

Motoman XRC Controller

Automatic Backup Function Instruction Manual

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NOTES

SECTION 1

INTRODUCTION

1.1 About this Document

This manual provides instructions for Automatic Backup 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 – AUTOMATIC BACKUP FUNCTION INSTRUCTIONS

Provides detailed instructions to utilize the Automatic Backup 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 UP20, XRC Manipulator Manual (P/N 144342-1)
- Motoman UP50, XRC Manipulator Manual (P/N 144343-1)
- 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, UP20, 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

FOR AUTOMATIC BACKUP 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 automatic backup 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.



NOTE 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.

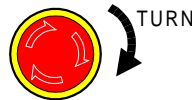
Injury or damage to machinery may result if the emergency stop circuit cannot stop the manipulator during an emergency. The manipulator should not be used if the emergency stop buttons do not function.



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.

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 ke  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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1 Automatic Backup Function

1.1 Purpose

With the automatic backup function, XRC memory contents are automatically saved in a PC card.

After unexpected trouble such as the accidental erasing of the memory, the backup data saved in a PC card by the automatic backup function can be loaded to the XRC memory and restore the file data.



The automatic backup function is enabled only while the XRC power supply is ON.

1.2 Outline

The automatic backup function works on the basic assumption that no major changes in the memory data were made during playback. This function backs up as much of the latest data as possible during editing.

1.2.1 Functions

There are two types of automatic backup: cyclic backup and backup at switching mode.

Function	Explanation
Cyclic backup	In teach mode, the data in memory is backed up in a specified cycle. This function backs up as much of the latest data as possible during editing. The backup data saved in a PC card can be loaded to the XRC in case of data loss so that the data loss can be minimized.
Backup at switching mode	When switching the mode from teach mode to play mode, the data in memory is backed up. The edited data is backed up when editing is completed.

1.2.2 Features

The following table shows the features of the automatic backup function.

Feature	Explanation
<u>Backup While Robot Program is Stopped</u> The backup during playback is disabled. However, in play mode, the backup is enabled when the robot program has stopped.	Backs up the variables for essential data.*
<u>Backup and Retry at Low-level Priority</u> When other operations affect the backup operation, the backup is suspended and the backup is retried.	The backup operation does not affect other operations, which enables you to use the programming pendant and FC2 to save the data to a floppy disc during backup.
<u>Backup in Binary</u> The data is saved as binary data. The range is the same as that of the "ALL CMOS AREA" when saved on a floppy disc, but the data type is different.	Backup in binary allows to system to be easily and speedily restored.

- * Two types of data are saved in variables: essential data and data saved temporarily for an operation. The latter is changed so frequently that it is difficult to save. Because the automatic backup is designed to give priority to essential data, the backup during playback is disabled.

2 Settings for Automatic Backup

Insert a PC card in the PC card slot, and select the options and values necessary for the execution of automatic backup in the AUTO BACKUP SET display.



As explained in “1.2 Outline”, there are two types of automatic backup: backup in a specified cycle and backup when switching the mode from teach mode to play mode. The XRC executes automatic backup according to the settings during operations except for execution of job.

2.1 PC Card

To use the automatic backup function, insert a PC card (ATA Flash) in the PC card slot on the XCP01 board. Only while the XRC power supply is OFF, the PC card can be inserted or removed.

When the data could not be saved in a PC card during an automatic backup due to the absence or insufficient capacity of the PC card, the error message “Cannot backup PC CARD” appears. At the same time, the signal “occurrence of error” is output, but the robot program will not be stopped. Check if a PC card is inserted and if it has enough capacity, and take the necessary actions. If no actions are taken while the error occurs, the data cannot be saved. Yaskawa recommends that the data be saved in two or more PC cards to minimize problems if the PC card should be damaged.

The following PC cards can be used with the XRC. PC cards are optional. Yaskawa supplies an SA020MF2SDSAA PC card when ordered (Refer to the following table).

For the automatic backup function, a storage capacity twice as large as the amount of data to be backed up is required; 2 MB for standard memory configuration (1MB), 8 MB for expanded memory (4 MB). When the system program is to be backed up, an average total of approx. 20 MB is recommended. Use PC cards with a capacity of 10 MB to 80 MB for the XRC.

2.2 AUTO BACKUP SET display

Manufacturer	Model	Remarks
SanDisk (U.S.A.)	SDP 3B-20	20 MB

The PC cards made by SanDisk (U.S.A.) described above are also supplied by the following companies as OEM products.

Supplier	Model	Remarks
Mitsubishi Plastics Industries, Ltd.	SA020MF2SDSAA	20 MB Yaskawa-recommended PC card.
I-O Data	PCFCA-20MS	20 MB

A CompactFlash with a TYPE II card adapter can be used as a PC card. CompactFlash disks from 10 MB to 80 MB made by SanDisk (U.S.A.) can be used with the XRC, and are supplied by the following companies as OEM products.

Supplier	Model	Remarks
Mitsubishi Plastics Industries, Ltd.	SC020MF1SDSAA	CompactFlash (20 MB)
I-O Data	PCCF-20M	CompactFlash (20 MB)

2.2 AUTO BACKUP SET display

Select the following items for the automatic backup in the AUTO BACKUP SET display.

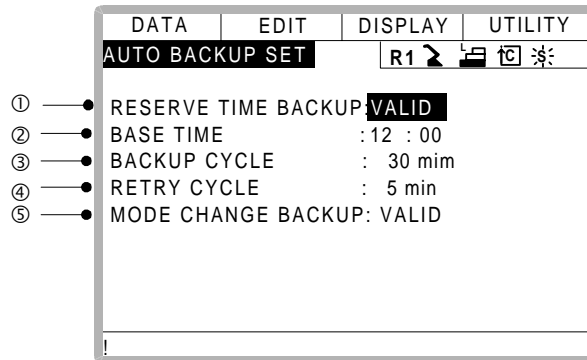
- RESERVE TIME BACKUP (VALID/INVALID of the cyclic backup)
- BASE TIME
- BACKUP CYCLE
- RETRY CYCLE
- MODE CHANGE BACKUP (VALID/INVALID of the backup when switching the mode from teach mode to play mode)

Operation

Change the security mode to management mode ➡ Select {SETUP} under the top menu
 ➡ Select {AUTO BACKUP SET}*1 ➡ Move the cursor to the item to be set ➡ type a value by pressing the number keys, and press [ENTER] (only for numerical input items)

Explanation

*1 The AUTO BACKUP SET display appears.



① RESERVE TIME BACKUP

Select whether the backup function in a specified cycle from a specified starting time is to be validated or not.

Each time [SELECT] is pressed, "INVALID" and "VALID" are displayed alternately.

The backup starting time and cycle are specified in the BASE TIME, the BACKUP CYCLE, and the RETRY CYCLE. Every time a value is set in these three items, RESERVE TIME BACKUP changes to INVALID. After setting these three items, reset the RESERVE TIME BACKUP to VALID. If these settings are incorrect, the RESERVE TIME BACKUP cannot be reset to VALID. If so, check and then change the values to the correct settings.

② BASE TIME

Specify the reference time to start backup. The BACKUP CYCLE starts from the BASE TIME not the startup time. The BACKUP CYCLE is first counted backwards from the BASE TIME, going back for as many cycles as possible until the startup time.

But if the BACKUP CYCLE is longer than the time between the startup time and the BASE TIME, the BACKUP CYCLE cannot be counted backwards but data will be backed up at the BASE TIME and continue automatically at the intervals set for the BACKUP CYCLE.

The setting ranges from 00:00 to 23:59.

③ BACKUP CYCLE

Specify the length of time for a cycle to back up. Set the backup cycle in units of minutes. After the first backup, the next backup is executed automatically in the time specified in the BACKUP CYCLE.

The cycle setting ranges from 10 to 9999 minutes, and is longer than the RETRY CYCLE setting range.

④RETRY CYCLE

Specify the length of time for a cycle to retry backing up when the backup operation is suspended. Set the retry cycle in units of minutes. After being suspended, the backup is retried in the time specified in the RETRY CYCLE. When the RETRY CYCLE is set to 0, the backup is not retried.

The cycle setting ranges from 0 to 255 minutes, and is shorter than the BACKUP CYCLE setting range.

⑤MODE CHANGE BACKUP

Select whether backup is to be executed or not when the mode is switches from teach mode to play mode.

Each time [SELECT] is pressed, "INVALID" and "VALID" are displayed alternately.

2.3 XRC Status and Automatic Backup

Backup Timing	XRC Status		Automatic Backup	
			PC card ready to save the data	Absence or insufficient capacity of PC card
From a specified starting time	Teach mode	Editing	Retry	Retry
		When editing is interrupted	Backup	Error
	Play mode	Executing jobs	Disabled	Disabled
		When stopped	Backup	Error
When switching the mode from teach mode to play mode	-		Backup	Error

2.3.1 Starting Backup at a Specified Time

While the data in the XRC memory is being edited or overwritten, the automatic backup is not executed at the specified backup starting time and is suspended and retried later. To start the cyclic backup from the specified starting time, set the BASE TIME so that the robot program is stopped (not during the editing or execution of a job) and the XRC power supply is ON when the backup starts.

2.3.2 Backup when Switching from Teach Mode to Play Mode

With MODE CHANGE BACKUP set to VALID, the job is disabled for 1 to 2 seconds when the teach mode is switched to play mode because of the backup operation. To start a job immediately after the mode is switched to play mode, set MODE CHANGE BACKUP to INVALID. When the mode is repeatedly switched from teach mode to play mode and vice versa within 1 to 2 seconds, backup starts after the last time the mode is switched.

2.3.3 Overwriting Limit in PC Card

The number of times that a PC card can be overwritten is limited to approx. 100,000. Because frequent backup operations may shorten the life of a PC card, the number of times that a PC card is overwritten should be as minimized if possible. Under the conditions described in the following table, the backup cycle is approx. 2 to 30 minutes.

	Operating Conditions where a PC card is used	Condition 1	Condition 2
a)	Manipulator's operating time per year (12 to 24 hours/day × 250 days/year)	3,000 hours	6,000 hours
b)	Ratio of operating time in teach mode to manipulator's total operating time	10%	20%
c)	Operating time in teach mode for 10 years (10 years × a × b)	3,000 hours	12,000 hours
d)	Number of times of switching from teach mode to play mode every 10 minutes in the operating time in teach mode for 10 years	18,000 times	72,000 times
e)	Length of backup cycle (c / (100,000 times - d))	2.2 minutes	25.7 minutes

2.4 Setting Examples

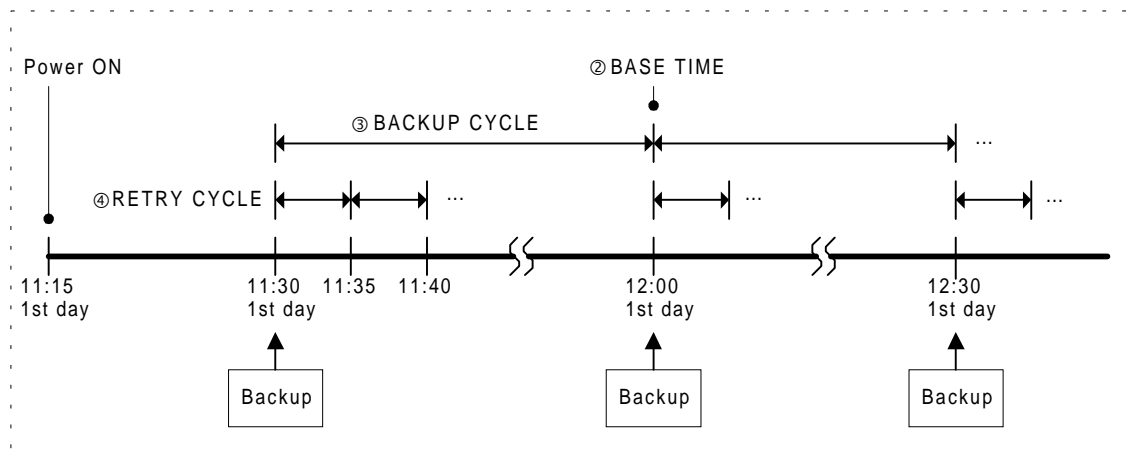
2.4.1 Setting Example 1

The following diagram shows a setting example with the following conditions:

BASE TIME: 12:00

BACKUP CYCLE: 30 (minutes)

RETRY CYCLE: 5 (minutes)



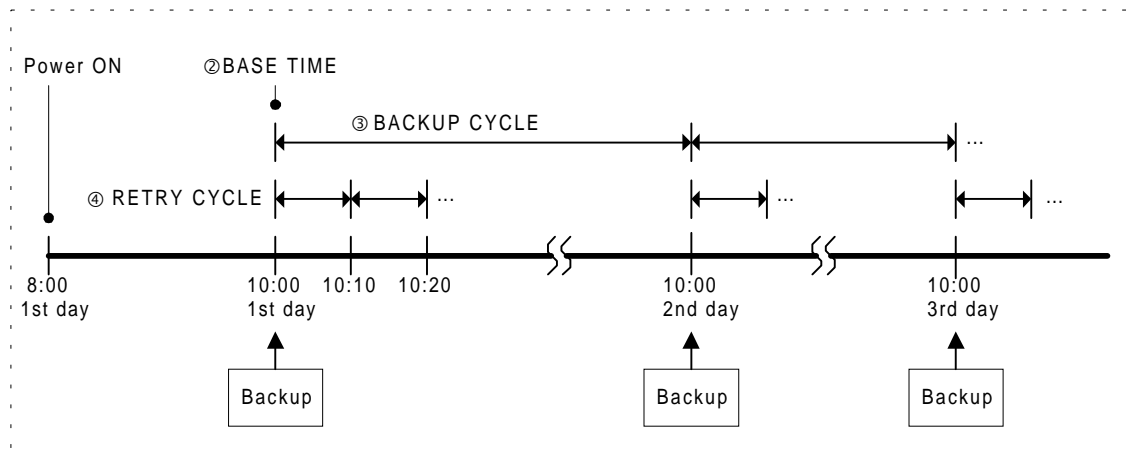
2.4.2 Setting Example 2

The following diagram shows a setting example with the following conditions:

BASE TIME: 10:00

BACKUP CYCLE: 1440 (minutes) (24 hours)

RETRY CYCLE: 10 (minutes)



During the execution of a job, the backup of data according to the settings in the AUTO BACKUP SET display is not executed.

3 Loading the Backup Data from the PC Card



CAUTION

Note that executing "SYSTEM RESTORE" replaces the current CMOS data with the data of the file "CMOSBK.BIN" in the PC card.

After "CMOSBK.BIN" has been loaded, check if the new data is the same as the previously saved data in the CMOS, and call the master job to confirm that the current manipulator position is correct and safe. Then, start moving the manipulator.

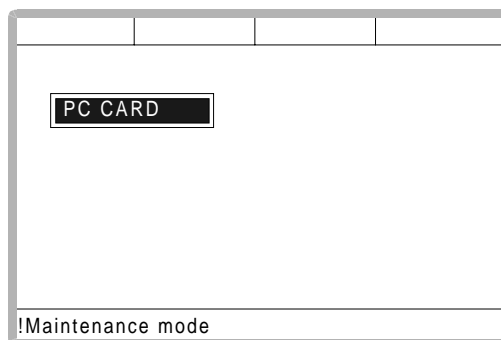
Load the backup data saved in the PC card to the XRC in maintenance mode.

Operation

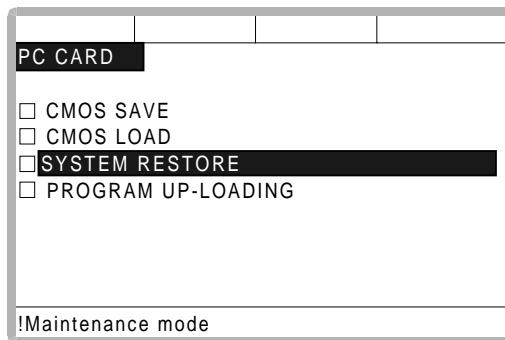
Insert the PC card with the backup data in the PC card slot on the XCP01 board ➡ Turn ON the XRC power supply while pressing [TOP MENU] ➡ Change the security mode to management mode ➡ Select {TOOL} under the top menu ^{*1} ➡ Select {PC CARD} ^{*2} ➡ Select "SYSTEM RESTORE" in the PC CARD display ^{*3} ➡ Select "YES" or "NO" for the message "Exchanged XCP01 board?" ^{*4} ➡ Select "YES"

Explanation

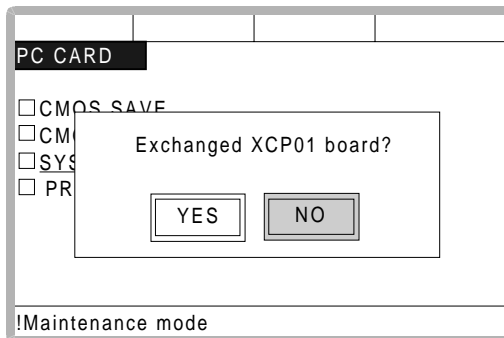
^{*1} The tool display appears.



-
- *2** The PC CARD display appears.
Move the cursor to SYSTEM RESTORE.

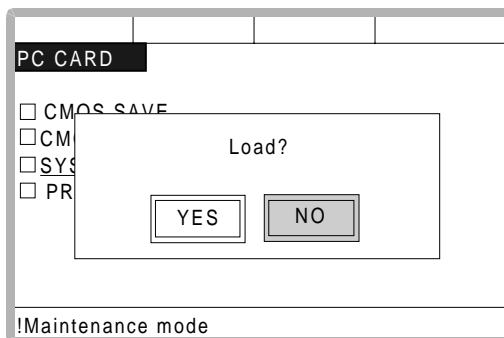


- *3** The XCP01 board replacement confirmation dialog box appears.



Select "YES" if the XCP01 board has been replaced, or select "NO" if the XCP01 board has not been replaced. Selecting "YES" initializes the system management time. Selecting "NO" continues the counting of the current system's management time.

- *4** The loading confirmation dialog box appears.



Selecting "YES" in the loading confirmation dialog box starts the loading of the data in the file "CMOSBK.BIN" from the PC card to the XRC CMOS.

4 Error List

Error No.	Message	Cause
3460	Cannot backup PC CARD	1: Insufficient capacity of the PC card
		2: Cannot access the PC card



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