

CNC SYSTEM FOR TURNING APPLICATIONS  
YASNAC J50L

# UPGRADING FUNCTION MANUAL

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Upon receipt of the product and prior to initial operation, read these instructions thoroughly, and retain for future reference.

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## FOREWORD

Thank you for selecting YASNAC J50L. The YASNAC J50L upgrades the specification of several functions.



This manual describes the function upgrades and how to handle them.

## CAUTIONS

This manual describes all the option functions (identified by the “\*” symbol) but some of these may not be available with your YASNAC J50L. To determine the option functions installed in your NC, refer to the specification document or manuals published by the machine tool builder.

For the items not covered by this manual, please refer to the YASNAC J50L Instruction Manual (manual No. TOE-C843-12.21).

Unless otherwise specified, the following conditions apply in programming explanations and programming examples.

- Metric system for input and metric system for output/movement
-  : Zero point in the base coordinate system
-  : Reference point

Yaskawa has made every effort to describe individual functions and their relationships to other functions as accurately as possible. However, there are many things that cannot or must not be performed and it is not possible to describe all of these. Accordingly, readers are requested to understand that unless it is specifically stated that something can be performed, it should be assumed that it cannot be performed.

Also bear in mind that the performance and functions of an NC machine tool are not determined solely by the CNC unit. The entire control system consists of the mechanical system, the machine operation panel and other machine related equipment in addition to the NC. Therefore, read the manuals published by the machine tool builder for detailed information relating to the machine.

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## General Precautions

- Some drawings in this manual are shown with the protective cover or shields removed, in order to describe the detail with more clarity. Make sure all covers and shields are replaced before operating this product, and operate it in accordance with the directions in the manual.
- The figures and photographs in this manual show a representative product for reference purposes and may differ from the product actually delivered to you.
- This manual may be modified when necessary because of improvement of the product, modification, or changes in specifications. Such modification is made as a revision by renewing the manual No.
- To order a copy of this manual, if your copy has been damaged or lost, contact your Yaskawa representative listed on the last page stating the manual No. on the front page.
- If any of the nameplates affixed to the product become damaged or illegible, please send these nameplates to your Yaskawa representative.
- Yaskawa is not responsible for any modification of the product made by the user since that will void our guarantee.

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## NOTES FOR SAFE OPERATION


Read this programming manual thoroughly before installation, operation, maintenance or inspection of the YASNAC J50L.

The functions and performance as an NC machine tool are not determined only by an CNC unit itself. Before the operation, read thoroughly the machine tool builder's documents relating to the machine tool concerned.

In this manual, the NOTES FOR SAFE OPERATION are classified as "WARNING" or "CAUTION".




Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury to personnel.

Symbol  is used in labels attached to the product.





Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury to personnel and damage to equipment.

It may also be used to alert against unsafe practice.

Even items described in  CAUTION may result in a vital accident in some situations.

In either case, follow these important items.

Please note that symbol mark used to indicate caution differs between ISO and JIS.

ISO	JIS
	

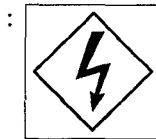
In this manual, symbol mark stipulated by ISO is used.

On products, caution symbol marks of ISO and JIS are used in labels. Please follow the same safety instructions concerning caution.

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## KEY TO WARNING LABELS

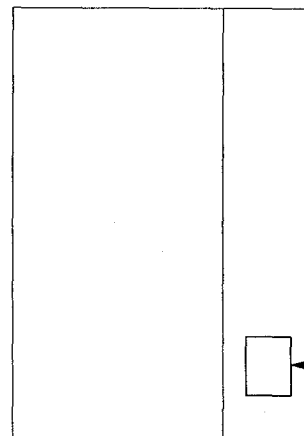
The following warning labels are used with the YASNAC J50L.



Electric shock hazard  
Do not touch the terminals while the power is on, and for 5 minutes after switching off the power supply!

Location of label

CNC unit

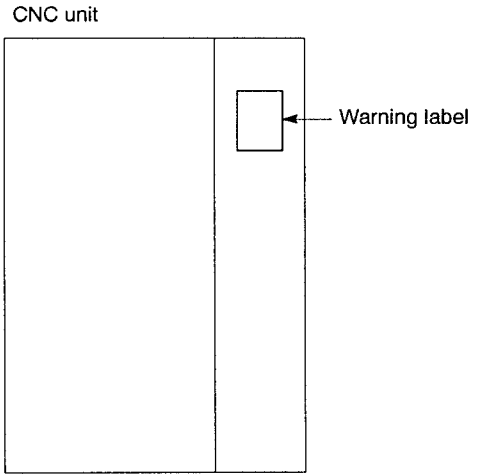


Warning label



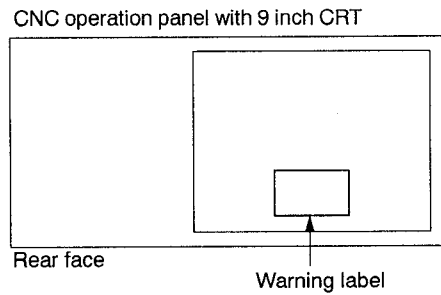
Grounding wires must be connected to the unit's grounding terminals.

Location of label



Electric shock hazard  
Do not touch inside.

Location of label



## TABLE OF FUNCTIONS ADDED FOR J50L UPGRADE

Class		Item/Function	Description	Hardware Restrictions
Upgrades to reduce cycle time	○	Upgraded "at-reference-point" output signal	Permits pulse width of the zero point return output signal to be changed.	
Upgrades to improve ease-of-operation	*	Key input lock	Prevents malfunctions due to incorrect key operations during automatic operation.	
	*	Position monitoring	Always checks if the machine position is in a designated area and outputs the status to I/O.	
	*	Program check screen	Adds the position, G code and S, T and F information to the program screen.	
	*	Absolute position detection	Makes zero point return unnecessary at power ON. Cannot be used in conjunction with the pitch error function.	SGDB absolute encoder
	○	ROM-based programs	Stores required programs such as macro programs for machine movements in ROM.	
	○	External offset input	Enables tool offset values to be changed using external switches.	
	*	Maintenance screen	When a time set with a preset value has elapsed, an output signal is issued to an external destination for notification.	
Upgrades to improve safety	○	Deceleration stop on reset during movement	Enables deceleration stop after reset operation performed during axis movement.	
	○	G10 upgrade	Enables selection of the sign when the workpiece shift amount is changed with G10.	
	○	Upgraded wear compensation	Enables selection of the timing for wear compensation motion.	
Other additional functions	*	mm/rev commands without spindle PG	Enables use of mm/rev commands even when there is no spindle PG.	Spindle PG shorting connector

○: Standard software function (may be subject to hardware restrictions)

\*: Optional software function (may be subject to hardware restrictions)

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## HARDWARE RELATED TO J50L UPGRADES

Chapter 1 describes the hardware that has been modified due to upgrades of the J50L.

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# 1.1 CONNECTIONS BETWEEN EQUIPMENT

This sections explains the points changed from previous connections. Connections not described in this section are the same as the original specification.

## 1.1.1 Connection Diagrams

The connections between equipment differ according to the operation panel specification.

### (1) Operation Panel with High-resolution CRT

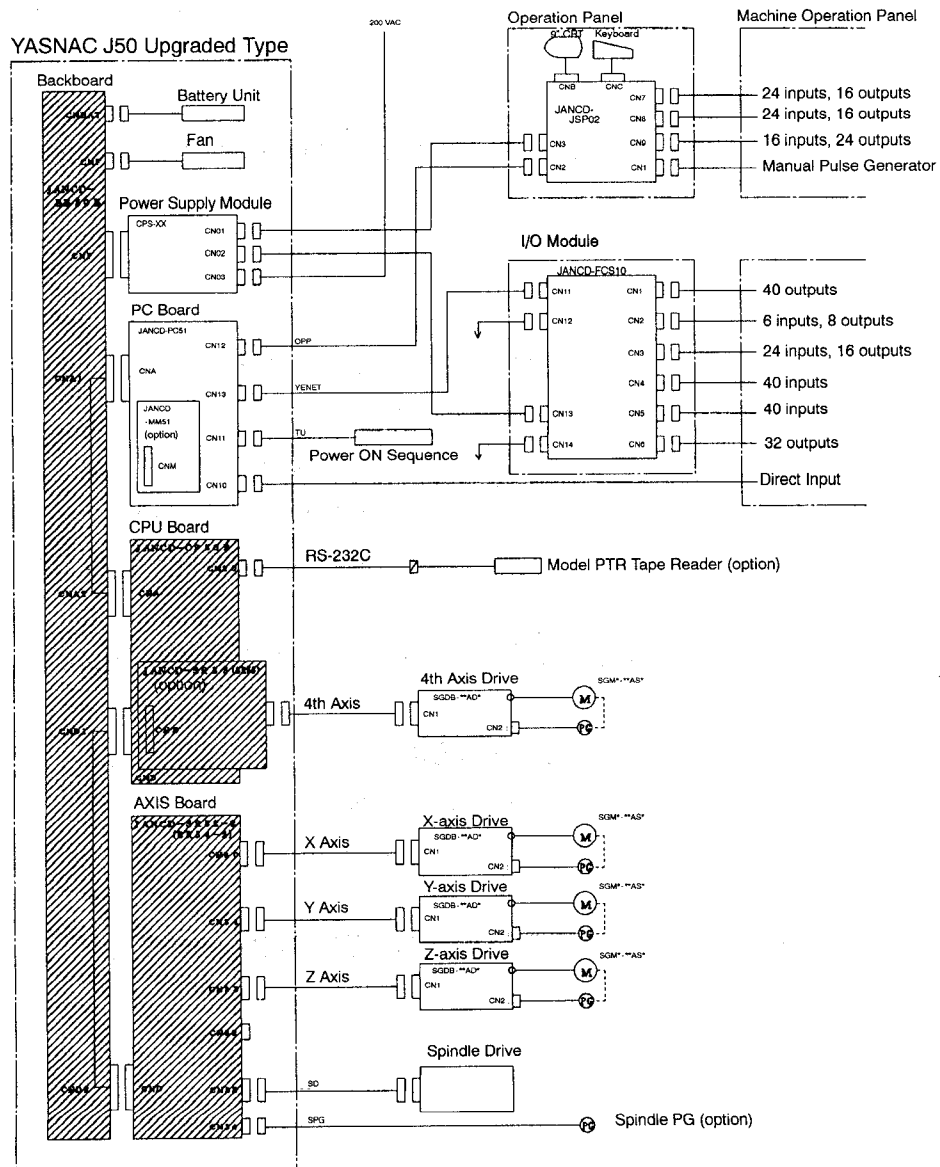


Fig. 1.1 High-resolution CRT Specification

(2) Operation Panel with Monochrome LCD

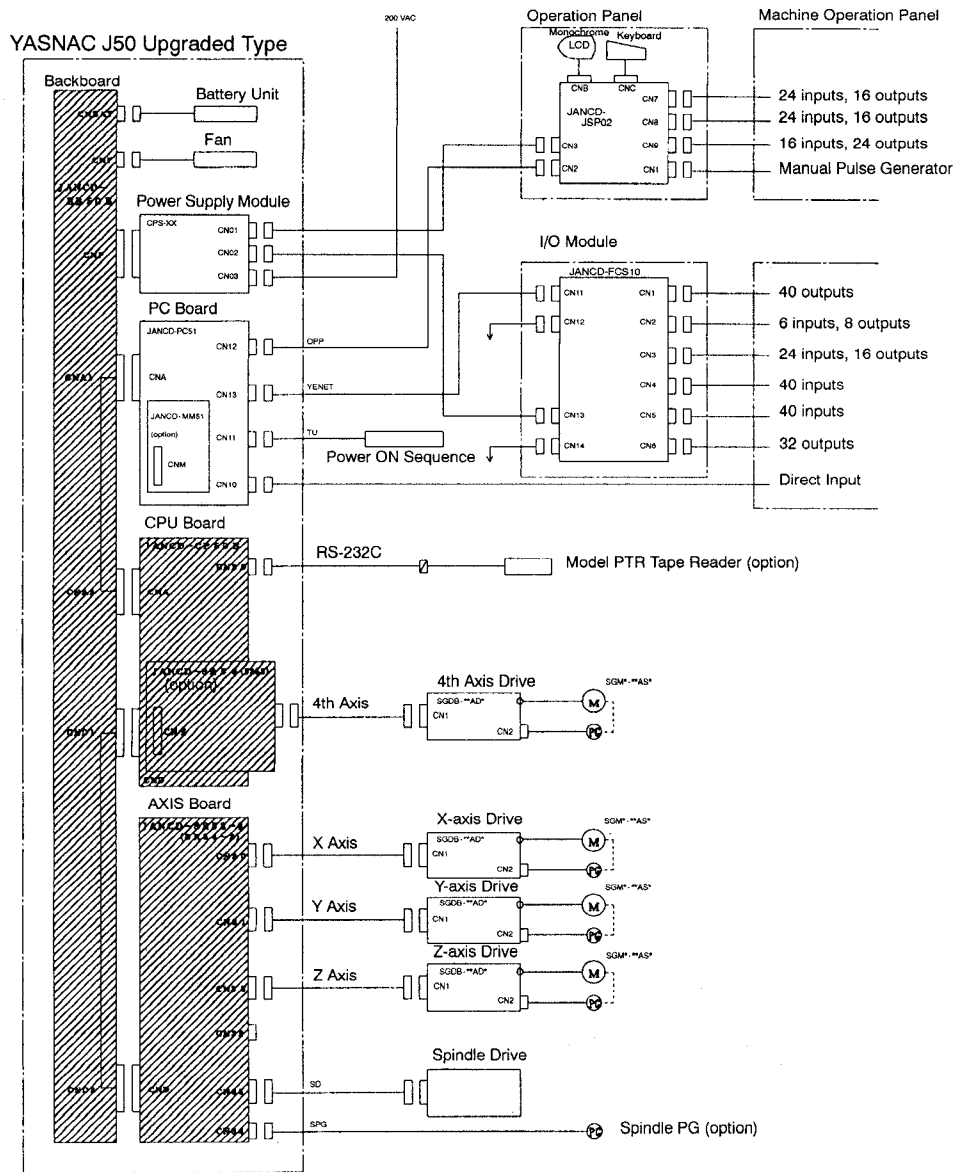


Fig. 1.2 Monochrome LCD Specification

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### 1.1.3 Connection with CNC Operation Panel

This section describes the connection between CNC unit (including the power supply unit) and CNC operation panel.

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#### (1) Connection with CNC Operation Panel

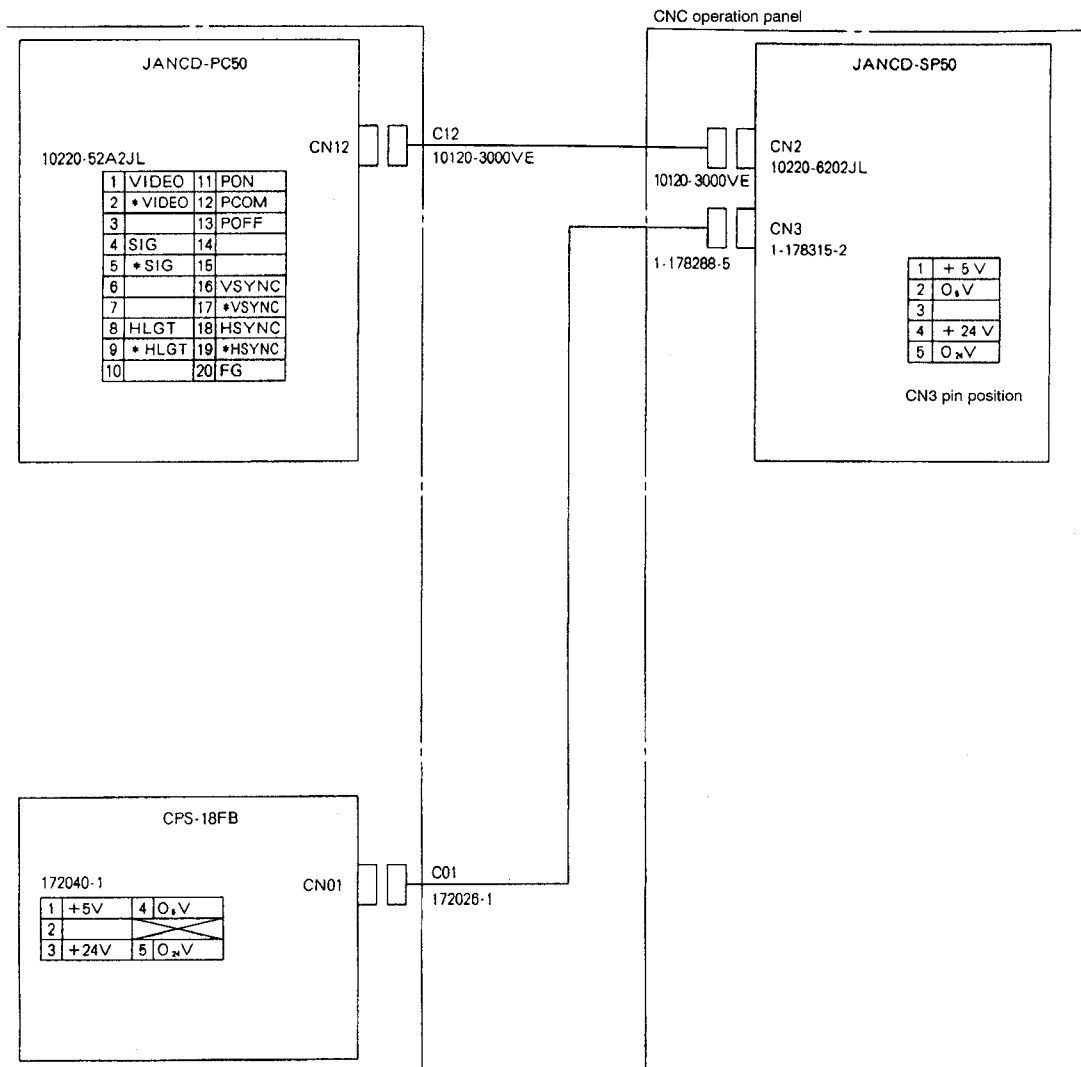
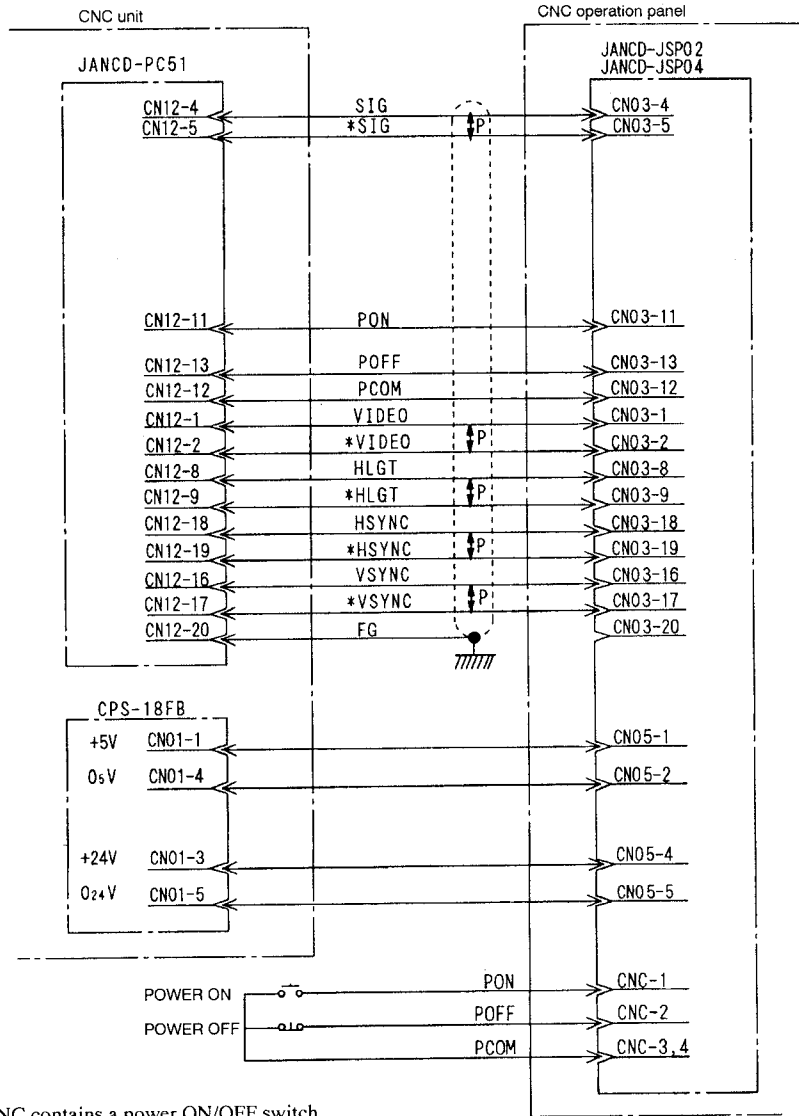


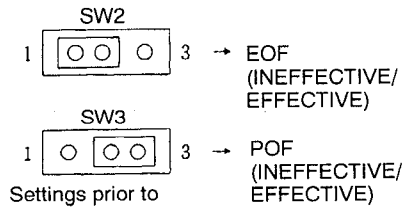
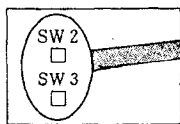
Fig. 1.4 Connection with CNC Operation Panel

(2) Details of Connection to Operation Panel



- Note 1: Vertical type CNC contains a power ON/OFF switch. A special external circuit does not have to be provided.
- 2: The shield enclosure does not have to be grounded outside.
- 3: Power ON/OFF can be selected by the panel power ON/OFF (POF) and/or remote power ON/OFF (EOF) by a shorting plug.

Setting in main board model JANCD-PC51



SW2, SW3 Setting

	Panel/Power ON/OFF (POF)	Remote Power ON/OFF (EOF)	Panel and Remote Power ON/OFF
SW2	OFF/ON 1 [ ] 3	OFF/ON 1 [ ] 3	OFF/ON 1 [ ] 3
SW3	OFF/ON 1 [ ] 3	OFF/ON 1 [ ] 3	OFF/ON 1 [ ] 3

Fig. 1.5 Details of Connection to Operation Panel

(3) Connection with Manual Pulse Generator

(a) Connection between devices

1

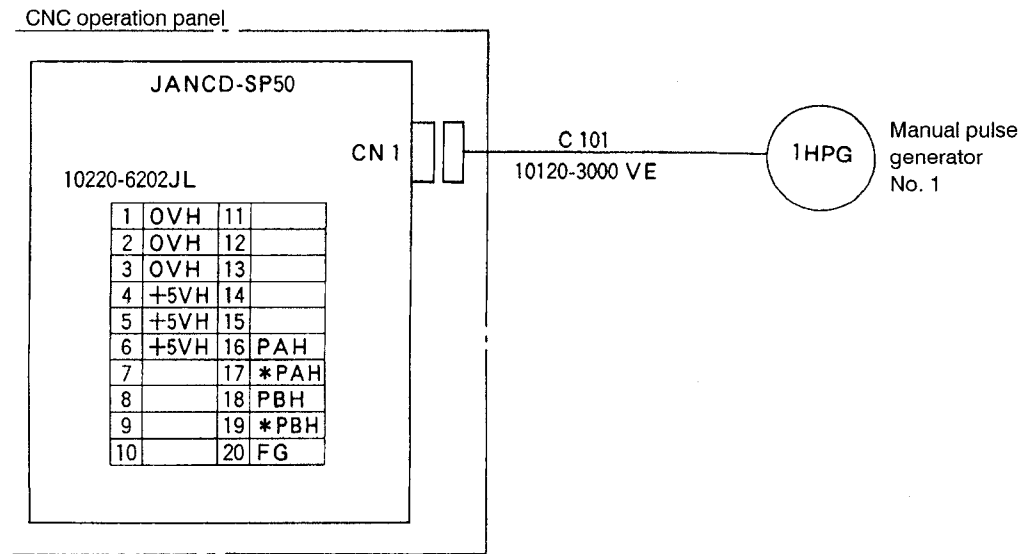
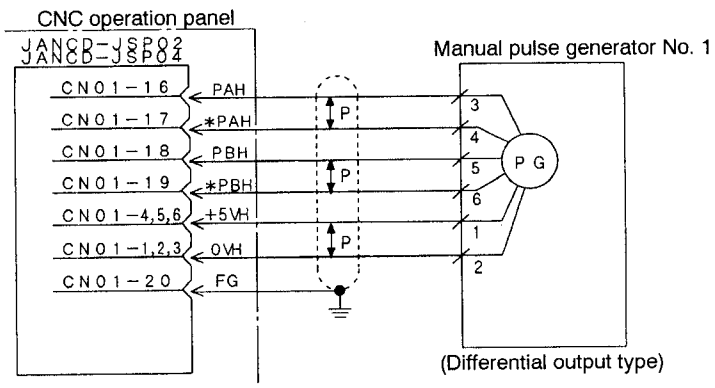
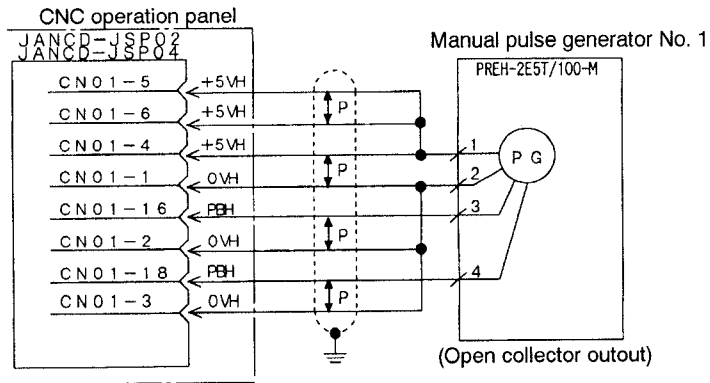
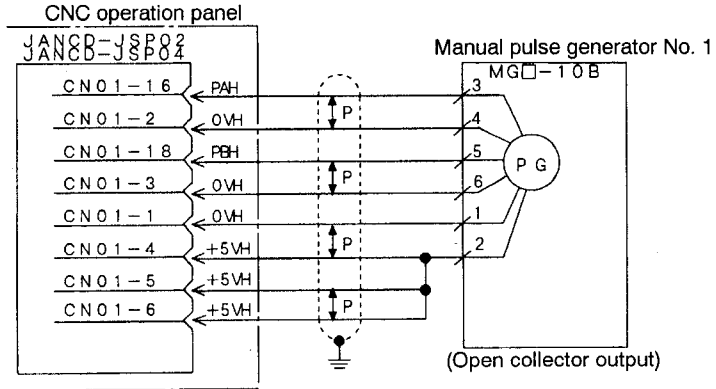


Fig. 1.6 Connection between Devices

1

(b) Details of connection

No.1 Manual Pulse Generator



Note 1: The HPG power supply is a constant +5V.

2: An open collector (cable length 5 m or less) or differential output (cable length 5 m or more) can be used for HPG output. Differential output type is not provided by Yaskawa.

3: Shielded cables are not needed if the cable lengths are less than 1 m.

Twisted-pair cables can be used. Use twisted-pair shielded cables if the cable lengths are more than 1 m and ground the cable shield enclosure using a ground plate inside the panel or CN01-20 pins (FG).

Fig. 1.7 Details of Connection



(c) Position of switches (TERMINATION, INVERS, and ADDRESS)  
I/O module (JANCD-JSP02, JSP04)

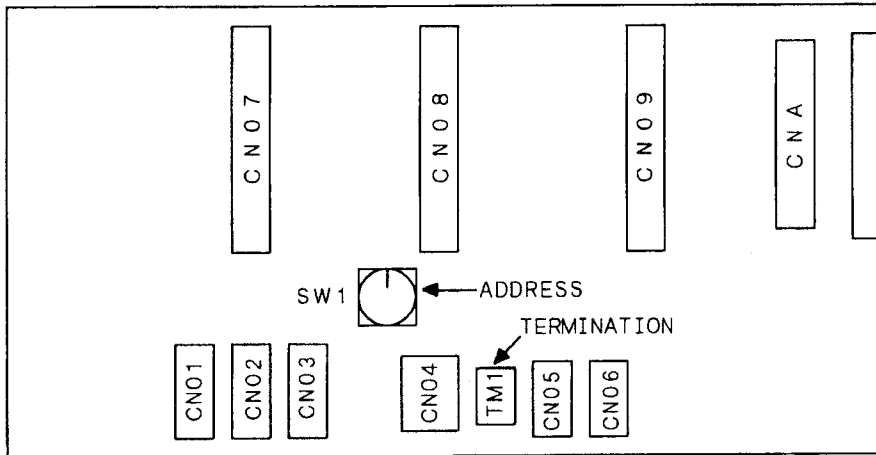
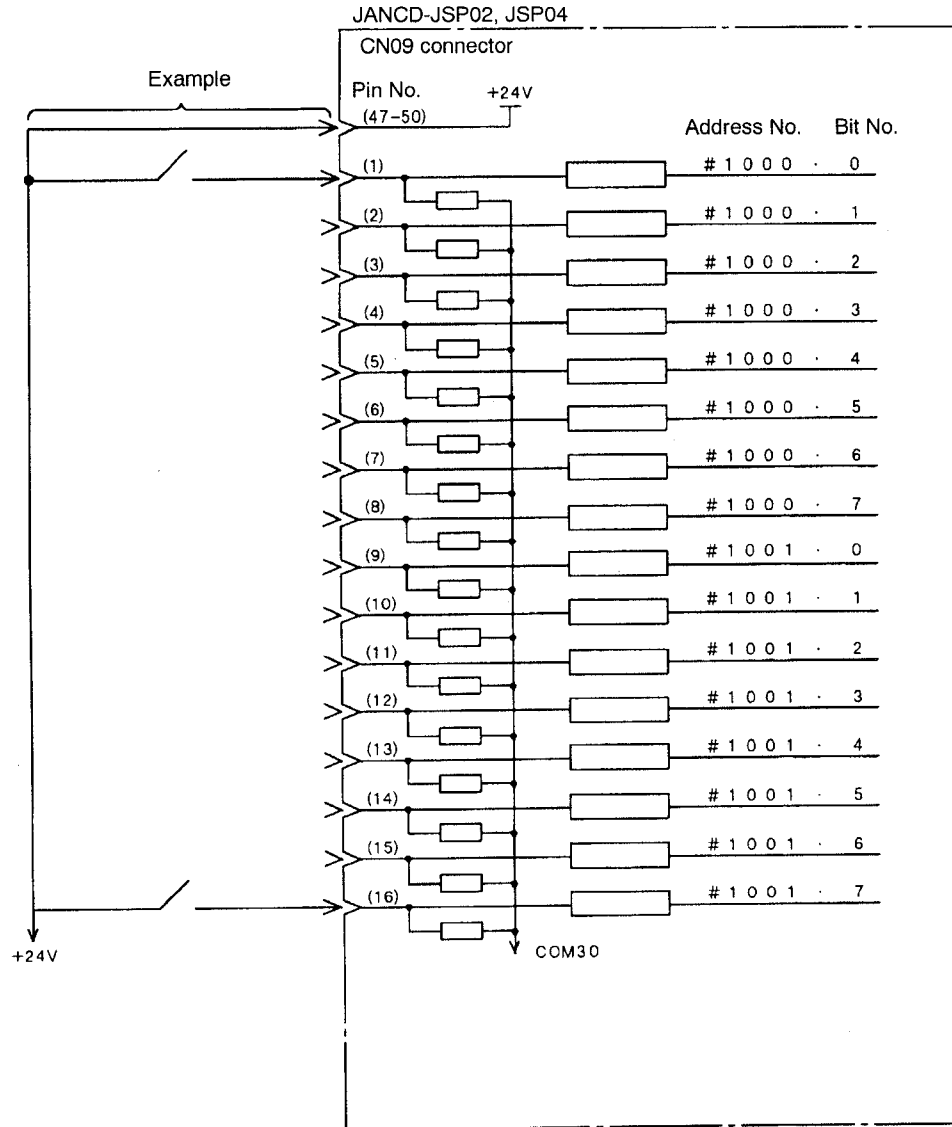


Fig. 1.8 Position of Switches

1

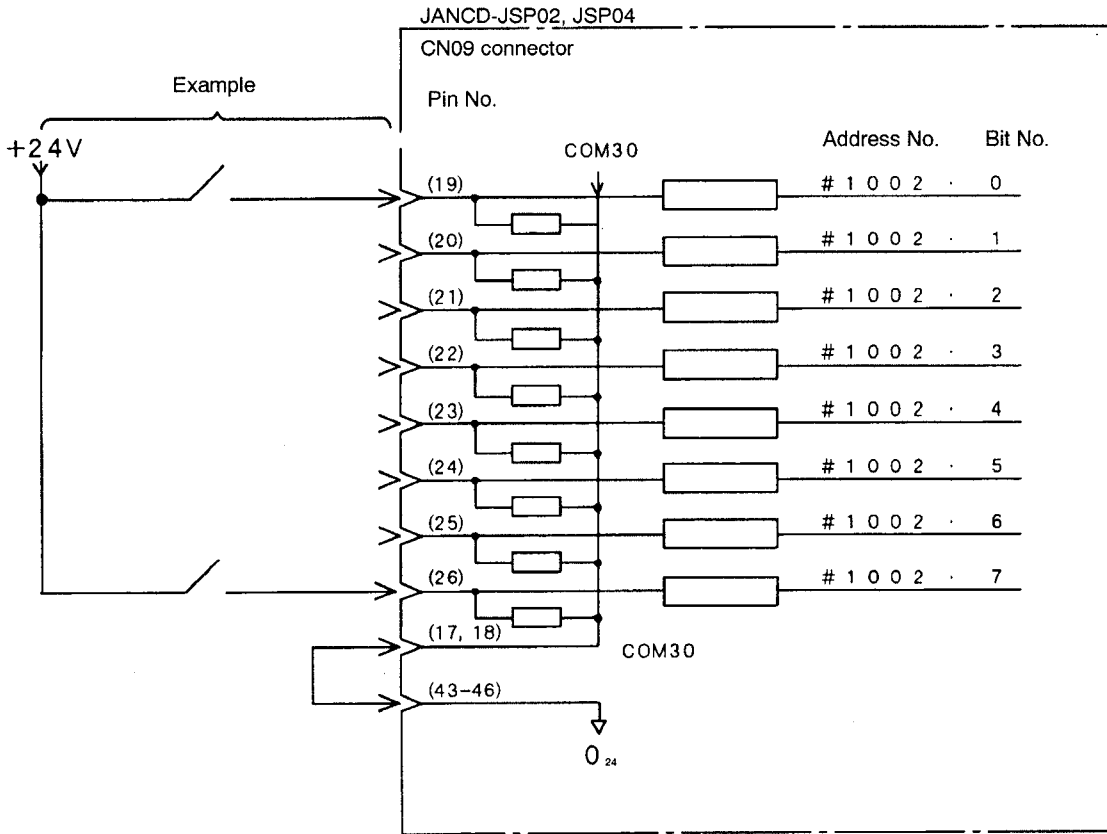
(4) JSP02/JSP04 Board



Note 1: The above example shows connection of +24V common. For the connection of 0V common, refer to “(5) JSP02, JSP04 Board.”

2: The address is that of module No. 1-1. (#1000.0 to #1001.7)  
For modules No. 2 to No. 8, the layout is as shown above, starting from the smaller address number.

Fig. 1.9 JSP02, JSP04 Board Connection  
(Address number and bit number: #1000.0 to #1001.7)



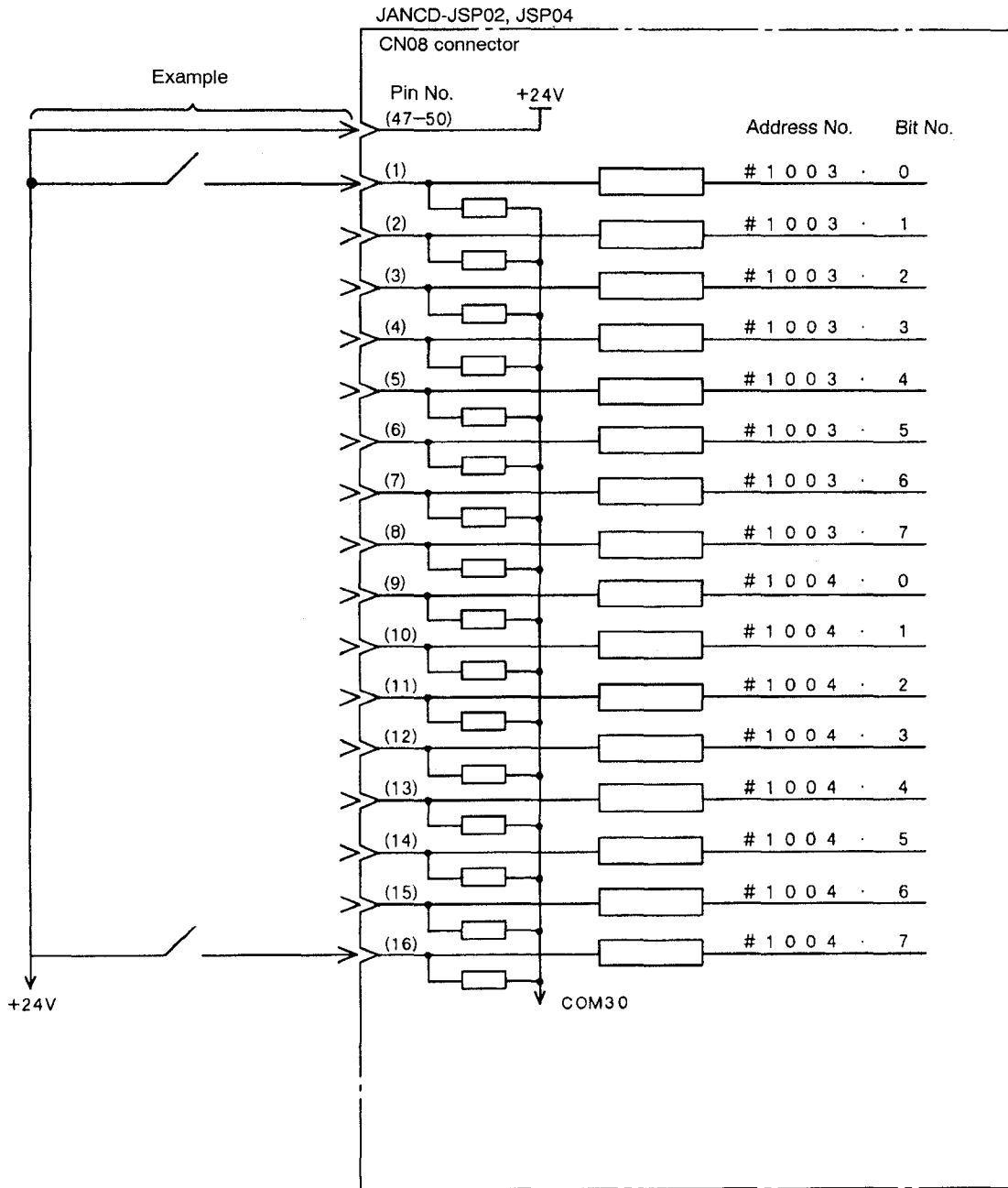
1

Note 1: The above examples show connection of +24V common. For the connection of 0V common, refer to "(5) JSP02, JSP04 Board."

2: The address is that of module No. 1-1. (#1002.0 to #1002.7)  
For modules No. 2 to No. 8, the layout is as shown above, starting from the smaller address number.

Fig. 1.10 JSP02, JSP04 Board Connection  
(Address number and bit number: #1002.0 to #1002.7)

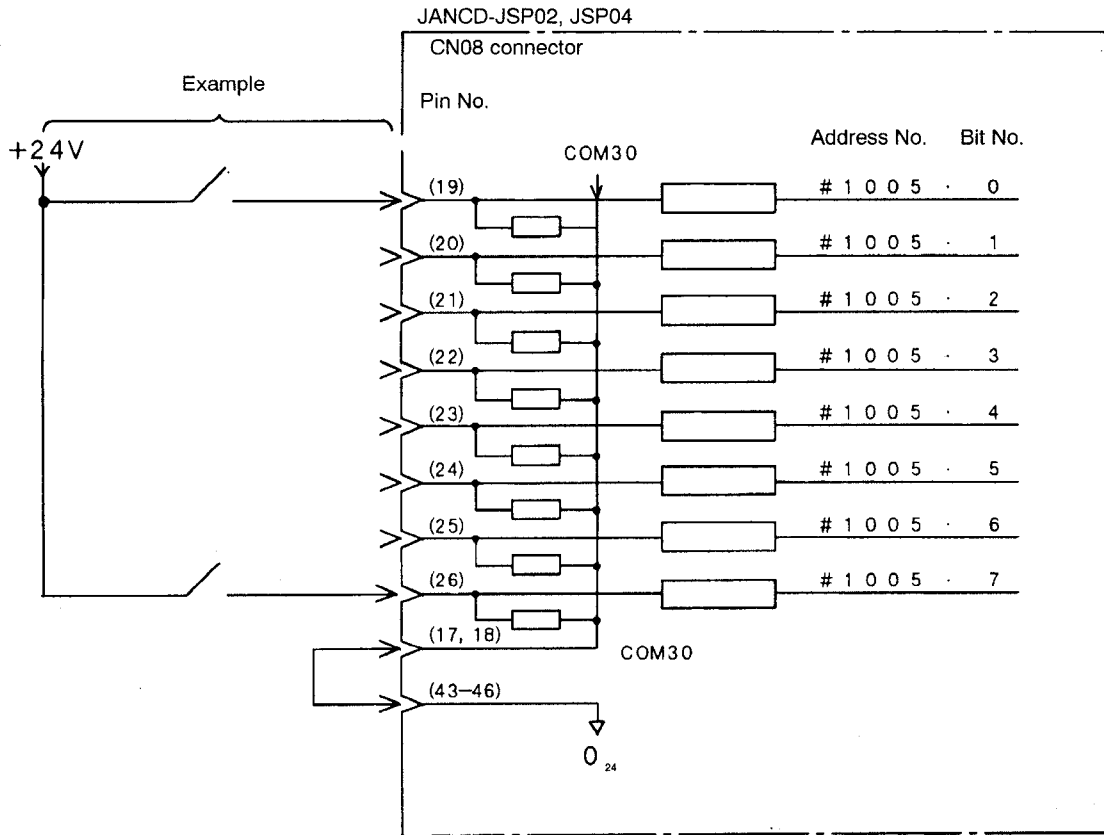
1



Note 1: The above example shows connection of +24V common. For the connection of 0V common, refer to“(5)JSP02, JSP04 Board.”

2: The address is that of module No. 1-1. (#1003.0 to #1004.7)  
For modules No. 2 to No. 8, the layout is as shown above, starting from the smaller address number.

Fig. 1.11 JSP02, JSP04 Board Connection  
(Address number and bit number: #1003.0 to #1004.7)



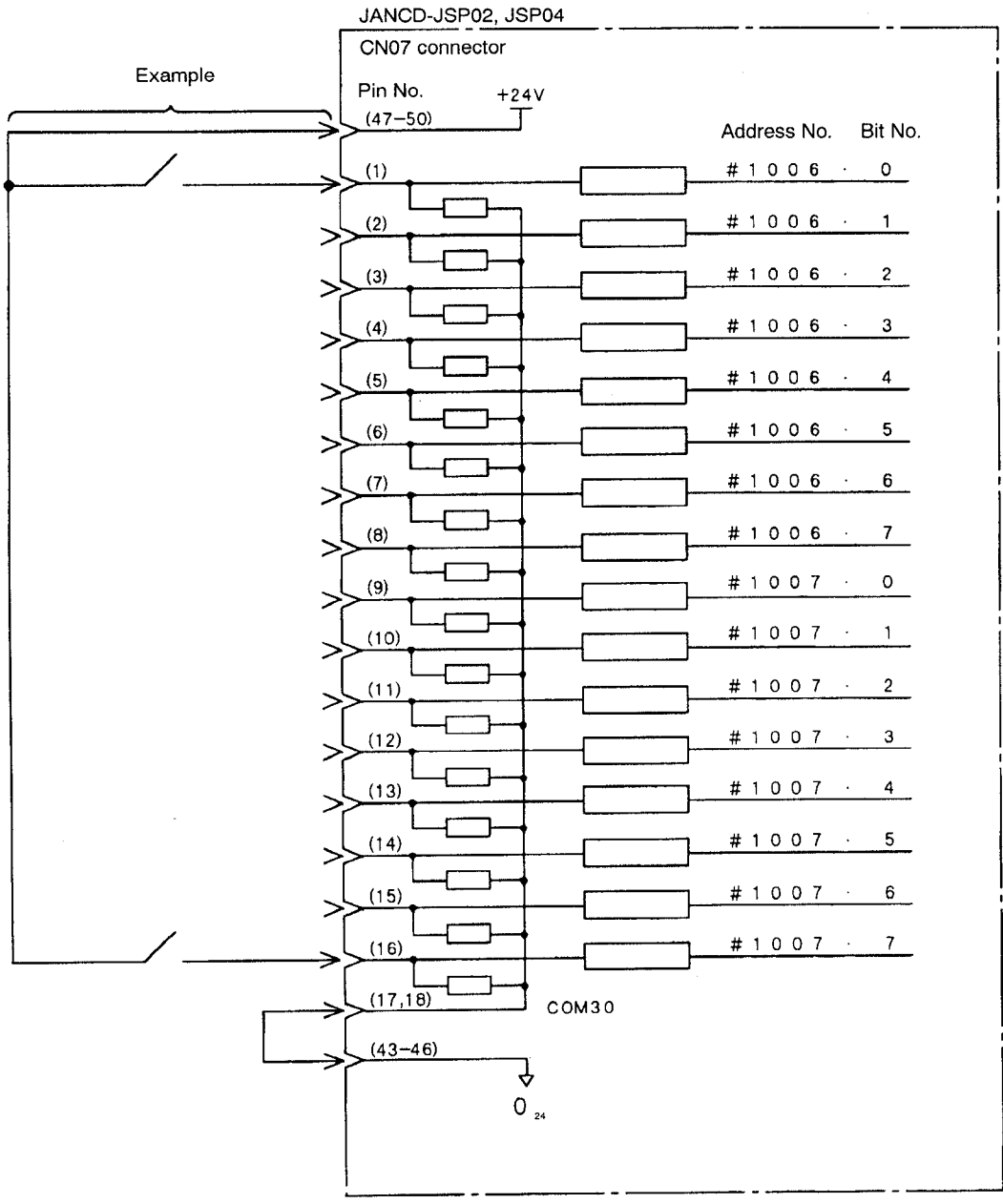
1

Note 1: The above example shows connection of +24V common. For the connection of 0V common, refer to "(5) JSP02, JSP04 Board."

Note 2: The address is that of module No. 1-1. (#1005.0 to #1005.7)  
For modules No. 2 to No. 8, the layout is as shown above, starting from the smaller address number.

Fig. 1.12 JSP02, JSP04 Board Connection  
(Address number and bit number: #1005.0 to #1005.7)

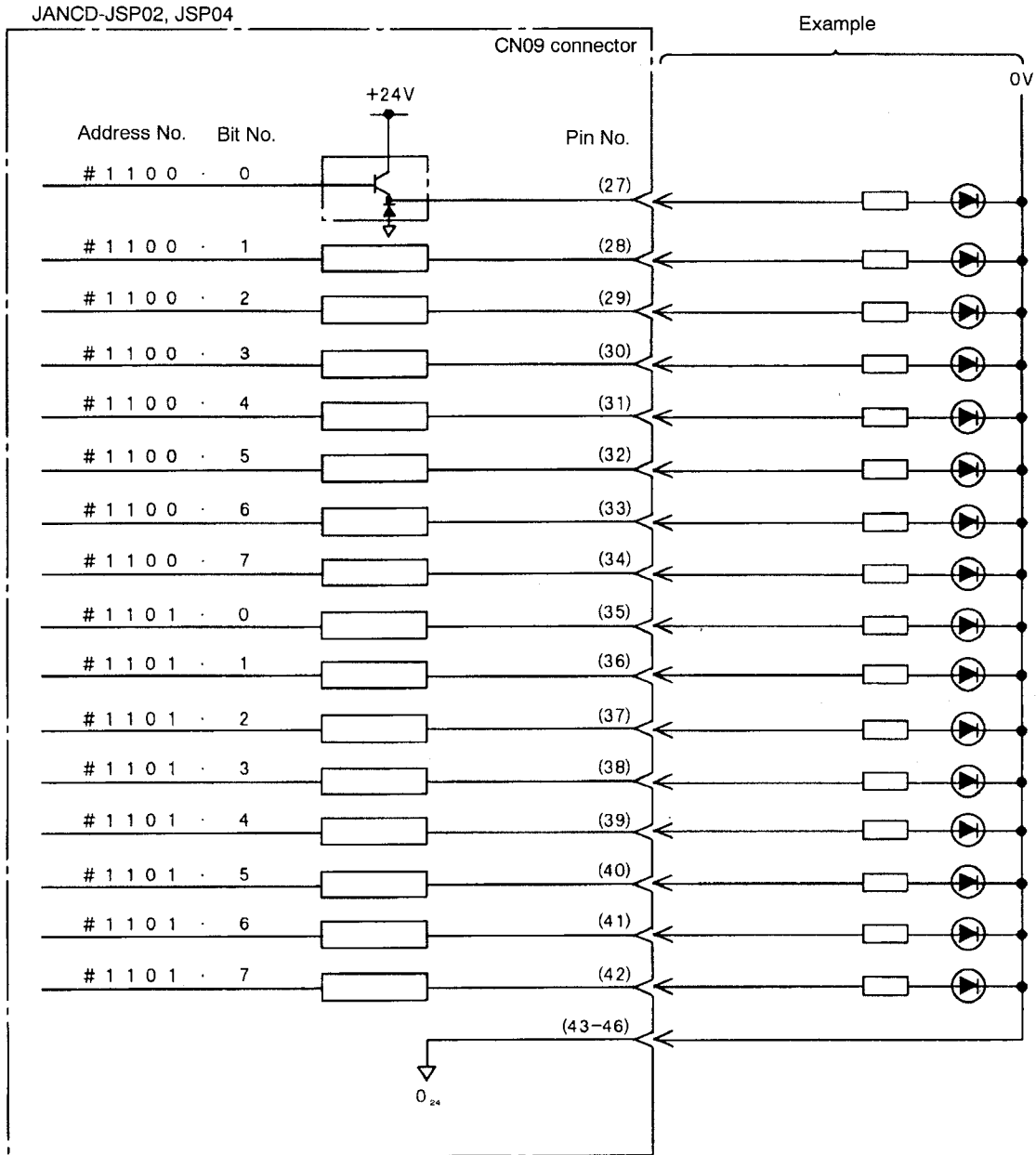
1



Note 1: The above example shows connection of +24V common. For the connection of 0V common, refer to“(5)JSP02, JSP04 Board.”

2: The address is that of module No. 1-1. (#1006.0 to #1007.7)  
For modules No. 2 to No. 8, the layout is as shown above, starting from the smaller address number.

Fig. 1.13 JSP02, JSP04 Board Connection  
(Address number and bit number: #1006.0 to #1007.7)



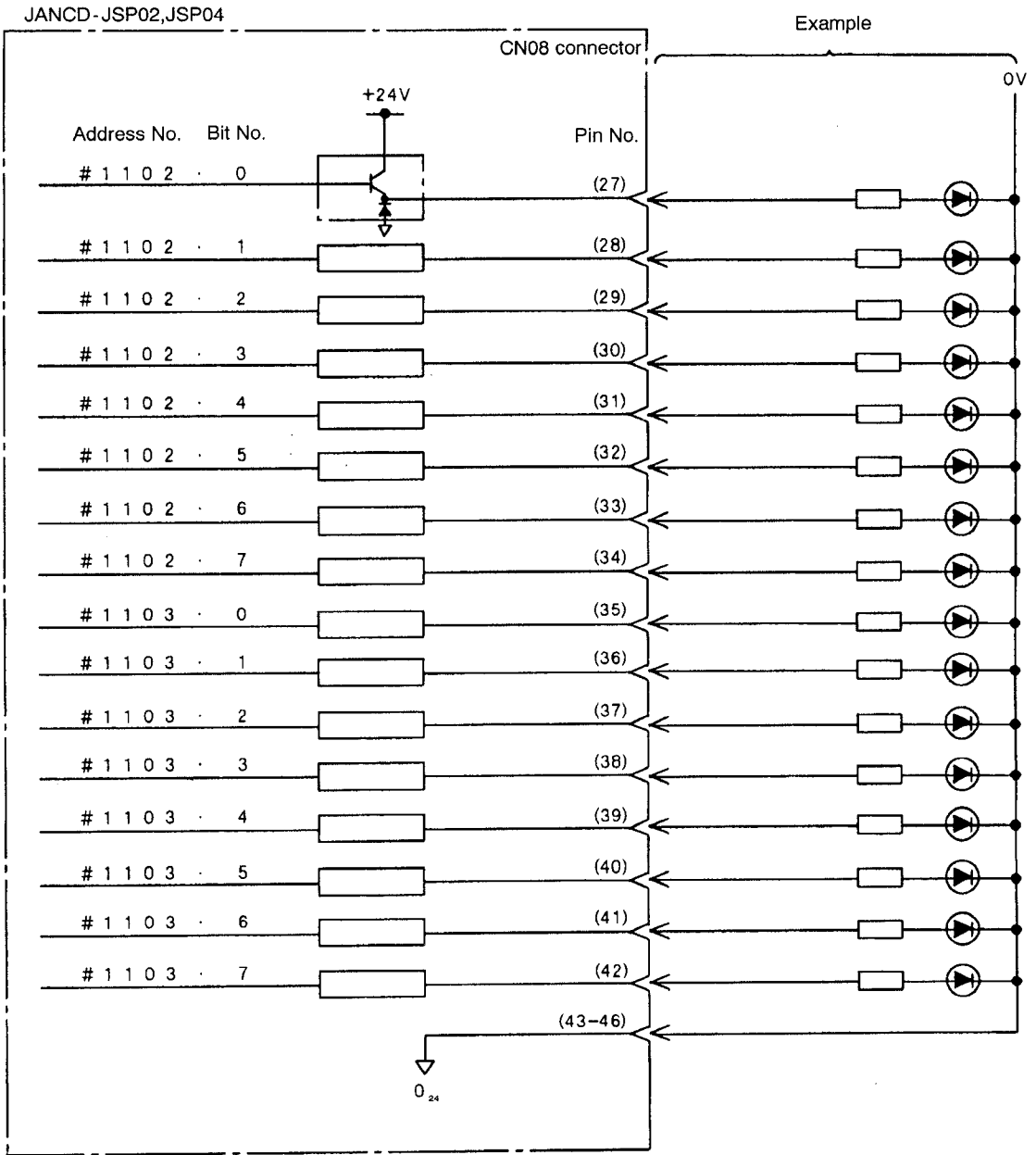
Note 1: The above example shows connection of +24V common. For the connection of 0V common, refer to“(5)JSP02, JSP04 Board.”

2: The address is that of module No. 1-1. (#1100.0 to #1101.7)  
For modules No. 2 to No. 8, the layout is as shown above, starting from the smaller address number.

Fig. 1.14 JSP02, JSP04 Board Connection  
(Address number and bit number: #1100.0 to #1101.7)

1

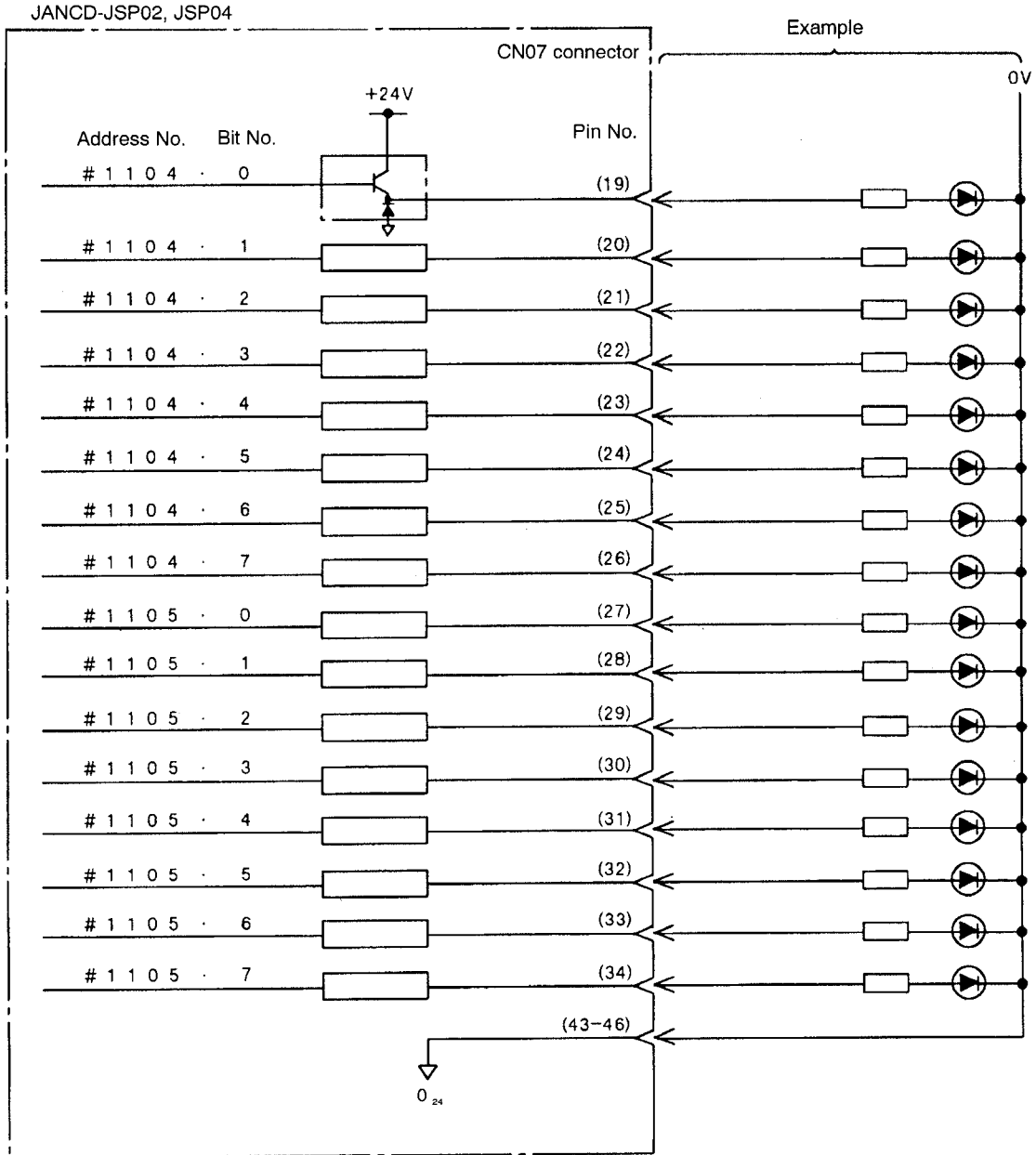
1



- Note 1: The above example shows connection of +24V common. For the connection of 0V common, refer to "(5)JSP02, JSP04 Board."
- 2: The address is that of module No. 1-1. (#1102.0 to #1103.7)  
For modules No. 2 to No. 8, the layout is as shown above, starting from the smaller address number.

Fig. 1.15 JSP02, JSP04 Board Connection  
(Address number and bit number: #1102.0 to #1103.7)

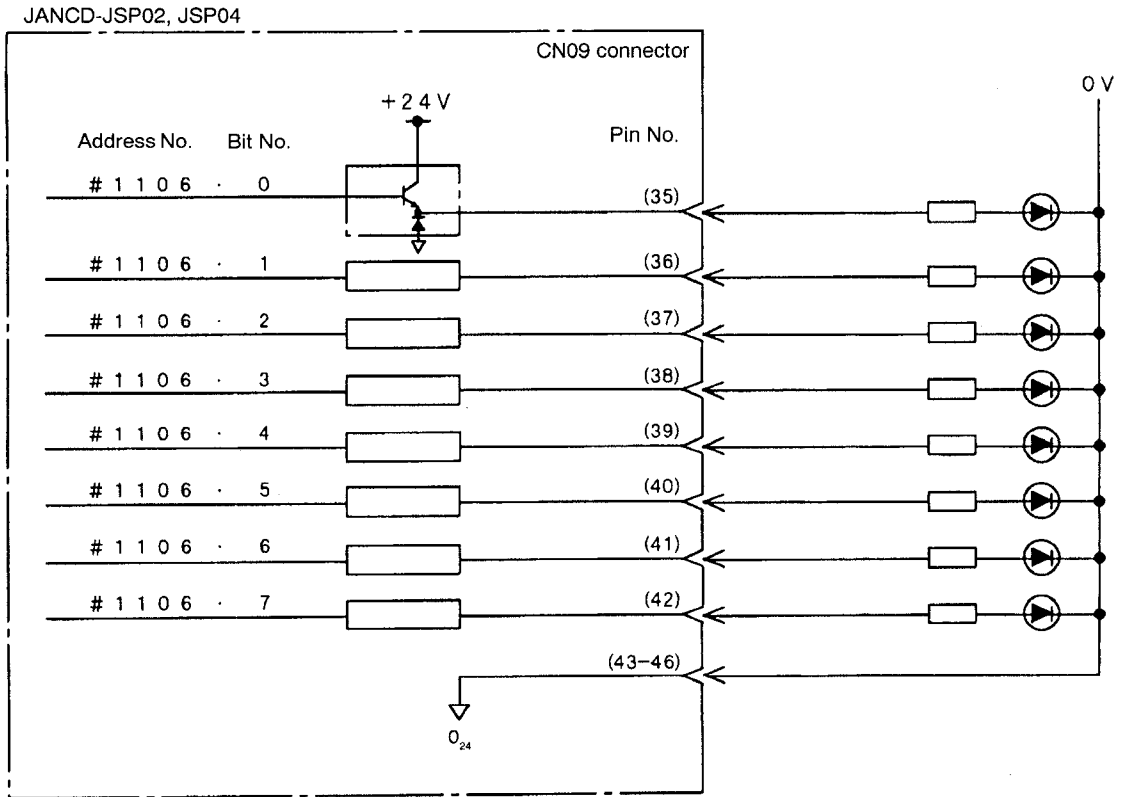




- Note 1: The above example shows connection of +24V common. For the connection of 0V common, refer to "(5)JSP02, JSP04 Board."
- 2: The address is that of module No. 1-1. (#1104.0 to #1105.7)  
For modules No. 2 to No. 8, the layout is as shown above, starting from the smaller address number.

Fig. 1.16 JSP02, JSP04 Board Connection  
(Address number and bit number: #1104.0 to #1105.7)

1



Note 1: The above example shows connection of +24V common. For the connection of 0V common, refer to“(5)JSP02, JSP04 Board.”

2: The address is that of module No. 1-1. (#1106.0 to #1106.7)

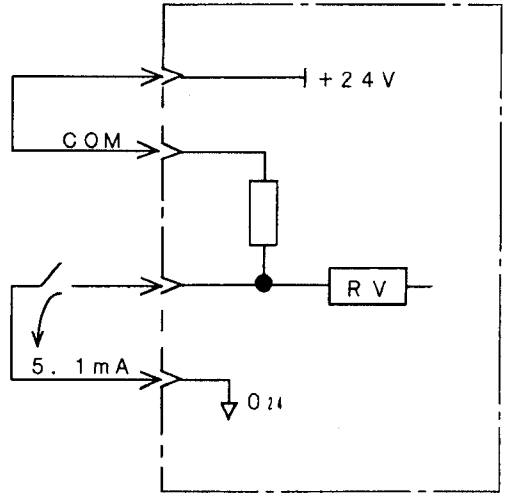
For modules No. 2 to No. 8, the layout is as shown above, starting from the smaller address number.

Fig. 1.17 JSP02, JSP04 Board Connection  
(Address number and bit number: #1106.0 to #1106.7)

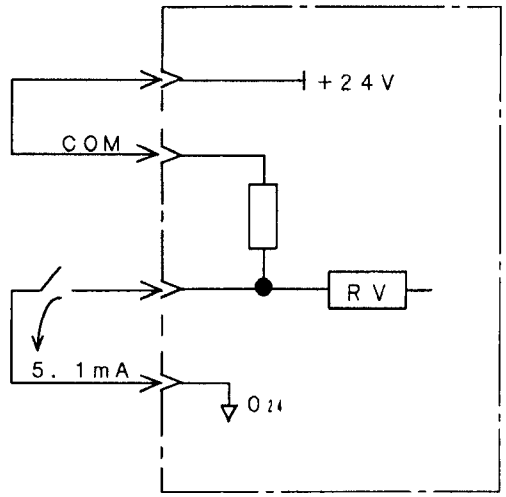
(5) JSP02, JSP04 Board Connection

(a) Input circuit

1



For 0 V common

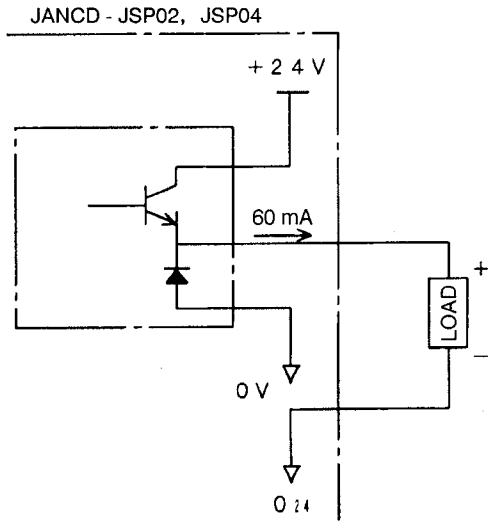


For +24 V common

Fig. 1.18 Input Circuit

1

(b) Output circuit (When using internal power)



Note: The 56 outputs are non-contact polarity points. Limit the current at ON to 60 mA (per circuit).

Fig. 1.19 Output Circuit (When using internal power)

## 1.2 DISPLAY UNIT SPECIFICATIONS

The table below shows the specifications of the original display unit and the upgraded J50L display unit.

Note that the original display unit and the upgraded J50L display unit are not compatible.

Table 1.1 Display Unit Specifications

Resolution of Screen Specification	High Resolution		Original Specification
	Monochrome LCD	High-resolution CRT	Original specification
Display	Monochrome LCD	High-resolution CRT	Original specification
Screen Size	9 inch		9 inch
Max. Characters	40 × 20		32 × 16
Displayed Characters	Numbers Letters Special codes		Numbers Letters Special codes
Keyboard	Symbol keys		Letter and symbol keys
Language	English, Japanese, German, French, Italian, Hangul Korean, Chinese		English, Japanese, German, French, Italian
External Dimensions (front)	Horizontal: 200(H) × 520 (W) × 120 (D) Vertical: 420 (H) × 290 (W) × 120 (D)	Horizontal: 200(H) × 520 (W) × 230 (D) Vertical: 420 (H) × 270 (W) × 230 (D)	Horizontal: 200(H) × 520 (W) × 230 (D) Vertical: 420 (H) × 270 (W) × 230 (D)

## 1.3 DIMENSIONS

The dimensions of the vertical monochrome LCD panel and CRT panel are different.

### 1.3.1 CNC Unit

1

Model: JZNC-JRK00□

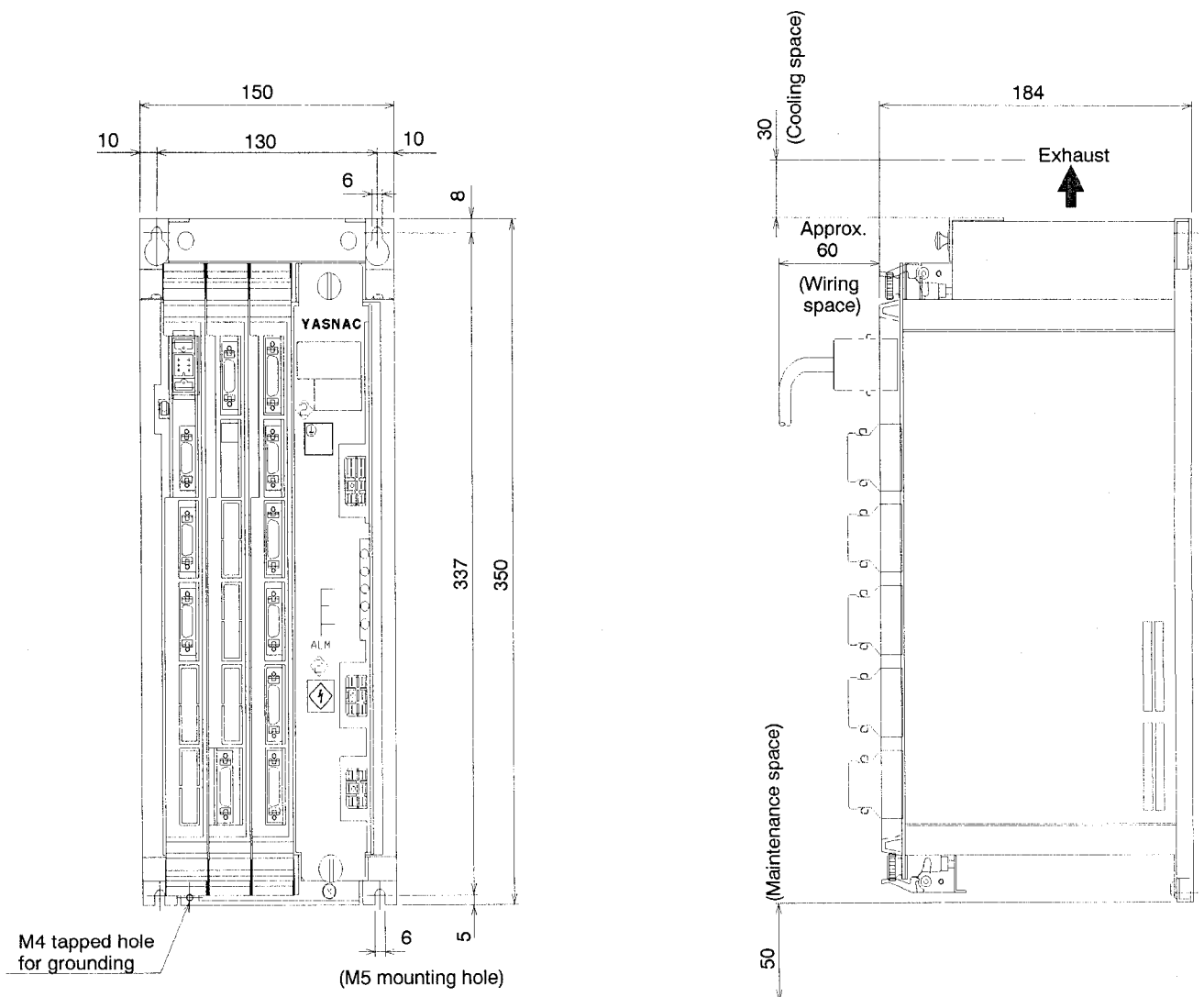
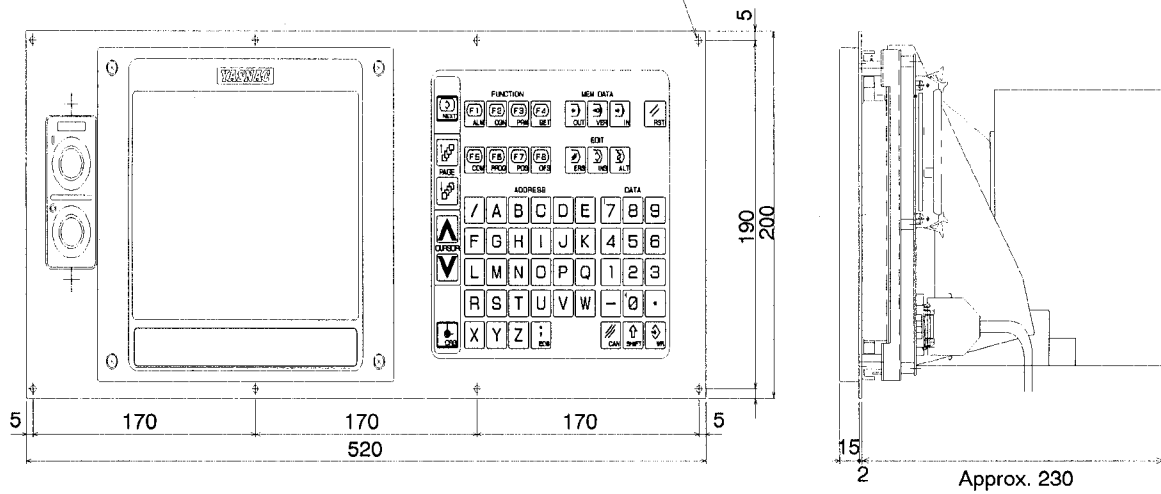


Fig. 1.20 Dimension of CNC Unit

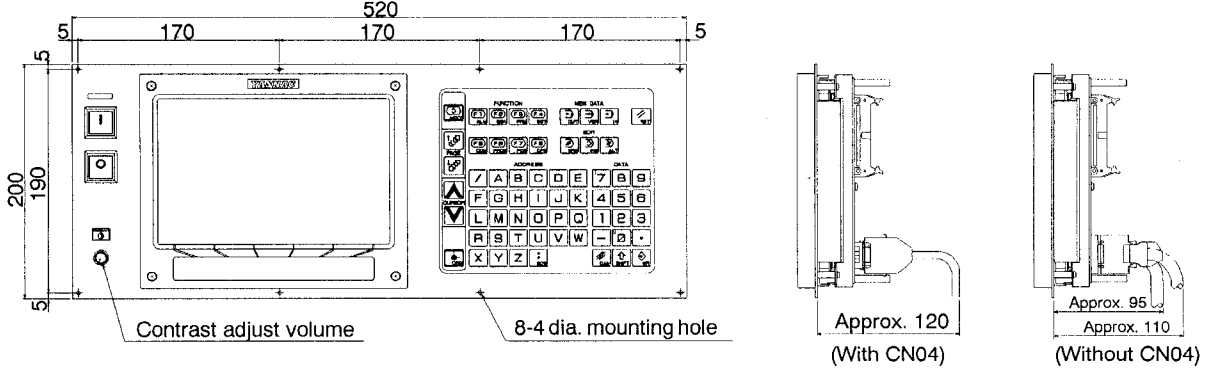
### 1.3.2 Operation Panel

Horizontal CRT Model: JZNC-JOP05C 8-4 dia. mounting hole

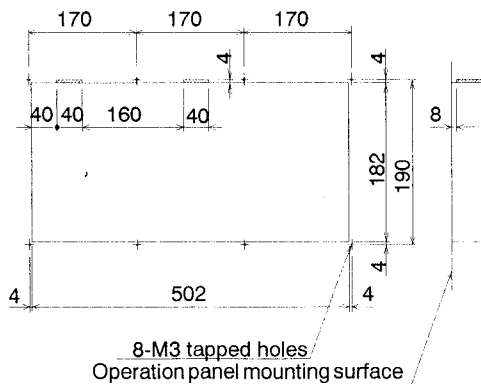


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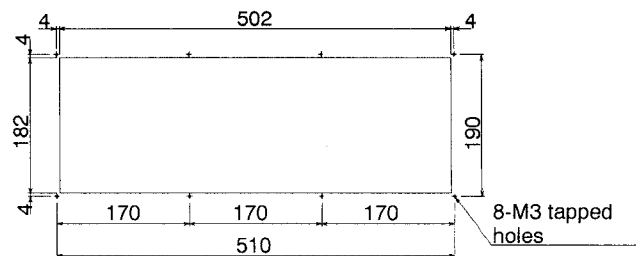
Horizontal LCD Model: JZNC-JOP03C



Horizontal CRT Mounting Dimensions

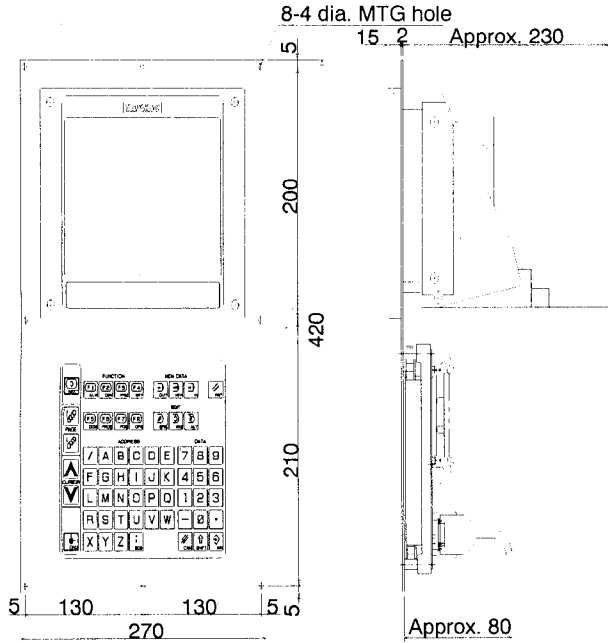


Horizontal LCD Mounting Dimensions

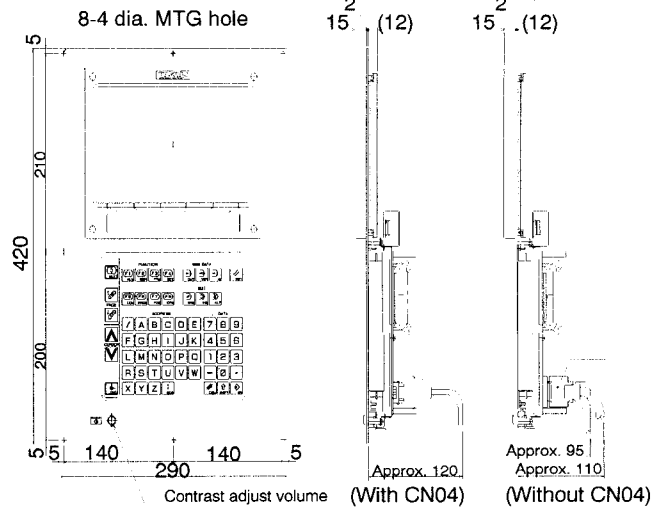


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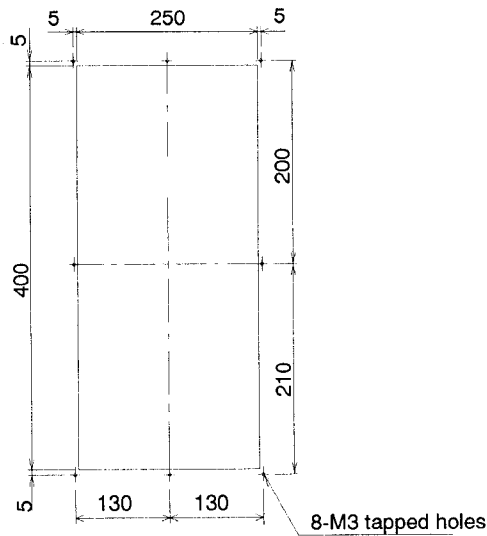
Vertical CRT Model: JZNC-JOP-06C



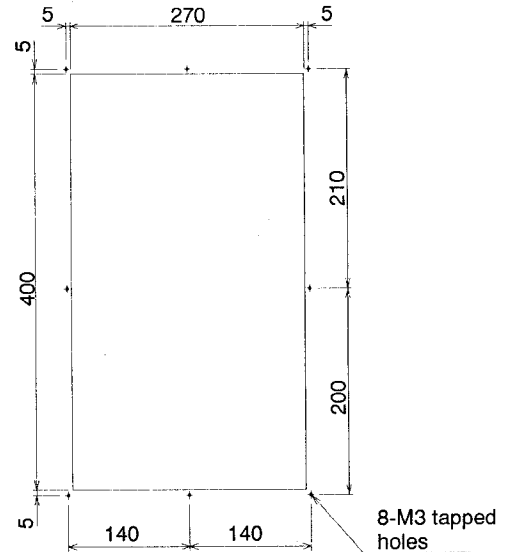
Vertical LCD Model: JZNC-JOP-04C



Vertical CRT Mounting Dimensions



Vertical LCD Mounting Dimensions



## 1.4 Sequence Editor

The sequence editor used with the upgraded specifications is the JZNC-JDU51.

The formerly used JZNC-JDU01 cannot be used. The method of operation of the sequence editor remains unchanged.



# 2

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## UPGRADED FUNCTIONS

2

Chapter 2 describes the upgraded function of the J50L.

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2

## 2.1 UPGRADES TO REDUCE CYCLE TIME

Several upgrades have been conducted to reduce cycle times. The times quoted in the explanations are reference values only. The same time reductions may not be achieved in an actual machine because of differences in factors such as the servo system settings and machine rigidity.

### 2.1.1 Upgraded “At-reference-point” Output Signal

#### (1) Outline of the Function

The start condition normally used for M codes which include machine movements (tool change, turret indexing, etc.), is the evaluation whether an axis is in the area near the zero point.

For this evaluation, YASNACJ50 normally uses the “at-reference-point” output signal, one of the signals output by the CNC. Because the signal output range is fixed at  $\pm 3$  pulses relative to the zero point, the signal can only be used as a “complete output (COIN)”, not as a “near-zero-point (NEAR)” output.

However, the upgrade makes the “at-reference-point” output signal variable so that it can be used as a “near-zero-point (NEAR)” output. Although the positioning settling time remains unchanged, a reduction in cycle time of several hundred milliseconds is possible because machine movement is enabled during the settling time instead of after it is complete.

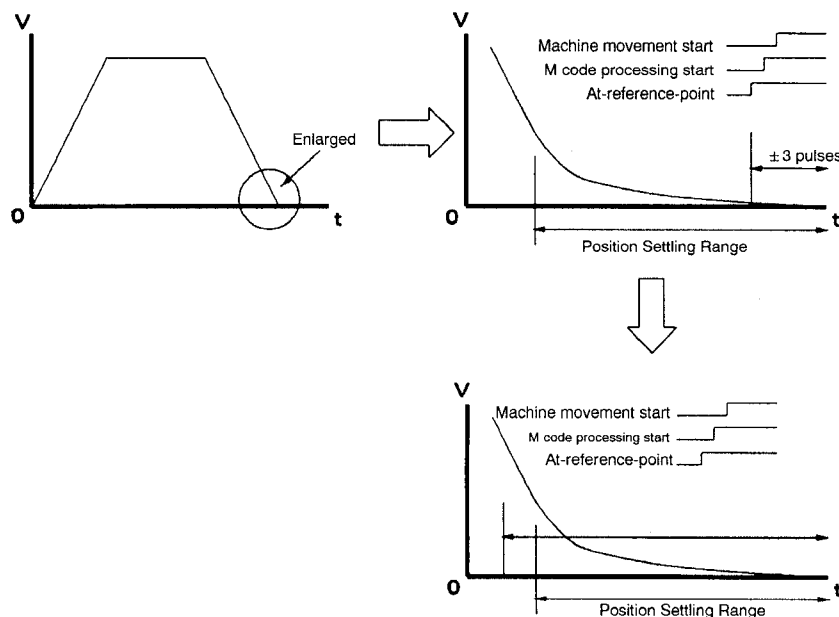


Fig. 2.1 At-reference-point Output Signal

(2) Specifications

This item explains the original specification and the upgraded specification.

(a) Original Specification

The I/O outputs the “at-reference-point” signal when the axis is within  $\pm 3$  pulses of the zero point.

This is also used as the start condition for automatic coordinate system set-up after zero point return is complete.

(b) Upgraded Specification

The following parameters have been added.

Table 2.1 At-reference-point Signal Output Parameters

Parameter No.	Description	Setting Units	Setting Range
pm8820	No. 1 at-reference-point signal output range	1 = 1 pulse	3 to 99999999
pm8821	No. 2 at-reference-point signal output range		

The “at-reference-point” signal is output when the axis is within the range set by the parameter relative to the zero point.

The range reverts to the original 3 pulses (fixed) if the parameter is set out of range.

When used as the start condition for automatic coordinate system set-up after zero point return is complete, the range remains the original 3 pulses.

## 2.2 UPGRADES TO IMPROVE EASE-OF-OPERATION

Several upgrades have been conducted to improve ease of operation. Some of the functions are subject to hardware limitations outside the CNC.

### 2.2.1 Key Input Lock Function

#### (1) Outline of the Function

With the keyboard provided on the CNC operation panel, key input is always enabled. But in some machine operation environments key input must be disabled to prevent malfunctions due to incorrect key operations during automatic operation.

This function is interlocked with the key lock switch to disable inputs from the CNC operation panel keyboard.

#### (2) How to Use the Function

The key lock switch mounts on the machine operation panel. When the key lock switch is turned ON, input is disabled from all keys on the CNC operation panel keyboard, including the mode function and reset keys.

Set the key lock switch to the OFF position to enable input from the keyboard on the CNC operation panel.

The key lock switch also disables screen switching using the mode function keys. However, screen switching is possible with the external screen switching function that uses I/O signals even when the key lock switch is ON.



- 
1. This function cannot be made valid by the forced contact input.
  2. Turn the key lock switch ON or OFF while no input is being made from the keyboard.
-

(3) Parameters and Input Signal

The parameter and input signal for the key lock function are shown in the tables below.

Table 2.2 Key Lock Function Parameter

Parameter No.	Bit No.	Description
pm6013	D4	0: Key input lock function OFF
		1: Key input lock function ON

Table 2.3 Key Input Lock Function Input Signal

Signal No.	Description
13140	Key input lock function input switch

(4) Conditions for Use

This function is available with the upgraded J50 standard specification and high-speed specification.

## 2.2.2 Position Monitoring Function\*

### (1) Outline of the Function

This function always checks whether the machine position is inside the range designated by a parameter and outputs the status as the position monitor signal to I/O.

This function is used to provide machine protection interlock for the position of the machine at power on for the machine equipped with the absolute position detection function.

2

### (2) How to Use the Function

First, set in the parameters which axis is to be checked and the position monitor area limit values in the positive and negative directions.

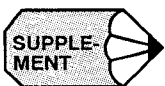
A maximum of six position monitor areas can be set, regardless of the axis name.

The CNC always monitors the machine position of the designated axis and turns the position monitor signal ON if the axis lies in the designated area. The machine position is considered to be inside the position monitor area if it lies on the limit of a designated area.

The position monitor function is enabled in the following situations.

- Incremental specification: After the completion of the first manual reference point return
- If absolute position detection function is used: After power ON (however, invalid if zero point setting has not been completed.)

This function is valid in both manual and automatic operation modes.



---

The area is monitored and output to I/O once approximately every 500 ms. Consequently, the position monitor function is not appropriate for overtravel check and other processing requiring immediate action. Use the function for position monitoring of an axis which is static or moving at low-speed.

---

### (3) Parameters and Output Signals

The parameters and output signals for the position monitor function are shown in the tables below.

Table 2.4 Position Monitor Function Parameters

Parameter No.	Description	Setting Range	Setting Units
# option	0: Position monitor function OFF 1: Position monitor function ON		
pm8800 to pm8805	Axis designation for position monitor areas 1 to 6	0 to 2 0: OFF 1: X-axis 2: Z-axis	
pm8806	Positive direction limit value for No. 1 position monitor area	±99999999	1 = 1 pulse
pm8807	Negative direction limit value for No. 1 position monitor area	±99999999	1 = 1 pulse
pm8808	Positive direction limit value for No. 2 position monitor area	±99999999	1 = 1 pulse
pm8809	Negative direction limit value for No. 2 position monitor area	±99999999	1 = 1 pulse
pm8810	Positive direction limit value for No. 3 position monitor area	±99999999	1 = 1 pulse
pm8811	Negative direction limit value for No. 3 position monitor area	±99999999	1 = 1 pulse
pm8812	Positive direction limit value for No. 4 position monitor area	±99999999	1 = 1 pulse
pm8813	Negative direction limit value for No. 4 position monitor area	±99999999	1 = 1 pulse
pm8814	Positive direction limit value for No. 5 position monitor area	±99999999	1 = 1 pulse
pm8815	Negative direction limit value for No. 5 position monitor area	±99999999	1 = 1 pulse
pm8816	Positive direction limit value for No. 6 position monitor area	±99999999	1 = 1 pulse
pm8817	Negative direction limit value for No. 6 position monitor area	±99999999	1 = 1 pulse



Table 2.5 Position Monitor Function Output Signals

Signal No.	Description
# 12260 to # 12265	Position monitor No. 1 to No. 6 area output

### 2.2.3 Program Check Screen\*

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#### (1) Outline of the Function

The program screen is able to display the program only. However, it is often necessary to confirm positions and other statuses while checking the program during memory or MDI operation but it can be inconvenient to switch between screens with the function keys. Consequently, the upgrade provides information such as positions and spindle speed on the program check screen to allow work to proceed without pressing function keys.

#### (2) How to Use the Function

Press the PRG function key to display the program check screen. A parameter setting determines which type of screens is displayed - the original program screen showing the program only or the program check screen.

PROGRAM (MEM)			O1234	N1234
O1;			G**	G39
N1;			G00	G67
N2 G50 X100. Z100.;			G17	G69
N3 G96 S150 M03;				G64
N4 X20.3 Z1.5;			G98	G122
N5 G01 X-100.;			G20	G50
N6 Z-10.5F5;			G40	
N7 X10.5 F10;			G37	G150
N8 Z-15.5F5;				
N9 X5.;				
(UNIVERSAL)	(INCREMENT)	S (ACT)	2345	
X-99999.999	X-99999.999	S (COM)	2345	
		T CODE	0101	
Z-99999.999	Z-99999.999	FEED	500. mm/min	
			LSK	RDY

Fig. 2.2 Program Check Screen

(3) Parameter

The parameter used for the selection of the screen type is indicated below.

Table 2.6 Program Check Screen Parameter

Parameter No.	Bit No.	Description
#option	D3	0: Do not display the program check screen
		1: Display the program check screen

## 2.2.4 Absolute Position Detection\*

### (1) Outline of the Function

Machine movements are detected and held even when the power is turned OFF so that the machine coordinate system and workpiece coordinate system are automatically set without conducting home position return when the power is turned ON, that is, the machine is in operation status.

This function gives the following advantages:

- Home position return is unnecessary after the power is turned ON.  
Operation is quickly and easily restarted.
- Stroke check is enabled immediately after the power is turned ON.
- Deceleration dog and limit switches such as the machine end limit switch are not required.

### (2) Method of Absolute Position Detection

Absolute positions are detected under semi-closed control using an absolute encoder attached to the end of the motor.

The detector comprises of an encoder that detects the position within one revolution and a counter that detects and counts rotations.

(a) Reading absolute data at power ON

Absolute data comprises the number of revolutions (N) from the absolute reference position and the position within one motor revolution. When the SEN signal is input, the number of motor revolutions is read as serial data and the position within one motor revolution is read as the number of initial incremental pulses. The number of motor revolutions can be read only once after the encoder power is turned ON.

Subsequently, output operation is identical to a normal incremental encoder.

The absolute position is calculated as:

$$P = (N \times RP) + PO$$

where,

N is the number of motor revolutions

RP is the number of pulses per motor revolution

PO is the counted number of incremental pulses

(b) Holding absolute data at power OFF .

When the power turns OFF, the rotation detector continues to detect rotations using the CNC backup battery. It can therefore follow machine rotations and detect the machine absolute position when the power is OFF.

(c) Reading absolute encoder data to NC

The CNC reads the result of the equation  $P = (N \times RP) + PO$  above, records it as an absolute position, then establishes the machine coordinate system and sets the workpiece coordinate system.

(3) Starting Up the Absolute Position Detection System

The absolute position detection system requires an initial setting of the machine home position when the absolute position detector is started.

The CNC gives an alarm if the initial setting of the machine home position has never been made or if the absolute position is lost. Set the home position again if this problem occurs.

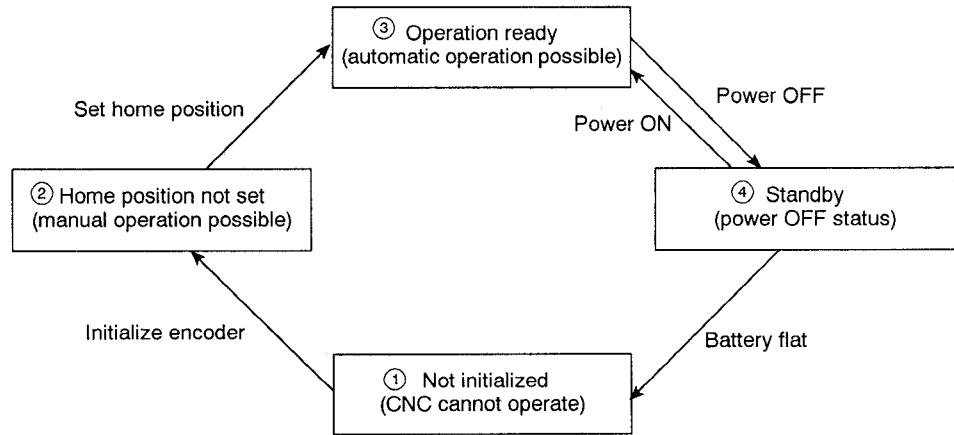


Fig. 2.3 Absolute Position Detector Status Transition Diagram

① Not Initialized

Encoder operation cannot be guaranteed in this status.

Encoder initialization: Encoder operation cannot be guaranteed if the voltage of the super-capacitor in the encoder is unstable. Discharge the super-capacitor to completely stop encoder operation.

② Home Position Not Set

The home position had not been set. Normal automatic operation is possible, providing that absolute position detection is not required.

③ Operation Ready

The home position has been set, absolute position detection is operating, and normal operation is possible.

④ Standby

The machine movements are detected and held while the power is OFF. This operation is powered by the super-capacitor or a battery.

(4) Home Position Setting

The home position must be set before absolute position detection can be carried out.

The machine coordinate system and machine home position are created when the machine home position (machine reference point) is set during home position initialization. The automatic coordinate system setting function is enabled when the home position is set.

The home position setting is required in the following cases:

- During machine initial adjustment (when the home position is determined)
- After a motor is replaced.
- After an alarm related to the absolute position encoder.

The machine coordinate values are set to zero (0) if the power is turned ON before the home position setting is complete.

The zero point can be set either by parameter setting, or by setting on the zero point setting screen that has been added in the upgraded specification.

#### (a) Setting by parameter

The zero point is set by performing manual operation and setting a parameter. The axis for which zero point setting is required is set in advance and the zero point for this axis is set.

The zero point setting completed/not completed status is recorded as a bit parameter. After completion of the zero point setting operation, the zero point setting completion bit is set. Zero point setting can be performed again by switching the zero point setting completion bit off.

When the zero point setting completion bit is off, the same status as established by the interlock operation prior to zero return is established and neither automatic nor MDI operation is possible.

#### (b) Setting on the zero point setting screen

The zero point setting screen is available from the [SET] functions.

The zero point setting screen shows the zero point setting statuses and position error information.

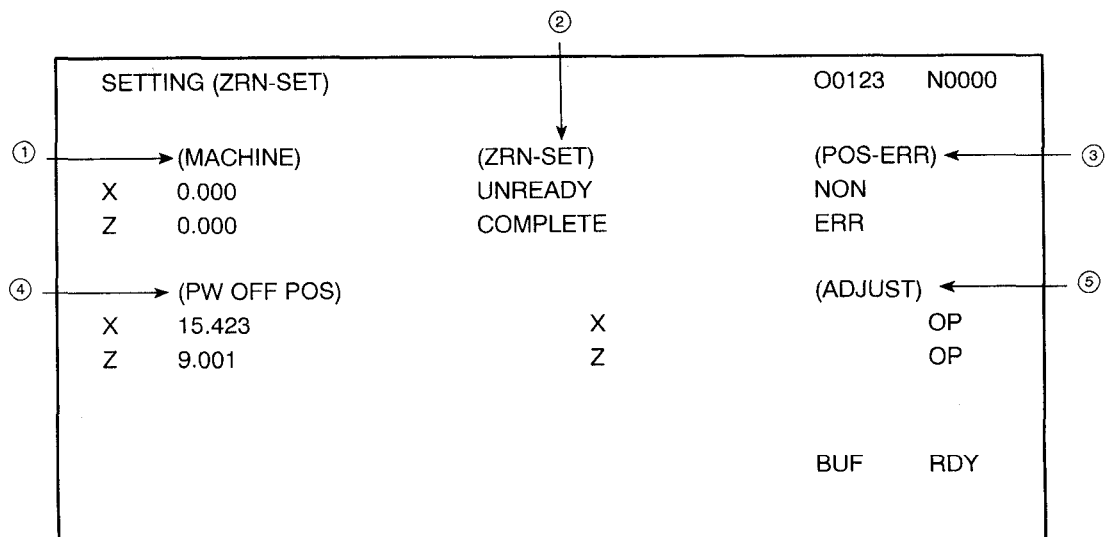


Fig. 2.4 Zero Point Setting Screen

- 
- ① Machine Coordinate Position  
Displays the machine coordinate position of each axis.
  - ② Zero Point Setting Status  
Displays whether the zero point is set for each axis.  
UNREADY: zero point setting is not complete  
COMPLETE: zero point setting is complete
  - ③ Position Error Information  
Displays position error information for each axis.  
NON: Normal status with no error occurred  
ERR: A position error occurred  
  
A position error occurs if the difference between the machine coordinate value when the power is turned ON and when it was previously turned OFF differs by the value set in parameters pm6576 and pm6577 or more.  
  
However, the position error check is not made for an axis if the corresponding parameter pm6576 or pm6577 is set to "0".
  - ④ Power OFF Position  
Displays the machine coordinate positions when the power turned OFF.  
  
If the function is enabled for only one axis, values are displayed for all axes but the setting operation applies only to the axis for which the function is enabled. A warning is displayed if a setting operation is carried out on an axis which has the function is disabled.
  - ⑤ Zero Point Setting Adjustment  
Displays the zero point adjustment if no deceleration dog is fitted.

## (c) Operations from the zero point setting screen

## &lt;Changing the Zero Point Setting Status&gt;

Press the cursor down keys to move the cursor to the axis to select.

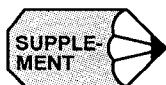
- Setting the zero point setting to COMPLETE

Enter “1” and press [WR]. The zero point setting status changes from UNREADY to COMPLETE. The status remains unchanged if it was already COMPLETE.

- Setting the zero point setting to UNREADY

Enter “0” and press [WR]. The zero point setting status changes from COMPLETE to UNREADY. The status remains unchanged if it was already UNREADY.

2



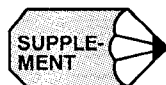
The zero point setting status does not change if only the [WR] key is pressed.

After the status is changed from COMPLETE to UNREADY, a message prompts the operator to turn OFF the power. Turn the power OFF and back ON.

## &lt;Changing the Position Error Status&gt;

The following operation resets an alarm after a position error (alarm 0335 to 0338) occurs.

- Enter “0” and press [WR] and [RESET]. The position error status changes from ERR to NON. The status remains unchanged if it was already NON.



1. The position error status does not change if only the [WR] key is pressed.
2. The setting can be changed only when pm6219 = 1 or 4.

## &lt;Changing the Zero Point Setting Adjustment&gt;

A value can be input whether or not a deceleration dog is fitted, but the zero point setting function is only enabled if no deceleration dog is fitted. The settings are made in units of pulses, with no decimal point.

2

<Cursor Movement>

The movement of the cursor when cursor up or down key is pressed is shown in the diagram below.

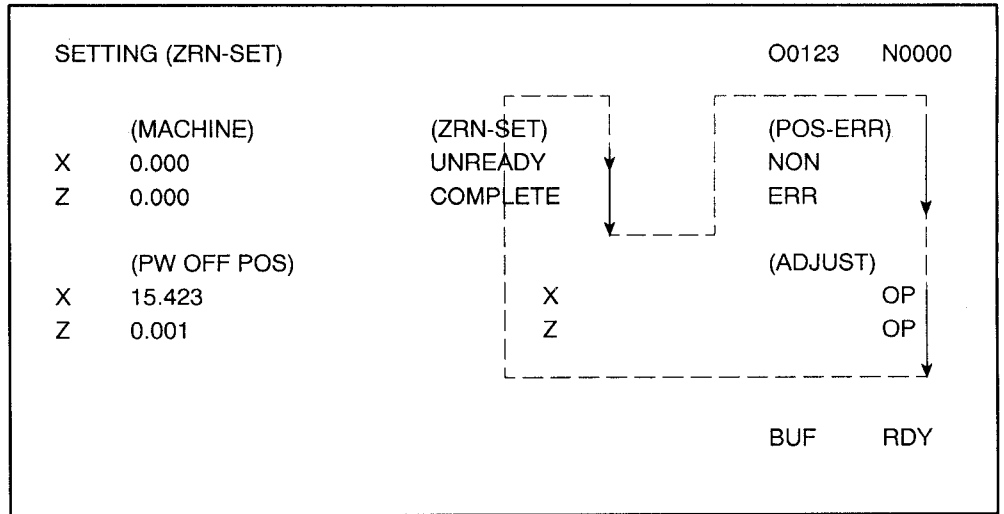


Fig. 2.5 Cursor Movement when the Cursor Down Key is Pressed



## (5) Setting the Zero Point

When manual low-speed zero point return is conducted for an axis with the absolute positioning function enabled but no zero point set, the zero point and machine coordinate system are set automatically.

To reset the zero point set the zero point setting (ZRN-SET) on the zero point setting screen to UNREADY. Turn the power OFF and back ON then conduct manual low-speed zero point return.

The zero point setting method differs according to whether a zero point deceleration dog is fitted.

### (a) Zero point deceleration dog fitted

Carry out the appropriate zero point setting method described below for the situation.

<Initial Status>

The zero point is not set and no absolute position error has occurred.

- ① On the zero point setting screen, check that the zero point setting (ZRN-SET) is UNREADY and no absolute position error (POS-ERR) has occurred.
- ② Conduct manual low-speed zero point return.

<If an Absolute Position Error Occurs>

Reset the absolute position error from the zero point setting screen.

<Zero Point is Set but Needs to be Set Again>

- ① Set the zero point setting (ZRN-SET) to UNREADY on the zero point setting screen.
- ② Turn the power OFF and back ON.
- ③ Conduct manual low-speed zero point return.

The second and subsequent zero point return operation differs according to the parameter setting. This method is only valid for parameter pm6013 D6 = 0 (use deceleration dog for zero point setting with absolute position detection function).

(b) No Zero Point Deceleration Dog Fitted

Follow the procedure below to manually move to the zero point and set the zero point.

- ① In the manual operation mode, move to the machine position to be set as the zero point 2).
- ② Still in the manual operation mode, use the zero point setting screen to set the zero point setting (ZRN-SET) for the appropriate axis to COMPLETE.
- ③ If a zero point adjustment from the position set in ① above is required, carry out the reset operation then set the adjustment amount.

The following diagram shows the relationship between the machine position and zero point setting position.

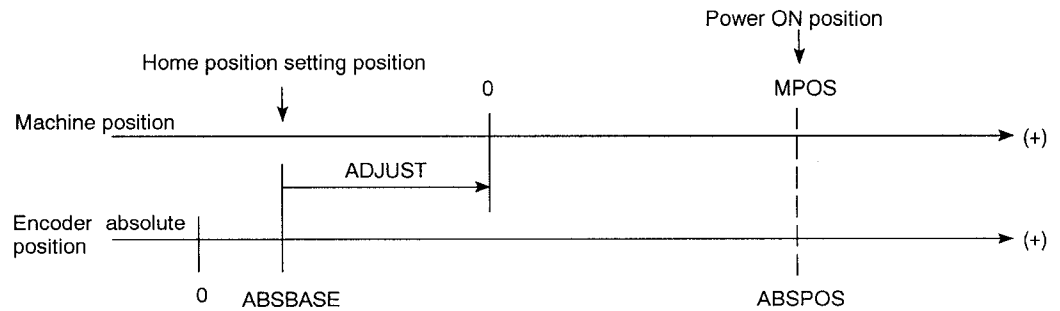


Fig. 2.6 Relationship Between Machine Position and Zero Point Setting Position

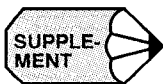
$$\text{Machine position at power ON} = (\text{ABSPOS} - \text{ABSBASE}) / \alpha\text{PG} - \text{ADJUST}$$

Where,

ABSPOS (pulses) is the encoder absolute position at power ON

ABSBASE (pulses) is the zero point setting position at power ON (stored in CNC)

ADJUST (μm) is the set adjustment for zero point setting αPG (μm/pulse) is the movement distance per encoder pulse



1. Because ABSBASE is not determined, the machine position set to zero (0) if the power is turned ON before the zero point setting is complete.
2. The adjustment for zero point setting can only be changed if pm6219 = 1 or 4.

## (6) Related Parameters, I/O Signals, and Alarms

Table 2.7 Parameters for the Absolute Position Detection Function

Parameter No.	Bit No.	Description
#option	D2	0: X-axis absolute position detection function disabled 1: X-axis absolute position detection function enabled
	D3	0: Use X-axis SGDB parameter (Cn-02) Bit 0 = 0 (available only when absolute position detection function is enabled) 1: Use X-axis SGDB parameter (Cn-02) Bit 0 = 1 (available only when absolute position detection function is enabled)
#option	D2	0: Z-axis absolute position detection function disabled 1: Z-axis absolute position detection function enabled
	D3	0: Use Z-axis SGDB parameter (Cn-02) Bit 0 = 0 (available only when absolute position detection function is enabled) 1: Use Z-axis SGDB parameter (Cn-02) Bit 0 = 1 (available only when absolute position detection function is enabled)
pm6013	D7	0: Use deceleration dog for the zero point setting of the absolute position detection function (available only when absolute position detection function is enabled) 1: Do not use deceleration dog for the zero point setting of the absolute position detection function (available only when absolute position detection function is enabled)
pm8770		Zero point setting complete status (This parameter is processed internally by the CNC. Do not set this parameter.)
	D0	X-axis zero point setting complete status 0: incomplete, 1: complete
	D1	Z-axis zero point setting complete status 0: incomplete, 1: complete
pm8771		Absolute position error status (This parameter is processed internally by the CNC. Do not set this parameter.)
	D0	X-axis absolute position error 0: None, 1: Error
	D1	Z-axis absolute position error 0: None, 1: Error

Table 2.8 Parameters for the Absolute Position Detection Function

Parameter No.	Description	Setting Range	Setting Units
pm6574, pm6575	Zero point setting adjustment (X-axis, Z-axis)	± 99999999	1 = 1 pulse
pm6576, pm6577	Position error limit value (X-axis, Z-axis)	0 to 32767	1 = 1 pulse
pm6610, pm6611	Table movement per motor rotation (X-axis, Z-axis)	0 to 99999999	1 = 1 μm
pm8760, pm8763	Zero point setting offset (X-axis, Z-axis) (These parameters are processed internally by the CNC. Do not set these parameters.)		
pm8766, pm8768	Machine position at power interruption (X-axis, Z-axis) (These parameters are processed internally by the CNC. Do not set these parameters.)		

Table 2.9 I/O Signals for Absolute Position Detection Function

I/O Signal No.	Description
12250, 12251	Position error output signal for absolute position detection function (X axis to 4th axis)

Table 2.10 Alarms for Absolute Position Detection Function

Alarm No.	Description
0335, 0336	Absolute position detection error (X-axis, Z-axis) The difference between the position at power ON and when it was previously turned OFF differs by more than a set distance.
0395, 0396	Absolute error (X-axis, Z-axis) Absolute encoder malfunction was detected at power ON.

### (7) Conditions for Use

This function is available with the upgraded standard specification.

This function is subject to the following restrictions:

#### (a) Hardware-related

- Use JANCD-SR54 (-SR55) as the SR board. Not compatible with JANCD-SR50 (-SR51).
- Use an SGDB Servopack.
- Use an absolute encoder.
- Not compatible with a separate pulse generator (linear scale)

#### (b) Function-related

- Backlash compensation is disabled if home position return has not be conducted.
- The function is not compatible with an infinitely long rotary axis.
- With a rotary axis, the position at the home position initial setting becomes the machine position reference. For example, if the power is turned OFF at the 720° position, a 720° machine position is used when the power is next turned ON.

## 2.2.5 ROM-based Programs

### (1) Outline of the Function

Programs can be pre-written to a sequence PROM that is mounted in the CNC.

This function eliminates the need for program transfer via RS-232C when the machine is started. Restarting is simple if a program is deleted by mistake.

Use this function for machine-specific programs, such as ATC macros.

#### (a) Program output (CMOS to PROM writer)

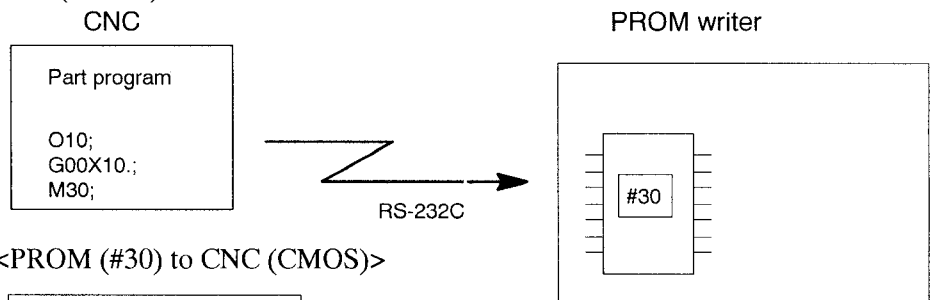
Programs in the CNC program area (CMOS) are converted to Intel HEX format, transferred to the PROM writer, and written to the sequence ROM (#30).

See “Selecting the PROM Writer” in the YASNAC J50 PC System Instruction Manual (manual No. TOE-C843-12.1) for information on selecting and operating the PROM writer.

#### (b) Program writing (PROM to CMOS)

Transfers the programs written in the sequence PROM (#30) on the CP50B board to the CNC program area (CMOS).

<CNC (CMOS) to PROM Writer>



<PROM (#30) to CNC (CMOS)>

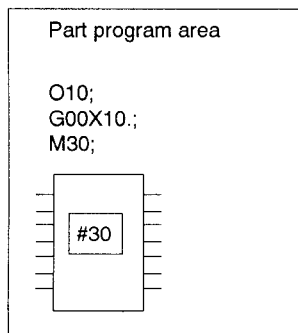


Fig. 2.7 Program Writing

## (2) How to Use the Function

This section describes how to transfer programs from CNC to PROM writer or from PROM writer to CNC.

### (a) Program Transfer from CNC to PROM Writer

Follow the procedure below to transfer programs from CNC to PROM writer.

- ① Set the CNC in Edit mode. Use the erase function to remove all programs from the CNC program area except the programs to be transferred to the PROM writer.
- ② Check that the total number of characters in the programs does not exceed the limit value.

#### <Size of Transferred Programs>

The number of program characters transferable to PROM is  $(32,768 - (\text{number of programs} \times 3))$ .  $(\text{number of programs} \times 3)$  occurs because the output format for each program “%;O10;-;M30;%” has three extra characters: “%;” at the start and “%” at the end.

A maximum of 100 programs can be output.

A warning is displayed (“CHARACTER OVER”) and transfer to the PROM writer is not possible if the number of characters or programs is too high.

Delete programs with the erase function in the Edit mode to reduce the number of characters within the permitted limit.

Even if the program to be output to the PROM writer contains only a few characters, the entire 32 KB contents of the CNC program area are transferred to the PROM writer. Data apart from the program is output as null data “FFH”.

- ③ Connect the CNC and PROM writer with an RS-232C cable. See the YASNAC J50 PC System Instruction Manual for details of the connections between CNC and PROM writer.

The transfer baud rate is set by the CNC parameters, as shown in Table 2.11.

Table 2.11 Parameter Setting

Parameter	D3	D2	D1	D0	Baud Rate
pm6028	0	0	0	0	50
	1	0	0	0	100
	0	1	0	0	110
	1	1	0	0	150
	0	0	1	0	200
	1	0	1	0	300
	0	1	1	0	600
	1	1	1	0	1200
	0	0	0	1	2400
	1	0	0	1	4800

- ④ Check the number of characters in the transferred programs and the transfer baud rate.
- ⑤ Set the system number switch to “6”, turn the power OFF, and then ON.

The initial menu screen is displayed.

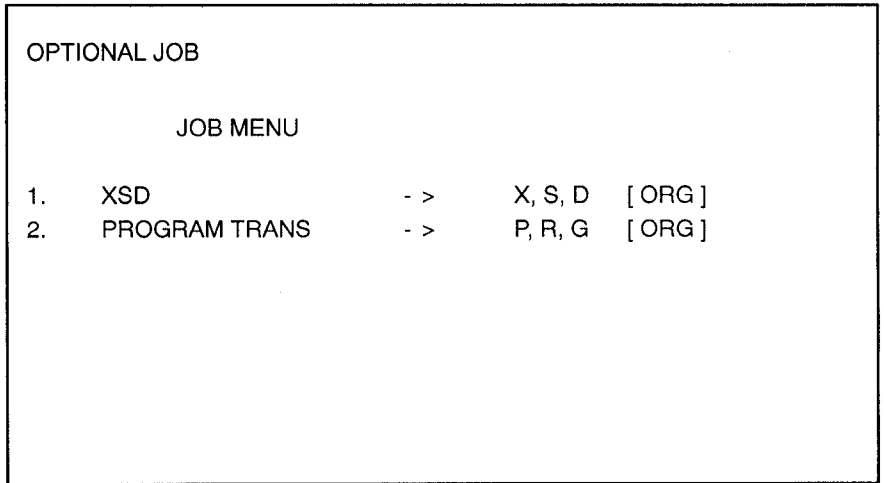


Fig. 2.8 Initial Menu Screen

- ⑥ Press P, R, G [ORG].



- ⑦ The program transfer menu screen is displayed.

The previous screen is displayed again if the cancel key [CAN] is pressed.  
(See Supplement 1.)

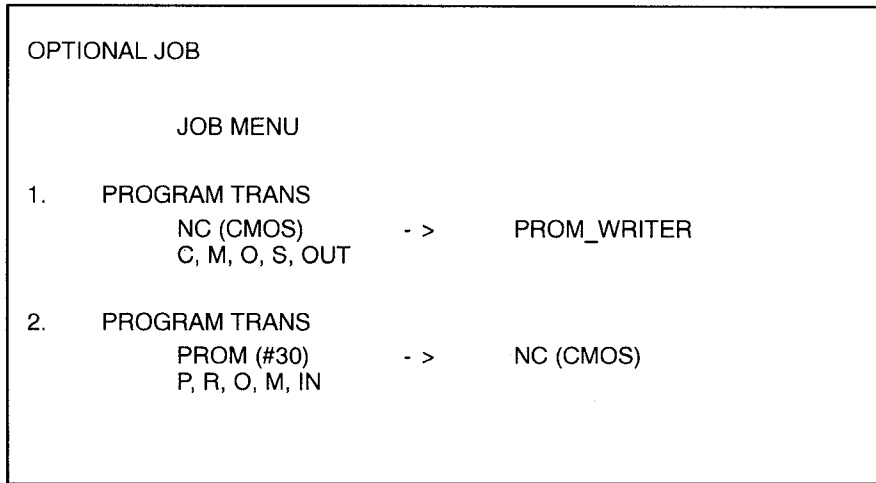


Fig. 2.9 Program Transfer Menu Screen

- ⑧ Enable data receiving at the PROM writer.  
⑨ Press C, M, O, S [OUT].

The CNC programs converted to Intel HEX format are transferred via the RS-232C to the PROM writer.

At the REMAINDER position on the screen, the asterisks (\*) indicate the amount of transfer remaining. Each asterisk (\*) is equivalent to 2 KB of program output remaining.

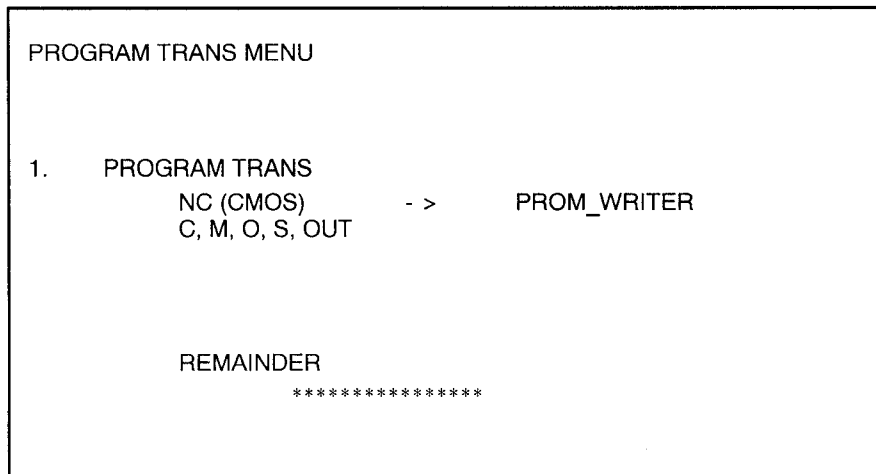


Fig. 2.10 Program Transfer (CMOS to PROM Writer)

2

- ⑩ The messages “TRANS COMPLETE!” and “POWER OFF!” are displayed when transfer is complete.

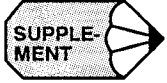
```
PROGRAM TRANS MENU

1.  PROGRAM TRANS
    NC (CMOS)      - >  PROM_WRITER
    C, M, O, S, OUT

    TRANS COMPLETE!
    POWER OFF!
```

Fig. 2.11 Program Transfer Complete

- ⑪ Turn the power OFF.



1. The key inputs displayed at the bottom of the screen can normally be deleted one at a time by pressing the cancel key [CAN], but this is not possible in this screen. To change the input, press the reset key [RST] and make the key inputs again.
2. Ensure that the part program format begins with "O\*\*\*\*". A warning is displayed ("FORMAT ERROR!") and the CNC format conversion processing stops if an attempt is made to output a program in a format that does not begin with "O\*\*\*\*".

2

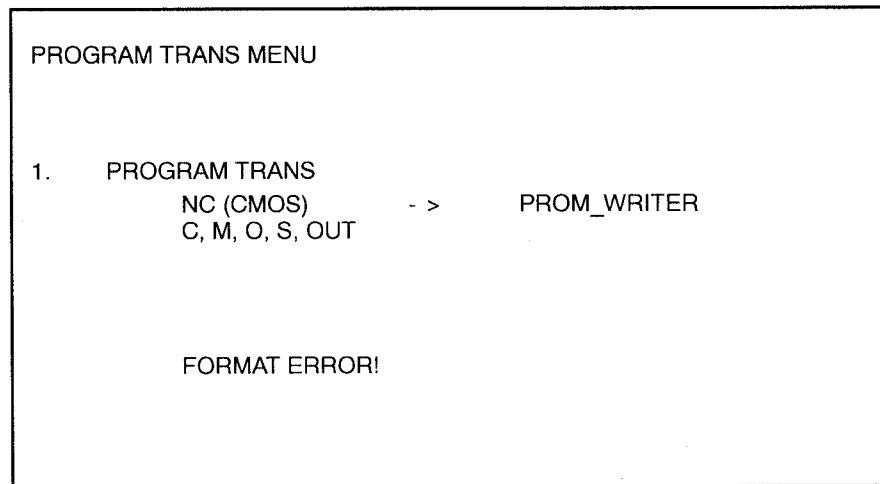


Fig. 2.12 Warning Displayed (FORMAT ERROR!)

3. Program output can be interrupted by a reset operation, but the output cannot be subsequently restarted. Repeat the program output by entering C, M, O, S[OUT].
4. Halt status after program output prevents other operations being carried out. Turn the power OFF, and then ON.

(b) Program Transfer from PROM to CNC (CMOS)

Follow the procedure below to transfer programs from PROM to the CNC CMOS memory.

- ① Before transfer, save any important part programs contained in the NC.  
All part programs existing in the CNC are deleted when programs are transferred from PROM to CNC CMOS memory.
- ② Check that the program PROM (which is also the sequence ladder PROM) is mounted at location #30 on the CP50B memory board.
- ③ Set the system number switch to “6”, turn the power OFF, and then ON. The initial menu screen is displayed.
- ④ Press P, R, G [ORG].
- ⑤ The program transfer menu screen is displayed.
- ⑥ Press P, R, O, M [IN]. The programs stored in the #30 PROM are transferred to the CMOS program area and stored.

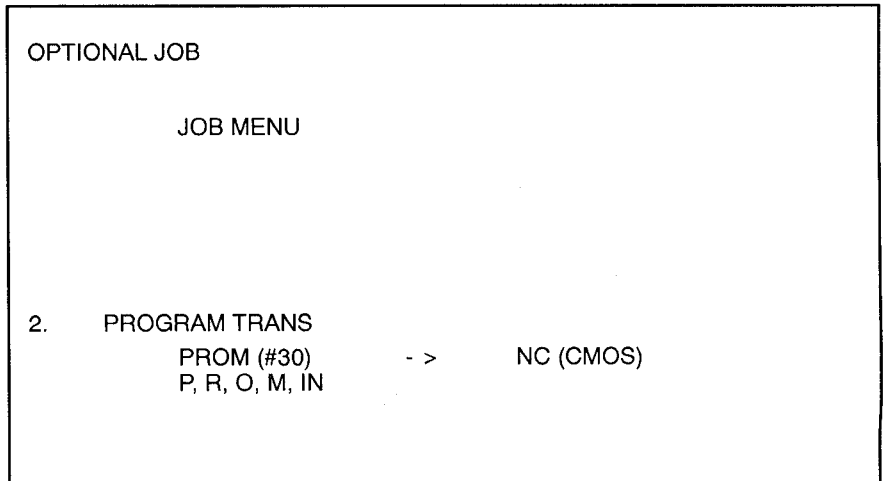


Fig. 2.13 Program Transfer (PROM to CNC)

A warning is displayed (“MEMORY OVER!”) and program transfer is interrupted if the CNC program memory area is unable to hold the transferred programs.

A warning is displayed (“FORMAT ERROR!”) and transfer stops if the PROM format is incorrect. Mount a PROM with the correct format and repeat the operation.

- ⑦ The messages “TRANS COMPLETE!” and “POWER OFF!” are displayed when transfer is complete.

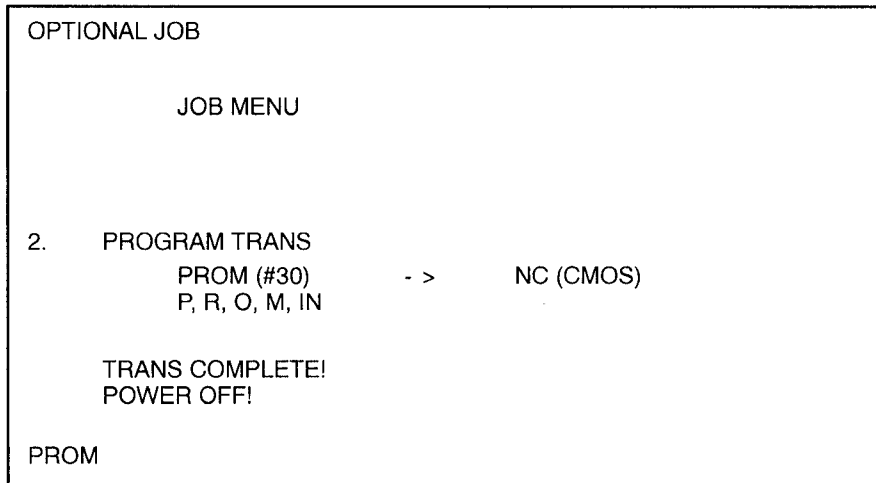
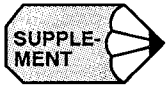


Fig. 2.14 Program Transfer Complete

- ⑧ Turn the power OFF.



1. Program transfer can be interrupted by a reset operation.
2. Programs are handled as follows when an interrupt occurs due to a warning or reset.

The program being transferred at the time of the interrupt is not a valid program.

Programs transferred before the time of the interrupt are valid programs.

---

### (3) Writing the PROM

The PROM containing programs is mounted at location #30, which is also the location of the sequence ladder ROM. Follow the procedure below to write the PROM after program transfer from CNC to the PROM writer is complete.

- ① Insert the sequence ladder PROM from location #30 in the PROM writer.  
Copy all ladder data, including tables, to the PROM writer memory.  
The system will not operate correctly if this step is omitted because the PROM will contain no sequence data.
- ② Transfer the program data to the PROM writer memory.  
Program data is transferred to the area 10000H to 13FFFH (32 KB).
- ③ Insert a virgin PROM in the PROM writer and write the PROM writer memory contents to it. This now becomes the new PROM at location #30.

## 2.2.6 External Offset Input Function

### (1) Outline of the Function

This function is an expansion of the “external tool compensation C” facility of the external data input function. The following are the results of this expansion.

- Offset numbers designated from external I/O signals can be displayed on the screen.
- Offset numbers to be changed can be selected.
- Part of the processing that used to be done in the sequence is now done automatically by the CNC.

2

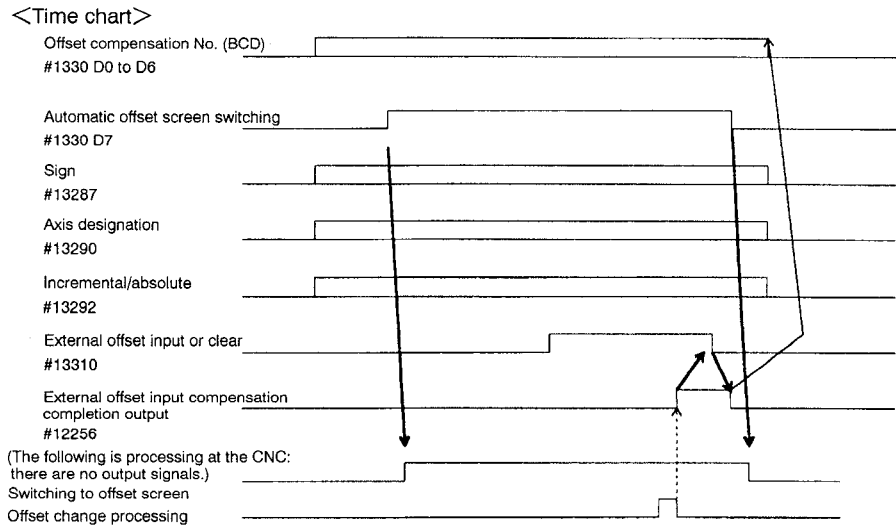
### (2) How to Use the Function

In order to make use of this function, sequence processing must be carried out. The following 3 signals are required.

- Offset number selection input signal
- Compensation condition (incremental/absolute, and axis designation)
- Processing request to CNC (compensation value input, compensation value clear)

This function can be used in all modes.

The signal time chart is as follows.



- ① The compensation number, sign, axis designation, incremental/absolute format, etc., are set in the sequence.
- ② When the automatic offset screen switching signal is “closed”, the CNC switches to the offset screen and moves the cursor to the position of the designated number. When this signal becomes “open”, the CNC switches from the offset screen to the function screen that was displayed before screen switching. If not switching the screen, there is no need to input this signal.
- ③ When the external tool compensation input signal becomes “closed”, the CNC rewrites the offset values on the basis of the values set in the parameters.



### (3) Precautions

- It may not be possible to execute rewriting processing immediately, for example in memory operation due to block pre-reading. On completion of offset value rewriting, the CNC outputs the external tool compensation completion output signal. Do not turn the external tool compensation input signal off before the completion output signal has been output.
- Construct an interlock to prevent the CNC from chattering of the input/clear signal when offset input or clearance is executed using the pushbuttons on the machine operation panel.
- The offset screen switching signal and screen switching processing at the CNC are interlocked. Accordingly, if a direct connection is made between the pushbuttons on the machine operation panel and the offset screen switching signal, the screen will only switch momentarily. It is for screen return processing, a timer that counts in second units in the sequence program.

(4) Related Parameters and Input Signals

The parameters and I/O signals of the external offset input function are shown below.

Table 2.12 Parameters of the External Offset Input Function

Parameter No.	Bit No.	Description
pm8773	D0	0: External offset function effective 1: External offset function ineffective

Table 2.13 Parameters of the External Offset Input Function

Parameter No.	Description	Setting Units	Setting Range
pm8818	Address of sequence parameter that sets the unit compensation amount used with the external offset input function.		
pm8819	Maximum value for tool offset (see Note)	0 to ±99999999	1 = 1 pulse

Note: When numerical values higher than this value are input (manual/external input), the value is clamped at the maximum value. If the set value is 0, clamping is not executed.

Table 2.14 I/O Signals of the External Offset Input Function

I/O Signal No.	Bit No.	Description
#1330	D0 to D6	Offset numbers for external tool compensation
	D7	0: External tool compensation expansion effective 1: External tool compensation expansion ineffective
#1331	D0	External tool compensation input
	D1	Tool compensation amount clear
#12256		External tool compensation execution completion
#12257		Tool offset clamp value reached output

## 2.2.7 Maintenance Screen

### (1) Outline of the Function

Five separate timers are provided, and each of them count operation times in one hour units to monitor time-up. The timers can be set on the screen.

### (2) How to Use the Function

#### (a) Display of the maintenance screen

Press the COM function soft key to display the screen shown below.

MAINTENANCE TIMER	O0123	N1234	
<u>TM1</u>	PRESET	COUNT	
* TM2	99999	99999	
TM3	99999	99999	
TM4	99999	99999	
TM5	99999	99999	
P, C → DATA → WR			
		S1234	T0101
		LSK	RDY

#### (b) Count processing

The count value increases by 1 for every hour of operation.

When the counter value exceeds a preset value, an asterisk blinks to the left of the relevant timer designation (TM1 to TM5 on the screen). At the same time, an output signal is output to an external equipment.

(c) Setting preset and counter values

- ① Select TM1 through TM5.

Locate the cursor at the timer to be set by using the cursor up/down motion keys.

- ② Set the timer value.

- For a preset value, input Pxxx (0 to 9999), then press the [WR] key.
- For a count value, input Cxxx (0 to 9998), then press the [WR] key.

Set so that the preset value is greater than or equal to the count value.

If the preset value is less than or equal to the count value the warning "INPUT ERROR!" is displayed.

(3) Related Parameters and Output Signals

The parameters and output signals of the maintenance screen are as follows.

Table 2.15 Maintenance Screen Parameters

Parameter No.	Description
#option	0: Maintenance screen effective 1: Maintenance screen ineffective

Table 2.16 Maintenance Screen Output Signals

Output Signal No.	Description
#12430 to #12434	Time up 1 through 5 outputs

## 2.3 UPGRADES TO IMPROVE SAFETY

Several upgrades have been conducted to improve safety.

### 2.3.1 Deceleration Stop on Reset During Movement

#### (1) Outline of the Function

With the original specification, any moving axes stopped immediately a reset operation was conducted during program operation. However, this sudden stop caused large shocks to the machine if the axes had a high maximum speed. To reduce the loads and protect the machine, the upgraded function forces the feed axis to make a deceleration stop when a reset is conducted.

#### (2) Specifications

This section explains the original specification and the upgraded specification.

##### (a) Original specification

Axes moving due to program or manual operation stop immediately a reset operation is conducted. Axes stop under exponential deceleration if the reset occurs during a cutting feed command.

##### (b) Upgraded specification

The following parameters have been added.

Table 2.17 Deceleration Stop Parameters for Reset During Movement

Parameter No.	Bit No.	Description
pm6019	D5	0: Immediate stop of moving axes if a reset occurs during program operation 1: Deceleration stop of moving axes if a reset occurs during program operation

This function is available in both the automatic and manual operation modes.

As with the original specification, axes stop under exponential deceleration if the reset occurs during a cutting feed command.

Similarly, the axis makes a linear deceleration if a reset occurs during manual pulse generator operation, as with the original specification.

The reset operation can be a panel reset or external reset.

The axis stops using S-curve deceleration if the G00 S-curve acceleration/deceleration function is used.

## 2.3.2 G10 Upgrade

### (1) Outline of the Function

There are two ways to set the workpiece coordinate system shift amount (T00) data: by direct key input from the offset screen, and with a G10 command in the part program.

It is possible to select the sign handling method for values set for U and W when making a setting by direct key input from the offset screen, but not when setting from a part program. This upgrade makes it possible to select the sign handling method for U and W even when changing the workpiece coordinate system shift amount.

### (2) How to Use the Function

Use the command in the following format.

G10 P00 U\_W\_;

The writing of workpiece coordinate system shift amount complies with the following parameter settings.

Table 2.18

Parameter No.	Bit No.	Description
pm6018	D0	0: Workpiece shift amount + machining allowance (U or W signed) 1: Workpiece shift amount - machining allowance (U or W signed)

<Setting example>

When the following workpiece coordinate system shift amount data is set

T00 X1.000 Z-2.000 ;

and the following command is executed.

G10 P00 U50 W-100 ;

When pm6018 D6 = 0, the result is X1.050 Z-2.100

When pm6018 D6 = 1, the result is X0.950 Z-1.900

### 2.3.3 Upgraded Wear Compensation

#### (1) Outline of the Function

In the original specification, the compensation operation (axis move) is performed immediately on execution of the T command, which means that in the case of machines in which the machine stroke end is the home position and the home position is the tool change position-an arrangement seen frequently in compact machines with short strokes-there is a danger of causing overtravel when the T command is executed, depending on the manner in which the compensation is executed.

In order to avoid this danger, the compensation operation is now not performed in response to the T command in isolation; instead the compensation is incorporated into the motion designated by the subsequent axis move commands.

2

#### (2) How to Use the Function

##### (a) T commands

When a T command such as T0101; is designated in isolation or a command that does not involve motion, such as M or S, is designated in the same block as a T command, only the tool indexing operation and tool coordinate system setting are executed in that block: the wear compensation operation is not executed.

##### (b) Timing of wear compensation motion

When a T command including wear compensation motion (T0101) has been designated, or a T command for canceling wear compensation (T0100) has been designated, the axis move designated by the axis move commands in the same block as that T command and the following blocks is executed while incorporating the motion corresponding to the amount of compensation.

##### (c) Wear compensation move axes

When there is an axis move command for only one of the axes X or Z after a T command including wear compensation motion or cancel command, compensation motion is performed on the axis for which the command was issued only. The compensation motion on the other axis is performed when a move command is designated for that axis.

(d) When the moving amount for an axis move command is 0

Even in cases where the moving amount for an axis move command is 0, for example U0 or W0, the relevant block is regarded as an axis move command, and axis moves by the amount of wear compensation.

<Operation example>

T0202 U0 W0 ;

Compensation motion on X-axis and Z-axis (axis moving amount = 0) + tool indexing + coordinate system setting

T0101; No compensation motion (tool indexing + coordinate system setting)

X30.; Only X-axis executes compensation motion.

Z50.; Only Z-axis executes compensation motion.

T0100 U100.;

Compensation motion on X-axis only + tool indexing + coordinate system setting

W20.; Z-axis compensation motion



### (3) Supplementary Information on the Wear Compensation Function

- This function is an option. Compensation is only executed in synchrony with the execution of axis move commands when the option parameter is effective. If the option parameter is not effective, wear compensation motion is performed when the T command is designated, as in the original specification.
- By using this function, T commands that used to be separated in two blocks can now be designated in one block.

Original format:      T0100; Tool indexing + tool coordinate system setting  
                                  G00 X\* Z\*;  
                                  T0101; Wear compensation

Synchronized format: T0101; Tool indexing + tool coordinate system setting  
                                  G00 X\*Z\*; Axis move + wear compensation

However, care is required in cases like the following.

G00 X\* Z\* T0101;

In this case, the wear compensation is incorporated into the G00 axis move, but the motion is executed in the coordinate system existing before the T01 tool coordinate system.

- This function can be used in combination with the tool life management function.

When the command T0191; is designated, it is treated in the same way as if a tool registered in group 1 were designated and compensation is executed in accordance with move commands issued in the same and subsequent blocks.

- Of the axis addresses of axis move commands, those for “X” and “U” are also used for dwell (G04) time designations, and in this case no compensation motion is performed. Compensation motion is only performed with axis address commands that generate motion.

(4) Related Parameters

Table 2.19 Wear Compensation Function Parameters

Parameter No.	Description
#option	0: Wear compensation upgrade is not used. 1: Wear compensation upgrade is used.

Apart from the option parameter, the following conditions are also necessary.

Table 2.20 Parameters Required for Wear Compensation

Parameter No.	Bit No.	Description
pm6011	D2	0: The automatic nose R compensation function and tool coordinate system setting function are not canceled.
pm6016	D6	1: T code setup (type 2) effective

## 2.4 OTHER ADDITIONAL FUNCTIONS

### 2.4.1 mm/rev Commands without Spindle PG

#### (1) Outline of the Function

With lathes, it is usual to use mm/rev for feed commands, and this means that it is a prerequisite that the spindle is equipped with an encoder. Previously if the spindle was not fitted with an encoder, thread cutting commands could not be executed.

This function enables the use of mm/rev commands when the spindle is not equipped with an encoder.

There are no restrictions on the G codes that can be used. However, since waiting at the start point is not possible with thread cutting commands, thread precision cannot be guaranteed. It is recommended that this function be used with machines whose application is other than thread cutting.

#### (2) How to Use the Function

This function is made effective by the following parameter setting.

Table 2.21

Parameter No.	Bit No.	Description
#option	D2	0: mm/rev commands not used without a spindle PG 1: mm/rev commands used without a spindle PG

A spindle PG short-circuit connector is required.

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# UPGRADING FUNCTION MANUAL

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