HITACHI

USER'S MANUAL

OPTION

IR.LINK

(LQE546)

S10mini S10V

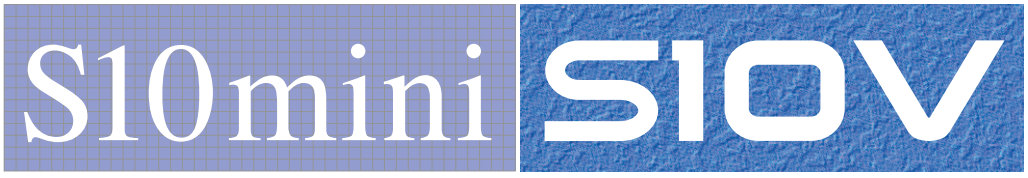
SVE-1-117 (F)

USER'S MANUAL

OPTION

IR.LINK

（LQE546）



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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.

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

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

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

NOTICE : 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 NOTICE Statements

(chapter 1, page 1-4)

NOTICE
Users of this product must have an 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 2-3)

NOTICE
Switch off the power supply before operating the module number setting switch and bit rate setting switch. If you operate while the power supply is applied, it may result in a malfunction.

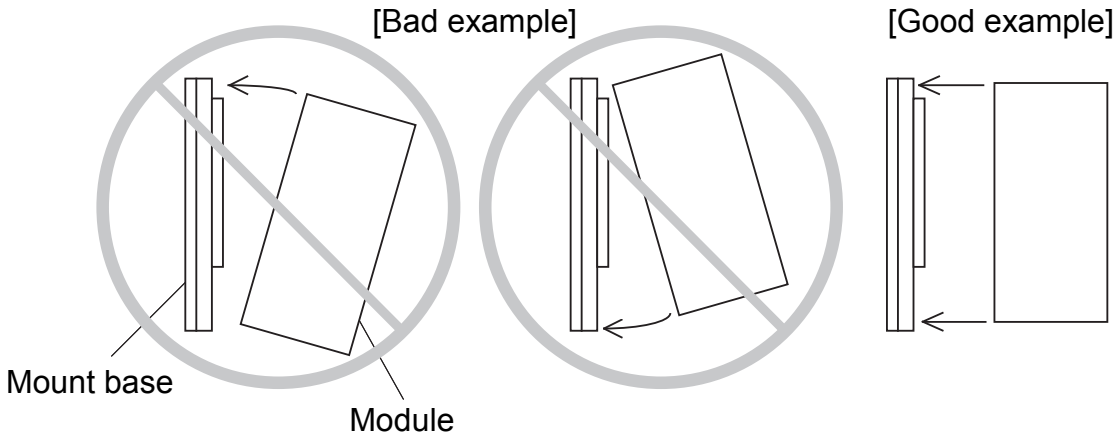
(chapter 3, page 3-2)

NOTICE
● Only one IR.LINK module can be installed. ● For the S10mini series, install option modules from the leftmost slot so that the I/O module may not exist between the CPU module and an option module and any empty slot may not exist between the option modules. ● For the S10V series, there is no constraint on the mounting position and empty slot. ● When installing the J.NET or J.NET-INT module and the IR.LINK module simultaneously, install the IR.LINK module as the sub-setting. When installing only the IR.LINK module, install it as the main setting.

(chapter 3, page 3-3)

NOTICE

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



(chapter 3, page 3-4)

NOTICE

- For the ground wiring of the FG (frame ground), connect the FG terminal of each module with an external terminal to the FG terminal of the mount base. Perform class D grounding from the FG terminal of the mount base.
- Use a ground wire with a wire diameter of 2 mm^2 or more.
- Connect the shielding wire of the communication cable to the SHD terminal of the CPU or LPU module.

(chapter 3, page 3-6)

NOTICE
Shield terminal (SHD) and one frame ground (FG) terminal are internally connected. Be sure to ground the FG terminal.

(chapter 4, page 4-2)

NOTICE
● Only one IR.LINK module can be installed. ● For the S10mini series, install option modules from the leftmost slot so that the I/O module may not exist between the CPU module and an option module and any empty slot may not exist between the option modules. ● For the S10V series, there is no constraint on the mounting position and empty slot. ● When installing the J.NET module (model: LQE040 or LQE540) or J.NET-INT module (model: LQE045 or LQE545) and the IR.LINK module simultaneously, install the IR.LINK module as the sub-setting. When installing only the IR.LINK module, install it as the main setting.

(chapter 4, page 4-4)

NOTICE
Before installing the IR.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 IR.LINK system without exiting such programs, an error may occur during installation. If such an error occurs, first uninstall the IR.LINK system as directed in “4.2.2 Uninstalling,” exit all the Windows® programs, and then install the IR.LINK system again.

(chapter 4, page 4-6)

NOTICE

- The S10V BASE SYSTEM is required for operating the S10V IR.LINK system. If it is not installed, you cannot install the S10V IR.LINK system.
- Before installing the S10V IR.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 IR.LINK system without exiting such programs, an error may occur during installation. If such an error occurs, first uninstall the S10V IR.LINK system as directed in "4.2.2 Uninstalling," exit all the Windows® programs, and then install the S10V IR.LINK system again.

(chapter 4, page 4-6)

NOTICE

If Windows® opens a window during the uninstall process to display the question "Remove Shared File?," click the [No] button to retain shared files.

(chapter 4, page 4-9)

NOTICE

- The S10mini Series does not support GP-IB. Do not select "GPIB" on the communication type selection window.
- The S10V Series does not support GP-IB. "GPIB" is not displayed on the communication type selection window.

(chapter 4, page 4-14)

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 5-4)

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 5-6)

NOTICE

When mounting S10V, IR.LINK module (model: LQE546) before Module Rev.B (Ver-Rev: 0002-0001) doesn't provide for application task start function by interrupt I/O input, but provides for I/O communication function with IR.Station only. When utilizing the application task start function performed by interrupt I/O input in combination with S10V, you should use the module after Module Rev.C (Ver-Rev: 0003-0000).
Moreover, the above-mentioned Ver-Rev is a microprogram Ver-Rev of IR.LINK module which is shown on "Module List" of S10V BASE SYSTEM.

(chapter 6, page 6-9)

NOTICE

A parameter error of LQE546 occurs when hardware is mounted in a different system from the system in which the parameters shown in "4.3 Commands" were set.

When parameters are set in the S10V and hardware is installed in an S10mini unit:

"IRM PRME" ("IRS PRME") is displayed on the CPU indicator.

When parameters are set in the S10mini system and hardware is installed in an S10V unit:

0x112 (error code that is displayed by error log of the S10V BASE SYSTEM)

This error is intended to prevent a malfunction by referring to the parameters set in a different model.
If this error occurs, set the parameters (definition information) in the installed model.

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>
IR.LINK (LQE546)

<Program products>
S-7890-36, IR.LINK SYSTEM, 07-02
S-7895-36, S10V IR.LINK SYSTEM, 01-02

Revision record

Revision No.	Revision record (revision details and reason for revision)	Month, Year	Remarks
B	First edition	January 2003	
E	Subsection 6.1.2, “Replacing or adding on the module” is newly added.	September 2008	
F	• 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.	December 2012	

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 IR.LINK module, which is an option for use with the S10mini/S10V. This manual, named USER'S MANUAL OPTION IR.LINK, describes how to use the IR.LINK module. For proper use of the IR.LINK module, it is requested that you thoroughly read this manual.

This 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 those for 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: LQE546
Environmentally resistant model: LQE546-Z

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

When mounting S10V, IR.LINK module (model: LQE546) before Module Rev.B (Ver-Rev: 0002-0001) doesn't provide for application task start function by interrupt I/O input, but provides for I/O communication function with IR.Station only. When utilizing the application task start function performed by interrupt I/O input in combination with S10V, you should use the module after Module Rev.C (Ver-Rev: 0003-0000).
Moreover, the above-mentioned Ver-Rev is a microprogram Ver-Rev of IR.LINK module which is shown on "Module List" of S10V BASE SYSTEM.

<Trademarks>
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<Note for storage capacity calculations>

- Memory capacities and requirements, file sizes and storage requirements, etc. must be calculated according to the formula 2^n. The following examples show the results of such calculations by 2^n (to the right of the equals signs).
  1 KB (kilobyte) = 1,024 bytes
  1 MB (megabyte) = 1,048,576 bytes
  1 GB (gigabyte) = 1,073,741,824 bytes
- As for disk capacities, they must be calculated using the formula 10^n. Listed below are the results of calculating the above example capacities using 10^n in place of 2^n.
  1 KB (kilobyte) = 1,000 bytes
  1 MB (megabyte) = $1{,}000^2$ bytes
  1 GB (gigabyte) = $1{,}000^3$ bytes

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1 SPECIFICATIONS

1.1 Use

Before using the IR.LINK module (model: LQE546), make sure that the IR.Station module (model: LQS021) is connected. The IR.LINK module communicates digital data and analog data with the IR.Station module. When a remote I/O is used, it implements higher-speed communication. It also supports a function that starts up a task upon the detection of a change in digital input.

1.2 Specifications

1.2.1 System specifications

Item	Specifications
Model	LQE546
Number of networks	1 network/module
Maximum number of IR.LINK module that can be mounted in the CPU	S10mini: 1 module/CPU (installed from the leftmost slot) S10V: 1 module/CPU (installing from the leftmost slot is not required.)
Mass	260 g

1.2.2 Line specifications

Item		Specifications
Transmission method		Serial (bit serial) transmission
Electrical interface		RS-485
Number of stations		Up to 31 stations
Communication cable	Line type	Two pairs of shielded twisted-pair cables Recommended cable: KPEV-SB 2P 0.5 mm^2 (Hitachi Cable, Ltd.)
	Distance	The distance depends on the transmission rate as follows: Transmission rate ≤ 1.0 Mbps: Up to 240 m Transmission rate ≤ 0.5 Mbps: Up to 480 m Transmission rate ≤ 0.25 Mbps: Up to 800 m Transmission rate ≤ 0.125 Mbps: Up to 1000 m
	Terminal block	6 points (M3 screw), fixed type

1.3 System Software Specifications

1.3.1 System overview

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

Table 1-1 Types of System Software (Tools)

Package name	Model		Supply style
	For S10mini	For S10V	
IR.LINK system	S-7890-36	S-7895-36	Optional

1.3.2 Required hardware and software

The following hardware and software are required for the use of the IR.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 32 MB 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 10 MB 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)

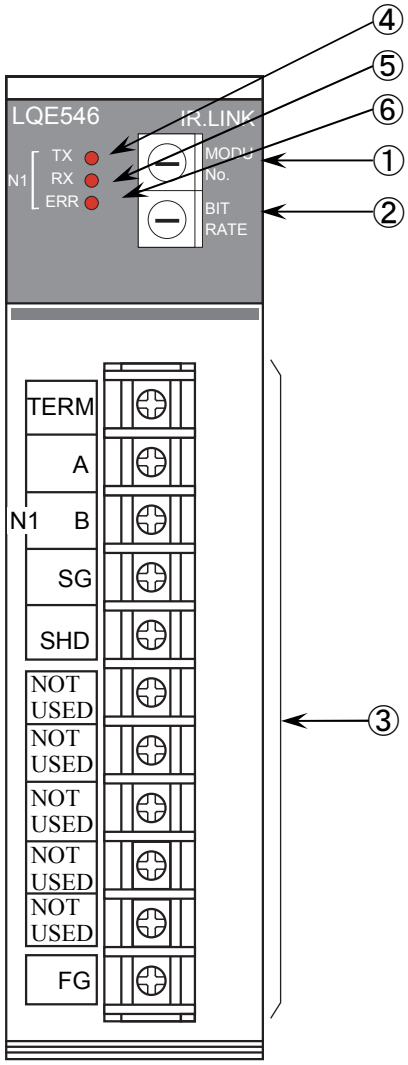
(2) For S10V

- 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 64 MB of RAM (when Windows® 2000 is used)
- At least 128 MB of RAM (when Windows® XP is used)
- At least 1 GB of RAM (when Windows® 7 (32-bit) is used)
- At least 10 MB 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-T twisted pair cross cable with RJ-45 modular connectors)

NOTICE
Users of this product must have an 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.

2 NAMES AND FUNCTIONS OF EACH PART

2.1 Names and Functions of Each Part



① Module number setting switch
Use this switch to set up the main module and sub-module.
Set IR.LINK as a sub-module when you install J.NET (LQE540) or a J.NET-INT module (LQE545) on the same CPU mount base.
Set up the main module and sub-module according to the table shown below.

Setting No.	Main module/sub-module
0	Main module
1	Sub-module
8, 9	Setting is disabled (T/M)

② Bit rate setting switch
The bit rate setting switch is used to set a transmission rate. The table below shows the relationship between setting number and transmission rates.

Setting No.	Transmission rate
0	1.0 Mbps
1	0.5 Mbps
2	0.25 Mbps
3	0.125 Mbps
8 to F	Setting is disabled (T/M)

③ Terminal blocks for interface
TERM: Terminals for a terminating resistor. Short TERM and A terminal when the IR.LINK module is used at an end of the network.
A, B: Used to connect a transmission/reception data line.
SG: Used for signal ground terminal.
SHD: Used for shield ground terminal.
FG: Used for frame ground terminal.

④ LED for transmission
Comes on when the IR.LINK module starts transmitting data.

⑤ LED for reception
Comes on when the IR.LINK module starts receiving data.

⑥ LED for errors
Comes on when a hardware error is detected in the IR.LINK module. When the IR.LINK module is installed in a different system from the system in which the parameters shown in “4.3 Commands” are set, a parameter error occurs and this LED comes on. (See “6.3.2 Hardware errors.”)

NOTICE
Switch off the power supply before operating the module number setting switch and bit rate setting switch. If you operate while the power supply is applied, it may result in a malfunction.

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3 MOUNTING AND WIRING

3.1 Mount Base

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

Table 3-1 Mount Bases Applicable to the IR.LINK Module

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

3.2 Mounting the Module

Mount the optional module in an option slot (slot numbered between 0 and 7) in the mount base as shown below:

NOTICE

- Only one IR.LINK module can be installed.
- For the S10mini series, install option modules from the leftmost slot so that the I/O module may not exist between the CPU module and an option module and any empty slot may not exist between the option modules.
- For the S10V series, there is no constraint on the mounting position and empty slot.
- When installing the J.NET or J.NET-INT module and the IR.LINK module simultaneously, install the IR.LINK module as the sub-setting. When installing only the IR.LINK module, install it as the main setting.

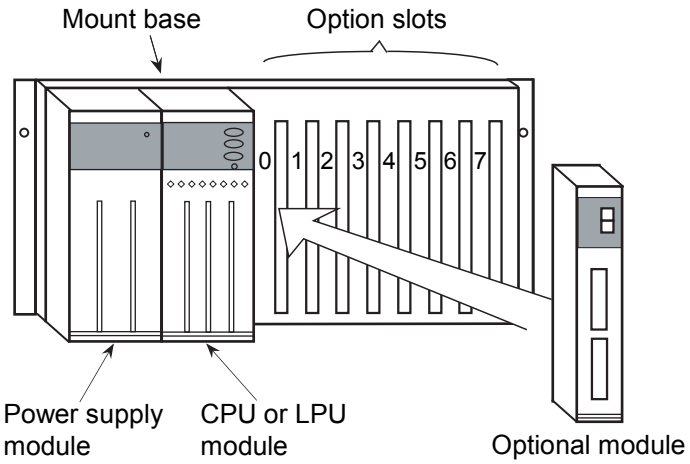
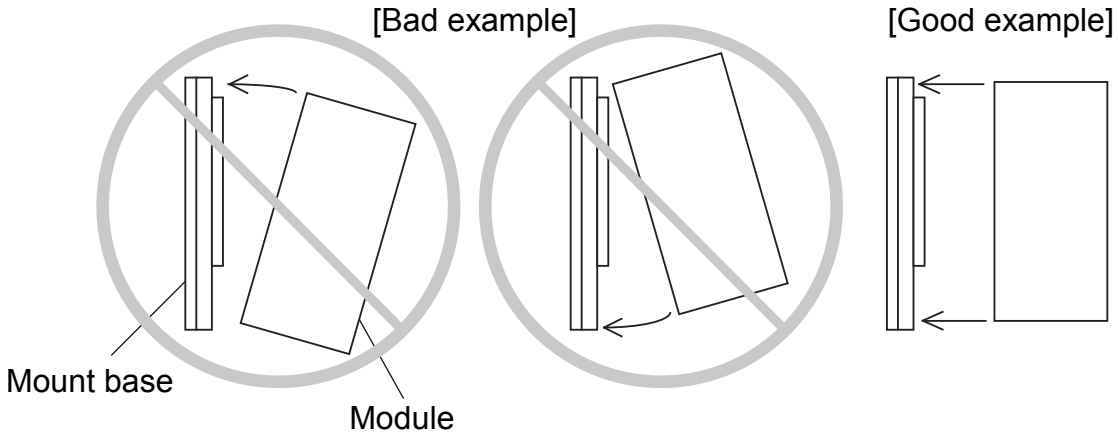


Figure 3-1 Mounting the Optional Module

NOTICE

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



3.3 Ground Wiring

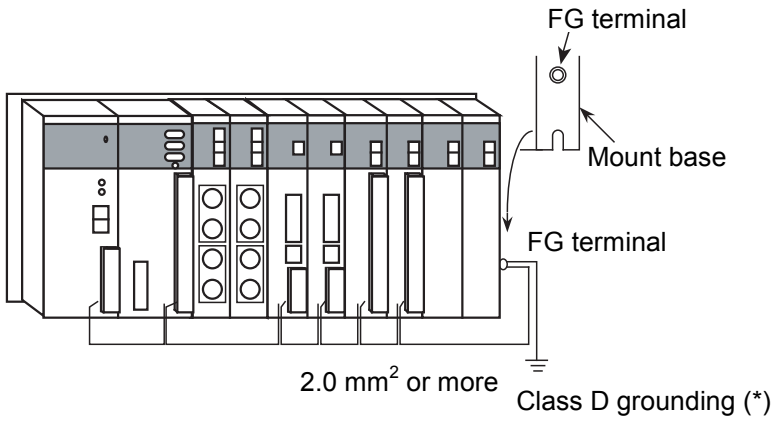


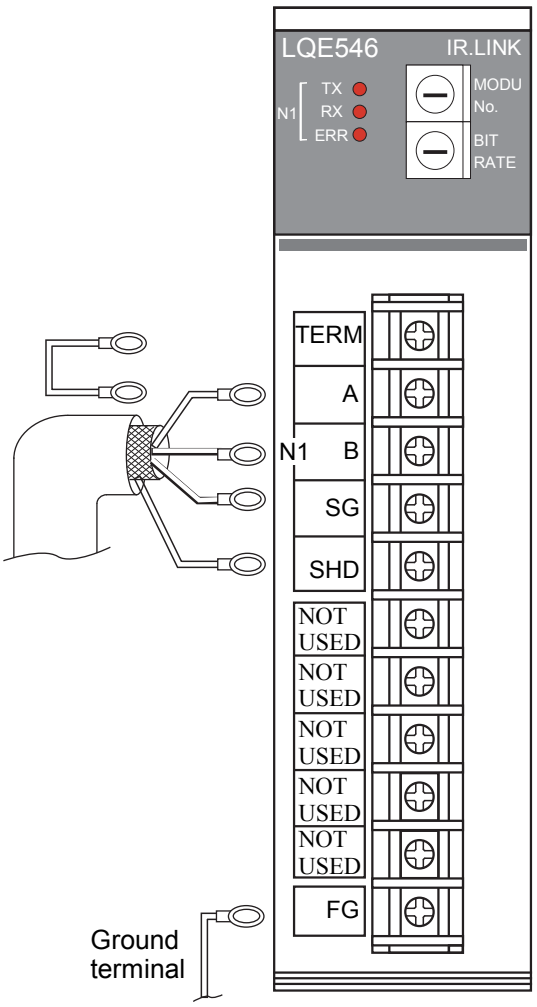
Figure 3-2 Ground Wiring

NOTICE
● For the ground wiring of the FG (frame ground), connect the FG terminal of each module with an external terminal to the FG terminal of the mount base. Perform class D grounding from the FG terminal of the mount base. ● Use a ground wire with a wire diameter of 2 mm^2 or more. ● Connect the shielding wire of the communication cable to the SHD terminal of the CPU or LPU module.

(*) 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.

3.4 Wiring

3.4.1 Interface signals and wiring method



Network 1 (N1)

Signal name	
Abbreviation	Name
A	Send/receive data (Linkage data)
B	
SG	Grounding for signal (Signal Ground)
SHD	Grounding for shield (SHielD ground)
TERM	Terminating resistor for transmission/reception (TERMinal resistor)

Others

Signal name	
Abbreviation	Name
FG	Grounding for frame (Frame Ground)

Interface signal voltage levels

Designation	Mark	Space
Interpretation	1/OFF	0/ON
Output condition	-6 to -1.5 V	1.5 to 6 V
Input condition	-0.2 V or lower	0.2 V or higher

The input condition represents the electric potential of A viewed from B.

Short TERM and A terminal when the IR.LINK module is used at an end of the network. The terminating resistor (120 ohms) is internally connected.

NOTICE
Shield terminal (SHD) and one frame ground (FG) terminal are internally connected. Be sure to ground the FG terminal.

3.4.2 Cable specifications

The IR.LINK module requires two pairs of shielded twisted-pair cables.
A polyethylene-insulated vinyl sheath cable for instrumentation should be used as the cable for IR.LINK and IR.Station.

Recommended cable model: KPEV-SB 2P × 0.5 mm^2 (Hitachi Cable, Ltd.)

Table 3-2 Recommended Cable Specifications

Item	Specifications
Maximum conductor resistance (20°C)	34.0 Ω/km
Withstand voltage	1000 VAC/minute
Minimum insulation resistance (20°C)	2500 MΩ•km
Electrostatic capacity (1 kHz)	60 PF/m
Characteristics impedance (1 MHz)	110 Ω

Note: The 1-MHz characteristics impedance of the above cable is 110 ohms but IR.LINK and IR.Station have 120-ohm internal terminating resistors in consideration of other transmission rates. Short TERM terminals with a jumper when the IR.LINK module is used at an end of the network. 120-ohm terminating resistors are connected in IR.LINK and IR.Station.

3.4.3 Examples of wiring

Connect terminating resistors to the devices connected to both ends of the cable.
Examples of wiring are given below.

- Connection when the IR.LINK module is used at an end.

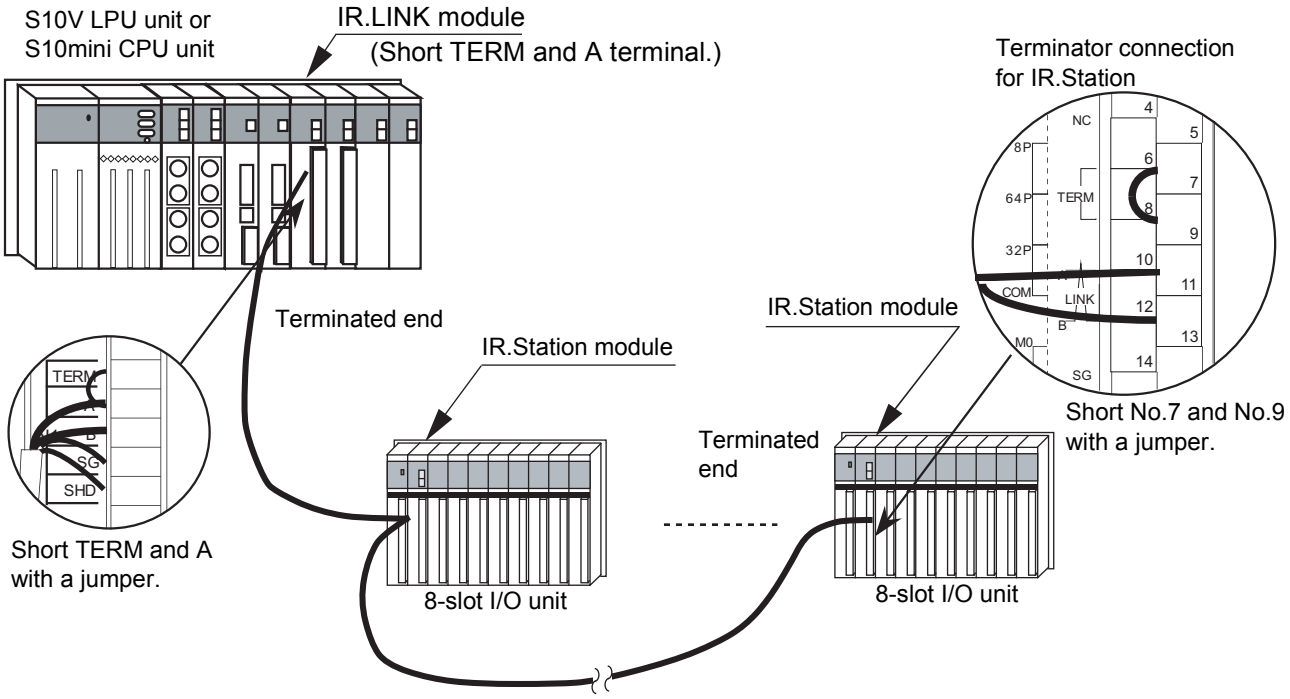


Figure 3-3 Wiring Example (when the IR.LINK module is terminated)

- Connection when the IR.LINK module is used somewhere between the ends.

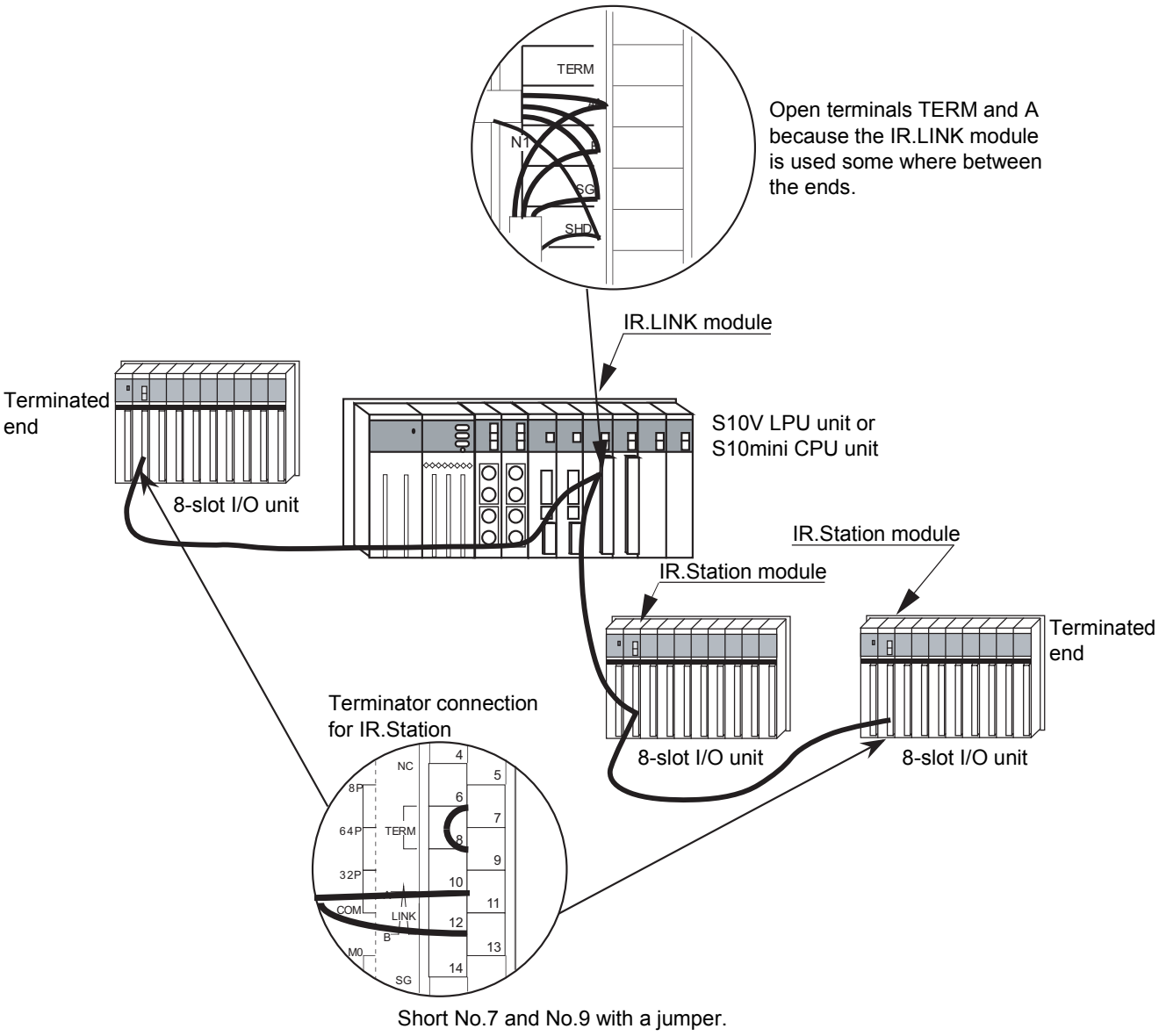


Figure 3-4 Wiring Example (when the IR.LINK module is not terminated)

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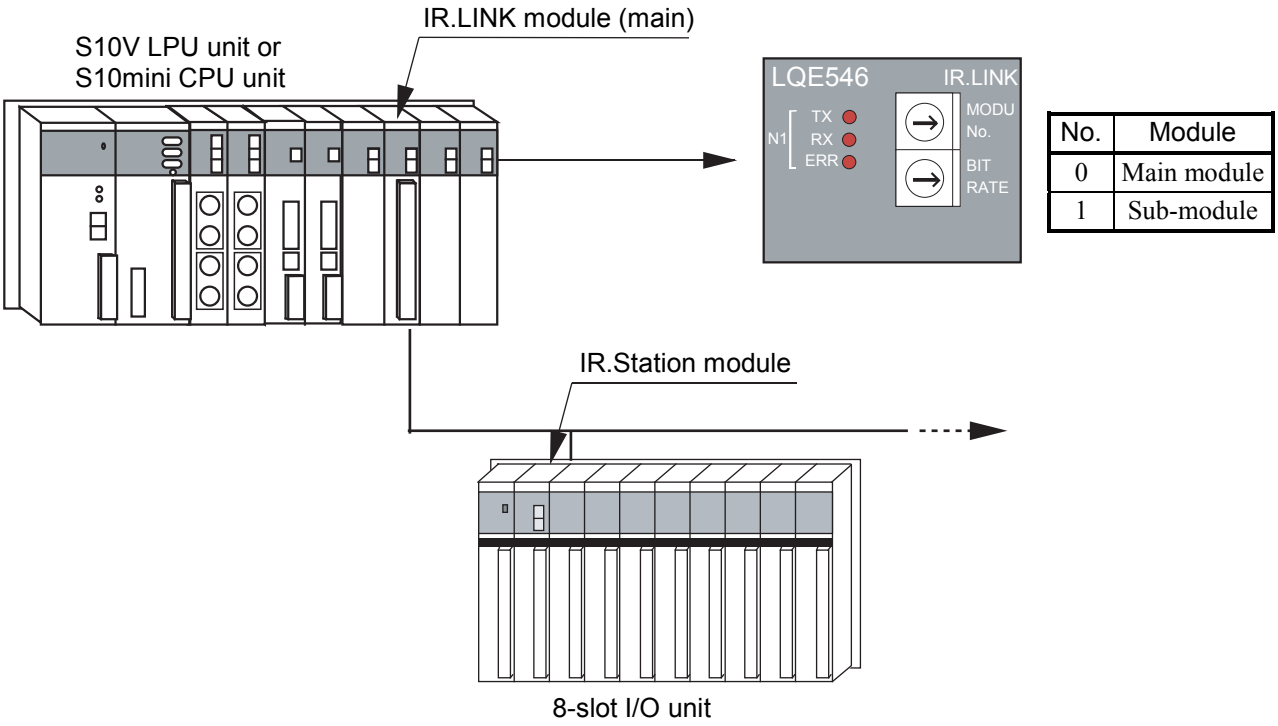
4 OPERATION

4.1 Information for Starting Up the System

Use the IR.LINK system as a tool for starting and setting the IR.LINK module.
The IR.LINK system is a man-machine tool that sets the information required for communication between the IR.LINK module and the IR.Station module.

4.1.1 System configuration



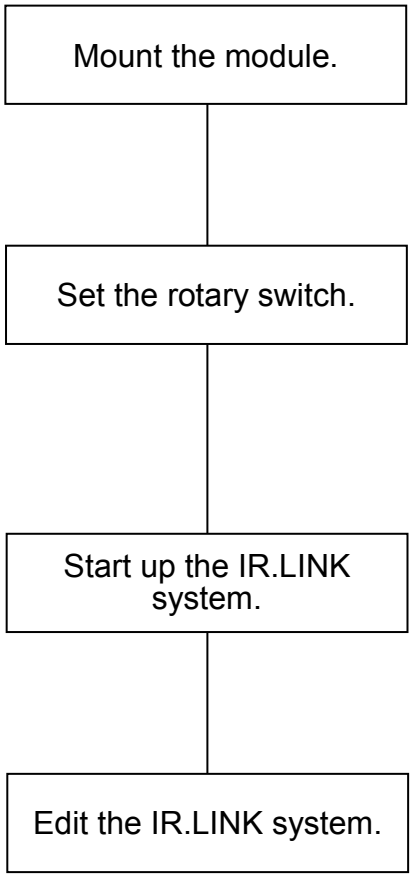
No.	Module
0	Main module
1	Sub-module

Figure 4-1 System Configuration

NOTICE

- Only one IR.LINK module can be installed.
- For the S10mini series, install option modules from the leftmost slot so that the I/O module may not exist between the CPU module and an option module and any empty slot may not exist between the option modules.
- For the S10V series, there is no constraint on the mounting position and empty slot.
- When installing the J.NET module (model: LQE040 or LQE540) or J.NET-INT module (model: LQE045 or LQE545) and the IR.LINK module simultaneously, install the IR.LINK module as the sub-setting. When installing only the IR.LINK module, install it as the main setting.

4.1.2 Procedure for starting up the IR.LINK system



(1) Turn off the CPU or LPU power supply and install the IR.LINK module.

(2) (a) Set Main/Sub with the module number setting switch of the IR.LINK module. (0: Main, 1: Sub)

(b) Set the transmission rate for communication with the BIT RATE switch of the IR.LINK module. (0: 1 Mbps, 1: 0.5 Mbps, 2: 0.25 Mbps, 3: 0.125 Mbps)

(3) Connect the CPU or LPU to a Windows® PC and start the IR.LINK system for S10mini or the IR.LINK system for S10V. For details, see “4.2 Installing and Starting Up the System.”

(4) Edit the IR.LINK system. For details, see “4.2 Installing and Starting Up the System.”

4.2 Installing and Starting Up the System

4.2.1 Installing

(1) Installing the S10mini IR.LINK system

To install the S10mini IR.LINK system, you must execute the setup program by double-clicking the "setup.exe" file stored in the DISK1 folder on the S10mini IR.LINK system CD. When the IR.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 Start button and choose [(All) Programs] – [Hitachi S10] – [IR.LINK SYSTEM] – [IR.LINK SYSTEM] from the [Start] menu on the Windows® screen. Click and hold the right mouse button on the [IR.LINK SYSTEM] and move the pointer to the desktop. Then, choose [Copy Here] from the pop-up menu.

NOTICE

Before installing the IR.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 IR.LINK system without exiting such programs, an error may occur during installation. If such an error occurs, first uninstall the IR.LINK system as directed in "4.2.2 Uninstalling," exit all the Windows® programs, and then install the IR.LINK system again.

(2) Installing the S10V IR.LINK system

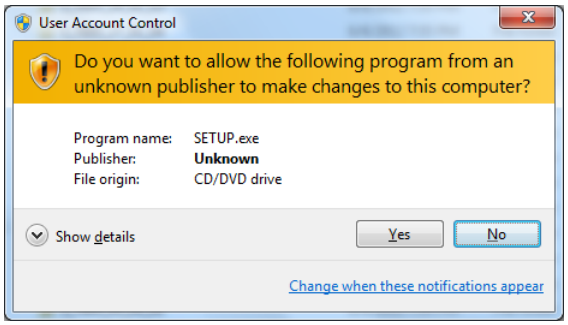
To install the S10V IR.LINK system, you must execute the setup program that is stored in the S10V IR.LINK system DISK1 folder on the CD.

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

Click the Start button and choose [(All) Programs] – [Hitachi S10V] – [S10V IR.LINK SYSTEM] – [S10V IR.LINK SYSTEM] from the [Start] menu on the Windows® screen. Click and hold the right mouse button on the [S10V IR.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 IR.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 IR.LINK System CD. When "setup.exe" is started, the dialog box as shown below will appear. Click the Yes button to continue the execution of the setup program.



The S10V IR.LINK system cannot be installed on a per-user basis. To install the S10V IR.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 IR.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 IR.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 IR.LINK system. In this case, click the Yes button to set off overwriting.

NOTICE

- The S10V BASE SYSTEM is required for operating the S10V IR.LINK system. If it is not installed, you cannot install the S10V IR.LINK system.
- Before installing the S10V IR.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 IR.LINK system without exiting such programs, an error may occur during installation. If such an error occurs, first uninstall the S10V IR.LINK system as directed in "4.2.2 Uninstalling," exit all the Windows® programs, and then install the S10V IR.LINK system again.

4.2.2 Uninstalling

The existing S10V IR.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 [Start] button on your Windows desktop and choose [Settings] – [Control Panel]. When the Control Panel opens, double-click on [Add/Remove Programs]. Then, choose "IR.LINK SYSTEM" (for S10mini controllers) or "S10V IR.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 [Yes] button.

(2) Uninstalling from Windows® XP
Click on [Start] button on your Windows desktop and choose ([Settings] –)[Control Panel]. When the Control Panel opens, double-click on [Add/Remove Programs]. Then, choose "IR.LINK SYSTEM" (for S10mini controllers) or "S10V IR.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 [Yes] button.

(3) Uninstalling from Windows® 7 (32-bit) -- for S10V controllers only
Click on [Start] button on your Windows desktop and choose [Control Panel]. When the Control Panel opens, click [Programs and features]. Then, select "S10V IR.LINK SYSTEM" and click [Uninstall/Change] button. When the [Confirm File Deletion] dialog box appears, click the [Yes] button.

NOTICE

If Windows® opens a window during the uninstall process to display the question "Remove Shared File?," click the [No] button to retain shared files.

4.2.3 Starting up the system

The start up the IR.LINK system, perform the following procedure:

(1) Select Start button – [(All) Program] – [IR.LINK SYSTEM] – [IR.LINK SYSTEM] for S10mini. Select Start button – [(All) Program] – [Hitachi S10V] – [S10V IR.LINK SYSTEM] – [S10V IR.LINK SYSTEM] for S10V. When a shortcut of the [IR.LINK SYSTEM] or [S10V IR.LINK SYSTEM] has been created on the desktop, double-click this shortcut to start the system.

(2) When the [IR.LINK SYSTEM] (see Figure 4-2) or [[S10V] IR.LINK SYSTEM] (see Figure 4-3) window then opens, click the button for a desired command.

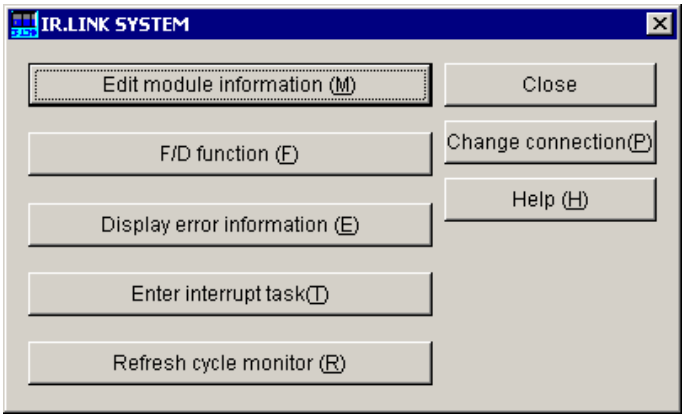


Figure 4-2 IR.LINK SYSTEM Window

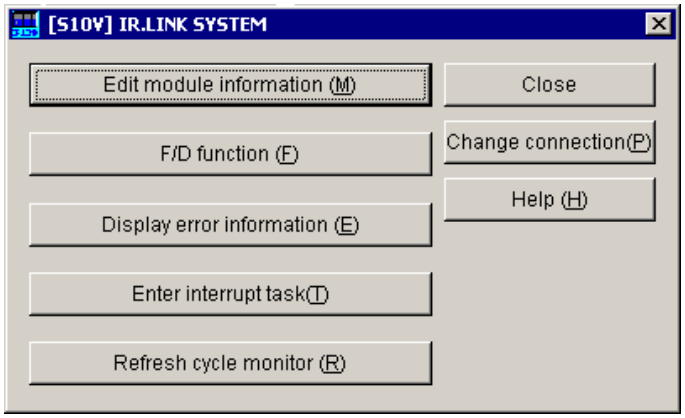


Figure 4-3 [S10V] IR.LINK SYSTEM Window

4.2.4 Changing connections

Function: Sets the communication type between the PCs and the PC.
Operation: The procedure is shown below.

(1) In the [IR.LINK SYSTEM] (see Figure 4-2) or [[S10V] IR.LINK SYSTEM] (see Figure 4-3) window, click the Change connection button.
(2) The [Communication type] window is displayed. ("GPIB" is not displayd for the [S10V] IR.LINK SYSTEM.) (See Figure 4-4.)

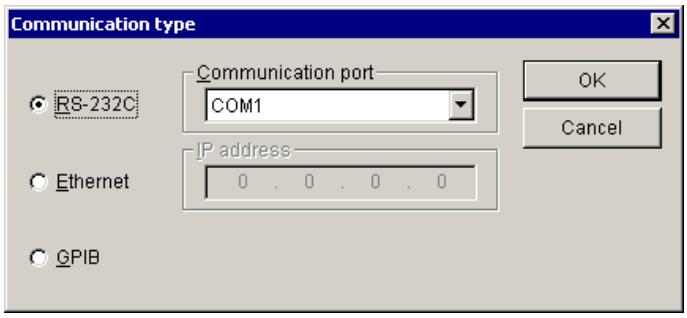


Figure 4-4 Changing Connections

(3) For RS-232C communication, click the "RS-232C" radio button and then select "communication port." (See Figure 4-5.)

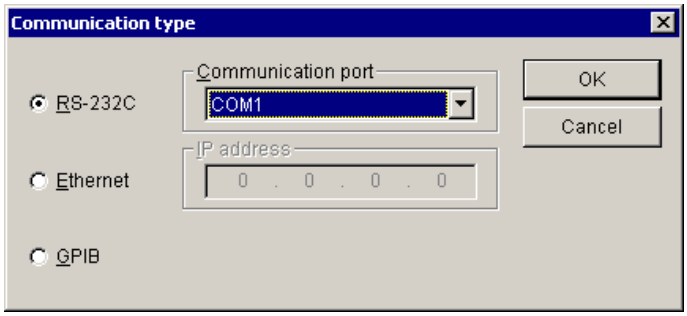


Figure 4-5 RS-232C Port Selection

(4) For Ethernet communication, click the “Ethernet” radio button and then enter the connection destination “IP address.” (See Figure 4-6.)

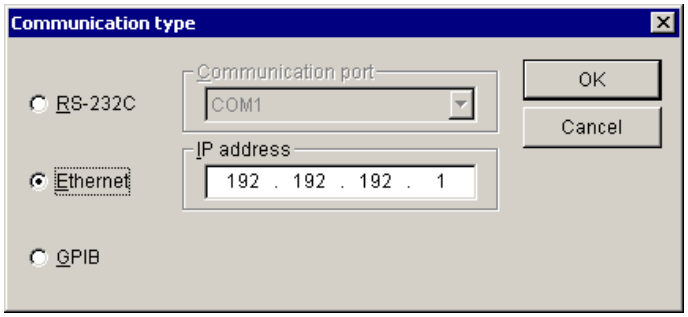


Figure 4-6 Ethernet Connection

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

NOTICE
● The S10mini Series does not support GP-IB. Do not select “GPIB” on the communication type selection window. ● The S10V Series does not support GP-IB. “GPIB” is not displayed on the communication type selection window.

4.2.5 Closing the system

In the [IR.LINK SYSTEM] window (see Figure 4-2) or [[S10V] IR.LINK SYSTEM] window (see Figure 4-3), click the × button or Close button.

4.3 Commands

4.3.1 Editing module information

Function: The module information of the IR.LINK module is edited and the edited information is written in the PCs.

Operation: The procedure is shown below.

(1) On the [IR.LINK SYSTEM] window (Figure 4-2) or [[S10V] IR.LINK SYSTEM] window (Figure 4-3), click the Edit module information button.

(2) The [Edit information] window (Figure 4-7) is displayed.

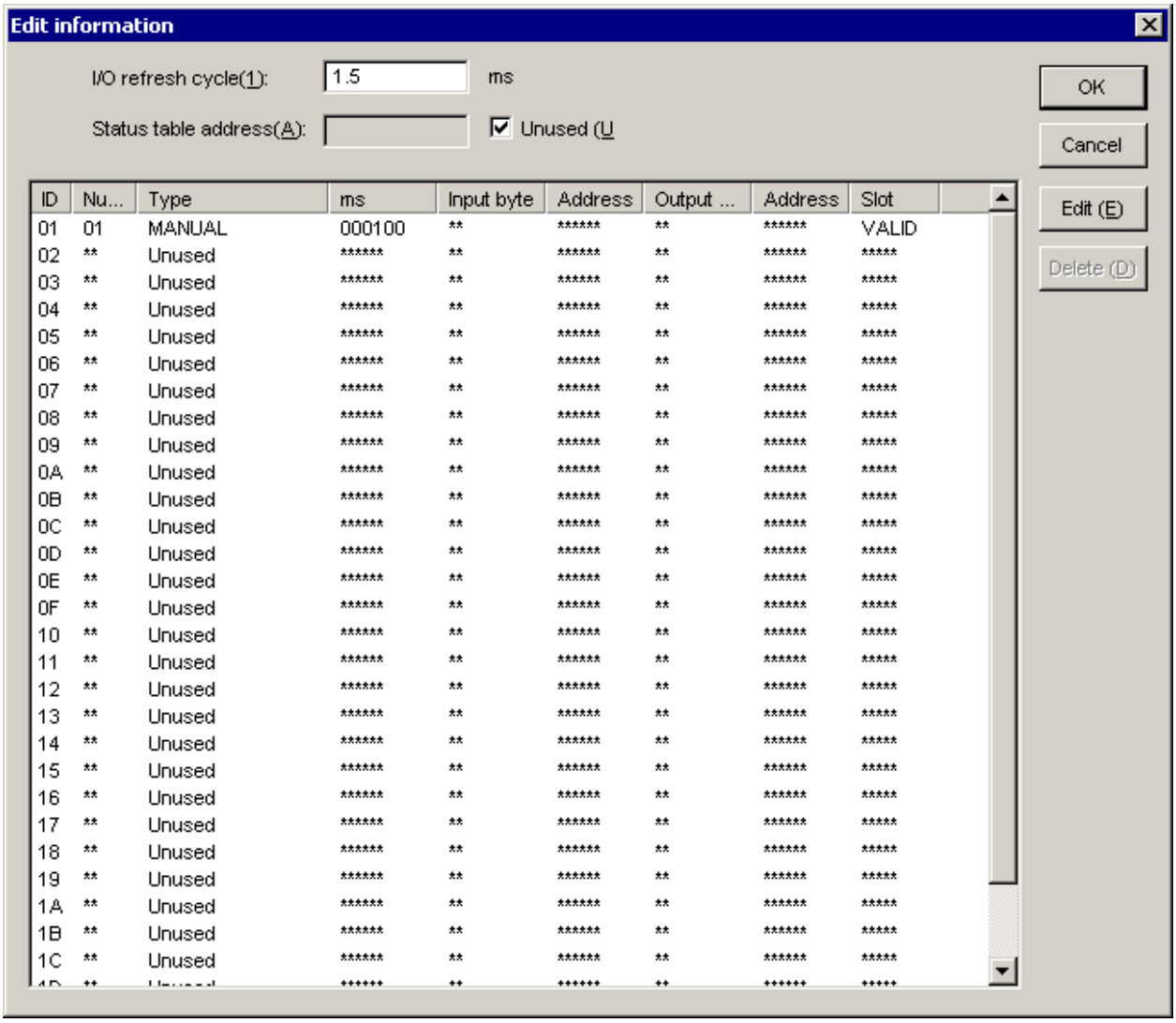


Figure 4-7 Edit Information Window

(3) Enter the I/O refresh cycle time. The settable range is "1.5, 2, 2.5, 3 to 3000" ms. When any value out of this range is specified, the message dialog box "The refresh cycle time is out of range (1.5, 2, 2.5, 3 to 3000)" is displayed.

(4) When using the status table, turn off the "Unused" check box (no check) and enter the beginning address of the status table. (When the "Unused" check box is ON, you cannot enter the beginning address of the status table.) If you do not use the status table, turn on the "Unused" check box. Table 4-1 shows the beginning addresses of the status table that can be set. For how to use the status table (NET status), see "5.3 NET Status."

Table 4-1 Status Table Address which can be Set

Address which can be set S10mini		Address which can be set S10V	
PI/O setting range	Address setting range	PI/O setting range	Address setting range
X000 to XFFF	/0A0000 to /0A1FFE	X000 to XFFF	/240000 to /241FFE
J000 to JFFF	/0A2000 to /0A3FFE	J000 to JF80	/0A2000 to /0A3F00
Y000 to YFFF	/0A4000 to /0A5FFE	Y000 to YF80	/242000 to /243F00
Q000 to QFFF	/0A6000 to /0A7FFE	Q000 to QFFF	/0A6000 to /0A7FFE
G000 to GF80	/0A8000 to /0A9F00	G000 to GF80	/0A8000 to /0A9F00
R000 to RFFF	/0AC000 to /0ADFFE	R000 to RFFF	/0AC000 to /0ADFFE
M000 to MF80	/0AE000 to /0AFF00	M000 to MF80	/0AE000 to /0AFF00
E400 to EF80	/0BC800 to /0BDF00	E400 to EF80	/0BC800 to /0BDF00
—	—	LB0000 to LBFFFF	/220000 to /23FFFE

For status information, 128 addresses starting from the beginning address of the set status table are unconditionally used. Accordingly, for the S10mini, the maximum address that can be set as the G, M, and E areas is not (G/M/E) FFF but (G/M/E) F80. For S10V, the maximum address that can be set as the J, Y, G, M, and E areas is not (J/Y/G/M/E) FFF but (J/Y/G/M/E) F80.

(5) To define an input/output with each station, click the ID to be edited (see Figure 4-7) and click the Edit button.

(6) The [Edit station information] window is displayed. (Figure 4-8)

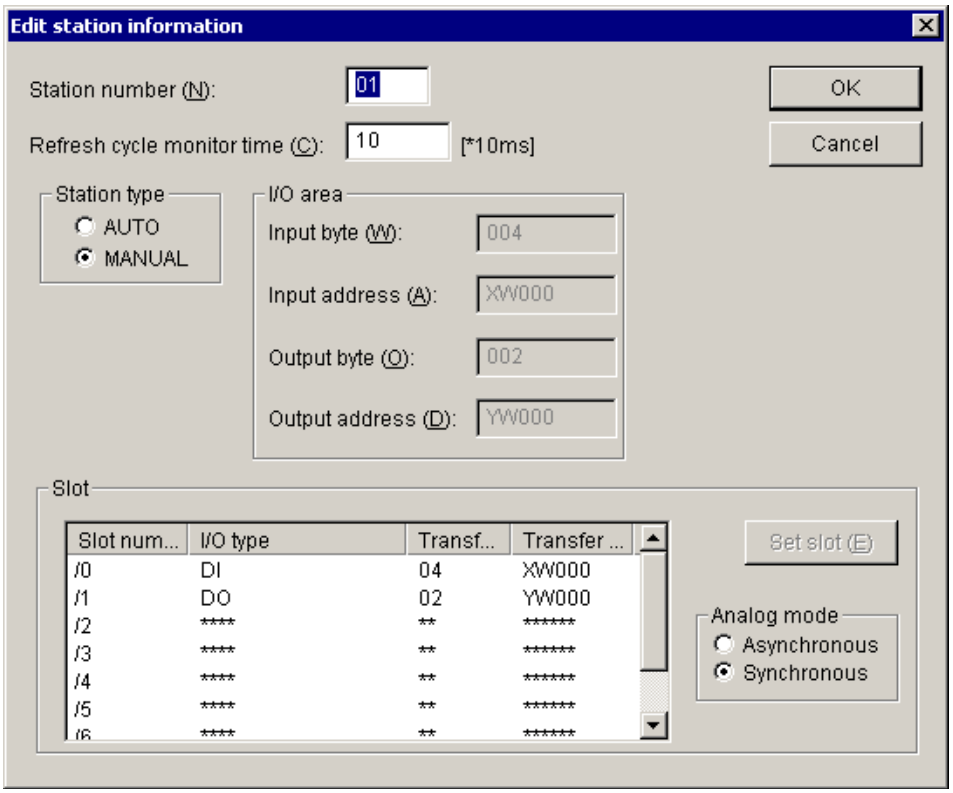


Figure 4-8 Edit Station Information Window

As the default display of the [Edit station information], the set station information is displayed when the set station information is available, or the following is displayed when set station information is not available (station information is not registered).

<Default value of station ID when station information is not registered>
Station number: 00
Refresh cycle monitor time: 0 ms
Station type: No selection
I/O area: Input disable status
Slot: Input disable status
Analog mode: Select disable status

To change or newly register station information, enter each piece of information and click the OK button. When you do not change station information, click the Cancel button. The setting range of each piece of information to be entered on the [Edit station information] window is shown on the next page.

<Effective setting range for station information>

Station number: Set the station number 1 to 7F (hexadecimal) allocated to the sub-station (IR.Station).

Refresh cycle monitor time: Set the refresh cycle time 0 to 65535 (decimal) of the sub-station. The setting unit is 10 ms. When 0 is specified, refresh cycle monitoring is not performed. The set point should be 5 times or more as large as the set point of refresh cycle.

Station type: Select "AUTO" or "MANUAL" as the station type of the sub-station. When "AUTO" is selected, set the I/O area. (Slot does not need to be set but details cannot be set.)

When "MANUAL" is selected, I/O area does not need to be set but Slot must be set. (The slot information including distinction between analog and digital and address/size of I/O area can be set in detail.)

I/O area: Input byte and Output byte cannot be set to 0. However, you may set either Input byte or Output byte to 0. The total number of input bytes and output bytes cannot exceed /100 at setting. The I/O area must not be set doubly between stations. Set it without duplication.

Input byte: Set the number of bytes of the input module. The setting range is /0 to /100 (hexadecimal, "/" input not required).

Input address: Set the beginning address to be allocated to the input module. For addresses that can be set, see Table 4-2.

Output byte: Set the number of bytes of the output module. The setting range is /0 to /100 (hexadecimal, "/" input not required).

Output address: Set the beginning address to be allocated to the input module. For addresses that can be set, see Table 4-2.

Analog mode: Select "Asynchronous" or "Synchronous." When "Synchronous" is selected, analog value input/output processing for the station side (IR.Station) is performed with the input/output request timing from the master side (IR.LINK).

When "Asynchronous" is selected, analog value input/output processing is performed regardless of the input/output request timing from the master side (the processing is performed according to the idle time of the station side).

Table 4-2 Addresses that can be Set as I/O Area Addresses and Transfer Addresses

Address which can be set for S10mini		Address which can be set for S10V	
PI/O setting range	Address setting range	PI/O setting range	Address setting range
XW000 to XWFF0	/0E0000 to /0E01FE	XW000 to XWFF0	/414000 to /4141FE
JW000 to JWFF0	/0E0200 to /0E03FE	JW000 to JWFF0	/0E0200 to /0E03FE
YW000 to YWFF0	/0E0400 to /0E05FE	YW000 to YWFF0	/414200 to /4143FE
QW000 to QWFF0	/0E0600 to /0E07FE	QW000 to QWFF0	/0E0600 to /0E07FE
GW000 to GWFF0	/0E0800 to /0E09FE	GW000 to GWFF0	/0E0800 to /0E09FE
RW000 to RWFF0	/0E0C00 to /0E0DFE	RW000 to RWFF0	/0E0C00 to /0E0DFE
MW000 to MWFF0	/0E0E00 to /0E0FFE	MW000 to MWFF0	/0E0E00 to /0E0FFE
DW000 to DWFFF	/061000 to /062FFE	DW000 to DWFFF	/061000 to /062FFE
EW400 to EWFF0	/0E1C80 to /0E1DFE	EW400 to EWFF0	/0E1C80 to /0E1DFE
FW000 to FWBFF	/0E2000 to /0E37FE	FW000 to FWBFF	/0E2000 to /0E37FE
— (Extension memory)	/100000 to /4FFFFE (Extension memory)	LBW0000 to LBWFFF0	/412000 to /413FFE
		LWW0000 to LWWFFFF	/450000 to /46FFFE
		LXW0000 to LXW3FFF	/4A0000 to /4A7FFE

* The address in which extends it to other ranges or exceeds it to the setting range cannot be set.

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.

(7) When "MANUAL" is selected in Station type, Slot can be set. When the I/O type of Slot is displayed as "****," this means that the slot information of this slot number is not yet registered. Select (click) an optional slot number (/01 to /07) and click the [Set slot] button.
The [Set slot information] window appears (Figure 4-9). Set each item. After completing the setting, click the [OK] button. To cancel the setting, click the [Cancel] button.

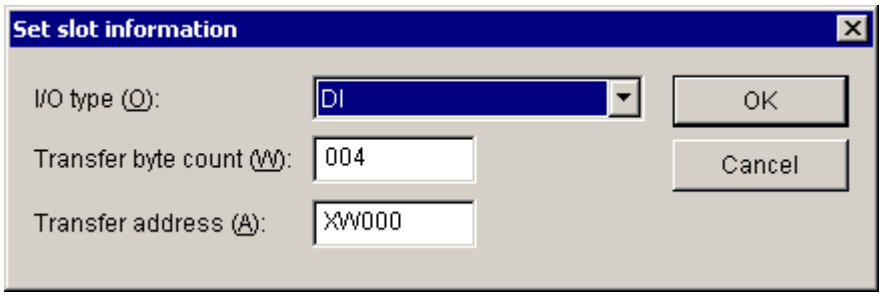


Figure 4-9 Set Slot Information Window

<Setting items on the [Set slot information] window>

I/O type: There are 7 I/O types that can be selected. Select an I/O type according to the I/O module installed in each slot. The default I/O type at new registration is "Delete."

Delete: Select "Delete" to delete the registered I/O module.

DI: Select DI when the module being installed is a digital input.

DO: Select DO when the module being installed is a digital output.

AI: Select AI when the module being installed is an analog input and the mode of the module is set to 1.

AO: Select AO when the module being installed is an analog output and the mode of the module is set to 1.

S10 AI (4ch): Select S10 AI (4ch) when the module being installed is an analog input and the mode of the module is set to 2.

S10 AO (4ch): Select S10 AO (4ch) when the module being installed is an analog output and the mode of the module is set to 2.

S10 PCT (pulse counter): Select S10 PCT when the module being installed is a pulse counter.

Transfer byte count: Set the number of bytes to be transferred in the range of /1 to /10 (hexadecimal input. However, "/" is not required.) If a value other than /1 to /10 is specified, the message dialog box " The number of bytes to be transferred is out of range (/01 to /10)." is displayed.

Transfer address: Set the beginning address of the area to be transferred. Table 4-2 shows areas that can be specified.

(8) After completing the setting, click the OK button on the [Edit information] window (Figure 4-7). To cancel the setting, click the Cancel button. When the OK button is clicked, the information edited on the [Edit information] window (Figure 4-7), Edit station information window (Figure 4-8), and [Set slot information] window (Figure 4-9) is written into the memory of the IR.LINK module of the PCs. When the Cancel button is clicked, the edited information is discarded and the [Edit information] window ends.

4.3.2 F/D function

Function: The information of the IR.LINK module is saved, transmitted to the PCs, and compared with the PCs.
Operation: The procedure is shown below.

(1) On the [IR.LINK SYSTEM] window (Figure 4-2) or [[S10V] IR.LINK SYSTEM] window (Figure 4-3), click the F/D function button.
(2) The [F/D function] window (Figure 4-10) is displayed.

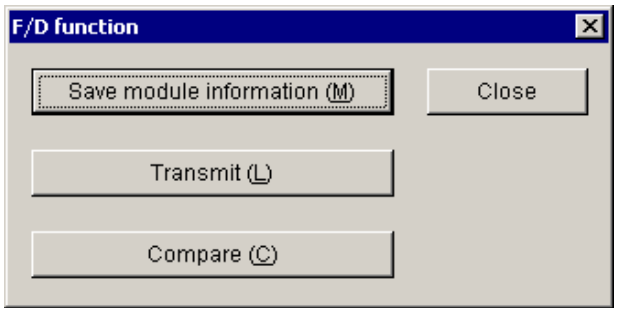


Figure 4-10 F/D Function Window

(1) Saving module information

Function: The system information of the IR.LINK module is saved as a file (PSE format) on the PC.
Operation: The procedure is shown below.

(1) On the [F/D function] window (Figure 4-10), click the Save module information button.
(2) The [Save As] window (Figure 4-11) is displayed.

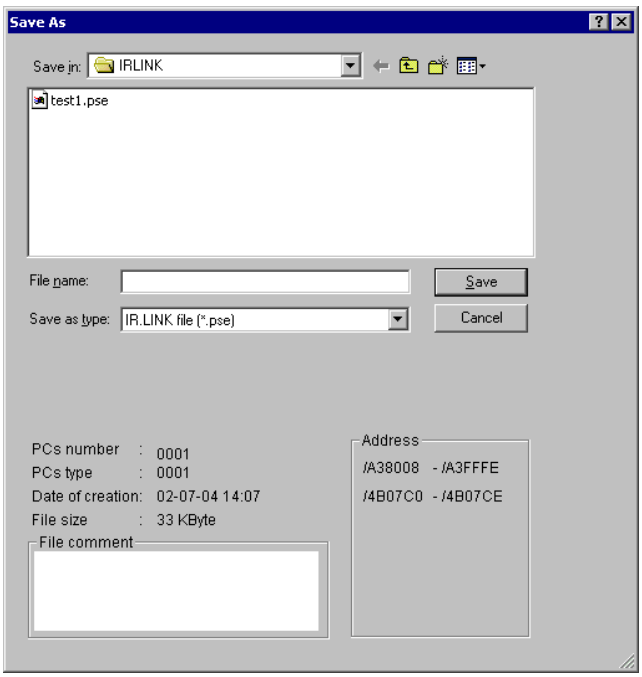


Figure 4-11 Save As Window

In “File name,” enter the file name to save the system information of the IR.LINK module. When a file is selected with the pointing device, the information is overwritten and saved in the file.
A file comment input is optional and up to 128 characters can be entered.
“Save as type,” “PCs number,” “PCs type,” “Date of creation,” “File size” (file size after saving), and “Address” (area of the IR.LINK module for saving) are automatically displayed. The address varies depending on the IR.LINK module setting (main/sub). For module setting, see “2.1 Names and Functions of Each Part.”
Saving addresses when the module is set to Main: /A38008 to /A3FFFE
/0FF010 to /0FF01E
Saving addresses when the module is set to Sub: /AB8008 to /ABFFFE
/0FF030 to /0FF03E

(3) After completing the setting, click the Save button. (The system information of the IR.LINK module is saved.) While the system information is saved, the IR.LINK System Information Receiving file window (Figure 4-12) is displayed. When the file has been received, the IR.LINK system information receiving completion dialog box (Figure 4-13) is displayed. Click the OK button. To cancel the information, click the Cancel button on the [Save As] window.

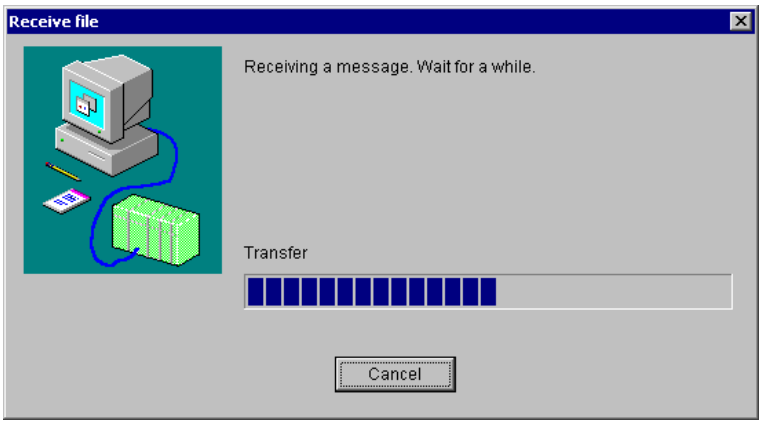


Figure 4-12 IR.LINK System Information Receiving File Window

Figure 4-13 IR.LINK System Information Receiving Completion Dialog Box

(2) Transmission

Function: The IR.LINK system information saved by the “4.3.2 (1) Saving module information” function is transmitted to the PCs.

Operation: The procedure is shown below.

(1) On the [F/D function] window (Figure 4-10), click the Transmit button.

(2) The [Open] window is displayed (Figure 4-14). Enter the file name or select (click) the file name to be transmitted with the pointing device.
Only when a file is selected with the pointing device, “PCs number,” “PCs type,” “Date of creation,” “File size,” “File comment,” and “Address” of the IR.LINK system information (file) to be transmitted are displayed.

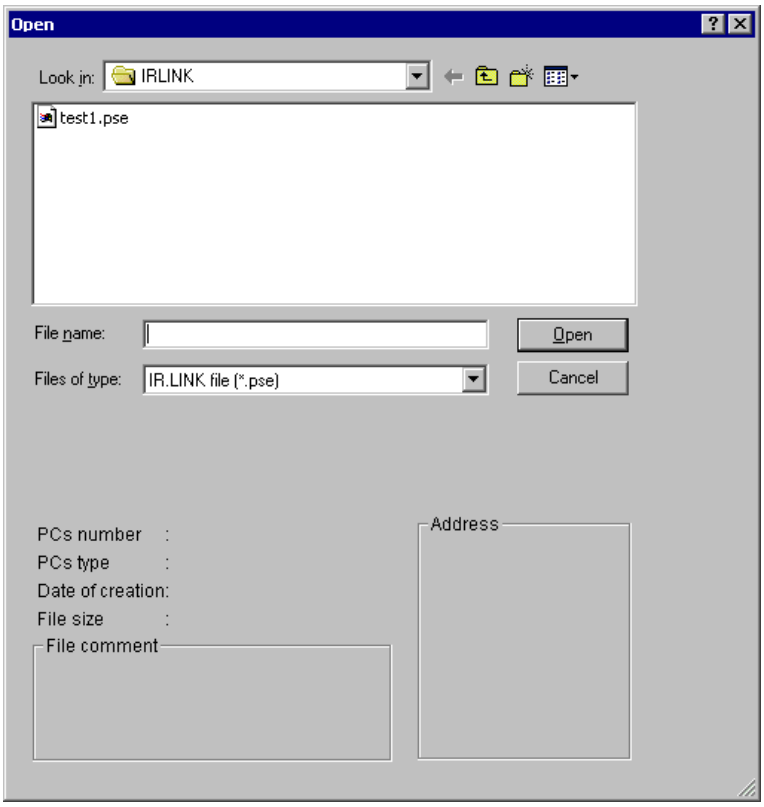


Figure 4-14 Open Window

Before transmitting the IR.LINK system information, make sure that the address of the IR.LINK system information to be transmitted agrees with the address of the transmitting destination. Transmit the IR.LINK system information saved when the module is set to Main, to the IR.LINK module that is set to Main.

(3) After determining the file name to be transmitted, click the Open button. (The IR.LINK system information is transmitted.) During the transmission, the window shown in Figure 4-15 is displayed. When the information has been transmitted, the dialog box shown in Figure 4-16 is displayed. Click the OK button.
If you do not want to transmit the information, click the Cancel button on the [Open] window.

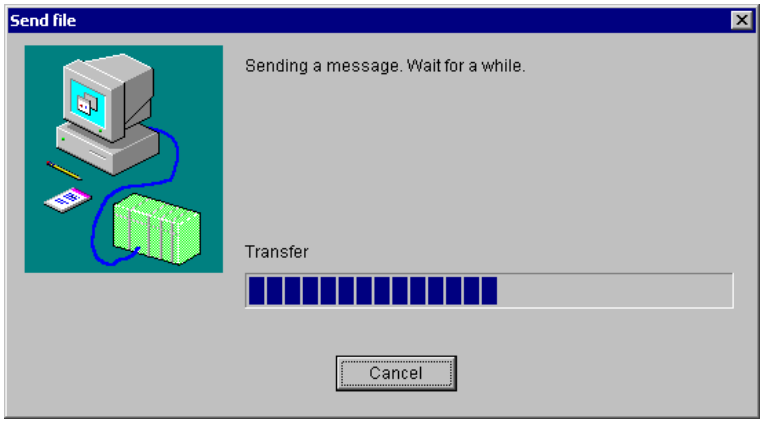


Figure 4-15 Send File Window

Figure 4-16 IR.LINK System Information Transmission Completion Dialog Box

Note: While IR.LINK system information is transmitted, do not click the Cancel button. If you have clicked the Cancel button for a compelling reason, it is necessary to reset the PCs or turn on and off the power supply.

(3) Comparison

Function: The IR.LINK system information is compared with the PCs.
Operation: The procedure is shown below.
See "4.3.2 (2) Transmission."

Note: As a result of comparison, a mismatch occurs in the following area. If the mismatch is only in this area, the saved file agrees with the PCs memory in respect of the IR.LINK system information. In the other cases, when a mismatch occurs, the saved file does not agree with the contents of the memory.
IR.LINK module (main) installation …… /A3BFFE
IR.LINK module (sub) installation …… /ABBFFE

4.3.3 Interrupt task registration

Function: Interrupt tasks are registered. Up to 8 tasks can be registered.
Operation: The procedure is shown below.

(1) On the [IR.LINK SYSTEM] window (Figure 4-2) or [[S10V] IR.LINK SYSTEM] window (Figure 4-3), click the [Enter interrupt task] button.
(2) The [Enter interrupt task] window is displayed (Figure 4-17).

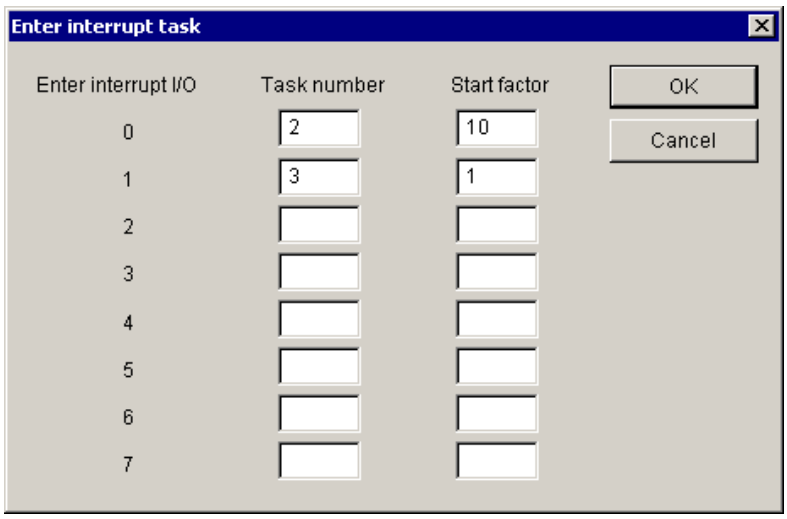


Figure 4-17 Enter Interrupt Task Window

When any interrupt task is already registered, the "Task number" and "Start factor" of the corresponding interrupt input are displayed. In the unregistered status, the task number field and the start factor field remain blank. The setting ranges for task number and start factor are shown below.
<Setting ranges for task number and start factor>
Task number: 1 to 255 (decimal input) (Note)
Start factor: 0 to 32 (decimal input)
(Note) Task number 230 to 255 cannot start, because it is already used in the system.
<Interrupt task deletion>
To delete any interrupt task, make the task number field and the start factor field of the corresponding interrupt I/O input blank and click the [OK] button.

(3) After completing the setting, click the [OK] button. Check the setting ranges for task number and start factor. If it results in OK, register the interrupt tasks. If you do not want to register them, click the [Cancel] button.

Note: The user should perform interrupt task registration by using the CPMSE debugger system for the S10mini or the RPDP/S10 for the S10V. Release interrupt tasks by the user program. (Incorporate the interrupt task release processing in the initial task.) When the user does not release interrupt tasks, a task start does not take place. When an unregistered task number is specified to an interrupt task (only registration from the [Enter interrupt task] window), a program error will occur.

4.3.4 Refresh cycle monitor

Function: The I/O refresh cycle time is monitored (measured).
Operation: The procedure is shown below.

(1) On the [IR.LINK SYSTEM] window (Figure 4-2) or [[S10V] IR.LINK SYSTEM] window (Figure 4-3), click the Refresh cycle monitor button.
(2) The [Refresh cycle monitor] window is displayed (Figure 4-18).

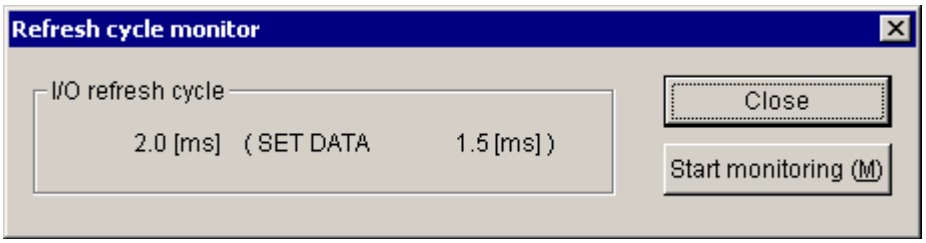


Figure 4-18 Refresh Cycle Monitor Window

(3) To start monitoring, click the Start monitoring button. To stop monitoring in the monitoring status, click the Stop monitoring button.
To exit the [Refresh cycle monitor] window, click the Close button.

4.3.5 Error information display

Function: Regarding the error information display of the module, Module error, Station error or Error multiple counter is selected.
Operation: The procedure is shown below.

(1) On the [IR.LINK SYSTEM] window (Figure 4-2) or [[S10V] IR.LINK SYSTEM] window (Figure 4-3), click the [Display error information] button.
(2) The [Error information] window is displayed (Figure 4-19).

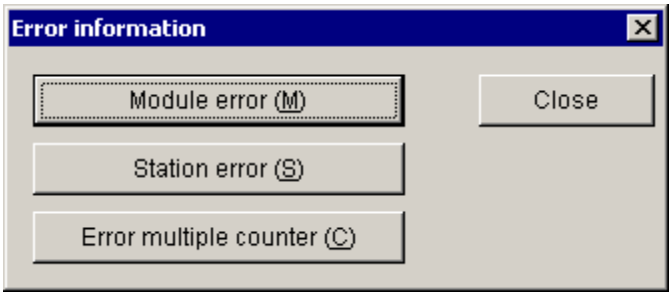


Figure 4-19 Error Information Window

(1) Module error

Function: The error information of the IR.LINK module is displayed.
Operation: The procedure is shown below.

(1) On the [Error information] window (Figure 4-19), click the [Module error] button. When the module is normal, the message dialog "The module is normal" appears.
If the module is not normal, the [Module error] window is displayed (Figure 4-20).

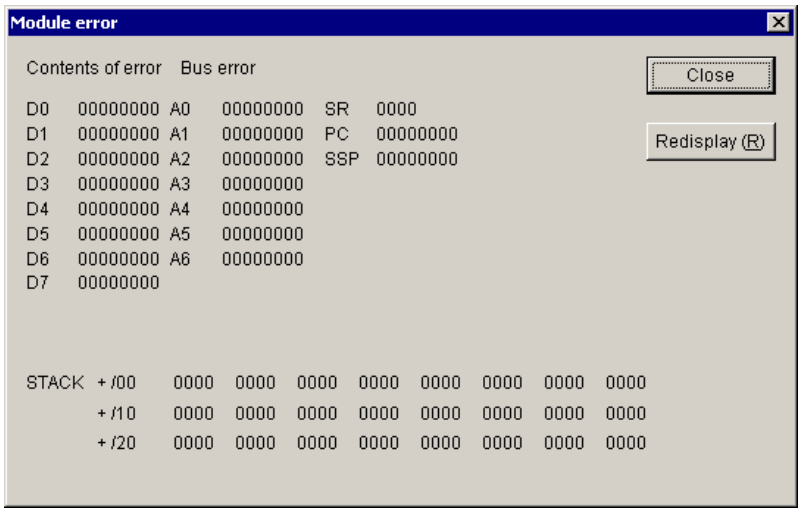


Figure 4-20 Module Error Window

For the details of the contents of error, see "6.3 Errors and Countermeasures."
(2) Clicking the [Redisplay] button displays the latest error information.
To exit from the [Module error] window, click the [Close] button.

(2) Station error

Function: The error information of each station of the IR.LINK module is displayed.
Operation: The procedure is shown below.

(1) On the [Error information] window (Figure 4-19), click the Station error button. The [Station error] window is displayed (Figure 4-21).

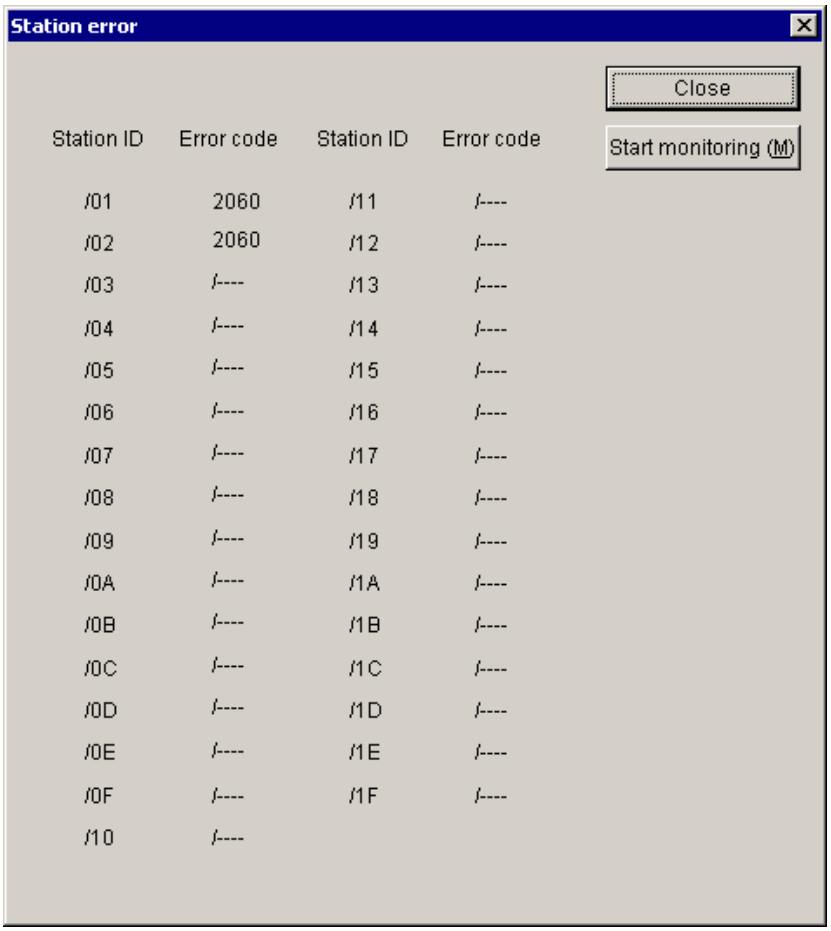


Figure 4-21 Station Error Window

The error information is displayed for each station ID. When the station is normal or not registered, the error code for this station ID appears as "/----." If any value other than the above appears, this means that an error has occurred in this station. For the details of the contents of station error codes, see "6.3 Errors and Countermeasures."

(2) To start monitoring, click the Start monitoring button. To stop monitoring in the monitoring status, click the Stop monitoring button.
To exit the [Station error] window, click the Close button.

(3) Error multiple counter

Function: The error multiple counter of each station under the control of the IR.LINK module is displayed.

Operation: The procedure is shown below.

(1) On the [Error information] window (Figure 4-19), click the Error multiple counter button.
The [Error multiple counter] window is displayed (Figure 4-22).

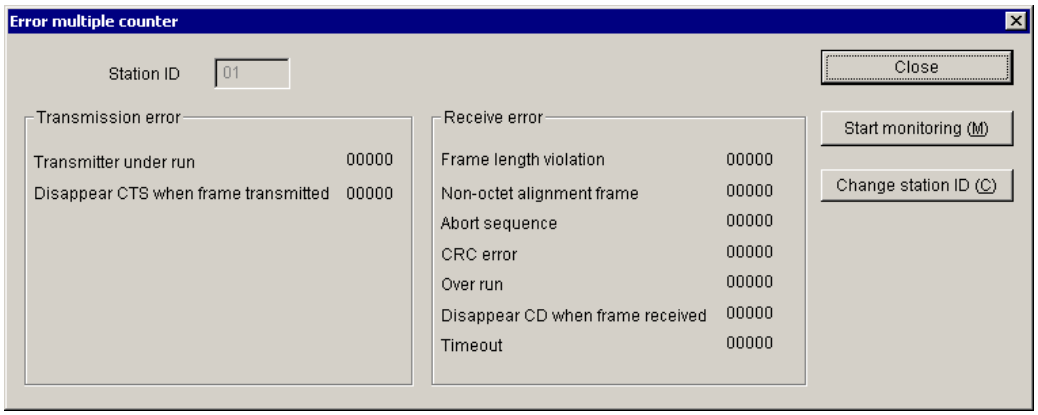


Figure 4-22 Error Multiple Counter Window

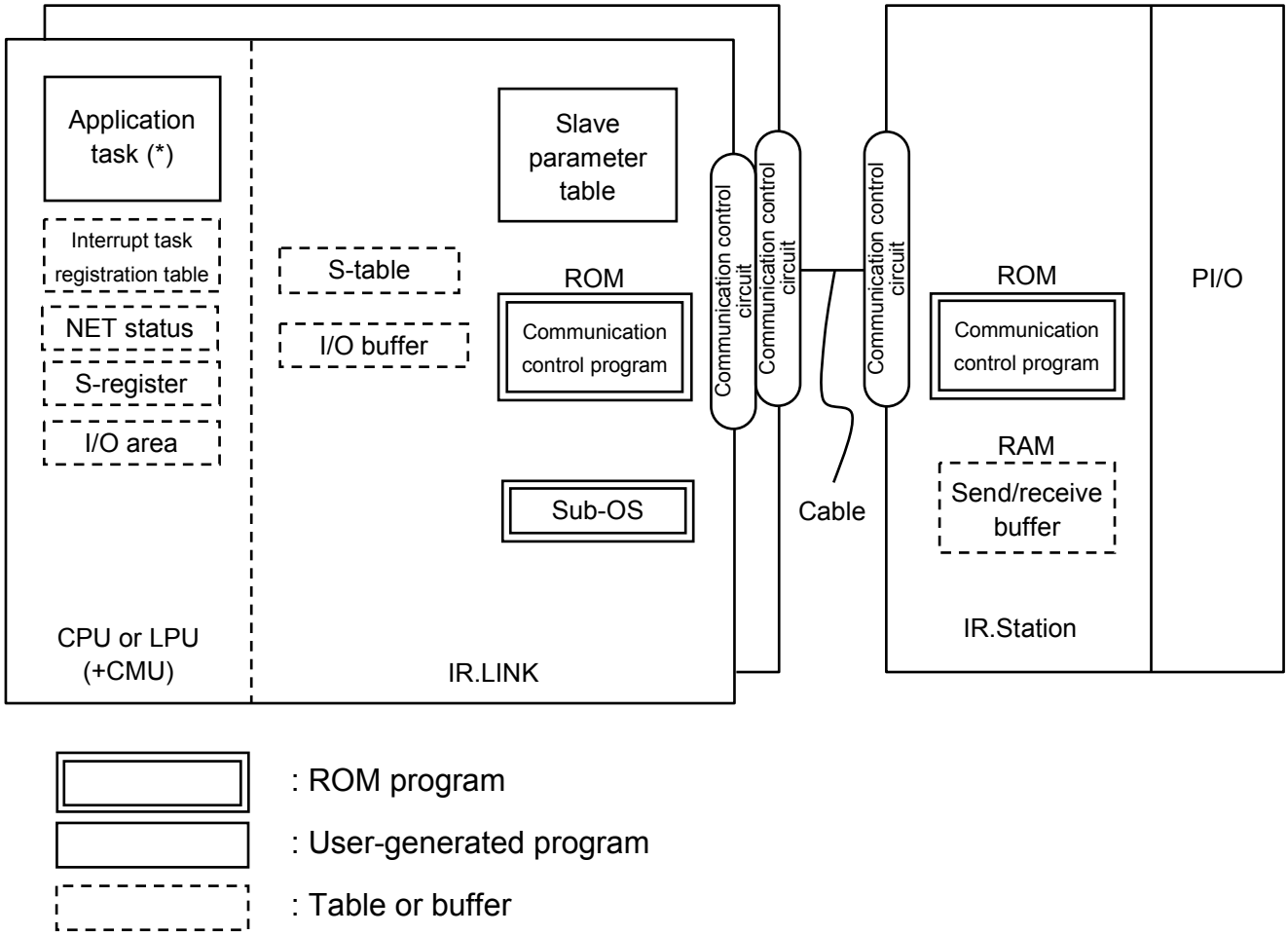
The error multiple counter is displayed for each station. The default "Station ID" is "01". Change it by clicking the Change station ID button as required.
When the Change station ID button is clicked, the Change station ID button changes into the Decide button. Enter the station ID (01 to 1F) of the station for which you want to see the information and click the Decide button, the [Error multiple counter] window of this station is displayed. If the specified station is invalid, the message dialog box "The station ID is out of range. (/01 to /1F)" is displayed.

(2) To start monitoring, click the Start monitoring button. To stop monitoring in the monitoring status, click the Stop monitoring button.
To exit the [Error multiple counter] window, click the Close button.
Note: During monitoring, the station ID cannot be changed.

5 USER GUIDE

5.1 Software Configuration of the IR.LINK System

An outline of the software configuration of the IR.LINK system is shown below.
The communication program and sub-OS are ROM programs and do not need to be loaded.



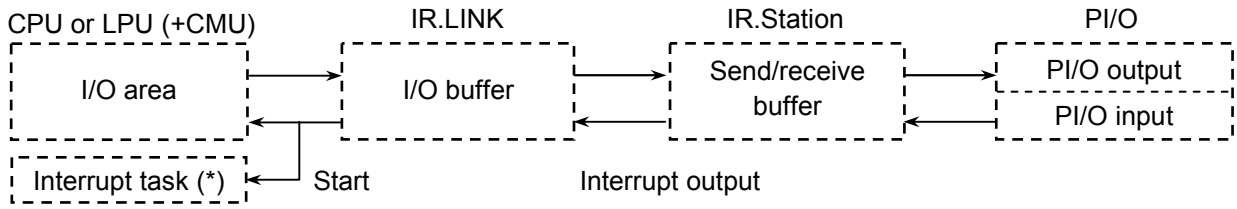
(*) In the S10V, the application task is available only when the CMU module is installed.

Figure 5-1 Outline of Software Configuration

- Communication control program

  The main functions are shown below.

  • This program transmits and receives data to/from the IR.Station, and when the specific DI input changes from OFF into ON, it causes an interrupt to the CPU or LPU to call the sub-OS.



(*) In the S10V, the interrupt task is available only when the CMU module is installed.

Figure 5-2 Communication Control Program Operation

- Sub-OS

  With an interrupt from the communication control program, the interrupt task corresponding to the DI that has changed (from OFF to ON) is started.

- NET status, S-register, and S-table

  These are a register and a table in which the communication control program sets data transmission/reception information and error information.

- I/O areas

  The following Table 5-1 shows I/O areas that permits I/O communication.

Table 5-1 I/O Areas

Name	Symbol range	Number of points
External input	XW000 (X000) to XWFF0 (XFFF)	256 words (4096 points)
External output	YW000 (Y000) to YWFF0 (YFFF)	256 words (4096 points)
Internal register	RW000 (R000) to RWFF0 (RFFF)	256 words (4096 points)
Global link register	GW000 (G000) to GWFF0 (GFFF)	256 words (4096 points)
Transfer register	JW000 (J000) to JWFF0 (JFFF)	256 words (4096 points)
Receive register	QW000 (Q000) to QWFF0 (QFFF)	256 words (4096 points)
Event register	EW400 (E400) to EWFF0 (EFFF)	192 words (3072 points)
Extended internal register	MW000 (M000) to MWFF0 (MFFF)	256 words (4096 points)
Function work register	FW000 to FWBFF	3072 words
Work register (*1)	LBW0000 to LBWFFF0	4096 words
Word work register (*1)	LWW0000 to LWWFFFF	65536 words
Word work register (*1)	LXW0000 to LXW3FFF	16384 words
Extended memory (*2)	/100000 to /4FFFFF	2M words

(*1) The work register and the word work register are available in the S10V only.
(*2) The extended memory is available in the S10mini 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.

5.2 Application Task Start by Interrupt I/O Input

5.2.1 Outline

The IR.LINK module can cause an interrupt with an DI input signal and start an application task (interrupt start application task) that was previously registered. The IR.LINK module can cause 8 interrupts. To start the interrupt start application task (hereafter abbreviated as the interrupt task), set the IR.Station and register the interrupt tasks.
In the S10V, the interrupt task is available only when the CMU module is installed. The interrupt task is not available with the LPU module only.

5.2.2 Setting and installing the IR.Station

- Setting station number
  Set the station number of the IR.Station to “01”. If any value other than “01” is set, the task is not started and fetched as input data only.

- Installing the DI module
  Install the DI module of the interrupt I/O input by the just right side of the IR.Station module. If it is installed in any other location, the task is not started but fetched as input data only. The task is started when the input signal changes from OFF into ON (from the low level into the high level).

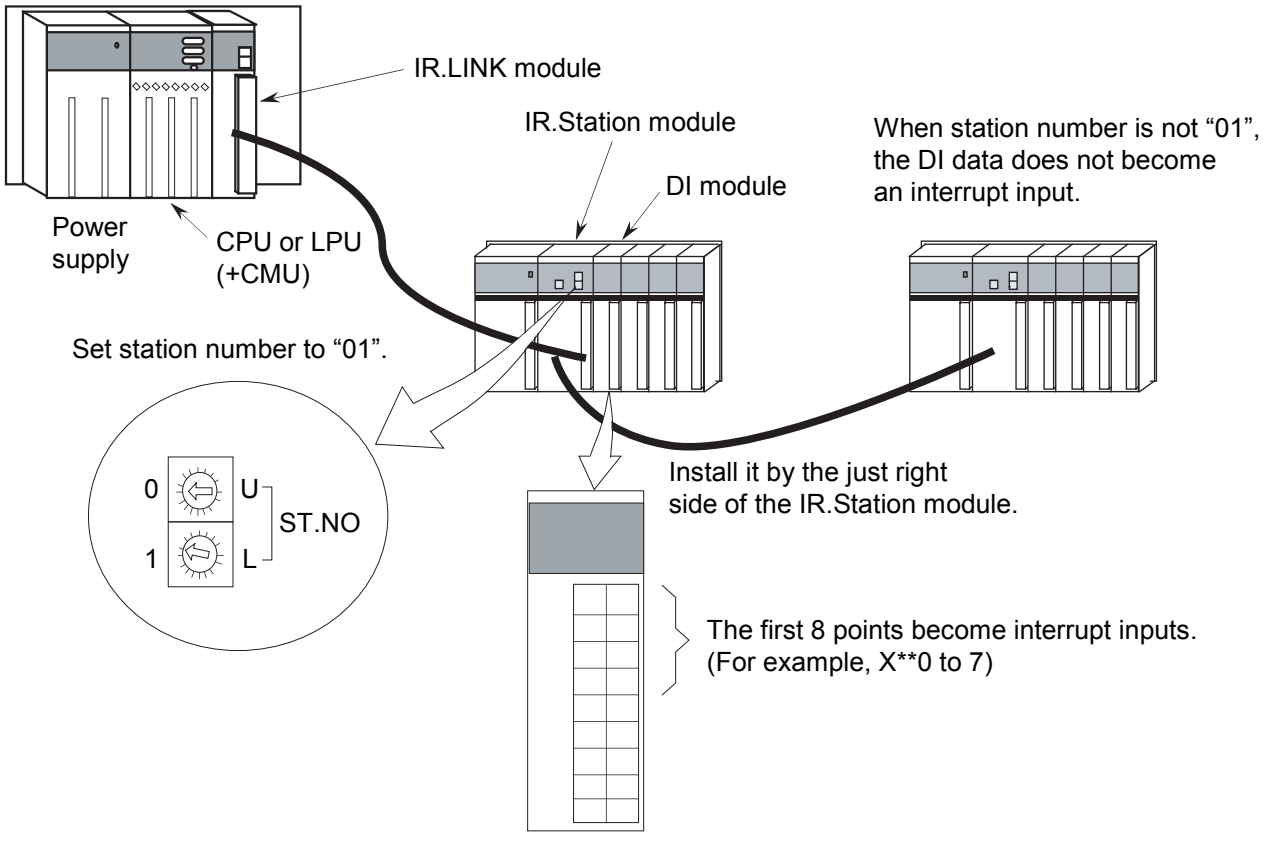


Figure 5-3 Example of Connection with the IR.Station

5.2.3 Interrupt task registration

Regarding the interrupt task to be started by an interrupt I/O input, register the task number and start factor in the table shown in the following table by using a tool. (See "4.3.3 Interrupt task registration.")
In the S10V, the interrupt task is executed by the CMU module. However, interrupt task registration is set in the LPU module. Accordingly, the LPU module itself can register the interrupt task but cannot execute it. To execute the interrupt task, install the CMU module.

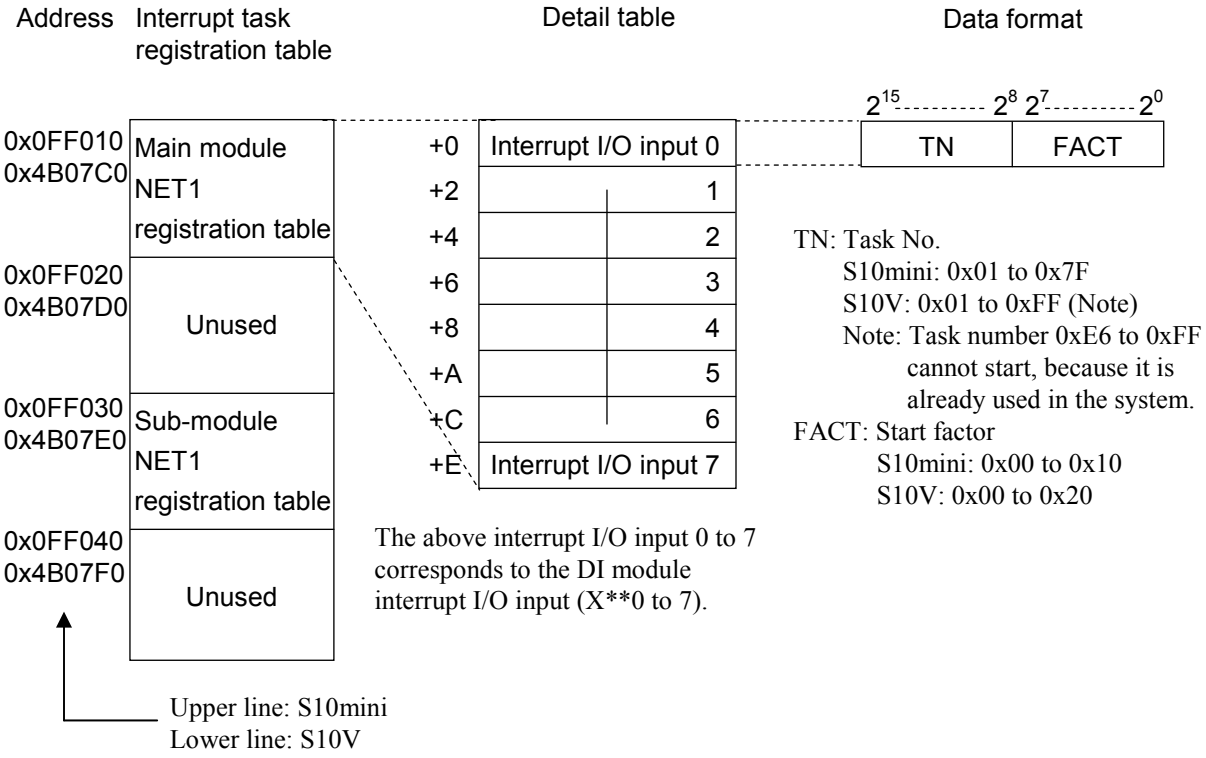


Figure 5-4 Interrupt Task Registration Table

NOTICE
When mounting S10V, IR.LINK module (model: LQE546) before Module Rev.B (Ver-Rev: 0002-0001) doesn't provide for application task start function by interrupt I/O input, but provides for I/O communication function with IR.Station only. When utilizing the application task start function performed by interrupt I/O input in combination with S10V, you should use the module after Module Rev.C (Ver-Rev: 0003-0000). Moreover, the above-mentioned Ver-Rev is a microprogram Ver-Rev of IR.LINK module which is shown on "Module List" of S10V BASE SYSTEM.

5.2.4 Starting timing

- Starting timing of interrupt task

  Figure 5-5 shows the relation between an interrupt I/O input and the task start timing.

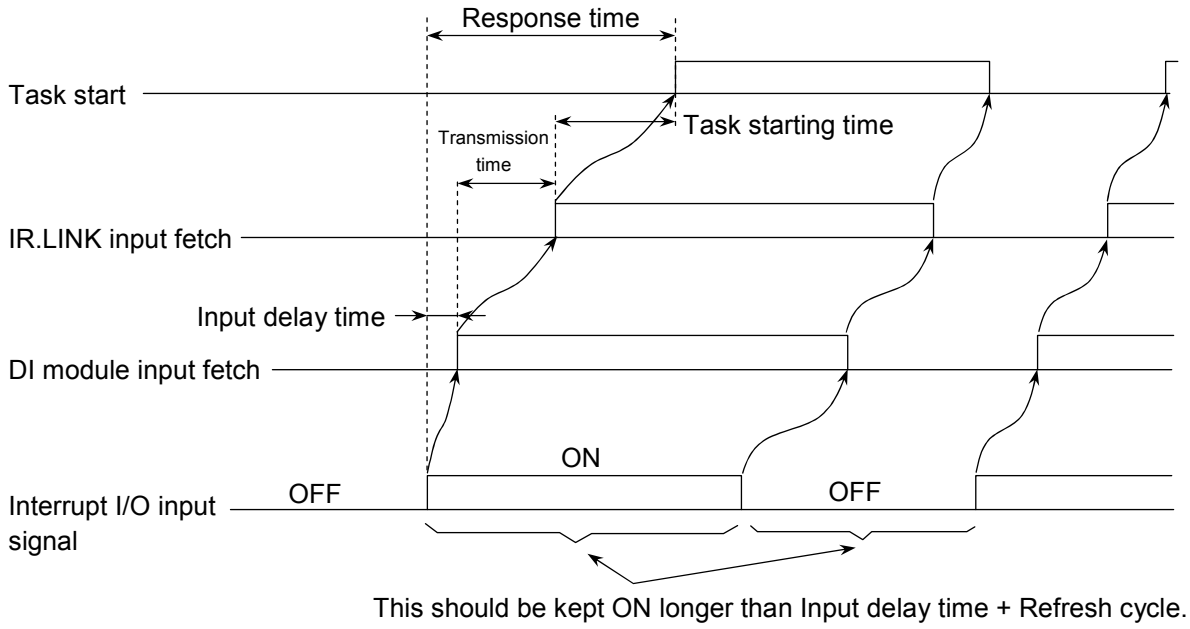


Figure 5-5 Interrupt Task Starting Timing

For the interrupt I/O input signal, an input delay time is caused by the filter of the DI module. (For the delay time due to the filter, see the specifications of each DI module.)
After the signal is fetched to the DI module as an input, it is transmitted to the IR.LINK by cyclic communication. This transmission time is equal to the maximum refresh cycle of the IR.LINK. Accordingly, the interrupt I/O input should be kept ON longer (1.5 times or more) than Input delay time + Refresh cycle. If the ON time is shorter than Input delay time + Refresh cycle, the interrupt input cannot be recognized and the task may not be started. Likewise, if the OFF time is shorter than Input delay time + Refresh cycle, the interrupt I/O input is regarded as being kept ON and the task may not be started.
The task starting time starts the task immediately after the I/O input is recognized. However, it varies with the task priority level and CPU or LPU (CMU) program processing status.

- Releasing the interrupt task

  At a task start after the interrupt I/O input is recognized, the task is not released. Accordingly, release the interrupt task by the user program. If the interrupt task is not released by the user, the task is not started.

5.3 NET Status

The NET status table stores the communication information of each station. The user must register the beginning address of the NET status table from the following bit areas by the IR.LINK system. The NET status table configuration is as shown in the following table. The registrable areas are the 9 types.

X000 to XFFF
Y000 to YFFF
J000 to JFFF
Q000 to QFFF
G000 to GFFF
R000 to RFFF
E400 to EFFF
M000 to MFFF
LB0000 to LBFFFF (Note)

(Note) The area of LB0000 to LBFFFF is available for the S10V only.

The NET status table requires a capacity of continuous 128 points. For example, if the NET station table is specified by starting with X500, X500 to X57F are occupied as shown in Table 5-2. However, X500, X520, X540, and X560 are not used.

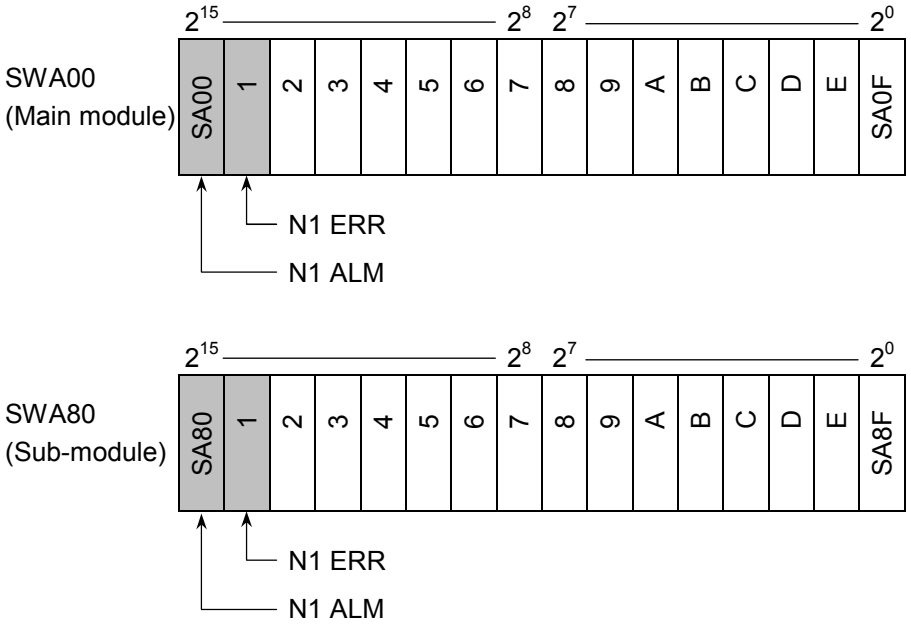
Table 5-2 An Example of NET Status Table

Station ID	Send enable flag	Data receive flag	Response receive flag	Error flag
0	-	-	-	-
1	X501	X521	X541	X561
2	X502	X522	X542	X562
≀	≀	≀	≀	≀
30	X51E	X53E	X55E	X57E
31	X51F	X53F	X55F	X57F

Contents of bits					
	0	Transmitting	Reception of no data	Reception of no response	No error
	1	Transmission enabled	Reception of data	Reception of response	Error

5.4 S-register

The S-register stores the information of errors that occurred. This register is turned "1" when an error occurs in any one of all the connected stations (sub-stations).



Note: ALM: Communication error
ERR: hardware error

Figure 5-6 S-register Format

Table 5-3 Meaning of Each Bit of the S-register

Symbol	Bit	Contents
SA00	0	The main module N1 is in normal communication.
	1	A communication error occurred in the main module N1.
SA01	0	The main module N1 is in normal operation.
	1	A hardware error occurred in the main module N1.
SA80	0	The sub-module N1 is in normal communication.
	1	A communication error occurred in the sub-module N1.
SA81	0	The sub-module N1 is in normal operation.
	1	A hardware error occurred in the sub-module N1.

The other bits cannot be used.

5.5 S-table

The S-table is an address table to store error codes that occurred during communication. For the details of error codes, see “6.3.3 Communication errors.”

Table 5-4 S-table Allocation

Net No.	Station ID	Main module error code	Sub-module error code
N1	0	/A40080	/AC0080
	1	82	82
	2	84	84
	⟨	⟨	⟨
	30	/A400BC	/AC00BC
	31	BE	BE

5.6 Communication Time

The communication time between the IR.LINK module and the IR.Station depends on the number of mounted slots and the I/O size. A standard calculation method for communication time is shown below.

- When the analog input/output is set to the asynchronous mode at communication

  The formula for communication time per station is outlined as follows:

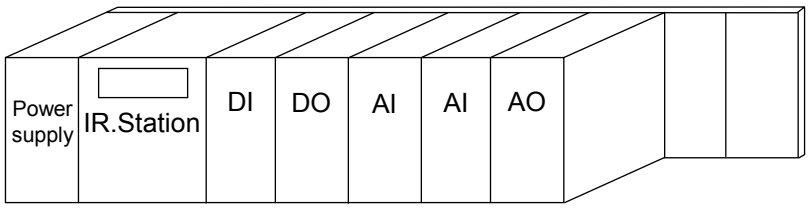
  • At 1 Mbps: 1.4 + (DS×0.06) + (DN×0.070) + (AS×0.015) + (AN×0.013) [ms]

  • At 0.5 Mbps: 1.7 + (DS×0.06) + (DN×0.077) + (AS×0.015) + (AN×0.024) [ms]

  DS: Number of slots in which the DI/DO modules are installed.
  DN: Total I/O size of the DI/DO module (Number of bytes)
  AS: Number of slots in which the AI/AO modules are installed.
  AN: Total I/O size of the AI/AO module (Number of bytes)

  For example, when 16-point DI (2 bytes) × 1, 16-point DO (2 bytes) × 1, 4-channel AL (8 bytes) × 2, and 4-channel AO (8 bytes) × 2 are installed and communication is made at 1 Mbps as shown in the following figure, the communication time is as follows:

  Communication time (analog asynchronous mode) =
  1.4 + (2×0.06) + (4×0.070) + (3×0.015) + (24×0.013) = 2.157 [ms]



Set a larger value than the total communication time of all IR.Stations as the refresh cycle.

- When the analog input/output is set to the synchronous mode at communication

  The formula for communication time per station is outlined as follows:

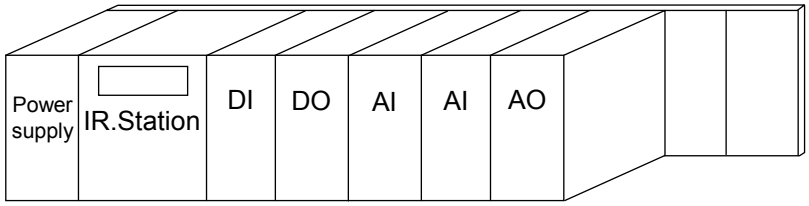
  • At 1 Mbps: 1.4 + (DS×0.06) + (DN×0.070) + (AS×0.23) + (AN×0.013) [ms]

  • At 0.5 Mbps: 1.7 + (DS×0.06) + (DN×0.077) + (AS×0.23) + (AN×0.024) [ms]

  DS: Number of slots in which the DI/DO modules are installed.
  DN: Total I/O size of the DI/DO module (Number of bytes)
  AS: Number of slots in which the AI/AO modules are installed.
  AN: Total I/O size of the AI/AO module (Number of bytes)

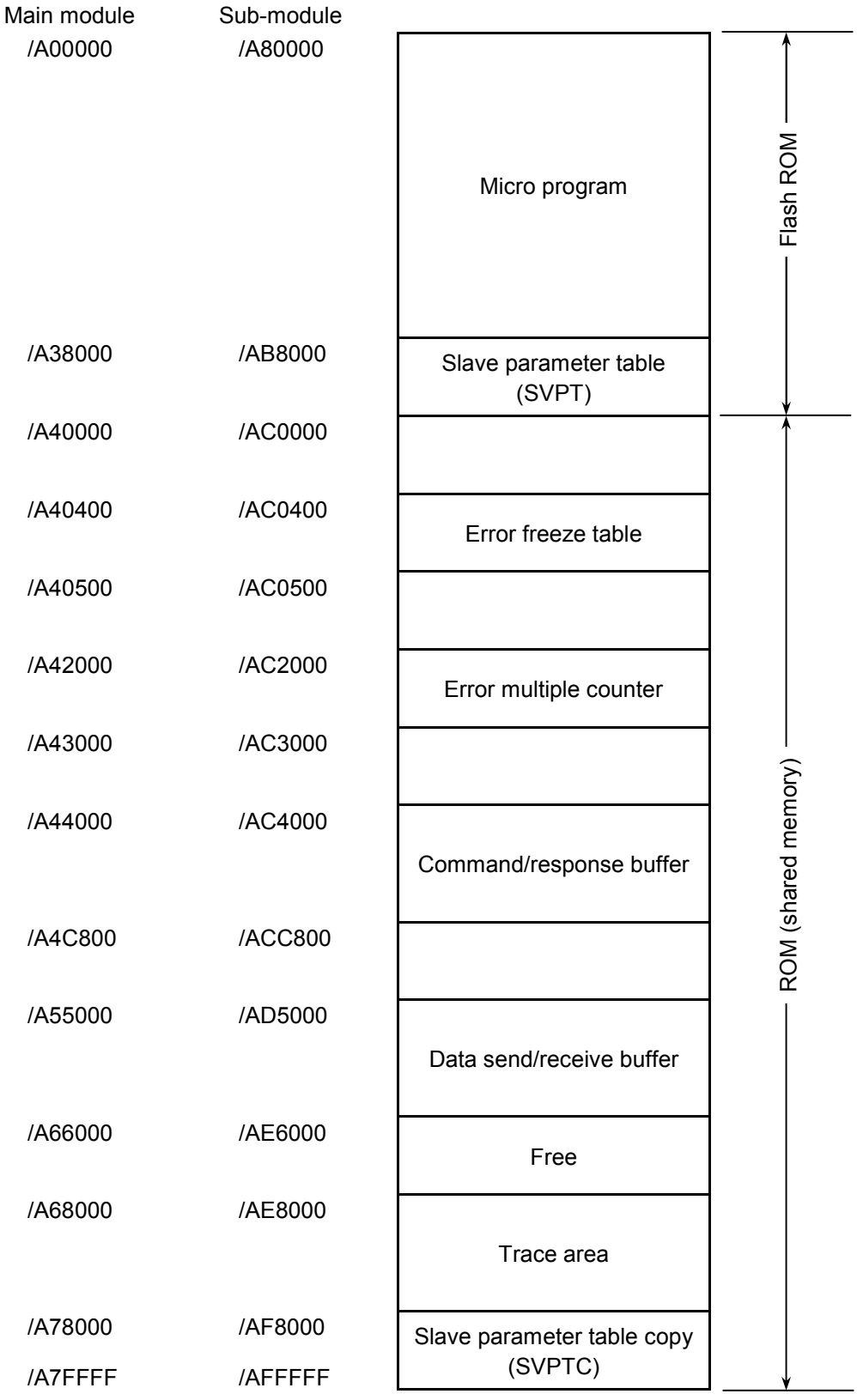
  For example, when 16-point DI (2 bytes) × 1, 16-point DO (2 bytes) × 1, 4-channel AI (8 bytes) × 2, and 4-channel AO (8 bytes) × 1 are installed and communication is made at 1 Mbps as shown in the following figure, the communication time is as follows:

  Communication time (analog asynchronous mode) =
  1.4 + (2×0.06) + (4×0.070) + (3×0.23) + (24×0.013) = 2.802 [ms]



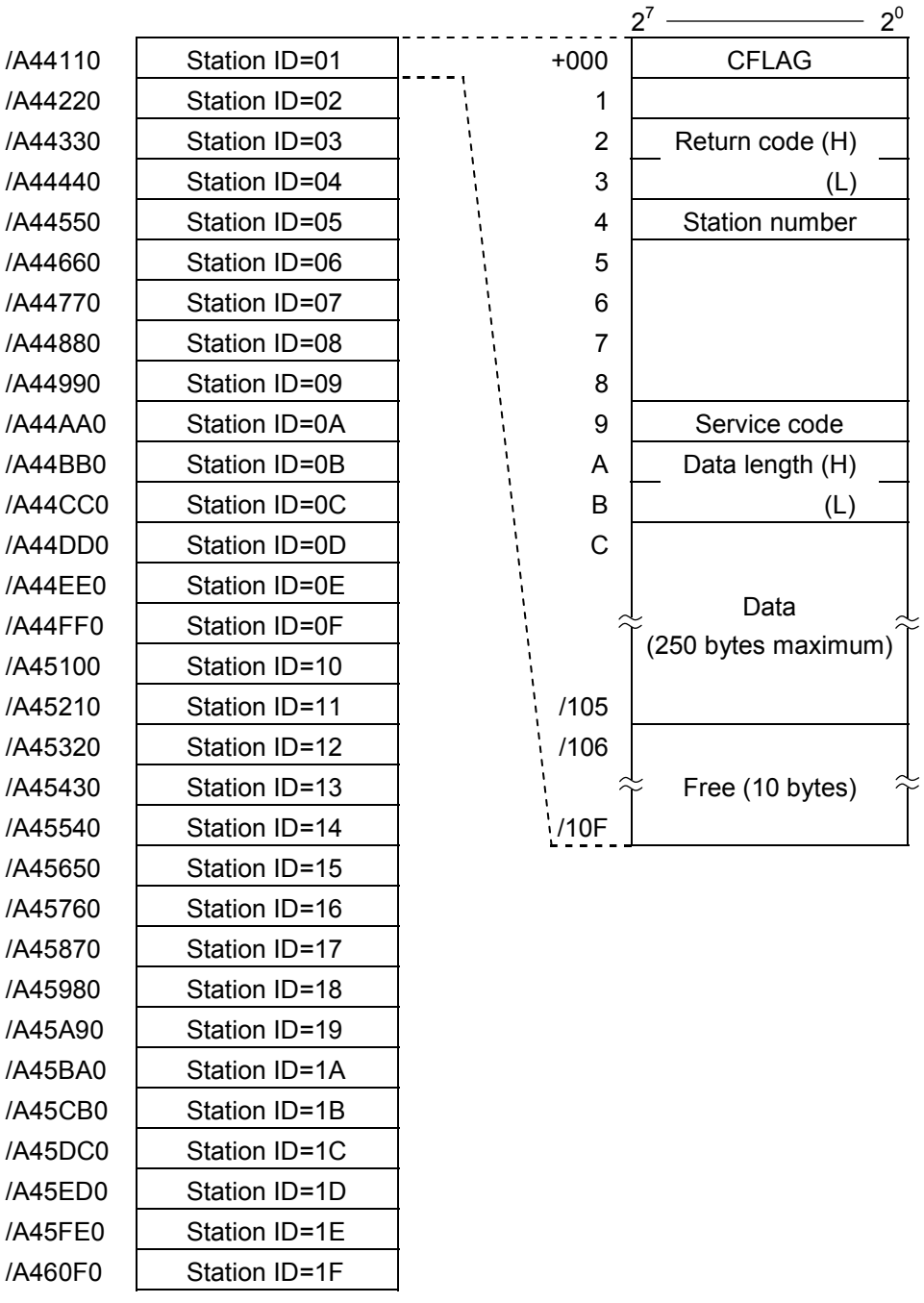
  Set a larger value than the total communication time of all IR.Stations as the refresh cycle.

5.7 Memory Map of IR.LINK Module

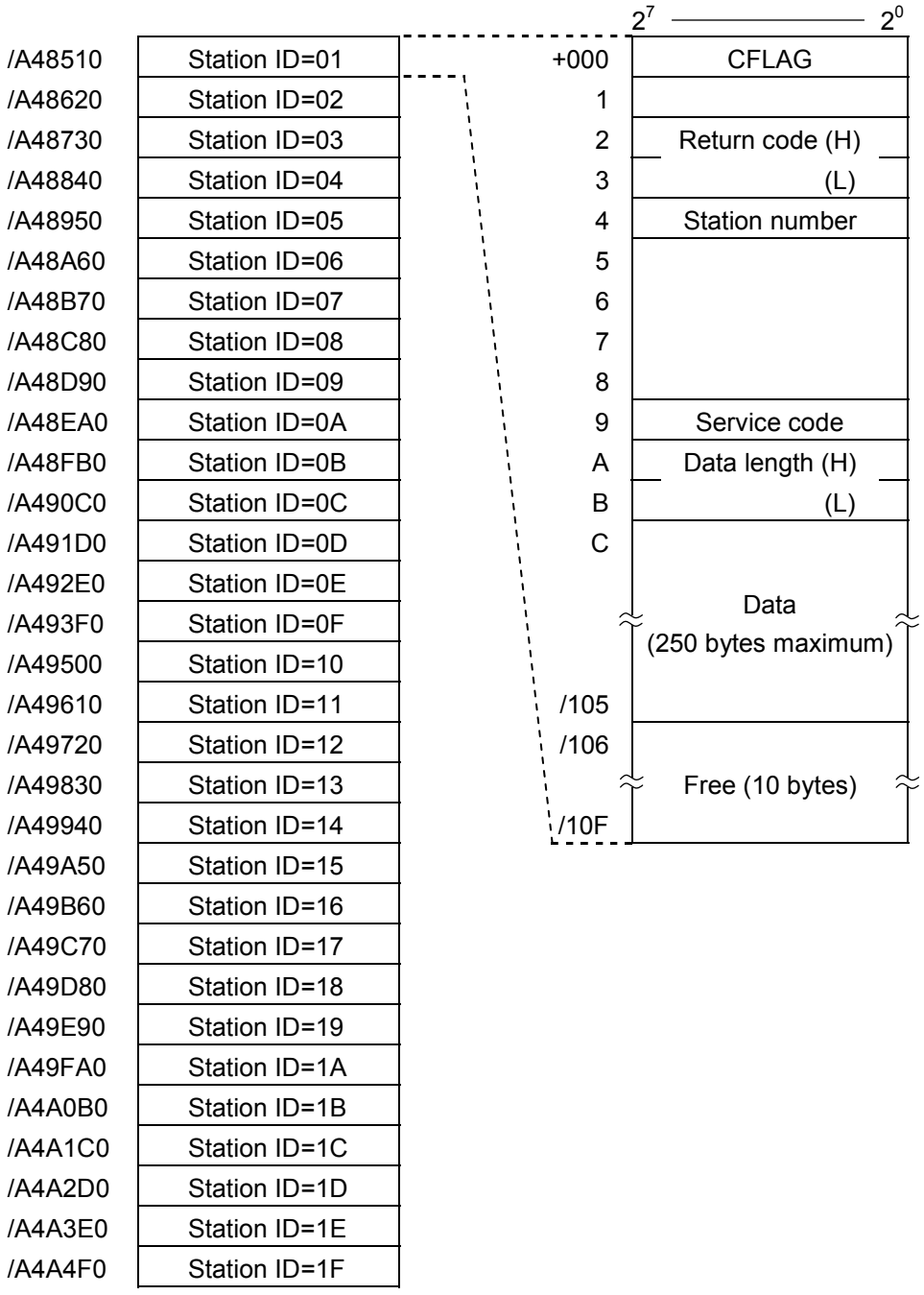


5.8 Command/Response Buffer

- Command buffer

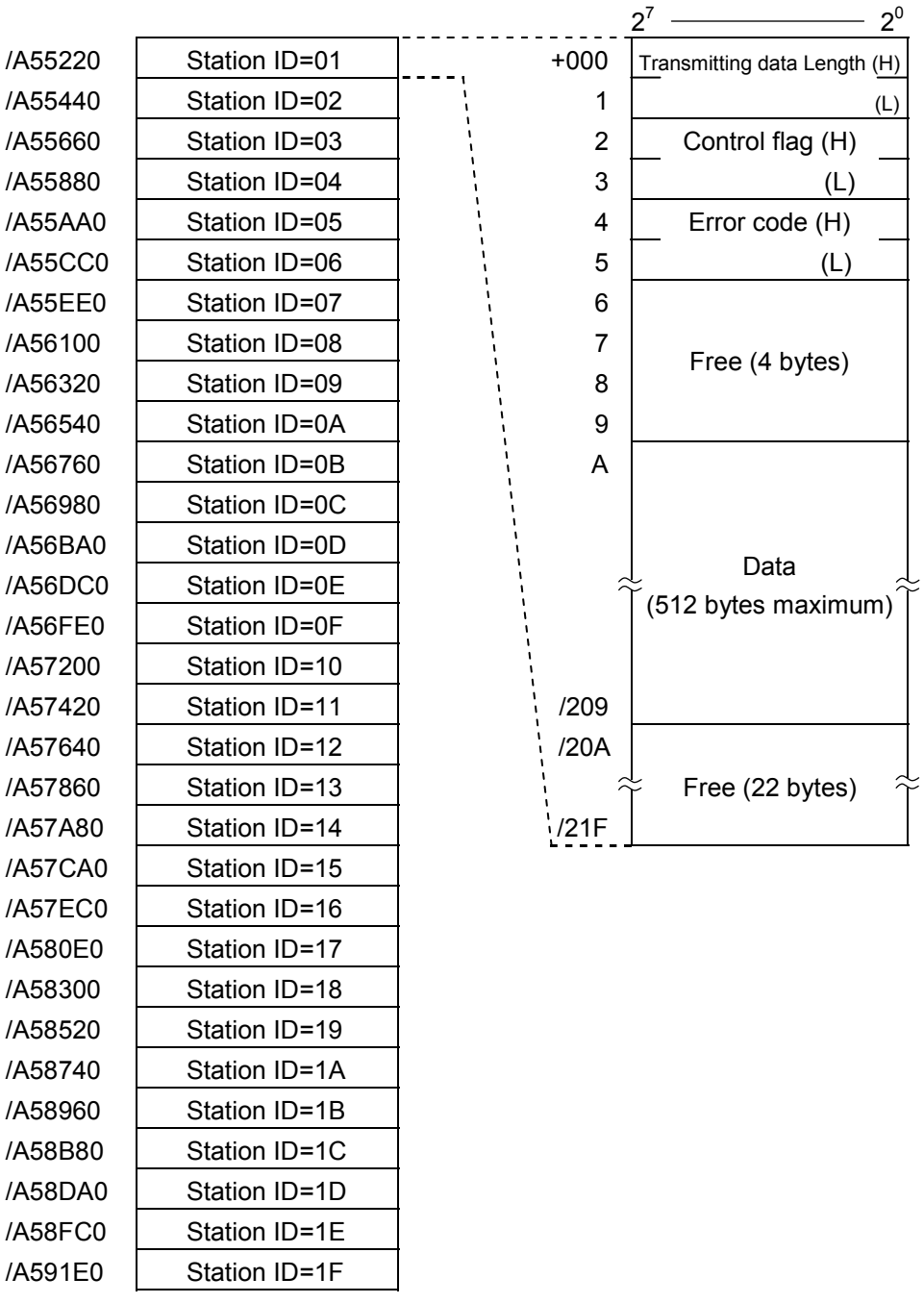


- Response buffer

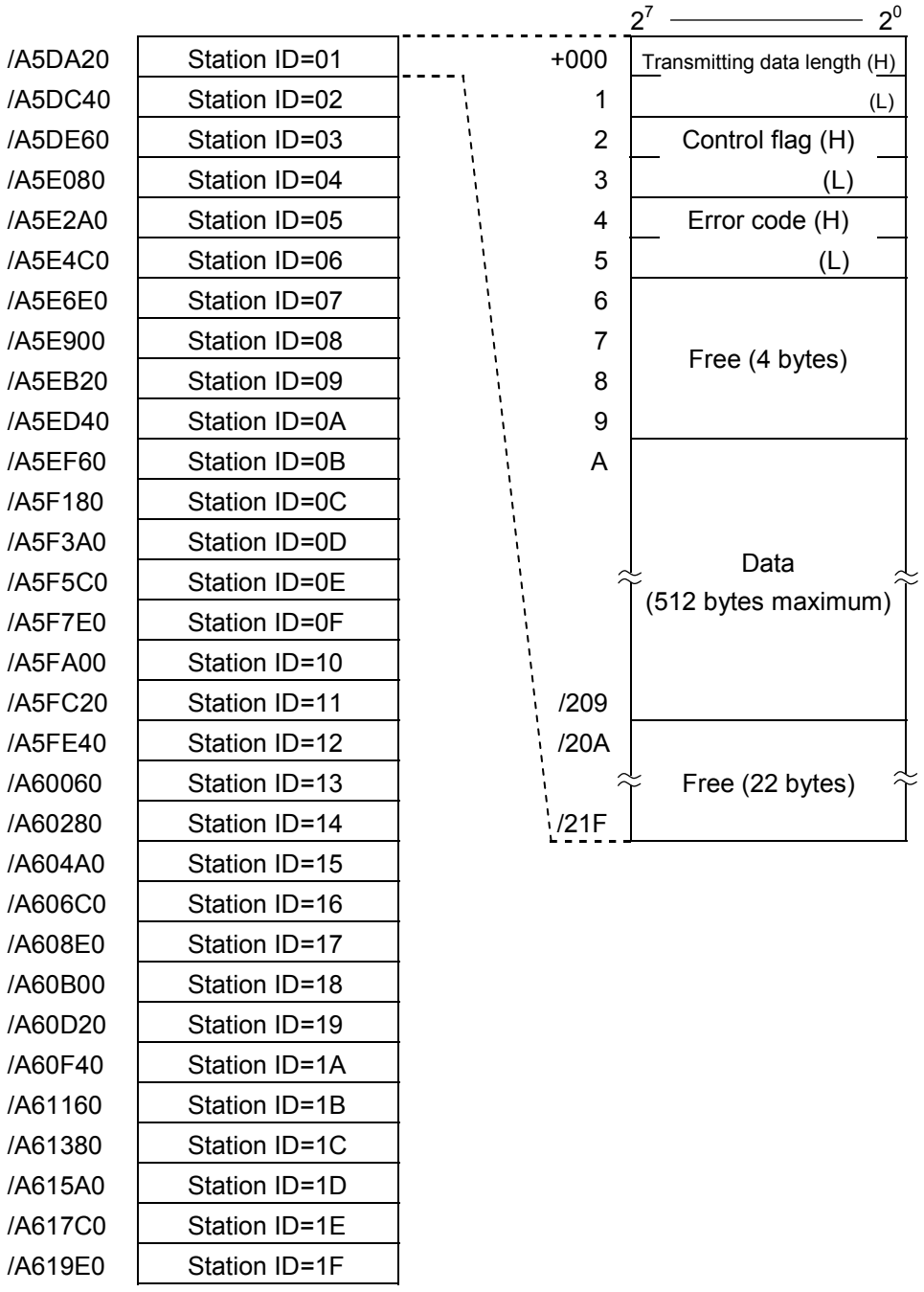


5.9 Data Send/Receive Buffer

- Send buffer

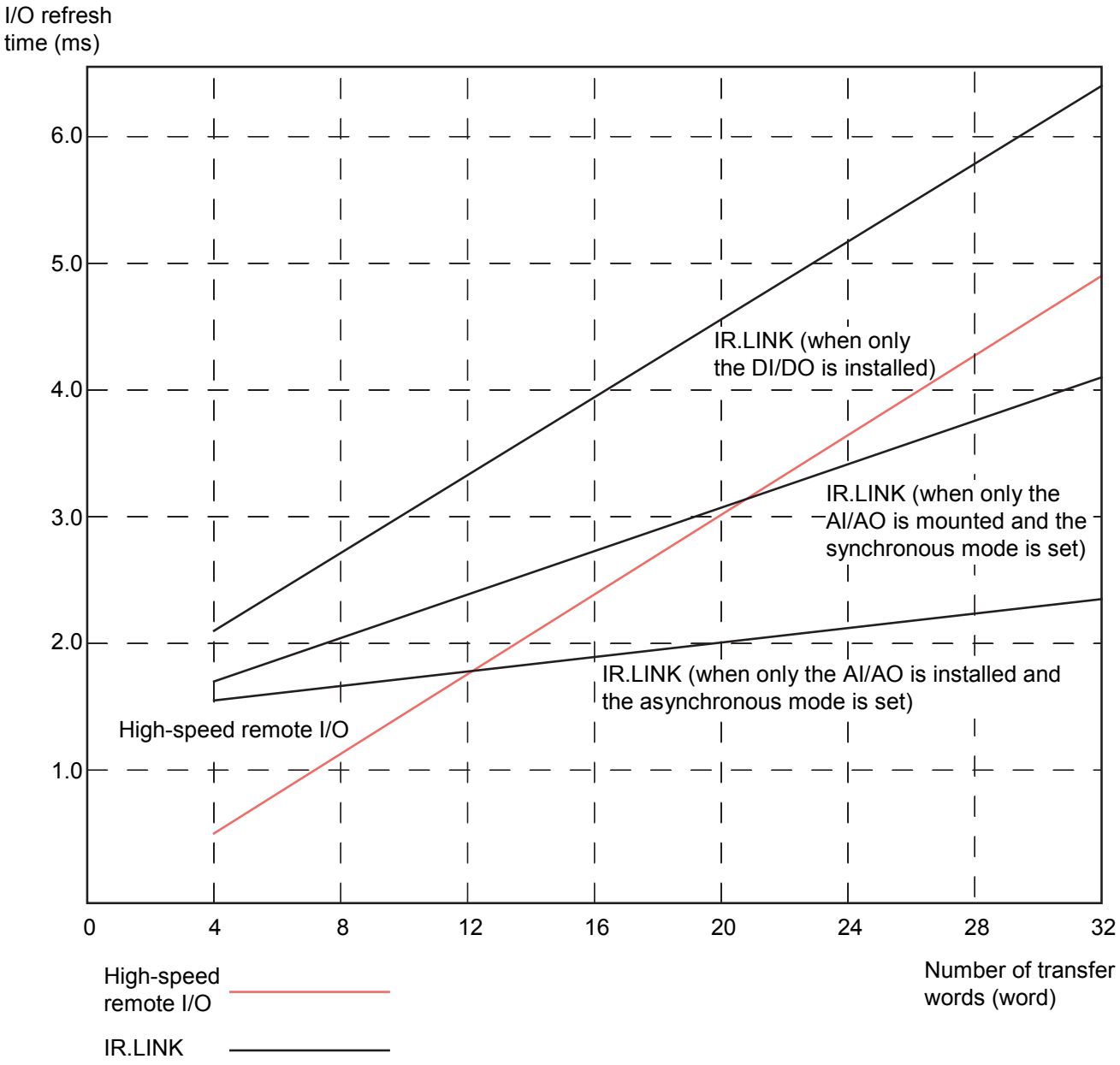


- Receive buffer



5.10 Comparison in I/O Refresh Time Performance between the S10/2α Series High-speed Remote I/O and the S10V IR.LINK

The following graph represents the I/O refresh time performance of the S10/2α series high-speed remote I/O (LWE100) and the S10mini and S10V IR.LINK (LQE546).
In this case, the bit rate setting switch of the IR.LINK is set to 1.0 Mbps and the analog module is set to 4W/slot and the digital module is set to 64 points/slot.



6 MAINTENANCE

6.1 Maintenance and Check

6.1.1 Periodic check

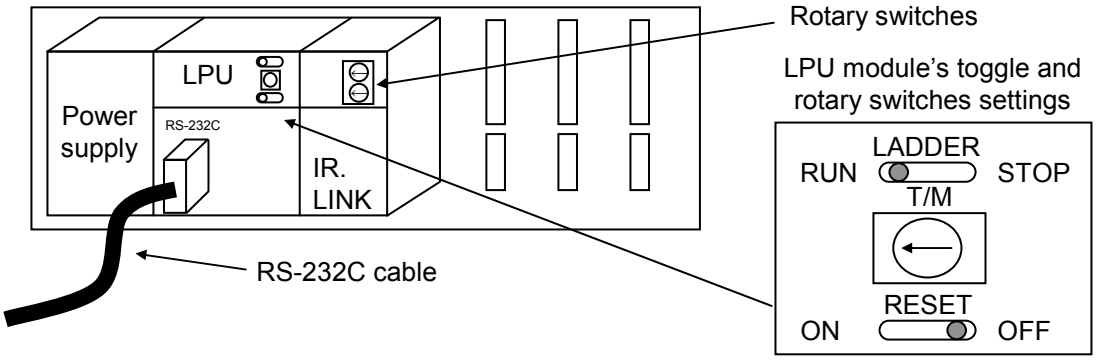
Item	Description	Frequency
Unit cleaning	Turn off all the power supplies and then vacuum the interior of the IR.LINK module through the slits in its casing. Do not raise dust during cleaning.	Twice/year
Mechanical check	Check IR.LINK module mounting screws, TB mounting screws, and communication cable mounting screws for looseness and damage. If a mounting screw is loose, tighten it. Replace damaged parts.	Twice/year

6.1.2 Replacing or adding on the module

- What you should get in preparation
  ① Personal computer (with Hitachi's S10V IR.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 IR.LINK module (LQE546)
  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 the USER'S MANUAL OPTION ET.NET (LQE520) (manual number SVE-1-103).

- Replacement procedure
  ① Write down, on a piece of paper, the current settings of the rotary switches that are, as shown below, accessible at the front side of the IR.LINK module to be replaced.

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.



③ Connect the personal computer and the LPU module together with the RS-232C cable.

④ Start the S10V IR.LINK System and save the set values of all the existing parameters by using its F/D function. (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 connecting cables from the IR.LINK module to be replaced.

⑦ Replace the existing IR.LINK module with the new one and set the new IR.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 send to the new IR.LINK module the set parameter values that you saved in Step ④ using the F/D function.

⑨ By using the F/D function, compare the set parameter values before and after you sent. This comparison may reveal a discrepancy for the following memory areas:

/A3BFFE for the main IR.LINK module mounted

/ABBFFE for the IR.LINK sub-module mounted

However, if no discrepancies are found for any other area, the set parameter values (system information) for the new IR.LINK module may be considered as being identical between the saved file and memory.

⑩ Reset the LPU module by setting the RESET switch in ON position and then in OFF position at its front.

⑪ Turn off the power supply of the controller unit.

⑫ Remove the RS-232C cable from both the personal computer and LPU module, which were connected together in Step ③.

⑬ Connect to the new IR.LINK module the connecting cables that you removed in Step ⑥.

⑭ Set the LPU module's LADDER and T/M switches in the same way as you wrote down in Step ②.

⑮ Turn on the power supply of the controller unit and check that the new IR.LINK module is running normally.

- Add-on procedure

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 a IR.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 IR.LINK module in place according to the instructions given under "3.2 Mounting the Module."

④ Set the add-on IR.LINK module's rotary switches in such a way that a new module no. setting, which must be a sub-module no. setting, will not duplicate with the current rotary switch settings of the existing main IR.LINK module.

⑤ 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 IR.LINK module by using the S10V IR.LINK System.

⑥ Reset the LPU module by setting the RESET switch in ON position and then in OFF position at its front.

⑦ Turn off the power supply of the controller unit and connect the connecting cables to the add-on IR.LINK module.

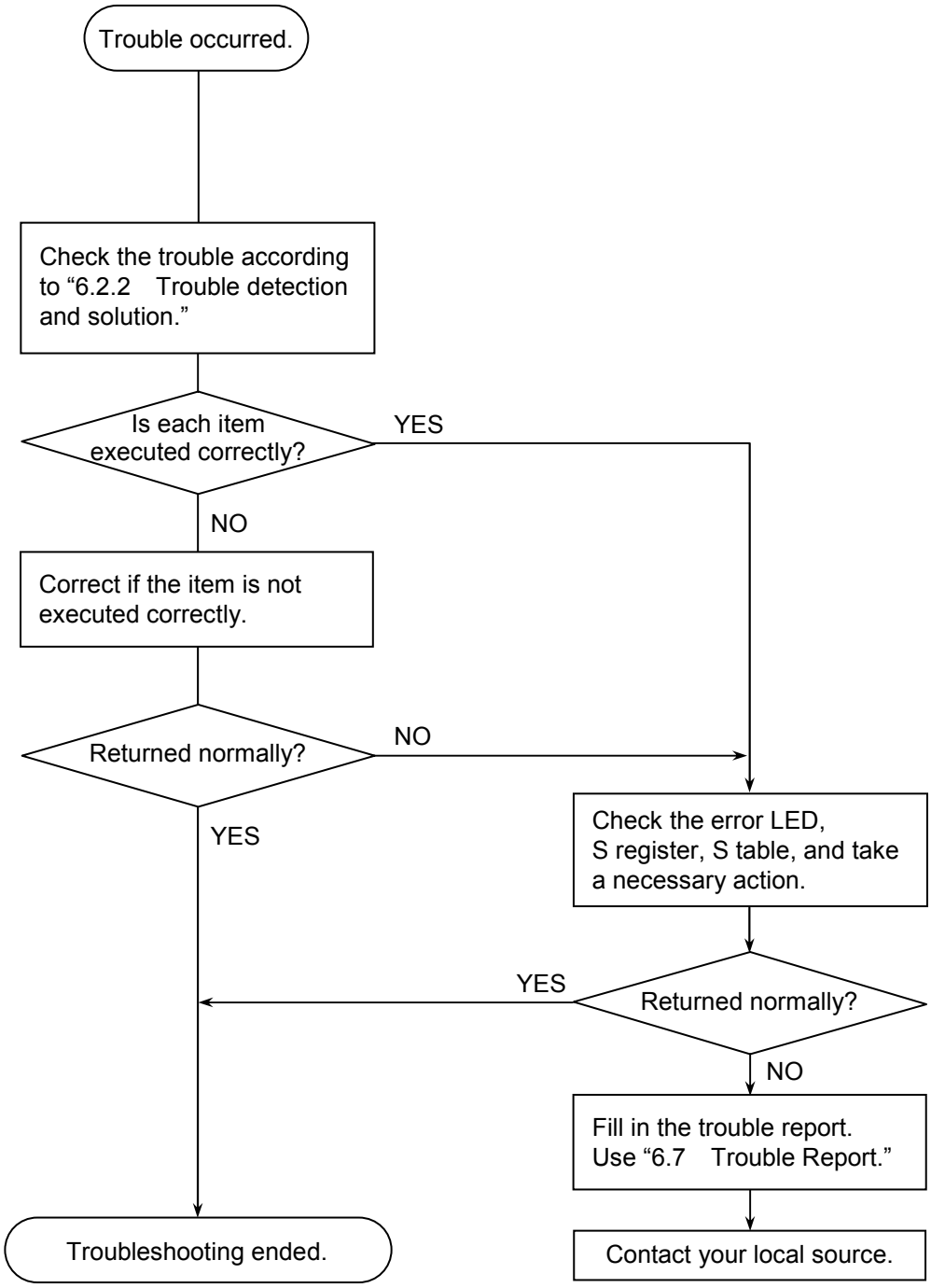
⑧ Set the LPU module's LADDER and T/M switches in the same way as you wrote down in Step ①.

⑨ Remove the RS-232C cable from both the personal computer and LPU module, which were connected together in Step ⑤.

⑩ Turn on the power supply of the controller unit and check that the add-on IR.LINK module is running normally.

6.2 Troubleshooting

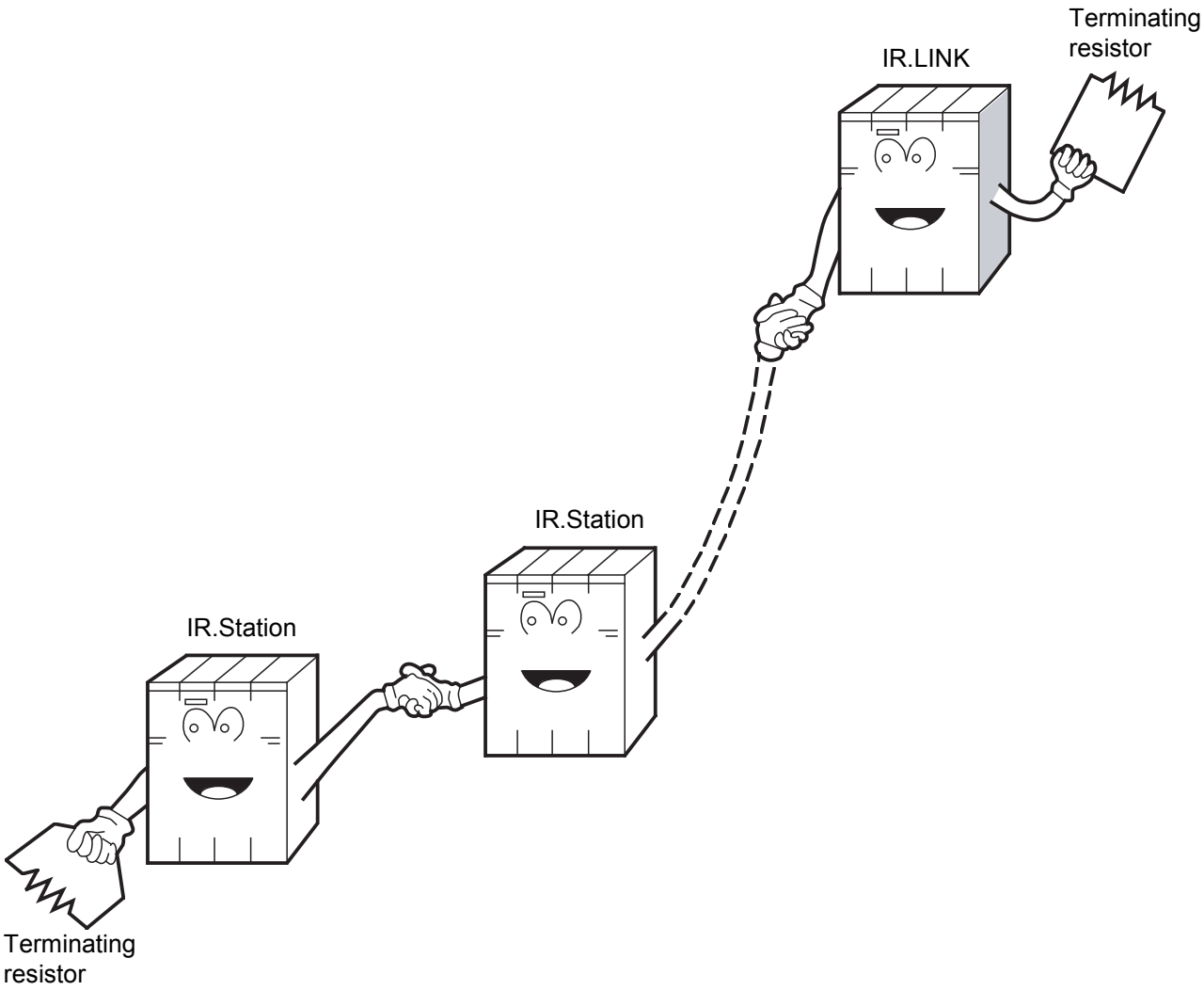
6.2.1 Procedure



6.2.2 Trouble detection and solution

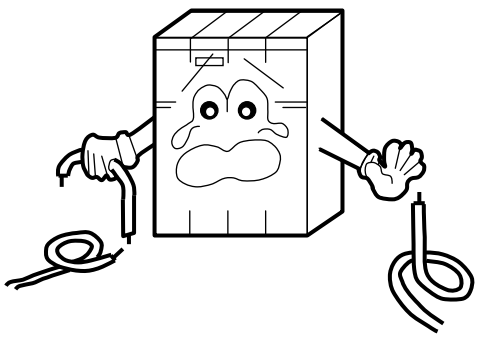
- Are the terminating resistors of the communication cable connected?

  Terminating resistors (120 ohms) must always be connected to both ends of the communication cable line. (In IR.LINK and IR.Station, short the TERM terminals with a jumper and thereby connect to the 120-ohm internal resistor.)

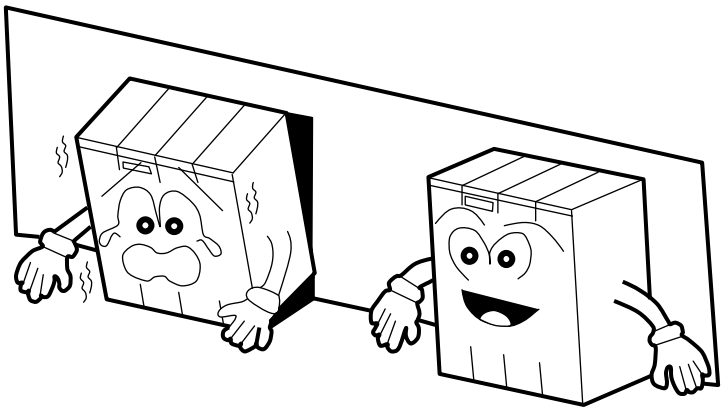


- Is the cabling correctly?

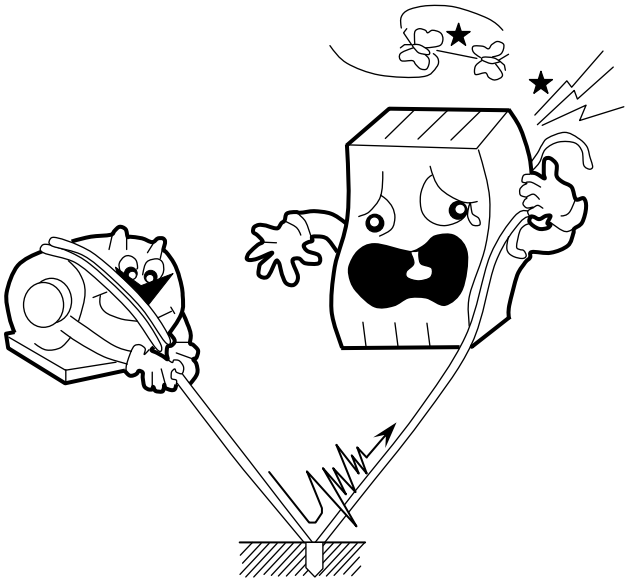
  Check cables for disconnection or incorrect connection.



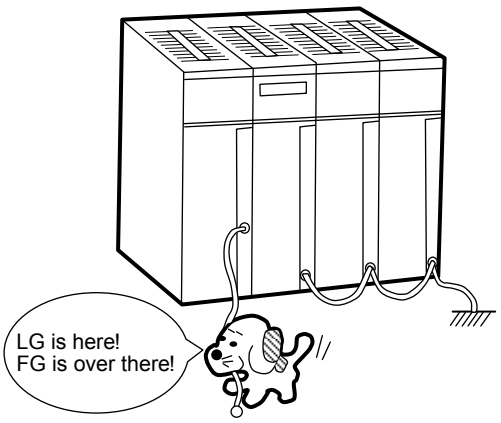
- Are the modules mounted correctly?
  - Check that the IR.LINK module is left-justified with no idle slot between the modules.
  - Check that no set screws loosen.



- Is grounding correctly?
  - Do not ground the IR.LINK module in the same place where high-voltage equipment is grounded. They must be grounded in separate places.
  - Perform grounding work conforming to class D grounding or higher.



- Are LG and FG separated?
  - Be sure to separate the LG from the FG or vice versa because power noise enters the FG via the LG. Failure to observe this rule may result in an equipment malfunction.
  - Ground the LG at the power supply side.



6.3 Errors and Countermeasures

6.3.1 CPU LED display messages

In the S10mini, if an event or error occurs, such a message as shown in the following table is displayed on the indicator of the CPU module. The contents of display are distinguished between the main module and sub-module of the IR.LINK.
In the S10V, error information is collected but an error is not displayed on the LPU module. Collected error information can be referenced from the S10V BASE SYSTEM. For details, see "6.3.2 Hardware errors" and "6.3.3 Communication errors."

Table 6-1 Messages Appearing on the CPU Module in the S10mini

MDL	Message	Description	Countermeasure
Main module	IRLM @. @	The IR.LINK module (main module) was started normally.	This is not an error.
	EX92 PTY	A parity error was detected when the CPU read data from memory in the IR.LINK module (main module).	If this message does not disappear even after the CPU key switch has been reset once and then set to the original position again, replace the IR.LINK module.
	IRM □□□□	An error was detected in the IR.LINK module (main module) board.	See "6.3.2 Hardware errors."
	IRMN ○○○○	An error was detected in the IR.LINK module (main module) network.	See "6.3.3 Communication errors."
	IRMS △△△△	An error was detected in the IR.LINK module (main module) station.	See "6.3.3 Communication errors."
Sub-module	IRLS @. @	The IR.LINK module (sub-module) was started normally.	This is not an error.
	EX93 PTY	A parity error was detected when the CPU read data from memory in the IR.LINK module (sub-module).	If this message does not disappear even after the CPU key switch has been reset once and then set to the original position again, replace the IR.LINK module.
	IRS □□□□	An error was detected in the IR.LINK module (sub-module) board.	See "6.3.2 Hardware errors."
	IRSN ○○○○	An error was detected in the IR.LINK module (sub-module) network.	See "6.3.3 Communication errors."
	IRSS △△△△	An error was detected in the IR.LINK module (sub-module) station.	See "6.3.3 Communication errors."

- @. @: IR.LINK module version, revision
- □□□□: Any of the hardware error messages explained in "6.3.2 Hardware errors"
- ○○○○: Any of the communication error codes explained in "6.3.3 Communication errors"
- △△△△: Any of the communication error codes explained in "6.3.3 Communication errors"

6.3.2 Hardware errors

When the IR.LINK module detects a hardware error, the following contents of the "CPU display" are displayed on the indicator of the CPU module in the S10mini. In the S10V, the following error codes are displayed by selecting the error log from the S10V BASE SYSTEM.
In any case, the IR.LINK module operation is stopped.

Table 6-2 IR.LINK Module Hardware Error Table

CPU display (S10mini)	Error code (S10V)	Contents	Action to be taken
BUS	0x0010	Bus error	The IR.LINK module may be faulty. Replace the module.
ADDR	0x0011	Address error	
ILLG	0x0012	Illegal instruction error	
ZERO	0x0013	Division by zero error	
PRIV	0x0014	Privilege violation	
WDT	0x0015	WDT error	
FMAT	0x0016	Format error	
SINT	0x0017	Spurious interrupt	
EXCP	0x0018	Unused exception	
PTY	0x0019	Parity error	
MDSW	0x0100	Module number switch setting error	Check the module number switch setting.
BRSW	0x0101	Bit rate switch setting error	Check the bit rate switch setting.
ROM1	0x0102	ROM1 sum error	The IR.LINK module may be faulty. Replace the module.
RAM1	0x0103	RAM1 compare error	
RAM2	0x0105	RAM2 compare error	
ROM3	0x010B	ROM3 sum error	
ROME	0x010C	ROM erase error (program)	
	0x010E	ROM erase error (parameter)	
ROMW	0x010D	ROM write error (program)	
	0x010F	ROM write error (parameter)	
WOVR	0x0110	ROM rewrite count over	The ROM rewrite count exceeds 50,000 times. Replace the module.
PRME	0x0112	Parameter error	Set the parameter again. For details, see the Note in the following frame.

For the starting method for the S10V basic system and the display method for error log information in the S10V, refer to the "USER'S MANUAL BASIC MODULE (Manual number SVE-1-100)."

NOTICE

A parameter error of LQE546 occurs when hardware is mounted in a different system from the system in which the parameters shown in "4.3 Commands" were set.
When parameters are set in the S10V and hardware is installed in an S10mini unit:
"IRM PRME" ("IRS PRME") is displayed on the CPU indicator.
When parameters are set in the S10mini system and hardware is installed in an S10V unit:
0x112 (error code that is displayed by error log of the S10V BASE SYSTEM)
This error is intended to prevent a malfunction by referring to the parameters set in a different model.
If this error occurs, set the parameters (definition information) in the installed model.

6.3.3 Communication errors

(1) Network errors

When an error was found on the network of the IR.LINK module, the status error flag of the NET status and the ALM of the S-register is turned ON and write error code (see table below) into S-table.

In the S10mini, the following “error code” is displayed on the indicator of the CPU module.

In the S10V, an error code (ex. 0x7110) with “0x” appended to the beginning of the following error code is displayed by selecting the error log from the S10V BASE SYSTEM.

Table 6-3 IR.LINK Module Network Error Table

Error code	Explanation	User response
7110	An undefined service was instructed.	• If this error recurs even after the CPU (or LPU) has been reset once and then set to the original position again, restart the IR.LINK module. • If this error still recurs, replace the IR.LINK module.
7120	The data length is incorrect.	
7130	The packet configuration is incorrect.	
2010	An error was detected during CRC check.	• Check whether the network line is normal. • Check whether SVPT setting matches station setting. • If this error still recurs, replace the IR.LINK module.
2020	The station number is from 128 to 254 or the received station number is incorrect.	
2030	An undefined service was specified.	
2040	The I-frame length is greater than or equal to 137 bytes or the UI-frame length is greater than or equal to 134 bytes.	
2041	No I-frame exists in the I-response.	
2042	An I-frame exists in the monitoring frame.	
2050	Data link procedure error	
2060	A timeout was detected (no response was made from the slave station within the specified time).	• Power on the station again. • Check whether the switches of the IR.LINK module and station are set correctly. • If this error still recurs even after the switches have been set correctly, replace the station.
2061	The error could not be recovered by retry.	
2070	No frame could be transmitted to the line or an error was detected during frame reception.	• Check the network line connection and terminating resistor connection. • Check whether SVPT setting matches station setting. • If this error recurs even after the CPU (or LPU) has been reset once and then set to the original position again, restart the IR.LINK module. • If this error still recurs, replace the IR.LINK module.
2080	Other errors	• If this error recurs even after the CPU (or LPU) has been reset once and then set to the original position again, restart the IR.LINK module. • If this error still recurs, replace the IR.LINK module.

(2) Station errors

When an error is found in the IR.Station connected with the IR.LINK module, the error flag of the NET status and the ALM of the S-register are turned on and the error code is written in the S-table (shown below).

In the S10mini, the following “error code” is displayed on the indicator of the CPU module.

In the S10V, an error code (ex. 0x9001) with “0x” appended to the beginning of the following error code is displayed by selecting the error log from the S10V BASE SYSTEM.

Table 6-4 IR.Station Module Error Table

Error code	Explanation	User response
9001	The station is inactive.	Power on the station again and then reset the CPU (or LPU). If this error still recurs, replace the station.
9002	The station is in an abnormal state. (An error was detected in the station.)	
9003	The station is inactive and also in an abnormal state.	
8020	The initialization instruction was rejected.	SVPT setting does not match station setting. Set SVPT again to match station setting. If this error still recurs, replace the station.
8081	When the AUTO mode is specified, the number of registered transfer bytes does not match the response I/O size from the station.	
8082	When a slot is specified, the number of registered transfer bytes does not match the response I/O size from the station.	

For the starting method for the S10V BASE SYSTEM and the display method for error log information in the S10V, refer to the “USER’S MANUAL BASIC MODULE (manual number SVE-1-100).”

6.4 Error Freeze

When it detects a hardware error, the IR.LINK module lights the error LED, stores error freeze information, and stops.

Main module	Sub-module	2^{31}——2^{16} 2^{15}——2^{0}
/A40400	/AC0400	Error code
/A40404	/AC0404	Time from reset (ms)
/A40410	/AC0410	D0 register
/A40414	/AC0414	D1 register
/A40418	/AC0418	D2 register
/A4041C	/AC041C	D3 register
/A40420	/AC0420	D4 register
/A40424	/AC0424	D5 register
/A40428	/AC0428	D6 register
/A4042C	/AC042C	D7 register
/A40430	/AC0430	A0 register
/A40434	/AC0434	A1 register
/A40438	/AC0438	A2 register
/A4043C	/AC043C	A3 register
/A40440	/AC0440	A4 register
/A40444	/AC0444	A5 register
/A40448	/AC0448	A6 register
/A4044C	/AC044C	A7 register
/A40450	/AC0450	Stack frames (*) (4 words, 6 words, bus error)
/A404FC	/AC04FC	

(*) The detail of the stack frames are shown on the next page.

Figure 6-1 Address Map of Error Freeze Information

Table 6-5 Error Codes to be Registered and Contents of Them

No.	Code	Error	Display
1	0010H	Bus error	BUS
2	0011H	Address error	ADDR
3	0012H	Illegal instruction error	ILLG
4	0013H	Division by zero error	ZERO
5	0014H	Privilege violation	PRIV
6	0015H	WDT error	WDT
7	0016H	Format error	FMAT
8	0017H	Spurious interrupt	SINT
9	0018H	Unused exception (e.g., CHK, TRAPV, L1010)	EXCP
10	0019H	Parity error	PTY
11	001AH	Power failure forecast	GR
12	0100H	Module number switch setting error	MDSW
13	0101H	Bit rate switch setting error	BRSW
14	0102H	ROM1 sum error	ROM1
15	0103H	RAM1 compare error	RAM1
16	0105H	RAM2 compare error	RAM2
17	0107H	DMA transfer error (IR.LINK module error)	
18	0108H		
19	0109H		
20	010AH		
21	010BH	ROM3 sum error	ROM3
22	010CH	ROM3 write error 2	
23	010DH		
24	010EH		
25	010FH		
26	0110H	Parameter rewrite count exceeded the limit	WOVR

The following shows the details of the stack frames in the error freeze information table.

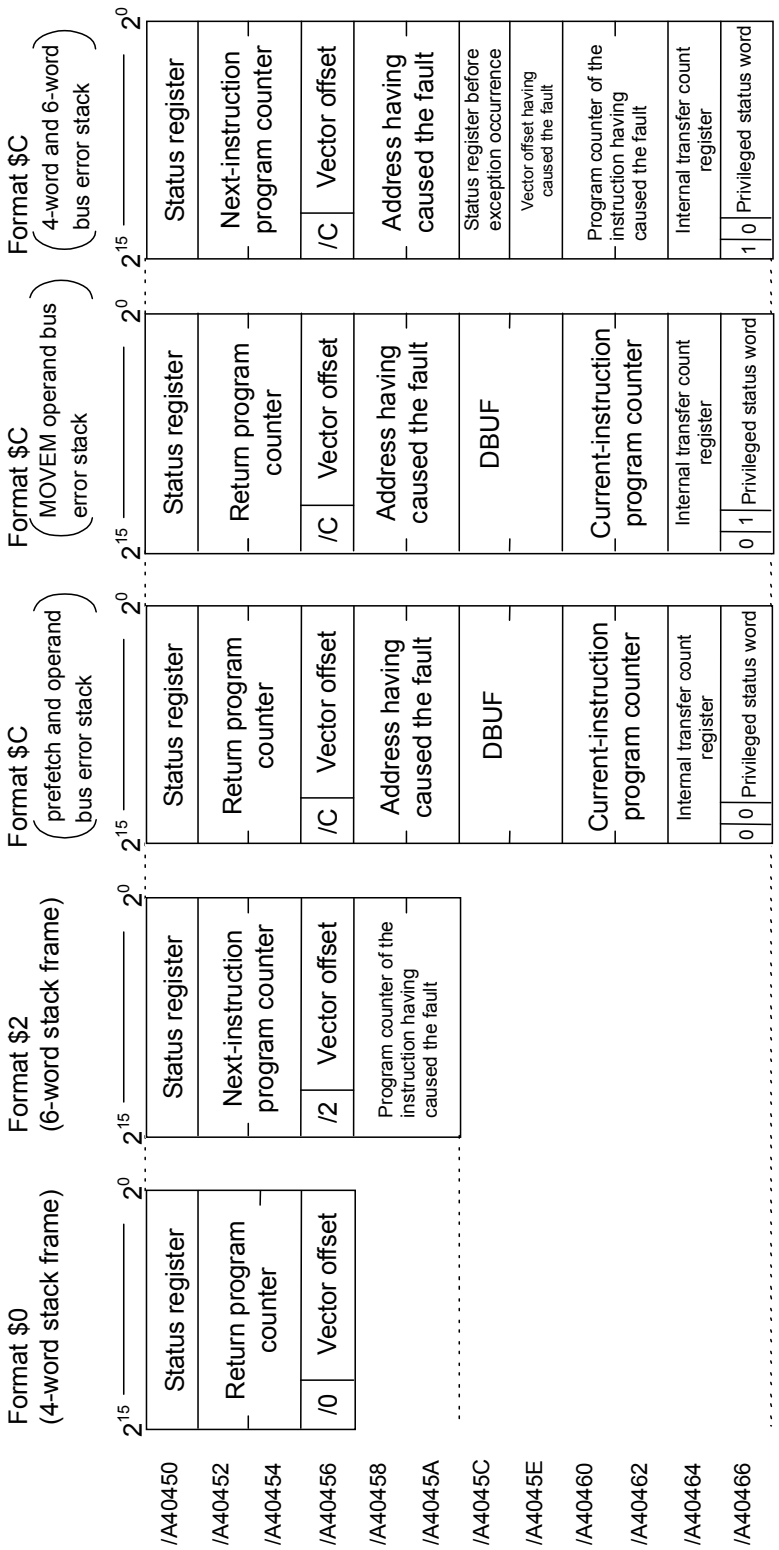


Figure 6-2 Address Map of Stack Frames

6.5 Error Multiple Counter

The error multiple counter counts the communication errors that occur between the IR.LINK module (master) and station (slave). This counter is initialized when it is reset.

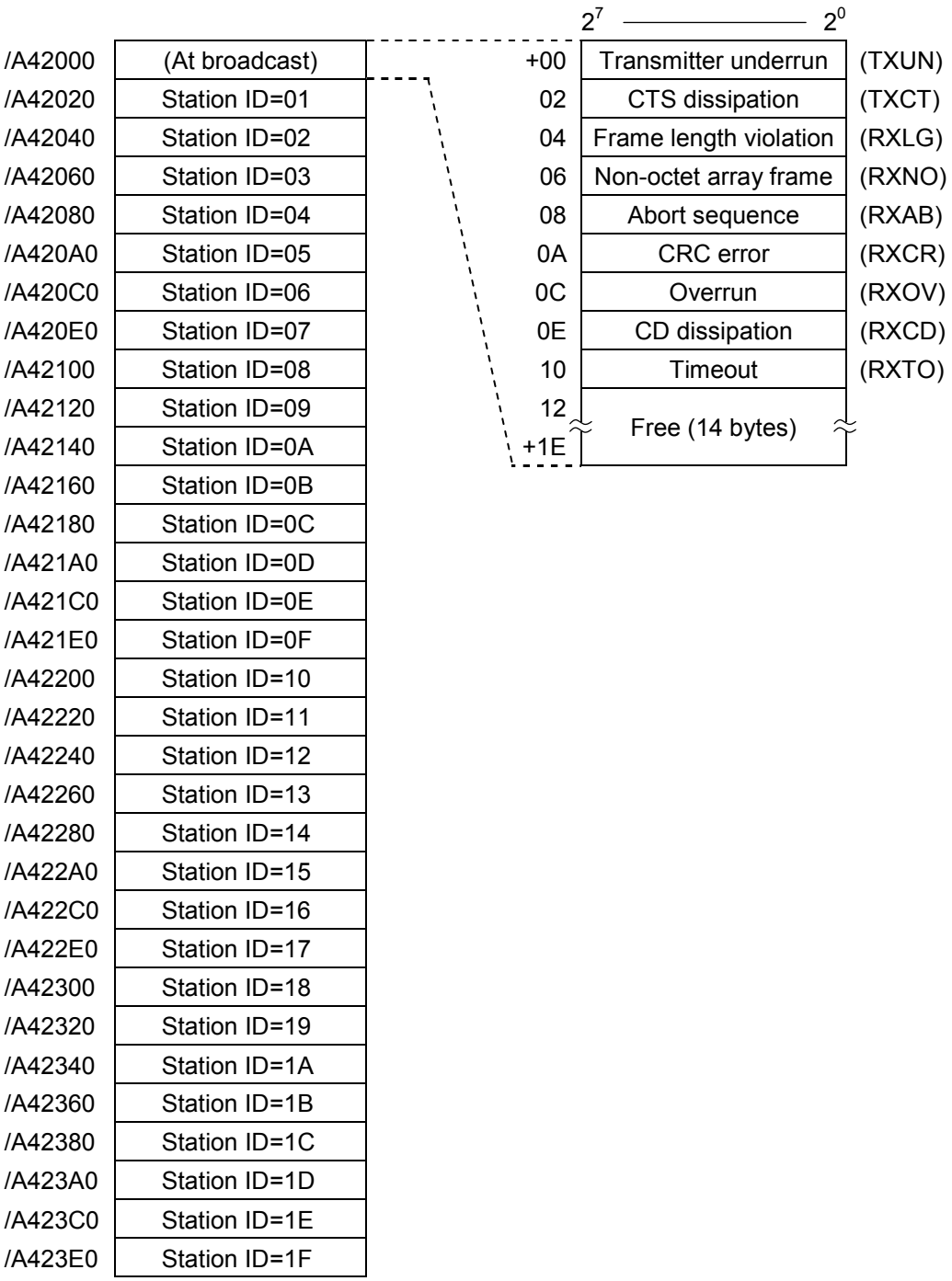


Figure 6-3 Address Map of Error Multiple Counter

6.6 Trace

IR.LINK trace is started in the error stop mode (stop of trace at occurrence of an error) when the CPU unit is reset or the LPU unit is reset and the power supply of each unit is recovered.
The trace data structure is shown below.

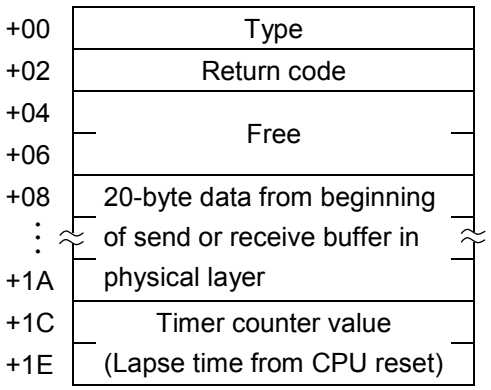


Figure 6-4 Trace Data Structure

(1) Type

Table 6-6 Meaning of Each Type in the Trace Data

3010	I/O service transmission error
3030	Initialization service transmission error
4010	I/O service reception error
4030	Initialization service reception error

(2) Return code

See “6.3.3 Communication errors.”

(3) 20-byte data from beginning of send or receive buffer in physical layer

<When an Initialization service transfer error occurs>

08	A	: Station number
09	C	: Control flag
0A	DL-SC	: DL layer service code
0B	DL-len	: DL layer length
0C	7L-hd	: 7L layer header
0D	7L-sc	: 7L layer service code
0E	7U-sc	: 7U layer service code
0F	len(L)	: Low-order bytes of length
10	len(H)	: High-order bytes of length
11	data[0]	: Data
⋮	⋮	⋮
1B	data[9]	: Data

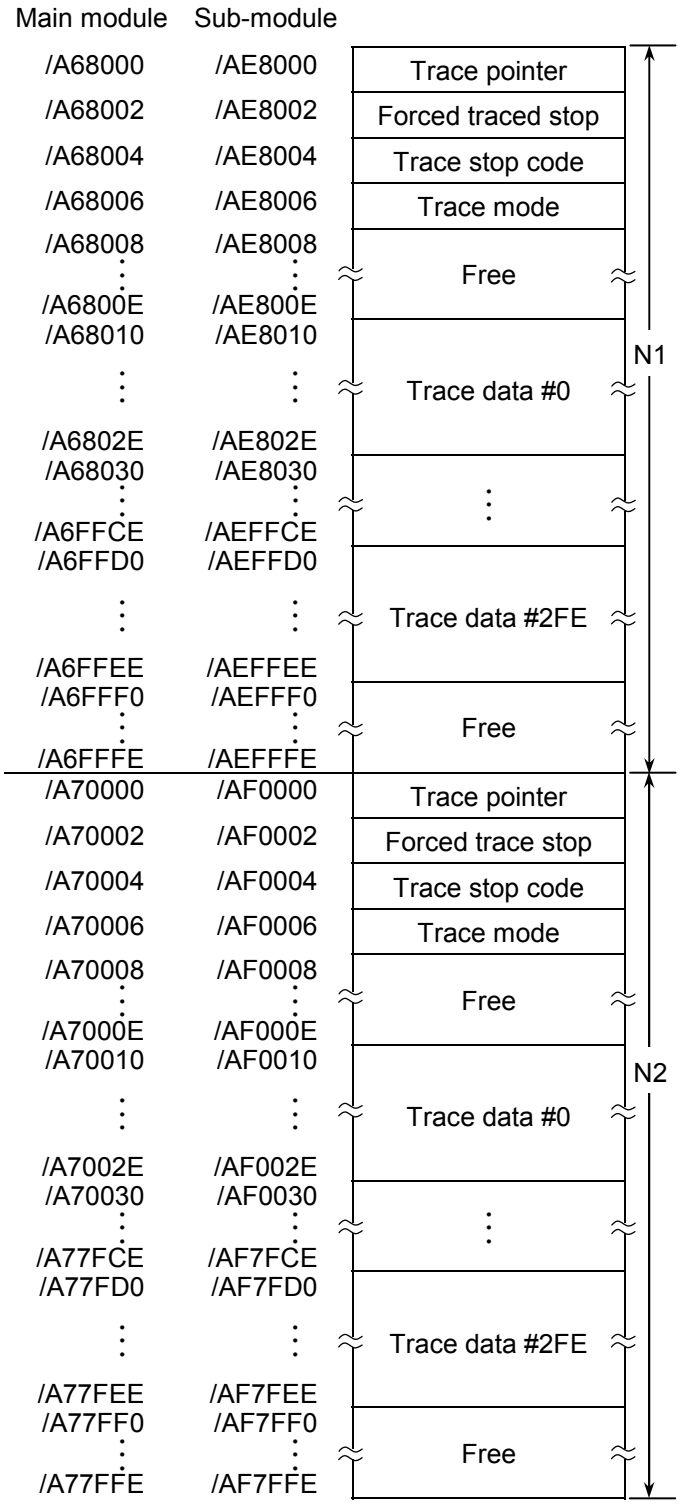
<When an I/O service transfer error occurs>

08	A	: Station number
09	7L-sc	: 7L layer service code
0A	7U-sc	: 7U layer service code
0B	data[0]	: Data
⋮	⋮	⋮
1B	data[15]	: Data

Figure 6-5 Address Map of 20 Bytes from the Beginning of the Send/Receive Buffer

(4) Timer counter value

The unit of timer count value is ms. The timer count value is updated in 4-ms units.



- **Trace pointer**
  The trace pointer points to a value of from 0 to 2FE. The reference address of trace data from the trace pointer is calculated by the expression "reference address = /A68010 + (trace pointer × /20)." /AE8010 of the sub-module becomes the reference address.

- **Forced trace stop**
  0: Forced trace stop
  Other values: Stop release

- **Trace stop code**
  Set a trace data type as the trace stop code.

- **Trace mode**
  0: Trace stop
  1: Endless trace
  2: Stop on error occurrence
  (The trace mode when an error occurs is 0.)

- **Trace data**
  The trace data area is of ring structure. Data next to #2FE is #0.

Figure 6-6 Trace Area

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				