Chapter 1
Introduction

1.1 About This Document

This manual provides information for the Job Data Restoration Function and contains the following sections:

CHAPTER 1 - INTRODUCTION
Provides general information about the structure of this manual, a list of reference documents, and customer service information.

CHAPTER 2 - SAFETY
This section provides information regarding the safe use and operation of Motoman products.

CHAPTER 3 - JOB DATA RESTORATION INSTRUCTIONS
Provides detailed information for the Job Data Restoration Function.

1.2 Reference to Other Documentation

For additional information refer to the following:

• NX100 Controller Manual (P/N 149201-1)
• Concurrent I/O Manual (P/N 149230-1)
• Operator's Manual for your application
• Vendor manuals for system components not manufactured by Motoman

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 (EA1900N, HP50, etc.)
• Application Type (handling, welding, etc.)
• Robot Serial Number (located on back side of robot arm)
• Robot Sales Order Number (located on back of controller)
Notes
Chapter 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 R15.06-1999. The address is as follows:

RoboticIndustriesAssociation
900VictorsWay
P.O.Box3724
AnnArbor,Michigan48106
TEL:(734)994-6088
FAX:(734)994-3338
INTERNET:www.roboticsonline.com

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, Operation, and Maintenance Safety (Section 2.6)

2.2 **Standard Conventions**

This manual includes the following alerts – in descending order of severity – that are essential to the safety of personnel and equipment. As you read this manual, pay close attention to these alerts to insure safety when installing, operating, programming, and maintaining this equipment.

**DANGER!**

Information appearing in a DANGER 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 in a WARNING 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 in a CAUTION 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 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 R15.06-1999, section 4.2.5, Sources of Energy, 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 R15.06-1999 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 equipment is provided as standard:

- Safety fences and barriers
- Light curtains and/or safety mats
- Door interlocks
- Emergency stop palm buttons located on operator station, robot controller, and programming pendant

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 R15.06-1999 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, Operation, and 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. 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 program, operate, and maintain the system. All personnel involved with the operation of the equipment must understand potential dangers of operation.

• 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 all safety equipment for proper operation. Repair or replace any non-functioning safety equipment immediately.
• Do not enter the robot cell while it is in automatic operation. Be sure that only the person holding the programming pendant enters the workcell.
• Check the E-STOP button on the programming pendant for proper operation before programming. The robot must be placed in Emergency Stop (E-STOP) mode whenever it is not in use.
• Back up all programs and jobs onto suitable media before 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.
• Any modifications to PART 1, System Section, of the robot controller concurrent I/O program can cause severe personal injury or death, as well as damage to the robot! Do not make any modifications to PART 1, System Section. 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.

• The robot controller allows modifications of PART 2, User Section, of the concurrent I/O program and modifications to controller parameters for maximum robot performance. Great care must be taken when making these modifications. 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 and other parts of the system. Double-check all modifications under every mode of robot operation to ensure that you have not created hazards or dangerous situations.

• Check and test any new or modified program at low speed for at least one full cycle.

• This equipment has multiple sources of electrical supply. Electrical interconnections are made between the controller and other equipment. Disconnect and lockout/tagout all electrical circuits before making any modifications or connections.

• Do not perform any maintenance procedures before reading and understanding the proper procedures in the appropriate manual.

• Use proper replacement parts.

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

MOTOMAN INSTRUCTIONS
MOTOMAN-□□□ INSTRUCTIONS
NX100 INSTRUCTIONS
NX100 OPERATOR’S MANUAL
NX100 MAINTENANCE MANUAL

The NX100 operator’s manuals above correspond to specific usage. Be sure to use the appropriate manual.
This manual explains Job data simplified restoration function of the NX100 system. Read this manual carefully and be sure to understand its contents before handling the NX100.

General items related to safety are listed in Section 1: Safety of the NX100 Instructions. To ensure correct and safe operation, carefully read the NX100 Instructions before reading this manual.

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 maintenance or inspection of the NX100.
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.

**NOTE**

To ensure safe and efficient operation at all times, be sure to follow all instructions, even if not designated as “CAUTION” and “WARNING.”
• Before maintenance, inspection, and wiring, check that servo power is turned OFF when the emergency stop buttons on the front door of the NX100 and programming pendant are pressed. When the servo power is turned OFF, the SERVO ON LED on the programming pendant is 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.

• 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.

• Observe the following precautions when performing teaching operations within the P-point maximum 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 P-point maximum envelope of the manipulator and that you are in a safe location before:
  - Turning ON the NX100 power
  - Moving the manipulator with the programming pendant
  - Running the system in the check mode
  - Performing automatic operations

Injury may result if anyone enters the P-point maximum envelope of the manipulator during operation. Always press an emergency stop button immediately if there are problems. The emergency stop buttons are located on the right of the front door of the NX100 and the 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 NX100 cabinet after use.

The programming pendant can be damaged if it is left in the P-point maximum envelope of the manipulator, on the floor, or near fixtures.

• Read and understand the Explanation of Warning Labels in the NX100 Instructions 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 programming pendant, and supply cables.

In this manual, the equipment is designated as follows.

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Manual Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>NX100 Controller</td>
<td>NX100</td>
</tr>
<tr>
<td>NX100 Programming Pendant</td>
<td>Programming Pendant</td>
</tr>
<tr>
<td>Cable between the manipulator and the controller</td>
<td>Manipulator cable</td>
</tr>
</tbody>
</table>
Descriptions of the programming pendant keys, buttons, and displays are shown as follows:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Manual Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programming Pendant</td>
<td>Character Keys: The keys which have characters printed on them are denoted with [], ex. [ENTER]</td>
</tr>
<tr>
<td></td>
<td>Symbol Keys: The keys which have a symbol printed on them are not denoted with [] but depicted with a small picture. ex. page key</td>
</tr>
<tr>
<td></td>
<td>The cursor key is an exception, and a picture is not shown.</td>
</tr>
</tbody>
</table>
|                         | Axis Keys
|                         | Numeric Keys: “Axis Keys” and “Numeric 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}                                                                          |

**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, or that the item is directly selected by touching the screen.
1 Outline

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   2.2 Job Data Restoration Method ......................... 2-3
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3 If Fail in Simplified Restoration
   3.1 Rechecking Job Data ............................... 3-1
   3.2 If Data Inconsistency Alarm Occurs Again ............ 3-2

4 Related Parameters

5 Specific Output Signal
1 Outline

There are some cases where the data in file system becomes inconsistent status if the controller power is turned off during edit operation. If this data inconsistent status is neglected, the following data errors (inconsistent status) might occur in rare cases. This Job data simplified restoration function checks the inconsistent status of the file and restore the data error status of the file system.

[Inconsistent status]
inconsistent chain status between position data and instruction file
  1) Overlapped chain with same position data
  2) Unregistered position data is chained with instruction file
  3) Registered position data is not chained
2 Job Data Restoration

2.1 How to Check Job Data Inconsistent Status

* "FILE" in WRONG DATA LOG screen corresponds to the following data.
  ① Job data
  ② User coordinate data (UFRAME)
  ③ Robot calibration file (RBCAL)
  ④ Edit buffer (-CUTBUF)

- Execute Job data restoration in management mode.
- Operation mode and editing mode permit monitoring only.

<table>
<thead>
<tr>
<th>Operation</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Detect data error</td>
<td>ALARM screen appears.</td>
</tr>
<tr>
<td>2 Press [SYSTEM INFO] under main menu and select [SECURITY]</td>
<td></td>
</tr>
</tbody>
</table>
2.1 How to Check Job Data Inconsistent Status

<table>
<thead>
<tr>
<th>Operation</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Select “MANAGEMENT MODE”</td>
<td>[Image] Input password to switch the mode to Management mode.</td>
</tr>
<tr>
<td>4 Press [SETUP] under main menu and select [WRONG DATA LOG]</td>
<td>[Image] WRONG DATA LOG screen appears.</td>
</tr>
<tr>
<td>5 Check the details of data inconsistency</td>
<td>Check the error contents, then execute restoration following “2.2 JOB data restoration method”.</td>
</tr>
</tbody>
</table>
## 2.2 Job Data Restoration Method

### 2.2.1 In Case Same Position Data is Chained

<table>
<thead>
<tr>
<th>Operation</th>
<th>Explanation</th>
</tr>
</thead>
</table>

The indication changes from "OCCURRED ON" to "RESTORED ON".
### 2.2 Job Data Restoration Method

<table>
<thead>
<tr>
<th><em>If fail in the restoration</em></th>
<th>If the indication doesn’t change from “OCCURRED ON” to “RESTORED ON”, refer to Chapter 3 “If fail in simplified restoration”.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Start up the system again</td>
</tr>
<tr>
<td>3</td>
<td>Press [SETUP] under main menu and select [WRONG DATA LOG]</td>
</tr>
<tr>
<td>4</td>
<td>Check the position</td>
</tr>
</tbody>
</table>
### 2.2.2 In Case Not-Registered Position Data is Chained

**Operation**

1. Press [UTILITY] and select [RESTORE]

**Explanation**

Press [RESTORE] button to register the position of the file indicated in WRONG DATA LOG screen tentatively, which enables to register position again.

The indication changes from "OCCURRED ON" to "REGISTERED ON".

* If fail in the restoration

If the indication doesn't change from "OCCURRED ON" to "RESTORED ON", refer to Chapter 3 "If fail in simplified restoration".
### 2.2 Job Data Restoration Method

<table>
<thead>
<tr>
<th>2</th>
<th>Start up the system again</th>
<th>After the restoration, the system must be started up again. Turn the control power OFF/ON and then execute the following checking operation.</th>
</tr>
</thead>
</table>
| 3 | Press [SETUP] under main menu and select [WRONG DATA LOG] | **Register teaching position again**

#### WRONG DATA LOG appears.

Register the position data of the file in the screen again.
## 2.2.3 In Case Not-Chained Position Data Exists

<table>
<thead>
<tr>
<th>Operation</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Press [UTILITY] and select [RESTORE] Press [RESTORE] to correct the chain. The indication changes from “OCCURRED ON” to “REGISTERED ON”</td>
</tr>
<tr>
<td>2</td>
<td>Start up the system again After the restoration, the system must be started up again. Turn the control power OFF/ON.</td>
</tr>
</tbody>
</table>

* If fail in the restoration

If the indication doesn’t change from “OCCURRED ON” to “RESTORED ON”, refer to Chapter 3 “If fail in simplified restoration”.

![Diagram](image-url)
3.1 Rechecking Job Data

3  If Fail in Simplified Restoration

Execute the following procedure if failing in the restoration by Job data simplified restoration method.

3.1  Rechecking Job Data

<table>
<thead>
<tr>
<th>Operation</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Select [RE CHECK] under [UTILITY]</td>
<td>Press [RE CHECK]</td>
</tr>
<tr>
<td>2 Restoration is completed</td>
<td>* Proceed to the next operation “3.2 If Data Inconsistency Alarm Occurs Again” if the alarm occurs again after this operation.</td>
</tr>
</tbody>
</table>
### 3.2 If Data Inconsistency Alarm Occurs Again

Execute the following procedure if the data inconsistency alarm occurs again even after rechecking Job data.

<table>
<thead>
<tr>
<th>Operation</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 1)</td>
<td>Delete the position data of the file indicated in WRONG DATA LOG screen</td>
</tr>
<tr>
<td>2) Register position data</td>
<td>Refer to “2.2 Job data restoration method” for checking operation after registration. (See the operations after procedure 2 “Start up the system again”)</td>
</tr>
</tbody>
</table>

Execute the following procedure if the position data cannot be deleted or re-registered with the operation indicated above.

<table>
<thead>
<tr>
<th>Operation</th>
<th>Explanation</th>
</tr>
</thead>
</table>
| 2 1) Save Job data and User Coordinate file and Robot Calibration. | *Delete the position data of the file indicated in WRONG DATA LOG screen in case the following error occurs while saving.  
**ERROR:** 0040 Undefined robot position variable  
* Refer to NX100 OPERATOR’S MANUAL “8.1.2. File Management” for details. |
| 2) Initialize Job area in maintenance mode. | * Refer to NX100 INSTRUCTIONS “9.18.1 Initialize Job file” for details. |
| 3) Load the data saved in the procedure 1. | * Refer to NX100 OPERATOR’S MANUAL “8.1.2. File Management” for details. |
| 4) Check the motion of the manipulator after loading. | * Refer to the procedure from “2 Start up the system again.” in 2.2 Job data restoration method. |
# 4 Related Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Meaning</th>
<th>Setting value</th>
<th>Initial value</th>
</tr>
</thead>
<tbody>
<tr>
<td>S2C221</td>
<td>Data inconsistency check specification</td>
<td>0 : Valid</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 : Invalid</td>
<td></td>
</tr>
<tr>
<td>S2C222</td>
<td>Inconsistency detection method in play mode</td>
<td>0 : Warning</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 : Stop with alarm</td>
<td></td>
</tr>
</tbody>
</table>
# 5 Specific Output Signal

The following signal outputs the status of data inconsistency occurrence.

<table>
<thead>
<tr>
<th>Output signal</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>50356</td>
<td>Indicate the data inconsistency occurrence</td>
</tr>
</tbody>
</table>
NX100 OPTIONS
INSTRUCTIONS
FOR JOB DATA SIMPLIFIED RESTORATION FUNCTION

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YASKAWA

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