

**Motoman XRC Controller**

---

# **TCP Function Manual**

**for UP/SKX-Series Robots**

Part Number:	143064-1
Release Date:	March 22, 2007
Document Status:	Final

---

**MOTOMAN**  
a YASKAWA company

Motoman, Incorporated  
805 Liberty Lane  
West Carrollton, OH 45449  
TEL: (937) 847-6200  
FAX: (937) 847-6277  
24-Hour Service Hotline: (937) 847-3200

## **COMPLETE OUR ONLINE SURVEY**

Motoman is committed to total customer satisfaction! Please give us your feedback on the technical manuals you received with your Motoman robotic solution.

To participate, go to the following website:

<http://www.motoman.com/forms/techpubs.asp>

The information contained within this document is the proprietary property of Motoman, Inc., and may not be copied, reproduced or transmitted to other parties without the expressed written authorization of Motoman, Inc.

©2007 by MOTOMAN  
All Rights Reserved

Because we are constantly improving our products, we reserve the right to change specifications without notice. MOTOMAN is a registered trademark of YASKAWA Electric Manufacturing.

---

# TABLE OF CONTENTS

<b><u>Section</u></b>	<b><u>Page</u></b>
1 INTRODUCTION	
1.1 About this Document .....	1-1
1.2 Reference to Other Documentation.....	1-1
1.3 Customer Service Information .....	1-1
2 SAFETY	
2.1 Introduction .....	2-1
2.2 Standard Conventions .....	2-2
2.3 General Safeguarding Tips.....	2-4
2.4 Mechanical Safety Devices .....	2-4
2.5 Installation Safety .....	2-5
2.6 Programming Safety .....	2-5
2.7 Operation Safety .....	2-6
2.8 Maintenance Safety.....	2-7
3 TCP FUNCTION	
1 TCP Function .....	1-1
2 Registration of Instructions.....	2-1
3 Examples of the TCP Function.....	3-1
4 Instruction List.....	4-1

---

# ***NOTES***

---

# **SECTION 1**

## **INTRODUCTION**

### **1.1 About this Document**

This manual provides instructions for TCP 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 – TCP FUNCTION**

Provides detailed instructions to utilize the TCP 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***

---

# 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

TCP FUNCTION

---

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

---

## 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 TCP 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.

---

## 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.

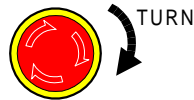
Injury or damage to machinery may result if the emergency stop circuit cannot stop the manipulator during an emergency. The manipulator should not be used if the emergency stop buttons do not function.



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.

---

---

1	TCP Function	
1.1	Job Preparation .....	1-2
2	Registration of Instructions	
2.1	TCPON Instruction .....	2-1
2.2	TCPOF Instruction.....	2-2
3	Examples with the TCP Function	
3.1	System with Two Manipulators.....	3-1
3.1.1	Independent Operation (MOVx + MOVx) .....	3-1
■	Job.....	3-2
3.1.2	Coordinated Operation (SMOVx + MOVx) .....	3-3
■	Job.....	3-3
4	Instruction List	



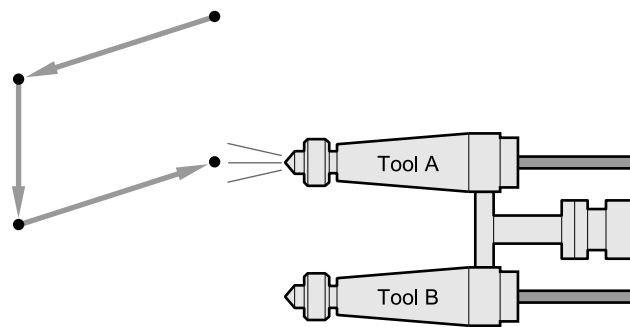
---

# 1 TCP Function

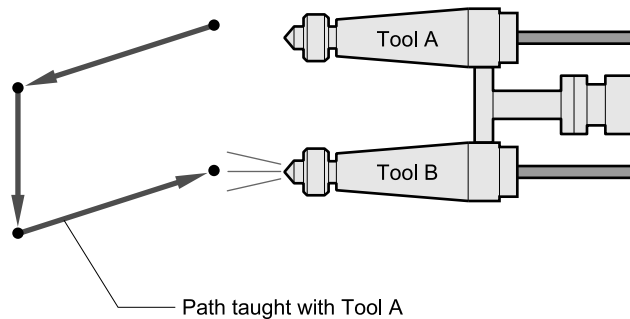
The TCP (Tool Center Point) function is to use a tool on the path taught with another tool. Several tools can be used for the same path with this function.

For example, the following figure shows a painting system with two tools. One tool is used for undercoating; the other is used for top-coating. To do top-coating after undercoating, teach a path to either one of the tools, and then teaching the other tool is not necessary.

1. After teaching with Tool A, do the undercoating with Tool A.

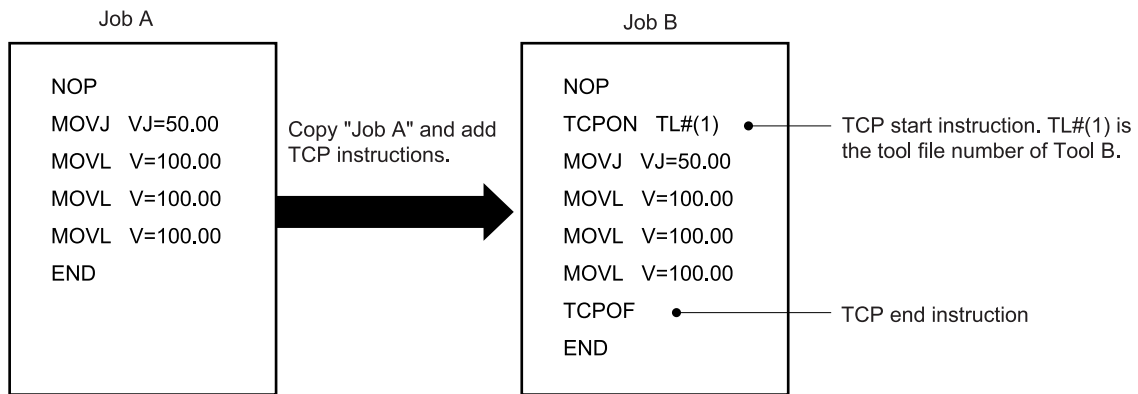


2. Using the TCP function, do the top-coating with Tool B.



## 1.1 Job Preparation

The job taught with Tool A is named "Job A." the job copied from Job A is named "Job B." Add the TCP instructions before and after the sections where Tool B is to be used in Job B. Set a tool file number for Tool B in the TCPON instruction.



## 2 Registration of Instructions

### 2.1 TCPON Instruction

TCPON is an instruction to start the TCP function in which the tool with the specified tool number starts an operation for the taught path.



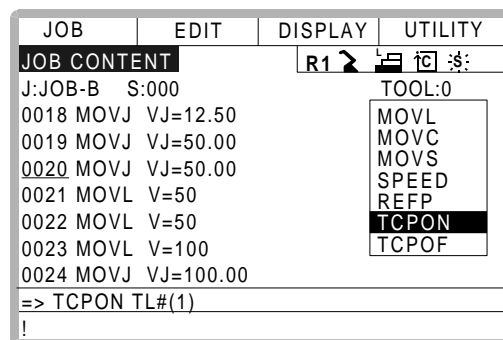
When a manipulator designation (RB1/RB2/RB3) is omitted in the coordinated system, a manipulator on the slave side carries out the TCP function.

#### Operation

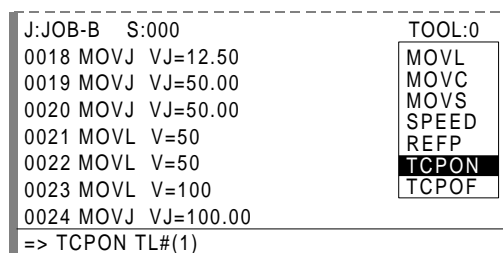
Move the cursor to address area ➡ Move the cursor to the line where the TCPON instruction is to be registered ➡ Press [INFORM LIST]<sup>\*1</sup> ➡ Select {TCPON}<sup>\*2</sup> ➡ Press [SELECT] again ➡ Enter a tool file number in the detail edit display<sup>\*3</sup> ➡ Press [ENTER]<sup>\*4</sup>

#### Explanation

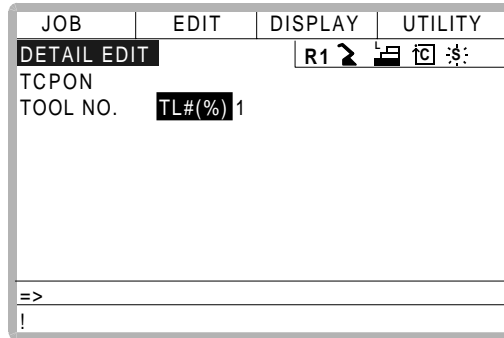
- \*1** The instruction list dialog is displayed. The cursor moves to the instruction list dialog while the cursor in the address area changes to an underbar.



- \*2** The TCPON instruction is displayed with the previously registered additional items in the input buffer line.



- \*3 Specify a tool file number from 0 to 23. Move the cursor on the file number, and press [SELECT]. Enter the tool file number with number keys, and press [ENTER].



- \*4 The input buffer line displays the data that was set for the operation. Press [ENTER] again to register the data.

## 2.2 TCPOF Instruction

TCPOF is an instruction to end the TCP function and make the operation tool a taught tool.

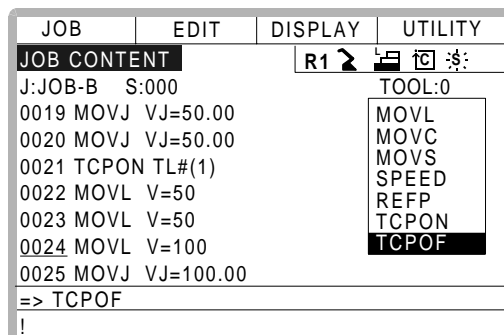
**NOTE** When a manipulator designation (RB1/RB2/RB3) is omitted in a coordinated system, a manipulator on the slave side ends its execution of the TCP function.

### Operation

Move the cursor to address area → Move the cursor to the line where the TCPOF instruction is to be registered → Press [INFORM LIST]<sup>\*1</sup> → Select {TCPOF}<sup>\*2</sup> → Press [ENTER]<sup>\*3</sup>

### Explanation

- \*1 The instruction list dialog is displayed. The cursor moves to the instruction list dialog while the cursor in the address area changes to an underbar.





- \*2** The TCPOF instruction is displayed with the previously registered additional items in the input buffer line.

```
J:JOB-B S:000 TOOL:0
0019 MOVJ VJ=50.00 MOVL
0020 MOVJ VJ=50.00 MOVJ
0021 TCPON TL#(1) MOVJ
0022 MOVL V=50 SPEED
0023 MOVL V=50 REFP
0024 MOVL V=100 TCPON
=> TCPOF TCPOF
```

- \*3** The contents displayed in the input buffer line are registered.



## 3 Examples with the TCP Function

### 3.1 System with Two Manipulators

#### 3.1.1 Independent Operation (MOVx + MOVx)

1. Prepare two jobs taught with Tool 0 and Tool 1 as in Fig. A.
2. Change from Tool 0 to Tool 2 and change from Tool 1 to Tool 3. Then use them with the TCP instruction. Fig. B shows that Tool 2 and Tool 3 move in the same path as Tool 0 and Tool 1 did.

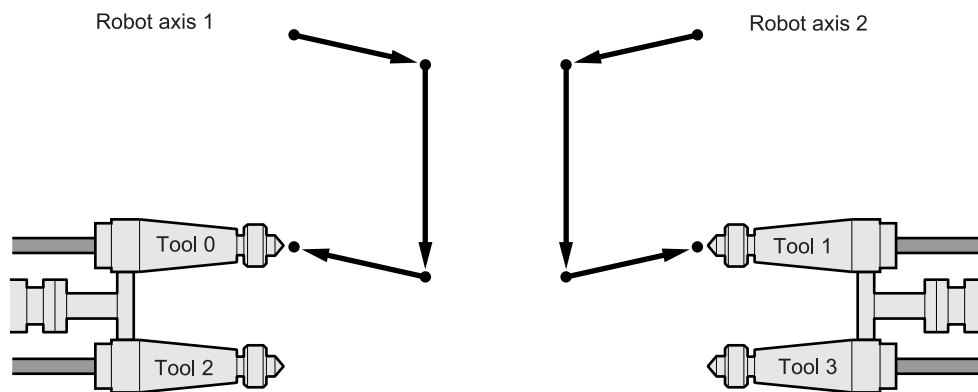


Fig. A

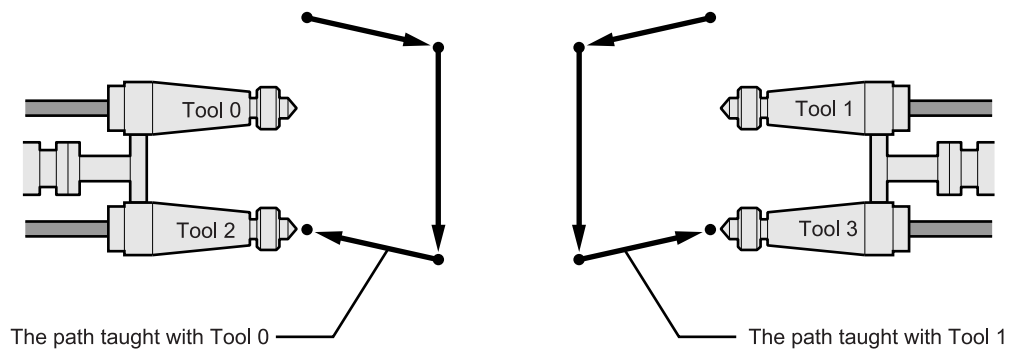


Fig. B

■ Job

- The job at teaching is as follows.  
This program is for Tool 0 and Tool 1.

```
0000 NOP
0001 MOVL
      +MOVL
0002 MOVL
      +MOVL
0003 MOVL
      +MOVL
0004 MOVL
      +MOVL
0005 END
```

- The job with the TCP instruction is as follows.  
This program is for Tool 2 and Tool 3.

```
0000 NOP
0001 TCPON RB1 TL#(2)
0002 TCPON RB2 TL#(3)
0003 MOVL
      +MOVL
0004 MOVL
      +MOVL
0005 MOVL
      +MOVL
0006 MOVL
      +MOVL
0007 TCPOF RB1
0008 TCPOF RB2
0009 END
```

### 3.1.2 Coordinated Operation (SMOVx + MOVx)

1. Prepare a job taught with Tool 1 on the master side as in Fig. A.
2. Change from Tool 1 to Tool 2 on the master side. Use Tool 2 with the TCP instruction.  
Fig. B shows that Tool 2 on the master side moves in the same path as Tool 1 did.

The motion on the slave side does not change. Tool 2's position on the master side when the motion is completed is changed to the same position taught to the Tool 1.

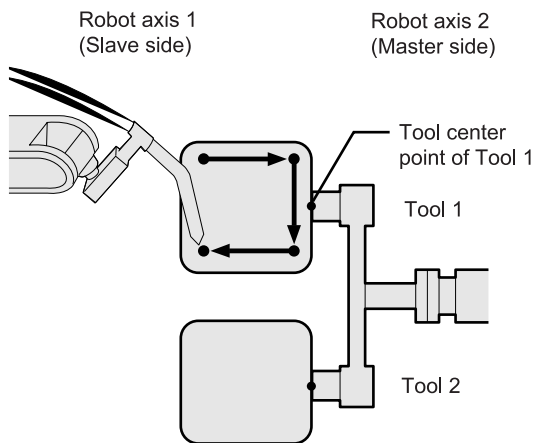


Fig. A

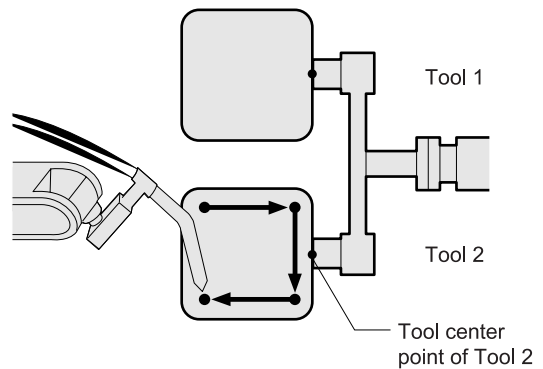


Fig. B

#### ■ Job

- The job at teaching is as follows.  
This program is for Tool 1.

```

0000 NOP
0001 SMOVL
      +MOVL
0002 SMOVL
      +MOVL
0003 SMOVL
      +MOVL
0004 SMOVL
      +MOVL
0005 END

```

---

### 3.1 System with Two Manipulators

---

- The job with the TCP instruction is as follows.  
This program is for Tool 2.

```
0000 NOP
0001 TCPON RB2 TL#(2)
0002 SMOVL
      +MOVL
0003 SMOVL
      +MOVL
0004 SMOVL
      +MOVL
0005 SMOVL
      +MOVL
0006 TCPOF RB2
0007 END
```

---

## 4 Instruction List

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

TCPON	Function	Starts the TCP function.	
	Format	TL# (<Tool File Number>)	
		RB1, RB2, or RB3	When omitted, the slave side starts the TCP function.
Example	TCPON RB1 TL#(1)		
TCPOF	Function	Ends the TCP function.	
	Format	RB1, RB2, or RB3	When omitted, the slave side completes the TCP function.
		Examples	TCPOF TCPOF RB1







# YASNAC XRC OPTIONS INSTRUCTIONS

## TCP FUNCTION

---

### **TOKYO OFFICE**

New Pier Takeshiba South Tower, 1-16-1, Kaigan, Minatoku, Tokyo 105-6891, Japan  
Phone 81-3-5402-4511 Fax 81-3-5402-4580

### **MOTOMAN INC. HEADQUARTERS**

805 Liberty Lane West Carrollton, OH 45449, U.S.A.  
Phone 1-937-847-6200 Fax 1-937-847-6277

### **MOTOMAN INC. TROY FACILITY**

1050 S. Dorset, Troy, OH 45373, U.S.A.  
Phone 1-937-440-2600 Fax 1-937-440-2626

### **YASKAWA MOTOMAN CANADA LTD.**

2280 ARGENTIA ROAD, MISSISSAUGA, ONTARIO, L5N 6H8, CANADA.  
Phone 1-905-813-5901 Fax 1-905-813-5911

### **YASKAWA ELECTRIC EUROPE GmbH**

Am Kronberger Hang 2, 65824 Schwalbach, Germany.  
Phone 49-6196-569-300 Fax 49-6196-888-301

### **Motoman Robotics AB**

Box 504 S38525 Torsås, Sweden  
Phone 46-486-48800 Fax 46-486-41410

### **Motoman Robotec GmbH**

Kammerfeldstraße1, 85391 Allershausen, Germany  
Phone 49-8166-900 Fax 49-8166-9039

### **YASKAWA ELECTRIC KOREA CORPORATION**

Kjpa Bldg #1201, 35-4 Youido-dong, Yeongdungpo-Ku, Seoul 150-010, Korea  
Phone 82-2-784-7844 Fax 82-2-784-8495

### **YASKAWA ELECTRIC (SINGAPORE) PTE. LTD.**

151 Lorong Chuan, #04-01, New Tech Park Singapore 556741, Singapore  
Phone 65-282-3003 Fax 65-289-3003

### **YATEC ENGINEERING CORPORATION**

Shen Hsiang Tang Sung Chiang Building 10F 146 Sung Chiang Road, Taipei, Taiwan  
Phone 886-2-2563-0010 Fax 886-2-2567-4677

### **BEIJING OFFICE**

Room No. 301 Office Building of Beijing International Club, 21 Jianguomenwai Avenue, Beijing 100020, China  
Phone 86-10-6532-1850 Fax 86-10-6532-1851

### **SHANGHAI OFFICE**

27 Hui He Road Shanghai 200437 China  
Phone 86-21-6553-6600 Fax 86-21-6531-4242

### **YASKAWA JASON (HK) COMPANY LIMITED**

Rm. 2909-10, Hong Kong Plaza, 186-191 Connaught Road West, Hong Kong  
Phone 852-2803-2385 Fax 852-2547-5773

### **TAIPEI OFFICE**

Shen Hsiang Tang Sung Chiang Building 10F 146 Sung Chiang Road, Taipei, Taiwan  
Phone 886-2-2563-0010 Fax 886-2-2567-4677

### **BEIJING YASKAWA BEIKE AUTOMATION ENGINEERING CO.,LTD.**

30 Xue Yuan Road, Haidian, Beijing P.R. China Post Code: 100083  
Phone 86-10-6233-2782 Fax 86-10-6232-1536

### **SHOUGANG MOTOMAN ROBOT CO., LTD.**

7,Yongchang-North Street, Beijing Economic Technological Investment & Development Area,  
Beijing 100076, P.R. China  
Phone 86-10-6788-0551 Fax 86-10-6788-2878



YASKAWA ELECTRIC CORPORATION

YASKAWA

Specifications are subject to change without notice  
for ongoing product modifications and improvements.

MANUAL NO. RE-CKI-A419  
© Printed in Japan February 1999 99-2