

HITACHI

USER'S MANUAL

OPTION

SD.LINK

(LQE530)

S10mini

SIOV

SVE-1-115(G)

USER'S MANUAL

OPTION

SD.LINK

(LQE530)

S10mini

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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)

 WARNING
<ul style="list-style-type: none">● Switch off the power supply before making connections to the terminal block. Making connections with the power supply being switched on may 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).

(chapter 6, page 6-4)

 WARNING
Laser light, though invisible, are harmful to the human eyes . Do not gaze at the tip of an optical fiber cable or the phototransmitter of an optical module receptacle while they are operating, either directly or through a lens.

2.2 CAUTION Statements

(chapter 6, page 6-4)

 CAUTION
Only optical fiber cables can be replaced online. To replace any other kinds of cables, such as power cables and grounding conductors, switch off the power to guard against electrical shock hazards.

(chapter 6, page 6-8)

 CAUTION
<ul style="list-style-type: none">● Switch off modules before replacing them to avoid electrical shock hazards.● When replacing modules, do not touch any terminals other than those of optical modules to avoid electrical shock hazards.

2.3 NOTICE Statements

(chapter 1, page 1-3)

NOTICE

- Up to two units of the SD.LINK (LQE030/530) module and the OD.RING (LQE010/015/510/515) module can be intermixed per CPU or LPU.
- The maximum module-to-module transmission distance of 15 km assumes the use of an optical fiber cable with a cable transmission loss of 0.5 dB/km. Cable transmission loss measurement is recommended during cabling. The cable transmission loss at the receiving end may not exceed -14 dBm to -31 dBm.
- The SD.LINK involves such large current dissipation that a limit is placed on the maximum number of modules that can be mounted in an S10mini CPU unit eight-slot mount base.
 - When one SD.LINK module is mounted: Up to seven can be mounted.
 - When two SD.LINK modules are mounted: Up to six can be mounted.With an S10V LPU unit, the sum total of the current dissipations of the modules mounted may not exceed 7 A (at an ambient temperature of 48°C or lower). For more information, refer to "9.7 Power Supply Module Output Current," in "S10V USER'S MANUAL BASIC MODULES (manual number SVE-1-100)."
- The SD.LINK (LQE030/530) and the OD.RING (LQE010/015/510/515) cannot be connected together because they use optical fiber cables of different make.

(chapter 1, page 1-5)

NOTICE

Users of this product must have adequate knowledge of the Windows® environment and user interface. This system conforms to the Windows® standard. This manual is prepared for users who are familiar with the basic Windows® operating procedures.

(chapter 2, page 2-2)

NOTICE

- Up to two units of the SD.LINK (LQE030/530) module and the OD.RING (LQE010/015/510/515) module can be intermixed. Set the module number setting switch on either module to main and that on the other to sub.
- If the module number setting switch is set to 'E' or 'F' and then the power to the SD.LINK module is cycled or it is reset, its error LED will glow but this is not a sign of fault.

(chapter 3, page 3-2)

NOTICE

S10mini Series

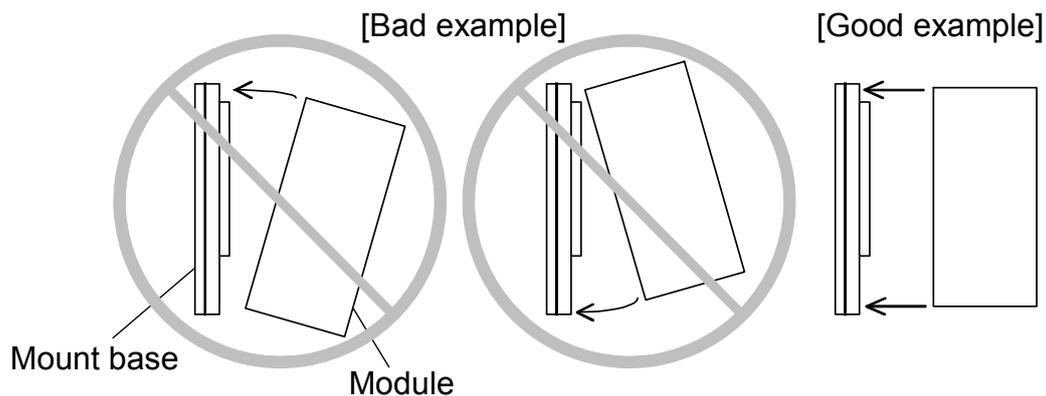
- Mount the option module in option slots that is located to the immediate right of the CPU module. Be sure that no I/O module is mounted between this option module and CPU module. Also, ensure that there is no unoccupied slot between option modules.
- This module (LQE530) can be mounted together with the LQE030 SD.LINK module, which is specially designed for use with the S10mini.

S10V Series

- There are no specific rules about the mounting position or unoccupied slots.
- The LQE030 SD.LINK module cannot be used as it is specially designed for use with the S10mini.

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, observed 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.



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 cable wiring is an error-prone task. Mark each optical fiber cable with the wire gauge before connecting it.

NOTICE

- Insert the optical connector key into the key slot in the optical module receptacle deep enough to hide the white mark on the optical connector.
- The primary ring and the secondary ring involve opposite directions of data transmission as shown on the previous page. Incorrect wiring could inhibit successful communication or result in degraded fault tolerance.
- Clamp optical fiber cables with a bending radius (R) of 30 mm or more. A bending radius less than 30 mm could break the internal fiber, resulting in a burnout. (The requirement for a bending radius of 30 mm or more applies to single-core optical fiber cables. Optical fiber cables come in numerous types. Check with your cable manufacturer to find out more.)
- Use optical fiber cables in a double-ring fashion. Use of a broken ring, or incorrect wiring of the primary and secondary rings could disable fault avoidance or detract from successful communication.
- When using an optical fiber cable with a tension member inserted in it and then fastening the tension member to a enclosure, insulate the enclosure electrically. (If the tension member electrically connects two enclosures, circulating current could flow, causing noise interferences.)

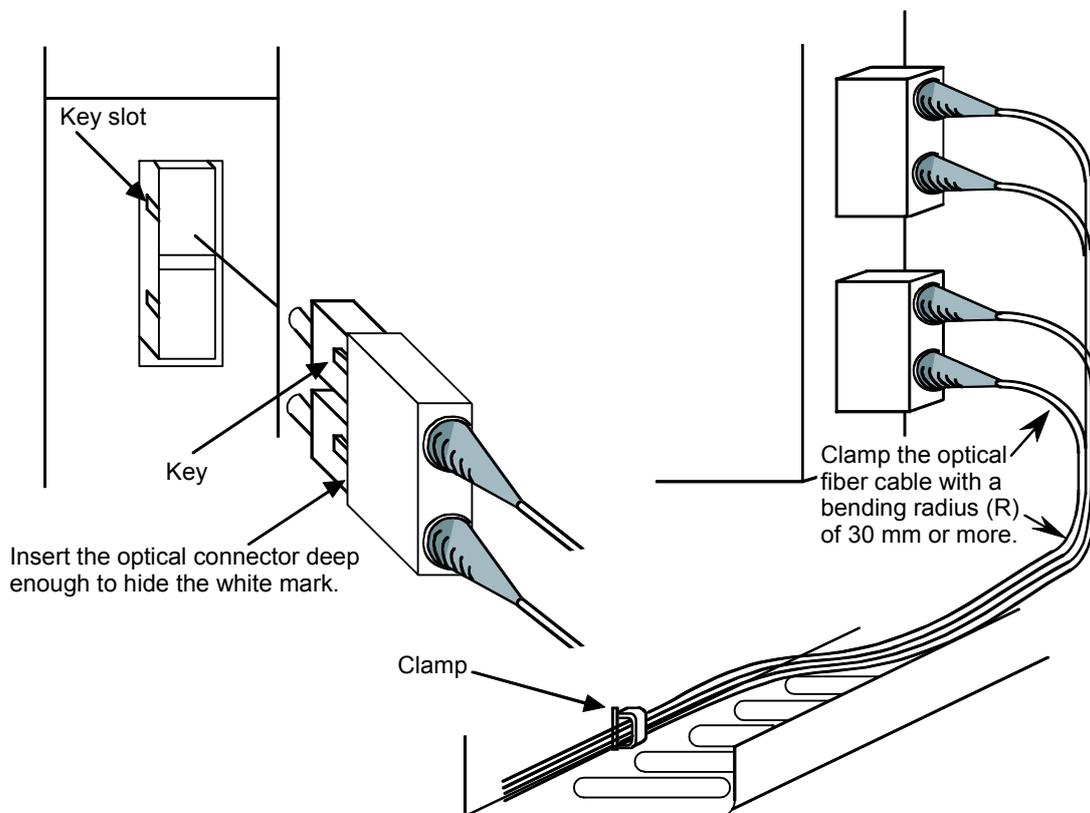


Figure 3-4 Optical Fiber Cable Handling

(chapter 4, page 4-3)

NOTICE

The following setting is not supported.

- The switch is set to an undefined function (see “2.1 Names and Functions of Each Part.”)

(chapter 4, page 4-3)

NOTICE

The following settings are not supported.

- The switch is set to an existing CPL number on the SD.LINK.
- A CPL number out of bounds (40 to FF) is set.

(chapter 4, page 4-4)

NOTICE

Relationship between the SD.LINK module and the CPU or LPU switches. Functioning of the CPU or LPU switches affects the operations of the SD.LINK module.

- STOP

The SD.LINK module receives data transmitted from another module and updates memory transfer areas. It does not transmit data from the local module but transmits communications control data.

- RUN, SIMU RUN

The SD.LINK 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® 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 and error occurs, first uninstall the S10mini OD.RING/SD.LINK system as directed in Section 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® programs, and then install the S10mini OD.RING/SD.LINK system again.

(chapter 4, page 4-8)

NOTICE

- The S10V Base 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® 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® 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 Base System, be sure to perform an uninstall and then perform an install.

(chapter 4, page 4-13)

NOTICE

- The S10mini Series does not support GP-IB. Do not select “GPIB” on the [Communication type] window.
- The S10V Series does not support GP-IB. GPIB is not displayed on the [Communication type] window.

(chapter 4, page 4-18)

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 5-2)

NOTICE

For a mixed connection of S10mini CPU units and S10V LPU units, see “4.6.7 Setting transfer areas where an S10mini and an S10V are intermixed.”

(chapter 5, page 5-5)

NOTICE

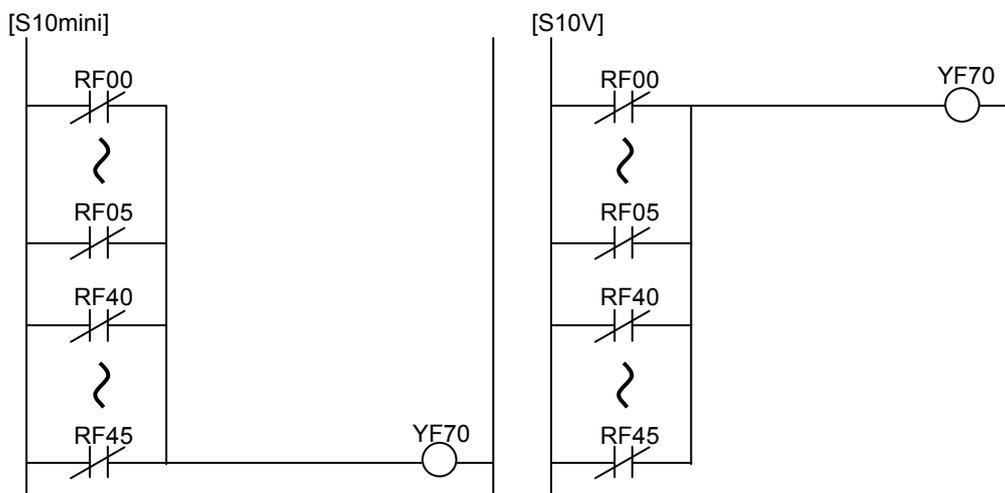
For S10mini, please confirm whether the extension memory corresponding to a set address is mounted when the address of the extension memory is set. The system performance might decrease when the extension memory corresponding to a set address is a unmounting, and mount it, please.

(chapter 5, page 5-13)

NOTICE

The breakage of the primary ring and the secondary ring at different point (different modules) as shown in Figure 5-12 could disable successful communication. Never use the SD.LINK module in a situation like this. Customers are advised to program all modules to detect a fault as soon as a breakage occurs at an one point and report an alarm condition accordingly.

[Example] The CPL numbers of SD.LINK modules connected are 0 to 5 and the RAS table starting address is set to RWF00 (YF70 is assigned as an alarm reporting coil in the example below).



(chapter 5, page 5-15)

NOTICE

If FW or an extend memory area is set as an RAS bit area, pre-reset data may be left for 2 seconds after a reset is cleared. Allow for at least 2 seconds after a reset before gaining access to these areas.

(chapter 6, page 6-8)

NOTICE

- Replace modules one at a time. If optical fiber cables are disconnected at multiple points and the same time, communication might be disabled.
- Before replacing optical modules receptacle, check that the optical fiber cables are not broken. Disconnecting optical fiber cables for replacement while they are broken could disable communication.
- A breakage is detected in the RAS table while replacement work is in progress. If an optical fiber cable is disconnected for replacement, a breakage is detected in the RAS table, but successful communication is carried on.

(chapter 6, page 6-10)

NOTICE

- Use maximum care in handling optical fiber cables. To avoid breakage, do not reduce the bending radius to 30 mm or less.
- Clean the optical module receptacle and optical connectors after measurement.
- Because the SD.LINK module (LQE530) uses a Type SC (or 2SC) optical connector, the optical power meter must support Type SC (or 2SC) accordingly. Use a Type SC (or 2SC) connector adapter (included with the optical power meter or sold separately).

(chapter 6, page 6-12)

NOTICE

- Use maximum care in handling optical fiber cables. To avoid breakage, do not reduce the bending radius to 30 mm or less.
- Clean the optical module receptacle and optical connectors after measurement.
- Because the SD.LINK module (LQE530) uses a Type SC (or 2SC) optical connector, the optical power meter must support Type SC (or 2SC) accordingly. Use a Type SC (or 2SC) connector adapter (included with the optical power meter or sold separately).

(chapter 6, page 6-17)

NOTICE

A parameter error occurs when the module is mounted on a model different from the one for which parameters has been set in “4.6 Commands.” Specifically, these two cases are conceivable:

Case 1: If an SD.LINK module for which parameters have been set with the S10V is mounted in the S10mini, either “SDM PRME” or “SDS PRME” is displayed in the CPU module indicator.

Case 2: If an SD.LINK module for which parameters have been set with the S10mini is mounted in the S10V, 0x0112 is displayed in the tool (S10V Basic System) error log.

These functions keep the SD.LINK module from malfunctioning on referencing parameters that have been set on a different model.

A parameter error would also be displayed when a checksum error occurs in the parameter settings. When a parameter error occurs, open the parameter setup screen on the model mounted to modify the parameter settings as needed.

(chapter 6, page 6-27)

NOTICE

Error status “FFFF” is set when a receive timeout error occurs.

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>

SD.LINK (LQE530)

<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.	September 2008	
G	<ul style="list-style-type: none">• Changes are added to the Table 6-6“Error Status Details.”• All the safety precautions and instructions in this manual have been reviewed and necessary changes are added to them.• Windows® 7 (32-bit) operating system is newly supported.	January 2013	

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 SD.LINK module, which is an option for use with the S10mini/S10V. This manual, named “USER’S MANUAL OPTION SD.LINK,” describes how to use the SD.LINK module. For proper use of the SD.LINK 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: LQE530

Environmentally resistant model: LQE530-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) = 1,000² bytes

1 GB (gigabyte) = 1,000³ bytes

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1 SPECIFICATIONS

1 SPECIFICATIONS

1.1 Use

The SD.LINK module allows data to be shared between CPU or LPU units by transferring memory between them. Up to 4,096 items of I/O data, and up to 4,096 words of data can be shared.

When the module (Model: LQE530) is used with an S10mini CPU unit, it can be intermixed with an SD.LINK module (Model: LQE030) that is dedicated to the S10mini. (The LQE030 cannot be used with an S10V LPU unit.)

1.2 Specifications

Item		Specifications (LQE530)
System	Maximum number of modules mounted	Two modules/CPU Two modules/LPU
	Number of lines	Two lines/module
	Mass	300 g
Line	Network configuration	Double ring
	Transmission speed	2 Mbps
	Maximum transmission distance	15 km between modules (using a cable with a transmission loss of 0.5 dB/km or less) 60 km/ring
	Number of units connected	64 units
	Maximum size of data shared between systems	I/O data: 4,096 items Word data: 4,096 words
	Maximum size of data shared between modules	I/O data: 2,048 items/module Word data: 1,024 words/module
	Data transfer cycle	Approx. 13 to 250 ms (dependent on the number of units connected and data traffic)
	Wavelength	1300 nm
Cable	Optical connector	SC type
	Optical fiber cable	Quartz glass fiber (single-mode optical fiber) (Use of a cable with a transmission loss of 0.5 dB/km or less recommended)

NOTICE

- Up to two units of the SD.LINK (LQE030/530) module and the OD.RING (LQE010/015/510/515) module can be intermixed per CPU or LPU.
- The maximum module-to-module transmission distance of 15 km assumes the use of an optical fiber cable with a cable transmission loss of 0.5 dB/km. Cable transmission loss measurement is recommended during cabling. The cable transmission loss at the receiving end may not exceed -14 dBm to -31 dBm.
- The SD.LINK involves such large current dissipation that a limit is placed on the maximum number of modules that can be mounted in an S10mini CPU unit eight-slot mount base.
 - When one SD.LINK module is mounted: Up to seven can be mounted.
 - When two SD.LINK modules are mounted: Up to six can be mounted.With an S10V LPU unit, the sum total of the current dissipations of the modules mounted may not exceed 7 A (at an ambient temperature of 48°C or lower). For more information, refer to “9.7 Power Supply Module Output Current,” in “S10V USER’S MANUAL BASIC MODULES (manual number SVE-1-100).”
- The SD.LINK (LQE030/530) and the OD.RING (LQE010/015/510/515) cannot be connected together because they use optical fiber cables of different make.

1 SPECIFICATIONS

1.3 System Software Specifications

1.3.1 System overview

When you use the SD.LINK module, you must register various items of information in the module. Register the module information using the following system software (tool) and by performing operating procedures similar to those for general Windows® applications.

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

Package name	Model		Supply style
	For S10mini	For S10V	
OD.RING/SD.LINK system	S-7890-28	H-7895-28	Optional

1.3.2 Required hardware and software

The following hardware and software are required for the use of the SD.LINK module system software.

(1) For S10mini

- Personal computer (main unit) containing a Pentium 133 MHz or faster CPU
- Personal computer (main unit) containing a Pentium 300 MHz or faster CPU (when Windows® 2000 or Windows® XP is used)
- Display having a resolution of 800 × 600 dots (SVGA) or higher
- 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 later
- At least 32MB of RAM
- At least 64 MB of RAM (when Windows® 2000 is used)
- At least 128 MB of RAM (when Windows® XP is used)
- At least 10MB of free hard disk space
- Cable for connecting the personal computer to the CPU unit (RS-232C cross cable with D-sub 9-pin connectors) or cable for connecting the personal computer to the ET.NET module (10BASE-T twisted pair cross cable with RJ-45 modular connectors)

(2) For S10V

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

NOTICE

Users of this product must have adequate knowledge of the Windows® environment and user interface. This system conforms to the Windows® standard. This manual is prepared for users who are familiar with the basic Windows® operating procedures.

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2 NAMES AND FUNCTIONS OF EACH PART

2 NAMES AND FUNCTIONS OF EACH PART

2.1 Names and Functions of Each Part

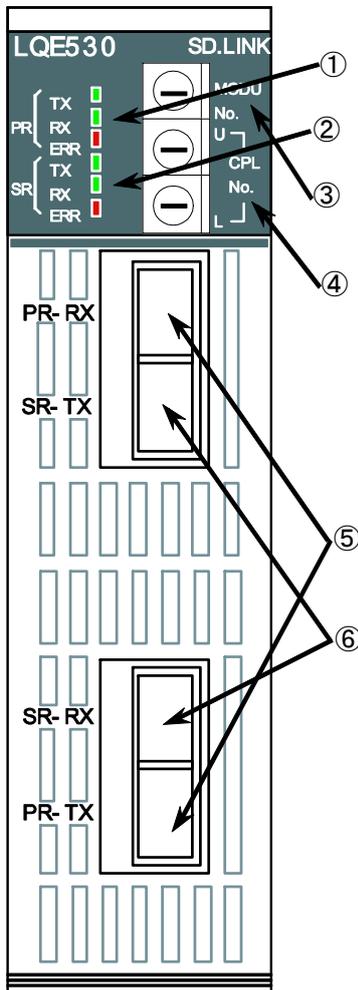


Figure 2-1 SD.LINK Module Front View

- ① Primary ring (PR) LEDs
TX: Glows when the local station is sending data.
RX: Glows when the local station is receiving data.
ERR: Glows when a hardware error has occurred.
A parameter error will occur if the SD.LINK module is mounted on a model different from the one that has been defined as a parameter in “4.6 Commands.”
- ② Secondary ring (SR) LEDs
Similar to ①.
- ③ Module number (MODU No.) setting switch
Set the number of units connected, the distinction between a main module and a submodule, optical level measurement and so on.

Table 2-1 Module Number Setting Switch

Function	Main module setting number	Submodule setting number
33 to 64 units connected	0	1
17 to 32 units connected	2	3
9 to 16 units connected	4	5
1 to 8 units connected	6	7
Not used (T/M1)	8	9
Not used (T/M2)	A	B
Not used (T/M3)	C	D
Optical level measurement	E	F

- ④ CPL number (CPL No.) setting switch
Set a unique number to identify each SD.LINK module connected to the line, between /00 and 3F.
- ⑤ Primary ring (PR) optical module receptacle
TX (transmit): Connected to the primary ring RX of the next-stage module.
RX (receive): Connected to the primary ring TX of the previous-stage module.
- ⑥ Secondary ring (SR) optical module receptacle
TX (transmit): Connected to the primary ring RX of the next-stage module.
RX (receive): Connected to the primary ring TX of the previous-stage module.

NOTICE

- Up to two units of the SD.LINK (LQE030/530) module and the OD.RING (LQE010/015/510/515) module can be intermixed. Set the module number setting switch on either module to main and that on the other to sub.
- If the module number setting switch is set to ‘E’ or ‘F’ and then the power to the SD.LINK module is cycled or it is reset, its error LED will glow but this is not a sign of fault.

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 SD.LINK 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 Module

Mount the option module in option slots (slot numbers 0 through 7) on the mount base as shown in Figure 3-1.

NOTICE

S10mini Series

- Mount the option module in option slots that is located to the immediate right of the CPU module. Be sure that no I/O module is mounted between this option module and CPU module. Also, ensure that there is no unoccupied slot between option modules.
- This module (LQE530) can be mounted together with the LQE030 SD.LINK module, which is specially designed for use with the S10mini.

S10V Series

- There are no specific rules about the mounting position or unoccupied slots.
- The LQE030 SD.LINK module cannot be used as it is specially designed for use with the S10mini.

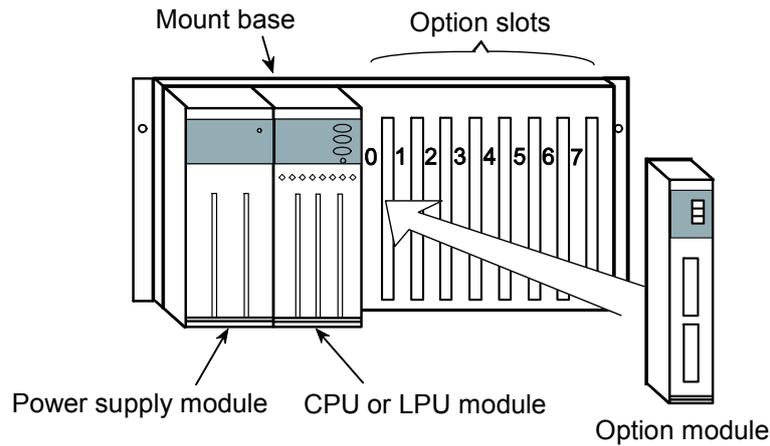
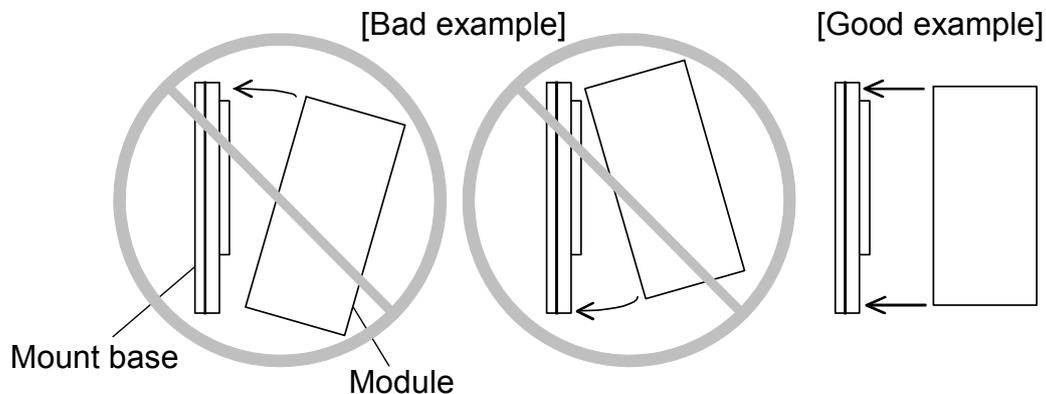


Figure 3-1 Mounting the Option Module

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, observed 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.



3.3 Ground Wiring

Carry out ground wiring as shown in Figure 2-2 by following these steps:

- ① Connect the FG terminals of the power supply module, CPU module and option modules by crossover wiring to the mount base's grounding seat, a hexagon nut fitted to the mount base FG terminal (with a wire diameter of 2.0 mm^2 or more).
 - The SD.LINK module (LQE530) does not have an FG terminal.
 - For information about other option modules, refer to the manuals supplied with the modules. (Some option modules do not have an FG terminal.)
- ② Wire the mount base FG terminal to the PCs unit grounding point of the enclosure in which the mount base is housed (with a wire diameter of 2.0 mm^2 or more).
- ③ Perform Class D grounding* from the PCs unit grounding point of the enclosure using a wire with a wire diameter of 5.5 mm^2 or more.

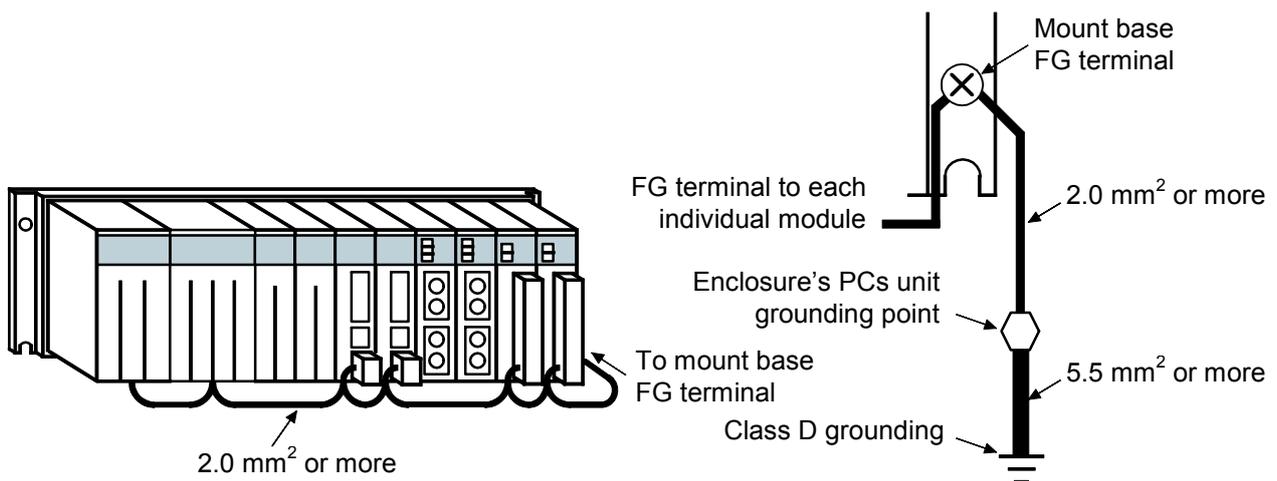


Figure 3-2 Grounding Wiring

* 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 making connections to the terminal block. Making connections with the power supply being switched on may 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

Connect the TX and RX terminals of each SD.LINK module and those of the adjoining SD.LINK module with optical fiber cables to form a ring as shown in Figure 3-3.

Communications data will transit from TX to RX in the arrow direction.

(2) Secondary ring (SR) wiring

Connect the TX and RX terminals of each SD.LINK module and those of the adjoining SD.LINK module the same way as in primary (PR) wiring, except that the communications data transmits in the opposite direction (in the direction opposite to the arrow mark for PR wiring).

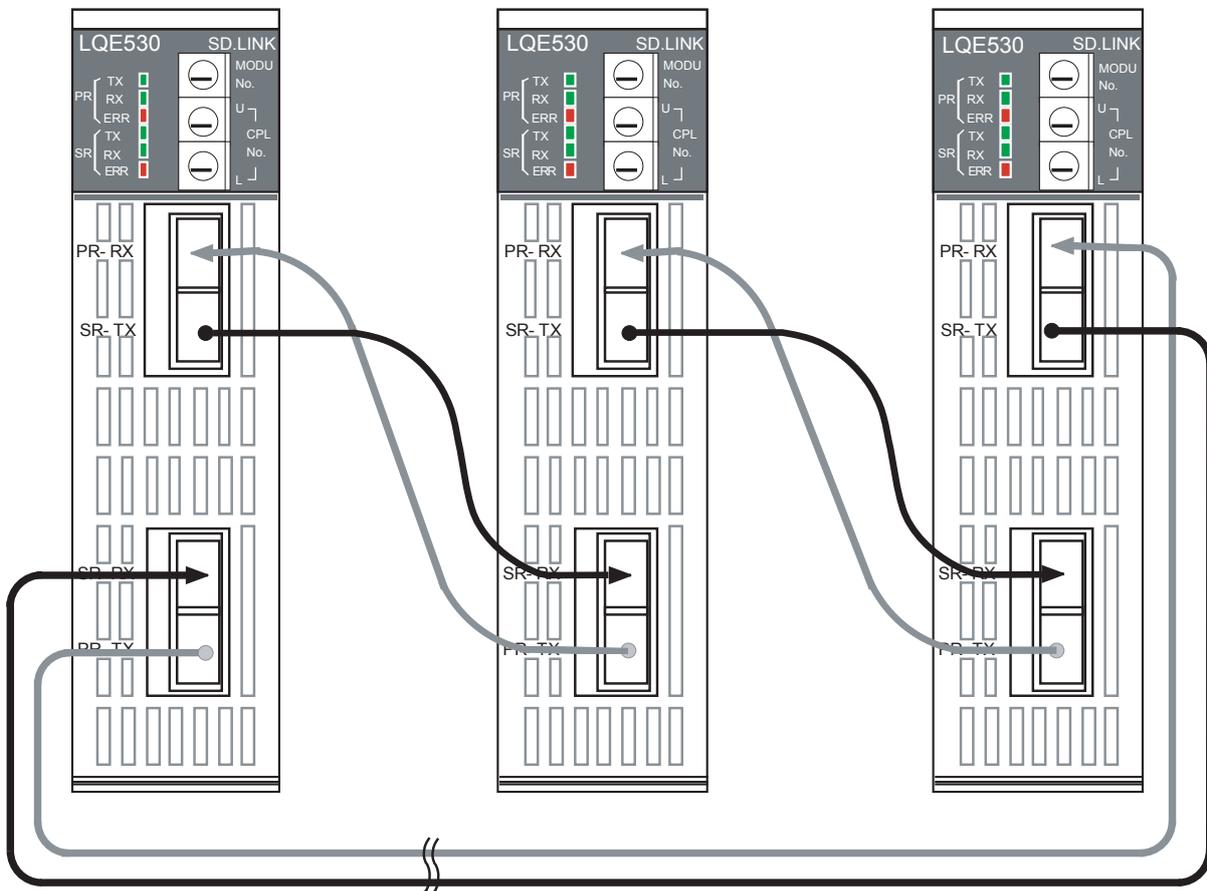


Figure 3-3 Optical Fiber Cable Wiring

NOTICE

Optical fiber cable wiring is an error-prone task. Mark each optical fiber cable with the wire gauge before connecting it.

NOTICE

- Insert the optical connector key into the key slot in the optical module receptacle deep enough to hide the white mark on the optical connector.
- The primary ring and the secondary ring involve opposite directions of data transmission as shown on the previous page. Incorrect wiring could inhibit successful communication or result in degraded fault tolerance.
- Clamp optical fiber cables with a bending radius (R) of 30 mm or more. A bending radius less than 30 mm could break the internal fiber, resulting in a burnout. (The requirement for a bending radius of 30 mm or more applies to single-core optical fiber cables. Optical fiber cables come in numerous types. Check with your cable manufacturer to find out more.)
- Use optical fiber cables in a double-ring fashion. Use of a broken ring, or incorrect wiring of the primary and secondary rings could disable fault avoidance or detract from successful communication.
- When using an optical fiber cable with a tension member inserted in it and then fastening the tension member to a enclosure, insulate the enclosure electrically. (If the tension member electrically connects two enclosures, circulating current could flow, causing noise interferences.)

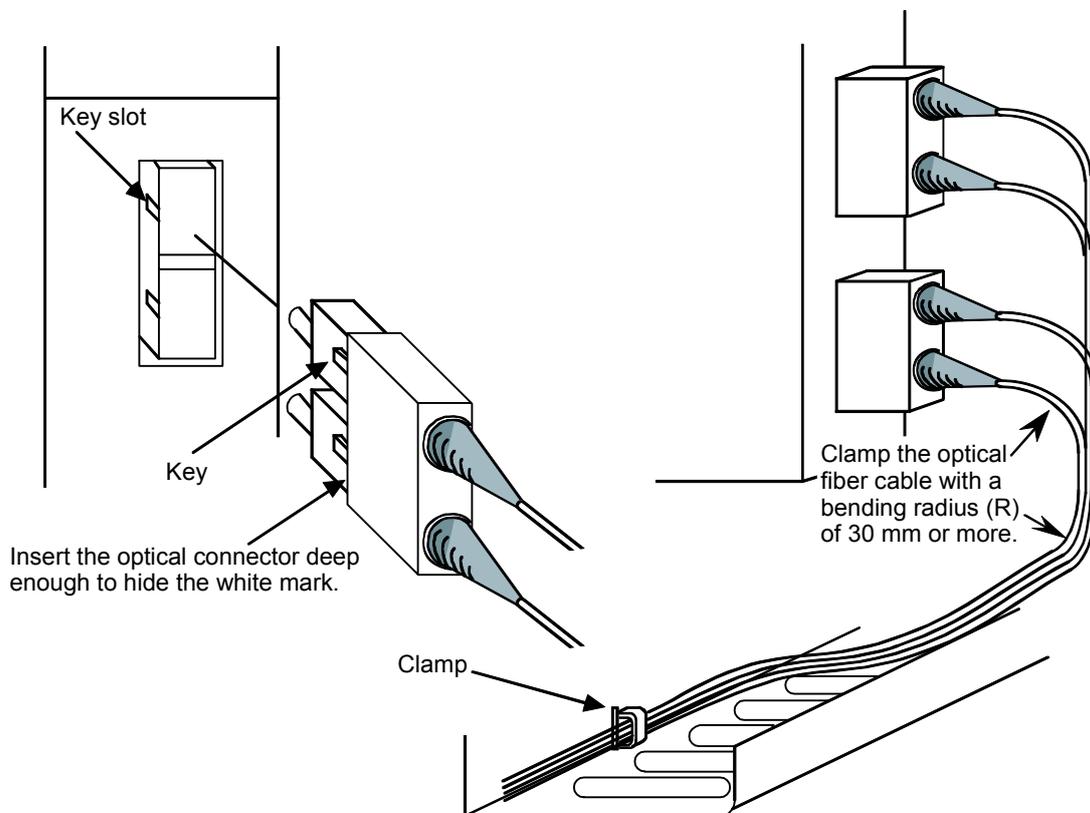


Figure 3-4 Optical Fiber Cable Handling

3.5 Optical Fiber Cables

3.5.1 Types of optical fiber cables

It would be technically difficult for customers to purchase an optical fiber cable and an optical connector separately and then attach the optical connector. Instead, customers are advised to purchase a cable with double-ended connectors or have a professional contractor carry out the cabling work.

Optical fiber cables come in diverse types. Select optical fiber cables to suit specific applications. Typical kinds of optical fiber cables available include single-core, flat, round, and spacer cables.

Table 3-2 Types of Optical Fiber Cable

Type	Feature	Cross section
Single core	Use for indoor wiring, particularly in intra-board wiring.	<p>Core Clad High-tensile fiber PVC sheath</p>
Flat	Use for indoor wiring over a relatively short cable laying distance, which is subject to no or little external forces.	<p>Optical fiber core wire Tension member Internal PVC sheath External PVC sheath</p>
Round	A tension member inserted in the center of the cable makes for enhanced mechanical characteristics. Use for indoor wiring where there is relatively little external force at work.	<p>Tension member Optical fiber core wire Tension member Internal PVC sheath Retaining tape External PVC sheath</p>
Spacer	The structural complexity of spacer optical fiber cables, when compared with flat and round cables, offers exceptional mechanical characteristics. Use for outdoor wiring where there is large external force acting.	<p>Optical fiber core wire Tension member Slotted spacer Retaining tape LAP sheath</p>

3.5.2 Optical fiber cable specifications

The kinds of optical fiber cables that can be used with the SD.LINK module are limited. When customers order an optical fiber cable, they should purchase one that meets the following specifications:

Table 3-3 Optical Fiber Cable Specifications

Item	Specifications
Fiber core wire material	Quartz glass
Optical fiber type	Single mode
Core diameter	9.5 μm
Clad diameter	125 μm
Optical connector	SC type
Wavelength	1300 nm
Transmission loss	0.5 dB/km

3 MOUNTING AND WIRING

3.5.3 Recommended cables

As cables with SC connector, cables manufactured by Hitachi Cable, Ltd. are recommended. To order the right kind of cable for specific applications, specify the kind of optical fiber cable, number of cores, kind of optical connector, cable length and so forth. When ordering optical fiber cables, check with your nearest office of Hitachi Cable, Ltd.

MC-SM1005-2F(Y)#2SC/P/0.2#2SC/P/0.2#50M
(1) (2) (3) (4) (5) (6) (7) (8) (9) (10)

The above format designates a single-mode optical fiber cable, twin-core flat type, terminated by double SC optical connectors at both ends, with a branch length of 0.2 m and a cable length of 50 m.

(1) Cord

Type MC: Centralized cord type (indoor use)

(2) Type of optical fiber cable (Specify the following code)

SM1005: Single mode (0.5 dB/km, wavelength: 1300 nm, core diameter: 9.5 μm)

(3) Optical fiber cable structure

2F(Y): Twin-core flat, yellow jacket

4R(Y): Four-core flat, yellow jacket

(4) Type of optical connector (Specify one of the following codes)

SC: SC type

2SC: Double SC type

(5) Optical connector grinding method (Specify the following code)

P: PC polished

(6) Branch length

Specify a branch length in meters.

(7) to (9)

These specifications are unnecessary for single-ended connectors. When using optical fiber cables with the SD.LINK module, however, specify (4) to (6) because they come essentially with double-ended connectors.

(10) Cable length

Specify in meters.

4 OPERATION

4.1 Startup Procedure

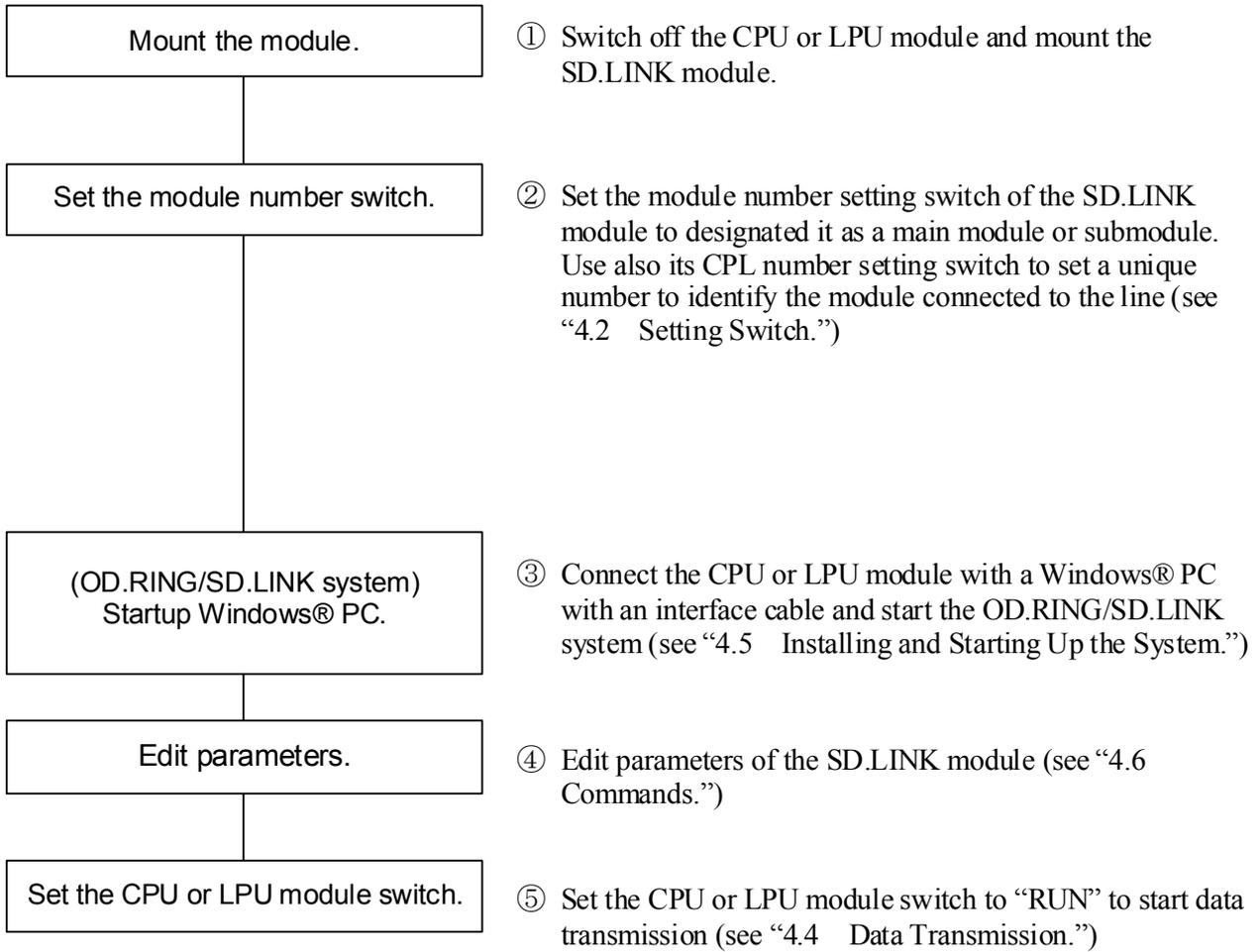


Figure 4-1 Startup Procedure

4.2 Setting Switches

- Module number setting switch

Set the module number switch to meet the number of modules connected to the line.

NOTICE

The following setting is not supported.

- The switch is set to an undefined function (see “2.1 Names and Functions of Each Part.”)

- CPL number setting switch

- Set the CPL number switch to assign a unique number to identify each module connected to the SD.LINK. Numbers need not be assigned in sequence.
- Set the module number switch and the CPL number switch according to the number of SD.LINK modules connected to the line as specified in Table 4-1.

Table 4-1 Module Number and CPL Number Setting Switch

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

NOTICE

The following settings are not supported.

- The switch is set to an existing CPL number on the SD.LINK.
- A CPL number out of bounds (40 to FF) is set.

4.3 Switching On

- (1) Set the CPU 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) Open the power supply module cover, set the POWER switch to “ON” to switch on the power.

NOTICE

Relationship between the SD.LINK module and the CPU or LPU switches.
Functioning of the CPU or LPU switches affects the operations of the SD.LINK module.

- STOP

The SD.LINK module receives data transmitted from another module and updates memory transfer areas. It does not transmit data from the local module but transmits communications control data.

- RUN, SIMU RUN

The SD.LINK module transmits and receives data.

4.4 Data Transmission

Set the CPU 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 by double-clicking the “setup.exe” file stored in the DISK1 folder on the S10mini OD.RING/SD.LINK system CD.

When the OD.RING/SD.LINK system is installed successfully, create a shortcut on the desktop for that system as necessary, because the window for the installed program is not displayed automatically on the screen. To accomplish this, do the following:

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® 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 and error occurs, first uninstall the S10mini OD.RING/SD.LINK system as directed in Section 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® programs, and then install the S10mini OD.RING/SD.LINK system again.

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

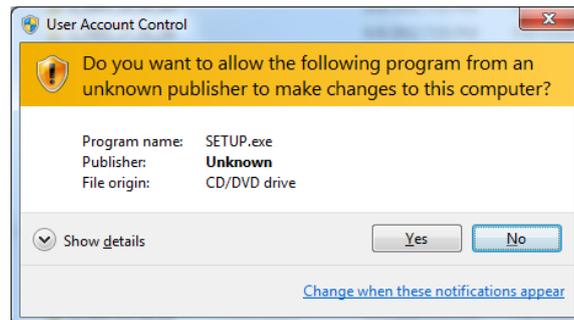
To install the S10V OD.RING/SD.LINK system, you must execute the setup program that is stored in the S10V OD.RING/SD.LINK system DISK1 folder on the CD.

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

Click the button and choose [(All) Programs] – [Hitachi S10V] – [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 personal computer. When you have so logged on, you can then double-click “setup.exe” that is stored in the DISK 1 folder on the S10V 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 S10V OD.RING/SD.LINK system cannot be installed on a per-user basis. To install the S10V 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 S10V 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 S10V 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 personal computer; 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 S10V OD.RING/SD.LINK system. In this case, click the button to set off overwriting.

NOTICE

- The S10V Base 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® 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® Programs, and then install the S10V OD.RING/SD.LINK system again.

4.5.2 Uninstalling

The existing S10V 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 [Change/Remove] 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 Base System, be sure to perform an uninstall and then perform an install.

4.5.3 Starting up the system

To start up the OD.RING/SD.LINK system, perform the following procedure:

- 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 [(All) 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.

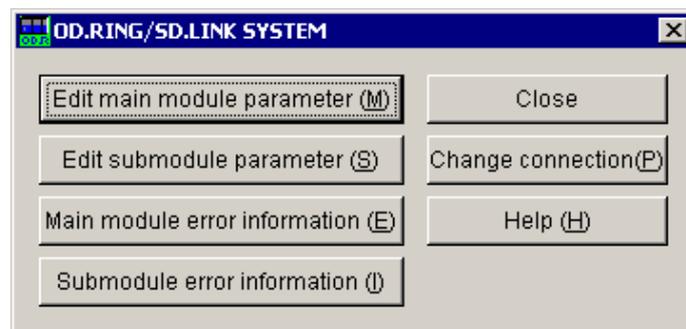


Figure 4-2 [OD.RING/SD.LINK SYSTEM] Window

- 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.

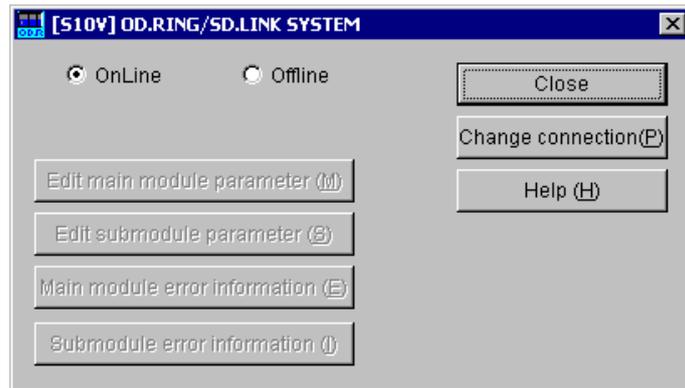


Figure 4-3 [[S10V] OD.RING/SD.LINK SYSTEM] Window

- (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.

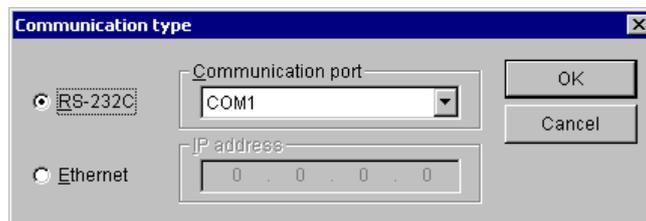


Figure 4-4 [Communication type] Window

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

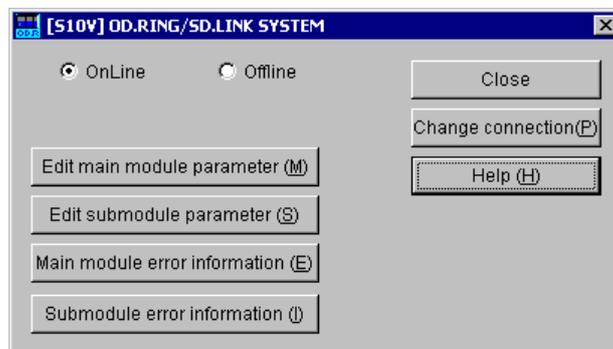


Figure 4-5 [[S10V] OD.RING/SD.LINK SYSTEM] Window

- 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.

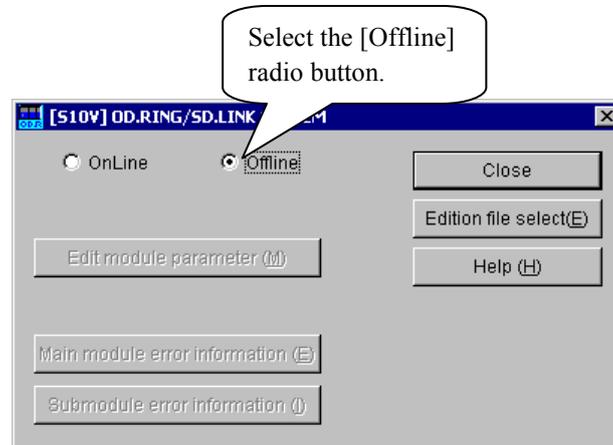


Figure 4-6 Selecting the [Offline] Radio Button

- (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.

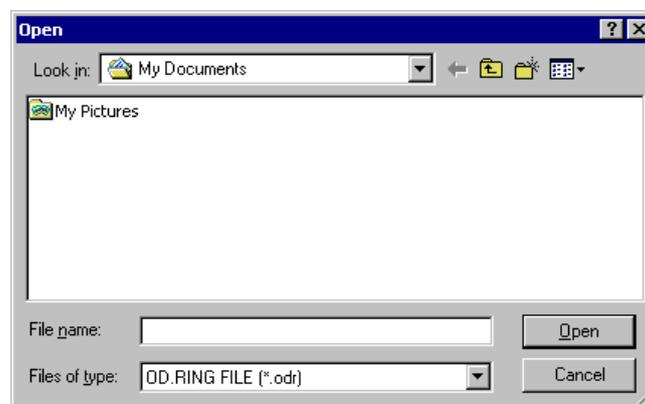


Figure 4-7 Selecting the Edition File You Want to Edit

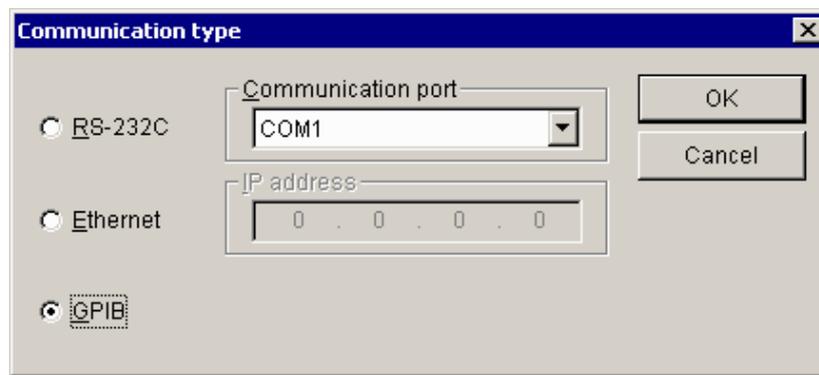
4 OPERATION

4.5.4 Changing connections

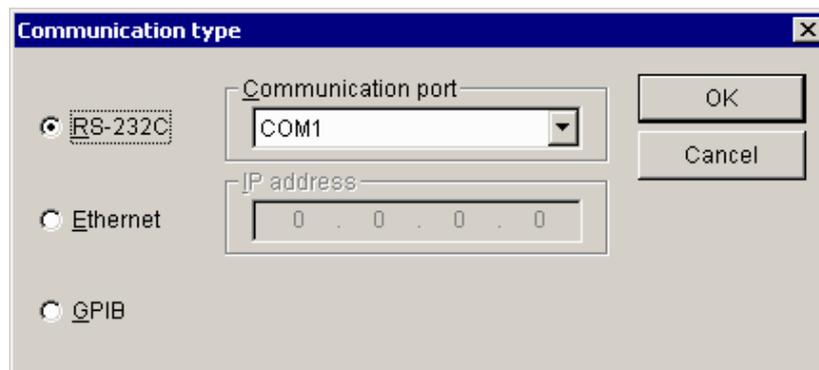
Function: Sets the PCs-to-personal computer communication type.

Operation: Follow these steps:

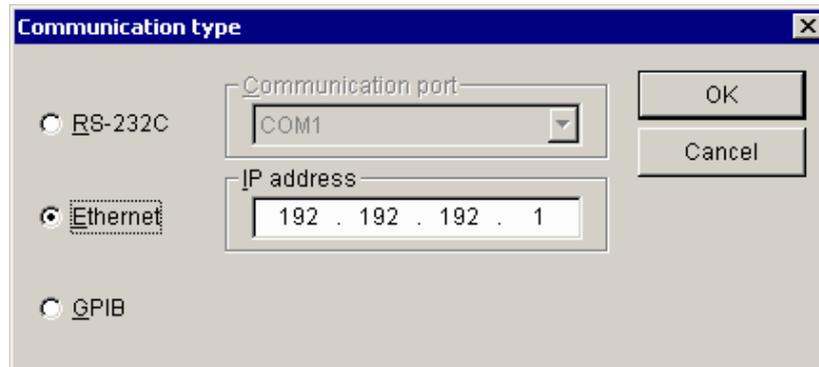
- (1) Click the **Change connection** button in either of the [OD.RING/SD.LINK SYSTEM] window (see Figure 4-2) or [[S10V] OD.RING/SD.LINK SYSTEM] window (see Figure 4-3).
- (2) The [Communication type] window then opens the [S10V] OD.RING/SD.LINK does not have a “GPIB” button.



- (3) For RS-232C communication, click “RS-232C” and then select a “Communication port.”



- (4) For Ethernet communication, click “Ethernet” and then enter the connection destination “IP address.”



NOTICE

- The S10mini Series does not support GP-IB. Do not select “GPIB” on the [Communication type] window.
- The S10V Series does not support GP-IB. GPIB is not displayed on the [Communication type] window.

- (5) After completion of setup, click the **OK** button. To abort the setup process, click the **Cancel** button.

4.5.5 Selecting an edition file

Function: The function of this action is to choose a file you want to edit in offline mode. The files that you can choose for editing are those parameter settings files which have been saved 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.

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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.

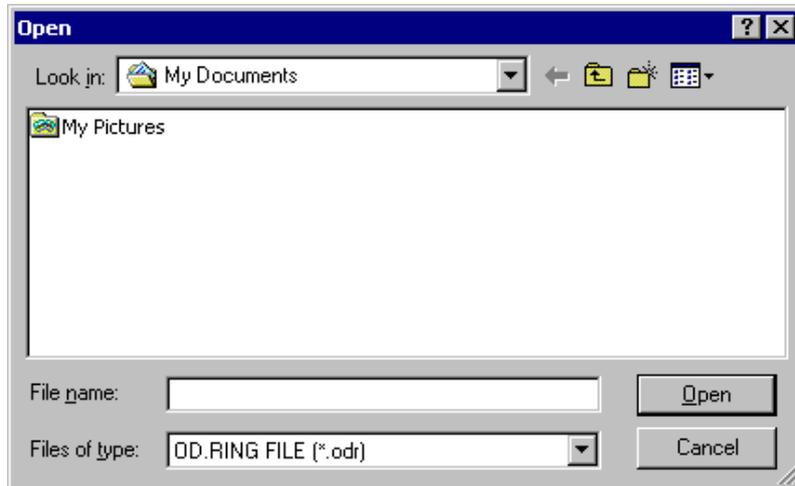


Figure 4-8 [Open] Window -- an Example

- (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, choose [main] or [sub] and 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 [Open] 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.

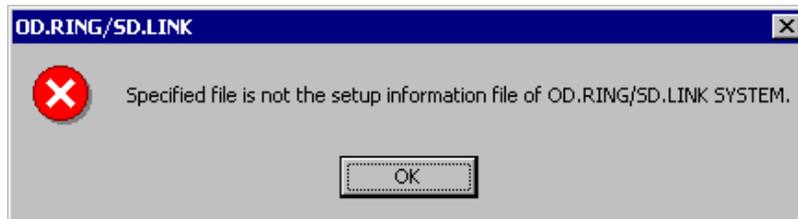


Figure 4-10 Error Message Dialog Box Reporting on an Invalid OD.RING/SD.LINK Setup Info File Specified

If the selected file is a valid external serial link setup info file, you can now edit the setup information in that file as you do while the external serial link system is running in online mode.

4.5.6 Closing the system

In the [OD.RING/SD.LINK] or [[S10V] OD.RING/SD.LINK] window (see Figures 4-2 and 4-3), click the button or button.

4.6 Commands

4.6.1 OD.RING/SD.LINK system function architecture

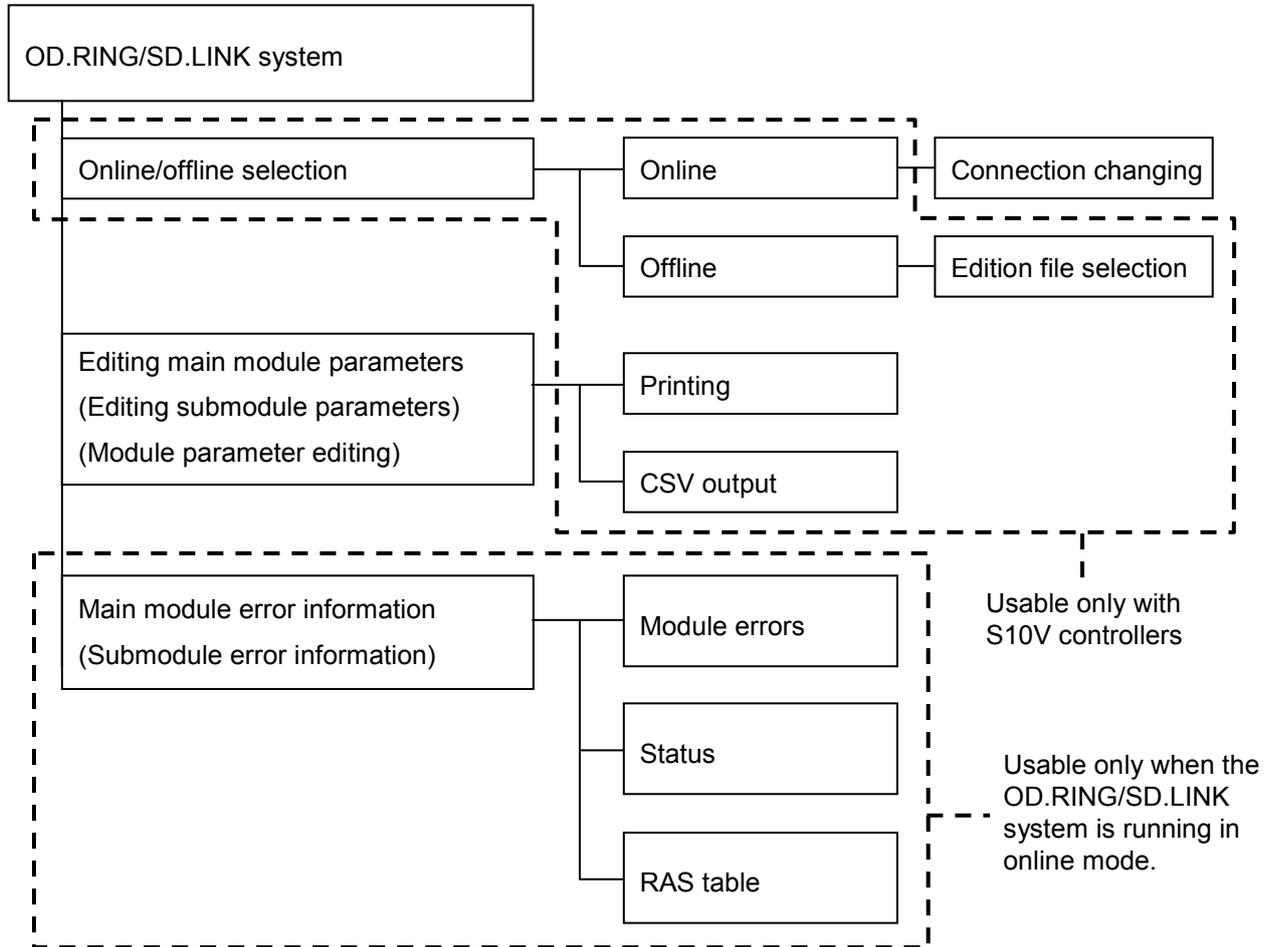


Figure 4-11 OD.RING/SD.LINK System Function Architecture

4.6.2 Main module (submodule) parameter information

Function: Set the main module (submodule) bit data, word data, and RAS table address.

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). (If you are editing parameters for the S10V controller in offline mode, click the button instead of [Edit main module parameter] and [Edit submodule parameter].)
- (2) A [Set parameter] window is displayed. Enter the starting address and ending address of the desired range of bit data addresses in the left and right “Bit data address” boxes, respectively. Enter such addresses also in the “Word data address” boxes for the desired range of word data addresses. For the RAS table addresses, enter only the starting address of the desired range of addresses in the left box. The ending address of that range will be automatically calculated.

In the S10mini OD.RING/SD.LINK system’s version of this window, the , , , and buttons, and the “Use extend memory” box are not present, and the button is replaced by the button.

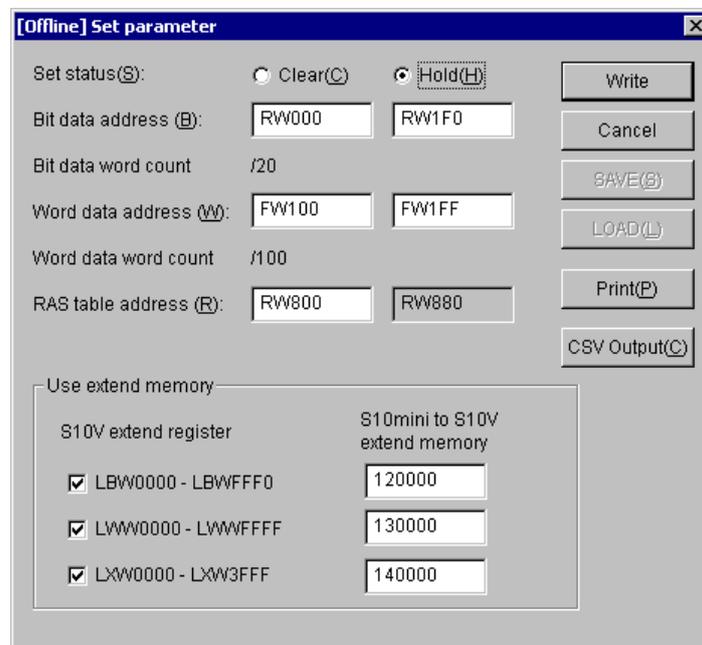


Figure 4-12 [Set parameter] Window -- an Example

4 OPERATION

- Set status
Set the hold/clear operation mode. The hold/clear mode holds or clears to 0 transfer areas from a remote SD.LINK module when data is no longer received from that module.
- Bit data address
Set bit data addresses to be transferred to a remote SD.LINK module. For the setting range, see the next page.
- Word data address
Set word data addresses to be transferred to a remote SD.LINK module. For the setting range, see the next page.
- RAS table address
Set a RAS table address. The RAS table is 9 words long. For the setting range, see the table below. To find out more about the RAS table, see “5.6 RAS Table.”

Setting range	Bit data	Word data	RAS table
FW000 to FWBFF	Setting disable	Setting enabled	Setting enabled
XW000 to XWFF0	Setting enabled		
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)	Setting disable		
LBW0000 to LBWFFF0 (S10V only)	Setting enabled		
LWW0000 to LWWFFFF (S10V only)	Setting disable		
LXW0000 to LXW3FFF (S10V only)			

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.

- Use extend memory (S10V only)

To enable the S10V extend registers (LBW0000 to LBWFFF0, LWW0000 to LWWFFFF, LXW0000 to LXW3FFFF) in transmitting and receiving bit and word data, click the respective check boxes for the “S10V extend register” and specify the “S10mini to S10V extend memory.” If this setup is omitted, the S10V does not transmit the S10V extend registers but abandons S10mini extend memory data when it is received. Carry out this setup where an S10mini and an S10V are intermixed on a single network or if two S10V’s are connected together. For more information, see “4.6.7 Setting transfer areas where an S10mini and an S10V are intermixed.”

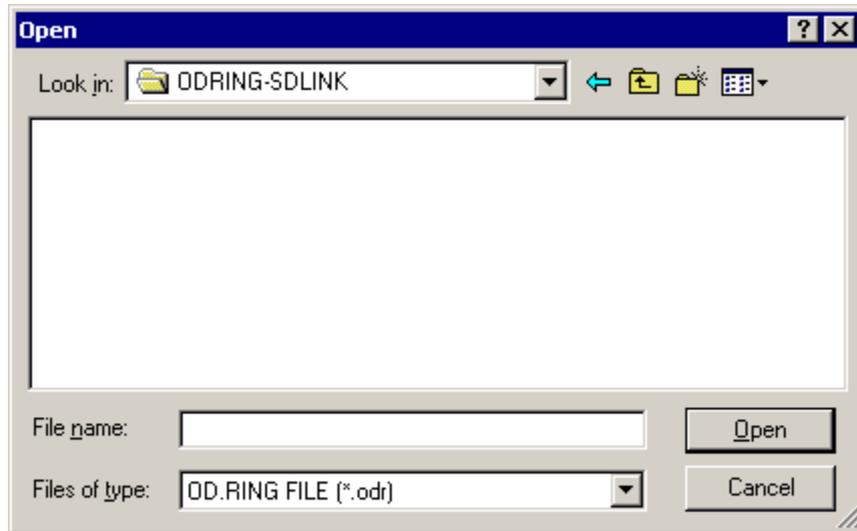
- (3) When the setup is complete, click the **OK** button (or **Write** button in the S10V OD.RING/SD.LINK system) to install the settings in the SD.LINK module. To abandon the settings, click the **Cancel** button.
- (4) You can save the settings to a file (S10V only). Click **SAVE** button in the [Set parameter] window when the setup in (3) is finished. A [Save As] window will be displayed.



- (5) When the setup is finished, click the **Save** button. To abandon the settings, click the **Cancel** button.

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- (6) You can also load the settings written to a file (S10V only). Click the **LOAD** button in the [Set parameter] window. An [Open] window will be displayed.



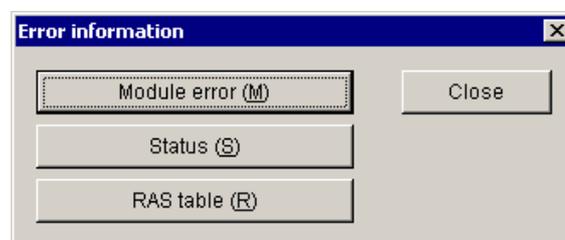
- (7) After setting the file name, click the **Open** button. Click the **Cancel** button not to load the file.

4.6.3 Main module (submodule) error information

Function: Select main module (submodule) error information to display.

Operation: Follow these steps:

- (1) Click the **Main module error information** or **Submodule error information** button in the [OD.RING/SD.LINK SYSTEM] window or the [[S10V] OD.RING/SD.LINK SYSTEM] window.
- (2) An [Error information] window is displayed.



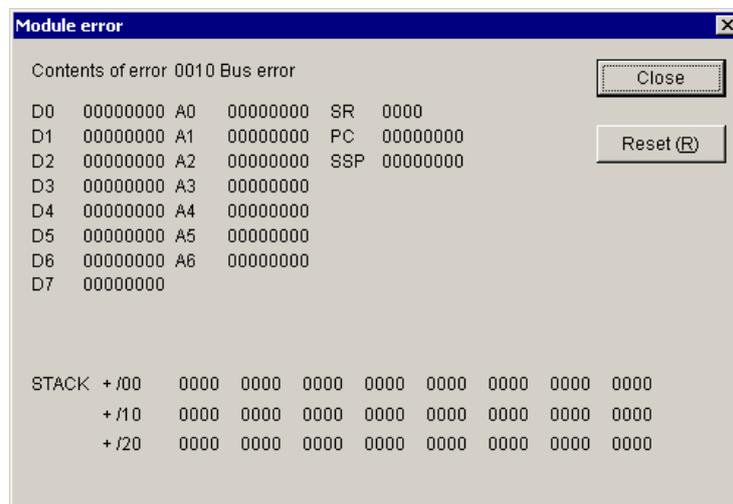
4.6.4 Module error

Function: Display main module (submodule) error information.

To find out more about error information, see “6.6.2 Error indications and remedial actions.”

Operation: Follow these steps:

- (1) Click the button in the [Error information] window.
Error information is displayed if a module error has been encountered.
Message “Module normal” is displayed if the main module or submodule is normal.



- (2) Click the button to view the latest error information. To quit the error display, click the button.

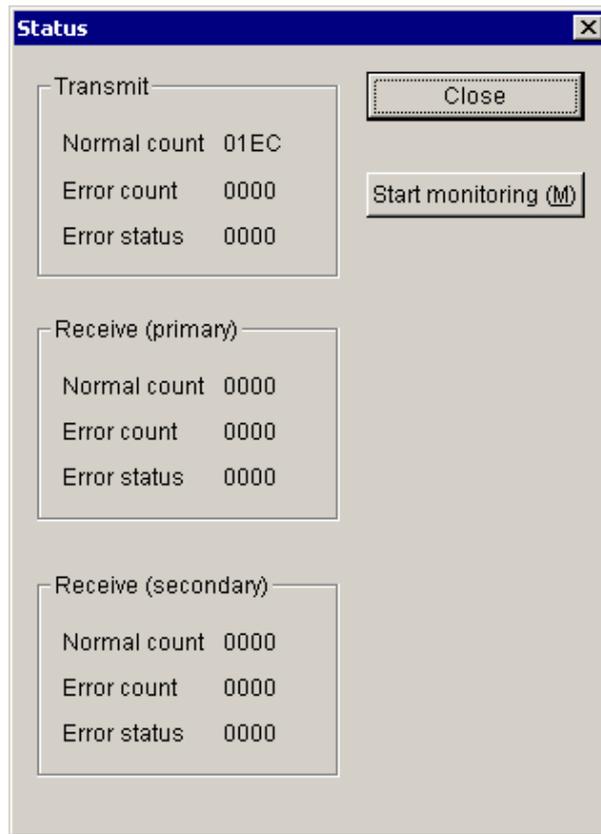
4 OPERATION

4.6.5 Status

Function: Display main module (submodule) status information.

Operation: Follow these steps:

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



- (2) Click the **Start monitoring** button to start monitoring. Click the **Stop monitoring** button to stop monitoring.
To quit the status display, click the **Close** button.

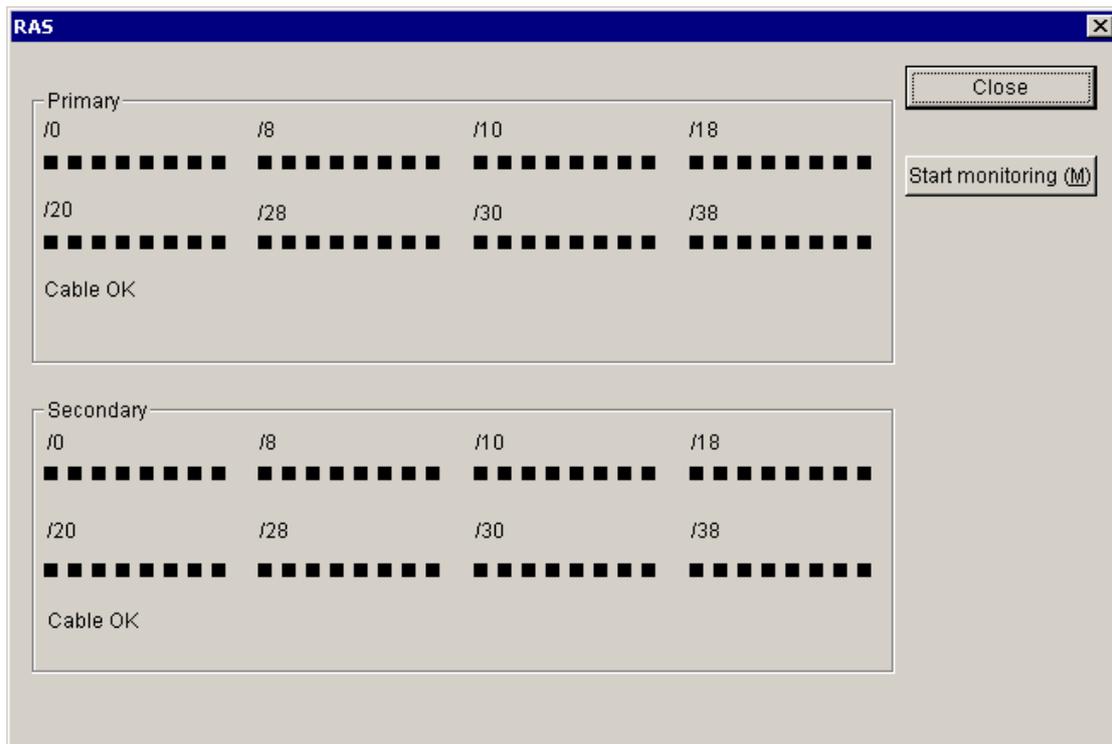
4.6.6 RAS table

Function: Display main module (submodule) RAS table information.

To find out more about the RAS table, see “5.6 RAS Table.”

Operation: Follow these steps:

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



- Click the **Start monitoring** button to start monitoring. Click the **Stop monitoring** button to stop monitoring.
To quit the status display, click the **Close** button.

Each bit of a CPL number is displayed in red if it is 1, or in black if it is 0.

For definitions of the bit positions, see “5.6 RAS Table.”

4 OPERATION

4.6.7 Printing

Function: Print the main or submodule setup information under editing to a specified printer.

This function is supported only in S10V controller systems.

Operation: The procedure used is shown below.

- (1) If the OD.RING/SD.LINK system is running in online mode, establish a connection between the OD.RING/SD.LINK system and the PCs (see “4.5.4 Changing the connection with the PCs”). If it is running in offline mode, choose the desired edition file (see “4.5.5 Selecting an edition file”).
- (2) Click the **Print** button in the [Set parameter] window (see Figure 4-12).
- (3) The [Print] dialog box appears. In this dialog box, specify the desired printer and its properties, and then click the **OK** button.

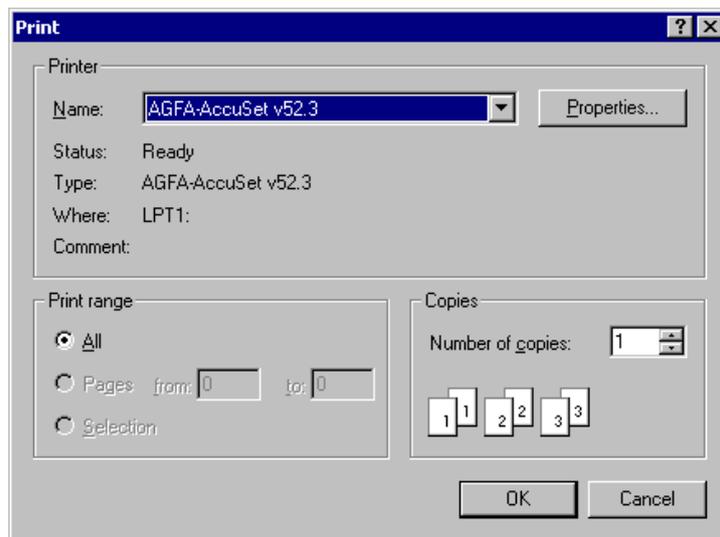


Figure 4-13 [Print] Dialog Box

<Sample printout>

OD. RING/SD. LINK 2006/10/31 20:15:20
File Name=C:\Documents and Settings\Administrator\Desktop\Nai\aaa\Settings\OD2.odr

Set status	Hold
Bit data address	RW000-RW1F0
Bit data word count	/20
Word data address	FW100-FW1FF
Word data word count	/100
RAS table address	RW800-RW880

Use extend memory	
LBW0000 - LBWFFFF0	120000
LWW0000 - LWWFFFF	130000
LXW0000 - LXW3FFF	140000

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4.6.8 CSV output

Function: Output the main or submodule setup information under editing to a specified file in CSV format. This function is supported only in S10V controller systems.

Operation: The procedure used is shown below.

- (1) If the OD.RING/SD.LINK system is running in online mode, establish a connection between the OD.RING/SD.LINK system and the PCs (see “4.5.4 Changing the connection with the PCs”). If it is running in offline mode, choose the desired edition file (see “4.5.5 Selecting an edition file”).
- (2) Click the **CSV Output** button in the [Set parameter] window (see Figure 4-12).
- (3) The [Save As] dialog box appears. In this dialog box, specify the desired folder and file to which you want to output the setup information, and then click the **Save** button.

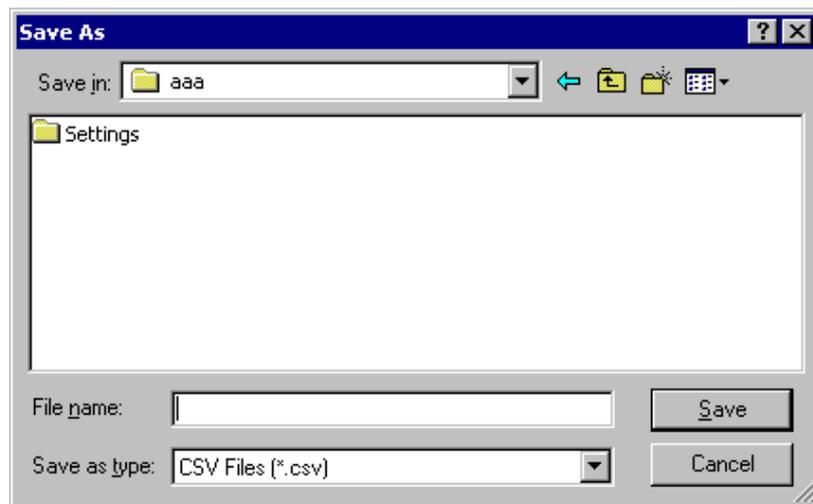


Figure 4-14 [Save As] Dialog Box

<Sample CSV file output>

OD. RING/SD. LINK 2006/10/31 20:16:51

File Name=C:\Documents and Settings\Administrator\Desktop\Nai\aaa\Settings\OD2.odr

Set status, Hold

Bit data address, RW000-RW1F0

Bit data word count, /20

Word data address, FW100-FW1FF

Word data word count, /100

RAS table address, RW800-RW880

Use extend memory

LBW0000 - LBWFFFF, 120000

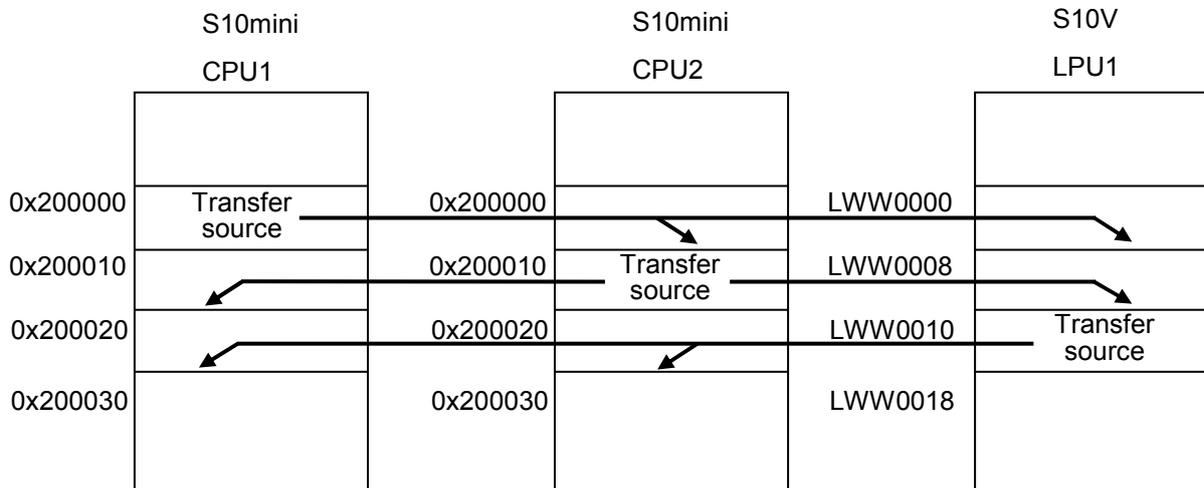
LWW0000 - LWWFFFF, 130000

LXW0000 - LXW3FFF, 140000

4 OPERATION

4.6.9 Setting transfer areas where an S10mini and an S10V are intermixed

This section describes how to configure and set the addition of an S10V to a network on which extend memory has been set as an SD.LINK transfer area by the S10mini. While the SD.LINK carries out absolute addressing-conscious transfers, simply transferring from S10mini extend memory to the S10V would not update the corresponding address location in the S10V, because its addresses associated with S10mini extend memory include ladder program and system table addresses as well. To work around this inconvenience, the S10mini extend memory addresses and S10V extend registers are associated with each other to carry out transfers between them. See the schematic below.



To transfer S10mini extend memory contents to the S10V and transfer S10V extend register contents to S10mini extend memory, associate the S10V extend registers with S10mini extend memory in the [S10V] OD.RING/SD.LINK system [Set parameter] window. The operation illustrated above could be accomplished by filling out the screen as shown in Figure 4-5.

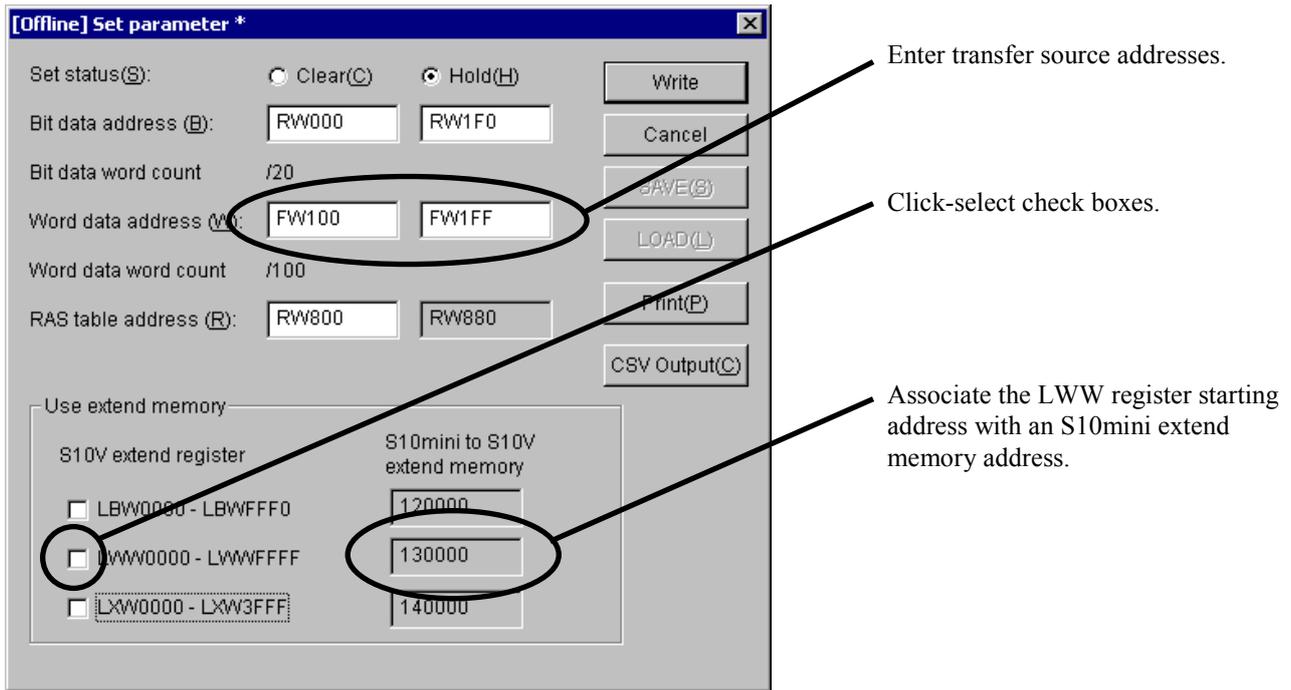


Figure 4-15 S10V (LPU1) Setting Example

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5 PROGRAMMING

5.1 Operation

The SD.LINK module transfers data in set area to a remote CPU (or LPU).

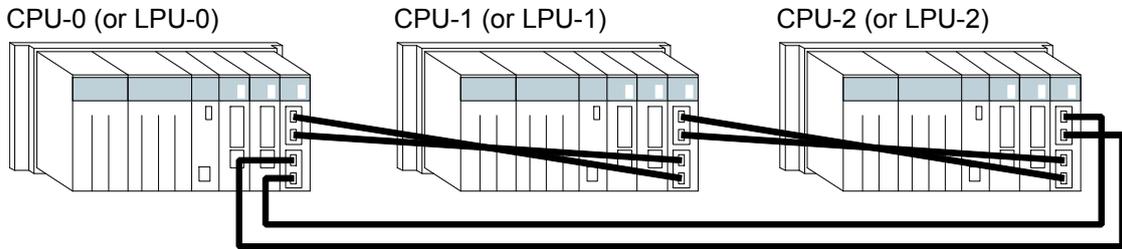


Figure 5-1 System Configuration Example

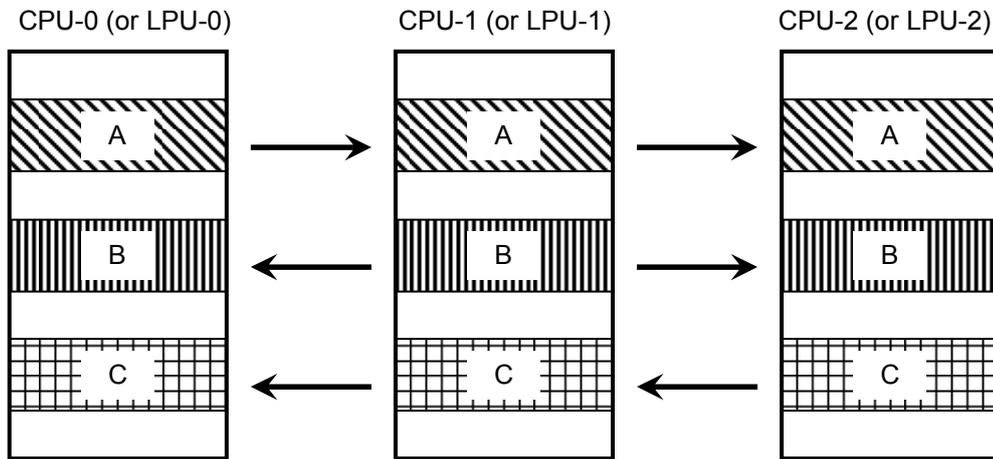


Figure 5-2 Memory Transfers

Figure 5-1 and Figure 5-2 show the memory transfer operations of 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 By this time, areas A to C have been shared by CPU-0 to CPU-2 (or LPU-0 to LPU-2).
Then, the flow returns to ① to iterate the sharing operation.

NOTICE

For a mixed connection of S10mini CPU units and S10V LPU units, see “4.6.7 Setting transfer areas where an S10mini and an S10V are intermixed.”

5.2 Transfer Cycle

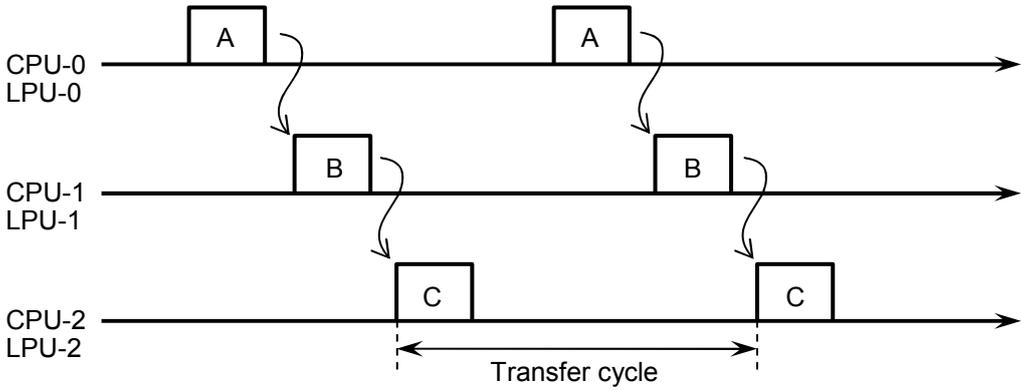


Figure 5-3 Transfer Cycle

The memory transfer operation described in “5.1 Operation” takes place at the timings shown in Figure 5-3. The time-base is taken on the horizontal axis. The sharing operation begins with CPU-0 (or LPU-0) transferring, and ends with CPU-2 (or LPU-2) transferring. This sequence is cyclically carried out to allow memory transfer areas to be shared.

The transfer cycle depends on the module number setting switch, the number of units connected, and data traffic and is calculated by solving the formulas listed in Table 5-1.

Table 5-1 Transfer Cycle Calculation Formulas

Module number setting switch	Transfer cycle calculation formula
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 active modules (units)
- Y: Size of word data (words)
- Z: Size of bit data (items)

5.3 Synchronism of Transfer Data

It may happen that application software and the SD.LINK module access a memory transfer area concurrently as they gain asynchronous access to the area. Note that the data might lose synchronicity as a memory transfer area block.

For example, if application software reads from a memory transfer area while the SD.LINK module is updating the area, data continuity would be lost.

Bit synchronicity within a single word is guaranteed, however, regardless of the access timing of the application software and the SD.LINK module, ensuring that analog data and counts will be transferred successfully.

5.4 Memory Transfer Area

Two memory transfer areas, one containing bit data and the other, word data, can be separately specified per module as memory transfer areas as listed in Table 5-2.

Table 5-2 Memory Transfer Areas

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
_____	_____	Extension memory (*1)	/100000 to /4FFFFFFE
LB0000 to LBFFF0 (*2)	/220000 to /23FFFFE	LBW0000 to LBWFFF0 (*2)	/412000 to /413FFE
_____	_____	LWW0000 to LWWFFFF (*2)	/450000 to /46FFFFE
_____	_____	LXW0000 to LXW3FFF (*2)	/4A0000 to 4A7FFE

(*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.

5 PROGRAMMING

As shown in Figure 5-4, the areas that are set by the individual modules may or may not be consecutive.

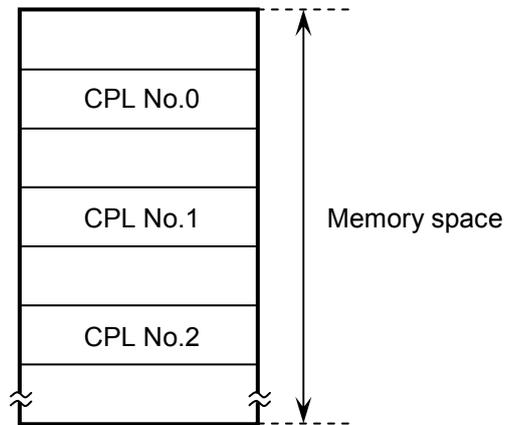
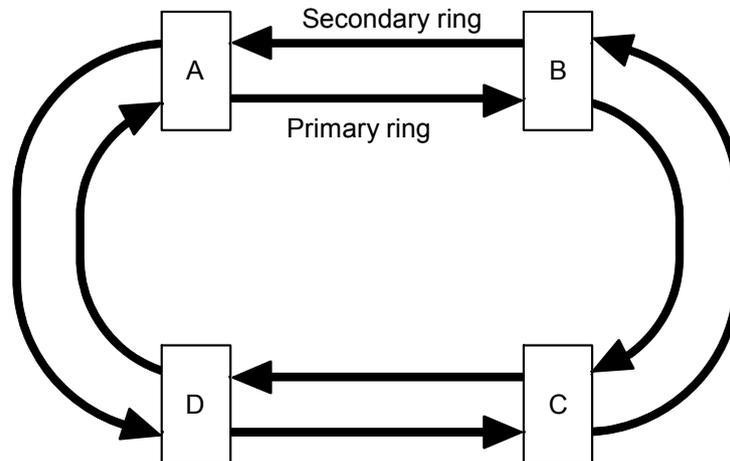


Figure 5-4 Set Areas

5.5 Faults and Fault Avoidance Operation

As long as the primary and secondary ring are communicating successfully, each module uses only the data on the primary ring and not the data on the secondary ring.



* A to D denote an SD.LINK module each.

Figure 5-5 Data Flow during Normal Operation

The SD.LINK module uses data on either of the two rings at a time. Choice of data on the primary ring or the secondary ring is determined under the following conditions:

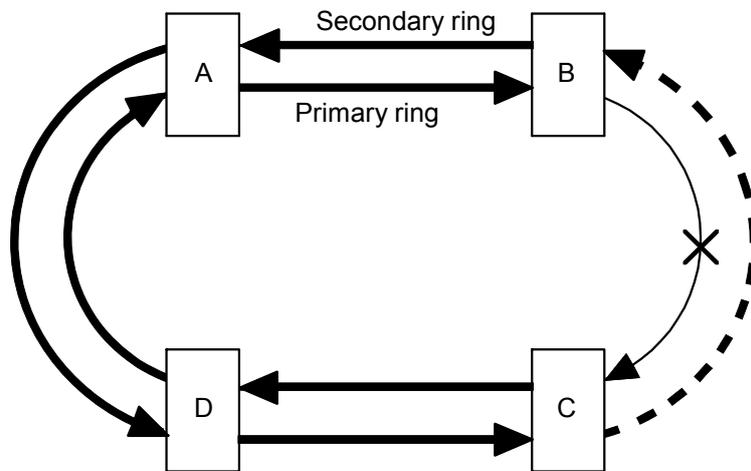
- If the SD.LINK module is successfully receiving data from a remote mode via both rings The SD.LINK module uses data on the primary ring. The primary ring has higher priority than the secondary ring.
- If the SD.LINK module is successfully receiving data from a remote mode via the primary ring The SD.LINK module uses data on the primary ring.
- If the SD.LINK module is successfully receiving data from a remote mode via the secondary ring The SD.LINK module uses data on the secondary ring.

Faults occurring in the SD.LINK module are automatically avoided to provide continued successful communication. Examples of fault avoidance operation are described on the pages that follow.

- If either ring is disconnected at one point

If the primary ring is broken at one point as shown in Figure 5-6, data transmission from the secondary ring at the point of breakage stops (designated by a dotted line), but communication is carried on using a secure portion of the ring. Transmission via the secondary ring resumes when the primary ring recovers from the breakage.

Modules A, C, and D cannot receive data from module B from the primary ring. Module C cannot receive data from modules A, B, and D from the primary ring. In these situations, data received from the secondary ring is used. Data received from the primary ring is used for other data.

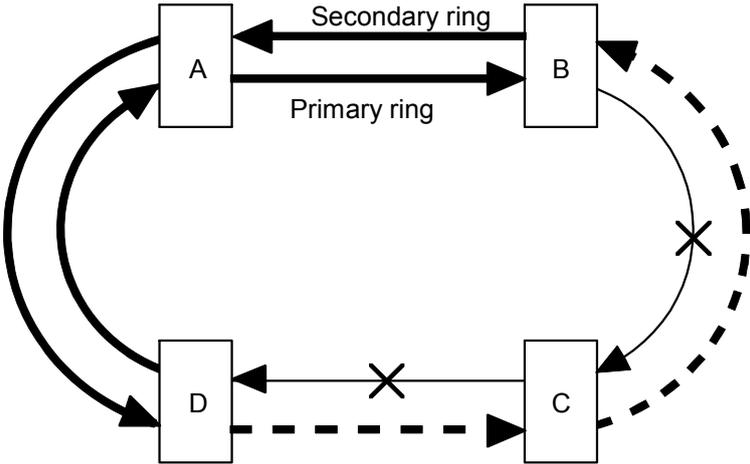


* A to D denote an SD.LINK module each.

Figure 5-6 If Either Ring Is Broken at One Point

- If either ring is disconnected at multiple points

If the primary ring is broken at multiple points as shown in Figure 5-7, data transmission from the secondary ring at the points of breakage stops (designated by dotted lines) and data from module C can no longer be received. In this situation, data is transmitted and received among modules A, B, and C. Transmission via the secondary ring resumes when the primary ring recovers from the breakages.



* A to D denote an SD.LINK module each.

Figure 5-7 If Either Ring Is Broken at Multiple Points

- Even if the two rings are disconnected at the same point

If the primary ring and the secondary ring are broken at the same point, communication is carried on using a secure portion of the route. In the example shown in Figure 5-8, modules A, C, and D cannot receive data from module B from the primary ring. Module C cannot receive data from modules A, B, and D from the primary ring. In these situations, data received from the secondary ring is used. Data received from the primary ring is used for other data.

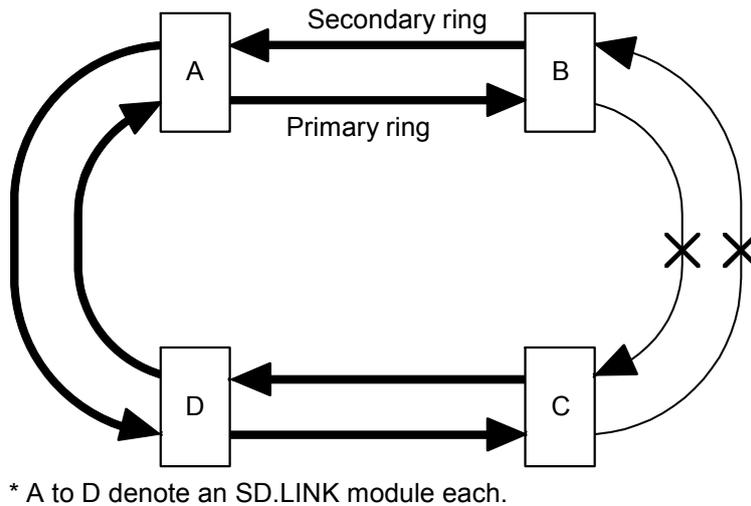


Figure 5-8 If the Two Rings Are Broken at the Same Point

- Even if one module shuts down

If one module shuts down, communication is carried on using the rest of the modules.

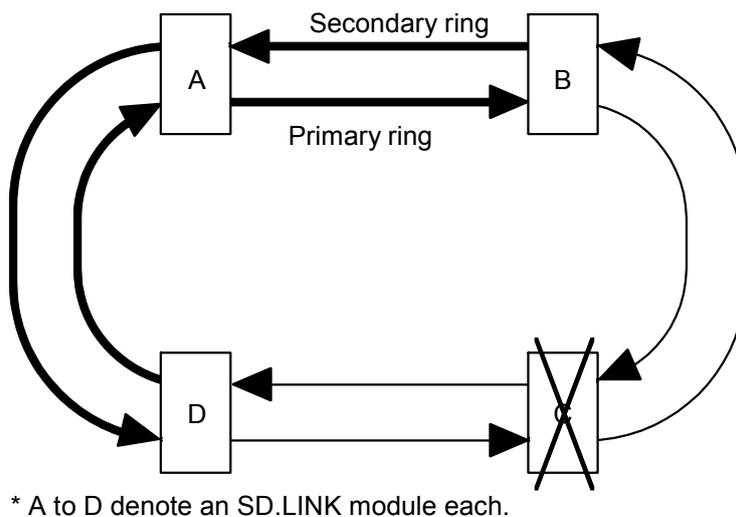
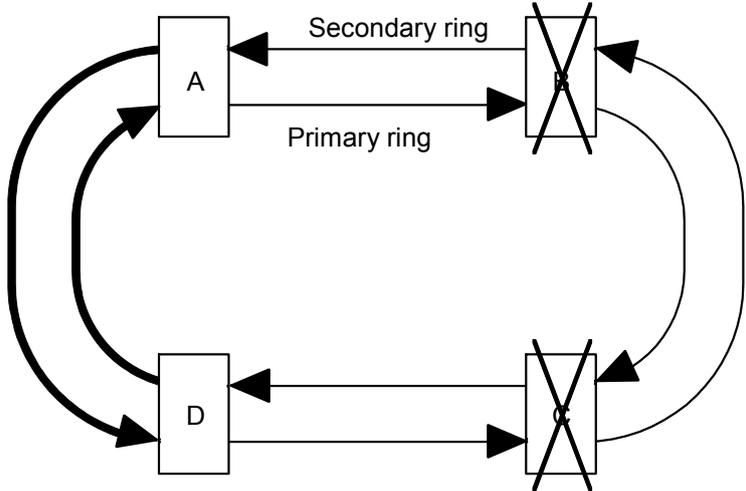


Figure 5-9 If One Module Shuts Down

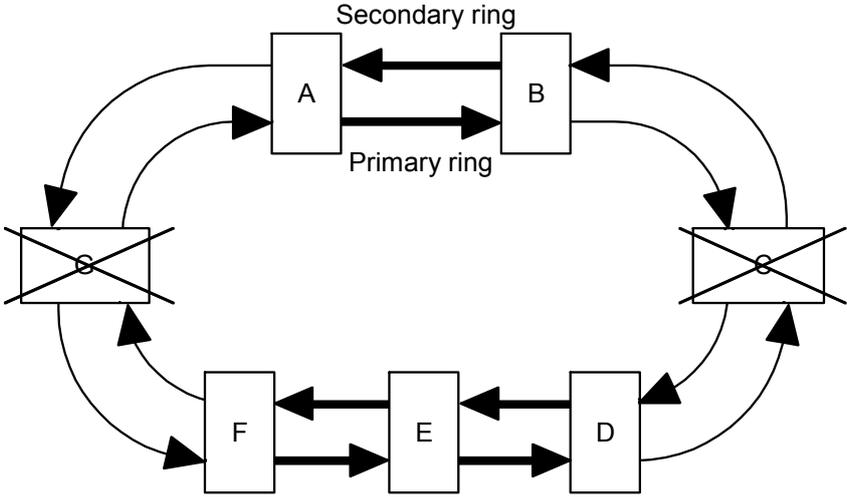
- Even if multiple adjoining modules shut down
If multiple adjoining modules shut down, communication is carried on using the rest of the modules.



* A to D denote an SD.LINK module each.

Figure 5-10 If Multiple Adjoining Modules Shut Down

- If multiple non-adjoining modules shut down
Communication is carried between the adjoining modules as shown in Figure 5-11.



* A to G denote an SD.LINK module each.

Figure 5-11 If Multiple Non-adjoining Modules Shut Down

- If the primary ring and the secondary ring are broken at different points
 If the primary ring and the secondary ring are broken at different points (different modules), transmission and reception at the points of breakage are disabled. (If the primary ring is broken, transmission from the secondary ring stops.) In the example shown below, communication is carried on in two groups of modules, one comprising modules B and C, the other, modules A, D, E, and F.

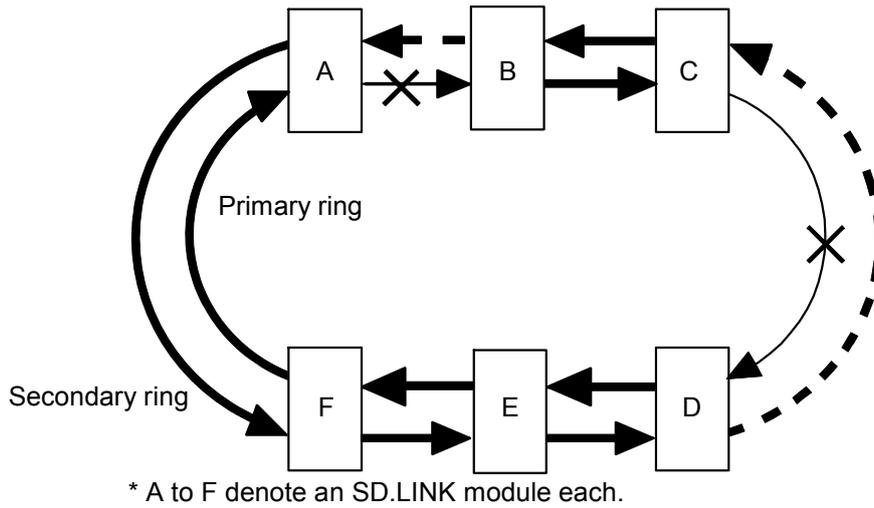
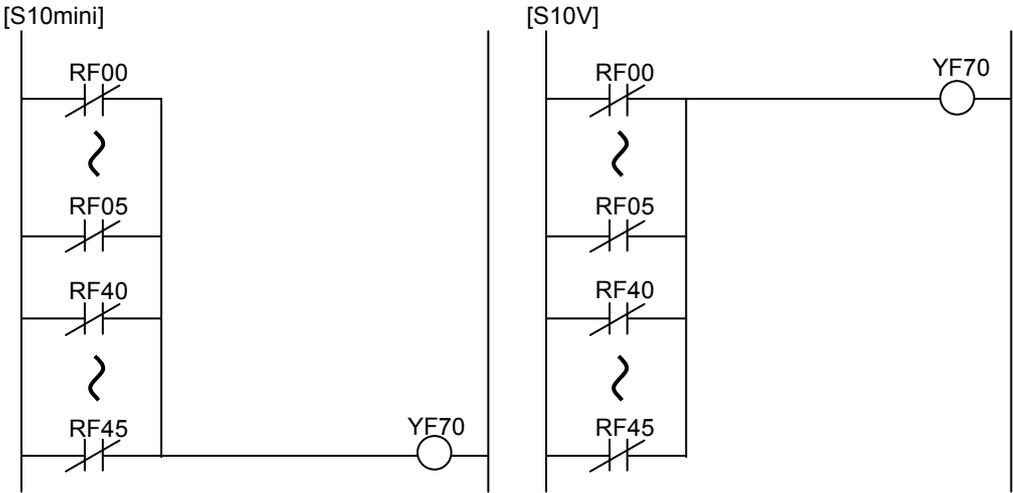


Figure 5-12 If the Primary Ring and the Secondary Ring Are Broken at Different Points

NOTICE

The breakage of the primary ring and the secondary ring at different point (different modules) as shown in Figure 5-12 could disable successful communication. Never use the SD.LINK module in a situation like this. Customers are advised to program all modules to detect a fault as soon as a breakage occurs at an one point and report an alarm condition accordingly.

[Example] The CPL numbers of SD.LINK modules connected are 0 to 5 and the RAS table starting address is set to RWF00 (YF70 is assigned as an alarm reporting coil in the example below).



5.6 RAS Table

The RAS table keeps a record of communicating module information. It is structured as shown in Figure 5-13.

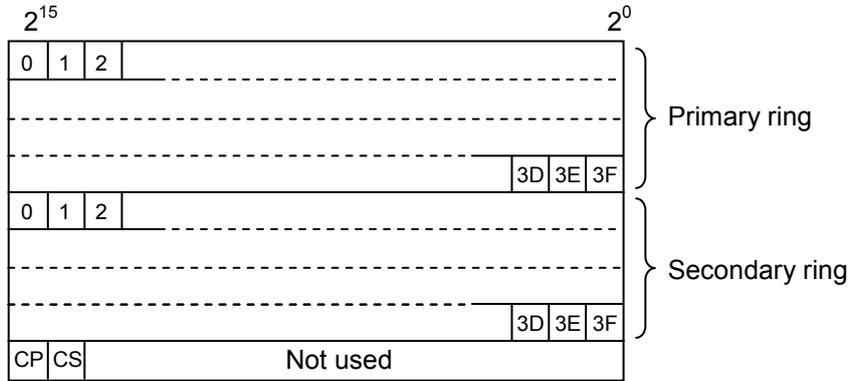


Figure 5-13 RAS Table Structure

- 0 to 3F correspond module CPL numbers. A module having its CPL number set is communicating.
 - 0: The module with the CPL number has its CPU (or LPU) switch set to STOP, the cable is broken, the module is powered off, or the transmission area of the module has not been set.
 - 1: Data from the module with the CPL number is being received successfully.

- CP and CS report the detection of breakages in the primary ring and the secondary ring.
 - 0: The approach to the local module is functioning successfully.
 - 1: The approach to the local module has broken, or the preceding module has shut down or failed.

Each communicating module is monitoring the behavior of other modules. When a communicating module receives data from a remote module, it assumes that the “remote module is communicating” and sets the corresponding bit of the RAS table. If a predetermined cycle of time elapses without data being received from a remote module, the communicating module assumes that the “remote module has shut down” and clears the corresponding bit of the RAS table.

The bit associated with the local module represents its operating status. The bit is set when the local module is functioning successfully, or is cleared when it has shut down after an error. The RAS table thus allows for the detection of the kinds of faults listed in Table 5-3.

Table 5-3 Faults and RAS Table

Fault	RAS table status
Cable breakage	The bits corresponding to all the modules located before the point of breakage in the ring are cleared.
Remote module shutdown	The bits corresponding to both primary and secondary rings of the corresponding module are cleared.
Local module shutdown	The bit corresponding to the local module is cleared. All bits corresponding to the primary and secondary rings are cleared since the local module is unable to receive data from remote modules.

NOTICE

If FW or an extend memory area is set as an RAS bit area, pre-reset data may be left for 2 seconds after a reset is cleared. Allow for at least 2 seconds after a reset before gaining access to these areas.

5.7 Hold/Clear

The hold/clear mode holds or clears to 0 transfer areas from a remote SD.LINK module when data is no longer received from that module.

- Hold

The area data (such as GW) in which the inactive remote module is registered is preserved, retaining the last transferred data.

- Clear

The area data (such as GW) in which the inactive remote module is registered is cleared to 0.

When the inactive module resumes the transmission, data update in the registered area resumes in both hold and clear modes. The LQE530 ships with the clear operation as a default.

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6 MAINTENANCE

6.1 Maintenance and Inspection

The SD.LINK module requires inspections to keep it running in optimal condition. Carry out such inspections daily or periodically (at least twice a year).

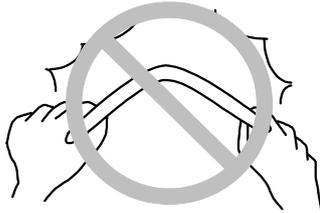
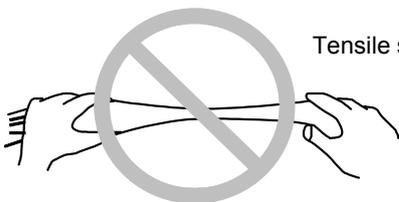
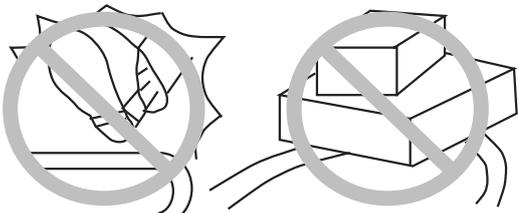
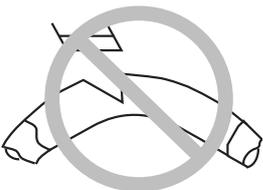
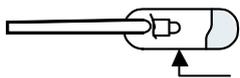
Table 6-1 Maintenance and Inspection Items

No.	Item	Point to check
1	Module appearance	Check the module case for cracks, flaws and other defects. Such defects may be signs of breakage in the internal circuitry, leading to system malfunctions.
2	LED	Check to see if the SD.LINK module ERR LED has not glowed.
3	Loose mounting screws	Check the mounting screws for tightness. Retighten them if found loose. Loose screws could lead to system malfunctions and eventually result in a burnout under heat.
4	Cable covering conditions	Check the cable coverings for defects. Coverings out of position could lead to system malfunctioning, electrical shock hazards, and a burnout after shorts.
5	Dust	Check the module to see if it has not caught dust. Remove dust with a vacuum cleaner if found. Dust could cause internal circuitry to short, resulting in a burnout.
6	Module replacement	Hot replacement could lead to hardware and software failures. Be sure to switch off the module before replacing it.
7	Optical module receptacle phototransmitter and photodetector surfaces	Glass caps are in position to safeguard the phototransmitter and photodetector of an optical module receptacle. Dust or foreign matter on the glass surfaces could degrade optical transmission characteristics. Whenever an optical fiber cable has been removed from the optical module receptacle, attach the dustproof cap supplied to the optical connector. If a glass surface has caught dust after frequent cycles of optical connector insertion and removal, blow it with air or wipe it off lightly with a soft cloth (such as gauze) impregnated with ethyl alcohol and twisted into a string. Avoid using cotton swabs because they could damage the glass surface. If dust is present on the end surface of an optical fiber cable plug, wipe it off lightly with a soft cloth impregnated with ethyl alcohol.

6.2 Handling Optical Fiber Cable and Connector

Maximum precautions, such as those outlined in Table 6-2, should be taken in handling optical fiber cables and optical connectors.

Table 6-2 Precautions in Handling

	Item	Explanation	Remarks
Optical fiber cables	Do not bend	 <p>A bending radius of 30 mm or more is required.</p>	A bending radius less than 30 mm could break the internal fiber.
	Do not pull	 <p>Tensile strength = 69N or less</p>	Do not pull the cable to such extent that the cable sheath is stretched. The fiber could be broken.
	Do not step onto cables		Do not step or place a heavy object onto the cable. The fiber could be broke or the fiber transmission loss would increase under load of the weight.
	Do not damage		Moisture inside the cable could increase the fiber loss.
Optical connectors	Attach a dustproof cap	<p>When optical connectors are not used, be sure to attach a dustproof cap to them.</p>  <p>Dustproof cap</p>	Do the same for the optical module receptacle side.
	Connect	<ul style="list-style-type: none"> • Clean the end surfaces of optical connectors with an industrial gauze moistened with ethyl alcohol. • Do not force insertion or removal of optical connectors. Damage to the end surfaces could result. 	The necks of optical connectors are vulnerable to bending force. Minimize the chances of optical connector insertion and removal.

6.3 Replacing Optical Fiber Cables

The SD.LINK module allows broken optical fiber cables to be replaced without closing the ongoing session of communication (online mode).



CAUTION

Only optical fiber cables can be replaced online. To replace any other kinds of cables, such as power cables and grounding conductors, switch off the power to guard against electrical shock hazards.



WARNING

Laser light, though invisible, are harmful to the human eyes . Do not gaze at the tip of an optical fiber cable or the phototransmitter of an optical module receptacle while they are operating, either directly or through a lens.

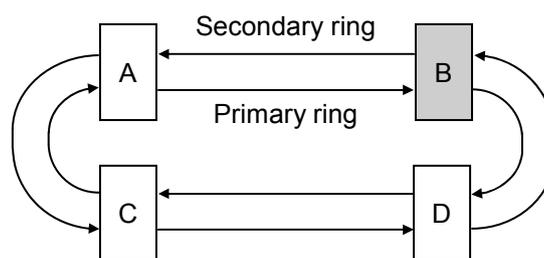
6.4 Replacing or Adding On the Module

The SD.LINK module may be replaced in online mode; that is, its replacement may be performed while communications are in progress with the other existing SD.LINK 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 SD.LINK module (LQE530)
 - 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.

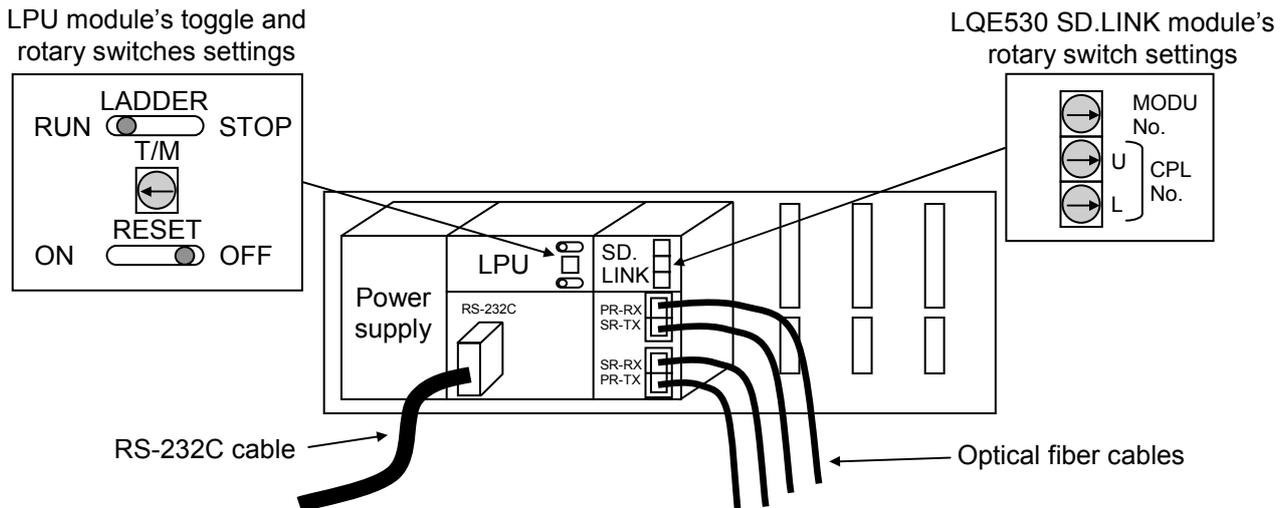


Note: Each of the modules labeled A thru D in this configuration is an SD.LINK module.

Figure 6-1 A Sample System Configuration

6 MAINTENANCE

- 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.
- 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 SD.LINK 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 SD.LINK 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 SD.LINK module is running normally. To accomplish this check, ensure that the new SD.LINK 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 SD.LINK 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 SD.LINK module in place according to the instructions given under "3.2 Mounting the Module."
 - ④ According to the information provided under "2.1 Names and Functions of Each Part," set the add-on SD.LINK 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 SD.LINK module.
 - ⑤ According to the instructions given under "4.2 Setting Switches," set the new SD.LINK 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 SD.LINK 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 SD.LINK 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 SD.LINK 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 SD.LINK module is running normally. To accomplish this check, ensure that the add-on SD.LINK module's PR-/SR-RX and PR-/SR-TX LEDs are all lit, but its ERR LED is not.



CAUTION

- Switch off modules before replacing them to avoid electrical shock hazards.
- When replacing modules, do not touch any terminals other than those of optical modules to avoid electrical shock hazards.

NOTICE

- Replace modules one at a time. If optical fiber cables are disconnected at multiple points and the same time, communication might be disabled.
- Before replacing optical modules receptacle, check that the optical fiber cables are not broken. Disconnecting optical fiber cables for replacement while they are broken could disable communication.
- A breakage is detected in the RAS table while replacement work is in progress. If an optical fiber cable is disconnected for replacement, a breakage is detected in the RAS table, but successful communication is carried on.

6.5 Optical Level Measurement

Optical level measurement allows faults to be located as they occur.

6.5.1 Optical receiving level measurement

Measure the optical receive level at the receiving end of each optical fiber cable as shown in Figure 6-2.

At measurement, switch on the SD.LINK module with the module number of the adjoining SD.LINK module set to E or F. Carry out measurement with regard to both the primary and secondary rings.

Connect the optical fiber cables and the optical power meter by way of a compatible connector adapter.

LQE530: Type SC connector (or Type 2SC connector)

Requirement: -14 dBm to -31 dBm

If the optical receive level does not meet this requirement, measure the optical level as instructed in “6.5.2 Locating fault portion,” to check the network.

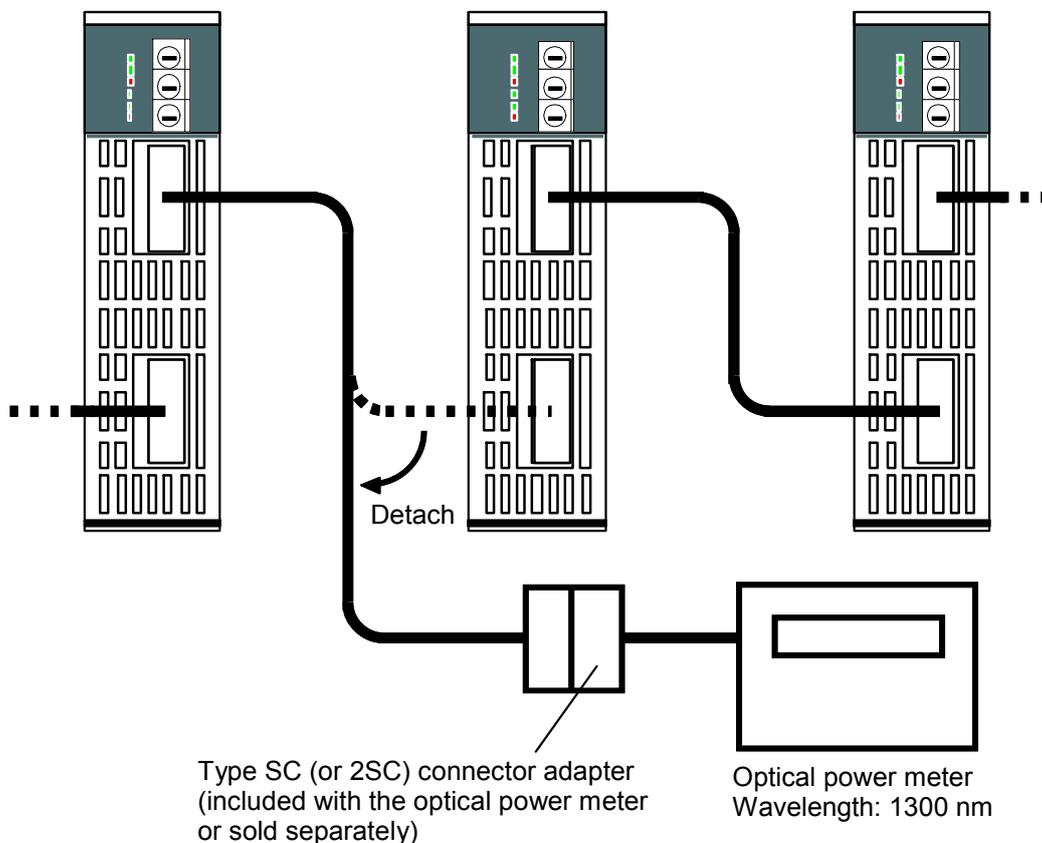
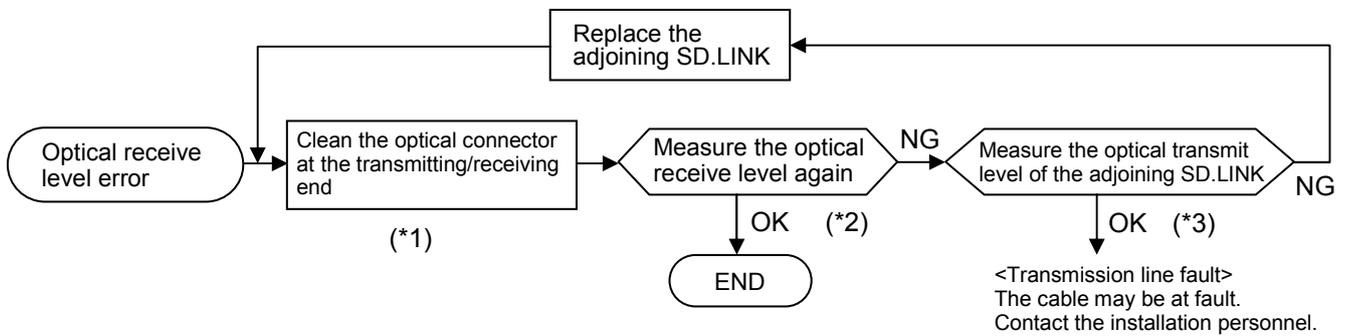


Figure 6-2 Example of Measuring the Optical Receive Level

NOTICE
<ul style="list-style-type: none"> ● Use maximum care in handling optical fiber cables. To avoid breakage, do not reduce the bending radius to 30 mm or less. ● Clean the optical module receptacle and optical connectors after measurement. ● Because the SD.LINK module (LQE530) uses a Type SC (or 2SC) optical connector, the optical power meter must support Type SC (or 2SC) accordingly. Use a Type SC (or 2SC) connector adapter (included with the optical power meter or sold separately).

6.5.2 Locating fault portion



(*1) See “6.2 Handling 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 Faults

6.5.3 Optical transmitting level measurement

Using a short optical fiber cable that is 1 m at the longest, measure the optical transmit level at the transmitting end as shown in Figure 6-4. Optical transmit level measurement is not needed for a transmission line that meets the requirement defined for optical receive level measurement. At measurement, connect the optical fiber cables and the optic power meter by way of a compatible connector adapter.

LQE530: Type SC connector (or Type 2SC connector)

Requirement: -14 dBm to -20 dBm

If the optical transmit level does not meet this requirement, replace the SD.LINK module.

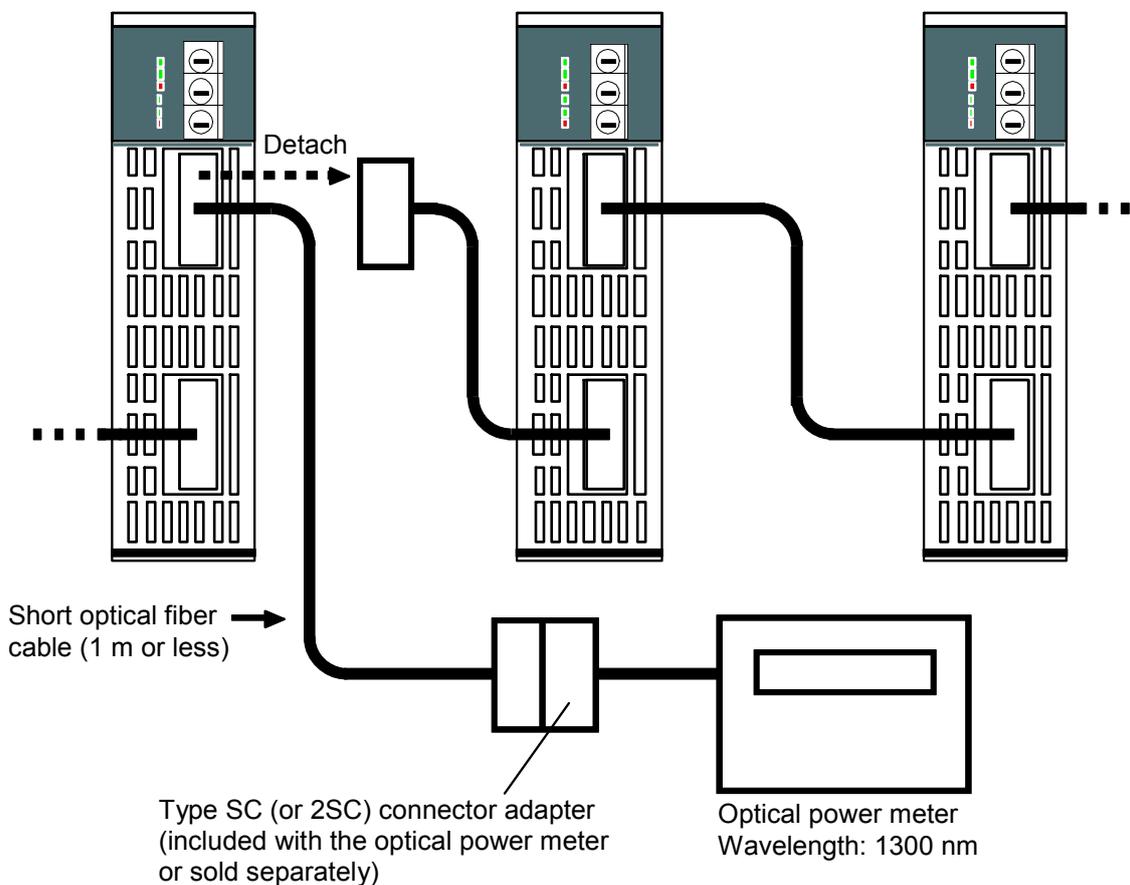


Figure 6-4 Example of Measuring the Optical Transmit Level

NOTICE

- Use maximum care in handling optical fiber cables. To avoid breakage, do not reduce the bending radius to 30 mm or less.
- Clean the optical module receptacle and optical connectors after measurement.
- Because the SD.LINK module (LQE530) uses a Type SC (or 2SC) optical connector, the optical power meter must support Type SC (or 2SC) accordingly. Use a Type SC (or 2SC) connector adapter (included with the optical power meter or sold separately).

6.6 Troubleshooting

6.6.1 Trouble detection and solution

- The transmit LED (TX) does not glow.
 - Is the power supply module POWER LED on?
If the POWER LED is off, power is not available. Switch on the power.
 - Has the error LED (ERR) not glowed?
If the ERR LED is on, some error is present. See “6.6.2 Error display and countermeasures.”
 - Is the receive LED (RX) on?
If the RX LED is on, the module may have failed. See “6.6.2 Error display and countermeasures.”

- The transmit LED (TX) is off and the receive LED (RX) is off on all modules.
 - Are the optical fiber cables connected properly?
Verify the correct connection of the optical fiber cables.
 - Are the optical fiber cable connectors inserted properly?
Verify the correct insertion of the optical fiber cables connector keys in slots.

- The receive LED (RX) does not glow.
 - Is the transmit LED (TX) on?
If the TX LED is off, see the explanation of “The transmit LED (TX) does not glow.”
 - Is the optical fiber cable properly?
Verify the correct connection of the optical fiber cable as specified in “3.4 Wiring.”
 - Is the optical fiber cable not broken or bent?
Optical fiber cables are fabricated of optical fibers. Bending optical fiber cables past their defined bending radius would inhibit communication (see Figure 3-4).
 - Is the remote module transmitting?
The receive LED (RX) won't glow unless the remote module is transmitting.

- Data is not transmitted from a remote module.
 - Is the remote module switched on?
If the remote module is switched off, switch it on.
 - Is the remote module transmitting?
If the transmit LED (TX) is off, see the explanation of “The transmit LED (TX) does not glow.”
 - Is the remote module switch set to RUN?
Memory transfers would not execute if the CPU or LPU module switch is not set to RUN.

- Has the remote module the correct transmit area setting?
If the transmit area setting is incorrect, correct it. A transmitted word count of 0 would inhibit transmission.
- Has the remote module the correct module and CPL number settings?
Verify the correct switch settings. A certain relationship dependent on the number of units connected exists between the module number setting switch and the CPL numbers setting switch. (See “4.2 Setting Switch.”) Further, a switch setting defined in duplicate would also inhibit success data transfers.
- Data is not transmitted to a remote module.
 - Is the remove module switch set to RUN?
Memory transfers would not execute if the CPU or LPU module switch is not set to RUN.
 - Has the local module the correct transmit area setting?
If the transmit area setting is incorrect, correct it. A transmitted word count of 0 would inhibit transmission.
 - Has the remote module the correct module and CPL number settings?
Verify the correct switch settings. A certain relationship dependent on the number of units connected exists between the module number setting switch and the CPL number setting switch. (See “4.2 Setting Switch.”) Further, a switch setting defined in duplicate would also inhibit success data transfers.
- Data in the transfer area is corrupted.
 - Has the data transfer module the correct transmit area setting?
If the transmit area setting of the data transfer module is incorrect, correct it.
 - Does the transmit area not overlap between multiple modules?
An overlapping transmit area would corrupt the overlapping portion of data.
 - Has the transfer area not been rewritten by the user program?
If possible, halt the user program and verify it.
- Transferred data has been cleared to 0.
 - Has the data transmitting module not shut down?
If the hold/clear mode has been set to clear, the transfer area is cleared to 0 as soon as data transmission terminates.
 - Is the data transmitting module switch not set to STOP?
If the CPU or LPU module switch is set to STOP, transfer area transmission would be inhibited. If the hold/clear mode has been set to clear, the transfer area is cleared to 0.

6.6.2 Error display and countermeasures

The module front-panel ERR LED glows when a fatal error is detected. Communication has shut down and the only way to resume it is by resetting the module (or cycling its power).

To find out why the ERR LED has glowed, make the checks suggested below. Make these checks also when reference to “6.6.2 Error display and countermeasures” is directed is “6.6.1 Trouble detection and solution” or operations are felt erratic.

- With the S10mini, is the SD.LINK module (LQE030/530) mounted in the mount base, left-justified?
- With the S10mini, are three or more units of the SD.LINK module (LQE030/530) not mounted? With the OD.RING module (LQE010/015/510/515) combined, are three or more units not mounted?
- With the S10V, are three or more units of the SD.LINK module (LQE530) not mounted? With the OD.RING module (LQE510/515) combined, are three or more units not mounted?
- Is the module number switch set correctly?
- Is the CPL number switch set correctly?
- Are optical fiber cables meeting defined specifications (such as length) used?

If no problems are found by these checks, reset the CPU or LPU module.

If the same problem recurs, cycle the power. If the problem persists, the module may have failed. Replace the module. Even though the problem is cleared by resetting the CPU or LPU module (or cycling the power), if the ERR LED glows again after a while, the module most likely has failed. Replace the module.

If the same problem recurs after the replacement of the module, contact your dealer.

6.6.3 CPU indicators display messages

With the S10mini, one of the messages listed below is displayed in the CPU module indicator when a certain event or error occurs in the SD.LINK 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 Indicator Display Messages

Error code (S10V)	Message (S10mini)	Explanation	Action
—	SD□ x.x	Normal operation	This is not an error. (x.x denotes version and revision numbers.)
0x0010	SD□ BUS	Bus error	Reset the module. If the same error message recurs, the SD.LINK module may have failed. Replace the module.
0x0011	SD□ ADDR	Address error	
0x0012	SD□ ILLG	Illegal instruction	
0x0013	SD□ ZERO	Division by 0	
0x0014	SD□ PRIV	Privilege violation	
0x0015	SD□ WDT	WDT error	
0x0016	SD□ FMAT	Format error	
0x0017	SD□ SINT	Spurious interrupt	
0x0018	SD□ EXCP	Unused exception	
0x0019	SD□ PTY	Parity error	
0x001A	SD□ GR	GR announcement	
0x0100	SD□ MDSW	Module number setting switch error	Set the module number switch to a valid value. (See “2 NAMES AND FUNCTIONS OF EACH PART.”)
0x0101	SD□ 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 Switch.”)
0x0102	SD□ ROM1	ROM1 checksum error	Reset the module. If the same error message recurs, the SD.LINK module may have failed. Replace the module.
0x0103	SD□ RAM1	RAM1 compare error	
0x0105	SD□ RAM2	ROM2 compare error	
0x010B	SD□ ROM3	ROM3 checksum error	
0x010C	SD□ ROME	ROM3 erase error (program)	
0x010D	SD□ ROMW	ROM3 write error (program)	
0x010E	SD□ ROME	ROM3 erase error (parameter)	Reset the module and set parameters. If the same error message recurs, the SD.LINK module may have failed. Replace the module.
0x010F	SD□ ROMW	ROM3 write error (parameter)	
0x0110	—	ROM rewrite count over	Replace the module.
0x0111	SD□ DPCP	Duplicate CPL number	Set a unique CPL number. (See “2 NAMES AND FUNCTIONS OF EACH PART.” and “4.2 Setting Switch.”)
0x0112	SD□ PRME	Parameter error	Set the parameters again. (See “4.6 Commands.”) To find out more, see the next page.

□=M: Main module
 □=S: Submodule

NOTICE

A parameter error occurs when the module is mounted on a model different from the one for which parameters has been set in “4.6 Commands.” Specifically, these two cases are conceivable:

Case 1: If an SD.LINK module for which parameters have been set with the S10V is mounted in the S10mini, either “SDM PRME” or “SDS PRME” is displayed in the CPU module indicator.

Case 2: If an SD.LINK module for which parameters have been set with the S10mini is mounted in the S10V, 0x0112 is displayed in the tool (S10V Basic System) error log.

These functions keep the SD.LINK module from malfunctioning on referencing parameters that have been set on a different model.

A parameter error would also be displayed when a checksum error occurs in the parameter settings. When a parameter error occurs, open the parameter setup screen on the model mounted to modify the parameter settings as needed.

6.6.4 Monitoring a specific module

To monitor that a specific module is communicating, use these methods:

- Check the RAS table

When a module shuts down, both the primary and secondary ring bits of the RAS table are cleared. Check this condition to see if a monitor is communicating or not.

- Set the hold/clear mode to clear

When a communicating module shuts down, the area allocated to it is cleared. Check this condition to see if a monitor is communicating or not.

6.6.5 Error freeze information

When the SD.LINK module has detected a hardware error, it lights the ERR LED and loads error freeze information. The SD.LINK module then shuts down.

Figure 6-5 shows the format of error freeze information. For definitions of the error code and the stack frame in the format, see the next pages.

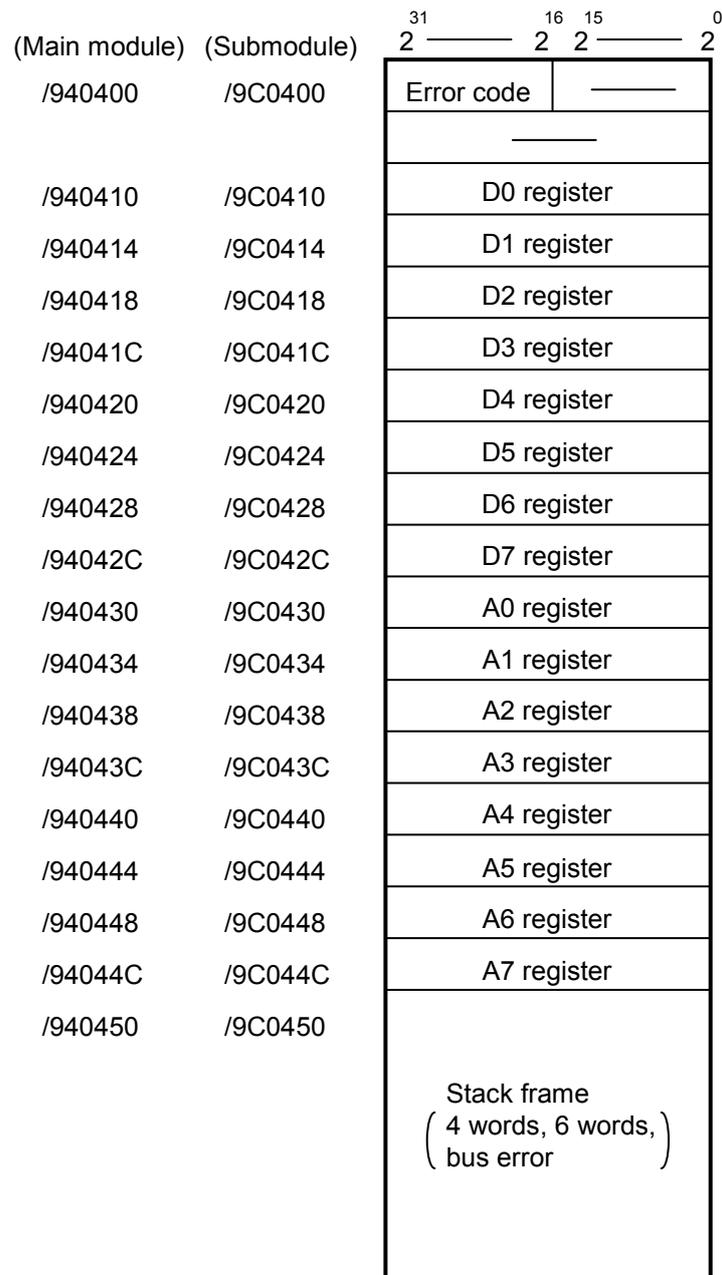


Figure 6-5 Error Freeze Information Format

The SD.LINK module, when running under normal conditions of operation, shows /0000.

Table 6-4 Error Codes

Code	Error	Action
/0010	Bus error	The SD.LINK module may have failed. 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 SD.LINK module may have failed. 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	Duplicate CPL number	Set correctly.
/0112	Parameter error	Specify the correct parameter. For more information, see “6.6.3 CPU indicator display messages.”

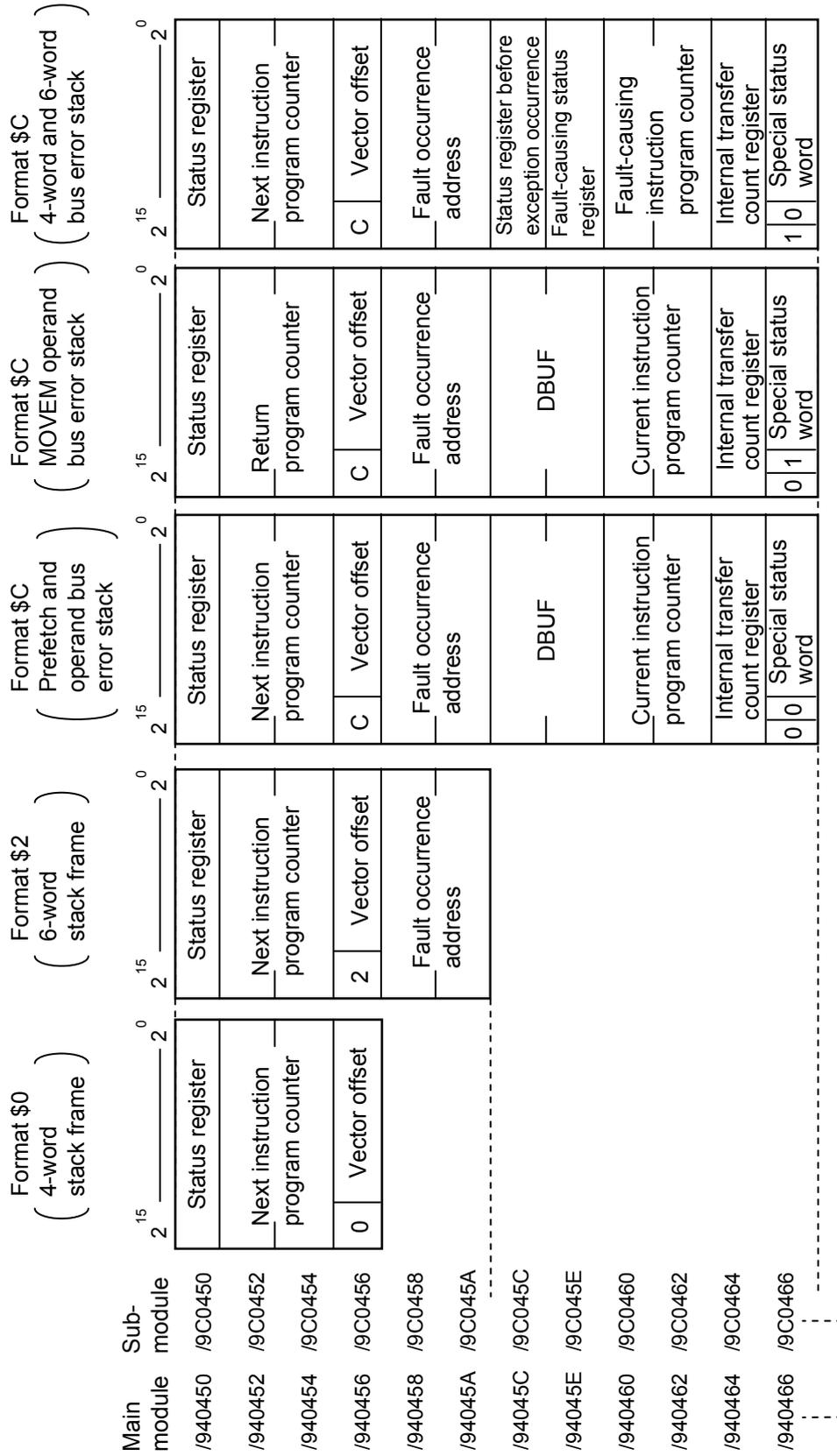


Figure 6-6 Stack Frame Format

6.6.6 Communication trace information

The SD.LINK module can trace communications information and events. Using this function, trace data can be created to aid in problem determination and corrective action.

(1) Trace buffer structure

The trace buffer consists of an 8-word trace control table and 256 cases (32 words/case) of trace data. Pointers allow data to be cyclically stored in the trace buffer.

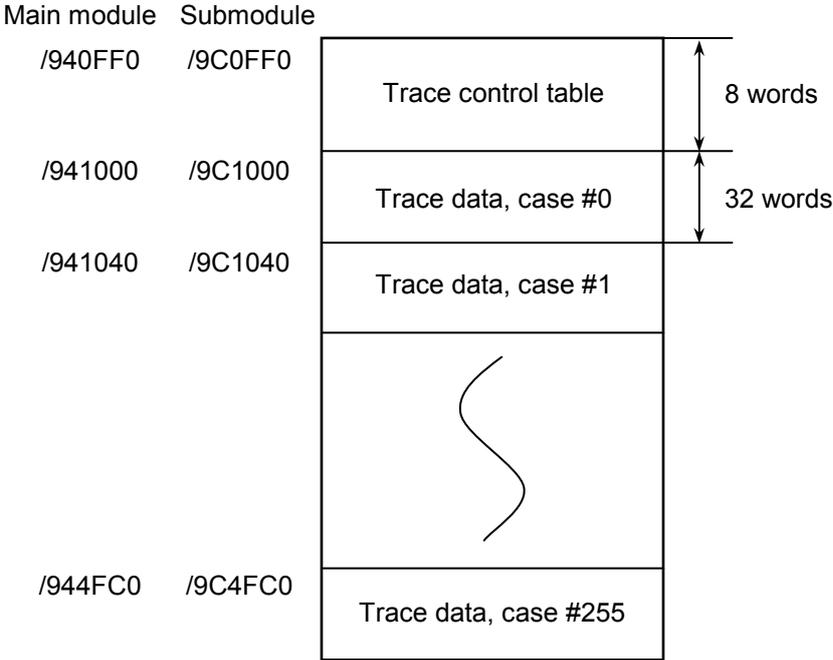


Figure 6-7 Trace Buffer

Trace data is loaded in sequence starting with case #0. Once trace data is loaded in the last case (case #255), new trace data is loaded from case #0 afterwards.

(2) Trace control table

The trace control table is organized into 8 words.

Main module	Submodule	
/940FF0	/9C0FF0	① Run/Stop
/940FF2	/9C0FF2	Not used
/940FF4	/9C0FF4	② Trace address
/940FF8	/9C0FF8	③ Mask data
/940FFA	/9C0FFA	④ Compare data
/940FFC	/9C0FFC	⑤ Pointer
/940FFE	/9C0FFE	Not used

Figure 6-8 Trace Control Table

① Run/Stop

Run or stop tracing.

0: Stop tracing.

1: Run tracing until a trace condition is established.

2: Run tracing until a trace condition is established or an error occurs.

“2” is set upon recovery from a power failure or when a reset is cleared. “0” is set when an error is encountered or when a trace condition is established.

② Trace address

Set the starting address of the area that is subject to conditional tracing.

③ Mask data

Set conditional trace mask data.

Only those bits that are set by mask data “0” are masked.

④ Compare data

Set conditional trace compare data.

Compare trace address ② ANDED with the mask data with compare data and assume a trace condition is established when they equal.

⑤ Pointer

Point to the case in which the next batch of trace data is stored. The latest batch of trace data is stored in pointer 1 (255 if 0).

<Use example 1>

Configure the trace control table as shown in Figure 6-9 to stop tracing when G002, which is supposed to be “0” under normal conditions of operation, changes to “0.”

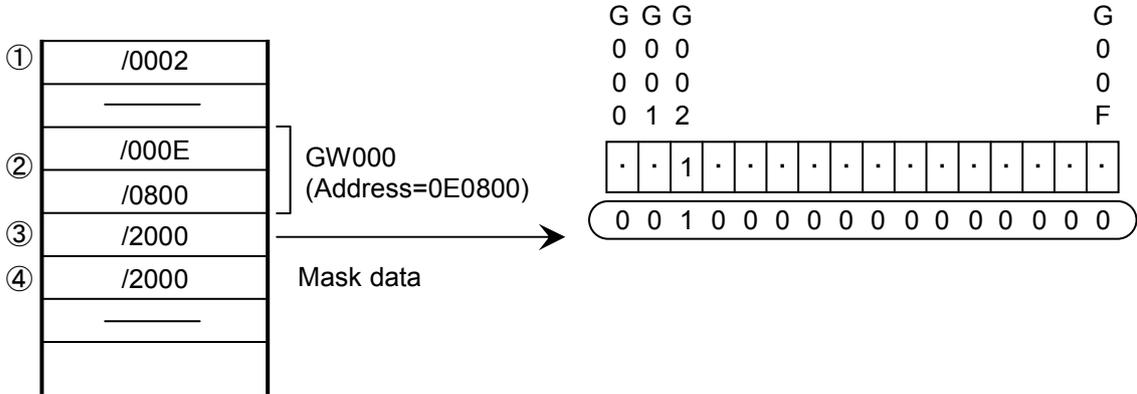


Figure 6-9 Use Example 1

<Use example 2>

Configure the trace control table as shown in Figure 6-10 to stop tracing when FW000, which is supposed to be “1234” under normal conditions of operation, changes to “1111.”

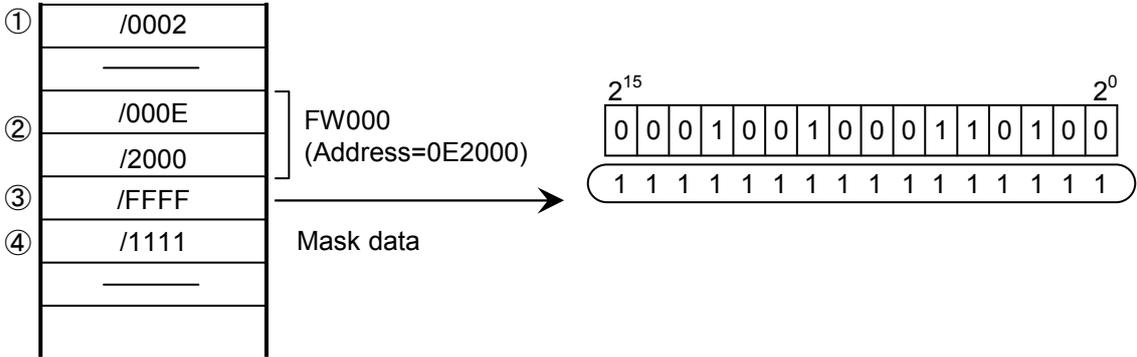


Figure 6-10 Use Example 2

(3) Trace data

Trace data is organized into 32 words by case.

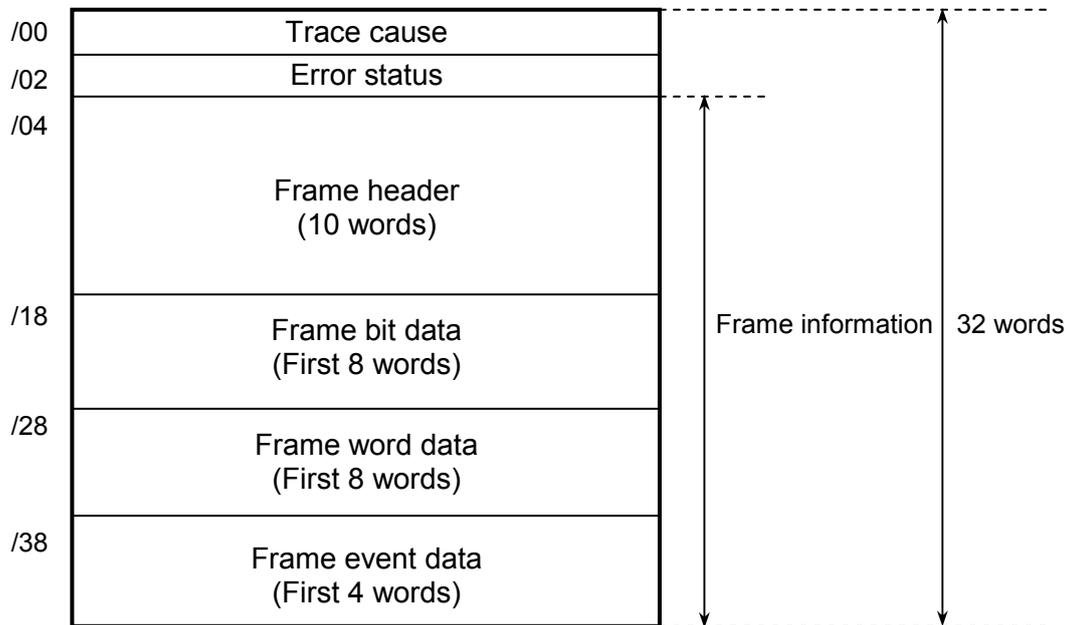


Figure 6-11 Trace Data

<Frame header details>

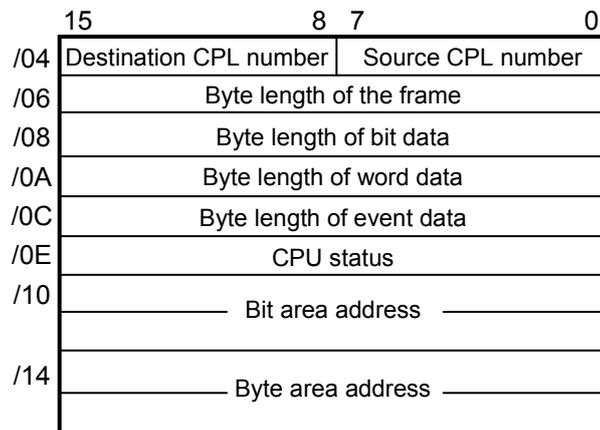


Figure 6-12 Frame Header

(4) Trace events and trace actions carried out

Table 6-5 gives the correspondence between the kinds of events that trigger trace data creation and the actions that are carried out.

Table 6-5 Trace Events and Actions

Event	Condition test	Error stop	Trace condition	Error status	Frame information
Transmission start	Yes	No	Enabled	Disabled	Enabled
Transmission completion	No	No	Enabled	Disabled	Disabled
Transmission error stop	No	Yes	Enabled	Enabled	Disabled
Transmission timeout	No	Yes	Enabled	Disabled	Disabled
Reception start	No	No	Enabled	Disabled	Disabled
Reception completion	Yes	No	Enabled	Disabled	Enabled
Reception error stop	Yes	Yes	Enabled	Enabled	Enabled
Reception timeout	No	Yes	Enabled	Enabled	Enabled

- Condition test

Run a condition test to determine whether to stop communications tracing conditionally. When a condition is established, condition true is set as a trace cause and tracing is stopped.

- Error stop

If the run/stop setting is 2, carry out an action to stop communications tracing upon occurrence of an error.

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- Trace cause

The cause that has triggered trace data creation is set as a trace cause.

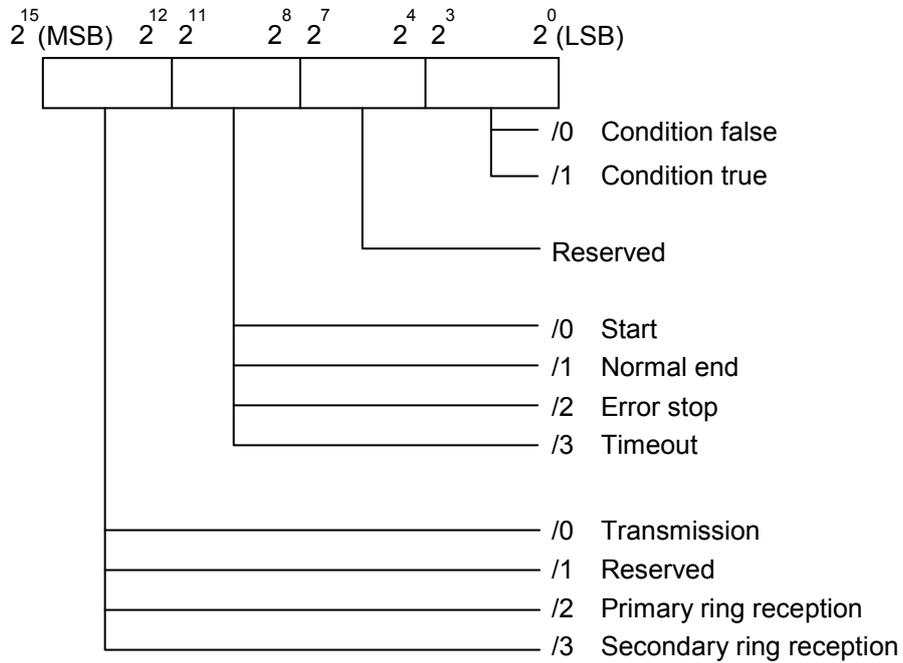


Figure 6-13 Trace Cause

- Error status

<Transmitting error status>

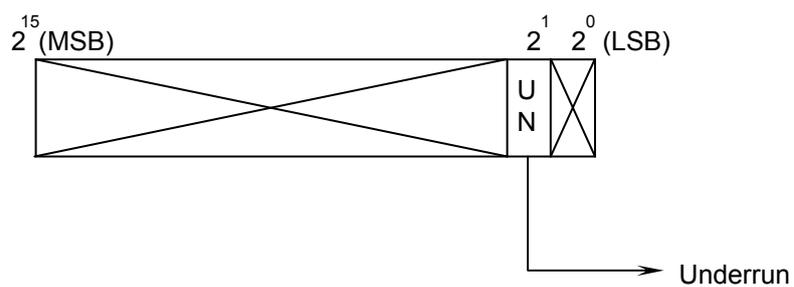


Figure 6-14 Transmitting Error Status

Table 6-6 details the error status.

Table 6-6 Error Status Details

No.	Transmit/Receive	Error name	Error description	Required user action
1	Transmit	Underrun	A transmitter underrun occurred while transmitting a frame.	<p>Any of these types of errors may occur when the power supply in a networked controller unit is turned off and back on again, or when the CPU is reset. In these cases, the error is caused by something other than a hardware failure. If any of these types of errors occurs 100 times or more in a single day due to a cause other than any of the above-mentioned operations, do the following:</p> <p>(1) Check that all of the optical connectors used for connections between the existing SD.LINK modules are inserted completely into those modules' receptacles. Any incompletely inserted connector must be inserted completely into the receptacle.</p> <p>(2) Check that no optical fiber cable wired to an existing SD.LINK module is bent excessively. Any excessively bent optical fiber cables must be corrected (the bending radius must be 30 mm or more). Check, also, that no such optical fiber cable is damaged. Any damaged optical fiber cable must be replaced with a new one.</p> <p>(3) Check that all of the optical fiber cables wired to the existing SD.LINK modules are recommended ones (i.e., those identified by the code MC-SM1005-2F(Y)#2SC/P/0.2#2SC/P/0.2#50M). Any non-recommended optical fiber cable, if used, must be replaced with a recommended one.</p> <p>(4) Check that no optical fiber cable wired to an existing SD.LINK module is too long. Any wired optical fiber cable must be 15 km or less in length.</p> <p>After you have checked the above items and have made any necessary corrections, measure the optical level of each of the optical fiber cables wired to the existing SD.LINK modules, and then check that there are no problems indicated by the measured level values. (For details, see "6.5 Optical Level Measurement.")</p> <p>If any of these types of errors still occurs 100 times or more in a single day, replace the existing SD.LINK modules.</p>
2	Receive	DPLL error	The DE bit is set when a transition is missing in the coding mode in which bit-specific transitions take place.	
3		Frame length violation	A frame length exceeding the maximum defined for this channel was detected.	
4		Non-octet sequence	A frame containing a bit length that could not be precisely divided by 8 was received.	
5		Abort sequence	At least seven consecutive 1s were received while receiving a frame.	
6		CRC error	A CRC error was detected in a frame.	
7		Overrun	A receiver overrun occurred while receiving a frame.	
8		Receive timeout error	Frames in excess of limitations was transmitted or received.	

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			

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