SECTION 1 OPERATION

1. Basic Construction of Operation Panels

Operation panels consist of the following four types of panels and switches.

(1) NC Operation Panel

The NC operation panel is used for operating the machine in other than manual mode operation.

It is used for operations such as file operation and data setting.

(2) Machine Operation Panel

Switches and keys mainly used for manual operation are arranged on the machine operation panel.

(3) Option Panel

An option panel is provided when switches and indicating lamps are additionally used according to the selection of an optional specification. Arrangement of the switches and indicating lamps differ depending on the selected optional specification.

(4) Manual Tool Change Operation Panel

The manual tool change operation panel is provided to change tools manually.

Arrangement of the switches and indicating lamps differ depending on the machine models.

(5) Manual Magazine Operation Panel

The manual magazine operation panel is provided to operate the magazine manually.

Arrangement of the switches and indicating lamps differ depending on the machine models.

(6) Parallel Type 2-Pallet APC Operation Panel

The APC operation panel is provided to control the APC manually.

Arrangement of the switches and indicating lamps differ depending on the machine models.

(7) AAC Operation Panel

The AAC operation panel is provided to change attachments manually.

(8) Manual Attachment Tool Change Operation Panel

The manual attachment tool change operation panel is provided to change attachment tools manually.

There are various types of operation panels according to the shape of the panel and the arrangement of the control on it. External views of the operation panels are provided in Appendix in this manual.

2. Outline of Controls on Operation Panel

2-1. Operation Mode Selection Keys

(1) AUTO Key

Select the automatic mode to operate the machine using part programs stored in the memory disk (MD). For the execution of a part program, it is read out to the IC memory from the memory disk.

(2) MDI Key

Select the MDI mode to operate the machine using a program, input from the keyboard, in the same manner as in the automatic mode. In the MDI, mode a program is input and executed in units blocks.

(3) MANUAL Key

Select the manual mode to operate the machine using the manual operation switches provided in the machine operation panel, the pulse handle operation box. and other operation panels.

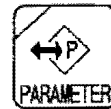## 2-2. Data Setting Mode Selection Keys

(1) EDIT AUX Key

Select the EDIT AUX (program operation) mode to read, edit, punch, or print a part program, to operate the tape reader, or to manage files.
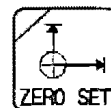
(2) PARAMETER Key

Select the parameter mode to set the parameters (system parameters, user parameters, common variables, NC optional parameters, machine system parameters, machine user parameters, etc.)
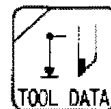
(3) ZERO SET Key

Select the zero set mode to set the zero offset data.

(4) TOOL DATA

Select the tool data set mode to set the tool length offset data, tool diameter compensation data, ATC related tool data, tool management data, etc.

(5) MacMan

Press the [MacMan] key to use the MacMan (machining management function).

2-3.   NC Status Indicating lamps

(1)   RUN Lamp

The RUN indicating lamp are lit while the NC is processing data.

R U N

(2)   S.T.M Lamp

The S.T.M. indicating lamp are lit while an S (spindle), T (tool), or M (miscellaneous) command is executed.

S . T . M

(3)   SLIDE HOLD Lamp

The SLIDE HOLD indicating lamp lights when the [SLIDE HOLD] button on the machine operation panel is pressed.

SLIDE
HOLD

(4)   PROGRAM STOP Lamp

The PROGRAM STOP indicating lamp is lit while the operation is suspended in the program stop or optional stop state.

The indicating lamp blinks while a dwell function is executed.

PROGRAM
STOP

(5)   LIMIT Lamp

The LIMIT indicating lamp is lit if an axis is at the variable limit position.

L I M I T

(6)   ALARM Lamp

The ALARM indicating lamp lights at the occurrence of an alarm.

The lamp does not light if a warning message is displayed on the screen for operator's errors.

A L A R M

2-4. Other Controls on NC Operation Panel

(1) Function Keys: F1 to F8

When an operator selects a desired operation mode, the screen displays the necessary operation functions at the bottom line. Each function corresponds to a function key (F1 through F8). Select the function to execute and press the corresponding function key.

The functions assigned to the function keys change according to the currently valid mode as the operation progresses.

F1   F2   F3   F4   F5   F6   F7   F8

(2) ? (Help) Key

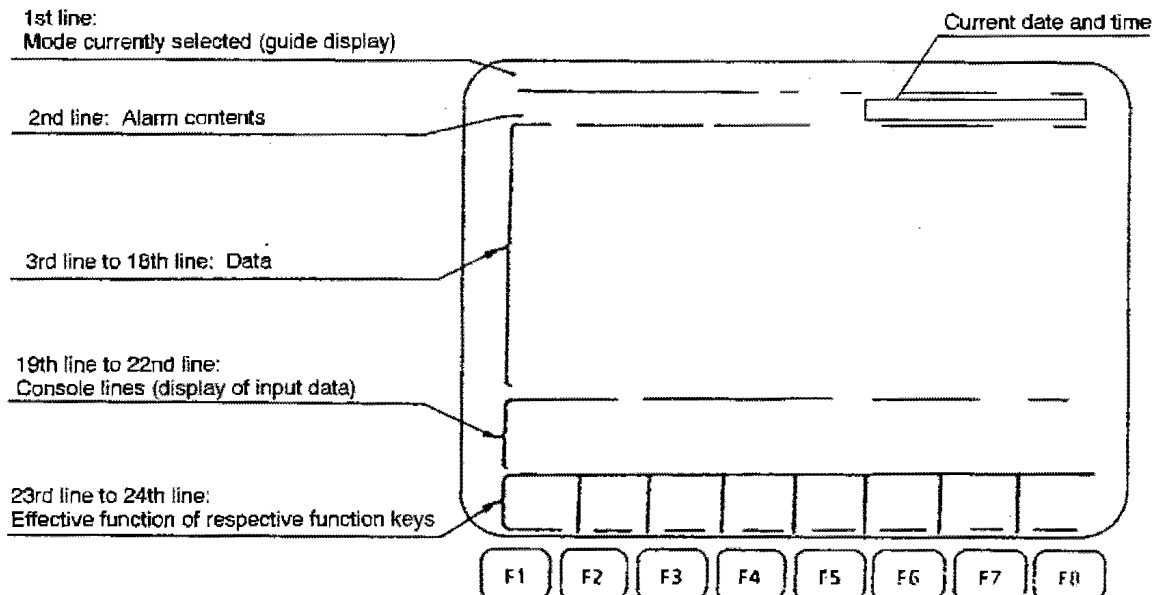This key, called the help key, is provided to the left side of function key [F1].

The key is used to display the description of the alarm which occurred during machine operation and also the alarm history.

(3) Display Screen

The display screen has the information display area of 64 characters x 24 lines.

It shows actual position data, part program data, block data, zero offset values, tool offset values, parameter data, alarm description, etc.

The basic format of display on the screen is shown below.

1st line:
Mode currently selected (guide display)   Current date and time

2nd line: Alarm contents

3rd line to 18th line: Data

19th line to 22nd line:
Console lines (display of input data)

23rd line to 24th line:
Effective function of respective function keys

F1   F2   F3   F4   F5   F6   F7   F8

(4) WRITE Key

Press the [WRITE] key to select an operation and also to confirm the input data.

WRITE

(5) BS (Backspace) Key

Press the [BS] key when erroneous data has been input. Each time this key is pressed, the character input last is erased.

For the display of file index and list, this key is used to display the next page.
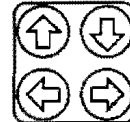
(6) CAN Key

Press the [CAN] key when erroneous data has been input. Each time this key is pressed, one line of the data is erased.

(7) Cursor Keys

Four cursor keys are used to move the cursor displayed on the screen.

(8) Page keys

If the information called out is displayed in more than one page, the page keys are used to change the display page.

(9) Operator Keys

These keys are used when an operator is used for program editing or for entering more than one piece of data with an operator in data setting operation.
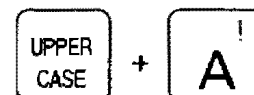
(10) Character Keys

Character keys are used for inputting a character for data input, program operation, and file edit operation.

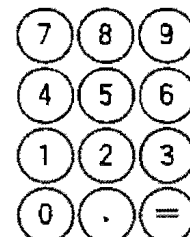(a) To input a character shown at the upper right corner of a key top, use the [UPPER CASE] key.

(b) In the state the [CAPS LOCK] key is pressed (indicating lamp at the upper left corner lit), upper case alphabetic letters A to Z are input. When the [CAPS LOCK] key is not pressed, lower case alphabetic letters a to z are input.

(11) Ten Keys

Character keys are used for inputting a number for data input, program operation, and file edit operation.

(12) Contrast Adjusting Keys
(only for Operation Panel with Monochrome STN Screen)

These keys are used to adjust the contrast for the display.
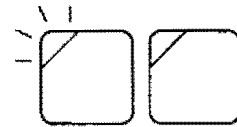
2-5. Controls on Machine Operation Panel

Flat keys used on the machine operation panel have features as indicated below depending on whether or not an indicating lamp is provided in it.

< Flat keys with an indicating lamp >

The indicating lamp in a key indicates if the function of the key is valid or not.

- Indicating lamp lit . . . . Key function is valid.

- Indicating lamp unlit . . . . Key function is invalid.

< Flat keys without an indicating lamp >

The function of the key is valid only while the key is held down. In the state the key is not pressed, the function is invalid.

(1) CONTROL ON Switch

The [CONTROL ON] switch is used to turn on the control power of the NC unit after turning on the main switch of the machine.

The pilot lamp in this switch lights when the control power is turned on.

If the [EMERGENCY STOP] button is pressed, the pilot lamp in this switch goes off. To restore from the emergency stop state, press the [CONTROL ON] switch.

(2) CONTROL OFF Switch

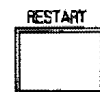The [CONTROL OFF] switch is used to turn off the control power of the NC unit.

When shutting off the power, turn off the control power first by pressing the [CONTROL OFF] switch before turning off the main switch of the machine.

(3) RESTART Key

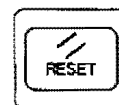The interlock function interrupts program execution if the door is opened during automatic operation.

To restart the interrupted program, press the [RESTART] key. Then, press the [CYCLE START] button.

(4) RESET Key

The NC unit is reset when the [RESET] key is pressed.

The key is used to recover the operation from such as an alarm state.

(5) NC PANEL Switch

NC PANEL
EDIT
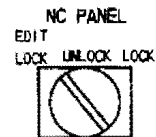LOCK UNLOCK LOCK

   (a) UNLOCK position

All controls on both the NC and machine operation panels are enabled.

   (b) EDIT LOCK position

Operations in the program operation (EDIT AUX) mode and parameter setting mode are disabled.
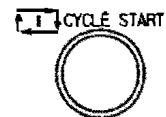
   (c) LOCK position

All controls on the NC operation panel are disabled.

(6) CYCLE START Button

CYCLE START

The [CYCLE START] button is used to start the machine operation according to the contents of the commands.

The CYCLE START signal is output when the button is released after it is pressed.

(7) SLIDE HOLD Button

SLIDE HOLD

Axis movements of X-, Y-, and Z-axis stop immediately when the [SLIDE HOLD] button is pressed. To resume axis movements, press the [CYCLE START] button.

If this button is pressed while an axis is not moving, the slide hold becomes valid after the completion of the sequence having been executed at the time the [SLIDE HOLD] button was pressed or when the next axis movement is going to be executed.
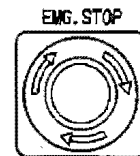
(8) EMG. STOP Button

EMG. STOP

Press the [EMG. STOP] button when an emergency state takes place.

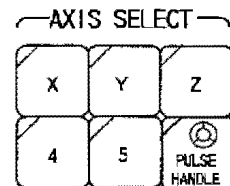Power supply to the NC is shut off when the [EMG. STOP] button is pressed.

To release the emergency stop state, unlock the [EMG. STOP] button and press the [CONTROL ON] button.

(9) AXIS SELECT Buttons

AXIS SELECT

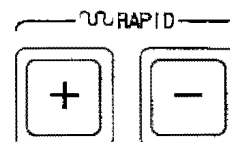| X | Y | Z |
| 4 | 5 | PULSE HANDLE |

These buttons are used to select the axis to be moved manually (rapid feed, cutting feed).

To move an axis by the pulse handle, select PULSE HANDLE.
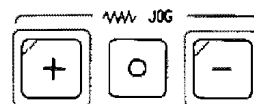
(10) RAPID Buttons

RAPID

| + | − |

The [RAPID] buttons are used to move an axis manually at a rapid traverse rate. The selected axis moves at a rapid traverse rate only while a [RAPID] button is held pressed.

[Supplement] Rapid traverse rate differs depending on machine model and specifications.

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SECTION 1 OPERATION

(11) JOG Buttons

The [JOG] buttons are used to move an axis manually at a cutting feedrate. The selected axis starts moving when a [JOG] button is pressed and it keeps moving even after the button is released. It stops moving when the OFF [O] button is pressed.

[Supplement]   Cutting feedrates differ depending on machine model and specifications.

(12) SPINDLE STOP Button

Use the [SPINDLE STOP] button to stop the spindle manually.

(13) SPINDLE CW Button

Used to start the spindle in the forward (CW) direction.

(14) SPINDLE CCW Button

Used to start the spindle in the reverse (CCW) direction.

(15) SPINDLE ORIENTATION Button

Press the [SPINDLE ORIENTATION] button while holding the [INTERLOCK RELEASE] button to stop the spindle at a predetermined angular position.
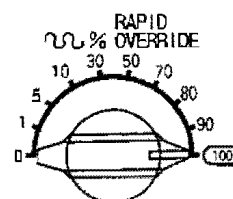
(16) SPINDLE RELEASE Button

Press the [SPINDLE RELEASE] button to set the spindle in the neutral state.

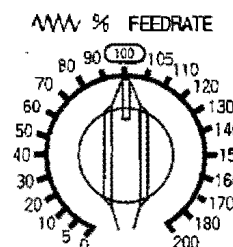[Supplement]   Spindle speeds differ depending on machine model and specifications.

(17) RAPID OVERRIDE Dial

The [RAPID OVERRIDE] dial sets the desired rapid feedrate in "%" in terms of the preset rapid feedrate.
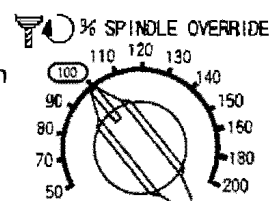
(18) FEEDRATE Override Dial

The [FEEDRATE] dial sets the desired feedrate in "%" in terms of the specified feedrate.
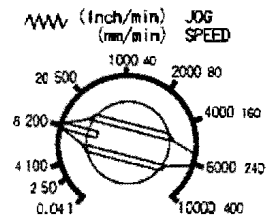
(19) SPINDLE OVERRIDE Dial

The [SPINDLE OVERRIDE] dial sets the desired spindle speed in "%" in terms of the specified spindle speed.

(20) JOG SPEED Dial

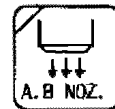The [JOG SPEED] dial sets jog feedrate (manual cutting feedrate).

(21) COOLANT Key

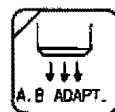The [COOLANT] key is used to turn on manual coolant supply.

(22) A.B NOZ. Key

The [A.B NOZ.] key is used to turn on air blow through the nozzle.

(23) A.B ADAPT. Key

The [A.B ADAPT.] key is used to turn on air blow through the adapter.

(24) OIL MIST Key

The [OIL MIST] key is used to turn on oil mist.

(25) OIL HOLE Key

The [OIL HOLE] key is used to turn on oil hole coolant supply.

(26) OIL HOLE HIGH Key

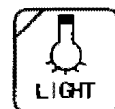The [OIL HOLE HIGH] key is used to turn on high-pressure oil hole coolant supply.

(27) SHOWER Key

The [SHOWER] key is used to turn on shower coolant supply.
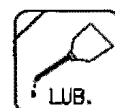
(28) LIGHT Key

The [LIGHT] key is used to turn on the machine light.

(29) LUB. Key

The [LUB.] key is used to supply lubricating oil to the slideway surfaces.

(30) ◀◀ CHIP CON. Key

The [◀◀ CHIP CON.] key is used to operate the chip conveyor in the reverse direction; the chip conveyor operates only while the [◀◀ CHIP CON.] key is held.
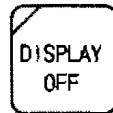
(31) ➡ CHIP CON. Key

The [➡ CHIP CON.] key is used to operate the chip conveyor in the forward direction; the chip conveyor operates only while the [➡ CHIP CON.] key is held.
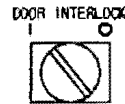
(32) DISPLAY OFF Key

To turn off the display, set this key valid (indicating lamp at the upper left corner of the key lit).

(33) DOOR INTERLOCK – ON/OFF Switch

The switch is used to select whether or not the door interlock function is made valid for operations on which the interlock is set in the state the door is open.
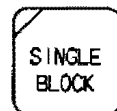
For details of the door interlock function, refer to the Door Interlock Function Manual.

2-6.   Mode Selection Keys

To operate the machine using a program, a variety of operation modes are provided.

(1) SINGLE BLOCK Key

(a) When the [SINGLE BLOCK] key is valid (indicating lamp at the upper left corner lit), a program is executed in units of blocks. To execute the next block, press the [CYCLE START] button.

(b) When the [SINGLE BLOCK] key is invalid (indicating lamp at the upper left corner unlit), program blocks are executed continuously.

(2) BLOCK SKIP Key

(a) When the [BLOCK SKIP] key is valid (indicating lamp at the upper left corner lit), commands between a slash (/) code and "ER" code are ignored.

[Supplement]   A slash code (/) must be placed at the start of a program block or immediately after the sequence number (or sequence name) of a block.

(b) When the [BLOCK SKIP] key is invalid (indicating lamp at the upper left corner unlit), commands entered following a slash code (/) are executed.

(3) PROGRAM BRANCH Key

(a) When the [PROGRAM BRANCH] key is valid (indicating lamp at the upper left corner of the key lit), a program branch instruction in a part program is executed.

(b) When the [PROGRAM BRANCH] key is invalid (indicating lamp at the upper left corner of the key unlit), a program branch instruction in a part program is not executed.

(4)　OPTIONAL STOP Key

　　(a)　When the [OPTIONAL STOP] key is valid (indicating lamp at the upper left corner lit), operation stops after the execution of an M01 block in a program.
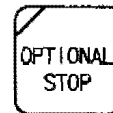
　　　　When the [CYCLE START] button is pressed, the previous state is recovered and the program is continuously executed.

　　(b)　When the [OPTIONAL STOP] key is invalid (indicating lamp at the upper left corner unlit), program is continuously executed even after the execution of an M01 block.

(5)　CYCLE STOP Key

　　(a)　While in the execution of a schedule program, execution of a program stops after the completion of a main program when the [CYCLE STOP] key is valid (indicating lamp at the upper left area of the key is lit).

　　(b)　While in the execution of a schedule program, execution of a program does not stop after the completion of a main program and the program is executed continuously when the [CYCLE STOP] key is invalid (indicating lamp at the upper left area of the key is unlit).

(6)　AXIS COM. CANCEL Key

　　The command of the specified axis is not executed if the [AXIS COM. CANCEL] key is invalid (indicating lamp at the upper left corner unlit).

(7)　S.T.M LOCK Key

　　When the [S.T.M LOCK] key is valid (indicating lamp at the upper left corner lit), only axis movement commands are executed and no miscellaneous operations are not executed.

(8)　DRY RUN Key

　　(a)　If the [DRY RUN] key is valid (indicating lamp at the upper left corner lit), feed commands specified in the cutting feed mode (G01, G02, G03, etc.) in a program are executed at the feedrate set by the [JOG SPEED] dial and feedrates specified in the program are all disregarded.

　　(b)　If the [DRY RUN] key is invalid (indicating lamp at the upper left corner unlit), feed commands specified in a program are executed at the feedrate specified in the program.

[Supplement]　To change the dry run mode valid or invalid state, it is necessary to press the [DRY RUN] key while holding down the [INTERLOCK RELEASE] key.

(9) .MACHINE LOCK Key

MACHINE
LOCK

(a) When the [MACHINE LOCK] key is valid (indicating lamp at the upper left corner lit), all commands in a part program are executed without actual machine operation.

However, the actual position data and block data display are updated as the program is executed. The display of such data returns to the previous state when the NC is reset.

(b) When the [MACHINE LOCK] key is invalid (indicating lamp at the upper left corner unlit), all commands in a part program are executed normally.

[Supplement]   To change the machine lock mode valid/invalid state, it is necessary to press the [MACHINE LOCK] key while holding down the [INTERLOCK RELEASE] key.

(10) MIRROR IMAGE Keys

MIRROR
IMAGE
X

MIRROR
IMAGE
Y

MIRROR
IMAGE
Z

MIRROR
IMAGE
4

(a) With the axis for which the mirror image function is valid (indicating lamp at the upper left corner lit), the sign of the coordinate value data is reversed.

(b) With the axis for which the mirror image function is invalid (indicating lamp at the upper left corner unlit), the sign of the coordinate value data is not reversed.

[Supplement]   To change the valid or invalid state of the mirror image function, it is necessary to press the [MIRROR IMAGE] key while holding down the [INTERLOCK RELEASE] key.

(11) INTERLOCK RELEASE Key

INTER
LOCK
RELEASE

To change the valid/invalid state of the dry run mode, machine lock mode and mirror image operation mode, it is necessary to press the [INTERLOCK RELEASE] key at the same time the corresponding mode key is pressed.

This key is also used to start a part program from a selected block.

Although the key has the indicating lamp at the upper left corner, the key is valid only while it is pressed.

(12) SEQUENCE RESTART Key

SEQUENCE
RESTART

The [SEQUENCE RESTART] key is used to restart a part program from a desired block.

In the mid. auto manual operation mode, this key is used to return the axes to the position where automatic operation has been interrupted to perform manual operation.

(13) MID. AUTO MANUAL Key

MID.
AUTO
MANUAL

To perform manual operation during automatic or MDI mode operation, press the [MID. AUTO MANUAL] key.

(14) PULSE HANDLE SHIFT Key

The [PULSE HANDLE SHIFT] key is used to add axis movements
operated by turning the pulse handle to the operation executed according
to the commands in the program.