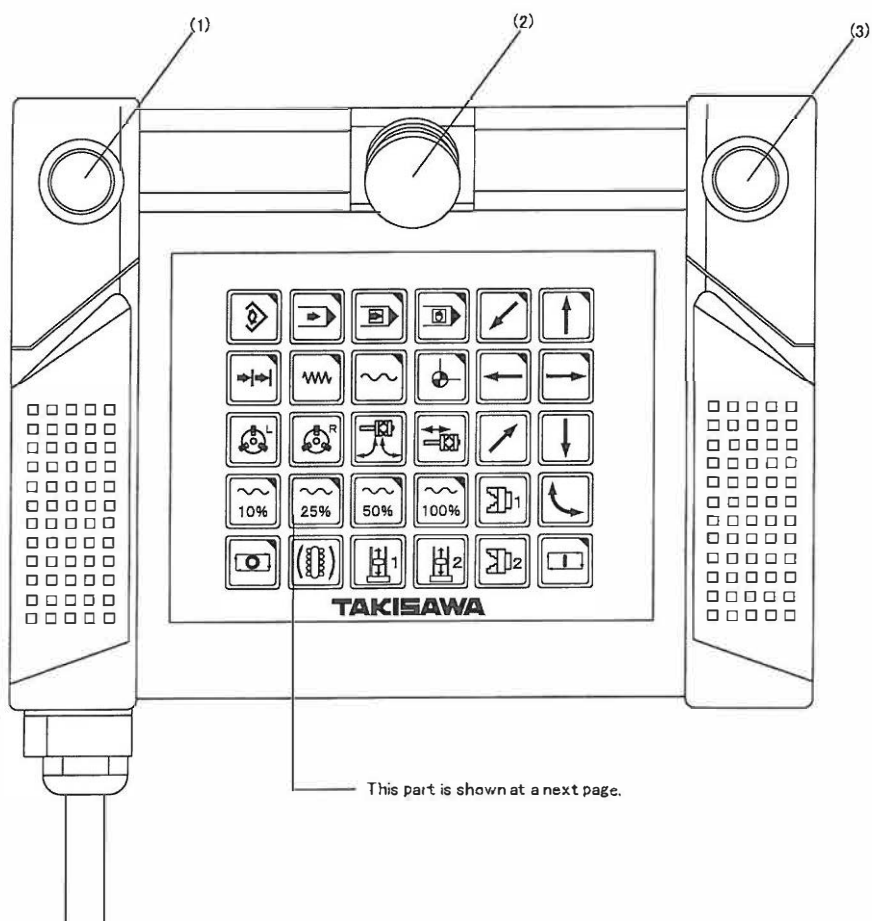
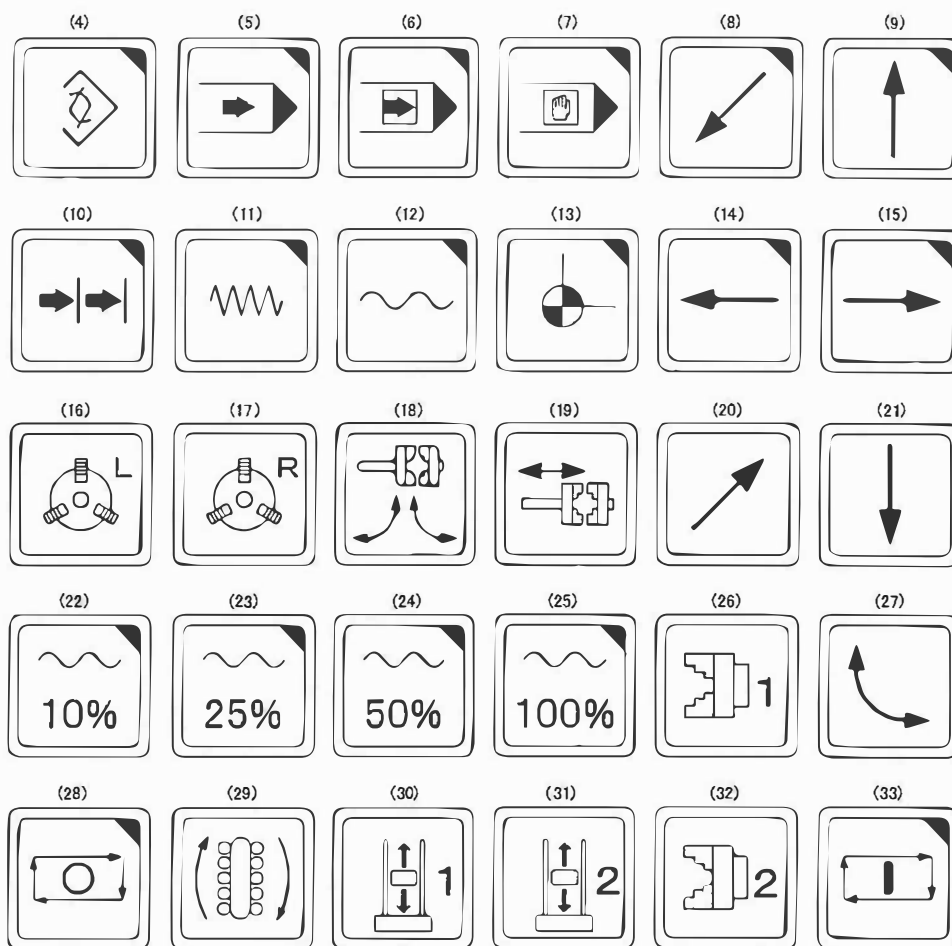


# 1 OPERATION PANEL

---

## 1-1 Loader pendant





Note: (1) When each mode is selected, the upper right corner of switch lamp lights.

(2) While the each axis is returning to reference position, the upper right corner of each axis feed switch lamp lights.

## 1-2 Operation of loader pendant

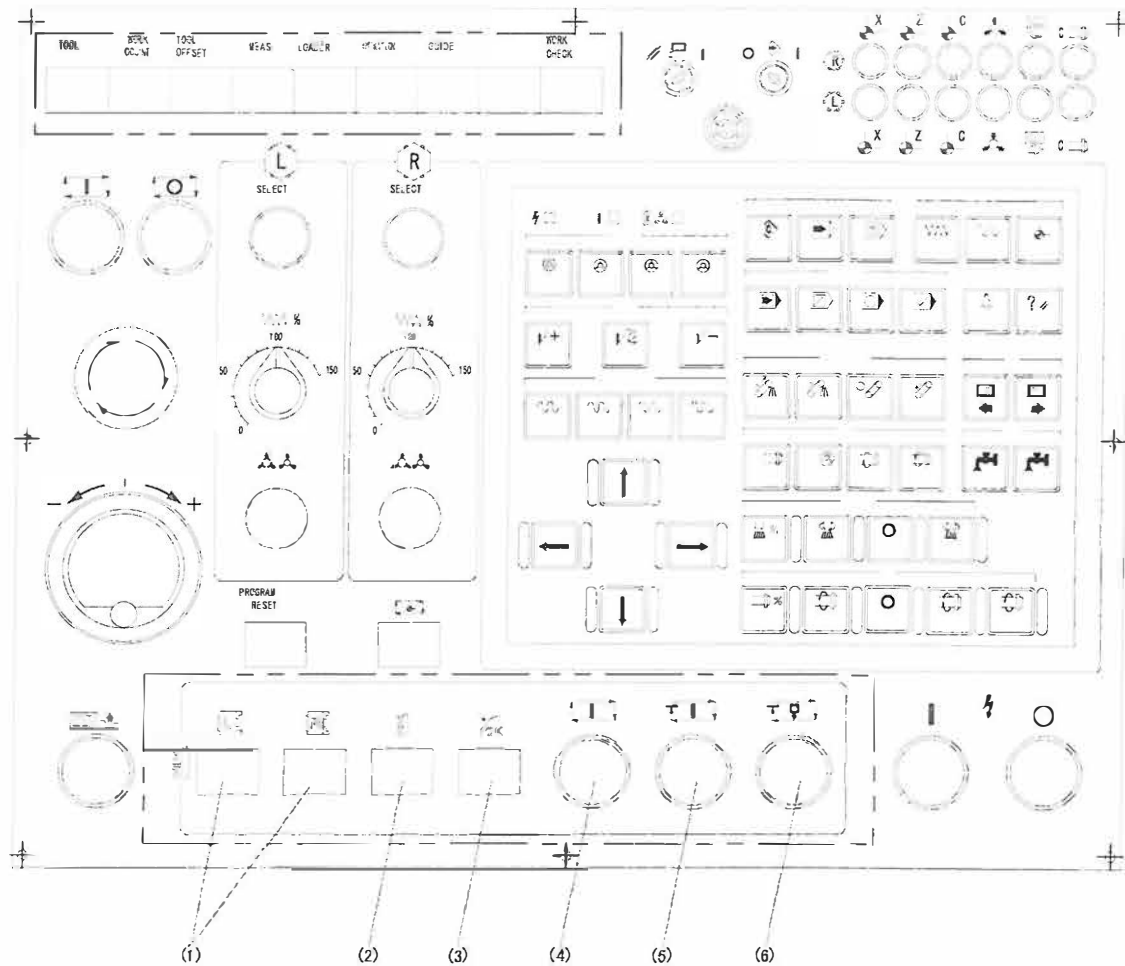
|      | Name                                            | Description                                                                                                                              |
|------|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| (1)  | Shift switch                                    | When operating equipment manually, another switch is pressed, pressing this switch.                                                      |
| (2)  | Emergency stop switch                           | Both loader and machine stop immediately in emergency state.                                                                             |
| (3)  | Shift switch                                    | When operating equipment manually, another switch is pressed, pressing this switch.                                                      |
| (4)  | Edit mode select switch                         | Set the loader mode to edit.                                                                                                             |
| (5)  | Memory mode select switch                       | Set the loader mode to memory.                                                                                                           |
| (6)  | Single block mode select switch                 | Set the loader mode to single block.                                                                                                     |
| (7)  | MDI mode select switch                          | Set the loader mode to MDI.                                                                                                              |
| (8)  | Loader axis ↙ direction shift switch (ZG-axis)  | When this switch is pressed under manual mode with [Shift switch] ((1) or (3)) still pressed, the loader axis is shifted in ↙ direction. |
| (9)  | Loader axis ↑ direction shift switch (YG-axis)  | When this switch is pressed under manual mode with [Shift switch] ((1) or (3)) still pressed, the loader axis is shifted in ↑ direction. |
| (10) | Step mode select switch (Manual mode)           | Set the loader mode to step.                                                                                                             |
| (11) | Jog feed mode select switch (Manual mode)       | Set the loader mode to jog feed.                                                                                                         |
| (12) | Rapid traverse mode select switch (Manual mode) | Set the loader mode to rapid traverse.                                                                                                   |
| (13) | Reference position return mode select switch    | Set the loader mode to reference position return.                                                                                        |
| (14) | Loader axis ← direction shift switch (XG-axis)  | When this switch is pressed under manual mode with [Shift switch] ((1) or (3)) still pressed, the loader axis is shifted in ← direction. |

|      | Name                                           | Description                                                                                                                                                 |
|------|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (15) | Loader axis → direction shift switch (XG-axis) | When this switch is pressed under manual mode with [Shift switch] ((1) or (3)) still pressed, the loader axis is shifted in → direction.                    |
| (16) | Turn over hand L OPEN/CLOSE switch             | As often as switch is pressed under manual mode, turn over hand L is opened/closed.                                                                         |
| (17) | Turn over hand R OPEN/CLOSE switch             | As often as switch is pressed under manual mode, turn over hand R is opened/closed.                                                                         |
| (18) | Turn over hand SWING/RETURN switch             | When this switch is pressed under manual mode with [Shift switch] ((1) or (3)) still pressed, the turn over hand is swing/returned as often as pressed.     |
| (19) | Turn over hand FORWARD/REVERSE switch          | When this switch is pressed under manual mode with [Shift switch] ((1) or (3)) still pressed, the turn over hand is forwarded/reversed as often as pressed. |
| (20) | Loader axis ↗ direction shift switch (ZG-axis) | When this switch is pressed under manual mode with [Shift switch] ((1) or (3)) still pressed, the loader axis is shifted in ↗ direction.                    |
| (21) | Loader axis ↓ direction shift switch (YG-axis) | When this switch is pressed under manual mode with [Shift switch] ((1) or (3)) still pressed, the loader axis is shifted in ↓ direction.                    |
| (22) | Rapid traverse override select switch (10%)    | The override value of loader is set to 10%.                                                                                                                 |
| (23) | Rapid traverse override select switch (25%)    | The override value of loader is set to 25%.                                                                                                                 |
| (24) | Rapid traverse override select switch (50%)    | The override value of loader is set to 50%.                                                                                                                 |
| (25) | Rapid traverse override select switch (100%)   | The override value of loader is set to 100%.                                                                                                                |
| (26) | Loader hand 1 OPEN/CLOSE switch                | As often as switch is pressed under manual mode, loader hand 1 (loading side) is opened/closed.                                                             |
| (27) | Loading hand SWING/RETURN switch               | When this switch is pressed under manual mode with [Shift switch] ((1) or (3)) still pressed, the loader hand is swing/returned.                            |

|      | Name                             | Description                                                                                                                                                                                                           |
|------|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (28) | Feed hold switch                 | Automatic operation is held.                                                                                                                                                                                          |
| (29) | Workpiece feeder rotary switch   | When this switch is pressed under manual mode with [Shift switch] (1) still pressed, the workpiece feeder rotates counterclockwise and with [Shift switch] (3) still pressed, the workpiece feeder rotates clockwise. |
| (30) | Loader lifter UP/DOWN switch     | When this switch is pressed under manual mode, the loading lifter raises. When this switch is pressed with [Shift switch] ((1) or (3)) still pressed, the lifter lowers.                                              |
| (31) | Unloading lifter UP/DOWN switch  | When this switch is pressed under manual mode, the unloading lifter raises. When this switch is pressed with [Shift switch] ((1) or (3)) still pressed, the lifter lowers.                                            |
| (32) | Loader hand 2 OPEN/CLOSE switch  | As often as switch is pressed under manual mode, loader hand 2 (unloading side) is opened/closed.                                                                                                                     |
| (33) | Automatic operation start switch | Automatic operation starts.                                                                                                                                                                                           |

Note: For D type, the side, which is selected with [Right side operation select switch] or [Left side operation select switch] of the machine, operates. Be sure to check which switch is selected before operating.

## 1-3 Sub operation panel

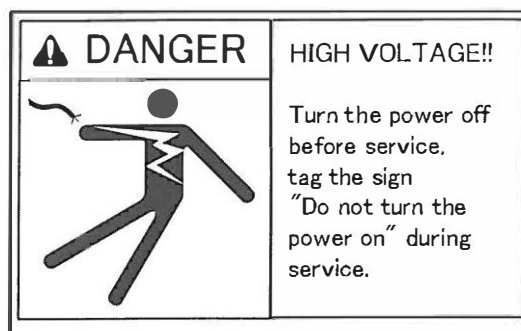


- (1) Machine interlock preparation switch
- (2) Loader interlock preparation switch
- (3) Repeat cycle switch
- (4) Cycle start switch
- (5) Discharge cycle switch
- (6) 1-cycle stop switch

## 2 POWER ON/OPERATION READY

### DANGER

- \* **Close the door on the enclosure before turning on power source.**
- \* **Turn off the power before performing the inspection maintenance.**
- \* **There is a danger of being killed by an electric shock.**

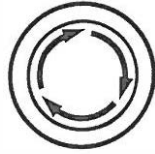


### CAUTION

- \* Inspect the machine according to [DAILY CHECK] in the machine instruction manual before turning on the power and after operation ready.

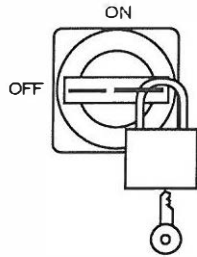
The following procedure is recommended for performing operation ready.

### 1. Release of emergency stop



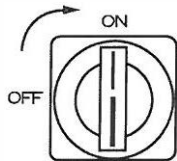
Turn [Emergency stop switch] to right to release the emergency stop mode.

### 2. Unlocking of padlock for main breaker



Unlock the padlock of [Main breaker].

### 3. Main breaker ON



Turn [ON] the main breaker located.

### 4. Power indicating lamp ON



[Power indicating lamp] on the main operation panel lights.

The working lamp also lights.

## 5. Operation ready ON



Press [Operation ready ON switch] on the main operation panel.

## 6. LCD display



When the CNC starting status is displayed on LCD, the system is normally started, a screen of the present position is displayed.

NOTE : While the CNC starting status is displayed, the machine can not be normally operated.

## 7. Operation ready completion



[Indicating lamp of ready for start-up] on the main operation panel lights.

The operation ready of all equipment (NC unit, hydraulic unit, lubrication unit, coolant pump, etc.) is completed.

### 3 EMERGENCY STOP

---

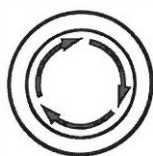
When stopping the machine immediately for any trouble during operation, [Emergency stop switch] is used.

When the machine trouble is not in emergency, it is recommended to use the [Feed HOLD switch] of automatic operation mode.

The following procedure is recommended to stop and release the machine by [Emergency stop switch].

NOTE : Since there is a possibility that each axis slips after releasing the emergency stop, be sure to return each axis to the reference position.

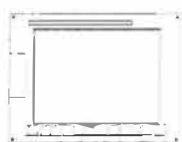
#### 1. Emergency stop



[Emergency stop switch] can be used even if either manual operation mode or automatic operation mode is set.

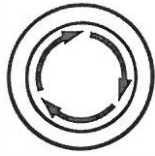
When pressing this switch, both loader and machine stop immediately. In the machine, the tool slide and spindle stop. In the loader, all axes stop. At this time, the switch is locked.

#### 2. Message of emergency stop



The message is displayed on the LCD.

### 3. Release of emergency stop



Turn [Emergency stop switch] to clockwise to release the emergency stop mode.

This switch is the red mushroom type. A yellow paint is coated around the switch to highlight the switch.

If machine failure occurs, this switch is pressed to stop the machine immediately.

At this time, each equipment stops and operation ready is turned off.

When work is finished, this switch is also pressed before turning off the power source.

When this switch is pressed once, the switch is locked.

When restarting the operation, it is necessary to press the [Operation ready ON switch].

## 4 POWER OFF

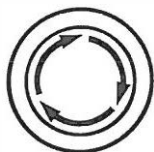
---

Turn off power source by the following procedure.

### 1. Machine stop

The equipment such as the loader, spindle, tool slide, etc., are stopped.

### 2. Emergency stop



Press the [Emergency stop switch].

### 3. Operation ready OFF



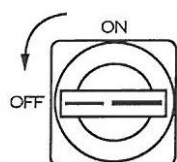
Press [Operation ready OFF switch] on the main operation panel.

### 4. Delete of LCD display



LCD display is deleted.

## 5. Main breaker OFF



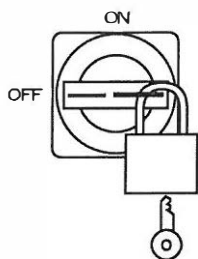
Turn [OFF] the main breaker located.

## 6. Power indicating lamp OFF



[Power indicating lamp] on the main operation panel goes out.

## 7. Locking of main breaker



Lock of [Main breaker].

## WARNING

- \* Be sure to lock the padlock for the main breaker so as not to be operated by other persons after finishing the work.
- \* There is the possibility to be shocked by a high voltage or the program and parameter are changed. If the machine will be operated without checking them, a potentially hazardous could result in serious injury or machine trouble.

## CAUTION

- \* Safety manager shall carefully save the key of the padlock.

## 5 MANUAL OPERATION (INTERLOCK)

---

The following explains the fundamental operation methods relative to the loader pendant.

Mainly, the operation methods by manual modes such as axis travel, chuck OPEN/CLOSE, etc., are described.

## 5-1 Axis travel

When travelling the loader axis, take care of feedrate.

Override is divided into four speeds of 10%, 25%, 50%, and 100% and a selected switch lamp lights.

In case of the reference position return mode, only reference position side switch is VALID. Since it is considered that the loader will interfere with the machine, reverse unit and peripheral equipment, perform the reference position return in order of ZG, YG and XG on the 3-axis loader.

For preventing collision and interference, shiftable area is limited.

When exceeding the shiftable area, the override is fixed forcedly to 10% under JOG mode regardless of manual operation and automatic operation.

In this case, when travelling the axis in the shiftable area, the mode can be changed. For the shiftable area, refer to the item of [8 INTERLOCK].

## 5-2 Loader hand

In the loader hand SWING/RETURN, the loader hand operates only area No.9 position (PSW9) and No.15 position (PSW15) also No.11 position (PSW11) and No.16 position (PSW16) for preventing collision.  
For the shiftable area, refer to the item of [8 INTERLOCK].

Note : When operating the loader hand forcedly by ignoring interlock,  
press the above switch simultaneously with the [Feed hold switch]  
of the loader pendant.

## 5-3 Turn over equipment

The turn over hand does not swing for preventing collision where the loader is in the area No.9 position (PSW9) and No.10 position (PSW10) also No.11 position (PSW11) and No.12 position (within limit PSW12) and No.5 position (PSW5).

In the turn over hand FORWARD mode, the turn over hand does not operate with both hands R, L clamped.

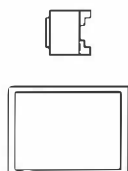
Note : When operating the loader hand forcedly by ignoring interlock, press the above switch simultaneously with the [Feed hold switch] of the loader pendant.

## 6 MANUAL OPERATION

---

### 6-1 Manual operation (Independent operation)

#### 1. Machine side



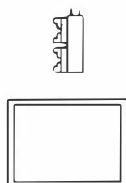
Check that [Machine interlock preparation switch] goes out.

When the switch lamp lights, turn OFF the switch lamp by pressing the switch.

Note : When [Machine interlock preparation switch] lights, only operations of the following items can be performed.

- (1) Emergency stop
- (2) Feed hold
- (3) Rapid traverse, Jog feed, Spindle override

#### 2. Loader side



Check that [Loader interlock preparation switch] goes out.

When the switch lamp lights, turn OFF the switch lamp by pressing the switch.

Note : When [Loader interlock preparation switch] lights, only operations of the following items can be performed.

- (1) Emergency stop
- (2) Feed hold
- (3) Rapid traverse override
- (4) Single block/memory modes
- (5) Cycle start, discharge cycle, 1-cycle stop

## 6-2 Safety cover interlock (Teaching mode)



When [Safety door interlock switch] on the safety cover is set to [OFF] during manual operation, the emergency stop is not applied to the machine even if the safety cover is opened.

At this time, when selecting the mode to travel the loader axis, the override is controlled to 25% or less. This control will not be released till enabling [Safety cover interlock switch] or selecting other than axis movement mode. Besides, by setting PMC parameter K70.5 to 1, the message of [Teaching mode is valid and override is controlled to 25% or less in manual operation.] is displayed.

Note : When [Safety cover interlock switch] is set to [OFF] and the safety cover is opened, the emergency stop is applied to.

## 7 AUTOMATIC OPERATION START WITH MACHINE AND LOADER INTERLOCKED

---

### 7-1 Interlock preparation

The following procedure is recommended for the preparation to interlock the machine and the loader.

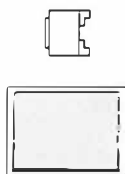
#### 1. Interlock preparation of machine

(1) Check the following interlock preparing conditions.

1. NC unit to be [Reset State].
2. Safety door to be [Closed State].
3. Machine not to be troubled. (Not to be emergency stop state.)
4. Loader not to be error or warning.  
(Not to be emergency stop state.)
- \* 5. X-axis and Z-axis are returned to [Reference positions].
- \* 6. Tool slide indexed to interlock position.
- \* 7. Counter not to be [Count Up].
- \* 8. Chuck to be [Unclamp].

\*Note : In each condition, INVALID or data change (tool slide No.) is available by specification.

Interlock preparation condition may be increased by option or special specification.



- (2) Press [Machine interlock preparation switch] on the sub-operation panel of machine.

At this time, the switch lamp lights and that the interlock preparation is completed can be checked.

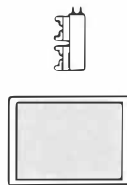
When the preparation is not completed, the condition that is not established is displayed on the screen. Be sure to establish the condition again.

## 2. Interlock preparation of loader

(1) Check the following interlock preparing conditions.

1. NC unit to be [Reset State].
2. Safety door to be [Closed State].
3. [Safety cover interlock switch] to be valid.
4. Loader not to be troubled. (Not to be emergency stop state.)
5. Any emergency stop mode (Machine or external equipment) not to be pressed.
- \* 6. XG-axis, YG-axis and ZG-axis are returned to [Reference positions].
- \* 7. Loading and unloading hands to be [Opened].
- \* 8. Machine and external equipment (loading, unloading units, etc.) to be [Interlock Preparation State].

\*Note : In each condition, INVALID or data change is available by specification.



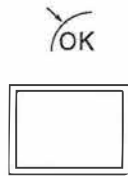
(2) Press [Loader interlock preparation switch] on the sub-operation panel of machine.

At this time, the switch lamp lights and that the interlock preparation is completed can be checked.

When the preparation is not completed, the condition that is not established is displayed on the screen. Be sure to establish the condition again.

For D type, press [Loader interlock preparation switch] to turn on the switch in each time of selecting the right side operation select switch or left side operation select switch.

## 7-2 Repeat cycle



[Repeat cycle switch] invalidates the part of interlock preparation conditions of machine and loader. Press [Repeat cycle switch] before pressing each [Interlock preparation switch].

However, this switch is not available unless the loader program is established.

Example 1 : When starting the interlocked operation with the machined workpiece chucked to the machine :

When pressing the [Repeat cycle switch], [Chuck Unclamp] of the machine interlock condition becomes invalid.

However, the above interlock state stands up on condition that the machined workpiece will be clamped to the chuck after completely executing M30.

When unclamping the chuck, the above state is released.

Even if clamped to the chuck again, the chuck is not clamped.

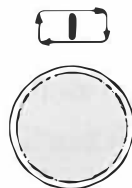
Example 2 : When starting cycle from the position on the machine even if the loader reference position return mode is eliminated.

When pressing the [Repeat cycle switch], the loader reference position of the loader interlock state becomes invalid.

Note : Take care since this switch may be used for the automatic zero return or automatic measuring, etc., of peripheral equipment, etc., at special specifications.

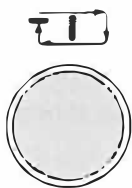
## 7-3 Cycle START/STOP

### 1. Cycle START



Check the completion state (switch lighting) of [Each interlock preparation switch] before pressing the [Cycle start switch] on the sub-operation panel of machine. During cycle start, the [Cycle start switch] lights.

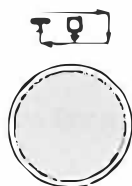
### 2. Discharge cycle



Press the [Discharge cycle switch] on the sub-operation panel of machine. During cycle, the [Discharge cycle switch] lights. The [Discharge cycle switch] can be pressed only during cycle operation.

Note : The discharge cycle may be automatically executed due to machine count-up, fault, non-workpiece, etc., by specifications.

### 3. 1-cycle STOP



Press the [1-cycle stop switch] on the sub-operation panel of machine.

The [1-cycle stop switch] lights while the 1-cycle stop is executing.

The [1-cycle stop switch] can be pressed only during cycle operation.

Note : The 1-cycle stop may be automatically executed due to machine count-up, fault, non-workpiece, etc., by specifications.

## 8 INTERLOCK

---

### 8-1 Setting of collision prevention barrier

To prevent the collision and interference of machine, the shifting area of loader hand is limited with the stored stroke check and position switch (area). Since this setting is for protecting the machine from the collision or interference, input correct values to the correct parameters.

## 8-2 Setting of stored stroke check

When attempting to be traveled over boundary set by the stored stroke check mode, alarm is displayed and each axis decelerates and stops.  
If the alarm occurs by traveling in prohibited area, the axis can travel in only reverse direction for the traveled direction.

(Alarm : [(n)+Over-travel (Soft limit1) or (n) -Over-travel (Soft limit1)])

| Parameter No. | Content                                                             |
|---------------|---------------------------------------------------------------------|
| 1320          | + direction coordinate value 1 of stored stroke check for each axis |
| 1321          | - direction coordinate value 1 of stored stroke check for each axis |

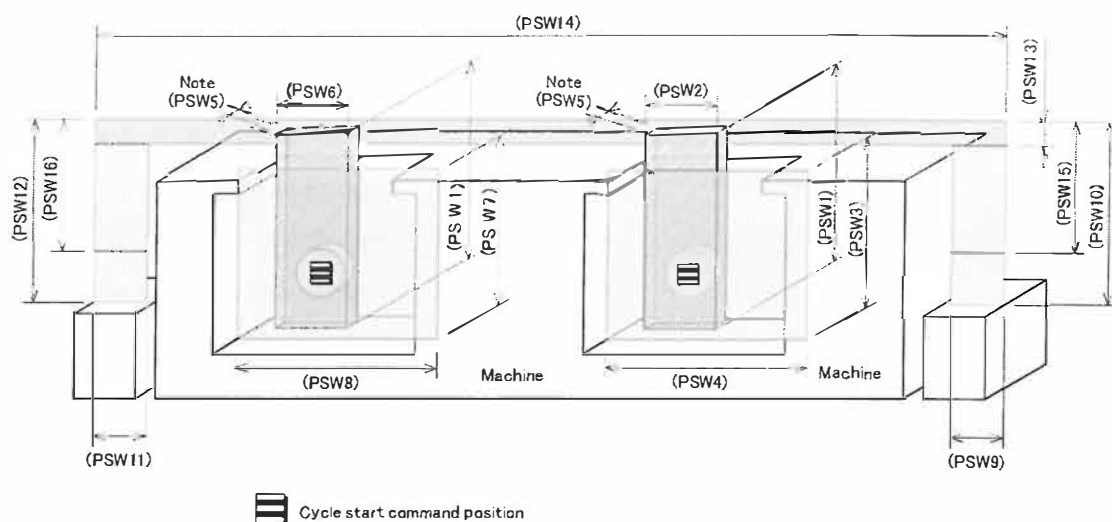
(Reference : [Machine Manual of Gantry Loader])

## 8-3 Setting of area (A, B, C type)

Position setting parameter list

| NC<br>parameter | Setting value | Content                             |
|-----------------|---------------|-------------------------------------|
| No. 6910        | 5             | No. 1 position control axis (PSW1)  |
| No. 6911        | 4             | No. 2 position control axis (PSW2)  |
| No. 6912        | 5             | No. 3 position control axis (PSW3)  |
| No. 6913        | 4             | No. 4 position control axis (PSW4)  |
| No. 6914        | 6             | No. 5 position control axis (PSW5)  |
| No. 6915        | 4             | No. 6 position control axis (PSW6)  |
| No. 6916        | 5             | No. 7 position control axis (PSW7)  |
| No. 6917        | 4             | No. 8 position control axis (PSW8)  |
| No. 6918        | 4             | No. 9 position control axis (PSW9)  |
| No. 6919        | 5             | No.10 position control axis (PSW10) |
| No. 6920        | 4             | No.11 position control axis (PSW11) |
| No. 6921        | 5             | No.12 position control axis (PSW12) |
| No. 6922        | 5             | No.13 position control axis (PSW13) |
| No. 6923        | 4             | No.14 position control axis (PSW14) |
| No. 6924        | 5             | No.15 position control axis (PSW15) |
| No. 6925        | 5             | No.16 position control axis (PSW16) |

| NC<br>parameter | Setting value | Content                                     |
|-----------------|---------------|---------------------------------------------|
| No. 6930        |               | Max. value of No. 1 position operating area |
| No. 6931        |               | Max. value of No. 2 position operating area |
| No. 6932        |               | Max. value of No. 3 position operating area |
| No. 6933        |               | Max. value of No. 4 position operating area |
| No. 6934        |               | Max. value of No. 5 position operating area |
| No. 6935        |               | Max. value of No. 6 position operating area |
| No. 6936        |               | Max. value of No. 7 position operating area |
| No. 6937        |               | Max. value of No. 8 position operating area |
| No. 6938        |               | Max. value of No. 9 position operating area |
| No. 6939        |               | Max. value of No.10 position operating area |
| No. 6940        |               | Max. value of No.11 position operating area |
| No. 6941        |               | Max. value of No.12 position operating area |
| No. 6942        |               | Max. value of No.13 position operating area |
| No. 6943        |               | Max. value of No.14 position operating area |
| No. 6944        |               | Max. value of No.15 position operating area |
| No. 6945        |               | Max. value of No.16 position operating area |
|                 |               |                                             |
| No. 6950        |               | Min. value of No. 1 position operating area |
| No. 6951        |               | Min. value of No. 2 position operating area |
| No. 6952        |               | Min. value of No. 3 position operating area |
| No. 6953        |               | Min. value of No. 4 position operating area |
| No. 6954        |               | Min. value of No. 5 position operating area |
| No. 6955        |               | Min. value of No. 6 position operating area |
| No. 6956        |               | Min. value of No. 7 position operating area |
| No. 6957        |               | Min. value of No. 8 position operating area |
| No. 6958        |               | Min. value of No. 9 position operating area |
| No. 6959        |               | Min. value of No.10 position operating area |
| No. 6960        |               | Min. value of No.11 position operating area |
| No. 6961        |               | Min. value of No.12 position operating area |
| No. 6962        |               | Min. value of No.13 position operating area |
| No. 6963        |               | Min. value of No.14 position operating area |
| No. 6964        |               | Min. value of No.15 position operating area |
| No. 6965        |               | Min. value of No.16 position operating area |



Note : Separate the area of the above (note) to 100 mm or more from chuck.

## Setting method (procedure)

### (1) Setting of cycle start command area



1. Set No.1 position to YG-axis. (No. 6910=5)  
No. 6930 : Max. value, No. 6950 : Min. value  
Note : In case of parallel hands, set min. value more than value of cycle start position.

2. Set No. 2 and No. 6 position to XG-axis.  
(No. 6911, 6915=4)  
No. 6931, 6935 : Max. value,  
No. 6951, 6955 : Min. value

3. Set No. 5 position to ZG-axis. (No. 6914=6)  
No. 6934 : Max. value, No. 6954 : Min. value

## (2) Setting of loader interfering area



Loader interfering area

1. Set No.3 and 7 position to YG-axis.

(No. 6912, 6916=5)

No. 6932, 6936 : Max. value,

No. 6952, 6956 : Min. value

Note : Max value is set to the position where  
the loader does not interfere to the  
shutter with the loader hand opened.

2. Set No. 4 and 8 position to XG-axis.

(No. 6913, 6917=4)

No. 6933, 6937 : Max. value,

No. 6953, 3957 : Min. value

## (3) Setting of loader shifting area



Setting of loader shifting area

PSW 10, 12, 14 are for loader  
shifting area.

PSW 15, 16 are for loader  
non-interference area.

1. Set No.9 position to XG-axis. (No. 6918=4)

No. 6938 : Max. value, No. 6958 : Min. value

2. Set No.10 position to YG-axis. (No. 6919=5)

No. 6939 : Max. value, No. 6959 : Min. value

3. Set No.11 position to XG-axis. (No. 6920=4)

No. 6940 : Max. value, No. 6960 : Min. value

4. Set No.12 position to YG-axis. (No. 6921=5)

No. 6941 : Max. value, No. 6961 : Min. value

5. Set No.13 position to YG-axis. (No. 6922=5)

No. 6942 : Max. value, No. 6962 : Min. value

6. Set No.14 position to XG-axis. (No. 6923=4)

No. 6943 : Max. value, No. 6963 : Min. value

7. Set No.15 position to YG-axis. (No. 6924=5)

No. 6944 : Max. value, No. 6964 : Min. value

8. Set No.16 position to YG-axis. (No. 6925=5)

No. 6945 : Max. value, No. 6965 : Min. value

## 8-4 Setting of area (D type)

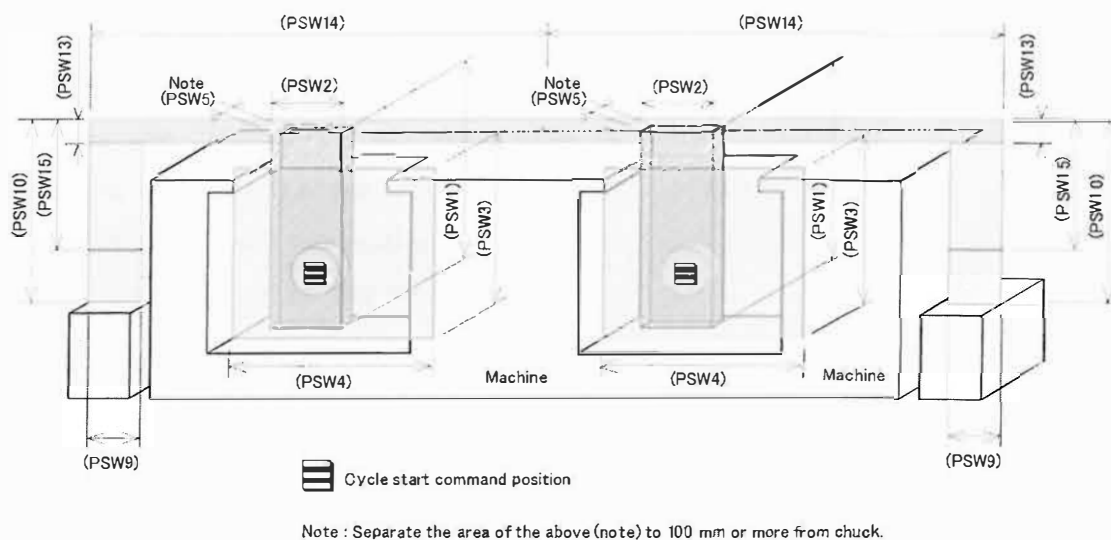
Position setting parameter list

| NC parameter | Setting value | Content                             |
|--------------|---------------|-------------------------------------|
| No. 6910     | 2             | No. 1 position control axis (PSW1)  |
| No. 6911     | 1             | No. 2 position control axis (PSW2)  |
| No. 6912     | 2             | No. 3 position control axis (PSW3)  |
| No. 6913     | 1             | No. 4 position control axis (PSW4)  |
| No. 6914     | 3             | No. 5 position control axis (PSW5)  |
| No. 6918     | 1             | No. 9 position control axis (PSW9)  |
| No. 6919     | 2             | No.10 position control axis (PSW10) |
| No. 6922     | 2             | No.13 position control axis (PSW13) |
| No. 6923     | 1             | No.14 position control axis (PSW14) |
| No. 6924     | 2             | No.15 position control axis (PSW15) |

\* NC parameters are located at each of the left and right sides.

| NC<br>parameter | Setting value | Content                                     |
|-----------------|---------------|---------------------------------------------|
| No. 6930        |               | Max. value of No. 1 position operating area |
| No. 6931        |               | Max. value of No. 2 position operating area |
| No. 6932        |               | Max. value of No. 3 position operating area |
| No. 6933        |               | Max. value of No. 4 position operating area |
| No. 6934        |               | Max. value of No. 5 position operating area |
| No. 6938        |               | Max. value of No. 9 position operating area |
| No. 6939        |               | Max. value of No.10 position operating area |
| No. 6942        |               | Max. value of No.13 position operating area |
| No. 6943        |               | Max. value of No.14 position operating area |
| No. 6944        |               | Max. value of No.15 position operating area |
|                 |               |                                             |
| No. 6950        |               | Min. value of No. 1 position operating area |
| No. 6951        |               | Min. value of No. 2 position operating area |
| No. 6952        |               | Min. value of No. 3 position operating area |
| No. 6953        |               | Min. value of No. 4 position operating area |
| No. 6954        |               | Min. value of No. 5 position operating area |
| No. 6958        |               | Min. value of No. 9 position operating area |
| No. 6959        |               | Min. value of No.10 position operating area |
| No. 6962        |               | Min. value of No.13 position operating area |
| No. 6963        |               | Min. value of No.14 position operating area |
| No. 6964        |               | Min. value of No.15 position operating area |

\* NC parameters are located at each of the left and right sides.



## Setting method (procedure)

### (1) Setting of cycle start command area



1. Set No.1 position to YG-axis. (No. 6910=5)  
No. 6930 : Max. value, No. 6950 : Min. value  
Note : In case of parallel hands, set min. value more than value of cycle start position.
2. Set No. 2 position to XG-axis. (No. 6911=4)  
No. 6931: Max. value, No. 6951 : Min. value
3. Set No. 5 position to ZG-axis. (No. 6914=6)  
No. 6934 : Max. value, No. 6954 : Min. value

## (2) Setting of loader interfering area



Loader interfering area

1. Set No.3 position to YG-axis. (No. 6912=5)  
No. 6932 : Max. value, No. 6952 : Min. value  
Note : Max value is set to the position where the loader does not interfere to the shutter with the loader hand opened.
2. Set No. 4 position to XG-axis. (No. 6913=4)  
No. 6933 : Max. value, No. 6953 : Min. value

## (3) Setting of loader shifting area



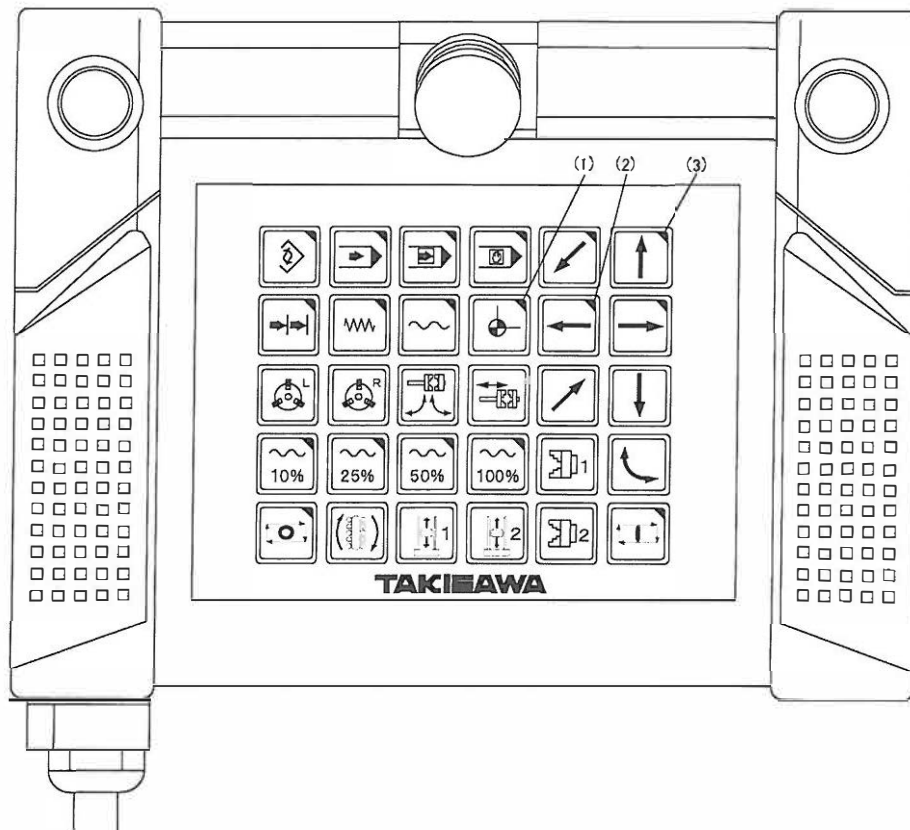
Setting of loader shifting area

PSW 10, 14 are for loader shifting area.

PSW 15 are for loader non-interference area.

1. Set No.9 position to XG-axis. (No. 6918=4)  
No. 6938 : Max. value, No. 6958 : Min. value
2. Set No.10 position to YG-axis. (No. 6919=5)  
No. 6939 : Max. value, No. 6959 : Min. value
3. Set No.13 position to YG-axis. (No. 6922=5)  
No. 6942 : Max. value, No. 6962 : Min. value
4. Set No.14 position to XG-axis. (No. 6923=4)  
No. 6943 : Max. value, No. 6963 : Min. value
5. Set No.15 position to YG-axis. (No. 6924=5)  
No. 6944 : Max. value, No. 6964 : Min. value

## 8-5 How to check area



- (1) Reference return mode indicating lamp : Loader reference return area
- (2) 1-axis reference return indicating lamp : Cycle start command area  
(indicating lamp of loader  
reference side)
- (3) 2-axis reference return indicating lamp : Loader interfering area

## Checking method (procedure)

- (1) Set the mode for loader pendant to MANUAL or SINGLE.
- (2) When the loader is entered in the cycle start command area,  
a 1-axis reference return indicating lamp of teaching box flickers.

When the loader is entered in the loader interfering area,  
a 2-axis reference return indicating lamp of teaching box flickers.

When the loader is entered in the loader reference return area,  
a reference return mode indicating lamp of teaching box flickers.

## 9 MACHINE SETTING ADJUSTMENT AFTER CHANGING THE SET-UP

---

### 9-1 Setting change of loader (Teaching point)

When the workpiece feeder and turn over equipment are completely adjusted, determine the teaching point of loader. If the teaching point is incorrectly set, the loader collides and interferes with the machine, workpiece feeder and turn over equipment .

The set point (#500 series on program) may be changed by specifications.

## 9-2 Adjustment of turn over equipment

When the workpiece is changed, the delivering distance between turn over hands must be adjusted with the fore and aft adjustment rod.

If the distance is incorrectly adjusted, the chuck clamps the workpiece inadequately and the turn over equipment causes damage.

Reference :

[GANTRY LOADER MACHINE INSTRUCTION MANUAL 6 CHANGING SET-UP]

## 9-3 Adjustment of workpiece feeder

When the height of the raw material (before machining) or product (after machining) of workpiece is changed, the height of workpiece check photoelectric switch on the workpiece feeder must be adjusted.

Each workpiece check photoelectric switch is provided on the unloading and loading sides.

First, adjust the photoelectric switch on the loading side and also, adjust the photoelectric switch on the unloading side on the basis of the photoelectric switch on the loading side.

If each photoelectric switch is inadequately adjusted, the machine chuck also clamps the workpiece inadequately and the workpiece feeder causes damage.

However, the photoelectric switch on the loading side may not be adjusted even if the machining workpiece is changed when the relationship between the workpiece feeder and the loader is well adjusted on the current machining.

The photoelectric switch on the unloading side must be adjusted or checked.

Reference : [GANTRY LOADER MACHINE INSTRUCTION MANUAL 6  
CHANGING SET-UP]

## 10 PROGRAMMING

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The following explains the program creation, editing and operation for use of loader.

Loader program consists of G-code, M-code and custom macro, which is same as NC program.

However, some operations, which can be performed by NC program, cannot be performed by loader program.

There are some restrictions and precautions on G-code, custom macro and program No.

Unless "ABLE" is written in this manual, consider it "DISABLE".

### 10-1 G-function

The G-code list

| G-code | Group | Function                        |
|--------|-------|---------------------------------|
| G00    | 01    | Positioning                     |
| G01    |       | Linear interpolation            |
| G04    | 00    | Dwell                           |
| G28    |       | Reference position return check |
| G31    |       | Skip function                   |

Note : (1) The G-code of 00 group shows the G-code that is not modal and only commanded block becomes valid.

(2) When commanding the G-code that is not in the G-code list, "(0106) SYNTAX: THIS G-CODE IS ILLEGAL." is displayed.

## 10-2 M-function (A, B, C type)

M-functions used for the loader are as follows.

However, take care since there are functions that are not included by the specifications of machine delivered.

| M-code | Function            | Description                                                                                                                                                                                                                                          |
|--------|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| M02    | End of program      | Though NC unit is reset, the program does not return to first position of program.<br>* When programmed in the block same as other M-code, alarm occurs.                                                                                             |
| M03    | Work feeder forward | Workpiece feeder forwards to 1-pallet.<br>* When programmed in the block same as M04, alarm occurs.                                                                                                                                                  |
| M04    | Work feeder reverse | Workpiece feeder reverses to 1-pallet.<br>* When programmed in the block same as M03, alarm occurs.                                                                                                                                                  |
| M10    | Loading lifter UP   | Loading lifter raises up. Unless workpiece feeder stop position is detected, the lifter does not raise. When programmed at unloading spec., of workpiece feeder, alarm occurs.<br>* When programmed in the blocks same as M11 and M14, alarm occurs. |
| M11    | Loading lifter DOWN | Loading lifter lowers.<br>When programmed at unloading spec., of workpiece feeder, alarm occurs.<br>* When programmed in the block same as M10, alarm occurs.                                                                                        |

| M-code | Function                             | Description                                                                                                                                                                                                                                                         |
|--------|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| M12    | Discharge lifter UP                  | <p>Unloading lifter raises.</p> <p>Unless workpiece feeder stop position is detected, the lifter does not raise. When programmed at loading spec., of workpiece feeder, alarm occurs.</p> <p>* When programmed in the blocks same as M13 and M15, alarm occurs.</p> |
| M13    | Discharge lifter DOWN                | <p>Unloading lifter lowers.</p> <p>When programmed at loading spec., of workpiece feeder, alarm occurs.</p> <p>* When programmed in the block same as M12, alarm occurs.</p>                                                                                        |
| M14    | Loading lifter down jog              | <p>Loading lifter lowers for time set can be on the set screen of [RAKU RAKU loader].</p> <p>When programmed at unloading spec., of workpiece feeder, alarm occurs.</p> <p>* When programmed in the block same as M10, alarm occurs.</p>                            |
| M15    | Discharge lifter down jog            | <p>Unloading lifter lowers for time set can be on the set screen of [RAKU RAKU loader].</p> <p>When programmed at loading spec., of workpiece feeder, alarm occurs.</p> <p>* When programmed in the block same as M12, alarm occurs.</p>                            |
| M19    | Work feeder stop position reindexing | Current pallet is reindexed.                                                                                                                                                                                                                                        |
| M21    | Repeat cycle OFF                     | Repeat cycle signal is turned OFF.                                                                                                                                                                                                                                  |
| M23    | Cycle time measure OFF               | <p>The measuring of cycle time is turned OFF.</p> <p>Turn OFF the measuring every cycle of program at spec., to measure the cycle time.</p>                                                                                                                         |
| M24    | Loader stop command check            | Loader stop command is checked.                                                                                                                                                                                                                                     |

| M-code | Function                    | Description                                                                                                                         |
|--------|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| M26    | Air blow ON<br>(Option)     | Air blows for time set can be on the set screen of [RAKU RAKU loader].<br>Air can be stopped by M27.                                |
| M27    | Air blow OFF<br>(Option)    | Air blow stops.                                                                                                                     |
| M30    | End of tape                 | NC unit is reset and program is returned to first position.<br>* When programmed in the blocks same as other M-codes, alarm occurs. |
| M31    | Auto override 10%           | The override of loader is set to 10%.<br>* Program M91 (Automatic override OFF), return to origin override.                         |
| M32    | Auto override 25%           | The override of loader is set to 25%.<br>* Program M91 (Automatic override OFF), return to origin override.                         |
| M33    | Auto override 50%           | The override of loader is set to 50%.<br>* Program M91 (Automatic override OFF), return to origin override.                         |
| M34    | Auto override 100%          | The override of loader is set to 100%.<br>* Program M91 (Automatic override OFF), return to origin override.                        |
| M36    | Loading counter +1          | Loading time of workpiece is counting.                                                                                              |
| M37    | Discharge counter +1        | Discharge time of workpiece is counting.                                                                                            |
| M38    | NG counter +1               | NG discharge time of workpiece is counting.                                                                                         |
| M39    | Quality check counter<br>+1 | Quality control time of workpiece is counting.                                                                                      |

| M-code | Function                        | Description                                                                                                                                                        |
|--------|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| M40    | Loader hand turn                | <p>Loader hand swings.</p> <p>* There is place that hand cannot be operated by setting area.</p> <p>* When programmed in the block same as M41, alarm occurs.</p>  |
| M41    | Loader hand return              | <p>Loader hand returns.</p> <p>* There is place that hand cannot be operated by setting area.</p> <p>* When programmed in the block same as M40, alarm occurs.</p> |
| M42    | Loading hand loose              | <p>Loader loading hand unclamps.</p> <p>* When programmed in the block same as M43, alarm occurs.</p>                                                              |
| M43    | Loading hand tight              | <p>Loader loading hand clamps.</p> <p>* When programmed in the block same as M42, alarm occurs.</p>                                                                |
| M44    | Discharge hand loose            | <p>Loader unloading hand unclamps.</p> <p>* When programmed in the block same as M45, alarm occurs.</p>                                                            |
| M45    | Discharge hand tight            | <p>Loader unloading hand clamps.</p> <p>* When programmed in the block same as M44, alarm occurs.</p>                                                              |
| M46    | Work pusher forward<br>(Option) | The workpiece pusher of loader hand forwards.                                                                                                                      |
| M47    | Work pusher reverse<br>(Option) | The workpiece pusher of loader hand reverses.                                                                                                                      |
| M48    | Cycle time measurement<br>start | The measuring of one loader cycle time is starting.                                                                                                                |
| M49    | Cycle time measurement<br>stop  | The measuring of one loader cycle time is finishing.                                                                                                               |
| M60    | In side turn hand loose         | <p>Turn over hand at loading side unclamps.</p> <p>* When programmed in the block same as M61, alarm occurs.</p>                                                   |

| M-code | Function                 | Description                                                                                                       |
|--------|--------------------------|-------------------------------------------------------------------------------------------------------------------|
| M61    | In side turn hand tight  | Turn over hand at loading side clamps.<br>* When programmed in the block same as M60, alarm occurs.               |
| M62    | Out side turn hand loose | Turn over hand at unloading side unclamps.<br>* When programmed in the block same as M63, alarm occurs.           |
| M63    | Out side turn hand tight | Turn over hand at unloading side clamps.<br>* When programmed in the block same as M62, alarm occurs.             |
| M64    | Turn hand turn           | Turn over hand swings.<br>* When programmed in the block same as M65, alarm occurs.                               |
| M65    | Turn hand return         | Turn over hand returns.<br>* When programmed in the block same as M64, alarm occurs.                              |
| M66    | Turn hand forward        | Turn over hand forwards.<br>* When programmed in the block same as M67, alarm occurs.                             |
| M67    | Turn hand reverse        | Turn over hand reverses.<br>* When programmed in the block same as M66, alarm occurs.                             |
| M90    | Work check               | It is not completed if there is a workpiece in NG chute.<br>It is completed if there is no workpiece in NG chute. |
| M91    | Auto. override OFF       | Automatic override values (M31, M32, M33 and M34) are set to OFF to make the override values of pendant.          |
| M92    | Buffering OFF            | Buffering becomes invalid.                                                                                        |
| M93    | Hand recycle OFF         | Repeat cycle of loader hand is turned OFF.                                                                        |
| M95    | Axis overlap ON          | Axis overlap is turned ON.                                                                                        |

| M-code | Function               | Description                                                                                                                      |
|--------|------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| M98    | Call the sub program   | Sub-program is called from main program and it is executed.<br>* For details, refer to Instruction Manual of FANUC.              |
| M99    | End of the sub program | Sub-program finishes and it returns to next block of main program (M98).<br>* For details, refer to Instruction Manual of FANUC. |

No. M100 series of M-code is only command mode and motion is not checked.

| M-code | Function                        | Description                                                                                                                                                                                                                                                                                                  |
|--------|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| M100   | Shutter open com.: A            | The shutter of machine A (1-process side) opens.<br>* Unless machine A is interlocked, alarm occurs.<br>* When programmed in the blocks same as M101, M201, alarm occurs.                                                                                                                                    |
| M101   | Shutter close com.: A           | The shutter of machine A (1-process side) closes.<br>* Unless machine A is interlocked, alarm occurs.<br>* When programmed in the blocks same as M100, M200, alarm occurs.                                                                                                                                   |
| M102   | Chuck loosen com.: A            | The chuck of machine A (1-process side) unclamps.<br>* Unless machine A is interlocked and reset, and spindle stops, alarm occurs.<br>* When programmed in the blocks same as M103, M203, alarm occurs.                                                                                                      |
| M103   | Chuck tighten com.: A           | The chuck of machine A (1-process side) clamps.<br>* Unless machine A is interlocked, alarm occurs.<br>* When programmed in the blocks same as M102, M202, alarm occurs.                                                                                                                                     |
| M106   | Air blow command: A             | The air blow of machine A (1-process side) for time set can be on the set screen of [RAKU RAKU loader].<br>* Unless machine A is interlocked, alarm occurs.                                                                                                                                                  |
| M107   | Loading sp. Orientation com.: A | The spindle of machine A (1-process side) stops at orientation.<br>The oriented spindle stop position for loading the workpiece can be set on the set screen of [RAKU RAKU loader].<br>* Unless machine A is interlocked, alarm occurs.<br>* When programmed in the blocks same as M108, M206, alarm occurs. |

| M-code | Function                             | Description                                                                                                                                                                                                                                                                                                                       |
|--------|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| M108   | Discharge sp.<br>Orientation com.: A | <p>The spindle of machine A (1-process side) stops at orientation.</p> <p>The oriented spindle stop position for unloading the workpiece can be set on the set screen of [RAKU RAKU loader].</p> <p>* Unless machine A is interlocked, alarm occurs.</p> <p>* When programmed in the blocks same as M107, M206, alarm occurs.</p> |
| M109   | Loader call read fin: A              | <p>The loader call read completion mode outputs to machine A (1-process side).</p> <p>* Unless machine A is interlocked, alarm occurs.</p>                                                                                                                                                                                        |
| M110   | M/C cycle start com.: A              | <p>The automatic run of machine A (1-process side) starts.</p> <p>* Unless machine A is interlocked and chuck clamps, alarm occurs.</p> <p>* When programmed in the block same as M209, alarm occurs.</p>                                                                                                                         |
| M111   | Air blow command 2: A                | <p>No.2 air blow of machine A (1-process side) for time set to PMC timer 112.</p> <p>* Unless machine A is interlocked, alarm occurs.</p>                                                                                                                                                                                         |
| M114   | Auto power off com.                  | The power of machine is turned off.                                                                                                                                                                                                                                                                                               |
| M115   | Spindle forward com.: A              | Spindle of machine A (1-process side) rotates forward.                                                                                                                                                                                                                                                                            |
| M116   | Spindle reverse com.: A              | Spindle of machine A (1-process side) rotates reversely.                                                                                                                                                                                                                                                                          |
| M117   | Spindle stop com.: A                 | Spindle of machine A (1-process side) stops.                                                                                                                                                                                                                                                                                      |
| M119   | New tool signal OFF: A               | New tool signal of machine A (1-process side) is turned OFF.                                                                                                                                                                                                                                                                      |
| M120   | M/C connect ready<br>OFF: A          | The interlock preparation of machine A (1-process side) is turned OFF.                                                                                                                                                                                                                                                            |
| M121   | Chip conveyor stop com.              | When the workpiece falls from the loader, this code stops the chip conveyor.                                                                                                                                                                                                                                                      |

| M-code | Function                     | Description                                                                                                                                                                                                                                                                                                                          |
|--------|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| M122   | NG count up message          | When the cycle ends because of seating NG count-up, measuring NG count-up, etc., the message of [NG Count-up] is displayed.                                                                                                                                                                                                          |
| M123   | Coolant command: A           | Coolant of machine A (1-process side) for time set to PMC timer 113.<br>* Unless machine A is interlocked, alarm occurs.                                                                                                                                                                                                             |
| M130   | Loading work request (ex.)   | Workpiece request signal is outputted to outside loading unit. Workpiece request signal is turned OFF by workpiece request OK signal of outside loading unit.<br>* Loading workpiece request signal can be outputted with 1-pulse signal by setting PMC parameter. Pulse width is set by PMC timer 139.                              |
| M131   | Ld. work uncl. com. (ex.)    | Workpiece unclamp signal is outputted to loading unit. Loading workpiece unclamp command is turned OFF by workpiece unclamp completion signal of outside loading unit.                                                                                                                                                               |
| M132   | Work discharge request (ex.) | Workpiece unloading request signal is outputted to outside unloading unit.<br>Workpiece unloading request signal is turned OFF by workpiece unloading OK signal of outside unloading unit.<br>* Loading workpiece request signal can be outputted with 1-pulse signal by setting PMC parameter. Pulse width is set by PMC timer 140. |
| M133   | Dis. work clamp com. (ex.)   | Workpiece clamp signal is outputted to outside unloading unit.<br>Unloading workpiece clamp command is turned OFF by workpiece clamp completion signal of outside unloading unit.                                                                                                                                                    |

| M-code | Function                           | Description                                                                                                                                                                                                                                                              |
|--------|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| M140   | Work loading (chuck): A            | <p>The loader loading hand unclamp and the chuck clamp of machine A (1-process side) are continuously operated.</p> <p>* Unless machine A is interlocked, alarm occurs.</p> <p>* When programmed in the block same as M141, alarm occurs.</p>                            |
| M141   | Work discharge (chuck) : A         | <p>The loader unloading hand clamp and the chuck unclamp of machine A (1-process side) are continuously operated.</p> <p>* Unless machine A is interlocked, reset and spindle stops, alarm occurs.</p> <p>* When programmed in the block same as M140, alarm occurs.</p> |
| M148   | Loading time measurement start : A | The measuring of loading time of machine A is starting.                                                                                                                                                                                                                  |
| M149   | Loading time measurement stop : A  | The measuring of loading time of machine A is finishing.                                                                                                                                                                                                                 |
| M150   | Work feeder loading start          | <p>Workpiece feeder loads the workpiece.</p> <p>* When programmed at unloading spec., of workpiece feeder, alarm occurs.</p> <p>* When programmed with workpiece feeder stop position not detected and workpiece feeder rotating, alarm occurs.</p>                      |
| M151   | Work feeder discharge start        | <p>Workpiece feeder unloads the workpiece.</p> <p>* When programmed at loading spec., of workpiece feeder, alarm occurs.</p> <p>* When programmed with workpiece feeder stop position not detected and workpiece feeder rotating, alarm occurs.</p>                      |
| M153   | Turn unit return                   | The turn over hand return cycle starts.                                                                                                                                                                                                                                  |

| M-code | Function                        | Description                                                                                                                                                |
|--------|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| M154   | Turn unit start                 | Turn over equipment reverse cycle starts.<br>* When programmed in the block same as M155,<br>alarm occurs.                                                 |
| M155   | Turn unit start<br>(return OFF) | Turn over equipment reverse cycle starts. However,<br>the turn over hand does not return.<br>* When programmed in the block same as M154,<br>alarm occurs. |

No. 200 series of M-code is listed to check equipment states.

| M-code | Function                                 | Description                                                                                                                          |
|--------|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| M200   | Shutter open chk.: A                     | Checks the shutter OPEN state of machine A (1-process side).<br>* When programmed in the block same as M101, alarm occurs.           |
| M201   | Shutter close chk.: A                    | Checks the shutter CLOSE state of machine A (1-process side).<br>* When programmed in the block same as M100, alarm occurs.          |
| M202   | Chuck loosen check: A                    | Checks the chuck UNCLAMP state of machine A (1-process side).<br>* When programmed in the block same as M103, alarm occurs.          |
| M203   | Chuck tighten check: A                   | Checks the chuck CLAMP state of machine A (1-process side).<br>* When programmed in the block same as M102, alarm occurs.            |
| M206   | Spindle stop check: A                    | Checks the spindle STOP state of machine A (1-process side).<br>* When programmed in the blocks same as M107 and M108, alarm occurs. |
| M207   | Loading sp. orientation comp. check: A   | Checks the spindle orientation STOP state of machine A (1-process side), for loading the workpiece.                                  |
| M208   | Discharge sp. orientation comp. check: A | Checks the spindle orientation STOP state of machine A (1-process side), for unloading the workpiece.                                |
| M209   | M/C origin check: A                      | Checks the machine reference position state of machine A (1-process side).                                                           |

| M-code | Function                    | Description                                                                                                                                                                                                                                                                                               |
|--------|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| M210   | Loader call check: A        | Checks the loader CALL of machine A (1-process side).<br>Simultaneously, checks shutter OPEN state, spindle STOP state, machine reference position and machine interlock preparation state.<br>* When programmed in the block same as M109, alarm occurs.                                                 |
| M211   | M/C origin 2 check: A       | Checks the machine home position 2 state of machine A (1-process side).                                                                                                                                                                                                                                   |
| M215   | Wait confirmation: A        | Checks the interlock preparation and loader CALL (M20) state during automatic operation of machine A (1-process side).<br>* It waits until the condition is met.                                                                                                                                          |
| M220   | Macro in machine: A         | Perform the macro input of machine A (1-process side) state.                                                                                                                                                                                                                                              |
| M222   | Program start M code        | This M-code is programmed to the first position of program and that its M-code is in the first position of program is checked to prevent malfunction.<br>* When programmed in the block same as other M codes, alarm occurs.<br>* When this M-code is not in the first position of program, alarm occurs. |
| M230   | Loading work check (ex.)    | Checks the workpiece request OK signal of outside loading unit.                                                                                                                                                                                                                                           |
| M231   | Ld. work uncl. check (ex.)  | Checks the loading workpiece unclamp completion signal of outside loading unit.                                                                                                                                                                                                                           |
| M232   | Work dis. OK check (ex.)    | Checks the workpiece unloading OK signal of outside unloading unit.                                                                                                                                                                                                                                       |
| M233   | Dis. work clamp check (ex.) | Checks the unloading workpiece clamp completion signal of outside unloading unit.                                                                                                                                                                                                                         |
| M250   | Work ld. chk. (work feeder) | Checks the workpiece loadable state of workpiece feeder.                                                                                                                                                                                                                                                  |

| M-code | Function                        | Description                                                                                                           |
|--------|---------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| M251   | work dis. chk.<br>(work feeder) | Checks the workpiece unloadable state of workpiece feeder.                                                            |
| M254   | Work turn check<br>(return)     | Checks the workpiece reverse completion state of turn over equipment.                                                 |
| M255   | Work turn check<br>(turn)       | Checks the workpiece reverse completion state of turn over equipment.<br>However, the turn over hand does not return. |
| M261   | Check MC/LD inter. : A          | Checks the shutter open state and machine home position state of machine A (1-process side).                          |

No. M300 series of M-code is only command mode and motion is not checked.

| M-code | Function                        | Description                                                                                                                                                                                                                                                                                                  |
|--------|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| M300   | Shutter open com.: B            | The shutter of machine B (2-process side) opens.<br>* Unless machine B is interlocked, alarm occurs.<br>* When programmed in the blocks same as M301, M401, alarm occurs.                                                                                                                                    |
| M301   | Shutter open com.: B            | The shutter of machine B (2-process side) closes.<br>* Unless machine B is interlocked, alarm occurs.<br>* When programmed in the blocks same as M300, M400, alarm occurs.                                                                                                                                   |
| M302   | Chuck loosen com.: B            | The chuck of machine B (2-process side) unclamps.<br>* Unless machine B is interlocked and reset, and spindle stops, alarm occurs.<br>* When programmed in the blocks same as M303, M403, alarm occurs.                                                                                                      |
| M303   | Chuck tighten com.: B           | The chuck of machine B (2-process side) clamps.<br>* Unless machine B is interlocked, alarm occurs.<br>* When programmed in the blocks same as M302, M402, alarm occurs.                                                                                                                                     |
| M306   | Air blow command: B             | The air blow of machine B (2-process side) for time set can be on the set screen of [RAKU RAKU loader].<br>* Unless machine B is interlocked, alarm occurs.                                                                                                                                                  |
| M307   | Loading sp. orientation com.: B | The spindle of machine B (2-process side) stops at orientation.<br>The oriented spindle stop position for loading the workpiece can be set on the set screen of [RAKU RAKU loader].<br>* Unless machine B is interlocked, alarm occurs.<br>* When programmed in the blocks same as M308, M406, alarm occurs. |

| M-code | Function                             | Description                                                                                                                                                                                                                                                                                                                       |
|--------|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| M308   | Discharge sp.<br>orientation com.: B | <p>The spindle of machine B (2-process side) stops at orientation.</p> <p>The oriented spindle stop position for unloading the workpiece can be set on the set screen of [RAKU RAKU loader].</p> <p>* Unless machine B is interlocked, alarm occurs.</p> <p>* When programmed in the blocks same as M307, M406, alarm occurs.</p> |
| M309   | Loader call read fin: B              | <p>The loader call read completion mode outputs to machine B (2-process side).</p> <p>* Unless machine B is interlocked, alarm occurs.</p>                                                                                                                                                                                        |
| M310   | M/C cycle start com.: B              | <p>The automatic run of machine B (2-process side) starts.</p> <p>* Unless machine B is interlocked and chuck clamps, alarm occurs.</p> <p>* When programmed in the block same as M409, alarm occurs.</p>                                                                                                                         |
| M311   | Air blow command 2: B                | <p>No.2 air blow of machine B (2-process side) for time set to PMC timer 114.</p> <p>* Unless machine B is interlocked, alarm occurs.</p>                                                                                                                                                                                         |
| M315   | Spindle forward com.: B              | Spindle of machine B (2-process side) rotates forward.                                                                                                                                                                                                                                                                            |
| M316   | Spindle reverse com.: B              | Spindle of machine B (2-process side) rotates reversely.                                                                                                                                                                                                                                                                          |
| M317   | Spindle stop com.: B                 | Spindle of machine B (2-process side) stops.                                                                                                                                                                                                                                                                                      |
| M319   | New tool signal OFF: B               | New tool signal of machine B (2-process side) is turned OFF.                                                                                                                                                                                                                                                                      |
| M320   | M/C connect ready OFF<br>: B         | The interlock preparation of machine B (2-process side) is turned OFF.                                                                                                                                                                                                                                                            |
| M323   | Coolant command : B                  | <p>Coolant of machine B (2-process side) for time set to PMC timer 115.</p> <p>* Unless machine B is interlocked, alarm occurs.</p>                                                                                                                                                                                               |

| M-code | Function                              | Description                                                                                                                                                                                                                                                              |
|--------|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| M340   | Work loading (chuck): B               | <p>The loader loading hand unclamp and the chuck clamp of machine B (2-process side) are continuously operated.</p> <p>* Unless machine B is interlocked, alarm occurs.</p> <p>* When programmed in the block same as M341, alarm occurs.</p>                            |
| M341   | Work discharge (chuck)<br>: B         | <p>The loader unloading hand clamp and the chuck unclamp of machine B (2-process side) are continuously operated.</p> <p>* Unless machine B is interlocked, reset and spindle stops, alarm occurs.</p> <p>* When programmed in the block same as M340, alarm occurs.</p> |
| M348   | Loading time<br>measurement start : B | The measuring of loading time of machine B is starting.                                                                                                                                                                                                                  |
| M349   | Loading time<br>measurement stop : B  | The measuring of loading time of machine B is finishing.                                                                                                                                                                                                                 |

No. 400 series of M-code is listed to check equipment states.

| M-code | Function                                 | Description                                                                                                                          |
|--------|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| M400   | Shutter open chk.: B                     | Checks the shutter OPEN state of machine B (2-process side).<br>* When programmed in the block same as M301, alarm occurs.           |
| M401   | Shutter close chk.: B                    | Checks the shutter CLOSE state of machine B (2-process side).<br>* When programmed in the block same as M300, alarm occurs.          |
| M402   | Chuck loosen check: B                    | Checks the chuck UNCLAMP state of machine B (2-process side).<br>* When programmed in the block same as M303, alarm occurs.          |
| M403   | Chuck tighten check: B                   | Checks the chuck CLAMP state of machine B (2-process side).<br>* When programmed in the block same as M302, alarm occurs.            |
| M406   | Spindle stop check: B                    | Checks the spindle STOP state of machine B (2-process side).<br>* When programmed in the blocks same as M307 and M308, alarm occurs. |
| M407   | Loading sp. orientation comp. check: B   | Checks the spindle orientation STOP state of machine B (2-process side), for loading the workpiece.                                  |
| M408   | Discharge sp. orientation comp. check: B | Checks the spindle orientation STOP state of machine B (2-process side), for unloading the workpiece.                                |
| M409   | M/C origin check: B                      | Checks the machine reference position state of machine B (2-process side).                                                           |

| M-code | Function               | Description                                                                                                                                                                                                                                                              |
|--------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| M410   | Loader call check: B   | <p>Checks the loader CALL of machine B (2-process side).</p> <p>Simultaneously, checks shutter OPEN state, spindle STOP state, machine reference position and machine interlock preparation state.</p> <p>* When programmed in the block same as M309, alarm occurs.</p> |
| M411   | M/C origin 2 check: B  | Checks the machine home position 2 state of machine B (2-process side).                                                                                                                                                                                                  |
| M415   | Wait confirmation: B   | <p>Checks the interlock preparation and loader CALL (M20) state during automatic operation of machine B. (2-process side).</p> <p>* It waits until the condition is met.</p>                                                                                             |
| M420   | Macro in machine: B    | Perform the macro input of machine B (2-process side) state.                                                                                                                                                                                                             |
| M461   | Check MC/LD inter. : B | Checks the shutter open state and machine home position state of machine B (2-process side).                                                                                                                                                                             |

## 10-3 M-function (D type)

M-functions used for the loader are as follows.

However, take care since there are functions that are not included by the specifications of machine delivered.

| M-code | Function            | Description                                                                                                                                                                                                                                          |
|--------|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| M02    | End of program      | Though NC unit is reset, the program does not return to first position of program.<br>* When programmed in the block same as other M-code, alarm occurs.                                                                                             |
| M03    | Work feeder forward | Workpiece feeder forwards to 1-pallet.<br>* When programmed in the block same as M04, alarm occurs.                                                                                                                                                  |
| M04    | Work feeder reverse | Workpiece feeder reverses to 1-pallet.<br>* When programmed in the block same as M03, alarm occurs.                                                                                                                                                  |
| M10    | Loading lifter UP   | Loading lifter raises up. Unless workpiece feeder stop position is detected, the lifter does not raise. When programmed at unloading spec., of workpiece feeder, alarm occurs.<br>* When programmed in the blocks same as M11 and M14, alarm occurs. |
| M11    | Loading lifter DOWN | Loading lifter lowers.<br>When programmed at unloading spec., of workpiece feeder, alarm occurs.<br>* When programmed in the block same as M10, alarm occurs.                                                                                        |

| M-code | Function                             | Description                                                                                                                                                                                                                                                                                                              |
|--------|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| M12    | Discharge lifter UP                  | <p>Unloading lifter raises.</p> <p>Unless workpiece feeder stop position is detected, the lifter does not raise. When programmed at loading spec., of workpiece feeder, alarm occurs.</p> <p>* When programmed in the blocks same as M13 and M15, alarm occurs.</p>                                                      |
| M13    | Discharge lifter DOWN                | <p>Unloading lifter lowers.</p> <p>When programmed at loading spec., of workpiece feeder, alarm occurs.</p> <p>* When programmed in the block same as M12, alarm occurs.</p>                                                                                                                                             |
| M14    | Loading lifter down jog              | <p>Loading lifter lowers for time set can be on the set screen of [RAKU RAKU loader].</p> <p>When programmed at unloading spec., of workpiece feeder, alarm occurs.</p> <p>* When programmed in the block same as M10, alarm occurs.</p>                                                                                 |
| M15    | Discharge lifter down jog            | <p>Unloading lifter lowers for time set can be on the set screen of [RAKU RAKU loader].</p> <p>When programmed at loading spec., of workpiece feeder, alarm occurs.</p> <p>* When programmed in the block same as M12, alarm occurs.</p>                                                                                 |
| M19    | Work feeder stop position reindexing | Current pallet is reindexed.                                                                                                                                                                                                                                                                                             |
| M21    | Repeat cycle OFF                     | Repeat cycle signal is turned OFF.                                                                                                                                                                                                                                                                                       |
| M22    | Program start M code                 | <p>This M-code is programmed to the first position of program and that its M-code is in the first position of program is checked to prevent malfunction.</p> <p>* When programmed in the block same as other M codes, alarm occurs.</p> <p>* When this M-code is not in the first position of program, alarm occurs.</p> |

| M-code | Function                  | Description                                                                                                                         |
|--------|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| M23    | Cycle time measure OFF    | The measuring of cycle time is turned OFF.<br>Turn OFF the measuring every cycle of program at spec., to measure the cycle time.    |
| M24    | Loader stop command check | Loader stop command is checked.                                                                                                     |
| M26    | Air blow ON (Option)      | Air blows for time set can be on the set screen of [RAKU RAKU loader].<br>Air can be stopped by M27.                                |
| M27    | Air blow OFF (Option)     | Air blow stops.                                                                                                                     |
| M30    | End of tape               | NC unit is reset and program is returned to first position.<br>* When programmed in the blocks same as other M-codes, alarm occurs. |
| M31    | Auto override 10%         | The override of loader is set to 10%.<br>* Program M91 (Automatic override OFF), return to origin override.                         |
| M32    | Auto override 25%         | The override of loader is set to 25%.<br>* Program M91 (Automatic override OFF), return to origin override.                         |
| M33    | Auto override 50%         | The override of loader is set to 50%.<br>* Program M91 (Automatic override OFF), return to origin override.                         |
| M34    | Auto override 100%        | The override of loader is set to 100%.<br>* Program M91 (Automatic override OFF), return to origin override.                        |
| M36    | Loading counter +1        | Loading time of workpiece is counting.                                                                                              |
| M37    | Discharge counter +1      | Discharge time of workpiece is counting.                                                                                            |
| M38    | NG counter +1             | NG discharge time of workpiece is counting.                                                                                         |

| M-code | Function                        | Description                                                                                                                                                        |
|--------|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| M39    | Quality check counter<br>+1     | Quality control time of workpiece is counting.                                                                                                                     |
| M40    | Loader hand turn                | <p>Loader hand swings.</p> <p>* There is place that hand cannot be operated by setting area.</p> <p>* When programmed in the block same as M41, alarm occurs.</p>  |
| M41    | Loader hand return              | <p>Loader hand returns.</p> <p>* There is place that hand cannot be operated by setting area.</p> <p>* When programmed in the block same as M40, alarm occurs.</p> |
| M42    | Loading hand loose              | <p>Loader loading hand unclamps.</p> <p>* When programmed in the block same as M43, alarm occurs.</p>                                                              |
| M43    | Loading hand tight              | <p>Loader loading hand clamps.</p> <p>* When programmed in the block same as M42, alarm occurs.</p>                                                                |
| M44    | Discharge hand loose            | <p>Loader unloading hand unclamps.</p> <p>* When programmed in the block same as M45, alarm occurs.</p>                                                            |
| M45    | Discharge hand tight            | <p>Loader unloading hand clamps.</p> <p>* When programmed in the block same as M44, alarm occurs.</p>                                                              |
| M46    | Work pusher forward<br>(Option) | The workpiece pusher of loader hand forwards.                                                                                                                      |
| M47    | Work pusher reverse<br>(Option) | The workpiece pusher of loader hand reverses.                                                                                                                      |
| M48    | Cycle time measurement<br>start | The measuring of one loader cycle time is starting.                                                                                                                |
| M49    | Cycle time measurement<br>stop  | The measuring of one loader cycle time is finishing.                                                                                                               |

| M-code | Function                                     | Description                                                                                                       |
|--------|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| M60    | In side turn hand loose<br>(Main side only)  | Turn over hand at loading side unclamps.<br>* When programmed in the block same as M61, alarm occurs.             |
| M61    | In side turn hand tight<br>(Main side only)  | Turn over hand at unloading side unclamps.<br>* When programmed in the block same as M60, alarm occurs.           |
| M62    | Out side turn hand loose<br>(Main side only) | Turn over hand at unloading side clamps.<br>* When programmed in the block same as M63, alarm occurs.             |
| M63    | Out side turn hand tight<br>(Main side only) | Turn over hand L clamps.<br>* When programmed in the block same as M62, alarm occurs.                             |
| M64    | Turn hand turn<br>(Main side only)           | Turn over hand swings.<br>* When programmed in the block same as M65, alarm occurs.                               |
| M65    | Turn hand return<br>(Main side only)         | Turn over hand returns.<br>* When programmed in the block same as M64, alarm occurs.                              |
| M66    | Turn hand forward<br>(Main side only)        | Turn over hand forwards.<br>* When programmed in the block same as M67, alarm occurs.                             |
| M67    | Turn hand reverse<br>(Main side only)        | Turn over hand reverses.<br>* When programmed in the block same as M66, alarm occurs.                             |
| M90    | Work check                                   | It is not completed if there is a workpiece in NG chute.<br>It is completed if there is no workpiece in NG chute. |
| M91    | Auto. override OFF                           | Automatic override values (M31, M32, M33 and M34) are set to OFF to make the override values of pendant.          |
| M92    | Buffering OFF                                | Buffering becomes invalid.                                                                                        |
| M93    | Hand recycle OFF                             | Repeat cycle of loader hand is turned OFF.                                                                        |

| M-code | Function               | Description                                                                                                                      |
|--------|------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| M98    | Call the sub program   | Sub-program is called from main program and it is executed.<br>* For details, refer to Instruction Manual of FANUC.              |
| M99    | End of the sub program | Sub-program finishes and it returns to next block of main program (M98).<br>* For details, refer to Instruction Manual of FANUC. |

No. M100 series of M-code is only command mode and motion is not checked. (No. M100 series are commanded by each left and right sides.)

| M-code | Function                     | Description                                                                                                                                                                                                                                                                             |
|--------|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| M100   | Shutter open com.            | The shutter of machine opens.<br>* Unless machine is interlocked, alarm occurs.<br>* When programmed in the blocks same as M101, M201, alarm occurs.                                                                                                                                    |
| M101   | Shutter close com.           | The shutter of machine closes.<br>* Unless machine is interlocked, alarm occurs.<br>* When programmed in the blocks same as M100, M200, alarm occurs.                                                                                                                                   |
| M102   | Chuck loosen com.            | The chuck of machine unclamps.<br>* Unless machine is interlocked and reset, and spindle stops, alarm occurs.<br>* When programmed in the blocks same as M103, M203, alarm occurs.                                                                                                      |
| M103   | Chuck tighten com.           | The chuck of machine clamps.<br>* Unless machine is interlocked, alarm occurs.<br>* When programmed in the blocks same as M102, M202, alarm occurs.                                                                                                                                     |
| M106   | Air blow command             | The air blow of machine for time set can be on the set screen of [RAKU RAKU loader].<br>* Unless machine is interlocked, alarm occurs.                                                                                                                                                  |
| M107   | Loading sp. orientation com. | The spindle of machine stops at orientation.<br>The oriented spindle stop position for loading the workpiece can be set on the set screen of [RAKU RAKU loader].<br>* Unless machine is interlocked, alarm occurs.<br>* When programmed in the blocks same as M108, M206, alarm occurs. |

| M-code | Function                          | Description                                                                                                                                                                                                                                                                                                  |
|--------|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| M108   | Discharge sp.<br>orientation com. | <p>The spindle of machine stops at orientation.</p> <p>The oriented spindle stop position for unloading the workpiece can be set on the set screen of [RAKU RAKU loader].</p> <p>* Unless machine is interlocked, alarm occurs.</p> <p>* When programmed in the blocks same as M107, M206, alarm occurs.</p> |
| M109   | Loader call read fin              | <p>The loader call read completion mode outputs to machine.</p> <p>* Unless machine is interlocked, alarm occurs.</p>                                                                                                                                                                                        |
| M110   | M/C cycle start com.              | <p>The automatic run of machine starts.</p> <p>* Unless machine is interlocked and chuck clamps, alarm occurs.</p> <p>* When programmed in the block same as M209, alarm occurs.</p>                                                                                                                         |
| M111   | Air blow command 2                | <p>No.2 air blow of machine for time set to PMC timer 112.</p> <p>* Unless machine is interlocked, alarm occurs.</p>                                                                                                                                                                                         |
| M114   | Auto power off com.               | The power of machine is turned off.                                                                                                                                                                                                                                                                          |
| M119   | New tool signal OFF               | New tool signal of machine is turned OFF.                                                                                                                                                                                                                                                                    |
| M120   | M/C connect ready<br>OFF          | The interlock preparation of machine is turned OFF.                                                                                                                                                                                                                                                          |
| M121   | Chip conveyor stop com.           | When the workpiece falls from the loader, this code stops the chip conveyor.                                                                                                                                                                                                                                 |
| M122   | NG count up (message)             | When the cycle ends because of seating NG count-up, measuring NG count-up, etc., the message of [NG Count-up] is displayed.                                                                                                                                                                                  |
| M123   | Coolant command                   | <p>Coolant of machine for time set to PMC timer 113.</p> <p>* Unless machine is interlocked, alarm occurs.</p>                                                                                                                                                                                               |

| M-code | Function                        | Description                                                                                                                                                                                                                                                                                                                                         |
|--------|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| M130   | Loading work request<br>(ex.)   | <p>Workpiece request signal is outputted to outside loading unit. Workpiece request signal is turned OFF by workpiece request OK signal of outside loading unit.</p> <p>* Loading workpiece request signal can be outputted with 1-pulse signal by setting PMC parameter. Pulse width is set by PMC timer 139.</p>                                  |
| M131   | Ld. work uncl. com. (ex.)       | <p>Workpiece unclamp signal is outputted to loading unit. Loading workpiece unclamp command is turned OFF by workpiece unclamp completion signal of outside loading unit.</p>                                                                                                                                                                       |
| M132   | Work discharge request<br>(ex.) | <p>Workpiece unloading request signal is outputted to outside unloading unit.</p> <p>Workpiece unloading request signal is turned OFF by workpiece unloading OK signal of outside unloading unit.</p> <p>* Loading workpiece request signal can be outputted with 1-pulse signal by setting PMC parameter. Pulse width is set by PMC timer 140.</p> |
| M133   | Dis. work clamp com.<br>(ex.)   | <p>Workpiece clamp signal is outputted to outside unloading unit.</p> <p>Unloading workpiece clamp command is turned OFF by workpiece clamp completion signal of outside unloading unit.</p>                                                                                                                                                        |
| M140   | Work loading (chuck)            | <p>The loader loading hand unclamp and the chuck clamp of machine are continuously operated.</p> <p>* Unless machine is interlocked, alarm occurs.</p> <p>* When programmed in the block same as M141, alarm occurs.</p>                                                                                                                            |

| M-code | Function                                      | Description                                                                                                                                                                                                                                         |
|--------|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| M141   | Work discharge (chuck)                        | <p>The loader unloading hand clamp and the chuck unclamp of machine are continuously operated.</p> <p>* Unless machine is interlocked, reset and spindle stops, alarm occurs.</p> <p>* When programmed in the block same as M140, alarm occurs.</p> |
| M148   | Loading time measurement start                | The measuring of loading time of machine is starting.                                                                                                                                                                                               |
| M149   | Loading time measurement stop                 | The measuring of loading time of machine is finishing.                                                                                                                                                                                              |
| M150   | Work feeder loading start                     | <p>Workpiece feeder loads the workpiece.</p> <p>* When programmed at unloading spec., of workpiece feeder, alarm occurs.</p> <p>* When programmed with workpiece feeder stop position not detected and workpiece feeder rotating, alarm occurs.</p> |
| M151   | Work feeder discharge start                   | <p>Workpiece feeder unloads the workpiece.</p> <p>* When programmed at loading spec., of workpiece feeder, alarm occurs.</p> <p>* When programmed with workpiece feeder stop position not detected and workpiece feeder rotating, alarm occurs.</p> |
| M153   | Turn unit return (Main side only)             | The turn over hand return cycle starts.                                                                                                                                                                                                             |
| M154   | Turn unit start (Main side only)              | <p>Turn over equipment reverse cycle starts.</p> <p>* When programmed in the block same as M155, alarm occurs.</p>                                                                                                                                  |
| M155   | Turn unit start (return OFF) (Main side only) | <p>Turn over equipment reverse cycle starts. However, the turn over hand does not return.</p> <p>* When programmed in the block same as M154, alarm occurs.</p>                                                                                     |

| M-code | Function                                   | Description                                   |
|--------|--------------------------------------------|-----------------------------------------------|
| M156   | Turn unit start : Next<br>(Sub side only)  | The turn over equipment reverse cycle starts. |
| M157   | Turn unit return : Next<br>(Sub side only) | The turn over hand returns.                   |
| M158   | Turn hand loosen : Next<br>(Sub side only) | Loosen the turn over hand of sub side.        |

No. 200 series of M-code is listed to check equipment states.

(No. M 200 series are commanded by each left and right sides.)

| M-code | Function                               | Description                                                                                                                                                                                                                            |
|--------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| M200   | Shutter open chk.                      | Checks the shutter OPEN state of machine.<br>* When programmed in the block same as M101, alarm occurs.                                                                                                                                |
| M201   | Shutter close chk.                     | Checks the shutter CLOSE state of machine.<br>* When programmed in the block same as M100, alarm occurs.                                                                                                                               |
| M202   | Chuck loosen check                     | Checks the chuck UNCLAMP state of machine.<br>* When programmed in the block same as M103, alarm occurs.                                                                                                                               |
| M203   | Chuck tighten check                    | Checks the chuck CLAMP state of machine.<br>* When programmed in the block same as M102, alarm occurs.                                                                                                                                 |
| M206   | Spindle stop check                     | Checks the spindle STOP state of machine.<br>* When programmed in the blocks same as M107 and M108, alarm occurs.                                                                                                                      |
| M207   | Loading sp.<br>orientation comp. check | Checks the spindle orientation STOP state of machine, for loading the workpiece.                                                                                                                                                       |
| M208   | Discharge sp.<br>orientation comp. ck  | Checks the spindle orientation STOP state of machine, for unloading the workpiece.                                                                                                                                                     |
| M209   | M/C origin check                       | Checks the machine reference position state of machine.                                                                                                                                                                                |
| M210   | Loader call check                      | Checks the loader CALL of machine.<br>Simultaneously, checks shutter OPEN state, spindle STOP state, machine reference position and machine interlock preparation state.<br>* When programmed in the block same as M109, alarm occurs. |
| M211   | M/C origin 2 check                     | Checks the machine home position 2 state of machine.                                                                                                                                                                                   |

| M-code | Function                                          | Description                                                                                                           |
|--------|---------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| M230   | Loading work check<br>(ex.)                       | Checks the workpiece request OK signal of outside loading unit.                                                       |
| M231   | Ld. work uncl. check<br>(ex.)                     | Checks the loading workpiece unclamp completion signal of outside loading unit.                                       |
| M232   | Work dis. OK check (ex.)                          | Checks the workpiece unloading OK signal of outside unloading unit.                                                   |
| M233   | Dis. work clamp check<br>(ex.)                    | Checks the unloading workpiece clamp completion signal of outside unloading unit.                                     |
| M250   | Work ld. chk.<br>(work feeder)                    | Checks the workpiece loadable state of workpiece feeder.                                                              |
| M251   | work dis. chk.<br>(work feeder)                   | Checks the workpiece unloadable state of workpiece feeder.                                                            |
| M254   | Work turn check<br>(return)<br>(Main side only)   | Checks the workpiece reverse completion state of turn over equipment.                                                 |
| M255   | Work turn check<br>(turn)<br>(Main side only)     | Checks the workpiece reverse completion state of turn over equipment.<br>However, the turn over hand does not return. |
| M256   | Work turn check:Next<br>(Sub side only)           | Checks the workpiece reverse completion state of turn over equipment.                                                 |
| M257   | Turn hand return<br>check:Next<br>(Sub side only) | Checks the return completion state of the turn over hand.                                                             |
| M258   | Turn hand loosen<br>check:Next<br>(Sub side only) | Checks the turn over hand loosen completion state of sub side.                                                        |

## 10-4 Loader program (A, B, C type)

The following explains the loader program configuration, range of program No. and program size, etc.

### 1. Program memory

Program is memorized in the NC program memory area.

It will be handled in the same way as NC program.

Size of NC program memory area differs depending on the model.

### 2. Range of program No.

O8001 to O8899 can be used for program No.

- Note :
- (1) Since the programs of O8000 series are used for loader, they are protected. (NC parameter No. 3202 #0 = 1)
  - (2) O8900 to O8999 are used for workpiece setting of RAKU RAKU LOADER 4. Therefore, do not use any number in this range.
  - (3) O8-digit cannot be used.

### 3. Number of programs

Maximum number of loader programs is 50.

Note : Up to 50 NC program registrations are used.

In addition, since O8900 to O8999 are used for workpiece setting, etc. of RAKU RAKU LOADER 4, up to 100 are used.

Up to approx. 150 program registrations are used in total.

## 4. Program size

Maximum size of 1 program is 20KB.

Total size of all programs (up to 50) is 100KB at a maximum.

Program with the size exceeding the above will cause an error.

Note : For loader program, up to 100KB area of NC program memory is used.

In addition, since O8900 to O8999 are used for workpiece setting, etc. of RAKU RAKU LOADER 4, up to 262KB area is used.

## 5. Program protection

Programs are protected so that a loader program should not be executed as a machining program incorrectly.

### (1) Protection by NC parameter

"1" has been set to NC parameter No. 3202 #0 (NE8).

Therefore, programs of O8000 series cannot be edited.

Note : This parameter will automatically be set to "1" when the power is supplied or workpiece setting, etc. is performed by RAKU RAKU LOADER 4.

### (2) Protection by RAKU RAKU LOADER 4

RAKU RAKU LOADER 4 monitors the program No.

When a program of O8000 series is selected, the loader program cannot be started. (This is also included in the loader starting conditions.)

If a program of O8000 series is executed, an alarm will be given.

## 10-5 Loader program (D type)

The following explains the loader program configuration, range of program No. and program size, etc.

### 1. Program memory

Program is memorized in the NC program memory area.

### 2. Range of program No.

O0001 to O7999 can be used for program No.

- Note : (1) Since the programs of O8000 series are used for RAKU RAKU LOADER 4, they are protected. (NC parameter No. 3202 #0 = 1)
- (2) O8900 to O8999 are used for workpiece setting of RAKU RAKU LOADER 4. Therefore, do not use any number in this range.
- (3) O8-digit cannot be used.

### 3. Program protection

A program of O8000 series should not be executed as a machining program incorrectly.

#### (1) Protection by NC parameter

"1" has been set to NC parameter No. 3202 #0 (NE8).

Therefore, programs of O8000 series cannot be edited.

Note : This parameter will automatically be set to "1" when the power is supplied or workpiece setting, etc. is performed by RAKU RAKU LOADER 4.

(2) Protection by RAKU RAKU LOADER 4

RAKU RAKU LOADER 4 monitors the program No.

When a program of O8000 series is selected, the loader program cannot be started. (This is also included in the loader starting conditions.)

## 10-6 Loader program configuration (A, B, C type)

There are main programs and subprograms.

### 1. Main program

O8001 is the main program.

First position of this program is executed first.

### 2. Subprogram

Programs other than O8001 are subprograms.

It is called by M98 P\*\*\*\*.

Note : (1) Multiplicity of subprogram call by M98 from the main program is 4 at a maximum.

(2) If it exceeds 4, the alarm "BUFFER NUMBER OF PROGRAM CAN'T BE GET." will be given.

## 10-7 Loader program configuration (D type)

There are main programs and subprograms.

### 1. Main program

Usually O0001 is the main program.

However, main programs can be changed freely.

### 2. Subprogram

It is called by M98 P\*\*\*\*.

## 10-8 Loader program editing (A, B, C type)

Loader program editing is performed on the NC program screen in the same way as NC program.

### 1. Program editing procedure

Follow the procedure below for program editing.

|                                                                                                                                        |                                                                                                                                                                                                   |
|----------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Change the system setting of RAKU RAKU loader 4 for loader program editing.<br/>         Procedure is the following ( ① to ⑥ ).</p> |                                                                                                                                                                                                   |
| ①                                                                                                                                      | <p>Press  [MDI mode select switch] on the main operation panel.</p>                                              |
| ②                                                                                                                                      | <p>Set  [Edit switch] on the main operation panel to [Valid].<br/>         This switch is provided with key.</p> |
| ③                                                                                                                                      | <p>Press [LOADER] key on the main operation panel to display the main screen of RAKU RAKU loader 4.</p>        |
| (1)                                                                                                                                    | <p>Press [SYSTEM] key on the main screen of RAKU RAKU loader 4 to display the system setting screen.</p>       |
| ④                                                                                                                                      | <p>Set [EDIT PERMISSION OF PROGRAM] on the system setting screen to [ON].</p>                                  |
| ⑤                                                                                                                                      | <p>Return  [Edit switch] on the main operation panel to [Invalid].</p>                                         |
| (2)                                                                                                                                    | <p>Press  [Edit mode select switch] on the main operation panel.</p>                                           |

|                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (3)                                                                                                       |  Set [Edit switch] on the main operation panel to [Valid]. This switch is provided with key.                                                                                                                                                                                          |
| (4)                                                                                                       | Press [PROGRAM] key to display the NC program screen.<br>                                                                                                                                                                                                                             |
| (5)                                                                                                       | Edit the loader programs.<br>Loader programs are between O8001 and O8899.<br>Check the restrictions and precautions for loader program.<br>After editing the loader program, be sure to return the program No. to the machining program No. before editing. (Make a note before editing.)<br>When a program of O8000 series is selected, the loader cannot be started. |
| Return the system setting of RAKU RAKU loader 4 to the original one. Procedure is the following (① to ⑥). |                                                                                                                                                                                                                                                                                                                                                                        |
| ①                                                                                                         | Press  [MDI mode select switch] on the main operation panel.                                                                                                                                                                                                                         |
| ②                                                                                                         | Set  [Edit switch] on the main operation panel to [Valid]. This switch is provided with key.                                                                                                                                                                                        |
| ③                                                                                                         | Press [LOADER] key on the main operation panel to display the main screen of RAKU RAKU loader 4.<br>                                                                                                                                                                                |
| (6)                                                                                                       | Press [SYSTEM] key on the main screen of RAKU RAKU loader 4 to display the system setting screen.<br>                                                                                                                                                                               |
| ⑤                                                                                                         | Set [EDIT PERMISSION OF PROGRAM] on the system setting screen to [OFF].<br>                                                                                                                                                                                                         |

- |     |                                                                                   |                                                                                                                                                                                                                                                     |
|-----|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (6) |  | Return  [Edit switch] on the main operation panel to [Invalid].                                                                                                    |
| (7) |                                                                                   | Return  [Edit switch] to [Invalid] after editing.<br>To protect the program, remove the key with the switch set to [Invalid].<br>Safety manager must keep the key. |
| (8) |                                                                                   | After editing, press  [Program reset] button.                                                                                                                      |

## 2. Restrictions and precautions for program

There are some restrictions on the program creating method and the functions.

The following is the different points from NC program.

### (1) Calculation command

Any calculation command other than addition (+), subtraction (-), multiplication (\*) and division (/) cannot be used.

Functions such as AND, OR, SIN and COS cannot be used, either.

### (2) Control command

- GOTO statement of unconditional branch, conditional branch  
GOTO statement of control command searches the sequence No. downward.

If there is no sequence No. downward, it will search upward.

If the sequence No. cannot be found, an alarm will be given.

- GO statement of unconditional branch, conditional branch  
GO statement of control command searches the sequence No. from the beginning.

If there is no sequence No., an alarm will be given.

- IF statement

Calculation command (+, -, \*, /) must not be used in [ ] of IF statement.

THEN of IF [ ] THEN cannot be used.

- Repetition statement

WHILE statement cannot be used for repetition.

Use DO\* - END\* for repetition. (\*: 1 to 3)

### (3) Macro call

Simple macro call (G65) cannot be performed.

Other calls cannot be performed, either.

- Move command call, each block call
- Macro call by G-code, M-code or T-code
- Subprogram macro call by M-code or S-code

- Subprogram macro call by 2nd auxiliary function or specific address.

(4) Interruption type custom macro

Interruption type custom macro cannot be used.

(5) External output command

External output command (BPRNT, DPRNT, POPEN, PCLOS) cannot be used.

(6) Range of command

| Item                                 | Description                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Usable variable                      | Common variable: #1 to #33, #100 to #149 (non-hold type)<br>Loader variable: #500 to #699 (non-hold type)<br>Common variable: #700 to #999 (hold type)<br>System variable:<br>Interface signal<br>#1000 to #1031, #1040 to #1055<br>#1100 to #1135<br>Position information<br>#5021- Machine coordinate<br>#5041- Workpiece coordinate<br>#5061- Skip position |
| Usable constant value                | Max. value $\pm 999999999$<br>Max. number of digits for command is 9-digit in decimal notation.<br>Even if a value exceeding 9-digit is commanded, an error will not occur.                                                                                                                                                                                    |
| Multiplicity of subprogram call      | 4 at a maximum                                                                                                                                                                                                                                                                                                                                                 |
| Identification number for repetition | 1 to 3                                                                                                                                                                                                                                                                                                                                                         |
| Multiplicity of [ ]                  | 1 at a maximum                                                                                                                                                                                                                                                                                                                                                 |

Note : There is no relationship with or effect on the custom macro variable of NC.

Value of variable cannot be set. (Value can be checked on a screen of RAKU RAKU loader 4.)

Variables between #700 and #999 are hold type.

Variables other than those are non-hold type.

(7) Sequence No.

Command the sequence No. N individually.

If it is commanded in the same block as the macro statement,  
an alarm will be given.

(8) Abbreviation

EN\* which is an abbreviation of END\* cannot be used.

If used, an alarm will be given.

(9) Parameter

Loader program does not have any relationship with the custom  
macro of NC.

Even if a parameter related to custom macro is set, it will not  
have any effect on the loader program.

(10) Overlap of feeding block

If M95 is commanded in G0 move command block, the next  
block will be executed when the speed is decreased before  
command position. (1-shot valid)

This will function when "overlap of feeding block" is set to "Valid"  
by the system setting of RAKU RAKU loader 4.

Make sure that there is no interference with the machine.

Note : Do not command M95 for move command of same axes.

Example) G0 X-100. M95 ;

G0 X-200. ;

## Overlap operation

Example) Workpiece delivery in machine

O8040

• • •

|                |   |                                                                     |
|----------------|---|---------------------------------------------------------------------|
| G0 Z#510 M95 ; | } | Overlap will function when the axis<br>moves to X-axis from Z-axis. |
| X#512 M107 ;   |   |                                                                     |

M207 ;

G0 Z[#513+#514] ;

G1 Z#513 F5000

M140 T400 ;

M92 ;

|                   |   |                                                                     |
|-------------------|---|---------------------------------------------------------------------|
| G0Z#504 M95 ;     | } | Overlap will function when the axis<br>moves to X-axis from Z-axis. |
| X#503 M101 M110 ; |   |                                                                     |

• • •

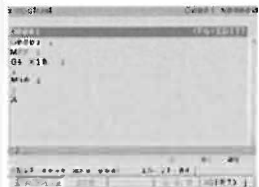
M99 ;

## 10-9 Loader program editing (D type)

Loader program editing is performed on the NC program screen in the same way as NC program.

### 1. Program editing procedure

Follow the procedure below for program editing.

|     |                                                                                                                                                                                                                                                       |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (1) | Procedure is the following.                                                                                                                                                                                                                           |
| (2) | Press  [Edit mode select switch] on the main operation panel.                                                                                                        |
| (3) | Set  [Edit switch] on the main operation panel to [Valid].<br>This switch is provided with key.                                                                      |
| (4) | Press [PROGRAM] key to display the NC program screen.<br>                                                                                                          |
| (5) | Edit the loader programs.<br>Loader programs are between O0001 and O7999.<br>When a program of O8000 series is selected, the loader cannot be started.                                                                                                |
| (6) | Return  [Edit switch] to [Invalid] after editing.<br>To protect the program, remove the key with the switch set to [Invalid].<br>Safety manager must keep the key. |
| (7) | After editing, press  [Program reset] button.                                                                                                                      |

## 10-10 Precautions (A, B, C type)

### WARNING

If a loader program is created, do not start the operation immediately by using the program.

Check each step of the created program to make sure that all the operations are appropriate and that the loader does not hit the workpiece or machine.

If it hits, the loader or machine could be broken or it could cause injury.

Do not execute any program of O8000 series as a machining program.

Do not execute any program of O8000 series by M98 (Call the sub program) or G65 (Macro call) from the machining program, either.

### CAUTION

There are some restrictions on the loader programming.

Check the restrictions.

Some operations, which can be performed by NC program, cannot be performed by loader program.

Pay special attention when using "Feeding block overlap" function.

Execute the next block when the feeding block decelerates.

Make sure that there is no interference with the machine.

## 10-11 Precautions (D type)

### WARNING

If a loader program is created, do not start the operation immediately by using the program.

Check each step of the created program to make sure that all the operations are appropriate and that the loader does not hit the workpiece or machine.

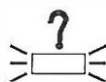
If it hits, the loader or machine could be broken or it could cause injury.

Do not execute any program of O8000 series as a machining program.

Do not execute any program of O8000 series by M98 (Call the sub program) or G65 (Macro call) from the machining program, either.

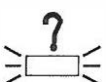
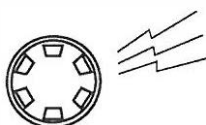
## 11 MEASURES FOR ALARM

### 11-1 Release of alarm



When [Alarm indication lamp] flickers, remove the cause of alarm and press [Alarm reset switch] to release the alarm.

However, when equipment becomes feed hold, remove the cause and press [RESET] key on MDI panel before pressing [Alarm reset switch].



When the buzzer sounds and [Alarm indicating lamp] flickers, press the [Alarm reset switch] to stop the [Buzzer].

When removing the cause of alarm and pressing this [Alarm reset switch] again, the alarm is released.

#### CAUTION

- \* If any alarm listed in [11-2 Alarm list (A, B, C type)] and [11-3 Alarm list (D type)] is displayed, be sure to press the [Alarm reset switch] to release the alarm.

## 11-2 Alarm list (A, B, C type)

| Alarm No. | Alarm Message                        | Cause and Measures                                                                                                                                                                                                                                                                     |
|-----------|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2500      | CHECK DETECTOR FOR<br>LOADERHAND     | Auto switches to detect hand positions are simultaneously turned ON.<br>* Check and repair switches.                                                                                                                                                                                   |
| 2501      | HAND TIGHTEN<br>MOVEMENT ALARM       | Completion signal is not output even after the loading or unloading hand tightening operation is performed for a certain period of time.<br>* Check and repair the auto switch at the hand tightening end.                                                                             |
| 2502      | HAND TURN/RETURN<br>MOVEMENT ALARM   | Completion signal is not output even after the hand turn/return operation is performed for a certain period of time.<br>* Check and repair the auto switch at the hand turn/return end.                                                                                                |
| 2503      | UNCHECKED M222-SIG ON<br>PROGRAM TOP | M222 (M code in first position of program) is not confirmed on the first position of program.<br>* Add M222 to the first position of program. Since cursor is not returned to the first position of program, return the cursor to the first position of program and start the program. |
| 2504      | CYCLE TIME OVER                      | It is detected the cycle time over that set by PMC timer 101, at automatic operation.<br>* Change time setting or loader, lathe malfunction.                                                                                                                                           |
| 2505      | S-SIGNAL NOT COMPLETED               | After S signal is executed and then passed over the set of PMC timer 102, this case can not outlet the completion signal.<br>* Check the S signal and its operation.                                                                                                                   |
| 2506      | PARAMETER MIS-SET                    | Both side set by parameter 1, K42 0-bit (workpiece feeder loading spec.) and 1-bit (workpiece feeder unloading spec.) or K42 2-bit (workpiece feeder fixed spec.) and K54 2-bit (workpiece pusher spec.).<br>* Set parameter 1 to one of both sides only.                              |

| Alarm No. | Alarm Message                    | Cause and Measures                                                                                                                                                                     |
|-----------|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2507      | SEARCH NO. CHANGE IN OPERATION   | Program search No. is changed during automatic operation of loader.<br>* Stop the loader and change the search No.                                                                     |
| 2508      | MAIN PNEUMATIC FAILS             | Main air pressure reduces.<br>* Check air pressure level.                                                                                                                              |
| 2509      | NOT MOVE AREA IN LOADER          | Loader exceeds shiftable area.<br>* Correct program or area.                                                                                                                           |
| 2510      | CONNECT READY OFF DURING LOADING | Machine interlock preparation mode is turned OFF while loader is approaching to machine.                                                                                               |
| 2511      | WORK FEEDER SUPPLY SIDE M-SIGNAL | Invalid M signal (M10, M11, M14, M150 or M250) is commanded when workpiece feeder is operated at unloading spec.<br>Reference : (10-2 M-function (A, B, C type))<br>* Correct program. |
| 2512      | WORK FEEDER EJECT SIDE M-SIGNAL  | Invalid M signal (M12, M13, M15, M151 or M250) is commanded when workpiece feeder is operated at loading spec.<br>Reference : (10-2 M-function (A, B, C type))<br>* Correct program.   |
| 2513      | S CODE OVER                      | Too much the command of spindle orientation value.<br>* Correct program.                                                                                                               |
| 2514      | WORK FEEDER ALARM                | An alarm workpiece feeder has been given when M250 or M251 is commanded.<br>* Release the alarm.                                                                                       |
| 2515      | UNCHECKED PALLET AT HOME         | When the pallet is not stopped at orientation, M150 (Workpiece feeder loading start) and M151 (Workpiece feeder unloading start) are commanded.<br>* Stop the pallet to orientation.   |
| 2516      | MACHINE ILK. READY IS OFF        | When machine interlock preparation is turned OFF, M210 (Loader call check completion: A) and M410 (Loader call check completion: B) are commanded.                                     |
| 2517      | DUPLICATION OF M-SIGNAL (LOADER) | M signal on loader side that cannot be duplicated in the same block by program is commanded.<br>* Correct program.                                                                     |

| Alarm No. | Alarm Message                                                         | Cause and Measures                                                                                                                                                                  |
|-----------|-----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2518      | DUPLIERR OF M-SIG<br>(FEEDER)                                         | M signal on workpiece feeder side that cannot be duplicated in the same block by program is commanded.<br>* Correct program.                                                        |
| 2519      | DUPLIERR OF M-SIG<br>(CONVEYOR)                                       | M signal on conveyor side that cannot be duplicated in the same block by program is commanded.<br>* Correct program.                                                                |
| 2520      | DUPLIERR OF M-SIG<br>(I/O)                                            | M signal (M100 ~ M400 series) for machine I/O that cannot be duplicated in the same block by program is commanded.<br>* Correct program.                                            |
| 2521      | DUPLIERR OF M-SIG<br>(REV UNIT)                                       | M signal on turn over equipment side that cannot be duplicated in the same block by program is commanded.<br>* Correct program.                                                     |
| 2522      | DUPLIERR OF M-SIG<br>(MEAS. UNIT)                                     | M signal on measuring instrument side that cannot be duplicated in the same block by program is commanded.<br>* Correct program.                                                    |
| 2523      | OVERARIA OF LOADER<br>OPERATION                                       | Loader exceeds shiftable area.<br>* Correct program or area.                                                                                                                        |
| 2524      | AUTO. REF. RETURN TIME<br>OVER                                        | After loader automatic REF. return signal is executed and then passed over the set of PMC timer 110, this case can not complete the operation.<br>* Check the loader operation.     |
| 2525      | LOADER EMERGENCY STOP                                                 | [Emergency stop switch] of machine operation panel or loader pendant is pressed.<br>* Release emergency by turning the switch to right.                                             |
| 2526      | REPLACE A BATTERY<br>IMMEDIATELY. IT BECOMES<br>RESTART IMPOSSIBILITY | Voltage of battery for back-up drops.<br>After power distribution, replace the battery with new one.<br>Note : If the battery is replaced with power disconnected, data is deleted. |

| Alarm No. | Alarm Message                                    | Cause and Measures                                                                                                                                                                                 |
|-----------|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2527      | LOADER READY ALARM                               | * Press [READY switch]. When the same alarm occurs even if [READY switch] is pressed again, contact our service engineer.                                                                          |
| 2528      | CLOSE SAFETY COVER                               | Safety cover opens.<br>* Close the safety cover.                                                                                                                                                   |
| 2529      | CLOSE MACHINE DOOR                               | The safety door of machine opens while the loader is automatically operating.<br>* Close the safety door of machine.                                                                               |
| 2530      | JAM THE WORKPIECE<br>(STOPPED CHIP-<br>CONVEYOR) | When the loader unloads the workpiece, since the workpiece falls in the machine, the chip conveyor is stopped.                                                                                     |
| 2531      | LOADING LIFTER<br>SW. CHECK                      | Proximity switches on top and bottom of loading lifter are simultaneously turned ON.<br>* Inspect and repair the switches.                                                                         |
| 2532      | DISCHARGE LIFTER<br>SW. CHECK                    | Proximity switches on top and bottom of unloading lifter are simultaneously turned ON.<br>* Inspect and repair the switches.                                                                       |
| 2533      | CLOSE FEEDER COVER &<br>PUSH CYCLE START         | Work feeder safety cover is open.<br>* Close the safety cover.<br>* Check and repair the safety switch.                                                                                            |
| 2534      | WORK FEEDER MOTOR<br>OVERLOAD                    | The alarm of inverter occurs because the motor for the workpiece feeder is overloaded.<br>* After checking and repairing the workpiece feeder, press the RESET switch of inverter.                 |
| 2535      | WORK FEEDER LOADING/<br>UNLOADING TIME OVER      | After work load and unload signal is executed and then passed over the set of PMC timer 103, this case can not complete the operation.<br>* Check each operation of workpiece loading / unloading. |
| 2536      | WORK FEEDER ROTARY<br>TIME OVER                  | After rotation of workpiece feeder signal is executed and then passed over the set of PMC timer 104, this case can not complete the operation.<br>* Check the operation of workpiece feeder.       |

| Alarm No. | Alarm Message                             | Cause and Measures                                                                                                                                                                                                                                                                                                |
|-----------|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2537      | WORK PIECE OVER STOCK                     | <p>Number of loaded workpieces exceeds the limit.<br/>Lifter is at the work feeder loading position and cannot be lifted.</p> <ul style="list-style-type: none"> <li>* Check the number of loaded workpieces.</li> <li>* Check the lifter operation.</li> <li>* Check and repair the proximity switch.</li> </ul> |
| 2538      | NG COUNT UP                               | The message is displayed in the M122 command.                                                                                                                                                                                                                                                                     |
| 2539      | WORK FEEDER LD. LIFT MOTOR OVERLOAD       | <p>The alarm of inverter occurs because the motor for the workpiece feeder loading lifter is overloaded.</p> <ul style="list-style-type: none"> <li>* After checking and repairing the workpiece feeder, press the RESET switch of inverter.</li> </ul>                                                           |
| 2540      | WORK FEEDER DIS. LIFT MOTOR OVERLOAD      | <p>The alarm of inverter occurs because the motor for the workpiece feeder unloading lifter is overloaded.</p> <ul style="list-style-type: none"> <li>* After checking and repairing the workpiece feeder, press the RESET switch of inverter.</li> </ul>                                                         |
| 2541      | REVERSE UNIT TURN/ RETURN SW. CHECK       | <p>Rotated and returned lead switches of turn over hand are simultaneously turned ON.</p> <ul style="list-style-type: none"> <li>* Check and repair switches.</li> </ul>                                                                                                                                          |
| 2542      | REVERSE UNIT FORWARD/ REVERSE SW. CHECK   | <p>Forwarded and reversed lead switches of turn over hand are simultaneously turned ON.</p> <ul style="list-style-type: none"> <li>* Check and repair switches.</li> </ul>                                                                                                                                        |
| 2543      | REVERSE UNIT CYCLE TIME OVER              | <p>After turn over cycle signal is executed and then passed over the set of PMC timer 106, this case can not complete the operation.</p> <ul style="list-style-type: none"> <li>* Check each operation for workpiece reverse.</li> </ul>                                                                          |
| 2544      | WORK FEEDER LOADING LIFTER UP TIME OVER   | <p>Loading lifter does not stop lifting even after the elapse of a certain period of time.</p> <ul style="list-style-type: none"> <li>* Check the proximity switch at the loading lifter lifting end.</li> </ul>                                                                                                  |
| 2545      | WORK FEEDER LOADING LIFTER DOWN TIME OVER | <p>Loading lifter does not stop lowering even after the elapse of a certain period of time.</p> <ul style="list-style-type: none"> <li>* Check the proximity switch at the loading lifter lowering end.</li> </ul>                                                                                                |

| Alarm No. | Alarm Message                                                 | Cause and Measures                                                                                                                                                                                                                                                                                                         |
|-----------|---------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2546      | WORK FEEDER DISCHARGE<br>LIFTER UP TIME OVER                  | Unloading lifter does not stop lifting even after the elapse of a certain period of time.<br><br>* Check the proximity switch at the unloading lifter lifting end.                                                                                                                                                         |
| 2547      | WORK FEEDER DISCHARGE<br>LIFTER DOWN TIME OVER                | Unloading lifter does not stop lowering even after the elapse of a certain period of time.<br><br>* Check the proximity switch at the unloading lifter lowering end.                                                                                                                                                       |
| 2548      | SET MACHINE TO CONNECT<br>READY                               | When M signal (M100, M300 series) for machine I/O is commanded, the machine interlock condition is turned OFF.<br><br>* Prepare the machine in interlock state.<br>[Reference : 7-2 Interlock preparation]                                                                                                                 |
| 2549      | SET MACHINE TO<br>CONNECT READY AND<br>STOP MACHINE & SPINDLE | When M signal (M100, M300 series) for machine I/O is commanded, the machine interlock condition is turned OFF, the machine is operating or the spindle is rotating.<br><br>* Prepare the machine in interlock state and operate the machine.<br>At this time, stop the spindle.<br>[Reference : 7-2 Interlock preparation] |
| 2550      | EXIT LOADER FORM<br>MACHINE                                   | The loader is not shifted to the outside of machine within 180 seconds after commanding M101, M301 (Door (shutter) CLOSE) with the loader positioned inside of machine.<br><br>* Shift the loader to the outside of machine (return vertical axis to reference position).<br>Also, correct the program.                    |
| 2551      | STOP MACHINE                                                  | The machine is not stopped within 10 seconds after commanding M106 or M306 (air blow command) during machine operation.<br><br>* Stop the machine or correct the program.                                                                                                                                                  |

| Alarm No. | Alarm Message                                                          | Cause and Measures                                                                                                                                                                                                                                                |
|-----------|------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2552      | CHECK LOADER POSITION                                                  | The loader is not entered in the machine automatic operation start range within 180 seconds after commanding M110 or M310 (machine automatic operation start).<br>Or the loader was in the interference area.<br>* Check loader position or correct the program.  |
| 2553      | CHUCK NOT CLAMPED                                                      | M110 or M310 (machine automatic operation start) is commanded when the chuck is unclamped.<br>* Clamp the chuck or correct the program.                                                                                                                           |
| 2554      | SET MACHINE TO CONNECT READY AND STOP MACHINE                          | When M signal (M100, M300 series : spindle rotation, reverse rotation, stop command) for machine I/O is commanded, the machine interlock condition is turned OFF or the machine is operating.<br>* Prepare the machine in interlock state and stop the operation. |
| 2555      | FUNCTION COMMAND PROCESSING ALARM                                      | * Turn ON power again and press [READY switch].<br>If the same alarm occurs, contact our service engineer.                                                                                                                                                        |
| 2556      | NO WORKPIECE                                                           | Raw material (workpiece) is eliminated.<br>* Load the workpiece.                                                                                                                                                                                                  |
| 2557      | FULL WORKPIECE                                                         | Workpieces are full.<br>* Unload the workpiece.                                                                                                                                                                                                                   |
| 2558      | SAFETY GUARD INTERLOCK SW. OFF AT OVERRIDE 25% OR 10% WHEN MANUAL MODE | This is actually-displayed message.<br>* When setting teaching mode to INVALID [Safety door interlock VALID] or selecting the mode except axis travel mode, the message disappears.                                                                               |

| Alarm No. | Alarm Message                     | Cause and Measures                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2563      | LOADER M** ARE NOT COMPLETE       | <p>The completion signal is not output even if the time set by the PMC timer 102 elapsed after the M-code was executed.</p> <ul style="list-style-type: none"> <li>* Check the M-code and its action.</li> <li>* Check the hydraulic pressure, air supply.</li> <li>* Check each driving system.</li> <li>* Check the completion confirmation switches or adjust its again or repair its.</li> <li>* M code number that did not complete is entered in **.</li> </ul> |
| 2564      | WORK FEEDER DISCHARGE READY ALARM | <p>Within the time set by the PMC timer 125, it was not possible to detect the workpiece to unloading lifter rising.</p> <p>Or was still detected a workpiece falling.</p> <ul style="list-style-type: none"> <li>* Check the M-code and its action.</li> <li>* Check the workpiece detect switches or adjust its again or repair its.</li> </ul>                                                                                                                     |

## 11-3 Alarm list (D type)

| Alarm No.            | Alarm Message                                                                  | Cause and Measures                                                                                                                                                                                                                                                                   |
|----------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| R : 1500<br>L : 1700 | R:CHECK DETECTOR FOR<br>LOADER HAND<br>L:CHECK DETECTOR FOR<br>LOADER HAND     | Auto switches to detect hand positions are simultaneously turned ON.<br>* Check and repair switches.                                                                                                                                                                                 |
| R : 1501<br>L : 1701 | R:HAND TIGHTEN<br>MOVEMENT ALARM<br>L:HAND TIGHTEN<br>MOVEMENT ALARM           | Completion signal is not output even after the loading or unloading hand tightening operation is performed for a certain period of time.<br>* Check and repair the auto switch at the hand tightening end.                                                                           |
| R : 1502<br>L : 1702 | R:HAND TURN/RETURN<br>MOVEMENT ALARM<br>L:HAND TURN/RETURN<br>MOVEMENT ALARM   | Completion signal is not output even after the hand turn/return operation is performed for a certain period of time.<br>* Check and repair the auto switch at the hand turn/return end.                                                                                              |
| R : 1510<br>L : 1710 | R:UNCHECKED M22-SIG ON<br>PROGRAM TOP<br>L:UNCHECKED M22-SIG ON<br>PROGRAM TOP | M22 (M code in first position of program) is not confirmed on the first position of program.<br>* Add M22 to the first position of program. Since cursor is not returned to the first position of program, return the cursor to the first position of program and start the program. |
| R : 1511<br>L : 1711 | R:LOADER CYCLE TIME<br>OVER<br>L:LOADER CYCLE TIME<br>OVER                     | It is detected the cycle time over that set by PMC timer 101, at automatic operation.<br>* Change time setting or loader, lathe malfunction.                                                                                                                                         |
| R : 1512<br>L : 1712 | R:S-SIGNAL NOT<br>COMPLETED<br>L:S-SIGNAL NOT<br>COMPLETED                     | After S signal is executed and then passed over the set of PMC timer 102, this case can not outlet the completion signal.<br>* Check the S signal and its operation.                                                                                                                 |
| R : 1513<br>L : 1713 | R:PARAMETER MIS-SET<br>L:PARAMETER MIS-SET                                     | Both side set by parameter 1, K42 0-bit (workpiece feeder loading spec.) and 1-bit (workpiece feeder unloading spec.) or K42 2-bit (workpiece feeder fixed spec.) and K54 2-bit (workpiece pusher spec.).<br>* Set parameter 1 to one of both sides only.                            |

| Alarm No.            | Alarm Message                                                                  | Cause and Measures                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| R : 1514<br>L : 1714 | R:SEARCH NO. CHANGE IN<br>OPERATION<br>L:SEARCHNO. CHANGE IN<br>OPERATION      | Program search No. is changed during automatic operation of loader.<br>* Stop the loader and change the search No.                                                                                                                                                                                                                                                                         |
| R : 1515<br>L : 1715 | R:MAIN PNEUMATIC FAILS<br>L:MAIN PNEUMATIC FAILS                               | Main air pressure reduces.<br>* Check air pressure level.                                                                                                                                                                                                                                                                                                                                  |
| R : 1516<br>L : 1716 | R:NOT MOVE ARIA IN<br>LOADER<br>L:NOT MOVE ARIA IN<br>LOADER                   | Loader exceeds shiftable area.<br>* Correct program or area.                                                                                                                                                                                                                                                                                                                               |
| R : 1517<br>L : 1717 | R:CONNECT READY OFF<br>DUR LOADING<br>L:CONNECT READY OFF<br>DUR LOADER        | Machine interlock preparation mode is turned OFF while loader is approaching to machine.                                                                                                                                                                                                                                                                                                   |
| R : 1520<br>L : 1720 | R:WORK FEEDER SUPPLY<br>SIDE M-SIG AL<br>L:WORK FEEDER SUPPLY<br>SIDE M-SIG AL | Invalid M signal (M10, M11, M14, M150 or M250) is commanded when workpiece feeder is operated at unloading spec.<br>Reference : (10-3 M-function (D type))<br>* Correct program.                                                                                                                                                                                                           |
| R : 1521<br>L : 1721 | R:WORK FEEDER EJECT<br>SIDE M-SIG AL<br>L:WORK FEEDER EJECT<br>SIDE M-SIG AL   | Invalid M signal (M12, M13, M15, M151 or M250) is commanded when workpiece feeder is operated at loading spec.<br>Reference : (10-3 M-function (D type))<br>* Correct program.                                                                                                                                                                                                             |
| R : 1522<br>L : 1722 | R:S CODE OVER<br>L:S CODE OVER                                                 | Too much the command of spindle orientation value.<br>* Correct program.                                                                                                                                                                                                                                                                                                                   |
| R : 1523<br>L : 1723 | R:LOADER M** ARE NOT<br>COMPLETE<br>L:LOADER M** ARE NOT<br>COMPLETE           | The completion signal is not output even if the time set by the PMC timer 102 elapsed after the M-code was executed.<br>* Check the M-code and its action.<br>* Check the hydraulic pressure and air supply.<br>* Check each driving system.<br>* Check the completion confirmation switches or adjust its again or repair its.<br>* M code number that did not complete is entered in **. |

| Alarm No.            | Alarm Message                                                          | Cause and Measures                                                                                                                                                                   |
|----------------------|------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| R : 1524<br>L : 1724 | R:WORK FEEDER ALARM<br>L:WORK FEEDER ALARM                             | An alarm workpiece feeder has been given when M250 or M251 is commanded.<br>* Release the alarm.                                                                                     |
| R : 1525<br>L : 1725 | R:UNCHECKED PALLET AT HOME<br>L:UNCHECKED PALLET AT HOME               | When the pallet is not stopped at orientation, M150 (Workpiece feeder loading start) and M151 (Workpiece feeder unloading start) are commanded.<br>* Stop the pallet to orientation. |
| R : 1526<br>L : 1726 | R:MACHINE ILK. READY IS OFF<br>L:MACHINE ILK. READY IS OFF             | When machine interlock preparation is turned OFF, M210 (Loader call check completion) is commanded.                                                                                  |
| R : 1540<br>L : 1740 | R:DUPLI ERR OF M-SIG (LOADER)<br>L:DUPLI ERR OF M-SIG (LOADER)         | M signal on loader side that cannot be duplicated in the same block by program is commanded.<br>* Correct program.                                                                   |
| R : 1541<br>L : 1741 | R:DUPLI ERR OF M-SIG (FEEDER)<br>L:DUPLI ERR OF M-SIG (FEEDER)         | M signal on workpiece feeder side that cannot be duplicated in the same block by program is commanded.<br>* Correct program.                                                         |
| R : 1542<br>L : 1742 | R:DUPLI ERR OF M-SIG (CONVEYOR)<br>L:DUPLI ERR OF M-SIG (CONVEYOR)     | M signal on conveyor side that cannot be duplicated in the same block by program is commanded.<br>* Correct program.                                                                 |
| R : 1543<br>L : 1743 | R:DUPLI ERR OF M-SIG (I/O)<br>L:DUPLI ERR OF M-SIG (I/O)               | M signal (M100 to M200 series) for machine I/O that cannot be duplicated in the same block by program is commanded.<br>* Correct program.                                            |
| R : 1544<br>L : 1744 | R:DUPLI ERR OF M-SIG (REV UNIT)<br>L:DUPLI ERR OF M-SIG (REV UNIT)     | M signal on turn over equipment side that cannot be duplicated in the same block by program is commanded.<br>* Correct program.                                                      |
| R : 1545<br>L : 1745 | R:DUPLI ERR OF M-SIG (MEAS. UNIT)<br>L:DUPLI ERR OF M-SIG (MEAS. UNIT) | M signal on measuring instrument side that cannot be duplicated in the same block by program is commanded.<br>* Correct program.                                                     |

| Alarm No.            | Alarm Message                                                                                                                                            | Cause and Measures                                                                                                                                                                  |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| R : 1550<br>L : 1750 | R:OVER AREA OF LOADER<br>OPERATION<br>C:OVER AREA OF LOADER<br>OPERATION                                                                                 | Loader exceeds shiftable area.<br>* Correct program or area.                                                                                                                        |
| R : 1551<br>L : 1751 | R:AUTO. REF. RETURN TIME<br>OVER<br>C:AUTO. REF. RETURN TIME<br>OVER                                                                                     | After loader automatic REF. return signal is executed and then passed over the set of PMC timer 110, this case can not complete the operation.<br>* Check the loader operation.     |
| R : 1552<br>L : 1752 | R:LOADER EMERGENCY<br>STOP<br>C:LOADER EMERGENCY<br>STOP                                                                                                 | [Emergency stop switch] of machine operation panel or loader pendant is pressed.<br>* Release emergency by turning the switch to right.                                             |
| R : 1553<br>L : 1753 | R:REPLACE A BATTERY<br>IMMEDIATELY. IT<br>BECOMES RESTART<br>IMPOSSIBILITY<br>L:REPLACE A BATTERY<br>IMMEDIATELY. IT<br>BECOMES RESTART<br>IMPOSSIBILITY | Voltage of battery for back-up drops.<br>After power distribution, replace the battery with new one.<br>Note : If the battery is replaced with power disconnected, data is deleted. |
| R : 1554<br>L : 1754 | R:LOADER READY ALARM<br>L:LOADER READY ALARM                                                                                                             | * Press [READY switch]. When the same alarm occurs even if [READY switch] is pressed again, contact our service engineer.                                                           |
| R : 1555<br>L : 1755 | R:CLOSE SAFETY COVER<br>L:CLOSE SAFETY COVER                                                                                                             | Safety cover opens.<br>* Close the safety cover.                                                                                                                                    |
| R : 1556<br>L : 1756 | R:CLOSE MACHINE DOOR<br>L:CLOSE MACHINE DOOR                                                                                                             | The safety door of machine opens while the loader is automatically operating.<br>* Close the safety door of machine.                                                                |
| R : 1557<br>L : 1757 | R:JAM THE WORKPIECE<br>(STOPPED CHIP-<br>CONVEYOR)<br>L:JAM THE WORKPIECE<br>(STOPPED CHIP-<br>CONVEYOR)                                                 | When the loader unloads the workpiece, since the workpiece falls in the machine, the chip conveyor is stopped.                                                                      |

| Alarm No.            | Alarm Message                                                                                  | Cause and Measures                                                                                                                                                                                                                             |
|----------------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| R : 1560<br>L : 1760 | R:LOADING LIFTER<br>SW. CHECK<br>L:LOADING LIFTER<br>SW. CHECK                                 | Proximity switches on top and bottom of loading lifter are simultaneously turned ON.<br>* Inspect and repair the switches.                                                                                                                     |
| R : 1561<br>L : 1761 | R:DISCHARGE LIFTER<br>SW. CHECK<br>L:DISCHARGE LIFTER<br>SW. CHECK                             | Proximity switches on top and bottom of unloading lifter are simultaneously turned ON.<br>* Inspect and repair the switches.                                                                                                                   |
| R : 1562<br>L : 1762 | R:CLOSE FEEDER COVER &<br>PUSH CYCLE START<br>L:CLOSE FEEDER COVER &<br>PUSH CYCLE START       | Work feeder safety cover is open.<br>* Close the safety cover.<br>* Check and repair the safety switch.                                                                                                                                        |
| R : 1563<br>L : 1763 | R:WORK FEEDER MOTOR<br>OVERLOAD<br>L:WORK FEEDER MOTOR<br>OVERLOAD                             | The alarm of inverter occurs because the motor for the workpiece feeder is overloaded.<br>* After checking and repairing the workpiece feeder, press the RESET switch of inverter.                                                             |
| R : 1564<br>L : 1764 | R:WORK FEEDER LOADING/<br>UNLOADING TIME OVER<br>L:WORK FEEDER LOADING/<br>UNLOADING TIME OVER | After work load and unload signal is executed and then passed over the set of PMC timer 103, this case can not complete the operation.<br>* Check each operation of workpiece loading / unloading.                                             |
| R : 1565<br>L : 1765 | R:WORK FEEDER ROTARY<br>TIME OVER<br>L:WORK FEEDER ROTARY<br>TIME OVER                         | After rotation of workpiece feeder signal is executed and then passed over the set of PMC timer 104, this case can not complete the operation.<br>* Check the operation of workpiece feeder.                                                   |
| R : 1566<br>L : 1766 | R:WORK PIECE OVER<br>STOCK<br>L:WORK PIECE OVER<br>STOCK                                       | Number of loaded workpieces exceeds the limit.<br>Lifter is at the work feeder loading position and cannot be lifted.<br>* Check the number of loaded workpieces.<br>* Check the lifter operation.<br>* Check and repair the proximity switch. |
| R : 1567<br>L : 1767 | R:NG COUNT UP<br>L:NG COUNT UP                                                                 | The message is displayed in the M122 command.                                                                                                                                                                                                  |

| Alarm No.            | Alarm Message                                                                                    | Cause and Measures                                                                                                                                                                                                                                    |
|----------------------|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| R : 1570<br>L : 1770 | R:WORK FEEDER<br>DISCHARGE READY<br>ALARM<br>L:WORK FEEDER<br>DISCHARGE READY<br>ALARM           | Within 30 seconds, it was not possible to detect the workpiece to unloading lifter rising.<br>Or was still detected a workpiece falling.<br>* Check the lifter operation.<br>* Check the workpiece detect switches or adjust its again or repair its. |
| R : 1571<br>L : 1771 | R:WORK FEEDER LD. LIFT<br>MOTOR OVERLOAD<br>L:WORK FEEDER LD. LIFT<br>MOTOR OVERLOAD             | The alarm of inverter occurs because the motor for the workpiece feeder loading lifter is overloaded.<br>* After checking and repairing the workpiece feeder, press the RESET switch of inverter.                                                     |
| R : 1572<br>L : 1772 | R:WORK FEEDER DIS. LIFT<br>MOTOR OVERLOAD<br>L:WORK FEEDER DIS. LIFT<br>MOTOR OVERLOAD           | The alarm of inverter occurs because the motor for the workpiece feeder unloading lifter is overloaded.<br>* After checking and repairing the workpiece feeder, press the RESET switch of inverter.                                                   |
| R : 1580<br>L : 1780 | R:REVERSE UNIT TURN/<br>RETURN SW. CHECK<br>L:REVERSE UNIT TURN/<br>RETURN SW. CHECK             | Rotated and returned lead switches of turn over hand are simultaneously turned ON.<br>* Check and repair switches.                                                                                                                                    |
| R : 1581<br>L : 1781 | R:REVERSE UNIT<br>FORWARD/REVERSE SW.<br>CHECK<br>L:REVERSE UNIT<br>FORWARD/REVERSE SW.<br>CHECK | Forwarded and reversed lead switches of turn over hand are simultaneously turned ON.<br>* Check and repair switches.                                                                                                                                  |
| R : 1582<br>L : 1782 | R:REVERSE UNIT CYCLE<br>TIME OVER<br>L:REVERSE UNIT CYCLE<br>TIME OVER                           | After turn over cycle signal is executed and then passed over the set of PMC timer 106, this case can not complete the operation.<br>* Check each operation for workpiece reverse.                                                                    |
| R : 1590<br>L : 1790 | R: WORK FEEDER LOADING<br>LIFTER UP TIME OVER<br>L: WORK FEEDER LOADING<br>LIFTER UP TIME OVER   | Loading lifter does not stop lifting even after the elapse of a certain period of time.<br>* Check the proximity switch at the loading lifter lifting end.                                                                                            |

| Alarm No.            | Alarm Message                                                                                                                            | Cause and Measures                                                                                                                                                                                                                                                                                               |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| R : 1591<br>L : 1791 | R:WORK FEEDER LOADING<br>LIFTER DOWN TIME<br>OVER<br>R:WORK FEEDER LOADING<br>LIFTER DOWN TIME<br>OVER                                   | Loading lifter does not stop lowering even after the elapse of a certain period of time.<br>* Check the proximity switch at the loading lifter lowering end.                                                                                                                                                     |
| R : 1592<br>L : 1792 | R:WORK FEEDER<br>DISCHARGE LIFTER UP<br>TIME OVER<br>L:WORK FEEDER<br>DISCHARGE LIFTER UP<br>TIME OVER                                   | Unloading lifter does not stop lifting even after the elapse of a certain period of time.<br>* Check the proximity switch at the unloading lifter lifting end.                                                                                                                                                   |
| R : 1593<br>L : 1793 | R:WORK FEEDER<br>DISCHARGE LIFTER<br>DOWN TIME OVER<br>L:WORK FEEDER<br>DISCHARGE LIFTER<br>DOWN TIME OVER                               | Unloading lifter does not stop lowering even after the elapse of a certain period of time.<br>* Check the proximity switch at the unloading lifter lowering end.                                                                                                                                                 |
| R : 1600<br>L : 1800 | R:SET MACHINE TO<br>CONNECT READY<br>L:SET MACHINE TO<br>CONNECT READY                                                                   | When M signal (M100 series) for machine I/O is commanded, the machine interlock condition is turned OFF.<br>* Prepare the machine in interlock state.<br>[Reference : 7-2 Interlock preparation]                                                                                                                 |
| R : 1601<br>L : 1801 | R:SET MACHINE TO<br>CONNECT READY AND<br>STOP MACHINE &<br>SPINDLE<br>L:SET MACHINE TO<br>CONNECT READY AND<br>STOP MACHINE &<br>SPINDLE | When M signal (M100 series) for machine I/O is commanded, the machine interlock condition is turned OFF, the machine is operating or the spindle is rotating.<br>* Prepare the machine in interlock state and operate the machine.<br>At this time, stop the spindle.<br>[Reference : 7-2 Interlock preparation] |

| Alarm No.            | Alarm Message                                                                                                                                                          | Cause and Measures                                                                                                                                                                                                                                                                            |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| R : 1602<br>L : 1802 | R:EXIT LOADER FORM<br>MACHINE<br>L:EXIT LOADER FORM<br>MACHINE                                                                                                         | The loader is not shifted to the outside of machine within 180 seconds after commanding M101 (Door (shutter) CLOSE) with the loader positioned inside of machine.<br>* Shift the loader to the outside of machine (return vertical axis to reference position).<br>Also, correct the program. |
| R : 1603<br>L : 1803 | R:STOP MACHINE<br>L:STOP MACHINE                                                                                                                                       | The machine is not stopped within 10 seconds after commanding M106 (air blow command) during machine operation.<br>* Stop the machine or correct the program.                                                                                                                                 |
| R : 1605<br>L : 1805 | R:CHECK LOADER<br>POSITION<br>L:CHECK LOADER<br>POSITION                                                                                                               | The loader is not entered in the machine automatic operation start range within 180 seconds after commanding M110 (machine automatic operation start) at position other than set position. Or the loader was in the interference area.<br>* Check loader position or correct the program.     |
| R : 1606<br>L : 1806 | R:CHUCK NOT CLAMPED<br>L:CHUCK NOT CLAMPED                                                                                                                             | M110 (machine automatic operation start) is commanded when the chuck is unclamped.<br>* Clamp the chuck or correct the program.                                                                                                                                                               |
| R : 1620<br>L : 1820 | R:FUNCTION COMMAND<br>PROCESSING ALARM<br>L:FUNCTION COMMAND<br>PROCESSING ALARM                                                                                       | * Turn ON power again and press [READY switch].<br>If the same alarm occurs, contact our service engineer.                                                                                                                                                                                    |
| R : 1621<br>L : 1821 | R:NO WORKPIECE<br>L:NO WORKPIECE                                                                                                                                       | Raw material (workpiece) is eliminated.<br>* Load the workpiece.                                                                                                                                                                                                                              |
| R : 1622<br>L : 1822 | R:FULL WORKPIECE<br>L:FULL WORKPIECE                                                                                                                                   | Workpieces are full.<br>* Unload the workpiece.                                                                                                                                                                                                                                               |
| R : 1623<br>L : 1823 | R:SAFETY GUARD<br>INTERLOCK SW. OFF AT<br>OVERRIDE 25% OR 10%<br>WHEM MANUAL MODE<br>L:SAFETY GUARD<br>INTERLOCK SW. OFF AT<br>OVERRIDE 25% OR 10%<br>WHEM MANUAL MODE | This is actually-displayed message.<br>* When setting teaching mode to INVALID [Safety door interlock VALID] or selecting the mode except axis travel mode, the message disappears.                                                                                                           |

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NC Lathe

TC-10G, TX-20G, T-200, TT-200, TT-160

TT-350, TC-100, TC-200, TC-350

TCC-1000, TCC-2000, TNR-200

TT-1600, TT-2000, TT-2100, TT-2500

T-2600, TT-2600, TCN-2000, TCN-2500

# ADJUSTMENT AND INSPECTION OF WORKPIECE FEEDER (CHAIN TYPE)

NC04040-105J

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

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- 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 reversed. 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.

Since TAKISAWA does not specify the coolant, select your desired coolants by consulting with oil makers sufficiently.

In addition, TAKISAWA shall have no liability for trouble incurred by using coolants.

- 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.

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# 1 ADJUSTMENT AND INSPECTION OF CHAIN FOR WORKPIECE FEEDER

---

The pallet of workpiece feeder is fixed to the chain with connecting pins.

Though the tension of chain has already been adjusted before shipping, the chain will extend slightly by running-in of each contact face of chain for tens of time from start. At this time, adjust the tension once.

After that, since the chain becomes running-in, the chain does not extend nearly.

However, since it extends again by operation for a long period of time, it is necessary to check the chain and adjust the tension periodically.

If the chain extends much, the pallet slips from stop position.

## 2 TENSION ADJUSTMENT PROCEDURE OF CHAIN

---

### 2-1 TC-10G

- (1) Remove the pallet from the workpiece feeder.
- (2) Loosen bolt A (3 pcs.).
- (3) When turning bolt B clockwise, the chain can be tensed.
- (4) At this time, tense the chain so that the middle part of chain will not be loosened.

If the chain is too tensed, the chain and the bearing will damage early.

- (5) Tighten bolt A (3 pcs.).
- (6) Mount the pallet to the workpiece feeder.
- (7) Loosen bolt C (4 pcs.).
- (8) Adjust the pallet guide so as to be closely contacted to the pallet.
- (9) Tighten bolt C (4 pcs.).
- (10) Adjust the pallet clamp cylinder so that it will contact the pallet slightly at stroke end.

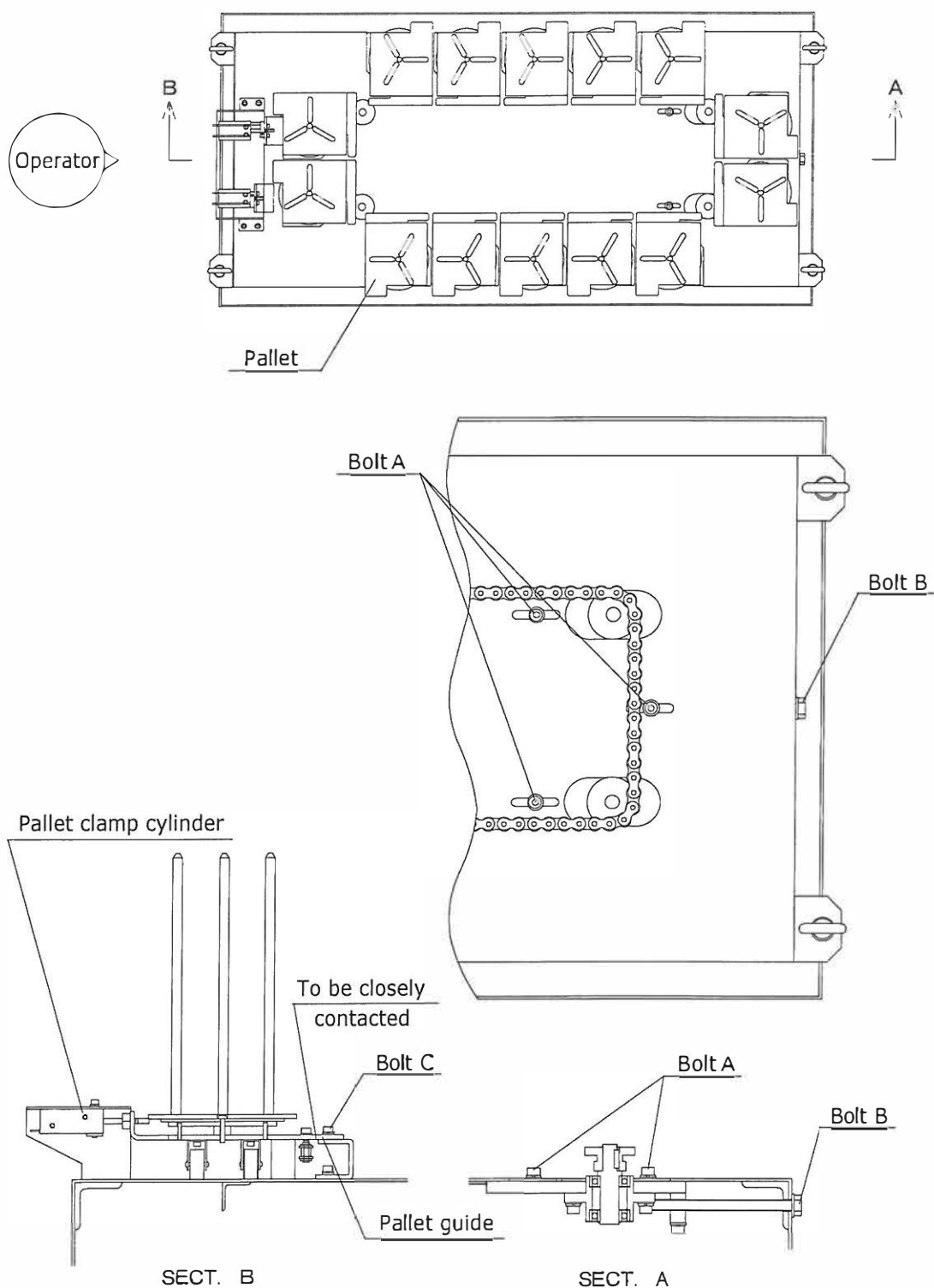


Fig. 2-1 Tension adjustment of chain (TC-10G)

## 2-2 TX-20G

- (1) Remove the pallet from the workpiece feeder.
- (2) Loosen bolt A (3 pcs.).
- (3) When turning bolt B clockwise, the chain can be tensed.
- (4) At this time, tense the chain so that the middle part of chain will not be loosened.

If the chain is too tensed, the chain and the bearing will damage early.

- (5) Tighten bolt A (3 pcs.).
- (6) Loosen bolt C (6 pcs.) and push the chain side with the chain guide.
- (7) Mount the pallet to the workpiece feeder.
- (8) Adjust the pallet by pushing so as not to make run-out, oscillating it manually so that the pallet will come apart from the pallet guide.
- (9) Tighten bolt C (6 pcs.).

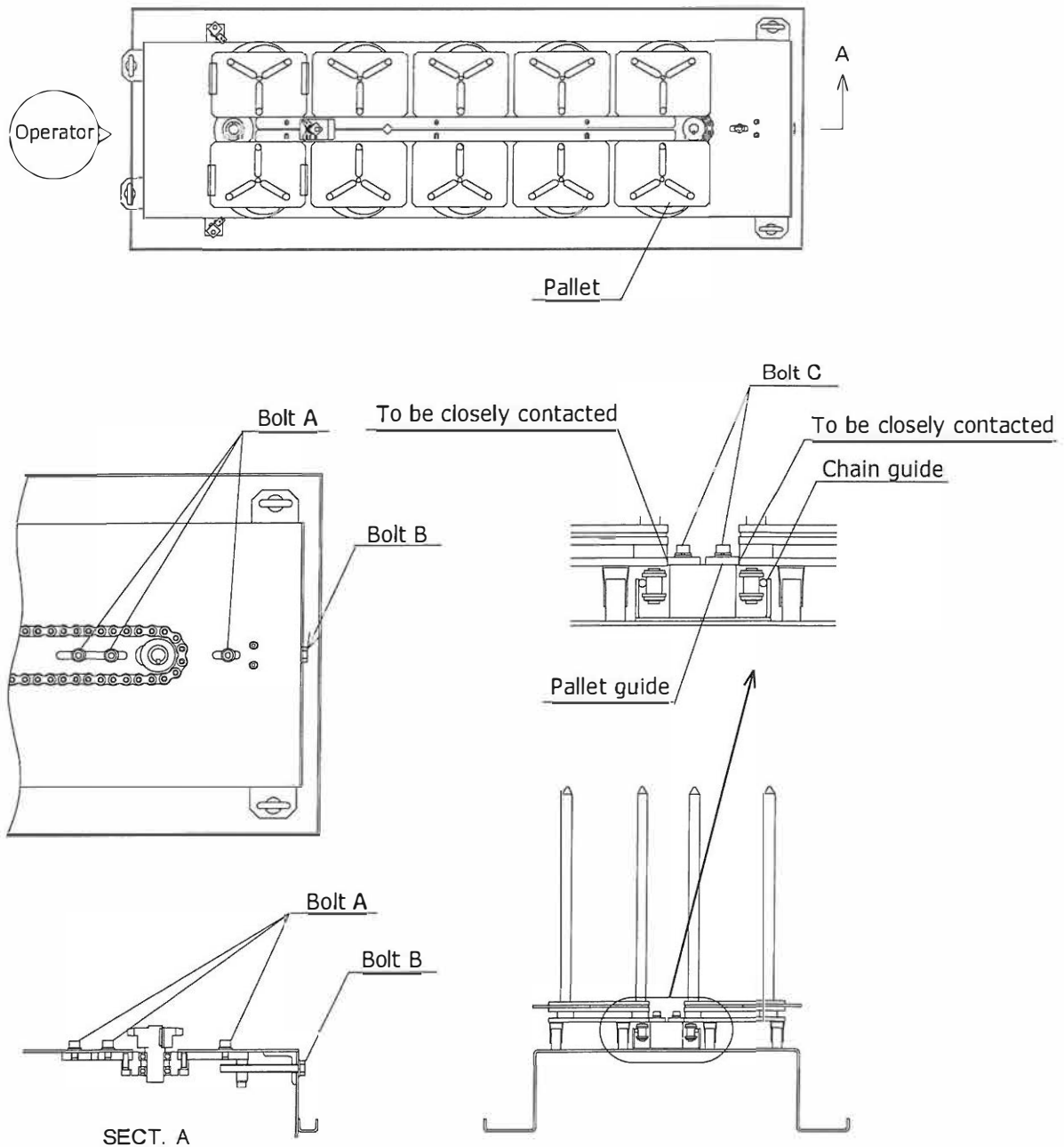


Fig. 2-2 Tension adjustment of chain (TX-20G)

## 2-3 T-200, TT-200, TT-160, TC-100, TC-200, TC-350 TT-350, TCC-1000, TCC-2000, TNR-200 TT-1600, TT-2000, TT-2100, TT-2500 T-2600, TT-2600, TCN-2000, TCN-2500

- (1) Remove the pallet from the workpiece feeder.
- (2) Loosen bolt A (4 pcs.).
- (3) When turning bolt B clockwise, the chain can be tensed.
- (4) At this time, tense the chain so that the middle part of chain will not be loosened.  
If the chain is too tensed, the chain and the bearing will damage early.
- (5) Tighten bolt A (4 pcs.).
- (6) Loosen bolt C (4 pcs.) and push the chain side with the chain guide.
- (7) Mount the pallet to the workpiece feeder.
- (8) Adjust the pallet by pushing so as not to make run-out, oscillating it manually so that the pallet will come apart from the pallet guide.
- (9) Tighten bolt C (4 pcs.).

Note: The chain guide is provided to only the lifter mounting side.

The side without the chain guide may be acceptable even if there is a gap between the pallet guide and the pallet.

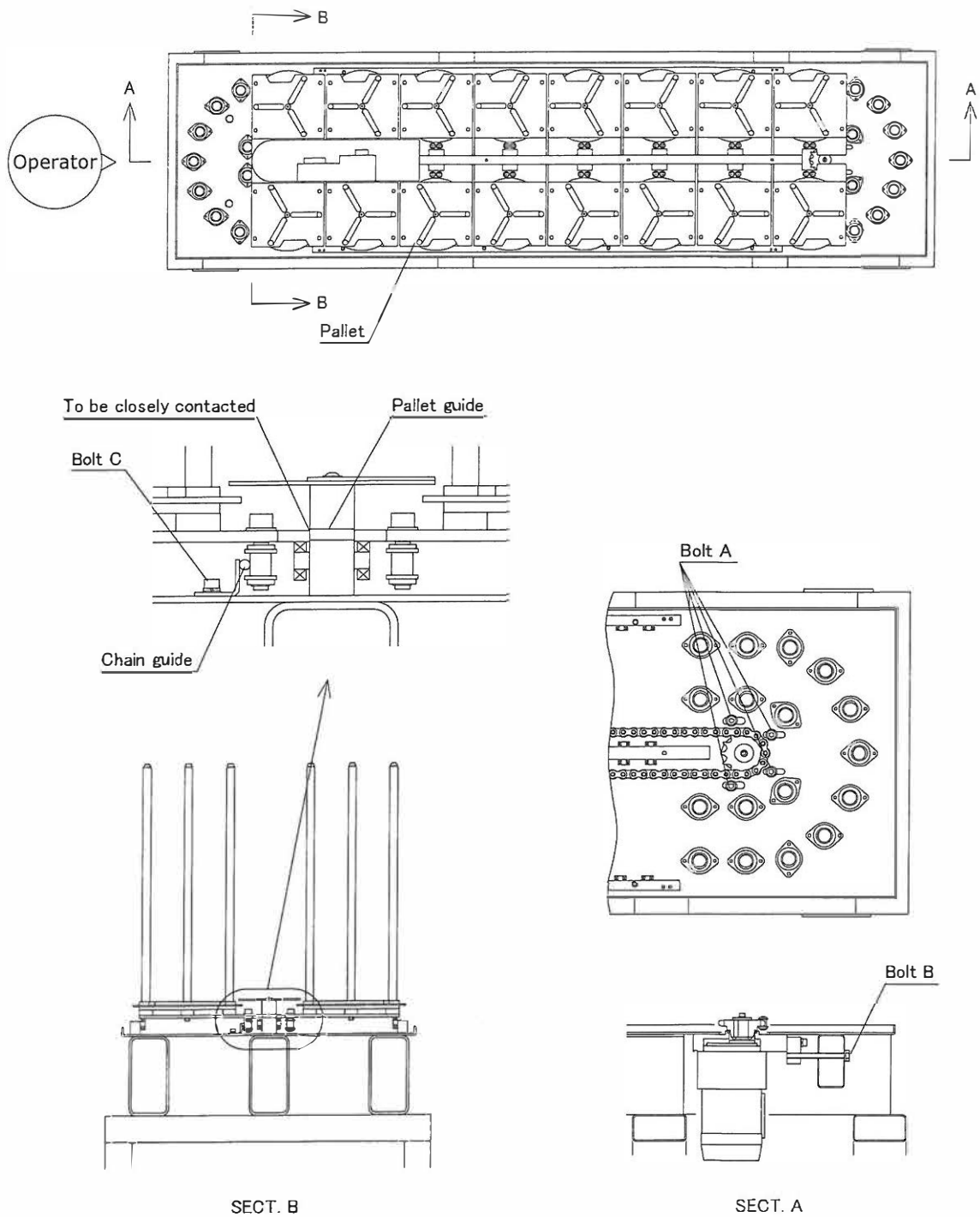


Fig. 2-3(a) Tension adjustment of chain  
 (T-200, TT-200, TC-100, TC-200, TC-350, TT-350, TCC-1000, TCC-2000, TNR-200,  
 TT-2000, TT-2100, TT-2500, T-2600, TT-2600, TCN-2000, TCN-2500)

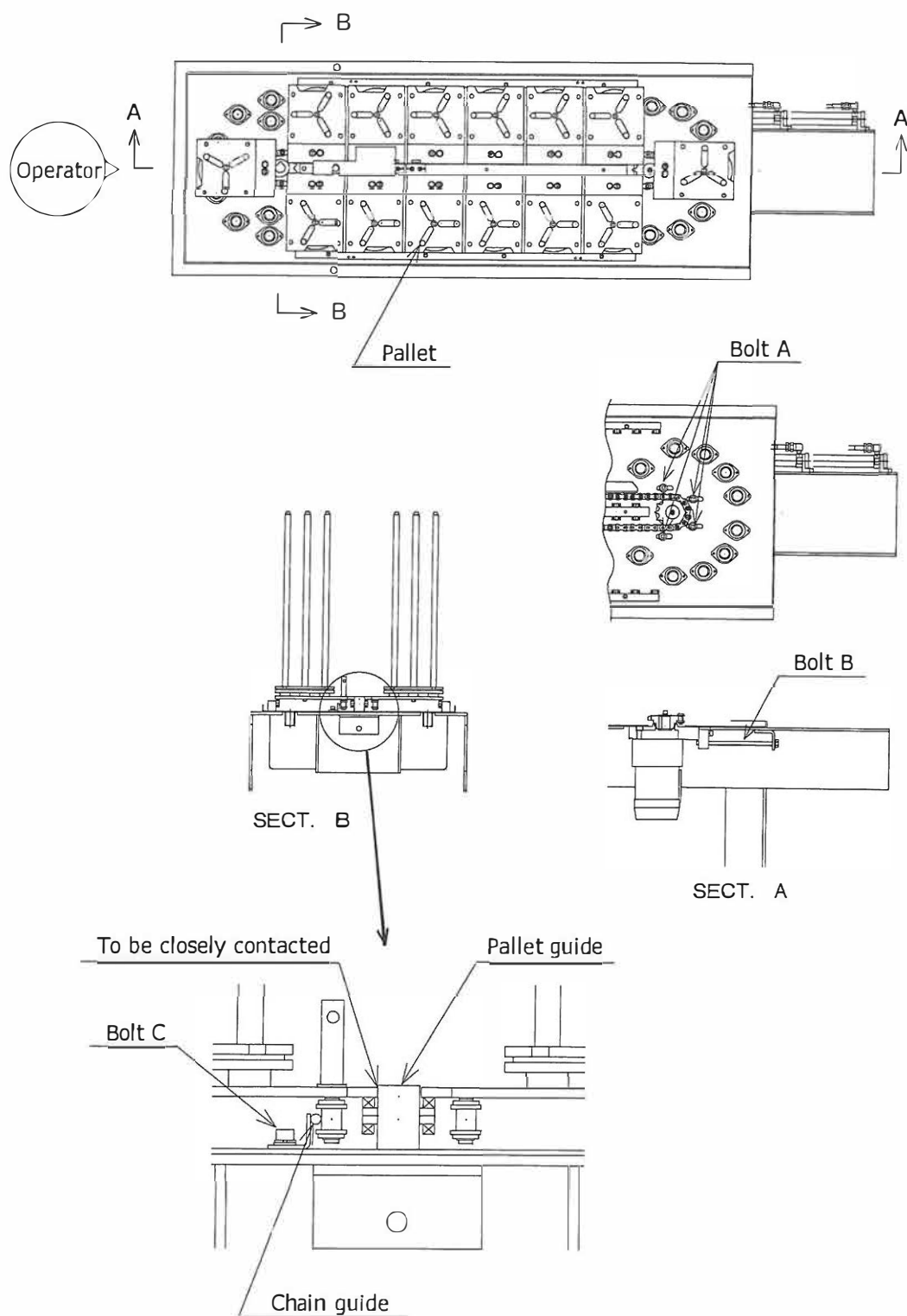


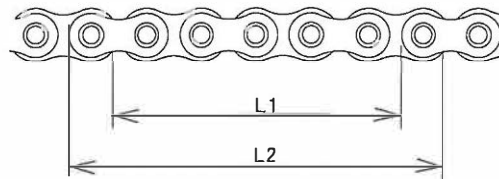
Fig. 2-3(b) Tension adjustment of chain (TT-160, TT-1600)

### 3 INSPECTION OF CHAIN EXTENSION

Measure the chain extension periodically according to the following procedure to foresee a service life.

- (1) Remove the pallet from the workpiece feeder.
- (2) To eliminate the play of entire chain, measure the chain with it properly tensed.
- (3) As shown in the following figure, the inside (L1) and the outside (L2) Between rollers of measuring links will be measured to find a determining dimension.

$$L = \frac{L1 + L2}{2}$$



- (4) Measure about 6 to 10 links so as to reduce a measuring error as less as possible.
- (5) Next, measure the chain extension.

$$\text{Chain extension} = \frac{\text{Measuring dimension} - \text{Reference length}}{\text{Reference length}} \times 100 (\%)$$

$$\text{Reference length} = \text{Chain pitch} \times \text{links}$$

Chain pitch

|                         |                         |
|-------------------------|-------------------------|
| 1) TC-10G : 15.875 mm   | 11) TCC-2000 : 19.05 mm |
| 2) TX-20G : 19.05 mm    | 12) TNR-200 : 19.05 mm  |
| 3) TT-200 : 19.05 mm    | 13) TT-1600 : 19.05 mm  |
| 4) T-200 : 19.05 mm     | 14) TT-2000 : 19.05 mm  |
| 5) TT-160 : 19.05 mm    | 15) TT-2100 : 19.05 mm  |
| 6) TC-100 : 19.05 mm    | 16) TT-2500 : 19.05 mm  |
| 7) TC-200 : 19.05 mm    | 17) T-2600 : 19.05 mm   |
| 8) TC-350 : 19.05 mm    | 18) TT-2600 : 19.05 mm  |
| 9) TT-350 : 19.05 mm    | 19) TCN-2000 : 19.05 mm |
| 10) TCC-1000 : 19.05 mm | 20) TCN-2500 : 19.05 mm |

(6) Service limit by chain extension is 1.5%

<Inspection items>

Tension adjustment of chain ... per 200 h

Inspection of chain extension ... per 200 h

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