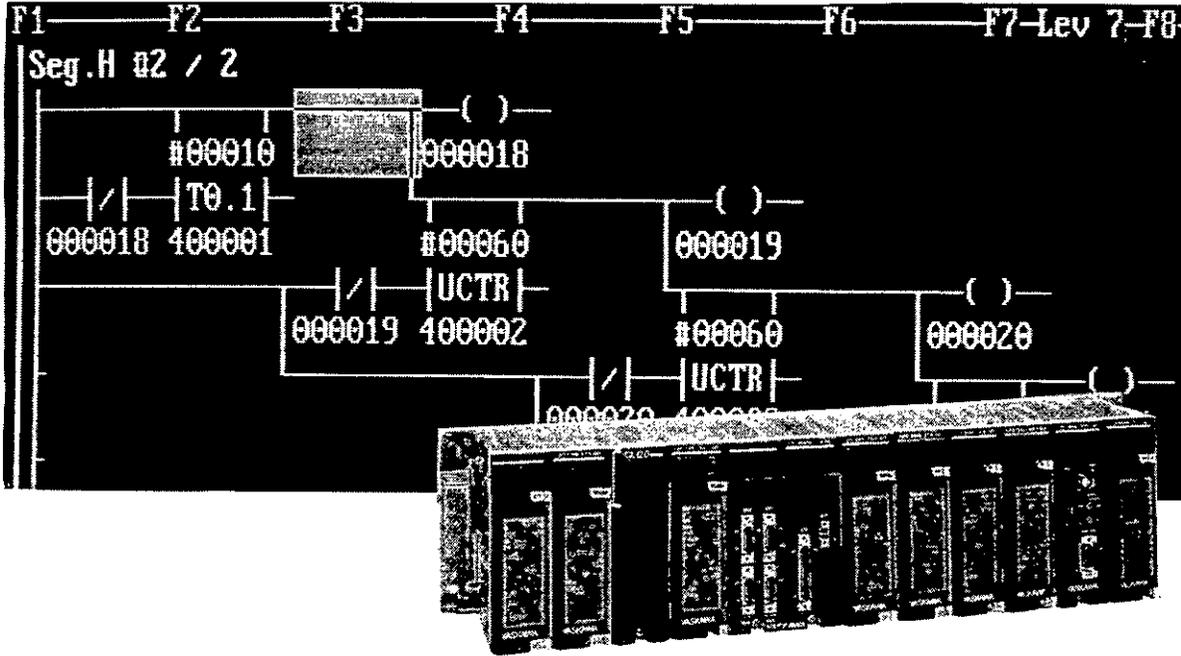


MEMOCON GL120, GL130 1000/2000-SERIES COAXIAL REMOTE I/O SYSTEM USER'S MANUAL



Manual Contents

This manual describes specifications and applications of 1000/2000-series Coaxial Remote I/O System.

Please read this manual carefully and be sure you understand the information provided before attempting to use 1000/2000-series Coaxial Remote I/O System.

Visual Aids

The following aids are used to indicate certain types of information for easier reference.



Indicates references for additional information.

IMPORTANT

Indicates important information that should be memorized.



Indicates application examples.



Indicates supplemental information.

SUMMARY

Indicates a summary of the important points of explanations.

Note

Indicates inputs, operations, and other information required for correct operation but that will not cause damage to the device.



Indicates definitions of terms used in the manual.

NOTICE

The following conventions are used to indicate precautions in this manual. Failure to heed precautions provided in this manual can result in injury to people or damage to the products.

WARNING Indicates precautions that, if not heeded, could possibly result in loss of life or serious injury.

Caution Indicates precautions that, if not heeded, could result in relatively serious or minor injury, damage to the product, or faulty operation.

©Yaskawa, 1999

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form, or by any means, mechanical, electronic, photocopying, recording, or otherwise, without the prior written permission of Yaskawa. No patent liability is assumed with respect to the use of the information contained herein. Moreover, because Yaskawa is constantly striving to improve its high-quality products, the information contained in this manual is subject to change without notice. Every precaution has been taken in the preparation of this manual. Nevertheless, Yaskawa assumes no responsibility for errors or omissions. Neither is any liability assumed for damages resulting from the use of the information contained in this publication.

CONTENTS

Introduction and Precautions	Intro-1
I.1 Overview	Intro-2
I.2 Precautions	Intro-3
I.2.1 Safety Precautions	Intro-3
I.2.2 Installation Precautions	Intro-4
I.2.3 Wiring Precautions	Intro-4
I.2.4 Applications Precautions	Intro-6
I.2.5 Maintenance	Intro-7
I.3 Using this Manual	Intro-8
CHAPTER 1 Overview of Remote I/O System	1-1
1.1 Remote I/O System	1-2
1.2 System Configuration	1-3
1.2.1 Overview	1-3
1.2.2 Definition of I/O Sections	1-4
1.2.3 Precautions on the System Configuration	1-4
CHAPTER 2 Remote I/O Specifications	2-1
2.1 Remote I/O Driver Module	2-2
2.1.1 Names of Components	2-2
2.1.2 General Specifications	2-3
2.1.3 Performance Specifications	2-4
2.1.4 Functions	2-5
2.2 2000-series Remote I/O Receiver Module	2-6
2.2.1 Names of Components	2-6
2.2.2 General Specifications	2-7
2.2.3 Performance Specifications	2-8
2.2.4 Functions	2-9
2.3 1000-series Remote I/O Receiver Module	2-13
2.3.1 Names of Components	2-13
2.3.2 General Specifications	2-15
2.3.3 Performance Specifications	2-16
2.3.4 Functions	2-17
CHAPTER 3 I/O Servicing and Scan Time	3-1
3.1 I/O Servicing and Scan Time	3-2
3.1.1 Logic Solving and I/O Processing	3-2
3.1.2 I/O Processing Sequence	3-2
3.1.3 Delay of I/O Signals	3-3
3.1.4 I/O Processing Time	3-5

CONTENTS

CHAPTER 4 External Connections	4-1
4.1 Remote I/O Ports	4-2
4.2 Transmission Distance	4-5
4.2.1 Calculation Method	4-5
4.2.2 Maximum Transmission Distance	4-6
4.3 Configuration of Remote I/O Transmission Lines	4-7
4.4 In-panel Wiring	4-10
4.4.1 Cables	4-10
4.4.2 Connections between Devices	4-13
4.4.3 Shield Treatment	4-13
4.4.4 Separating Coaxial Cables from Other Cables	4-13
4.5 Indoor Panel-to-Panel Wiring	4-15
4.5.1 Connection between Devices	4-15
4.5.2 Shield Treatment	4-16
4.5.3 Separating Coaxial Cables from Other Cables	4-16
4.6 Outdoor Panel-to-Panel Wiring	4-19
4.7 Grounding	4-21
4.7.1 Grounding Methods	4-21
4.7.2 Shielded Coaxial Cables	4-22
4.7.3 Metal Conduits and Metal Ducts	4-22
4.8 Installation of Control Panel	4-23
CHAPTER 5 I/O Allocations	5-1
5.1 I/O Allocations Using MEMOSOFT	5-2
5.1.1 Overview of I/O Allocations	5-2
5.1.2 MEMOSOFT I/O Allocation Screen	5-3
5.1.3 I/O Allocations	5-4
5.1.4 Switching I/O Allocation Screens	5-13
CHAPTER 6 Troubleshooting	6-1
6.1 Self Diagnosis	6-2
6.1.1 Self-diagnostic Functions	6-2
6.1.2 Fault Detection	6-3
6.1.3 Fault Checking Procedure	6-6
APPENDICES	
A Coaxial Cable Connector Installation Procedures	A-1
B Remote I/O Module External Dimensions	B-1

Introduction and Precautions

This chapter introduces general information, including basic information and precautions for the use of this manual. **You must read this chapter before attempting to read the rest of the manual or using the product.**

I.1 Overview	Intro-2
I.2 Precautions	Intro-3
1.2.1 Safety Precautions	Intro-3
1.2.2 Installation Precautions	Intro-4
1.2.3 Wiring Precautions	Intro-4
1.2.4 Applications Precautions	Intro-6
1.2.5 Maintenance	Intro-7
I.3 Using this Manual	Intro-8

I.1 Overview

- This manual describes how to use the 1000/2000-series Remote I/O Modules. Read this manual carefully to ensure the proper use of the Remote I/O Modules. Also, keep this manual in a safe place so that it can be used whenever necessary.

- The following Remote I/O Modules are discussed in this manual.

JAMSC-120CRD13110 2000-series Remote I/O Driver Module

JAMSC-IF70 2000-series Remote I/O Receiver Module

JAMSC-IF70T 1000-series Remote I/O Receiver Module

DISCT-J1060 1000-series Remote I/O Adapter

- Refer to the following related manuals as required.

Manual	Manual Number	Contents
MEMOCON GL120, GL130 Hardware User's Manual	SIEZ-C825-20.1	Describes the system configuration, system components, functions, specifications, installation, wiring, and external appearance of the GL120 and GL130.
MEMOCON GL120, GL130 Software User's Manual, Volume 1	SIEZ-C825-20.11	Describes the following for the GL120 and GL130: 1) Operating principles 2) I/O allocation 3) Overview of instructions 4) Instruction processing times
MEMOCON GL120, GL130 MEMOSOFT for P120 Programming Panel User's Manual	SIEZ-C825-60.7	Describes the functions, specifications, and usage of the P120 Programming Panel with MEMOSOFT.
MEMOCON GL120, GL130 MEMOSOFT for DOS User's Manual	SIEZ-C825-60.10	Describes the features and operating procedures of the DOS version of MEMOSOFT.
MEMOCON GL120, GL130 MEMOBUS User's Manual	SIEZ-C825-70.13	Describes the functions, specifications, and usage of the MEMOBUS.
MEMOCON GL120, GL130 COM Instructions User's Manual	SIEZ-C825-70.14	Describes the functions, specifications, and usage of the COM instructions. It also describes the specifications and usage of the MEMOBUS Module.
MEMOCON-SC GL60S Remote I/O System User's Manual	SIE-C815-14.7	Describes the functions, specifications, and usage of the GL60S Coaxial Remote I/O System.

- Thoroughly check the specifications and conditions or restrictions of the product before use.

I.2 Precautions

This section outlines general precautions that apply to using this manual and the product. **You must read this section first before reading the remainder of the manual.**

I.2.1	Safety Precautions	Intro-3
I.2.2	Installation Precautions	Intro-4
I.2.3	Wiring Precautions	Intro-4
I.2.4	Applications Precautions	Intro-6
I.2.5	Maintenance	Intro-7

I.2.1 Safety Precautions

- MEMOCON was not designed or manufactured for use in devices or systems directly related to human life. Users who intend to use the product described in this manual for special purposes such as devices or systems relating to transportation, medical, space aviation, atomic power control, or underwater use must contact Yaskawa Electric Corporation beforehand.
- This product has been manufactured under strict quality control guidelines. However, if this product is to be installed in any location in which a failure of MEMOCON involves a life and death situation or in a facility where failure may cause a serious accident, safety devices **MUST** be installed to minimize the likelihood of any accident.
- Any illustrations, photographs, or examples used in this manual are provided as examples only and may not apply to all products to which this manual is applicable.
- The products and specifications described in this manual or the content and presentation of the manual may be changed without notice to improve the product and/or the manual. A new version of the manual will be released under a revised manual number when any changes are made.
- Contact your Yaskawa representative or a Yaskawa office listed on the back of this manual to order a new manual whenever this manual is damaged or lost. Please provide the document number listed on the front cover of this manual when ordering.
- Contact your Yaskawa representative or a Yaskawa office listed on the back of this manual to order new nameplates whenever a nameplate becomes worn or damaged.
- Yaskawa cannot make any quality guarantee for products which have been modified. Yaskawa assumes no responsibility for any injury or damage caused by a modified product.

1.2.2 Installation Precautions

Abide by the following precautions when installing MEMOCON systems.

 **Caution** The installation environment must meet the environmental conditions given in the product catalog and manuals.

Using the MEMOCON in environments subject to high temperatures, high humidity, excessive dust, corrosive gases, vibration, or shock can lead to electrical shock, fire, or faulty operation. Do not use the MEMOCON in the following locations.

- Locations subject to direct sunlight or ambient temperatures not between 0 and 60°C.
- Locations subject to relative humidity in excess of 95%, rapid changes in humidity, or condensation.
- Locations subject to corrosive or flammable gas.
- Locations that would subject the MEMOCON to direct vibration or shock.
- Locations subject to contact with water, oil, chemicals, etc.

 **Caution** Install the MEMOCON as described in this product manual.

Improper installation can cause product failure, malfunctions, or Modules or other components to fall off.

 **Caution** Do not allow wire clippings or other foreign matter to enter the MEMOCON.

Foreign matter can cause fires, product failure, or malfunctions.

1.2.3 Wiring Precautions

 **Caution** Wiring must be performed by qualified personnel.

Wrong or inappropriate wiring can result in fire, failure, or electric shock.

Insert the Interface Cables Properly.

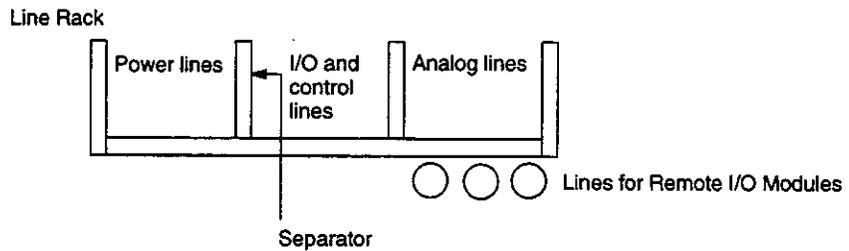
 **Caution** Insert the connectors of the various interface cables that are to be connected to MEMOCON into the communication ports and attach them properly.

Improper insertion of interface cables may cause operational errors in the MEMOCON.

Separate Wiring Properly.

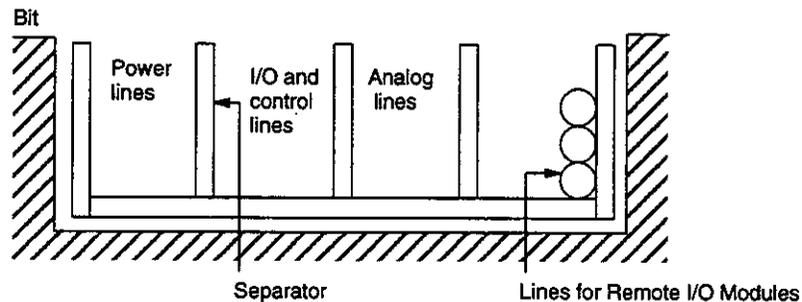
⚠ Caution I/O lines connecting the MEMOCON to external devices must be selected based on the following considerations: mechanical strength, resistance to noise, wiring distance, signal voltage, etc.

I/O lines must be separated from power lines both within and outside of the control panel to minimize the affects of noise. Faulty operation can result if I/O lines are not sufficiently separated from power lines.



⚠ Caution When wiring Remote I/O Module cables outside of the control panel, place them in a duct or conduit by themselves to minimize the affects of noise.

Faulty operation can result if MEMOBUS lines are not sufficiently insulated.



I.2.4 Applications Precautions

! Caution The 2000-series Remote I/O Driver Module can be used only if the CPU Module and the MEMOSOFT used for the MEMOCON GL120, GL130 are of the versions shown in the following table.

Using the wrong versions may result in failure or malfunction.

Name	Description	Model	Applicable Version	Location of Version Indication
CPU Module (8 kW)	CPU10	DDSCR-120CPU14200	<input type="checkbox"/> <input type="checkbox"/> A01 or later	Nameplate of the Module (see note.)
CPU Module (16 kW)	CPU20	DDSCR-120CPU34100	<input type="checkbox"/> <input type="checkbox"/> B01 or later	
CPU Module (16 kW)	CPU21	DDSCR-120CPU34110	<input type="checkbox"/> <input type="checkbox"/> A01 or later	
CPU Module (32 kW)	CPU30	DDSCR-130CPU54100	<input type="checkbox"/> <input type="checkbox"/> B01 or later	
CPU Module (40 kW)	CPU35	DDSCR-130CPU54110	<input type="checkbox"/> <input type="checkbox"/> A01 or later	
MEMOSOFT		FMSGL-AT3 (for DOS)	1.31 <input type="checkbox"/> or later	Bottom center of MEMOSOFT startup screen
		FMSGL-PP3 (for P120)		
		FMSGL-PP3E (for P120)		

Note The nameplate is attached to the right side of the Module.

! Caution Operations such as RUN, STOP, forced output, and program changes during operation must be carried out with care.

Operational errors may damage the machine or cause accidents.

! WARNING Do not touch terminals while the power is ON.

Touching live terminals may cause electric shock.

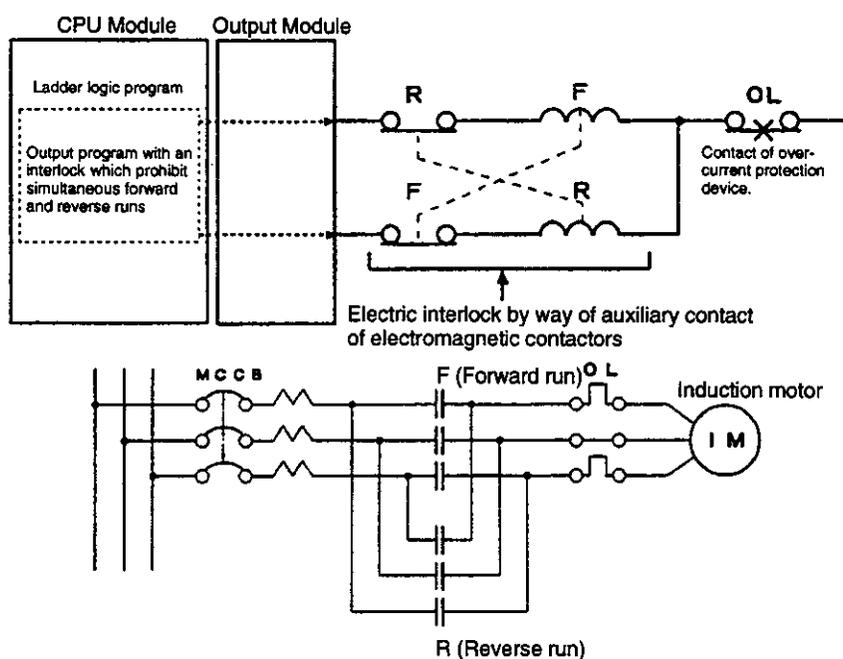
WARNING Externally connect emergency stop, interlock circuits, and other switches to the MEMOCON.

External Interlocks for the GL120 and GL130

Externally connect an interlock to the GL120 and GL130 if there is any chance that GL120 and GL130 failure could result in bodily harm or equipment damage.

Always use an external interlock system as shown in the following example when reciprocal operations (e.g., forward and reverse directions) are being performed with a motor.

An interlock is generally programmed in the GL120/GL130 to ensure that forward and reverse signals are not simultaneously output. An external interlock circuit must also be provided using the auxiliary contacts of electromagnetic contactors.



I.2.5 Maintenance

Caution Do not attempt to disassemble or modify the MEMOCON in any way. Doing so can cause fires, product failure, or malfunctions.

Make sure that equipment power is turned OFF before mounting or removing the MEMOCON Modules.

WARNING Turn OFF the power supply before installing or removing a Remote I/O Driver Module.

Otherwise, an electric shock, an operation error, or a fault may occur.

I.3 Using this Manual

This manual is written for those who already have a basic knowledge of MEMOCON PLCs. We recommend reading the *MEMOCON GL120, GL130 Hardware User's Manual* before attempting to read this manual.

- **Basic Abbreviations**

In this manual, the following terms are described as follows, unless otherwise specified:

- **Remote I/O = Remote I/O System**
- **Remote I/O Driver = Remote I/O Driver Module**
- **Remote I/O Receiver = Remote I/O Receiver Module**
- **PLC = Programmable (Logic) Controller**
- **PP = Programming Panel**
- **GL120, GL130 = MEMOCON GL120 and/or MEMOCON GL130 Programmable Controller**

Overview of Remote I/O System

1

This chapter outlines the Remote I/O System and the system configuration.

1.1 Remote I/O System	1-2
1.2 System Configuration	1-3
1.2.1 Overview	1-3
1.2.2 Definition of I/O Sections	1-4
1.2.3 Precautions on the System Configuration	1-4

1.1 Remote I/O System

- This section gives an overview of the 2000-series Remote I/O System.

Overview

- 1) The 2000-series Remote I/O System is a communications system for installing 2000-series I/O sections and 1000-series I/O sections in remote locations.
- 2) Remote I/O consists of a Remote I/O Driver Module and a Remote I/O Receiver Module, which respectively function as a master station and a slave station on a remote communications line.
- 3) A Remote I/O Receiver Module has one MEMOBUS port. By connecting a P120 Programming Panel or a personal computer to this MEMOBUS port, programming and monitoring for the CPU Module are enabled.
- 4) All 2000-series and 1000-series I/O Modules can be used at remote stations.
- 5) Data can be transmitted over distances of up to 1 kilometer by selecting the baud rate and cable type.



In this manual, the term "2000-series Remote I/O Driver" is used for the Remote I/O Driver Module. This Module, however, can be used for both 1000-series and 2000-series I/O Modules.

1.2 System Configuration

This section describes the system configuration of Remote I/O and definition of the I/O sections.

- 1.2.1 Overview 1-3
- 1.2.2 Definition of I/O Sections 1-4
- 1.2.3 Precautions on the System Configuration 1-4

1.2.1 Overview

Figure 1.1 illustrates the system configuration of Remote I/O.

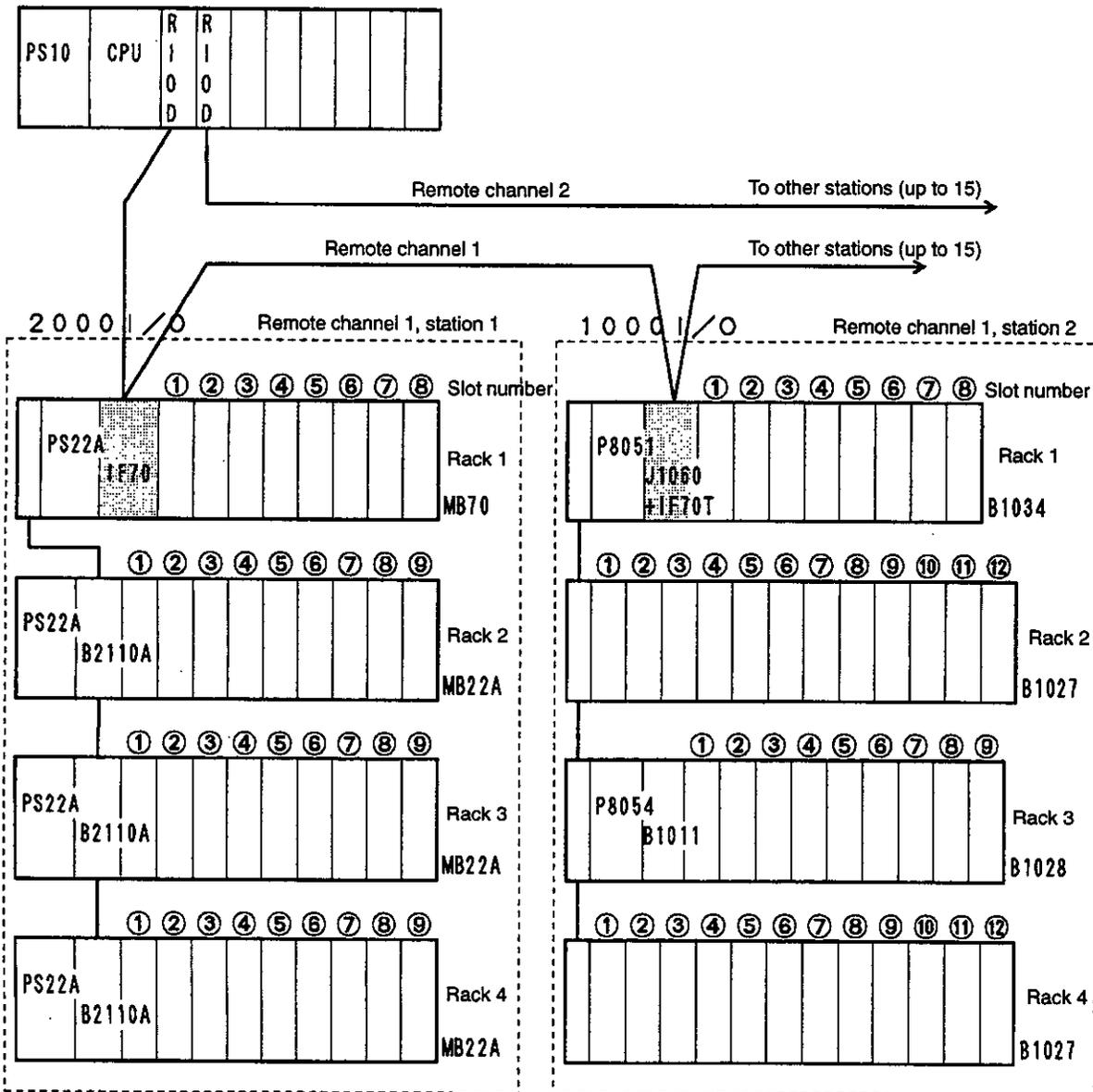


Figure 1.1 System Configuration Diagram

1

1.2.2 Definition of I/O Sections

1) Local Channel

The local channel includes all the I/O Modules mounted on the Mounting Base where the GL120 or GL130 CPU Module is installed, and all the I/O Modules mounted on Mounting Bases connected by Rack-to-rack Cables via I/O Expander Modules located on the right end of the Mounting Bases.

2) Remote Channels

A remote channel includes all of the I/O connected by a remote cable from a 2000-series Remote I/O Driver Module. Up to two Remote I/O Driver Modules can be installed on the GL120 and GL130 and these Modules are identified as remote channel 1 and remote channel 2. Remote channel numbers are set with a switch on the Remote I/O Driver Modules.

3) Remote Stations

A remote station includes all of the I/O Modules installed on the Mounting Base where a 2000-series Remote I/O Receiver Module and a 1000-series Remote I/O Receiver Module are installed, and all the I/O Modules installed on the Mounting Base connected with rack-to-rack cables via I/O Expander Modules. Up to 15 (from 1 to 15) station addresses can be assigned to remote stations for identification. The same station address cannot be assigned more than once within a remote channel. Station addresses are set using the rotary switches on the 2000-series and 1000-series Remote I/O Receiver Modules. The numbers set by the rotary switches must be the same as the station addresses.

4) Racks

A rack includes all of the I/O Modules installed on one Mounting Base. Rack numbers from 1 to 4 are assigned to the racks.

5) Slots

A slot is one of connectors for the various types of Modules that can be installed on a Mounting Base.

1.2.3 Precautions on the System Configuration

1) Station Combinations

Within the same channel, 120-series remote stations and 2000-series (or 1000-series) remote stations cannot be mixed. However, 2000-series remote stations and 1000-series remote stations can be mixed.

2) Numberd of Racks, Slots, and Modules

The numbers of racks, slots, and Modules that can be used is determined by the type and revisions of the Modules used in the remote station. The following table shows the numbers of racks, slots, and Modules that can be used according to the Module types and revisions.

Module Type	2000-series Remote I/O	1000-series Remote I/O		
	IF70	J1060□ + IF70T ↑ Revision A or Earlier	J1060 + IF70T	J1060A + IF70T ↑ Revision B or Later
Number of Racks	4	4	4	4
Number of Slots				
Rack 1	8	8	8	8
Rack 2	9	9	9	12
Rack 3	9	9	9	9
Rack 4	9	9	9	12
Maximum Number of Modules	35	35	35	38 Full slots cannot be allocated.

Note J1060□: Indicates a J1060 or J1060A Adapter.

Revision: The revision is given as a letter of the alphabet on the bottom of the IF70T Module.

Remote I/O Specifications

2

This chapter provides the Remote I/O specifications.

2.1 Remote I/O Driver Module	2-2
2.1.1 Names of Components	2-2
2.1.2 General Specifications	2-3
2.1.3 Performance Specifications	2-4
2.1.4 Functions	2-5
2.2 2000-series Remote I/O Receiver Module	2-6
2.2.1 Names of Components	2-6
2.2.2 General Specifications	2-7
2.2.3 Performance Specifications	2-8
2.2.4 Functions	2-9
2.3 1000-series Remote I/O Receiver Module	2-13
2.3.1 Names of Components	2-13
2.3.2 General Specifications	2-15
2.3.3 Performance Specifications	2-16
2.3.4 Functions	2-17

2.1 Remote I/O Driver Module

This section provides the names and specifications of each component of the 2000-series Remote I/O Driver.

2.1.1	Names of Components	2-2
2.1.2	General Specifications	2-3
2.1.3	Performance Specifications	2-4
2.1.4	Functions	2-5

2.1.1 Names of Components

The following diagram shows the name of each component.

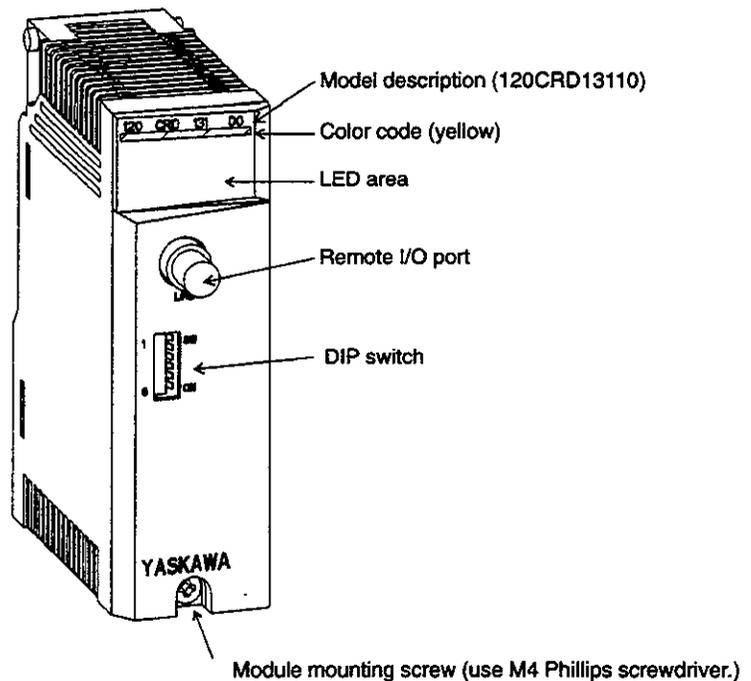


Figure 2.1 Appearance of 2000-series Remote I/O Driver Module

LED area		LED	Color	Indication when ON
120 CRD 131 10		READY	Green	Module is operating normally.
READY	<input type="checkbox"/> ACTIVE	ACTIVE	Green	Module is processing I/O.
RMT TX	<input type="checkbox"/>	RMT TX	Green	Module is transmitting data from the remote I/O port.
RMT RX	<input type="checkbox"/>	RMT RX	Green	Module is receiving data from the remote I/O port.
RMT ERR	<input type="checkbox"/>	RMT ERR	Red	An error has occurred in a communications on the remote I/O port.

If a status error occurs, the READY indicator will turn OFF and the RMT ERR indicator will flash as described in the following table.

ROM Error	RMT ERR will flash continuously.
RAM Error	RMT ERR will flash twice, turn OFF for 1 s, and then repeat this cycle.
Common Memory Error	RMT ERR will flash three times, turn OFF for 1 s, and then repeat this cycle.
Watchdog Timer Error	RMT ERR will flash four times, turn OFF for 1 s, and then repeat this cycle.

2.1.2 General Specifications

The general specifications of 2000-series Remote I/O Driver Modules is given in the following table.

Table 2.1 General Specifications of 2000-series Remote I/O Driver Module

Item		Specifications
Physical Environment	Ambient Operating Temperature	0 to 60 °C
	Ambient Storage Temperature	-25 to 85 °C
	Ambient Operating Humidity	30% to 95% RH (with no condensation)
	Ambient Storage Humidity	5% to 95% RH (with no condensation)
	Pollution Level	Pollution level 1 according to JIS B3501.
	Corrosive Gas	No corrosive gas
	Operating Altitude	Less than 2,000 m above sea level
Mechanical Operating Conditions	Vibration Resistance	Complies with JIS B3502: 10 to 57 Hz: Single amplitude 0.075 mm 57 to 150 Hz: Fixed acceleration 9.8 m/s ² (1G) 10 sweep cycles in directions X, Y, and Z. (Sweep time: 1 octave/min)
	Shock Resistance	Complies with JIS B3502: Acceleration peak value: 147 m/s ² (15G) Usage time: 11 ms Shock direction: Twice in directions ±X, ±Y, and ±Z.
Electrical Operating Conditions	Noise Immunity	Complies with JIS B3502: 1,500 V _(p-p) in either normal or common mode with a pulse width of 100 ns/1 μs and a pulse rise time of 1 ns (tested with impulse noise simulator)
Dielectric Strength		Between all I/O terminals and internal circuit, and between I/O common terminals: 1,500 VAC (for 1 min) or 1,800 VAC (for 1 s)
Insulation Resistance		Between all I/O terminals and ground: At least 100 MΩ (at normal temperature and humidity) when measured with a 500-VDC insulation resistance tester.
Installation Requirements	Ground	Ground to 100 Ω or less
	Configuration	Building-block structure Wall-mounted or DIN track-mounted (either possible)
	Cooling Method	Natural cooling

2.1.3 Performance Specifications

The following table lists the performance specifications for the 2000-series Remote I/O Driver Module.

Table 2.2 2000-series Remote I/O Driver Module Specifications

Item		Specifications
Model Name		RIOD-2000
Model Number		JAMSC-120CRD13110
Dimensions		40.3 × 130 × 103.9 mm (W × H × D)
Mass		Approx. 300 g
Internal Current Consumption		800 mA
Heat Generation		4.0 W max.
Hot Swapping (Removal/Insertion under Power)		Not permitted.
Remote I/O Port Specifications	Topology (Communications Network Configuration)	Bus
	Media Access Control Method	Multi-drop (1:n communications)
	Media (Transmission Medium)	Coaxial cable (75 Ω)
	Modulation Method	Baseband
	Encoding Method	Manchester coding
	Baud Rate	Choose from 0.5, 1, 2, and 4 Mbps
	Transmission Distance	Transmission distance varies according to the baud rate and the specifications of coaxial cable. If, for example, the baud rate is 4 Mbps and 12C-5AF Coaxial Cable is used, it is possible to transmit up to 1 km max.
	Number of Stations	15 max. (Up to 15 Remote I/O Receiver Modules are connectable.)
	Error Control (RAS)	Automatic removal and recovery function for error stations
	Synchronization Method	Frame
	Communications Format	Conforms to HDLC.
	Insulation Method	Pulse transformer
Connector	BNC connector	



In this manual, the term "2000-series Remote I/O Driver" is used for the Remote I/O Driver Module. This Module, however, can be used for both 1000-series and 2000-series I/O Modules.

2.1.4 Functions

The 2000-series Remote I/O Driver Module functions as a master station for the Remote I/O System.

1) Remote I/O Port

The 2000-series Remote I/O Driver, 2000-series Remote I/O Receiver, and 1000-series Remote I/O Receiver each have one remote I/O port for data communications. The Remote I/O System is configured by connecting these ports with coaxial cable.

2) DIP Switch

- a) The DIP switch consists of 6 pins. The pins are numbered from 1 to 6 as shown in the diagram.
- b) Each pin is turned ON when pressed to the right.
- c) The setting of each pin is effective when AC power is turned On to the Power Supply Module of Rack 1 (CPU Rack).
- d) Each pin's function is shown in the following table.

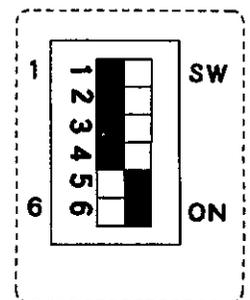


Table 2.3 Functions of DIP Switch

Pin No.	Settings	Function		
1	ON	Sets Module to self diagnosis mode.		
	OFF	Sets Module to remote mode.		
2	ON	Not used. Set to OFF.		
	OFF			
3	ON	Sets Module to master station of channel 2.		
	OFF	Sets Module to master station of channel 1.		
4	ON	Not used. Set to OFF.		
	OFF			
5 6	Set the baud rate of Remote I/O System according to the table shown on the right.	Pin 5	Pin 6	Baud Rate
		ON	ON	4 Mbps
		ON	OFF	2 Mbps
		OFF	ON	1 Mbps
		OFF	OFF	0.5 Mbps

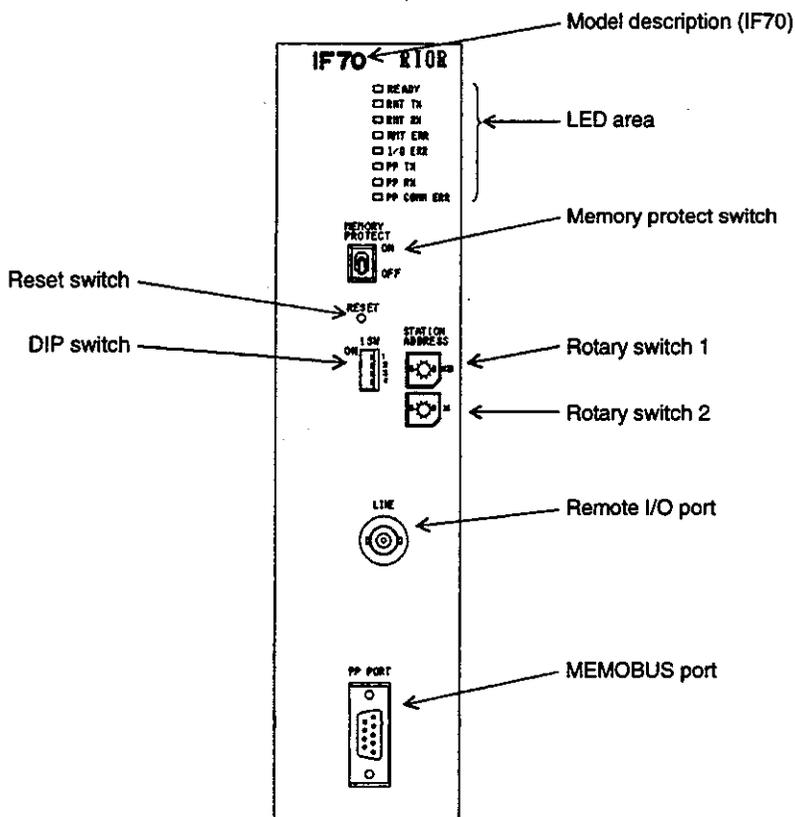
2.2 2000-series Remote I/O Receiver Module

This section gives the names and specifications of each component of the 2000-series Remote I/O Receiver Module.

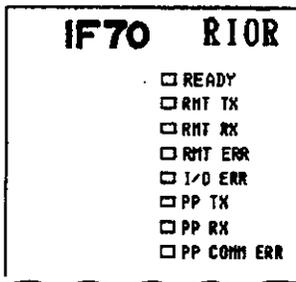
2.2.1	Names of Components	2-6
2.2.2	General Specifications	2-7
2.2.3	Performance Specifications	2-8
2.2.4	Functions	2-9

2.2.1 Names of Components

The following diagram shows the name of each component.



LED area



LED	Color	Indication when ON
READY	Green	Module is operating normally.
RMT TX	Green	Module is transmitting data from the remote I/O port.
RMT RX	Green	Module is receiving data from the remote I/O port.
I/O ERR	Red	An error has occurred during Module I/O processing.
RMT ERR	Red	An error has occurred in the communications for the remote I/O port. Lit for 10 ms.
PP TX	Green	Module is transmitting data from the MEMOBUS port.
PP RX	Green	Module is receiving data from the MEMOBUS port.
PP COMM ERR	Red	An error has occurred in the transmission from the MEMOBUS port.

2.2.2 General Specifications

The following table shows the general specifications for the 2000-series Remote I/O Receiver Module.

Table 2.4 General Specifications of 2000-series Remote I/O Receiver Module

Item		Specifications
Physical Environment	Ambient Operating Temperature	0 to 55 °C
	Ambient Storage Temperature	-20 to 85 °C
	Ambient Operating Humidity	30% to 95% RH (with no condensation)
	Pollution Level	Pollution level 1 according to JIS B3501.
	Corrosive Gas	No corrosive gas.
Mechanical Operating Conditions	Vibration Resistance	Complies with JIS B3502 10 to 57 Hz: Single amplitude 0.075 mm 57 to 150 Hz: Fixed acceleration 9.8 m/s ² (1G) 10 sweep cycles in directions X, Y, and Z. (Sweep time: 1 octave/min)
	Shock Resistance	Complies with JIS B3502 Acceleration peak value: 147 m/s ² (15G) Usage time: 11 ms Shock direction: Twice in directions ±X, ±Y, and ±Z.
Electrical Operating Conditions	Noise Immunity	Complies with JIS B3502: 1,500 V _(p-p) in either normal or common mode with a pulse width of 100 ns/1 μs and a pulse rise time of 1 ns (tested with impulse noise simulator)
Dielectric Strength		Between all I/O terminals and internal circuit, and between I/O common terminals: 1,500 VAC (for 1 min)
Insulation Resistance		Between all I/O terminals and ground: At least 100 MΩ (at normal temperature and humidity) when measured with a 500-VDC insulation resistance tester
Installation Requirements	Ground	Ground to 100 Ω or less
	Configuration	Building-block structure. Wall-mounted or DIN track-mounted (either possible)
	Cooling Method	Natural cooling

2.2.3 Performance Specifications

The following table lists the performance specifications for the 2000-series Remote I/O Driver Module.

Table 2.5 2000-series Remote I/O Receiver Module Specifications

Item		Specifications
Model Number		JAMSC-IF70
Dimensions		59.8 × 250 × 94 mm (W × H × D)
Mass		Approx. 600 g
Internal Current Consumption		2.4 A
Heat Generation		12 W max.
Hot Swapping (Removal/Insertion under Power)		Not permitted.
Remote I/O Port Specifications	Topology (Communications Network Configuration)	Bus
	Media Access Control Method	Multi-drop (1:n communications)
	Media (Transmission Medium)	Coaxial cable (75 Ω)
	Modulation Method	Baseband
	Encoding Method	Manchester coding
	Baud Rate	Choose from 0.5, 1, 2 and 4 Mbps
	Transmission Distance	Transmission distance varies according to the baud rate and the specifications of coaxial cable. If, for example, the baud rate is 4 Mbps and 12C-5AF Coaxial Cable is used, it is possible to transmit up to 1 km max.
	Number of Stations	15 max. (Up to 15 Remote I/O Receiver Modules are connectable.)
	Error Control (RAS)	Automatic removal and recovery function for error stations
	Synchronization Method	Frame
	Communications Format	Conforms to HDLC.
	Insulation Method	Pulse transformer
	Connector	BNC connector
MEMOBUS Port Specifications	Communications Method	Half-duplex asynchronous method
	Transmission Levels	Conform to RS-232C
	Protocol	MEMOBUS protocol
	Baud Rate	9,600 bps
	Communications Mode	RTU mode
	Data Format	The following data format is used between master and slaves, between master and modems, and between modems and slaves: 1) Data bit length: 8 (RTU mode) 2) Parity check: Yes 3) Parity: Even 4) Stop bits: 1 or 2
	Transmission Distance	15 m (Can be extended to 4.5 km maximum by using Yaskawa modem.)
	Transmission Error Detection	CRC-16 (RTU mode)
Connector	D-sub connector (9-pin, female)	

2.2.4 Functions

The 2000-series Remote I/O Receiver Module functions as a slave station for the Remote I/O System.

1) Remote I/O Port

The 2000-series Remote I/O Driver, 2000-series Remote I/O Receiver, and 1000-series Remote I/O Receiver each have one remote I/O port for data communications. The Remote I/O System is configured by connecting these ports with coaxial cable.

2) MEMOBUS Port

- a) The 2000-series Remote I/O Receiver Module can perform communications (slave communications) using an RS-232C interface via a MEMOBUS port. The MEMOBUS protocol is used as the communications protocol.
- b) The following table shows an example of the devices that can be connected to the MEMOBUS port. An RS-232C interface must be provided by these devices.

Table 2.6 Example of Devices Connectable to the MEMOBUS Port

Type	Device	Remarks
MEMOBUS Master	P120-series Programming Panel	<ul style="list-style-type: none"> • Communications performed using the MEMOBUS protocol. • No communications program needs to be created.
	Personal computer (with MEMOSOFT)	<ul style="list-style-type: none"> • If your computer does not have MEMOSOFT, create a communications program based on the MEMOBUS protocol.
	ACGC4000/400-series FA Monitor	

c) Number of Connectable MEMOBUS Masters

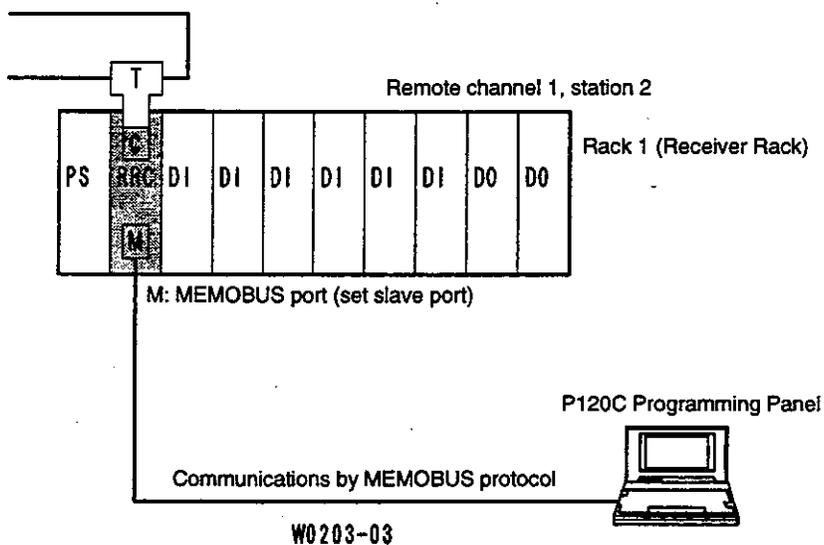
Note When connecting a MEMOBUS master such as a P120 Programming Panel to the MEMOBUS port of the Remote I/O Receiver Module, only one master can be connected per remote channel. More than one master cannot be connected to one remote channel.

- d) See *Table 2.5* for the transmission specifications of the MEMOBUS port.

e) An example using the MEMOBUS port is shown below.

◀EXAMPLE▶

Connecting Programming Panel to MEMOBUS Port



- PS: Power Supply Module
- RRC: Remote I/O Receiver Module
- DI: Input Module
- DO: Output Module
- MB: Mounting Base
- W0203-03: MEMOBUS Cable (2.5 m)

Figure 2.2 Using the MEMOBUS Port

f) The connector for the MEMOBUS port is a D-sub connector (9-pin, female). The connector pin arrangement and signal names are shown in the following table.

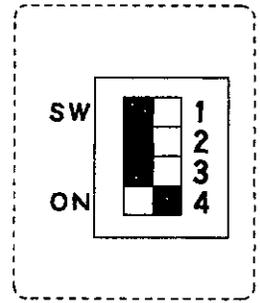
Table 2.7 Pin Arrangement and the Signal Names of MEMOBUS Port

Pin No.	Symbol	Signal Name
1	FG	Protective ground
2	TXD	Transmission data
3	RXD	Reception data
4	RTS	Request to send
5	CTS	Clear to send
6	DSR	Data set ready
7	GND	Signal ground
8	-	Not used
9	DTR	Data terminal ready

3) DIP Switch

The baud rate for the 2000-series Remote I/O Receiver Module is set using the DIP switch on the front panel of the Module. The DIP switch can be set either before or after the Module is installed. The switch settings are read and stored when the Module is turned ON or reset.

a) The DIP switch consists of 4 pins. The pins are numbered from 1 to 4 as shown in the diagram.



b) Each pin is turned ON when pressed to the left.

c) Each pin becomes effective at the following times.

Pin 3 and pin 4: When the reset switch is pressed, or when AC power is turned ON to the Power Supply Module of Rack 1 (Receiver Rack).

d) Each pin's function is shown in the following table.

Table 2.8 Function of DIP Switch

Pin No.	Settings	Function		
1	ON	Not used. Set to OFF.		
	OFF			
2	ON	Not used. Set to OFF.		
	OFF			
3 4	Set the baud rate of Remote I/O System according to the table shown on the right.	Pin 3	Pin 4	Baud Rate
		ON	ON	4 Mbps
		ON	OFF	2 Mbps
		OFF	ON	1 Mbps
		OFF	OFF	0.5 Mbps

4) Rotary Switches

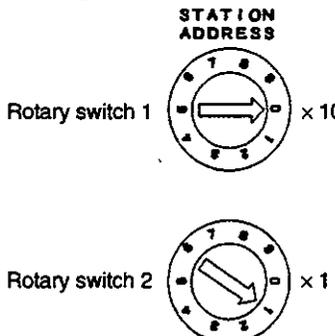
a) The rotary switches are used to set the station address of the Remote I/O Receiver Module.

b) There are two rotary switches. The top rotary switch is rotary switch 1 and the bottom switch is rotary switch 2. Each switch has positions form 0 to 9.

c) The settings of the rotary switches are effective (read) when the reset switch is pressed, or when AC power is turned ON to the Power Supply Module of the Rack where the Remote I/O Receiver Module is mounted.

d) Station addresses are set between 1 and 15. The following table shows the settings.

Table 2.9 Setting the Station Address

Example Settings of Station Address 1		Station Address	Rotary Switch 1	Rotary Switch 2
	1 to 9	0	1 to 9	
	10 to 15	1	0 to 5	
	0 or 16 to 99	Not permitted.		

- Note**
- (1) Set station address to between 1 and 15. If the address is set to 0 or to 16 or above, normal communications will not be possible.
 - (2) Do not use the same address for more than one station within the same channel. If this occurs, remote stations with the same address will not be able to communicate normally.

5) Reset Switch

a) Press the reset switch in the following cases.

- (1) When you have changed the setting of DIP switch pin 3 or 4.
- (2) When you have changed the setting of the rotary switches.
- (3) When errors have occurred.

b) When the reset switch is pressed, communications between the Remote I/O Receiver Module and Remote I/O Driver Module are interrupted. Communications restart when the switch is released.

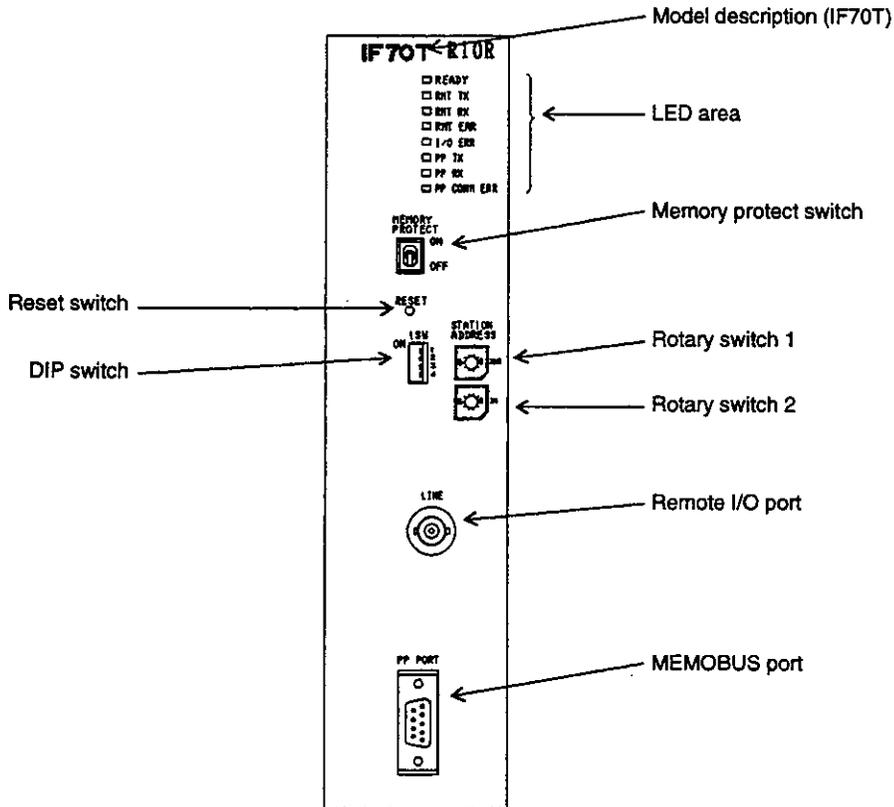
2.3 1000-series Remote I/O Receiver Module

This section provides the names and specifications of each component of the 1000-series Remote I/O Receiver.

2.3.1	Names of Components	2-13
2.3.2	General Specifications	2-15
2.3.3	Performance Specifications	2-16
2.3.4	Functions	2-17

2.3.1 Names of Components

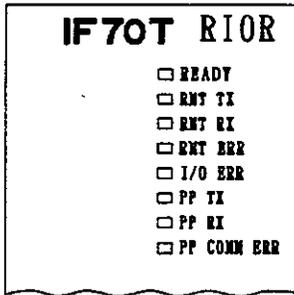
The following diagram shows the name of each component.



Remote I/O Specifications

2.3.1 Names of Components cont.

LED area



LED	Color	Indication when ON
READY	Green	Module is operating normally.
RMT TX	Green	Module is transmitting data from the remote I/O port.
RMT RX	Green	Module is receiving data from the remote I/O port.
I/O ERR	Red	An error has occurred during Module I/O processing.
RMT ERR	Red	An error has occurred in the communications for the remote I/O port. Lit for 10 ms.
PP TX	Green	Module is transmitting data from the MEMOBUS port.
PP RX	Green	Module is receiving data from the MEMOBUS port.
PP COMM ERR	Red	An error has occurred in the transmission from the MEMOBUS port.

Note The 1000-series Remote I/O Receiver Module (IF70T) is used in conjunction with a 1000-series I/O Adapter (J1060).

2.3.2 General Specifications

The following table lists the general specifications for the 1000-series Remote I/O Receiver Module.

Table 2.10 General Specifications of 1000-series Remote I/O Receiver Module

Item		Specifications
Physical Environment	Ambient Operating Temperature	0 to 55 °C
	Ambient Storage Temperature	-20 to 85 °C
	Ambient Operating Humidity	30% to 95% RH (with no condensation)
	Pollution Level	Pollution level 1 according to JIS B3501.
	Corrosive Gas	No corrosive gas
Mechanical Operating Conditions	Vibration Resistance	Complies with JIS B3502: 10 to 57 Hz: Single amplitude 0.075 mm 57 to 150 Hz: Fixed acceleration 9.8 m/s ² (1G) 10 sweep cycles in directions X, Y, and Z. (Sweep time: 1 octave/min)
	Shock Resistance	Complies with JIS B3502: Acceleration peak value: 147 m/s ² (15G) Usage time: 11 ms Shock direction: Twice in directions ±X, ±Y, and ±Z.
Electrical Operating Conditions	Noise Immunity	Complies with JIS B3502: 1,500 V _(p-p) in either normal or common mode with a pulse width of 100 ns/1 μs and a pulse rise time of 1 ns (tested with impulse noise simulator)
Dielectric Strength		Between all I/O terminals and internal circuit, and between I/O common terminals: 1,500 VAC (for 1 min)
Insulation Resistance		Between all I/O terminals and ground: At least 100 MΩ (at normal temperature and humidity) when measured with a 500-VDC insulation resistance tester
Installation Requirements	Ground	Ground to 100Ω or less
	Configuration	Building-block structure Wall-mounted or DIN track-mounted (either possible)
	Cooling Method	Natural cooling

2.3.3 Performance Specifications

The following table lists the performance specifications for the 1000-series Remote I/O Receiver Module.

Table 2.11 1000-series Remote I/O Receiver Module Specifications

Item		Specifications
Model Number		JAMSC-IF70T
Dimensions		59.8 × 250 × 94 mm (W × H × D)
Mass		Approx. 600 g
Internal Current Consumption		2.4 A
Heat Generation		12 W max.
Hot Swapping (Removal/Insertion under Power)		Not permitted
Remote I/O Port Specifications	Topology (Communications Network Configuration)	Bus
	Media Access Control Method	Multi-drop (1:n communications)
	Media (Transmission Medium)	Coaxial cable (75 Ω)
	Modulation Method	Baseband
	Encoding Method	Manchester coding
	Baud Rate	Choose from 0.5, 1, 2, and 4 Mbps
	Transmission Distance	Transmission distance varies according to the band rate and the specifications of coaxial cable. If, for example, the baud rate is 4 Mbps and 12C-5AF Coaxial Cable is used, it is possible to transmit up to 1 km max.
	Number of Stations	15 max. (Up to 15 Remote I/O Receiver Modules are connectable.)
	Error Control (RAS)	Automatic removal and recovery function for error stations
	Synchronization Method	Frame
	Communications Format	Conforms to HDLC.
	Insulation Method	Pulse transformer
	Connector	BNC connector
MEMOBUS Port Specifications	Communications Method	Half-duplex asynchronous method
	Transmission Levels	Conform to RS-232C
	Protocol	MEMOBUS protocol
	Baud Rate	9,600 bps
	Communications Mode	RTU mode
	Data Format	The following data format is used between master and slaves, between master and modems, and between modems and slaves: 1) Data bit length: 8 (RTU mode) 2) Parity check: Yes 3) Parity: Even 4) Stop bits: 1 or 2
	Transmission Distance	15 m (Can be extended to 4.5 km maximum by using Yaskawa modem.)
	Transmission Error Detection	CRC-16 (RTU mode)
Connector	D-sub connector (9-pin, female)	

2.3.4 Functions

The 1000-series Remote I/O Receiver Module functions as a slave station for the Remote I/O System.

1) Remote I/O Port

The 2000-series Remote I/O Driver, 2000-series Remote I/O Receiver, and 1000-series Remote I/O Receiver each have one remote I/O port for data communications. The Remote I/O System is configured by connecting these ports with coaxial cable.

2) MEMOBUS Port

- a) The 1000-series Remote I/O Receiver Module can perform communications (slave communications) using an RS-232C interface via a MEMOBUS port. The MEMOBUS protocol is used as the communications protocol.
- b) The following table shows an example of the devices that can be connected to the MEMOBUS port. An RS-232C interface must be provided by these devices.

Table 2.12 Example of Devices Connectable to the MEMOBUS Port

Type	Device	Remarks
MEMOBUS Master	P120-series Programming Panel	<ul style="list-style-type: none"> • Communications performed using the MEMOBUS protocol. • No communications program needs to be created.
	Personal computer (with MEMOSOFT)	<ul style="list-style-type: none"> • If your computer does not have MEMOSOFT, create a communications program based on the MEMOBUS protocol.
	ACGC4000/400-series FA Monitor	

c) Number of Connectable MEMOBUS Masters

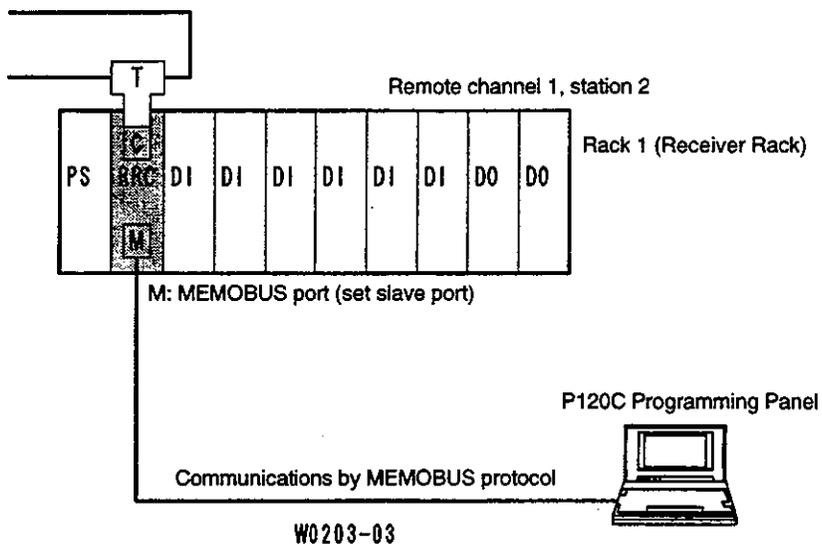
Note When connecting a MEMOBUS master such as a P120 Programming Panel to the MEMOBUS port of the Remote I/O Receiver Module, only one master can be connected per remote channel. More than one master cannot be connected to one remote channel.

- d) See *Table 2.11* for the transmission specifications of the MEMOBUS port.

e) An example using the MEMOBUS port is shown below.

◀ **EXAMPLE** ▶

Connecting Programming Panel to MEMOBUS Port



- PS: Power Supply Module
- RRC: Remote I/O Receiver Module**
- DI: Input Module
- DO: Output Module
- MB: Mounting Base
- W0203-03: MEMOBUS Cable (2.5 m)

Figure 2.3 Using the MEMOBUS Port

f) The connector for the MEMOBUS port is a D-sub connector (9-pin, female). The connector pin arrangement and signal names are shown in the following table.

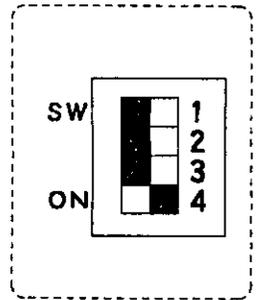
Table 2.13 Pin Arrangement and the Signal Names of MEMOBUS Port

Pin No.	Symbol	Signal Name
1	FG	Protective ground
2	TXD	Transmission data
3	RXD	Reception data
4	RTS	Request to send
5	CTS	Clear to send
6	DSR	Data set ready
7	GND	Signal ground
8	-	Not used
9	DTR	Data terminal ready

3) DIP Switch

The baud rate for the 1000-series Remote I/O Receiver Module is set using the DIP switch on the front panel of the Module. The DIP switch can be set either before or after the Module is installed. The switch settings are read and stored when the Module is turned ON or reset.

- a) The DIP switch consists of 4 pins. The pins are numbered from 1 to 4 as shown in the diagram.
- b) Each pin is turned ON when pressed to the left.
- c) Each pin becomes effective at the following times.



Pin 3 and pin 4: When the reset switch is pressed, or when AC power is turned ON to the Power Supply Module of Rack 1 (Receiver Rack).

- d) Each pin's function is shown in the following table.

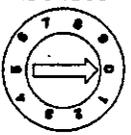
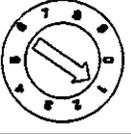
Table 2.14 Functions of DIP Switch

Pin No.	Settings	Function		
1	ON	Not used. Set to OFF.		
	OFF			
2	ON	Not used. Set to OFF.		
	OFF			
3	Set the baud rate of Remote I/O System according to the table shown on the right.	Pin 3	Pin 4	Baud Rate
4		ON	ON	4 Mbps
		ON	OFF	2 Mbps
		OFF	ON	1 Mbps
	OFF	OFF	0.5 Mbps	

4) Rotary Switches

- a) The rotary switches are used to set the station address of the Remote I/O Receiver Module.
- b) There are two rotary switches. The top rotary switch is rotary switch 1 and the bottom switch is rotary switch 2. Each switch has positions from 0 to 9.
- c) The settings of the rotary switches are effective (read) when the reset switch is pressed, or when AC power is turned ON to the Power Supply Module of the Rack where the Remote I/O Receiver Module is mounted.
- d) Station addresses are set between 1 and 15. The following table shows the settings.

Table 2.15 Setting the Station Address

Example Settings of Station Address 1		Station Address	Rotary Switch 1	Rotary Switch 2
Rotary switch 1 		1 to 9	0	1 to 9
		10 to 15	1	0 to 5
Rotary switch 2 		0 or 16 to 99	Not permitted.	

- Note**
- (1) Set station address to between 1 and 15. If the address is set to 0 or to 16 or above, normal communications will not be possible.
 - (2) Do not use the same address for more than one station within the same channel. If this occurs, remote stations with the same address will not be able to communicate normally.

5) Reset Switch

a) Press the reset switch in the following cases.

- (1) When you have changed the setting of DIP switch pin 3 or 4.
- (2) When you have changed the settings of the rotary switches.
- (3) When errors have occurred.

b) When the reset switch is pressed, communications between the Remote I/O Receiver Module and Remote I/O Driver Module are interrupted. Communications restart when the switch is released.

I/O Servicing and Scan Time

3

This chapter describes the relationship between I/O servicing and the scan time.

3.1 I/O Servicing and Scan Time	3-2
3.1.1 Logic Solving and I/O Processing	3-2
3.1.2 I/O Processing Sequence	3-2
3.1.3 Delay of I/O Signals	3-3
3.1.4 I/O Processing Time	3-5

3.1 I/O Servicing and Scan Time

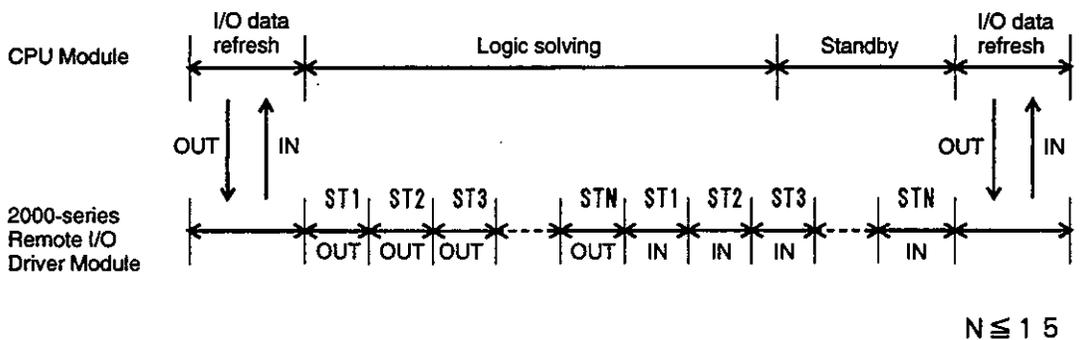
■ This section describes the relationship between I/O servicing and scanning.

3.1.1	Logic Solving and I/O Processing	3-2
3.1.2	I/O Processing Sequence	3-2
3.1.3	Delay of I/O Signals	3-3
3.1.4	I/O Processing Time	3-5

3.1.1 Logic Solving and I/O Processing

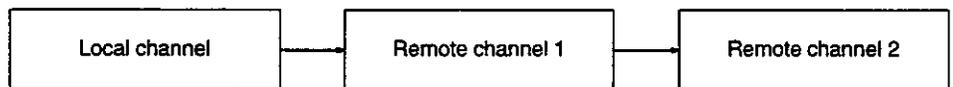
- 1) With the GL120 or GL130, logic solving by the CPU Module and parallel I/O processing by the 2000-series Remote I/O Driver Module are performed in parallel. Therefore, a scan delay occurs until the input signal connected to an Input Module is transmitted to the CPU Module, or until the result of logic solving (output signal) by the CPU Module is transmitted to an external device connected to an Output Module.

- 2) The relationship between logic solving by the CPU Module and I/O processing by the 2000-series Remote I/O Driver is shown below.

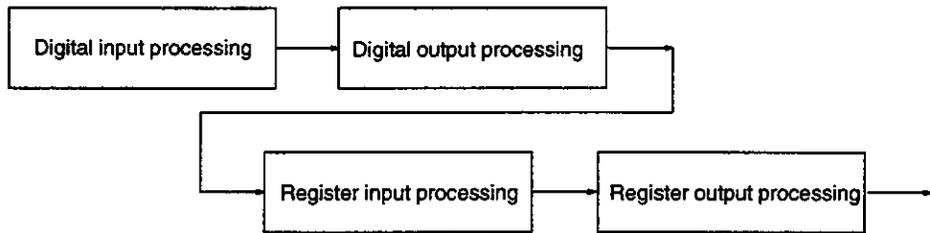


3.1.2 I/O Processing Sequence

- 1) I/O processing services are performed in the following sequence: local channel, remote channel 1, and then remote channel 2.



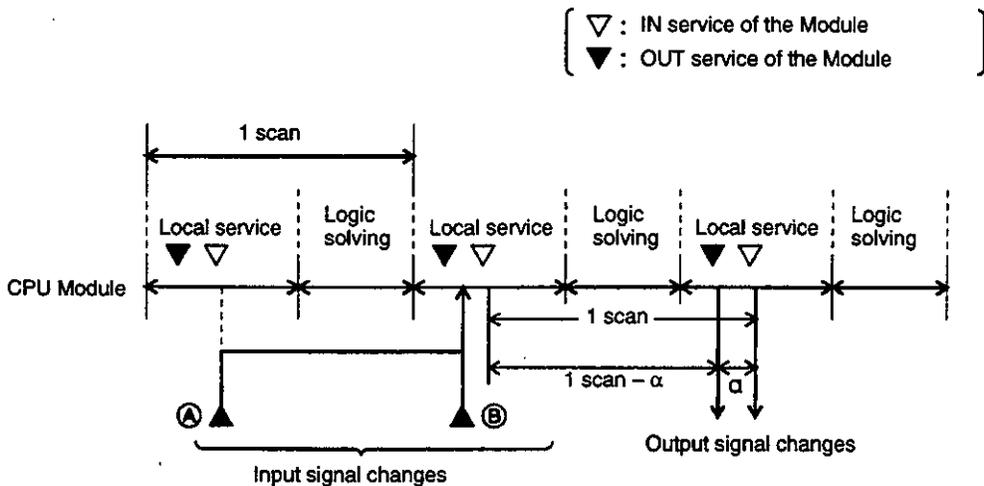
- 2) For each remote channel, I/O servicing is performed in ascending order of station addresses (1 to 15) in the following sequence.



3.1.3 Delay of I/O Signals

A delay occurs from the time a change occurs in an input signal until the CPU Module recognizes the change, solves the logic, and the result appears as an output signal.

1) Local Channel



a) Change of Input Signal → CPU Module: 0 to 1 Scan

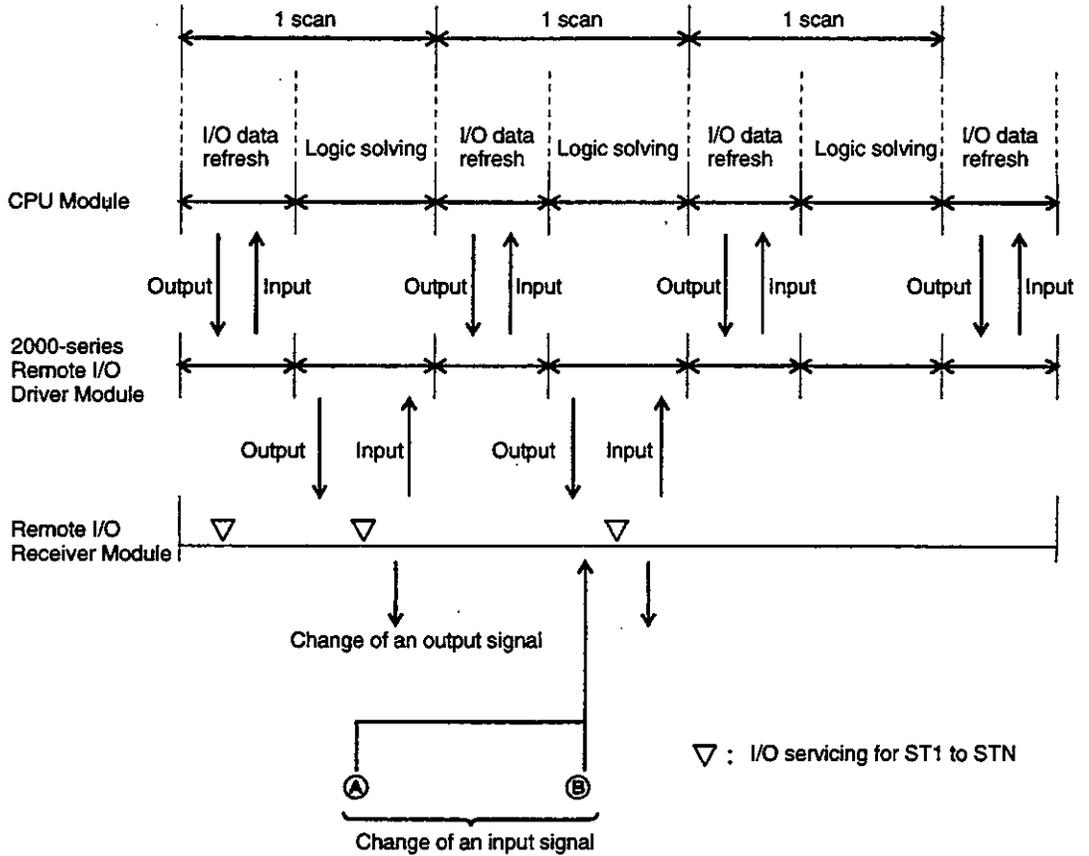
Time required for a change of an input signal to be input to the CPU Module through an Input Module is shown above. When a change of an input signal occurs near (A), the maximum delay is one scan, however, if a change occurs near (B), the delay will be minimal.

b) CPU Module → Change of Output Signal: $1 \text{ Scan} - \alpha$

The value of α depends on the I/O allocation. This is the time required from when a CPU Module starts to solve logic until the result appears as an output signal through an Output Module.

- c) A time of $(1 \text{ scan} - \alpha)$ to $(2 \text{ scan} - \alpha)$ is thus required from a change in an input signal to the result appearing as an output signal. However, α varies according to the I/O allocation.

2) Remote I/O Channels



a) Change in Input Signal → Remote I/O Receiver Module: 1 Scan or Less

This is the time required for a change in an input signal to be input to a Remote I/O Receiver Module through an Input Module. As shown above, when a change in an input signal occurs near (A) in the diagram, the maximum delay is one scan. When a change occurs near (B) in the diagram, the delay will be minimal.

b) Remote I/O Receiver Module → Remote I/O Driver Module → CPU Module: 1 Scan

c) CPU Module → Remote I/O Driver Module: 1 Scan

d) Remote I/O Driver Module → Remote I/O Receiver → Change in Output: 1 Scan or Less

- e) Therefore, 2 to 4 scan times are required for a change in an input signal to be output as an output signal.

3.1.4 I/O Processing Time

- 1) The I/O processing time in GL120 or GL130 can be calculated using the following equation.

$$\text{I/O processing time} = \text{Local I/O processing time} + \text{Optional Module processing time} + \text{Remote I/O processing time}$$

When no I/O Modules are allocated, the I/O processing time will be 0 if an Optional Module is not used.

- 2) Local I/O processing time = Input overhead + Output overhead + Total Input Module time + Total input byte time + Total Output Module time + Total output byte time

Item	GL120 (μs)	GL130 (μs)
Input overhead	67	100
Output overhead	56	91
Overhead per Input Module	83 (96)	72 (88)
Transmission time per input byte	20 (24)	15 (19)
Overhead per Output Module	91 (105)	75 (91)
Transmission time per output byte	10 (14)	8 (12)

Note Values in parentheses are for when Modules are installed in two to four racks.

◀EXAMPLE▶

The local I/O processing time will be as follows when two 24-VDC 32-point Input Modules and two 24-VDC 32-point Output Modules are used on rack 1 of the GL120:

$$\text{Local I/O processing time} = 67 + 56 + 83 \times 2 + 20 \times 8 + 91 \times 2 + 10 \times 8 = 711 \text{ (}\mu\text{s)}$$

- 3) The following table lists I/O processing times of Optional Modules.

I/O Processing Time of Optional Modules

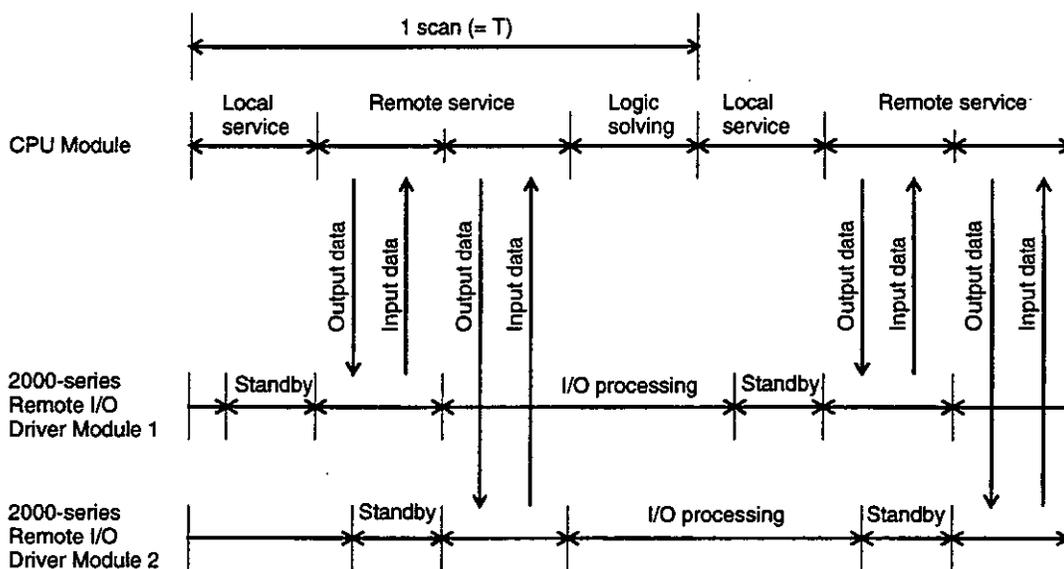
Name	Abbreviation	Model	GL120 I/O Processing Time (μs)	GL130 I/O Processing Time (μs)
MEMOBUS Module (RS-232)	MEMOBUS-232	JAMSC-120NOM26100	2900±300	3000±330
MEMOBUS Module (RS-422)	MEMOBUS-422	JAMSC-120NOM27100	2900±300	3000±330
PC Link Module (See note.)	PC LINK-COAX	JAMSC-120NFB23100	7400±1800+α	3000±1000+β
4-axis Motion Module	MC20	JAMSC-120MMB10400	1870	1497
1-axis Motion Module	MC10	JAMSC-120MMB10100		

Note The processing time for the following link data items is added to the PC Link Module.

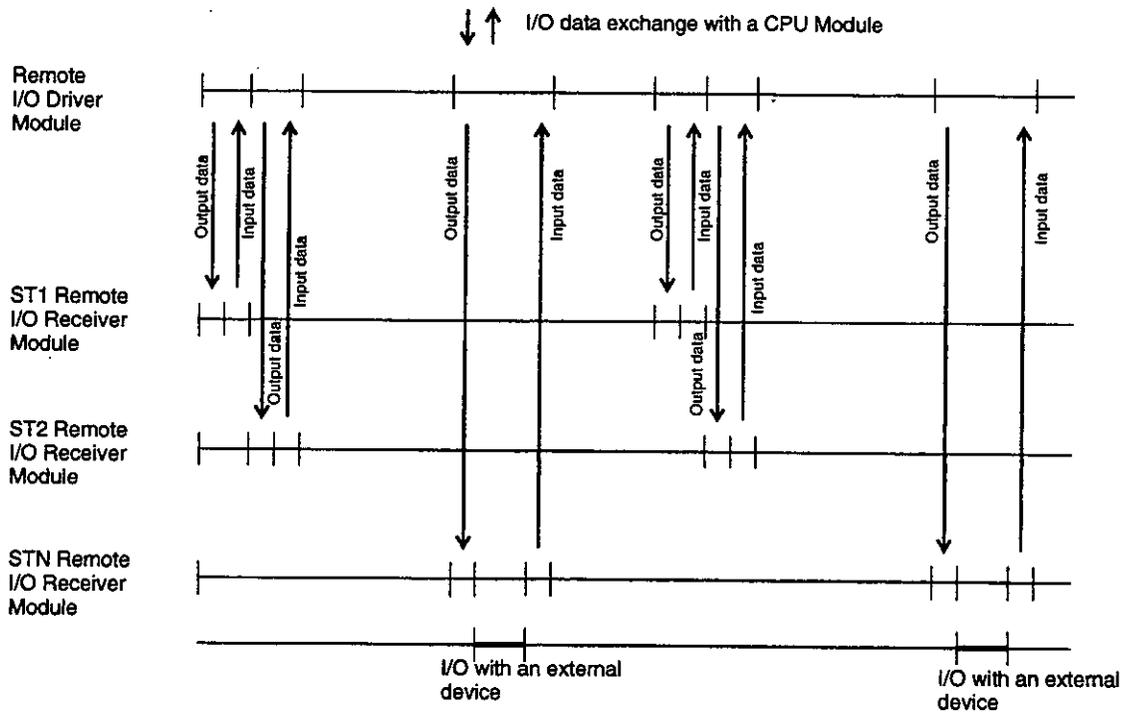
Item	Processing Time for Number of GL120 Data Items (μs)	Processing Time for Number of GL130 Data Items (μs)
Link input processing time	$3650 + 0.4 \times \text{No. of input words}$	$3500 + 0.23 \times \text{No. of input words}$
Link output processing time	$4260 + 1.42 \times \text{No. of output words}$	$140 + 1.95 \times \text{No. of output words}$
Processing time for the number of link data items	$\alpha = \text{input} + \text{output}$	$\beta = \text{input} + \text{output}$

4) Processing Time of Remote I/O

a) When remote I/O is connected, the relationship of data exchange between a Remote I/O Driver Module and the CPU Module is as follows:



b) 2000-series Remote I/O Station I/O Timing



3

External Connections

4

This chapter describes the procedures for installing and connecting a Remote I/O System.

4.1 Remote I/O Ports	4-2
4.2 Transmission Distance	4-5
4.2.1 Calculation Method	4-5
4.2.2 Maximum Transmission Distance	4-6
4.3 Configuration of Remote I/O Transmission Lines	4-7
4.4 In-panel Wiring	4-10
4.4.1 Cables	4-10
4.4.2 Connections between Devices	4-13
4.4.3 Shield Treatment	4-13
4.4.4 Separating Coaxial Cables from Other Cables	4-13
4.5 Indoor Panel-to-Panel Wiring	4-15
4.5.1 Connection between Devices	4-15
4.5.2 Shield Treatment	4-16
4.5.3 Separating Coaxial Cables from Other Cables	4-16
4.6 Outdoor Panel-to-Panel Wiring	4-19
4.7 Grounding	4-21
4.7.1 Grounding Methods	4-21
4.7.2 Shielded Coaxial Cables	4-22
4.7.3 Metal Conduits and Metal Ducts	4-22
4.8 Installation of Control Panel	4-23

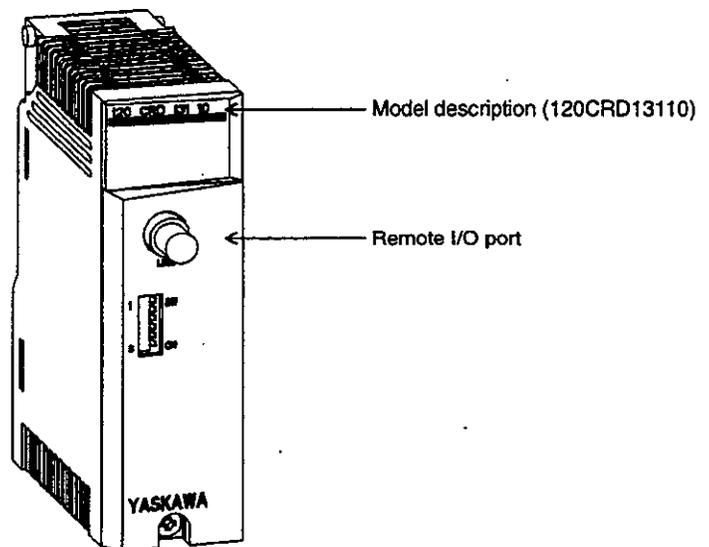
4.1 Remote I/O Ports

■ This section provides the specifications of the remote I/O ports.

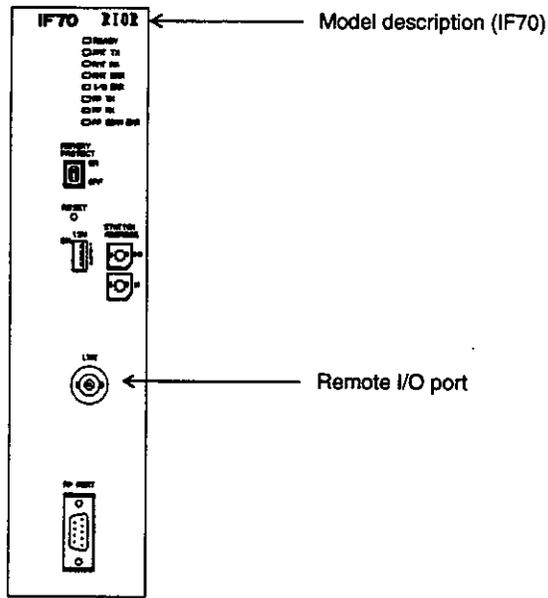
Overview

The 2000-series Remote I/O Driver, 2000-series Remote I/O Receiver, and 1000-series Remote I/O Receiver each have one remote I/O port for data communications. The Remote I/O System is configured by connecting these ports with coaxial cable.

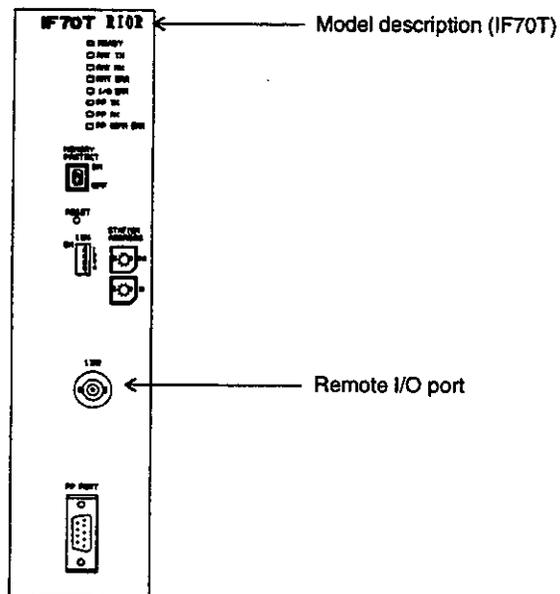
1) 2000-series Remote I/O Driver



2) 2000-series Remote I/O Receiver (Model: JAMSC-IF70)



3) 1000-series Remote I/O Receiver (Model: JAMSC-IF70T)



4) Remote I/O Port Specifications

Table 4.1 Remote I/O Port Specifications

Item	Specifications
Topology (Communications Network Configuration)	Bus
Media Access Control Method	Multi-drop (1:n communications)
Media (Transmission Medium)	Coaxial cable (75 Ω)
Modulation Method	Baseband
Encoding Method	Manchester coding
Baud Rate	Choose from 0.5, 1, 2, and 4 Mbps
Transmission Distance	Transmission distance varies according to the band rate and the specifications of coaxial cable. If, for example, the baud rate is 4 Mbps and 12C-5AF Coaxial Cable is used, it is possible to transmit up to 1 km max.
Number of Stations	15 max. (Up to 15 Remote I/O Receiver Modules are connectable.)
Error Control (RAS)	Automatic removal and recovery function for error stations
Synchronization Method	Frame
Communications Format	Conforms to HDLC.
Insulation Method	Pulse transformer
Connector	BNC Connector

4.2 Transmission Distance

This section describes how to calculate the transmission distance of a Remote I/O transmission line.

4.2.1	Calculation Method	4-5
4.2.2	Maximum Transmission Distance	4-6

4.2.1 Calculation Method

The distance of a Remote I/O transmission line varies according to the baud rate, the number of Remote I/O Receiver Modules that are connected, and the type of coaxial cables used. The calculation method is shown below.

$$L = PL/Pa \text{ (km)}$$

$$\begin{aligned} \text{Where, } PL &= Pdr - Pm - Pt - Psn \\ &= Pdr - 4.0 - 1.0 - Psn \text{ (dB)} \end{aligned}$$

$$\begin{aligned} Pdr &= Pd - Pr + Px \\ &= 19.4 \text{ (dB)} + Px \end{aligned}$$

- L: Transmission distance (km)
 PL: Coaxial cable allowable loss (dB)
 Pa: Coaxial cable signal attenuation (dB/km)
 Pdr: Transmission/reception level difference (dB)
 Pm: Noise margin (dB)
 Pt: Power supply temperature fluctuation (dB)
 Psn: Module insertion loss (dB)
 Pd: Transmission level = 68.9 (dB)
 Pr: Reception level = 49.5 (dB)
 Px: Compensation (depends on the baud rate) =
 -3.4 dB/4 MHz, -2.4 dB/2 MHz, -1.9 dB/1 MHz, -1.4 dB/0.5 MHz

1) Coaxial Cable Allowable Loss: PL

Baud Rate (Mbps)	Transmission/ Reception Level Difference: Pdr (dB)	Coaxial Cable Allowable Loss: PL (dB)		
		PL	n = 1 (Receivers)	n = 15 (Receivers)
4	16.0	PL (4) = 11.0 - Psn (4)	10.78 dB	9.24 dB
2	17.0	PL (2) = 12.0 - Psn (2)	11.76 dB	10.08 dB
1	17.5	PL (1) = 12.5 - Psn (1)	12.22 dB	10.26 dB
0.5	18.0	PL (0.5) = 13.0 - Psn (0.5)	12.66 dB	10.28 dB

2) Module Insertion Loss: Psn

Baud Rate (Mbps)	Module Insertion Loss: Psn (dB)		
	Ps	n = 9	n = 15
4	0.11 (dB/unit)	1.1 dB	1.76 dB
2	0.12 (dB/unit)	1.2 dB	1.92 dB
1	0.14 (dB/unit)	1.4 dB	2.24 dB
0.5	0.17 (dB/unit)	1.7 dB	2.72 dB

$P_{sn} = P_s \times (n + 1)$

Where n = Number of Remote I/O Receiver Modules and 1 = Remote I/O Driver Module

3) Coaxial Cable Signal Attenuation: Pa

Cable (Manufactured by Fujikura, Ltd.)	Signal Attenuation: Pa (dB/km)			
	0.5 MHz	1 MHz	2 MHz	4 MHz
3C-2V, 3C-2V (Cu, Fe) ZV	9.0	13.8	20.0	28.8
5C-2V, 5C-2V (Cu, Fe) ZV	5.1	8.8	12.7	18.4
5C-FB, 5C-FB (Cu, Fe) ZV	4.8	7.4	10.5	14.0
7C-FB, 7C-FB (Cu, Fe) ZV	4.2	5.8	7.6	10.0
7C-FL, 7C-FL (Cu, Fe) ZV	2.9	4.4	6.4	9.3
12C-5AF, 12C-5AF (Cu, Fe) ZV	1.46	2.2	3.2	4.5

Signal attenuation: Pa is the value determined by multiplying the standard value by 1.15.

4.2.2 Maximum Transmission Distance

The maximum transmission distance (Lmax) is given in the following table when the number (n) of Remote I/O Receiver Modules is 15 and the in-panel cable length (3C-2V) is 50 m or less.

Maximum transmission distance:

$L_{max} = \text{In-panel cable length} + \text{Panel-to-panel cable length}$

Example of Lmax (n = 15 Modules)

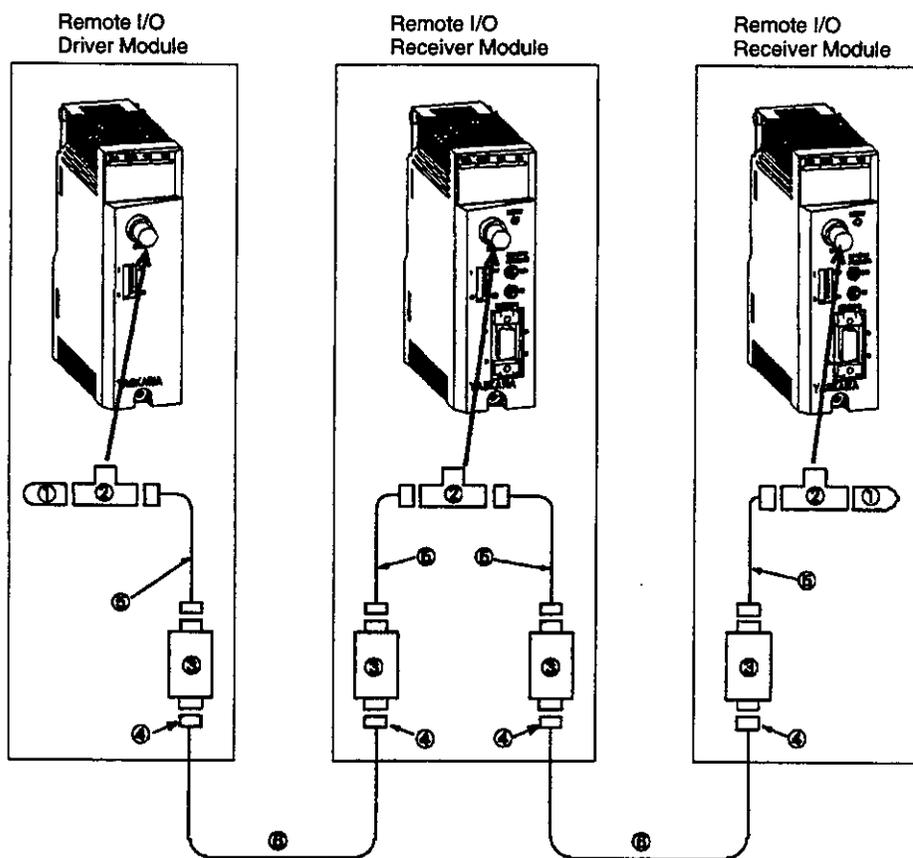
Baud Rate (Mbps)	Length of Coaxial Cable (km)				Maximum Transmission Distance: Lmax (km)
	3C-2V	5C-2V	7C-FL	12C-5AF	
4	0.05	0.42	0	0	0.47
	0.05	0.05	0	1.29	1.39
	0.05	0	0.83	0	0.88
2	0.05	0.71	0	0	0.76
	0.05	0.05	0	2.27	2.37
	0.05	0	1.41	0	1.46
1	0.05	1.03	0	0	1.08
	0.05	0.05	0	3.35	3.45
	0.05	0	2.16	0	2.21

4.3 Configuration of Remote I/O Transmission Lines

■ This section describes the configuration of remote I/O transmission lines.

The configuration of Remote I/O transmission lines is illustrated below. A Remote I/O transmission line consists of coaxial cables and coaxial connectors. As illustrated, the Remote I/O Driver Module does not necessarily have to be installed as an end station of the transmission line. Coaxial cables can be in-panel cables or panel-to-panel cables.

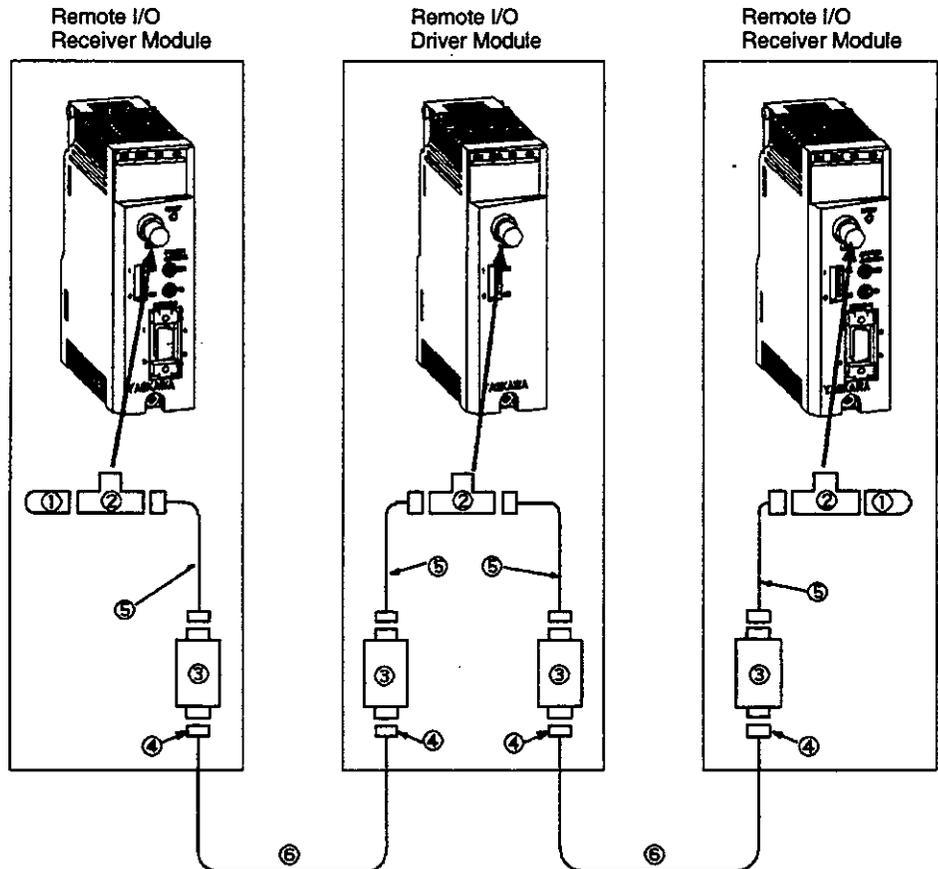
a) Remote I/O Driver Module Installed at End of Transmission Line



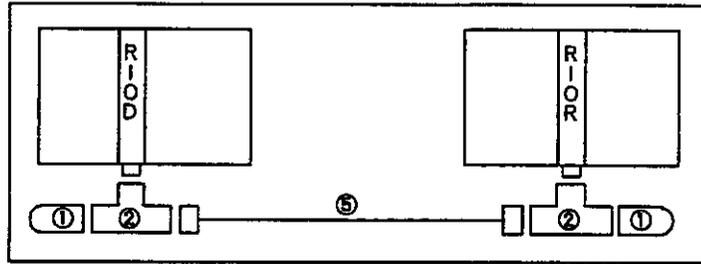
No.	Name	Model	Remarks
1	Terminator (75 Ω)	221629-5	Used at the end station of a transmission line.
2	T-adapter	413592-2	Used to connect a coaxial cable used as the terminal at a BNC Connector to a Module intended as a station.
3	Conversion Adapter	T-0298	Used to connect a coaxial cable used as the terminal at a BNC Connector to an F-connector coaxial cable.
4	F-connector	F-5FB	Used as the terminal for a trunk-line coaxial cable.
5	W60 Cable	JZMSZ-W60-□ W60-1: 2.0 m W60-2: 3.0 m W60-3: 5.0 m	Used as a branch cable (for in- panel wiring). A BNC Connector is used at each end of the cable.
6	Panel-to-panel coaxial cable (See note)	5C, 7C, 11C, 12C etc.	Select the appropriate cable according to the connection distance.

Note The W61 Cable, which can be used as a trunk line (panel-to-panel wiring), with an F-connector at both ends, is also available from Yaskawa.

b) Remote I/O Receiver Module Panels Installed at Ends of Transmission Line



c) Remote I/O Driver and Receiver Modules Installed in Same Panel



No.	Name	Model	Remarks
1	Terminator (75 Ω)	221629-5	Used at the end station of a transmission line.
2	T-adapter	413592-2	Used to connect a coaxial cable used as the terminal at a BNC Connector to a Module intended as a station.
3	Conversion Adapter	T-0298	Used to connect a coaxial cable used as the terminal at a BNC Connector to an F-connector coaxial cable.
4	F-connector	F-5FB	Used as the terminal for a trunk-line coaxial cable.
5	W60 Cable	JZMSZ-W60-□ W60-1: 2.0 m W60-2: 3.0 m W60-3: 5.0 m	Used as a branch cable (for in-panel wiring). A BNC Connector is used at each end of the cable.
6	Panel-to-panel coaxial cable (See note)	5C, 7C, 11C, 12C etc.	Select the appropriate cable according to the connection distance.

Note The W61 Cable, which can be used as a trunk line (panel-to-panel wiring), with an F-connector at both ends, is also available from Yaskawa.

4.4 In-panel Wiring

■ This section describes in-panel wiring.

4.4.1	Cables	4-10
4.4.2	Connections between Devices	4-13
4.4.3	Shield Treatment	4-13
4.4.4	Separating Coaxial Cables from Other Cables	4-13

4.4.1 Cables

1) Yaskawa Standard Coaxial Cables

Use the same coaxial cables as for GL120 PC Link Systems. The following table shows the models and specifications of Yaskawa standard coaxial cables.

a) W1000 Cable

Model	Cable Length	Cable Used	Remarks
JZMSZ-W1000-02	2 m	3C-2V (in-panel)	BNC Connectors at both ends
JZMSZ-W1000-03	3 m		
JZMSZ-W1000-05	5 m		

b) W60 Cable

Model	Cable Length	Cable Used	Remarks
JZMSZ-W60-1	2 m	3C-2V (in-panel)	BNC Connectors at both ends
JZMSZ-W60-2	3 m		
JZMSZ-W60-3	5 m		

c) W61 Cable

Model	Cable Length	Cable Used	Remarks
JZMSZ-W61-1	2 m	5C-FB (panel to panel)	F-connectors (F-5FB) at both ends Gold-plated contacts
JZMSZ-W61-2	5 m		
JZMSZ-W61-3	10 m		

2) Other Coaxial Cables

The table below shows the models and specifications of coaxial cables manufactured by Fujikura, Ltd.

Model (Fujikura, Ltd.)	Electrostatic and Magnetic Shield	Application	Conditions	Signal Attenuation: Pas (dB/km)			
				0.5 MHz	1 MHz	2 MHz	4 MHz
3C-2V	Not provided	In-panel	Special duct	9.0	12.0	17.0	25.0
3C-2V (Cu, Fe) ZV	Provided		Low-voltage duct				
5C-2V	Not provided	Panel-to-panel	Special duct	5.1	7.6	11.0	16.0
5C-2V (Cu, Fe) ZV	Provided		Low-voltage duct				
5C-FB	Not provided	Panel-to-panel	Special duct	4.8	7.4	10.5	14.0
5C-FB (Cu, Fe) ZV	Provided		Low-voltage duct				
7C-FB	Not provided	Panel-to-panel	Special duct	4.2	5.8	7.6	10.0
7C-FB (Cu, Fe) ZV	Provided		Low-voltage duct				
7C-FL	Not provided	Panel-to-panel	Special duct	2.9	3.8	5.6	8.1
7C-FL (Cu, Fe) ZV	Provided		Low-voltage duct				
12C-5AF	Not provided	Panel-to-panel	Special duct	1.46	2.2	3.2	4.5
12C-5AF (Cu, Fe) ZV	Provided		Low-voltage duct				

Note (a) Coaxial cables equivalent to the above can be applicable.

(b) Signal attenuation: Pas (dB/km) shows standard values.

3) Coaxial Connectors

The following table shows the models and specifications of coaxial connectors.

Connector	Name	Model	Abbreviation	Remarks	Manufacturer
Connection	BNC Connector	BNC-P-3-Ni-CAu	BNC-P-3	For 3C-2V, Gold-plated contacts	Daiichi Electronic Industries, Ltd.
	F-connector	FSPW-5-Ni-CAu		For 5C-2V, Gold-plated contacts	Fujikura, Ltd.
		F-5FB		For 5C-FB, Gold-plated contacts	Fujikura, Ltd.
		FSPW-7-Ni-CAu		For 7C-FL, Gold-plated contacts	Fujikura, Ltd.
		F-7FB		For 7C-FB, Gold-plated contacts	Fujikura, Ltd.
	Fitting Connector	FT-12C-2.9-TC31		For 12C-5AF, Gold-plated contacts	Fujikura, Ltd.
		FT-7C-FL		For 7C-FB, Gold-plated contacts	Fujikura, Ltd.
Branching	T-adapter	413592-2		For connection and branching	AMP
Conversion	Conversion Adapter	T-0298		For conversion of BNC and F-connectors	Yaskawa Electric Corp.
	Conversion Connector	FTR-FJ		For conversion of Fitting and F-connectors	Fujikura, Ltd.
Junction	Junction Connector	F-A		For joining F-connectors to each other	Fujikura, Ltd.
		FI-A		For connecting Fitting Connectors to each other	Fujikura, Ltd.
Termination	Terminator	221629-5		For termination of ends of transmission line	AMP

Note (a) All of the above connectors have a connection loss of 0 dB.

(b) Waterproof and insulate the junctions of the coaxial cable (e.g., wrap with self sealing tape).

(c) See 4.7 *Grounding* for information on grounding.

4.4.2 Connections between Devices

Figure 4.1 shows the connections between the Remote I/O Driver Module and a Remote I/O Receiver Module and the use of the Conversion Adapter between these Modules.

- 1) Connect a T-adapter to the BNC Connector (LINE) on the front panel of the Module.
- 2) Connect the BNC Connector at one end of the coaxial cable to the T-adapter and the BNC Connector at the other end of the cable to the BNC receptacle on the Conversion Adapter.

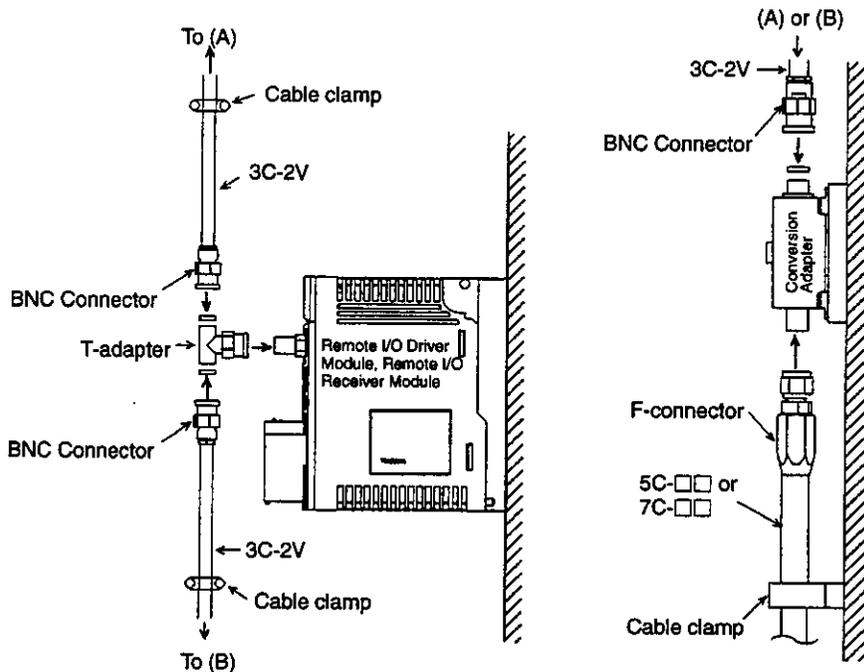


Figure 4.1 Device Connections

4.4.3 Shield Treatment

For shielded coaxial cables, ground the shield at one point (ground resistance: 100 Ω max). See 4.7 *Grounding* for details.

4.4.4 Separating Coaxial Cables from Other Cables

1) Separation from Low-voltage Cables

Keep coaxial cables at least 100 mm away from low-voltage cables. Alternatively, use coaxial cables shielded with copper or iron (hereafter referred to as shielded coaxial cables). The coaxial cable should be housed in metal conduit or a metal duct.

2) Separation from Operation Circuit Cables

Keep shielded coaxial cables at least 100 mm away from operation circuit cables. Alternatively, shield the operation circuit cables.

3) Separation from Main Circuit Cables

Keep shielded coaxial cables away from main circuit cables as shown in *Table 4.2*. Alternatively, shield the main circuit cables.

Table 4.2 Recommended Distances between Shielded Coaxial Cable and Main Circuit Cable

Main Circuit	Recommended Distance
125 V, 10 A	300 mm or more
250 V, 50 A	450 mm or more
440 V, 200 A	600 mm or more
3 kV to 6 kV, 800 A	1,200 mm or more

4.5 Indoor Panel-to-Panel Wiring

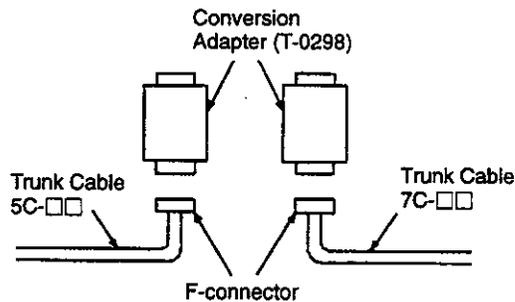
■ This section describes indoor panel-to-panel wiring.

4.5.1	Connection between Devices	4-15
4.5.2	Shield Treatment	4-16
4.5.3	Separating Coaxial Cables from Other Cables	4-16

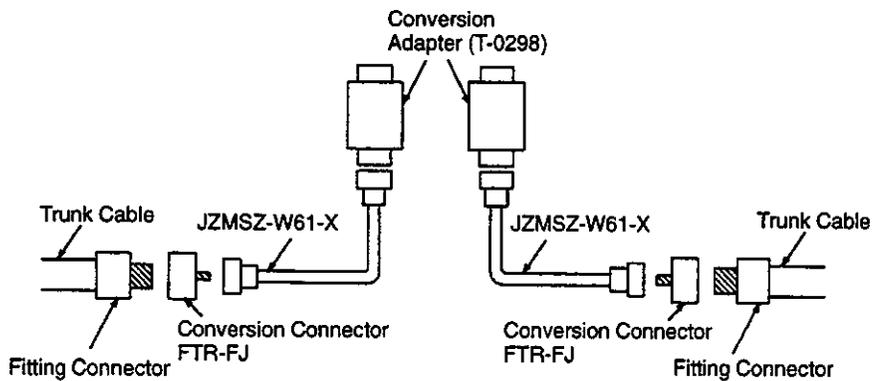
4.5.1 Connection between Devices

- 1) For Coaxial Cables 5C-□□ and 7C-□□, use F-connectors to connect to Conversion Adapters (see figure at a) below).
- 2) For trunk Coaxial Cables 11C-4AF and 12C-5AF, first connect to smaller Coaxial Cables 5C-□□ and 7C-□□ with Conversion Connectors, then connect these cables to Conversion Adapters with F-connectors (see figure at b) below).
- 3) Use Junction Connectors to connect trunk Coaxial Cables of the same size (see figure at c) below).

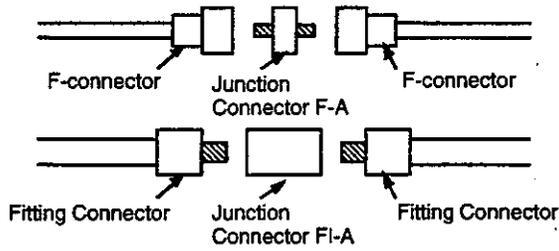
a) Connection of 5C - □□ and 7C - □□



b) Connection using Large Size Connectors



c) Connecting between Coaxial Cables



4.5.2 Shield Treatment

For shielded coaxial cables, ground the shield at one point (ground resistance: 100 Ω max). See 4.7 Grounding for details.

4.5.3 Separating Coaxial Cables from Other Cables

1) Shielded Coaxial Cables

House the shielded coaxial cable in a low-voltage circuit duct separated from general operation circuit duct as shown in Figure 4.2 (a). If the low-voltage circuit and general operation circuits are in the same duct, separate them by at least 100 mm, then place the shielded coaxial cable on the low-voltage circuit side as shown in Figure 4.2 (b).

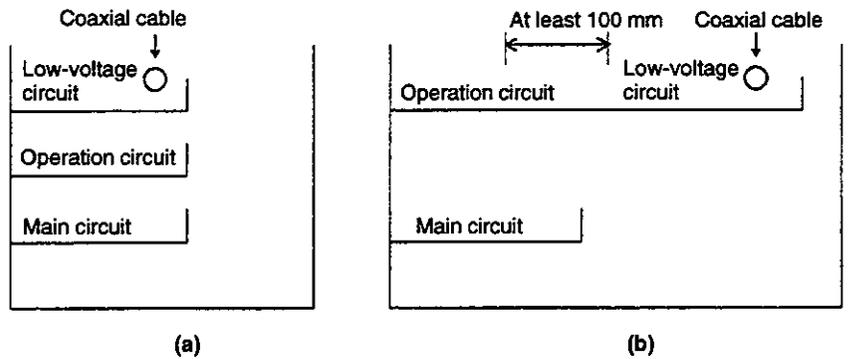


Figure 4.2 Separating Wire Ducts

2) Use a fitted duct cover that does not leave a gap between the duct and the cover.

Main Circuit	Recommended Distance
125 V, 10 A	300 mm or more
250 V, 50 A	450 mm or more
440 V, 200 A	600 mm or more
3 kV to 6 kV, 800 A	1,200 mm or more

3) Unshielded Coaxial Cables

Coaxial Cables must be run individually in metal conduit or metal duct as shown in *Figure 4.3*. Ground both ends of the metal conduit or duct and at as many points as necessary. Coaxial Cables 11C-4AF and 12C-5AF are difficult to run in conduit because they are inflexible. Run them individually in metal ducts. See *Figure 4.3 (b) and (d)*.

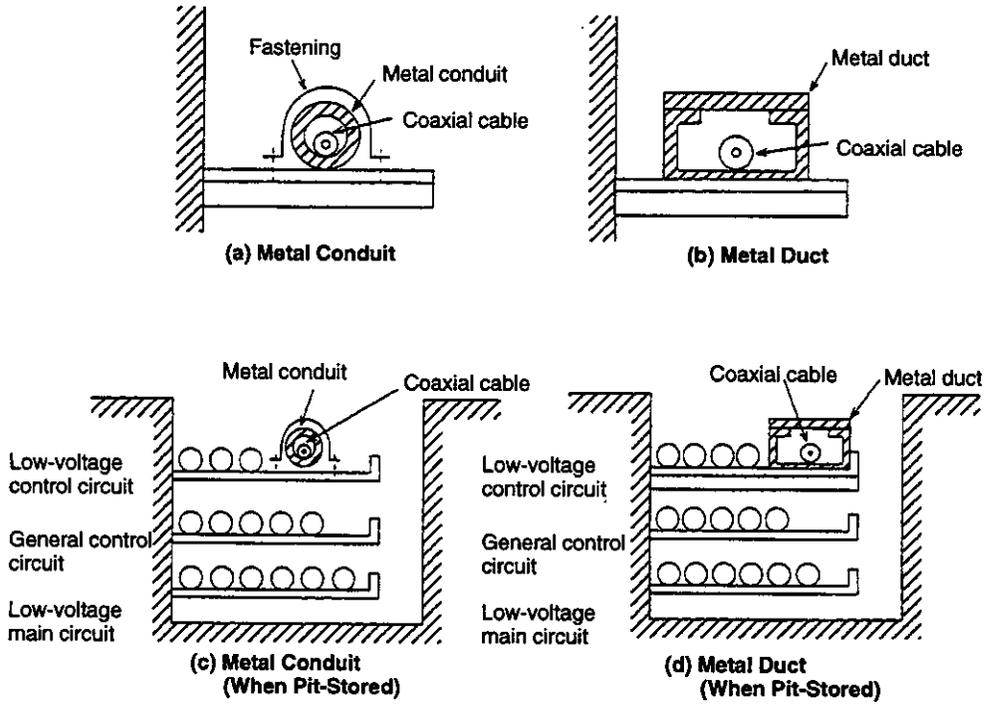


Figure 4.3 Coaxial Cable Installation

4) Bending Coaxial Cables

Use the following guidelines when bending coaxial cables: For 5C-□□ and 7C-□□, the bending radius must be 10 times or more of the finished bend diameter; For 11C-4AF and 12C-5AF, 20 times or more. (See Figures 4.4 and 4.5.) Use flexible metal conduit for bending so that the metal conduits can contact each other. In this case, the bending radius must be 20 times or more of the finished bend diameter for 5C-□□ and 7C-□□. (See Figure 4.5.)

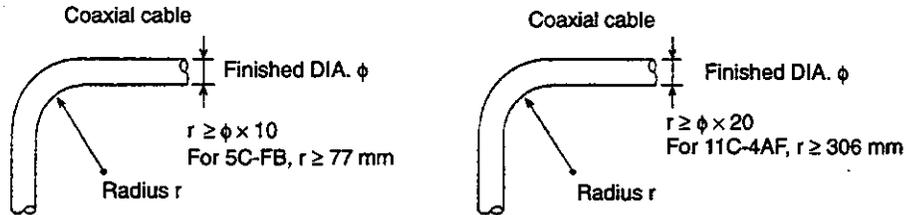


Figure 4.4 Cable Bending

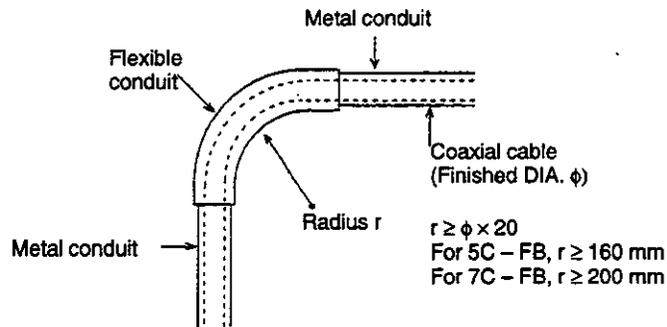


Figure 4.5 Metal Conduit Bending

a) Minimum Cable Bending Radius

Model (Made by Fujikura, Ltd.)	Finished Diameter in mm	Minimum Bending Radius in mm (formula)
3C-2V	5.6	56 ($r = \phi \times 10$)
3C-2V (Cu, Fe) ZV	8.6	86 ($r = \phi \times 10$)
5C-2V	7.5	75 ($r = \phi \times 10$)
5C-2V (Cu, Fe) ZV	12.0	120 ($r = \phi \times 10$)
5C-FB	7.7	77 ($r = \phi \times 10$)
5C-FB (Cu, Fe) ZV	12.0	120 ($r = \phi \times 10$)
7C-FB	10.0	100 ($r = \phi \times 10$)
7C-FB (Cu, Fe) ZV	13.0	130 ($r = \phi \times 10$)
7C-FL	10.0	100 ($r = \phi \times 10$)
7C-FL (Cu, Fe) ZV	14.5	145 ($r = \phi \times 10$)
11C-4AF	15.3	306 ($r = \phi \times 20$)
11C-4AF (Cu, Fe) ZV	18.3	366 ($r = \phi \times 20$)
12C-5AF	15.3	306 ($r = \phi \times 20$)
12C-5AF (Cu, Fe) ZV	20.0	400 ($r = \phi \times 20$)

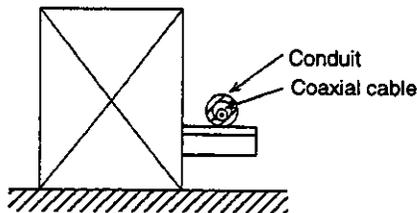
4.6 Outdoor Panel-to-Panel Wiring

■ This section describes outdoor panel-to-panel wiring.

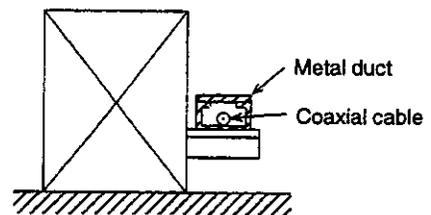
The procedures for laying coaxial cables are basically the same as those described in 4.5 *Indoor Panel-to-Panel Wiring*, but note the following differences.

- 1) For outdoor wiring, always lay coaxial cables along above ground structures (steel frames). If no such structures are available, house the cables in an underground pit or tunnel or bury the cables in the ground.

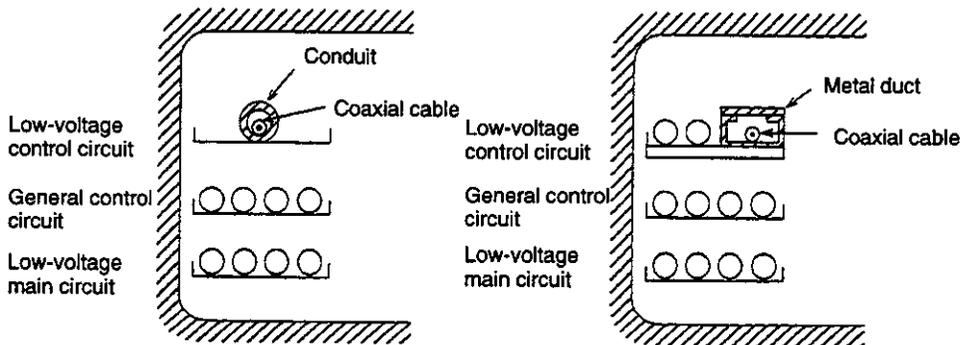
Construction on ground (with iron frames)



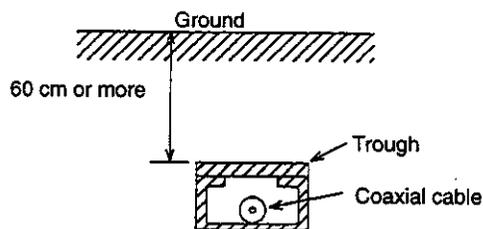
Construction on ground (with iron frames)



(a) Construction on Ground



(b) Underground Pit or Tunnel



(c) Burying in the Ground

- 2) Do not route bare coaxial cables overhead. The cables may receive noise induced from airborne radio waves and cause transmission errors. Because the GL120, GL130 Remote I/O System is not protected from lightning, the equipment may also be damaged by lightning strikes.

- 3) Coaxial cable expands and contracts with temperatures. The thermal expansion coefficient of coaxial cables is about 0.005% per degree (°C). For example, a coaxial cable of 500 m expands 25 cm when the temperature increases 10°C. Normally, this extent of expansion can be compensated through the entire cable route. When coaxial cables are routed through an above ground structure, however, changes in the cable length may not be compensated because of large temperature fluctuations. Therefore, let the coaxial cable have some play at the inlet and outlet of each metal conduit so that changes in the cable length can be compensated.

- 4) If water is trapped in a metal conduit or duct and freezes in winter, it applies mechanical stress to the coaxial cable. To prevent this, drill drain holes in the metal conduit or duct.

4.7 Grounding

■ This section describes grounding methods.

4.7.1	Grounding Methods	4-21
4.7.2	Shielded Coaxial Cables	4-22
4.7.3	Metal Conduits and Metal Ducts	4-22

4.7.1 Grounding Methods

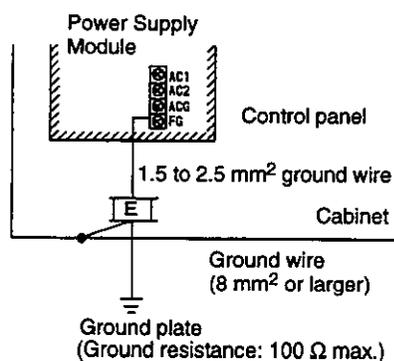
1) Procedure

a) Installing Equipment

The Mounting Base on which each Module of the GL120 or GL130 is installed must be mounted on an integrated steel base (frame). Always leave coaxial connectors above the electrical ground.

b) Ground Wire

Mount a ground terminal (E) in the control panel and connect the terminal to the cabinet of the control panel. Also, connect the ground terminal to the FG terminal on the Power Supply Module. For the ground wire between the ground terminal and the ground plate, use a ground wire of at least 8 mm² (AWG8) and also make the wire as short as possible. If the distance between the ground terminal and the ground plate is long, use a thicker ground wire so that the sum of the ground resistance and the ground wire resistance is less than 100 Ω.



c) Ground Plate

The ground plate should be as close to the GL120 or GL130 control panel as possible and kept at least 15 meters away from the ground plates of other high-voltage control panels (Group B in *Table 4.3* below). The ground resistance must be 100 Ω or less.

d) Sharing Ground

Basically, a GL120 or GL130 should have its own ground. If a GL120 or GL130 must share the ground wire and ground plate with other control panels, use the following information as guidelines.

Table 4.3 Sharing Ground Wire and Ground Plate

Shared Use Permitted (Group A Panel)	Computer panels, instrumentation control panels, I/O relay panels, general control circuit panels, etc.
Shared Use NOT Permitted (Group B Panel)	High-voltage main circuit panels, large-capacity thyristor panels, etc.

4.7.2 Shielded Coaxial Cables

Ground the shield of the shielded coaxial cable at one point only. The figure below shows examples of grounding shielded coaxial cables (Sa, Sb, Sc, and Sd: relay terminals).

1) Sb and Sc Connected

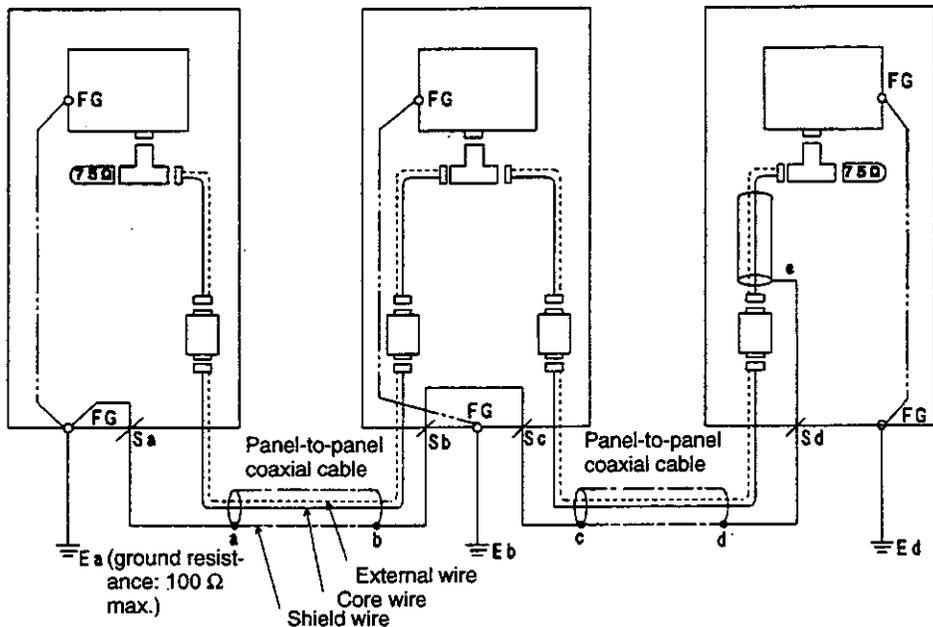
Ground the shield at point Ea or Ed in the figure.

2) Shield Not Groundable at Point Ea or Ed

Sa and Sc can be grounded at point Eb.

3) Shielded Coaxial Cable Inside a Panel

Connect point e on the shield to point d on the shield of the panel-to-panel shielded coaxial cable via relay terminal Sd.



4.7.3 Metal Conduits and Metal Ducts

Always ground both ends of a metal conduit or duct. Each metal conduit or duct should be grounded at as many points as possible.

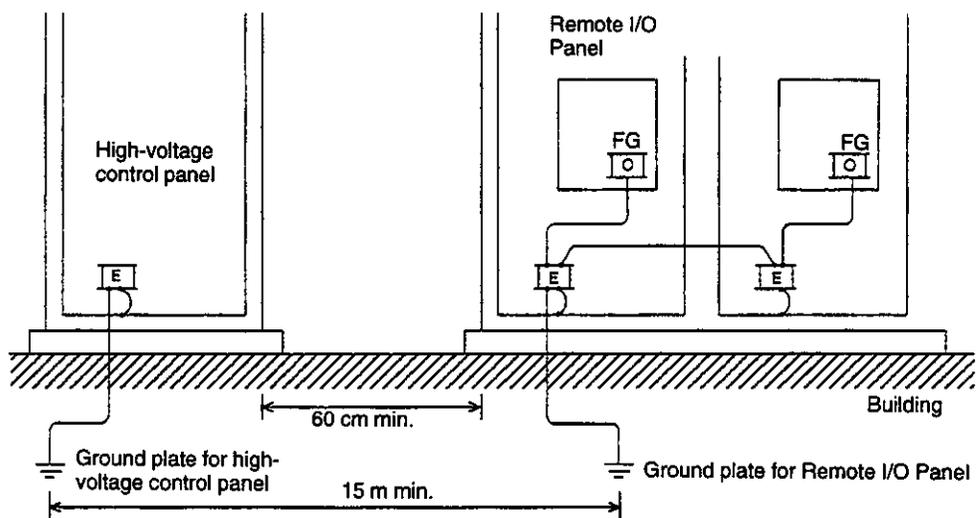
4.8 Installation of Control Panel

■ This section describes the method of installing a control panel.

Follow the procedure described below when installing a control panel (hereafter referred to as a Remote I/O Panel) for the GL120 or GL130, a Remote I/O Driver Module, or a Remote I/O Receiver Module.

1) Separating Remote I/O Panels from High-voltage Control Panels

Do not install a Remote I/O Panel and a high-voltage control panel (Group B in the *Table 4.3*) side by side. If a Remote I/O Panel must be installed near a high-voltage control panel, always keep the Remote I/O Panel at least 60 cm away from the high-voltage control panel. Likewise, keep the ground wire at least 60 cm away from that of the high-voltage control panel and keep the ground plate at least 15 m away from that of the high-voltage control panel.



2) Installing Remote I/O Panels and Other Control Panels Side by Side

Remote I/O Panels and Group A control panels can be installed side by side. In this case, these control panels are electrically connected to each other through the channel base. To further ensure safe grounding, connect the ground terminals (E) of these control panels with a ground wire of at least 8 mm² as shown in the figure below. Then, connect one of the ground terminals to the ground plate.

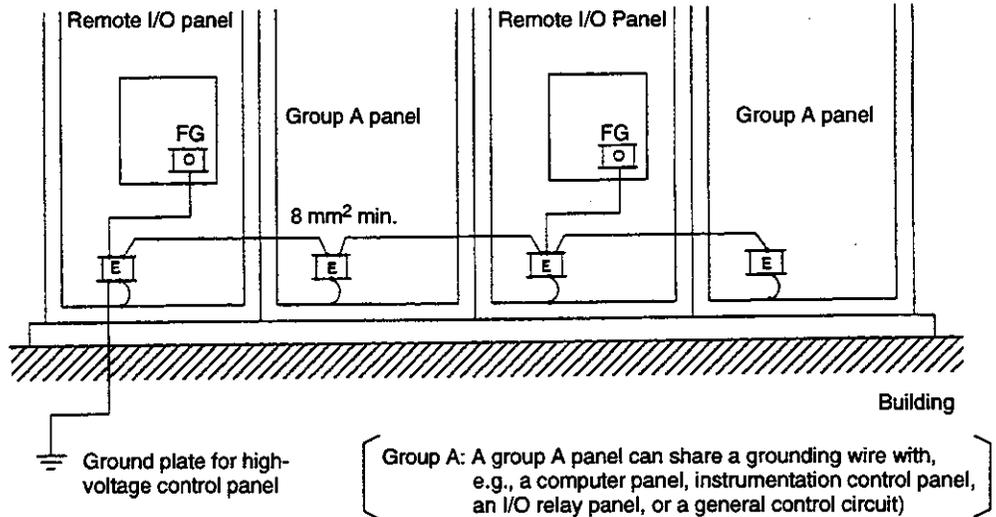


Figure 4.6 Separation from Group A Panels

3) Insulating Remote I/O Panels

When a Remote I/O Panel is installed in a steel-frame building, it is grounded through the building. This will not normally cause a problem. However, if a Remote I/O Panel is installed near a high-voltage control panel, a ground current from the high-voltage control panel will cause ground noise at the Remote I/O Panel. To prevent this, insulate the Remote I/O Panel from the building as shown in the figure below. Then, connect the ground terminal (E) of the Remote I/O Panel to its own ground plate.

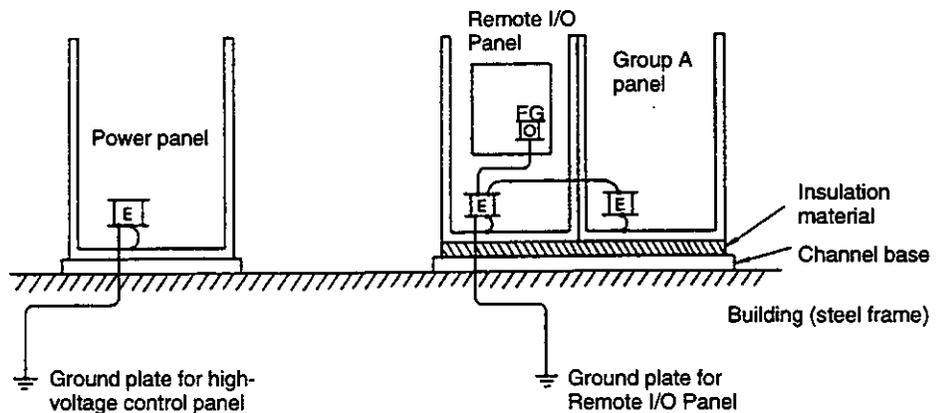


Figure 4.7 Remote I/O Panel Insulation

I/O Allocations

5

This chapter describes the I/O allocations.

5.1	I/O Allocations Using MEMOSOFT	5-2
5.1.1	Overview of I/O Allocations	5-2
5.1.2	MEMOSOFT I/O Allocation Screen	5-3
5.1.3	I/O Allocations	5-4
5.1.4	Switching I/O Allocation Screens	5-13

5.1 I/O Allocations Using MEMOSOFT

This section describes the I/O allocations (maps) for the 2000-series Remote I/O System.

5.1.1	Overview of I/O Allocations	5-2
5.1.2	MEMOSOFT I/O Allocation Screen	5-3
5.1.3	I/O Allocations	5-4
5.1.4	Switching I/O Allocation Screens	5-13

5.1.1 Overview of I/O Allocations

- 1) The interface between CPU Modules and 2000-series I/O Modules is established by allocating input relays, output coils, input registers, and output registers.
- 2) The method of allocating the reference numbers is the same as for 120-series I/O Modules. See 5.1.3 for the allocation method.
- 3) The 2000-series Remote I/O Driver Modules must be one of the Module versions supported by the MEMOCON GL120 or GL130. Make sure you fully understand the conditions of use and that you use the Module correctly.

Caution The 2000-series Remote I/O Driver Module can be used only if the CPU Module and the MEMOSOFT used for the MEMOCON GL120, GL130 are of the versions shown in the following table.

Using the wrong versions may result in failure or malfunction.

Name	Description	Model	Applicable Version	Location of Version Indication
CPU Module (8 kW)	CPU10	DDSCR-120CPU14200	<input type="checkbox"/> <input type="checkbox"/> A01 or later	Nameplate of the Module (see note.)
CPU Module (16 kW)	CPU20	DDSCR-120CPU34100	<input type="checkbox"/> <input type="checkbox"/> B01 or later	
CPU Module (16 kW)	CPU21	DDSCR-120CPU34110	<input type="checkbox"/> <input type="checkbox"/> A01 or later	
CPU Module (32 kW)	CPU30	DDSCR-130CPU54100	<input type="checkbox"/> <input type="checkbox"/> B01 or later	
CPU Module (40 kW)	CPU35	DDSCR-130CPU54110	<input type="checkbox"/> <input type="checkbox"/> A01 or later	
MEMOSOFT		FMSG-L-AT3 (for DOS) FMSG-L-PP3 (for P120) FMSG-L-PP3E (for P120)	1.31 <input type="checkbox"/> or later	Bottom center of MEMOSOFT startup screen

Note The nameplate is attached to the right side of the Module.

5.1.2 MEMOSOFT I/O Allocation Screen

The MEMOSOFT I/O Allocation Screen is described below.

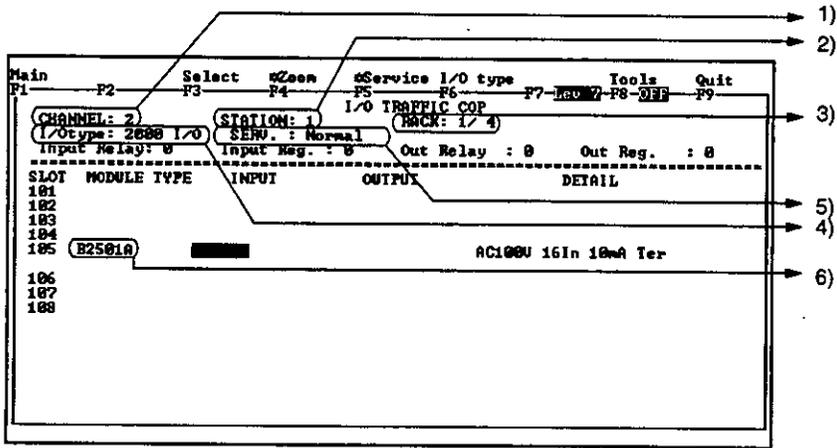


Figure 5.1 MEMOSOFT I/O Allocation Screen

1) Channel No.

Set 1 or 2 when a 2000-series I/O Module or a 1000-series I/O Module is used for a remote channel.

2) Station No.

From 1 to 15 Remote I/O Receiver Modules can be connected.

3) Rack No.

Rack numbers from 1 to 4 are assigned.

4) I/O Type

Set 2000-series I/O Modules or 1000-series I/O Modules.

5) Service Scan

Set I/O data refresh to be performed in a normal scan cycle or in a high-speed scan cycle. A normal scan will be used when a 2000-series I/O Module or a 1000-series I/O Module is selected as the I/O type.

6) Module Type

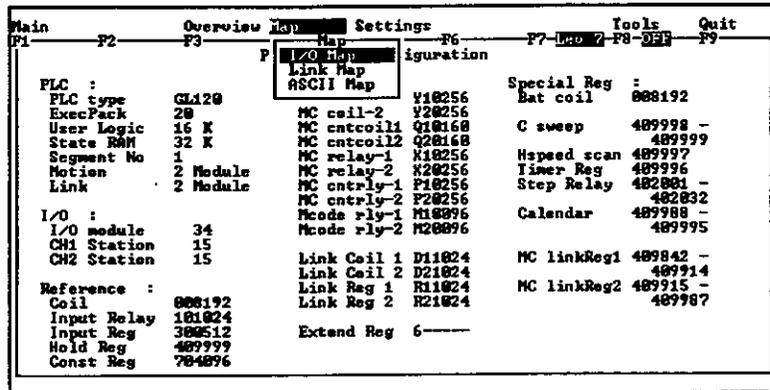
Enter the description (code) for the 2000-series I/O Module or the 1000-series I/O Module.

5.1.3 I/O Allocations

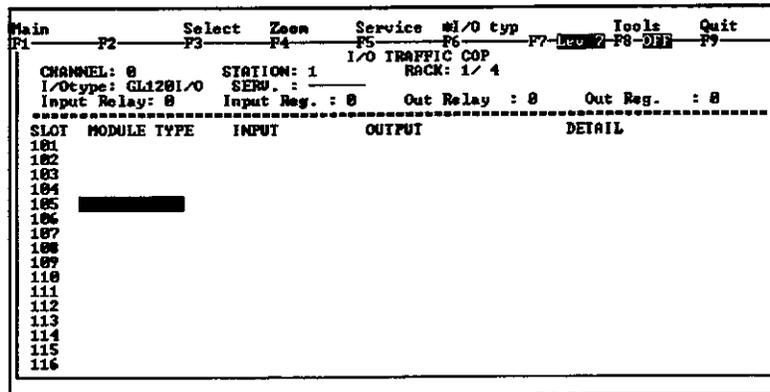
1. Basic Allocations

The I/O Allocation Screen can be displayed by selecting **I/O Map** from the Map Menu. Editing operations are not possible when the PLC is in RUN state.

- 1) Select **I/O Map** from the Map Menu using the Cursor Keys and press the Enter Key.



- 2) The I/O Allocation Screen will be displayed. Press the F3 Key to select the Select Menu. Then, press the F1 Key and select **Station**.



- 3) A window for entering a channel number and a station number will be displayed. Enter the channel number (2 in this example) and press the Enter Key. Enter the station number (1

in this example) and press the Enter Key. For Remote I/O, enter 1 or 2 as the channel number.

```

Station
F1-----F2-----F3-----F4-----F5-----F6-----F7-ESC-F8-DEL-F9
CHANNEL: 0          STATION: 1          I/O TRAFFIC COP          RACK: 1/ 4
I/Otype: GL1201/O  SERU. : 
Input Relay: 0     Input Reg. : 0      Out Relay : 0          Out Reg. : 0
-----
SLOT  MODULE TYPE  INPUT      OUTPUT      DETAIL
101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116

```

Input number:
 Channel No [0-2] : 2
 Station No [1-15] : 1

The I/O Allocation Screen for channel number 2 and station number 1 will be displayed.

```

Station
F1-----F2-----F3-----F4-----F5-----F6-----F7-ESC-F8-DEL-F9
CHANNEL: 2          STATION: 1          I/O TRAFFIC COP          RACK: 1/ 4
I/Otype: GL1201/O  SERU. : Normal
Input Relay: 0     Input Reg. : 0      Out Relay : 0          Out Reg. : 0
-----
SLOT  MODULE TYPE  INPUT      OUTPUT      DETAIL
101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116

```

4) Press the Esc Key, then press the F6 Key to set the I/O type.

```

Main
F1-----F2-----F3-----F4-----F5-----F6-----F7-ESC-F8-DEL-F9
Select  Zenn  Service I/O type  Tools  Quit
CHANNEL: 2          STATION: 1          I/O TRAFFIC COP          RACK: 1/ 4
I/Otype: GL1201/O  SERU. : Normal
Input Relay: 0     Input Reg. : 0      Out Relay : 0          Out Reg. : 0
-----
SLOT  MODULE TYPE  INPUT      OUTPUT      DETAIL
101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116

```

5) Select **I/O type** and press the F2 Key to set **2000 I/O** as the I/O type.

```
1201/0 20001/0 10001/0
F1-----F2-----F3-----F4-----F5-----F6-----F7-Lco 2-F8-Off-F9
I/O TRAFFIC COP
CHANNEL: 2 STATION: 1 RACK: 1/ 4
I/Otype: GL1201/0 SERU. : Normal
Input Relay: 0 Input Reg. : 0 Out Relay : 0 Out Reg. : 0
-----
SLOT MODULE TYPE INPUT OUTPUT DETAIL
101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116
```

6) Move the cursor to the slot to be allocated.

```
1201/0 20001/0 10001/0
F1-----F2-----F3-----F4-----F5-----F6-----F7-Lco 2-F8-Off-F9
I/O TRAFFIC COP
CHANNEL: 2 STATION: 1 RACK: 1/ 4
I/Otype: 2000 I/O SERU. : Normal
Input Relay: 0 Input Reg. : 0 Out Relay : 0 Out Reg. : 0
-----
SLOT MODULE TYPE INPUT OUTPUT DETAIL
101
102
103
104
105
106
107
108
```

Control can be transferred between racks by the following key operations.

PgUp

The I/O Allocation Screen of the rack one number lower is displayed. When Rack 1 is displayed, the screen is switched to that of Rack 4.

PgDn

The I/O Allocation Screen of the rack one number higher is displayed. When Rack 4 is displayed, the screen is switched to that of Rack 1.

Channels and stations can be switched from the menu only.

- 7) When the ? Key is pressed, a list of Module types that can be allocated will be displayed. To select the Module to be allocated, move the cursor to the position of the Module and press the Enter Key.

```

1201/0  *20001/0 10001/0
F1-----F2-----F3-----F4-----F5-----F6-----F7-DEC-2-F8-DEF-F9
I/O TRAFFIC COP
CHANNEL: 2 STATION: 1 RACK: 1/4
I/Otype: 2000 I/O SERU.: Normal
Input Relay: 0 Input Reg.: 0 Out Relay : 0 Out Reg. : 0
-----
SLOT MODULE TYPE INPUT OUTPUT DETAIL
101
102 B2500 B2625 B2803
103 B2501 B2700 B2804
104 B2502 B2701 B2805
105 B2503 B2702 B2806
106 B2504 B2703 B2808-1
107 B2505 B2704 B2808-2
108 B2506 B2705 B2808
109 B2507 B2706 B2809
110 B2508 B2707 B2810
111 B2509 B2708 B2811
112 B2510 B2709 B2812
113 B2511 B2710 B2813
114 B2512 B2711 B2814
115 B2513 B2712 B2815
116 B2514 B2713 B2816
117 B2515 B2714 B2817
118 B2516 B2715 B2818
119 B2517 B2716 B2819
120 B2518 B2717 B2820
121 B2519 B2718 B2821
122 B2520 B2719 B2822
123 B2521 B2720 B2823
124 B2522 B2721 B2824
125 B2523 B2722 B2825
126 B2524 B2723 B2826
127 B2525 B2724 B2827
128 B2526 B2725 B2828
129 B2527 B2726 B2829
130 B2528 B2727 B2830
131 B2529 B2728 B2831
132 B2530 B2729 B2832
133 B2531 B2730 B2833
134 B2532 B2731 B2834
135 B2533 B2732 B2835
136 B2534 B2733 B2836
137 B2535 B2734 B2837
138 B2536 B2735 B2838
139 B2537 B2736 B2839
140 B2538 B2737 B2840
141 B2539 B2738 B2841
142 B2540 B2739 B2842
143 B2541 B2740 B2843
144 B2542 B2741 B2844
145 B2543 B2742 B2845
146 B2544 B2743 B2846
147 B2545 B2744 B2847
148 B2546 B2745 B2848
149 B2547 B2746 B2849
150 B2548 B2747 B2850
151 B2549 B2748 B2851
152 B2550 B2749 B2852
153 B2551 B2750 B2853
154 B2552 B2751 B2854
155 B2553 B2752 B2855
156 B2554 B2753 B2856
157 B2555 B2754 B2857
158 B2556 B2755 B2858
159 B2557 B2756 B2859
160 B2558 B2757 B2860
161 B2559 B2758 B2861
162 B2560 B2759 B2862
163 B2561 B2760 B2863
164 B2562 B2761 B2864
165 B2563 B2762 B2865
166 B2564 B2763 B2866
167 B2565 B2764 B2867
168 B2566 B2765 B2868
169 B2567 B2766 B2869
170 B2568 B2767 B2870
171 B2569 B2768 B2871
172 B2570 B2769 B2872
173 B2571 B2770 B2873
174 B2572 B2771 B2874
175 B2573 B2772 B2875
176 B2574 B2773 B2876
177 B2575 B2774 B2877
178 B2576 B2775 B2878
179 B2577 B2776 B2879
180 B2578 B2777 B2880
181 B2579 B2778 B2881
182 B2580 B2779 B2882
183 B2581 B2780 B2883
184 B2582 B2781 B2884
185 B2583 B2782 B2885
186 B2584 B2783 B2886
187 B2585 B2784 B2887
188 B2586 B2785 B2888
189 B2587 B2786 B2889
190 B2588 B2787 B2890
191 B2589 B2788 B2891
192 B2590 B2789 B2892
193 B2591 B2790 B2893
194 B2592 B2791 B2894
195 B2593 B2792 B2895
196 B2594 B2793 B2896
197 B2595 B2794 B2897
198 B2596 B2795 B2898
199 B2597 B2796 B2899
200 B2598 B2797 B2900
201 B2599 B2798 B2901
202 B2600 B2799 B2902
203 B2601 B2800 B2903
204 B2602 B2801 B2904
205 B2603 B2802 B2905
206 B2604 B2803 B2906
207 B2605 B2804 B2907
208 B2606 B2805 B2908
209 B2607 B2806 B2909
210 B2608 B2807 B2910
211 B2609 B2808 B2911
212 B2610 B2809 B2912
213 B2611 B2810 B2913
214 B2612 B2811 B2914
215 B2613 B2812 B2915
216 B2614 B2813 B2916
217 B2615 B2814 B2917
218 B2616 B2815 B2918
219 B2617 B2816 B2919
220 B2618 B2817 B2920
221 B2619 B2818 B2921
222 B2620 B2819 B2922
223 B2621 B2820 B2923
224 B2622 B2821 B2924
225 B2623 B2822 B2925
226 B2624 B2823 B2926
227 B2625 B2824 B2927
228 B2626 B2825 B2928
229 B2627 B2826 B2929
230 B2628 B2827 B2930
231 B2629 B2828 B2931
232 B2630 B2829 B2932
233 B2631 B2830 B2933
234 B2632 B2831 B2934
235 B2633 B2832 B2935
236 B2634 B2833 B2936
237 B2635 B2834 B2937
238 B2636 B2835 B2938
239 B2637 B2836 B2939
240 B2638 B2837 B2940
241 B2639 B2838 B2941
242 B2640 B2839 B2942
243 B2641 B2840 B2943
244 B2642 B2841 B2944
245 B2643 B2842 B2945
246 B2644 B2843 B2946
247 B2645 B2844 B2947
248 B2646 B2845 B2948
249 B2647 B2846 B2949
250 B2648 B2847 B2950
251 B2649 B2848 B2951
252 B2650 B2849 B2952
253 B2651 B2850 B2953
254 B2652 B2851 B2954
255 B2653 B2852 B2955
256 B2654 B2853 B2956
257 B2655 B2854 B2957
258 B2656 B2855 B2958
259 B2657 B2856 B2959
260 B2658 B2857 B2960
261 B2659 B2858 B2961
262 B2660 B2859 B2962
263 B2661 B2860 B2963
264 B2662 B2861 B2964
265 B2663 B2862 B2965
266 B2664 B2863 B2966
267 B2665 B2864 B2967
268 B2666 B2865 B2968
269 B2667 B2866 B2969
270 B2668 B2867 B2970
271 B2669 B2868 B2971
272 B2670 B2869 B2972
273 B2671 B2870 B2973
274 B2672 B2871 B2974
275 B2673 B2872 B2975
276 B2674 B2873 B2976
277 B2675 B2874 B2977
278 B2676 B2875 B2978
279 B2677 B2876 B2979
280 B2678 B2877 B2980
281 B2679 B2878 B2981
282 B2680 B2879 B2982
283 B2681 B2880 B2983
284 B2682 B2881 B2984
285 B2683 B2882 B2985
286 B2684 B2883 B2986
287 B2685 B2884 B2987
288 B2686 B2885 B2988
289 B2687 B2886 B2989
290 B2688 B2887 B2990
291 B2689 B2888 B2991
292 B2690 B2889 B2992
293 B2691 B2890 B2993
294 B2692 B2891 B2994
295 B2693 B2892 B2995
296 B2694 B2893 B2996
297 B2695 B2894 B2997
298 B2696 B2895 B2998
299 B2697 B2896 B2999
300 B2698 B2897 B3000
301 B2699 B2898 B3001
302 B2700 B2899 B3002
303 B2701 B2900 B3003
304 B2702 B2901 B3004
305 B2703 B2902 B3005
306 B2704 B2903 B3006
307 B2705 B2904 B3007
308 B2706 B2905 B3008
309 B2707 B2906 B3009
310 B2708 B2907 B3010
311 B2709 B2908 B3011
312 B2710 B2909 B3012
313 B2711 B2910 B3013
314 B2712 B2911 B3014
315 B2713 B2912 B3015
316 B2714 B2913 B3016
317 B2715 B2914 B3017
318 B2716 B2915 B3018
319 B2717 B2916 B3019
320 B2718 B2917 B3020
321 B2719 B2918 B3021
322 B2720 B2919 B3022
323 B2721 B2920 B3023
324 B2722 B2921 B3024
325 B2723 B2922 B3025
326 B2724 B2923 B3026
327 B2725 B2924 B3027
328 B2726 B2925 B3028
329 B2727 B2926 B3029
330 B2728 B2927 B3030
331 B2729 B2928 B3031
332 B2730 B2929 B3032
333 B2731 B2930 B3033
334 B2732 B2931 B3034
335 B2733 B2932 B3035
336 B2734 B2933 B3036
337 B2735 B2934 B3037
338 B2736 B2935 B3038
339 B2737 B2936 B3039
340 B2738 B2937 B3040
341 B2739 B2938 B3041
342 B2740 B2939 B3042
343 B2741 B2940 B3043
344 B2742 B2941 B3044
345 B2743 B2942 B3045
346 B2744 B2943 B3046
347 B2745 B2944 B3047
348 B2746 B2945 B3048
349 B2747 B2946 B3049
350 B2748 B2947 B3050
351 B2749 B2948 B3051
352 B2750 B2949 B3052
353 B2751 B2950 B3053
354 B2752 B2951 B3054
355 B2753 B2952 B3055
356 B2754 B2953 B3056
357 B2755 B2954 B3057
358 B2756 B2955 B3058
359 B2757 B2956 B3059
360 B2758 B2957 B3060
361 B2759 B2958 B3061
362 B2760 B2959 B3062
363 B2761 B2960 B3063
364 B2762 B2961 B3064
365 B2763 B2962 B3065
366 B2764 B2963 B3066
367 B2765 B2964 B3067
368 B2766 B2965 B3068
369 B2767 B2966 B3069
370 B2768 B2967 B3070
371 B2769 B2968 B3071
372 B2770 B2969 B3072
373 B2771 B2970 B3073
374 B2772 B2971 B3074
375 B2773 B2972 B3075
376 B2774 B2973 B3076
377 B2775 B2974 B3077
378 B2776 B2975 B3078
379 B2777 B2976 B3079
380 B2778 B2977 B3080
381 B2779 B2978 B3081
382 B2780 B2979 B3082
383 B2781 B2980 B3083
384 B2782 B2981 B3084
385 B2783 B2982 B3085
386 B2784 B2983 B3086
387 B2785 B2984 B3087
388 B2786 B2985 B3088
389 B2787 B2986 B3089
390 B2788 B2987 B3090
391 B2789 B2988 B3091
392 B2790 B2989 B3092
393 B2791 B2990 B3093
394 B2792 B2991 B3094
395 B2793 B2992 B3095
396 B2794 B2993 B3096
397 B2795 B2994 B3097
398 B2796 B2995 B3098
399 B2797 B2996 B3099
400 B2798 B2997 B3100
401 B2799 B2998 B3101
402 B2800 B2999 B3102
403 B2801 B3000 B3103
404 B2802 B3001 B3104
405 B2803 B3002 B3105
406 B2804 B3003 B3106
407 B2805 B3004 B3107
408 B2806 B3005 B3108
409 B2807 B3006 B3109
410 B2808 B3007 B3110
411 B2809 B3008 B3111
412 B2810 B3009 B3112
413 B2811 B3010 B3113
414 B2812 B3011 B3114
415 B2813 B3012 B3115
416 B2814 B3013 B3116
417 B2815 B3014 B3117
418 B2816 B3015 B3118
419 B2817 B3016 B3119
420 B2818 B3017 B3120
421 B2819 B3018 B3121
422 B2820 B3019 B3122
423 B2821 B3020 B3123
424 B2822 B3021 B3124
425 B2823 B3022 B3125
426 B2824 B3023 B3126
427 B2825 B3024 B3127
428 B2826 B3025 B3128
429 B2827 B3026 B3129
430 B2828 B3027 B3130
431 B2829 B3028 B3131
432 B2830 B3029 B3132
433 B2831 B3030 B3133
434 B2832 B3031 B3134
435 B2833 B3032 B3135
436 B2834 B3033 B3136
437 B2835 B3034 B3137
438 B2836 B3035 B3138
439 B2837 B3036 B3139
440 B2838 B3037 B3140
441 B2839 B3038 B3141
442 B2840 B3039 B3142
443 B2841 B3040 B3143
444 B2842 B3041 B3144
445 B2843 B3042 B3145
446 B2844 B3043 B3146
447 B2845 B3044 B3147
448 B2846 B3045 B3148
449 B2847 B3046 B3149
450 B2848 B3047 B3150
451 B2849 B3048 B3151
452 B2850 B3049 B3152
453 B2851 B3050 B3153
454 B2852 B3051 B3154
455 B2853 B3052 B3155
456 B2854 B3053 B3156
457 B2855 B3054 B3157
458 B2856 B3055 B3158
459 B2857 B3056 B3159
460 B2858 B3057 B3160
461 B2859 B3058 B3161
462 B2860 B3059 B3162
463 B2861 B3060 B3163
464 B2862 B3061 B3164
465 B2863 B3062 B3165
466 B2864 B3063 B3166
467 B2865 B3064 B3167
468 B2866 B3065 B3168
469 B2867 B3066 B3169
470 B2868 B3067 B3170
471 B2869 B3068 B3171
472 B2870 B3069 B3172
473 B2871 B3070 B3173
474 B2872 B3071 B3174
475 B2873 B3072 B3175
476 B2874 B3073 B3176
477 B2875 B3074 B3177
478 B2876 B3075 B3178
479 B2877 B3076 B3179
480 B2878 B3077 B3180
481 B2879 B3078 B3181
482 B2880 B3079 B3182
483 B2881 B3080 B3183
484 B2882 B3081 B3184
485 B2883 B3082 B3185
486 B2884 B3083 B3186
487 B2885 B3084 B3187
488 B2886 B3085 B3188
489 B2887 B3086 B3189
490 B2888 B3087 B3190
491 B2889 B3088 B3191
492 B2890 B3089 B3192
493 B2891 B3090 B3193
494 B2892 B3091 B3194
495 B2893 B3092 B3195
496 B2894 B3093 B3196
497 B2895 B3094 B3197
498 B2896 B3095 B3198
499 B2897 B3096 B3199
500 B2898 B3097 B3200
501 B2899 B3098 B3201
502 B2900 B3099 B3202
503 B2901 B3100 B3203
504 B2902 B3101 B3204
505 B2903 B3102 B3205
506 B2904 B3103 B3206
507 B2905 B3104 B3207
508 B2906 B3105 B3208
509 B2907 B3106 B3209
510 B2908 B3107 B3210
511 B2909 B3108 B3211
512 B2910 B3109 B3212
513 B2911 B3110 B3213
514 B2912 B3111 B3214
515 B2913 B3112 B3215
516 B2914 B3113 B3216
517 B2915 B3114 B3217
518 B2916 B3115 B3218
519 B2917 B3116 B3219
520 B2918 B3117 B3220
521 B2919 B3118 B3221
522 B2920 B3119 B3222
523 B2921 B3120 B3223
524 B2922 B3121 B3224
525 B2923 B3122 B3225
526 B2924 B3123 B3226
527 B2925 B3124 B3227
528 B2926 B3125 B3228
529 B2927 B3126 B3229
530 B2928 B3127 B3230
531 B2929 B3128 B3231
532 B2930 B3129 B3232
533 B2931 B3130 B3233
534 B2932 B3131 B3234
535 B2933 B3132 B3235
536 B2934 B3133 B3236
537 B2935 B3134 B3237
538 B2936 B3135 B3238
539 B2937 B3136 B3239
540 B2938 B3137 B3240
541 B2939 B3138 B3241
542 B2940 B3139 B3242
543 B2941 B3140 B3243
544 B2942 B3141 B3244
545 B2943 B3142 B3245
546 B2944 B3143 B3246
547 B2945 B3144 B3247
548 B2946 B3145 B3248
549 B2947 B3146 B3249
550 B2948 B3147 B3250
551 B2949 B3148 B3251
552 B2950 B3149 B3252
553 B2951 B3150 B3253
554 B2952 B3151 B3254
555 B2953 B3152 B3255
556 B2954 B3153 B3256
557 B2955 B3154 B3257
558 B2956 B3155 B3258
559 B2957 B3156 B3259
560 B2958 B3157 B3260
561 B2959 B3158 B3261
562 B2960 B3159 B3262
563 B2961 B3160 B3263
564 B2962 B3161 B3264
565 B2963 B3162 B3265
566 B2964 B3163 B3266
567 B2965 B3164 B3267
568 B2966 B3165 B3268
569 B2967 B3166 B3269
570 B2968 B3167 B3270
571 B2969 B3168 B3271
572 B2970 B3169 B3272
573 B2971 B3170 B3273
574 B2972 B3171 B3274
575 B2973 B3172 B3275
576 B2974 B3173 B3276
577 B2975 B3174 B3277
578 B2976 B3175 B3278
579 B2977 B3176 B3279
580 B2978 B3177 B3280
581 B2979 B3178 B3281
582 B2980 B3179 B3282
583 B2981 B3180 B3283
584 B2982 B3181 B3284
585 B2983 B3182 B3285
586 B2984 B3183 B3286
587 B2985 B3184 B3287
588 B2986 B3185 B3288
589 B2987 B3186 B3289
590 B2988 B3187 B3290
591 B2989 B3188 B3291
592 B2990 B3189 B3292
593 B2991 B3190 B3293
594 B2992 B3191 B3294
595 B2993 B3192 B3295
596 B2994 B3193 B3296
597 B2995 B3194 B3297
598 B2996 B3195 B3298
599 B2997 B3196 B3299
600 B2998 B3197 B3300
601 B2999 B3198 B3301
602 B3000 B3199 B3302
603 B3001 B3200 B3303
604 B3002 B3201 B3304
605 B3003 B3202 B3305
606 B3004 B3203 B3306
607 B3005 B3204 B3307
608 B3006 B3205 B3308
609 B3007 B3206 B3309
610 B3008 B3207 B3310
611 B3009 B3208 B3311
612 B3010 B3209 B3312
613 B3011 B3210 B3313
614 B3012 B3211 B3314
615 B3013 B3212 B3315
616 B3014 B3213 B3316
617 B3015 B3214 B3317
618 B3016 B3215 B3318
619 B3017 B3216 B3319
620 B3018 B3217 B3320
621 B3019 B3218 B3321
622 B3020 B3219 B3322
623 B3021 B3220 B3323
624 B3022 B3221 B3324
625 B3023 B3222 B3325
626 B3024 B3223 B3326
627 B3025 B3224 B3327
628 B3026 B3225 B3328
629 B3027 B3226 B3329
630 B3028 B3227 B3330
631 B3029 B3228 B3331
632 B3030 B3229 B3332
633 B3031 B3230 B3333
634 B3032 B3231 B3334
635 B3033 B3232 B3335
636 B3034 B3233 B3336
637 B3035 B3234 B3337
638 B3036 B3235 B3338
639 B3037 B3236 B3339
640 B3038 B3237 B3340
641 B3039 B3238 B3341
642 B3040 B3239 B3342
643 B3041 B3240 B3343
644 B3042 B3241 B3344
645 B3043 B3242 B3345
646 B3044 B3243 B3346
647 B3045 B3244 B3347
648 B3046 B3245 B3348
649 B3047 B3246 B3349
650 B3048 B3247 B3350
651 B3049 B3248 B3351
652 B3050 B3249 B3352
653 B3051 B3250 B3353
654 B3052 B3251 B3354
655 B3053 B3252 B3355
656 B3054 B3253 B3356
657 B3055 B3254 B3357
658 B3056 B3255 B3358
659 B3057 B3256 B3359
660 B3058 B3257 B3360
661 B3059 B3258 B3361
662 B3060 B3259 B3362
663 B3061 B3260 B3363
664 B3062 B3261 B3364
665 B3063 B3262 B3365
666 B3064 B3263 B3366
667 B3065 B3264 B3367
668 B3066 B3265 B3368
669 B3067 B3266 B3369
670 B3068 B3267 B3370
671 B3069 B3268 B3371
672 B3070 B3269 B3372
673 B3071 B3270 B3373
674 B3072 B3271 B3374
675 B3073 B3272 B3375
676 B3074 B3273 B3376
677 B3075 B3274 B3377
678 B3076 B3275 B3378
679 B3077 B3276 B3379
680 B3078 B3277 B3380
681 B3079 B3278 B3381
682 B3080 B3279 B3382
683 B3081 B3280 B3383
684 B3082 B3281 B3384
685 B3083 B3282 B3385
686 B3084 B3283 B3386
687 B3085 B3284 B3387
688 B3086 B3285 B3388
689 B3087 B3286 B3389
690 B3088 B3287 B3390
691 B3089 B3288 B3391
692 B3090 B3289 B3392
693 B3091 B3290 B3393
694 B3092 B3291 B3394
695 B3093 B3292 B3395
696 B3094 B3293 B3396
697 B3095 B3294 B3397
698 B3096 B3295 B3398
699 B3097 B3296 B3399
700 B3098 B3297 B3400
701 B3099 B3298 B3401
702 B3100 B3299 B3402
703 B3101 B3300 B3403
704 B3102 B3301 B3404
705 B3103 B3302 B3405
706 B3104 B3303 B3406
707 B3105 B3304 B3407
708 B3106 B3305 B3408
709 B3107 B3306 B3409
710 B3108 B3307 B3410
711 B3109 B3308 B3411
712 B3110 B3309 B3412
713 B3111 B3310 B3413
714 B3112 B3311 B3414
715 B3113 B3312 B3415
716 B3114 B3313 B3416
717 B3115 B3314 B3417
718 B3116 B3315 B3418
719 B3117 B3316 B3419
720 B3118 B3317 B3420
721 B3119 B3318 B3421
722 B3120 B3319 B3422
723 B3121 B3320 B3423
724 B3122 B3321 B3424
725 B3123 B3322 B3425
726 B3124 B3323 B3426
727 B3125 B3324 B3427
728 B3126 B3325 B3428
729 B3127 B3326 B3429
730 B3128 B3327 B3430
731 B3129 B3328 B3431
732 B3130 B3329 B3432
733 B3131 B3330 B3433
734 B3132 B3331 B3434
735 B3133 B3332 B3435
736 B3134 B3333 B3436
737 B3135 B3334 B343
```

The setting will be stored and the cursor will move to the next slot.

```

1281/O  u20001/O 10001/O
F1-----F2-----F3-----F4-----F5-----F6-----F7-0000?F8-000 F9
I/O TRAFFIC COP
CHANNEL: 2 STATION: 1 RACK: 1/ 4
I/Otype: 2000 I/O SERVO. : Normal
Input Relay: 16 Input Reg. : 0 Out Relay : 0 Out Reg. : 0
-----
SLOT MODULE TYPE INPUT OUTPUT DETAIL
181
182 B2501A 100161-100176 AC100U 16In 10mA Ter
183
184
185
186
187
188
    
```

10) Allocate other I/O Modules using the same procedure.

```

Main Select uZoom uService I/O type Tools Quit
F1-----F2-----F3-----F4-----F5-----F6-----F7-0000?F8-000 F9
I/O TRAFFIC COP
CHANNEL: 2 STATION: 1 RACK: 1/ 4
I/Otype: 2000 I/O SERVO. : Normal
Input Relay: 16 Input Reg. : 2 Out Relay : 48 Out Reg. : 8
-----
SLOT MODULE TYPE INPUT OUTPUT DETAIL
181
182 B2501A 100161-100176 AC100U 16In 10mA Ter
183 B2603 300020-300021 DC12-24U 32In 5-10mA Ter
184 B2500 000161-000176 AC100-200U 16Out 1A Ter
185 B2602A 000177-000208 DC12-24U 32SinkOut 0.3A Ter
186
187
188
    
```



- 1) When specifying an I/O relay as the reference, specify a value of $16n + 1$ ($n = 0, 1, 2, \dots$) as the starting reference number.
- 2) If the reference number that was entered has already been assigned, a warning message will be displayed. If the existing reference number can be used, simply press the Enter Key.
- 3) To change the last reference number set by default, enter a different reference number in the position of the last reference number. When specifying an I/O relay as the reference, specify $8n$ ($n = 1, 2, 3, \dots$) as the number of I/O points.

2. Changing a Reference Number

Use the following procedure to change a reference number that has been allocated.

- 1) Move the cursor to the position of the reference number to be changed using the Cursor Keys.

```

Main      Select  #Zoom  #Service I/O type  Tools  Quit
F1        F2      F3      F4      F5      F6      F7-DEL F8-DEL F9
CHANNEL: 2 STATION: 1 I/O TRAFFIC COP RACK: 1/ 4
I/Otype: 2000 I/O SERU. : Normal
Input Relay: 16 Input Reg. : 2 Out Relay : 48 Out Reg. : 8
-----
SLOT MODULE TYPE INPUT OUTPUT DETAIL
181
182 B2501A 100161-100176 AC100U 16In 10mA Ter
183 B2603 300020-300021 DC12-24U 32In 5-10mA Ter
184 B2500 000161-000176 AC100-200U 16Out 1A Ter
185 B2602A 000161-000200 DC12-24U 32SinkOut 0.3A Ter
186
187
188

```

- 2) Enter the starting reference number (209 in this example) and press the Enter Key.

```

Main      Select  #Zoom  #Service I/O type  Tools  Quit
F1        F2      F3      F4      F5      F6      F7-DEL F8-DEL F9
CHANNEL: 2 STATION: 1 I/O TRAFFIC COP RACK: 1/ 4
I/Otype: 2000 I/O SERU. : Normal
Input Relay: 16 Input Reg. : 2 Out Relay : 48 Out Reg. : 8
-----
SLOT MODULE TYPE INPUT OUTPUT DETAIL
181
182 B2501A 100161-100176 AC100U 16In 10mA Ter
183 B2603 300020-300021 DC12-24U 32In 5-10mA Ter
184 B2500 000161-000176 AC100-200U 16Out 1A Ter
185 B2602A 000161-000200 DC12-24U 32SinkOut 0.3A Ter
186
187
188

```

- 3) The cursor will move to the position of the last reference number. The number determined by adding the number of I/O points of the Module to the starting reference number will be set by default. In this example, assign 16 points. Enter the last reference number (224 in this example) and press the Enter Key.

```

Main      Select  #Zoom  #Service I/O type  Tools  Quit
F1        F2      F3      F4      F5      F6      F7-DEL F8-DEL F9
CHANNEL: 2 STATION: 1 I/O TRAFFIC COP RACK: 1/ 4
I/Otype: 2000 I/O SERU. : Normal
Input Relay: 16 Input Reg. : 2 Out Relay : 48 Out Reg. : 8
-----
SLOT MODULE TYPE INPUT OUTPUT DETAIL
181
182 B2501A 100161-100176 AC100U 16In 10mA Ter
183 B2603 300020-300021 DC12-24U 32In 5-10mA Ter
184 B2500 000161-000176 AC100-200U 16Out 1A Ter
185 B2602A 000209-224 DC12-24U 32SinkOut 0.3A Ter
186
187
188

```

The reference number will be changed.

```

Main          Select  #Zoom  #Service I/O type      Tools      Quit
F1           F2       F3      F4       F5         F6         F7-LEW  F8-DEF  F9
I/O TRAFFIC COP
CHANNEL: 2      STATION: 1      RACK: 1/ 4
I/Otype: 2000 I/O  SERU. : Normal
Input Relay: 16  Input Reg. : 2   Out Relay : 32   Out Reg. : 0
-----
SLOT  MODULE TYPE  INPUT      OUTPUT      DETAIL
181
182  B2501A         100161-100176
183  B2603          300020-300021
184  B2500          000161-000176  AC100-2000 16Out 1A Ter
185  B2602A         000209-000224  DC12-24V 32SinkOut 0.3A Ter
186
187
188
    
```



It is also possible to change the last reference number only. Move the cursor to the position of the current last reference number and enter a new last reference number.

3. Allocating Composite Modules

For Composite Modules, allocate Digital I/O and Register I/O using a 2-line allocation area on the I/O Allocation Screen. The following example shows how to allocate Composite Modules.

- 1) A Counter Module is allocated as an example. Move the cursor to the slot where the Counter Module is to be allocated. Select a Counter Module, and a 2-line allocation area will be displayed and the cursor will move to the input relay position. Enter the starting reference number of the input relay (**100177** in this example) and press the Enter Key.

```

Main          Select  #Zoom  #Service I/O type      Tools      Quit
F1           F2       F3      F4       F5         F6         F7-LEW  F8-DEF  F9
I/O TRAFFIC COP
CHANNEL: 2      STATION: 1      RACK: 1/ 4
I/Otype: 2000 I/O  SERU. : Normal
Input Relay: 16  Input Reg. : 2   Out Relay : 32   Out Reg. : 0
-----
SLOT  MODULE TYPE  INPUT      OUTPUT      DETAIL
181
182  B2501A         100161-100176
183  B2603          300020-300021
184  B2500          000161-000176  AC100-2000 16Out 1A Ter
185  B2602A         000209-000224  DC12-24V 32SinkOut 0.3A Ter
186  B2801          100177
187
188
    
```

- 2) The cursor will move to the position of the last reference number. Press the Enter Key if the last reference does not need to be changed.

Main	Select	Zoom	Service	I/O type	Tools	Quit
F1	F2	F3	F4	F5	F6	F7
CHANNEL: 2 STATION: 1 I/O TRAFFIC COP RACK: 1/ 4 I/O type: 2000 I/O SERU : Normal Input Relay: 32 Input Reg. : 2 Out Relay : 32 Out Reg. : 0						
SLOT	MODULE TYPE	INPUT	OUTPUT	DETAIL		
181						
182	B2501A	100161-100176		AC100U	16In	10mA Ter
183	B2603			DC12-24U	32In	5-10mA Ter
184	B2500	300020-300021	000161-000176	AC100-200U	16Out	1A Ter
185	B2602A		000209-000224	DC12-24U	32SinkOut	0.3A Ter
186	B2001	100177-100178		Reversible Counter 2ch		
187						
188						

The settings will be stored, and the cursor will move to the position of the starting reference number of the output coil.

- 3) Allocate the output coil, input register, and output register using the same procedure given above.

4. Changing the I/O Module Type

Use the following procedure to change the I/O Module type that has been allocated. The following example shows how to change the remote station allocated for a 2000-series I/O Module to a 1000-series I/O Module.

- 1) Display the I/O Allocation Screen for the channel and station numbers to be changed, then press the F6 Key to select *I/O type*.

Main	Select	Zoom	Service	I/O type	Tools	Quit
F1	F2	F3	F4	F5	F6	F7
CHANNEL: 2 STATION: 1 I/O TRAFFIC COP RACK: 1/ 4 I/O type: 2000 I/O SERU : Normal Input Relay: 16 Input Reg. : 2 Out Relay : 48 Out Reg. : 0						
SLOT	MODULE TYPE	INPUT	OUTPUT	DETAIL		
181						
182	B2501A	100161-100176		AC100U	16In	10mA Ter
183	B2603			DC12-24U	32In	5-10mA Ter
184	B2500	300020-300021	000161-000176	AC100-200U	16Out	1A Ter
185	B2602A		000177-000208	DC12-24U	32SinkOut	0.3A Ter
186						
187						
188						

2) Press the F3 Key to select **1000 I/O**.

```

1281/I/O  #20001/I/O 10001/I/O
F1-----F2-----F3-----F4-----F5-----F6-----F7-1000- F8-000- F9
CHANNEL: 2 STATION: 1 I/O TRAFFIC COP BACK: 1/ 4
I/Otype: 2000 I/O SERU. : Normal
Input Relay: 16 Input Reg. : 2 Out Relay : 48 Out Reg. : 0
-----
SLOT MODULE TYPE INPUT OUTPUT DETAIL
181
182 B2501A 100161-100176 AC100U 16In 10mA Ter
183 B2603 300020-300021 DC12-24U 32In 5-10mA Ter
184 B2500 000161-000176 AC100-200U 16Out 1A Ter
185 B2602A 300122-000200 DC12-24U 32SinkOut 0.3A Ter
186
187
188
    
```

3) A confirmation message will be displayed on the bottom of the screen. Enter "Y" and press the Enter Key.

```

1281/I/O  #20001/I/O 10001/I/O
F1-----F2-----F3-----F4-----F5-----F6-----F7-1000- F8-000- F9
CHANNEL: 2 STATION: 1 I/O TRAFFIC COP BACK: 1/ 4
I/Otype: 2000 I/O SERU. : Normal
Input Relay: 16 Input Reg. : 2 Out Relay : 48 Out Reg. : 0
-----
SLOT MODULE TYPE INPUT OUTPUT DETAIL
181
182 B2501A 100161-100176 AC100U 16In 10mA Ter
183 B2603 300020-300021 DC12-24U 32In 5-10mA Ter
184 B2500 000161-000176 AC100-200U 16Out 1A Ter
185 B2602A 300122-000200 DC12-24U 32SinkOut 0.3A Ter
186
187
188
    Modules of other type exist in this station. change OK? (Y/N)
    
```

4) A confirmation message will be displayed asking you whether the I/O allocation for the selected remote station is to be deleted. If the remote station is to be changed to the 1000-series I/O Module, enter "Y" and press the Enter Key.

```

1281/I/O  #20001/I/O 10001/I/O
F1-----F2-----F3-----F4-----F5-----F6-----F7-1000- F8-000- F9
CHANNEL: 2 STATION: 1 I/O TRAFFIC COP BACK: 1/ 4
I/Otype: 2000 I/O SERU. : Normal
Input Relay: 16 Input Reg. : 2 Out Relay : 48 Out Reg. : 0
-----
SLOT MODULE TYPE INPUT OUTPUT DETAIL
181
182 B2501A 100161-100176 AC100U 16In 10mA Ter
183 B2603 300020-300021 DC12-24U 32In 5-10mA Ter
184 B2500 000161-000176 AC100-200U 16Out 1A Ter
185 B2602A 300122-000200 DC12-24U 32SinkOut 0.3A Ter
186
187
188
    Delete all modules in this station. OK? (Y/N)
    
```

The I/O type of the selected remote station will be changed to the I000-series I/O Module.

```

1201/I0  20001/I0  010001/I0
F1-----F2-----F3-----F4-----F5-----F6-----F7-Dev 7-F8-0FF-F9
CHANNEL: 2      STATION: 1  I/O TRAFFIC COP      RACK: 1/ 4
I/Otype: 1000 I/O  SERU. : Normal
Input Relay: 0   Input Reg. : 0   Out Relay : 0   Out Reg. : 0
-----
SLOT  MODULE TYPE  INPUT      OUTPUT      DETAIL
101
102
103
104
105
106
107
108

```

5.1.4 Switching I/O Allocation Screens

The I/O Allocation Screen is displayed for each rack. Therefore, to allocate I/O for a different rack, the I/O Allocation Screen must be switched. The channel number, station number, and rack number currently being edited are displayed on the 4th line from the top of the screen. An example of switching a channel or a station is shown below.

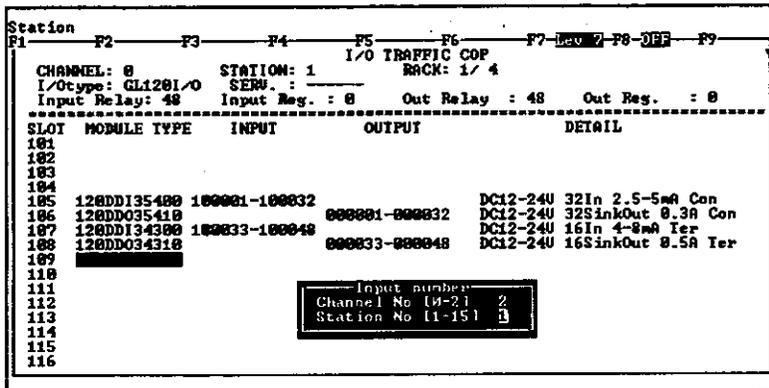
- 1) Switch to the menu cursor using the Tab Key.
- 2) Select **Station** from the Select Menu using the Cursor Keys and press the Enter Key.

```

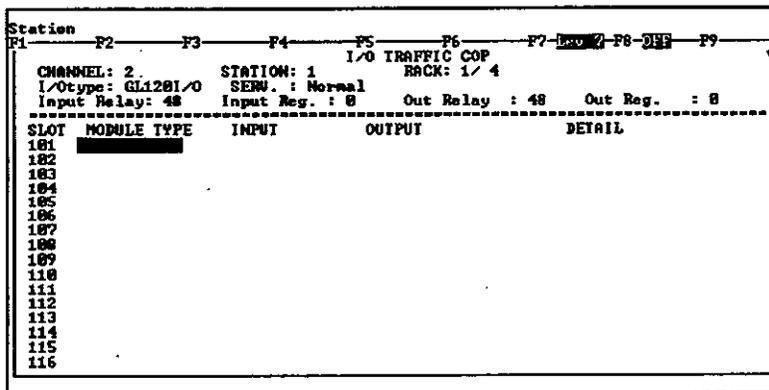
Main      Select  Zoom  Service  I/O typ  Tools  Quit
F1-----F2-----F3-----F4-----F5-----F6-----F7-Dev 7-F8-0FF-F9
CHANNEL: 0      STATION: 1  I/O TRAFFIC COP      RACK: 1/ 4
I/Otype: G1201/I0  SERU. : 
Input Relay: 48  Input Reg. : 0   Out Relay : 48  Out Reg. : 0
-----
SLOT  MODULE TYPE  INPUT      OUTPUT      DETAIL
101
102
103
104
105  120DD135400  100001-100032
106  120DD035410
107  120DD134300  100033-100048
108  120DD034310
109
110
111
112
113
114
115
116

```

- 3) A window for entering a channel number and a station number will be displayed. Enter the channel number (2 in this example) and press the Enter Key. Enter the station number (1 in this example) and press the Enter Key.



The I/O Allocation Screen for channel number 2 and station number 1 will be displayed.



Control can be transferred between racks by the following key operations.

- PgUp** The I/O Allocation Screen of the rack one number lower is displayed. When Rack 1 is displayed, the screen is switched to that of Rack 4.
- PgDn** The I/O Allocation Screen of the rack one number higher is displayed. When Rack 4 is displayed, the screen is switched to that of Rack 1.

Channels and stations can be switched from the menu only.

Troubleshooting

6

This chapter describes remote I/O error processing.

6.1	Self Diagnosis	6-2
6.1.1	Self-diagnostic Functions	6-2
6.1.2	Fault Detection	6-3
6.1.3	Fault Checking Procedure	6-6

6.1 Self Diagnosis

This section describes the self-diagnostic functions of the 2000-series Remote I/O Driver.

6.1.1	Self-diagnostic Functions	6-2
6.1.2	Fault Detection	6-3
6.1.3	Fault Checking Procedure	6-6

6.1.1 Self-diagnostic Functions

1) Self-diagnostic Functions

The 2000-series Remote I/O Driver Module performs self diagnosis at startup and while the power is ON. If a fault is detected, the content is displayed on the LED indicators on the front panel of the Module.

a) Self-diagnostic Functions at Startup

CPU check

RAM check

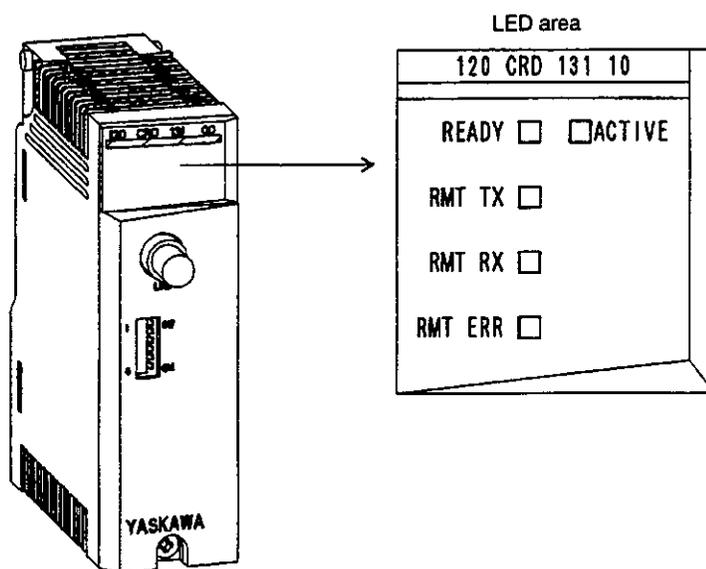
ROM check

b) Self-diagnostic Function with Power ON (Continuous Check)

Watchdog timer check

2) Error Display

When an error occurs, the content is shown on the indicators in the LED area.



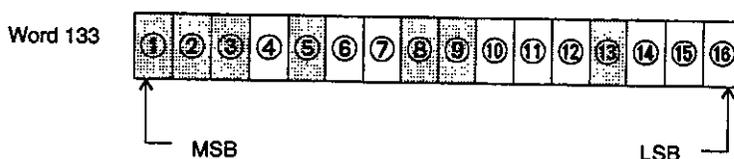
If a status error occurs, the READY indicator will turn OFF and the RMT ERR indicator will flash as described in the following table.

ROM Error	RMT ERR will flash continuously.
RAM Error	RMT ERR will flash twice, turn OFF for 1 s, and then repeat this cycle.
Common Memory Error	RMT ERR will flash three times, turn OFF for 1 s, and then repeat this cycle.
Watchdog Timer Error	RMT ERR will flash four times, turn OFF for 1 s, and then repeat this cycle.

6.1.2 Fault Detection

1) Monitoring by a Remote Station Status Table

- a) Status information for the Remote I/O Driver can be read using the STAT instruction.
- b) Status information for the remote channel is stored in status words 133 to 162 (for 30 stations).
- c) Status word 133 contains the status of station 1 of remote channel 1 as follows (same for 134 to 162);



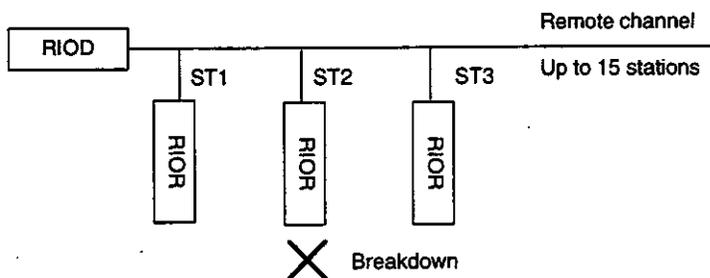
Bit Number	Name	Meaning when Bit is Set to "1"
1	Communications error or no remote station response	A communications error occurred between a Remote I/O Driver Module and a Remote I/O Receiver Module. Alternatively, no response is sent from a remote station.
2	Allocated data error	The data that was allocated contains an abnormality.
3	Output data length error	The output data length sent from the Remote I/O Driver Module is abnormal.
8	Bus check error	The bus control signal is faulty.
9	Allocation request	No data is allocated to the remote station.
13	I/O service timeout error	No I/O service was performed within a certain period.
14	BUSY check error	The response from the I/O Module is faulty.
16	RIOR error	The Remote I/O Receiver Module is faulty.



A momentary 2008H error will occur when the power for the Remote I/O Receiver Module is turned ON, but this does not indicate faulty operation.

2) Detection of Faulty Stations

- a) The Remote I/O Driver Module performs a scan service for Remote I/O Receiver Modules. If no response is sent or an abnormality is detected, the related bit of the remote station status table of the CPU is set to "1."
- b) When an abnormality is detected over five scans consecutively, the input signal for the station is set to "0."
- c) Other non-faulty Remote I/O Receiver Modules are serviced normally.
- d) Station #2 is faulty in the following example. Status word 134 is set to 8000H.

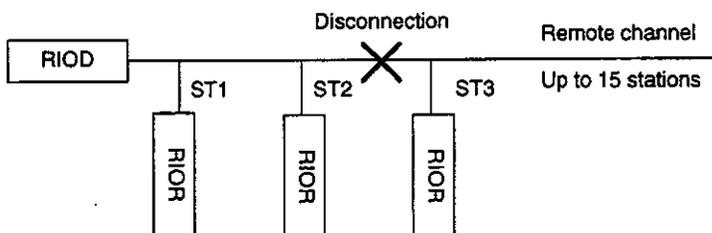


RIOD: Remote I/O Driver Module
RIOR: Remote I/O Receiver Module
ST1: Station number 1

3) Break on the Transmission Line

- a) Since the terminator at one end of the transmission line will be lost by disconnection, normal transmission to all the Remote I/O Receiver Modules is not guaranteed.
- b) Since the Remote I/O Driver Module performs scan services for all the Remote I/O Receiver Modules, I/O operation is performed for only those Remote I/O Receiver Modules that issue a normal response.

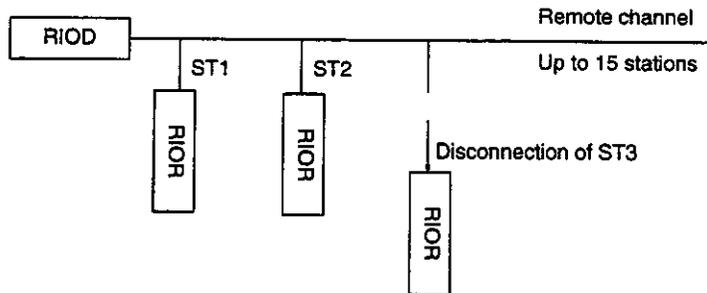
c) Example of a Break on the Transmission Line



4) Disconnection from the Transmission Line

- a) Since no response is sent from a disconnected Remote I/O Receiver Module, the station is assumed to be faulty.

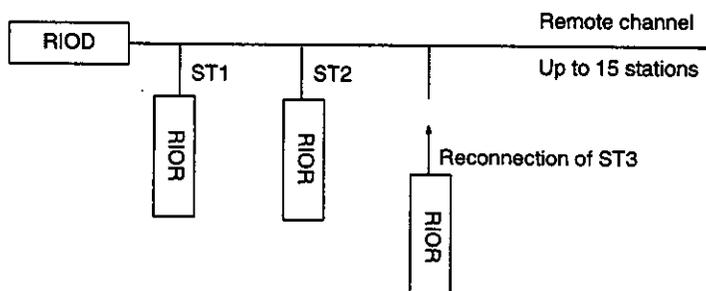
b) Example of Disconnection from the Transmission Line



5) Reconnection to the Transmission Line

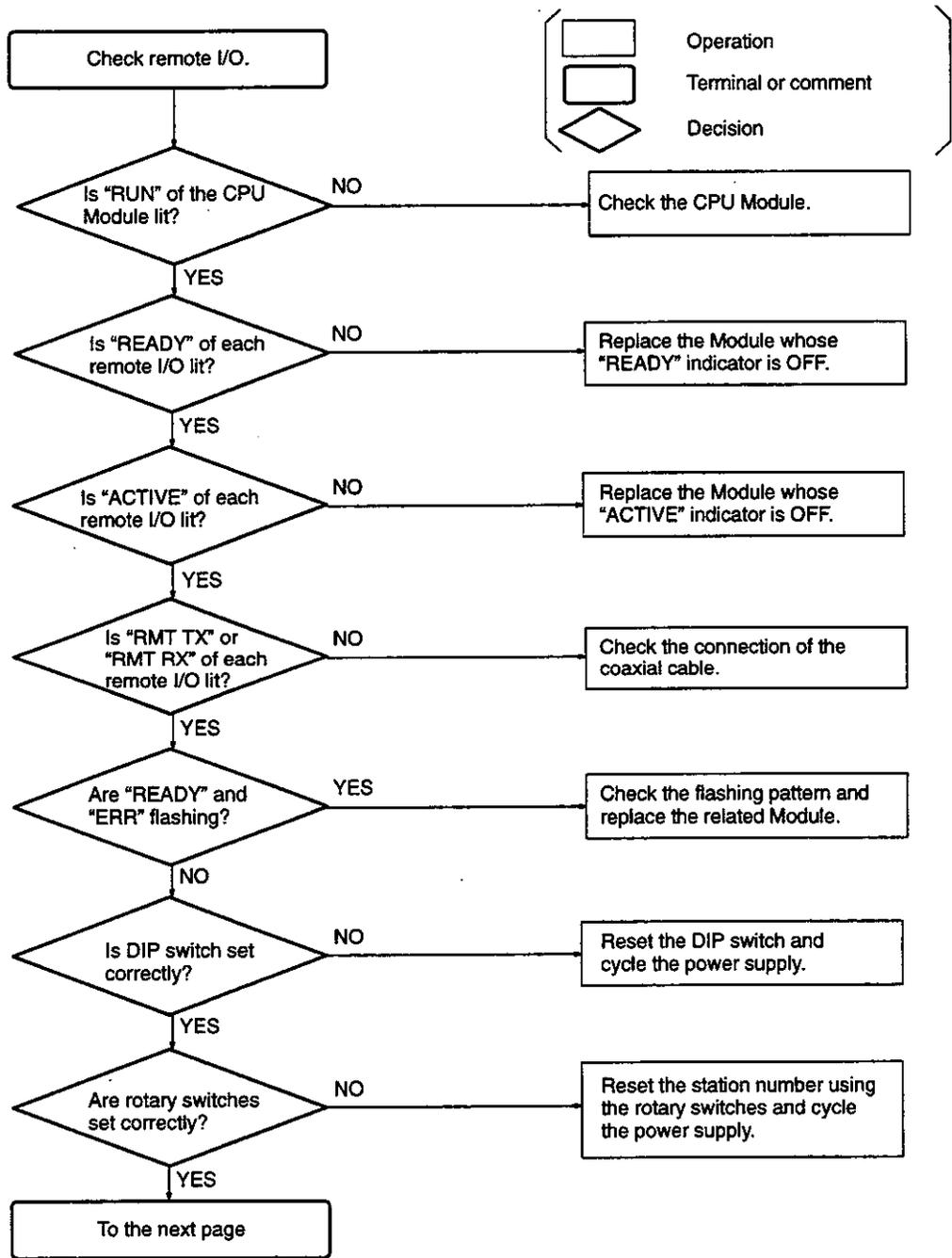
- a) In the first service after reconnection, the I/O allocation is requested from the Remote I/O Receiver Module.
- b) Normal operation starts after I/O allocation information is sent to Remote I/O Receiver Module from the Remote I/O Driver Module.
- c) The same operation is also performed when the Remote I/O Receiver Module reset switch is pressed.

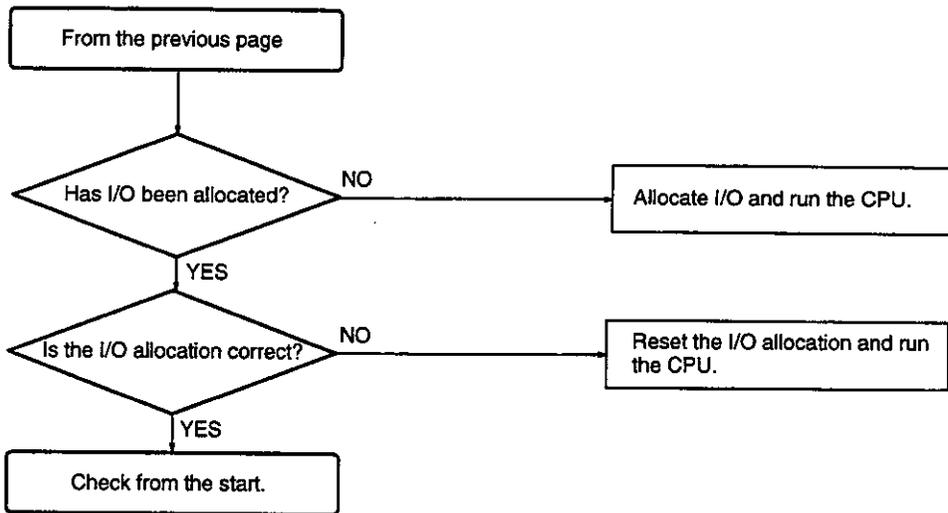
d) Example of Reconnection to the Transmission Line



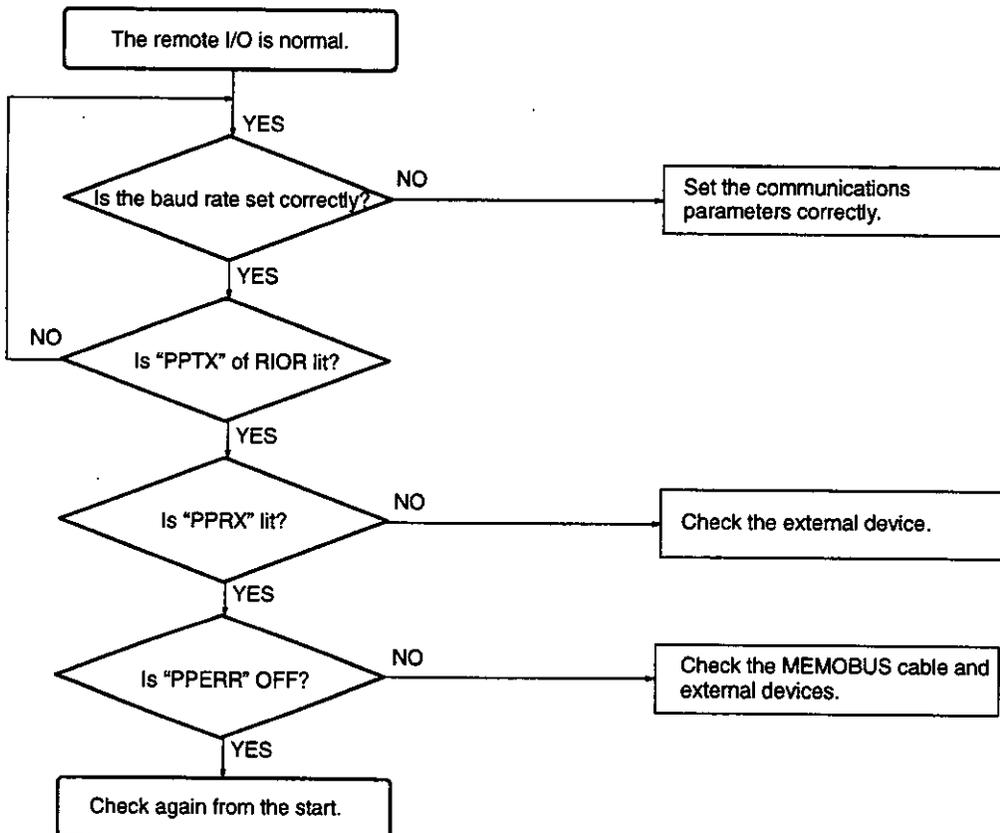
6.1.3 Fault Checking Procedure

1) Checking Remote I/O Faults





2) Checking Remote I/O Receiver Module MEMOBUS Port Failures



Appendix **A**

Coaxial Cable Connector Installation Procedures

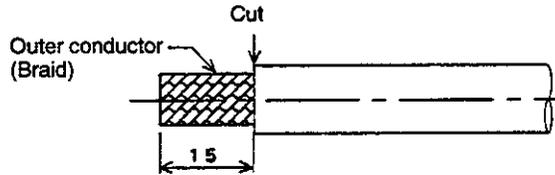
A

This appendix describes the installation procedures for BNC Connectors, F-connectors, and Fitting Connectors.

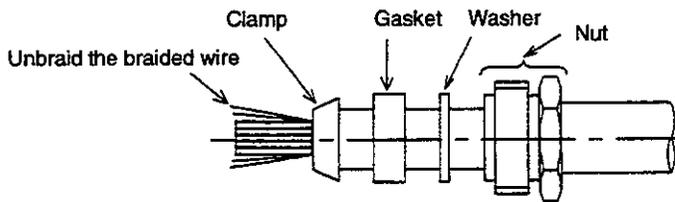
A.1	BNC Connector Installation	A-2
A.2	F-connector Installation	A-4
A.3	Fitting Connector Installation	A-7

A.1 BNC Connector Installation

- 1) Remove the sheath to 15 mm from the cable end. Use a cutter knife or pipe cutter (IFV1638).



- 2) Slide a nut, washer, gasket, and clamp onto the coaxial cable in this order.

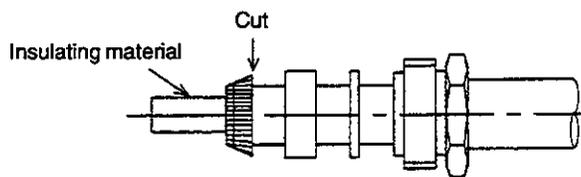


Note a) Place the nut, washer, and gasket over the sheath.

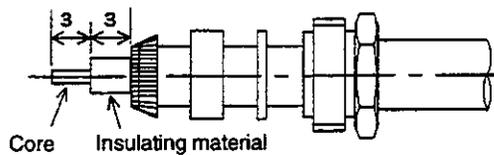
b) Place the clamp over the braided wire until it reaches the cut sheath end.

c) After placing the clamp, unbraid the braided wire.

- 3) Turn back the braided wires along the clamp taper, and cut them to the same dimension as the taper.

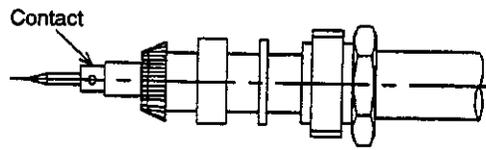


- 4) Remove the insulating material, leaving about 3 mm, to expose the core. Cut the core end, so that the bare core is 3 mm long.



Note Be careful not to damage the core.

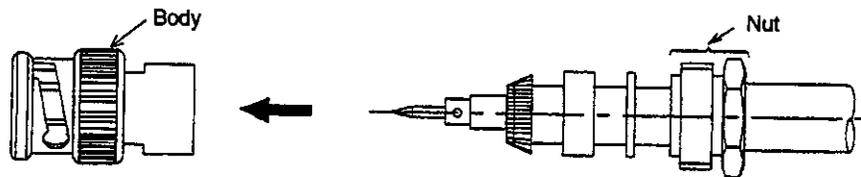
5) Thread the core through the contact, and solder it.



Note a) Solder quickly, being careful not to deform the insulating material.

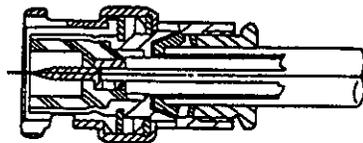
b) Do not permit the solder to form a lump or a gap between the contact and insulating material.

6) Insert the contact into the body.



Note Insert the contact all the way into the body.

7) Using a wrench, turn the nut to tighten the body. This completes connector installation.

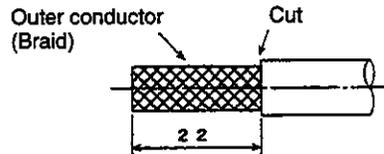


A.2 F-connector Installation

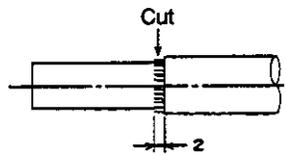
The following example is for a 5C-2V cable.

1) Prepare the ends of coaxial cable, using a cutter knife or pipe cutter (IFV1638).

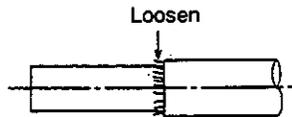
a) Remove the sheath to 22 mm from the cable end.



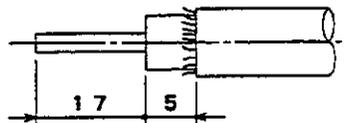
b) Using nippers, remove braided wires, leaving them about 2 mm long.



c) Loosen the braided wires.

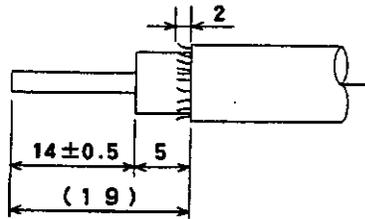


d) Pull out the insulating material 17 mm from the end.



Note Be sure not to damage the core.

- e) Cut the core end, and adjust the bare core to 14 ± 0.5 mm.

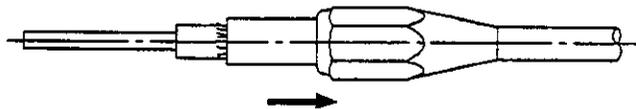


Note a) The bare core must be 14 ± 0.5 mm.

b) Leave aluminum foil about 5 mm.

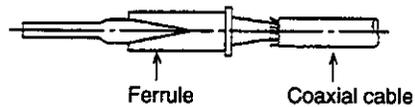
c) Leave the braided wires loose.

- 2) Insert the F-connector nut into the coaxial cable.



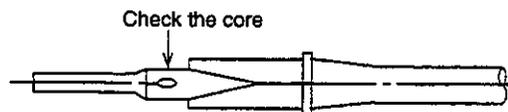
- 3) Press a ferrule into the coaxial cable.

a) Insert the cable end into the ferrule.



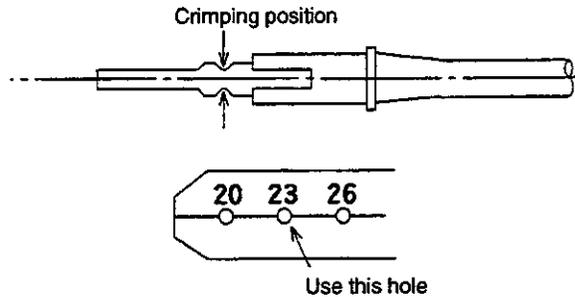
Note During insertion, be careful not to turn up the aluminum foil.

b) Check through the contact window to make sure that the core is correctly inserted into the contact.



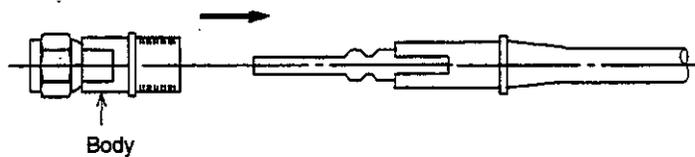
4) Crimp the ferrule contact.

Always use a crimping tool (FC-1, DIA 23 mm, manufactured by Fujikura, Ltd.) to crimp the ferrule contact. The crimping position must be at the contact window.

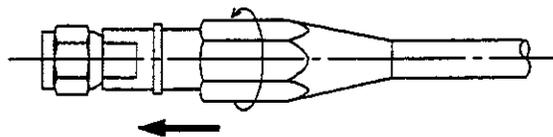


Note Be careful not to bend the contact.

5) Insert the body into the ferrule.



6) Using a wrench, tighten the nut until the rubber gasket is completely hidden. This completes the connector installation.

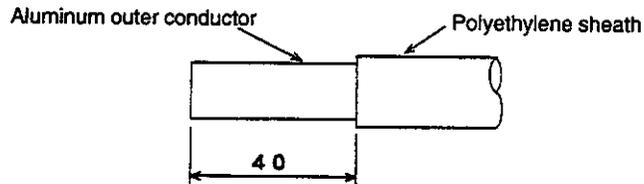


Note Fix the body with a wrench (12 mm width across flat) or an adjustable spanner and firmly tighten the nut with a wrench (14 mm width across flat) or an adjustable spanner.

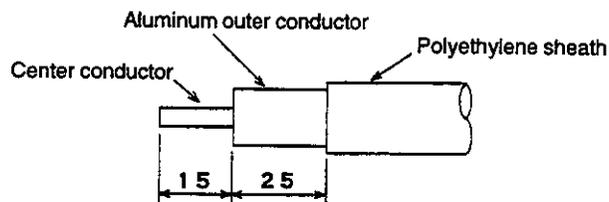
A.3 Fitting Connector Installation

1) Prepare the ends of a coaxial cable, using a cutter knife or pipe cutter (IFV1638).

a) Remove the sheath to 40 mm from the cable end.

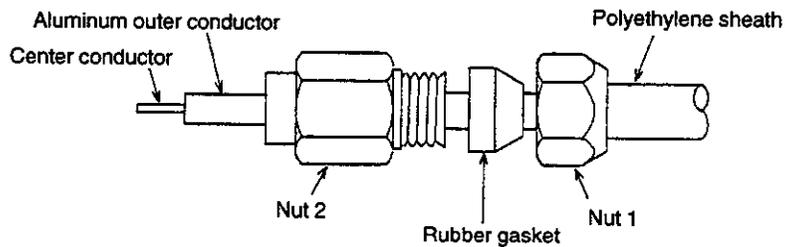


b) Remove the aluminum outer conductor and insulating material to 15 mm from the cable end.

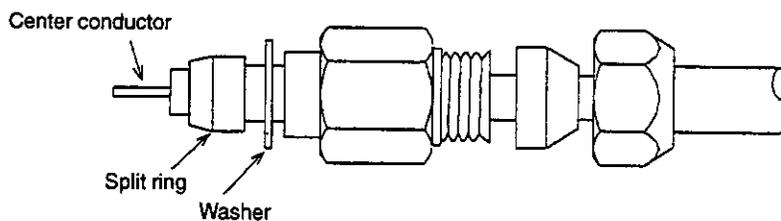


Note Be careful not to bend or damage the center conductor.

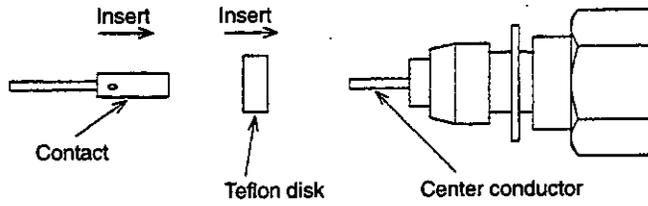
2) Slide nut 1, rubber gasket, and nut 2 onto the coaxial cable in this order.



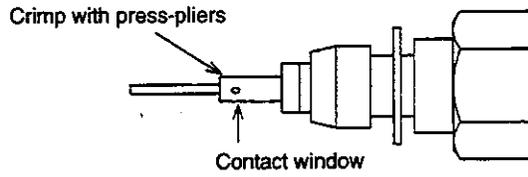
3) Slide a washer and split ring onto the aluminum outer conductor.



4) Slide the Teflon disk and contact onto the center conductor in this order.

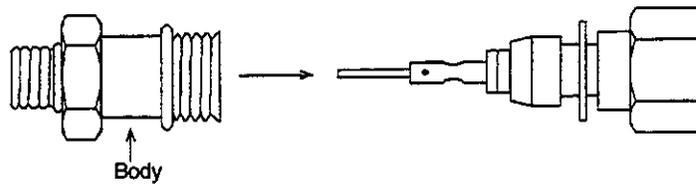


5) Crimp the contact, using 9.5 mm coaxial-cable press-pliers.

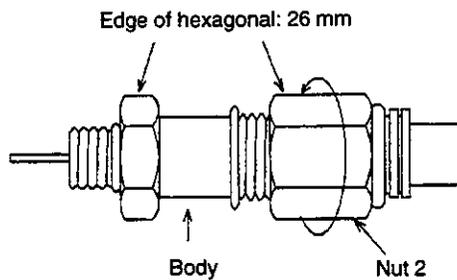


Note Check through the contact window to make sure that the contact is inserted all the way in.

6) Insert the contact into the body.

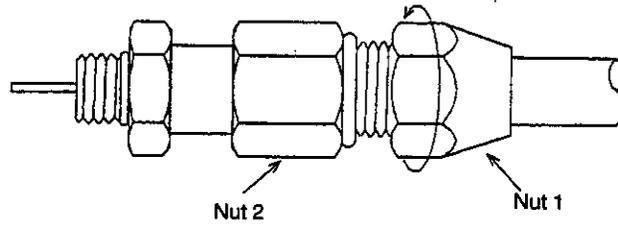


7) Tighten the body and nut 2.



Note Fully insert the body and tighten nut 2.

8) Tighten nut 1. This completes the connector installation.



Note Secure nut 2, then tighten nut 1.

A

A.4 Tool List

Coaxial Cable Stripper CST

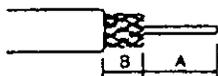
Manufacturer: Nihon Weidmuller Co., Ltd.

Table A.1 Coaxial Cable Stripper

Specifications		
Length	100 mm	
Mass	65 g	
Height	42 mm	
Width	26 mm	
Sheath Trim		
Coaxial Cable	2.8 to 8 mm Dia	
	RG58, 59, 62, 71, 174, 187, 188	
Order Data		
Type	No.	Sheath Trim (Refer to the following diagram)
Coaxial Cable Stripper CST	903050	
Screw Holder (Spare)	903206	
Blade Cassette (Gray)	903205	Approx. 3.9 mm (B)
Blade Cassette (Red)	903204	Approx. 6 mm (B)
Blade Cassette (Yellow)	903203	Approx. 12 mm (B)
Blade Cassette (Blue)	903202	Approx. 6.5 mm (B)
Blade Cassette (Brown)	903201	Approx. 7.5 mm+ Approx. 3.5 mm (C+B)
Blade Cassette (Green)	903200	Approx. 7.1 mm + Approx. 5.1 mm (C+B)

Sheath Trimming Dimensions

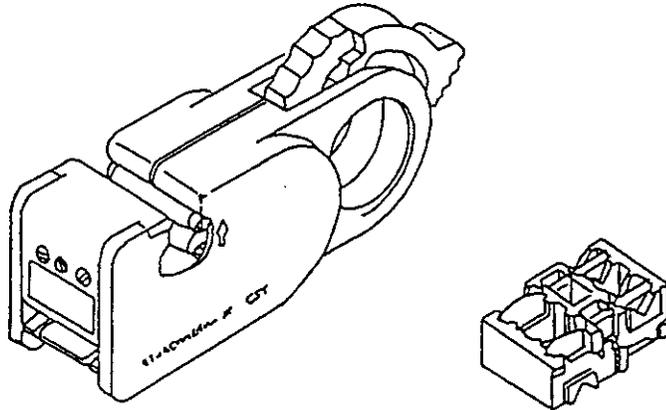
Blade Cassette:
Gray/Red/Yellow/Blue



Blade Cassette:
Green/Brown



Coaxial cable stripper cannot be used for the cable type 7C, 7C2V, 11C, and 12C.



Coaxial cable stripper

Blade cassette

Figure A.1 Coaxial Cable Stripper and Blade Cassette

A

Appendix **B**

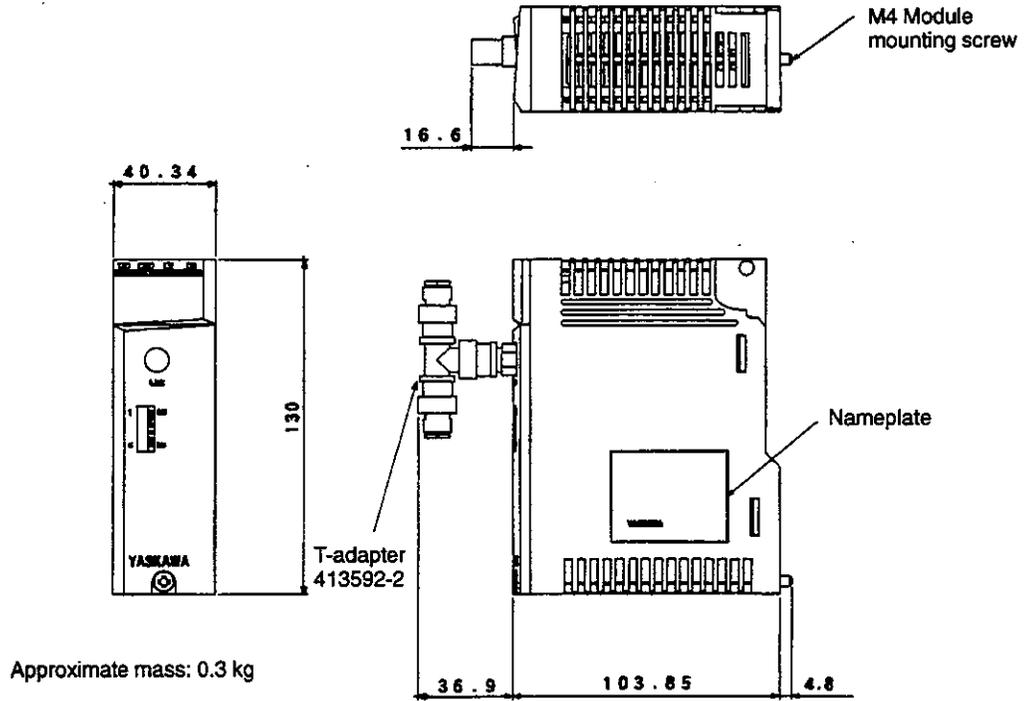
Remote I/O Module External Dimensions

This appendix shows external dimensions of Remote I/O Modules and related products.

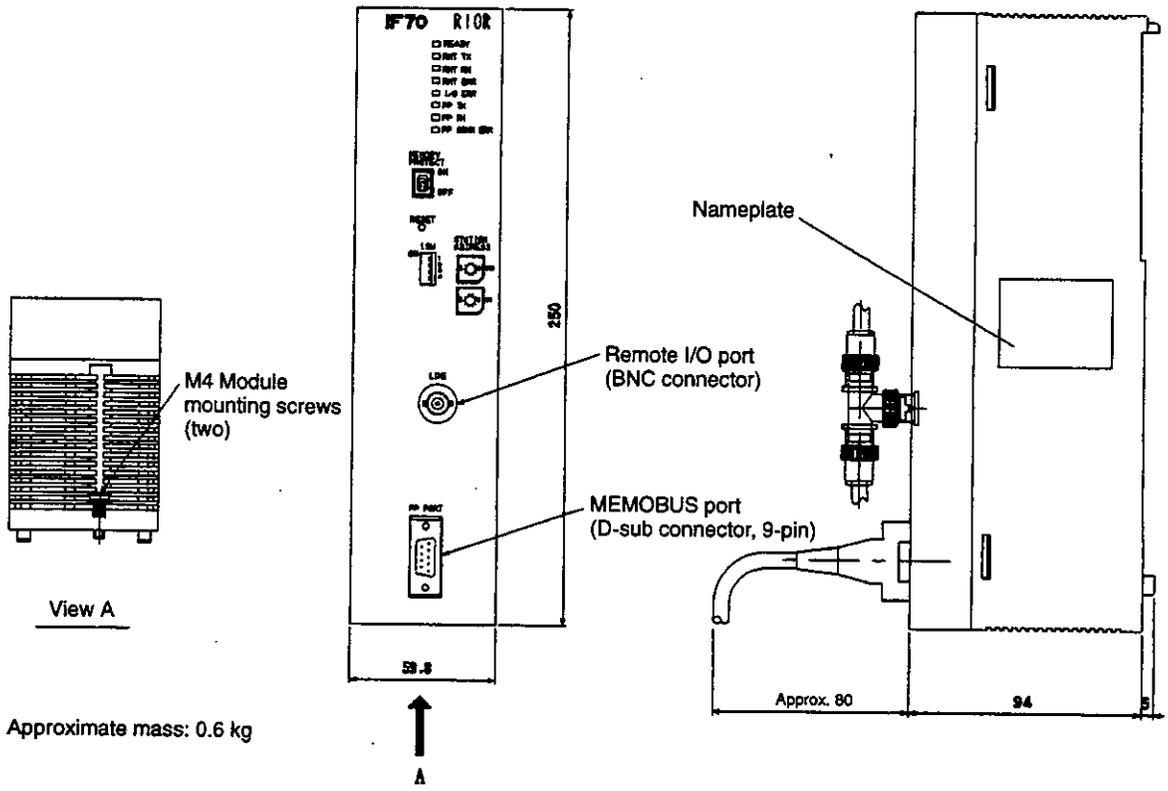
B

Remote I/O Module External Dimensions in mm

1) 2000-series Remote I/O Driver Module (JAMSC-120CRD13110)

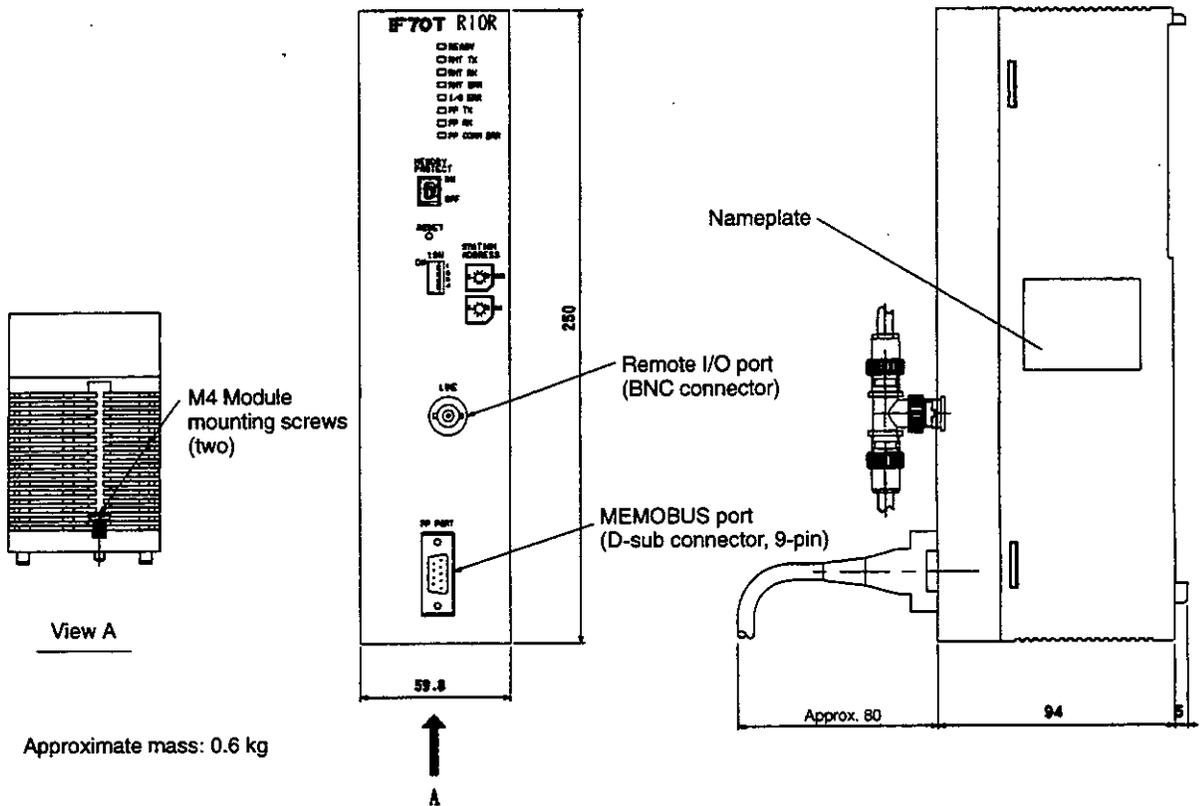


2) 2000-series Remote I/O Receiver Module (JAMSC-IF70)

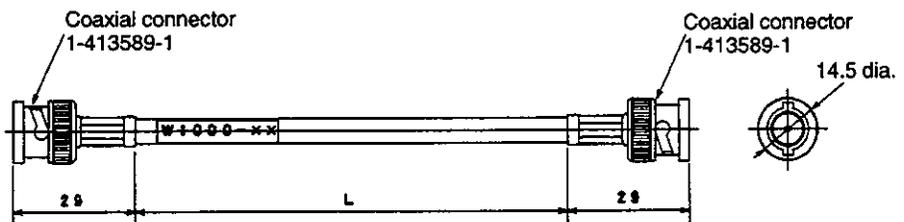


B

3) 1000-series Remote I/O Receiver Module (JAMSC-IF70T)

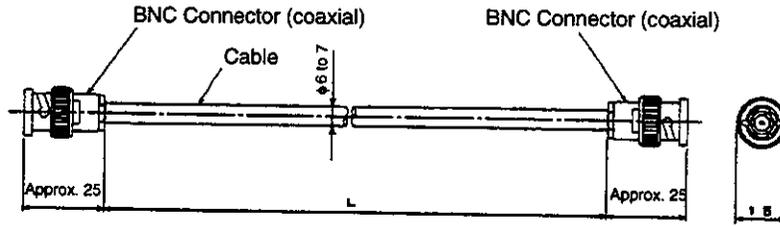


4) W1000 Cable (JZMSZ-W1000-□)



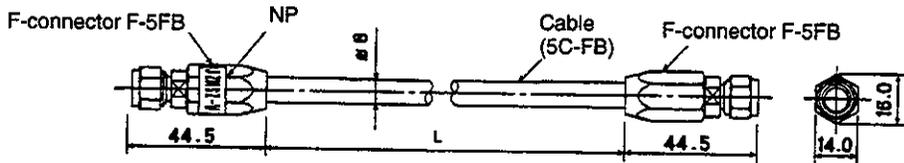
Model	Length (L)	Approximate Mass
JZMSZ-W1000-02	2,000 mm	0.3 kg
JZMSZ-W1000-03	3,000 mm	0.4 kg
JZMSZ-W1000-05	5,000 mm	0.5 kg

5) Coaxial Cable (JZMSZ-W60-□)



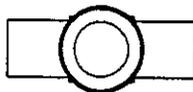
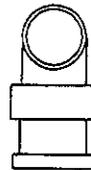
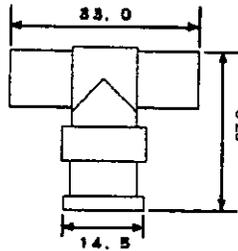
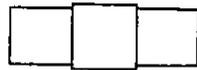
Model	Length (L)	Approximate Mass
JZMSZ-W60-1	2,000 mm	0.3 kg
JZMSZ-W60-2	3,000 mm	0.4 kg
JZMSZ-W60-3	5,000 mm	0.5 kg

6) Coaxial Cable (JZMSZ-W61-□)



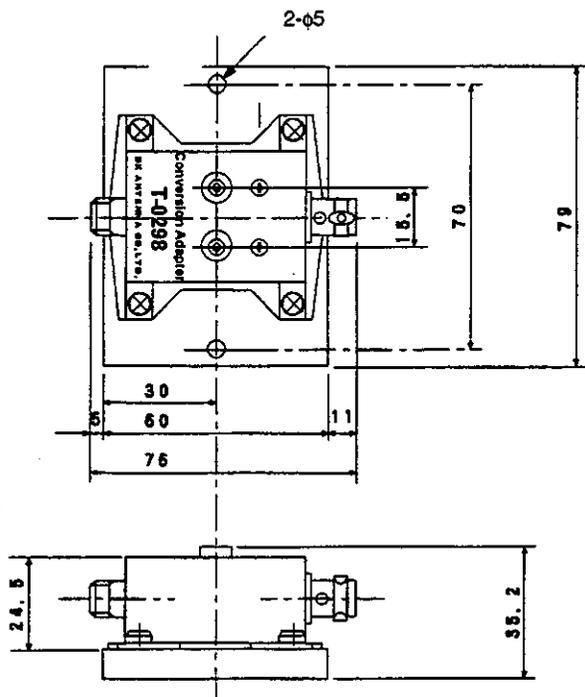
Model	Length (L)	Approximate Mass
JZMSZ-W61-1	2,000 mm	0.3 kg
JZMSZ-W61-2	5,000 mm	0.5 kg
JZMSZ-W61-3	10,000 mm	0.8 kg

7) T-adapter (413592-2)

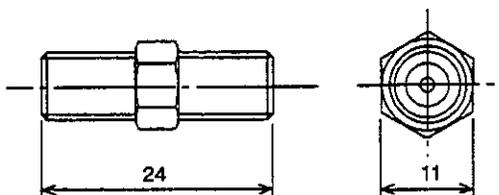


B

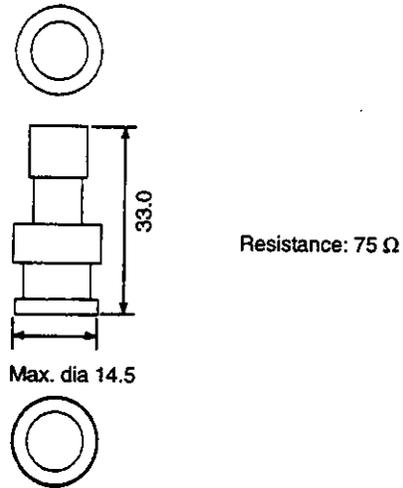
8) Conversion Adapter (T-0298)



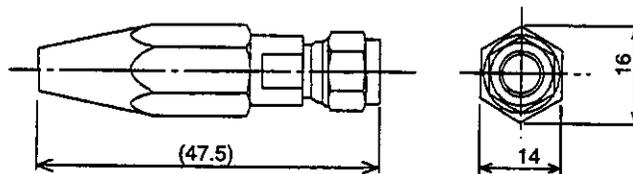
9) Junction Connector (F-A)



10) Terminator (221629-5)



11) F-connector (F-7FB)



MEMOCON GL120, GL130 1000/2000-SERIES COAXIAL REMOTE I/O SYSTEM USER'S MANUAL

TOKYO OFFICE

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

YASKAWA ELECTRIC AMERICA, INC.

2121 Norman Drive South, Waukegan, IL 60085, U.S.A.
Phone 1-847-887-7000 Fax 1-847-887-7370

MOTOMAN INC. HEADQUARTERS

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

YASKAWA ELÉTRICO DO BRASIL COMÉRCIO LTDA.

Avenida Fagundes Filho, 620 Bairro Saude-Sao Paulo-SP, Brazil CEP: 04304-000
Phone 55-11-5071-2552 Fax 55-11-5581-8795

YASKAWA ELECTRIC EUROPE GmbH

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

Motoman Robotics AB

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

Motoman Robotec GmbH

Kammerfeldstraße 1, 85391 Allershausen, Germany
Phone 49-8166-900 Fax 49-8166-9039

YASKAWA ELECTRIC UK LTD.

1 Hunt Hill Orchardton Woods Cumbernauld, G68 9LF, United Kingdom
Phone 44-1236-735000 Fax 44-1236-458182

YASKAWA ELECTRIC KOREA CORPORATION

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

YASKAWA ELECTRIC (SINGAPORE) PTE. LTD.

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

YATEC ENGINEERING CORPORATION

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

BEIJING OFFICE

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

SHANGHAI OFFICE

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

YASKAWA JASON (HK) COMPANY LIMITED

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

TAIPEI OFFICE

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

SHANGHAI YASKAWA-TONGJI M & E CO., LTD.

27 Hui He Road Shanghai China 200437
Phone 86-21-6531-4242 Fax 86-21-6553-6060

BEIJING YASKAWA BEIKE AUTOMATION ENGINEERING CO., LTD.

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

SHOUGANG MOTOMAN ROBOT CO., LTD.

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



YASKAWA ELECTRIC CORPORATION