

# HITACHI

USER'S MANUAL

OPTION

# OD.RING

(LQE510/515)

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S10mini

S10V

USER'S MANUAL

OPTION

**OD.RING**

(LQE510/515)

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S10mini

**SIOV**

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## SAFETY PRECAUTIONS

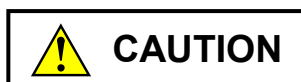
- Before installation, operation, maintenance, and/or inspection of this product, be sure to read through carefully this manual and other related manuals. Do not use this product until you are familiar with all the information concerning this product, safety information, and precautions provided in those 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 Statements

(chapter 3, page 3-5)


 <b>WARNING</b>
<ul style="list-style-type: none"><li>● Switch off the power supply before wiring the terminal strip. Wiring with the power supply switched on could incur electrical shock hazards.</li><li>● Electric shock hazards exist so that you might suffer burns or become electrocuted. Further, the system might malfunction due to noise interference. Therefore, ground the line ground (LG), frame ground (FG), and shield wire (SHD).</li></ul>

### 2.2 CAUTION Statement

(chapter 6, page 6-4)

 <b>CAUTION</b>
<p>Only optical fiber cables can be replaced online. Wiring of cables other than optical fiber cables such as power cables and grounding conductors may cause an electrical shock. Be sure to turn off the power supply before wiring such cables.</p>

(chapter 6, page 6-8)

 <b>CAUTION</b>
<ul style="list-style-type: none"><li>● Be sure to turn off the power supply when replacing an OD.RING module. Failure to observe this rule may cause an electrical shock.</li><li>● When replacing a optical module receptacle, do not touch terminals other than OD.RING module terminals. Failure to observe this rule may cause an electrical shock.</li></ul>

## 2.3 NOTICE Statement

(chapter 1, page 1-2)

### **NOTICE**

- A mix of up to two modules of the OD.RING (LQE010/015/510/515) and SD.LINK (LQE030/530) per CPU or LPU can mount.
- The LQE510 cannot be connected to an LQE015/515 by an optic line. Connect the LQE510 to an LQE010 or LQE510 by an optic line.
- The LQE515 cannot be connected to an LQE010/515 by an optic line. Connect the LQE515 to an LQE015 or LQE515 by an optic line.
- The OD.RING (LQE010/015/510/515) and SD.LINK (LQE030/530) cannot be connected to each other because they differ in their optical fiber cabling.

(chapter 1, page 1-4)

### **NOTICE**

A knowledge of the Windows® environment and user interfaces is assumed to use this product. This system is made to adhere to the Windows® standard. This manual is written for those users who have mastered a basic concept of Windows® usage.

(chapter 2, page 2-2)

### **NOTICE**

- A mix of up to two modules of the OD.RING (LQE010/015/510/515) and SD.LINK (LQE030/530) per CPU or LPU can mount. Set the module number setting switch of either module to main and that of the other to sub.
- Do not set the module number switch to any position from 8 to D. Setting the module number setting switch to such a position could alter PI/O memory.

**NOTICE**

**S10mini Series**

- Mount the option module at the leftmost positions without an intervening space from the CPU module. Further leave no open slots between option modules mounted.
- The module (LQE510/LQE515) can be mixed with a S10mini OD.RING module (LQE010/LQE015).

**S10V Series**

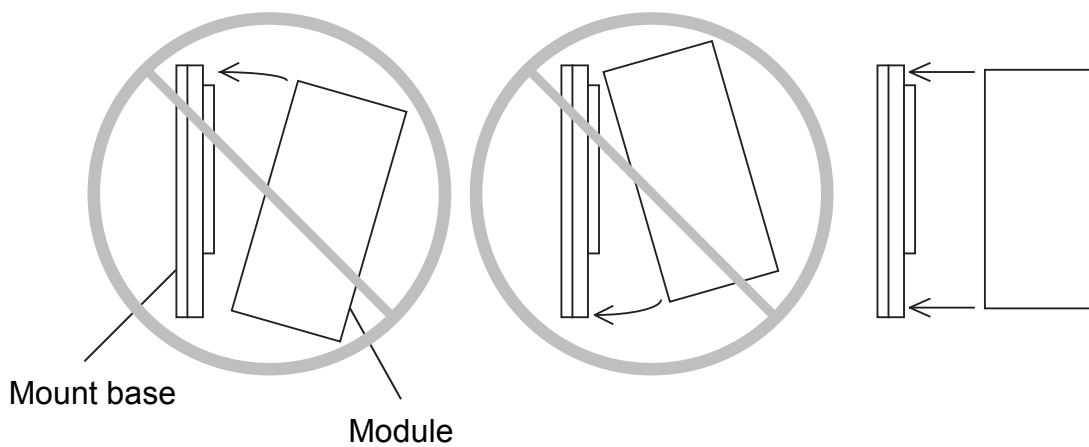
- There are no constraints on the mounting location and slots.
- The S10mini OD.RING module (LQE010/LQE015) cannot be used.

### 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 3-5)

**NOTICE**

- Insulate the mount base from the enclosure. To keep the mount base insulated, avoid removing the insulation sheets that are supplied with the mount base.
- The LG is a ground terminal for power supply noise. The FG and SHD are ground terminals for the noise in the remote I/O, communication module and other external interface lines. To avoid interference between the ground terminals, separately ground the LG and FG.

(chapter 3, page 3-6)

**NOTICE**

Optical fiber cabling is an error-prone operation. To ensure correct wiring, assign cables to optical fiber cables before wiring them.

## NOTICE

- As shown in Figure 3-4, insert the optical connector key into the key groove of the optical module receptacle, then fasten the key with the attached screw. If the optical connector key does not fit the key groove, do not screw the key forcibly into the groove. Failure to observe this rule may damage the optical connector or interrupt normal communication. (Applicable only to the LQE510)
- There is a difference between primary ring wiring and secondary ring wiring. As shown on the previous page, the data flow direction in the primary ring differs from that in the secondary ring, so take care when wiring the rings. Incorrect wiring interrupts normal communication or deteriorates resistance failure performance.
- Clamp optical fiber cables to allow a bending radius (R) of 30 mm or more. A bending radius less than 30 mm could cause the fibers to break, resulting in breakage. (The bending radius requirement of 30 mm or more applies to single-core optical fiber cables. Optical fiber cables are available in numerous types. Consult your cable manufacturer.
- Be sure to connect cables when the ring is in the dual state. Using an open or broken primary ring or secondary ring or incorrectly connecting them may make failure avoidance or normal communication impossible.
- The screwed part of the optical connector is metallic. For this reason, when the screwed part is touched by hand, static electricity may be discharged from the human body. This may result in a dual ring communication error. To prevent static electricity from being discharged, cover the optical connectors shown in Figure 3-4 with rubber or an insulating material.
- When fastening a optical fiber cable with a tension member to a enclosure, be sure to electrically insulate the enclosure. (If enclosure are electrically connected by the tension member, circulating current may flow and generate noise.)

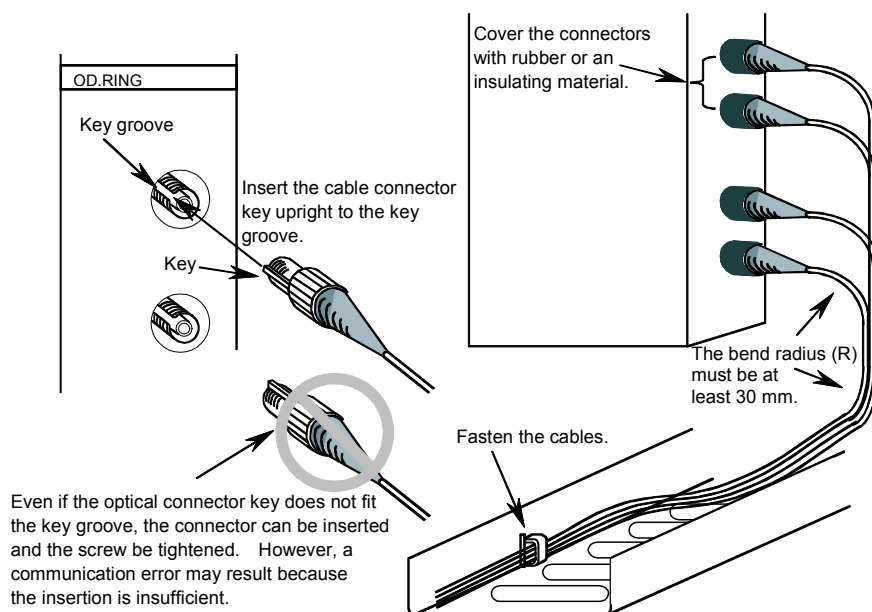


Figure 3-4 Handling Optical Fiber Cables

(chapter 4, page 4-3)

### **NOTICE**

Note that the following setting is prohibited:

- Setting the module number switch to a number to which no function is assigned (see “2.1 Names and Functions of Each Part”).

(chapter 4, page 4-3)

### **NOTICE**

Note that the following settings are prohibited:

- The module of the same CPL number exists in the dual ring.
- The CPL number is set to a value outside the permitted range (40 to FF).
  - When module number setting switch is set to 0 or 1, an error occurs at CPL No.40 to FF.
  - When module number setting switch is set to 2 or 3, an error occurs at CPL No.20 to FF.
  - When module number setting switch is set to 4 or 5, an error occurs at CPL No.10 to FF.
  - When module number setting switch is set to 6 or 7, an error occurs at CPL No.08 to FF.

(chapter 4, page 4-4)

### **NOTICE**

Relationship between the OD.RING module and CPU or LPU switch.

The switch of the CPU or LPU module affects the operation of the OD.RING module.

- STOP

The OD.RING module receives data from a remote module and updates data in the memory transfer area. It transmits communication control data, not local module data.

- RUN, SIMU RUN

The OD.RING module transmits and receives data.

(chapter 4, page 4-6)

### **NOTICE**

Before installing the S10mini OD.RING/SD.LINK system, be sure to exit all the currently open Windows®-based programs. Do not forget to exit anti-virus software and other memory-resident programs. If you install the S10mini OD.RING/SD.LINK system without exiting such programs, an error may occur during installation. If such an error occurs, first uninstall the S10mini OD.RING/SD.LINK system as directed in “4.5.2 Uninstalling,” exit all the Windows®-based programs, and then install the S10mini OD.RING/SD.LINK system again.

(chapter 4, page 4-8)

### **NOTICE**

- The S10V basic system is required for operating the S10V OD.RING/SD.LINK system. If it is not installed, you cannot install the S10V OD.RING/SD.LINK system.
- Before installing the S10V OD.RING/SD.LINK system, be sure to exit all the currently open Windows®-based programs. Do not forget to exit anti-virus software and other memory-resident programs. If you install the OD.RING/SD.LINK system without exiting such programs, an error may occur during installation. If such an error occurs, first uninstall the S10V OD.RING/SD.LINK system as directed in “4.5.2 Uninstalling”, exit all the Windows®-based programs, and then install the S10V OD.RING/SD.LINK system again.

(chapter 4, page 4-9)

### **NOTICE**

- If Windows® opens a window during the uninstall process to display the question “Remove Shared File?”, click the  button to retain shared files.
- When you want to reinstall the OD.RING/SD.LINK System, be sure to uninstall it before reinstalling.



(chapter 4, page 4-13)

**NOTICE**

- S10mini does not support GP-IB. Do not select GPIB in the [Communication type] window.
- S10V does not support GP-IB. Do not display GPIB in the [Communication type] window.

(chapter 4, page 4-18)

**NOTICE**

For S10mini, please confirm that the extension memory location corresponding to a specified address is present when setting its address. The system performance might decrease when the extension memory location corresponding to a specified address is not present. If it is not present, please install it.

(chapter 5, page 5-2)

**NOTICE**

S10mini CPU units and S10V LPU units may be interconnected in a mixed fashion. For details, see “4.6.9 Setting a transfer area where an S10mini and an S10V are intermixed.”

(chapter 5, page 5-5)

**NOTICE**

For S10mini, please confirm whether the extension memory corresponding to a set address is mounted when the address of the extension memory is set. The system performance might decrease when the extension memory corresponding to a set address is a unmounting, and mount it, please.

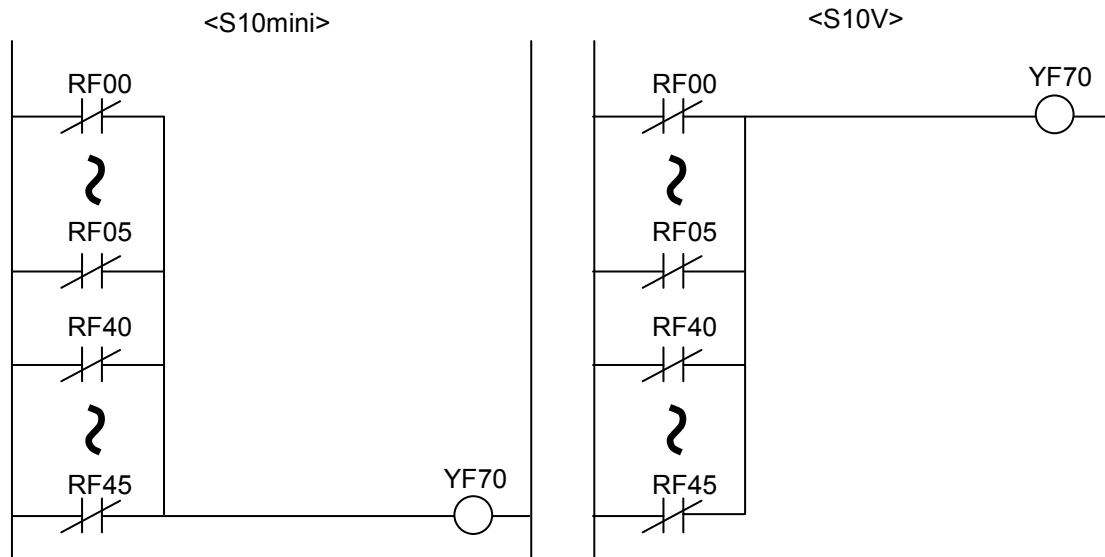
(chapter 5, page 5-11)

### NOTICE

As shown in Figure 5-12, if the primary ring and secondary ring are disconnected at different places (between different modules), normal communication may be impossible. In these cases, be sure not to use the modules.

All the modules should also be programmed so that they can detect an error and issue an alarm when the primary ring or secondary ring is disconnected at one place.

Example: When the CPL number of the connected OD.RING module is from 0 to 5 and the starting address of the RAS table is set to RWF00. (The figure below shows the case where YF70 is assigned to the coil for alarm issuance.)



(chapter 5, page 5-13)

### NOTICE

If an FW or an extension area of expanded memory is set as the RAS bit area, any data before resetting may remain there within two seconds after the resetting condition has been cleared. Wait at least for two seconds after resetting, then reference the defined area.

(chapter 6, page 6-8)

### **NOTICE**

- Replace one module at a time. Removing optical fiber cables simultaneously at several places may interrupt communication.
- Check that the optical fiber cables are not broken before replacing a module. Removing the broken optical fiber cable for module replacement may interrupt communication.
- During module replacement, disconnections are detected according to the RAS table. If an optical fiber cable is removed for module replacement, disconnection is detected according to the RAS table but communication continues normally.

(chapter 6, page 6-10)

### **NOTICE**

- Take care when handling the optical fiber cable. In particular, do not make the bend radius smaller than 30 mm, otherwise a wipe breaking may be caused.
- After measurement, clean the optical module receptacle and the optical connector.
- Since the optical connector of the OD.RING (LQE510) is the FC type (SMA type for the LQE515), the optical power meter must be applicable to the FC type (or SMA type). Use the connector adapter (attached to the optical power meter or separately sold) for the FC type (or the SMA type).

(chapter 6, page 6-12)

### **NOTICE**

- Take care when handling the optical fiber cable. In particular, do not make the bend radius smaller than 30 mm, otherwise a wipe breaking may be caused.
- After measurement, clean the optical module receptacle and the optical connector.
- Since the optical connector of the OD.RING (LQE510) is the FC type (SMA type for the LQE515), the optical power meter must be applicable to the FC type (or SMA type). Use the connector adapter (attached to the optical power meter or separately sold) for the FC type (or the SMA type).

(chapter 6, page 6-17)

### ***NOTICE***

If the module has been mounted on a model different from the one on which the parameters defined in “4.6 Commands,” have been set, a parameter error occurs. Specifically, parameter errors may occur in these two cases:

Case 1: If an OD.RING module for which parameters have been set on the S10V is mounted in the S10mini, “ODM PRME” or “ODS PRME” is displayed in the CPU module indicator.

Case 2: If an OD.RING module for which parameters have been set on the S10mini is mounted in the S10V, 0x0112 is displayed in the error log of the tool (S10V BASE SYSTEM).

This function aims at preventing malfunctions upon reference to parameters that have been set on another model.

A parameter error also occurs when a checksum error has resulted from a parameter setting. When such a parameter error occurs, open the parameter setup screen on the model mounted, and modify the settings as appropriate.

(chapter 6, page 6-27)

### ***NOTICE***

If a time-out is generated during reception, the error status of FFFF will be returned.

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## 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.

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

<Hardware product>

OD.RING (LQE510/515)

<Program products>

S-7890-28, OD.RING/SD.LINK SYSTEM, 07-03

S-7895-28, S10V OD.RING/SD.LINK SYSTEM, 01-03



## Revision record

Revision No.	Revision record (revision details and reason for revision)	Month, Year	Remarks
B	First edition	February 2003	
F	Section 6.4, “Replacing or Adding On the Module” is newly added.	October 2008	
G	A change is added to the S10mini OD.RING/SD.LINK system installation procedure. Because of the S10V OD.RING/SD.LINK system’s revised window specifications, changes are added to the relevant sections of this manual.	April 2010	
H	<ul style="list-style-type: none"><li>• Windows® 7 (32-bit) operating system is newly supported.</li><li>• All the safety precautions and instructions in this manual have been reviewed and necessary changes are added to them.</li></ul>	December 2012	
I	Specification have been added.	April 2016	

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

## PREFACE

Thank you for purchasing the OD.RING module, which is an option for use with the S10mini/S10V.

This manual, named “USER’S MANUAL OPTION OD.RING,” describes how to use the OD.RING module. For proper use of the OD.RING module, it is requested that you thoroughly read this manual.

The S10mini and S10V products are available in two types: standard model and environmentally resistant model. The environmentally resistant model has thicker platings and coatings than the standard model.

The model number of the environmentally resistant model is marked by adding the suffix “-Z” to the model number of the standard model.

(Example) Standard model: LQE510

Environmentally resistant model: LQE510-Z

This manual is applicable to both the standard model and environmentally resistant model.

Although the descriptions contained in this manual are based on the standard model, follow the instructions set forth in this manual for proper use of the product even if you use the environmentally resistant model.

### <Trademarks>

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### <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) =  $1,000^2$  bytes

1 GB (gigabyte) =  $1,000^3$  bytes

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# 1 SPECIFICATIONS

# 1 SPECIFICATIONS

## 1.1 Use

The OD.RING module shares data by performing memory transfer between CPUs or LPU units. For I/O data, the maximum data sharing size is 4,096 points. For word data, the size is 4,096 words.

The module (LQE510/LQE515) can be mixed with an S10mini OD.RING module (LQE010/LQE015) when it is used in the S10mini CPU unit. (The LQE010/LQE015 cannot be used with the S10V LPU unit.)

## 1.2 Specifications

Item Type		Specifications	
		LQE510	LQE515
System	Maximum number of installable modules	2 per CPU or 2 per LPU	
	Number of lines	2 per module	
	Weight	300 g	
Lines	Network configuration	Dual rings	
	Transmission rate	2 Mbps	
	Maximum transmission distance	4 km between modules 60 km per ring	1 km between modules 60 km per ring
	Maximum number of connectable units	64	
	Maximum data sharing size of the system	I/O data: 4,096 points Word data: 4,096 words	
	Maximum data sharing size of the module	I/O data: 2,048 points Word data: 1,024 words	
	Data transfer interval	About 13 to 250 ms (depending on the number of modules connected and the amount of data transferred)	
	Wavelength	850 nm	880 nm
	Transmission level	-15 to -18 dBm	-14 to -18 dBm
	Reception level	-15 to -30 dBm	-14 to -28 dBm
Cable	Optical connector	FC type	SMA type
	Optical fiber cable	Grated index type	Plastic-clad, multi-mode type

### NOTICE

- A mix of up to two modules of the OD.RING (LQE010/015/510/515) and SD.LINK (LQE030/530) per CPU or LPU can mount.
- The LQE510 cannot be connected to an LQE015/515 by an optic line. Connect the LQE510 to an LQE010 or LQE510 by an optic line.
- The LQE515 cannot be connected to an LQE010/515 by an optic line. Connect the LQE515 to an LQE015 or LQE515 by an optic line.
- The OD.RING (LQE010/015/510/515) and SD.LINK (LQE030/530) cannot be connected to each other because they differ in their optical fiber cabling.

## 1.3 System Software Specifications

### 1.3.1 System overview

Various kinds of information need to be loaded in the OD.RING module before it can be used. Using the system software package (tool) mentioned below, carry out an operational equivalent of a typical Windows®-based application to load module information.

Table 1-1 Types of System Software Package (Tool)

Package name	Model		Distribution media
	S10mini use	S10V use	
OD.RING/SD.LINK system	S-7890-28	S-7895-28	Optional

### 1.3.2 Required hardware and software

The hardware and software prerequisites to using the system software package of the OD.RING module are listed below.

#### (1) S10mini

- PC with a Pentium 133 MHz or faster CPU
- PC with a Pentium 300 MHz or faster CPU (if Windows® 2000 or Windows® XP is used)
- Display with a resolution of 800 × 600 dots (SVGA) or more
- Microsoft® Windows® 95 operating system, Microsoft® Windows® 98 operating system, Microsoft® Windows® 2000 operating system or Microsoft® Windows® XP operating system
- Microsoft® Internet Explorer 4.01 or higher
- 32 MB of RAM or more
- 64 MB of RAM or more (if Windows® 2000 is used)
- 128 MB of RAM or more (if Windows® XP is used)
- 10 MB of hard disk space or more
- PC and CPU unit connecting cable (RS-232C cross cable with D-sub 9-pin connectors) or cable for connecting the PC to the ET.NET module (10BASE-T twisted pair cross cable with RJ-45 modular connectors)

#### (2) S10V

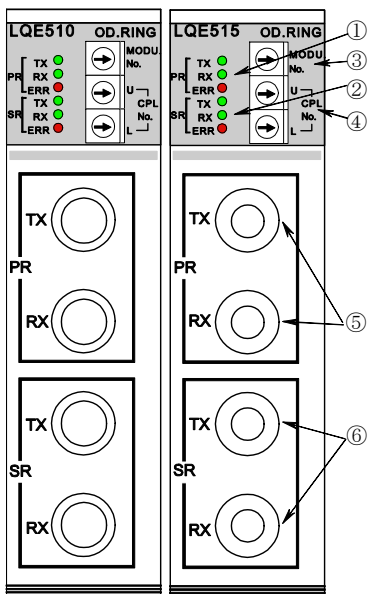
- PC with a Pentium 300 MHz or faster CPU, or a 1 GHz or faster CPU (if Windows® 7 (32-bit version) is used)
- Display with a resolution of 800 × 600 dots (SVGA) or more
- Microsoft® Windows® 2000 operating system, Microsoft® Windows® XP operating system or Microsoft® Windows® 7 (32-bit) operating system
- 64 MB of RAM or more (if Windows® 2000 is used)
- 128 MB of RAM or more (if Windows® XP is used)
- 1GB of RAM or more (if Windows® 7 (32-bit) is used)
- 10 MB of hard disk space or more
- PC and LPU unit connecting cable (RS-232C cross cable with D-sub 9-pin connectors) or cable for connecting the PC to the CMU or ET.NET module (10BASE-T or 100BASE-T twisted pair cross cable with RJ-45 modular connectors)

### ***NOTICE***

A knowledge of the Windows® environment and user interfaces is assumed to use this product. This system is made to adhere to the Windows® standard. This manual is written for those users who have mastered a basic concept of Windows® usage.

## 2 NAMES AND FUNCTIONS OF EACH PART

2.1 Names and Functions of Each Part



- ① LEDs for primary ring (PR)  
TX: Comes on when the local station is transmitting.  
RX: Comes on when the local station is receiving data.  
ERR: Comes on when a hardware error is detected.  
When the module is mounted on a model different from the one for which parameters has been set in 4.6, "Commands," a parameter error would occur, causing the LED to glow.
- ② LEDs for secondary ring (SR)  
The functions of these LEDs are the same as those of LEDs for the primary ring.
- ③ Module number (MODU No.) setting switch  
Set the number of modules connected, their distinction between a main module and a submodule and so on.

Table 2-1 Module Number Setting Switch

Function	Main module setting number	Submodule setting number
33-64 modules connection	0	1
17-32 modules connection	2	3
9-16 modules connection	4	5
1-8 modules connection	6	7
Prohibition of use (T/M1)	8	9
Prohibition of use (T/M2)	A	B
Prohibition of use (T/M3)	C	D
Prohibition of use	Other setting Nos.	

Figure 2-1 Front of OD.RING Module

- ④ CPL number setting switch  
The CPL number setting switch is used to set the number (/00 to /3F) for identifying the module connected to the line. Set a unique number to avoid duplication with any other OD.RING module attached to the same line.
- ⑤ Optical module receptacles for primary ring (PR)  
TX (transmission): Used to connect the OD.RING module to the primary ring (RX) of the next-stage module.  
RX (reception): Used to connect the OD.RING module to the primary ring (TX) of the previous-stage module.
- ⑥ Optical module receptacles for secondary ring (SR)  
TX (transmission): Used to connect the OD.RING module to the secondary ring (RX) of the next-stage module.  
RX (reception): Used to connect the OD.RING module to the secondary ring (TX) of the previous-stage module.

**NOTICE**

- A mix of up to two modules of the OD.RING (LQE010/015/510/515) and SD.LINK (LQE030/530) per CPU or LPU can mount. Set the module number setting switch of either module to main and that of the other to sub.
- Do not set the module number switch to any position from 8 to D. Setting the module number setting switch to such a position could alter PI/O memory.

# **3 MOUNTING AND WIRING**



### 3 MOUNTING AND WIRING

#### 3.1 Mount Base

This module can be mounted in the mount bases as shown in Table 3-1.

Table 3-1 Mount Bases Applicable to the OD.RING Module

Series	Name	Model	Specifications
S10mini	2-slot mount base	HSC-1020	Power supply + CPU + 2 slots (option, for I/O)
	4-slot mount base	HSC-1040	Power supply + CPU + 4 slots (option, for I/O)
	8-slot mount base	HSC-1080	Power supply + CPU + 8 slots (option, for I/O)
S10V	4-slot mount base	HSC-1540	Power supply + LPU + 4 slots (option, for I/O)
	8-slot mount base	HSC-1580	Power supply + LPU + 8 slots (option, for I/O)

#### 3.2 Mounting the Modules

Mount the option module in option slots (slot numbers 0 through 7) on the mount base as shown below.

**NOTICE**

**S10mini Series**

- Mount the option module at the leftmost positions without an intervening space from the CPU module. Further leave no open slots between option modules mounted.
- The module (LQE510/LQE515) can be mixed with a S10mini OD.RING module (LQE010/LQE015).

**S10V Series**

- There are no constraints on the mounting location and slots.
- The S10mini OD.RING module (LQE010/LQE015) cannot be used.

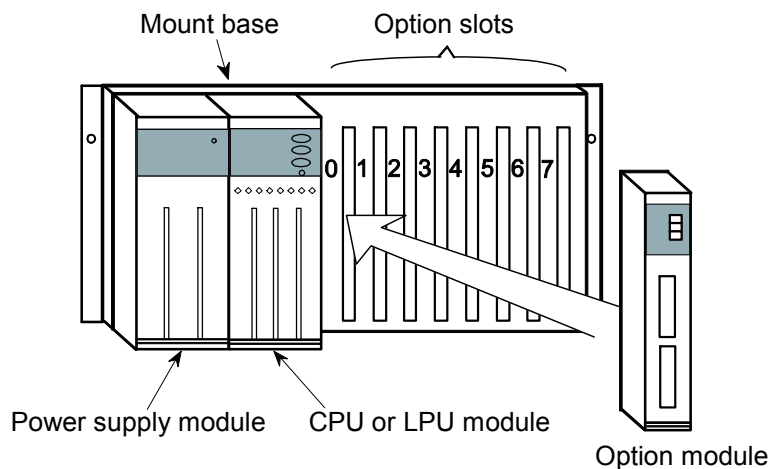


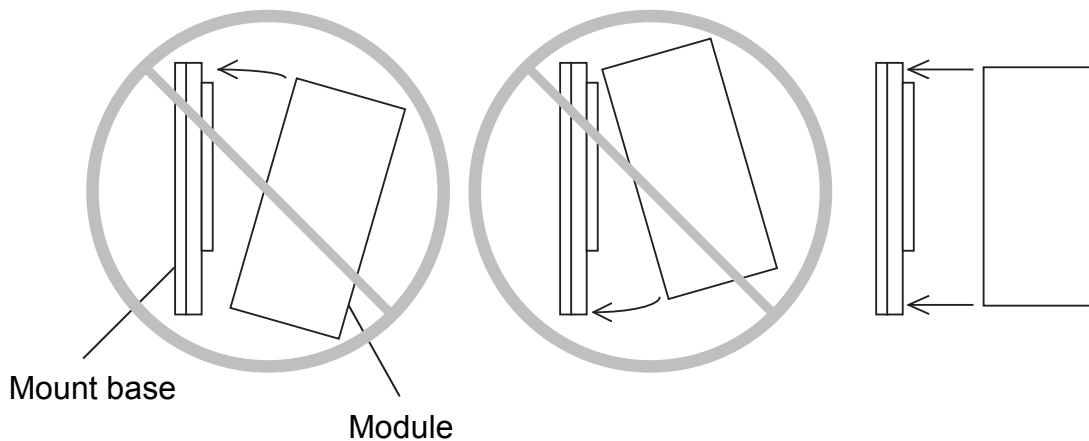
Figure 3-1 Mounting Option Module

**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]



### 3.3 Grounding Wiring

Carry out grounding as instructed in Figure 3-2.

- ① Connect the FG terminals of the power supply module, CPU or LPU module and optional modules to the mount base FG terminal by crossover wiring (with a wire of 2.0 mm<sup>2</sup> of more).
  - The OD.RING module (LQE510/LQE515) does not have a FG terminal.
  - For other optional modules, refer to the manual supplied with them. (Some optional modules do not have an FG terminal).
- ② Connect the mount base FG terminal and the PCs unit grounding point of the enclosure in which the mount base is mounted (with a wire of 2.0 mm<sup>2</sup> or more).
- ③ Carry out Class D grounding\* with a wire of 5.5 mm<sup>2</sup> or more from the PCs unit grounding point of the enclosure.

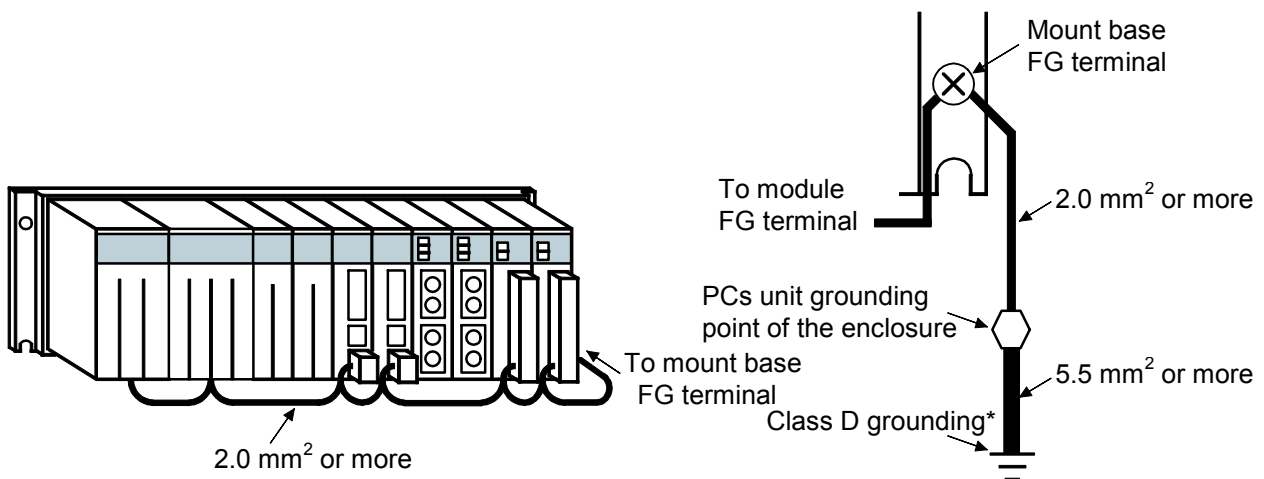


Figure 3-2 Ground Wiring

\* Class D grounding is defined in the Technical Standard for Electrical Facilities of Japan. This standard states that the grounding resistance must be 100 ohms or less for equipment operating on 300 VAC or less, and 500 ohms or less for devices that shut down automatically within 0.5 seconds when shorting occurs in low tension lines.

**WARNING**

- Switch off the power supply before wiring the terminal strip. Wiring with the power supply switched on could incur electrical shock hazards.
- Electric shock hazards exist so that you might suffer burns or become electrocuted. Further, the system might malfunction due to noise interference. Therefore, ground the line ground (LG), frame ground (FG), and shield wire (SHD).

**NOTICE**

- Insulate the mount base from the enclosure. To keep the mount base insulated, avoid removing the insulation sheets that are supplied with the mount base.
- The LG is a ground terminal for power supply noise. The FG and SHD are ground terminals for the noise in the remote I/O, communication module and other external interface lines. To avoid interference between the ground terminals, separately ground the LG and FG.

3.4 Wiring

(1) Primary ring (PR) wiring

As shown in Figure 3-3, connect the TX and RX receptacles of two adjacent OD.RING modules with optical fiber cables to configure the primary ring. Communication data flows from TX to RX in the direction of the arrow.

(2) Secondary ring (SR) wiring

In secondary ring wiring, connect the TX and RX receptacles of two adjacent OD.RING modules with optical cables as in primary ring wiring. In this wiring, however, be sure to connect TX and RX so that communication data flows from RX to TX (i.e., in the direction of the arrow which is the reverse of the direction of the primary ring).

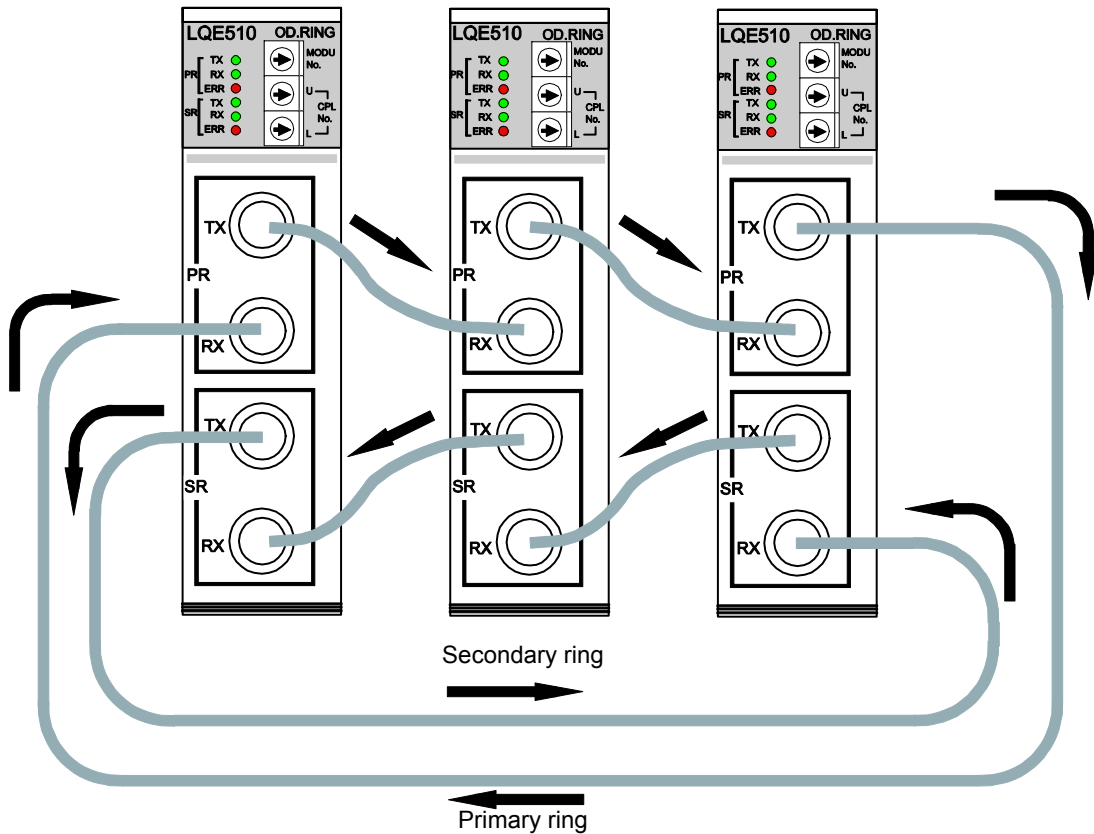


Figure 3-3 Optical Fiber Cable Connection

**NOTICE**

Optical fiber cabling is an error-prone operation. To ensure correct wiring, assign cables to optical fiber cables before wiring them.

**NOTICE**

- As shown in Figure 3-4, insert the optical connector key into the key groove of the optical module receptacle, then fasten the key with the attached screw. If the optical connector key does not fit the key groove, do not screw the key forcibly into the groove. Failure to observe this rule may damage the optical connector or interrupt normal communication. (Applicable only to the LQE510)
- There is a difference between primary ring wiring and secondary ring wiring. As shown on the previous page, the data flow direction in the primary ring differs from that in the secondary ring, so take care when wiring the rings. Incorrect wiring interrupts normal communication or deteriorates resistance failure performance.
- Clamp optical fiber cables to allow a bending radius (R) of 30 mm or more. A bending radius less than 30 mm could cause the fibers to break, resulting in breakage. (The bending radius requirement of 30 mm or more applies to single-core optical fiber cables. Optical fiber cables are available in numerous types. Consult your cable manufacturer.)
- Be sure to connect cables when the ring is in the dual state. Using an open or broken primary ring or secondary ring or incorrectly connecting them may make failure avoidance or normal communication impossible.
- The screwed part of the optical connector is metallic. For this reason, when the screwed part is touched by hand, static electricity may be discharged from the human body. This may result in a dual ring communication error. To prevent static electricity from being discharged, cover the optical connectors shown in Figure 3-4 with rubber or an insulating material.
- When fastening a optical fiber cable with a tension member to a enclosure, be sure to electrically insulate the enclosure. (If enclosure are electrically connected by the tension member, circulating current may flow and generate noise.)

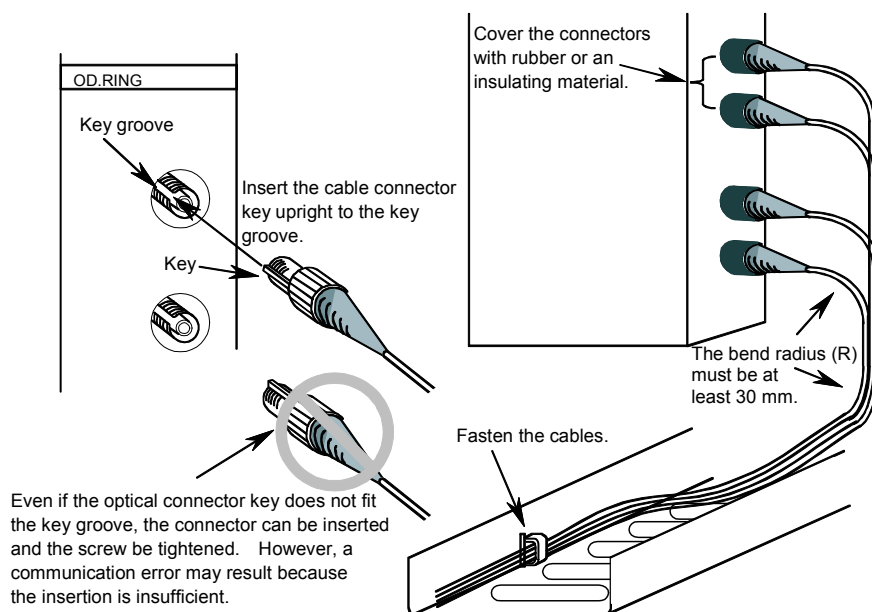


Figure 3-4 Handling Optical Fiber Cables

## 3.5 Optical Fiber Cables

### 3.5.1 Types of optical fiber cables

It is technically difficult for users to separately purchase an optical fiber cable and optical connector for connector connections. For this reason, we recommend that the users purchase an optical fiber cable with a double-end connector or entrust the work to the expert worker. There are a variety of different optical fiber cables. Select a proper cable according to its use. Optical fiber cables are usually divided into four types: single core, flat, round, and spacer.

Table 3-2 Types of Optical Fiber Cables (for the LQE510)

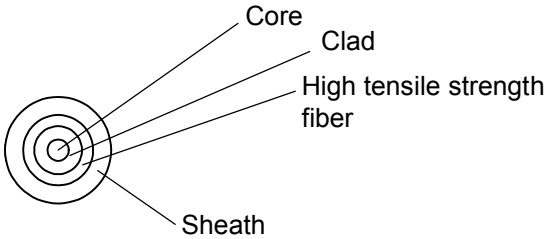
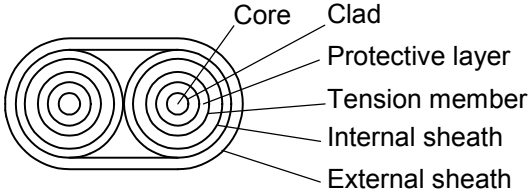
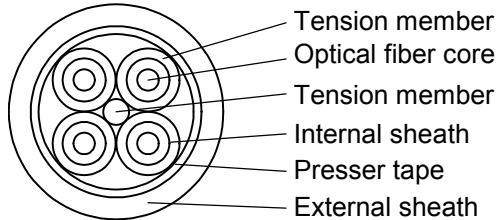
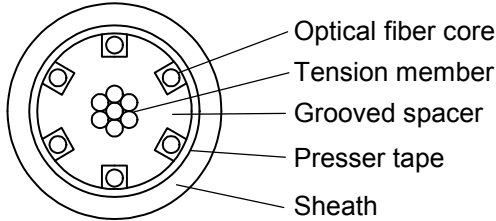
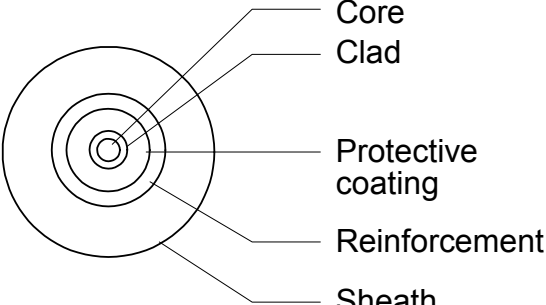
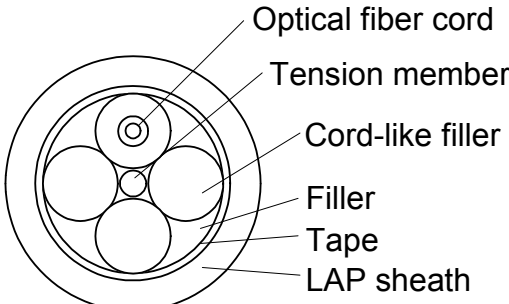
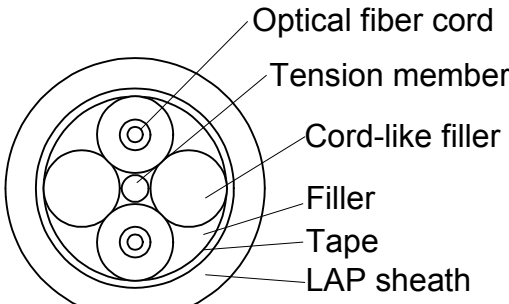
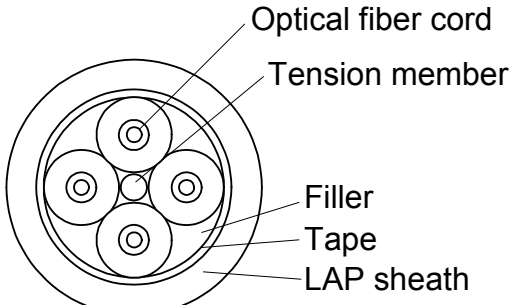
Type	Characteristics	Section
Single core	In indoor wiring, the single core cable is specially used for panel wiring.	 <p>Core Clad High tensile strength fiber Sheath</p>
Flat	In indoor wiring, use the flat-type cable in the place where the laying distance is comparatively short and external force is rarely applied.	 <p>Core Clad Protective layer Tension member Internal sheath External sheath</p>
Round	To improve mechanical characteristics, a tension member is inserted into the center of the cable. In indoor wiring, use the round cable where external force is comparatively small.	 <p>Tension member Optical fiber core Tension member Internal sheath Presser tape External sheath</p>
Spacer	The structure of the spacer cable is more complicated than the structures of the flat and round cables. The spacer cable is superior in mechanical characteristics. For this reason, in indoor wiring, etc., the cable of this type is suited for the place where external force is large.	 <p>Optical fiber core Tension member Grooved spacer Presser tape Sheath</p>

Table 3-3 Optical Fiber Cables (for the LQE515)

Type	Feature	Cross section
Single-core cord	Suitable for indoor wiring, particularly for wiring in the cubicle. Use this type of cable in a place to which little or no force is applied.	 <p>Core Clad Protective coating Reinforcement Sheath</p>
Single-core cable (1C-LAP type)	The tension member at the center improves mechanical characteristics. The LAP sheath also improves resistance to water and heat. As a result, this type of cable is suitable for outdoor wiring.	 <p>Optical fiber cord Tension member Cord-like filler Filler Tape LAP sheath</p>
Two-core cable (2C-LAP type)		 <p>Optical fiber cord Tension member Cord-like filler Filler Tape LAP sheath</p>
Four-core cable (4C-LAP type)		 <p>Optical fiber cord Tension member Filler Tape LAP sheath</p>



### 3 MOUNTING AND WIRING

#### 3.5.2 Optical fiber cable specifications

The types of optical fiber cables that can be used by the OD.RING module are limited. The user must purchase the optical fiber cables satisfying the specifications shown in Table 3-4.

Table 3-4 Optical Fiber Cable Specifications (for the LQE510)

Item	Specifications
Fiber core material	Quartz glass
Type of optical fiber	Grated index type
Core diameter	50 $\mu\text{m}$
Clad diameter	125 $\mu\text{m}$
Transmission loss	3 dB/km maximum ( $\lambda=850\text{ nm}$ )
Optical connector	FC type (JIS C5970 F01 type)

Table 3-5 Optical Fiber Cable Specifications (for the LQE515)

Item		Specifications
Optical fiber		Plastic-clad, multi-mode type
Core	Material	Quartz glass
	Outer diameter	200 $\pm$ 5 $\mu\text{m}$
	Noncircularity	6% or less
Clad	Material	Fluoroacrylate resin
	Outer diameter	230 $\mu\text{m}$
	Eccentricity	6 $\mu\text{m}$ or less
Numerical aperture (NA)		About 0.4
Transmission loss		7 dB/km maximum ( $\lambda=850\text{ nm}$ )
Protective coating		Outer diameter: 0.5 $\pm$ 0.1 mm      Material: Ethylene-tetrafluoroethylene
Reinforcement		Aromatic tensile strength fiber
Sheath		Outer diameter: 2.2 $\pm$ 0.2 mm      Material: Heat-resistant PVC (black)
Optical connector		SMA type single-core

### 3.5.3 Recommended cables

Cables of Hitachi Cable, Ltd. are recommended as cables with FC connectors. When procuring a cable, specify the type of optical fiber, core diameter, transmission loss, number of cores, type of cable, optical connector connection, type of optical connector, and cable length, as described below. Use this as the reference when ordering LQE510 optical cables.

GI 50 3 - 2 R - C 7 - 500M  
 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧

The above type indicates cable having the following attributes: The type of the optical fiber is grated index, the core diameter is 50  $\mu\text{m}$ , transmission loss is 3 dB/km or lower, and the number of cores is 2. In addition, the type of cable is round, the optical connector connection is double end, the type of optical connector is FC, and the cable length is 500 m.

- ① Type of optical fiber cable  
GI: Grated index type
- ② Core diameter  
50: 50  $\mu\text{m}$
- ③ Transmission loss  
3: 3 dB/km
- ④ Number of cores  
None: Valid for single core cable  
2: Valid for flat 2-core cable  
2, 3, 4, 6: Valid for round cable  
1: Valid for spacer cable
- ⑤ Type of cable  
None: Single core  
R: Round  
F: Flat  
S: Spacer
- ⑥ Optical connector connection  
B: Single end  
C: Double end
- ⑦ Type of optical connector  
7: FC type (JIS C5970 F01 type)
- ⑧ Cable length  
500M: 500m (Specify the cable length in meters.)

### 3 MOUNTING AND WIRING

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As a cable with SMA connectors, the cable manufactured by Sumitomo Electric Industries, Ltd. is recommended. To order the appropriate cable, specify the model name correctly that represents the optical fiber type, the number of cores, the cable type, the cable length, and other information, as shown below. The example below is to order LQE515 optical cables from Hakuto Co., Ltd.

- Single-core cord

HC / 1C - CCV - SMA - 2  
①            ②            ③            ④            ⑤

In addition, the type of cable length is 2 m.

- ① Type of optical fiber cable  
Plastic-clad, multi-mode type
- ② Number of cores  
1-core
- ③ Type of cord  
Fiber
- ④ Type of optical connector  
SMA type at both ends of the cable
- ⑤ Cable length  
2 m (Specify the cable length in meters.)

- Outdoor cable

HC / 2C - LAP - SMP - 0.2 / 2  
①            ②            ③            ④            ⑤            ⑥

In addition, the type of cable length is 2 m.

- ① Type of optical fiber cable  
Plastic-clad, multi-mode type
- ② Number of cores  
2-core
- ③ Type of cable  
Outdoor LAP sheath
- ④ Type of optical connector  
SMA type at both ends of the cable
- ⑤ Length without sheath  
0.2 m
- ⑥ Cable length  
2 m (Specify the cable length in meters.)

# 4 OPERATION

## 4.1 Startup Procedure

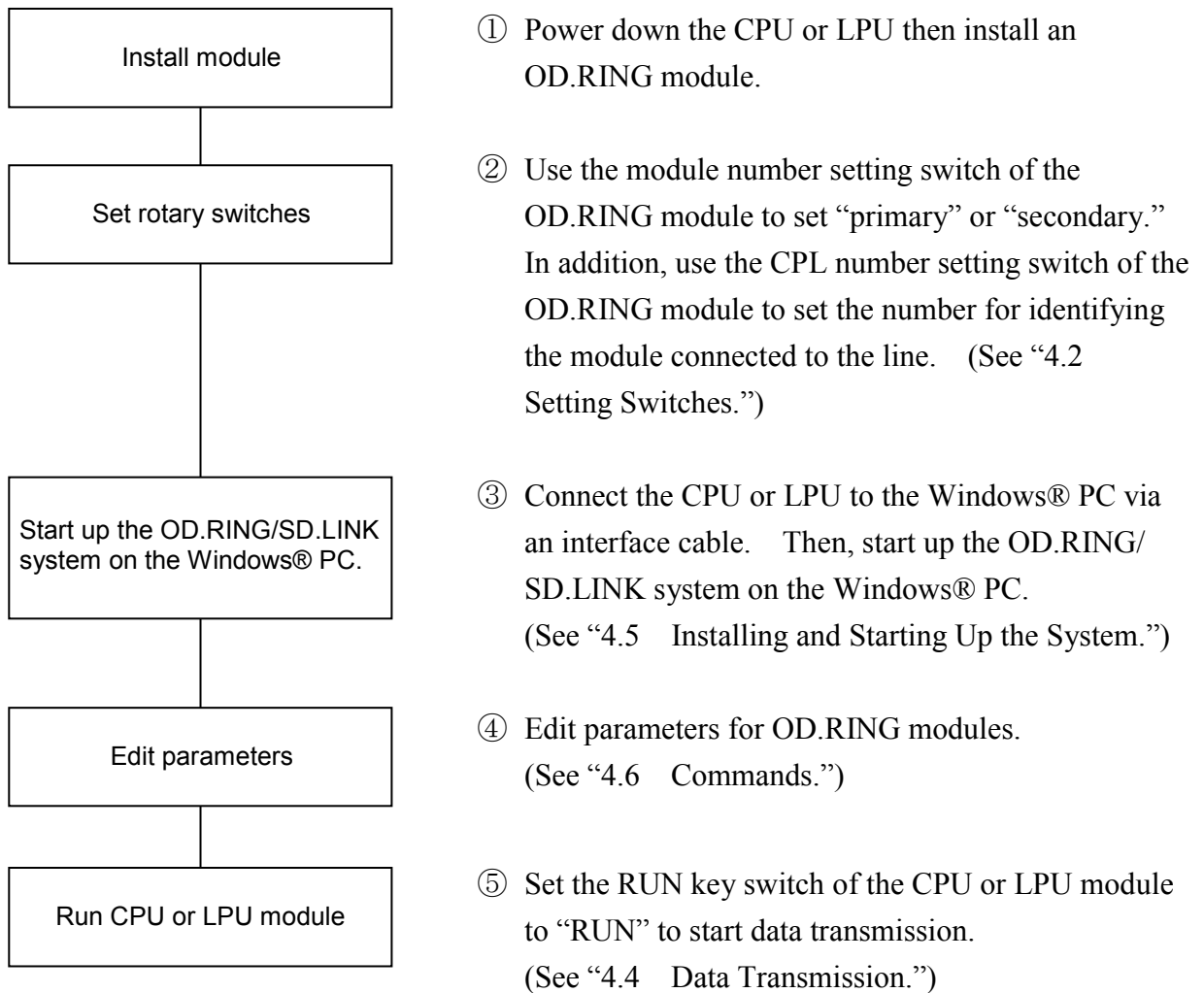


Figure 4-1 Startup Procedure

## 4.2 Setting Switches

- Module number setting switch  
Set the module number switch to match the number of connected modules (see “2.1 Names and Functions of Each Part”).

### NOTICE

Note that the following setting is prohibited:

- Setting the module number switch to a number to which no function is assigned (see “2.1 Names and Functions of Each Part”).

- CPL number setting switch
  - Set the CPL number switch so that all the modules connected to the OD.RING are assigned different numbers. Module numbers need not be in sequence.
  - Set the module number switch and CPL number switch according to the number of modules connected, as shown in Table 4-1.

Table 4-1 Module Number Setting Switch and CPL Number Setting Switch

Number of modules connected	Module number setting switch	CPL number setting switch
33 to 64 modules	0, 1	Any value from 00 to 3F
17 to 32 modules	2, 3	Any value from 00 to 1F
9 to 16 modules	4, 5	Any value from 00 to 0F
1 to 8 modules	6, 7	Any value from 00 to 07

### NOTICE

Note that the following settings are prohibited:

- The module of the same CPL number exists in the dual ring.
  - The CPL number is set to a value outside the permitted range (40 to FF).
- ( When module number setting switch is set to 0 or 1, an error occurs at CPL No.40 to FF.  
When module number setting switch is set to 2 or 3, an error occurs at CPL No.20 to FF.  
When module number setting switch is set to 4 or 5, an error occurs at CPL No.10 to FF.  
When module number setting switch is set to 6 or 7, an error occurs at CPL No.08 to FF. )

### 4.3 Switching On

(1) Set the CPU module or LPU module switches.

- S10mini CPU module
  - LADDER switch: STOP
  - MODE switch: NORM
  - PROTECT switch: OFF
- S10V LPU module
  - LADDER switch: STOP
  - RESET switch: OFF

(2) With the power supply module cover open, set the POWER switch to ON to power up.

#### **NOTICE**

Relationship between the OD.RING module and CPU or LPU switch.

The switch of the CPU or LPU module affects the operation of the OD.RING module.

- STOP

The OD.RING module receives data from a remote module and updates data in the memory transfer area. It transmits communication control data, not local module data.

- RUN, SIMU RUN

The OD.RING module transmits and receives data.

## 4.4 Data Transmission

Set the CPU module or LPU module LADDER switch to RUN to start data transmission.



### 4.5 Installing and Starting Up the System

#### 4.5.1 Installing

##### (1) Installing the S10mini OD.RING/SD.LINK system

To install the S10mini OD.RING/SD.LINK system, you must execute the setup program that is stored in the S10mini OD.RING/SD.LINK system DISK1 folder on the CD.

Double-click “setup.exe” that is stored in the DISK1 folder on the S10mini OD.RING/SD.LINK system CD. Since no window opens upon completion of installation, attach a shortcut to the desktop as needed.

Click the  button and choose [(All) Programs] - [Hitachi S10] - [OD.RING/SD.LINK SYSTEM] - [OD.RING/SD.LINK SYSTEM] from the [Start] menu on the Windows® screen. Click and hold the right mouse button on the [OD.RING/SD.LINK SYSTEM] and move the pointer to the desktop. Then, choose [Copy Here] from the pop-up menu.

#### **NOTICE**

Before installing the S10mini OD.RING/SD.LINK system, be sure to exit all the currently open Windows®-based programs. Do not forget to exit anti-virus software and other memory-resident programs. If you install the S10mini OD.RING/SD.LINK system without exiting such programs, an error may occur during installation. If such an error occurs, first uninstall the S10mini OD.RING/SD.LINK system as directed in “4.5.2 Uninstalling,” exit all the Windows®-based programs, and then install the S10mini OD.RING/SD.LINK system again.

##### (2) Installing the S10V OD.RING/SD.LINK system

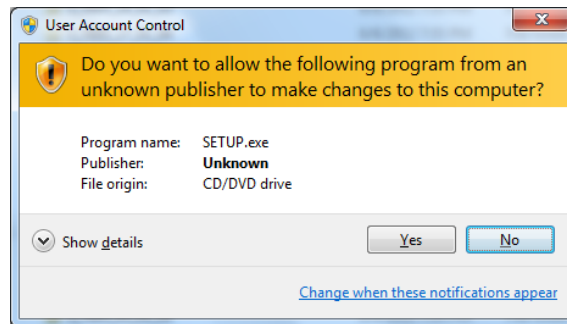
To install the S10V OD.RING/SD.LINK system, you must execute the setup program that is stored in the S10V OD.RING/SD.LINK system DISK1 folder on the CD.

Double-click “setup.exe” that is stored in the DISK1 folder on the S10V OD.RING/SD.LINK system CD. Since no window opens upon completion of installation, attach a shortcut to the desktop as needed.

Click the  button and choose [(All) Programs] - [Hitachi S10] - [S10V OD.RING/SD.LINK SYSTEM] - [S10V OD.RING/SD.LINK SYSTEM] from the [Start] menu on the Windows® screen. Click and hold the right mouse button on the [S10V OD.RING/SD.LINK SYSTEM] and move the pointer to the desktop. Then, choose [Copy Here] from the pop-up menu.

<Notes on installing in Windows® 7 (32-bit)>

Installing the S10V OD.RING/SD.LINK system in Windows® 7 (32-bit) operating system requires prior logging onto the operating system with an appropriate Administrator account, which is the Administrator account first created in the initial condition of your PC. When you have so logged on, you can then double-click “setup.exe” that is stored in the DISK 1 folder on the OD.RING/SD.LINK System CD. When “setup.exe” is started, the dialog box as shown below will appear. Click the  button to continue the execution of the setup program.



The OD.RING/SD.LINK system cannot be installed on a per-user basis. To install the OD.RING/SD.LINK system successfully, the user must first log onto the operating system with an appropriate Administrator account, which is the Administrator account first created in the initial condition of your personal computer.

The OD.RING/SD.LINK system may not be installed properly in any of the following cases: 1) administrator permission is acquired by using User Account Control(\*) with a standard user account and 2) logon is made with an Administrator account that has been created using User Account Control with a standard user account.

If you make a logon with a user account that is different from the one you have used for the installation of the OD.RING/SD.LINK system, the installed program may be missing from the program menu displayed. In this case, you should perform the following series of steps: 1) make a logon again with the Administrator account first created in the initial condition of your PC; 2) uninstall the installed program; and 3) install the program again.

When you want to create a new account, be sure to make a logon with an Administrator account. Do not use User Account Control at that time.

(\*) User Account Control is a Microsoft Windows feature that temporarily grants administrative rights to standard user accounts.

A message reporting a read-only file detected may be displayed during the reinstallation of the OD.RING/SD.LINK system. In this case, click the  button to set off overwriting.

### **NOTICE**

- The S10V basic system is required for operating the S10V OD.RING/SD.LINK system. If it is not installed, you cannot install the S10V OD.RING/SD.LINK system.
- Before installing the S10V OD.RING/SD.LINK system, be sure to exit all the currently open Windows®-based programs. Do not forget to exit anti-virus software and other memory-resident programs. If you install the OD.RING/SD.LINK system without exiting such programs, an error may occur during installation. If such an error occurs, first uninstall the S10V OD.RING/SD.LINK system as directed in “4.5.2 Uninstalling”, exit all the Windows®-based programs, and then install the S10V OD.RING/SD.LINK system again.

#### 4.5.2 Uninstalling

The existing OD.RING/SD.LINK system needs to be uninstalled when, for instance, you want to upgrade it. The procedure required for uninstalling it is as follows:

(1) Uninstalling from Windows® 2000

Click on  button on your Windows desktop and choose [Settings] - [Control Panel]. When the Control Panel opens, double-click on [Add/Remove Programs]. Then, choose “OD.RING-SD.LINK SYSTEM” (for S10mini controllers) or “S10V OD.RING-SD.LINK SYSTEM” (for S10V controllers) in the [Change or Remove Programs] tab and click the  button. When the [Confirm File Deletion] dialog box appears, click the  button.

(2) Uninstalling from Windows® XP

Click on  button on your Windows desktop and choose ([Settings] - ) [Control Panel]. When the Control Panel opens, double-click on [Add/Remove Programs]. Then, choose “OD.RING-SD.LINK SYSTEM” (for S10mini controllers) or “S10V OD.RING-SD.LINK SYSTEM” (for S10V controllers) in the [Change or Remove Programs] tab and click the  button. When the [Confirm File Deletion] dialog box appears, click the  button.

(3) Uninstalling from Windows® 7 (32-bit) -- for S10V controllers only

Click on  button on your Windows desktop and choose [Control Panel]. When the Control Panel opens, click [Programs and features]. Then, select “S10V OD.RING-SD.LINK SYSTEM” and click  button. When the [Confirm File Deletion] dialog box appears, click the  button.

**NOTICE**

- If Windows® opens a window during the uninstall process to display the question “Remove Shared File?”, click the  button to retain shared files.
- When you want to reinstall the OD.RING/SD.LINK System, be sure to uninstall it before reinstalling.

## 4.5.3 Starting up the system

To start the OD.RING/SD.LINK system, follow these steps:

- S10mini OD.RING/SD.LINK system startup procedure
  - (1) If you want to start up the S10mini OD.RING/SD.LINK system from the Windows® desktop, double-click the [OD.RING/SD.LINK SYSTEM] icon. Alternatively, if you want to start it up from the  button, choose [Programs] - [Hitachi S10] - [OD.RING/SD.LINK SYSTEM] from the Start menu.
  - (2) The [OD.RING/SD.LINK SYSTEM] window appears (see Figure 4-2). Then, click a desired command button.

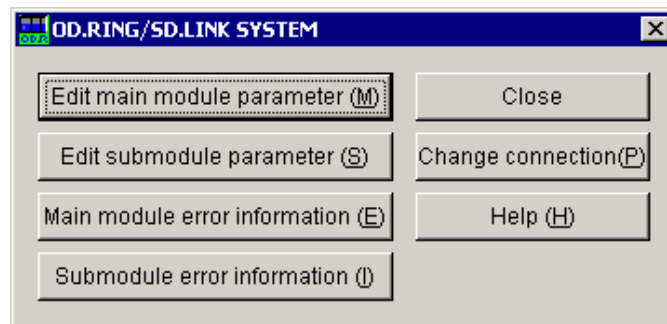


Figure 4-2 [OD.RING/SD.LINK SYSTEM] Window

- S10V OD.RING/SD.LINK system startup procedure to start it up in online mode
  - (1) If you want to start up the S10V OD.RING/SD.LINK system from the Windows® desktop, double-click the [S10V OD.RING/SD.LINK SYSTEM] icon. Alternatively, if you want to start it up from the  button, choose [All Programs] - [Hitachi S10V] - [S10V OD.RING/SD.LINK SYSTEM] - [S10V OD.RING/SD.LINK SYSTEM] from the Start menu.  
The [[S10V] OD.RING/SD.LINK SYSTEM] window will then appear. At this stage of the procedure, the OD.RING/SD.LINK system is not connected with the PCs yet.

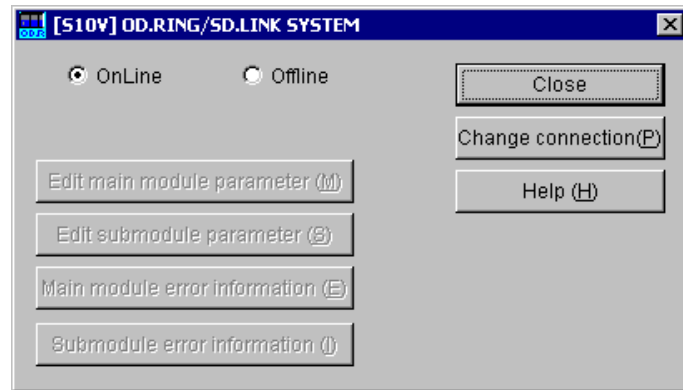


Figure 4-3 [[S10V] OD.RING/SD.LINK SYSTEM] Window

- (2) By clicking the **Change connection** button in the window, display the [Communication type] window (see Figure 4-4) on-screen. When the [Communication type] window appears, specify the desired destination of connection and click the **OK** button (see “4.5.4 Changing the connection with the PCs” for details on the communication type). If you need not change the current connection destination setting, click the **Cancel** button instead.

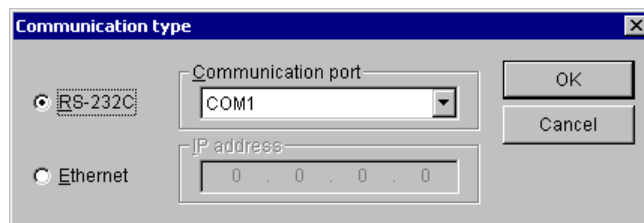


Figure 4-4 [Communication type] Window

- (3) The [[S10V] OD.RING/SD.LINK SYSTEM] window appears. Then, click a desired command button.

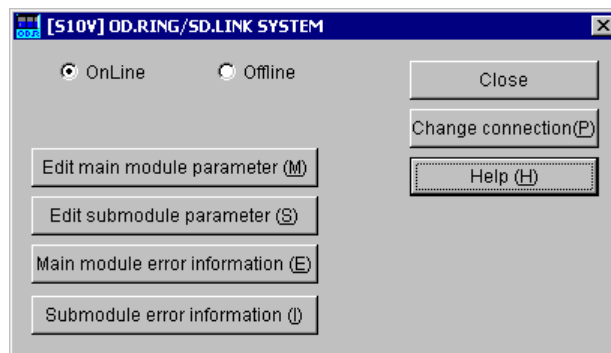


Figure 4-5 [[S10V] OD.RING/SD.LINK SYSTEM] Window

- S10V OD.RING/SD.LINK system startup procedure to start it up in offline mode  
The procedure described below enables you to create a setup information file for the OD.RING/SD.LINK and edit it, all in offline mode, even if the actual target machine is not present in your user system. The setup information file prepared this way can be read out through interaction with the [Set parameter] window in online mode and then sent to the actual target machine.
- (1) Take the same action as specified in Step (1) under “● S10V OD.RING/SD.LINK system startup procedure to start it up in online mode.”
  - (2) Choose the [Offline] radio button. The **Change connection** button is then replaced by the **Edition File Select** button. Also, at the same time, both the **Edit main module parameter** and **Edit submodule parameter** buttons are replaced by one single button, named **Edit module parameter**.

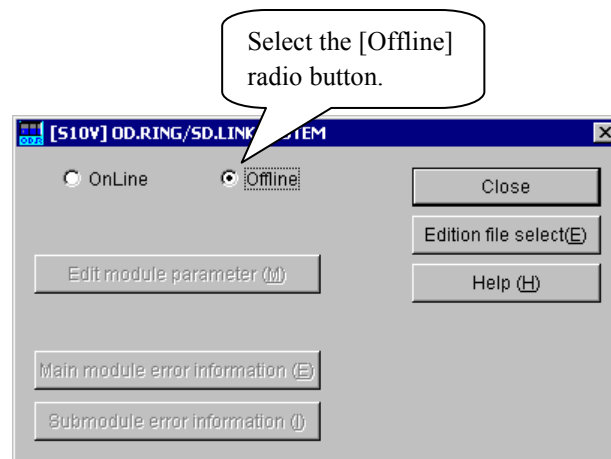


Figure 4-6 Selecting the [Offline] Radio Button

- (3) Click the **Edition File Select** button and choose the desired OD.RING/SD.LINK setup information file you want to edit in offline mode.

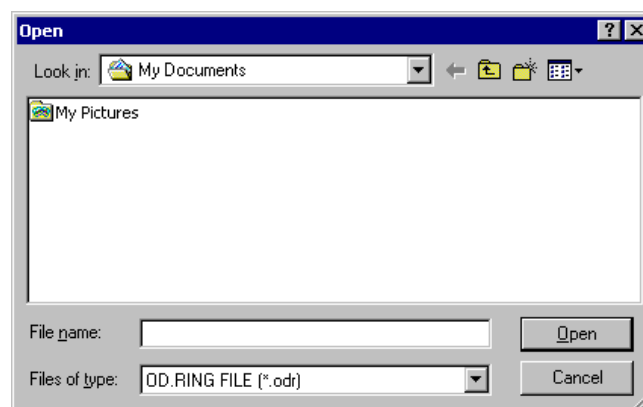


Figure 4-7 Selecting the Edition File You Want to Edit

## 4 OPERATION

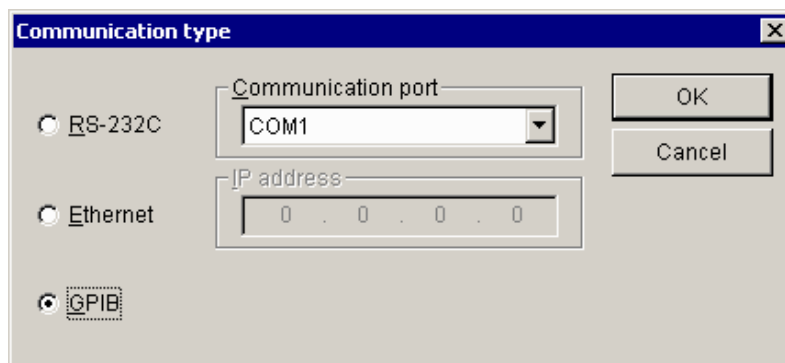
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### 4.5.4 Changing connections

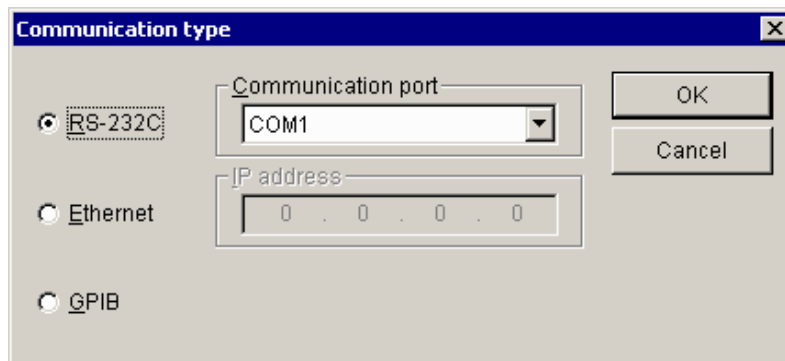
Function: Sets the type of communication between the PCs and PC.

Operation: Follow these steps:

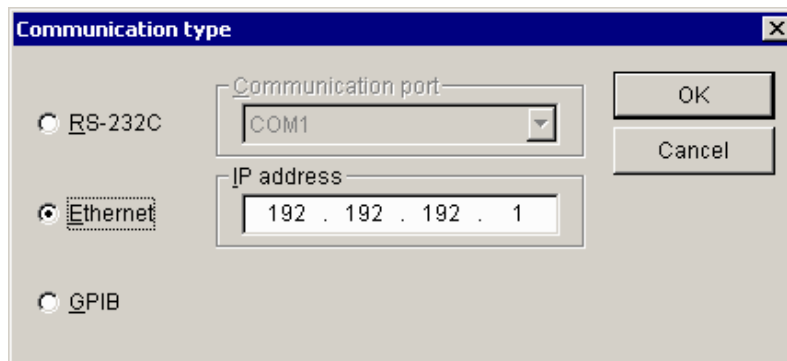
- (1) Click the **Change connection** button in the [OD.RING/SD.LINK] window (see Figure 4-2) or [[S10V] OD.RING/SD.LINK] window (see Figure 4-3).
- (2) The [Communication type] window is displayed. (GPIB is not displayed for S10V OD.RING.)



- (3) With RS-232C, click "RS-232C" and select a "Communication port."



(4) With Ethernet, click “Ethernet” and enter the destination “IP address.”



### **NOTICE**

- S10mini does not support GP-IB. Do not select GPIB in the [Communication type] window.
- S10V does not support GP-IB. Do not display GPIB in the [Communication type] window.

(5) When the setup is complete, click the **OK** button. To cancel the setup, click the **Cancel** button.

#### 4.5.5 Selecting an edition file

**Function:** Chooses an edition file you want to edit in offline mode. The edition files that you can choose for editing are those which have been saved as parameter settings files in online mode or have been prepared through offline editing. You can also create a new file by specifying a non-existing file name. This function is supported only in S10V controller systems.

**Operation:** The procedure used is shown below.

(1) In the [[S10V] OD.RING/SD.LINK SYSTEM] window displayed, choose the [Offline] radio button. If it is already selected, skip this step.



## 4 OPERATION

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- (2) If you have not selected an edition file yet or want to change the currently selected edition file, click the **Edition File Select** button. The [Open] window as shown below will then appear.

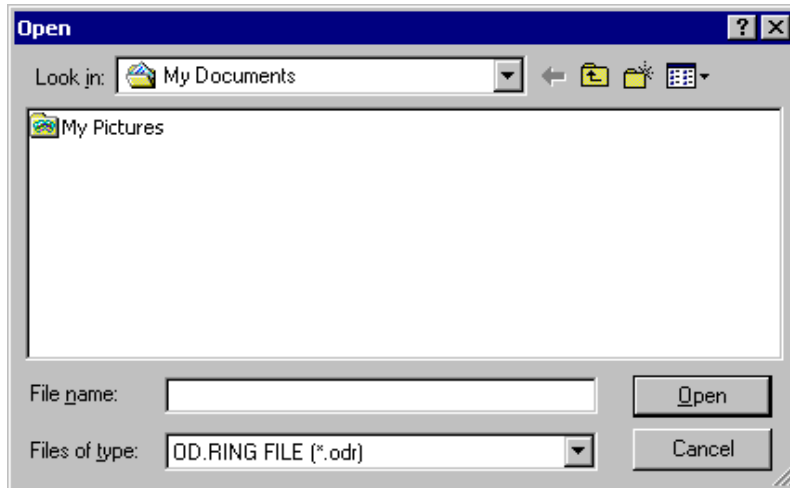


Figure 4-8 [Open] Window -- an Example

- (3) If you want to create a new OD.RING/SD.LINK setup information file and edit its content, enter a non-existing unique file name and click the **Open** button. The [Creation confirmation] dialog box shown below will then appear. When it appears, click the **OK** button.

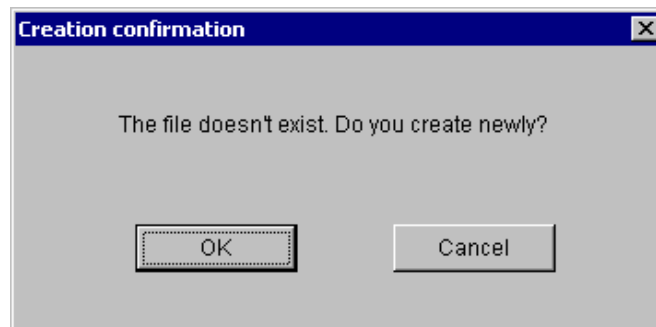


Figure 4-9 [Creation confirmation] Dialog Box

- (4) If you want to edit an already created OD.RING/SD.LINK setup information file, choose that file in the  window, and click the  button.

If the selected file is a non-OD.RING/SD.LINK setup info file or invalid file, the error message dialog box shown below will appear.

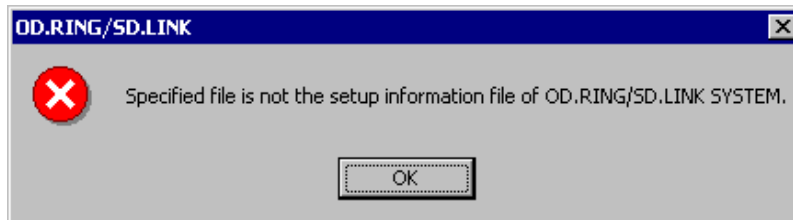


Figure 4-10 Error Message Dialog Box Reporting on an Invalid OD.RING/SD.LINK Setup Info File Specified

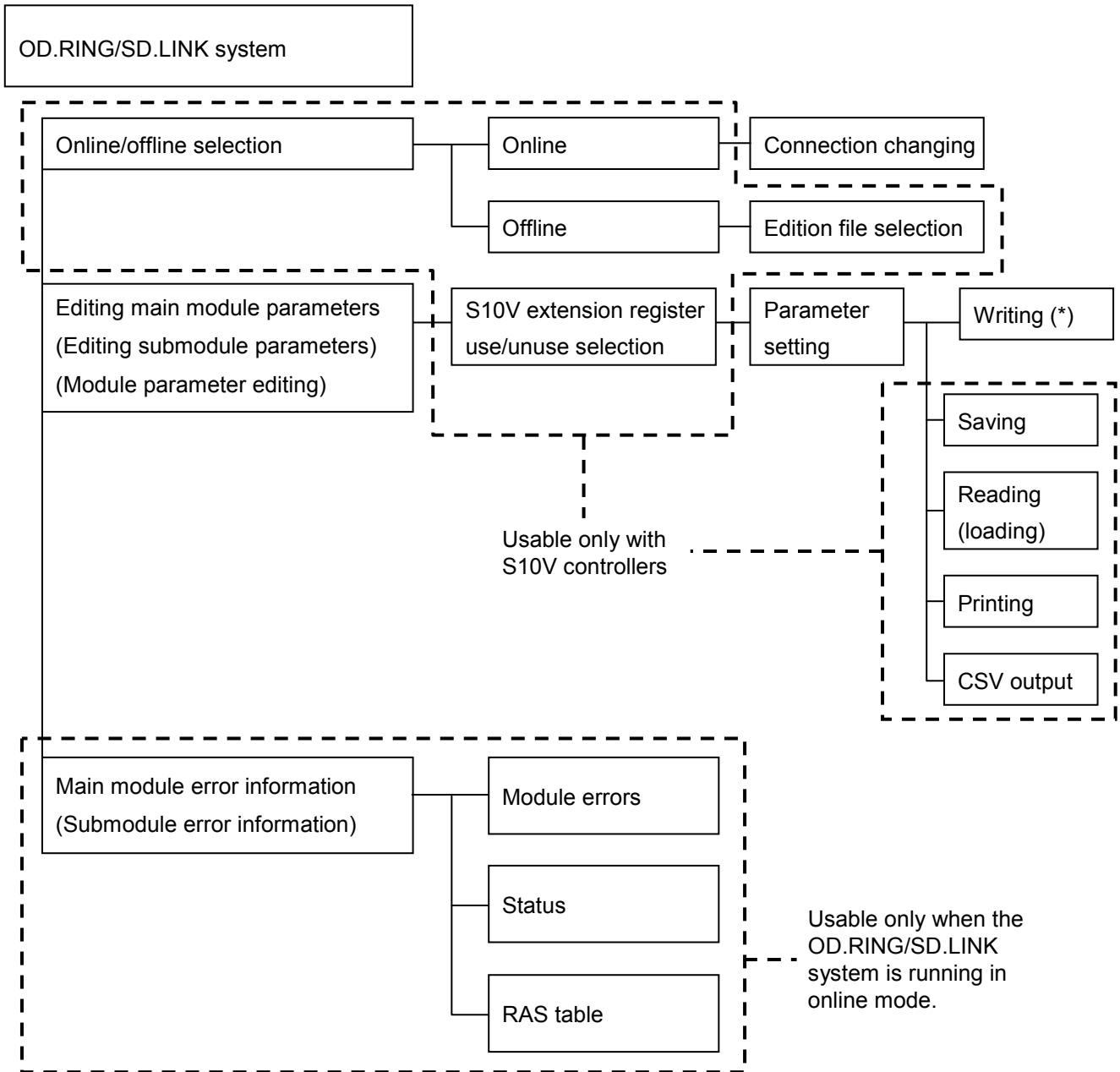
If the selected file is a valid OD.RING/SD.LINK setup info file, you can now edit the setup information in that file as you do while the OD.RING/SD.LINK system is running in online mode.

#### 4.5.6 Closing the system

Click  or  button in the [OD.RING/SD.LINK] window (see Figure 4-2) or [[S10V] OD.RING/SD.LINK] window (see Figure 4-3).

4.6 Commands

4.6.1 OD.RING/SD.LINK system function architecture



(\*) The function writes parameters to the S10V or S10mini OD.RING/SD.LINK module.

Figure 4-11 OD.RING/SD.LINK System Function Map

### 4.6.2 Edit main module (submodule) parameter

Function: Sets bit data, word data, and RAS table addresses for the main module (submodule).

Operation: Follow one of the procedures described below. The procedure used for editing parameters for an OD.RING/SD.LINK main module or submodule is different between the S10mini and the S10V controller.

#### (a) Procedure for editing OD.RING/SD.LINK parameters

<Procedure used with S10mini controllers>

- (1) Make sure that the OD.RING/SD.LINK system (tool) is online with the OD.RING/SD.LINK main module or submodule. Then, click on the Edit main module parameter or Edit submodule parameter button in the [OD.RING/SD.LINK SYSTEM] window (Figure 4-2).
- (2) The [Set parameter] window as shown below opens, which shows the current parameter settings of the OD.RING/SD.LINK module connected with the tool.

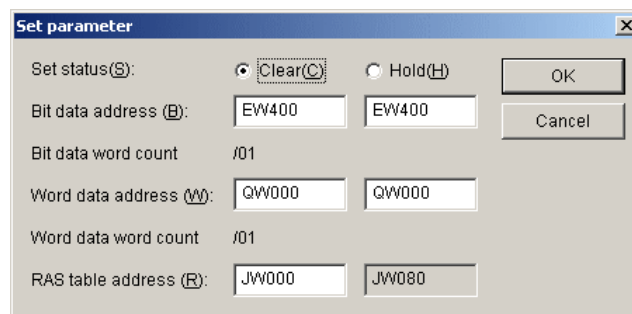


Figure 4-12 [Set parameter] Window for the S10mini -- an Example

<Description of the displayed parameters>

- Set status  
Set hold/clear operation mode. The hold/clear operation holds or clears (to 0) transfer areas of data from a remote OD.RING module when data is no longer transmitted from that module.
- Bit data address setting  
Specifies the starting address and ending address of a bit data storage area whose content is to be transferred from the local module to the other remote modules in the same ring configuration. For details on the range of specifiable addresses, see Table 4-2. If you do not want to transfer bit data, leave the starting and ending addresses undefined; that is, do not enter any values in their edit boxes.

## 4 OPERATION

- Word data address setting

Specifies the starting address and ending address of a word data storage area whose content is to be transferred from the local module to the other remote modules in the same ring configuration. For details on the range of specifiable addresses, see Table 4-2. If you do not want to transfer word data, leave the starting and ending addresses undefined; that is, do not enter any values in their edit boxes.

- RAS table address setting

Set RAS table addresses. For details on the range of specifiable addresses, see the table below. For more information about the RAS table, see “5.6 RAS Table.”

Table 4-2 The Ranges of Specifiable Parameter Values

Range of specifiable values	Bit data	Word data	RAS table
FW000 to FWBFF	Invalid with these addresses	Valid with these addresses	Valid with these addresses
XW000 to XWFF0	Valid with these addresses		
YW000 to YWFF0			
JW000 to JWFF0			
QW000 to QWFF0			
GW000 to GWFF0			
RW000 to RWFF0			
EW400 to EWFF0			
MW000 to MWFF0			
/100000 to /4FFFFE (S10mini only)	Invalid with these addresses		
LBW0000 to LBWFFFF0 (S10V only)	Valid with these addresses		
LWW0000 to LWWFFFFF (S10V only)	Invalid with these addresses		
LXW0000 to LXW3FFF (S10V only)			

### **NOTICE**

For S10mini, please confirm that the extension memory location corresponding to a specified address is present when setting its address. The system performance might decrease when the extension memory location corresponding to a specified address is not present. If it is not present, please install it.

Table 4-3 Parameter Error Messages (1/2)

Error message	Cause of error	Remedial action by user	Remarks
Beyond address	A register specified as the starting or ending address of a bit data storage area is out of range.	Check the specified addresses and use the correct registers.	This error message is common to the two types of controllers: S10mini and S10V.
	Only one address (starting or ending) is specified for a bit data storage area.	Enter the missing address.	This error message is common to the two types of controllers: S10mini and S10V.
	The specified ending address of a bit data storage area is smaller than the specified starting address.	Enter an ending address larger than the specified starting address.	This error message is common to the two types of controllers: S10mini and S10V.
	Different types of registers are used as the starting and ending addresses of a bit data storage area.	Use registers of the same type as the starting and ending addresses.	This error message is common to the two types of controllers: S10mini and S10V.
	A register specified as the starting or ending address of a word data storage area is out of range.	Check the specified addresses and use the correct registers.	This error message is common to the two types of controllers: S10mini and S10V.
	Only one address (starting or ending) is specified for a word data storage area.	Enter the missing address.	This error message is common to the two types of controllers: S10mini and S10V.
	The specified ending address of a word data storage area is smaller than the specified starting address.	Enter an ending address larger than the specified starting address.	This error message is common to the two types of controllers: S10mini and S10V.
	Different types of registers are used as the starting and ending addresses of a word data storage area.	Use registers of the same type as the starting and ending addresses.	This error message is common to the two types of controllers: S10mini and S10V.
The number of transferred words exceeded the limit.	Too many words are present in a specified bit data storage area.	Correct the specified ending address so that the number of words in the bit data storage area will not exceed the upper limit of 128 words.	This error message is common to the two types of controllers: S10mini and S10V.
	Too many words are present in a specified word data storage area.	Correct the specified ending address so that the number of words in the word data storage area will not exceed the upper limit of 1,024 words.	This error message is common to the two types of controllers: S10mini and S10V.

Table 4-3 Parameter Error Messages (2/2)

Error message	Cause of error	Remedial action by user	Remarks
It is necessary to set the extension memory for S10mini to transcribe the S10V extension register.	Although S10V extension registers are specified as the starting and ending addresses of a bit data storage area, no corresponding S10mini extension memory addresses are specified in the “Use extend memory” pane.	Enter proper values as the corresponding S10mini extension memory addresses in the “Use extend memory” pane.	The “Use extend memory” pane is part of the [Set parameter (S10V extension register use)] window that is displayed in the procedure used with S10V controllers.
The extension memory for S10mini overlaps between LB, LW, and the LX register. Please review the extension memory for S10mini.	Although the corresponding S10mini extension memory addresses are specified in the “Use extend memory” pane, overlapping exists between some two of the resulting S10mini extension memory areas for each type of S10V extension register.	Correct the specified S10mini extension memory addresses so that the resulting S10mini extension memory areas will not overlap with each other.	The “Use extend memory” pane is part of the [Set parameter (S10V extension register use)] window that is displayed in the procedure used with S10V controllers.
The S10V extension register cannot be used. Please use “Set parameter (S10V extension register use)” screen when you use the S10V extension register for the bit data address.	An S10V extension register (LB) is used as the starting or ending address of a bit data storage area in a place where it is illegal to do so.	Either specify such S10V extension registers in the [Set parameter (S10V extension register use)] window or do not use them as the starting and ending addresses of a bit data storage area.	The “Use extend memory” pane is part of the [Set parameter (S10V extension register unused)] window that is displayed in the procedure used with S10V controllers.
The S10V extension register cannot be used. Please use “Set parameter (S10V extension register use)” screen when you use the S10V extension register for the word data address.	An S10V extension register is used as the starting or ending address of a word data storage area in a place where it is illegal to do so.	Either specify such S10V extension registers in the [Set parameter (S10V extension register use)] window or do not use them as the starting and ending addresses of a word data storage area.	The “Use extend memory” pane is part of the [Set parameter (S10V extension register unused)] window that is displayed in the procedure used with S10V controllers.

When your parameter editing work is complete, click the  button. Then, the tool will check the specified starting and ending addresses of a bit data storage area, word data storage area, and/or a RAS table for error. If an error is detected during the check, the tool will display an error message dialog box (see Table 4-3 for the meaning of the error message). Read the error message and click the  button. The error dialog box will then be closed, with the focus position moved to the location of the error. Remove the cause of the error and click  button again. The error-free parameters will then be written to the OD.RING/SD.LINK module.

- (3) If you want to close the [Set parameter] window without doing anything, just click the  button.



<Procedure used with S10V controllers>

- (1) Click on the  or  button in the [[S10V] OD.RING/SD.LINK SYSTEM] window (Figure 4-3) if the OD.RING/SD.LINK system (tool) is online with the OD.RING/SD.LINK main module or submodule. If it is offline, click the  button instead.
- (2) The [S10V extension register use/unused] window as shown below will open. Choose whether or not to use S10V extension registers as parameters through editing.

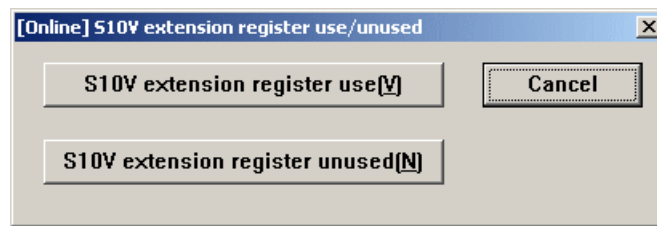


Figure 4-13 [[Online] S10V extension register use/unused] Window

In this window:

button:

Is clicked when you want to use S10V extension registers as parameters. When this button is clicked, the [Set parameter (S10V extension register use)] window (as shown later) will appear except where no such registers are used among the parameters read out from the OD.RING/SD.LINK module (in online state) or setup information file (in offline state), in which case a message dialog box as shown below will appear instead of the above window.

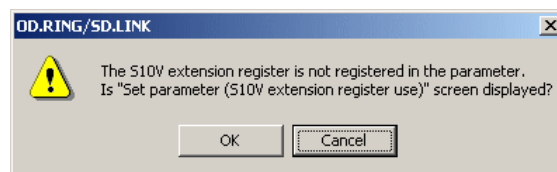


Figure 4-14 The “S10V extension register is not registered ...” Message Dialog Box

To use S10V extension registers as parameters, click the  button in the message dialog box. The [Set parameter (S10V extension register use)] window will then be displayed.

If you do not want to use such registers, click the  button instead of  in the above dialog box. When the [S10V extension register use/unused] window becomes active again, click the  button.

button:

Is clicked when you do not want to use S10V extension registers as parameters.

When this button is clicked, the [Set parameter (S10V extension register unused)] window (as shown later) will appear except where such registers are used among the parameters read out from the OD.RING/SD.LINK module (in online state) or setup information file (in offline state), in which case a message dialog box as shown below will appear instead of the above window.

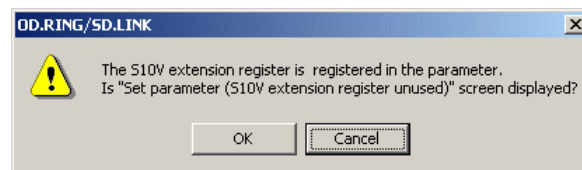


Figure 4-15 The “S10V extension register is registered ...” Message Dialog Box

To use no S10V extension registers as parameters, click the  button in the message dialog box. The [Set parameter (S10V extension register unused)] window will then be displayed.

If you want to use such registers, click the  button instead of  in the above dialog box. When the [S10V extension register use/unused] window becomes active again, click the  button.

button:

Is clicked when you want to close the [S10V extension register use/unused] window.

When this button is clicked, the [[S10V] OD.RING/SD.LINK SYSTEM] window (Figure 4-3) becomes active again.

- (3) Parameters from the OD.RING/SD.LINK module (in online state) or OD.RING/SD.LINK setup information file (in offline state) are displayed in the [Set parameter] window, as shown below.

## 4 OPERATION

<[Set parameter (S10V extension register use)] window>

S10V extend register	S10mini to S10V extend memory
LBW0000 - LBWFFFF0	<input type="checkbox"/> Default value use(D) 412000 - 413FFE
LWW0000 - LWWFFFFF	450000 - 46FFFE
LXW0000 - LXW3FFF	4A0000 - 4A7FFE

Figure 4-16 [Set parameter (S10V extension register use)] Window for the S10V -- an Example

<[Set parameter (S10V extension register unused)] window>

S10V extend register	S10mini to S10V extend memory
EW400 - EW400	412000 - 413FFE
GW000 - GW000	450000 - 46FFFE
JW000 - JW080	4A0000 - 4A7FFE

Figure 4-17 [Set parameter (S10V extension register unused)] Window for the S10V -- an Example

## &lt;Description of the displayed parameters&gt;

## ● Set status

Set hold/clear operation mode. The hold/clear operation holds or clears (to 0) transfer areas of data from a remote OD.RING module when data is no longer transmitted from that module.

## ● Bit data address setting

Specifies the starting address and ending address of a bit data storage area whose content is to be transferred from the local module to the other remote modules in the same ring configuration. For details on the range of specifiable addresses, see Table 4-2. If you do not want to transfer bit data, leave the starting and ending addresses undefined; that is, do not enter any values in their edit boxes.

The starting and ending addresses of a bit data storage area are displayed together with the corresponding S10mini extension memory addresses (read-only) if the [Set parameter] window displayed is a [Set parameter (S10V extension register use)] window. These S10mini extension memory addresses are ones that are specified in the “Use extend memory” pane in one-to-one correspondence with the S10V extension registers specified for the storage area.

## ● Word data address setting

Specifies the starting address and ending address of a word data storage area whose content is to be transferred from the local module to the other remote modules in the same ring configuration. For details on the range of specifiable addresses, see Table 4-2. If you do not want to transfer word data, leave the starting and ending addresses undefined; that is, do not enter any values in their edit boxes.

The starting and ending addresses of a word data storage area are displayed together with the corresponding S10mini extension memory addresses (read-only) if the [Set parameter] window displayed is a [Set parameter (S10V extension register use)] window. These S10mini extension memory addresses are ones that are specified in the “Use extend memory” pane in one-to-one correspondence with the S10V extension registers specified for the storage area.

## ● RAS table address setting

Set RAS table addresses. For details on the range of specifiable addresses, see Table 4-2. For more information about the RAS table, see “5.6 RAS Table.”

## 4 OPERATION

- “Use extend memory” setting -- only in the [Set parameter (S10V extension register use)] window

Set S10mini extension memory addresses in the “Use extend memory” pane in any of the following cases: 1) an S10mini controller is used in conjunction with an S10V controller in the same network, and extension memory addresses are specified as the starting and ending addresses of a bit data storage area and/or a word data storage area for the S10mini controller, and 2) two S10V controllers are connected together and S10V extension registers are specified as the starting and ending addresses of a bit data storage area and/or a word data storage area. For details on the first case, see “4.6.9 Setting a transfer area where an S10mini and an S10V are intermixed.”

The above-mentioned S10mini extension memory addresses must be specified under the title “S10mini to S10V extend memory” in the “Use extend memory” pane, and they must be in one-to-one correspondence with the S10V extension registers (in one of the ranges LBW0000 to LBWFFF0, LWW0000 to LWWFFFF, or LXW0000 to LXW3FFF) that are specified for use in sending and receiving bit data or word data between the OD.RING/SD.LINK modules. If these addresses are not specified, the S10V controller’s OD.RING/SD.LINK module will not send data from its S10V extension registers to the S10mini controller and will discard any data received from the extension memory addresses of the S10mini controller.

S10mini extension memory addresses that may be specified in the “Use extend memory” pane are those in the range 0x00100000 to 0x004FFFFE. These addresses must be specified in such a way that the defined memory areas do not overlap with each other. In addition, where two S10V controllers are connected together in the same network, the setting details in the “Use extend memory” pane must be identical between the two S10V controllers.

The “Default value use” check box, if checked, will automatically display the S10mini extension memory addresses corresponding to the specified S10V extension registers (see the table below). None of these automatically displayed addresses can be changed without prior deselection of the “Default value use” check box.

S10V extension register	Corresponding S10mini extension memory address displayed
LBW0000 – LBWFFF0	412000 – 413FFE
LWW0000 – LWWFFFF	450000 – 46FFFE
LXW0000 – LXW3FFF	4A0000 – 4A7FFE

- (4) When you have finished your editing work, click the  button in the [Set parameter (S10V extension register use)] or [Set parameter (S10V extension register unused)] window. Then, the tool will check all of the specified starting and ending addresses of the bit data storage area, word data storage area, RAS table, and/or extension memory area(s) for error. If an error is detected, the tool will display an error message dialog box (see Table 4-3 for the meaning of the error message). Read the displayed error message and click the  button in the message dialog box. The message dialog box will then close, with the focus position moved to the location of the error. Remove the cause of the error and click the  button again. The error-free parameters will then be written to the OD.RING/SD.LINK module or setup information file. (\*) During the writing, one of the confirmation messages listed below may appear depending on what you have specified in the [Set parameter (S10V extension register use)] or [Set parameter (S10V extension register unused)] window.

(\*) The above-mentioned writing is automatically directed to the OD.RING/SD.LINK module if the tool is online with it. If it is offline, it is automatically directed to the selected OD.RING/SD.LINK setup information file.

<In the case where the [Set parameter (S10V extension register use)] window is displayed>

- If you click the  button without specifying S10V extension registers in any of the bit data, word data, and “Use extend memory” address settings, a confirmation message as shown below will appear that asks you whether to continue the writing.

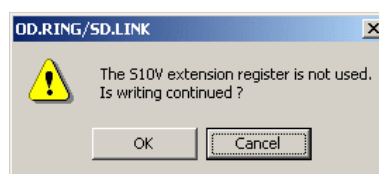


Figure 4-18 A Confirmation Message Dialog Box for Continuing the Writing -- Case 1

If you click the  button in the above dialog box, the dialog box will close together with the [Set parameter (S10V extension register use)] window and the edited parameters will be written to the OD.RING/SD.LINK module (in online state) or setup information file (in offline state). (\*)

If you click the  button in place of , the above dialog box will close and the [Set parameter (S10V extension register use)] window will become active again. In this case, none of the edited parameters will be written to the destination.

- If you specify S10V extension registers in the bit data, word data, and/or “Use extend memory” address settings and then click the **Write** button, a confirmation message as shown below will appear that asks you whether to continue the writing.

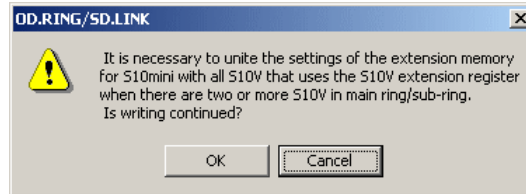


Figure 4-19 A Confirmation Message Dialog Box for Continuing the Writing -- Case 2

If you click the **OK** button in the above dialog box, the dialog box will close together with the [Set parameter (S10V extension register use)] window and the edited parameters will be written to the OD.RING/SD.LINK module (in online state) or setup information file (in offline state). (\*)

If you click the **Cancel** button in place of **OK**, the above dialog box will close and the [Set parameter (S10V extension register use)] window will become active again. In this case, none of the edited parameters will be written to the destination.

- (\*) The above-mentioned writing is automatically directed to the OD.RING/SD.LINK module if the tool is online with it. If it is offline, it is automatically directed to the selected OD.RING/SD.LINK setup information file.

<In the case where the [Set parameter (S10V extension register unused)] window is displayed>

- If “Use extend memory” address settings are included among the parameters read out from the OD.RING/SD.LINK module or setup information file, and you click the **Write** button in that situation, then a confirmation message as shown below will appear that asks you whether to delete setup information for the S10V extension registers specified by those address settings.

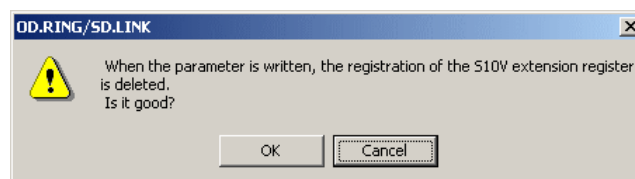


Figure 4-20 A Confirmation Message Dialog Box for Deleting Setup Info for Given S10V Extension Registers

If you click the  button in the above dialog box, the dialog box will close together with the [Set parameter (S10V extension register unused)] window and the edited parameters will be written to the OD.RING/SD.LINK module (in online state) or setup information file (in offline state), with a requested deletion performed.

If you click the  button in place of , the above dialog box will close and the [Set parameter (S10V extension register unused)] window will become active again. In this case, none of the edited parameters will be written to the destination, and no such deletion will occur.

- (5) If you want to finish your editing work without adding any changes to the existing setup information, just click the  button in the [Set parameter (S10V extension register use)] or [Set parameter (S10V extension register unused)] window. Then, the [Set parameter (S10V extension register use)] or [Set parameter (S10V extension register unused)] window will close except when the following are all true: 1) the [Set parameter (S10V extension register unused)] window is currently displayed, and 2) “Use extend memory” address settings are included among the parameters read out from the OD.RING/SD.LINK module or setup information file. When these are true, a confirmation message as shown below will appear which asks you whether to exit the [Set parameter (S10V extension register unused)] window.

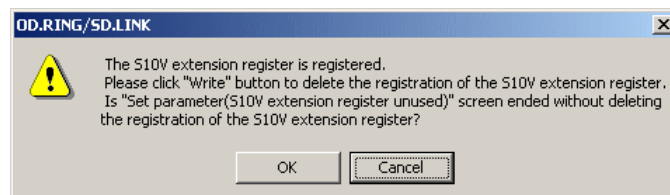


Figure 4-21 A Confirmation Message Dialog Box for Exiting the [Set parameter (S10V extension register unused)] Window

If you click the  button in the above dialog box, the dialog box will close together with the [Set parameter (S10V extension register unused)] window. In this case, no setup information for the S10V extension registers specified by those address settings will be deleted.

If you click the  button instead of , the dialog box will close and the [Set parameter (S10V extension register unused)] window will become active again.



## 4 OPERATION

- (b) Procedure (used only with S10V controllers) for reading parameters from the OD.RING/SD.LINK setup info file in online state

You can read parameters from the OD.RING/SD.LINK setup information file to the [Set parameter (S10V extension register use)] or [Set parameter (S10V extension register unused)] window while the tool is online with the OD.RING/SD.LINK module. The procedure used is described below.

<In the case where the [Set parameter (S10V extension register use)] window is displayed>

- (1) Click the **Load** button in the [Set parameter (S10V extension register use)] window. The [Open] window as shown below will then appear.

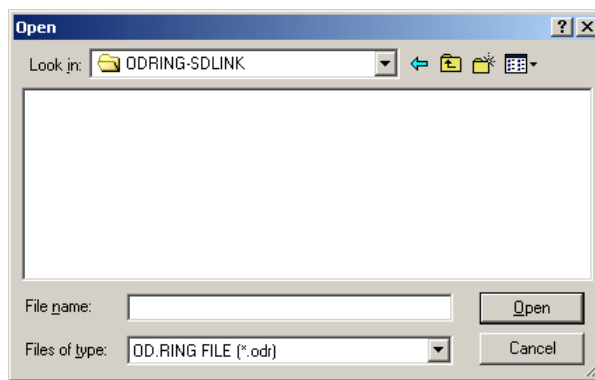


Figure 4-22 [Open] Window

- (2) In this window, select the desired (existing) OD.RING/SD.LINK setup info file and click the **Open** button. Then, the contents of the selected file will be read out and reflected in the [Set parameter (S10V extension register use)] window except when no S10V extension registers are listed in that file. When no such registers are listed in it, a confirmation message as shown below will appear that asks you whether to open the setup info file.

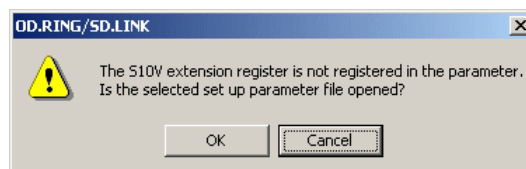


Figure 4-23 A Confirmation Message Dialog Box for Opening the Setup Info File

If you click the  button in the above dialog box, the contents of the selected OD.RING/SD.LINK setup info file will be read out and reflected in the [Set parameter (S10V extension register use)] window. However, if you click the  button instead of [OK], they will not be read out and reflected in that window.

<In the case where the [Set parameter (S10V extension register unused)] window is displayed>

- (1) Click the  button in the [Set parameter (S10V extension register unused)] window. The [Open] window as shown in Figure 4-22 will then appear.
- (2) In the [Open] window displayed, select the desired (existing) OD.RING/SD.LINK setup info file and click the  button. Then, the contents of the selected file will be read out and reflected in the [Set parameter (S10V extension register unused)] window except when S10V extension registers are listed in that file. When such registers are listed in it, a confirmation message as shown below will appear that asks you whether to open the setup info file.

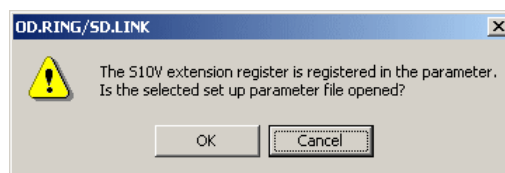


Figure 4-24 A Confirmation Message Dialog Box for Opening the Setup Info File

If you click the  button in the above dialog box, the contents of the selected OD.RING/SD.LINK setup info file will be read out and reflected in the [Set parameter (S10V extension register unused)] window. However, if you click the  button instead of , they will not be read out and reflected in that window.

<Selecting a file other than OD.RING/SD.LINK files>

If a file other than OD.RING/SD.LINK files is selected in the [Open] window, an error message to that effect will be displayed, as shown in Figure 4-25.

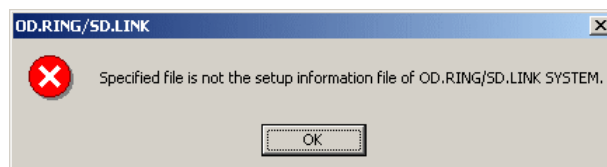


Figure 4-25 An Error Message Dialog Box Reporting a Non-OD.RING/SD.LINK File Selected

## 4 OPERATION

- (c) Procedure (used only with S10V controllers) for saving parameters as an OD.RING/SD.LINK setup info file in online state

You can save the parameters currently displayed in the [Set parameter (S10V extension register use)] or [Set parameter (S10V extension register unused)] window as an OD.RING/SD.LINK setup information file while the tool is online with the OD.RING/SD.LINK module. The parameters saved in this way can be read out to the [Set parameter (S10V extension register use)] or [Set parameter (S10V extension register unused)] window again by clicking the **LOAD** button in those windows. They can also be read out by file selection while the tool is offline.

The procedure used is described below.

<In the case where the [Set parameter (S10V extension register use)] window is displayed>

- (1) Click the **SAVE** button in the [Set parameter (S10V extension register use)] window. Then, a confirmation message as shown below will usually appear that asks you whether or not to continue the saving procedure.

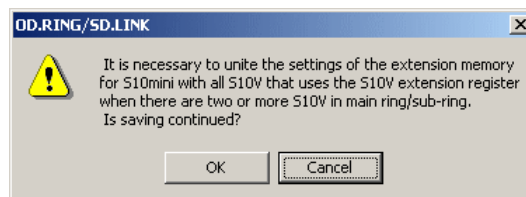


Figure 4-26 A Confirmation Message Dialog Box for Continuing the Saving Procedure -- Case 1

If you click the **OK** button in this dialog box, the [Save As] window as shown below will open. If you click the **Cancel** button instead of **OK**, the [Set parameter (S10V extension register use)] window will become active again.

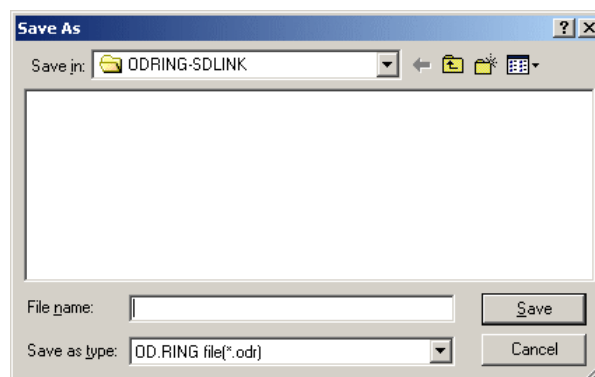


Figure 4-27 [Save As] Window

When the  button is clicked in the confirmation message dialog box shown in Figure 4-26, another confirmation message as shown below will appear if no S10V extension registers are specified in the bit data address, word data address, and “Use extend memory” address settings. This confirmation message also asks you whether or not to continue the saving procedure.

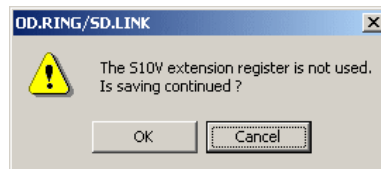


Figure 4-28 A Confirmation Message Dialog Box for Continuing the Saving Procedure -- Case 2

If you click  in this dialog box, the [Save As] window will open. If you click  instead of , the [Set parameter (S10V extension register use)] window will become active again.

- (2) Enter a unique file name in the “File name” edit box of the [Save As] window and click the  button. The parameters displayed in the [Set parameter (S10V extension register use)] window will then be saved under the specified file name.

<In the case where the [Set parameter (S10V extension register unused)] window is displayed>

- (1) Click the  button in the [Set parameter (S10V extension register unused)] window. Then, the [Save As] window (Figure 4-27) will appear unless “Use extend memory” address settings are present. If they are present, a confirmation message as shown below will appear that asks you whether to delete setup information for the S10V extension registers specified by those address settings.

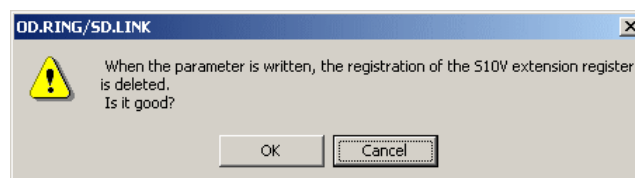


Figure 4-29 A Confirmation Message Dialog Box for Deleting Setup Info for Given S10V Extension Registers

## 4 OPERATION

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If you click the  button in the above dialog box, the [Save As] window will then open. If you click the  button instead of , the [Set parameter (S10V extension register unused)] window will become active again.

- (2) Enter a unique file name in the “File name” edit box of the [Save As] window and click the  button. The parameters displayed in the [Set parameter (S10V extension register unused)] window will then be saved under the specified file name. No “Use extend memory” address settings, if present, will be saved together with the displayed parameters.

### 4.6.3 Main module (submodule) error information

Function: Selects the main module (submodule) error information to view.

Operation: Follow these steps:

- (1) Click the  or  button in the [OD.RING/SD.LINK SYSTEM] window (see Figure 4-2) or the [[S10V] OD.RING/SD.LINK SYSTEM] window (see Figure 4-3).
- (2) An [Error information] window is displayed.

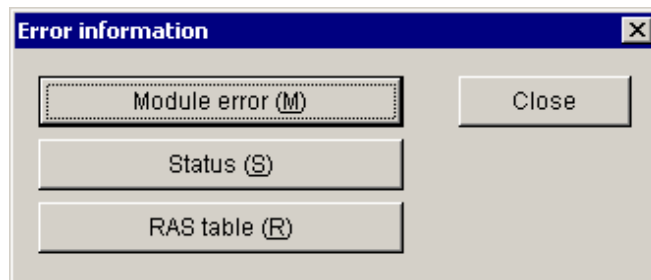


Figure 4-30 [Error information] Window

#### 4.6.4 Module error

Function: Displays main module (submodule) error information. For more details on error information, see “6.6.2 Error display and countermeasures.”

Operation: Follow these steps:

- (1) Click the **Module error** button in the [Error information] window.  
When a module is found at fault, relevant error information is displayed. If a module is normal, message “The module is normal.” is displayed.

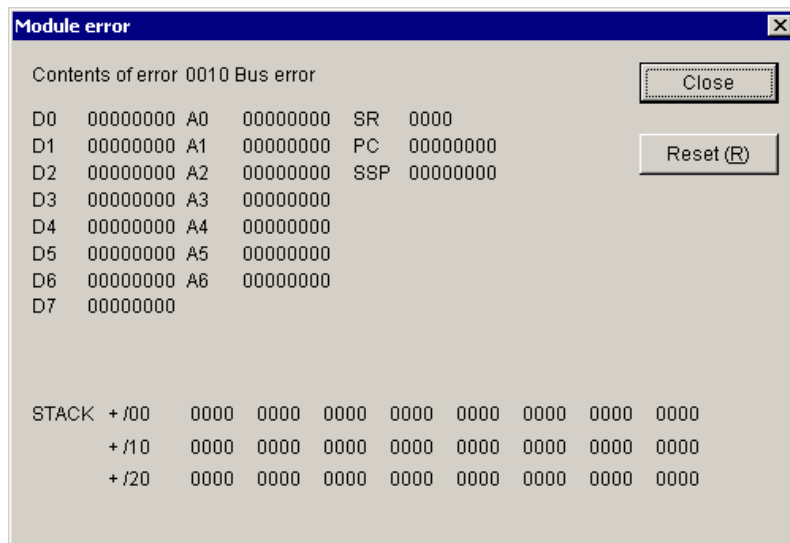


Figure 4-31 [Module error] Window

- (2) Click the **Reset** button to refresh the error information. To quit the error display, click the **Close** button.

## 4 OPERATION

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### 4.6.5 Status

Function: Displays main module (submodule) status error information.

Operation: Follow these steps:

- (1) Click the **Status** button in the [Error information] window. A [Status] window is displayed.

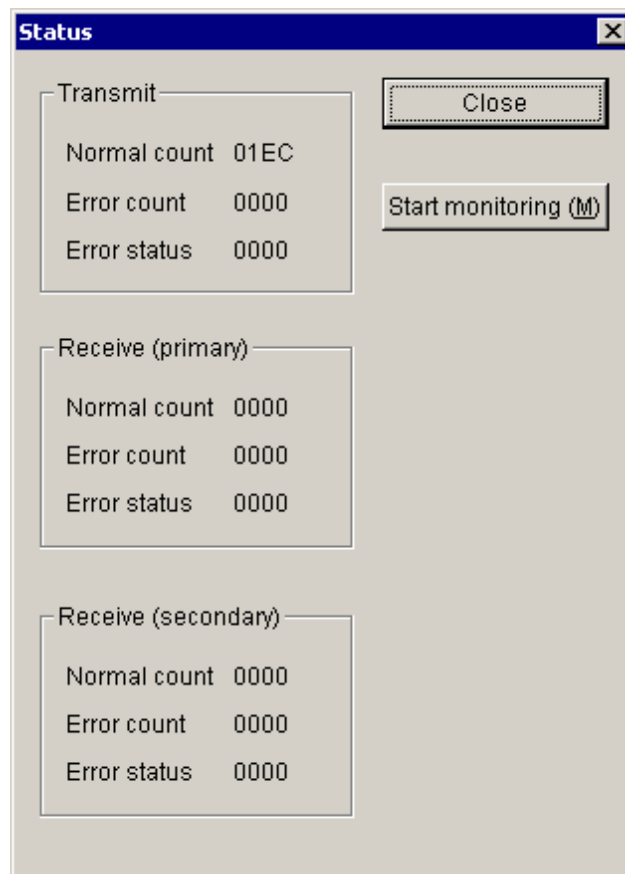


Figure 4-32 [Status] Window

- (2) To start monitoring, click the **Start monitoring** button. To pause monitoring in progress, click the **Stop monitoring** button. To quit the status display, click the **Close** button.

#### 4.6.6 RAS table

Function: Displays main module (submodule) RAS table information. For more information about the RAS table, see “5.6 RAS Table.”

Operation: Follow these steps:

- (1) Click the **RAS table** button in the [Error information] window. A [RAS] window is displayed.

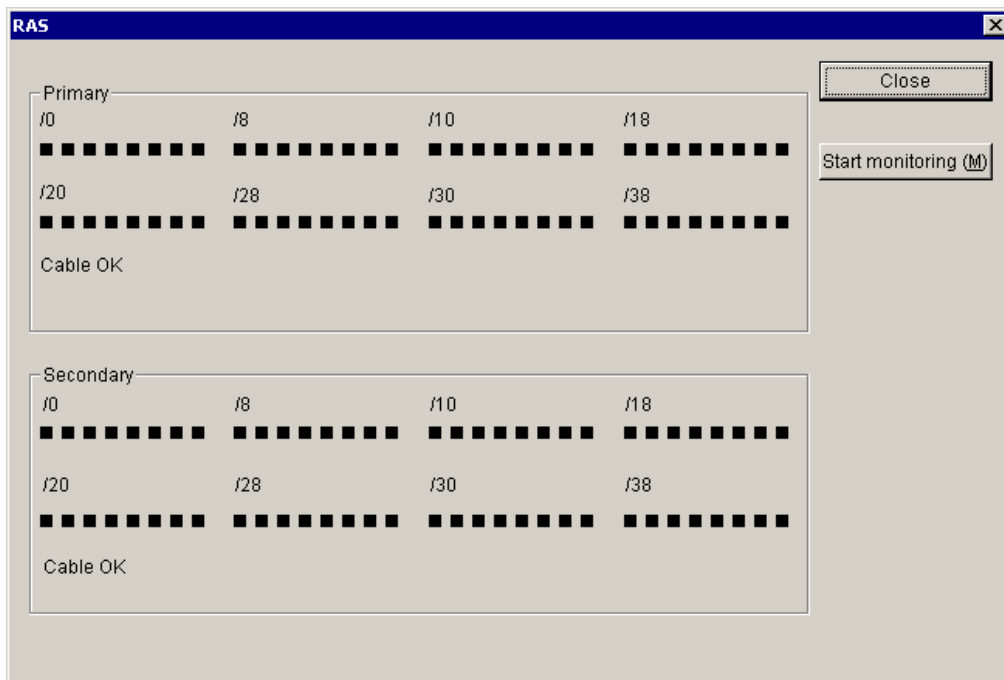


Figure 4-33 [RAS] Window

- (2) To start monitoring, click the **Start monitoring** button. To pause monitoring in progress, click the **Stop monitoring** button. To quit the RAS table display, click the **Close** button.

If a CPL No. bit is 1, it appears in red; if it is 0, it appears in black.

For bit definitions, see “5.6 RAS Table.”



## 4 OPERATION

### 4.6.7 Printing

Function: Prints all the parameter settings displayed in the [Set parameter (S10V extension register use)] or [Set parameter (S10V extension register unused)] window. This Print function supports only the S10V platform.

Operation: Follow the procedure described below.

- (1) Click the **Print** button in the [Set parameter (S10V extension register use)] or [Set parameter (S10V extension register unused)] window. The [Print] window as shown below will then be displayed unless “Use extend memory” address settings are present among the parameter settings read out to the [Set parameter (S10V extension register unused)] window. If they are present(\*), an alert message as shown below will appear which tells you that setup information for those S10V extension registers will not be printed. Click the **OK** button in the dialog box. Then, the [Print] window will be displayed.

(\* ) These “Use extend memory” address settings are not displayed in the [Set parameter (S10V extension register unused)] window for S10V controllers (Figure 4-17).



Figure 4-34 An Alert Message Notifying of Setup Info Not to Be Printed for S10V Extension Registers

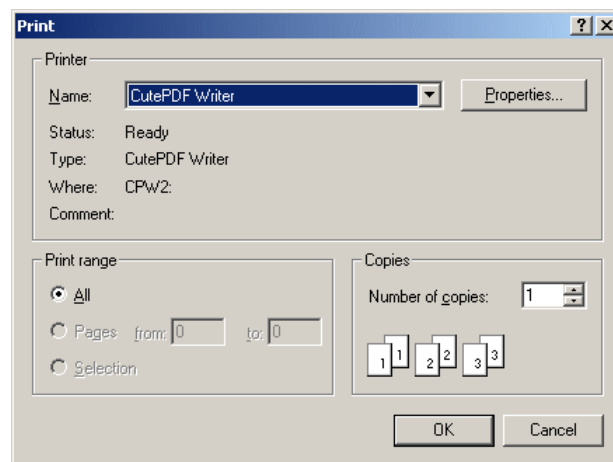


Figure 4-35 [Print] Window

- (2) In the [Print] window, do the following: specify the printer on which you want to print the displayed settings; set properties for the printer if necessary; and then click the  button. The displayed parameter settings will then be printed in a predetermined format, which is different between the [Set parameter (S10V extension register use)] and [Set parameter (S10V extension register unused)] windows, as shown below.

<A printout from the [Set parameter (S10V extension register use)] window>

```

OD. RING/SD. LINK      2010/03/02    19:59:24
File Name=C:\Hitachi\S10V\ODRING-SDLINK\ODRingPara. odr

Set status              Hold
Bit data address        QW000-QW0F0           QW000-QW0F0
Bit data word count     /10
Word data address       LWW0000-LWW00FF      450000-4501FE
Word data word count    /100
RAS table address       RW000-RW080

Use extend memory
LBW0000 - LBWFFFF0     412000-413FFE
LWW0000 - LWWFFFFF     450000-46FFFE
LXW0000 - LXW3FFF      4A0000-4A7FFE

```

<A printout from the [Set parameter (S10V extension register unused)] window>

```

OD. RING/SD. LINK      2010/03/02    20:00:39
File Name=C:\Hitachi\S10V\ODRING-SDLINK\ODRingPara. odr

Set status              Hold
Bit data address        QW000-QW0F0
Bit data word count     /10
Word data address       FW000-FW100
Word data word count    /101
RAS table address       RW000-RW080

```

## 4 OPERATION

### 4.6.8 CSV output

Function: Saves the setting details of the main module or submodule currently under editing to a file in CSV (comma-separated values) format. This CSV Output function supports only the S10V platform.

Operation: Follow the procedure described below.

- (1) Click the **CSV Output** button in the [Set parameter (S10V extension register use)] or [Set parameter (S10V extension register unused)] window. The [Save As] window as shown below will then be displayed, except in the case where “Use extend memory” address settings(\*) are present among the parameter settings read out to the [Set parameter (S10V extension register unused)] window. If they are present, an alert message as shown below will appear which tells you that setup information for these S10V extension registers will not be output in CSV format. Click the **OK** button in the dialog box. Then, the [Save As] window will be displayed.

(\*) These “Use extend memory” address settings are not displayed in the [Set parameter (S10V extension register unused)] window for S10V controllers (Figure 4-17).

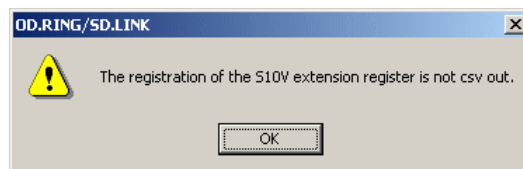


Figure 4-36 An Alert Message Notifying of Setup Info Not to Be CSV-Output for S10V Extension Registers

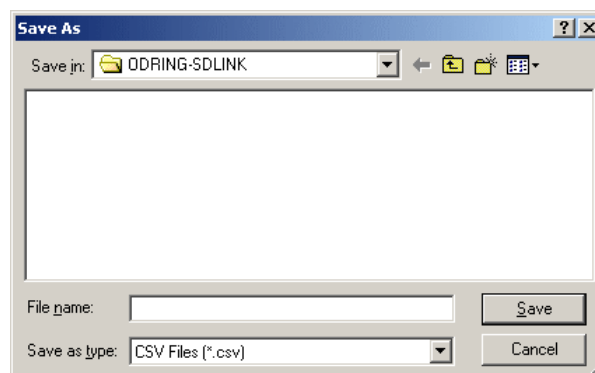


Figure 4-37 [Save As] Window

- (2) In the [Save As] window, select the desired folder, specify a unique file name, and then click the  button. The setting details will then be saved in CSV format.

<An example of CSV file output>

```
OD. RING/SD. LINK      2010/03/02      19:59:41
File Name=C:\Hitachi\S10V\ODRING-SDLINK\ODRingPara.odr
```

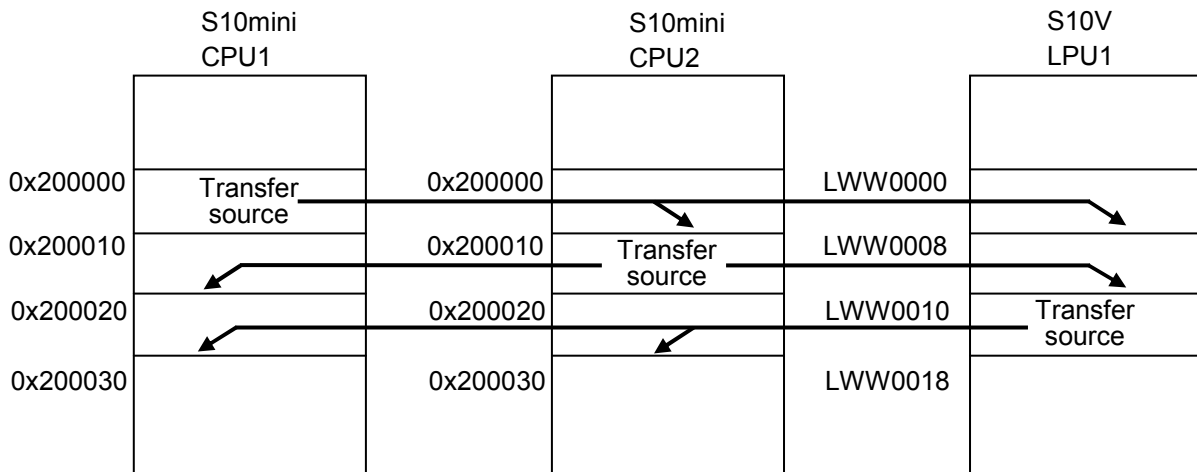
```
Set status, Hold
Bit data address, QW000-QW0F0, QW000-QW0F0
Bit data word count, /10
Word data address, LWW0000-LWW00FF, 450000-4501FE
Word data word count, /100
RAS table address, RW000-RW080
```

```
Use extend memory
LBW0000 - LBWFFF0, 412000-413FFE
LWW0000 - LWWFFFF, 450000-46FFFE
LXW0000 - LXW3FFF, 4A0000-4A7FFE
```

## 4 OPERATION

### 4.6.9 Setting a transfer area where an S10mini and an S10V are intermixed

This describes the setting and method for adding an S10V to a network on which an OD.RING transfer area has been set in extended memory by the S10mini. While the OD.RING carries out transfers to allow for absolute addressing, the S10V has S10mini extended memory addresses included in the ladder program and system tables. Consequently, simply transferring these areas to the S10V would not allow them to reach the corresponding addresses in the S10V. As a solution, the S10mini extended memory addresses and S10V extended registers are associated with one another to carry out transfers as schematically shown below.



To transfer S10mini extended memory contents to the S10V and transfer the S10V extended register contents to S10mini extended memory, associate the S10V extended registers with S10mini extended memory locations in the [S10V] OD.RING/SD.LINK system parameter setup window. The parameter settings required to carry out the operation illustrated above are shown below.

Specify the transfer source address.

Associate the LWW register starting address with an S10mini extended memory address.

Figure 4-38 S10V (LPU1) Setting Example

# 5 PROGRAMMING

5.1 Operation

The OD.RING module transfers data in a set area of memory from one CPU or LPU to another.

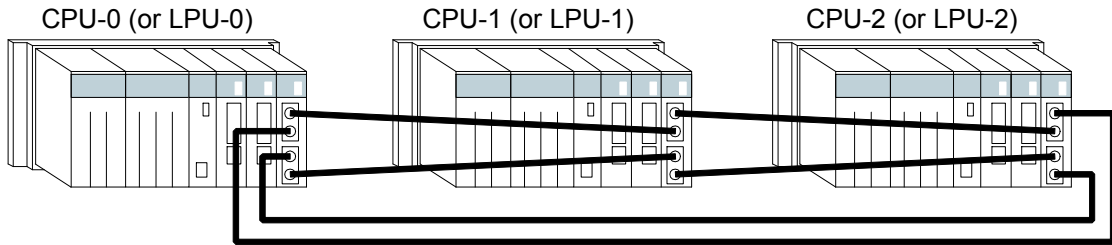


Figure 5-1 Example of System Configuration

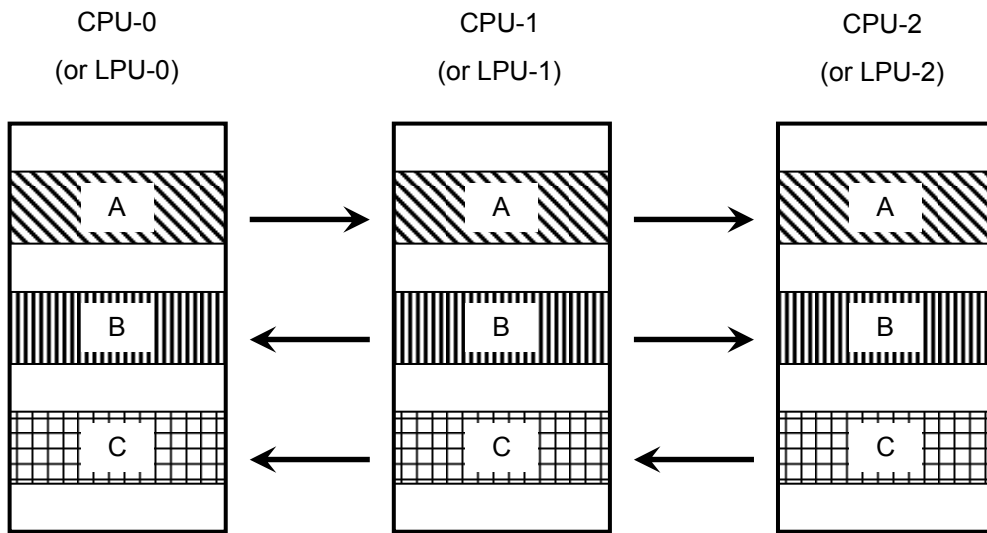


Figure 5-2 Memory Transfer

Figures 5-1 and 5-2 show memory transfer by each CPU or LPU.

- ① CPU-0 (or LPU-0) transfers area A to CPU-1 and CPU-2 (or LPU-1 and LPU-2).
- ② CPU-1 (or LPU-1) transfers area B to CPU-0 and CPU-2 (or LPU-0 and LPU-2).
- ③ CPU-2 (or LPU-2) transfers area C to CPU-0 and CPU-1 (or LPU-0 and LPU-1).
- ④ Areas A through C are being shared by CPU-0 through CPU-2 (or LPU-0 through LPU-2).  
The OD.RING module subsequently returns to ① and repeats sharing.

**NOTICE**

S10mini CPU units and S10V LPU units may be interconnected in a mixed fashion. For details, see “4.6.9 Setting a transfer area where an S10mini and an S10V are intermixed.”

5.2 Transfer Cycle

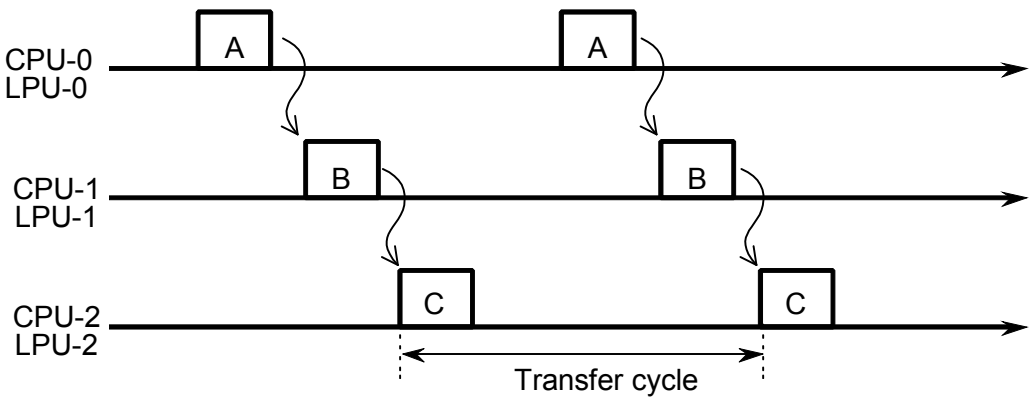


Figure 5-3 Transfer Cycle

Memory transfer explained in Section 5.1 is performed according to the timing chart shown in Figure 5-3. Each horizontal reference line above is a time axis. Sharing starts when CPU-0 (or LPU-0) transfers area A and ends when CPU-2 (or LPU-2) transfers area C. Memory transfer areas are shared by periodically repeating this cycle. The transfer cycle depends on the module number setting switches, the number of modules installed, and the amount of data transferred. This cycle is calculated from the expressions shown in Table 5-1.

Table 5-1 Expressions for Calculating Transfer Cycle

Module number setting switch	Expressions for calculating transfer cycle
0, 1	$192 - 0.5964X + 0.0146Y + 0.0009Z + 0.005WX$ (ms)
2, 3	$96 - 0.5964X + 0.0146Y + 0.0009Z + 0.005WX$ (ms)
4, 5	$48 - 0.5964X + 0.0146Y + 0.0009Z + 0.005WX$ (ms)
6, 7	$24 - 0.5964X + 0.0146Y + 0.0009Z + 0.005WX$ (ms)

W: Total ring length (km)  
 X: Number of operating modules  
 Y: Amount of word data (words)  
 Z: Amount of bit data (points)



### 5.3 Synchronism of Transfer Data

Application software and the OD.RING module may simultaneously access the memory transfer area because they asynchronously access that area. In these cases, note that synchronism of transfer data as a memory transfer area block is lost.

For example, if an application reads the memory transfer area during update by the OD.RING module of that area, the chronological sequence of the data contained is disrupted.

Application software and the OD.RING module, however, assure such sequence in each individual word. Thus, analog data and counter values are transferred normally.

## 5.4 Memory Transfer Area

As shown in Table 5-2, bit data per module and word data per module can be separately specified as the memory transfer area.

Table 5-2 Memory Transfer Area

Bit data		Word data	
Area	Absolute address	Area	Absolute address
X000 to FFF	/A0000 to /A1FFE (S10mini) /240000 to /241FFE (S10V)	XW000 to FF0	/E0000 to /E01FE (S10mini) /414000 to /4141FE (S10V)
Y000 to FFF	/A4000 to /A5FFE (S10mini) /242000 to /243FFE (S10V)	YW000 to FF0	/E0400 to /E05FE (S10mini) /414200 to /4143FE (S10V)
J000 to FFF	/A2000 to /A3FFE	JW000 to FF0	/E0200 to /E03FE
Q000 to FFF	/A6000 to /A7FFE	QW000 to FF0	/E0600 to /E07FE
G000 to FFF	/A8000 to /A9FFE	GW000 to FF0	/E0800 to /E09FE
R000 to FFF	/AC000 to /ADFFE	RW000 to FF0	/E0C00 to /E0DFE
E400 to FFF	/BC800 to /BDFFE	EW400 to FF0	/E1C80 to /E1DFE
M000 to FFF	/AE000 to /AFFFE	MW000 to FF0	/E0E00 to /E0FFE
_____	_____	FW000 to BFF	/E2000 to /E37FE
_____	_____	Memory extension (*1)	/100000 to /4FFFFFFE
LB0000 to LBF000 (*2)	/220000 to /23FFFFE	LBW0000 to LBW0000 (*2)	/412000 to /413FFFFE
_____	_____	LWW0000 to LWW0000 (*2)	/450000 to /46FFFFE
_____	_____	LXW0000 to LXW0000 (*2)	/4A0000 to /4A7FFFFE

(\*1) Not available to the S10V.

(\*2) Not available to the S10mini.

### NOTICE

For S10mini, please confirm whether the extension memory corresponding to a set address is mounted when the address of the extension memory is set. The system performance might decrease when the extension memory corresponding to a set address is a unmounting, and mount it, please.

As shown in Figure 5-4, the areas set by each module may be non-continuous.

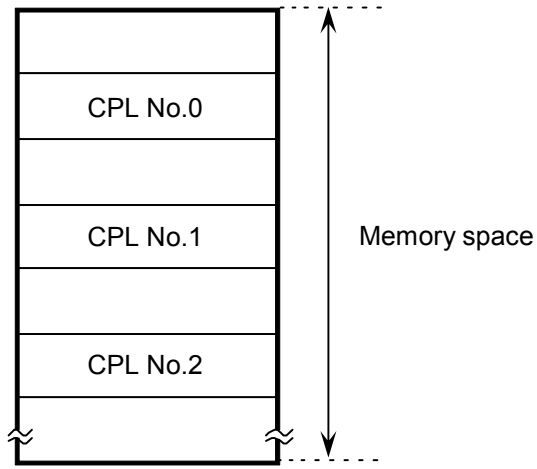


Figure 5-4 Areas Set by Each Module

## 5.5 Faults and Fault Avoidance Operation

When both the primary ring and secondary ring are communicating normally, each OD.RING module uses primary ring data, not secondary ring data.

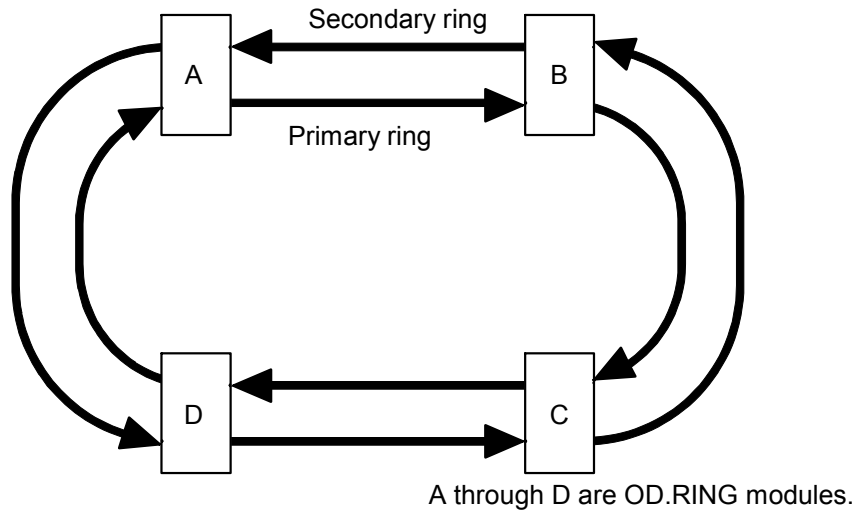


Figure 5-5 Data Flow in Normal Operation of Primary Ring and Secondary Ring

The OD.RING modules use only primary ring data or secondary ring data. Whether they use primary ring data or secondary ring data depends on how data is received.

- When one module is receiving data normally from another via both the primary ring and secondary ring, the primary ring data is used. Primary ring data has priority over secondary ring data.
- When one module is receiving data normally from another via the primary ring, the primary ring data is used.
- When one module is receiving data normally from another via the secondary ring, the secondary ring data is used.

Even if a failure occurs, the OD.RING modules can automatically avoid this to continue communication normally. Examples of failures and their avoidance are given below.

- If the primary ring or secondary ring is disconnected at one place, and data from the ring cannot be received, data from the other ring is used.

In Figure 5-6, for example, modules A, C, and D cannot receive module B data from the primary ring. Module C also cannot receive module A data, module B data, or module D data from the primary ring. In this case, the data received from the secondary ring is used. Primary ring data is used in other cases.

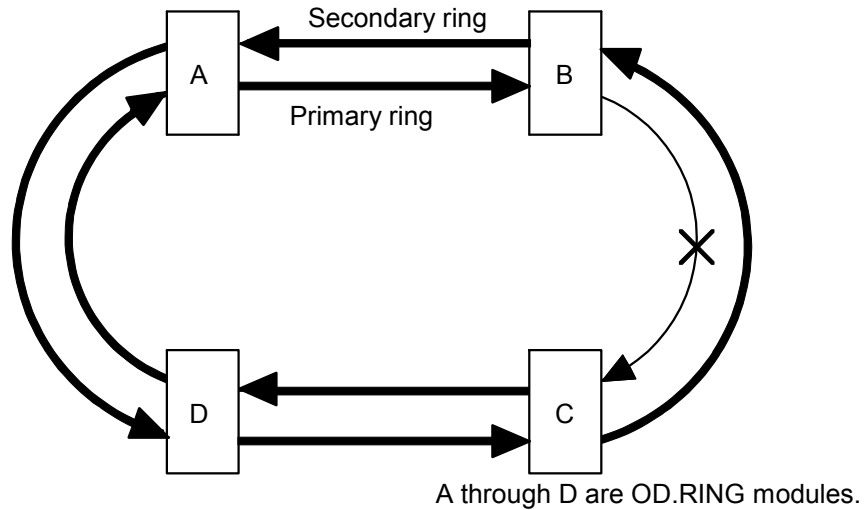


Figure 5-6 When One Ring is Disconnected at One Place

- If one ring is disconnected at several places, data from the other ring is used. In Figure 5-7, for example, modules A, C, and D cannot receive module B data from the primary ring. Modules A, B, and D also cannot receive module C data from the primary ring. In this case, the data received from the secondary ring is used. Primary ring data is used in other cases.

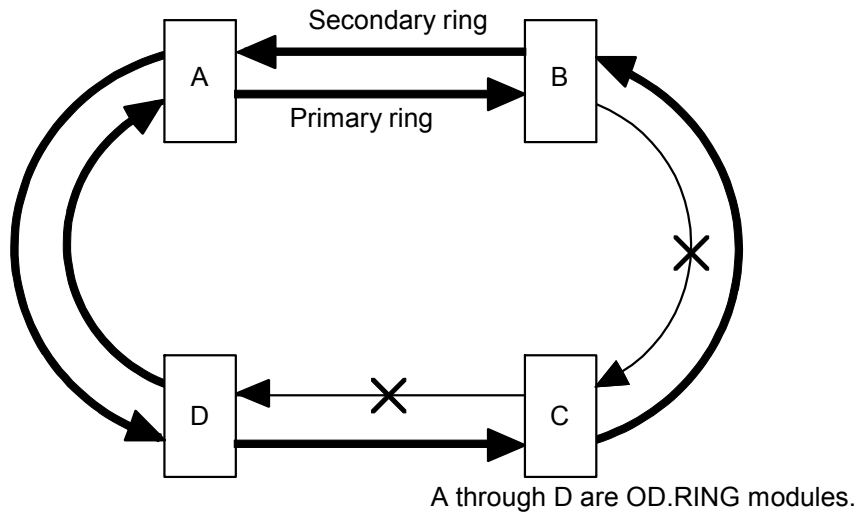


Figure 5-7 When One Ring is Disconnected at Several Places

- If both the primary ring and secondary ring are disconnected at the same place, a connected route is used to continue communication.

In Figure 5-8, for example, modules A, C, and D cannot receive module B data from the primary ring. Module C also cannot receive module A data, module B data, or module D data from the primary ring. In this case, the data received from the secondary ring is used. Primary ring data is used in other cases.

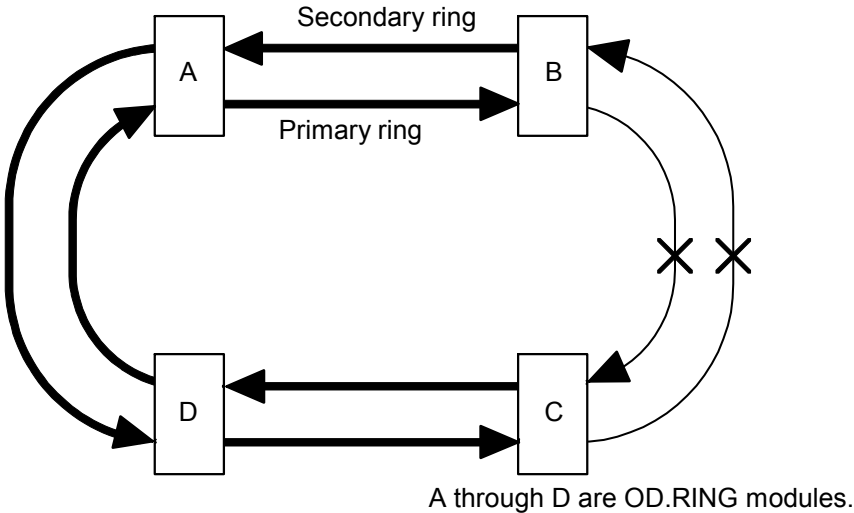


Figure 5-8 When Both Primary Ring and Secondary Ring are Disconnected at Same Place

- If one module stops, the remaining modules are used to continue communication.

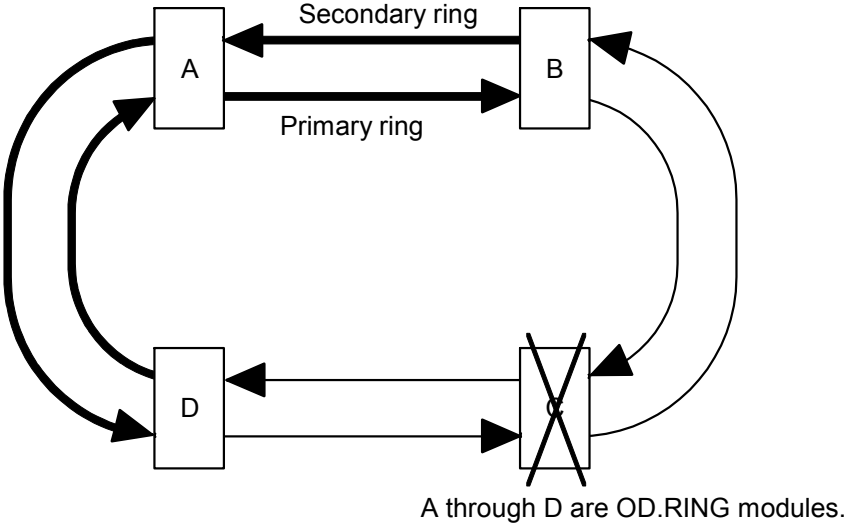


Figure 5-9 When the First Module Shuts Down

- If adjacent modules stop, the remaining modules are used to continue communication.

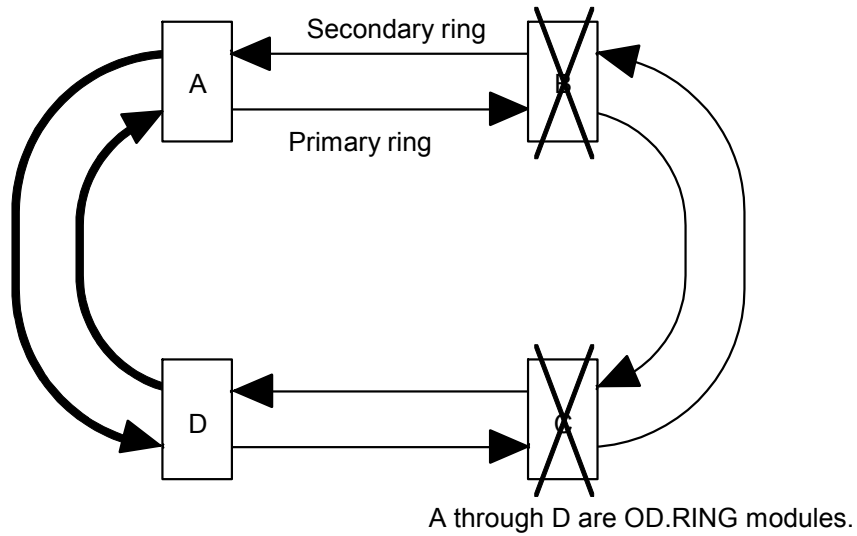


Figure 5-10 When Adjacent Multiple Modules Stop

- If nonadjacent modules stop, as shown in Figure 5-11, adjacent modules continue communication.

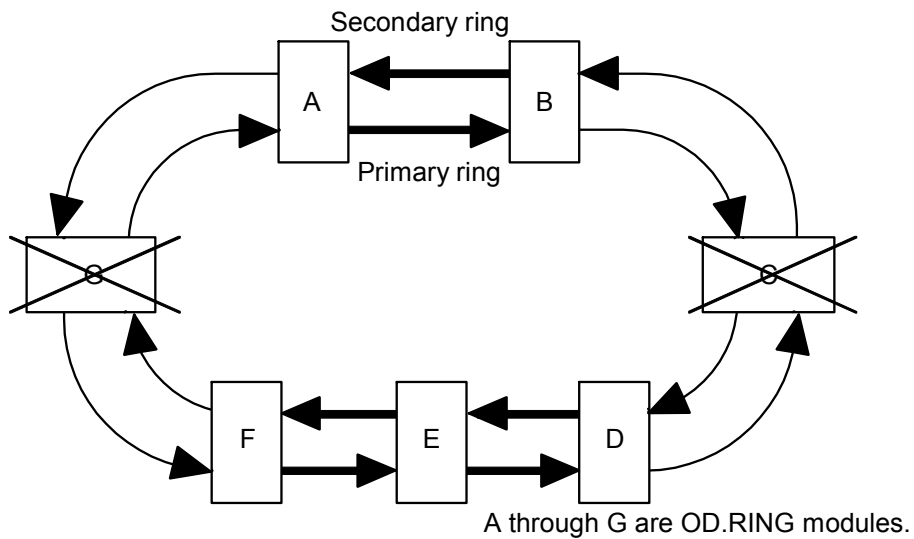


Figure 5-11 When Nonadjacent Multiple Modules Stop

- When the Primary Ring and Secondary Ring are Disconnected at Different Places  
 If the primary ring and secondary ring are disconnected at different places (between different modules), normal communication is impossible. (Depending on the number of modules connected, CPL numbers, and number of words transferred, some modules may be unable to transfer data at all. Some modules may also be unable to transfer data intermittently.)

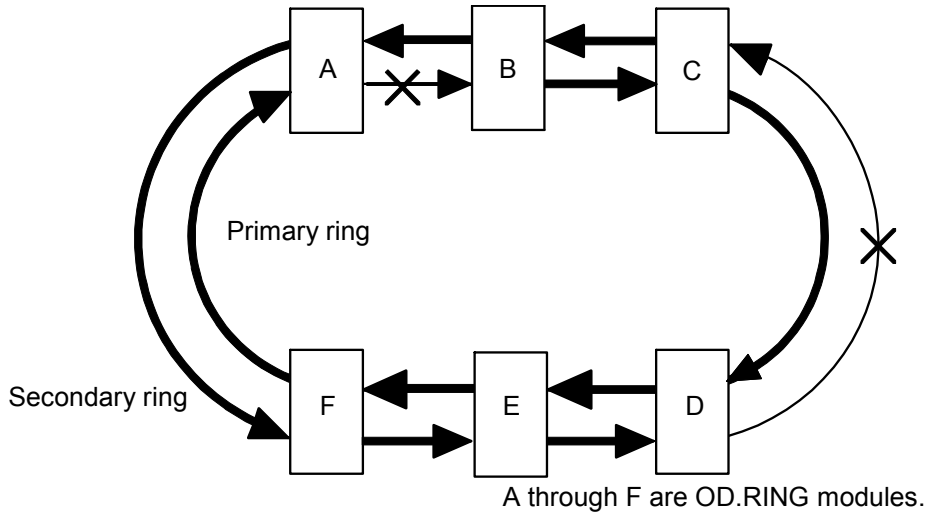


Figure 5-12 When the Primary Ring and Secondary Ring are Disconnected at Different Places

**NOTICE**

As shown in Figure 5-12, if the primary ring and secondary ring are disconnected at different places (between different modules), normal communication may be impossible. In these cases, be sure not to use the modules. All the modules should also be programmed so that they can detect an error and issue an alarm when the primary ring or secondary ring is disconnected at one place.

Example: When the CPL number of the connected OD.RING module is from 0 to 5 and the starting address of the RAS table is set to RWF00. (The figure below shows the case where YF70 is assigned to the coil for alarm issuance.)

<S10mini>

<S10V>



5.6 RAS Table

The RAS table contains communication module information. Figure 5-13 shows the structure of the RAS table.

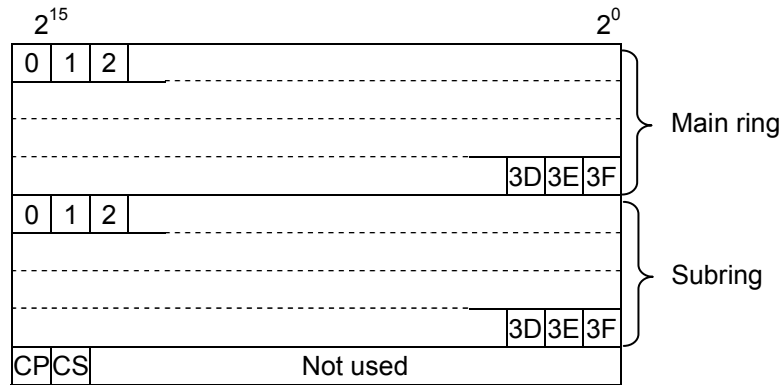


Figure 5-13 Structure of RAS Table

- The figures 0 through 3F correspond to the CPL numbers of the module. A set bit indicates that the module is communicating with another module.
  - 0: The LADDER switch of the CPU or LCP identified with the set CPL number is set to STOP; the cable is broken or not connected; power is not supplied; or the transmission area for the module having the CPL number is not yet set.
  - 1: Data is being received normally from the module identified with the set CPL number.
- CP indicates detection of primary ring disconnection and CS detection of secondary ring disconnection.
  - 0: The module immediately preceding the local module is normal.
  - 1: Disconnection occurred in the module immediately before the local module or the immediately preceding module is inactive or faulty.

The communicating module is monitoring other modules. When the communicating module receives data from another module, it judges that this module is communicating with another and sets the associated bit of the RAS table. If it does not receive data within a fixed time period, the communicating module judges that the other module is inactive and clears the associated bit of the RAS table.

The bit corresponding to the local module indicates the operating status of the module. This bit is set when the local module is operating normally. It is cleared when the module stops abnormally. The above shows that the failures listed in Table 5-3 can be detected from the RAS table.

Table 5-3 Failures and RAS Table

Failure	RAS table status
Cable disconnection	The bits of all the modules before the place where the associated ring was disconnected are cleared.
Remote module stop	The bits of both the primary ring and secondary ring of the associated module are cleared.
Local module error stop	The bit of the local module is cleared. Since data cannot be received from other modules, all the bits of the primary ring and secondary ring are cleared.

**NOTICE**

If an FW or an extension area of expanded memory is set as the RAS bit area, any data before resetting may remain there within two seconds after the resetting condition has been cleared. Wait at least for two seconds after resetting, then reference the defined area.

**5.7 Hold/Clear**

If data is not transmitted from a module that is in communication, this module is judged to have stopped, a hold or clear (clear to 0) is performed for the area to save the data from this module.

- Hold

Data in the area (e.g., GW) where an inactive module is registered is held (retained) as is. The last data transmitted remains.

- Clear

The area (e.g., GW) in which an inactive module is registered is cleared to 0.

If the inactive module resumes communication, data update for the area in which the module is registered is resumed in hold or clear. The LQE510/LQE515 ship with the clear operation enabled.

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# 6 MAINTENANCE

## 6.1 Maintenance and Inspection

To use OD.RING modules under the optimum condition, check the items listed in Table 6-1. Perform this check periodically (i.e., twice or more every year).

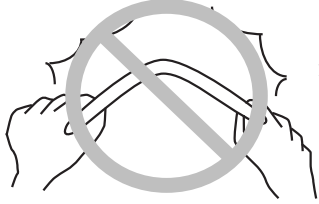
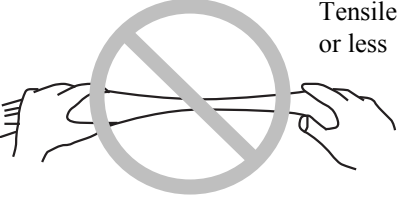
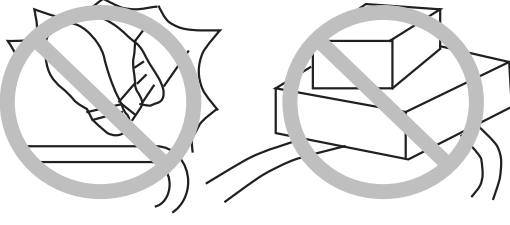
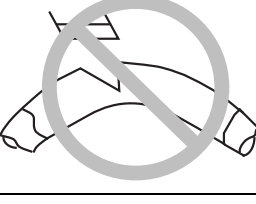
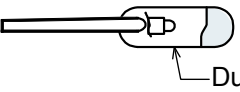
Table 6-1 Check Items

No.	Item	Check point
1	Appearance of module	Check that the module case is free from cracks, etc. If the case is faulty, the internal circuit may have been damaged. This damage can lead to a system malfunction.
2	LED	Check that the ERR LED of the OD.RING module is not on.
3	Looseness of mounting screws	Check module mounting screws for looseness. If the module mounting screws are loose, tighten them. Loose screws can cause a system malfunction and overheating.
4	Cable covering state	Check the cable covering state. An uncovered cable can cause a system malfunction and electrical shock. It can also cause a fire by shorting.
5	Dirt adhesion state	Check the module for dirt. If dirt is found, remove it with a cleaner. Dirt adhesion to the module can cause the internal circuit to short and start a fire.
6	Module replacement	Replacing the module during hot swap may result in hardware or software destruction. Be sure to turn off the power supply when replacing the module.
7	Conditions of light source and detector surfaces of optical module receptacle	The light source and detector elements of the optical module receptacle are protected by glass caps. If dust and dirt adheres to the glass surface, optical transmission characteristics deteriorate. For this reason, when the optical fiber cable is disconnected from the optical module receptacle, be sure to cover the optical connector with the attached dustproof cap. If dust and dirt adheres to the glass surface due to frequent connection and disconnection of the connector, blow it off with air or wipe it off lightly with a soft cloth (e.g., gauze) dipped into ethyl alcohol. Do not use a cotton swab, etc., because it may damage the glass surface. If dust and dirt adheres to the end face of the optical fiber cable side, wipe it off with a soft cloth dipped into ethyl alcohol.

6.2 Handling an Optical Fiber Cable and Connector

As shown in Table 6-2, handling the optical fiber cable and optical connector requires sufficient care.

Table 6-2 Notes on Handling

Item	Description	Remarks
Optical fiber cable	<p>Do not bend!</p>  <p>The bend radius should be 30 mm or more.</p>	If the bend radius is smaller than the 30 mm, the internal fibers will be broken.
	<p>Do not pull!</p>  <p>Tensile force = 69 N or less</p>	The fibers may break if the cable is pulled excessively.
	<p>Do not step on the cable!</p> 	Do not step on the cable nor place anything on it because the fibers may break, increasing the fiber transfer loss.
	<p>Do not scratch!</p> 	Fiber loss increases if the inside of the cable is humid.
Optical connector	<p>Do not forget the dustproof cap!</p>  <p>Do not remove the dustproof cap when not using the optical connector.</p>	Same as on the optical module receptacle side
	<p>Connection</p> <ul style="list-style-type: none"> <li>• Before connecting the optical connector, be sure to clean its end face with industrial-use gauze dipped into ethyl alcohol.</li> <li>• Do not insert or extract the optical connector by force, otherwise its end face will be damaged.</li> </ul>	The neck of the optical connector is apt to be easily damaged by bending. Insert or extract the optical connector only when necessary.

### 6.3 Replacing Optical Fiber Cables

The disconnected optical fiber cable of an OD.RING module can be replaced while communication continues online.



#### **CAUTION**

Only optical fiber cables can be replaced online.

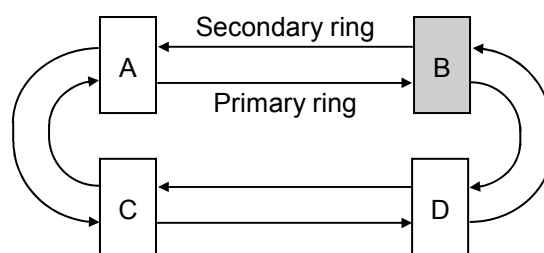
Wiring of cables other than optical fiber cables such as power cables and grounding conductors may cause an electrical shock. Be sure to turn off the power supply before wiring such cables.

## 6.4 Replacing or Adding On the Module

The OD.RING module may be replaced in online mode; that is, its replacement may be performed while communications are in progress with the other existing OD.RING modules.

- What you should get in preparation
  - ① Personal computer (with Hitachi's S10V OD.RING/SD.LINK System installed in it)
  - ② RS-232C cable (or 10BASE-T cable if the communication module used is an ET.NET module)
  - ③ New or add-on OD.RING module (LQE510/515)
  - ④ Copies of the parameter values for the module to be replaced. (These copies are prepared for use in cases where the parameters are not accessible for some reason.)
  - ⑤ The above-mentioned ET.NET module is an optional module and, if it is mounted in place, may be selected as the type of communication module to be used. For more information, refer to Section 2.1, "Names and Functions of Each Part," and Section 3.2, "Mounting the Module," in either the USER'S MANUAL OPTION ET.NET (LQE520) (manual number SVE-1-103) or the USER'S MANUAL OPTION ET.NET (LQE720) (manual number SVE-1-128).
  
- Replacement procedure
 

Suppose that your system has a system configuration as shown in Figure 6-1, and that you want to replace module B in the system configuration. Then, perform the replacement procedure described below.



Note: Each of the modules labeled A thru D in this configuration is an OD.RING module.

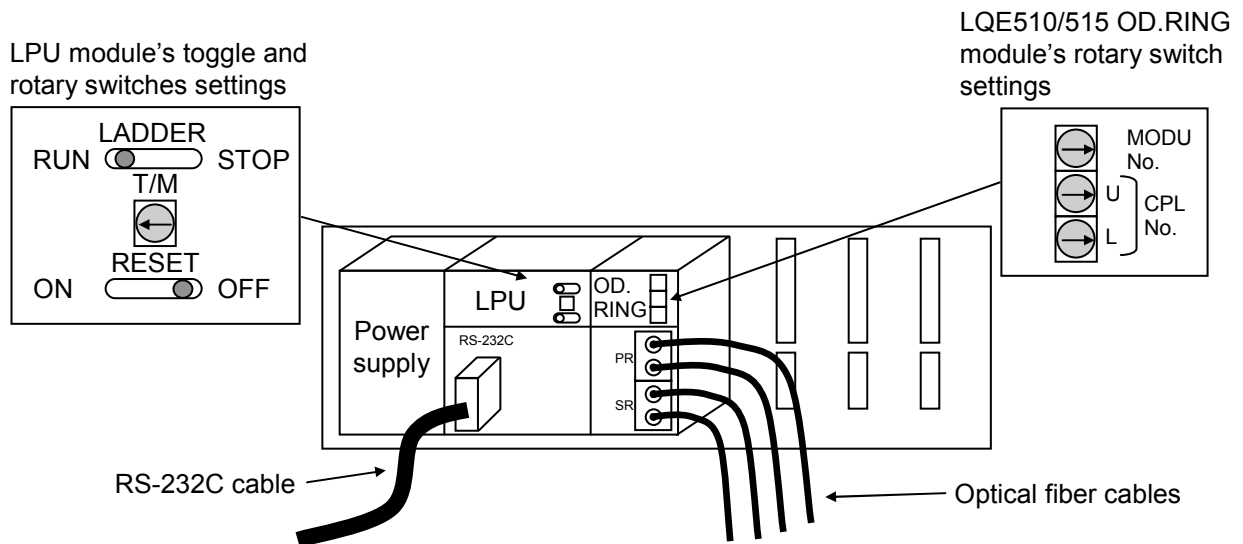
Figure 6-1 A Sample System Configuration

- ① Write down, on a piece of paper, the current settings of the rotary switches (MODU No., and CPL No.U and L) that are, as shown below, accessible at the front side of module B.



## 6 MAINTENANCE

- ② Write down also the current settings of two switches, labeled LADDER (toggle switch) and T/M (rotary switch), respectively, that are, as shown below, accessible at the front side of the LPU module installed in the same controller unit as module B.
- ③ Connect the personal computer and the LPU module together with the RS-232C cable.



- ④ Start Hitachi's S10V OD.RING/SD.LINK System and save the set values of all the existing parameters. (If the existing parameters are not accessible for some reason, use the copies of their set values [item ④] that were obtained in preparation.)
- ⑤ Set the LPU module's LADDER switch in STOP position and turn off the power supply of the controller unit.
- ⑥ Remove the optical fiber cables from module B. To prevent dust and dirt from getting into the connectors of both the removed optical fiber cables and module B, attach dust-proof caps to those connectors.
- ⑦ Replace module B with the new one and set the new OD.RING module's rotary switches in the same way as you wrote down in Step ①.
- ⑧ Turn on the power supply of the controller unit and read in the parameter values that you saved in Step ④, by using the S10V OD.RING/SD.LINK System.
- ⑨ Write the parameter values read in to the target from the S10V OD.RING/SD.LINK System.
- ⑩ Check that all the set parameter values are identical to those that were saved in Step ④.
- ⑪ Reset the LPU module by setting the RESET switch in ON position and then in OFF position at its front.
- ⑫ Turn off the power supply of the controller unit.
- ⑬ Remove the RS-232C cable from both the personal computer and LPU module, which were connected together in Step ③.

- ⑭ Connect the optical fiber cables to the new OD.RING module, the cables that were removed from it in Step ⑥.
  - ⑮ Set the LPU module's LADDER and T/M switches in the same way as you wrote down in Step ②.
  - ⑯ Turn on the power supply of the controller unit and check that the new OD.RING module is running normally. To accomplish this check, ensure that the new OD.RING module's PR-/SR-RX and PR-/SR-TX LEDs are all lit, but its ERR LED is not.
- Add-on procedure (for adding on a sub-module)
    - ① Write down, on a piece of paper, the current settings of two switches, labeled LADDER (toggle switch) and T/M (rotary switch), respectively, that are accessible at the front side of the LPU module, the one that is installed in the controller unit in which you are adding on an OD.RING module.
    - ② Ensure that your application system has been shut down. Then, set the LPU module's LADDER switch in STOP position and turn off the power supply of the controller unit.
    - ③ Mount the add-on OD.RING module in place according to the instructions given under "3.2 Mounting the Modules."
    - ④ According to the information provided under "2.1 Names and Functions of Each Part," set the add-on OD.RING module's MODU No. switch in such a way that a new sub-module No. setting will not duplicate with the current MODU No. switch setting of the existing main OD.RING module.
    - ⑤ According to the instructions given under "4.2 Setting Switches," set the new OD.RING module's CPL No.U and L switches in such a way that a new number setting will not duplicate with any of the current number settings of the existing OD.RING modules forming the full-duplex ring.
    - ⑥ Connect the personal computer and the LPU module together with the RS-232C cable. Then, turn on the power supply of the controller unit and set parameters for the add-on OD.RING module (sub-module) by using the S10V OD.RING/SD.LINK system.
    - ⑦ Reset the LPU module by setting the RESET switch in ON position and then in OFF position at its front.
    - ⑧ Turn off the power supply of the controller unit and connect the optical fiber cables from the ring to the add-on OD.RING module.
    - ⑨ Set the LPU module's LADDER and T/M switches in the same way as you wrote down in Step ①.
    - ⑩ Turn on the power supply of the controller unit and check that the add-on OD.RING module is running normally. To accomplish this check, ensure that the add-on OD.RING module's PR-/SR-RX and PR-/SR-TX LEDs are all lit, but its ERR LED is not.



**CAUTION**

- Be sure to turn off the power supply when replacing an OD.RING module. Failure to observe this rule may cause an electrical shock.
- When replacing a optical module receptacle, do not touch terminals other than OD.RING module terminals. Failure to observe this rule may cause an electrical shock.

***NOTICE***

- Replace one module at a time. Removing optical fiber cables simultaneously at several places may interrupt communication.
- Check that the optical fiber cables are not broken before replacing a module. Removing the broken optical fiber cable for module replacement may interrupt communication.
- During module replacement, disconnections are detected according to the RAS table. If an optical fiber cable is removed for module replacement, disconnection is detected according to the RAS table but communication continues normally.

## 6.5 Optical Level Measurement

### 6.5.1 Optical receiving level measurement

Measure the optical level on the receiving side of the optical fiber cable as shown in Figure 6-2. Measure it for the primary ring and the secondary ring.

Connect the optical cable to the optical power meter through an applicable connector adapter.

LQE510: FC type (JIS C5970 F01 type) optical connector

LQE515: SMA type optical connector

- S10mini

Measure the optical level while holding down the RESET switch of the CPU module.

- S10V

- (1) Switch off the LPU unit.
- (2) Set the LPU module T/M and Operation Setting switch to C.
- (3) Switch on the LPU unit
- (4) Set the LPU unit RESET switch to ON.
- (5) Measure the optical level.
- (6) After measurement, switch off the LPU unit reset the T/M and Operation Setting switch to the original position, and restart the LPU unit.

For more information on the status of the LPU during measurement (optical level measurement reset mode), refer to “S10V USER’S MANUAL BASIC MODULES (manual number SVE-1-100).”

#### Criterion

- For LQE510: The optical level should be within the range of -15 dBm to -30 dBm.  
(Optical power meter: Wavelength = 850 nm)
- For LQE515: The optical level should be within the range of -14 dBm to -28 dBm.  
(Optical power meter: Wavelength = 880 nm)

If the above criterion is not satisfied, measure the optical level according to “6.5.2 Locating a fault portion” and check the network.

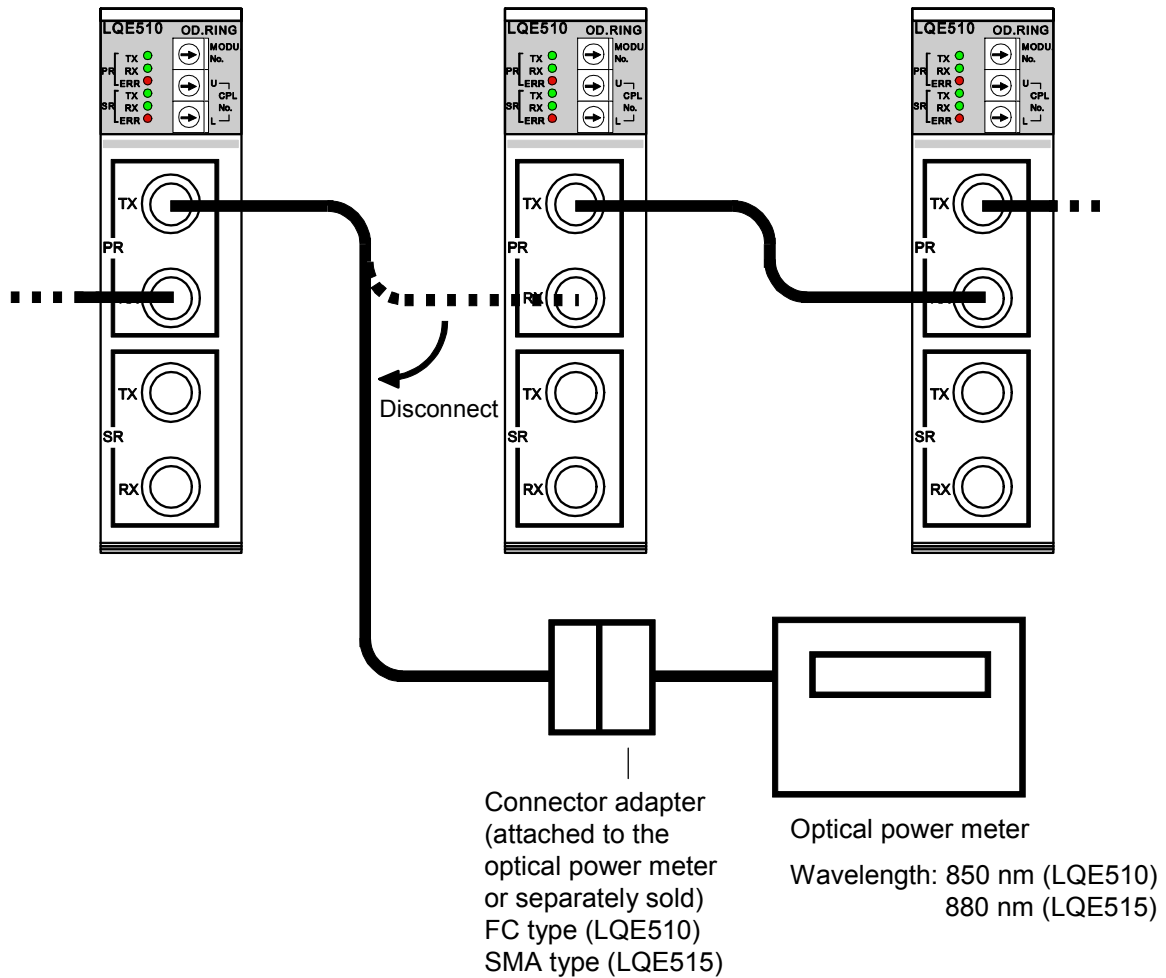
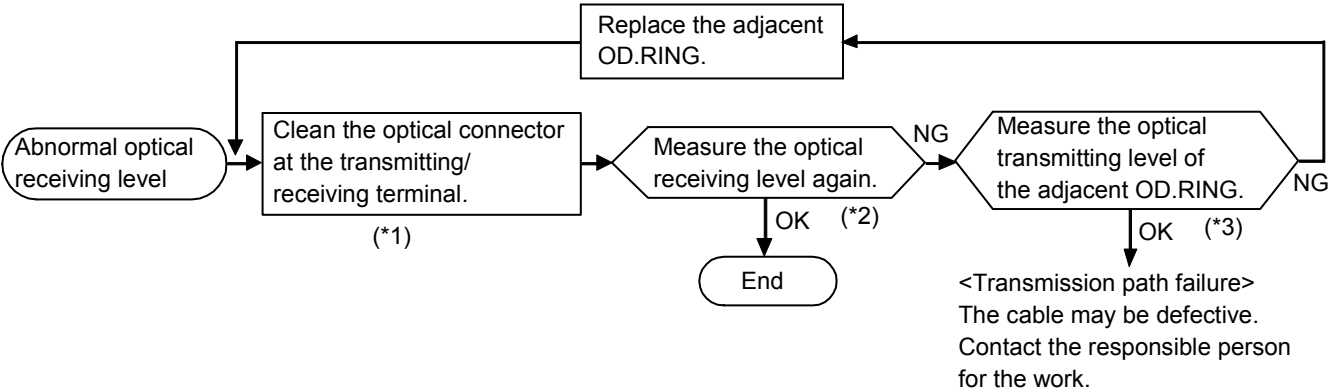


Figure 6-2 Example of Optical Receiving Level Measurement

**NOTICE**

- Take care when handling the optical fiber cable. In particular, do not make the bend radius smaller than 30 mm, otherwise a wipe breaking may be caused.
- After measurement, clean the optical module receptacle and the optical connector.
- Since the optical connector of the OD.RING (LQE510) is the FC type (SMA type for the LQE515), the optical power meter must be applicable to the FC type (or SMA type). Use the connector adapter (attached to the optical power meter or separately sold) for the FC type (or the SMA type).

6.5.2 Locating a fault portion



(\*1) See “6.2 Handling an Optical Fiber Cable and Connector.”  
(\*2) See “6.5.1 Optical receiving level measurement.”  
(\*3) See “6.5.3 Optical transmitting level measurement.”

Figure 6-3 Locating a Faulty Portion

6.5.3 Optical transmitting level measurement

Measure the optical level on the transmitting side by using a short optical fiber cable with a length of 1 m or less as shown in Figure 6-4.

A transmission path that satisfies the criterion at optical receiving level measurement requires no optical transmitting level measurement.

Connect the optical fiber cable to the optical power meter through an applicable connector adapter.

For LQE510: FC type (JIS C5970 F01 type) optical connector

For LQE515: SMA type optical connector

Criterion

- For LQE510: The optical level should be within the range of -15 dBm to -18 dBm. (Optical power meter: Wavelength = 850 nm)
- For LQE515: The optical level should be within the range of -14 dBm to -18 dBm. (Optical power meter: Wavelength = 880 nm)

If the criterion is not satisfied, replace the OD.RING.

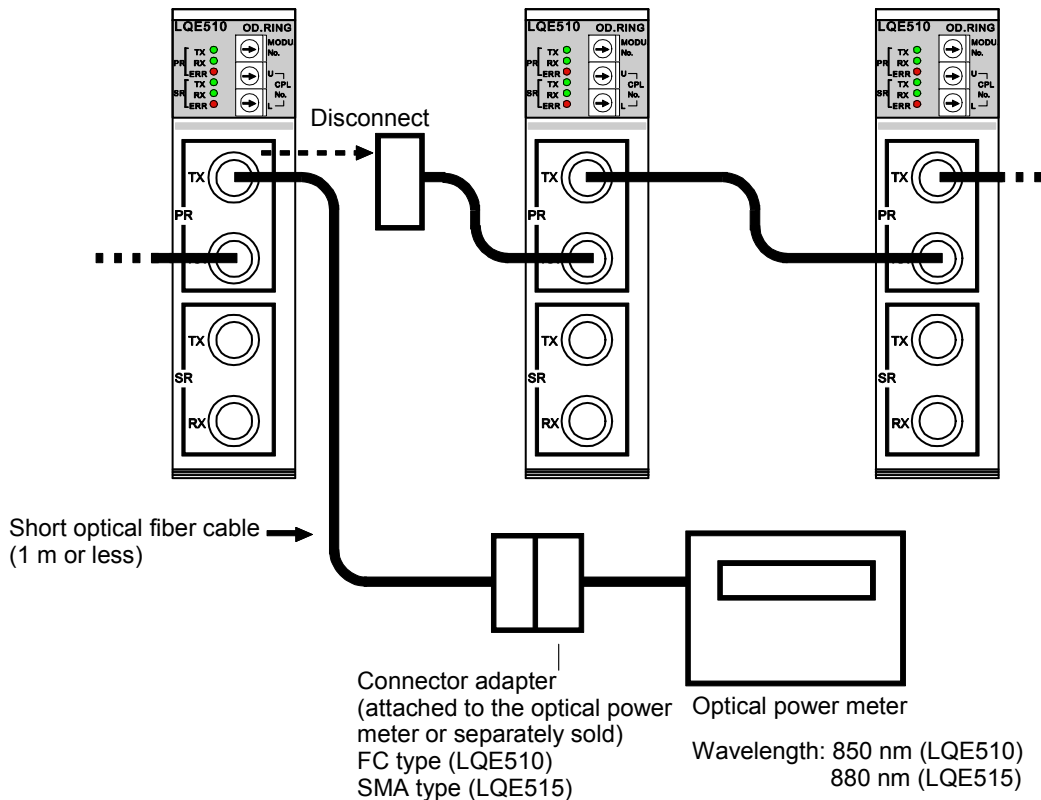


Figure 6-4 Example of Optical Transmitting Level Measurement

<b>NOTICE</b>
<ul style="list-style-type: none"> <li>● Take care when handling the optical fiber cable. In particular, do not make the bend radius smaller than 30 mm, otherwise a wipe breaking may be caused.</li> <li>● After measurement, clean the optical module receptacle and the optical connector.</li> <li>● Since the optical connector of the OD.RING (LQE510) is the FC type (SMA type for the LQE515), the optical power meter must be applicable to the FC type (or SMA type). Use the connector adapter (attached to the optical power meter or separately sold) for the FC type (or the SMA type).</li> </ul>

## 6.6 Troubleshooting

### 6.6.1 Trouble detection and solution

- The LED for transmission does not come on.
  - Is the POWER LED of the power module on?  
If the POWER LED is not on, power is not supplied. Turn on the power supply.
  - Is the error LED (ERR) on?  
The error LED (ERR) which is on indicates that an error occurred. See “6.6.2 Error display and countermeasures.”
  - Is the LED (RX) for reception on?  
If the LED (RX) for reception is on, the module may be faulty. See “6.6.2 Error display and countermeasures.”
  
- The LEDs (TX) for transmission of all the modules go out and the LEDs (RX) for reception come on.
  - Is the optical fiber cable connection correct?  
Check the optical fiber cable connection.
  - Is the optical fiber cable connector inserted properly?  
Check whether the optical fiber cable connector key fits the key groove.
  
- The LED (RX) for reception does not come on.
  - Is the LED (TX) for transmission on?  
If the LED (TX) for transmission is not on, see the item with the title “The LED (TX) for transmission does not come on” above.
  - Is the optical fiber cable connection correct?  
Check whether the cables are wired as described in “3.4 Wiring.”
  - Is an optical fiber cable disconnected or bent?  
An optical fiber cable is made up of optical fibers. Communication through optical fiber cables is disabled if the cable is bent more than the specified bending radius. (See Figure 3-4.)
  - Is the remote module sending data?  
If the remote module is not sending data, the LED (RX) for reception does not come on.
  
- Data is not sent from the remote module.
  - Is the power supply of the remote module on?  
If the power supply is off, turn it on.
  - Is the remote module sending data?  
If the LED (TX) for transmission is not on, see the item with the title “The LED (TX) for transmission does not come on” above.



- Is the remote module switch set on RUN?  
The CPU or LPU module switch must be set to RUN to enable memory transfers.
  - Is the transmission area of the remote module set correctly?  
If the transmission area is set incorrectly, set it correctly. If the number of words to be sent is set to 0, no data will be sent.
  - Are the set module number and CPL number correct?  
Check whether the set module number and CPL number are correct. Module number setting switch and CPL number setting switch depend on the number of modules connected (see “4.2 Setting Switches”). If the set value is duplicated, data will be sent incorrectly.
- Data is not sent to the remote module.
    - Is the local module switch set to RUN?  
The CPU or LPU module switch must be set to RUN to enable memory transfers.
    - Is the transmission area of the local module set correctly?  
If the transmission area is set incorrectly, set it correctly. If the number of words to be sent is set to 0, no data will be sent.
    - Are the set module number and CPL number correct?  
Check whether the set module number and CPL number are correct. Module number setting switch and CPL number setting switch depend on the number of the modules connected (see “4.2 Setting Switches.”) If the set value is duplicated, data will be sent incorrectly.
- Transfer area data is lost.
    - Is the transmission area of the module currently sending data set correctly?  
If the transmission area is set incorrectly, set it correctly.
    - Is a transmission area duplicated in several modules?  
If the transmission area is duplicated, data in the area will be lost.
    - Was the transfer area rewritten by the user program?  
If possible, stop the user program and check whether the transfer area was rewritten.
- The sent data was zeroized.
    - Is the module currently sending data stopped?  
If the hold/clear mode is set to CLEAR, the transfer area is cleared to 0 when data is no longer transmitted.
    - Is the switch of the module currently sending data set to STOP?  
If the CPU or LPU module switch is set to STOP, the transfer area is not transferred. The transfer area is cleared to 0 if the hold/clear mode is set to CLEAR.

## 6.6.2 Error display and countermeasures

If a fatal error occurs, the ERR LED on the front of the module comes on. Communication is halted at this point of time. Recovery from this error can be made only by means of resetting the CPU (or powering down). To find the cause of this error (ERR LED on), check the items below. When the instruction “See 6.6.2 Error display and countermeasures” appears in “6.6.1 Trouble detection and solution” or when you feel that the operation is unstable, also check them.

- With the S10mini, the OD.RING modules (LQE010/015/510/515) are mounted in the mount base, left justified.
- With the S10mini, are three or more OD.RING modules (LQE010/015/510/515) not mounted? Are three or more modules not mounted with the SD.LINK module (LQE030/530) inclusive?
- With the S10V, are three or more OD.RING modules (LQE510/515) not mounted? Are three or more modules not mounted with the SD.LINK module (LQE530) inclusive?
- Is the module number switch set correctly?
- Is the CPL number switch set correctly?
- Are the optical fiber cables as described in the specifications being used? (Too long, etc.)

If no problem is found in these checks, reset the CPU or LPU module.

If the same error recurs, turn off the power supply once. If the error condition is not cleared despite this operation, the module may be faulty. Replace the module. If the ERR LED comes on again although error recovery is made successfully by resetting the CPU (or powering down), the module may be faulty. Replace the module. If the same error still recurs despite module replacement, contact your local source.

6.6.3 CPU indicators display messages

The S10mini displays the messages listed below in the CPU module indicator when certain events or errors occur in the OD.RING module.

The S10V collects error information, but does not display errors on the LPU module. Error information collected can be referenced from Error Log on S10V basic system. For more information, refer to “S10V USER’S MANUAL BASIC MODULES (manual number SVE-1-100).”

Table 6-3 CPU Indicators Display Messages

Error code (S10V)	Message (S10mini)	Explanation	Action
—	OD□ x.x	Normal operation	This is no an error. (x.x denotes version and revision numbers.)
0x0010	OD□ BUS	Bus error	Reset the module. If the same error message recurs, the OD.RING module may have failed. Replace the module.
0x0011	OD□ ADDR	Address error	
0x0012	OD□ ILLG	Illegal instruction	
0x0013	OD□ ZERO	Division by 0	
0x0014	OD□ PRIV	Privilege violation	
0x0015	OD□ WDT	WDT error	
0x0016	OD□ FMAT	Format error	
0x0017	OD□ SINT	Spurious interrupt	
0x0018	OD□ EXCP	Unused exception	
0x0019	OD□ PTY	Parity error	
0x001A	OD□ GR	GR announcement	
0x0100	OD□ MDSW	Module number setting switch error	
0x0101	OD□ CPSW	CPL number setting switch error	Set the CPL number switch to a valid value. (See “2 NAMES AND FUNCTIONS OF EACH PART” and “4.2 Setting Switches.”)
0x0102	OD□ ROM1	ROM1 checksum error	Reset the module. If the same error message recurs, the OD.RING module may have failed. Replace the module.
0x0103	OD□ RAM1	RAM1 compare error	
0x0105	OD□ RAM2	RAM2 compare error	
0x010B	OD□ ROM3	ROM3 checksum error	
0x010C	OD□ ROME	ROM3 erase error (program)	
0x010D	OD□ ROMW	ROM3 write error (program)	
0x010E	OD□ ROME	ROM3 erase error (parameter)	Reset the module and set parameters. If the same error message recurs, the OD.RING module may have failed. Replace the module.
0x010F	OD□ ROMW	ROM3 write error (parameter)	
0x0110	—	ROM rewrite count over	Replace the module.
0x0111	OD□ DPCP	Duplicate CPL number	Set a unique CPL number. (See “2 NAMES AND FUNCTIONS OF EACH PART” and “4.2 Setting Switches.”)
0x0112	OD□ PRME	Parameter error	Set parameters again. (See “4.6 Commands.”) See the next page for more information.

□=M: Main module

□=S: Submodule

**NOTICE**

If the module has been mounted on a model different from the one on which the parameters defined in “4.6 Commands,” have been set, a parameter error occurs. Specifically, parameter errors may occur in these two cases:

Case 1: If an OD.RING module for which parameters have been set on the S10V is mounted in the S10mini, “ODM PRME” or “ODS PRME” is displayed in the CPU module indicator.

Case 2: If an OD.RING module for which parameters have been set on the S10mini is mounted in the S10V, 0x0112 is displayed in the error log of the tool (S10V BASE SYSTEM).

This function aims at preventing malfunctions upon reference to parameters that have been set on another model.

A parameter error also occurs when a checksum error has resulted from a parameter setting. When such a parameter error occurs, open the parameter setup screen on the model mounted, and modify the settings as appropriate.

#### 6.6.4 Monitoring a specific module

Whether a specific module is communicating with another module is monitored with the following methods:

- The RAS table is checked.

If the module stops, both the primary ring bit and secondary ring bit of the RAS table are reset. Whether the module is communicating with another module can be monitored by monitoring these bits.

- In hold/clear mode setting, CLEAR is selected.

If the communicating module stops, the area assigned to the module is cleared. Whether the module is communicating with another module can be monitored by checking this area.

6.6.5 Error freeze information

When it detects a hardware error, the OD.RING module lights the ERR LED, saves error freeze information, and stops. Figure 6-5 shows the error freeze information format. For the error codes and stack frame in this format, see the next and subsequent pages.

(Main)	(Sub)	2 <sup>31</sup> —2 <sup>16</sup>	2 <sup>15</sup> —2 <sup>0</sup>
/940400	/9C0400	Error code	—
		—	
/940410	/9C0410	D0 register	
/940414	/9C0414	D1 register	
/940418	/9C0418	D2 register	
/94041C	/9C041C	D3 register	
/940420	/9C0420	D4 register	
/940424	/9C0424	D5 register	
/940428	/9C0428	D6 register	
/94042C	/9C042C	D7 register	
/940430	/9C0430	A0 register	
/940434	/9C0434	A1 register	
/940438	/9C0438	A2 register	
/94043C	/9C043C	A3 register	
/940440	/9C0440	A4 register	
/940444	/9C0444	A5 register	
/940448	/9C0448	A6 register	
/94044C	/9C044C	A7 register	
/940450	/9C0450	Stack frame (4 words, 6 words, bus error)	

Figure 6-5 Error Freeze Information Format

The code “/0000” indicates normal operation.

Table 6-4 Error Codes

Code	Error	User response
/0010	Bus error	The OD.RING module may be faulty. Replace it.
/0011	Address error	
/0012	Illegal instruction	
/0013	Division by 0	
/0014	Privilege violation	
/0015	WDT error	
/0016	Format error	
/0017	Spurious interrupt	
/0018	Unused exception	
/0019	Parity error	
/001A	GR announcement	
/0100	Module number setting switch error	Set the switch correctly.
/0101	CPL number setting switch error	
/0102	ROM1 checksum error	The OD.RING module may be faulty. Replace it.
/0103	RAM compare error	
/0105		
/010B	ROM3 checksum error	
/010C	ROM3 micro erase error	
/010D	ROM3 micro write error	
/010E	ROM3 parameter erase error	
/010F	ROM3 parameter write error	
/0111	Duplicated CPL number	Set a correct CPL number
/0112	Parameter error	Specify parameters again. For more information, see “6.6.3 CPU indicators display messages.”

	Format \$0 (4-word stackframe)	Format \$2 (67-word stackframe)	Format \$C (bus error stack for prefetch and operands)	Format \$C (bus error stack for MOVEM operand)	Format \$C (4- and 6-word bus error stack)
Main					
/940450	Sub				
/940452					
/940454					
/940456					
/940458					
/94045A					
/94045C					
/94045E					
/940460					
/940462					
/940464					
/940466					
...					
...					
...					

Figure 6-6 Stack Frame Format

### 6.6.6 Communication trace information

The OD.RING module has a communication information trace function. This function can be used to create trace data for use in investigation of the causes of faults and take actions for the faults.

#### (1) Trace buffer structure

A trace buffer consists of an 8-word trace control table and 256-case trace data. Each case consists of 32 words. The OD.RING module cyclically stores trace data according to the pointer.

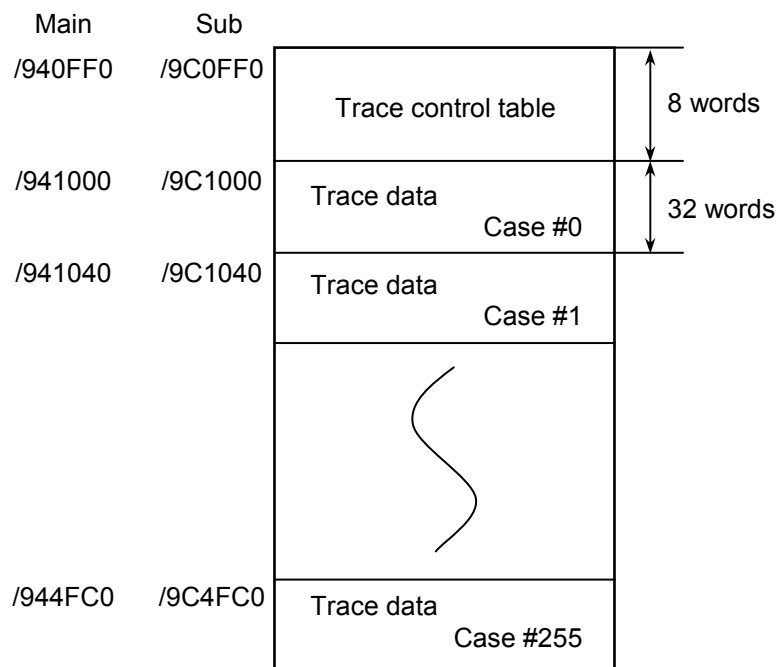


Figure 6-7 Trace Buffer Structure

Trace data is stored in turn, starting from case #0. When trace data is stored in the last case (case #255), the next data is stored in case #0 again.



(2) Structure of trace control table

A trace control table consists of eight words.

Main	Sub	
/940FF0	/9C0FF0	① Execution/stop
/940FF2	/9C0FF2	Unused
/940FF4	/9C0FF4	② Trace target address
/940FF8	/9C0FF8	③ Mask data
/940FFA	/9C0FFA	④ Comparison data
/940FFC	/9C0FFC	⑤ Pointer
/940FFE	/9C0FFE	Unused

Figure 6-8 Structure of Trace Control Table

① Execution/stop

Used to set trace execution or stop.

0: Stop tracing

1: Continue tracing until the trace condition is met.

2: Continue tracing until the trace condition is met or until an error occurs.

When power is recovered or the resetting condition is cleared, a 2 is set. If an error is detected or the trace condition is satisfied, tracing is stopped and a 0 is set.

② Trace target address

Used to set the starting address of the condition trace target area.

③ Mask data

Set mask data for conditional tracing. Of the data bits, only the bit(s) set to 0 are masked off.

④ Comparison data

Set comparison data for conditional tracing. The comparison data is compared with the result obtained by ANDing the trace target address in ② and the mask data. If a match is found, the condition holds.

⑤ Pointer

Used to point to the case in which the next trace data is to be stored. The newest trace data is stored in pointer 1 (for 0, pointer 255).



(3) Trace data structure

Trace data consists of 32 words per case.

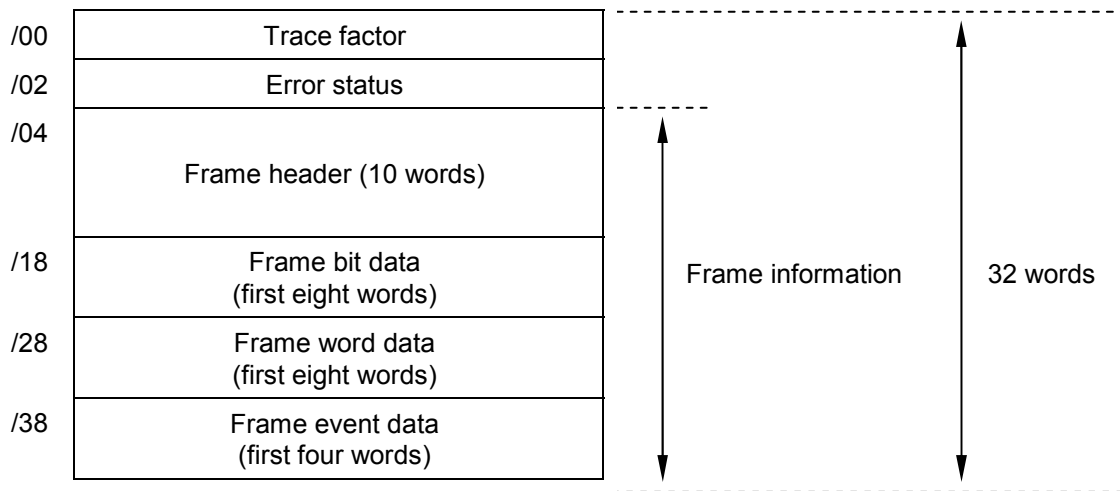


Figure 6-11 Trace Data Structure

**Details of frame header**

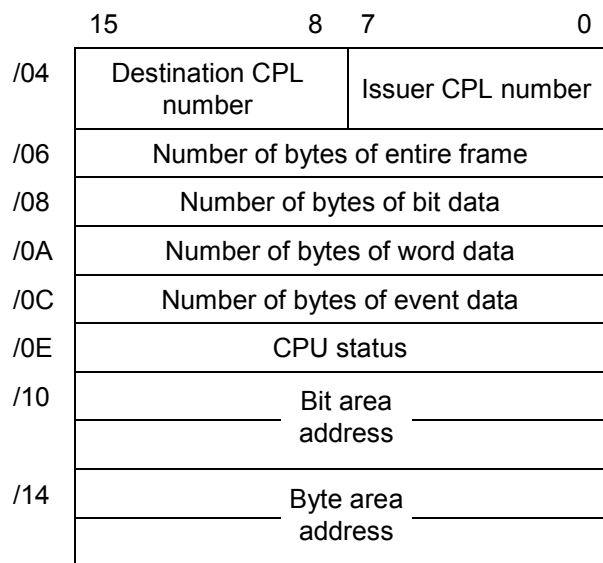


Figure 6-12 Details of Frame Header

## (4) Trace events and trace processing

Table 6-5 shows the correspondence between trace events and trace processing.

Table 6-5 Correspondence between Trace Events and Trace Processing

Event	Condition check	Error stop	Trace factor	Error status	Frame information
Transmission start	Done	Not made	Valid	Invalid	Valid
Normal transmission end	Not done	Not made	Valid	Invalid	Invalid
Transmission ended up with error	Not done	Made	Valid	Valid	Invalid
Transmission timed out	Not done	Made	Valid	Invalid	Invalid
Reception started	Not done	Not made	Valid	Invalid	Invalid
Normal reception ended	Done	Not made	Valid	Invalid	Valid
Reception ended up with error	Done	Made	Valid	Valid	Valid
Reception timed out	Not done	Made	Valid	Valid	Valid

- Condition check

The OD.RING module performs condition check to determine whether to stop communication trace. When the condition is established, the module sets condition establishment in the trace factor and stops communication trace.

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- Error stop

When the execution/stop item is set to 2, the OD.RING module performs communication trace error stop processing.

- Trace factor

The factor for creation of the trace data is set in the trace factor area.

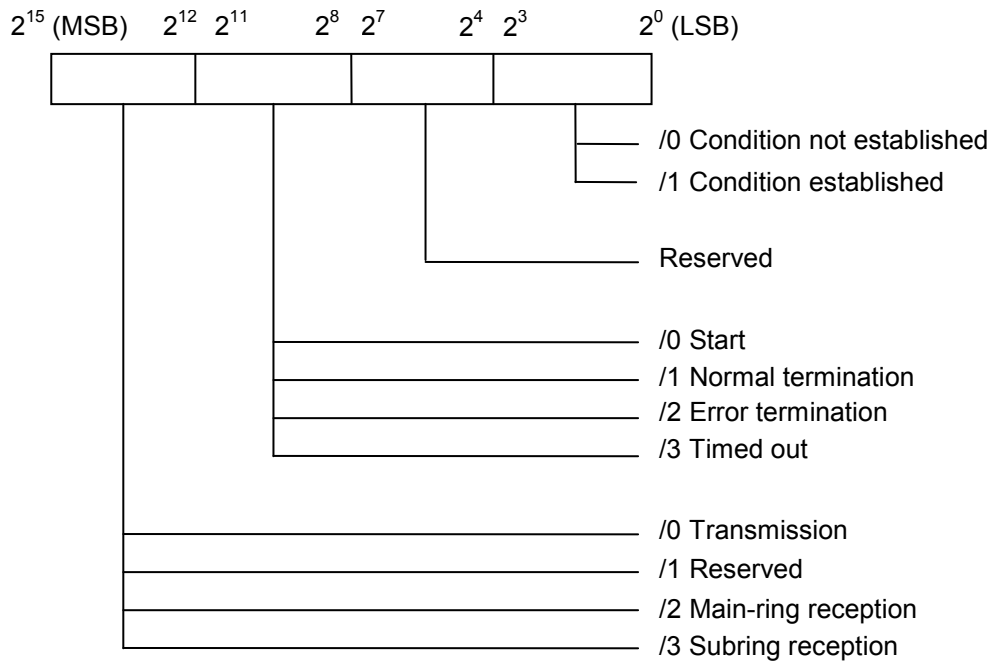


Figure 6-13 Trace Factor

- Error status

<Error status on transmission>

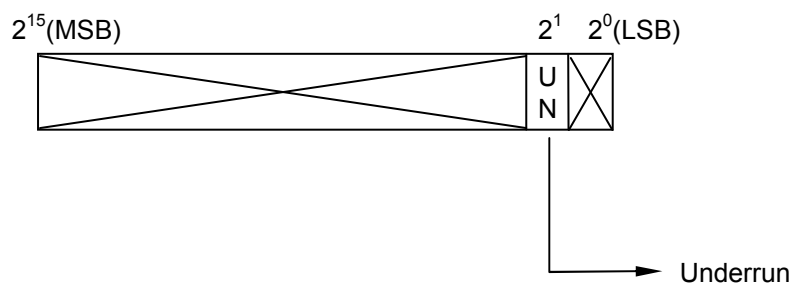


Figure 6-14 Error Status on Transmission

<Error status on reception>

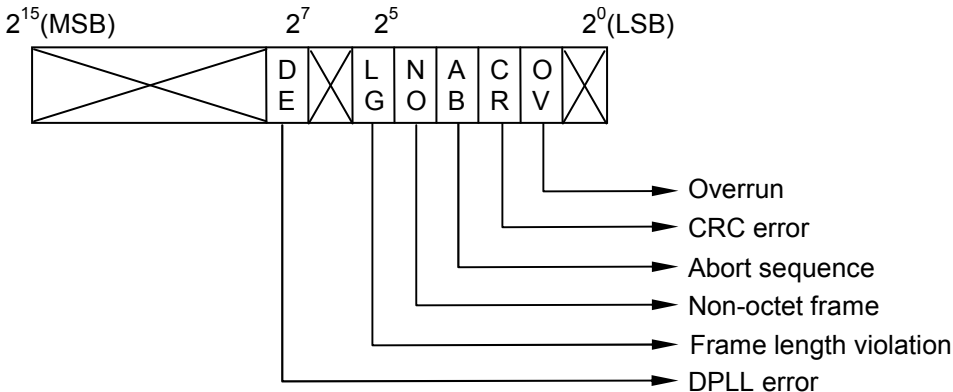


Figure 6-15 Error Status on Reception

**NOTICE**

If a time-out is generated during reception, the error status of FFFF will be returned.

Table 6-6 shows the error status in detail.

Table 6-6 Details of Error Status

Transmission/reception	Error name	Description
Transmission	Underrun	A transmitter underrun has occurred while transmitting data.
Reception	DPLL error	The DE bit is set when transition omission occurred in the coding mode in which transition occurs per bit.
	Frame length violation	The frame length greater than the maximum value defined in this channel was recognized.
	Non-octet frame	A frame having a number of bits that cannot be accurately divided by 8 was received.
	Abort sequence	Not less than seven continuous 1s were received during frame reception.
	CRC error	A CRC error exists in the frame.
	Overrun	A receiver overrun occurred during frame reception.
	Time-out during reception	An attempt was made to send or receive more frames than permitted.

- Frame information  
Frame information is stored.

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6.7 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		CPU/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			