Motoman XRC Controller

ControlNet I/F Board Instruction Manual

for UP-Series Robots

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TABLE OF CONTENTS

Section **Page**

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 CONTROLNET I/F BOARD INSTRUCTIONS
- 1 Outline 1-1
- 2 Connection 2-1
- 3 Settings 3-1
- 4 Setup of ControlNet Communications 4-1
- 5 Alarms 5-1
- 6 Communication Specifications 6-1
- 7 Message Transmission 7-1

NOTES

SECTION 1
INTRODUCTION

1.1 About this Document

This manual provides information on how to use the ControlNet I/F communications board with the XRC controller. The XRC must be running system software version X6.23 or later to use this communications board.

This manual is organized as follows:

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– CONTROLNET I/F INSTRUCTION MANUAL

Provides detailed instructions for setting up ControlNet communications on the XRC contoller, alarms, and message transmission protocols.

1.2 Reference to Other Documentation

For additional information refer to the following:

- Concurrent I/O Parameters Manual for XRC 2001 (P/N 147626-1)
- 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 2001 Manipulator Manual (P/N 145960-1)
- Motoman UP20, XRC 2001 Manipulator Manual (P/N 145965-1)
- Motoman UP50, XRC 2001 Manipulator Manual (P/N 145964-1)
- Motoman UP130/165, XRC 2001 Manipulator Manual (P/N 145967-1)

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, UP130, UP165, 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 of the controller PLC can cause severe personal injury or death, as well as damage to the robot! Do not make any modifications to the PLC. 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, 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, 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
INSTRUCTIONS

FOR ControlNet 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.

YASKAWA

MANUAL NO. HW0480590 ①

MANDATORY

- **This manual explains the ControlNet 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

- **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.**

  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.

- **Do not open the XRC front door while the power supply is ON. After turning OFF the power supply, wait 5 minutes or more before opening the XRC front door.**
  Do not turn ON the power while the XRC front door is open.

  Failure to observe this warning may result in electric shock or injury.

- **Do not touch any parts inside the XRC unless otherwise specified.**

  Failure to observe this warning may result in injury or failure.

CAUTION

- **Although the system data may be altered, do not change the data before thoroughly understanding the ControlNet function.**
  An accident or damage involving the manipulator or the whole system may occur. Observe the following precautions:
  - Set or change the data under the guidance and supervision of qualified personnel.
  - Always save the data after creating or changing any data. Be sure data has not been missed or overlooked.

- **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 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.

Registered Trademark

ControlNet is a trademark or a registered trademark of ControlNet International, Ltd.
In this manual, names of companies, corporations, or products are trademarks, registered trademarks, or bland names for each company or corporation. (R) and TM are omitted.

1 Outline

1.1 I/O Transmission 1-1
1.2 Message Transmission 1-2

2 Connection

2.1 Board External View 2-1
2.2 Cable Connections 2-2
2.3 Recommended Network Devices 2-2
2.4 Status Indicator LED 2-2
2.5 Cable Connection Example 2-3

3 Settings

3.1 ControlNet Function Setting 3-1
3.1.1 Enabling ControlNet Function and Allocating OUT Signals 3-1
3.1.2 Correlation of Signals 3-3
3.1.3 Communication Parameter Settings 3-3
3.2 Message Transmission Settings 3-4
3.2.1 Parameters for Transmission 3-4
3.2.2 Command Remote Selection 3-5
■ Settings for the Pseudo Input Signal “CMD REMOTE SEL” . 3-5
■ Setting to REMOTE Mode 3-6
■ Confirmation of Command Mode 3-6

4 Setup of ControlNet Communications

4.1 Settings for I/O Transmission 4-1
4.1.1 Setup of the Communications Master 4-1
4.1.2 Network Configuration 4-1
4.1.3 Concurrent I/O Program in the XRC 4-1
4.2 Message Transmission 4-2
4.2.1 Remote Mode 4-2
4.2.2 Transmission Protocol 4-2

5 Alarms

5.1 Alarm List 5-1

5.2 Alarm “5040 CONTROLNET TRANSMISSION ERROR” 5-2
5.2.1 Alarm Triggerring Disabled Conditions 5-2
■ Scheduled Data Transmission Has Never Been Established 5-2
■ I/O Disabled Status 5-2
5.2.2 Data Transmission During Alarm Occurrence 5-2
5.3 Status LED Indication 5-3
5.3.1 System Status LED 5-3
5.3.2 Network Status LED 5-4
5.4 Restrictions 5-5

6 Communication Specifications

6.1 Features 6-1
6.1.1 Producer and Consumer Model Communications 6-1
6.1.2 Flexible Network Configuration 6-1
6.1.3 Real-time Network 6-2
■ Scheduled Data Transmissions 6-2
■ Unscheduled Data Transmission 6-3
6.1.4 Product Classes 6-4
■ Messaging Class 6-4
■ Adapter Class 6-4
■ Scanner Class 6-5
6.2 Network Specifications 6-5
6.3 Electronic Data Sheet (EDS) File 6-7

7 Message Transmission Protocol

7.1 Data Transmission Process 7-1
7.2 Data Format 7-2
7.2.1 Common Items 7-2
■ Endian 7-2
■ File Name for Receiving and Sending 7-2
7.2.2 Basic Configuration 7-2
■ I/O and Alarm Data 7-2
■ Function Execution Status Data 7-3
■ Function Command and Answer 7-4
7.2.3 “Read I/O and Alarm Data” Function 7-5
■ Function 7-5
■ Function Number 7-5
■ Process 7-5
■ Command/Answer Format 7-5
7.2.4 “Read Identification Character String” Function 7-5
■ Function 7-5

- Function Number 7-5
- Process 7-6
- Command/Answer Format 7-7

7.2.5 "Read Alarm Data" Function 7-7
- Function 7-7
- Function Number 7-7
- Process 7-7
- Command/Answer Format 7-8

7.2.6 "Load File" Function 7-9
- Function 7-9
- Function Number 7-9
- Process 7-9
- Command/Answer Format 7-10

7.2.7 "Save File" Function 7-10
- Function 7-10
- Function Number 7-10
- Process 7-10
- Command/Answer Format 7-11
- Function 7-12
- Function Number 7-12
- Process 7-12
- Command/Answer Format 7-13

7.2.9 "Get File List" Function 7-13
- Function 7-13
- Function Number 7-13
- Process 7-13
- Command/Answer Format 7-14

7.2.10 "Read Status" Function 7-15
- Function 7-15
- Function Number 7-15
- Process 7-15
- Command/Answer Format 7-16
- Command/Answer Character String 7-16

7.3 Data Transmission Example 7-17

1 Outline

This manual describes how to use the ControlNet communication function for the XRC. Refer to "6 Communication Specifications" for details of the specifications for ControlNet communications.

1.1 I/O Transmission

The XRC sends or receives scheduled data for the ControlNet.
The following table shows the I/O contact points for transmission.
The XRC receives all of the following 64 IN contact signals.
The XRC sends any 64 contact signals of the following OUT signals.

I/O Signal	Logic Number	Classification	Signal Range
IN	9xxx	Network input	9010 to 9087 (64 inputs)
OUT	1xxx	General output	1010 to 1247 (192 outputs)
	3xxx	External output	3010 to 3327 (256 outputs)
	5xxx	Specific output	5010 to 5387 (304 outputs)
	7xxx	Auxiliary relay	7010 to 7887 (704 outputs)
	--	Fixed value output	Outputs a fixed value 0, or 1.

1.2 Message Transmission

The XRC transmits a message as unscheduled data on the ControlNet netwok. Using the host control of the XRC data transmission function, messages are transferred through ControlNet network. Using the ControlNet message transmission, the following processes can be executed.

Classification	Function	Contents	
File data transmission function	"Load File" (Personal computer to XRC)	Loads a job.	
		• Loads condition files and general data.	• Tool data • Weaving data • User coordinates data • Welding data • Variables
	"Save File" (XRC to Personal computer)	Saves a job.	
		• Saves condition files and general data.	• Tool data • Weaving data • User coordinates data • Welding data • Variables
		• Saves the system information.	• System information • Alarm history
		• Saves parameters.	• System matching parameter • Transmission parameter • Parameter for individual application
	"Delete File"	Deletes a job.	
	"Get File List"	Gets a list of jobs.	
		• Gets a list of condition files/general data/system information.	

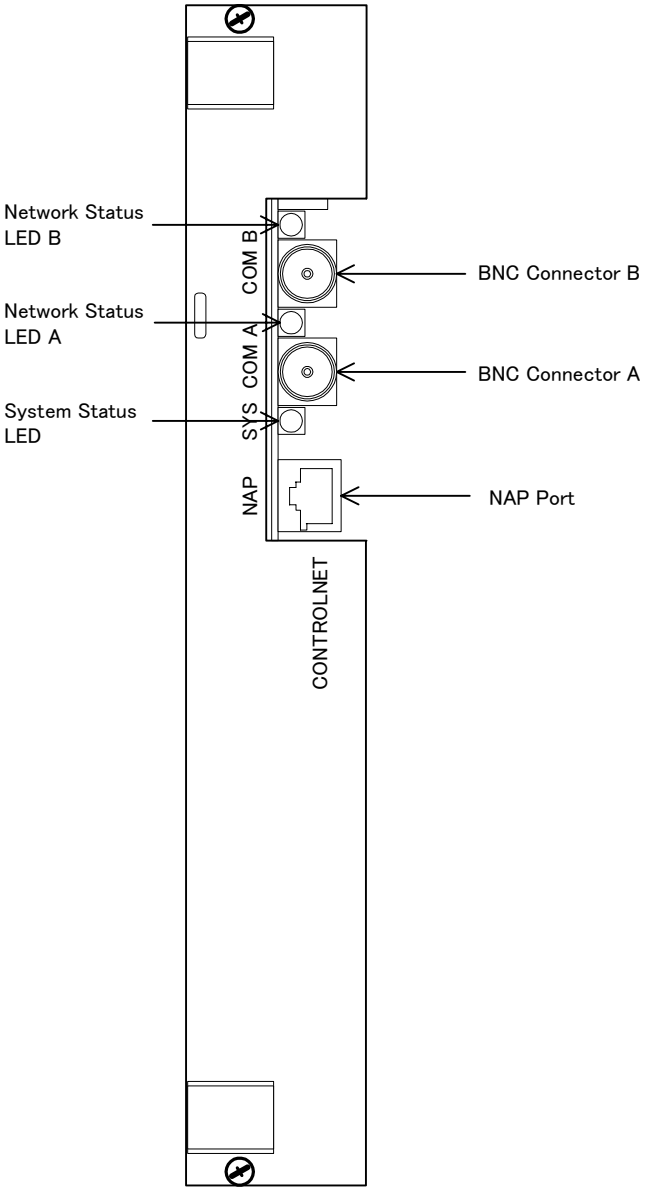
Classification	Function	Contents
Robot control function	Reads out I/O and alarm data.	Reads out I/O and alarm codes/alarm data. Enabled even if Command Remote setting is not “Command remote enable.”
	Reads out the identification character strings.	Sends the identification character string “ControlNet on YASNAC XRC.” Enabled even if Command Remote setting is not “Command remote enable.”
	Reads out alarm data.	Reads out an alarm code/alarm data.
	Reads out the status.	• Reads out the current position in joint coordinate system. • Reads out the current position on the specified Cartesian coordinate system. • Reads out the status of the mode, cycle, motion, alarm error, and servo. • Reads out the executing job name, line number, and step number.

2 Connection

This chapter describes how to physically connect the XRC ControlNet communications board JANCD-XCP03 to ControlNet network.

2.1 Board External View

The following figure shows the front view of the ControlNet board, JANCD-XCP03 board (hereinafter called the XCP03 board) for the XRC.



2.2 Cable Connections

Since the physical layer of ControlNet allows the signal duplex, two connectors are provided on the XCP03 board. For the signal duplex, connect the A system network cable and the B system network cable to BNC Connector A and BNC Connector B, respectively. Separate the wiring routes for A system network and B system network. Even if the depulex is not constructed, make sure to connect the cable to BNC Connector A to use the network as A system, and connect the cable to BNC Connector B to use the network as B system.
Refer to "6 Communication Specifications" for ControlNet network configuration.

2.3 Recommended Network Devices

The following network devices are recommended for ControlNet application.
Refer to " 6.1.2 Flexible Network Configuration " for ControlNet network configuration.

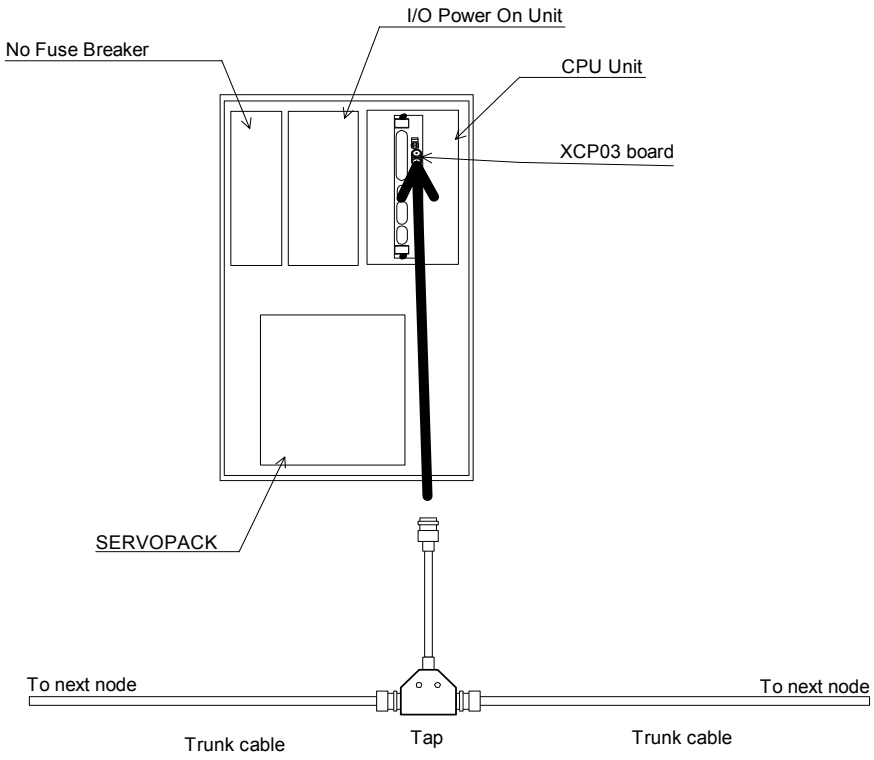
Item	Model	Remarks	Manufacturer
Trunk cable	1786RG6 (1000FT)	Without terminal	Rockwell Automation
Trunk cable connector	1786BNC	For trunk cable termination	
Terminator	1786XT	75Ω	
Tap	1786TPS	Drop cable integrated	
Tool kit	1786CTK	For trunk cable termination	

2.4 Status Indicator LED

The ControlNet communications status is indicated by three LEDs on JANCD-XCP03: System Status LED, Network Status LED A, and Network Status LED B.
Refer to " 5.3 Status LED Indication " for details.

2.5 Cable Connection Example

The following figure shows an example of cable connection to the XRC.



3 Settings

This chapter describes the settings in the XRC required to enable the ControlNet network.

3.1 ControlNet Function Setting

Carry out the following procedures to enable the ControlNet function in the XRC.
This setting enables I/O transmission.

3.1.1 Enabling ControlNet Function and Allocating OUT Signals

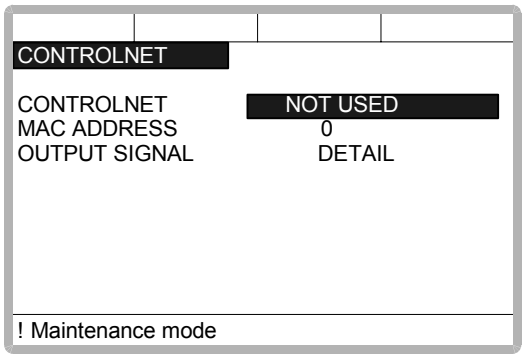
Carry out the following operation to call the CONTROLNET display.

Operation

Turn ON the power supply, pressing [TOP MENU] (startup of maintenance mode.) ➡ Change security mode to the “MANAGEMENT MODE” ➡ Select {SYSTEM} from the top menu ➡ Select {SETUP} ➡ Select {OPTION BOARD} ➡ Select {CONTROLNET}*1

Explanation

*1 The parameter settings for ControlNet communications (CONTROLNET display) appears.



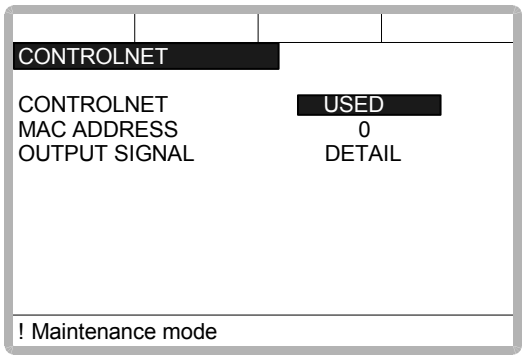
Proceed to the following operation.

Operation

Select “NOT USED”*1 ➡ Select the currently displayed node address of “MAC ADDRESS”*2 ➡ Enter a new node address, and press [ENTER] ➡ Select “DETAIL”*3 ➡ Enter the logic name to be changed*4 ➡ Enter a new logic name, and press [ENTER] ➡ Press [ENTER]*5 ➡ Press [ENTER]*6 ➡ Select “YES”

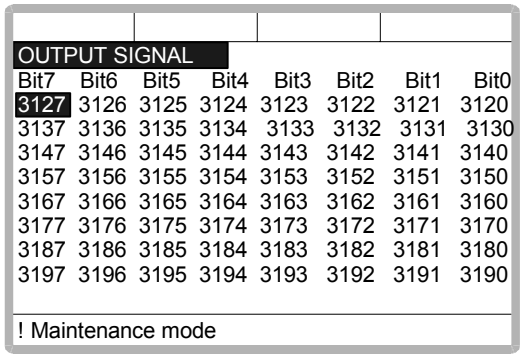
Explanation

1 “USED” and “NOT USED” are displayed alternately each time [SELECT] is pressed.

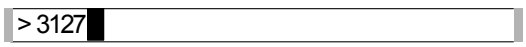


2 The number input mode enters. Enter a new node address.

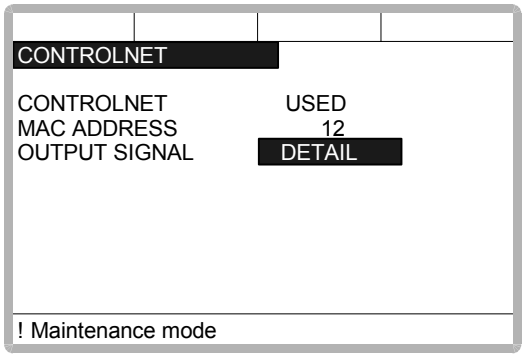
3 The ControlNet output signal allocation display (OUTPUT SIGNAL) appears.



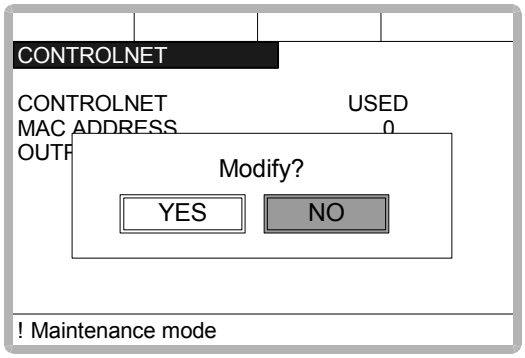
4 The number input mode enters. Enter a new logic number.



5 The CONTROLNET display reappears.



6 The confirmation dialog box appears.



3.1.2 Correlation of Signals

When only setting ControlNet function to be enabled, the input signals are sent to the network input of the XRC but not to the XRC itself. Some output signals should be combined to make a new signal. Therefore, to use the ControlNet, a correlation between signals must be made using the concurrent I/O program. Refer to “YASNAC XRC Concurrent I/O・Parameter” for the settings and modification method of the concurrent I/O program.

3.1.3 Communication Parameter Settings

Set the following parameter to control the ControlNet communications.
Changes made to the setting of this parameter are valid after turning the power supply OFF and then ON again.

Parameter Number	Explanation	Initial Value
RS041	Standby time to establish communications (unit: second) 0: No communication error due to time-out 1 to 255: Communication error occurs if communications are not established after the set time.	0

3.2 Message Transmission Settings

Make the following settings to enable message transmission.
This setting enables the host control of XRC data transmission function.

3.2.1 Parameters for Transmission

Set the following parameters to their initial values.
Refer to the “YASNAC XRC OPTIONS INSTRUCTIONS For Data Transmission Function” for details.

Parameter No.	Contents	Initial Value
RS000	Specifies the protocol for the standard port.	2: BSC LIKE
RS030	Specifies the data length.	8: 8 bits
RS031	Specifies the number of stop bits.	0: 1 bit
RS032	Specifies the parity bits.	2: even parity
RS033	Specifies the transmission speed in bauds.	7: 9600 bauds
RS036	Specifies the number of transmission retries of the control characters for invalid or missing responses.	10: 10 times
RS037	Specifies the number of transmission retries of text for block check error (NAK reception).	3: 3 times
RS038	Specifies the checking method for text transmission errors.	0: Checksum

Adjust the following parameters to stabilize the communications for the remote monitoring function.

Parameter No.	Contents	Initial Value	Recommended Setting for Remote Monitoring
RS034	TIMER A: Timer for monitoring the sequence. Specify the response waiting time for invalid or missin-gresponses in units of 0.1 sec. Setting range: 0 to 100	30	100
RS035	TIMER B: Timer for monitoring text reception. Specify the monitoring time to wait for the termination character in units of 0.1 sec. Setting range: 0 to 255	200	200

To control the transmission alarm while using the remote monitoring function, set the following parameter.

Parameter No.	Contents	Initial Value	Recommended Setting for Remote Monitoring
RS039	Data Transmission Alarm Control 0: Not ignore, 1 to 254: Ignorring counter, 255: Ignore forever	0	255

3.2.2 Command Remote Selection

■ Settings for the Pseudo Input Signal “CMD REMOTE SEL”

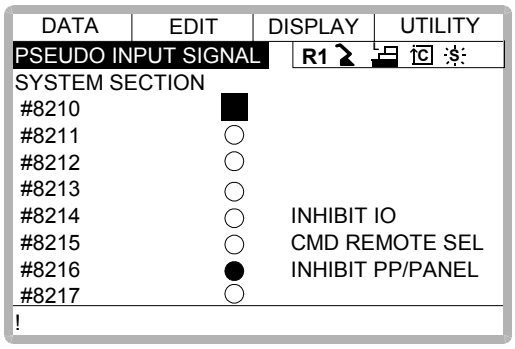
Validate the command remote selection signal.

Operation

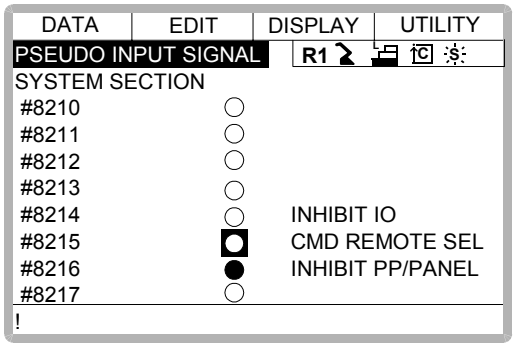
Change the security mode to management mode ➡ Select {IN/OUT} under the top menu ➡ Select {PSEUDO INPUT SIGNAL}*1 ➡ Move the cursor to the CMD REMOTE SEL signal ➡ Press [INTERLOCK] + [SELECT] *2

Explanation

1 The PSEUDO INPUT SIGNAL display appears.



2 CMD REMOTE SEL signal is validated (●).
While the cursor is on CMD REMOTE SEL signal, the mark “●” is highlighted by being shown in reverse.



■ Setting to REMOTE Mode

Press the [REMOTE] button on the playback panel to set the XRC to REMOTE mode.

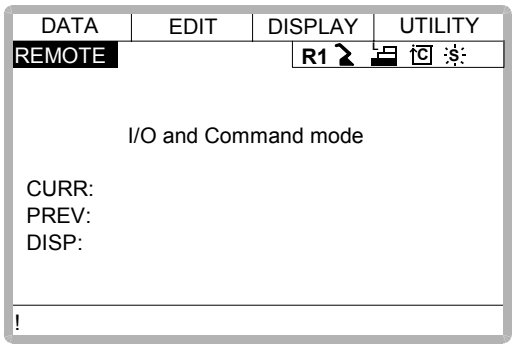
■ Confirmation of Command Mode

Operation

Select {IN/OUT} under the top menu ➡ Select {REMOTE}*1*

Explanation

1 The current mode status appears.
If not set to the I/O remote mode, “Command mode” appears.



4 Setup of ControlNet Communications

This chapter describes how to set up the system for actual communications after cable connection and other settings.

4.1 Settings for I/O Transmission

The following settings are required for I/O transmission through ControlNet network.

4.1.1 Setup of the Communications Master

Because the XRC ControlNet communication function is of Adapter Class, provide a Scanner Class product as the master for I/O data transmission. Refer to the product's instruction manual for setup and operation of the master.

4.1.2 Network Configuration

After setting up the master, configure the network: device on each node, number of bytes of the data to be sent and received on each node, and data transmission cycle in ms, etc. Because the XRC ControlNet communication function has no configuration function, provide a communications master with configuration function or provide a configurator separately from the communications master. Refer to the configurator's instruction manual for its operation and settings. The Electronic Data Sheet (EDS) file is required to use a configurator. Refer to " 6.3 Electronic Data Sheet (EDS) File " for details.

4.1.3 Concurrent I/O Program in the XRC

After the communications master is correctly installed and the network configuration is complete, the I/O transmission through the XRC ControlNet network starts at the same time as the startup of the XRC system. If the I/O signals are not set properly for the system configuration, modify the concurrent I/O program. Refer to "YASNAC XRC Concurrent I/O・Parameter" for the method to modify the concurrent I/O program.

4.2 Message Transmission

The following settings are required for message transmission through ControlNet network.

4.2.1 Remote Mode

The message transmission from/to the XRC through ControlNet network is enabled when the XRC operation mode is set to the Remote mode. Refer to “2.1 Remote Mode” of “YASNAC XRC OPTIONS INSTRUCTIONS For Data Transmission Function” for the Remote mode.

4.2.2 Transmission Protocol

The emulation using the Integer File of PLC5 made by Rockwell Automation allows the XRC message transmission through ControlNet network. Refer to “7. Message Transmission Protocol” for details.

5 Alarms

This chapter describes the alarm messages and the corrective actions when an alarm occurs in the XRC communications through ControlNet network.

5.1 Alarm List

The alarms that occur in the XRC when using ControlNet function are listed below.

Alarm Message List

Alarm Number	Message	Cause	Remedy
1003	ROM ERROR (XCP02)	Checksum error in the ROM (memory) of the sensor program.	Replace the XCP03 board.
1110	SYSTEM ERROR (CONTROLNET) [Decimal Data]	An error occurred in the system of the sensor in the ControlNet function. The decimal data indicates the type of error.	Needs investigation. Contact your Yaskawa representative. State any observations, the alarm number, and the data displayed.
1205	CONTROLNET ERROR	An error occurred in the system of the sensor in the ControlNet function. The decimal data indicates the type of error.	This alarm may occur when loading the system batch data ALCM-Sxx.HEX. Refer to " 5.4 Restrictions " for details. When this alarm occurs for other reason, contact your Yaskawa representative for investigation. State any observations, the alarm number, and the data displayed.
1410	CONTROLNET MODULE ERROR [Decimal Data]	An error occurred in the ControlNet transmission module which is connected to the XCP03 board. The decimal data indicates the type of error.	Replace the XCP03 board. Contact your Yaskawa representative for investigation. State any observations, the alarm number, and the data displayed.
1411	CONTROLNET CONFIGURATION ERROR [Decimal Data]	A setting for ControlNet transmission is incorrect. 1. A MAC address is incorrect. 2. The output signal allocation is incorrect.	Correct the setting.
1412	CONTROLNET PROCESS ERROR	An error occurred in the system of the sensor in the ControlNet function. The decimal data indicates the type of error.	Needs investigation. Contact your Yaskawa representative. State any observations, the alarm number, and the data displayed.

Alarm Message List

Alarm Number	Message	Cause	Remedy
5040	CONTROLNET TRANSMIS-SION ERROR [Decimal Data]	A communications error occurred. 1. The scheduled data cannot be received/sent. 2. The scheduled data cannot be exchanged with a scan-ner.	Check the connection and the operation of the network devices such as the network cable. Check the operation of the ControlNet scanner.

5.2 Alarm “5040 CONTROLNET TRANSMISSION ERROR”

5.2.1 Alarm Triggerring Disabled Conditions

The XRC ControlNet function does not trigger the alarm “5040 CONTROLNET TRANSMIS-SION ERROR” in the following conditions.

■ Scheduled Data Transmission Has Never Been Established

The XRC ControlNet function does not trigger the alarm 5040 when the Scheduled Data transmission with the scanner has never been established. This can be changed with param-eter “RS041.” Refer to " 3.1.3 Communication Parameter Settings " for details.

■ I/O Disabled Status

The XRC ControlNet function does not trigger the alarm 5040 when the specific input #4057 “IO DISABLED” is ON. Refer to “YASNAC XRC Concurrent I/O · Parameter” for the specific input #4057 and the concurrent I/O.

5.2.2 Data Transmission During Alarm Occurrence

The I/O data transmission is kept enabled during the alarm occurrence. Therefore, after the cause for the alarm “5040 CONTROLNET TRANSMISSION ERROR” is removed, the com-mand from the scanner can reset the alarm.

5.3 Status LED Indication

The LEDs on the XCP03 board indicate the communication status. The following table explains the meaning and corrective actions.
Refer to "Fig. 2.1 Board External View" for the location of each LED.

5.3.1 System Status LED

NOTE The System Status LED is different from the Module Status LED of “ControlNet Specification Part10.”

The System Status LED lamps indicate the following status of the communications module.

LED Lamps	Explanation
Unlit	The module is in offline mode (the module is not ready for communications.)
Lit in yellow	The module is in online mode, and no message has been transmited for last five seconds.
Lit in red	An error occurs. The module had returned the error status during last five seconds or the message transmission failed. The red lamp stays lit for one second even when the error status remains only a few milliseconds.
Lit in green	The module is in online mode, and an message transmission has been correctly executed during last five seconds.

5.3.2 Network Status LED

The Network Status LED lamps indicate the following status of the ControlNet network in two ways: indicating status by the combination of two LEDs or indicating each communications status of two BNC connectors by the corresponding LED. When the network is in more than one status, the status of higher priority is indicated. (Refer to the following table for the priority.)

Priority	LED Lamps	Indicating Method	Explanation
1	B: Unlit A: Unlit	Indicating status by the combination of two LEDs	The network is being reset, or the power is not supplied.
2	B: Lit in red A: Lit in red		A serious error occurs. Contact your Yaskawa representative for investigation. State any observation including alarm occurrence.
3	B: Lit in red and green alternately A: Lit in green and red alternately in reversed order of LED B		The network is in self-diagnosis at startup.
4	A and B are alternately lit in red		MAC ID setting error such as duplicated MAC ID
5	Unlit	Indicating each communications status of two BNC connectors by the corresponding LED	The corresponding connector is set to “Not Used” in the communications condition, or the connector has a fault.
6	Alternately lit in red and green		Incorrect setting for the corresponding connector
7	Flashes in red		The communications is not performed correctly or no data has been received through the corresponsing connector.
8	Flashes in green		The corresponding connector is in temporary communications error status or waiting data.
9	Lit in green		Normal data transmission is being performed through the corresponsing connector.

NOTE

- When both network A and B systems are used by the signal duplex, both A and B of the Network Status LED are lit in green. The brighter green LED shows of the currently-used system.
- The communications status of the NAP port is not indicated by LEDs. Therefore, when the XRC is connected to the network via the NAP port, the System Status LED is lit in green and both A and B of the Network Status LED lamps flashes in red simultaneously.

5.4 Restrictions

If the system batch data ALCMSxx.HEX is loaded to the XRC with the setting for the ControlNet function is set to “used,” alarm 1205 “CONTROLNET ERROR” occurs. This is because the loading process of the system batch data stops the processes being carried out by the ControlNet function. To avoid such alarm occurrence, set “CONTROLNET” to “NOT USED” in the CONTROLNET display explained in " 3.1.1 Enabling ControlNet Function and Allocating OUT Signals " before loading the system batch data.

6 Communication Specifications

This chapter outlines the ControlNet communications and the XRC supported ControlNet data transmission function.

6.1 Features

The ControlNet networked communications has the following features.

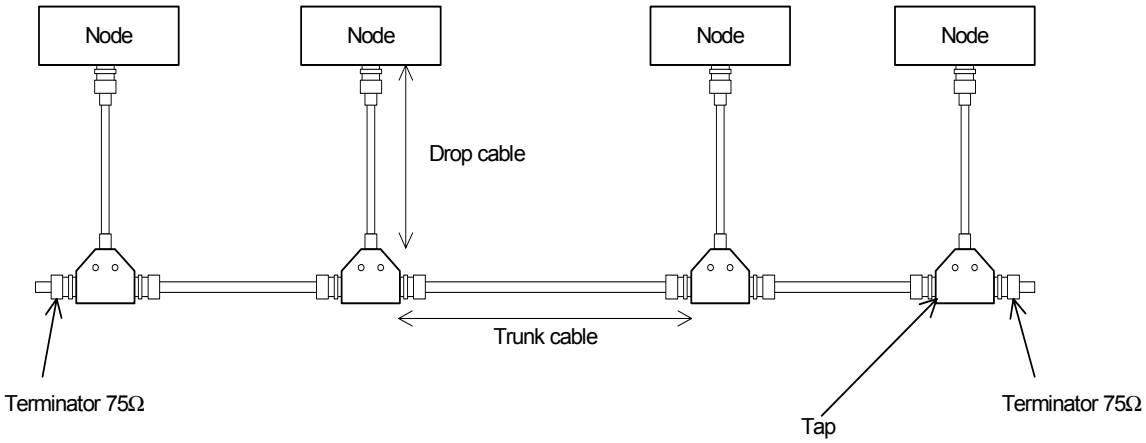
6.1.1 Producer and Consumer Model Communications

The ControlNet is a communications system with multi-cast connections using the newest communications technology of a “Producer/Consumer” model.

- “Producer” is the sender of data.
  - No destination address is designated for the data packet that the Producer sends, and therefore, only the connection ID and data are broadcasted.
- “Consumer” is the receiver of data.
  - Consumer checks the connection ID of the data packet broadcasted from the Producer, and receives and uses only the necessary data.
  - Multiple consumers can receive data at the same time from a single Producer.

6.1.2 Flexible Network Configuration

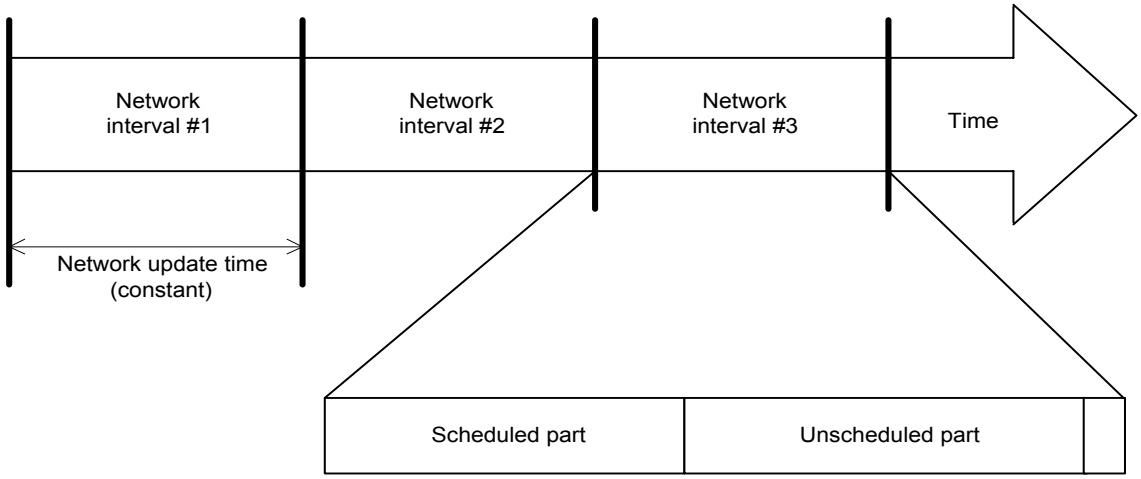
The network configuration is based on a passive bus of trunk lines and drop lines, which does not affect the communication by connecting or removing devices. Depending on the specifications of the repeaters to be used, cable length can be extended and tree or star configurations can be formed. Refer to “ControlNet Specification Part 2: Physical Layer and Media” for details.



6.1.3 Real-time Network

The ControlNet ensures network access to each node by Concurrent Time Domain Multiple Access (CTDMA).

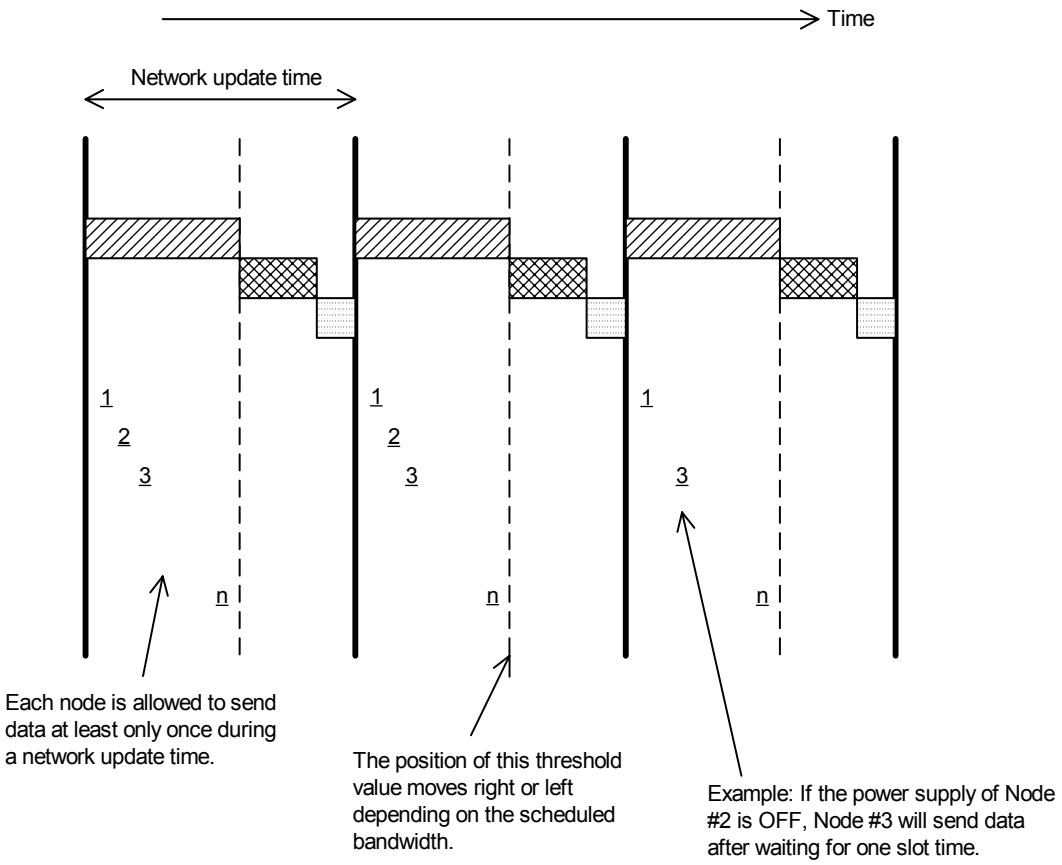
- Using a time-sharing algorithm, all the nodes carry out synchronized communications.
- When some nodes stop or interrupt the communications, data is sent after waiting for one slot time.



■ Scheduled Data Transmissions

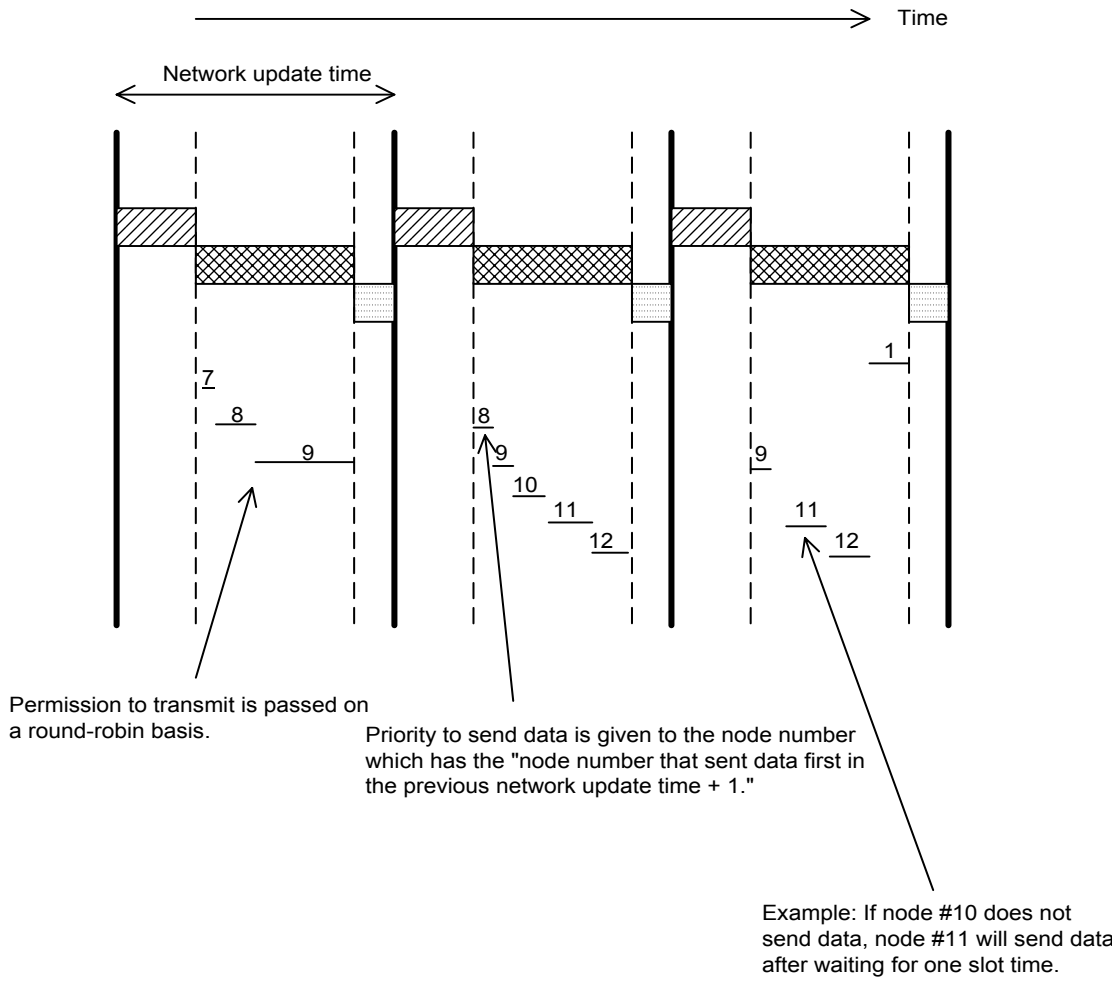
- During the scheduled part of each network's update time, one opportunity to send data is secured for each node.
- This scheduled transmission can be used to send and receive I/O data for time-critical controls and to send and receive interlocking data between controllers.

  - Scheduled: Time-critical
    - Real time control data (I/O data)
    - Peer to peer interlocking
  - Unscheduled: No-time-critical
    - Peer to peer messaging
    - Programming data



■ Unscheduled Data Transmission

- During the unscheduled part of each network update time, data can be transmited up to the time limit. Depending on the load on the network, there may be a case that no data is sent within a network update time or a case that data are sent several times within the same network update time.
- It can be used for transmission of non-time-critical data (i.e. peer-to-peer messaging or programming data).



6.1.4 Product Classes

ControlNet products are classified into the following three classes according to the functions to be supported.

■ Messaging Class

- Messaging Class products can send and receive unscheduled data to and from products of any class.
- Transmission of scheduled data is not possible.

■ Adapter Class

Adapter Class products support functions including those of Messaging Class products.

- Adapter Class products can send and receive unscheduled data to and from products of any class.
- Scheduled data can be sent and received only upon a request from a Scanner Class.

■ Scanner Class

Scanner Class products support functions including those of both the Messaging Class and the Adapter Class.

- Scanner Class products can send and receive unscheduled data to and from products of any class.
- Scheduled data can be sent and received upon a request from another product of Scanner Class. Scanner Class products can request scheduled data transmission to and from another Scanner Class product or an Adapter Class product.

6.2 Network Specifications

The following table shows the specifications of ControlNet communications in the XRC.

ControlNet Network Specifications

Item	Specifications
Transmission speed	5 Mbps
Network	Passive bus
Trunk cable	RG-6 coaxial cable
Connector	BNC connector
Max. number of nodes per subnet	99
Drop cable length	Fixed to 1 m
Min. distance between taps	Not required
Max. cable length without repeater	2 nodes: 1000 m 32 nodes: 500 m 48 nodes: 250 m
Max. number of connected repeaters	5 repeaters
Max. number of segments	6 segments

Functional Specifications of ControlNet Communications in the XRC

Item	Classification	Specifications
Physical layer	Communication port	Redundancy Channel (A,B), NAP
Network layer	Product class	Adapter class
I/O transmission	Refresh points	IN = 64 points OUT = 64 points
Message transmission	Connection establishment	Not applicable
	Transport class	Not applicable
	Message length	Not applicable
User interface	LED (System Status)	Applicable
	LED (Network Status)	A and B
	MAC-ID	Software setting

6.3 Electronic Data Sheet (EDS) File

The following shows the EDS file for the XRC ControlNet.

```
[File]
   DescText = "5136-CN Simple Adapter";
   CreateDate = 05-19-2000;
   CreateTime = 14:20:00;
   ModDate = 05-19-2000;
   ModTime = 14:20:00;
   Revision = 1.1;

[Device]
   VendCode = 0x08;
   VendName = "SST";
   ProdType = 0x0C;
   ProdTypeStr = "Comm Adapter";
   ProdCode = 0x02;
   MajRev = 1;
   MinRev = 1;
   ProdName = "5136-CN Simple Adapter";
   Catalog = "5136-CN Simple Adapter";
   $ Icon is optional and omitted here
   1_Revision_Alpha = Yes;

[Device Classification]
   Class1 = 1_RSNetWorx_Adapter;
   Class2 = ControlNet;

[Port]
   Port2 = ControlNet_Redundant,
         "Port A",
         "20 F0 24 01",2;

[Modular]

[ParamClass]

[Params]

  Param1 =
    0,                    $ first field shall equal 0
    ,,                   $ path size,path
    0x0000,                  $ descriptor
    2,                    $ data type : 16-bit Unsigned Integer
    2,                    $ data size in bytes
    "Transmit Length",          $ name
    "",                   $ units
    "",                   $ help string
    2,488,2,                $ min,max,default data values
    0,0,0,0,               $ mult,dev,base,offset scaling not used
    0,0,0,0,               $ mult,dev,base,offset link not used
    0;                    $ decimal places not used
```

```
  Param2 =
    0,                    $ first field shall equal 0
    ,,                    $ path size,path
    0x0000,                 $ descriptor
    2,                    $ data type : 16-bit Unsigned Integer
    2,                    $ data size in bytes
    "Receive  Length",          $ name
    "",                   $ units
    "",                   $ help string
    6,484,6,                $ min,max,default data values
    0,0,0,0,                $ mult,dev,base,offset scaling not used
    0,0,0,0,                $ mult,dev,base,offset link not used
    0;                    $ decimal places not used

   Param3 = 0,,,0x0000,24,1,"Instance","","",1,128,1,,,,,,,,;

[EnumPar]

[Groups]

[Assembly]

[Connection Manager]

  Connection1=
    0x04010002,    $ trigger & transport
                $    0-15    = supported transport classes (class 1)
                $    16    = cyclic (1 = supported)
                $    17    = change of state (0 = not supported)
                $    18    = on demand (0 = not supported)
                $    19-23    = reserved (must be zero)
                $    24-27    = input only
                $    28-30    = reserved (must be zero)
                $    31    = client 0 (don't care for classes 0 and 1)
    0x44240405,    $ point/multicast & priority & realtime format
                $   0     = O=>T fixed (1 = supported)
                $   1     = O=>T variable (0 = not supported)
                $   2     = T=>O fixed (1 = supported)
                $   3     = T=>O variable (0 = not supported)
                $    4-7    = reserved (must be zero)
                $    8-11    = O=>T header (4 byte run/idle)
                $    12-15    = T=>O header
                $    16-19    = O=>T point-to-point
                $    20-23    = T=>O multicast
                $    24-27    = O=>T scheduled
                $    28-31    = T=>O scheduled
    , Param1,,  $ O=>T RPI,Size,Format
    , Param2,,  $ T=>O RPI,Size,Format
    , ,
    , ,
    "Exclusive Owner",
    "",
    "20 04 24 [Param3] 2c 08 2c 07";

   1_PLC5C_RTD_Format1 = 1_PLC5C_1794_Discrete_RTD_Format;
```

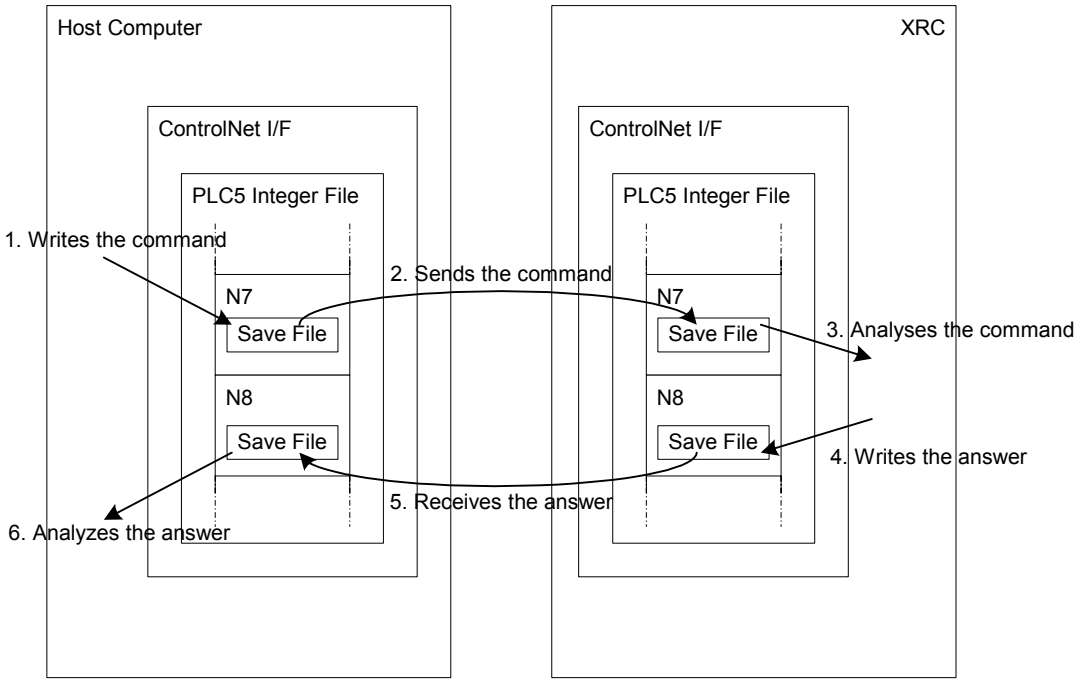
```
Connection2 =
  0x01010002,    $ trigger & transport
            $  0-15  = supported transport classes (class 1)
            $  16 = cyclic (1 = supported)
            $  17 = change of state (0 = not supported)
            $  18 = on demand (0 = not supported)
            $  19-23 = reserved (must be zero)
            $  24-27 = listen only
            $  28-30 = reserved (must be zero)
            $  31 = client 0 (don't care for classes 0 and 1)
  0x44240455,    $ point/multicast & priority & realtime format
                  $   0     = O=>T fixed (1 = supported)
                  $   1     = O=>T variable (0 = not supported)
                  $   2     = T=>O fixed (1 = supported)
                  $   3     = T=>O variable (0 = not supported)
            $  4-5   = 0=>T #ofBytes/slot
            $  6-7   = T=>O #ofBytes/slot
            $  8-10  = O=>T header (4 byte run/idle)
            $  11  = reserved (must be zero)
            $  12-14 = T=>O header
            $  15  = reserved (must be zero)
            $  16-19 = O=>T point-to-point
            $  20-23 = T=>O multicast
            $  24-27 = O=>T scheduled
            $  28-31 = T=>O scheduled
  ,0,,       $ O=>T range,default,description (sizes in bytes)
  ,Param2,,   $ T=>O range,default,description (sizes in bytes)
  , ,        $ config part 1 (private configuration)
  , ,        $ config part 2 (module configuration)
  "Listen Only",    $ connection name
  "",           $ Help string
  "20 04 24 [Param3] 2C 01 2C 07"; $ listen only path
1_PLC5C_RTD_Format3 = 1_PLC5C_1794_Discrete_RTD_Format;
```

7 Message Transmission Protocol

The XRC message transmission function through the ControlNet network receives and sends data using the PLC5 Integer File made by Rockwell Automation. This chapter explains how the XRC performs communications through ControlNet network.

7.1 Data Transmission Process

To receive and send data, N7 and N8 areas of the PLC5 Integer File are divided for each command. The following diagram illustrates the process for “Save File” function.



1. Writes the command
   The host computer writes the command data in “Save File” command area of N7 file in the “Save File” command format.
2. Sends the command
   The host computer sends the data written in “ Save File” command area of N7 file to the XRC.
3. Analyzes the command
   The XRC analyzes the received command written in “ Save File” command area of N7 file, and carries out the command.
4. Writes the answer
   The XRC writes the result of processing carried out by “Save File” command in “Save File” answer area of N8 file in the “Save File” command format.

5. Receives the answer
   The host computer receives the answer in “Save File” answer area of N8 file from the XRC.
6. Analyzes the answer
   The host computer analyzes the received answer in “Save File” answer area of N8 file, and saves the data if necessary.

7.2 Data Format

This section describes the data allocations and format in N7 and N8 files.

7.2.1 Common Items

■ Endian

The data transmission by the message transmission function through ControlNet network applies big endian. Therefore, the first transmitted data is the most significant bit (MSB).

■ File Name for Receiving and Sending

The file name cannot exceed eight characters and the extension cannot exceed three characters.
Add <CR(0x0D)><LF(0x0A)> at the end of file name.
To get a list of file names, the wildcards such as the asterisk (*), which stands for zero or more character or characters, and the question mark (?), which stands for any single character, can be used.

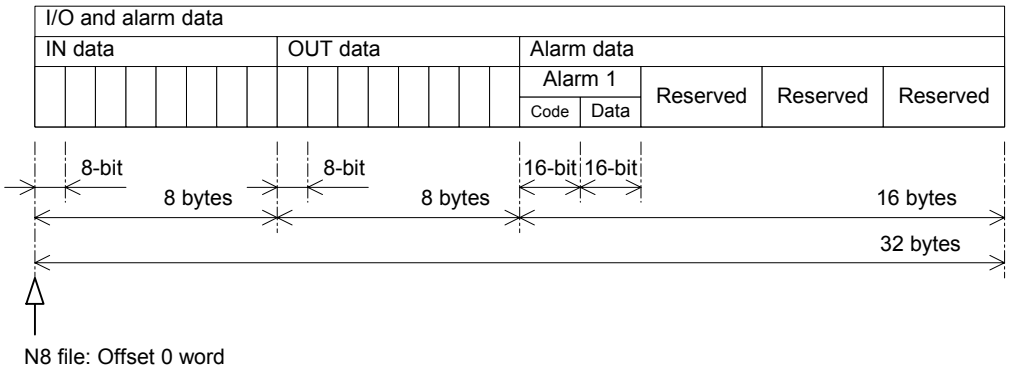
7.2.2 Basic Configuration

The message transmission uses the following three types of data.

- I/O and alarm data
- Function execution status data
- Function command and answer

■ I/O and Alarm Data

The data received/sent from the communications master by the scheduled data transmission and the currently-occuring alarms are reported. Because the XRC automatically updates these data in the concurrent I/O operation cycle, N7 file is not used.



IN data

The data that the XRC receives from the communications master by the scheduled data transmission. The IN data is 64 bits in total (8 bytes of 8-bit).

OUT data

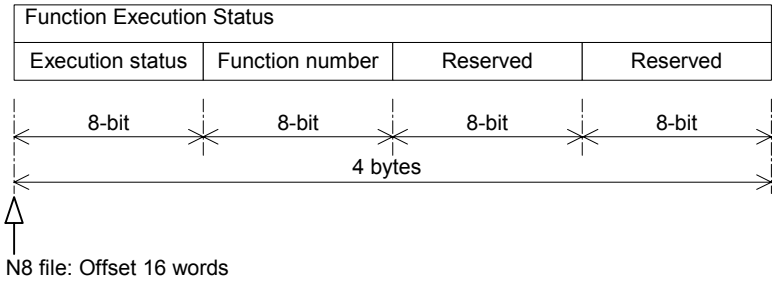
The data that the XRC sends to the communications master by the scheduled data transmission. The OUT data is 64 bits in total (8 bytes of 8-bit).

Alarm data

The data of the alarm that currently occurs. This data are copied from the XRC concurrent I/O register. M110 (alarm code) represents the code of Alarm 1 and M111 (alarm data) represents the data of Alarm 1. Both alarm code and alarm data are 16 bits.

■ Function Execution Status Data

These data report the function execution status. Because the XRC automatically updates these data according to the actual execution status, N7 file is not used.



Execution status

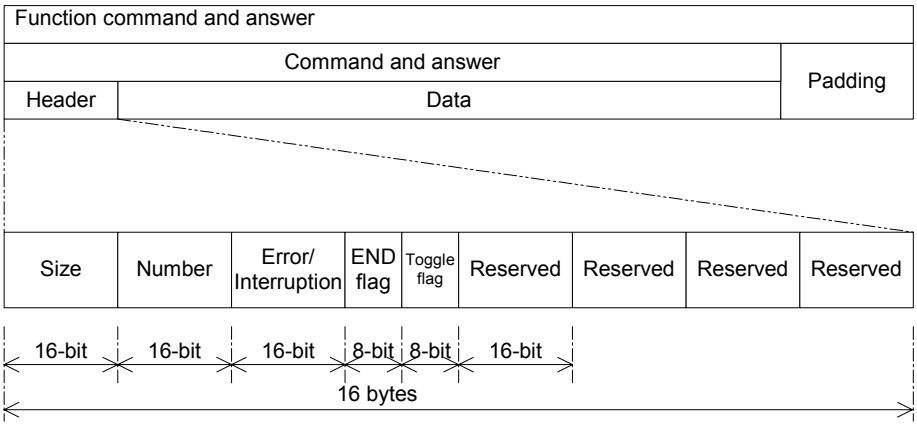
Indicates whether the XRC is carrying out a command or not. For the command that was previously sent, “0” indicates that the XRC completes the processing for the command, and “1” indicates that the XRC is carrying out the command.

Function Number

Indicates the function that the XRC is executing. “0” indicates that the XRC is in standby status for a new function command. The numbers other than “0” indicates the function number that the XRC is executing. When the execution status is “0” and this function number is other than “0,” a series of the process for the function has not been completed yet so the XRC is awaiting the next command. For function numbers, refer to the explanation of each function.

■ Function Command and Answer

Each function command and answer are transmit in the following format.
A header is always included, but the data and padding may not be included depending on the data. Refer to the explanation of each function for details.



Size

An unsigned 16-bit value. Indicates the data length (number of bytes) of function command or answer. The applicable range is 16 (only header) to 240.

Number

An unsigned 16-bit value. Indicates a serial number of command/answer to be transmit for a series of processings for a function. “1” is set at executing a new function command, and the number increases by 1 up to 65535 each time a command is sent.

Error/Interruption

A signed 16-bit value. Indicates the result of processing for the command.

<table>
<tr><td>+</td><td>Interrupt request (only from master)</td><td>1 to 32767</td><td colspan="3">Undefined</td></tr>
<tr><td>0</td><td colspan="5">Normal</td></tr>
<tr><td rowspan="6">-</td><td rowspan="6">Error Reset Report (from master and slave)</td><td rowspan="4">-999 to -1</td><td rowspan="4">General purpose</td><td>-1</td><td>Incorrect header information</td></tr>
<tr><td>-2</td><td>Execution conditions not satisfied</td></tr>
<tr><td>-3 to -998</td><td>Undefined</td></tr>
<tr><td>-999</td><td>Error other than the above</td></tr>
<tr><td>-9999 to -1000</td><td colspan="3">Reserved</td></tr>
<tr><td>-19999 to -10000</td><td colspan="3">Transmission error report = (Data transmission interpreter message + 10000) × (-1)</td></tr>
<tr><td>-32768 to -20000</td><td colspan="3">Reserved</td></tr>
</table>

END flag

An unsigned 8-bit value. Indicates the end of transmission.
“0” indicates that there is another data to be sent. Set “0” when all the data cannot be sent at once because of the size when loading files, saving files, or getting a list of files. “1” indicates that the current transmission is the end of transmission process.

Toggle flag

An unsigned 8-bit value. Set a different value for each transmission.
When this value is different from the stored value, the XRC judges the command as a new command.

7.2.3 “Read I/O and Alarm Data” Function

■ Function

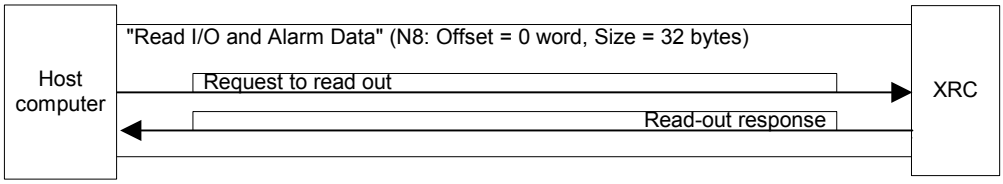
Reads out the I/O data received/sent by the Scheduled Data transmission and the data of the alarm that currently occurs. This function is enabled regardless of Command Remote setting.

■ Function Number

None

■ Process

Receives I/O or alarm data.



■ Command/Answer Format

Refer to "Fig. 7.2.2 Basic Configuration."

7.2.4 “Read Identification Character String” Function

■ Function

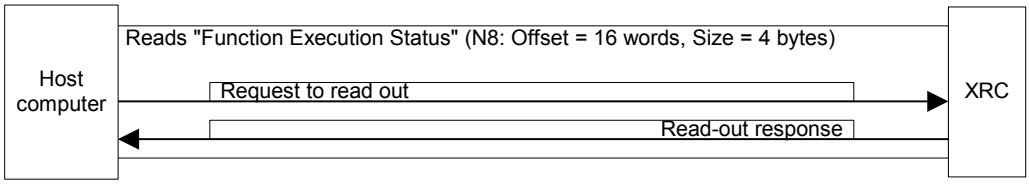
Sends the identification character string “ControlNet on YASNAC XRC.”
This function is enabled regardless of Command Remote settings.

■ Function Number

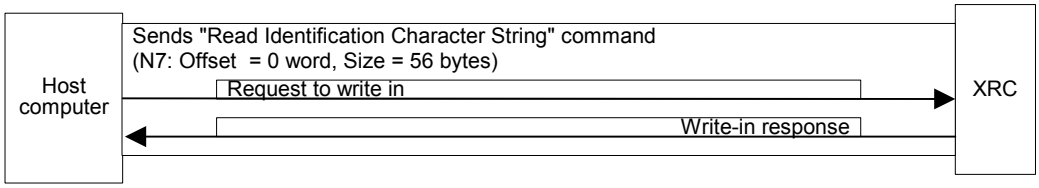
10 (decimal)

■ Process

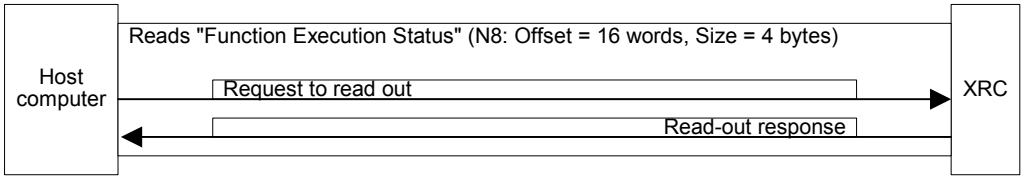
1. Reads “Function Execution Status” to check if there is any process being carried out. If there is a function in process, repeats reading “Function Execution Status” until the process is complete.



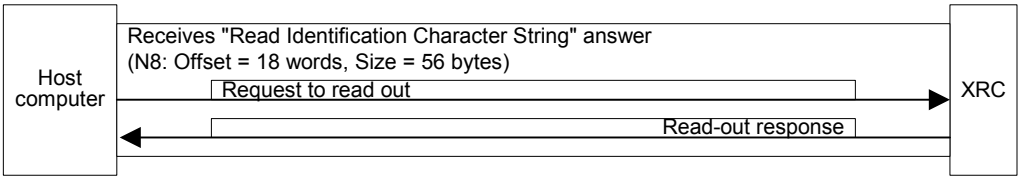
2. Sends “Read Identification Character String” command.



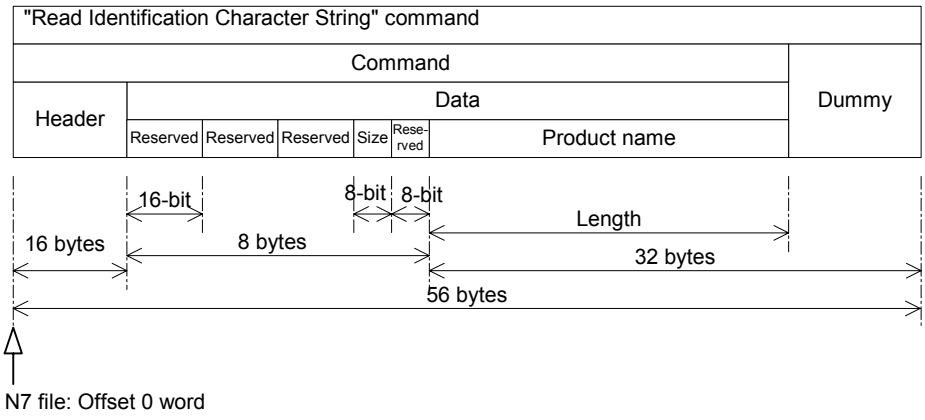
3. Reads “Function Execution Status” to confirm that the XRC completes the process of the command.
   If not, repeats reading “Function Execution Status”until the process is complete.

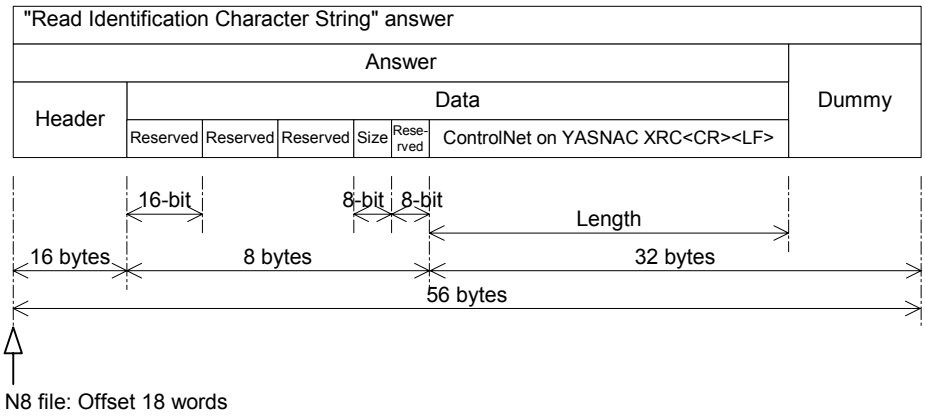


4. Receives “Read Identification Character String” answer.



■ Command/Answer Format





7.2.5 “Read Alarm Data” Function

■ Function

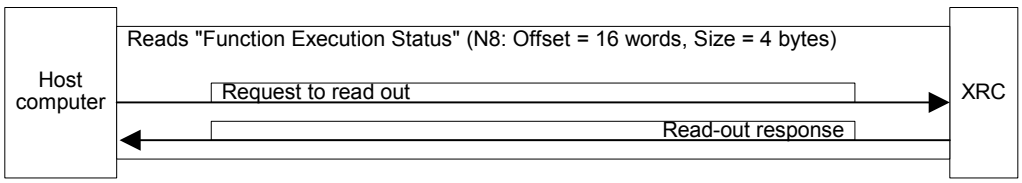
Reads out the data of alarm that currently occurs (up to 4 data).
This function is enabled only when Command Remote mode is set.

■ Function Number

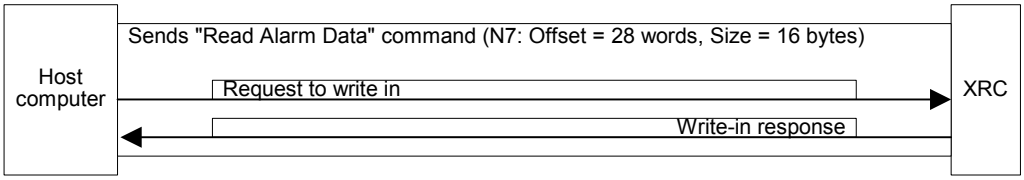
11 (decimal)

■ Process

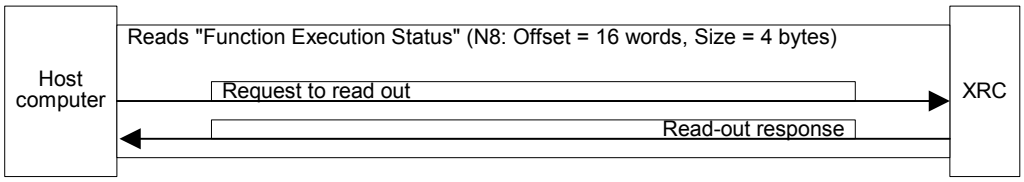
1. Reads “Function Execution Status” to check if there is any process being carried out. If there is a function in process, repeats reading “Function Execution Status” until the process is complete.



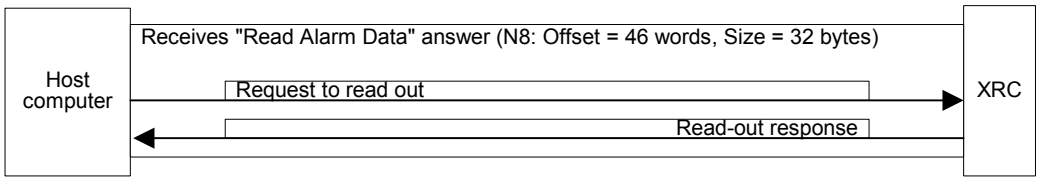
2. Sends “Read Alarm Data” command.



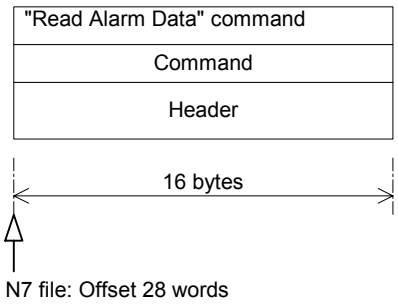
3. Reads “Function Execution Status” to confirm that the XRC completes the process of the command.
   If not, repeats reading “Function Execution Status” until the process is complete.

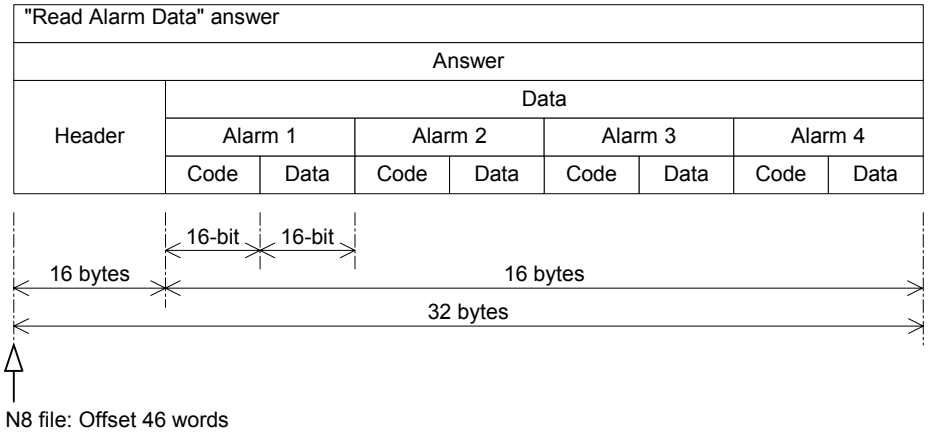


4. Receives “Read Alarm Data” answer.



■ Command/Answer Format





7.2.6 “Load File” Function

■ Function

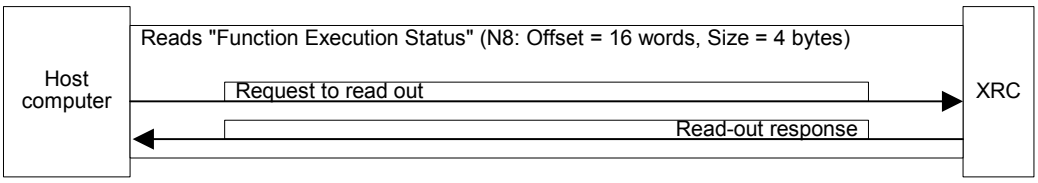
Loads a file from the host computer to the XRC.
This function is enabled only when Command Remote mode is set.

■ Function Number

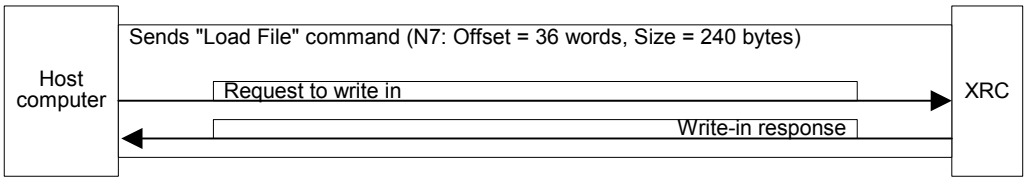
12 (decimal)

■ Process

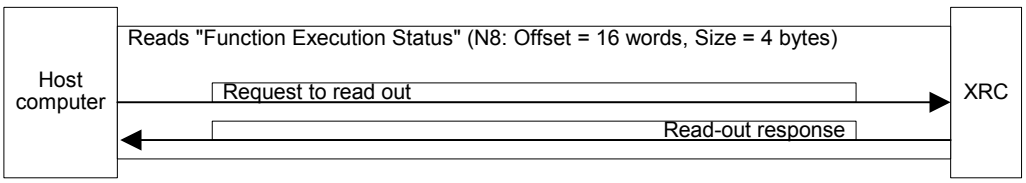
1. Reads “Function Execution Status” to check if there is any process being carried out. If there is a function in process, repeats reading “Function Execution Status” until the process is complete.



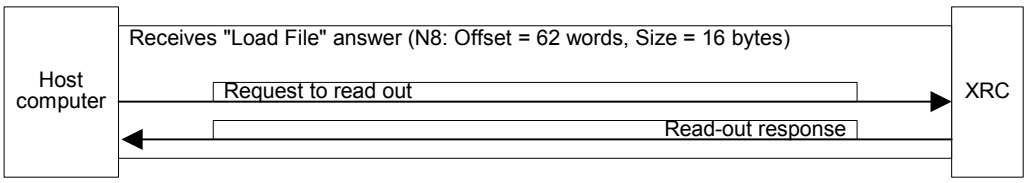
2. Sends “Load File” command.



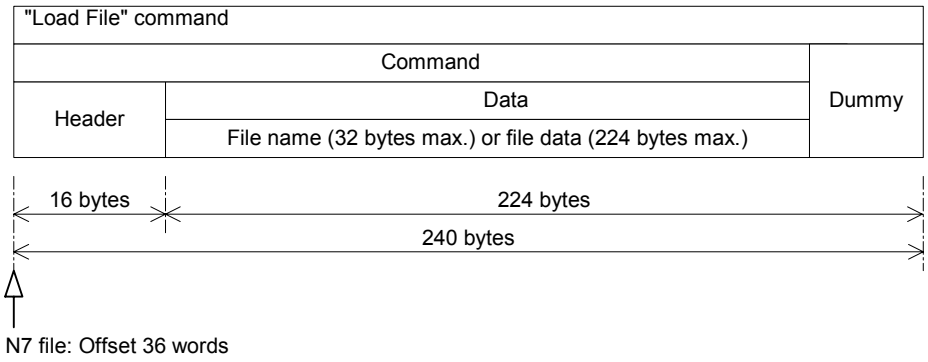
3. Reads “Function Execution Status” to confirm that the XRC completes the process of the command.
   If not, repeats reading “Function Execution Status” until the process is complete.

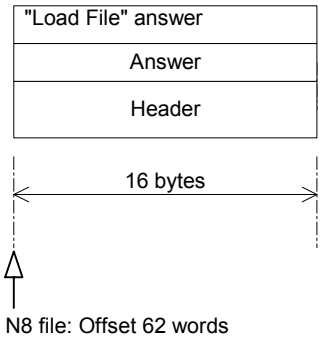


4. Receives “Load File” answer.



■ Command/Answer Format





7.2.7 “Save File” Function

■ Function

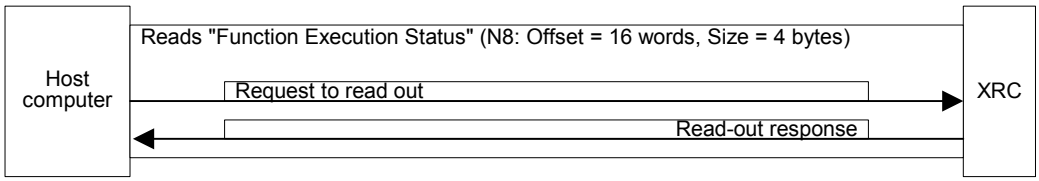
Transfers a file from the XRC to the host computer.
This function is enabled only when Command Remote mode is set.

■ Function Number

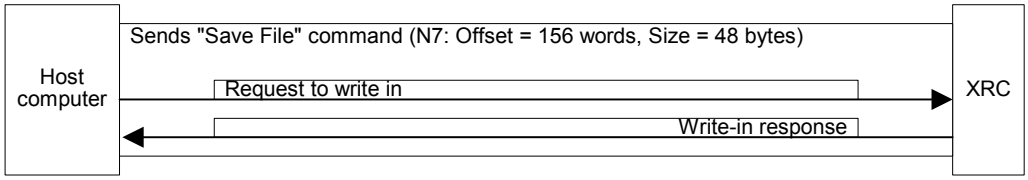
13 (decimal)

■ Process

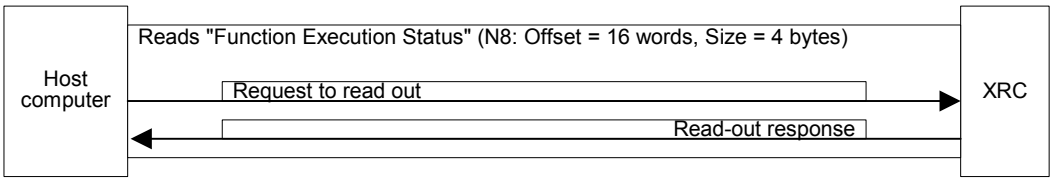
1. Reads “Function Execution Status” to check if there is any process being carried out. If there is a function in process, repeats reading “Function Execution Status” until the process is complete.



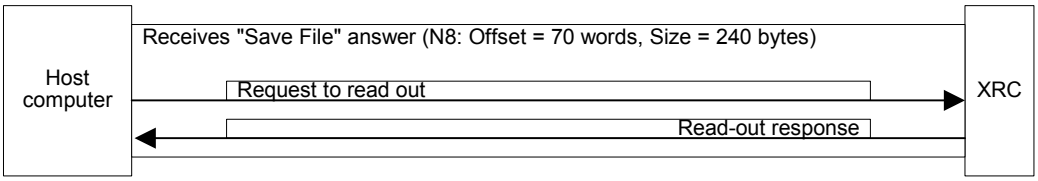
2. Sends “Save File” command.



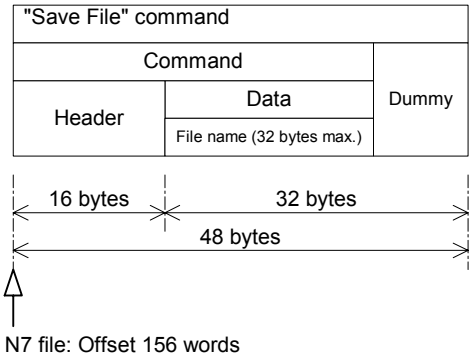
3. Reads “Function Execution Status” to confirm that the XRC completes the process of the command.
   If not, repeats reading “Function Execution Status” until the process is complete.

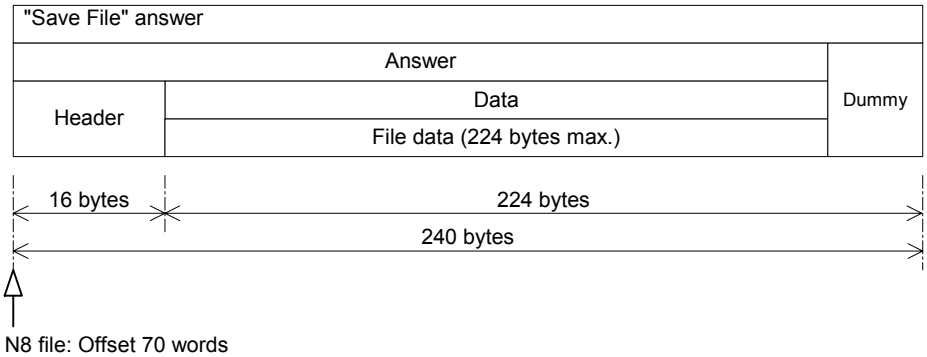


4. Receives “Save File” answer.



■ Command/Answer Format





7.2.8 “Delete File” Function

■ Function

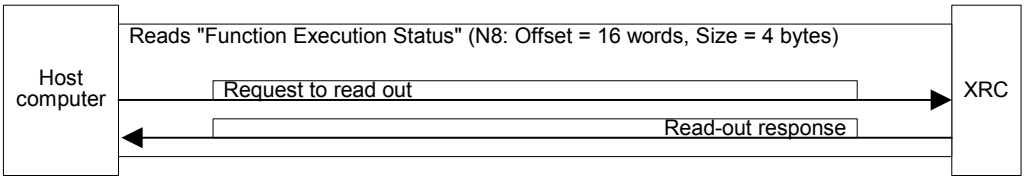
Deletes a job registered in the XRC.
This function is enabled only when Command Remote mode is set.

■ Function Number

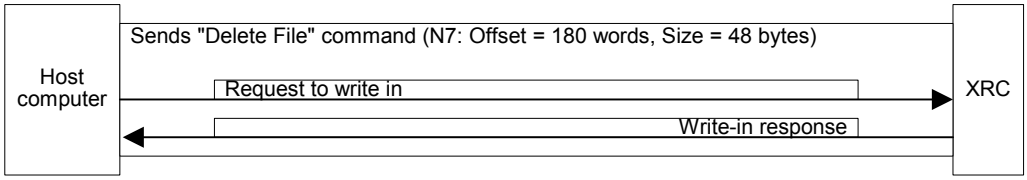
14 (decimal)

■ Process

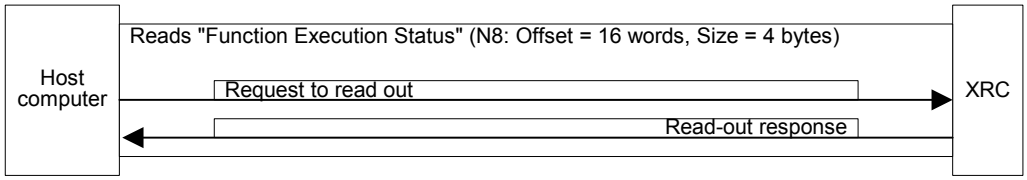
1. Reads “Function Execution Status” to check if there is any process being carried out. If there is a function in process, repeats reading “Function Execution Status” until the process is complete.



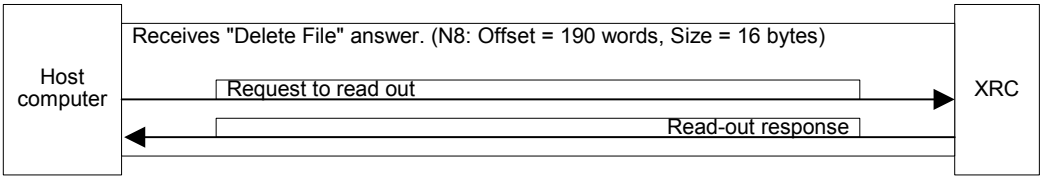
2. Sends “Delete File” command.



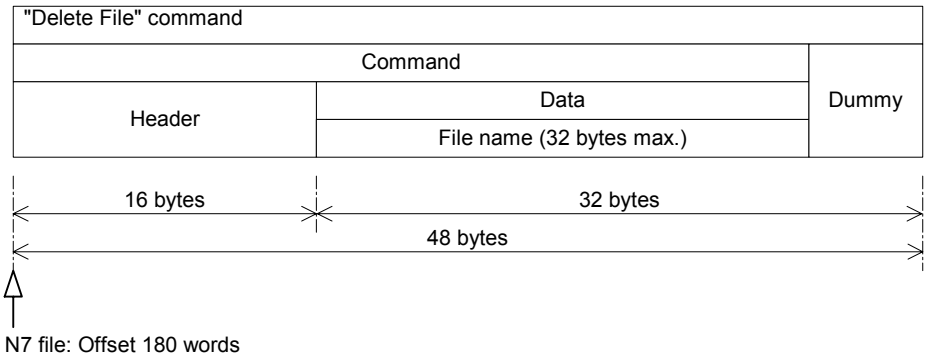
3. Reads “Function Execution Status” to confirm that the XRC completes the process of the command.
   If not, repeats reading “Function Execution Status” until the process is complete.

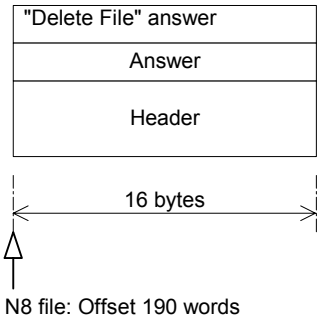


4. Receives “Delete File” answer.



■ Command/Answer Format





7.2.9 “Get File List” Function

■ Function

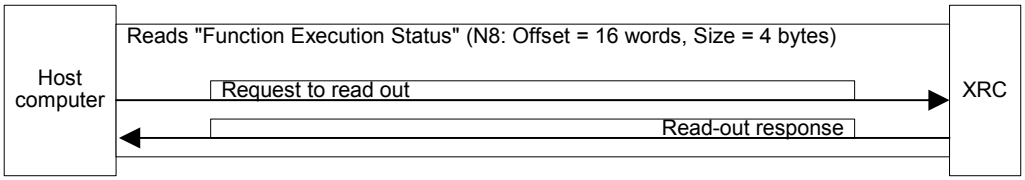
Transfers a list of files from the XRC to the host computer.
This function is enabled only when Command Remote mode is set.

■ Function Number

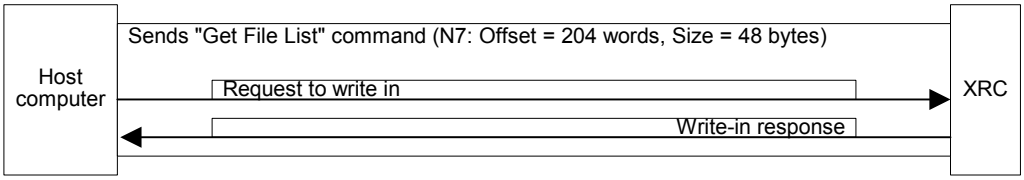
15 (decimal)

■ Process

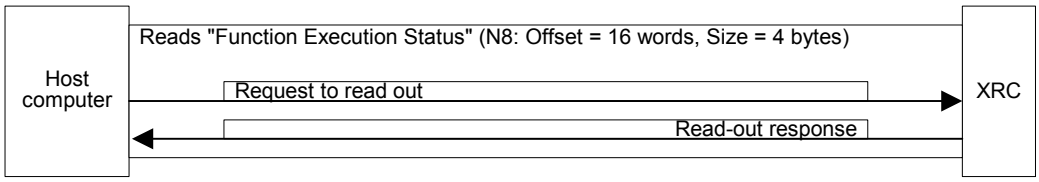
1. Reads “Function Execution Status” to check if there is any process being carried out. If there is a function in process, repeats reading “Function Execution Status” until the process is complete.



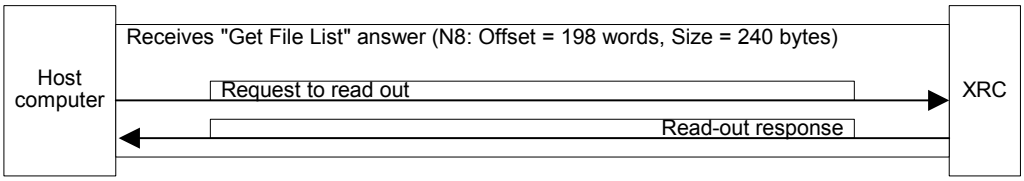
2. Sends “Get File List” command.



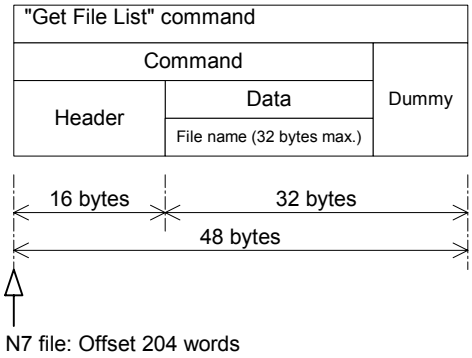
3. Reads “Function Execution Status” to confirm that the XRC completes the process of the command.
   If not, repeats reading “Function Execution Status” until the process is complete.

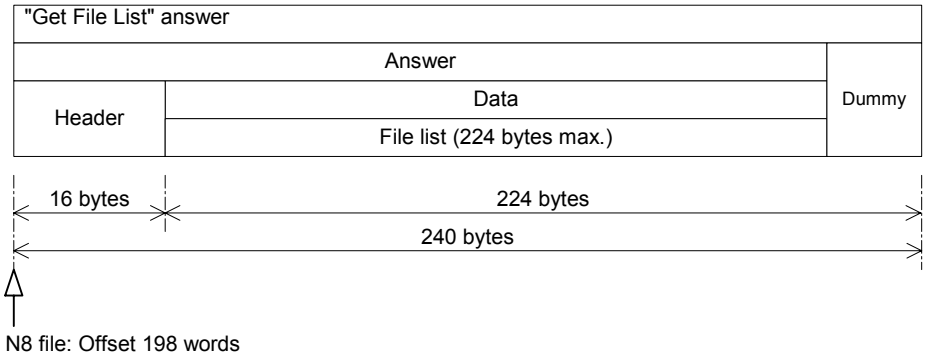


4. Receives “Get File List” answer.



■ Command/Answer Format





7.2.10 “Read Status” Function

■ Function

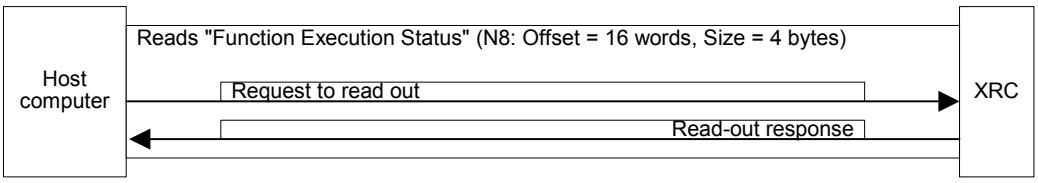
Transfers status information of the XRC to the host computer.
This function is enabled only when Command Remote mode is set.

■ Function Number

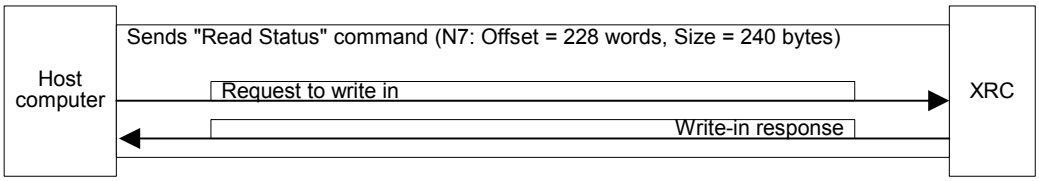
16 (decimal)

■ Process

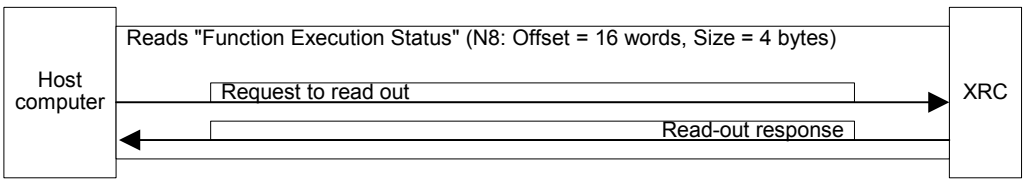
1. Reads “Function Execution Status” to check if there is any process being carried out.
   If there is a function in process, repeats reading “Function Execution Status” until the process is complete.



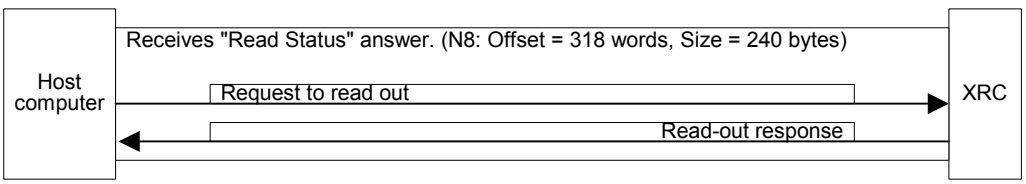
2. Sends “Read Status” command.



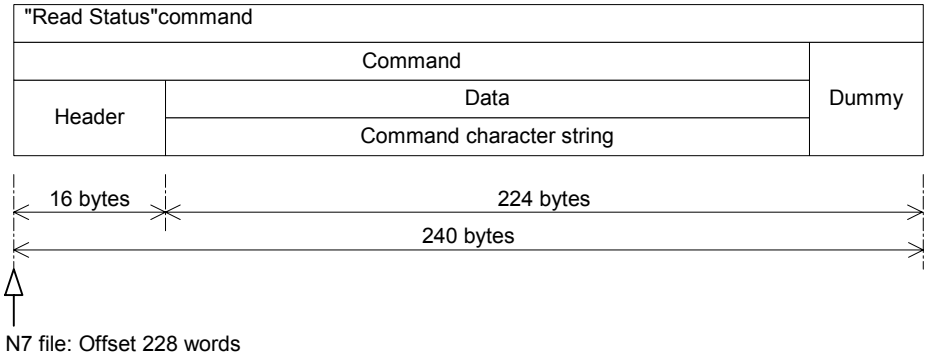
3. Reads “Function Execution Status” to confirm that the XRC completes the process of the command.
   If not, repeats reading “Function Execution Status” until the process is complete.

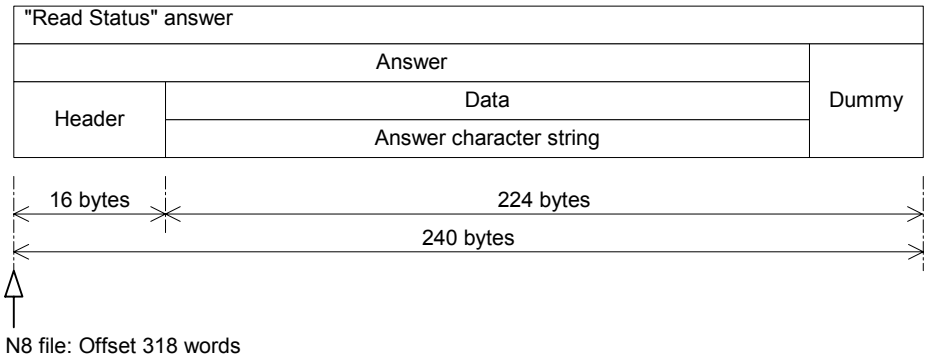


4. Receives “Read Status” answer.



■ Command/Answer Format





■ Command/Answer Character String

Use the command character strings shown in the following table. The answer character strings are the same as those described in “YASNAC XRC OPTIONS INSTRUCTIONS For Data Transmission Function.” Refer to “5.2.5 Status Read Function” of “YASNAC XRC OPTIONS INSTRUCTIONS For Data Transmission Function” for details.

Function	Command Character String	Reference in YASNAC XRC OPTIONS INSTRUCTIONS For Data Transmission Function
Read-out of the current position in joint coordinate system	RPOSJ[CR][LF]	RPOSJ
Read-out of the current position on the specified Cartesian coordinate system	RPOS[CR][LF]	RPOS
Read-out of the status of the mode, cycle, motion, alarm error, and servo	RSTATS[CR][LF]	RSTATS
Read-out of the executing job name, line number, and step number	RJSEQ[CR][LF]	RJSEQ

7.3 Data Transmission Example

The following table shows an example of the data transmission through ControlNet network for deleting a file. The underlined data are the Integer File data. Refer to “ControlNet Specification” and the instruction manual for PLC5 of Rockwell Automation for the data other than the Integer File data.

Process	Sender	Receiver	Packet Data Example	Explanation
Checking if the XRC is carrying out a command	Host computer	XRC	04 01 83 0A 05 00 00 F0 02 F8 14 01 83 0A 02 56 00 F8 4B 02 20 67 24 01 07 00 00 00 00 00 00 0F 00 00 00 68 00 00 02 00 00 24 4E 38 3A 31 36 00 02 00	Requests to read “Function Execution Status.”
	XRC	Host computer	04 01 83 02 01 00 00 F8 0A F8 10 05 83 02 03 00 00 F8 CB 00 00 00 07 00 00 00 00 00 00 4F 00 00 00 99 09 05 42 00 00 00 00 00	Receives “Function Execution Status.” Because there is neither other command nor function in process (0x00), goes to the next step to send a command.
Sending a command	Host computer	XRC	04 01 83 0A 05 00 00 F8 02 F8 25 05 83 0A 02 56 00 00 4B 02 20 67 24 01 07 00 00 00 00 00 00 0F 00 00 00 67 00 00 0F 00 00 24 4E 37 3A 31 38 30 00 99 09 1F 42 00 1E 00 01 00 00 01 27 00 00 00 00 00 00 00 00 61 62 63 64 65 66 67 68 2E 6A 62 69 0D 0A 0A	Sends “Delete File” command. In this example, the file “ABCDEFGH.JBI” is specified to be deleted.
	XRC	Host computer	04 01 83 02 01 00 00 00 0A F8 0C 05 83 02 03 00 00 00 CB 00 00 00 07 00 00 00 00 00 00 4F 00 00 00 00	Reports the reception of “Delete File” command.
Checking if the XRC completes the command	Host computer	XRC	04 01 83 0A 05 00 00 00 02 F8 14 01 83 0A 02 56 00 08 4B 02 20 67 24 01 07 00 00 00 00 00 00 0F 00 00 00 68 00 00 02 00 00 24 4E 38 3A 31 36 00 02 00	Requests to read “Function Execution Status.”
	XRC	Host computer	04 01 83 02 01 00 00 08 0A F8 10 05 83 02 03 00 00 08 CB 00 00 00 07 00 00 00 00 00 00 4F 00 00 00 99 09 05 42 01 0E 00 00 00	Receives “Function Execution Status.” Because the XRC is carrying out the command (0x01) for “Delete File” function (0x0E), reconfirmation of “Function Execution Status” is required.

Process	Sender	Receiver	Packet Data Example	Explanation
Confirming that the process is complete	Host computer	XRC	04 01 83 0A 05 00 00 10 02 F8 14 01 83 0A 02 56 00 18 4B 02 20 67 24 01 07 00 00 00 00 00 00 0F 00 00 00 68 00 00 02 00 00 24 4E 38 3A 31 36 00 02 00	Requests to read “Function Execution Status.”
	XRC	Host computer	04 01 83 02 01 00 00 18 0A F8 10 05 83 02 03 00 00 18 CB 00 00 00 07 00 00 00 00 00 00 4F 00 00 00 99 09 05 42 00 00 00 00 00	Receives “Function Execution Status.” Because there is neither command (0x00)nor function(0x00) in process, goes to the next step to receive the answer.
Receiving the answer	Host computer	XRC	04 01 83 0A 05 00 00 18 02 F8 15 05 83 0A 02 56 00 20 4B 02 20 67 24 01 07 00 00 00 00 00 00 0F 00 00 00 68 00 00 08 00 00 24 4E 38 3A 31 39 30 00 08 00 00	Requests to read “Delete File” answer.
	XRC	Host computer	04 01 83 02 01 00 00 20 0A F8 16 05 83 02 03 00 00 20 CB 00 00 00 07 00 00 00 00 00 00 4F 00 00 00 99 09 11 42 00 10 00 01 00 00 01 27 00 00 00 00 00 00 00 00 00	Receives “Delete File” answer. The successful completion and the last packet ends the transmission.

YASNAC XRC
INSTRUCTIONS

FOR ControlNet FUNCTION

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