

**Motoman XRC Controller**

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**Interrupt Job  
Function Manual  
for UP/SKX-Series Robots**

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# ***NOTES***

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# **SECTION 1**

## **INTRODUCTION**

### **1.1 About this Document**

This manual provides instructions for Interrupt Job Function and contains the following sections:

#### **SECTION 1 – INTRODUCTION**

General information about this manual, a list of reference documents, and customer service information.

#### **SECTION 2 – SAFETY**

Provides information for the safe use and operation of Motoman products.

#### **SECTION 3 – INTERRUPT JOB FUNCTION**

Provides detailed instructions to utilize the Interrupt Job Function.

### **1.2 Reference to Other Documentation**

For additional information refer to the following:

- Concurrent I/O Parameters Manual (P/N 142102-1)
- Operator's Manual for General Purpose (P/N 142099-1)
- Operator's Manual for Handling (P/N 142100-1)
- Operator's Manual for Spot Welding (P/N 142101-1)
- Operator's Manual for Arc Welding (P/N 142098-1)
- Motoman UP6, XRC Manipulator Manual (P/N 142104-1)
- Motoman SK16X, XRC Manipulator Manual (P/N 142105-1)
- Motoman SK45X, XRC Manipulator Manual (P/N 142106-1)
- Motoman UP130, XRC Manipulator Manual (P/N 142107-1)

### **1.3 Customer Service Information**

If you are in need of technical assistance, contact the Motoman service staff at (937) 847-3200. Please have the following information ready before you call:

- Robot Type (UP6, SK16X, etc.)
- Application Type (welding, handling, etc.)
- Robot Serial Number (located on the back side of the robot arm)
- Robot Sales Order Number (located on back side of XRC controller)

# ***NOTES***

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# SECTION 2

## SAFETY

### 2.1 Introduction

**It is the purchaser's responsibility to ensure that all local, county, state, and national codes, regulations, rules, or laws relating to safety and safe operating conditions for each installation are met and followed.**

We suggest that you obtain and review a copy of the ANSI/RIA National Safety Standard for Industrial Robots and Robot Systems. This information can be obtained from the Robotic Industries Association by requesting ANSI/RIA R15.06. The address is as follows:

**Robotic Industries Association**  
900 Victors Way  
P.O. Box 3724  
Ann Arbor, Michigan 48106  
TEL: (734) 994-6088  
FAX: (734) 994-3338

Ultimately, the best safeguard is trained personnel. The user is responsible for providing personnel who are adequately trained to operate, program, and maintain the robot cell. **The robot must not be operated by personnel who have not been trained!**

We recommend that all personnel who intend to operate, program, repair, or use the robot system be trained in an approved Motoman training course and become familiar with the proper operation of the system.

This safety section addresses the following:

- Standard Conventions (Section 2.2)
- General Safeguarding Tips (Section 2.3)
- Mechanical Safety Devices (Section 2.4)
- Installation Safety (Section 2.5)
- Programming Safety (Section 2.6)
- Operation Safety (Section 2.7)
- Maintenance Safety (Section 2.8)

## 2.2 **Standard Conventions**

This manual includes information essential to the safety of personnel and equipment. As you read through this manual, be alert to the four signal words:

- DANGER
- WARNING
- CAUTION
- NOTE

Pay particular attention to the information provided under these headings which are defined below (in descending order of severity).



### **DANGER!**

*Information appearing under the DANGER caption concerns the protection of personnel from the immediate and imminent hazards that, if not avoided, will result in immediate, serious personal injury or loss of life in addition to equipment damage.*



### **WARNING!**

*Information appearing under the WARNING caption concerns the protection of personnel and equipment from potential hazards that can result in personal injury or loss of life in addition to equipment damage.*



### **CAUTION!**

*Information appearing under the CAUTION caption concerns the protection of personnel and equipment, software, and data from hazards that can result in minor personal injury or equipment damage.*

**NOTE:**

*Information appearing in a NOTE caption provides additional information which is helpful in understanding the item being explained.*



## 2.3 **General Safeguarding Tips**

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot must become familiar with the operation of this equipment. All personnel involved with the operation of the equipment must understand potential dangers of operation. General safeguarding tips are as follows:

- Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation of this robot, the operator's manuals, the system equipment, and options and accessories should be permitted to operate this robot system.
- Do not enter the robot cell while it is in automatic operation. Programmers must have the teach pendant when they enter the robot cell.
- Improper connections can damage the robot. All connections must be made within the standard voltage and current ratings of the robot I/O (Inputs and Outputs).
- The robot must be placed in Emergency Stop (E-STOP) mode whenever it is not in use.
- In accordance with ANSI/RIA R15.06, section 6.13.4 and 6.13.5, use lockout/tagout procedures during equipment maintenance. Refer also to Section 1910.147 (29CFR, Part 1910), Occupational Safety and Health Standards for General Industry (OSHA).

## 2.4 **Mechanical Safety Devices**

The safe operation of the robot, positioner, auxiliary equipment, and system is ultimately the user's responsibility. The conditions under which the equipment will be operated safely should be reviewed by the user. The user must be aware of the various national codes, ANSI/RIA R15.06 safety standards, and other local codes that may pertain to the installation and use of industrial equipment. Additional safety measures for personnel and equipment may be required depending on system installation, operation, and/or location. The following safety measures are available:

- Safety fences and barriers
- Light curtains
- Door interlocks
- Safety mats
- Floor markings
- Warning lights

Check all safety equipment frequently for proper operation. Repair or replace any non-functioning safety equipment immediately.

## 2.5 *Installation Safety*

Safe installation is essential for protection of people and equipment. The following suggestions are intended to supplement, but not replace, existing federal, local, and state laws and regulations. Additional safety measures for personnel and equipment may be required depending on system installation, operation, and/or location. Installation tips are as follows:

- Be sure that only qualified personnel familiar with national codes, local codes, and ANSI/RIA R15.06 safety standards are permitted to install the equipment.
- Identify the work envelope of each robot with floor markings, signs, and barriers.
- Position all controllers outside the robot work envelope.
- Whenever possible, install safety fences to protect against unauthorized entry into the work envelope.
- Eliminate areas where personnel might get trapped between a moving robot and other equipment (pinch points).
- Provide sufficient room inside the workcell to permit safe teaching and maintenance procedures.

## 2.6 *Programming Safety*

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot must become familiar with the operation of this equipment. All personnel involved with the operation of the equipment must understand potential dangers of operation. Programming tips are as follows:

- Any modifications to PART 1 of the MRC controller PLC can cause severe personal injury or death, as well as damage to the robot! Do not make any modifications to PART 1. Making any changes without the written permission of Motoman will **VOID YOUR WARRANTY!**
- Some operations require standard passwords and some require special passwords. Special passwords are for Motoman use only. **YOUR WARRANTY WILL BE VOID** if you use these special passwords.
- Back up all programs and jobs onto a floppy disk whenever program changes are made. To avoid loss of information, programs, or jobs, a backup must always be made before any service procedures are done and before any changes are made to options, accessories, or equipment.
- The concurrent I/O (Input and Output) function allows the customer to modify the internal ladder inputs and outputs for maximum robot performance. Great care must be taken when making these modifications. Double-check all modifications under every mode of robot operation to ensure that you have not created hazards or dangerous situations that may damage the robot or other parts of the system.
- Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation, manuals, electrical design, and equipment interconnections of this robot should be permitted to operate the system.

- Inspect the robot and work envelope to be sure no potentially hazardous conditions exist. Be sure the area is clean and free of water, oil, debris, etc.
- Be sure that all safeguards are in place.
- Check the E-STOP button on the teach pendant for proper operation before programming.
- Carry the teach pendant with you when you enter the workcell.
- Be sure that only the person holding the teach pendant enters the workcell.
- Test any new or modified program at low speed for at least one full cycle.

## 2.7 **Operation Safety**

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot must become familiar with the operation of this equipment. All personnel involved with the operation of the equipment must understand potential dangers of operation. Operation tips are as follows:

- Be sure that only trained personnel familiar with the operation of this robot, the operator's manuals, the system equipment, and options and accessories are permitted to operate this robot system.
- Check all safety equipment for proper operation. Repair or replace any non-functioning safety equipment immediately.
- Inspect the robot and work envelope to ensure no potentially hazardous conditions exist. Be sure the area is clean and free of water, oil, debris, etc.
- Ensure that all safeguards are in place.
- Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation, manuals, electrical design, and equipment interconnections of this robot should be permitted to operate the system.
- Do not enter the robot cell while it is in automatic operation. Programmers must have the teach pendant when they enter the cell.
- The robot must be placed in Emergency Stop (E-STOP) mode whenever it is not in use.
- This equipment has multiple sources of electrical supply. Electrical interconnections are made between the controller, external servo box, and other equipment. Disconnect and lockout/tagout all electrical circuits before making any modifications or connections.
- All modifications made to the controller will change the way the robot operates and can cause severe personal injury or death, as well as damage the robot. This includes controller parameters, ladder parts 1 and 2, and I/O (Input and Output) modifications. Check and test all changes at slow speed.

## 2.8 **Maintenance Safety**

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot must become familiar with the operation of this equipment. All personnel involved with the operation of the equipment must understand potential dangers of operation. Maintenance tips are as follows:

- Do not perform any maintenance procedures before reading and understanding the proper procedures in the appropriate manual.
- Check all safety equipment for proper operation. Repair or replace any non-functioning safety equipment immediately.
- Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation, manuals, electrical design, and equipment interconnections of this robot should be permitted to operate the system.
- Back up all your programs and jobs onto a floppy disk whenever program changes are made. A backup must always be made before any servicing or changes are made to options, accessories, or equipment to avoid loss of information, programs, or jobs.
- Do not enter the robot cell while it is in automatic operation. Programmers must have the teach pendant when they enter the cell.
- The robot must be placed in Emergency Stop (E-STOP) mode whenever it is not in use.
- Be sure all safeguards are in place.
- Use proper replacement parts.
- This equipment has multiple sources of electrical supply. Electrical interconnections are made between the controller, external servo box, and other equipment. Disconnect and lockout/tagout all electrical circuits before making any modifications or connections.
- All modifications made to the controller will change the way the robot operates and can cause severe personal injury or death, as well as damage the robot. This includes controller parameters, ladder parts 1 and 2, and I/O (Input and Output) modifications. Check and test all changes at slow speed.
- Improper connections can damage the robot. All connections must be made within the standard voltage and current ratings of the robot I/O (Inputs and Outputs).

# YASNAC XRC OPTIONS INSTRUCTIONS

FOR THE INTERRUPT JOB FUNCTION

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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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## MOTOMAN INSTRUCTIONS

MOTOMAN SETUP MANUAL  
MOTOMAN-□□□ INSTRUCTIONS  
YASNAC XRC INSTRUCTIONS  
YASNAC XRC OPERATOR'S MANUAL  
YASNAC XRC OPERATOR'S MANUAL for BEGINNERS

The YASNAC XRC operator's manuals above correspond to specific usage.  
Be sure to use the appropriate manual.





## MANDATORY

- This manual explains the interrupt job function of the YASNAC XRC system and general operations. Read this manual carefully and be sure to understand its contents before handling the YASNAC XRC.
- General items related to safety are listed in Section 1: Safety of the Setup Manual. To ensure correct and safe operation, carefully read the Setup Manual before reading this manual.



## CAUTION

- Some drawings in this manual are shown with the protective covers or shields removed for clarity. Be sure all covers and shields are replaced before operating this product.
- The drawings and photos in this manual are representative examples and differences may exist between them and the delivered product.
- YASKAWA may modify this model without notice when necessary due to product improvements, modifications, or changes in specifications. If such modification is made, the manual number will also be revised.
- If your copy of the manual is damaged or lost, contact a YASKAWA representative to order a new copy. The representatives are listed on the back cover. Be sure to tell the representative the manual number listed on the front cover.
- YASKAWA is not responsible for incidents arising from unauthorized modification of its products. Unauthorized modification voids your product's warranty.

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## NOTES FOR SAFE OPERATION

Read this manual carefully before installation, operation, maintenance, or inspection of the YASNAC XRC.

In this manual, the Notes for Safe Operation are classified as “WARNING”, “CAUTION”, “MANDATORY”, or “PROHIBITED”.



### WARNING

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



### CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury to personnel and damage to equipment. It may also be used to alert against unsafe practices.



### MANDATORY

Always be sure to follow explicitly the items listed under this heading.



### PROHIBITED

Must never be performed.

Even items described as “CAUTION” may result in a serious accident in some situations. At any rate, be sure to follow these important items.



To ensure safe and efficient operation at all times, be sure to follow all instructions, even if not designated as “CAUTION” and “WARNING”.



## WARNING

- Before operating the manipulator, check that servo power is turned off when the emergency stop buttons on the playback panel or programming pendant are pressed. When the servo power is turned off, the SERVO ON READY lamp on the playback panel and the SERVO ON LED on the programming pendant are turned off.

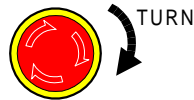
Injury or damage to machinery may result if the emergency stop circuit cannot stop the manipulator during an emergency. The manipulator should not be used if the emergency stop buttons do not function.



Emergency Stop Button

- Once the emergency stop button is released, clear the cell of all items which could interfere with the operation of the manipulator. Then turn the servo power ON

Injury may result from unintentional or unexpected manipulator motion.



Release of Emergency Stop

- Always set the Teach Lock before entering the robot work envelope to teach a job.

Operator injury can occur if the Teach Lock is not set and the manipulator is started from the playback panel.

- Observe the following precautions when performing teaching operations within the working envelope of the manipulator :
  - View the manipulator from the front whenever possible.
  - Always follow the predetermined operating procedure.
  - Ensure that you have a safe place to retreat in case of emergency.

Improper or unintended manipulator operation may result in injury.

- Confirm that no persons are present in the manipulator's work envelope and that you are in a safe location before:
  - Turning on the YASNAC XRC power
  - Moving the manipulator with the programming pendant
  - Running check operations
  - Performing automatic operations

Injury may result if anyone enters the working envelope of the manipulator during operation. Always press an emergency stop button immediately if there are problems. The emergency stop button is located on the right side of both the YASNAC XRC playback panel and programming pendant.





## CAUTION

- Perform the following inspection procedures prior to conducting manipulator teaching. If problems are found, repair them immediately, and be sure that all other necessary processing has been performed.
  - Check for problems in manipulator movement.
  - Check for damage to insulation and sheathing of external wires.

- Always return the programming pendant to the hook on the XRC cabinet after use.

The programming pendant can be damaged if it is left in the manipulator's work area, on the floor, or near fixtures.

- Read and understand the Explanation of the Alarm Display in the setup manual before operating the manipulator.

## Definition of Terms Used Often in This Manual

The MOTOMAN manipulator is the YASKAWA industrial robot product.


The manipulator usually consists of the controller, the playback panel, the programming pendant, and supply cables.

The MOTOMAN manipulator is the YASKAWA industrial robot product.

In this manual, the equipment is designated as follows.

Equipment	Manual Designation
YASNAC XRC Controller	XRC
YASNAC XRC Playback Panel	Playback Panel
YASNAC XRC Programming Pendant	Programming Pendant

Descriptions of the programming pendant and playback panel keys, buttons, and displays are shown as follows:

Equipment		Manual Designation
Programming Pendant	Character Keys	The keys which have characters printed on them are denoted with [ ]. ex. [ENTER]
	Symbol Keys	The keys which have a symbol printed on them are not denoted with [ ] but depicted with a small picture. ex. page key  The cursor key is an exception, and a picture is not shown.
	Axis Keys Number Keys	“Axis Keys” and “Number Keys” are generic names for the keys for axis operation and number input.
	Keys pressed simultaneously	When two keys are to be pressed simultaneously, the keys are shown with a “+” sign between them, ex. [SHIFT]+[COORD]
	Displays	The menu displayed in the programming pendant is denoted with { }. ex. {JOB}
Playback Panel	Buttons	Playback panel buttons are enclosed in brackets. ex. [TEACH] on the playback panel

## Description of the Operation Procedure

In the explanation of the operation procedure, the expression "Select •••" means that the cursor is moved to the object item and the SELECT key is pressed.

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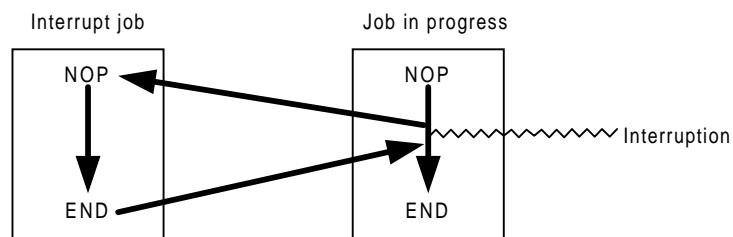
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## 7 Instruction List

# 1 What is the Interrupt Job Function?

The interrupt job function is a kind of call job. When a signal to interrupt the job is sent from a peripheral device or another system, this function momentarily suspends a job in progress, and executes the job corresponding to the signal.

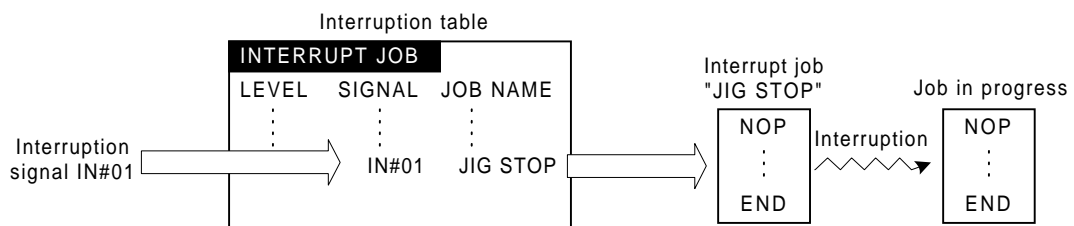
This function is useful when an error occurs in a peripheral device or in another system, or when the manipulator should be withdrawn in an emergency.



An interruption table defines the relation among the interruption levels (priority of an interruption signal), the interruption signals, and the interrupting jobs.

Sending a general input signal specified in the table calls, a job corresponding to that signal. When interrupt job is completed, the suspended job is restarted from the instruction line where the cursor was at the time of interruption.

**NOTE** If an interruption signal is received while the manipulator is in the “step” cycle, the manipulator stops at once, and then the next starting operation starts the interrupt job.



The smaller the interruption level number becomes, the higher the priority of the processing becomes.

Since the XRC determines which interrupt job is to be executed according to this interruption table, make sure the settings for this table are correct. The system engineer sets up this interruption table.



An interrupt job can be executed when the start lamp is ON and between the execution of the EI (enable interruption) instruction and the DI (disable interruption) instruction. A different interruption level can be specified for both EI and DI.

```
0010 MOVJ VJ=50.00
0011 EI ●
0012 MOVJ VJ=50.00
0013 TIMER T=1.00
0014 DI LEVEL=5 ●
0015 MOVJ VJ=50.00
```

Allows all levels if no interruption level is specified.

Disables the interruption levels 0 and 2.

## 2 Setting of the Interrupt Job Function

### 2.1 Interruption Table Display

#### Operation

Select {JOB} from the top menu ➔ Select {INTERRUPT JOB} in the submenu

#### NOTE

{INTERRUPT JOB} appears only in the edit mode.

JOB	EDIT	DISPLAY	UTILITY
<b>INTERRUPT JOB</b>			
R1 [Icons]			
① TABLE NO. :1			
LEVEL	SIGNAL	JOB_NAME	PERMIT EXEC
0	IN#001	JIG1STOP	<input type="checkbox"/> <input type="radio"/>
1	IN#002	JIG2STOP	<input type="checkbox"/> <input type="radio"/>
② 2	IN#003	WAIT1	<input type="checkbox"/> <input type="radio"/>
3	IN#004	WAIT2	<input type="checkbox"/> <input type="radio"/>
4			<input type="checkbox"/> <input type="radio"/>
5			<input type="checkbox"/> <input type="radio"/>
6			<input type="checkbox"/> <input type="radio"/>
7	IN#008	TIPRPLC	<input type="checkbox"/> <input type="radio"/>
!			

①TABLE NO. (Initial value: 1)

②LEVEL

The interruption level indicates the priority of the interruption signal. The smaller the interruption level number becomes, the higher the priority of the processing becomes. Eight levels from 0 to 7 can be set.

③SIGNAL (Initial value: IN#001)

A general input signal serves as an interruption signal.

④JOB NAME (Initial value: no setting)

A job name corresponding to an interruption signal

⑤PERMIT

Interruption enabled or disabled status (for diagnosis)

■(Enabled): Interruption enabled by the execution of the EI instruction

□(Disabled): Interruption disabled

⑥ EXEC

- (ON): Interrupting job in progress
- (OFF): Interrupting job not in progress


“Exec” turns ON when an interruption signal is received and the interrupt job is called, and turns OFF when the job is completed.

“Exec” turns OFF in the following cases:

- An interrupt job is completed and the suspended job is restarted.
- Another job is called.
- CLEAR STACK instruction is executed.

## 2.2 Setting of Interruption Table




Pressing the page key  changes the table No. in this order : “1” → “2” → “3” → “1” .

Pressing [SHIFT] + the page key  changes the table No. in the reverse order : “3” → “2” → “1” → “3”.

### 2.2.1 Setting of Signals

**Operation**

Move the cursor to the item to be selected, and press [SELECT] ➡ Enter a numerical value using the numerical keys

JOB	EDIT	DISPLAY	UTILITY
<b>INTERRUPT JOB</b>		R1	  
TABLE NO. :1			
LEVEL	SIGNAL	JOB NAME	PERMIT EXEC
0	IN#001	JIG1STOP	<input type="checkbox"/> <input type="radio"/>
1	IN#002	JIG2STOP	<input type="checkbox"/> <input type="radio"/>
2	IN#003	WAIT1	<input type="checkbox"/> <input type="radio"/>
3	IN#004	WAIT2	<input type="checkbox"/> <input type="radio"/>
4			<input type="checkbox"/> <input type="radio"/>
5			<input type="checkbox"/> <input type="radio"/>
6			<input type="checkbox"/> <input type="radio"/>
7	IN#008	TIPRPLC	<input type="checkbox"/> <input type="radio"/>

**NOTE**

Entering “0” in SIGNAL clears the set signal No. and job name.



## 2.2.2 Setting of Job Names

### Operation

Move the cursor to the item to be selected ➡ Select a job in the job list display ➡ Press [ENTER]

JOB	EDIT	DISPLAY	UTILITY
<b>INTERRUPT JOB</b>			
TABLE NO. :1			
LEVEL	SIGNAL	JOB NAME	PERMIT EXEC
0	IN#001	JIG1STOP	<input type="checkbox"/> <input type="radio"/>
1	IN#002	JIG2STOP	<input type="checkbox"/> <input type="radio"/>
2	IN#003	WAIT1	<input type="checkbox"/> <input type="radio"/>
3	IN#004	WAIT2	<input type="checkbox"/> <input type="radio"/>
4			<input type="checkbox"/> <input type="radio"/>
5			<input type="checkbox"/> <input type="radio"/>
6			<input type="checkbox"/> <input type="radio"/>
7	IN#008	TIPRPLC	<input type="checkbox"/> <input type="radio"/>

## 2.3 Setting of Interruption Levels

To specify the levels where interruptions can be enabled or disabled by the EI and DI instructions respectively, set the bits corresponding to the levels to "1".

d7	d6	d5	d4	d3	d2	d1	d0
LEVEL7	LEVEL6	LEVEL5	LEVEL4	LEVEL3	LEVEL2	LEVEL1	LEVEL0
128	64	32	16	8	4	2	1

The set values for the EI/DI instructions

For example, the set value of level 0 is "1" and the set value of level 2 is "4", with a total set value of "5". Therefore, to permit levels 0 and 2, set the EI instruction to "5".

EI							
LEVEL=5							
d7	d6	d5	d4	d3	d2	d1	d0
0	0	0	0	0	1	0	1
					4	+	1
							→ 5

The status of the other interruption levels remains unchanged.

### NOTE

- If no interruption level is specified, all levels from 0 to 7 enable or disable interruption.
- If the interruption level is set to "0", it is treated like an NOP instruction where no operation is executed and proceeds to the next instruction.

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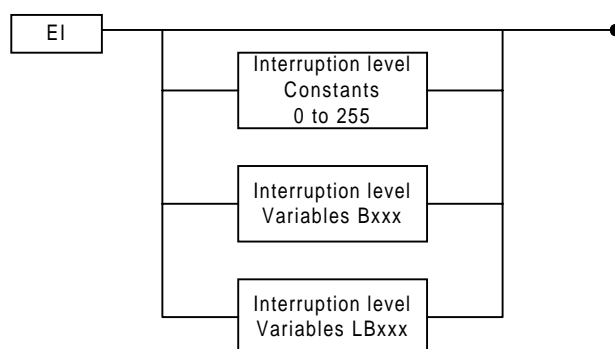
### 2.3 Setting of Interruption Levels

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## 3 Registration of Instructions

### 3.1 EI (Enable Interruption) Instruction

Executing an EI instruction activates the specified interruption levels in the additional item. To specify the levels where interruptions can be enabled, set the bits corresponding to the levels to "1". The status of the other interruption levels remains unchanged.



#### Operation

Move the cursor to the address area ➡ Press [INFORM LIST] ➡ Select [CONTROL]  
➡ Move the cursor to "EI"\*1 ➡ Press [SELECT] twice to set an interruption level in the detail edit display\*2 ➡ Press [ENTER] twice

#### Explanation

\*1 The EI instruction appears in the input buffer line with the previously registered additional items.

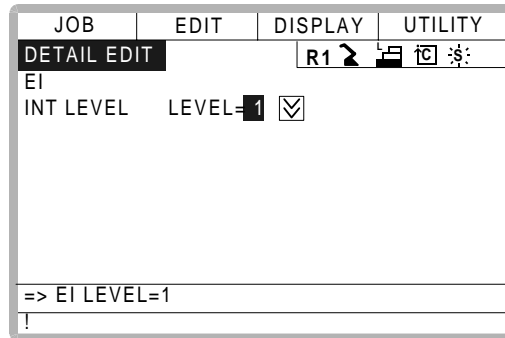
JOB	EDIT	DISPLAY	UTILITY
JOB CONTENT		R1	TOOL:0
J:WORK	S:020 R1		LABEL
0019	MOVJ VJ=50.00		COMMENT
0020	MOVJ VJ=100.00		RET
0021	MOVL V=100		NOP
0022	MOVL V=100		PAUSE
0023	MOVJ VJ=100.00		CWAIT
0024	MOVL V=100		EI
0025	MOVJ VJ=100.00		DI
=> EI LEVEL=1			
!			

---

## 3.2 DI (Disable Interruption) Instruction

---

- \*2** Enter the interruption level using the numerical keys.

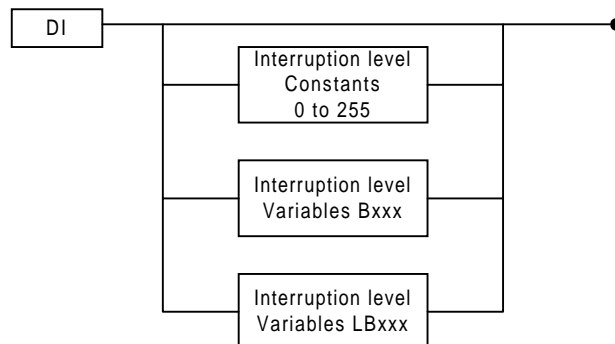


- \*3** Pressing [ENTER] once shows the set contents in the input buffer line. Pressing [ENTER] again registers the set contents in the job.

---

## 3.2 DI (Disable Interruption) Instruction

Executing a DI instruction activates the specified interruption levels in the additional item. To specify the levels where interruptions can be disabled, set the bits corresponding to the levels to "1". The status of the other interruption levels remains unchanged.



**Operation**

Move the cursor to the address area ➡ Press [INFORM LIST] ➡ Select [CONTROL]  
 ➡ Move the cursor to "DI"\*1 ➡ Press [SELECT] twice to set an interruption level in the detail edit display\*2 ➡ Press [ENTER] twice

**Explanation**

- \*1 The DI instruction appears in the input buffer line with the previously registered additional items.

JOB	EDIT	DISPLAY	UTILITY
<b>JOB CONTENT</b>		R1	UTILITY
J:WORK	S:022 R1		TOOL:00
0019	MOVJ VJ=50.00		LABEL
0020	MOVJ VJ=100.00		COMMENT
0021	EI LEVEL=1		RET
0022	MOVL V=100		NOP
0023	MOVL V=100		PAUSE
0024	MOVJ VJ=100.00		CWAIT
0025	MOVL V=100		EI
	=> DI LEVEL=1		<b>DI</b>
!			

- \*2 Enter the interruption level using the numerical keys.

JOB	EDIT	DISPLAY	UTILITY
<b>DETAIL EDIT</b>		R1	UTILITY
DI			
INT LEVEL	LEVEL=1	<input checked="" type="checkbox"/>	
=> DI LEVEL=1			
!			

- \*3 Pressing [ENTER] once shows the set contents in the input buffer line. Pressing [ENTER] again registers the set contents in the job.

---

## 3.2 DI (Disable Interruption) Instruction

---

## 4 Execution of an Interrupt Job

### 4.1 Interruption Signal Detection

An interruption signal is detected at the rising edge of the signal.

If more than one interruption signal is detected at the same time, the job for the level with higher priority is executed.

### 4.2 Timing for Interrupt Job Execution

The timing of executing an interrupt job depends on what instruction is being executed when the interruption signal is received, and can be divided into the following two types.

- Suspends the instruction being executed to do an interrupt job

The following instructions are suspended while executing an interrupt job.

Move Instructions	MOVJ/MOVL/MOVC/IMOV
I/O Instruction	WAIT
Control Instruction	TIMER

- Executes an interrupt job after the completion of the instruction being executed. Any instructions other than those listed above are completed before starting an interrupt job.

### 4.3 Deceleration Before Interrupt Job Execution

If the manipulator is moving at a high speed and the interrupt job is executed immediately after the interruption signal is received, an excessive shock to the manipulator may result. To avoid this risk, the manipulator automatically decelerates upon receipt of the interruption signal, and then the interrupt job is executed.

## 4.4 Interruption Signal Entered During Another Interrupt Job

All interruptions are automatically disabled during the execution of an interrupt job. Therefore, if another interruption signal with a higher priority is received, its corresponding job is not executed.

The new signal is ignored. When an interrupt job is completed, even if any interruption signal is ON, the corresponding interrupt job is not executed until the rising edge of the interruption signal is detected.

## 4.5 Automatic Interruption Disabled Status

Only execution of the EI instruction enables interruptions. Even after the main power supply turns OFF, the interruption enabled/disabled status is kept.

However, when a job is called, all interruption levels are automatically disabled for security.

## 4.6 Job Call Stack

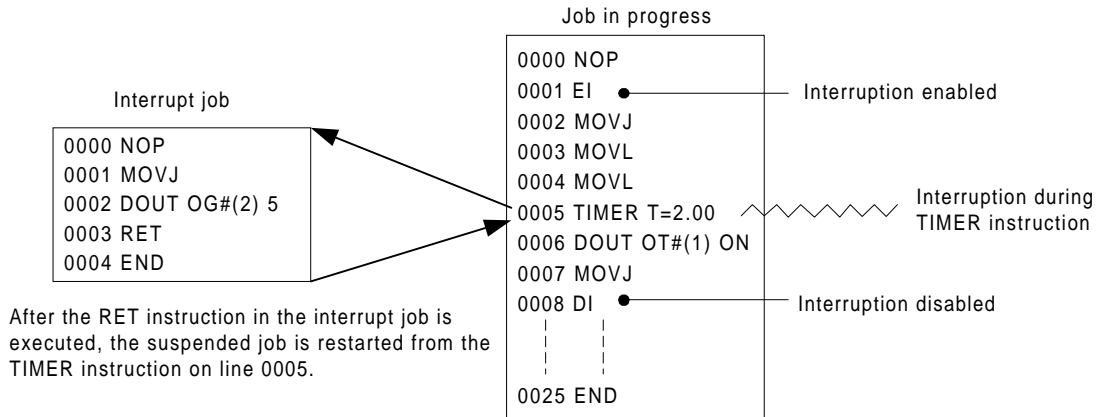
Job calls made by interruptions are processed like other job calls. The same job call stack is used for both kinds of job calls.

Therefore, adding an interrupt job to a job call stack filled to level 8 causes the stack to overflow.

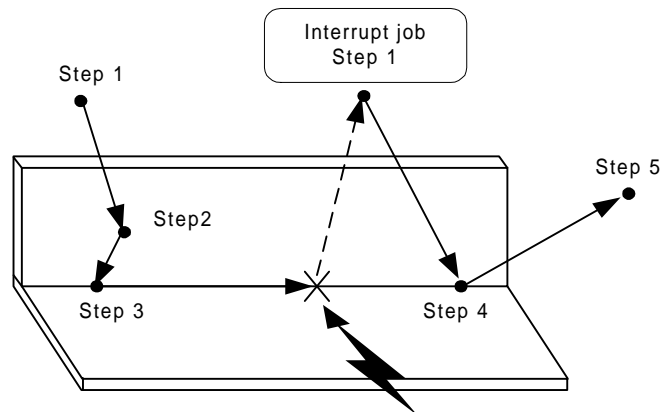
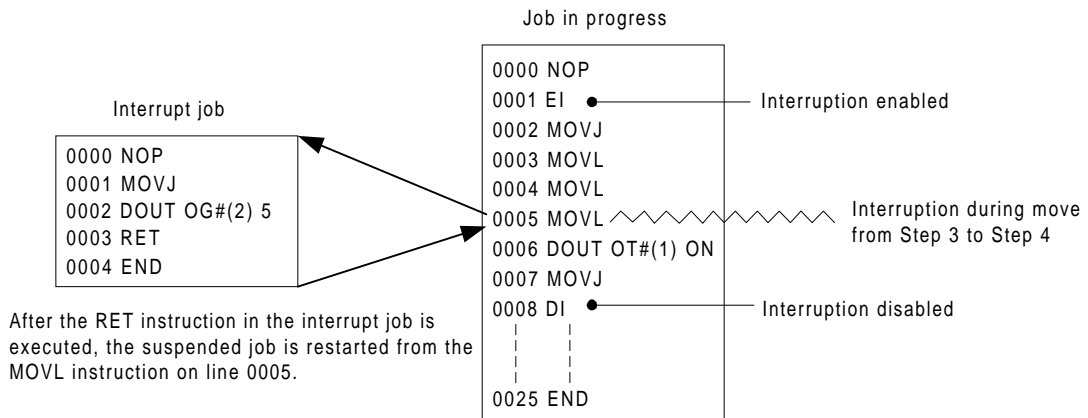


# 5 Application Examples

## 5.1 Interruption During Timer Instruction

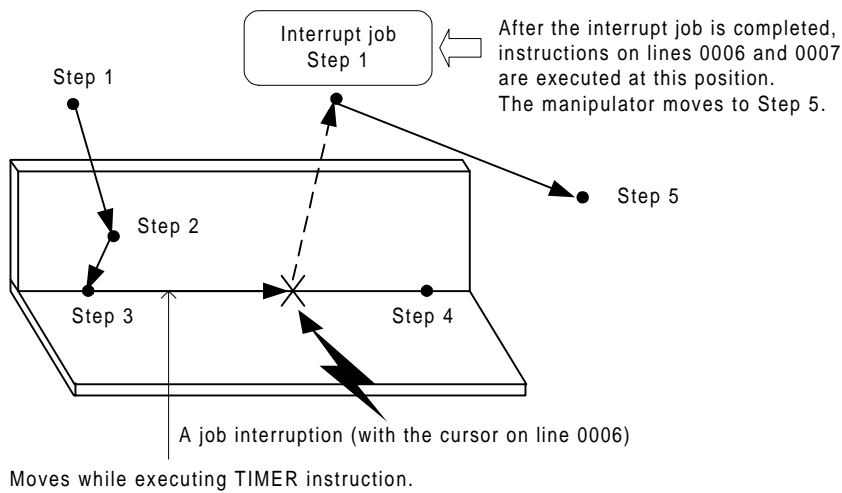
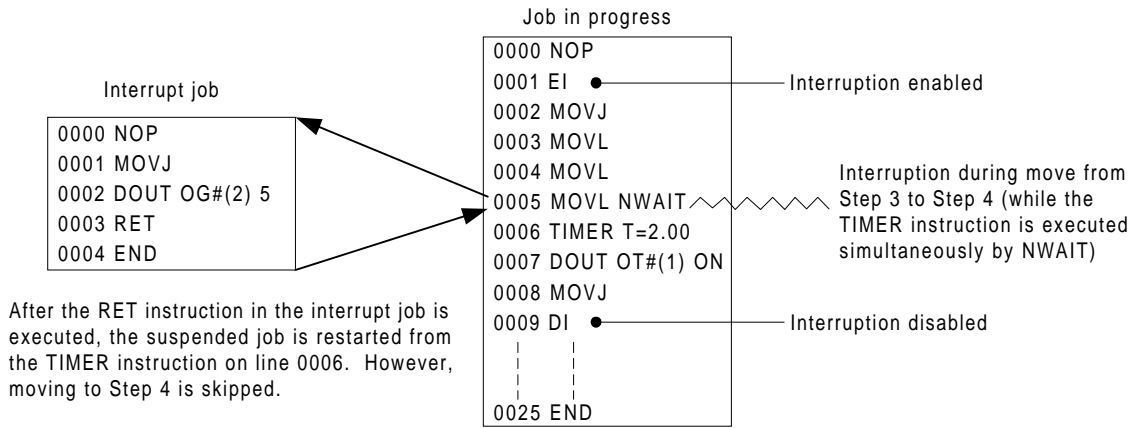


## 5.2 Interruption During Move Instruction

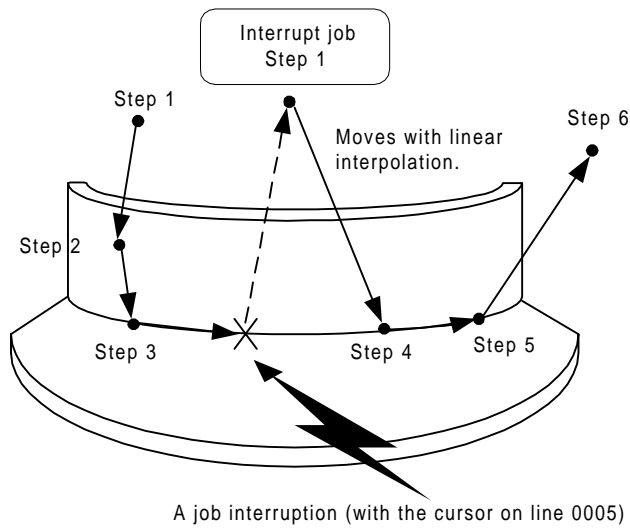
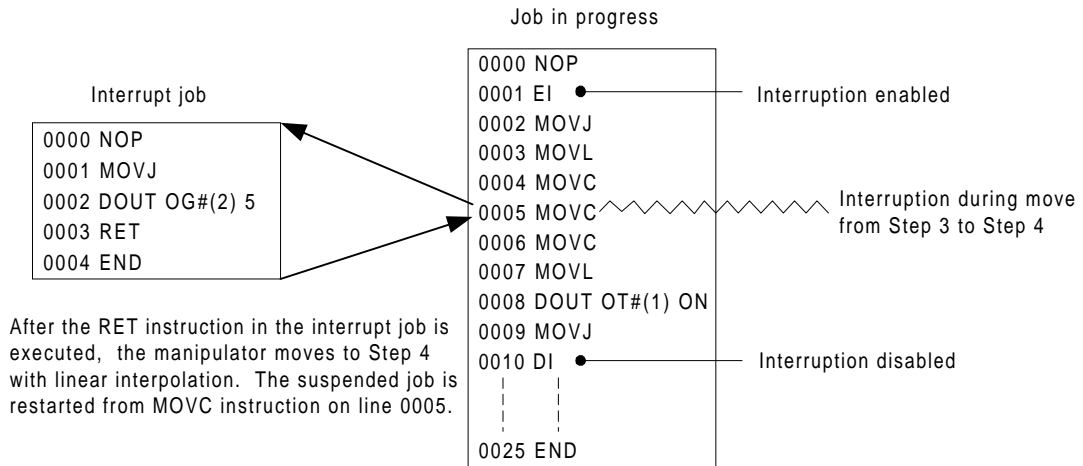


A job interruption (with the cursor on line 0005)

## 5.3 Interruption During Move Instruction with NWAIT



## 5.4 Interruption During Circular Interpolation Move Instruction (MOVC)





# 6 System with Independent Control

In a system where an independent control is used simultaneously with the interrupt job function, an interrupt job can be set and executed for each task.

The table No. indicates the type of task being displayed.

Master task ... Table No. 1

Subtask 1 ... Table No. 2

Subtask 2 ... Table No. 3

The image displays three overlapping screenshots of a control interface, each showing a table of interrupt jobs for a specific task. The tables are titled 'TABLE NO. : 1', 'TABLE NO. : 2', and 'TABLE NO. : 3'.

**Master task (Table No. 1):**

LEVEL	SIGNAL	JOB NAME	PERMIT	EXEC
0	IN#001	JIG 1 STOP	■	○
1	IN#002	JIG 2 STOP	■	○
2	IN#003	WAI		
3	IN#004	WAI		
4				
5				
6				

**Subtask 1 (Table No. 2):**

LEVEL	SIGNAL	JOB NAME	PERMIT	EXEC
0	IN#001	JIG 1 STOP	■	●
1	IN#002	JIG 2 STOP	■	○
2	IN#003	WAI		
3	IN#004	WAI		
4				
5				
6				

**Subtask 2 (Table No. 3):**

LEVEL	SIGNAL	JOB NAME	PERMIT	EXEC
0	IN#001	JIG 3 STOP	□	○
1	IN#002	JIG 4 STOP	□	○
2	IN#003	WAIT 1	■	●
3	IN#004	WAIT 2	□	○
4			■	○
5			□	○
6			□	○

---

---



- EI and DI instructions are valid only in each individual task. For example, an EI instruction in subtask 1 does not affect any interruption tables in the master task or in subtask 2.

- The following instructions are used for independent control.

PSEND  
PRCIV  
PSTART  
PWAIT  
TSYNC

During execution of an independent control instruction above, the interrupt job function can not be used. Program a DI and an EI instruction before and after the independent control instruction to disable interruptions.

<Job Example>

When a PSEND instruction is used

```
NOP
....
DI
PSEND SUB1 1
EI
....
END
```

# 7 Instruction List

< > indicates numerical or alphabetical data. If multiple items are shown in one section, select one of the items.

EI	Function	Enables a specified interruption level.	
	Instruction items	<Interruption level> B <Variable No.> LB <Variable No.>	0 to 255 for constants. When omitted, all levels are enabled.
	Examples	EI LEVEL=1 EI LEVEL=B001 EI	
DI	Function	Disables a specified interruption level.	
	Instruction items	<Interruption level> B <Variable No.> LB <Variable No.>	0 to 255 for constants When omitted, all levels are disabled
	Examples	DI LEVEL=5 DI LEVEL=B001 DI	







# YASNAC XRC OPTIONS INSTRUCTIONS

FOR THE INTERRUPT JOB FUNCTION

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