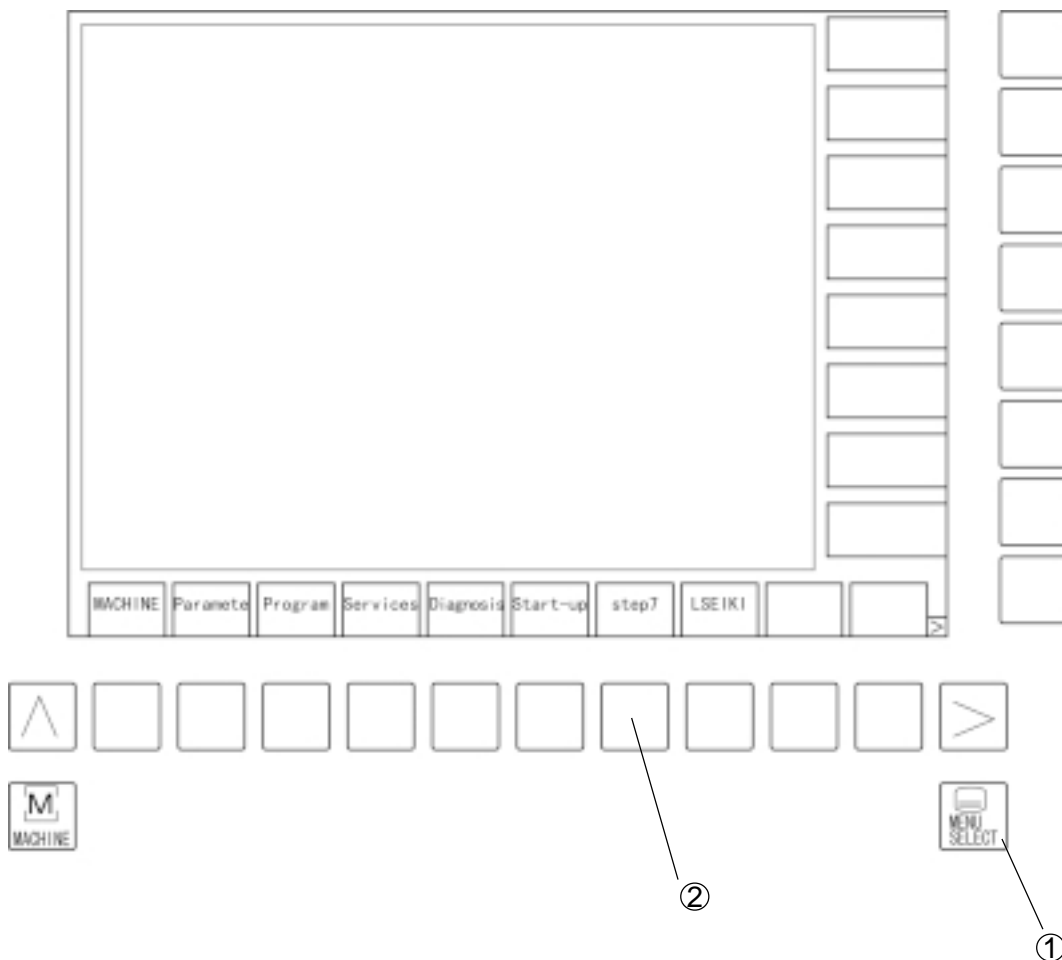


Fig. 20-1 (a) Y Screen

- ③ Press **Alt** key to open the sub menu of the File using **F** key. Using the cursor **↑** **↓** keys, move the cursor to the Open in the sub menu and press **INPUT** .

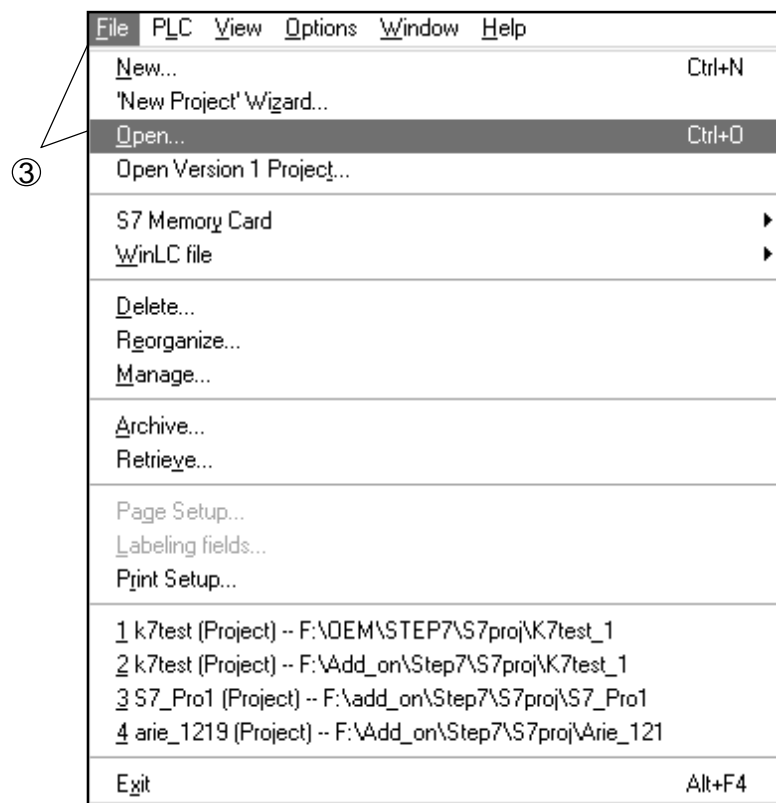


Fig. 20-1 (b) File Open Screen

- ④ Move the cursor to the file of the project (in the example, k7test) with the cursor **↑** **↓** keys and press **INPUT** key.

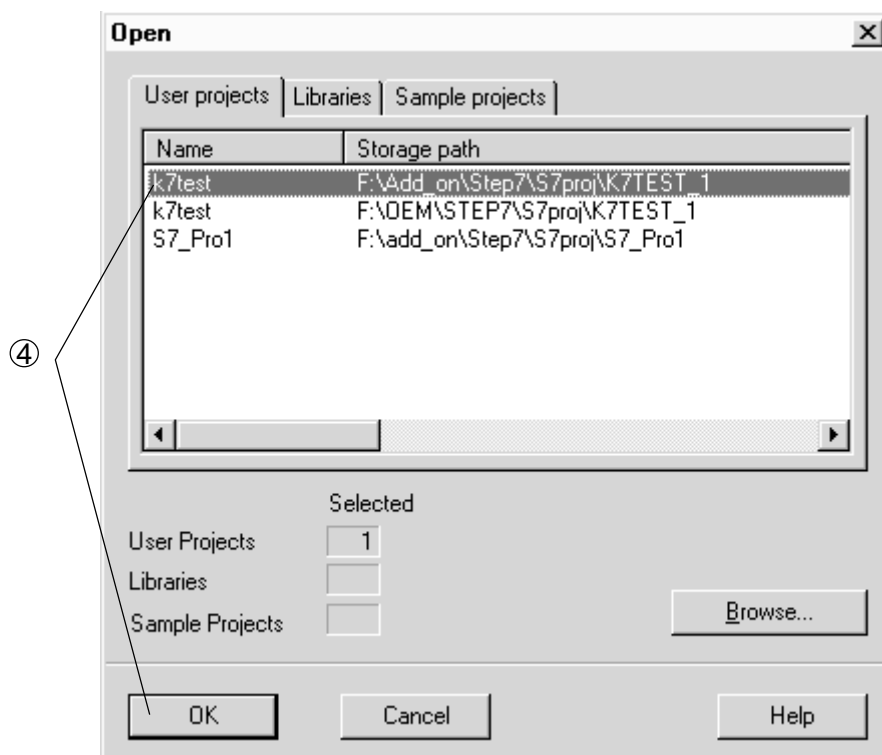




Fig. 20-1 (c) Project Select Screen

- ⑤ Using the cursor  key, bring down the tree in the screen as far as it reaches the folder of S7 Program, then open the Blocks folder with the  key.

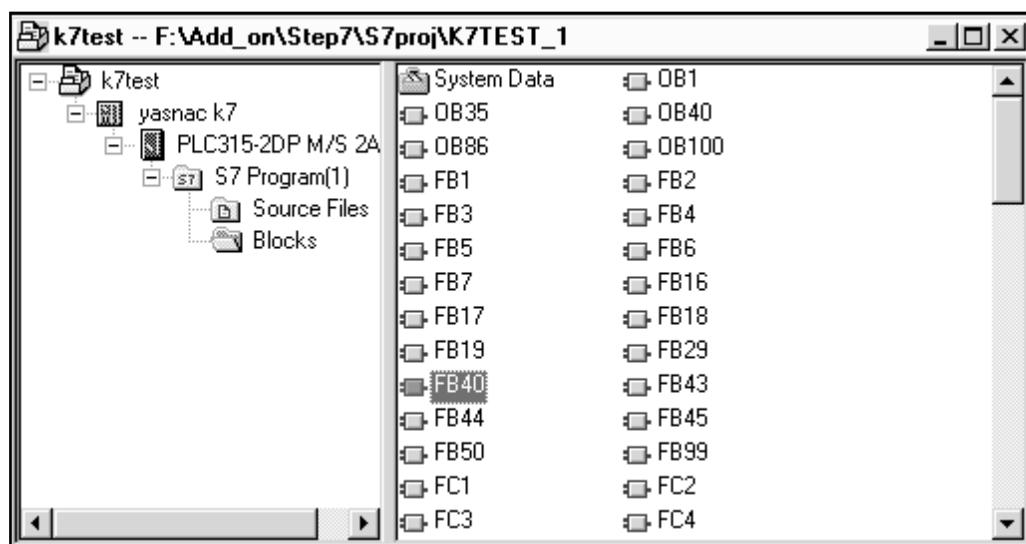
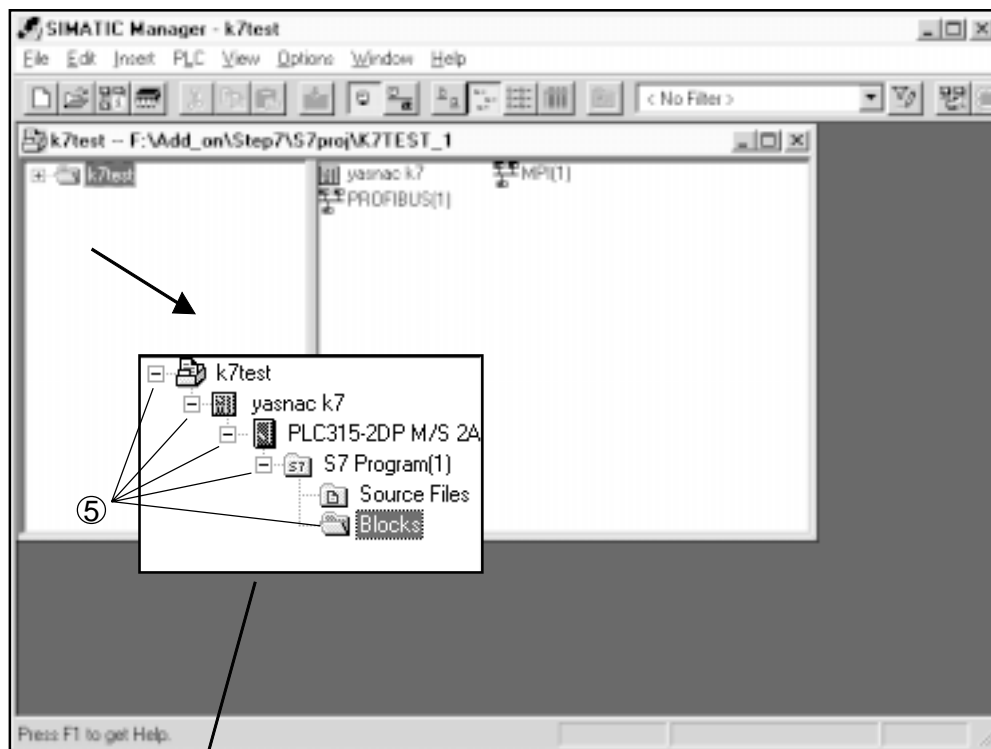


Fig. 20-1 (d) Block Select Screen

- ⑥ Move the cursor to the right window with **TAB** key, select the file you want to refer to with the cursor **↑** **↓** key then press **INPUT** key, and the ladder screen is displayed.

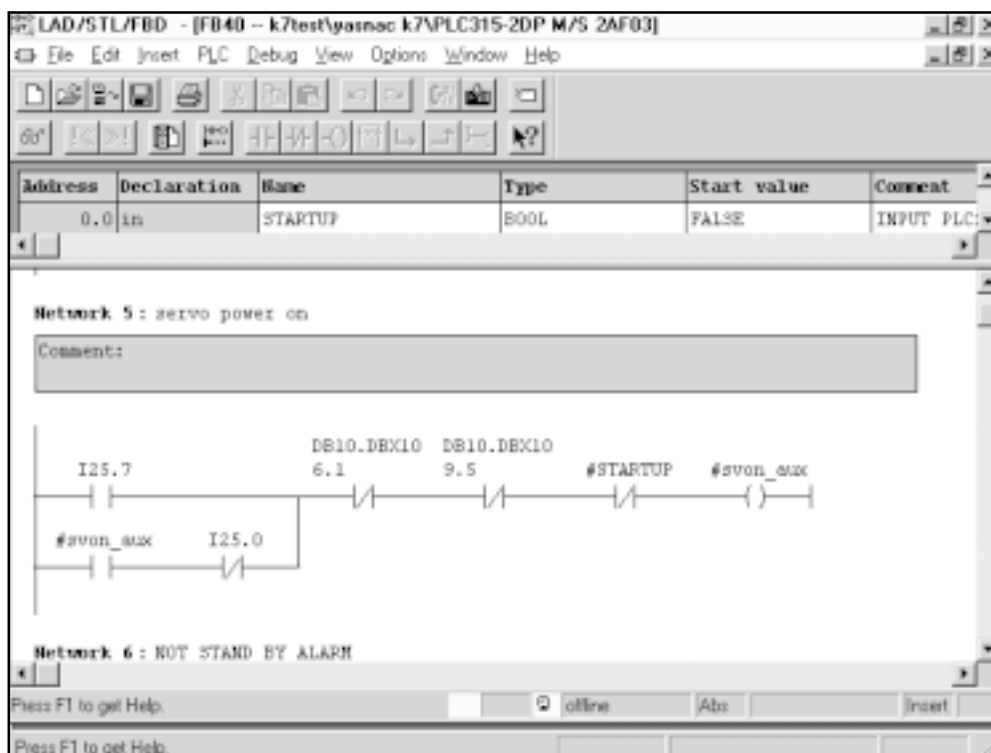


Fig. 20-1 (e) Ladder Screen

- ⑦ When the ladder live line display is finished, press **Alt** key, open the File menu with **F** key, select Exit with the cursor **↑** **↓** key and press **INPUT** key to close the window.

20-2 Search

- ① Press **Alt** key, open the Edit menu with **E** key, move the cursor to the Find and Replace with the cursor **↑** **↓** key and press **INPUT** key. Then the Find and Replace window is displayed.

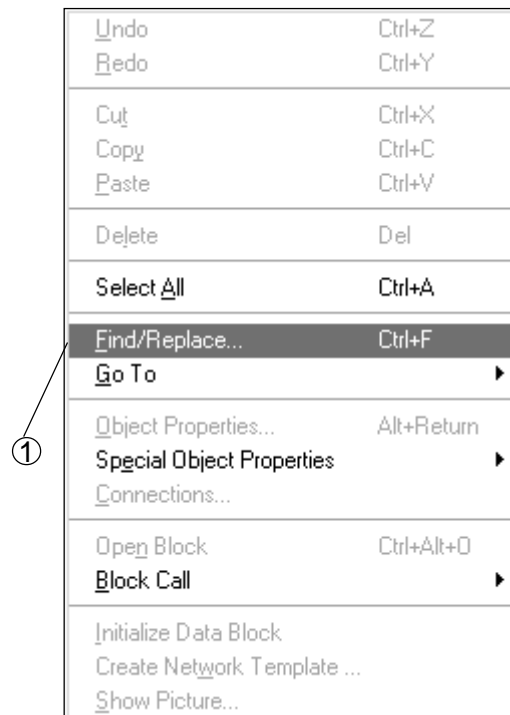


Fig. 20-2 (a) Search Select Screen

- ② Enter the data to be searched and press **INPUT** key, and search is executed.

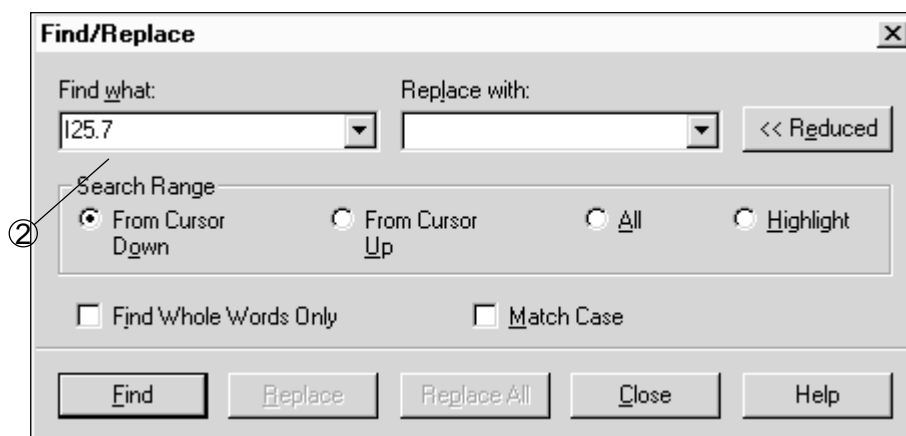


Fig. 20-2 (b) Search Window

20-3 Cross Reference

- ① Press **Alt** key, open the Options menu with **O** key, move the cursor to the Reference Data → Display with the cursor **↑** **↓** **→** key and press **INPUT** key. Then you can check in which block the contact point or coil is used.



Fig. 20-3 (a) Reference Data Select Screen

- ② As a message that the data are filtered is displayed, press **INPUT** and proceed to the next.

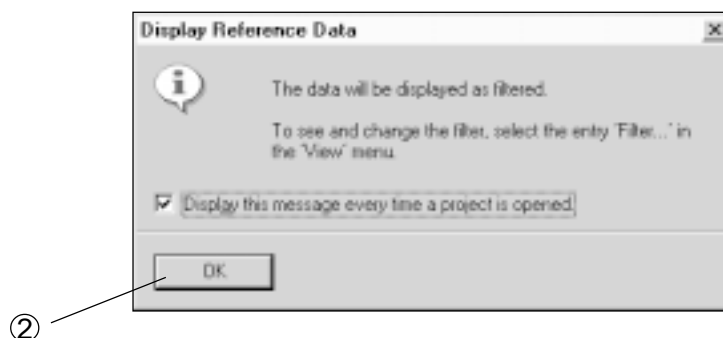


Fig. 20-3 (b) Filter Select Window

- ③ Check the cross reference and press **INPUT** , and the cross reference boots up.

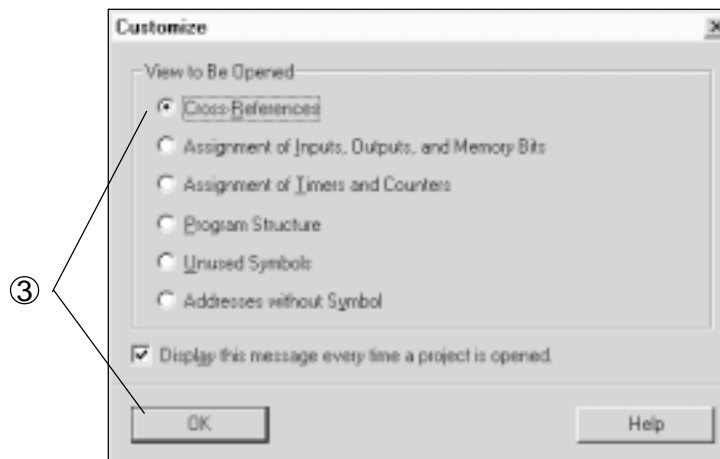


Fig. 20-3 (c) Cross Reference Select Window

Ref - [S7 Program(1)] [Cross-references: 2 -- k7test\yasmac k7\PLC315-2DP M/S 2AF03]

Reference Data Edit View Window Help

Address	Symbol	Block	Type	Language	Details
DB7.DBX1...	gp_par.IN45	FC3	R	STL	NW 1 Sta 1 /A
DB8.DBX45.0		FB17	R	STL	NW 1 Sta 1 /A
DB8.DBX45.0		FC9	R	STL	NW 1 Sta 1 /A
DB8.DBX48.1		FC2	M	STL	NW 1 Sta 84 /S
DB8.DBX48.1		FC2	R	STL	NW 1 Sta 82 /A
DB8.DBX48.2		FC2	M	STL	NW 1 Sta 76 /S
DB8.DBX49.0		FB1	R	STL	NW 1 Sta 130 /A
DB8.DBX56.0		FC1	M	STL	NW 1 Sta 2 /S
DB8.DBX56.0		FC1	M	STL	NW 1 Sta 1025 /S
DB10.DBX...	NC_A_EHE...	FB43	M	LAD	NW 1 /-
DB10.DBX...	NC_A_EHE...	FB43	R	LAD	NW 2 /AN
DB10.DBX...	NC_A_EHE...	FB43	M	LAD	NW 2 /-
DB10.DBX...	NC_A_Inc...	FC19	M	STL	NW 1 Sta 54 /S
DB10.DBX...	NC_A_Inc...	FC26	M	STL	NW 1 Sta 48 /S
DB10.DBX...	NC_A_Inc...	FC24	M	STL	NW 1 Sta 57 /S
DB10.DBX...	NC_A_Inc...	FC25	M	STL	NW 1 Sta 49 /S
DB10.DBX...	NC_F57_3	OB100	R	LAD	NW 2 /O
DB10.DBX...	NC_F57_3	OB100	R	LAD	NW 2 /ON
DB10.DBX...	NC_E_NCK...	FC2	R	STL	NW 1 Sta 65 /AN
DB10.DBX...	NC_E_NCK...	FC2	M	STL	NW 1 Sta 106 /S

Press F1 to get Help.

Fig. 20-3 (d) Cross Reference Screen

- ④ If there are no items you want to know in the cross reference, execute the cross reference filtering (extraction of items to be displayed) with following steps.
Return to the ladder display screen, press **[Alt]** key, open the Options menu with **[O]** key, move the cursor to the Reference Data → Filter with the cursor **[↑]** **[↓]** **[→]** key and press **[INPUT]** key.



Fig. 20-3 (e) Display Item Extraction Select Screen

- ⑤ Move to the item you want to know with **[Tab]** key and **[↑]** **[↓]** key, press **[INPUT]** key and check.

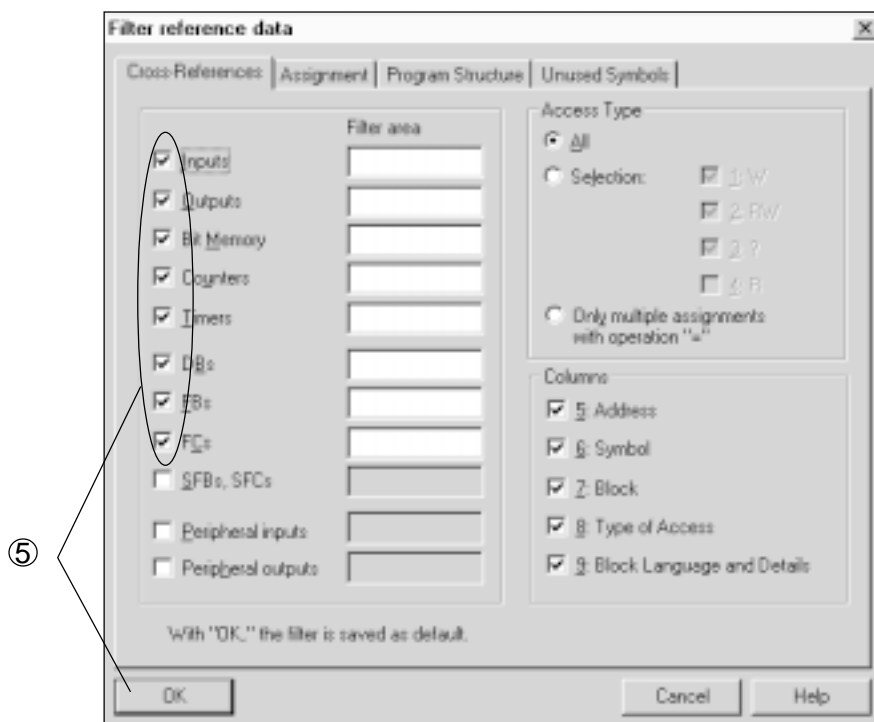


Fig. 20-3 (f) Item Select Screen

- ⑥ When the cross reference is finished, press **Alt** key, open the File menu with **F** key, select Exit with the cursor **↑** **↓** key and press **INPUT** key to close the window.

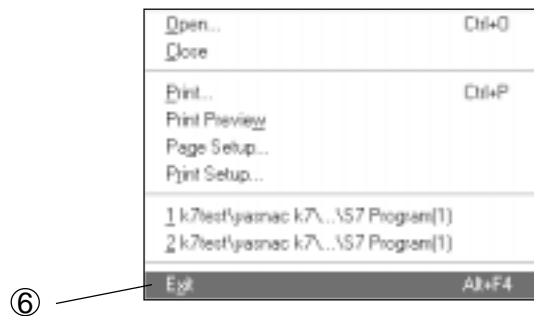


Fig. 20-3 (g) EXIT Select Screen

20-4 Return to pcFLexi screen

- ① Press MENU SELECT .
- ② Press F8/LSEIKI .
- ③ Press **>** .
- ④ Returns to the overall screen.

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