

# HITACHI

## USER'S MANUAL

OPTION

# EX.RI/O

(LQE220)

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# SIOV

Programmable Controller

SVE-1-148(A)

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**EX.RI/O**

(LQE220)

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Programmable Controller

First Edition, June 2011, SVE-1-148(A)

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## SAFETY PRECAUTIONS

- Before installation, operation, maintenance, and/or inspection of this product, be sure to read through carefully this manual and other related manuals. Do not use this product until you are familiar with all the information concerning this product, safety information, and precautions provided in those manuals.
- Keep this manual in a readily accessible place so that users of this product may easily reach it.
- This manual contains information on potential hazards that is intended as a guide for safe use of this product. The potential hazards listed in the manual are divided into four hazard levels of danger, warning, caution, and notice, according to the level of their severity. The following are definitions of the safety labels containing the corresponding signal words DANGER, WARNING, CAUTION, and NOTICE.



: This safety label identifies precautions that, if not heeded, will result in death or serious injury.



: Identifies precautions that, if not heeded, could result in death or serious injury.



: Identifies precautions that, if not heeded, could result in minor or moderate injury.



: This safety label without a safety alert symbol identifies precautions that, if not heeded, could result in property damage or loss not related to personal injury.

Failure to observe any of the  **CAUTION** and  **NOTICE** statements used in this manual could also lead to a serious consequence, depending on the situation in which this product is used. Therefore, be sure to observe all of those statements without fail.

The following are definitions of the phrases “serious injury,” “minor or moderate injury,” and “property damage or loss not related to personal injury” used in the above definitions of the safety labels.

**Serious injury:** Is an injury that requires hospitalization for medical treatment, has aftereffects, and/or requires long-term follow-up care. Examples of serious injuries are as follows: vision loss, burn (caused by dry heat or extreme cold), electric-shock injury, broken bone, poisoning, etc.

**Minor or moderate injury:** Is an injury that does not require either hospitalization for medical treatment or long-term follow-up care. Examples of minor or moderate injuries are as follows: burn, electric-shock injury, etc.

**Property damage or loss not related to personal injury:** Is a damage to or loss of personal property. Examples of property damages or losses not related to personal injury are as follows: damage to this product or other equipment or their breakdown, loss of useful data, etc.

The safety precautions stated in this manual are based on the general rules of safety applicable to this product. These safety precautions are a necessary complement to the various safety measures included in this product. Although they have been planned carefully, the safety precautions posted on this product and in the manual do not cover every possible hazard. Common sense and caution must be used when operating this product. For safe operation and maintenance of this product, establish your own safety rules and regulations according to your unique needs. A variety of industry standards are available to establish such safety rules and regulations.

## 1. General Safety Guidelines

Before installing, operating inspecting or conducting maintenance on this unit, read the following instructions carefully:

- Follow all the operating procedures provided in this manual.
- Pay special attention to and follow all the hazard warnings on the machine and in the manual. Failure to do so can cause injury to yourself or damage to the machine.
- Do not perform any operation or action in any way other than as provided in this manual. When in doubt, call the designated field engineer. Keep in mind that the hazard warnings in this manual or on the machine cannot cover every possible case, as it is impossible to predict and evaluate all circumstances beforehand.  
Be alert and use your common sense.
- Do not install, wire, handle, modify, or use maintenance parts in any manner not described in this manual. Such a practice may result in breakdown of this equipment or peripherals, injury or even death. Hitachi will not be responsible for any accident or failure resulting from such mishandling.

Read the following safety guidelines carefully and follow them when you conduct maintenance of the machine.

### Before starting maintenance

- Maintenance of the machine must be done only by trained and qualified field engineers.
- Read and follow the safety guidelines and procedures in this manual and the related manuals.
- In this manual and on the machine, hazard warnings are provided to aid you in preventing or reducing the risk of death, personal injury, or product damage. Understand and follow these hazard warnings fully.
- Keep in mind that the hazard warnings in this manual or on the machine cannot cover every possible case, as it is impossible to predict and evaluate all circumstances beforehand.  
Be alert and use your common sense.

### During work

- For each procedure, follow the given sequence of steps.
- Use the special tools and instruments, specified for the work in the manual or commercially available tools and instruments which fit the purpose.
- Use measurement instruments and powered tools which are properly calibrated or periodically inspected.
- Keep the maintenance area neat and tidy.
- Always put away parts, materials or tools when not in use.
- Wear an eye protector where anything may fly about.
- When using sharp objects or cutting tools, make sure that no part of your body lies in the path of the blade bit, or point.
- Before finishing your work, make sure that all parts removed during maintenance have been installed back in their original positions in the machine.  
Make sure that no tool or foreign material is left in the machine.

## Prevention of electric shocks

- Before starting work, make sure that, unless otherwise specifically instructed, there is no potential electric hazard in the maintenance area such as insufficient grounding or a wet floor.
- Before starting work, note where the emergency power-off switches are located and make sure you know how to operate them.
- Unless otherwise specifically instructed, cut off all power sources to the machine before starting maintenance. Just switching off the machine power supplies is usually not enough.

When power is fed from a wall or floor outlet, unplug the power supply cord, or turn off the switch on the power distribution panel or board. Attach a notice on the panel or board prohibiting the use of the switch.

If the energy isolating device such as the switch on the power distribution panel or board accepts a lockout device, turn off the power, lock out the energy isolating device, and bring the key with you. When you take over the work and the key for the lockout device if applicable, do not assume that the power is off. Make sure yourself that the above-mentioned conditions such as switches are satisfied. If necessary, use a measurement tool to ensure that the power is off.

- Do not touch any uninsulated conductor or surface, where so instructed, which remains charged for a limited time after the external power supply to the machine is disconnected.
- When working on a machine which has a grounding terminal, make sure that the terminal is properly connected to the facility's ground.
- When working close to a hazardously energized part, do not work alone; work with another person who can immediately turn off the power in an emergency.
- Do not wear any metallic item such as a wrist watch with a metallic surface, or metallic accessories.

If you wear eyeglasses with a metallic frame, take care not to let the frame touch an uninsulated surface.

- Make sure that your hands and arms are dry.
- Unless otherwise specifically instructed, use only one hand when it is necessary to work near an exposed live electric circuit.

This prevents the completion of the circuit through your heart even if you accidentally touch the circuit.

- Do not use a dental mirror near an exposed live electric circuit.

The mirror surface is conductive and can become hazardous even if it is made of plastic.

- Unless otherwise specifically instructed, do not supply power to any subassembly such as a power supply unit or a motor while it is removed from the machine.

## Procedures in an emergency

### For electric shock

- Do not panic. Do not become another victim through contact with the injured person.
- First, shut off the electric current passing through the victim.  
Use the emergency power-off switch, if there is one, or, otherwise, a normal power-off switch. If this cannot be done, push the victim away from the source of the electric current by using a nonconductive object such as a dry wooden stick.
- Then, call an ambulance.
- If the victim is unconscious, artificial respiration may be necessary.  
A proper method for performing artificial respiration or resuscitation should be learned beforehand. If the victim's heart is not beating, cardio-pulmonary resuscitation should be performed by a trained and qualified person.

### For outbreak of fire

- First, shut off all the power from the machine using the emergency power-off switch, if there is one, or the normal power-off switch.
- If the fire continues burning after the power is shut off, take suitable actions including the use of a fire extinguisher or a call for the fire department.

## 2. Hazard Warning Statements

The following are the hazard warning statements contained in this manual.

### 2.1 WARNING Statement

(chapter 3, page 3-10)

 <b>WARNING</b>
Cable wirings must be done by qualified specialists. Any improper wiring may result in a fire, product failure, or an electric shock.

### 2.2 CAUTION Statements

(chapter 1, page 1-2)

 <b>CAUTION</b>
This product must be provided with the following external circuits: an emergency stop and an interlock circuit. Without these external circuits, failure of this product may cause equipment damage or personal injury.

(chapter 3, page 3-3)

 <b>CAUTION</b>
<ul style="list-style-type: none"><li>● At installation sites where there is a risk of a water leak, be sure to install the programmable controller in a drip-proof cubicle and use it. Disregarding this rule may result in failure of the product.</li><li>● Do not touch any of the modules in the programmable controller when they are in an energized state. Touching any of the modules in an energized state may lead to a discharge of static electricity from your body to the module, resulting in malfunction or breakage of the module. If you have no choice but to touch a module, be sure to discharge the static electricity by touching the metal frame of the cubicle and then touch the module. This is also true when you perform any of the following actions on a module in its non-energized state: 1) setting a switch on the module; 2) connecting or disconnecting the cable from the module; or 3) inserting or removing the connector from the module.</li></ul>

(chapter 3, page 3-5)



### CAUTION

Do not touch any of the modules in the programmable controller when they are in an energized state. Touching any of the modules in an energized state may lead to a discharge of static electricity from your body to the module, resulting in malfunction or breakage of the module. If you have no choice but to touch such a module, be sure to discharge the static electricity by touching the metal frame of the cubicle and then touch the module. This is also true when you perform any of the following actions on a module in its non-energized state: 1) setting a switch on the module; 2) connecting or disconnecting the cable from the module; or 3) inserting or removing the connector from the module.

(chapter 3, page 3-10)



### CAUTION

- Before wiring the power supply equipment, make sure that no voltage is being applied to the power cables. Upon completion of the wiring, replace all the removed terminal covers in their original positions.
- Never touch the terminal block and connector pins while this product is energized. Disregarding this rule may result in an electrical shock hazard.
- Do not carry out any installation, wiring, handling, or remodeling that is not described in this manual. The manufacturer takes no responsibility for any damages to this product, other products, and personal injuries arising from your failure to adhere to this rule.
- Do not touch any of the modules in the programmable controller when they are in an energized state. Touching any of the modules in an energized state may lead to a discharge of static electricity from your body to the module, resulting in malfunction or breakage of the module. If you have no choice but to touch a module, be sure to discharge the static electricity by touching the metal frame of the cubicle and then touch the module. This is also true when you perform any of the following actions on a module in its non-energized state: 1) setting a switch on the module; 2) connecting or disconnecting the cable from the module; or 3) inserting or removing the connector from the module.

(chapter 3, page 3-12)



**CAUTION**

Do not touch any of the modules in the programmable controller when they are in an energized state. Touching any of the modules in an energized state may lead to a discharge of static electricity from your body to the module, resulting in malfunction or breakage of the module. If you have no choice but to touch a module, be sure to discharge the static electricity by touching the metal frame of the cubicle and then touch the module. This is also true when you perform any of the following actions on a module in its non-energized state: 1) setting a switch on the module; 2) connecting or disconnecting the cable from the module; or 3) inserting or removing the connector from the module.

(chapter 5, page 5-2)



**CAUTION**

If the EX.RI/O module needs to be replaced with a new one, be sure to turn off the power to that module before replacing it. Also, before replacing the module, be sure to discharge any static electricity from your body. Failure to observe these rules may result in an electric shock hazard, damage to the module, and/or malfunction.

## 2.3 NOTICE Statements

(chapter 1, page 1-2)

**NOTICE**

It may happen that this product needs to be stored away for future use. In such cases, wrap it up with cushioning around it and keep it in a place that satisfies the environmental requirements listed in Table 1-2.

(chapter 1, page 1-3)

**NOTICE**

The EX.RI/O module must be used in combination with a model-LQP511 LPU module. If an attempt is made to use it in combination with a model-LQP510 LPU module, an optional-module start check error will result, which makes it impossible for the module to run normally.

(chapter 1, page 1-3)

**NOTICE**

Mixed use of the EX.RI/O module and a model-LQE540 J.NET module is not possible if the latter's module no. setting switch is set to 2 (Sub2) or 3 (Sub3). If you need mixed use of these two modules, set the J.NET module's module no. setting switch to 0 (Main) or 1 (Sub or Sub1).

(chapter 1, page 1-5)

**NOTICE**

Any user of this product must have knowledge about Windows® environment and user interface. This product itself conforms to Windows® standards and its manual is written for those who have basic knowledge about the usage of Windows®.

(chapter 1, page 1-8)

**NOTICE**

The PCs OK signal is a contact output via the LPU module's terminal block. If PCs OK signal linkage is enabled by parameter setting, the EX.RI/O module will perform data communication only when the PCs OK signal is ON. For information on when the PCs OK signal is turned ON or OFF, refer to the *USER'S MANUAL BASIC MODULES* (manual number SVE-1-100).

(chapter 1, page 1-10)

**NOTICE**

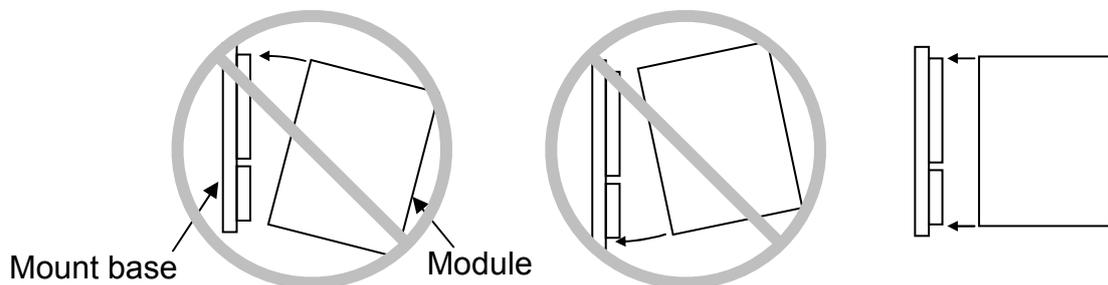
In ladder-synchronous mode, the EX.RI/O module in operation may not notify the LPU of the end of transfer if its hardware component fails during the transfer. If this happens, it will be reported as a transfer timeout error (with the error code 0x0004 from the EX.RI/O module). This type of error will inevitably cause a ladder watchdog timer timeout error (reported with the error code 0x1206 from the LPU), resulting in system stop. Therefore, when you need to use the ladder-synchronous mode, please make sure that the use of the operation mode will not cause any problem in the operation of the entire system.

### **NOTICE**

- Dust or other foreign matter might accumulate on the connector, resulting in poor contact. Immediately after the module is unpacked, perform the mounting and wiring procedures.
- To prevent the module from being damaged, observe the following precautions when you mount or demount the module:
  - Before mounting the module to the mount base connector, check that the connector pins are properly aligned and not bent, broken, or soiled with dirt or the like.
  - Ensure that the module is parallel to the mount base vertical surface as shown below when mounting. If you connect a module to or disconnect it from its connector while it is tilted, the connector pins may become damaged.
  - If the mount base is positioned overhead due to the employed enclosure structure, use a stepladder or the like and mount the module squarely. If you mount the module obliquely, the connector may become damaged.

[Bad example]

[Good example]



(chapter 3, page 3-10)

### **NOTICE**

- Install a fuse or circuit protector for any external power supply for protection against short-circuit. The circuit protector selected must match the ratings of the external power supply.
- Before applying power to this product, check that all the cable wirings for the product are correct.
- When wiring communication, power supply, motive power, and other cables, group them according to their types and set the resulting groups apart from each other. The motive power cables for inverters, motors, power regulators, etc., in particular, must be set at least 300 mm away from the other types of cables. Further, the communication cables must be set in a different conduit than the conduit in which the motive power cables are set.
- The EX.RI/O module (and any other hardware module) may be easily damaged by static electricity. Before you work on the module, be sure to discharge any static electricity from your body.
- To prevent noise-induced malfunction, keep the 100-VAC/DC cable and the network cable at least 100 mm apart from each other, rather than bundle them together.

(chapter 4, page 4-27)

### **NOTICE**

The values entered in the [Analog counter] window will not be written to the LPU until you click the  button in the [Communication setting] window. Therefore, if you click the  button in the [Communication setting] window without clicking the  button, none of those values will be written to the LPU.

(chapter 4, page 4-31)

### **NOTICE**

If the displayed [RAS] window indicates that the EX.RI/O module is currently not in RUN state, you should check to see if there is a problem in the LPU. Whether the LPU is running normally or suffering from a problem can be determined from the following:

- The LPU module's ERR LED indication -- this ERR LED is lit if there is a problem; otherwise, it is not.
- The "ERR LED" indication by the S10V Base System's PCs status display function -- this "ERR LED" indication is "ON" if there is a problem; otherwise, it is "OFF".

(chapter 4, page 4-35)

### **NOTICE**

The above-mentioned existing communication statistics are automatically set to "0" when the LPU is either reset or powered down and then up again. When you click the  button, however, such communication statistics may not be cleared depending on the timing of the clicking.

(chapter 5, page 5-3)

### **NOTICE**

- The discharge of static electricity may damage the EX.RI/O module. So, be sure to discharge the static electricity from your body before doing your work on the module.
- Gallium arsenide (GaAs) is used in some component parts of this product. Gallium arsenide is designated as a harmful substance by law. Use extreme care in handling, particularly in scrapping the product. Have a specialized agent dispose of the product as industrial waste.

## WARRANTY AND SERVICING

Unless a special warranty contract has been arranged, the following warranty is applicable to this product.

### 1. Warranty period and scope

#### Warranty period

The warranty period for this product is for one year after the product has been delivered to the specified delivery site.

#### Scope

If a malfunction should occur during the above warranty period while using this product under normal product specification conditions as described in this manual, please deliver the malfunctioning part of the product to the dealer or Hitachi Engineering & Services Co., Ltd. The malfunctioning part will be replaced or repaired free of charge. If the malfunctioning is shipped, however, the shipment charge and packaging expenses must be paid for by the customer.

This warranty is not applicable if any of the following are true.

- The malfunction was caused by handling or use of the product in a manner not specified in the product specifications.
- The malfunction was caused by a unit other than that which was delivered.
- The malfunction was caused by modifications or repairs made by a vendor other than the vendor that delivered the unit.
- The malfunction was caused by a relay or other consumable which has passed the end of its service life.
- The malfunction was caused by a disaster, natural or otherwise, for which the vendor is not responsible.

The warranty mentioned here means the warranty for the individual product that is delivered. Therefore, we cannot be held responsible for any losses or lost profits that result from the operation of this product or from malfunctions of this product. This warranty is valid only in Japan and is not transferable.

### 2. Range of services

The price of the delivered product does not include on-site servicing fees by engineers. Extra fees will be charged for the following:

- Instruction for installation and adjustments, and witnessing trial operations.
- Inspections, maintenance and adjustments.
- Technical instruction, technical training and training schools.
- Examinations and repairs after the warranty period is concluded.
- Even if the warranty is valid, examination of malfunctions that are caused by reasons outside the above warranty scope.

This manual provides information on the following hardware and program products:

<Hardware product>

EX.RI/O (LQE220)

<Program product>

S-7895-42, S10V EX.RI/O SYSTEM, 01-10

### **Revision record**

Revision No.	Revision record (revision details and reason for revision)	Month, Year	Remarks
A	First edition	June 2011	

In addition to the above changes, all the unclear descriptions and typographical errors found are also corrected without prior notice.

## PREFACE

Thank you for choosing a model-LQE220 EX.RI/O module. An option module that is dedicated to extended remote input/output (EX.RI/O) operations of S10V controllers.

This manual, entitled the *USER'S MANUAL OPTION EX.RI/O*, provides information on how to use the EX.RI/O module. Please read this manual carefully and use this product correctly.

When you use the EX.RI/O module, be sure to use it in conjunction with one of the LPU modules listed below. If it is used with an LPU module of any other model, the EX.RI/O module will not run normally.

Available LPU module models
LQP511, LQP511-Z, LQP711-Z

In addition, be sure to use the EX.RI/O module with the following system:

System name and version
S10V EX.RI/O SYSTEM For Windows®, Ver-Rev 01-00 or later

The EX.RI/O module cannot be used together with a J.NET module (model LQE540) whose module no. setting switch is set to 2 (Sub2) or 3 (Sub3). If you want to use this product together with a J.NET module, the J.NET module's module no. setting switch must be set to 0 (Main) or 1 (Sub or Sub1).

### <Trademarks>

- Ethernet® is registered trademark of Xerox, Corp.
- Microsoft® Windows® operating system, Microsoft® Windows® 2000 operating system, Microsoft® Windows® XP operating system are registered trademarks of Microsoft Corporation in the United States and/or other countries.
- All trademarks are the properties of their respective companies.

<Note for storage capacity calculations>

- Memory capacities and requirements, file sizes and storage requirements, etc. must be calculated according to the formula  $2^n$ . The following examples show the results of such calculations by  $2^n$  (to the right of the equals signs).

1 KB (kilobyte) = 1,024 bytes

1 MB (megabyte) = 1,048,576 bytes

1 GB (gigabyte) = 1,073,741,824 bytes

- As for disk capacities, they must be calculated using the formula  $10^n$ . Listed below are the results of calculating the above example capacities using  $10^n$  in place of  $2^n$ .

1 KB (kilobyte) = 1,000 bytes

1 MB (megabyte) = 1,000<sup>2</sup> bytes

1 GB (gigabyte) = 1,000<sup>3</sup> bytes

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# 1 SPECIFICATIONS

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## 1.1 Brief Outline

The EX.RI/O module (model LQE220) performs data communications with remote I/O stations, each consisting of only one HSC-2100 PI/O unit, over remote I/O communication lines.



### **CAUTION**

This product must be provided with the following external circuits: an emergency stop and an interlock circuit. Without these external circuits, failure of this product may cause equipment damage or personal injury.

### **NOTICE**

It may happen that this product needs to be stored away for future use. In such cases, wrap it up with cushioning around it and keep it in a place that satisfies the environmental requirements listed in Table 1-2.

## 1.2 Overall Specification

Tables 1-1 and 1-2 show the major specification and environmental specification, respectively, of the EX.RI/O module.

Table 1-1 Major Specification

Item	Specification
Product name	EX.RI/O module
Model number	LQE220
Number of modules installable	One per LPU unit
Connectable station model	LWS410 (remote I/O station model for HSC-2100 PI/O units)
Number of available remote I/O ports	2
Number of connectable stations	12 (max) per port
LPU module usable	Model LQP511

**NOTICE**

The EX.RI/O module must be used in combination with a model-LQP511 LPU module. If an attempt is made to use it in combination with a model-LQP510 LPU module, an optional-module start check error will result, which makes it impossible for the module to run normally.

**NOTICE**

Mixed use of the EX.RI/O module and a model-LQE540 J.NET module is not possible if the latter's module no. setting switch is set to 2 (Sub2) or 3 (Sub3). If you need mixed use of these two modules, set the J.NET module's module no. setting switch to 0 (Main) or 1 (Sub or Sub1).

Table 1-2 Environmental Specification

Item	Specification
Ambient operating temperature	0 to +55°C
Ambient storage temperature	-20 to 70°C
Ambient operating humidity	30 to 90%RH (non-condensing)
Ambient storage humidity	10 to 90%RH (non-condensing)
Vibration resistance	Frequency, 10 to 150 Hz; acceleration, 10 m/s <sup>2</sup> ; directions, X, Y, and Z; sweeping time, 8 minutes; sweeping cycles, 20.
Shock resistance	10 G, 3 times in each of X, Y, and Z directions
Insulation resistance	5 MΩ or more at 500 VDC
Dielectric strength	1 minute at 1,500 VAC (between external terminals and FG)
Ambient environment	No corrosive gas, 0.1 mg/m <sup>3</sup> or less dust

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## 1.3 Communication Specification

Table 1-3 shows the communication specification of the EX.RI/O module.

Table 1-3 Communication Specification

Item		Specification	
Data transfer rate		768 kbps	
Number of words (points) transferred		Selected between the three: 512 points, 1,024 points, or 2,048 points (1,024 points per port)	
Recommended cables' specifications	300-m (or less) cable	Model	CO-EV-SX-1P-0.75 mm <sup>2</sup> (manufactured by Hitachi Cable, Ltd.)
		Characteristic impedance	150 Ω
		Attenuation rate	10 dB/km at 750 kHz
		Terminating resistor	150 Ω
		Model	CO-EV-SB-1P × 0.3SQ (manufactured by Hitachi Cable, Ltd.)
		Characteristic impedance	150 Ω
		Attenuation rate	10 dB/km at 750 kHz
		Terminating resistor	150 Ω
	200-m (or less) cable	Model	CO-EV-SB-1P × 0.18SQ (manufactured by Hitachi Cable, Ltd.)
		Characteristic impedance	150 Ω
		Attenuation rate	12 dB/km at 750 kHz
		Terminating resistor	150 Ω
100-m (or less) cable	Model	CO-SPEV-SB-1P-0.3 mm <sup>2</sup> (manufactured by Hitachi Cable, Ltd.)	
	Characteristic impedance	100 Ω	
	Attenuation rate	21 dB/km at 750 kHz	
	Terminating resistor	100 Ω	

## 1.4 System Software

### 1.4.1 Brief outline

Successful use of the EX.RI/O module requires prior storage of module information in that module. To accomplish this, the system software listed below is available, which is often called the tool (or setup tool) in this manual. This tool allows you to do your job on a Windows platform -- it runs as an application on Windows®-based.

Table 1-4 Available System Software (Tool)

Package name	Model	Sold separately or bundled
EX.RI/O system	S-7895-42	Sold separately

### 1.4.2 Hardware and software requirements

The system software (tool) for EX.RI/O modules is usable only when the hardware and software requirements listed below are satisfied.

- Personal computer with Pentium 300 MHz or faster CPU
- Display with 800 × 600 dots (SVGA) or higher resolution
- Microsoft® Windows® 2000 or Microsoft® Windows® XP operating system
- 64 MB or more RAM when Windows® 2000 is used; or 128 MB or more RAM when Windows® XP is used.
- 10 MB or more free space on hard disk drive
- Cable connecting the personal computer and the LPU unit together

#### **NOTICE**

Any user of this product must have knowledge about Windows® environment and user interface. This product itself conforms to Windows® standards and its manual is written for those who have basic knowledge about the usage of Windows®.

## 1.5 System Configuration

The EX.RI/O module is an optional module that is used to extend the number of available remote I/O points per S10V controller unit. This extension can be accomplished by simply connecting additional remote I/O stations' modules to the EX.RI/O module mounted in place.

### 1.5.1 Configuration example

Only one EX.RI/O module may be mounted in your single S10V controller unit. One EX.RI/O module enables you to extend the number of available I/O points to a maximum of 2,048. You can set up the mounted EX.RI/O module by running the dedicated tool on your personal computer. The LPU module that can be used in conjunction with the EX.RI/O module is only that of model LQP511 (or later). No model-LQP510 LPU module is usable with it.

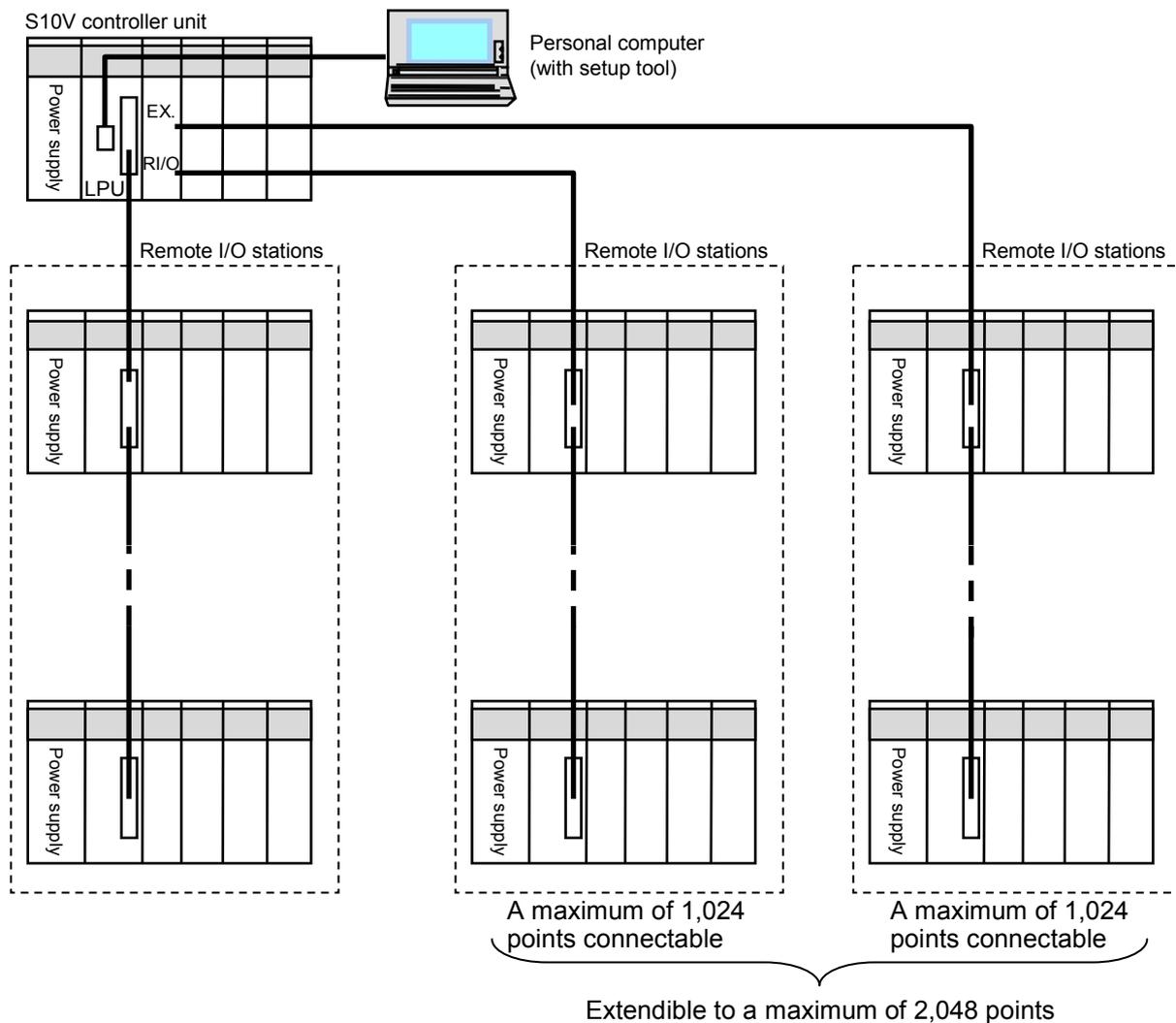


Figure 1-1 System Configuration Example

## 1.6 Operational Specification

Although the EX.RI/O module is capable of extending the number of available remote I/O points, you should remember that the operational specification of remote I/O stations connected to the LPU module is different from that of remote I/O stations connected to the EX.RI/O module. Table 1-5 compares the operational specifications of two such groups of remote I/O stations connected.

Table 1-5 Comparison of Two Operational Specifications

Item		LPU-connected remote I/O's specification	EX.RI/O-connected remote I/O's specification
Setup tool		S10V ladder chart system (model S-7895-02)	EX.RI/O system (model S-7895-42)
Number of settable points		64, 128, 256, 512, 1,024 or 2,048	512, 1,024 or 2,048
Input/output addresses		XW000 to XW7F0 YW000 to YW7F0	XW800 to XWFF0 (default) and YW800 to YWFF0 (default); or user-specified addresses
Analog-/ pulse- counter control data registration	Maximum number of specifiable cases of registration	24	40
	Data storage area	EW400 to EWFB0	User-specified addresses
Ladder-synchronous/ nonsynchronous mode		Supported	Supported
PCs OK signal linkage		Not supported	Supported
System registers		Status: SWBF0 Communication counter: SW150 Error information: SW300 to SW470	Status: SW880 Communication counter: SW160 Error information: User-specified address

# 1 SPECIFICATIONS

## 1.7 Remote I/O Communication Operation

The EX.RI/O module performs different communication operations, depending on the operation (RUN/STOP) status of the ladder and on the input (ON/OFF) status of an RI/O STOP signal from external source. This is shown in Table 1-6 for each of the following two cases: 1) LPU-connected remote I/O and 2) EX.RI/O-connected remote I/O.

Table 1-6 Comparison of Remote I/O Communication (Transfer) Operations

Status		LPU-connected remote I/O	EX.RI/O-connected remote I/O	
RI/O STOP signal input	Ladder operation		PCs OK signal linkage disabled	PCs OK signal linkage enabled
OFF	STOP	√	√	—
	RUN	√	√	√
	SIMU RUN	—	—	—
ON	STOP	—	—	—
	RUN	—	—	√
	SIMU RUN	—	—	—

√: Remote I/O communication is in progress.

—: Remote I/O communication is stopped.

**□**: Each shows a difference in operation between the two cases of remote I/O.

### NOTICE

The PCs OK signal is a contact output via the LPU module's terminal block. If PCs OK signal linkage is enabled by parameter setting, the EX.RI/O module will perform data communication only when the PCs OK signal is ON. For information on when the PCs OK signal is turned ON or OFF, refer to the *USER'S MANUAL BASIC MODULES* (manual number SVE-1-100).

## 1.8 Ladder-Synchronous/Nonsynchronous Mode

### (1) Ladder-nonsynchronous mode

In ladder-nonsynchronous mode of operation, the EX.RI/O module runs asynchronously with the ladder, as shown in Figure 1-2. In this mode of operation, the LPU-connected remote I/O may have a duty cycle slower than its conventional applications', due to the presence of the EX.RI/O module. For information on the duty cycles of the two types of remote I/O, see "1.11 Refresh Cycles Including Remote I/O Time Delay."

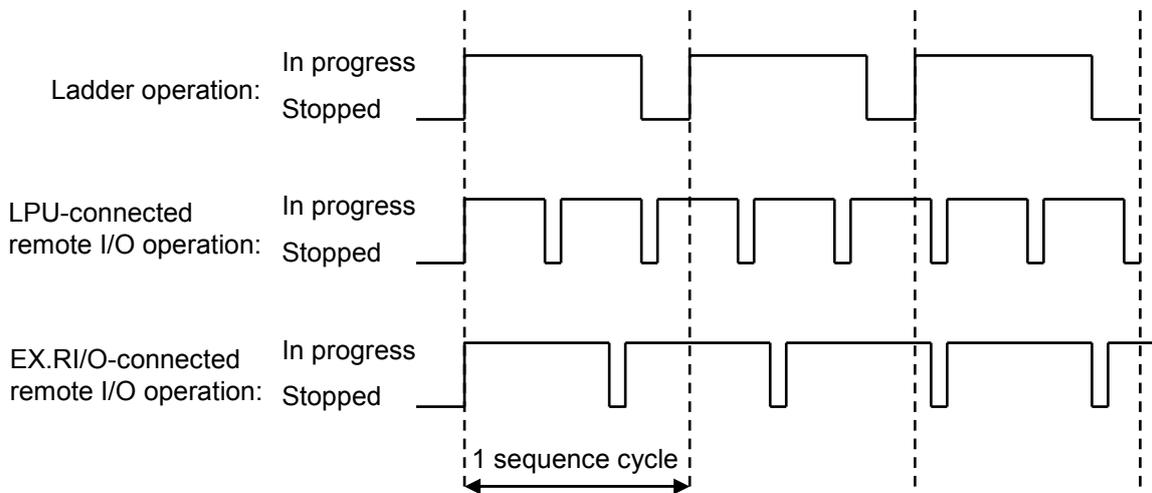


Figure 1-2 Ladder-Nonsynchronous Mode Operation Timing Chart

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## (2) Ladder-synchronous mode

In ladder-synchronous mode of operation, the EX.RI/O module runs synchronously with the ladder, as shown in Figure 1-3. In this mode of operation, the LPU-connected remote I/O also runs synchronously with the ladder, but both the LPU-connected remote I/O and the ladder may have their duty cycles slower than their conventional applications', due to the presence of the EX.RI/O module. For information on the duty cycles of the two types of remote I/O, see "1.11 Refresh Cycles Including Remote I/O Time Delay."

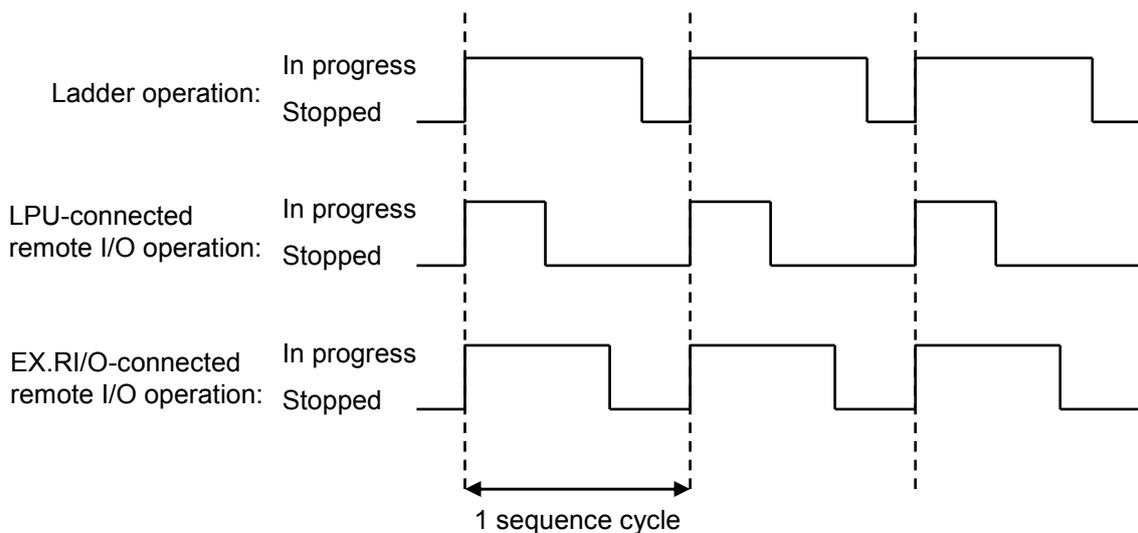


Figure 1-3 Ladder-Synchronous Mode Operation Timing Chart

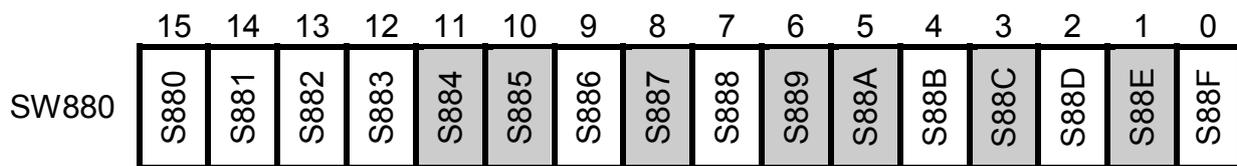
### **NOTICE**

In ladder-synchronous mode, the EX.RI/O module in operation may not notify the LPU of the end of transfer if its hardware component fails during the transfer. If this happens, it will be reported as a transfer timeout error (with the error code 0x0004 from the EX.RI/O module). This type of error will inevitably cause a ladder watchdog timer timeout error (reported with the error code 0x1206 from the LPU), resulting in system stop. Therefore, when you need to use the ladder-synchronous mode, please make sure that the use of the operation mode will not cause any problem in the operation of the entire system.

## 1.9 System Registers

### (1) EX.RI/O status register (SW880)

The system register named SW880 is used to reflect the following: the conditions of the EX.RI/O module at each given point in time and a variety of error conditions detected. This reflection is done by setting or resetting appropriate bits in the register. Of the error conditions detected, the station timeout and fuse-brown errors, in particular, are reflected in the register (by setting their associated bits to 1) even when detected in one of the stations connected to the EX.RI/O module.

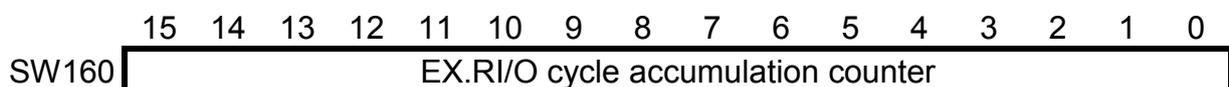


Symbol	Bit value	Meaning
S884	0	The EX.RI/O module is currently stopped.
	1	The EX.RI/O module is currently in operation.
S885	0	No transfer timeout error was detected.
	1	A transfer timeout error was detected.
S887	0	No error was detected by initial diagnosis.
	1	An error was detected by initial diagnosis.
S889	0	No timeout was detected in any station connected.
	1	A timeout was detected in a station connected.
S88A	0	No fuse-brown error was detected in any station connected.
	1	A fuse-brown error was detected in a station connected.
S88C	0	No parity error was detected in any station connected.
	1	A parity error was detected in a station connected.
S88E	0	The EX.RI/O module is currently up and running.
	1	The EX.RI/O module is currently down.

The bits other than those listed above are unused.

### (2) EX.RI/O cycle accumulation counter (SW160)

The system register named SW160 is called the EX.RI/O cycle accumulation counter. This counter counts up every time data communication starts during the operation of the EX.RI/O module. When the counter overflows, it is reset to 0 and continues counting up.



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## 1.10 EX.RI/O Refresh Time

The refresh time used with the EX.RI/O module (model LQE220) varies depending on whether or not an optical adapter (model LQZ410) is used and on the number of input (output) points used. This is shown in Tables 1-7 and 1-8. For details on how to use the optical adapter, refer to the *USER'S MANUAL OPTION OPT.RI/O* (manual number SVE-1-150).

(1) EX.RI/O refresh times when no optical adapter is used

Table 1-7 EX.RI/O Refresh Times When No Optical Adapter Is Used

Number of input (output) points	Refresh time (ms)
512	7.3 ms
1,024	14.1 ms
2,048	27.8 ms

(2) EX.RI/O refresh times when an optical adapter is used

Table 1-8 EX.RI/O Refresh Times When An Optical Adapter Is Used

Number of input (output) points	Refresh time (ms)
512	8.9 ms
1,024	17.3 ms
2,048	34.1 ms

## 1.11 Refresh Cycles Including Remote I/O Time Delay

LPU-connected remote I/O and EX.RI/O-connected remote I/O will affect each other, resulting in a delay in their refresh cycle, if they are operating concurrently. This section shows the refresh cycles including a transfer delay in each of the ladder-synchronous and ladder-nonsynchronous modes.

### (1) Refresh cycle delay in the LPU-connected remote I/O running in ladder-nonsynchronous mode

LPU-connected remote I/O runs asynchronously with the ladder. During such a run, if EX.RI/O-connected remote I/O is also running, it will affect the LPU-connected remote I/O, resulting in a delay in the refresh cycle of the latter. The refresh cycle of the LPU-connected remote I/O can be expressed and displayed on an operation timing chart, as shown below.

Refresh cycle of LPU-connected remote I/O

$$\leq (\text{LPU-connected remote I/O line communication [transmission and reception] time}) + (\text{EX.RI/O-connected remote I/O data reflection time}) + (\text{LPU-connected remote I/O data reflection time})$$

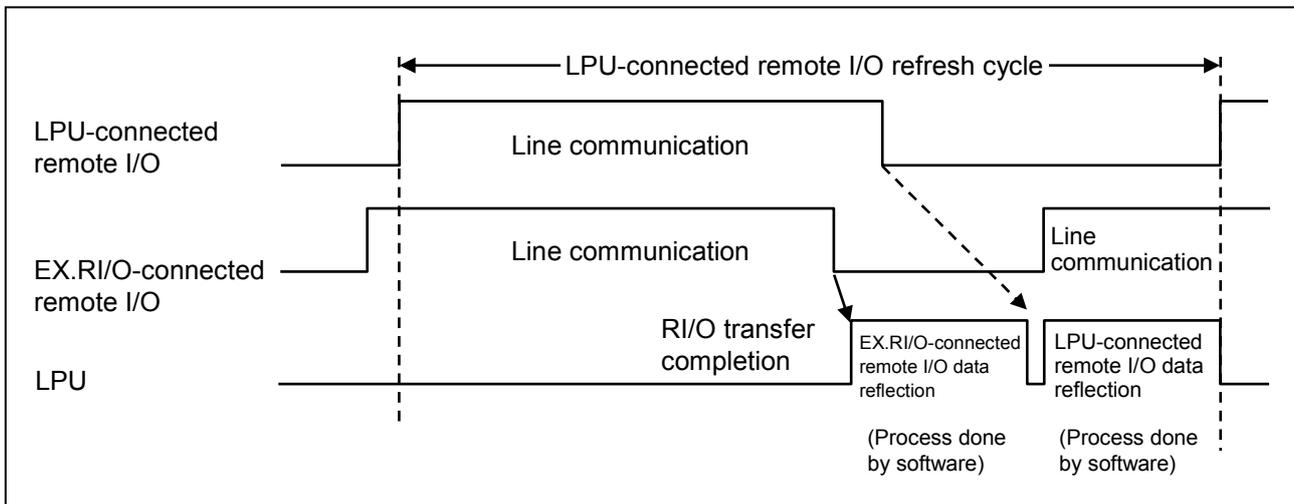


Figure 1-4 LPU-Connected Remote I/O Refresh Cycle



- (3) Remote I/O refresh cycle and sequence cycle longer than it in ladder-synchronous mode  
 In ladder-synchronous mode, both the EX.RI/O-connected and LPU-connected forms of remote I/O run synchronously with the ladder. The refresh cycle of the two forms of remote I/O can be expressed and displayed on an operation timing chart, as shown below, if the sequence cycle used is longer than that refresh cycle.

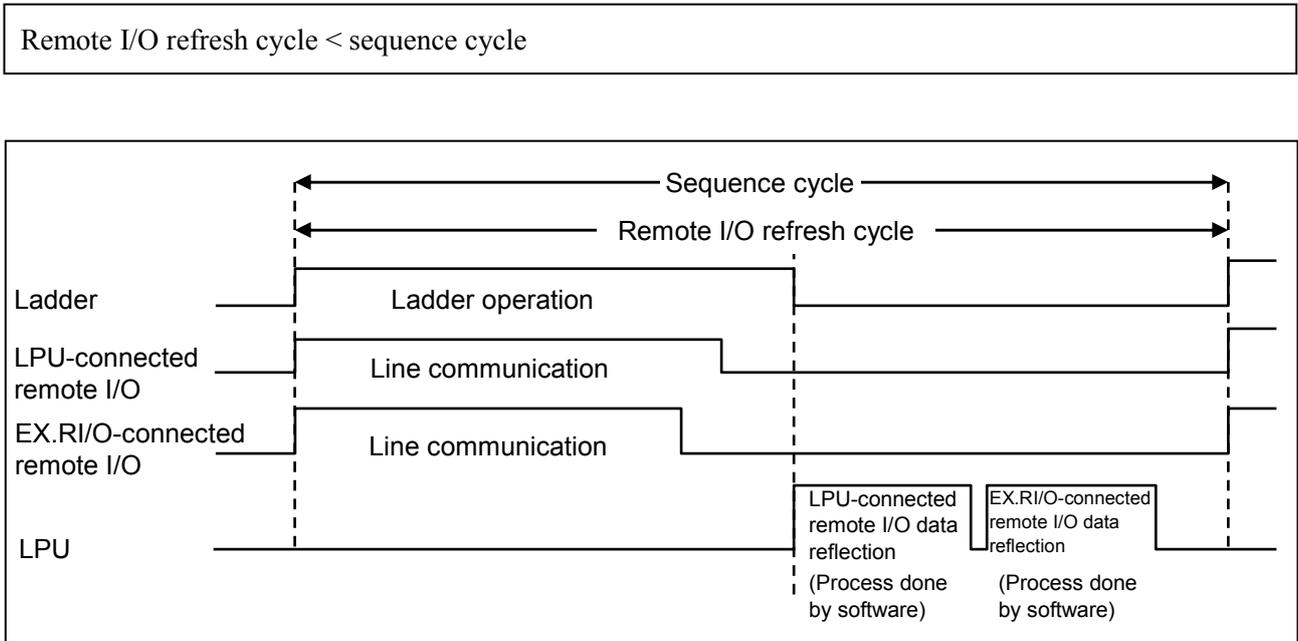


Figure 1-6 Remote I/O Refresh Cycle and Sequence Cycle Longer Than It in Ladder-Synchronous Mode

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- (4) Remote I/O refresh cycle and sequence cycle shorter than or equal to it in ladder-synchronous mode

In ladder-synchronous mode, both the EX.RI/O-connected and LPU-connected forms of remote I/O run synchronously with the ladder. The refresh cycle of the two forms of remote I/O can be expressed and displayed on an operation timing chart, as shown below, if the sequence cycle used is shorter than or equal to that refresh cycle.

$$\text{Remote I/O refresh cycle} = \text{MAX} \left( \begin{array}{l} \text{Ladder operation time or} \\ \text{EX.RI/O-connected remote I/O line communication time or} \\ \text{LPU-connected remote I/O line communication time} \end{array} \right) + (\text{EX.RI/O-connected remote I/O data reflection time} + \text{LPU-connected remote I/O data reflection time})$$

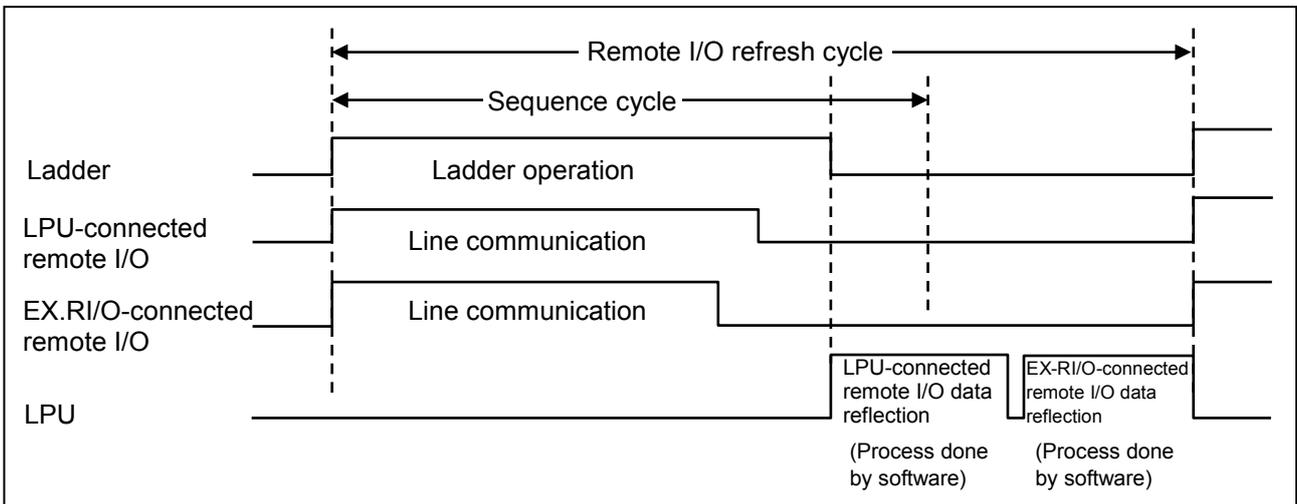


Figure 1-7 Remote I/O Refresh Cycle and Sequence Cycle Shorter Than or Equal to It in Ladder-Synchronous Mode

## 2 NAMES AND FUNCTIONS OF EACH PART

## 2 NAMES AND FUNCTIONS OF EACH PART

### 2.1 Names and Functions of Each Part

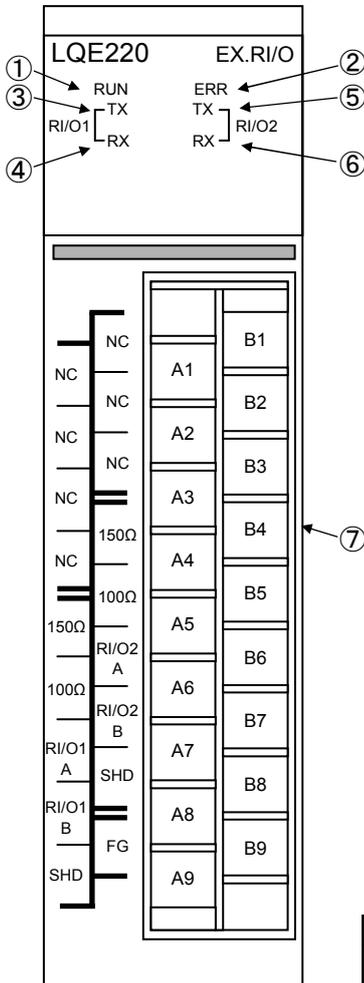


Figure 2-1 Names of Each Part

- ① RUN LED indicator:  
An LED indicator that lights up when the EX.RI/O module is running.
- ② ERR LED indicator:  
An LED indicator that lights up when an error is detected in the EX.RI/O module.
- ③ RI/O1 Transmission LED indicator:  
An LED indicator that lights up when the EX.RI/O module is sending data via remote I/O port 1.
- ④ RI/O1 Reception LED indicator:  
An LED indicator that lights up when the EX.RI/O module is receiving data via remote I/O port 1.
- ⑤ RI/O2 Transmission LED indicator:  
An LED indicator that lights up when the EX.RI/O module is sending data via remote I/O port 2.
- ⑥ RI/O2 Reception LED indicator:  
An LED indicator that lights up when the EX.RI/O module is receiving data via remote I/O port 2.
- ⑦ Terminal block:  
Is used to make electrical connections between the EX.RI/O module and a remote I/O cable. Table 2-1 shows the labeling and function of each terminal.

Table 2-1 The Labeling and Functions of the Terminal Block's Terminals

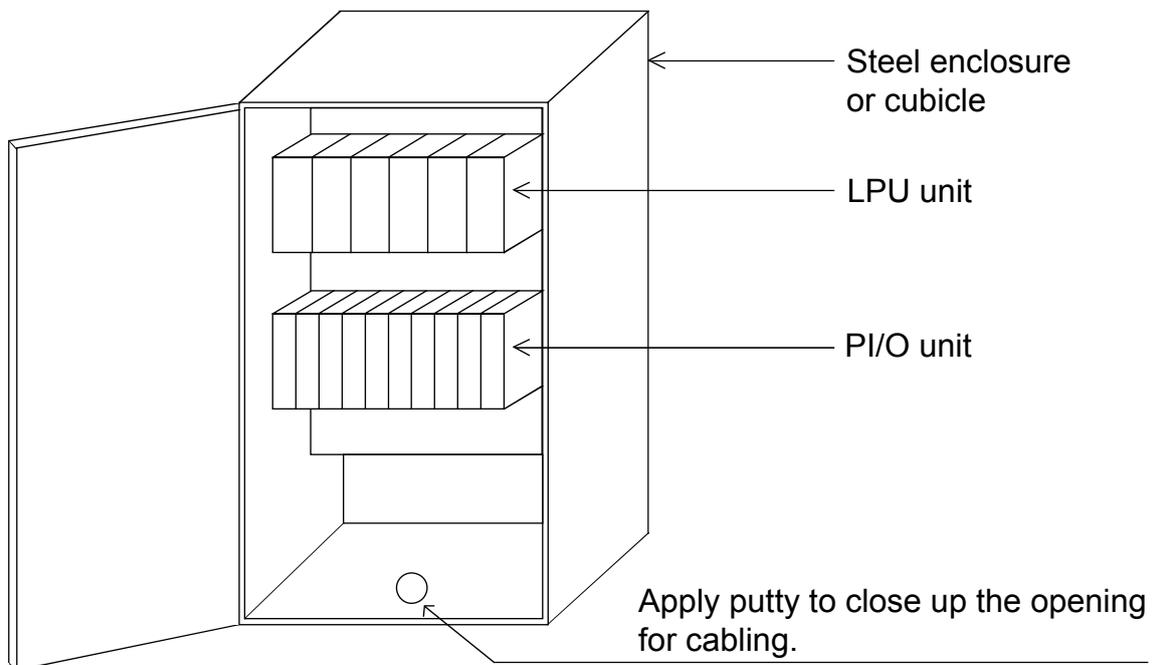
ID number	Label	Function
A5	150Ω	Is used to make an electrical connection with a terminating resistor for port 1. Short this terminal to the terminal RI/O1A. The 150-Ω terminating resistor is then connected to the communication line.
A6	100Ω	Is used to make an electrical connection with another terminating resistor for port 1. Short this terminal to the terminal RI/O1A. The 100-Ω terminating resistor is then connected to the communication line.
A7	RI/O1A	These terminals are wired with the remote I/O cable for port 1.
A8	RI/O1B	
A9	SHD	
B4	150Ω	Is used to make an electrical connection with a terminating resistor for port 2. Short this terminal to the terminal RI/O2A. The 150-Ω terminating resistor is then connected to the communication line.
B5	100Ω	Is used to make an electrical connection with another terminating resistor for port 2. Short this terminal to the terminal RI/O2A. The 100-Ω terminating resistor is then connected to the communication line.
B6	RI/O2A	These terminals are wired with the remote I/O cable for port 2.
B7	RI/O2B	
B8	SHD	
B9	FG	Wire this terminal with the FG terminal of the mount base.
A1	NC	These terminals are unused. Leave them unwired.
A2	NC	
A3	NC	
A4	NC	
B1	NC	
B2	NC	
B3	NC	

# **3 MOUNTING AND WIRING**

#### 3.1 Precautions for Using PCs

Hitachi's programmable controllers or PCs are a product of application of electronic circuit and processor technologies. The use of the product therefore requires special attention to be given to the following:

- (1) The conditions to be met in system construction, such as maximum rated values, operating voltage ranges, heat dissipation characteristics, and mounting conditions, must all be within the warranty coverage stated in this manual. The manufacturer will not be held responsible for any damage that may be caused to the product and/or any physical injury that may be incurred as a result of using the product with conditions outside the warranty coverage. In addition to the above requirement, fail-safe measures should also be provided in any user system by taking the expected failure rate and failure mode of the product into consideration. This is the case even when the product is used with every condition within the warranty coverage. The purpose of such fail-safe measures is to prevent the user system from suffering physical injuries, fire accidents, and/or other enlarged damages, due to the operation of the product.
- (2) None of the PCs supplied to our customers is fireproof, dust-proof, and waterproof. So, please install your PCs in dust-proof and waterproof steel enclosures or cubicles as shown below.



**CAUTION**

- At installation sites where there is a risk of a water leak, be sure to install the programmable controller in a drip-proof cubicle and use it. Disregarding this rule may result in failure of the product.
- Do not touch any of the modules in the programmable controller when they are in an energized state. Touching any of the modules in an energized state may lead to a discharge of static electricity from your body to the module, resulting in malfunction or breakage of the module. If you have no choice but to touch a module, be sure to discharge the static electricity by touching the metal frame of the cubicle and then touch the module. This is also true when you perform any of the following actions on a module in its non-energized state: 1) setting a switch on the module; 2) connecting or disconnecting the cable from the module; or 3) inserting or removing the connector from the module.

## 3.2 Mount Base

The EX.RI/O module must be mounted on a proper mount base before use. The mount bases available are as follows:

Product series	Name	Model
S10V	4-slot LPU mount base	HSC-1540
	8-slot LPU mount base	HSC-1580

## 3.3 Mounting the Module

### 3.3.1 Mounting the EX.RI/O module

The EX.RI/O module must be mounted in any of the option slots (slot numbers 0 through 7) on the mount base, as shown below.

The S10V Series of programmable controllers does not restrict the use of mounting positions and empty slots. However, it does place some restrictions on the combined use of the EX.RI/O module and other I/O modules. For details, refer to the *USER'S MANUAL BASIC MODULES* (manual number SVE-1-100).

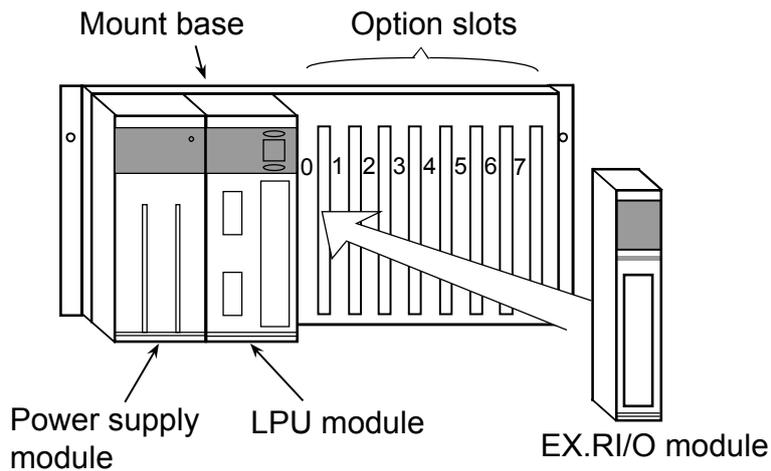


Figure 3-1 Mounting the EX.RI/O Module on the Mount Base

**CAUTION**

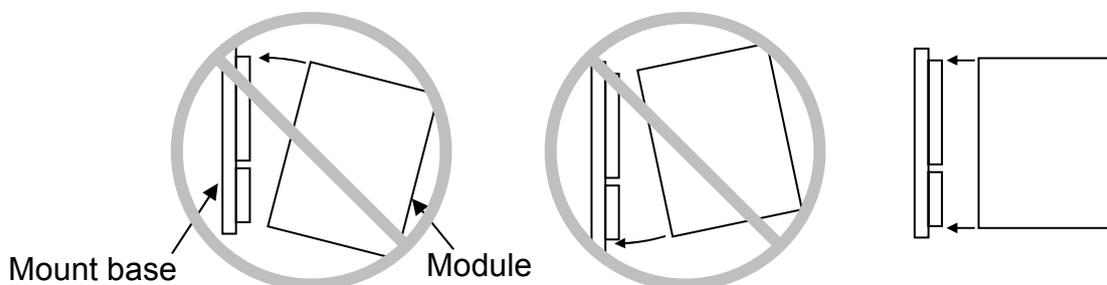
Do not touch any of the modules in the programmable controller when they are in an energized state. Touching any of the modules in an energized state may lead to a discharge of static electricity from your body to the module, resulting in malfunction or breakage of the module. If you have no choice but to touch such a module, be sure to discharge the static electricity by touching the metal frame of the cubicle and then touch the module. This is also true when you perform any of the following actions on a module in its non-energized state: 1) setting a switch on the module; 2) connecting or disconnecting the cable from the module; or 3) inserting or removing the connector from the module.

**NOTICE**

- Dust or other foreign matter might accumulate on the connector, resulting in poor contact. Immediately after the module is unpacked, perform the mounting and wiring procedures.
- To prevent the module from being damaged, observe the following precautions when you mount or demount the module:
  - Before mounting the module to the mount base connector, check that the connector pins are properly aligned and not bent, broken, or soiled with dirt or the like.
  - Ensure that the module is parallel to the mount base vertical surface as shown below when mounting. If you connect a module to or disconnect it from its connector while it is tilted, the connector pins may become damaged.
  - If the mount base is positioned overhead due to the employed enclosure structure, use a stepladder or the like and mount the module squarely. If you mount the module obliquely, the connector may become damaged.

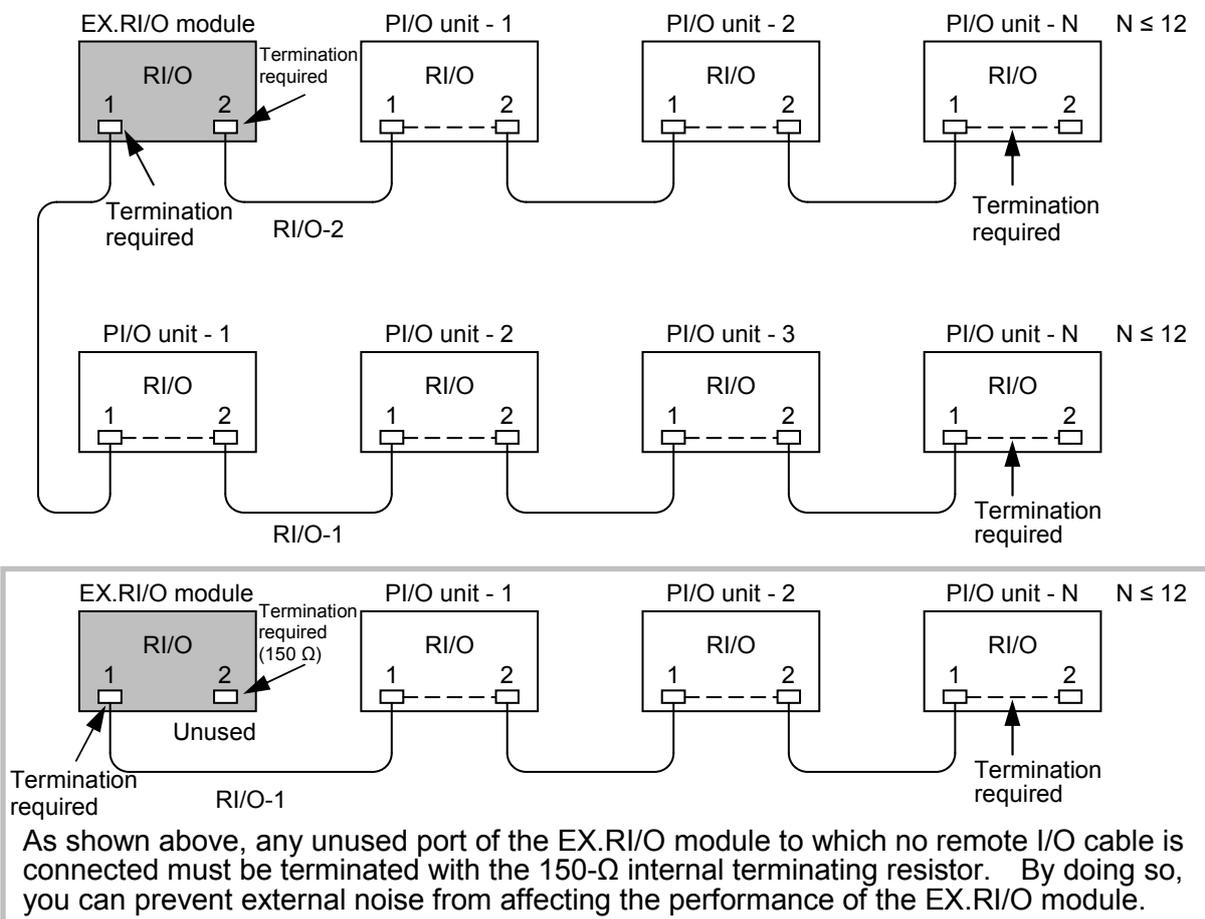
[Bad example]

[Good example]



### 3.4 Wiring Remote I/O Cables

- The EX.RI/O module has two ports, named RI/O-1 and RI/O-2, to each of which you can connect up to 12 PI/O units by using remote I/O cables.
- Each PI/O unit's RI/O-1 and RI/O-2 ports for remote-I/O cable connections are internally connected together, and their port numbers have no correspondence with the port numbers of the EX.RI/O module. When you want to connect a group of PI/O units interconnected in series to the EX.RI/O module's RI/O-1 or RI/O-2 port, assign them station numbers in the range 00 to 3F or 40 to 7F, respectively (by setting the rotary switches of the station modules).
- The EX.RI/O module and a remote I/O station module each of which you want to connect with one end of the same remote I/O line must be terminated with a terminating resistor. The terminating resistors used are an internal resistor (100 Ω or 150 Ω) for the EX.RI/O module and an external user-selected resistor for the station module. The external user-selected resistor must be one that is selected according to the characteristic impedance of the remote I/O cable. More information is given in "3.4.3 Installing terminating resistors."
- Remote I/O cable must be wired correctly as stated in this manual. Any incorrect wiring will result in inability of data communication to proceed. More information is given in "3.4.1 Examples of prohibited cable wiring."
- After the EX.RI/O module and remote I/O stations (modules) have been properly connected together in series, they require setup. The required setup is described in "4 OPERATION."
- If the frame-ground (FG) terminal of a remote I/O station is inside the same cubicle in which the EX.RI/O module is installed, and it can be grounded at the same grounding point as the EX.RI/O module, then you should ground them at that same grounding point. Otherwise, leave the FG terminal ungrounded. In this case, grounding must be done only at the grounding point of the EX.RI/O module.



3.4.1 Examples of prohibited cable wiring

Remote I/O cable must be wired properly as shown below. The use of prohibited cable wiring as exemplified below will transmit distorted data signals via the communication line, resulting in communication errors.

Table 3-1 Examples of Permitted and Prohibited Cable Wiring

Examples of permitted cable wiring	<p>EX.RI/O module    PI/O unit    PI/O unit    PI/O unit</p> <p>Terminated    Unused; terminated (with 150-Ω resistor)    R/I/O-1    R/I/O-2    Terminated</p> <p>■ The number of PI/O units connected in series, connected to a port of the EX.RI/O module must be 12 or less, and the communication line must be terminated at its both ends. Any unused port of the EX.RI/O module must be terminated with the 150-Ω internal terminating resistor.</p>
	<p>PI/O unit    EX.RI/O module    PI/O unit    PI/O unit</p> <p>Terminated    R/I/O-1    R/I/O-2    Terminated</p> <p>■ The EX.RI/O module may be installed at any position on the communication line.</p>
Examples of prohibited cable wiring	<p>EX.RI/O module    PI/O unit    PI/O unit    PI/O unit</p> <p>R/I/O-1</p> <p>■ No branching from the trunk line is permitted.</p>
	<p>EX.RI/O module    PI/O unit    PI/O unit    PI/O unit</p> <p>R/I/O-1    R/I/O-2</p> <p>■ No closed loop is permitted.</p>
	<p>EX.RI/O module    PI/O unit    PI/O unit</p> <p>R/I/O-1    TB    TB</p> <p>■ Remote I/O cable must be directly connected to the EX.RI/O module and PI/O units. Do not use any terminal block (TB) in between them.</p>
	<p>EX.RI/O module    PI/O unit    PI/O unit</p> <p>R/I/O-1</p> <p>■ The cables used for a communication line must all be of the same model.</p>

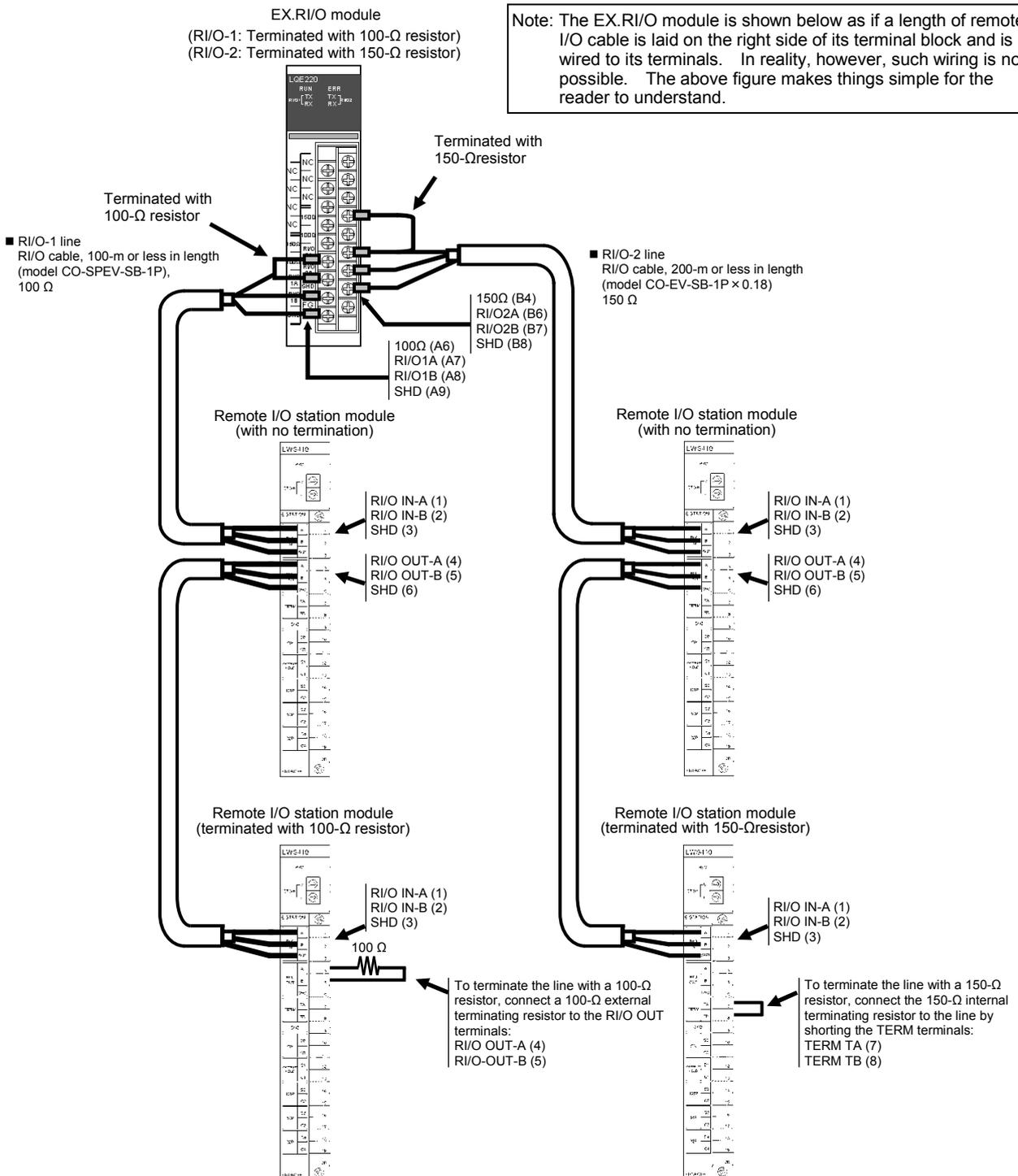
### 3 MOUNTING AND WIRING

#### 3.4.2 An example of cable wiring

- Using two different models of cable (different in characteristics), one for RI/O-1 line and one for RI/O-2 line

The example of cable wiring shown below uses two different models of cable connected to the EX.RI/O module, one for RI/O-1 line and one for RI/O-2 line. These two cable models have different characteristics from each other.

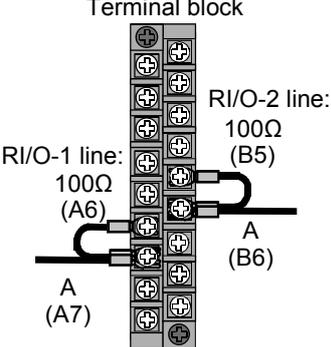
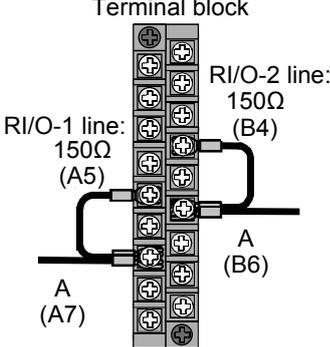
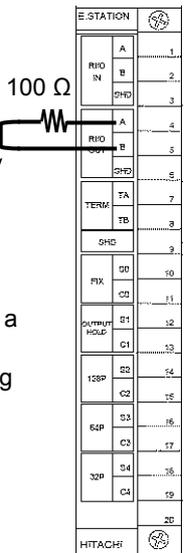
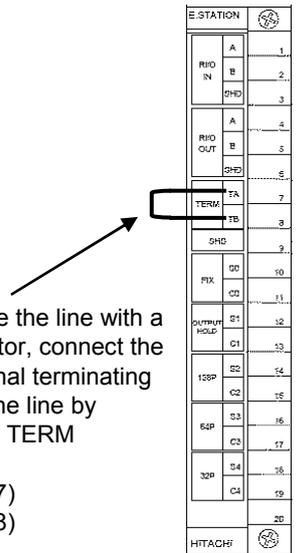
- For details on how to wire HSC-2100 series PI/O units together, refer to the *S10/2α, 4α SERIES WIRING MANUAL* (manual number SAE-4-001).
- The method of terminating the cable is described in “3.4.3 Installing terminating resistors.”
- Information on necessary ground wiring is given in “3.5 Ground Wiring.”



3.4.3 Installing terminating resistors

The use of a specified cable requires termination using the 100-Ω or 150-Ω internal terminating resistor of the EX.RI/O module. Connect them to the cable by shorting the terminals as shown below.

Table 3-2 Installed Terminating Resistors

	Termination using 100-Ω resistor	Termination using 150-Ω resistor
Recommended cable model	CO-SPEV-SB-1P-0.3 mm <sup>2</sup>	CO-EV-SX-1P-0.75 mm <sup>2</sup> CO-EV-SB-1P×0.3SQ CO-EV-SB-1P×0.18SQ
EX.RI/O module	<p>Terminal block</p>  <p>Terminal A: Connects the signal cable wire and shorting wire together.</p>	<p>Terminal block</p>  <p>Terminal A: Connects the signal cable wire and shorting wire together.</p> <p>Note: If you need not connect a remote I/O cable to any of the EX.RI/O module's remote I/O ports, connect the 150-Ω internal terminating resistor by shorting the terminals as shown above. In this case, terminal A connects only the shorting wire.</p>
Remote I/O station module	<p>Terminal block</p>  <p>To terminate the line with a 100-Ω resistor, connect a 100-Ω external terminating resistor to the R/O OUT terminals: R/O OUT-A (4) R/O OUT-B (5)</p>	<p>Terminal block</p>  <p>To terminate the line with a 150-Ω resistor, connect the 150-Ω internal terminating resistor to the line by shorting the TERM terminals: TERM TA (7) TERM TB (8)</p>

- Recommended specifications of terminating resistor (R)
  - Material: Metal oxide film
  - Resistance value: Same value as the impedance of the cable
  - Tolerance: ±10%
  - Power: 0.5 W (1/2 W)
  - Package: Axial



#### **WARNING**

Cable wirings must be done by qualified specialists. Any improper wiring may result in a fire, product failure, or an electric shock.



#### **CAUTION**

- Before wiring the power supply equipment, make sure that no voltage is being applied to the power cables. Upon completion of the wiring, replace all the removed terminal covers in their original positions.
- Never touch the terminal block and connector pins while this product is energized. Disregarding this rule may result in an electrical shock hazard.
- Do not carry out any installation, wiring, handling, or remodeling that is not described in this manual. The manufacturer takes no responsibility for any damages to this product, other products, and personal injuries arising from your failure to adhere to this rule.
- Do not touch any of the modules in the programmable controller when they are in an energized state. Touching any of the modules in an energized state may lead to a discharge of static electricity from your body to the module, resulting in malfunction or breakage of the module. If you have no choice but to touch a module, be sure to discharge the static electricity by touching the metal frame of the cubicle and then touch the module. This is also true when you perform any of the following actions on a module in its non-energized state: 1) setting a switch on the module; 2) connecting or disconnecting the cable from the module; or 3) inserting or removing the connector from the module.

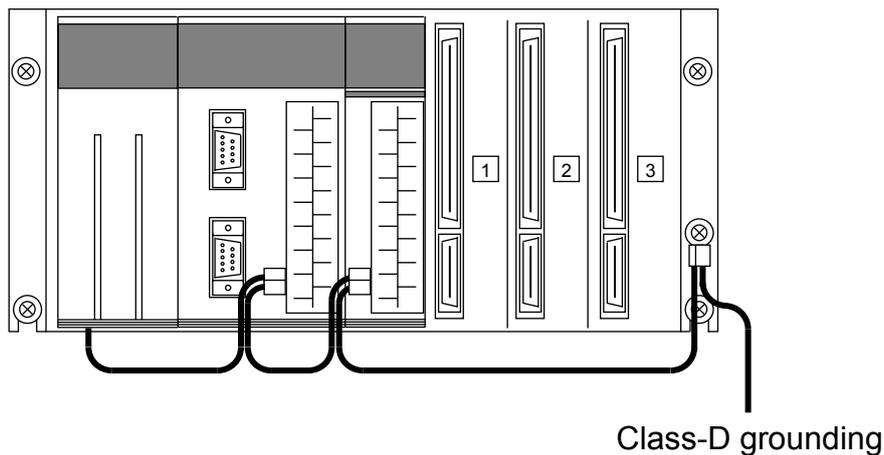
#### **NOTICE**

- Install a fuse or circuit protector for any external power supply for protection against short-circuit. The circuit protector selected must match the ratings of the external power supply.
- Before applying power to this product, check that all the cable wirings for the product are correct.
- When wiring communication, power supply, motive power, and other cables, group them according to their types and set the resulting groups apart from each other. The motive power cables for inverters, motors, power regulators, etc., in particular, must be set at least 300 mm away from the other types of cables. Further, the communication cables must be set in a different conduit than the conduit in which the motive power cables are set.
- The EX.RI/O module (and any other hardware module) may be easily damaged by static electricity. Before you work on the module, be sure to discharge any static electricity from your body.
- To prevent noise-induced malfunction, keep the 100-VAC/DC cable and the network cable at least 100 mm apart from each other, rather than bundle them together.

### 3.5 Ground Wiring

The EX.RI/O module and remote I/O stations have their own FG terminals. If the EX.RI/O module and a remote I/O station(s) are all mounted in the same cubicle, their FG terminals must be wired with the FG terminals of their respective mount bases, as shown below, and must be grounded at the same grounding point. By meeting this requirement, you can make the grounding potentials of those mount bases equal to each other, resulting in good grounding and high resistance to noise.

However, it is possible that, because, for example, they are mounted in separate cubicles and are wired by remote I/O cable, the EX.RI/O module and the remote I/O station(s) cannot be grounded at the same grounding point. In these cases, leave the FG terminal(s) of the remote I/O station(s) unwired, and ground only the FG terminal of the EX.RI/O module. If the FG terminal(s) of the station(s) are grounded, a resulting difference between the grounding potentials of the mount bases will weaken the resistance to noise.



For information on how to ground the power supply module, LPU module, and the LPU unit, refer to Chapter 5, "CABLING," of the *USER'S MANUAL BASIC MODULES* (manual number SVE-1-100).



#### **CAUTION**

Do not touch any of the modules in the programmable controller when they are in an energized state. Touching any of the modules in an energized state may lead to a discharge of static electricity from your body to the module, resulting in malfunction or breakage of the module. If you have no choice but to touch a module, be sure to discharge the static electricity by touching the metal frame of the cubicle and then touch the module. This is also true when you perform any of the following actions on a module in its non-energized state: 1) setting a switch on the module; 2) connecting or disconnecting the cable from the module; or 3) inserting or removing the connector from the module.

# 4 OPERATION

### 4.1 Installing and Starting Up the System

#### 4.1.1 Installing the system

First of all, check that the compact disc (CD) you have for your installation work is the correct one. The EX.RI/O system you are installing is compatible with the following operating systems: Microsoft® Windows® 2000 and Microsoft® Windows® XP.

The EX.RI/O system can be installed by launching the setup program stored in the DISK1 folder on the EX.RI/O system CD. To accomplish this, double-click on “setup.exe” in the DISK1 folder on that CD. When the installation is completed, the window for the installed system is not displayed automatically. So, create a shortcut to the system on the desktop if necessary.

- For its operation, the EX.RI/O system requires that the S10V Base System should already be installed on your Windows machine. If it is not, the installation of the EX.RI/O system is not possible on that machine.
- Before installing the EX.RI/O system on your machine, be sure to terminate any application programs currently running under Windows®-based, including memory-resident programs, such as the antivirus program. Any attempt to install the EX.RI/O system without terminating those applications may result in an error. If such an error occurs, first uninstall the EX.RI/O system according to the instructions given in “4.1.2 Uninstalling the system.” Then, terminate all the applications currently running under Windows®-based and try to install the system again.

#### 4.1.2 Uninstalling the system

To uninstall the EX.RI/O system, first click on the  button on the desktop and choose [Settings] - [Control Panel] from the [Start] menu. In the control panel opened, double-click on [Add/Remove Programs]. Then, choose [S10V EX.RI/O SYSTEM] in the [Change or Remove Programs] tab and click the  button in that tab.

The [Confirm File Deletion] window will then be displayed. Click the  button.

- During uninstallation of the EX.RI/O system, the message “Remove Shared File?” may be displayed. In this case, click the  button. By doing so, you can leave the shard file undeleted.
- When you install the EX.RI/O system again, be sure to first uninstall it and then install it again.

### 4.1.3 Starting the EX.RI/O system

To set parameters for the EX.RI/O module, start the EX.RI/O system by using the procedure described below.

- ① To start the EX.RI/O system, click the **Start** button on the Windows desktop and choose [Programs] or [All Programs] from the [Start] menu and then choose [Hitachi S10V] - [S10V EX.RIO SYSTEM] - [S10V EX.RIO SYSTEM] from the pulldown menu displayed. If a shortcut to the EX.RI/O system is created on the desktop, double-clicking that shortcut will also produce the same result.
- ② The EX.RI/O system's main window, titled [[S10V] EX.RI/O system], is then displayed as shown below.

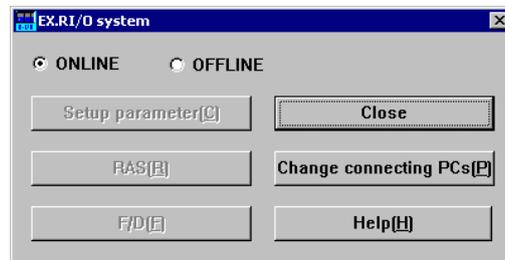


Figure 4-1 The EX.RI/O system's Main Window

If you want to use RS-232C as the communication type in online mode, or want to change the destination's Ethernet port IP address to the one at which the programmable controller currently connected with your personal computer by Ethernet cable is located, click the **Change connecting PCs** button. The [Communication type] window will then appear. Alternatively, you can edit an existing EX.RI/O setup file in offline mode. If you want to do so, just skip to Step ⑦.

- ③ If the communication type you want to use is RS-232C, select the [RS-232C] radio button and then the desired communication port. A communication port is selectable from among those of "COM1" through "COM4". The default is "COM1".

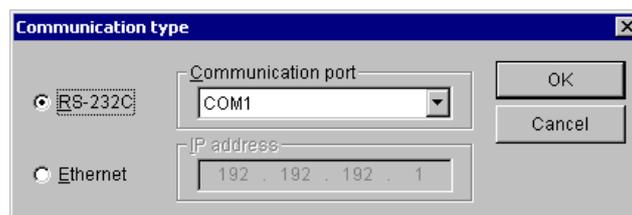


Figure 4-2 [Communication type] Window with RS-232C Selected

## 4 OPERATION

- ④ If it is Ethernet, select the [Ethernet] radio button and enter the IP address of the desired Ethernet port of the destination.

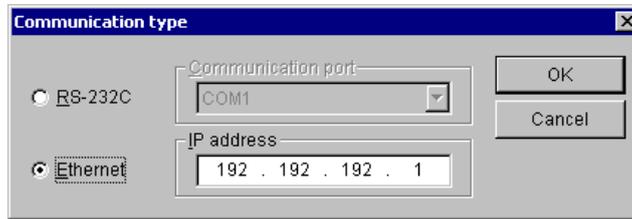


Figure 4-3 [Communication type] Window with Ethernet Selected

- ⑤ When the IP address has been entered, click the **OK** button. Clicking the **Cancel** button in place of **OK** will not change the communication type (connection) currently used.
- ⑥ The EX.RI/O system's main window is re-displayed as shown below if the connected LPU is Ver-Rev 03-00 or later. As shown, all of the **Setup parameter**, **RAS**, and **F/D** buttons are now selectable.

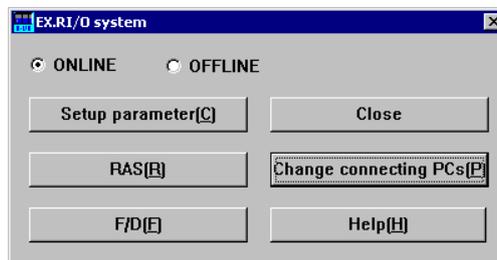


Figure 4-4 The EX.RI/O System's Main Window

However, if the connected LPU is earlier than Ver-Rev 03-00, an error message as shown below will be displayed, stating that the EX.RI/O system supports only LPUs of Ver-Rev 03-00 or later.

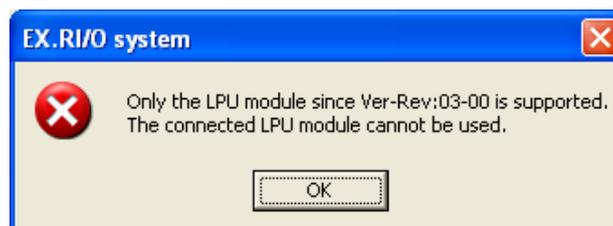


Figure 4-5 An Error Message Stating Only LPUs of Ver-Rev 03-00 or Later Is Supported.

Click the  button in the error message dialog box. The EX.RI/O system's main window will then become active again. Replace the existing LPU in the programmable controller with an LPU of Ver-Rev 03-00 or later. For details, refer to the *USER'S MANUAL BASIC MODULES* (manual number SVE-1-100).

In addition, if an EX.RI/O module is not installed in the programmable controller, an alert message to that effect will be displayed:

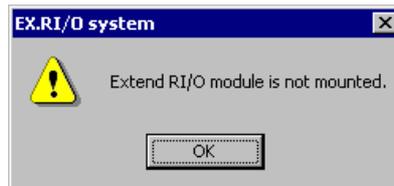


Figure 4-6 An Alert Message Reporting an EX.RI/O Module Not Mounted in Place

Click the  button if you want to continue this procedure.

- ⑦ Click the [OFFLINE] radio button in the EX.RI/O system's main window. The  button will then change into the  button.

This step is unnecessary if the [OFFLINE] radio button is already selected.

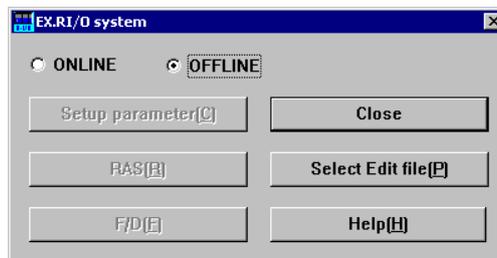


Figure 4-7 The EX.RI/O System's Main Window

- ⑧ Click the  button to choose an edit file. The [Open] window will then be displayed.

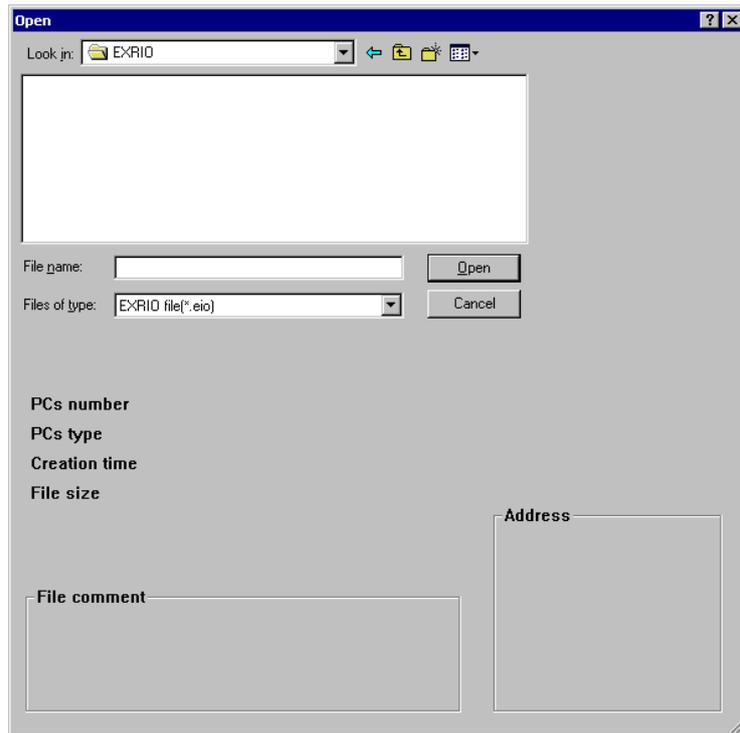


Figure 4-8 [Open] Window

- ⑨ If you want to create an EX.RI/O file and edit setup information by using it, enter its unique file name and click the **Open** button. A file-creation confirmation message as shown below will then appear. Click the **Yes** button.

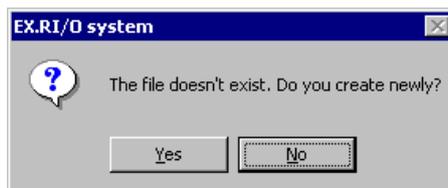


Figure 4-9 A File-Creation Confirmation Message

- ⑩ If you want to edit an already created EX.RI/O file, select that file in the [Open] window. The PCs number (decimal), PCs type (hexadecimal), and so on will then be displayed in that window. Click the  button.
- If the selected file is invalid (e.g., it is not an EX.RI/O file), the following error message will be displayed:

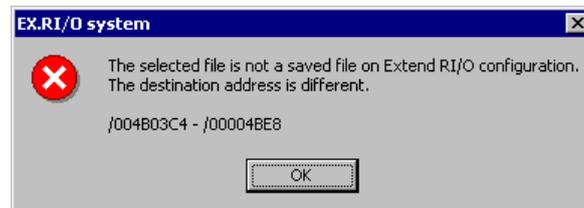


Figure 4-10 An Error Message Reporting an Invalid Setup Info File Specified

If it is valid, you will now be able to edit its contents by using operating procedures as described in “4.2 Operating Procedures.” In offline mode, however, the  button is clickable in the [Communication setting] window, but the  button is not.

#### 4.1.4 Terminating the system

To terminate the EX.RI/O system, click  or the  button in the EX.RI/O system’s main window.

4.2 Operating Procedures

4.2.1 Setup parameter

Function: The “Setup parameter” command sets communication parameters for extended RI/O operations by request. It also saves those parameters to a file in comma-separated-values (CSV) format by request.

Operation: The operating procedure used is described below.

<Setting parameters>

- ① In the EX.RI/O system’s main window displayed, click the Setup parameter button. The [Communication setting] window as shown below will then be displayed along with the latest parameter values.

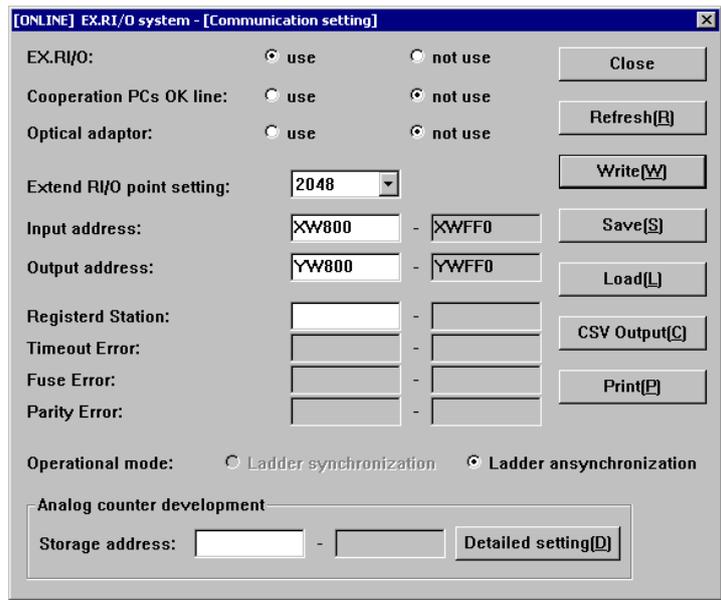


Figure 4-11 [Communication setting] Window

- ② Specify parameter values necessary for data communications in extended RI/O operations. If you need not add any changes to the existing parameter values, just click the  button. The following describes the individual parameters displayed in the [Communication setting] window.

- [EX.RI/O] radio buttons (available only in online mode):

These radio buttons choose between whether or not to use EX.RI/O functionality. If “use” is selected and this parameter value is written to the programmable controller along with the other communication parameter values specified, then after automatic resetting of the programmable controller, data communication will automatically start for extended RI/O operation.

If “not use” is selected instead and this parameter value is written to the programmable controller, then after automatic resetting of the programmable controller, data communication will not automatically start for extended RI/O operation. In this case, none of the other communication parameter values specified are written to the programmable controller, along with that parameter value. So, if you do not want to run the mounted EX.RI/O module, choose “not use” for this parameter and write the parameter value to the programmable controller.

If no EX.RI/O module is mounted in the programmable controller, a message as shown in Figure 4-6 (stating “Extend RI/O module is not mounted”) will be displayed when you select the desired communication type. Even in this case, you can select “use” and write it to the programmable controller. The resulting parameter value will not affect the operation of the LPU at all.

The default value of this parameter is “not use”.

- [Cooperation PCs OK line] radio buttons:

Choose between whether or not to use PCs OK signal linkage. If PCs OK signal linkage is used by setting this parameter to a value of “use”, the EX.RI/O module will start and stop data communication interlockingly with the PCs OK contact output (PCs OK signal) from the LPU module’s terminal block. This is summarized below.

Status of PCs OK contact output	ON	OFF
Communication started or stopped by EX.RI/O module	Started	Stopped

For information on the PCs OK signal, refer to the *USER’S MANUAL BASIC MODULES* (manual number SVE-1-100).

The default value of this parameter is “not use”.

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- [Optical adaptor] radio buttons:

Choose between whether or not to use optical-adapter functionality.

If an optical adapter is connected to your programmable controller, it will cause a time delay in data transmission. This time delay makes it necessary to increase timeout detection time. The EX.RI/O module will automatically adjust the length of timeout detection time if this parameter is set to a value of “use”. If it is set to a value of “not use”, no such automatic adjustment will take place. So, if an optical adapter is connected to the programmable controller, a timeout may occur. To avoid this, be sure to set this parameter to a value of “use” if an optical adapter is connected to the programmable controller. The default value is “not use”.

- [Extend RI/O point setting] drop-down list:

Shows a list of extended RI/O point counts one of which you can select. Available point counts are as follows:

Point count	Default
512, 1,024, 2,048	2,048

If a point count of 512 or 1,024 is selected, the EX.RI/O module will use only the RI/O-1 port (line) for data communication. If a point count of 2,048 is selected instead, it will use both of the RI/O-1 and RI/O-2 ports (lines) for such a purpose. Information on the RI/O-1 and RI/O-2 ports (lines) is provided in Table 4-1, “A General Method of Assigning Registers to the Station Numbers Available.”

- Input address:

These two edit boxes can hold the starting and ending addresses of an input area to be used by the EX.RI/O module for input data storage (the ending address is not enterable).

The ending address of the input area will be automatically determined from both the entered starting address and a predetermined offset and will be displayed.

The default starting address of an input area is the address symbol “XW800”.

Enterable address symbols are listed in Table 4-2, “Specifiable Address Symbols.”

- Output address:

These two edit boxes can hold the starting and ending addresses of an output area to be used by the EX.RI/O module for output data storage (the ending address is not enterable).

The ending address of the output area will be automatically determined from both the entered starting address and a predetermined offset and will be displayed.

The default starting address of an output area is the address symbol “YW800”.

Enterable address symbols are listed in Table 4-2, “Specifiable Address Symbols.”

- Registered Station:

These two edit boxes can hold the starting and ending addresses of a sequence of registers in which to store the statuses of registered or defined stations (the ending address is not enterable).

Any one of the specified sequence of registers is set to 1 when during data communication the corresponding station sends back a normal response at least once to the EX.RI/O module with which it is connected by communication line.

By your entry of an address symbol as the starting address (first register) of the sequence, the ending address of the same sequence of registers will be automatically determined from that address symbol, along with the starting and ending addresses of the following sequences of status registers:

- Timeout Error
- Fuse Error
- Parity Error

The default starting address of this sequence of registers is none (displayed as blank space).

Enterable address symbols are listed in Table 4-2, “Specifiable Address Symbols.”

- Timeout Error (no entries required):

These two edit boxes can hold the starting and ending addresses of a sequence of registers in which to store timeout error conditions of registered stations.

Any one of the specified sequence of registers is set to 1 when the corresponding station does not send back a response three times consecutively within a fixed time period.

The starting and ending addresses of this sequence of registers will be automatically determined from the specified starting address of the sequence of registers for “Registered Station” and will be displayed.

The default starting and ending addresses of this sequence of registers are none (displayed as blank space).

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- Fuse Error (no entries required):

These two edit boxes can hold the starting and ending addresses of a sequence of registers in which to store fuse error conditions of registered stations.

Any one of the specified sequence of registers is set to 1 when the corresponding station sends back a “fuse error” response to the EX.RI/O module.

The starting and ending addresses of this sequence of registers will be automatically determined from the specified starting address of the sequence of registers for “Registered Station” and will be displayed.

The default starting and ending addresses of this sequence of registers are none (displayed as blank space).

- Parity Error (no entries required):

These two edit boxes can hold the starting and ending addresses of a sequence of registers in which to store parity error conditions (potentially not serious) of registered stations.

Any one of the specified sequence of registers is set to 1 when such a parity error occurs in the corresponding station.

The starting and ending addresses of this sequence of registers will be automatically determined from the specified starting address of the sequence of registers for “Registered Station” and will be displayed.

The default starting and ending addresses of this sequence of registers are none (displayed as blank space).

The table below shows a usage example of the sequences of status registers described above. In the table, the address symbol “RW700” is used as the starting address of the sequence of registers for “Registered Station” and the shaded address symbols are those which are automatically determined and displayed.

Designation of status registers	Starting address	Ending address
Registered-station status register	RW700	RW770
Timeout-error status register	RW780	RW7F0
Fuse-error status register	RW800	RW870
Parity-error status register	RW880	RW8F0

Table 4-1 shows a general method of assigning registers to the station numbers or ST Nos. (set by the rotary switches U and L) of stations connected to each remote I/O port of the EX.RI/O module.

Table 4-1 A General Method of Assigning Registers to the Station Numbers Available

Line	ST No.		Starting address of I/O area	Status registers				Remarks
	U	L		Registered -station	Timeout -error	Fuse-error	Parity-error	
RI/O-1	0	0	XW800 / YW800	R700	R780	R800	R880	Only registered-station status registers are settable along with the starting addresses of I/O areas. (R700, R780, R800, and R880 are bit registers, which are parts of word registers, such as RW700.)
	0	1	+010 / +010	+001	+001	+001	+001	
	0	2	+020 / +020	+002	+002	+002	+002	
	0	3	+030 / +030	+003	+003	+003	+003	
	0	4	+040 / +040	+004	+004	+004	+004	
	0	5	+050 / +050	+005	+005	+005	+005	
	0	6	+060 / +060	+006	+006	+006	+006	
	0	7	+070 / +070	+007	+007	+007	+007	
	...	...	...	...	...	...	...	
	3	8	+380 / +380	+038	+038	+038	+038	
	3	9	+390 / +390	+039	+039	+039	+039	This ST No. may be used only for a 2- or 4-slot mount-base station.
	3	A	+3A0 / +3A0	+03A	+03A	+03A	+03A	This ST No. may be used only for a 2- or 4-slot mount-base station.
	3	B	+3B0 / +3B0	+03B	+03B	+03B	+03B	This ST No. may be used only for a 2- or 4-slot mount-base station.
	3	C	+3C0 / +3C0	+03C	+03C	+03C	+03C	This ST No. may be used only for a 2- or 4-slot mount-base station.
	3	D	+3D0 / +3D0	+03D	+03D	+03D	+03D	This ST No. may be used only for a 2-slot mount-base station.
3	E	+3E0 / +3E0	+03E	+03E	+03E	+03E	This ST No. may be used only for a 2-slot mount-base station.	
3	F	+3F0 / +3F0	+03F	+03F	+03F	+03F	This ST No. is not settable by users.	
RI/O-2	4	0	+400 / +400	+040	+040	+040	+040	
	4	1	+410 / +410	+041	+041	+041	+041	
	4	2	+420 / +420	+042	+042	+042	+042	
	4	3	+430 / +430	+043	+043	+043	+043	
	...	...	...	...	...	...	...	
	7	8	+780 / +780	+078	+078	+078	+078	
	7	9	+790 / +790	+079	+079	+079	+079	This ST No. may be used only for a 2- or 4-slot mount-base station.
	7	A	+7A0 / +7A0	+07A	+07A	+07A	+07A	This ST No. may be used only for a 2- or 4-slot mount-base station.
	7	B	+7B0 / +7B0	+07B	+07B	+07B	+07B	This ST No. may be used only for a 2- or 4-slot mount-base station.
	7	C	+7C0 / +7C0	+07C	+07C	+07C	+07C	This ST No. may be used only for a 2- or 4-slot mount-base station.
	7	D	+7D0 / +7D0	+07D	+07D	+07D	+07D	This ST No. may be used only for a 2-slot mount-base station.
	7	E	+7E0 / +7E0	+07E	+07E	+07E	+07E	This ST No. may be used only for a 2-slot mount-base station.
	7	F	+7F0 / +7F0	+07F	+07F	+07F	+07F	This ST No. is not settable by users.

## 4 OPERATION

- [Operational mode] radio buttons (no clicking required):  
Display either ladder synchronization mode or ladder asynchronization mode -- these radio buttons reflect the mode setting done using the ladder chart system. The unselected radio button is grayed out.
- Storage address under “Analog counter development”:  
These two edit boxes can hold the starting and ending addresses of an analog-data storage area (the ending address is not enterable).  
By your entry of an address symbol as the starting address of the storage area, the ending address will be automatically determined from that address symbol and will be displayed. The default starting and ending addresses of this storage area are none (displayed as blank space).  
The starting address of this storage area must be specified as an integer multiple of 16 (bytes). For example:

Address allowable	Address not allowable
JW000	JW016
JW080	JW032
JW010	JW1F8

Enterable address symbols are listed in Table 4-2, “Specifiable Address Symbols.”

Table 4-2 Specifiable Address Symbols

Address symbol	Memory address	Uses or application		
		Starting address of I/O area	Registered-station status register	Storage address under “Analog counter development”
JW000 to JWFFF	0x400200 to 0x4003FE	√	√	√ (*)
QW000 to QWFFF	0x400600 to 0x4007FE	√	√	√ (*)
GW000 to GWFFF	0x400800 to 0x4009FE	√	√	√ (*)
AW000 to AWWFF	0x400A00 to 0x400BFE	√	√	√ (*)
RW000 to RWFFF	0x400C00 to 0x400DFE	√	√	√ (*)
MW000 to MWFFF	0x400E00 to 0x400FFE	√	√	√ (*)
FW000 to FWBFF	0x402000 to 0x4037FE	√	ns	√
IW000 to IWFFF	0x404000 to 0x405E6E	√	ns	√
OW000 to OWFFF	0x406000 to 0x407FFE	√	ns	√
LBW0000 to LBWFFFF	0x412000 to 0x413FFE	√	√	√
XW800 to XWFF0	0x414100 to 0x4141FE	√	ns	ns
YW800 to YWFF0	0x414300 to 0x4143FE	√	ns	ns
LWW0000 to LWWFFFF	0x450000 to 0x46FFFE	√	ns	√
LXW0000 to LXW3FFF	0x4A0000 to 0x4A7FFE	√	ns	√
DW000 to DWFFF	0x470000 to 0x471FFE	√	ns	√

√, specifiable; ns, not specifiable.

(\*) This use of the sequence of address symbols is allowed to secure only up to 256 words, equivalent to 32 cases of location setting (compared with up to 320 words for a maximum of 40 cases), because of the given range of memory addresses available.

- ③ If you want to assign storage locations in the analog-data storage area to counter modules, click the **Detailed setting** button in the “Analog counter development” field. (For a description of the subsequent steps, see “4.2.2 Detailed setting -- setting analog counters.”)
- ④ If you are using the EX.RI/O system in online mode and want to display the latest parameter values in the [Communication setting] window, click the **Refresh** button in that window. Then, if you have added changes to the displayed parameter values, a confirmation message as shown below will appear, asking whether you really want to update them. If you need not use the added changes, click the **Yes** button. Otherwise, click the **No** button, in which case the [Communication setting] window becomes active again without saving them.

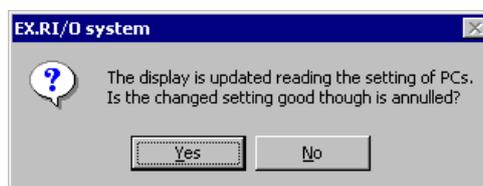


Figure 4-12 A Confirmation Message for Updating the Displayed Parameter Values

- ⑤ If you want to use the added changes, click the **Write** button in the window. Then, if the LPU that has a connection established with the EX.RI/O system is currently in RUN state, an error message as shown below will appear, indicating that an attempt has been made to write to the LPU in its RUN state.

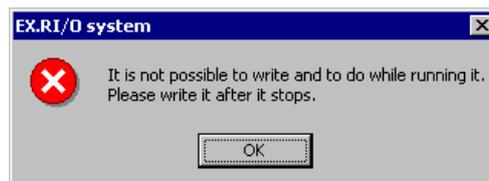


Figure 4-13 An Error Message Reporting an Attempted Write to the LPU in its RUN State

Click the **OK** button, and then the [Communication setting] window becomes active again.

If the LPU is currently in STOP state, however, take the actions described below.

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If you are using the EX.RI/O system in online mode, the specified parameter values will be checked for error. If they are error-free, a confirmation message as shown below will appear. Click the  button. Then, the entered parameter values will be written to the programmable controller. The resulting communication settings in the programmable controller can be made effective by resetting it.

However, if you need not write them, click the  button instead. Then, the [Communication setting] window will become active again without writing them.

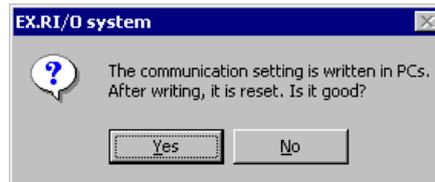


Figure 4-14 A Confirmation Message for Writing the Parameter Values

When the write is complete, an end-of-write-to-PCs message as shown below will be displayed.



Figure 4-15 An End-of-Write-to-PCs Message

Click the  button and then the [Communication setting] window will become active again.

You may select the [EX.RI/O] “not use” radio button in the [Communication setting] window and may write only that parameter value to the programmable controller. In such a case, a confirmation message as shown below will be displayed to confirm you need not use EX.RI/O functionality. If you really want to do without the functionality, click the  button.

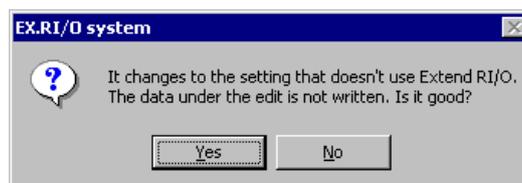


Figure 4-16 A Confirmation Message for Not Using EX.RI/O Functionality

Otherwise, click the  button. The [Communication setting] window will then become active again without writing any of the other entered parameter values to it. When the setting of “not use” is complete, an “EX.RI/O not used” message as shown below will be displayed.



Figure 4-17 An “EX.RI/O not used” Message

Click the  button. The [Communication setting] window will then become active again.

If you are using the EX.RI/O system in offline mode, the specified parameter values will be checked for error as are done in online mode. If they are error-free, however, a save confirmation message as shown below will be displayed instead of a write confirmation message as shown in Figure 4-14. Click the  button. Then, the entered parameter values will be saved to the EX.RI/O file currently open.

If you need not save them, click the  button instead. Then, the [Communication setting] window will become active again without saving them.

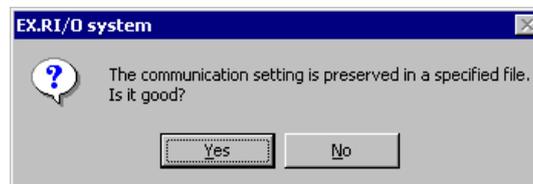


Figure 4-18 A Confirmation Message for Saving the Parameter Values to the File

When the save is complete, an end-of-save-to-file message as shown below will be displayed.

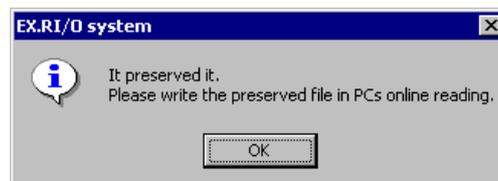


Figure 4-19 An End-of-Save-to-File Message

Click the  button. The [Communication setting] window will then become active again.

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- ⑥ You can save the parameter values entered into the [Communication setting] window to a new or existing file when the EX.RI/O system is running in online mode. To accomplish this, click the **Save** button in that window. The specified parameter values will then be checked for error. If they are error-free, a save confirmation message as shown below will be displayed. Click the **Yes** button. The [Save As] window as shown below will then be displayed.

If you need not save them, click the **No** button instead. The [Communication setting] window will then become active again.

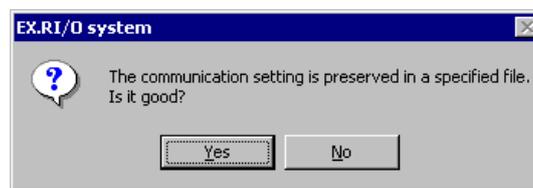


Figure 4-20 A Confirmation Message for Saving the Parameter Values to a File

<[Save As] window>

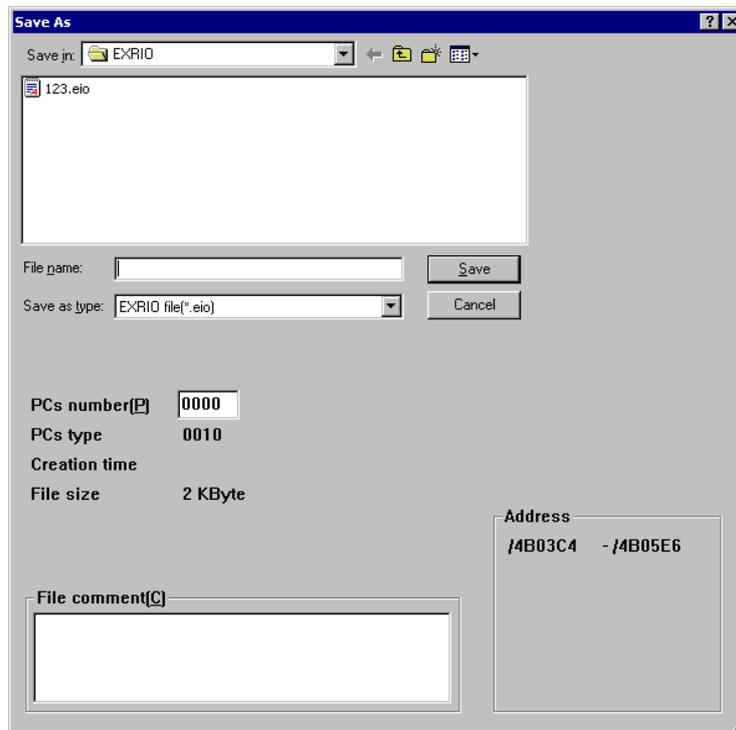


Figure 4-21 The [Save As] Window

The following is a description of the major items displayed in the [Save As] window.

**File name:** File name of a file to which to save the entered parameter values.

**PCs number:** By default, the ID number of the programmable controller that the EX.RI/O system currently has a connection established with. You can save the entered parameter values by changing this PCs number if you want to. Specifiable PCs numbers are in the range 0 to 9999 (decimal).

**File comment:** Optionally entered. File comments may have a length of up to 128 characters.

Click the  button in the [Save As] window. When the save is complete, an end-of-save-to-file message as shown below will be displayed.

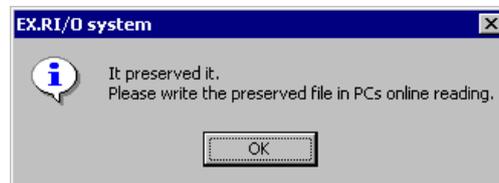


Figure 4-22 An End-of-Save-to-File Message

Click the  button. The [Communication setting] window will then become active again.

- ⑦ You can load the communication settings from a specified file into the [Communication setting] window when the EX.RI/O system is running in online mode. To achieve this, click the  button in that window. A confirmation message as shown below will then be displayed to confirm you are loading the communication settings in. Click the  button. The [Open] window as shown below will then appear.

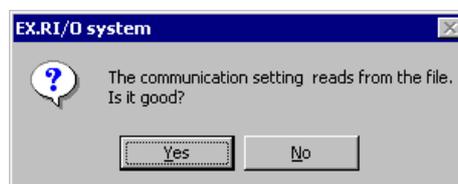


Figure 4-23 A Confirmation Message for Loading the Communication Settings in

If you need not load them in, click the  button instead. The [Communication setting] window will then become active again.

<[Open] window>

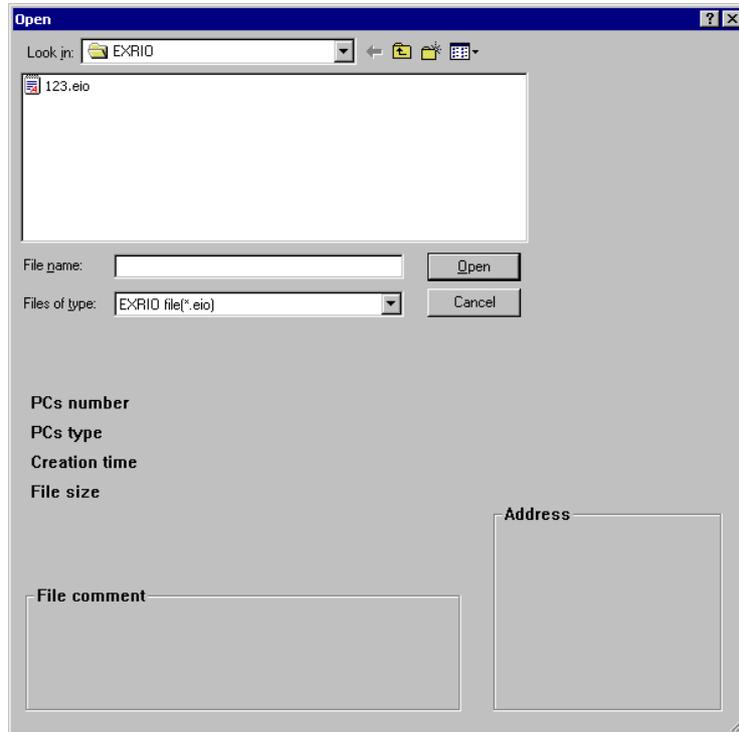


Figure 4-24 The [Open] Window

Specify the desired file and click the **Open** button. If the file specification is correct, the communication settings will then be loaded in from that file.

If you click the **Cancel** button instead, the [Communication setting] window will simply become active again without loading them in.

When the loading is complete, an end-of-communication-settings-loading message as shown below will be displayed.



Figure 4-25 An End-of-Communication-Settings-Loading Message

Click the **OK** button. The [Communication setting] window will then become active again.

<Saving the displayed parameter values to a file in CSV format>

- ① To save the displayed parameter values to a file in comma-separated-values (CSV) format, click the **CSV Output** button in the [Communication setting] window. Then, if the parameter values entered into that window are error-free, a confirmation message as shown below will be displayed to confirm you are saving them to a CSV-format file. If an error message is displayed instead, remove the cause of the error and click the **CSV Output** button again.

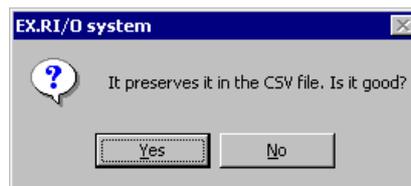


Figure 4-26 A Confirmation Message for Saving the Parameter Values to a CSV File

If you click the **Yes** button in that dialog box, the [Save As] window as shown below will appear. If you click the **No** button instead, the [Communication setting] window will become active again without saving them.



Figure 4-27 The [Save As] Window

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- ② Enter the desired file name in the [Save As] window and click the  button therein. The parameter values currently displayed in the [Communication setting] window will then be saved to the specified CSV-format file.

If you need not save them to that file, click the  button instead. The [Communication setting] window will then become active again without saving them. When the save is complete, an end-of-save-to-CSV-file message as shown below will be displayed.

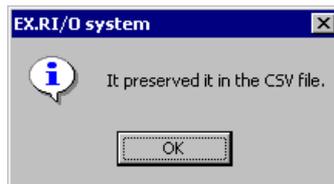


Figure 4-28 An End-of-Save-to-CSV-File Message

Click the  button. The [Communication setting] window will then become active again.

<Printing the displayed parameter values on a Specified Printer>

- ① To print the displayed parameter values on a specified printer, click the **Print** button in the [Communication setting] window. Then, if the parameter values entered into that window are error-free, a confirmation message as shown below will be displayed to confirm you are printing them on a printer. If an error message is displayed instead, remove the cause of the error and click the **Print** button again.

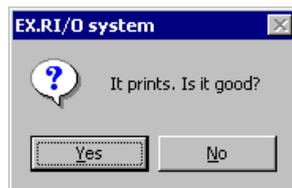


Figure 4-29 A Confirmation Message for Printing the Parameter Values on a Printer

If you click the **Yes** button in that dialog box, the [Print] dialog box as shown below will appear. If you click the **No** button instead, the [Communication setting] window will become active again without printing them.

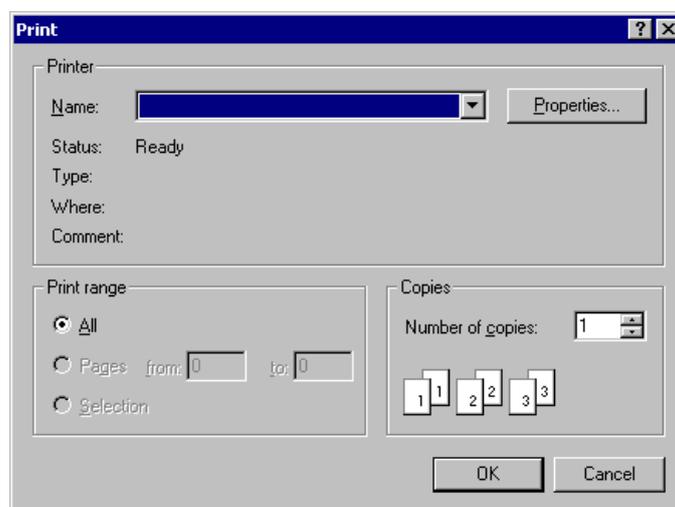


Figure 4-30 The [Print] Dialog Box

- ② Specify the desired printer and its properties if necessary, and click the **OK** button. The parameter values currently displayed in the [Communication setting] window will then be printed on the specified printer. If you need not print them on the printer, click the **Cancel** button instead. The [Communication setting] window will then become active again without printing them.

<Exiting the “Setup parameter” command without writing the added changes to the LPU>  
To exit the “Setup parameter” command without writing the added changes to the LPU, click the  button in the [Communication setting] window. Then, an exit confirmation message as shown below will be displayed.

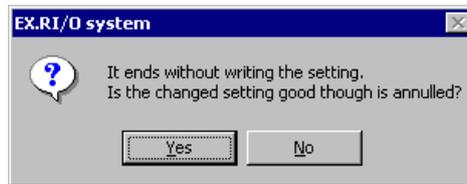


Figure 4-31 An Exit Confirmation Message

If you click the  button in that dialog box, the [Communication setting] window will close, discarding the added changes. Then, the EX.RI/O system’s main window will become active again.

If you click the  button instead, the [Communication setting] window will become active again.

### 4.2.2 Detailed setting -- setting analog counters

Function: The “Detailed setting” command sets or allocates specified storage locations in the defined analog-data storage area (up to 40 cases of location setting are allowable).

This command can accomplish the goal when you want to use analog and pulse counter modules.

Operation: The operating procedure used is as follows:

- ① Click the Detailed setting button in the [Communication setting] window. Then, the [Analog Counter] window as shown below will be displayed.

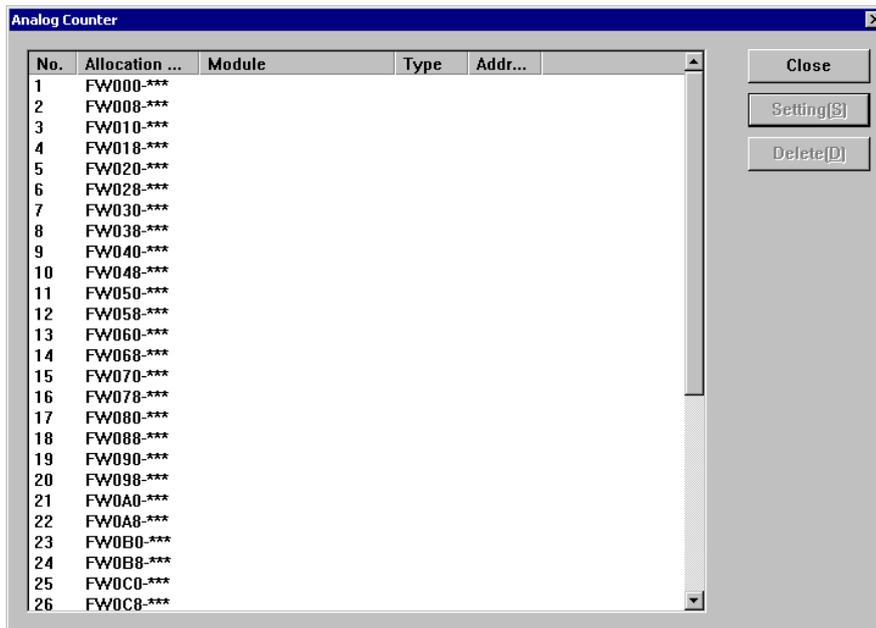


Figure 4-32 The [Analog Counter] Window

Along with the [Analog Counter] window, a confirmation message as shown below may also be displayed to confirm you are allocating storage for analog data. This may be the case, depending on the register specified as the starting address of the analog-data storage area. (For information on the address symbols specifiable as the starting address of the analog-data storage area, see Table 4-2, “Specifiable Address Symbols.”)

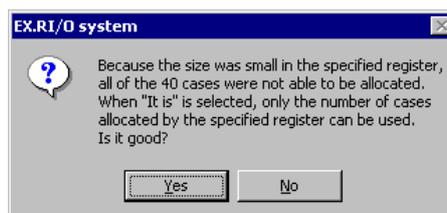


Figure 4-33 A Confirmation Message for Allocating Storage for Analog Data

## 4 OPERATION

If you want to continue without changing the register specified as the starting address of the analog-data storage area, click the **Yes** button in the dialog box. If not, click the **No** button instead. The [Communication setting] window will then become active again to allow you to change that specified register.

- ② Select the desired No. in the [Analog counter] window and click the **Setting** button therein. Alternatively, just double-click the desired No. Then, the [Setting] window as shown below will appear that enables you to specify the name and address of the desired module.

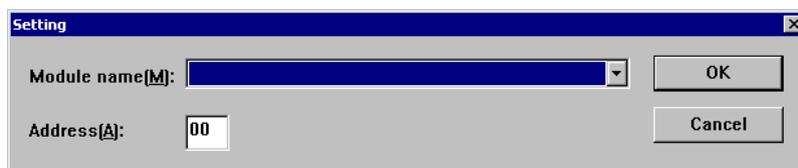


Figure 4-34 The [Setting] Window Enabling You to Set a Hardware Module

- ③ Choose the module name of the desired module from the “Module name” pulldown list, enter the address of that module, and then click the **OK** button. What you have specified will then be displayed in the [Analog counter] window.

The table shown below is a list of the ranges of specifiable addresses, which vary depending on the number of extended RI/O points you want to use.

If you need not choose any module name, just click the **Cancel** button. The [Analog counter] window will then become active again.

Extended RI/O points to be used	Range of specifiable addresses	Description
2,048	00 to 7F	Every value in these ranges is an offset value from the starting address of the analog-data storage area.
1,024	00 to 3F	
512	00 to 1F	

All the module names selectable are listed in Table 4-3, “Settable Analog and Pulse Counter Modules.”

- ④ If you want to delete an existing module setting, select the corresponding No. in the [Analog counter] window and then click the  button therein. A deletion confirmation message as shown below will be displayed.

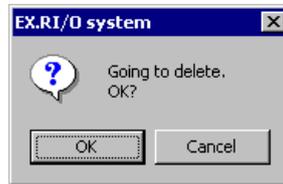


Figure 4-35 A Deletion Confirmation Message

If you click the  button in the dialog box, the desired module setting will be deleted. If you need not delete it, click the  button instead. The [Analog counter] window will then become active again.

- ⑤ Click the  button in the [Analog counter] window. The [Communication setting] window will then become active again.

### **NOTICE**

The values entered in the [Analog counter] window will not be written to the LPU until you click the  button in the [Communication setting] window. Therefore, if you click the  button in the [Communication setting] window without clicking the  button, none of those values will be written to the LPU.

## 4 OPERATION

Table 4-3 Settable Analog and Pulse Counter Modules (1/2)

Model	LPU-connected RI/O supported or not	Extended RI/O supported or not	Type
PAF300	√	ns	AI
LQA000	√	√	
LQA100	√	√	
LQA310	√	√	
LQA810	√	ns	
LWA400	√	√	
LWA430	√	√	
PAF301	√	ns	
LQA200	√	√	
LQA201 (functionally identical to LQA200)	√	√	
LQA301 (functionally identical to LQA200)	√	√	
LQA800 (functionally identical to LQA200)	√	ns	
LWA421	√	√	
LWA422	√	√	
LWA423	√	√	
PAF309	√	ns	
LWA401	√	√	
LWA404	√	√	
PAF320	√	ns	
LWA402	√	√	
PAF329	√	ns	
LWA403	√	√	

Symbols: √, supported; ns, not supported.

Table 4-3 Settable Analog and Pulse Counter Modules (2/2)

Model	LPU-connected RI/O supported or not	Extended RI/O supported or not	Type
PAN300B	√	ns	AO
LQA500	√	√	
LWA450	√	√	
PAN301B	√	ns	
LQA600	√	√	
LQA610	√	√	
LWA460	√	√	
PAN309	√	ns	
PAN320B	√	ns	
PAN329	√	ns	
PTF300	√	ns	
LQC000 (MODE2)	√	√	
LWC401	√	√	
LWC402	√	√	
PTF320	√	ns	
LQC000 (MODE1)	√	√	
LWC400	√	√	
LQA050, 055 (MODE2)	√	√	AI
LQA150, 155 (MODE2)	√	√	
LQA050, 055 (MODE4) ch0-3	√	√	
LQA150, 155 (MODE4) ch0-3	√	√	
LQA050, 055 (MODE4) ch4-7	√	√	
LQA150, 155 (MODE4) ch4-7	√	√	
LWA435	√	√	

Symbols: √, supported; ns, not supported.

## 4 OPERATION

### 4.2.3 RAS -- RAS information

Function: The “RAS” command displays module status (Reliability, Availability, and Serviceability or RAS) information for the EX.RI/O module.

Operation: The operating procedure used is described below.

<Monitoring RAS information>

- ① To monitor RAS information for the EX.RI/O module, click the **RAS** button in the EX.RI/O system’s main window. The [RAS] window as shown below will then be displayed, presenting the latest RAS information. In this window, the EX.RI/O module’s current state is indicated by one or more black bullets (“●”) -- each white bullet (“○”) indicates no such thing is detected. For details on each error detected, see Table 5-2, “Error Information and Remedial Actions.”

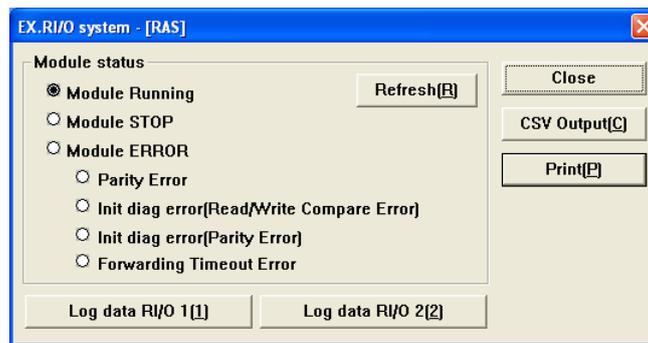


Figure 4-36 The [RAS] Window

- ② If you want to update the displayed RAS information, click the **Refresh** button in the [RAS] window. The displayed RAS information will then be updated.
- ③ If you want to display communication statistics for the RI/O-1 port of the EX.RI/O module, click the **Log data RI/O 1** button. The [Log data(RI/O 1)] window will then be displayed, presenting communication statistics for the RI/O-1 port.
- ④ If you want to display communication statistics for the RI/O-2 port of the EX.RI/O module, click the **Log data RI/O 2** button. The [Log data(RI/O 2)] window will then be displayed, presenting communication statistics for the RI/O-2 port.

The **Log data RI/O 2** button may or may not be selectable, as shown below, depending on the value you have selected from the “Extend RI/O point setting” dropdown list in the [Communication setting] window.

Extended RI/O points	512	1,024	2,048
Button name			
Log data RI/O 1	Selectable	Selectable	Selectable
Log data RI/O 2	Not selectable	Not selectable	Selectable

### NOTICE

If the displayed [RAS] window indicates that the EX.RI/O module is currently not in RUN state, you should check to see if there is a problem in the LPU. Whether the LPU is running normally or suffering from a problem can be determined from the following:

- The LPU module’s ERR LED indication -- this ERR LED is lit if there is a problem; otherwise, it is not.
- The “ERR LED” indication by the S10V Base System’s PCs status display function -- this “ERR LED” indication is “ON” if there is a problem; otherwise, it is “OFF”.

<Saving RAS information to a CSV-format file>

You can save the displayed RAS information to a CSV-format file by performing the following procedure:

- ① Click the **CSV Output** button in the [RAS] window. The [Save As] window as shown below will then be displayed.



Figure 4-37 The [Save As] Window (for Saving the RAS Information)

- ② Enter a unique file name in the “File name” edit box and click the **Save** button. The displayed RAS information (including the communication statistics) will then be saved to the specified file in CSV format. If you need not save it, click the **Cancel** button instead.

## 4 OPERATION

### <Printing RAS information on a printer>

You can print the displayed RAS information on a specified printer by performing the following procedure:

- ① Click the **Print** button in the [RAS] window. The [Print] dialog box as shown below will then be displayed.

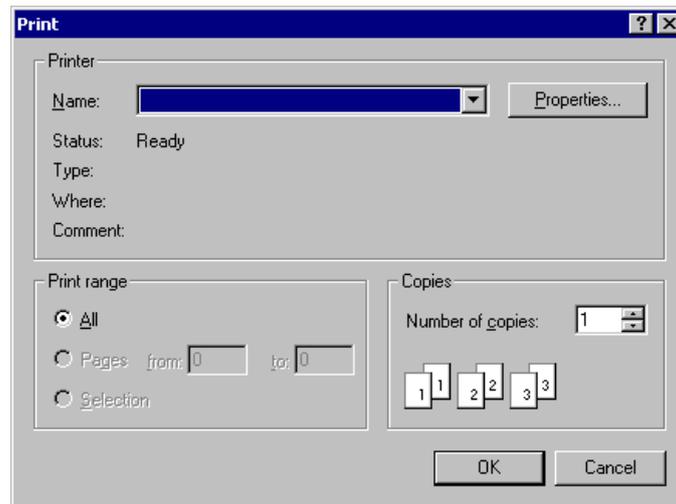


Figure 4-38 The [Print] Dialog Box (for Printing the RAS Information)

- ② Specify the desired printer on which to print the RAS information, and specify its properties if necessary. Then, click the **OK** button.

The displayed RAS information (including the communication statistics) will then be printed on the specified printer.

If you need not print it, click the **Cancel** button instead.

The communication statistics saved in a CSV-format file or printed on a printer are not the latest, compared with those displayed by clicking the **Refresh** button in the [RAS] window. If you want to save or print the latest, take the following steps: 1) close the [RAS] window and re-open it; or open the [Log data(RI/O 1)] or [Log data(RI/O 2)] window and close them by clicking the **Close** button in them, and then the [RAS] window will become active again; and 2) click the **CSV Output** or **Print** button in the [RAS] window.

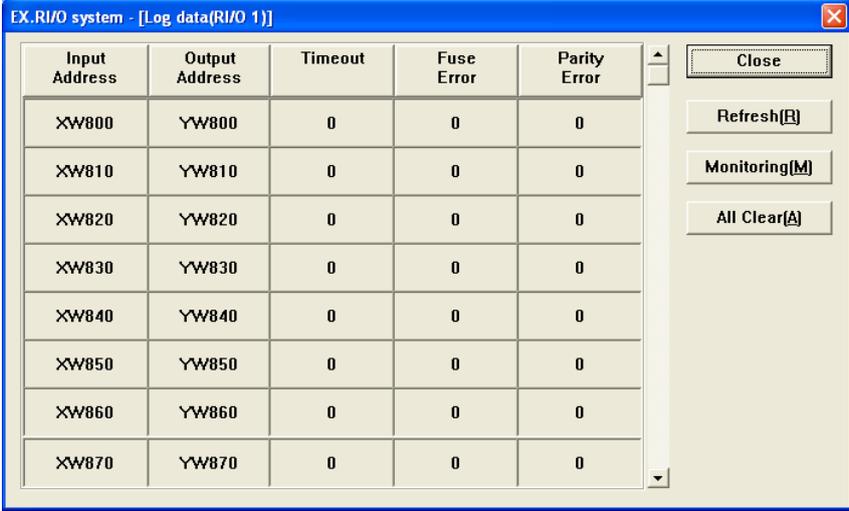
#### 4.2.4 Log data RI/O 1 or 2

Function: The “Log data RI/O 1” and “Log data RI/O 2” commands display and monitor the communication statistics for the EX.RI/O module.

Operation: The operating procedure used is described below -- the [Log data(RI/O 1)] window as shown below offers the same set of buttons as the [Log data(RI/O 2)] window does and basically there is no functional difference between the two sets.

<Monitoring the communication statistics>

- ① First and foremost, you have to display the [Log data(RI/O 1)] window presenting the latest communication statistics. To accomplish this, click the Log data RI/O 1 button in the [RAS] window. The [Log data(RI/O 1)] window as shown below will then be displayed, which presents a list of the frequencies (statistics) of three types of errors -- timeout, fuse error, and parity error. A description of these three types of errors is given in Table 5-3.



Input Address	Output Address	Timeout	Fuse Error	Parity Error
XW800	YW800	0	0	0
XW810	YW810	0	0	0
XW820	YW820	0	0	0
XW830	YW830	0	0	0
XW840	YW840	0	0	0
XW850	YW850	0	0	0
XW860	YW860	0	0	0
XW870	YW870	0	0	0

Figure 4-39 The [Log data(RI/O 1)] Window

## 4 OPERATION

- ② If you want to update the communication statistics presented in the [Log data(RI/O 1)] window, click the  button in that window.

Table 4-4 shows the names of the items presented in the [Log data(RI/O 1)] window and the maximum values of the communication statistics or frequencies. More details on these communication statistics are given in “5.3.2 Communication statistics.”

Table 4-4 Items Displayed in the [Log data(RI/O 1)] Window and Their Maximum Values

Displayed item	Maximum value	Remarks
Input address (starting address of input area)	None	Set value supplied via [Communication setting] window
Output address (starting address of output area)	None	Set value supplied via [Communication setting] window
Timeout	65,535	These statistics can be initialized (set to “0”) by clicking the <input type="button" value="All Clear"/> button in the [Log data(RI/O 1)] window.
Fuse error	65,535	
Parity error	65,535	

- ③ Now, to monitor the communication statistics, click the  button in the [Log data(RI/O 1)] window. Monitoring will then start and this is manifested by the  button changed into the  button.
- ④ When you want to stop the monitoring, click the  button. Then, the monitoring will be stopped and the  button will be changed into the  button.

Here, you should pay attention to the following fact. As shown in the table below, the [Log data(RI/O 1)] and [Log data(RI/O 2)] windows present different numbers of statistical information lines, depending on the point count selected from the [Extend RI/O point setting] drop-down list in the [Communication setting] window.

Name of window	Extended RI/O point count			Remarks
	512	1,024	2,048	
Log data(RI/O 1)	32 lines	64 lines	64 lines	
Log data(RI/O 2)	–	–	64 lines	This window presents the lines numbered 65 thru 128 only when the selected point count is 2,048.

<Clearing the communication statistics>

- ① If you want to clear the existing communication statistics, click the **All Clear** button in the [Log data(RI/O 1)] window. A confirmation message as shown below will then be displayed to confirm you want to clear the existing communication statistics.

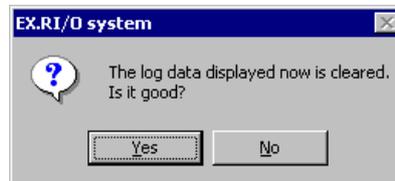


Figure 4-40 A Confirmation Message for Clearing the Existing Communication Statistics

If you click the **Yes** button in the dialog box, the existing communication statistics currently displayed will be cleared (set to “0”). If you do not want to clear them, click the **No** button instead. Then, in either case, the [Log data(RI/O 1)] window will become active again.

### **NOTICE**

The above-mentioned existing communication statistics are automatically set to “0” when the LPU is either reset or powered down and then up again. When you click the **All Clear** button, however, such communication statistics may not be cleared depending on the timing of the clicking.

## 4 OPERATION

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### 4.2.5 F/D

Function: The “F/D” command performs the following three functions: 1) saving the existing communication settings for the EX.RI/O module to an EX.RI/O setup file, 2) sending an existing EX.RI/O setup file to a specified programmable controller, and 3) comparing the contents of a specified EX.RI/O setup file that was previously saved by F/D function with the existing communication settings stored in the associated programmable controller’s memory.

Operation: The operating procedures used are described below.

#### <Save>

The “Save” command saves the existing communication settings for the EX.RI/O module to a binary-format file (with the file extension “.eio”) on your personal computer. The range of memory area to be subjected to such saving is from /4B 03C4 to /4B 05E6. The procedure used for such saving is as follows:

- ① In the [EX.RI/O system] window (Figure 4-4) displayed, click the F/D button. The [F/D] window as shown below will then be displayed.

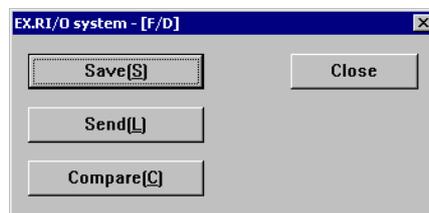


Figure 4-41 The [F/D] Window

- ② Click the **Save** button in the [F/D] window displayed. The [Save As] window as shown below will then be displayed.

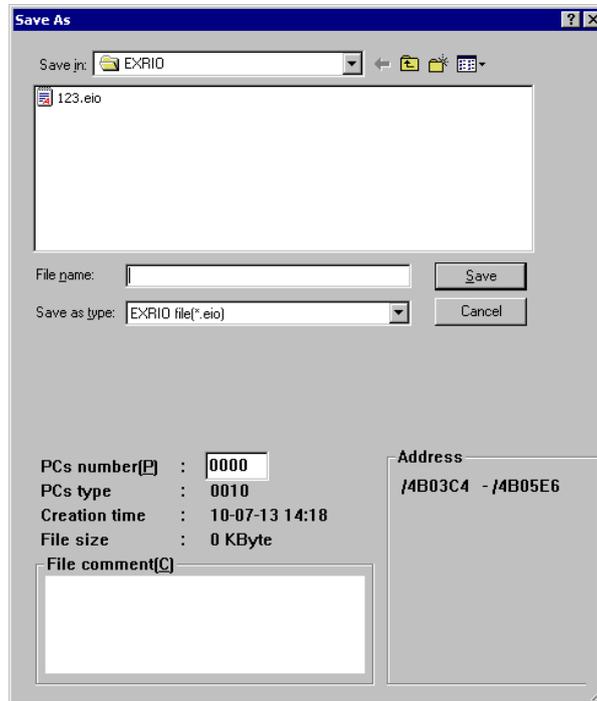


Figure 4-42 The [Save As] Window for Saving by F/D Function

In this [Save As] window:

**File name:** Is the file name of a file to which to save the existing communication settings.

**PCs number:** By default, this is the PCs number of the programmable controller with which the EX.RI/O system currently has a connection established. This default PCs number may be changed to save the communication settings with a different PCs number. Specifiable PCs numbers are within the range 0 to 9999 (decimal).

**File comment:** Optionally entered text whose length is up to 128 characters.

## 4 OPERATION

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- ③ Click the  button in the [Save As] window. Then, if the specified programmable controller's LPU is currently in RUN state, a confirmation message as shown below will be displayed to confirm you want to continue even when the LPU is in RUN state.

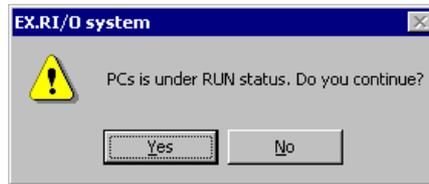


Figure 4-43 A Confirmation Message for Saving While the LPU Is in RUN State

If you click the  button in the dialog box, the "Save" command will proceed. If you click the  button instead, the "Save" command will quit (and the [F/D] window will become active again).

In addition, if your personal computer's free disk storage space is not enough to store all the communication settings, a disc capacity shortage message as shown below will be displayed. In this case, increase the free disk storage space and try again.



Figure 4-44 A Disc Capacity Shortage Message

Click the  button in the dialog box. A data reception failure message as shown below will then be displayed.



Figure 4-45 A Data Reception Failure Message

Click the  button. The [F/D] window will then become active again.

- ④ Saving of the communication settings will start. During the saving, the [Receive file] window as shown below will be displayed.

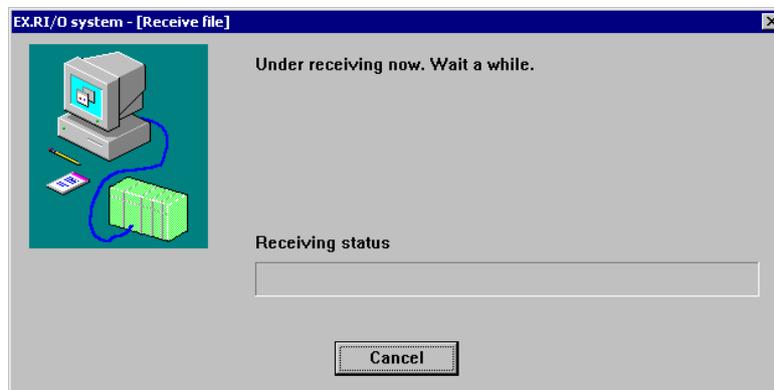


Figure 4-46 The [Receive file] Window

During the file reception, you may click the  button. In this case, a data reception abort message as shown below will be displayed. Click the  button, and then the [Receive file] window will close and the [F/D] window will become active again. The file partially created will be automatically deleted.



Figure 4-47 A Data Reception Abort Message

- ⑤ When the saving is complete, an end-of-data-reception message as shown below will be displayed.



Figure 4-48 An End-of-Data-Reception Message

Click the  button. The [F/D] window will then become active again.

## 4 OPERATION

### <Send>

The “Send” command sends to a specified programmable controller the communication settings that have been saved to an EX.RI/O file via the [F/D] window or an existing EX.RI/O file that has been saved through offline editing or via the [Communication setting] window in online mode. The procedure used is as follows:

- ① In the [F/D] window displayed, click the **Send** button. The [Open] window as shown below will then appear.

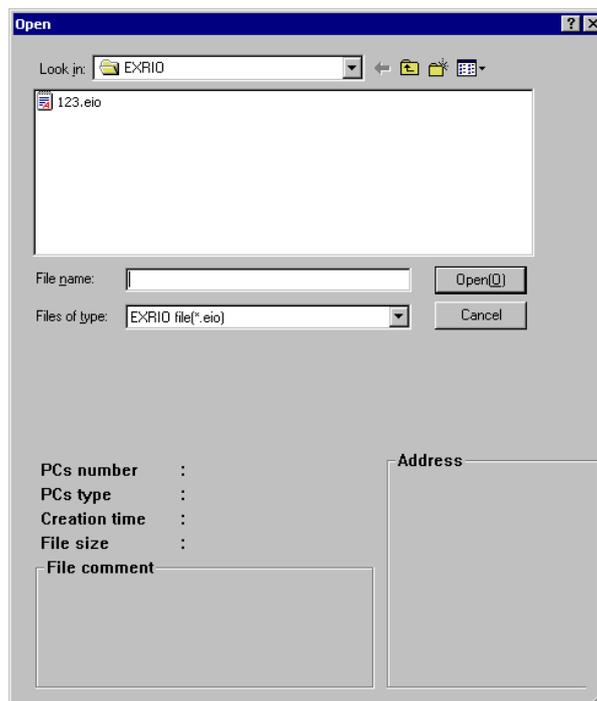


Figure 4-49 The [Open] Window (for Sending by F/D Function)

Select the desired file you want to send to the desired programmable controller. Then, information on the selected file will be displayed. This information is as follows: PCs number, PCs type, file creation time, file size, file comment, and address. This information will not be displayed if you enter the file name of that file, rather than selecting that file.

- ② Click the  button to open the selected file. If the selected file is a non-EX.RI/O file, an error message as shown below will appear. In this case, check to see whether the selected file is the correct one. If not, select the correct one and then click the  button.



Figure 4-50 A Destination Address Error Message

Click the  button in the error message dialog box. The [F/D] window will then become active again.

In addition, if a PCs-number mismatch is detected between the selected file and the destination programmable controller, a confirmation message as shown below will be displayed to confirm you want to send the file contents to the destination. However, this is not the case if the PCs number specified in the selected file is 9999.

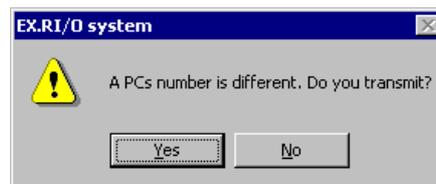


Figure 4-51 A Confirmation Message for Sending to a Programmable Controller Other Than the Specified One

If you click the  button, the “Send” command will send the file contents to the non-specified programmable controller. If you click  button, it will not, and the [Open] window will become active again.

Further, if the destination’s LPU is currently in RUN state, an error message as shown below will be displayed.

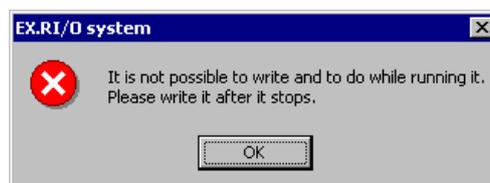


Figure 4-52 An Error Message Reporting an Attempted Write to the Destination during Its RUN State

Click the  button. The [F/D] window will then become active again.

## 4 OPERATION

- ③ If the destination's LPU is currently in STOP state, a confirmation message as shown below will be displayed to confirm you want to write to the destination.

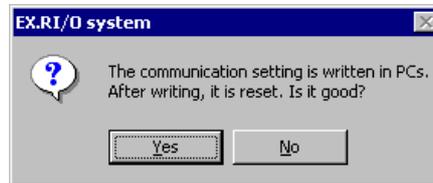


Figure 4-53 A Confirmation Message for Writing to the Destination

If you want to continue, click the  button. Otherwise, click , in which case no writing will be performed and the [F/D] window will become active again.

- ④ Writing or sending the file contents will start and the [Send file] window as shown below will be displayed, indicating the progress of the sending.



Figure 4-54 The [Send file] Window

During the sending, you may click the  button to abort the sending. In this case, the sending will be aborted with an abort-of-send message displayed.

- ⑤ When the sending is complete, an end-of-file-send message as shown below will appear. Click the  button, and then the [F/D] window will become active again.



Figure 4-55 An End-of-File-Send Message

## &lt;Compare&gt;

The “Compare” command compares the contents of a specified EX.RI/O file that was previously saved by F/D function with the existing communication settings stored in the associated programmable controller’s memory. The procedure used is as follows:

- ① In the [F/D] window displayed, click the **Compare** button. The [Open] window as shown below will then appear.

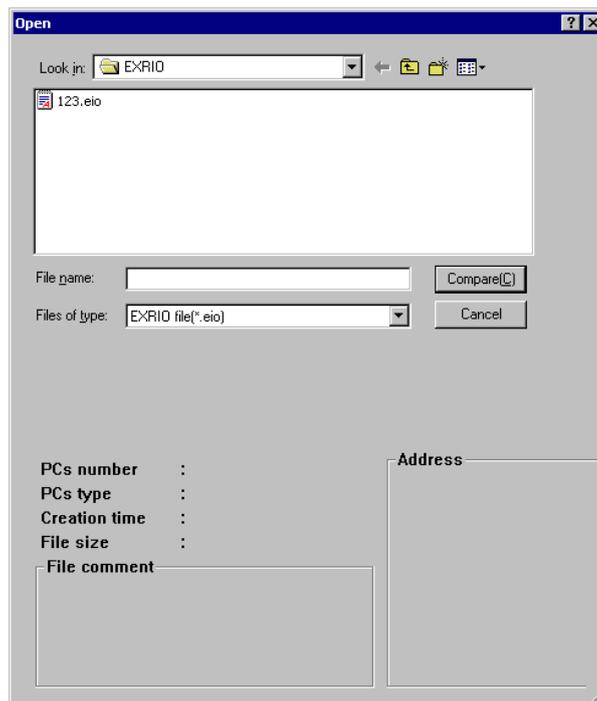


Figure 4-56 The [Open] Window (for Comparing the Communication Settings)

Select the desired file you want to compare with the associated programmable controller’s memory. Then, information on the selected file will be displayed. This information is as follows: PCs number, PCs type, file creation time, file size, file comment, and address. This information will not be displayed if you enter the file name of that file, rather than selecting that file.

## 4 OPERATION

- ② Click the **Compare** button to compare the selected file. If the selected file is an EX.RI/O file, comparison will start. If not, an error message as shown below will be displayed. In this case, select the correct EX.RI/O file and click the **Compare** button.



Figure 4-57 A Destination Address Error Message

When comparison is started, the [Compare file] window as shown below will be displayed, indicating the progress of the comparison.

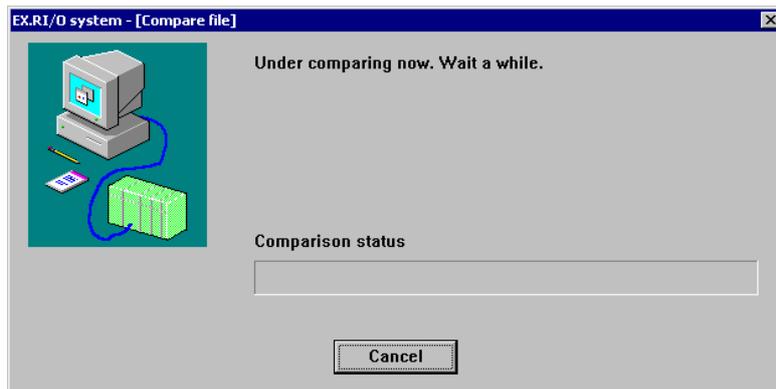


Figure 4-58 The [Compare file] Window

During the comparison, you may click the **Cancel** button to abort the comparison. In this case, the comparison will be aborted with an abort-of-comparison message displayed as shown below. Click the **OK** button, and then the [F/D] window will become active again.



Figure 4-59 An Abort-of-Comparison Message

- ③ If any discrepancy is detected between the file and the programmable controller's memory, the [Memory contents] window as shown below will appear.

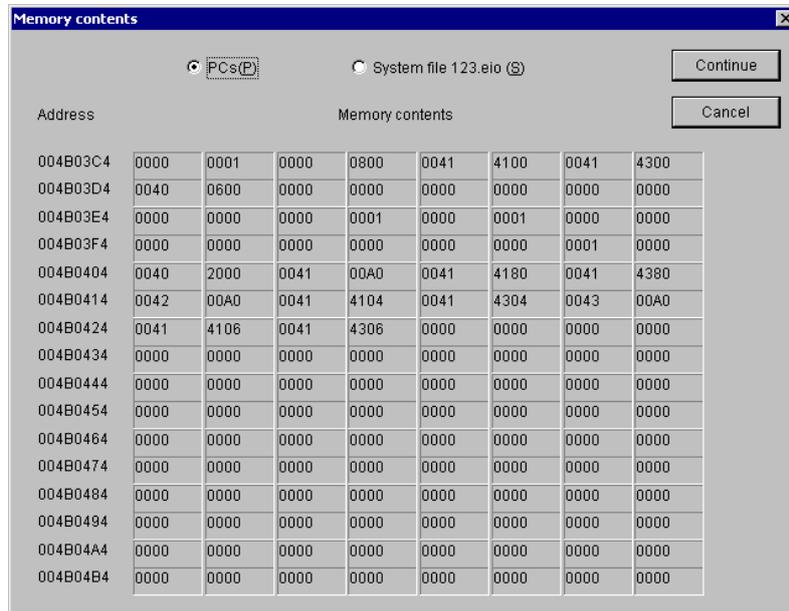


Figure 4-60 The [Memory contents] Window

If you click the **Continue** button, the [Memory contents] window will close and the comparison will proceed. Then, if another discrepancy is detected between the two, the [Memory contents] window will appear again.

If you click the **Cancel** button instead, the comparison will be aborted with an abort-of-comparison message displayed as shown below. Click the **OK** button. The [F/D] window will then become active again.

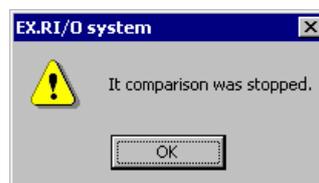


Figure 4-61 An Abort-of-Comparison Message

- ④ When the comparison is complete, an end-of-comparison message as shown below will be displayed if there is no discrepancy detected between the two.



Figure 4-62 An End-of-Comparison Message Reporting There Is No Discrepancy Detected

- ⑤ If there is a discrepancy(ies) detected between the two, however, an end-of-comparison message as shown below will be displayed.

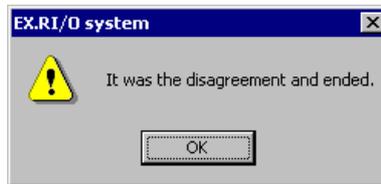


Figure 4-63 An End-of-Comparison Message Reporting There Is a Discrepancy(ies) Detected

### 4.2.6 Checking the error log

If the EX.RI/O module's ERR LED indicator is lit up during operation, open the [RAS] window and check the condition of that module. For information on the [RAS] window, see "4.2.3 RAS -- RAS information."

# **5 MAINTENANCE**

5.1 Maintenance Inspection

To use the EX.RI/O module in good condition, you should perform regular inspection of that module, as described below. The regular inspection should be daily or two or more times a year.

Table 5-1 Items To Be Inspected and Details of the Inspection

Item to be inspected	Details of inspection
External appearance	Check to see if there is any crack or gap on the surface of the EX.RI/O module’s casing. Such abnormal conditions are often indicative of a damage caused to the EX.RI/O module’s internal circuit, which will be a cause of system malfunction.
LED indicator	The EX.RI/O module should be checked regularly to see if its ERR LED indicator is lit up.
Loosened fixing screws	Check the fixing screws of the EX.RI/O module and communication cables to see if they are loosened. Any loosened fixing screw must be retightened; otherwise, it may be a cause of system malfunction or a cause of burnout due to heating.
Condition of cable sheath	Check the sheath of every cable used with the EX.RI/O module. If the sheath of any such cable is partly peeled off, it may result in system malfunction, electric shock hazard, or burnout due to shorting.
Module interior and exterior surfaces (for dust and dirt)	Check the EX.RI/O module’s exterior surfaces to see if dust and dirt is collected on them. If dust and dirt is collected on any such surface, remove it with a vacuum cleaner. The collected dust and dirt may cause a short circuit in the EX.RI/O module’s internal circuit.
Module to be replaced	If the EX.RI/O module needs to be replaced with a new one, be sure to turn off the power to that module before replacing it. Disregarding this rule may result in damage to the hardware and/or software used.



**CAUTION**

If the EX.RI/O module needs to be replaced with a new one, be sure to turn off the power to that module before replacing it. Also, before replacing the module, be sure to discharge any static electricity from your body. Failure to observe these rules may result in an electric shock hazard, damage to the module, and/or malfunction.

**NOTICE**

- The discharge of static electricity may damage the EX.RI/O module. So, be sure to discharge the static electricity from your body before doing your work on the module.
- Gallium arsenide (GaAs) is used in some component parts of this product. Gallium arsenide is designated as a harmful substance by law. Use extreme care in handling, particularly in scrapping the product. Have a specialized agent dispose of the product as industrial waste.

## 5 MAINTENANCE

### 5.1.1 Replacing the module

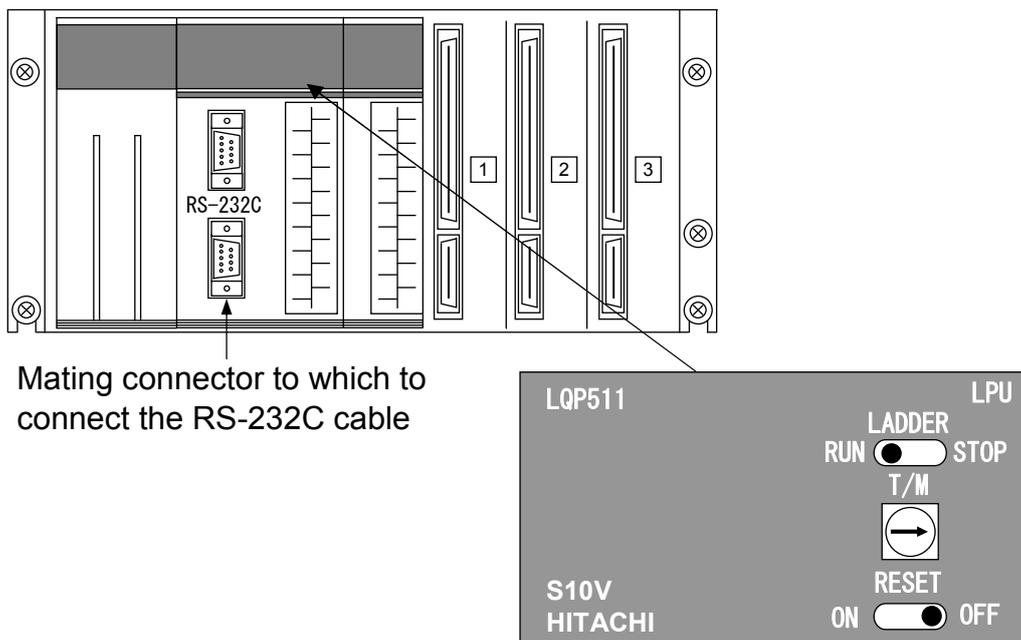
To replace the EX.RI/O module with a new one, follow the instructions given below.

- Things that need to be prepared

- ① Personal computer (with S10V EX.RI/O system installed in it)
- ② RS-232C cable
- ③ Replacement EX.RI/O module (model LQE220)
- ④ Parameter values for the EX.RI/O module to be replaced (in case they cannot be read out from that module)

- Replacement procedure

- ① Make a record of the current settings of the LPU module's LADDER and T/M switches provided at its front (see the figure below).
- ② Connect the personal computer and the LPU module together with the RS-232C cable.



- ③ Start the S10V EX.RI/O system on the personal computer and save the existing communication settings to a file by using the procedure described in "4.2.5 F/D." The purpose of this saving is to produce a backup of the existing communication settings for use in case the replacement EX.RI/O module does not work after replacement.
- ④ Set the LPU module's LADDER switch in STOP position and turn off the power supply of the controller unit.

- ⑤ Remove the connected cable(s) from the EX.RI/O module.
- ⑥ Replace the EX.RI/O module with the new one (replacement module).
- ⑦ Turn on the power supply of the controller unit and make sure that the EX.RI/O module is not stopped due to error.
- ⑧ Reset the LPU module by moving its RESET switch from the ON position to the OFF position.
- ⑨ Turn off the power supply of the controller unit.
- ⑩ Remove from both the personal computer and the LPU module the RS-232C cable that you connected to them in Step ②.
- ⑪ Connect to the EX.RI/O module the cable(s) that you removed from it in Step ⑤.
- ⑫ Set the LPU module's LADDER and T/M switches back in the previous positions that you made a record of in Step ①.
- ⑬ Turn on the power supply of the controller unit and make sure that the EX.RI/O module is running normally.

5.2 Troubleshooting

5.2.1 Troubleshooting procedure

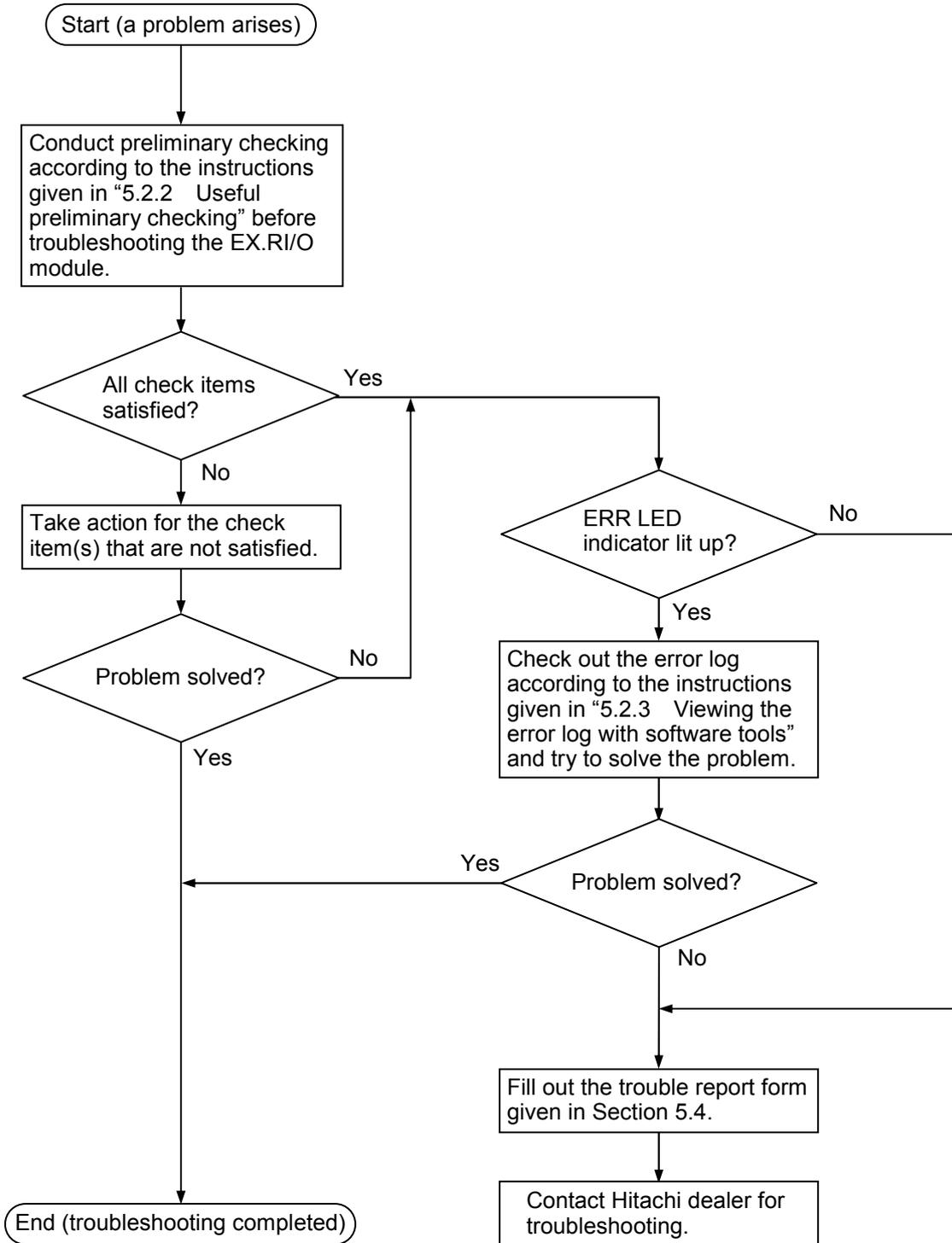
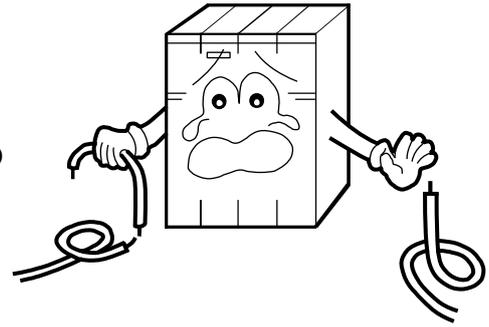


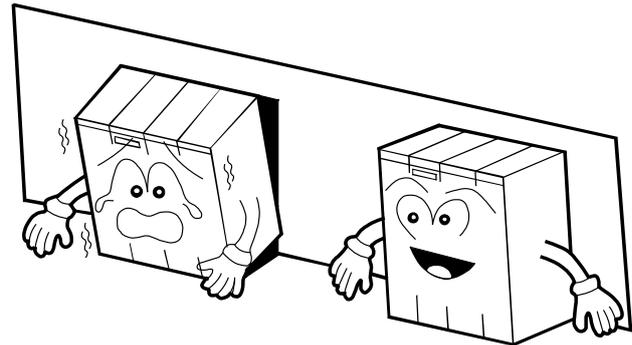
Figure 5-1 Troubleshooting Procedure

### 5.2.2 Useful preliminary checking

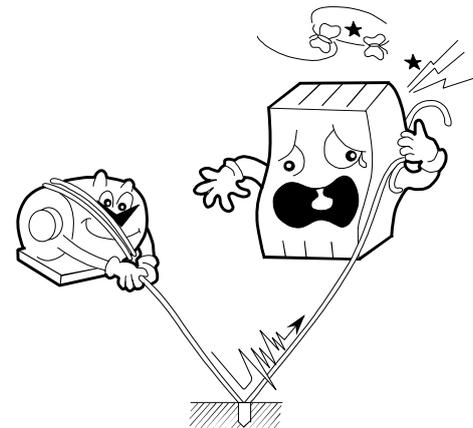
- (1) Is the EX.RI/O module networked by proper cabling?  
Check that the network cabling connecting the EX.RI/O module is not broken or is provided properly.



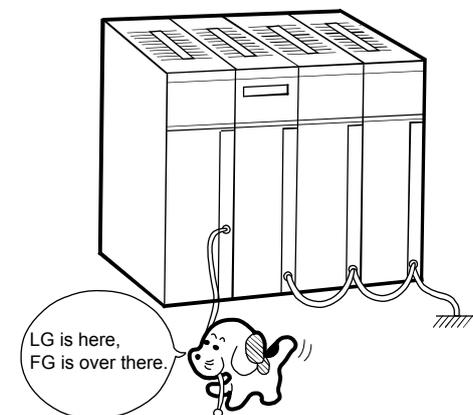
- (2) Is the EX.RI/O module mounted in place properly?  
Check that the EX.RI/O module mounted in place has no loose fixing screws on the mount base.



- (3) Is the programmable controller unit containing the EX.RI/O module grounded properly?
- Check that the programmable controller cubicle in which the EX.RI/O module is mounted is grounded separately from high-voltage equipment. Never use one-point grounding for both the EX.RI/O module and high-voltage equipment.
  - Check that the above-mentioned cubicle is grounded by Class-D grounding.



- (4) Are the line grounding (LG) and frame grounding (FG) used for the above-mentioned cubicle separated from each other?
- If the FG and LG are connected to the same grounding point, noise from the power supply will creep into the FG via the LG. Such noise may cause malfunction. Check that they are separated from each other.
  - Check that the LG is grounded together with the power supply.

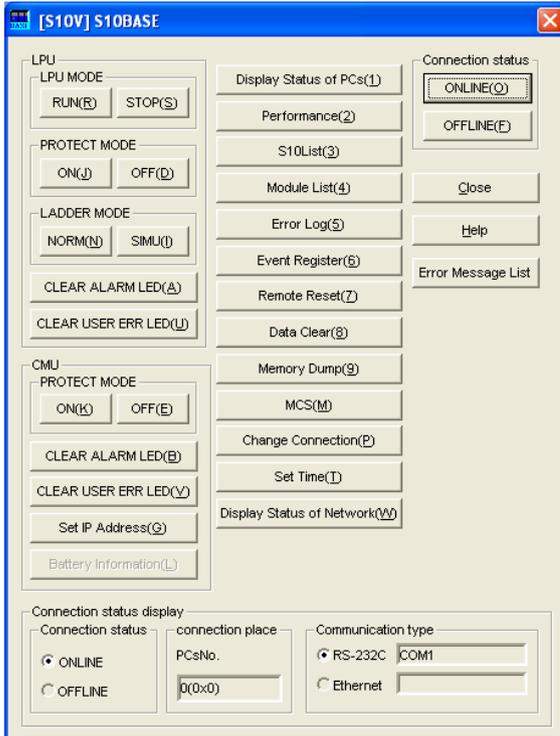


## 5 MAINTENANCE

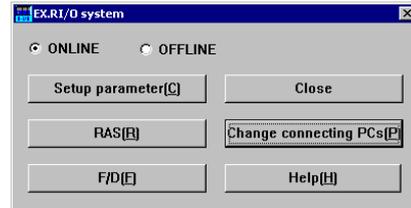
### 5.2.3 Viewing the error log with software tools

The error log that records errors detected in the EX.RI/O module can be viewed by using either of the two methods: 1) starting the S10V Base System and then clicking the **Error Log** button or 2) starting the EX.RI/O system and then clicking the **RAS** button, as shown below.

<S10V Base System's window>



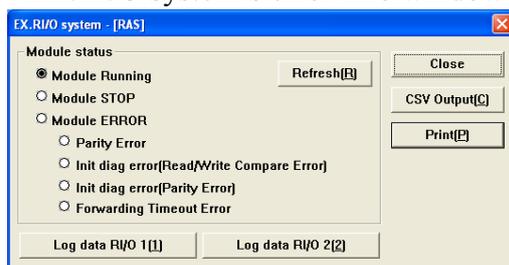
<EX.RI/O system's main window>



The above two software tools provide the following types of information:

- S10V Base System's error log
  - EX.RI/O error information
- EX.RI/O system's RAS information
  - EX.RI/O error information (see below)
  - EX.RI/O log data or communication statistics (see below)

<EX.RI/O system's error info window>



<EX.RI/O system's log data window>

Input Address	Output Address	Timeout	Fuse Error	Parity Error
XW800	YW800	0	0	0
XW810	YW810	0	0	0
XW820	YW820	0	0	0
XW830	YW830	0	0	0
XW840	YW840	0	0	0
XW850	YW850	0	0	0
XW860	YW860	0	0	0
XW870	YW870	0	0	0

## 5.3 Errors and Remedial Actions

If an error has occurred in the EX.RI/O module, check out the collected error information by operating the S10V Base System or the EX.RI/O system, and then you can take a remedial action, as described in “5.3.1 Remedial actions in the event of errors.”

### 5.3.1 Remedial actions in the event of errors

The error information collected in the event of an error can be viewed either by clicking the **Error Log** button in the S10V Base System’s S10BASE window or by clicking the **RAS** button in the EX.RI/O system’s main window. Looking at the collected error information, you can take a remedial action according to the instructions given in Table 5-2.

Table 5-2 Error Information and Remedial Actions

S10V Base System’s error code	EX.RI/O system’s error info	Description	Remedial action
/0001	Parity error	Three parity errors occurred one after another during the operation of the EX.RI/O module.	Power down the EX.RI/O module and then up again. If the error still recurs, replace the EX.RI/O module with a new one (model LQE220).
/0002	Initial-diagnosis error (read-/write-compare error)	A compare error occurred in a read or write during the initial diagnosis.	
/0003	Initial-diagnosis error (parity error)	A parity error occurred during the initial diagnosis.	
/0004	Transfer timeout error	Data transmission was started, but no notification is received that the reception of that data was completed. (If this type of error is detected during the operation of the EX.RI/O module in ladder-synchronous mode, the S10V controller’s LPU will suffer a ladder-program watch-dog timer timeout error.)	

5.3.2 Communication statistics

Error frequencies in remote I/O communications, called the communication statistics, can be viewed by clicking the Log data RI/O 1 button or the Log data RI/O 2 button in the EX.RI/O system's [RAS] window. Table 5-3 shows the three kinds of communication statistics maintained by the EX.RI/O system. Each kind of communication statistic indicates the number of times the corresponding type of error occurred during data communications between the EX.RI/O module and the stations connected to it. No error frequencies displayed are significant for those stations which have not performed data communication with the EX.RI/O module since the start of operation of that module.

Table 5-3 Kinks of Communication Statistics and Remedial Actions

Kind of communication statistic	Description of error	Remedial action
Timeout frequency	Although data was transmitted to the corresponding station, no response was received from that station three times consecutively.	Check that the station number set for the station is correct. Check, also, that the cabling from the station to the EX.RI/O module is properly connected and is not loosened.
Fuse-error frequency	A fuse-error response was received from the corresponding station.	Check if the station's I/O module has its fuse blown. If the fuse is blown, replace it.
Parity-error frequency	A parity error occurred during the EX.RI/O module's access to its RAM or during the LPU's access to that RAM.	If this error frequency is significant (i.e., it is a non-zero value), replace the EX.RI/O module with a new one.

5.4 Trouble Report

Fill out this form and submit it to local source.

Your company name		Person in charge	
Data and time of occurrence		(year / month / day / hour / minute)	
Where to make contact	Address		
	Telephone		
	FAX		
	E-mail		
Model of defective module		LPU model	
OS	Ver.	Rev.	Program name: Ver. Rev.
Support program		Program name: Ver. Rev.	
Symptom of defect			
Connection load	Type		
	Model		
	Wiring state		
System configuration and switch setting			
Space for correspondence			

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