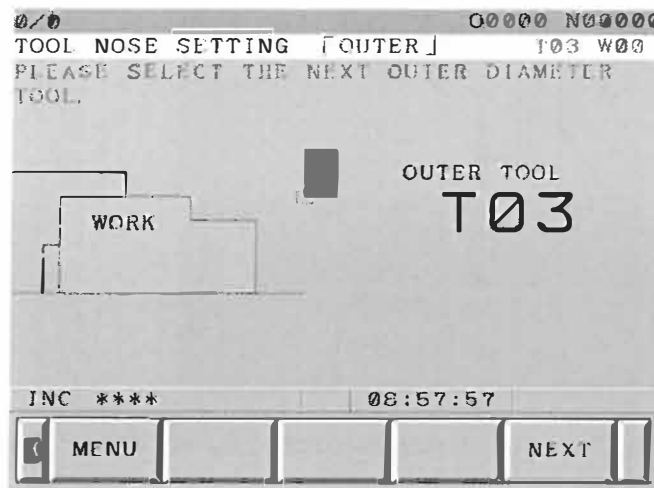


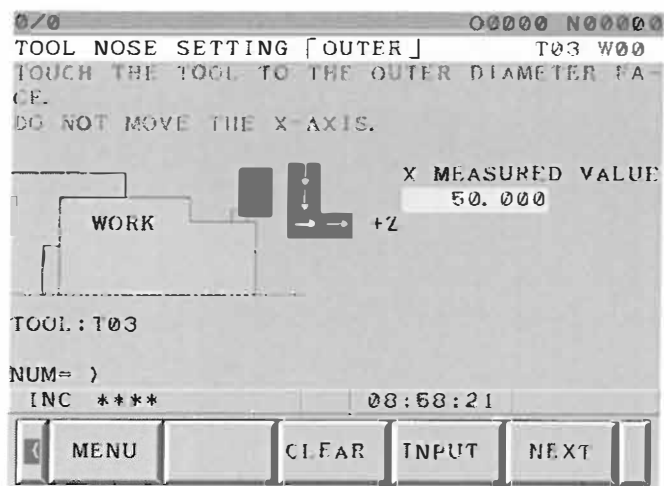
11-5 TOOL NOSE SETTING OF OUTER DIAMETER TOOL

1. OUTER DIAMETER TOOL SELECTION



Turret is turned and an outer diameter tool is chosen.
The [NEXT] is pushed after selection.

2. TOOL NOSE SETTING OF THE X-AXIS

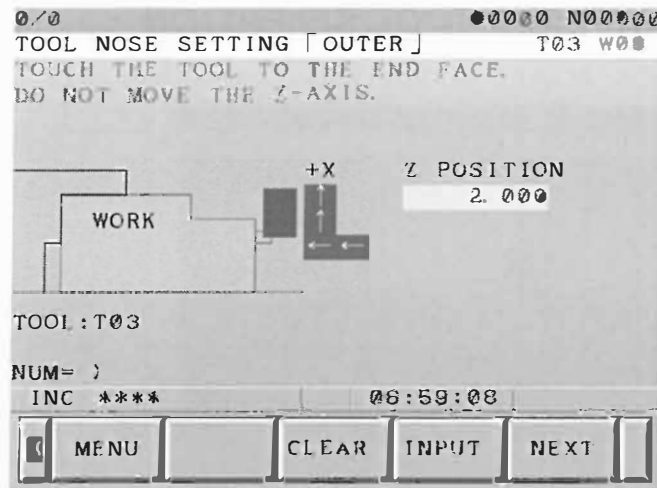


The value measured by tool nose setting of a standard outer diameter tool is displayed on diameter measurement.

Touch the tool to the outer diameter face.

The [NEXT] is pushed after tool nose setting. At this time, the value of the X-axis of TOOL OFFSET / GEOMETRY is calculated.

3. TOOL NOSE SETTING OF THE Z-AXIS

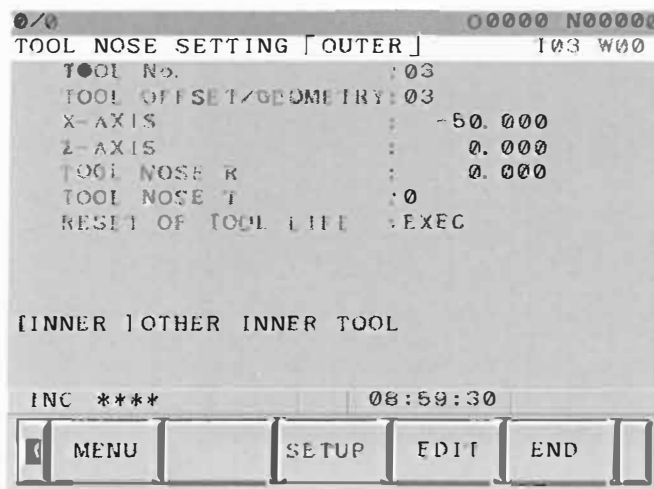


The value by which Z position was calculated by workpiece coordinate system shift setup is displayed.

Touch the tool to the end face.

The [NEXT] is pushed after tool nose setting. At this time, the value of the Z-axis of TOOL OFFSET / GEOMETRY is calculated.

4. SETUP OF TOOL OFFSET / GEOMETRY

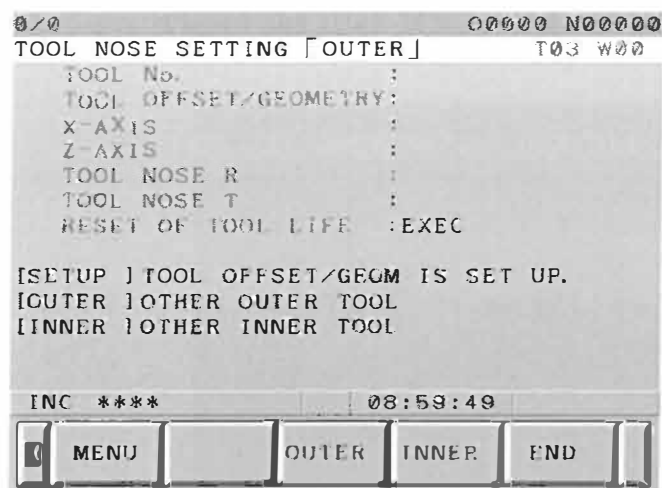


If [EDIT] is pushed, cursor is displayed and a value can be changed.

A push on [SETUP] sets a value as TOOL OFFSET / GEOMETRY.

In a setup "EXEC" tool life management, the same processing as the completion of tool exchange is performed.

5. END



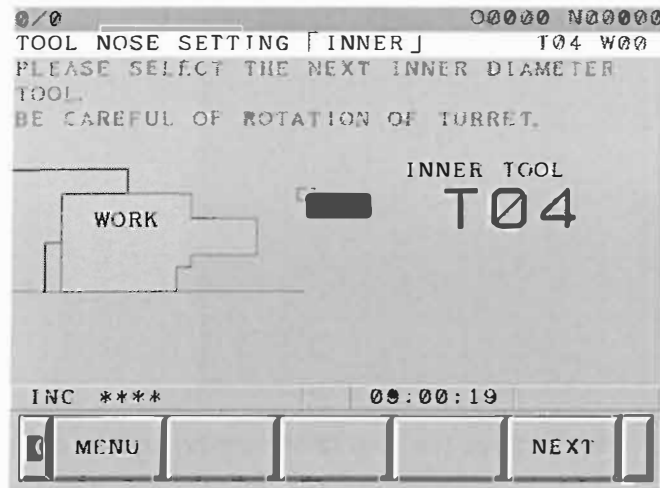
A push on [OUTER] displays the tool nose setting screen of outer diameter tool.

A push on [INNER] displays the tool nose setting screen of inner diameter tool.

It will end, if [END] is pushed.

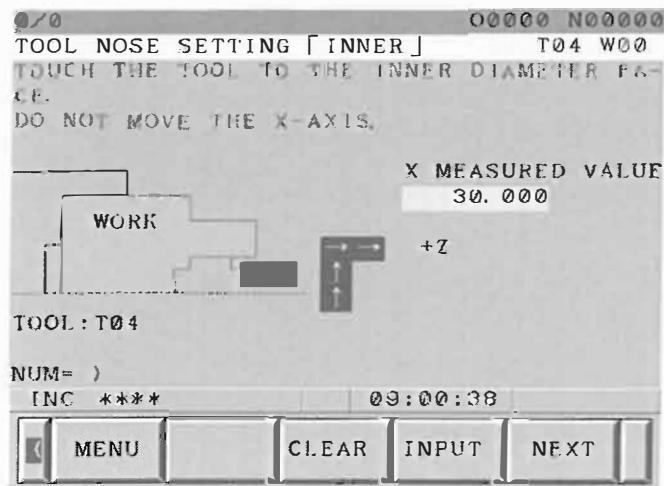
11-6 TOOL NOSE SETTING OF INNER DIAMETER TOOL

1. INNER DIAMETER TOOL SELECTION



Turret is turned and an outer diameter tool is chosen.
The [NEXT] is pushed after selection.

2. TOOL NOSE SETTING OF THE X-AXIS

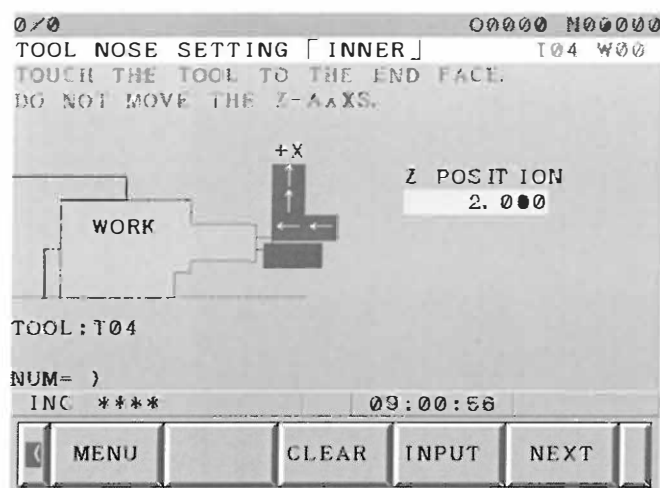


The value measured by tool nose setting of a standard inner diameter tool is displayed on diameter measurement.

Touch the tool to the inner diameter face.

The [NEXT] is pushed after tool nose setting. At this time, the value of the X-axis of TOOL OFFSET / GEOMETRY is calculated.

3. TOOL NOSE SETTING OF THE Z-AXIS

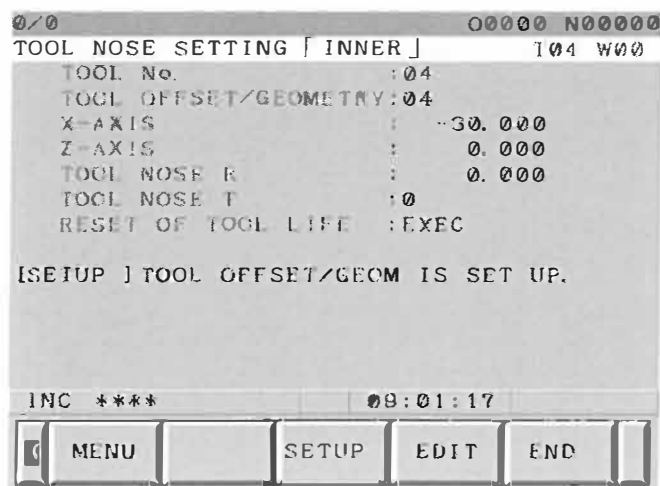


The value by which Z position was calculated by workpiece coordinate system shift setup is displayed.

Touch the tool to the end face.

The [NEXT] is pushed after tool nose setting. At this time, the value of the Z-axis of TOOL OFFSET / GEOMETRY is calculated.

4. SETUP OF TOOL OFFSET / GEOMETRY

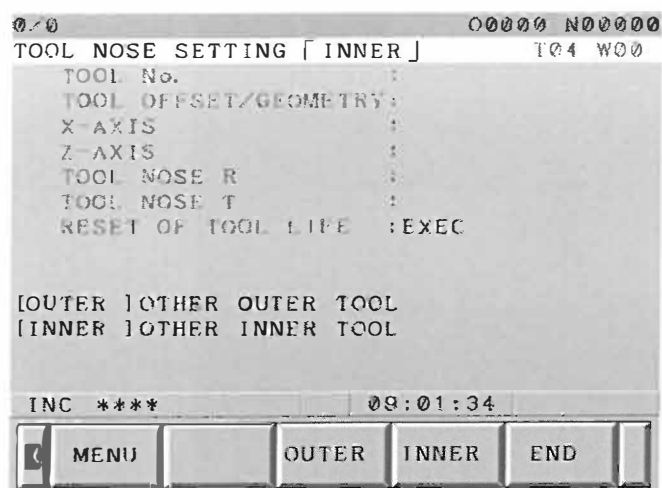


If [EDIT] is pushed, cursor is displayed and a value can be changed.

A push on [SETUP] sets a value as TOOL OFFSET / GEOMETRY.

In a setup "EXEC" tool life management, the same processing as the completion of tool exchange is performed.

5. END



A push on [OUTER] displays the tool nose setting screen of outer diameter tool.

A push on [INNER] displays the tool nose setting screen of inner diameter tool.

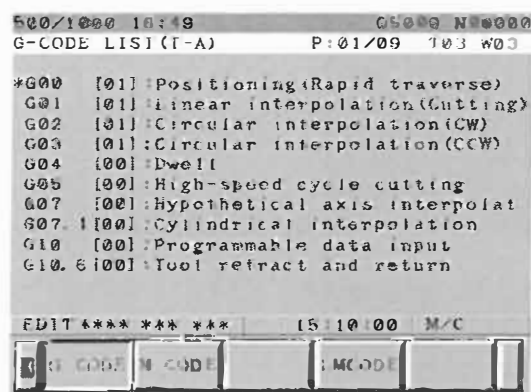
It will end, if [END] is pushed.

12 GM CODE MENU

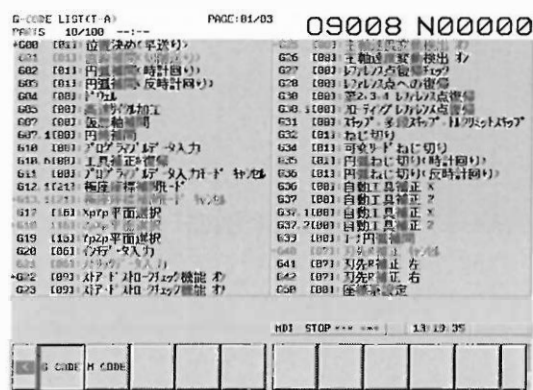
12-1 G-CODE LIST SCREEN

The list of G codes is displayed.

1. DISPLAY EXPLANATION



8.4 INCH SCREEN



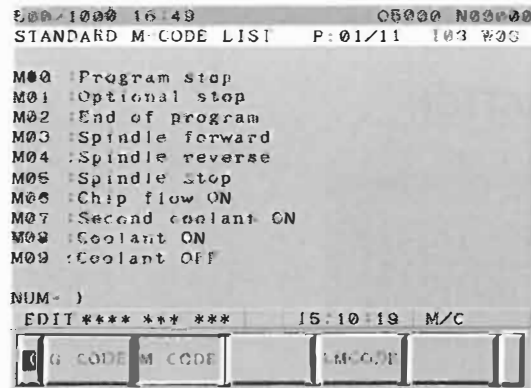
10.4 INCH SCREEN

It is blue and a modal state is displayed.

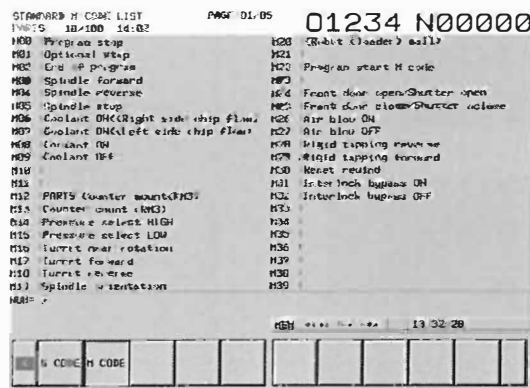
12-2 M-CODE LIST SCREEN

The list of M codes is displayed.

1. DISPLAY EXPLANATION



8.4 INCH SCREEN



10.4 INCH SCREEN



IMPORTANT

The M code list displays only standard M codes.

The other M code is not displayed.

Additional registration cannot be performed, either.

This screen is not displayed at the time of using with "RAKURAKU LOADER 4" together.

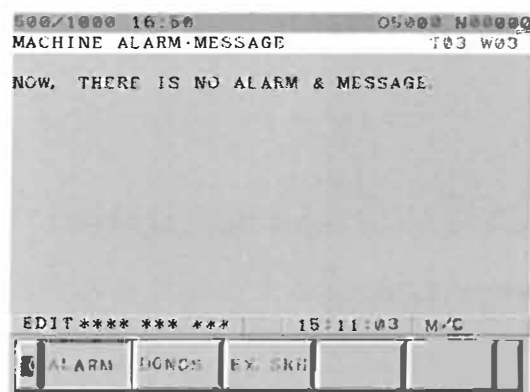
Please use M code list screen of "RAKURAKU LOADER 4".

13 MACHINE DIAGNOSIS MENU

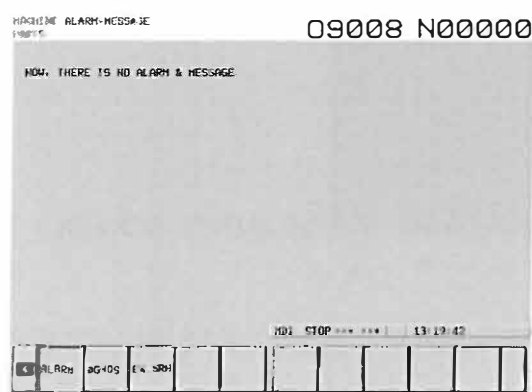
13-1 MACHINE ALARM MESSAGE SCREEN

NC alarm under present generating is displayed.

1. DISPLAY EXPLANATION



8.4 INCH SCREEN



10.4 INCH SCREEN

The contents are displayed when the message to the EX number 1000-2999 has occurred.



IMPORTANT

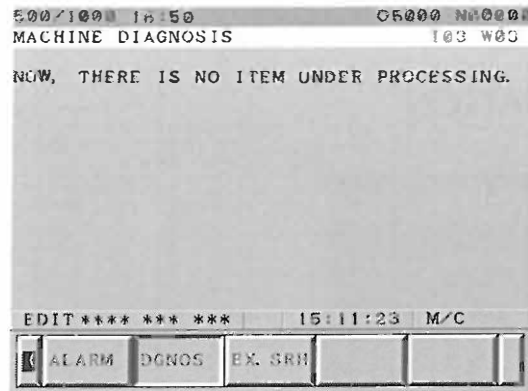
This screen is not displayed at the time of using with "RAKURAKU LOADER 4" together.

Please use alarm screen of "RAKURAKU LOADER 4".

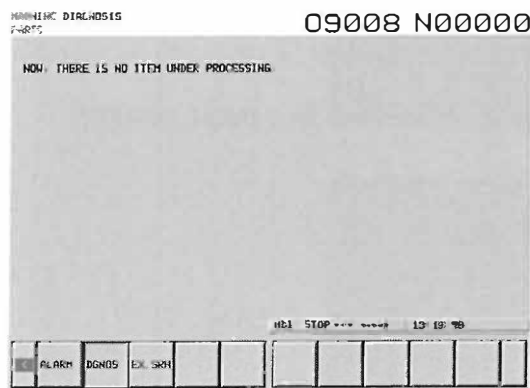
13-2 MACHINE DIAGNOSIS SCREEN

A diagnostic message is displayed.

1. DISPLAY EXPLANATION



8.4 INCH SCREEN



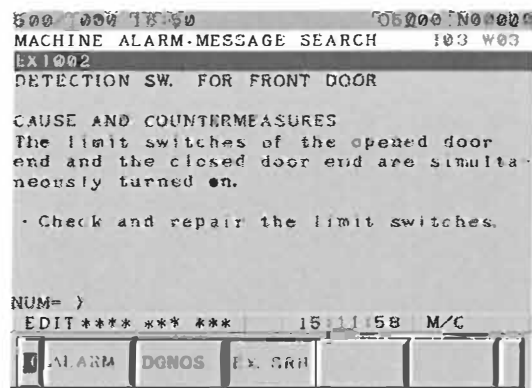
10.4 INCH SCREEN

The same contents as the diagnostic screen of FANUC are displayed.

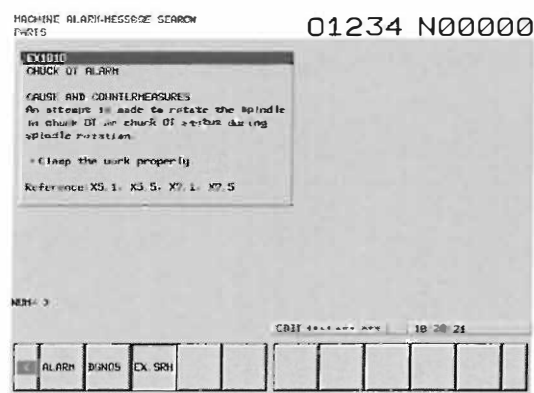
13-3 MACHINE ALARM MESSAGE SEARCH SCREEN

An input of EX number will display applicable EX message.

1. DISPLAY EXPLANATION



8.4 INCH SCREEN



10.4 INCH SCREEN

An input of EX number displays the corresponding cause and measure of EX message.

Z. APPENDIX

The following explains detailed functions and messages.

CONTENTS

1 TOOL	Z-4
1-1 TOOL STATE MARK.....	Z-4
1-2 TOOL COUNT.....	Z-4
2 CYCLIC OFFSET ADDTION.....	Z-6
2-1 CONTINUATION PROCESSING	Z-6
3 LOAD MONITOR	Z-7
3-1 LOAD VALUE	Z-7
3-2 CUTTING LOAD MONITOR	Z-7
3-3 LOAD WARNING VALUE AND ABNORMAL VALUE	Z-8
3-4 SAMPLING	Z-9
3-5 LOAD MONITOR OF SPINDLE	Z-9
3-6 ABOUT SPEED ATTAINMENT DELAY TIMER	Z-9
3-7 ABOUT AN INTERRUPTED TYPE CUSTOM-MACRO (NC OPTION).....	Z-10
3-8 ABOUT MACHINE ACTION AT THE TIME OF LOAD WARNING.....	Z-14
4 ABOUT HOW TO USE NOTES OF THE CUTTING LOAD MONITOR.....	Z-16
4-1 ABOUT SETTING OF THE LOAD WARNING VALUE AND THE LOAD ABNORMAL VALUE.	Z-16
4-2 CHANGE IN WARNING VALUE AND ABNORMAL VALUE BY PROGRAM	Z-20
4-3 NOTES OF CUTTING LOAD MONITOR	Z-22
5 GROUP MANAGEMENT.....	Z-25
5-1 TOOL SHIFT (CHANGE).....	Z-25
5-2 TOOL SEARCH MODE.....	Z-25
5-3 RESET METHOD OF GROUP LIFE END	Z-26
6 FREE COUNTER	Z-28
6-1 PRODUCT CHECK COUNTER	Z-28
7 MACHINE ACTION SIGNAL.....	Z-29
8 MESSAGE	Z-30
8-1 MESSAGES TO REQUIRE SETTING CHANGE.....	Z-30
8-2 MESSAGE LIST	Z-31
8-3 SYSTEM ALARM	Z-34
8-4 A FUNCTION TO CHECK THE MESSAGE WHICH EDITING NEEDS WITH AN ALARM RESET BUTTON	Z-35
9 CP (PROCESS CAPACITY INDEX)	Z-37
9-1 FORMULA.....	Z-37

9-2 PROCESS CAPACITY TABLE	Z-39
9-3 OUTPUT OF CALCULATION RESULTS OF CP	Z-39
10 MEMORY CARD	Z-40
10-1 KIND OF MEMORY CARDS	Z-40
10-2 TO SET NC WHEN MEMORY CARD IS USED.....	Z-40
11 ABOUT BAR FEEDER SPECIFICATION (M30)	Z-41
11-1 TOOL COUNT METHOD IS SET AS "PROCESS"	Z-41
11-2 "G916 ;" IS ADDED IN FRONT OF M30.....	Z-41
11-3 MACHINE ACTION IS SET TO " DON'T CYCLE".....	Z-41
11-4 M30 PROGRAM EXAMPLE.....	Z-41
12 ABOUT BAR FEEDER SPECIFICATION (M99)	Z-42
12-1 TOOL COUNT METHOD IS SET AS "PROCESS"	Z-42
12-2 "G916 ;" IS ADDED IN FRONT OF M99.....	Z-42
12-3 MACHINE ACTION IS SET TO "BDT / OFF".	Z-42
12-4 OPTIONAL BLOCK SKIP OF AN OPERATION BOARD IS INVALIDATED.	Z-42
12-5 M99 PROGRAM EXAMPLE.....	Z-43
13 ABOUT THE TOOL OF SPINDLE	Z-44
13-1 ABOUT NEXT TOOL AND OFFSET	Z-44
14 ABOUT THE GANG TYPE.....	Z-45
14-1 SETTING OF "GANG TYPE".....	Z-45
14-2 NOTES IN "GANG TYPE".....	Z-45
15 ABOUT THE PROTECT KEY	Z-46
16 FAQ (Frequently Asked Questions).....	Z-48

1 TOOL

1-1 TOOL STATE MARK

The tool state mark displayed on the left of a tool number is as follows.

MARK	MESSAGE	PRIORITY
! (Lighting)	Wear limit	 Low
% (Flickering)	Load warning	
% (Lighting)	Load abnormal	
* (Flickering)	Tool change forecast	
* (Lighting)	Tool life end	
# (Lighting)	No use	High

1-2 TOOL COUNT

In TURRET, tool count is counted when ordered in a tool number (T code).

In MAGAZINE POT, tool count is counted when ordered in M6 (Tool change).

1. COUNT METHOD

There are two kinds of tool count methods.

The tool count method is set on "SYSTEM SETTING" of "SYSTEM MENU".

(1) PROCESS

The counter counts the used tool frequency within 1 process from the cycle start of machining program to machining finish by M02 or M30.

(Only 1 is added to the tool used frequency.)

The counter shows only 1 even if the same tool is commanded in 1 process several times.

It is initial value.

(2) ORDER

It is counted when a tool number is commanded within a processing program.

The tool counter is added to every command.

This setting mode is effective when the program returns to the top from the program end and the program is repeatedly executed.

2. FUNCTION MODE OF TOOL COUNT

There are two function mode of tool count.

The function mode is set on "SYSTEM SETTING" of "SYSTEM MENU".

(1) FUNCTION MODE "ON"

The counter does not count the tool-used frequency under the single block and dry run machine lock operations.

It is initial value.

(2) FUNCTION MODE "OFF"

It counts always.

3. TOOL COUNT AT TOOL LIFE VALUE 0

It is set that the tool counter counts or not when the tool life value is 0.

It is set on "SYSTEM SETTING" of "SYSTEM MENU".

(1) COUNT

The counter can count even if the tool life value is zero (0).

However, in this case, the tool life management is invalid.

That's all the counter counts.

(2) NONE

It does not count, when the tool life value is zero (0).

2 CYCLIC OFFSET ADDITION

The cyclic offset addition function can be used in the case of continuous processing and so on.

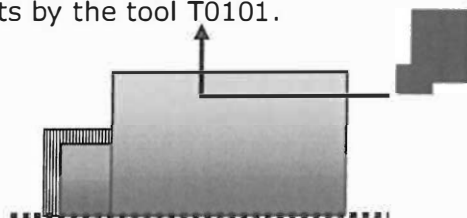
Usually, when adding the amount of offset, it is added to the same offset number of both coordinate systems. When the coordinate system is specified, it adds to the appointed coordinate system.

2-1 CONTINUATION PROCESSING

When the cyclic offset addition function is used on the continuous machining, it is set that the tool is used any times and any size of cutter edge is worn.

1. EXAMPLE OF SETTING

It cuts by the tool T0101.



With the tool cut 20 times, when the cutter edge is worn 0.001mm in X direction and 0.001mm in Z direction, the cyclic offset addition is set as follows:

CYCLE ADDITION SCREEN

CYCLE	20
COUNT	0
X WEAR ADDITION	-0.001
Z WEAR ADDITION	-0.001
ADD NUMBER OF TIMES	0
ADDITION LIMIT	0

As shown in above, value ? 0.001 is added to wear compensation values of X and Z axes once a 20-time.

When used 110 times, five offset values are added.

When finishing the offset addition at 3 times, set the addition limit to 3. When machining 60th time and third offset value is added, a periodic addition limit message is displayed.

After that, the counter stops and the offset value is not added.

3 LOAD MONITOR

Load monitor processing of the RAKURAKU MONITOR 3 is performed in PMC.

3-1 LOAD VALUE

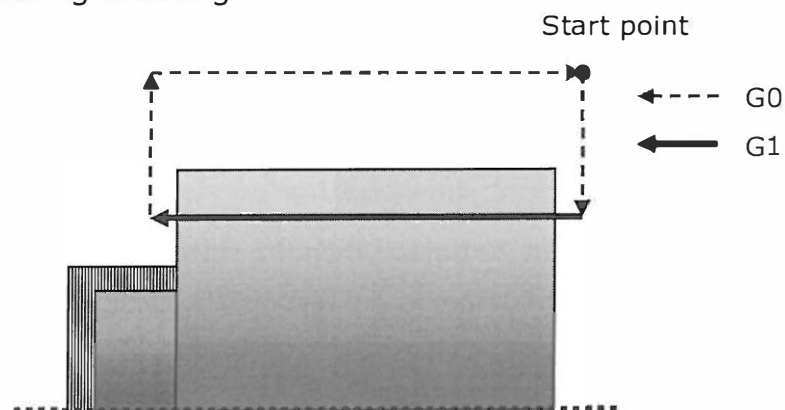
The load value is setting the torque value 0-255 (%).

Although the load value is always displayed, cutting load monitor processing is performed only during cutting.

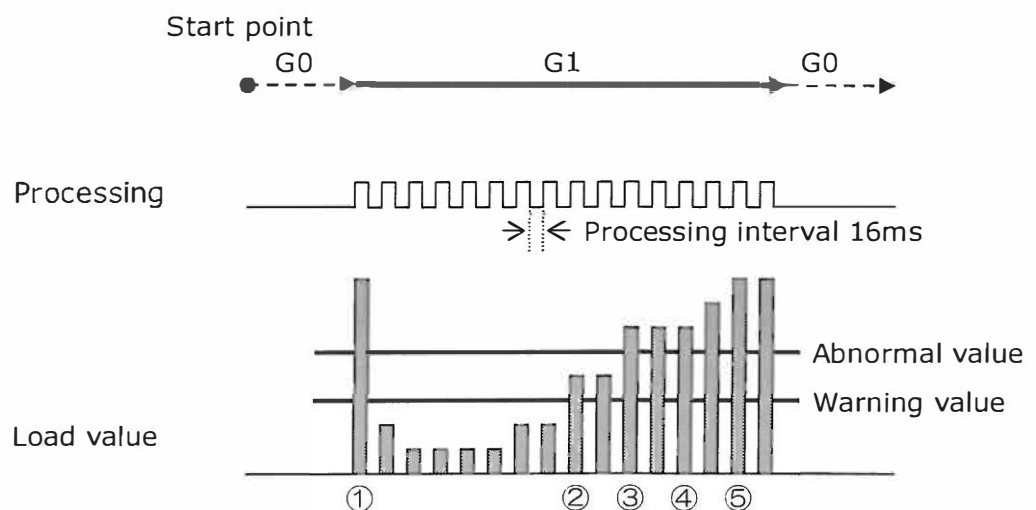
3-2 CUTTING LOAD MONITOR

1. MECHANISM OF CUTTING LOAD MONITOR

(1) Cutting drawing



(2) Timing chart



(3) Explanation

The cutting load is monitored when cutting feed is commanded (All cutting feed).

The cutting load is also monitored for only while cutting even if outer dia., inner dia., turning cycle or threading cycle is operated.

In case of positioning (G0: Rapid traverse), the load is not monitored.

The cutting load monitoring is processed at about 16ms interval.

When the load value exceeds the warning value continuously by the LOAD WARN.

NOTIFY. COUNTER, the LOAD WARNING is outputted.

When the load value exceeds the abnormal value continuously by the LOAD ABNO.

NOTIFY. COUNTER, the LOAD ABNORMAL is outputted.

Example)

When the load notification counter is set to 5 ,at the above measuring load value, though the above point ① exceeds the warning value and abnormal value, the warning or abnormal state does not occur since it is only one time.

The count of the load notification counter is reset.

Since the above point ② exceeds the warning value and point ③ abnormal value, the counter counts the load notification counter.

Since the above point ④ exceeds the warning value 5 times, the warning message is outputted.

Also, since the above point ⑤ exceeds the abnormal value 5 times continuously, the abnormal message and signal are outputted.

3-3 LOAD WARNING VALUE AND ABNORMAL VALUE

The load warning value • load abnormal value vary by tool or cutting conditions. The cutting load monitor of RAKURAKU MONITOR 3 determines whether the set measuring load value exceeds the load warning value • load abnormal value or not.

When the tool nose is not abnormal with the warning or abnormal message displayed, increase the warning value • abnormal value gradually.

Finally, the values just before tool change become the warning value • abnormal value corresponding to its tool and machining.

Consequently, when the tool is changed at the same machining condition, it is unnecessary to change the warning value • the abnormal value.

When the sample is measured during tool change, take care since the warning value • the abnormal value are changed.

If the load warning state occurs, the message is displayed.

If the load abnormal state occurs, the message and the machine operation signal are outputted.

3-4 SAMPLING

In case of sampling, the load average value in cutting of its tool is calculated during automatic operation and it is set to the load warning value • the load abnormal value after multiplying the load warning sampling factor and the load abnormal sampling factor (%) set to the "LOAD SETTING" screen for its load maximum value.

When the sampling factor is small, after measuring the sample, the warning • abnormal messages may be displayed instantly.

It is not necessarily true that the load warning value • the load abnormal value obtained by the sampling are correct.

They differ by using tool or cutting condition.

Search the warning value, abnormal value and sampling factor corresponding to each tool.

In case of sample measuring, take care since the warning and abnormal states are not processed.

The sampling is not measured under the single block, dry run and machine lock operations.

3-5 LOAD MONITOR OF SPINDLE

In case of the constant control of peripheral speed, since the spindle speed increases while cutting, the load value increase or decreases suddenly.

In this case, there is a case that is hard to monitor the spindle load.

In case of the constant control of peripheral speed, monitor the axis load (X • Z axes) by clearing the load warning value • abnormal value of spindle to zero (INVALID).

3-6 ABOUT SPEED ATTAINMENT DELAY TIMER

The load monitor of the X-axis, the Z-axis, and a spindle is started after setting time from the speed attainment signal of a spindle.

Setting time is in the page 2 of a load setting screen of a system menu.
Since the load value at the time of acceleration is disregarded, this is used.
Default:320msec

3-7 ABOUT AN INTERRUPTED TYPE CUSTOM-MACRO (NC OPTION)

An interrupted type custom-macro is the function in which other programs can be called during program execution. (FANUC NC option is required.)

Please refer to the instructions manual of FANUC for details.

When you use this function by the RAKURAKU MONITOR 3, please set up NC parameter as follows.

P6003 = 10110010 (Bit type)
P6033 = 94 (The M code which enables a function)
P6034 = 95 (The M code which repeals a function)

Please set up 2CTRL (HEAD2) similarly.

"ACTION AT LOAD ABNORMAL" is set as an "MACRO" on the load value setting screen of RAKURAKU MONITOR 3.

When "LOAD ABNORMAL" is detected, other programs can be called on an interrupted type custom-macro.

A machine can be stopped, after stopping processing on the way and making a safe position stand by.

You have to use the program to call properly by cutting or the tool.

Sub programs, such as outer diameter cutting, and diameter cutting of inner, drill cutting, are created.

The call of an interrupted type custom-macro is performed on a main program as follows.

M94 P0000 ;	The M code which enables a function
M95 ;	The M code which repeals a function

P0000 is a program number which interrupts.

An interrupted type custom-macro can be used only during program execution.

The conditions which become effective are as follows.

When memory operation is chosen

When STL (start lamp) serves as ON

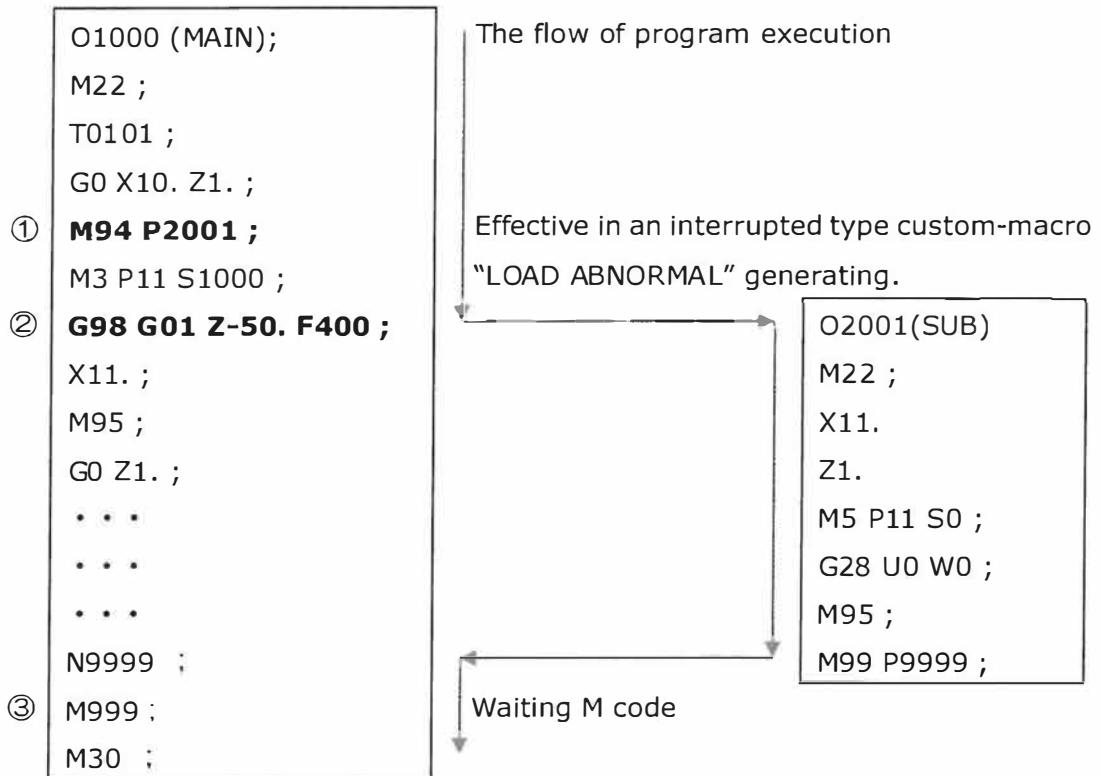
The state which an interrupted type custom-macro is not performing

When "LOAD ABNORMAL" is detected during cutting

From the sub program which interrupted, it is ordered M99 for returning to a main program.

Moreover, the sequence number in the program which returns by Address P can also be specified.

SAMPLE PROGRAM



DESCRIPTION

A main program chooses the tool number of No. 1, and performs outer diameter cutting.

① confirms the call of an interrupted type custom-made broad view.

It is a setup which performs the sub program of O2001 by "LOAD ABNORMAL" generating.

In ②, if the "LOAD ABNORMAL" occur while performing outer diameter cutting, the sub program of O2001 will be performed.

In a sub program O2001, a tool is missed, an axis is stopped and a starting point return is carried out. Then, it returns to N9999 of a main program.

In the case of many systems, in M999 (waiting M code) of ③, a synchronization is taken and it ends.

MACHINE OPERATION SETUP OF MANY SYSTEMS (PMC PARAMETER)

K22 6Bit

0: Operation is processed in each system.

1: If machine operation occurs in one of systems, other systems will perform machine operation.

When 6 bits of K22 are 0, even if machine operation is performed by the 1CTRL side, it is uninfluential in the 2CTRL side.

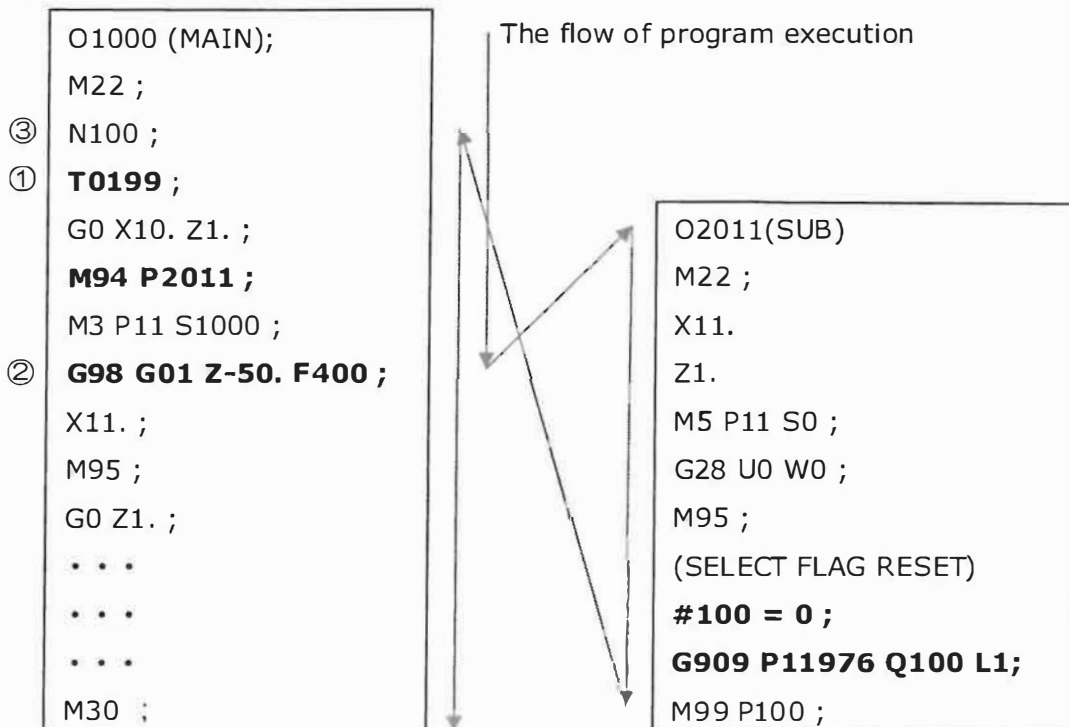
When 6 bits of K22 is 0, even if a sub program is called by HEAD1 side, it is not called by the HEAD2 side.

When 6 bits of K22 is 1, even if a sub program is called by HEAD1 side, the sub program by the side of HEAD2 will also be called.

When interruption is not effective by the HEAD2 side, a sub program is executed at the same time it ordered it M94.

When tool group management is being used, if the "LOAD ABNORMAL" occur, it can exchange for the following tool and re-processing can also be performed.

SAMPLE PROGRAM



DESCRIPTION

① chooses the tool of the group number of No. 1.

Outer diameter cutting is performed.

It is a setup which performs the sub program of O2011 by "LOAD ABNORMAL" generating.

In ②, if the "LOAD ABNORMAL" occur while performing outer diameter cutting,

the sub program of O2011 will be performed.

In a sub program O2011, a tool is missed, an axis is stopped and a starting point return is carried out.

The selection flag of a group tool is reset in G909.

Keep in mind that the same tool will be chosen if a selection flag is not reset.

P address of G909 specifies the value of a "11975+ group number." It is set to "11978" when a group number is 3.

Q address is a macro-variables number. The value of the macro-variables number specified here is surely set to "0." (Example: #100=0)

L address is an input-and-output flag, and, in the case of L1, writes the macro-variables value of Q address in the P code variable value of P address.

G909 P11976 Q100 L1 ; The selection flag of the group number of No. 1 is reset.

If it returns to ③ of a main program, by ①, the tool next to the group number of No. 1 will be chosen, and it will be processed again.



CAUTION

- ◆ Running DNC cannot use the interruption type custom macro.
- ◆ The interruption type custom macro cannot be used while multiple repetitive cycle executing it.
- ◆ It is not possible to interrupt while executing the program of cycle operation.

After it completes at the cycle, it becomes an interruption.

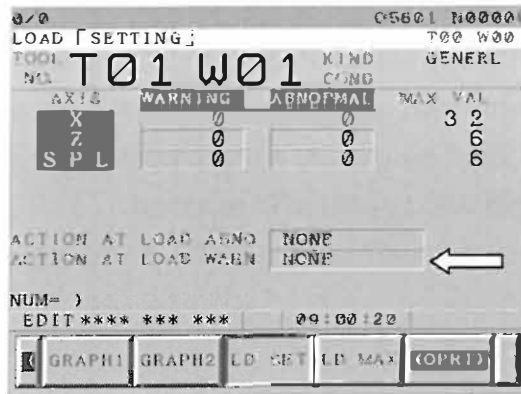
In cycle operation, the following functions are provided.

- ◆ Automatic reference position return
- ◆ Canned cycle
- ◆ Automatic tool length measurement
- ◆ Angel chamfering / Corner R
- ◆ Exponential interpolation
- ◆ Normal direction control
- ◆ Cylindrical interpolation, Cutting point interpolation

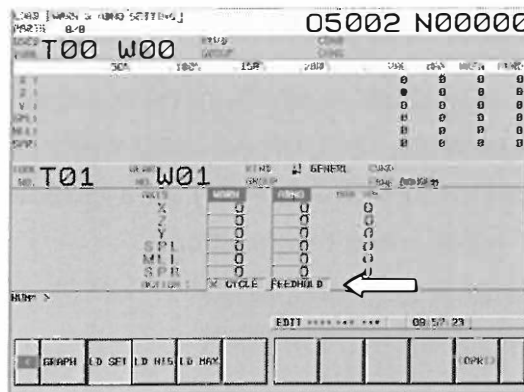
(2) ACTION AT LOAD WARN

When "ACTION AT LOAD WARNING" is "ON", "ACTION AT LOAD WARN" is displayed on the "SETTING SCREEN" of a "LOAD MENU."

A setup of "ACTION AT LOAD WARN" will perform machine operation at the time of load warning.



8.4 INCH SCREEN



10.4 INCH SCREEN

4 ABOUT HOW TO USE NOTES OF THE CUTTING LOAD MONITOR

4-1 ABOUT SETTING OF THE LOAD WARNING VALUE AND THE LOAD ABNORMAL VALUE.

Setting of the load warning value and the load abnormal value is needed to use a CUTTING LOAD MONITOR.

The load warning value and load abnormal value vary by tool or cutting conditions.

Please find the load warning value and the load abnormal value which fit a tool and cutting condition.

In case of the constant control of peripheral speed, since the spindle speed increases while cutting, the load value increase or decreases suddenly.

In this case, there is a case that is hard to monitor the spindle load.

CUTTING LOAD MONITOR by an axis (X and Z) is recommended.

Next a procedure of setting is explained.

1. AUTOMATIC SETTING BY SAMPLING OF THE LOAD WARNING VALUE AND THE ABNORMAL VALUE

In case of sampling, the load average value in cutting of its tool is calculated during automatic operation and it is set to the load warning value and the load abnormal value after multiplying the load warning sampling factor and the load abnormal sampling factor (%) set to the "LOAD SETTING" screen for its load maximum value.

It's sampled first.

When not using sampling, an operator consults the maximum of the load, and establishes the warning value and the abnormal value on the screen.

Attention)

- ◇ In case of sample measuring, take care since the warning and abnormal states are not processed.
- ◇ The sampling is not measured under the single block, dry run and machine lock operations.

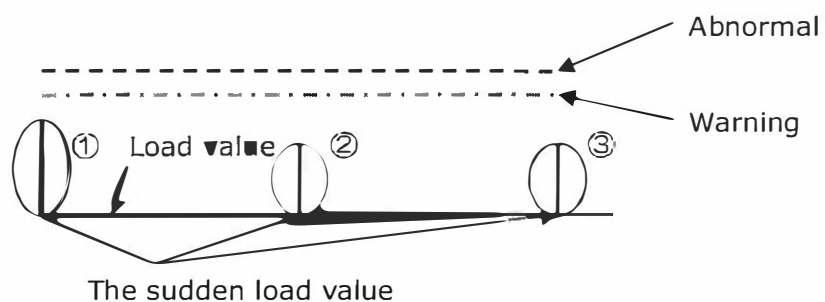
2. CONFIRMATION OF THE WARNING VALUE AND THE ABNORMAL VALUE

It's confirmed whether there isn't a problem in the warning value and the abnormal value.

The warning value and the abnormal value are confirmed using a load graph screen.

Attention)

- ◇ When the warning value and the abnormal value are away more fairly than the cutting load value, the sudden load value is being sometimes detected.
- ◇ Please sampling once again and confirm the set value in this case.



When being not improved, please confirm the following thing.

- ① When the sudden load is detected in the cutting beginning, a high value is set to the warning value and the abnormal value. In such case, please change the "speed arrival delayed timer" of system screen.(320msec)
 - ② When the sudden load while cutting is detected, a high value is set to the warning value and the abnormal value. For this case, sampling must not be used, and the operator must set the warning value and the abnormal value.
 - ③ The load of "G0(Rapid traverse)" might be detected from the delay of the signal etc. when cutting ends, and it moves by "G0(Rapid traverse)". For this case, sampling must not be used, and the operator must set the warning value and the abnormal value.
- ◇ If a high value is set to the warning value and the abnormal value, warning and abnormal might not be able to be detected even if becoming tool exchange time.

3. MACHINING (MEM)

The cutting load monitor can be used by setting the warning value and the abnormal value.

When the load while cutting rises, the message of the load warning is displayed.

If the message is displayed, the tip of the blade of the tool is checked.

Please change the warning value and the abnormal value when there is no problem in the tool.

This is repeated.

The value before tools are finally exchanged reaches the value that adjusts to the tool and the processing.

Attention)

- ◇ When beginning to cut, the load value by the acceleration and deceleration of the motor might be detected.
In such case, please change the "speed arrival delayed timer" of system screen.(320msec)
- ◇ When "LOAD WARN/ABNO. NOTIFY. COUNTER" of the system screen is small, it is likely to be detected by sudden load.
Please increase "LOAD WARN/ABNO. NOTIFY. COUNTER".
The abnormal load detection slows when there are oppositely a lot of numbers of "LOAD WARN/ABNO. NOTIFY. COUNTER".
- ◇ When the same processing is continued when tools are exchanged, it is not necessary to change in the warning value and the abnormal value.
It is not necessary to do Sampling.
When Sampling is used, the warning value and the abnormal value that adjusts to the tool and the processing are changed.

4. SETTING OF MACHINE ACTION SIGNAL

When load abnormality is detected, the movement of the machine can be specified.

The machine operation is set to "NONE" in default.

(1) DON'T START OR DON'T CYCLE

Stops next machining.

Stops machine after machining.

(2) FEED HOLD

Stops machine immediately by feed hold signal.

Although an axis stops, a spindle does not stop.

(3) BDT / OFF

The block delete is made effective, and the line of "/" of the program is not executed.

(4) MACRO

When the "LOAD ABNORMAL" occur, the interruption signal of a custom-macro is outputted.

(FANUC NC OPTION is required.)

Attention)

- ◇ Please specify "NONE" for the machine operation signal when you exchange it for the following tool when you detect an abnormal load by using the tool group management.

Tools are not exchanged when selecting it excluding "NONE".

5. THE WARNING VALUE AND THE ABNORMAL VALUE OF EACH TOOL ARE SET.

The warning value and the abnormal value are set repeating 1-4 of each the tools.

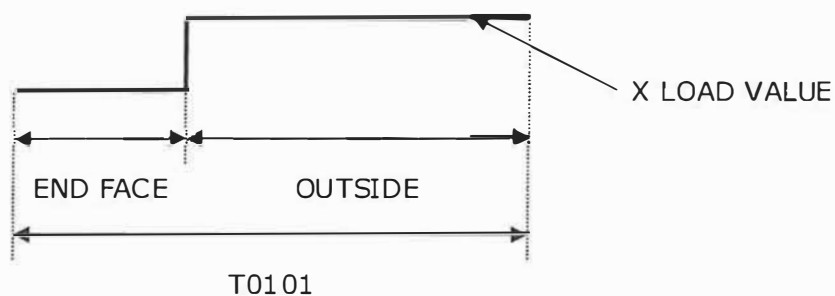
4-2 CHANGE IN WARNING VALUE AND ABNORMAL VALUE BY PROGRAM

The warning value and the unexpected value can be set by using G900.
Please refer to "B. PROGRAMMING 3. G CODE 3-1. G900" for the format of G900.

1. Example) END FACE CUTTING AND OUTSIDE CUTTING

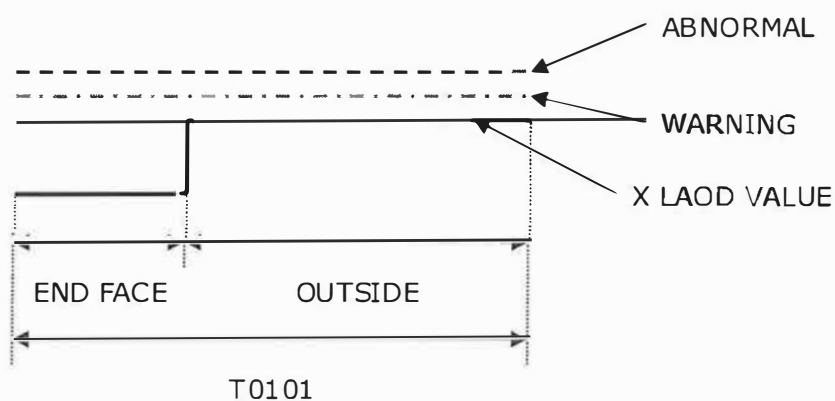
When the end face and the outside diameter are cut with the same tool, the load value might be shown in Figure 1.

Figure 1) X LOAD VALUE



In this case, if the warning value and the abnormal value are set by sampling automatically, the warning value and the abnormal value are set automatically by the maximum load value of the outside diameter cutting, and it becomes as shown in Figure 2 because the load value of the outside diameter cutting is higher than the load value of the roller end face cutting.

Figure2) The warning value and the abnormal value. (X LOAD VALUE)



For this case, "LOAD MONITOR" can be done by dividing the roller end face cutting and the outside diameter cutting by using G900 from the program.

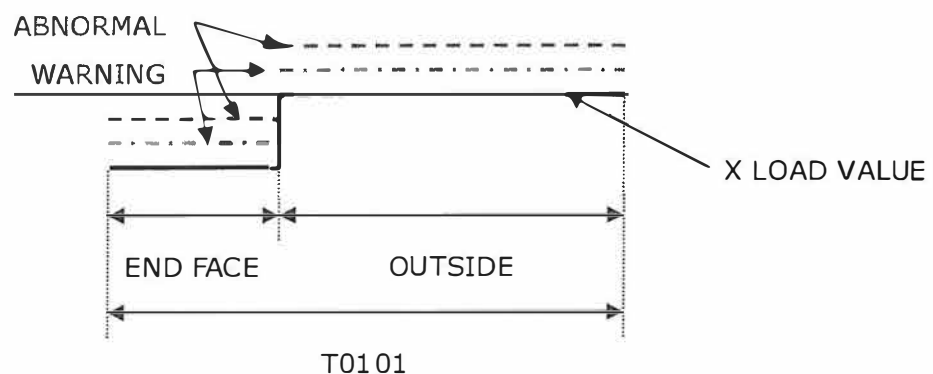
"(G900 A_. H_.)" is put before cutting of the end face, "(G900 A_. H_.)" is put before cutting of the outside diameter, and "LOAD MONITOR" is done.

Program example

T0606 M16	→ The warning value and the abnormal value are set by T code
G50 S1600	
G96 S80 M3	
G18 G99 G0 X36. Z0.3 M8	→ The warning value and the abnormal value are changed
G900 A32. H34.	
G1 X5. F0.18	
G0 X30.	→ End face cutting
Z2.	
M92	→ Buffering off
G900 A42. H44.	→ The warning value and the abnormal value are changed
G1 X35. Z-20. F0.2	
X36. Z-19.	
G40 G18 G99 G0 X400. Z200. Y0. T0 M9	→ Outside cutting
M5	
M1	

"LOAD MONITOR" can be done dividing the end face cutting and the outside diameter cutting by changing the warning value and the abnormal value as shown in Figure 3.

Figure 3) The warning value and the abnormal value.
(The warning value and the abnormal value are changed.)



4-3 NOTES OF CUTTING LOAD MONITOR

There is a cutting load monitoring function as one of the tool life management. It is a purpose to detect the rise of the load value, to give the message, and to urge the exchange of tools.

It is not likely to be able to detect it even by "LOAD MONITOR".

1. CASE WHERE ABNORMAL LOAD CANNOT BE DETECTED

In the following cases, an abnormal load might not be able to be detected.

- ◇ When the cutting time is extremely short (thread cut etc.)
- ◇ It is not possible to detect it by the first setting for 400msec or less (about 0.5 seconds or less).
(320msec of "SPEED DELAY TIMER" + 80msec of "LOAD ABNO. NOTIFY. COUNTOR")
- ◇ When the tip of the blade is damaged at once.
When tips of the blade are damaged faster than the time of "LOAD ABNO. NOTIFY. COUNTOR" (Initial value:80msec), it is not possible to detect it.
- ◇ When the cutting time few left.
When the remainder time of cutting is shorter than the time of "LOAD ANBO. NOTIFY. COUNTOR"(Initial value:80msec), it is not possible to detect it.
- ◇ If an extremely high value is set to the warning value and the abnormal value, it is not likely to be able to detect it even if becoming the exchange time of the tool.
- ◇ When the width of the change of the load value is small.
Even if the warning value and the abnormal value are set when the width of the change of the load value is small in the finish machining etc. , it is not likely to be able to detect it.
- ◇ Detection of no-load-condition.
No-load-condition when the tip of the blade is damaged cannot be detected.

2. ABOUT THE LOAD VALUE

The presumption load torque has been treated as a load value.

The presumption load torque reaches the value in which the acceleration and deceleration of the motor is removed.

3. LOAD MONITOR OF SPINDLE

In case of the constant control of peripheral speed, since the spindle speed increases while cutting, the load value increase or decreases suddenly.

In this case, there is a case that is hard to monitor the spindle load.

The load detection with axis (X,Z) is recommended.

4. ABOUT THE WARNING VALUE AND THE ABNORMAL VALUE SET BY SAMPLING AUTOMATICALLY

It is not necessarily true that the load warning value • the load abnormal value obtained by the sampling are correct.

They differ by using tool or cutting condition.

Search the warning value, abnormal value and sampling factor corresponding to each tool.

5. ABOUT THE PROCESSING CONDITION OF THE CUTTING LOAD MONITOR

The cutting load watch is turned on cutting signal (G01,G02,G03), turns on the speed attainment signal of Spindle, and starts after the "SPEED DELAY TIMER" (Initial value:320msec).

6. ABOUT "SPEED DELAY TIMER"

"SPEED DELAY TIMER" is used to disregard the acceleration division of Spindle and the deceleration part after the speed reaches.

(Initial value:320msec)

7. ABOUT "LOAD WARN./ABNO. NOTIFY COUNTOR"

It uses it to disregard broken a load value.

When the load value continuously exceeds this frequency, it detects it as warning and abnormality.

8. ABOUT THE CUTTING SIGNAL

Turning off the cutting signal might be delayed, and the load of the movement be detected when cutting from cutting in the movement and changing.

It is necessary to note it because a high value is set to the warning value and the abnormal value by sampling automatically when the load value of this movement is higher than the load value of cutting.

"LOAD WARN./ABNO. NOTIFY COUNTOR" is able not to be detected by setting values that are larger than one.

9. ABOUT T CODE

"0" might be set by sampling by the lookahead of the program.

In this case, the load monitor is not done.

Please confirm the following items.

- ◇ "T-CODE BLOCK BUFFERING M92" is set to EXEC on SYSTEM OTHERS SETTING screen.
- ◇ P3411~P3420 It checks whether 92 is registered.

10. ABOUT THE CASE WHERE THE LOAD MONITOR IS NOT DONE

The following conditions are required to perform load monitor.

- ◇ MEM mode
- ◇ Signal ON under processing (STL signal)
- ◇ Cutting feed (G01, G02, G03)
- ◇ Spindle speed attainment signal turns ON
- ◇ Speed attainment delay timer turns ON
- ◇ It is ordered a wear compensation number.
- ◇ Single block, machine lock, and program check turn OFF.
- ◇ LOAD MONITOR setup is set to EXEC. (SYSTEM OTHERS SETTING SCREEN)

11. ABOUT THE CASE WHERE THE WARNING VALUE AND THE ABNORMAL VALUE HAVE NOT BEEN DETECTED

Although load maximum is over warning and abnormal value, a message may not occur.

If five continuation warning and abnormal value are exceeded, a message will occur. (It is made time and is about $16\text{msec} \times 5 = 80\text{msec}$)

It doesn't detect it as warning and abnormality though broken load is recorded as the maximum value.

5 GROUP MANAGEMENT

The numbers of groups are a maximum of 12 groups.

The numbers of groups is set on "SYSTEM SETTING" of "SYSTEM MENU".

5-1 TOOL SHIFT (CHANGE)

To change to spare tool registered into the group, the required condition can be selected from the following four items.

LIFE END (LE)	When tool-used count reaches tool life value.
LOAD WARNING (LW)	When load warning state occurs.
LOAD ABNORMAL (LA)	When load warning state occurs.
NO USE (NU)	When judged as abnormal (measuring NG) with measuring instrument.

Three conditions are set at initial value.

These conditions can be changed on the "GROUP DETAILS" screen every group.

NO USE condition is valid only when the machine is equipped with the MEASURING MONITOR (option).

5-2 TOOL SEARCH MODE

For searching the usable tool in the group, there are the forward direction search method and the research method.

They are set on the "GROUP DETAILS" screen every group.

The initial value can be searched with the forward direction search.

1. Forward direction

In the forward direction search, the tool is selected from the group tool registration No. 01.

If there is no registered tool or usable tool, the group change forecast and the group life worn-out messages or signals are outputted to inform operator that the tool change is required.

The tool is selected again from the group registration No. 01 with [ALLCPL] key.

2. RESEARCH

In the research, the tool is selected from the group tool registration No. 01.
If there is no registered tool or usable tool, the usable tool is researched from No. 01.

When still there is no usable tool, the group change forecast and the group life worn-out messages or signals are outputted to inform operator that the tool change is required.

The tool is selected again from the group registration No. 01 with [ALLCPL] key.

5-3 RESET METHOD OF GROUP LIFE END

If all the tools in a group become a life end, a group life end message will be displayed.

In this case, please reset in the following procedures.

1. [GROUP] of MENU SOFYKEY is chosen.
2. In the case of a group list screen



1. The [(OPRT)] key is pushed.
2. Cursor is moved to a group.
3. The [ALLCPL] key of a soft key is pushed.

3. In the case of a group detailed screen

500/1000 18:38 05000 N00000

GROUP [DETAILS] GP01 103 W03

No.	TNo.	LFPM	LFRLM
01	0101	1500	450
02	0202	3000	500
03			
04			
05			
06			
07			
08			
09			
10			

GP SETTING

TOOL SHIFT

LE LA NU

SEARCH MODE

FORWARD

LINK GP No.

NONE

NEW TOOL SIG

OUTPUT 1

ACTION GP END

X CYCLE

EDIT*** ** ** 14:53:58 M/C

GP LIST DETAIL (OPRT)

1. A group is chosen.
(A group number replaces by the page key.)
2. The [(OPRT)] key is pushed.
4. The [ALLCPL] key of a soft key is pushed.

6 FREE COUNTER

6-1 PRODUCT CHECK COUNTER

1. PRODUCT CHECK COUNTER SETUP

On the "MACHINE RUN INFORMATION SCREEN" of "RUN MENU", it sets up as follows.

REQUIRED

The optional number

0 RESET

ALARM RESET

M ACTION

DON'T START

(In the case of a loader machine, it CYCLE STOP.)

For instance, when the work piece is checked every 20-time, set an estimated value to 20.

When the counter shows 20, the message that reaches the estimated value is displayed and a cycle start button becomes invalid before stopping the machine.

Worker checks machined work pieces.

After checking, press an alarm-reset button.

At this time, the cycle start button becomes valid and the counter is reset to zero (0).

Press the cycle start button to start the machining for work pieces again.

2. SETTING: "AUTO 0" of zero (0) reset action

When the reset action to "AUTO 0", the counter can be used as the product check counter.

The machine action is set as "CHECK SIGNAL" mode.

When the counter reaches the estimated value, the check signal is outputted and the counter is automatically cleared to zero (0).

At this time, the message for estimated reaching value is not displayed.

However, a machine action is not performed in the state like this.

It is necessary to set the machine action for the check signal on PMC side.

When using the "AUTO 0" mode after delivering, it is necessary to change PMC ladder.

7 MACHINE ACTION SIGNAL

Machine action signal is as follows.

NONE	Usual (Anything is not done)
FEED HOLD	Stops machine immediately by feed hold signal. Although an axis stops, a spindle does not stop.
DON'T START	Stops next machining. (By the machine of loader loading, it becomes invalid.)
DON'T CYCLE	Stops machine after machining. (It becomes invalid when there is no loader.)
BDT / OFF	The block delete is made effective, and the line of "/" of the program is not executed. It is made to perform a (/) line. When a message occurs, "BDT /" is set up to stop a program on the way.
MACRO	When the "LOAD ABNORMAL" occur, the interruption signal of a custom-macro is outputted. (FANUC NC OPTION is required.)
ALLSTP	Stops machine immediately by feed hold signal. A spindle and milling are also stopped.

Special signal

NEW TOOL SELECT SIGNAL

Stops machine after machining by new tool.
(Only tool group management)

CHECK SIGNAL

When setting the reset action of counter to "AUTO 0" on the parts counter and the versatile counter, this signal is outputted.
When the machine action is checked with the check signal, it is necessary to change the PMC ladder.

8 MESSAGE

The following explains about messages displayed on the RAKURAKU MONITOR 3.

The newest message is displayed on the left side of 24-line on each screen.

When setting change or reset operation is required for the displayed message, No. is displayed on the left side of newest message. (Reversal display)

The No. shows the number of messages.



When checking the message, press the alarm reset button on the operation panel.

The newest message is deleted.



IMPORTANT

Don't press the alarm reset button during CNC operation.

There is a possibility that the machine is reset by the machine operation signal.

8-1 MESSAGES TO REQUIRE SETTING CHANGE

Tool life end, group life end, parts completion, load abnormal messages are applicable to the above condition.

When these messages are displayed, the number is displayed.

When the setting change or reset operation is completed, the number disappears.

8-2 MESSAGE LIST

1. CHANGE FORECAST MESSAGE

- Example: T01 REPLACE FORECAST
- Meaning: When the tool life remaining (Life - Count) is the same as the forecast value, the change forecast message is displayed.
- Countermeasure: The tool nose is checked and it is determined that the tool change is required or not.
When the tool change is required, the tool is changed and the count is reset to 0 with [RPLCPL] key.
When the tool can be still used, the tool life is extended.

2. LIFE END MESSAGE

- Example: T01 LIFE END.
- Meaning: When the tool count reaches the life value, the life end message is displayed.
- Countermeasure: The tool nose is checked and it is determined that the tool change is required or not.
When the tool change is required, the tool is changed and the count is reset to 0 with [RPLCPL] key.
When the tool can be still used, the tool life is extended.

3. GROUP CHANGE FORECAST MESSAGE

- Example: GP01 REPLACE FORECAST
- Meaning: When the tool life remaining (Life - Count) of final tool in the group is the same as the forecast value, the group change forecast message is displayed.
- Countermeasure: The all tool noses in the group are checked and it is determined that the tool change is required or not.
When the tool change is required, the tool is changed and all tools registered in the group are completely changed (count is reset to 0) with [ALLCPL] key.
When the tool can be still used, the tool life is extended.

4. GROUP LIFE END MESSAGE

- Example: GP01 LIFE END

Meaning: When the tool count of final tool in the group reaches the life value, the group change forecast message is displayed.

Countermeasure: The all tool noses in the group are checked and it is determined that the tool change is required or not.
When the tool change is required, the tool is changed and all tools registered in the group are completely changed (count is reset to 0) with [ALLCPL] key.
When the tool can be still used, the tool life is extended.

5. GROUP NEW TOOL SELECT MESSAGE

Example: GP01 NEW TOOL

Meaning: When new tool is selected in the group, this message is displayed.

Countermeasure: Check the new tool, product and wear compensation.

6. WEAR LIMIT MESSAGE

Example: T01 WEAR LIMIT

Meaning: When the set wear compensation value exceeds the wear limit value, this message is displayed.

Countermeasure: Check the wear compensation value.
When there is no problem, correct the wear limit value.

7. ADDITION LIMIT MESSAGE

Example: T01 CYCLE ADD LIMIT

Meaning: It is displayed when the number of times of addition of offset addition exceeds an addition limit value.

Countermeasure: Please change an addition limit value.

8. LOAD WARNING MESSAGE

Example: T01 LOAD WARNING

Meaning: When the load measuring value exceeds the warning value within the load notifying delay time continuously, this message is displayed.

Countermeasure: Check the tool nose.
When there is no problem, increase the warning value or extend the load notifying delay time.

9. LOAD ABNORMAL MESSAGE

- Example: WT1 LOAD ABNORMAL
- Meaning: When the load measuring value exceeds the abnormal value within the load notifying delay time continuously, this message is displayed.
- Countermeasure: Check the tool nose.
When there is no problem, increase the abnormal value or extend the load notifying delay time.

10. PARTS COMPLETION FORECAST MESSAGE

- Example: PARTS COUNT UP FCST
- Meaning: It is displayed before the number of parts reaches the number of required parts.
- Countermeasure: Reset the parts count or increase the parts required.

11. PARTS COMPLETION MESSAGE

- Example: PARTS COUNT UP
- Meaning: When work count reaches the set value, this message is displayed.
- Countermeasure: Reset the parts count or increase the parts required.

12. FREE COMPLETION FORECAST MESSAGE

- Example: FREE COUNT UP FCST
- Meaning: It is displayed before the number of counter reaches the number of required counter.
- Countermeasure: Reset the count or increase the required value.

13. FREE COMPLETION MESSAGE

- Example: FREE COUNT UP
- Meaning: When number of times reaches the set value, this message is displayed.
- Countermeasure: Reset the count or increase the required value.

8-3 SYSTEM ALARM

It may become the following system alarms.

1. 3090 T-CODE GROUP No. ERROR

It is displayed when it is commanded an inaccurate group number.
Please check a group number.

2. 3091 TOOL NOT FOUND IN GROUP

When the tool is not registered in the group, this message is displayed.
Please check group registration.

3. 3092 G90* *** ERROR

It is displayed when the command format of G900 - G916 is wrong.

4. 3093 LINK GP SETTING ERROR

Please check a link group number.

5. 3094 LINK GROUP ERROR

Please check tool registration of a link group.

6. 3095 TOOL SETTING ERROR

Please check a "TOOL REGISTRATION SCREEN".

8-4 A FUNCTION TO CHECK THE MESSAGE WHICH EDITING NEEDS WITH AN ALARM RESET BUTTON

When the message which editing needs occurs when I pushed the alarm reset button, this function is the function that does not reset a message.

(About the message which editing needs, please refer to 8-1.)

It is necessary to edit a set point to reset a message.

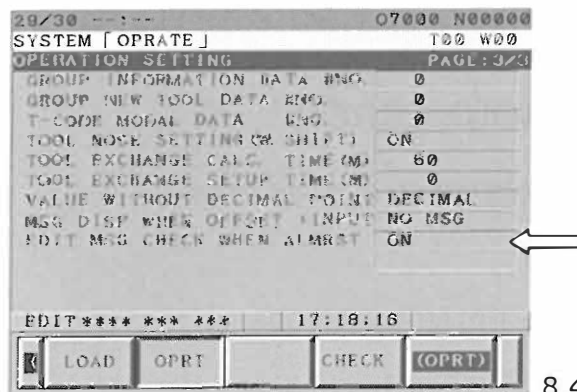
For example, in the case of LIFE END, the value that is smaller than life value cannot reset the count number of tools unless I edit it.

1. SETUP

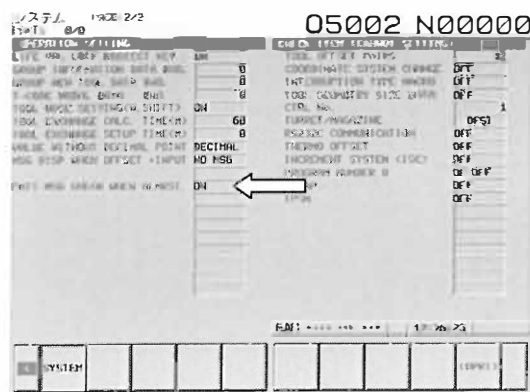
(1) SYSTEM SETTING

"EDIT MSG CHECK WHEN ALMRST" item is displayed on the operation setting screen of the system menu for "PMC LADDER" corresponding to this function.

When this function is used, this item is made "ON".



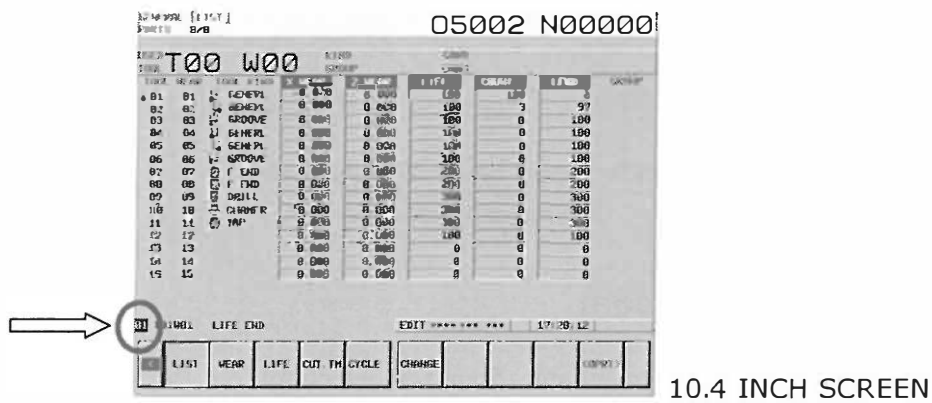
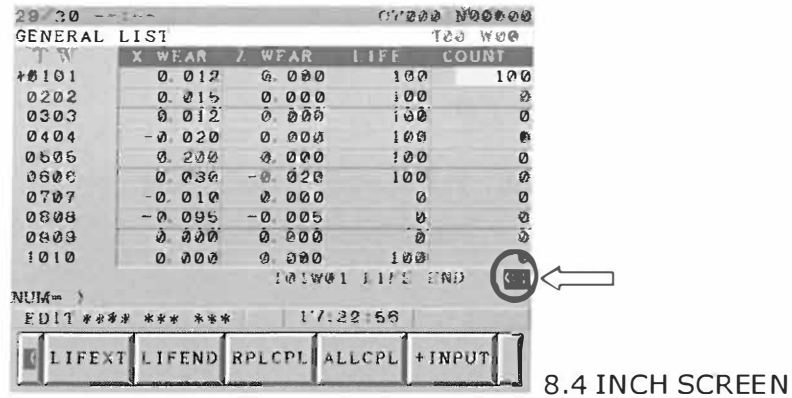
8.4 INCH SCREEN



10.4 INCH SCREEN

2. Operation explanation

When the message which editing needs occurred, a number is displayed.
In this case, even if alarm reset is pushed, the message cannot be reset.



The display of the number disappears if the count is adjusted to a value that is smaller than life value for life end.

When the alarm reset button is pushed with the number disappeared, the message is reset.

9 CP (PROCESS CAPACITY INDEX)

9-1 FORMULA

1. CALCULATION OF CP

Tu : Standard upper limit Tl : Standard lower limit

σ : Standard deviation Xbar : Average value

(1) Both-end standards

$$Cp = \frac{Tu - Tl}{6\sigma} = \frac{\text{Tolerance(Standard width)}}{6 \times \text{Standard Deviation}}$$

(2) Upper limit standard

$$Cp = \frac{Tu - Xbar}{3\sigma} = \frac{\text{Standard upper limit - Average value}}{3 \times \text{Standard Deviation}}$$

(3) Lower limit standard

$$Cp = \frac{Xbar - Tl}{3\sigma} = \frac{\text{Average value - Standard lower limit}}{3 \times \text{Standard Deviation}}$$

2. CALCULATION OF CM

Tu : Standard upper limit Tl : Standard lower limit

σ : Standard deviation Xbar : Average value

(1) Both-end standards

$$Cp = \frac{Tu - Tl}{8\sigma} = \frac{\text{Tolerance(Standard width)}}{8 \times \text{Standard Deviation}}$$

(2) Upper limit standard

$$Cp = \frac{Tu - Xbar}{4\sigma} = \frac{\text{Standard upper limit - Average value}}{4 \times \text{Standard Deviation}}$$

(3) Lower limit standard

$$C_p = \frac{Xbar - Tl}{4\sigma} = \frac{\text{Average value} - \text{Standard lower limit}}{4 \times \text{Standard Deviation}}$$

3. CALCULATION OF CPK

Tu : Standard upper limit Tl : Standard lower limit

Xbar : Average value Cp : Process capacity index K: Bias degree

(1) Bias degree

$$K = \frac{|(Tu + Tl) / 2 - Xbar|}{(Tu - Tl) / 2} = \frac{\text{Deviation between standard center and distributed center}}{1/2 \text{ of standard}}$$

(2) Cpk

$$Cpk = (1 - K)Cp = (1 - K) \frac{Tu - Tl}{6\sigma}$$

4. CALCULATION OF CMK

Tu : Standard upper limit Tl : Standard lower limit

Xbar : Average value Cp : Process capacity index K: Bias degree

(1) Bias degree

$$K = \frac{|(Tu + Tl) / 2 - Xbar|}{(Tu - Tl) / 2} = \frac{\text{Deviation between standard center and distributed center}}{1/2 \text{ of standard}}$$

(2) Cmk

$$Cmk = (1 - K)Cp = (1 - K) \frac{Tu - Tl}{8\sigma}$$

5. CALCULATION OF STANDARD DEVIATION (σ)

(Standard deviation: Accidental error)

Xi: Data, Xbar: Average value, N: Number of data

$$\sigma = \sqrt{\frac{\sum (Xi - Xbar)^2}{(N - 1)}}$$

6. OK. NG CRITERIA

$C_p, C_m, C_{pk}, C_{mk} < 1$	NG
$1 \leq C_p, C_m, C_{pk}, C_{mk} < 1.33$	NG
$1.33 \leq C_p, C_m, C_{pk}, C_{mk}$	OK

9-2 PROCESS CAPACITY TABLE

1. CALCULATION OF BOTH-END STANDARDS

Both the upper limit tolerance and the lower limit tolerance are set and both-end standards are calculated.

2. CALCULATION OF UPPER LIMIT STANDARD

Only upper limit tolerance is set and the upper limit standard is calculated.

3. CALCULATION OF LOWER LIMIT STANDARD

Only lower limit tolerance is set and the lower limit standard is calculated.

9-3 OUTPUT OF CALCULATION RESULTS OF CP

When calculation result is outputted to memory card, it is outputted by CSV.

(CSV : Comma Separated Value)

It is done on the "DATA INPUT/OUTPUT SCREEN" to output it.

10 MEMORY CARD

The machining program in NC program memory, RAKURAKU MONITOR 3 set program, process capacity calculation results, etc., can be written in the memory card.

It is convenient when the data are backed up or stored into the personal computer.

When the "CP" calculation results are formed with table calculation software (MS EXCEL, etc.), its formed document can be easily found.

The document can also be printed out.

10-1 KIND OF MEMORY CARDS

PCMCIA Flash ATA Card (recommended)

Compact Flash Card (Adapter required)

SRAM Card

10-2 TO SET NC WHEN MEMORY CARD IS USED

Display the setting screen with  key.

Set I/O channel item on the setting screen to 4.

11 ABOUT BAR FEEDER SPECIFICATION (M30)

When processing it with a bar feeder, it may repeat using M30 at the last of a main program. Here, it explains the setting when the program is repeated with M30.

11-1 TOOL COUNT METHOD IS SET AS "PROCESS"

The counter counts the used tool frequency within 1 process from the cycle start of machining program to machining finish by M30.

11-2 "G916 ;" IS ADDED IN FRONT OF M30.

When repeating a program, the number of times of tool use cannot be counted " PROCESS."

In order to count the number of times of tool use, it is ordered G916 before the end of a program.

11-3 MACHINE ACTION IS SET TO " DON'T CYCLE".

Please set " DON'T CYCLE" when you want to stop the machine when the TOOL LIFE END, the GROUP LIFE END, and PARTS COUNT UP.

11-4 M30 PROGRAM EXAMPLE

```
O0001 (MAIN PROG);  
M22 ;  
T0101 ;  
G0 X** Z** ;  
G1 X** Z** ;  
***  
***  
***  
  
T0 ;  
G916 ;  
M30 ;
```

Offset cancel
Count flag reset

12 ABOUT BAR FEEDER SPECIFICATION (M99)

When processing it with a bar feeder, it may repeat using M99 at the last of a main program. Here, it explains the setting when the program is repeated with M99.

12-1 TOOL COUNT METHOD IS SET AS "PROCESS"

The counter counts the used tool frequency within 1 process from the cycle start of machining program to machining finish by M99 or M30.

12-2 "G916 ;" IS ADDED IN FRONT OF M99.

When repeating a program, the number of times of tool use cannot be counted "PROCESS."

In order to count the number of times of tool use, it is ordered G916 before the end of a program.

12-3 MACHINE ACTION IS SET TO "BDT / OFF".

When the program is repeated with M99, "DON'T START" and "DON'T CYCLE" of the machine action signal cannot be used.

Please set "BDT / OFF"(optional block skip) when you want to stop the machine when the TOOL LIFE END, the GROUP LIFE END, and PARTS COUNT UP.

12-4 OPTIONAL BLOCK SKIP OF AN OPERATION BOARD IS INVALIDATED.

The optional block skip of the operation board is invalidated and the program is executed.

The optional block skip is effective (light), the block of "/" is not executed when the block signal is output, and the processing ends by M30.

12-5 M99 PROGRAM EXAMPLE

```
O0001 (MAIN PROG);  
M22 ;  
T0101 ;  
G0 X** Z** ;  
G1 X** Z** ;  
...  
...  
...  
T0 ;  
G916 ;  
/ M01; (M30)  
M99 ;
```

Offset cancel

Count flag reset

/ The Brock skip stops by ON.

13 ABOUT THE TOOL OF SPINDLE

Here, the directions for the tool of SPINDLE are explained.

13-1 ABOUT NEXT TOOL AND OFFSET

When carrying out a next tool command, it needs to be cautious of a offset number.

Please carry out the command of the offset number after carrying out tool exchange and carrying out the command of next tool.

Example)	USUAL	GROUP TOOL
	T0100 ;	T0188 ;
	M6 ;	M6 ;
	T0200 ;	T0288 ;
	T01;	T0199 ;
	G1 X** Z** ;	G1 X** Z** ;

14 ABOUT THE GANG TYPE

Here, it explains use for "GANG TYPE".

14-1 SETTING OF "GANG TYPE"

T code of "GANG TYPE" doesn't order the tool number, and order only the correction number.

In this case, "LIFE MANAGEMENT METHOD" of the system setting screen is set to "OFST".

If the tool is registered to the corresponding offset number for "OFST", the life management can be done.

14-2 NOTES IN "GANG TYPE"

- Please set "TOOL number + OFFSET number" to the registration of the group tool of the group management.
An offset number alone cannot be registered.
- T code of tool number + offset number is instructed in when the group management is used. The tool number is disregarded.
- "0" is displayed in the tool number and the offset number of "TOOL NOSE SETTING" screen. Please set the offset number when you register.

15 ABOUT THE PROTECT KEY

There is an item to which the operation and the edit are limited when the protecting key is made effective.

STATE : ○= Editable Operations、×= Editing operation prohibition,
△= Editing operation prohibition(Depend on the setting)

MENU	SCREEN	DISPLAY ITEM	STATE
GENERAL	LIST	X WEAR	△
		Z WEAR	△
		LIFE *1	×
		COUNT	○
	WEAR	X WEAR	○
		Z WEAR	○
		X LIMIT	×
		Z LIMIT	×
	TOOL LIFE	LIFE *1	×
		COUNT	○
		LFRM	○
		FCST	○
	CHANGE		○
	CUTTING TIME	LIFE (M) *1	×
		TOTAL(M)	○
		LFRM(M)	○
		FCST(M)	○
	CYCLE ADDITION	CYCLE	×
		COUNT	×
		X+WEAR	×
		Z+WEAR	×
TOOL	TOOL REGISTRATION		×
	TOOL SETTING		×
	WEAR UPDATE HISTORY		○
LOAD	GRAPH1		○
	GRAPH2		○
	SETTING		×
	MAX RECORD		○
GROUP	LIST		×

	DETAILS		×
RUN	LIST	REQUIRED	○
		PARTS CT	○
	PARTS COUNTER	PARTS REQUIRED	○
		PARTS COUNT	○
		PARTS TOTAL	×
		TODAY COUNT	×
		MONTH COUNT	×
	COUNTER	COUNTER REQUIRED	○
		COUNTER COUNT	○
		COUNTER TOTAL	×
		TODAY COUNT	×
		MONTH COUNT	×
	TIME		×
	PROGRAM COUNTER		○
	PROGRAM REGISTRATION		×
FUNCTION	STOP WATCH		○
	CP1		○
	CP2		○
IN/OUT	INPUT/OUTPUT		○
MESSAGE	MESSAGE		○
	HISTORY		○
SYSTEM	LOAD		×
	OPRATE		×
TOOL NOSE	WORK SHIFT		○
	ST.OUT		○
	ST.INN		○
	OUTER		○
	INNER		○
GM CODE	G-CODE LIST		○
	M-CODE LIST		○
DGNOS	ALARM		○
	DGNOS		○
	EX SRH		○

*1: When "LIFE VAL LOCK PROTECT KEY" of the system screen is made "OFF",
"LIFE VALUE" is not locked with the protecting key.

16 FAQ (Frequently Asked Questions)

1. Load monitor cannot be used.

The following conditions are required to perform load monitor.

MEM mode

Cutting feed (G01, G02, G03)

Spindle speed attainment signal turns ON

Speed attainment delay timer turns ON

It is ordered a wear compensation number.

Single block, machine lock, and program check turn OFF.

LOAD MONITOR setup is set to EXEC. (SYSTEM OTHERS SETTING SCREEN)

(1) Cutting time is short.

A load monitor may not be made when cutting time is short (0.5 or less second).

2. "0" is set as warning and abnormal value after a load sampling.

"0" may be set up by prediction of a program.

Please perform the following measures.

"T-CODE BLOCK BUFFERING M92" is set to EXEC on SYSTEM OTHERS SETTING screen.

The T code and the following T code make it 4 blocks or more. (EOB; is added)

P3411~P3420 It checks whether 92 is registered.

It is set to "0" when cutting time is short (320msec).

3. A tool counter does not count.

The following conditions are required for the count of a tool counter.

A tool life value is set up.

It is ordered a wear compensation number.

Single block, machine lock, and program check turn OFF.

TOOL LIFE FUNCTION setup is set to EXEC. (SYSTEM OTHERS SETTING SCREEN)

4. A tool counter counts only 1.

The counter counts the used tool frequency within 1 process from the cycle start of machining program to machining finish by M02 or M30.

(Only 1 is added to the tool used frequency.)

It can be added to every order on the SYSTEM OTHERS SETTING screen, too.
In this case, if ordered in a wear compensation number within a program, it will count.

5. Unless it pushes a button repeatedly at the time of a single block, it does not go to block [of the next].

The time of a single block, unless it pushes repeatedly by the block which is ordering it the T code, it may not move to the next block.

In this case, please check whether P6000 #5 (SBM) of NC parameter is 0.

This parameter may be set to (1) when checking a custom macro program.

6. Although load maximum is over warning and abnormal value, a message does not occur.

Although load maximum is over warning and abnormal value, a message may not occur.

If five continuation warning and abnormal value are exceeded, a message will occur.

(It is made time and is about $16\text{msec} \times 5 = 80\text{msec}$)

7. It is not used for having exchanged the group tool from a top tool.

When a group tool is exchanged, please be sure to push the [ALLCPL] soft key of a GROUP LIST or a GROUP DETAIL screen.

By the [ALLCPL] soft key of a GENERAL screen, it does not become a top tool.

8. Can tool breakage detection and no-load detection be performed?

It cannot do.

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RAKU RAKU LOADER 4

NS24001-551

TT-2100/TT-2600/T-2600

Please read each manual and understand contents enough.
Then keep these manuals handy for answers to any questions you may have and to check.

MACHINE TOOLS
TAKISAWA

IMPORTANT NOTICE

- Be sure to read each instruction manual before operating the machine.
Be sure to observe the safety precautions in the instruction manuals and the contents of warning labels adhered to the machine. If ignored, an accident resulting in injury or death or machine malfunction may be caused.
There are many [DISABLE] or [MUST NOT DO] conditions.
Unless [ABLE] is written in the instruction manual, consider it [DISABLE].
- Some illustrations in the instruction manual are given without cover or door to illustrate the detailed parts. In actual operation, it is necessary to mount the cover or door.
- Keep instruction manuals handy for ready reference as it will help you operate the machine and equipment to their full advantage.
- When any instruction manual is required again, contact your agent with the number of the instruction manual (or model name, manual name).
- Japanese laws prohibit this machine from being used to develop or manufacture "weapons of mass destruction" or "conventional arms", as well as from being used to process parts for them.
Export of the product may require the permission of governmental authorities of the country from where the product is exported.
Should you wish to resell, transfer or export the product, please notify Takisawa Machine Tool Co., Ltd. or our distributor in advance.
- Observe the laws and regulations established by the national and local governments.
- Observe the laws and regulations established by the national and local government for disposal of machines and waste oil.

- Software copyright is held by us.
- No part of the software is allowed to use, copy, or modify without written permission of us.
- This instruction manual is copyrighted, and all rights are reserved. No part of the drawings and technical descriptions contained in this instruction manual may be disclosed, photocopied, translated to another language or copied to any readable electronic devices and apparatus without the prior written consent.
- The contents in this instruction manual are subject to change without notice.
- All brand names and product name listed in this instruction manual are trademarks or registered trademarks of their respective companies.
- This instruction manual is prepared for native English-speakers. When the machine is operated by non-native English speakers, please provide safety instruction for the operators by customers. In addition, please provide warning labels in their native language.
- Be sure to attach this instruction manual in case of reselling this machine.
- The manual is written for people who have a basic knowledge of machine tools. TAKISAWA disclaims all responsibility for damage or accidents arising due to people with insufficient knowledge or training with machine tools, attempting to operate, maintain or program said tools.
- When replacing the parts, use the parts specified by company. TAKISAWA disclaims all responsibility for damage or problems occurring due to using parts other than those specified.
If the specified parts are not used, not only the machine function is reduced but also safety is compromised, thus possibly causing an accident resulting in injury or death or machine malfunction.

- There are many kinds of coolants.

Though TAKISAWA does not specify the coolant, select the coolant by consulting with maker about the following items.

TAKISAWA disclaims all the responsibility for trouble incurred by the coolant.

- Contact us for requesting an installation, modification, and specification change, and dismantlement of the machine. If the machine is installed, modified, or its specification is changed by customer, not only the performance of the machine may be lost but also the safety of the customer may not be secured.

GENERAL PRECAUTIONS

In order to secure safety when using RAKU RAKU LOADER, refer to the following preventive measures.



WARNING

Make sure that the input data was input correctly on the screen before starting the subsequent operations.

If it is operated by incorrect data, the loader could collide against work pieces or machine, resulting in damage of the machine or injury.

Before starting the operation of RAKU RAKU LOADER, be sure to set necessary parameters and data.

When the loader operation program was created by using the function of RAKU RAKU LOADER, do not immediately start the operation using the RAKU RAKU LOADER function. Instead, check the created program for each step to make sure that all the operations are correct and the loader does not collide against work pieces or machine.

If the collision occurs, it could cause the loader or machine to be damaged or it could cause injury.



CAUTION

After pressing the power button, do not touch the keys of the keyboard until the screen is displayed.

Some keys are used for maintenance or other special operations, and pressing such keys could cause unexpected operation.

The instruction manual of RAKU RAKU LOADER does not describe the function or operation of CNC unit

For the actual function or operation of CNC unit, refer to the instruction manual of CNC unit.

Some operations described in the instruction manual of RAKU RAKU LOADER are not able to be performed.

For detail, refer to the precautions, etc. in the manual.

Data (teaching data, setting data, system parameters, etc.) used for RAKU RAKU LOADER are memorized in SRAM (program area).

Generally, the data are not deleted by turning the power on/off.

To restore the machine promptly in case of unforeseeable circumstances, however, make backups of each data in advance.

CONTENTS

1	OUTLINE	1-1
2	DESCRIPTION OF CODES TO BE USED	2-1
3	FUNCTIONS	3-1
3-1	Teaching	3-2
1	Teaching Pattern 1	3-2
2	Teaching Pattern 2	3-6
3-2	Copying workpiece	3-10
1	Workpiece offset list	3-10
2	Example of workpiece offset	3-11
3-3	P-MOVE function	3-12
3-4	Quality check	3-13
3-5	Operation setting	3-14
3-6	System	3-18
1	Loader operation setting	3-18
2	Setting of teaching spares and character strings	3-19
3	Operation setting of setting, PMC spares and character strings	3-20
4	Operation setting of setting, macro spares, character strings	3-20
5	Setting position switch	3-23
6	Setting offset axis for copying workpiece	3-23
3-7	Guide	3-24
1	Guide screen	3-24
7	Loader starting condition	3-24
8	Alarm display	3-25
9	M code list	3-25
10	Signal tower setting	3-25
11	Manual operation condition	3-25
12	Machine operation panel	3-26
13	Tool offset screen	3-26
14	Workpiece coordinate system shift screen	3-26
4	OPERATION	4-1
4-1	Loader main screen display method	4-2
1	Loader main screen display	4-2
2	MDI mode program execution procedure	4-3
4-2	Workpiece relating operation	4-4
1	Workpiece list screen display	4-4
2	"Newly creating" workpieces	4-5
3	"Selecting" workpieces	4-6
4	"Copying" workpieces	4-7
5	"Deleting" workpiece	4-8
6	"Outputting" workpiece information	4-9
4-3	Operation relating to teaching	4-10
1	Display and operation of teaching screen	4-10
2	"Directly inputting" teaching coordinate value	4-11
3	Setting the teaching coordinate value for "ALL the coordinates"	4-12
4	Setting the teaching coordinate value for "SINGLE coordinate"	4-13
5	Moving axis to teaching coordinate value by using "P-MOVE."	4-14
6	Setting teaching coordinate value by "+ INPUT"	4-15

7	Returning (UNDO) teaching coordinate value	4-16
8	"Deleting (DELETE)" teaching coordinate value	4-17
9	Displaying teaching list screen	4-18
10	Displaying "DETAILS" of teaching point.....	4-19
11	Setting the coordinate value of teaching list by "SINGLE" coordinate	4-20
12	"Deleting [DELETE]" the coordinate value of teaching list.....	4-21
13	Setting the coordinate value for teaching list by "+ INPUT"	4-22
14	Returning (UNDO) the coordinate value of teaching coordinate list	4-23
15	Moving axis to teaching coordinate value by using "P-MOVE."	4-24
4-4	Operation setting	4-25
1	Displaying operation setting screen.....	4-25
2	Changing operation setting	4-26
4-5	Quality check	4-27
1	Displaying quality check screen	4-27
2	Checking quality of workpieces under processing	4-28
3	Periodically checking quality.....	4-28
1	Scheduled number of workpieces to be processed	4-29
1	Setting scheduled number of workpieces to be processed	4-29
4-7	Displaying macro variable	4-30
2	Displaying macro variable for loader	4-30
2	Outputting loader program.....	4-31
1	Displaying loader program list.....	4-31
2	"Outputting" loader program.....	4-32
4-9	System setting	4-33
1	Displaying system setting screen	4-33
2	Changing loader setting.....	4-34
3	Changing spare character string	4-35
4	Changing position switch	4-37
5	Setting coordinate value of the position switch	4-38
6	Setting offset axis for copying workpieces.....	4-40
7	"Outputting" system setting.....	4-41
4-10	Guide	4-42
1	Displaying guide screen.....	4-42
2	Displaying loader starting condition screen	4-43
3	Displaying alarm display screen.....	4-44
4	Displaying M-code list screen	4-45
5	Displaying signal tower setting screen	4-46
6	Displaying manual operation conditions screen.....	4-47
7	Displaying operation panel (board) screen	4-48
8	Displaying tool offset/wear screen	4-49
9	Displaying work shift screen.....	4-50
5	EXPLANATION ABOUT SCREENS.....	5-1
5-1	Loader main screen.....	5-2
1	Explanation about displays.....	5-2
2	Soft key	5-3
5-2	Workpiece list screen.....	5-4
1	Explanation about displays.....	5-4
2	Soft key	5-4
5-3	Teaching screen	5-5
1	Explanation about displays.....	5-5
2	Soft key	5-5
5-4	Teaching list screen.....	5-6
1	Explanation about displays.....	5-6
2	Soft key	5-6
5-5	Operation setting screen	5-7

1	Explanation about displays.....	5-7
5-6	Quality check screen	5-8
2	Explanation about displays.....	5-8
5-7	Macro variable screen	5-9
1	Explanation about displays.....	5-9
5-8	Loader program list screen	5-10
1	Explanation about displays.....	5-10
2	Soft key	5-10
5-9	System setting	5-11
1	Explanation about Displays	5-11
2	Soft key	5-11
5-10	Guide screen	5-12
1	Explanation about displays.....	5-12
2	Soft key	5-13
5-11	Loader starting condition screen.....	5-14
1	Explanation about displays.....	5-14
2	Operation key	5-14
3	Operation Soft key.....	5-14
5-12	Alarm display screen	5-15
1	Explanation about displays.....	5-17
2	Operation key	5-17
3	Operation soft key	5-17
5-13	M-code list screen	5-18
1	Explanation about displays.....	5-18
2	Operation key	5-18
3	Operation soft key	5-18
5-14	Signal tower setting screen.....	5-19
1	Explanation about displays.....	5-19
2	Operation key	5-19
3	Operation soft key	5-19
5-15	Manual operation condition screen.....	5-20
1	Explanation about displays.....	5-20
2	Operation key	5-20
3	Operation soft key	5-20
5-16	Machine operation panel screen.....	5-21
1	Explanation about displays.....	5-21
2	Operation key	5-22
3	Soft key	5-22
5-17	Tool offset screen	5-25
4	Explanation of displays.....	5-25
5	Operation key	5-25
6	Soft key	5-26
5-18	Workpiece coordinate system shift screen.....	5-27
7	Explanation about displays.....	5-27
8	Operation key	5-27
9	Soft key	5-28
6	APPENDIX.....	6-1
6-1	Memory card and USB memory.....	6-2
	Kinds of memory cards	6-2
10	NC setting when the memory card is used	6-2
11	Restrictions for use of USB memories.....	6-2
12	NC setting when using USB memories	6-2

1 OUTLINE

RAKU RAKU LOADER is a useful function to facilitate creating the loader operation program.

This instruction manual describes functions relating to RAKU RAKU LOADER.

For further information, refer to the instruction manual of NC unit manufacturer.

Unless [ABLE] is written in the instruction manual, consider it [DISABLE].

2 DESCRIPTION OF CODES TO BE USED

In this manual, operations of the keys are described by the following abbreviations.

MDI key (keys with English characters, numerical values or codes imprinted.)

EX.)



Soft key (10 keys at the bottom of the screen)

Soft keys for each screen are put in square brackets [].

EX.)

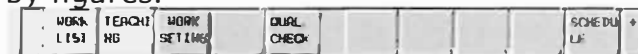
[TEACH] [SET]

or indicated by frames.

10-type soft key

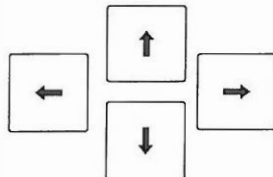


or indicated by figures.



Cursor key

EX.)



Page key

EX.)



Operation panel and button

EX.) Alarm reset button



3 FUNCTIONS

In this chapter, each function of RAKU RAKU LOADER is described.

RAKU RAKU LOADER is a useful function which makes it possible to set or change the operation of the loader by operating the dedicated screen only without changing the program.

- 99 types of work preparation information (teaching and setting) can be registered easily on the dedicated screen.
Comment can be input up to 22 characters for each workpiece (alphanumeric characters in upper case only)
- Teaching is performed on the dedicated screen.
Loading position, unloading position, etc.
- P-MOVE function makes it possible to move axis to the teaching point.
- Necessary setting can be performed for each workpiece.
Setting air blow time and setting relating to PMC such as type of machine, either right-handed or left-handed is possible.
Functions relating to micro variable dedicated for loader such as number of retries when checking if it is seated.
- Loader starting conditions can be checked at view.
- It is possible to respond to the difference of workpiece in the length by the automatic offset function considering the length of the workpiece.
- On the system screen, setting relating to RAKU RAKU LOADER or customization of the soft keys is possible.

3-1 Teaching

Teaching can be performed on the dedicated screen.
Set the coordinate value for the teaching to the loader macro variable.
Items of teaching, there is a pattern 2 and pattern 1.

1 Teaching Pattern 1

(1) Loader Macro Variable

System setting coordination: [TT-32] (TT-2100)

Name of Position		Items	To which value is set: Loader macro variable
Loader types A, C(R)	Loader types B, C(L)		
WORK LOAD		X-axis Y-axis Z-axis Approach	#500 #501 #502 #503
MC-R UNLOAD	MC-L UNLOAD	X-axis Y-axis Z-axis Approach	#504 #505 #506 #507
MC-R LOAD	MC-L LOAD	X-axis Y-axis Z-axis Approach	#508 #509 #510 #511
TURN RIGHT	TURN LEFT	X-axis Y-axis Z-axis Approach	#512 #513 #514 #515
TURN LEFT	TURN RIGHT	X-axis Y-axis Z-axis Approach	#516 #517 #518 #519
MC-L UNLOAD	MC-R UNLOAD	X-axis Y-axis Z-axis Approach	#520 #521 #522 #523
MC-L LOAD	MC-R LOAD	X-axis Y-axis Z-axis Approach	#524 #525 #526 #527
WORK UNLOAD		X-axis Y-axis Z-axis Approach	#528 #529 #530 #531
WORK NG		X-axis Y-axis Z-axis Approach	#532 #533 #534 #535

QUALITY	X-axis	#536
	Y-axis	#537
	Z-axis	#538
	Approach	#539
MEASUREMENT	X-axis	#540
	Y-axis	#541
	Z-axis	#542
	Approach	#543
MEASURING NG	X-axis	#544
	Y-axis	#545
	Z-axis	#546
	Approach	#547
ORIENTATION	X-axis	#548
	Y-axis	#549
	Z-axis	#550
	Approach	#551
FIRST UNLOAD	X-axis	#552
	Y-axis	#553
	Z-axis	#554
	Approach	#555
QUALITY 2	X-axis	#556
	Y-axis	#557
	Z-axis	#558
	Approach	#559
RESERVE 1 System → Character string setting Displayed character strings can be changed by No.16.	X-axis	#560
	Y-axis	#561
	Z-axis	#562
	Approach	#563
RESERVE 2 System → Character string setting Displayed character strings can be changed by No.17.	X-axis	#564
	Y-axis	#565
	Z-axis	#566
	Approach	#567
RESERVE 3 System → Character string setting Displayed character strings can be changed by No.18.	X-axis	#568
	Y-axis	#569
	Z-axis	#570
	Approach	#571
RESERVE 4 System → Character string setting Displayed character strings can be changed by No.19.	X-axis	#572
	Y-axis	#573
	Z-axis	#574
	Approach	#575
RESERVE 5 System → Character string setting Displayed character strings can be changed by No.20.	X-axis	#576
	Y-axis	#577
	Z-axis	#578
	Approach	#579
RESERVE 6 System → Character string setting Displayed character strings can be changed by No.21.	X-axis	#580
	Y-axis	#581
	Z-axis	#582
	Approach	#583
RESERVE 7 System → Character string setting Displayed character strings can be changed by No.22.	X-axis	#584
	Y-axis	#585
	Z-axis	#586
	Approach	#587

RESERVE 8 System → Character string setting Displayed character strings can be changed by No.23.	X-axis Y-axis Z-axis Approach	#588 #589 #590 #591
RESERVE 9 System → Character string setting Displayed character strings can be changed by No.24.	X-axis Y-axis Z-axis Approach	#592 #593 #594 #595
RESERVE 10 System → Character string setting Displayed character strings can be changed by No.25.	X-axis Y-axis Z-axis Approach	#596 #597 #598 #599

(2) Position switch

When "006: Position switch check" on the system setting screen is "Effective" on the system setting screen, input can be limited by the value of the position switch.

It is possible to set No. of the position switch by which the teaching point performs check from the position setting screen.

System setting model:[TT-32] (TT-2100)

Position Name		Axis (No.)	Position switch No. (Initial value.)	
Loader types A, C(R)	Loader types B, C(L)		A/B	C
WORK LOAD		X-axis (1)	9	
		Y-axis (2)	10	
MC-R UNLOAD	MC-L UNLOAD	X-axis (1)	2	
		Y-axis (2)	1	
MC-R LOAD	MC-L LOAD	X-axis (1)	2	
		Y-axis (2)	1	
TURN RIGHT	TURN LEFT	X-axis (1)	14	
		Y-axis (2)	13	
TURN LEFT	TURN RIGHT	X-axis (1)	14	
		Y-axis (2)	13	
MC-L UNLOAD	MC-R UNLOAD	X-axis (1)	6	
		Y-axis (2)	1	
MC-L LOAD	MC-R LOAD	X-axis (1)	6	
		Y-axis (2)	1	
WORK UNLOAD		X-axis (1)	9	11
		Y-axis (2)	10	12
WORK NG		X-axis (1)	9	11
		Y-axis (2)	10	12
QUALITY		X-axis (1)	9	11
		Y-axis (2)	10	12

MEASUREMENT	X-axis (1)	9	11
	Y-axis (2)	10	12
MEASURING NG	X-axis (1)	9	11
	Y-axis (2)	10	12
ORIENTATION	X-axis (1)	9	
	Y-axis (2)	10	
FIRST UNLOAD	X-axis (1)	9	11
	Y-axis (2)	10	12
QUALITY 2	X-axis (1)	9	
	Y-axis (2)	10	
RESERVE 1	X-axis (1)	0	
	Y-axis (2)	0	
RESERVE 2	X-axis (1)	0	
	Y-axis (2)	0	
RESERVE 3	X-axis (1)	0	
	Y-axis (2)	0	
RESERVE 4	X-axis (1)	0	
	Y-axis (2)	0	
RESERVE 5	X-axis (1)	0	
	Y-axis (2)	0	
RESERVE 6	X-axis (1)	0	
	Y-axis (2)	0	
RESERVE 7	X-axis (1)	0	
	Y-axis (2)	0	
RESERVE 8	X-axis (1)	0	
	Y-axis (2)	0	
RESERVE 9	X-axis (1)	0	
	Y-axis (2)	0	
RESERVE 10	X-axis (1)	0	
	Y-axis (2)	0	

2 Teaching Pattern 2

(1) Loader Macro Variable

System setting coordination: [TT-32] (TT-2100/TT-2600/T-2600)

Name of Position		Items	To which value is set: Loader macro variable
Loader types A, C(R)	Loader types B, C(L)		
WORK LOAD		X-axis Y-axis Z-axis Approach	#500 #501 #502 #503
ORIENTATION		X-axis Y-axis Z-axis Approach	#504 #505 #506 #507
MC-R UNLOAD	MC-L UNLOAD	X-axis Y-axis Z-axis Approach	#508 #509 #510 #511
MC-R LOAD	MC-L LOAD	X-axis Y-axis Z-axis Approach	#512 #513 #514 #515
TURN RIGHT	TURN LEFT	X-axis Y-axis Z-axis Approach	#516 #517 #518 #519
TURN LEFT	TURN RIGHT	X-axis Y-axis Z-axis Approach	#520 #521 #522 #523
MC-L UNLOAD	MC-R UNLOAD	X-axis Y-axis Z-axis Approach	#524 #525 #526 #527
MC-L LOAD	MC-R LOAD	X-axis Y-axis Z-axis Approach	#528 #529 #530 #531
WASHER.UNLD		X-axis Y-axis Z-axis Approach	#532 #533 #534 #535
WASHER.LOAD		X-axis Y-axis Z-axis Approach	#536 #537 #538 #539
MEAS.UNLOAD		X-axis Y-axis Z-axis Approach	#540 #541 #542 #543

MEAS.LOAD	X-axis Y-axis Z-axis Approach	#544 #545 #546 #547
MEASURING NG	X-axis Y-axis Z-axis Approach	#548 #549 #550 #551
QUALITY	X-axis Y-axis Z-axis Approach	#552 #553 #554 #555
WORK UNLOAD	X-axis Y-axis Z-axis Approach	#556 #557 #558 #559
QUAL.RETURN	X-axis Y-axis Z-axis Approach	#560 #561 #562 #563
WORK NG	X-axis Y-axis Z-axis Approach	#564 #565 #566 #567
WORK NG2	X-axis Y-axis Z-axis Approach	#568 #569 #570 #571
FIRST UNLOAD	X-axis Y-axis Z-axis Approach	#572 #573 #574 #575
QUALITY 2	X-axis Y-axis Z-axis Approach	#576 #577 #578 #579
RESERVE 1 System → Character string setting Displayed character strings can be changed by No.21.	X-axis Y-axis Z-axis Approach	#580 #581 #582 #583
RESERVE 2 System → Character string setting Displayed character strings can be changed by No.22.	X-axis Y-axis Z-axis Approach	#584 #585 #586 #587
RESERVE 3 System → Character string setting Displayed character strings can be changed by No.23.	X-axis Y-axis Z-axis Approach	#588 #589 #590 #591
RESERVE 4 System → Character string setting Displayed character strings can be changed by No.24.	X-axis Y-axis Z-axis Approach	#592 #593 #594 #595

RESERVE 5 System → Character string setting Displayed character strings can be changed by No.25.	X-axis Y-axis Z-axis Approach	#596 #597 #598 #599
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(2) Position switch

When "006: Position switch check" on the **system** setting screen is "Effective" on the system setting screen, input can be limited by the value of the position switch.

It is possible to set No. of the position switch by which the teaching point performs check from the position setting screen.

System setting model:[TT-32] (TT-2100/TT-2600/T-2600)

Position Name		Axis (No.)	Position switch No. (Initial value)	
Loader types A, C(R)	Loader types B, C(L)		A/B	C
WORK LOAD		X-axis (1)	9	
		Y-axis (2)	10	
ORIENTATION		X-axis (1)	20	
		Y-axis (2)	21	
MC-R UNLOAD	MC-L UNLOAD	X-axis (1)	2	
		Y-axis (2)	1	
MC-R LOAD	MC-L LOAD	X-axis (1)	2	
		Y-axis (2)	1	
TURN RIGHT	TURN LEFT	X-axis (1)	14	
		Y-axis (2)	13	
TURN LEFT	TURN RIGHT	X-axis (1)	14	
		Y-axis (2)	13	
MC-L UNLOAD	MC-R UNLOAD	X-axis (1)	6	
		Y-axis (2)	1	
MC-L LOAD	MC-R LOAD	X-axis (1)	6	
		Y-axis (2)	1	
WASHER.UNLD		X-axis (1)	27	
		Y-axis (2)	28	
WASHER.LOAD		X-axis (1)	27	
		Y-axis (2)	28	
MEAS.UNLOAD		X-axis (1)	30	
		Y-axis (2)	31	
MEAS.LOAD		X-axis (1)	30	
		Y-axis (2)	31	
MEASURING NG		X-axis (1)	30	
		Y-axis (2)	31	

QUALITY	X-axis (1)	25	
	Y-axis (2)	26	
WORK UNLOAD	X-axis (1)	9	11
	Y-axis (2)	10	12
QUAL.RETURN	X-axis (1)	25	
	Y-axis (2)	26	
WORK NG	X-axis (1)	23	
	Y-axis (2)	24	
WORK NG2	X-axis (1)	23	
	Y-axis (2)	24	
FIRST UNLOAD	X-axis (1)	9	11
	Y-axis (2)	10	12
QUALITY 2	X-axis (1)	25	
	Y-axis (2)	26	
RESERVE 1	X-axis (1)	0	
	Y-axis (2)	0	
RESERVE 2	X-axis (1)	0	
	Y-axis (2)	0	
RESERVE 3	X-axis (1)	0	
	Y-axis (2)	0	
RESERVE 4	X-axis (1)	0	
	Y-axis (2)	0	
RESERVE 5	X-axis (1)	0	
	Y-axis (2)	0	

3-2 Copying workpiece

Information on the workpieces (teaching setting and operation setting) are copied. When copying the teaching data, specify the work offset value. Copying is automatically performed, considering the difference of the workpiece length. Whether you offset to any axis, is done on the system screen in the "offset axis setting".

1 Workpiece offset list

System setting, coordination:[TT-32] (TT-2100/TT-2600/T-2600)

Position Name		Axis performing automatic offset (No.) Default value
Loader types A, C(R)	Loader types B, C(L)	
WORK LOAD		Not performed
ORIENTATION		Not performed
MC-R UNLOAD	MC-L UNLOAD	Z-axis (3)
MC-R LOAD	MC-L LOAD	Z-axis (3)
TURN RIGHT	TURN LEFT	Z-axis (3)
TURN LEFT	TURN RIGHT	Z-axis (3)
MC-L UNLOAD	MC-R UNLOAD	Z-axis (3)
MC-L LOAD	MC-R LOAD	Z-axis (3)
WASHER.UNLD		Y-axis (2)
WASHER.LOAD		Y-axis (2)
MEAS.UNLOAD		Y-axis (2)
MEAS.LOAD		Y-axis (2)
MEASURING NG		Y-axis (2)
QUALITY		Y-axis (2)
WORK UNLOAD		Not performed
QUAL.RETURN		Y-axis (2)
WORK NG		Y-axis (2)
WORK NG2		Y-axis (2)
FIRST UNLOAD		Not performed
QUALITY 2		Y-axis (2)
RESERVE 1		Not performed
RESERVE 2		Not performed
RESERVE 3		Not performed
RESERVE 4		Not performed
RESERVE 5		Not performed

2 Example of workpiece offset

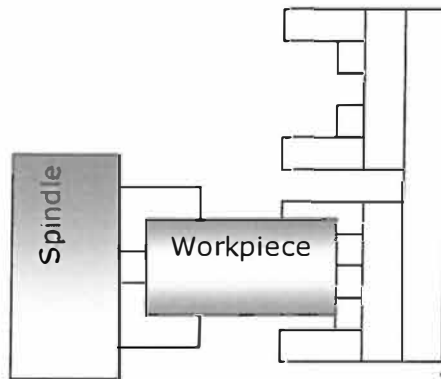
Teaching or setting is performed for transferring workpiece No. 01 which is 50mm-long.

To transfer the workpiece of 30mm-long by using the loader, copy the data of the workpiece No. 01 to the workpiece No. 11.

At this point, set -20mm as the workpiece offset value and perform copying.

For the value of Z-axis coordinate for "Inside the machine: Unloading, the value deducted by -20mm from the Z-axis coordinate value of the workpiece No. ".

Workpiece No.01 of 50mm-long



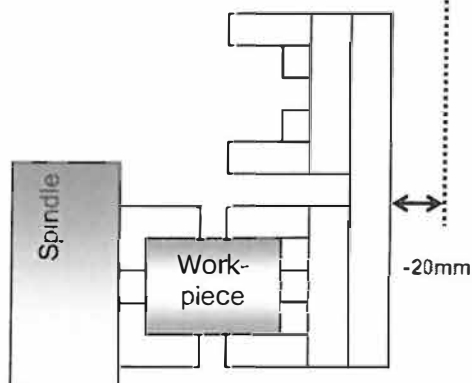
"Inside the machine: Discharging"

X :	-500.000
Z :	-1500.000
A :	10.000

Workpiece offset
Copying performed



Workpiece No.11 of 30mm-long



"Inside the machine: Discharging"

X :	- 500.000
Z :	-1520.000
A :	10.000

(1) Notes

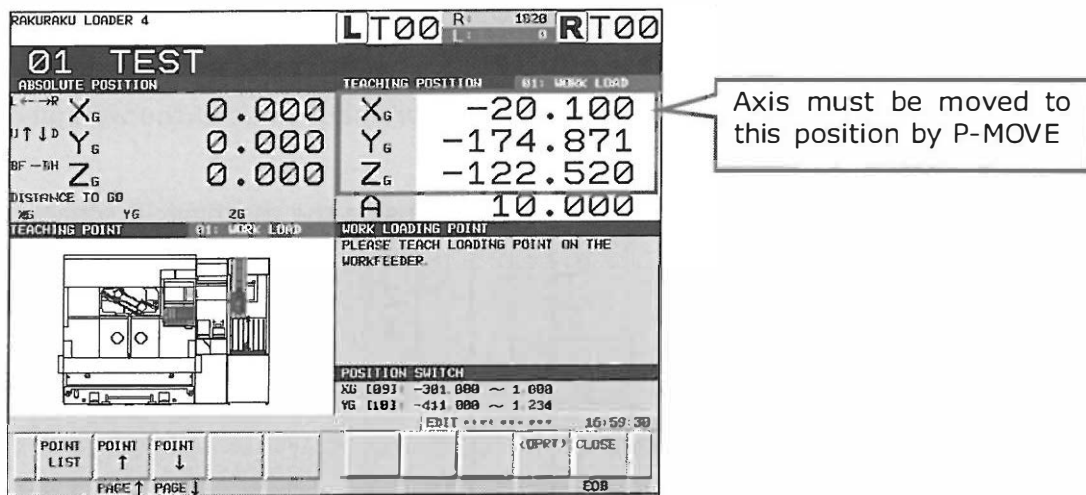
Workpiece gripping margin is not considered.

Adjusting the height of the photoelectric switch of the unloading side of the work feeder is necessary.

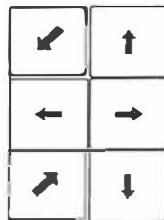
After copying, check all the teaching positions.

3-3 P-MOVE function

This is a function to move the axis to the coordinate of the teaching point.
Perform manually.



By pressing the key of the loader operation panel corresponding to the axis to be moved, the axis will move to the teaching point. Press the shift button first, and then the following direction keys.



Move each axis to the teaching coordinate value, and then stop. (It cannot be moved in the reverse direction.)

3-4 Quality check

Setting for quality check is performed from the quality check screen.
The set value is set to the macro variables designed for the loader.

System setting and model:[TT-32] (TT-2100)

At the series processing

	Set value	Specified value	Where to set
PROCESSING WORK	OFF/ON	OFF	#630
SETTING VALUE	0 to 32767	0	#631
COUNTER	0 to 32767	0	#632

At a parallel processing

	Set value	Specified value	Where to set
PROCESSING WORK	OFF/ON	OFF	#630
SETTING VALUE [R]	0 to 32767	0	#631
COUNTER	0 to 32767	0	#632
SETTING VALUE [L]	0 to 32767	0	#633
COUNTER	0 to 32767	0	#634

3-5 Operation setting

Necessary setting can be performed for each workpiece.

System setting and model:[TT-32] (TT-2100)

	Setting Value	Specified value	Desitin a-tion
000: SPINDLE ORIENTATION LOAD [R]	NO USE/USE	USE	D3000
001: SPINDLE ORIENTATION UNLOAD [R]	NO USE/USE	USE	D3002
002: SPINDLE ORIENTATION LOAD [L]	NO USE/USE	USE	D3004
003: SPINDLE ORIENTATION UNLOAD [L]	NO USE/USE	USE	D3006
004:SPINDLE ORI. ANGLE LOAD [R]	0.0 to 359.9	0.0	D3008
005: SPINDLE ORI. ANGLE UNLOAD [R]	0.0 to 359.9	0.0	D3010
006:SPINDLE ORI. ANGLE LOAD [L]	0.0 to 359.9	0.0	D3012
007: SPINDLE ORI. ANGLE UNLOAD [L]	0.0 to 359.9	0.0	D3014
008:			
009:			
010: AIR BLOW LOAD [R]	NO USE/USE	USE	D3020
011: AIR BLOA UNLOAD [R]	NO USE/USE	USE	D3022
012: AIR BLOW LOAD [L]	NO USE/USE	USE	D3024
013: AIR BLOA UNLOAD [L]	NO USE/USE	USE	D3026
014: AIR BLOW LOAD TIME [R]	0.000 to 262.128	1.000	D3028
015: AIR BLOW UNLOAD TIME [R]	0.000 to 262.128	1.000	D3030
016: AIR BLOW LOAD TIME [L]	0.000 to 262.128	1.000	D3032
017: AIR BLOW UNLOAD TIME [L]	0.000 to 262.128	1.000	D3034
018: HAND AIR BLOW TIME	0.000 to 262.128	1.000	D3036
019:			
020:LOAD HAND SIDE	CLOSE/OPEN	CLOSE	D3040
021:UNLOAD HAND SIDE	CLOSE/OPEN	CLOSE	D3042
022:LOAD HAND LOOSE CHECK TIME	0.000 to 262.128	0.400	D3044
023:LOAD HAND TIGHT CHECK TIME	0.000 to 262.128	0.400	D3046
024:UNL. HAND LOOSE CHECK TIME	0.000 to 262.128	0.400	D3048
025:UNL. HAND TIGHT CHECK TIME	0.000 to 262.128	0.400	D3050
026:			
027:			
028:			
029:			
030:TURN HAND [R] SIDE	CLOSE/OPEN	CLOSE	D3060
031:TURN HAND [R] TIG. CHECK TM	0.000 to 262.128	1.000	D3064
032:TURN HAND [R] LOO. CHECK TM	0.000 to 262.128	1.000	D3068
033:TURN HAND [L] SIDE	CLOSE/OPEN	CLOSE	D3062
034:TURN HAND [L] TIG. CHECK TM	0.000 to 262.128	1.000	D3066
035:TURN HAND [L] LOO. CHECK TM	0.000 to 262.128	1.000	D3070
036:			
037:			
038:			
039:			
040:NO WORK CHECK COUNT	0 to 32767	1	D3080
041:LOADING LIFTER DOWN TIME	0.000 to 262.128	0.200	D3082
042:UNLOADING LIFTER DOWN TIME	0.000 to 262.128	0.200	D3084
043:			
044:			
045:LOADING (CNVYR) WORK NUM.	0 to 99		#640

046:LOADING (CNVYR) WORK PITCH	0 to 999.999		#641
047:UNLOAD (CNVYR) WORK NUM.	0 to 99		#642
048:UNLOAD (CNVYR) WORK PITCH	0 to 999.999		#643
049:			
050:STOP METHOD WHEN COUNT UP	CYL. ST/OUT/NO USE	CYL. ST	D3100
051:STOP METHOD WHEN MC ALARM2	CYL. ST/OUT/NO USE	CYL. ST	D3102
052:STOP METHOD WHEN NO WORK	CYL. ST/OUT/WAIT/ NO USE	OUT	D3104
053:STOP METHOD WHEN FULL WORK	CYL. ST/OUT/WAIT/ NO USE	CYL. ST	D3106
054:AUTO POWER OFF WHEN ALARM	NO USE/USE	NO USE	D3108
055: PROCESSING PROGRAM No. [R]	0 to 7999	0	D3110
056: PROCESSING PROGRAM No. [L]	0 to 7999	0	D3112
057:			
058:			
059:			
060: CHUCK LOOSE [R] COMP. TIME	0.000 to 262.128	0.400	D3120
061: CHUCK TIGHT [R] COMP. TIME	0.000 to 262.128	0.400	D3122
062: CHUCK LOOSE [L] COMP. TIME	0.000 to 262.128	0.400	D3124
063: CHUCK TIGHT [R] COMP. TIME	0.000 to 262.128	0.400	D3126
064:INTER. CHIP CON. ON TIME	0.000 to 262.128	60.000	D3128
065:INTER. CHIP CON. OFF TIME	0.000 to 262.128	30.000	D3130
066:INTERMIT. CHIP CONVEYOR	NO USE/USE	NO USE	D3132
067: WASHER COOLANT TIME	0.000 to 262.128	10.000	D3134
068: WASHER AIR BLOW TIME	0.000 to 262.128	5.000	D3136
069:			
070:PMC RESERVE 01	0 to 32767		D3180
071:PMC RESERVE 02	0 to 32767		D3182
072:PMC RESERVE 03	0 to 32767		D3184
073:PMC RESERVE 04	0 to 32767		D3186
074:PMC RESERVE 05	0 to 32767		D3188
075:PMC RESERVE 06	0.000 to 262.128		D3190
076:PMC RESERVE 07	0.000 to 262.128		D3192
077:PMC RESERVE 08	0.000 to 262.128		D3194
078:PMC RESERVE 09	0.000 to 262.128		D3196
079:PMC RESERVE 10	0.000 to 262.128		D3198
080: CHUCK CONF. ENTRY COUNT [R]	0 to 32767	2	#600
081: CHUCK CONF. NG COUNT [R]	0 to 32767	2	#601
082: MEASURE NG COUNT [R]	0 to 32767	2	#602
083: CHUCK CONF. ENTRY COUNT [L]	0 to 32767	2	#603
084: CHUCK CONF. NG COUNT [L]	0 to 32767	2	#604
085: MEASURE NG COUNT [L]	0 to 32767	2	#605
086: QUALITY CHECK SETTING [R]	0 to 32767	0	#631
087: QUALITY CHECK SETTING [L] [PARALLEL]	0 to 32767	0	#633
088:			
089:			
090:TURNING DEVICE	NO USE/USE	USE	#610 D3140
091:EXTERNAL UNLOADING UNIT	NO USE/USE	NO USE	#611 D3142
092:MEASURING UNIT	NO USE/USE	NO USE	#612 D3144
093:ORIENTATION UNIT	NO USE/USE	NO USE	#613 D3146

094:UNLOADING 1TH	NO USE/USE	NO USE	#614 D3148
095:EXTERNAL LOADING UNIT	NO USE/USE	NO USE	#615 D3150
096: PROCESS ORDER	SERIES/PALALL/ OTHERS	SERIES	#616 D3152
097: WASHER	NO USE/USE	NO USE	#617 D3154
098: WORK RETURN OF QUAL.CHECK	NO USE/USE	NO USE	#618 D3156
099:			
100:MACRO RESERVE 01	0 to 32767	0	#620 D3160
101:MACRO RESERVE 02	0 to 32767	0	#621 D3162
102:MACRO RESERVE 03	0 to 32767	0	#622 D3164
103:MACRO RESERVE 04	0 to 32767	0	#623 D3166
104:MACRO RESERVE 05	0 to 32767	0	#624 D3168
105:MACRO RESERVE 06	0 to 32767	0	#625 D3170
106:MACRO RESERVE 07	0 to 32767	0	#626 D3172
107:MACRO RESERVE 08	0 to 32767	0	#627 D3174
108:MACRO RESERVE 09	0 to 32767	0	#628 D3176
109:MACRO RESERVE 10	0 to 32767	0	#629 D3178
110:			
111:			
112:			
113:			
114:			
115:			
116:			
117:			
118:			
119:			
120:MACRO RESERVE 11	±99999.999		#650
121:MACRO RESERVE 12	±99999.999		#651
122:MACRO RESERVE 13	±99999.999		#652
123:MACRO RESERVE 14	±99999.999		#653
124:MACRO RESERVE 15	±99999.999		#654
125:MACRO RESERVE 16	±99999.999		#655
126:MACRO RESERVE 17	±99999.999		#656
127:MACRO RESERVE 18	±99999.999		#657
128:MACRO RESERVE 19	±99999.999		#658
129:MACRO RESERVE 20	±99999.999		#659
130:MACRO RESERVE 21	±99999.999		#660
131:MACRO RESERVE 22	±99999.999		#661
132:MACRO RESERVE 23	±99999.999		#662
133:MACRO RESERVE 24	±99999.999		#663

134:MACRO RESERVE 25	±99999.999		#664
135:MACRO RESERVE 26	±99999.999		#665
136:MACRO RESERVE 27	±99999.999		#666
137:MACRO RESERVE 28	±99999.999		#667
138:MACRO RESERVE 29	±99999.999		#668
139:MACRO RESERVE 30	±99999.999		#669
140:MACRO RESERVE 31	±99999.999		#670
141:MACRO RESERVE 32	±99999.999		#671
142:MACRO RESERVE 33	±99999.999		#672
143:MACRO RESERVE 34	±99999.999		#673
144:MACRO RESERVE 35	±99999.999		#674
145:MACRO RESERVE 36	±99999.999		#675
146:MACRO RESERVE 37	±99999.999		#676
147:MACRO RESERVE 38	±99999.999		#677
148:MACRO RESERVE 39	±99999.999		#678
149:MACRO RESERVE 40	±99999.999		#679

3-6 System

Setting relating to RAKU RAKU LOADER, setting for character string, etc. are performed.

1 Loader operation setting

<i>Name</i>	<i>Meaning</i>
000: MACHINE TYPE (All the data will be initialized.)	[TT-32]: 3-axis loader, 2 spindle TT-2100/TT-2600 [T-32]: 3-axis loader, 1 spindle T-2600
001: Loader type (Setting of the position switch and name of teaching will be initialized.)	For setting type of loader "A/B/C/D" (Macro variable for the loader: #636)
002: LOADING DIRECTION (Name of teaching will be initialized.)	For setting workpiece loading direction Loader type: Type A Select "RIGHT". Loader type: Type B Select "LEFT". Loader type: Type C Select "RIGHT/LEFT". (Macro variable for the loader: #639)
006: Position switch check	In case of "Not performed" Input by the item on the teaching screen will not be limited by using the position switch. In case of "Performed" Input will be limited.
010: Loading unit TYPE	Select the loading unit. "Work feeder", "Conveyor 1", "Conveyor 2" (Macro variable for the loader: #637)
011: Unloading unit TYPE	Select the loading unit. "Work feeder", "Conveyor 1", "Conveyor 2" (Macro variable for the loader: #638)
014 : EDIT PERMISSION OF PROFRAM	In case of "ON" The loader program can be edited. In case of "OFF" The loader program cannot be edited. (Parameter No.3102#0=1)
015: NO.1 AXIS DIRECTION	For specifying the operating direction of the axis
016: NO.2 AXIS DIRECTION	For specifying the operating direction of the axis
017: NO.3 AXIS DIRECTION	For specifying the operating direction of the axis
020: NO.1 AXIS LOAD VALUE +/-	For specifying the loading code of the axis
021: NO.2 AXIS LOAD VALUE +/-	For specifying the loading code of the axis
022: NO.3 AXIS LOAD VALUE +/-	For specifying the loading code of the axis

025:INPUT OF MACRO VAR (#700-#999)	In case of "ON". The input of the macro variables is possible.
028: "PSW" CHECK INTERFERENCE	For checking the interference by the position switch. This can be performed only in the automatic operation.
029: OVERLAP OF FEED BLOCK	If M95 is specified to the block of G0 moving command, whether or not this block is overlapped is set.

2 Setting of teaching spares and character strings

01: TEACHING01	For registering name of 01th teaching point. Within 12 half-size characters
02: TEACHING02	For registering name of 02th teaching point. Within 12 half-size characters
03: TEACHING03	For registering name of 03th teaching point. Within 12 half-size characters
04: TEACHING04	For registering name of 04th teaching point. Within 12 half-size characters
05: TEACHING05	For registering name of 05th teaching point. Within 12 half-size characters
06: TEACHING06	For registering name of 06th teaching point. Within 12 half-size characters
07: TEACHING07	For registering name of 07th teaching point. Within 12 half-size characters
08: TEACHING08	For registering name of 08th teaching point. Within 12 half-size characters
09: TEACHING09	For registering name of 09th teaching point. Within 12 half-size characters
10: TEACHING10	For registering name of 10th teaching point. Within 12 half-size characters
11: TEACHING11	For registering name of 11th teaching point. Within 12 half-size characters
12: TEACHING12	For registering name of 12th teaching point. Within 12 half-size characters
13: TEACHING13	For registering name of 13th teaching point. Within 12 half-size characters
14: TEACHING14	For registering name of 14th teaching point. Within 12 half-size characters
15: TEACHING15	For registering name of 15th teaching point. Within 12 half-size characters
16: TEACHING16	For registering name of 16th teaching point. Within 12 half-size characters
17: TEACHING17	For registering name of 17th teaching point. Within 12 half-size characters
18: TEACHING18	For registering name of 18th teaching point. Within 12 half-size characters
19: TEACHING19	For registering name of 19th teaching point. Within 12 half-size characters
20: TEACHING20	For registering name of 20th teaching point. Within 12 half-size characters
21: TEACHING21	For registering name of 21st teaching point. Within 12 half-size characters
22: TEACHING22	For registering name of 22nd teaching point. Within 12 half-size characters

23: TEACHING23	For registering name of 23rd teaching point. Within 12 half-size characters
24: TEACHING24	For registering name of 24th teaching point. Within 12 half-size characters
25: TEACHING25	For registering name of 25th teaching point. Within 12 half-size characters

3 Operation setting of setting, PMC spares and character strings

70: PMC SIGNAL01	Operation setting 70: For registering name of PMC signal spare 01. Within 20 half-size characters
71: PMC SIGNAL02	Operation setting 71: For registering name of PMC signal spare 02. Within 20 half-size characters
72: PMC SIGNAL03	Operation setting 72: For registering name of PMC signal spare 03. Within 20 half-size characters
73: PMC SIGNAL04	Operation setting 73: For registering name of PMC signal spare 04. Within 20 half-size characters
74: PMC SIGNAL05	Operation setting 74: For registering name of PMC signal spare 05. Within 20 half-size characters
75: PMC SIGNAL06	Operation setting 75: For registering name of PMC signal spare 06. Within 20 half-size characters
76: PMC SIGNAL07	Operation setting 76: For registering name of PMC signal spare 07. Within 20 half-size characters
77: PMC SIGNAL08	Operation setting 77: For registering name of PMC signal spare 08. Within 20 half-size characters
78: PMC SIGNAL09	Operation setting 78: For registering name of PMC signal spare 09. Within 20 half-size characters
79: PMC SIGNAL10	Operation setting 79: For registering name of PMC signal spare 10. Within 20 half-size characters

4 Operation setting of setting, macro spares, character strings

100: MACRO VAL01	Operation setting 100: For registering name of macro variable spare 01. Within 20 half-size characters
101: MACRO VAL02	Operation setting 101: For registering name of macro variable spare 02. Within 20 half-size characters
102: MACRO VAL03	Operation setting 102: For registering name of macro variable spare 03. Within 20 half-size characters

103: MACRO VAL04	Operation setting 103: For registering name of macro variable spare 04. Within 20 half-size characters
104: MACRO VAL05	Operation setting 104: For registering name of macro variable spare 05. Within 20 half-size characters
105: MACRO VAL06	Operation setting 105: For registering name of macro variable spare 06. Within 20 half-size characters
106: MACRO VAL07	Operation setting 106: For registering name of macro variable spare 07. Within 20 half-size characters
107: MACRO VAL08	Operation setting 107: For registering name of macro variable spare 08. Within 20 half-size characters
108: MACRO VAL09	Operation setting 108: For registering name of macro variable spare 09. Within 20 half-size characters
109: MACRO VAL10	Operation setting 109: For registering name of macro variable spare 10. Within 20 half-size characters
120: MACRO VAL11	Operation setting 120: For registering name of macro variable spare 11. Within 20 half-size characters
121: MACRO VAL12	Operation setting 121: For registering name of macro variable spare 12. Within 20 half-size characters
122: MACRO VAL13	Operation setting 122: For registering name of macro variable spare 13. Within 20 half-size characters
123: MACRO VAL14	Operation setting 123: For registering name of macro variable spare 14. Within 20 half-size characters
124: MACRO VAL15	Operation setting 124: For registering name of macro variable spare 15. Within 20 half-size characters
125: MACRO VAL16	Operation setting 125: For registering name of macro variable spare 16. Within 20 half-size characters
126: MACRO VAL17	Operation setting 126: For registering name of macro variable spare 17. Within 20 half-size characters
127: MACRO VAL18	Operation setting 127: For registering name of macro variable spare 18. Within 20 half-size characters
128: MACRO VAL19	Operation setting 128: For registering name of macro variable spare 19. Within 20 half-size characters
129: MACRO VAL20	Operation setting 129: For registering name of macro variable spare 20. Within 20 half-size characters
130: MACRO VAL21	Operation setting 130: For registering name of macro variable spare 21. Within 20 half-size characters
131: MACRO VAL22	Operation setting 131: For registering name of macro variable spare 22. Within 20 half-size characters

132: MACRO VAL23	Operation setting 132: For registering name of macro variable spare 23. Within 20 half-size characters
133: MACRO VAL24	Operation setting 133: For registering name of macro variable spare 24. Within 20 half-size characters
134: MACRO VAL25	Operation setting 134: For registering name of macro variable spare 25. Within 20 half-size characters
135: MACRO VAL26	Operation setting 135: For registering name of macro variable spare 26. Within 20 half-size characters
136: MACRO VAL27	Operation setting 136: For registering name of macro variable spare 27. Within 20 half-size characters
137: MACRO VAL28	Operation setting 137: For registering name of macro variable spare 28. Within 20 half-size characters
138: MACRO VAL29	Operation setting 138: For registering name of macro variable spare 29. Within 20 half-size characters
139: MACRO VAL30	Operation setting 139: For registering name of macro variable spare 30. Within 20 half-size characters
140: MACRO VAL31	Operation setting 140: For registering name of macro variable spare 31. Within 20 half-size characters
141: MACRO VAL32	Operation setting 141: For registering name of macro variable spare 32. Within 20 half-size characters
142: MACRO VAL33	Operation setting 142: For registering name of macro variable spare 33. Within 20 half-size characters
143: MACRO VAL34	Operation setting 143: For registering name of macro variable spare 34. Within 20 half-size characters
144: MACRO VAL35	Operation setting 144: For registering name of macro variable spare 35. Within 20 half-size characters
145: MACRO VAL36	Operation setting 145: For registering name of macro variable spare 36. Within 20 half-size characters
146: MACRO VAL37	Operation setting 146: For registering name of macro variable spare 37. Within 20 half-size characters
147: MACRO VAL38	Operation setting 147: For registering name of macro variable spare 38. Within 20 half-size characters
148: MACRO VAL39	Operation setting 148: For registering name of macro variable spare 39. Within 20 half-size characters
149: MACRO VAL40	Operation setting 149: For registering name of macro variable spare 40. Within 20 half-size characters

5 Setting position switch

Position switch No. can be set.

Note)

When you want to change the number of the position switch, please be careful.

There is a case to be alarm.

For detail, refer to "3-1 Teaching 2 position switch."

The coordinate value of the position switch can be set from the screen.

6 Setting offset axis for copying workpiece

Which axis of the spare teaching point, should the workpiece offset value applied to will be set when setting the workpiece offset and copy it, considering the difference of the workpiece length.

TEACHING00	For specifying the axis to offset the difference of the workpiece length. Without this, the offset will not be performed.
~	
TEACHING25	

3-7 Guide

There are useful functions including the loader starting condition, alarm display, M-code list, etc.

1 Guide screen

Information of alarm, caution check information, automatic power supply shut-off information and processed parts information are displayed.

In addition to the above, each screen can be displayed by using the soft key.

7 Loader starting condition

Starting condition for interlocking operation is displayed.

Since the detailed starting condition for each loader and machine is displayed, the cause by which the machine cannot be started can be checked at one view.

Loader

<i>Starting condition</i>	Countermeasure when the starting condition is faulty
INTERLOCK PREPARATION	The machine is not ready yet. Check the starting condition of the machine.
LOADING DEVICE	The loading unit is not ready yet.
UNLOADING DEVICE	The unloading unit is not ready yet.
TURNING DEVICE	The reverse rotation unit is not ready yet. Either return to the original position or press the repeat cycle button.
MESURING DEVICE	Return it to the original position.
NO WORK	Load workpieces, and press the alarm reset key.
FULL WORK	Remove the workpiece and press the alarm reset key.
LOADER POSITION	Either return to the original position or press the repeat cycle button.
Hand return	Recover it.
Loading hand	Either remove the workpiece or press the repeat cycle button.
Unloading hand	Either remove the workpiece or press the repeat cycle button.
Safety cover interlock	Set the interlock key switch to the effective side.
LOADER IS RUNNING	Stop the operation.
ALARM · WARNING	Remove the cause and press the alarm reset key.
RESET · EMERGENCY STOP	Remove the cause.
Program reset & rewind	The program cursor is not at the first end. Press the program reset key.
RAKURAKU LOADER WORK No.	Workpiece is not selected by RAKU RAKU LOADER. Select a workpiece.

Machine

Starting condition	Countermeasure when the starting condition is faulty
X·Z·TURRET ORIGIN POSITION	Return the -axis and Z-axis to the original position. A specified position of the turret is registered.
MACHINE IS RUNNING	Stop the operation.
ALARM	Remove the cause, and press the alarm reset key.
Safety door	Close the safety door.
Count up	Reset the counter.
CHUCK CONFIRMATION	Remove the cause, and press the alarm reset key.
Message	Press the alarm reset key.
Tool setter	Check the tool setter. Return to the original position.
Chuck	Either remove the workpiece or press the repeat cycle button.
Door interlock	Make the door interlock to be effective.
PROGRAM NO.	Check the processing program No. Check the setting of the RAKU RAKU LOADER.
Program reset & rewind	The program cursor is not at the first end. Press the program reset key.
Chip conveyor	Set the chip conveyor in the automatic mode.
Tail stock	Check the tailstock. Return to the original position.
Parts catcher	Check the parts catcher. Return to the original position.
ETC	Check other auxiliary equipment.

8 Alarm display

Alarm or message currently given is displayed.
Alarm history or operator message history is also displayed.

9 M code list

M-code lists of the machine and loader are displayed.

10 Signal tower setting

Displaying signal towers of the loader and signal tower can be set.

11 Manual operation condition

The manual operation condition is displayed.
The detailed operation condition is displayed so that the causes by which the machine cannot be started can be checked at one view.

12 Machine operation panel

The operation buttons or lamps are displayed.

The buttons or lamps displayed could differ depending on the type of the machine.

13 Tool offset screen

Display or setting of the tool offset (in the shape and wear condition) can be displayed.

The cursor position can be enlarged for display.

The screen is divided into right side and left side to prevent wrong entering of offset values

14 Workpiece coordinate system shift screen

Display of the workpiece coordinate system shift is divided into the left side and right side to prevent wrong entering of workpiece coordinate system shift.