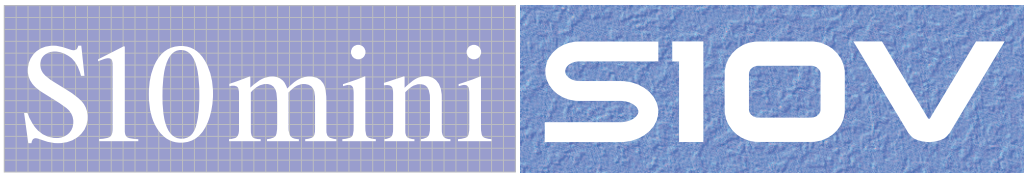
HITACHI

USER'S MANUAL

OPTION

SV.LINK

(LQE521)



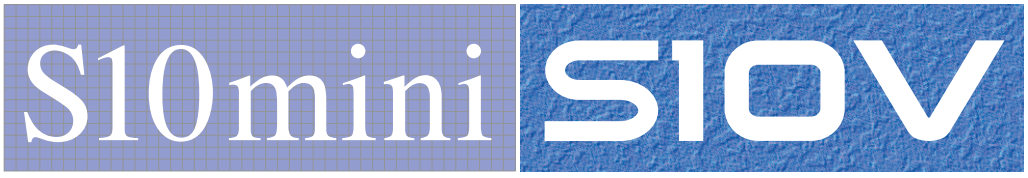
SVE-1-116 (E)

USER'S MANUAL

OPTION

SV.LINK

（LQE521）



First Edition, February 2003, SVE-1-116(B) (out of print)
Second Edition, June 2005, SVE-1-116(C) (out of print)
Third Edition, October 2008, SVE-1-116(D) (out of print)
Fourth Edition, February 2013, SVE-1-116(E)

Printed in Japan.

BI<IC> (FL-MW2007, AI10)

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 1-2)

NOTICE
● LQE521 can be used with the SV.LINK module (LQE021) dedicated to the S10mini, when used in the CPU unit of the S10mini (though LQE021 cannot be used in the LPU unit of the S10V). ● When used in the LPU unit of the S10V, LQE521 cannot be used with the ET.NET module (LQE720) (but can be used with LQE520).

(chapter 1, page 1-3)

NOTICE
When using 10BASE-5 connections, a 12-VDC external power supply is required.

(chapter 1, page 1-4)

NOTICE
● The physical line between the S10mini or S10V and MELSEC must be exclusively used for high-speed I/O communications. Ensure that nothing is connected to the physical line except for the S10mini or S10V and MELSEC. ● When using two high-speed I/O communication channels, provide a physical line for each channel.

(chapter 1, page 1-6)

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

(chapter 2, page 2-2)

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

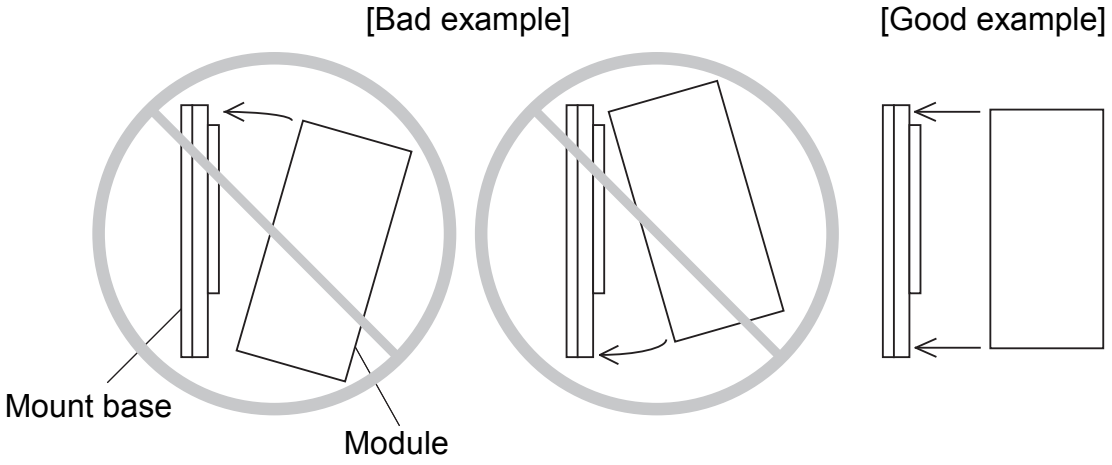
(chapter 3, page 3-2)

NOTICE
For the S10mini Series, mount 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.

(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 communication using the 10BASE-5, perform class D grounding for the FG terminal of the SV.LINK module through the FG terminal of the mount base.
- Use a ground wire with a wire diameter of 2 mm2 or more.
- While the power supply is ON, do not touch the 10BASE-5 connector. The system may malfunction due to static electricity.

(chapter 3, page 3-5)

NOTICE

- This hardware unit may malfunction if it is connected poorly or has a broken line. After connecting the 10BASE-5 connector, check whether the locking post is locked by the retainer.
- Do not touch the 10BASE-5 connector during power-on. Otherwise, the system may malfunction due to static electricity, etc.

(chapter 3, page 3-6)

NOTICE

- The following 12 VDC external power supply is recommended. Use the recommended power supply.
  Power supply model name: HK-25A-12 (manufacturer: Densei-Lambda K.K.)
- When the two ET.NET modules LQE020 and LQE520 are installed, no SV.LINK module can be installed.
- When ET.NET module LQE720 is installed, no SV.LINK module can be installed.
- When mounting the SV.LINK module and ET.NET module on the same mount base, perform setup so that the main module and submodule are distinctively defined.
  Example: If the ET.NET module is defined as the main module, be sure to define the SV.LINK module as the submodule. If the ET.NET module is defined as the submodule, be sure to define the SV.LINK module as the main module.
- A total of up to two modules (ET.NET and SV.LINK modules) can be mounted on the same mount base.
- Even if no ET.NET module is installed, you can mount only one SV.LINK module.

(chapter 3, page 3-7)

NOTICE

- When using 10BASE-T, do not wire the FG terminal.
- There are two types of 10BASE-T twisted-pair cable available: straight cable and cross cable. The user should choose one of these two types according to the requirements of the hardware unit to which this product is to be connected.

Hardware unit	Cable type
Hub	Straight
MELSEC (direct connection)	Cross

(chapter 4, page 4-3)

NOTICE

Before installing the S10mini ET.NET system, be sure to exit all the currently open Windows® programs. Do not forget to exit anti-virus software and other memory-resident programs. If you install the S10mini ET.NET system without exiting such programs, an error may occur during installation. If such an error occurs, first uninstall the S10mini ET.NET system as directed in “4.2.2 Uninstalling,” exit all the Windows® programs, and then install the S10mini ET.NET system again.

(chapter 4, page 4-5)

NOTICE

- The S10V Base System is required for operating the S10V ET.NET system. If it is not installed, you cannot install the S10V ET.NET system.
- Before installing the S10V ET.NET 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 S10V ET.NET system without exiting such programs, an error may occur during installation. If such an error occurs, first uninstall the S10V ET.NET system as directed in “4.2.2 Uninstalling,” exit all the Windows® Programs, and then install the S10V ET.NET system again.

(chapter 4, page 4-5)

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 4-7)

NOTICE

Confirm the version of the ET.NET system in the [Version information (ET.NET)] window. The [Version information (ET.NET)] window will be displayed by selecting "Version information (ET.NET)" in the icon located in the upper left corner of the [ET.NET SYSTEM] window or [[S10V] ET.NET] window.

(chapter 4, page 4-8)

NOTICE

- The S10mini does not support GP-IB. Select "RS232C" on the [Communication type] window.
- The S10V does not support GP-IB. "GP-IB" is not displayed on the [Communication type] window.

(chapter 4, page 4-10)

NOTICE

On the [ET.NET SYSTEM] or [[S10V] ET.NET] window, the setting and the display method vary depending on whether the ET.NET module is installed or not as shown in the following table.

Installation status	IP address	Subnet mask	Route information	Physical address
Installed	Settable (The contents of setting are displayed.)	Settable (The contents of setting are displayed.)	Settable (Button is displayed.)	Can be referenced. (Physical address is displayed.)
Not installed	Settable (The contents of setting are displayed.)	Settable (The contents of setting are displayed.)	Not settable (Button is not displayed.)	Cannot be referenced. (FFFFFFFF is displayed.)

(chapter 4, page 4-11)

NOTICE

The “Search of Station No.” is a function dedicated to SV.LINK (LQE720). This function is not available for ET.NET (LQE521).

(chapter 4, page 4-12)

NOTICE

SV.LINK is not supporting the following commands. Therefore, the following commands cannot be executed.

- Ladder and HI-FLOW (Display Communication of Error Log)
- Socket handler (Display Communication of Error Log)
- Display Status of DHP
- Display Status of Network

(chapter 5, page 5-8)

NOTICE

- Although the parameters are checked at startup, they are not checked for a duplicate of areas 1 through 4 and transmission/reception areas. The user should exercise area management so as to avoid area duplication. Also, note that crossover use of registers is not checked for (the crossover use of registers means that, if, for instance, a 16-word transmission beginning with YFC0 is specified, the areas YFC0 through YFFF and Q000 through Q0BF would be actually transmitted). To prevent unexpected operations, you should perform setup so as to avoid the crossover use of registers.
- I/O data transmission/reception cannot be invoked simply by setting the above areas. For the transmission/reception of I/O data, it is necessary to complete word count setup as indicated in item (5), “Transmission/reception word count setup areas.”

(chapter 5, page 5-9)

NOTICE

- Although the parameters are checked at startup, they are not checked for a duplicate of the areas 1 through 4 and write/read areas. The user should exercise area management so as to avoid area duplication.
- Local station and remote station (MELSEC) transmission/reception start address setup areas must agree in bit/word register. If they do not agree, a parameter setting error occurs and SV.LINK stops its communications.

(chapter 5, page 5-12)

NOTICE

After necessary communication parameters are set in the BD register, be sure to start communication by writing a value other than 0 to the setting start flag. If communication is started with undefined parameter values, a parameter error or abnormal operation results.

(chapter 5, page 5-15)

NOTICE
After necessary communication parameters are set in the BD register, be sure to start communication by writing a value other than 0 to the setting start flag. If communication is started with undefined parameter values, a parameter error or abnormal operation results.

(chapter 5, page 5-17)

NOTICE
After setting the required communication parameters in the DB register, be sure to write a value other than 0 into the setting start flag and start communication. If the communication is started when the parameters are unstable, a parameter error or operation error may occur.

(chapter 6, page 6-2)

NOTICE
● Connect a repeater to a coaxial cable via a transceiver cable and a transceiver. ● A repeater can be attached to a transceiver at any position in the coaxial segment. ● Do not attach a station to a link cable. ● The distance between attached transceivers shall be a multiple of 2.5 (m).

(chapter 6, page 6-3)

NOTICE
● The number of repeaters between the S10mini or S10V and MELSEC shall be two(2) or less. ● The number of segments to which two or more repeaters can be connected shall be one(1).

(chapter 6, page 6-4)

NOTICE

- The maximum length of a link segment is 500 m.
- Do not attach a station to a link segment.
- The number of repeaters between the S10mini or S10V and MELSEC shall be two(2) or less.
- The number of segments to which two or more repeaters can be connected shall be one(1).
- A link segment including the repeaters at both ends is regarded as one repeater.

(chapter 6, page 6-5)

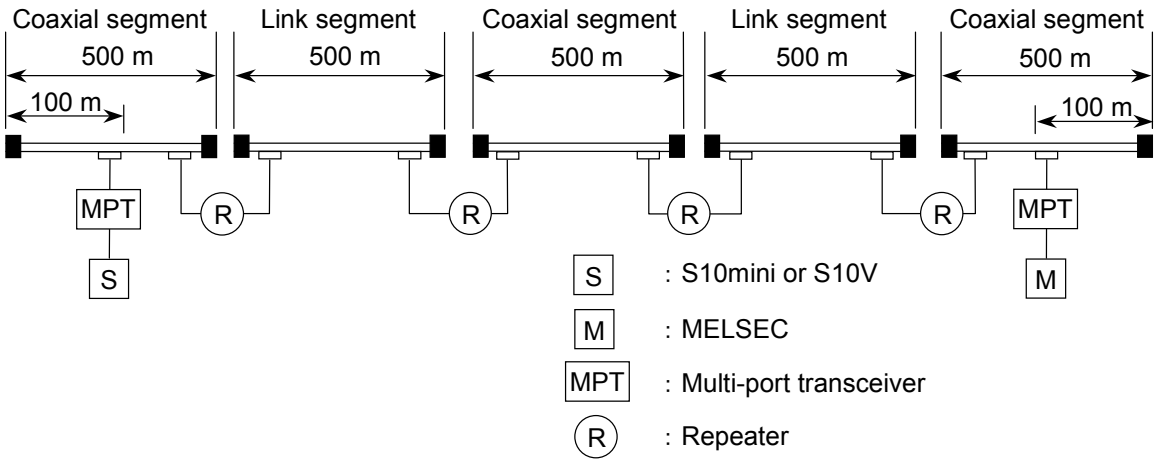
NOTICE

Restrictions on multi-port transceiver installation positions

- When multi-port transceivers are installed on the most distant coaxial cable segment in a system in which the maximum length of coaxial cables is 2,500 m (five segments), data delay time increases due to the installation. To avoid this, restrictions are placed on the multi-port transceiver installation positions. The maximum distance between stations via multi-port transceivers decreases by 100 m (in terms of coaxial cable length) if it passes one single multi-port transceiver. For this reason, there is the following restriction on the coaxial cable length (L [m]) of the route from a station to another station:

  L [m] ≤ 2,500 [m] - 100 × N [m]

  N: Total number of passing multi-port transceivers
- In a system consisting of coaxial cables of 2,500 m in total, set a multi-port transceiver 100 m or more inside from the most distant coaxial cable terminator (such terminator position decreasing the distance between stations).

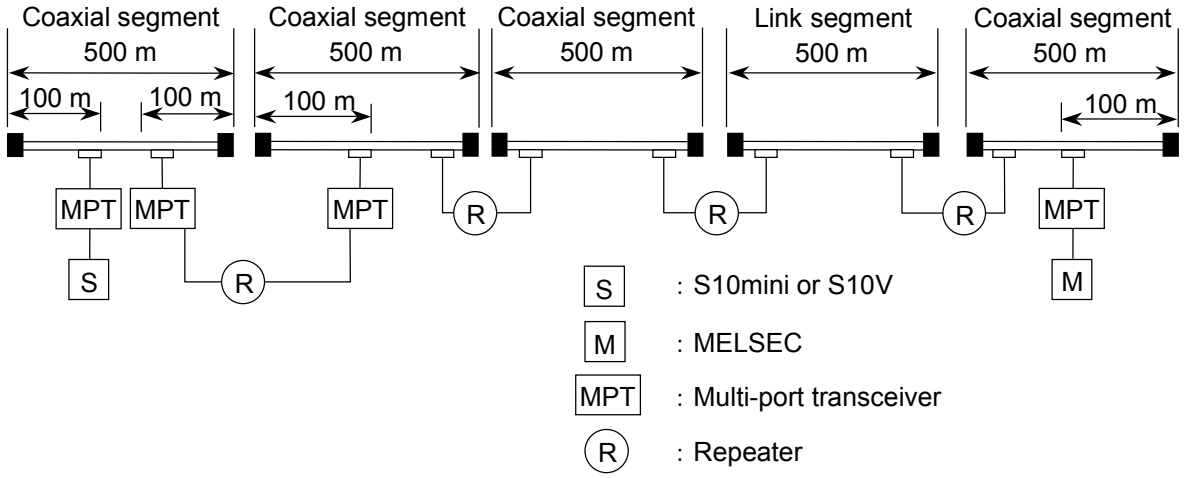


(cont.)

(chapter 6, page 6-6)

NOTICE

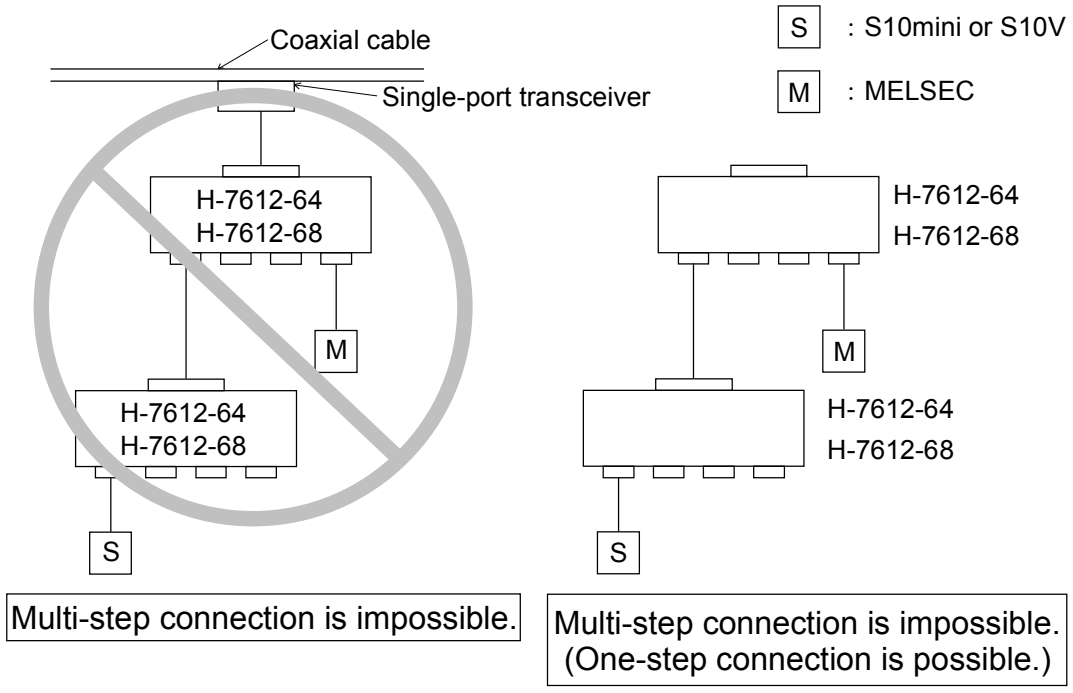
- When connecting a repeater between segments by using multi-port transceivers, it is also necessary to set the multi-port transceivers at the positions decreasing the distance between the most distant stations by 100 m each time in passes one of the multi-port transceiver.



(chapter 6, page 6-7)

NOTICE

- When multi-port transceivers (H-7612-64/H-7612-68) are used in network mode, multi-step connection is impossible due to the restrictions on transmission characteristics.

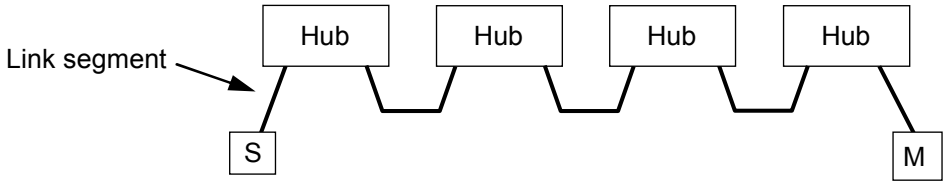


- In network mode, use the following specified device types as the single-port transceivers connected at higher level than multi-port transceivers, so that the condition to operate on the 12 VDC power supplied from the multi-port transceivers is assured:
  - HLT-200TB (manufactured by Hitachi Cable, Ltd.)
  - HLT-200 (manufactured by Hitachi Cable, Ltd.)
  - HLT-200TZ (manufactured by Hitachi Cable, Ltd.)
  - HLT-200TD (manufactured by Hitachi Cable, Ltd.)

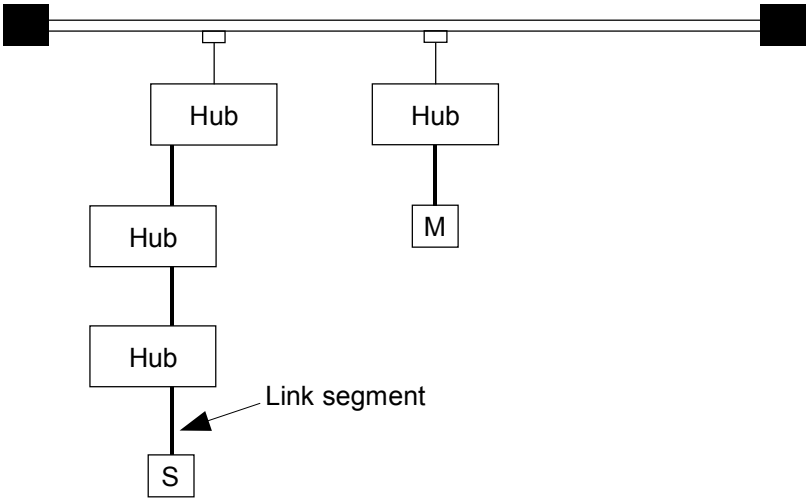
(chapter 6, page 6-9)

NOTICE

Constraints on multi-Hub connection
When a multi-hub connection is used, limit the number of hubs between the S10mini or S10V and MELSEC to four and the number of link segments to five.



When a coaxial cable is used for connection purposes, limit the number of hubs between the S10mini or S10V and MELSEC to four and the number of segments to five (the number of coaxial segments to three).



(chapter 6, page 6-10)

NOTICE

No dedicated setup tool is provided for SV.LINK. For IP address and subnet mask settings, use the ET.NET system tool.

(chapter 7, page 7-2)

NOTICE
Static electricity may damage the module. Before starting the work, discharge all electrostatic charge from your body.

WARRANTY AND SERVICING

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

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

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

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

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

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

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

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

This Page Intentionally Left Blank

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

<Hardware product>
SV.LINK (LQE521)

<Program products>
S-7890-29, ET.NET SYSTEM, 07-01
S-7895-29, S10V ET.NET SYSTEM, 02-04

Revision record

Revision No.	Revision record (revision details and reason for revision)	Month, Year	Remarks
B	First edition	February 2003	
D	Subsection 7.1.1, “Replacing or adding on the module” is newly added.	October 2008	
E	• 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.	February 2013	

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

PREFACE

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

The S10mini and S10V products are available in two types: standard model and environmentally resistant model. The environmentally resistant model has thicker platings and coatings than 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: LQE521
Environmentally resistant model: LQE521-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.

Note the following restrictions when installing the SV.LINK module in S10V.
- The SV.LINK module (LQE521) and the ET.NET module (LQE720) cannot be used together in an LPU unit.

<Trademarks>
- MELSEC is a trademark of MITSUBISHI ELECTRIC CORPORATION.
- Microsoft® Windows® operating system, Microsoft® Windows® 95 operating system, Microsoft® Windows® 98 operating system, Microsoft® Windows® 2000 operating system, Microsoft® Windows® XP operating system, Microsoft® Windows® 7 (32-bit) operating system are registered trademarks of Microsoft Corporation in the United States and/or other countries.
- Ethernet® is a registered trademark of Xerox Corp.

<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

CONTENTS

FIGURES

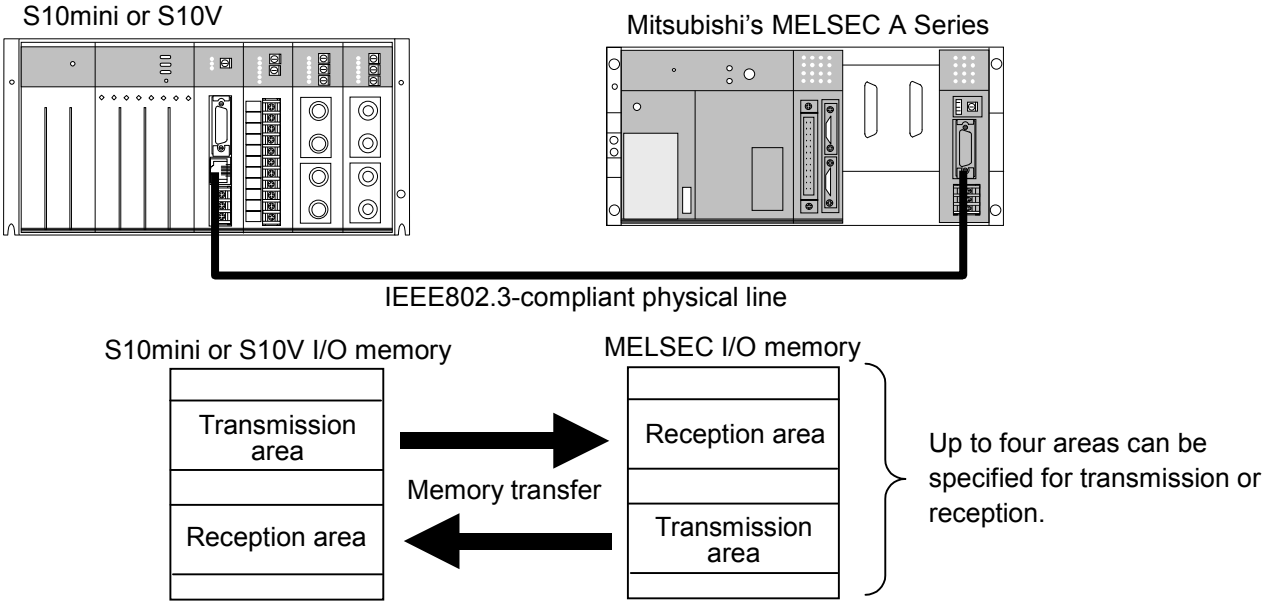
TABLES

This Page Intentionally Left Blank

1 SPECIFICATIONS

1.1 Usage

The SV.LINK module (model: LQE521) implements high-speed I/O communication at the ratio of peer to peer with the S10mini or S10V and the MELSEC A series sequencer or motion controller manufactured by MITSUBISHI ELECTRIC CORPORATION (hereafter abbreviated as Mitsubishi).
In the high-speed I/O communication, I/O data is exchanged at a high speed between the S10mini or S10V and the MELSEC by UDP/IP protocol through the physical line conforming to the IEEE802.3 specification.
The SV.LINK module (LQE021) dedicated to the S10mini cannot be used in the LPU unit of the S10V.



NOTICE

- LQE521 can be used with the SV.LINK module (LQE021) dedicated to the S10mini, when used in the CPU unit of the S10mini (though LQE021 cannot be used in the LPU unit of the S10V).
- When used in the LPU unit of the S10V, LQE521 cannot be used with the ET.NET module (LQE720) (but can be used with LQE520).

1.2 Specifications

1.2.1 System specifications

Item	Specifications
Model	LQE521
Maximum number of installable SV.LINK modules	S10mini: 1 module/CPU (installed from the leftmost slot) S10V: 1 module/LPU (Installing from the leftmost slot is not required.)
Mass	240 g

NOTICE
When using 10BASE-5 connections, a 12-VDC external power supply is required.

1.2.2 Line specifications

Item	Specifications
Transmission method	Serial (bit serial) transmission
Electrical interface	Conforming to IEEE 802.3 (conforming to CSMA/CD) standard
Coding system	Manchester
Protocol	UDP/IP or high-speed I/O communication protocol
Maximum number of connectable units	10BASE-5: 1 per segment 10BASE-T: 1 per hub
Maximum number of stations	2 per network (one unit of S10mini or S10V and MELSEC each)
Communication cable	10BASE-5 coaxial cable: Up to 500 m per segment 10BASE-5 transceiver cable: Up to 50 m 10BASE-T twisted-pair cable: Up to 100 m per segment
Data transmission rate	10 Mbps

1.2.3 High-speed I/O communication specifications

Item	Specifications
Communication style	Peer-to-peer communication (between the S10mini or S10V and MELSEC)
Applicable Mitsubishi sequencer	Sequencer or motion controller in which the MELSEC A Series Ethernet® interface unit (Model AJ71E71 or equivalent) is mounted
Port number used	Fixed at 34100 (decimal notation; for both the S10mini or S10V and MELSEC)
IP address used	Any address is usable. However, the S10mini or S10V and MELSEC must agree with each other in network address.
Supported communication function	Cyclic communication based on the MELSEC's fixed-buffer communication function (asynchronous)
S10mini communication areas	Bit registers: X, Y, J, Q, R, M, G, and E registers Word registers: DW and FW registers Up to four areas can be specified for transmission and reception each.
Transmission/reception communication word count	Bit register: 40 words max. Word register: 256 words max. (256 words maximum for a total of four areas)
Communication cycle	Determined according to the transmission/reception word count, communication delay time, and MELSEC response time. See Section 6.4, "Communication Cycle."
I/O data consistency guarantee unit	One word

Note: For the fixed-buffer communication function (asynchronous) of MELSEC, refer to the MELSEC documentation.

NOTICE

- The physical line between the S10mini or S10V and MELSEC must be exclusively used for high-speed I/O communications. Ensure that nothing is connected to the physical line except for the S10mini or S10V and MELSEC.
- When using two high-speed I/O communication channels, provide a physical line for each channel.

1.3 System Software Specifications

1.3.1 System overview

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

Table 1-1 Types of System Software (Tool)

Package name	Model		Supply style
	For S10mini	For S10V	
ET.NET system	S-7890-91	S-7895-29J	Optional

1.3.2 Required hardware and software

The following hardware and software are required for the use of the SV.LINK 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)

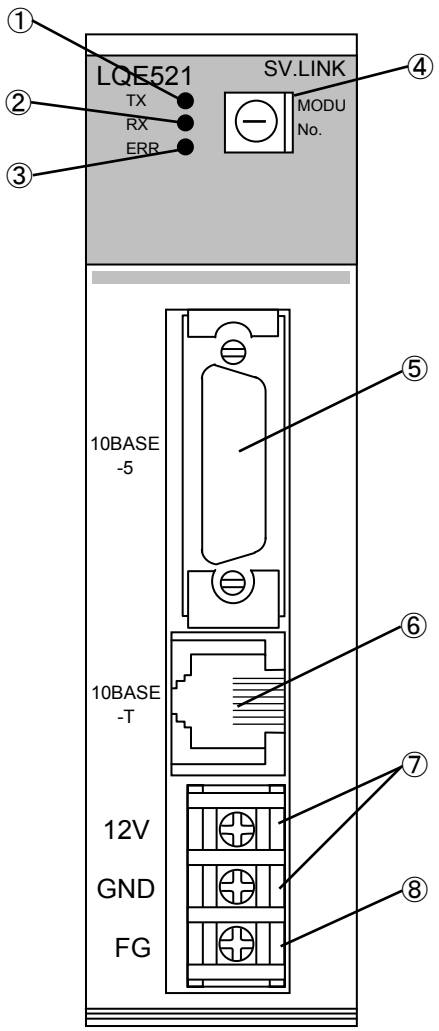
(2) For S10V

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

2 NAMES AND FUNCTIONS OF EACH PART

2.1 Names and Functions of Each Part



No.	Name	Function
①	TX LED	Lights during data transfer.
②	RX LED	Lights when data flows on the transmission line (when a carrier is detected).
③	ERR LED	Lights when a hardware error or user setup parameter error is detected.
④	Module number setting switch	Specifies the main module or submodule and also sets a communication port type. The setting of this switch becomes effective when resetting of the computer system is completed.
⑤	10BASE-5 connector	Connects to Mitsubishi's MELSEC sequencer or motion controller.
⑥	10BASE-T connector	Connects to Mitsubishi's MELSEC sequencer or motion controller.
⑦	Power input terminal	Connects with the power supply (12 VDC) for a transceiver which is connected with 10BASE-5.
⑧	Frame ground	Connected to the shield line of the transceiver cable.

Module No.		Description
Main	Sub	
0	1	Communication using 10BASE-5 connections
2	3	Communication using 10BASE-T connections
4	5	Setting is disabled.
6	7	Setting is disabled.
8	9	Setting is disabled.
A	B	Setting is disabled.
C	D	Setting is disabled.
E	F	Setting is disabled.

NOTICE

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

3 MOUNTING AND WIRING

3.1 Mount Base

This module can be mounted on the mount bases shown in below.

Series	Name	Model
S10V	4-slot mount base	HSC-1540
	8-slot mount base	HSC-1580
S10mini	2-slot mount base	HSC-1020
	4-slot mount base	HSC-1040
	8-slot mount base	HSC-1080

3.2 Mounting the Module

Mount the option module in an option slot (slot numbered between 0 to 7) in the mount base as shown below.

NOTICE

For the S10mini Series, mount 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.

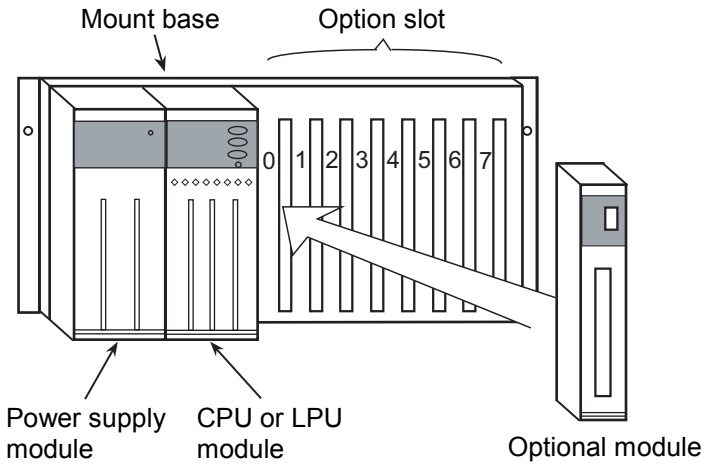
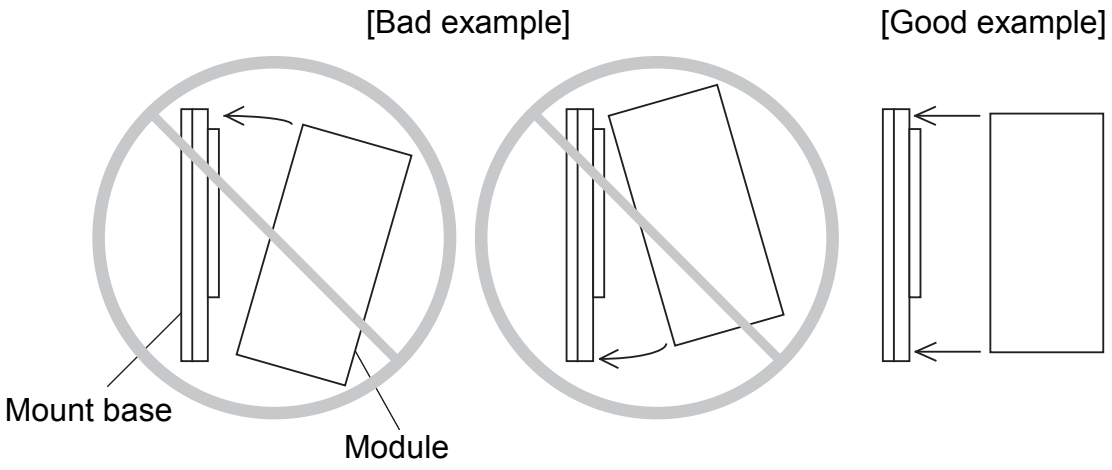


Figure 3-1 Mounting the Optional Module

NOTICE

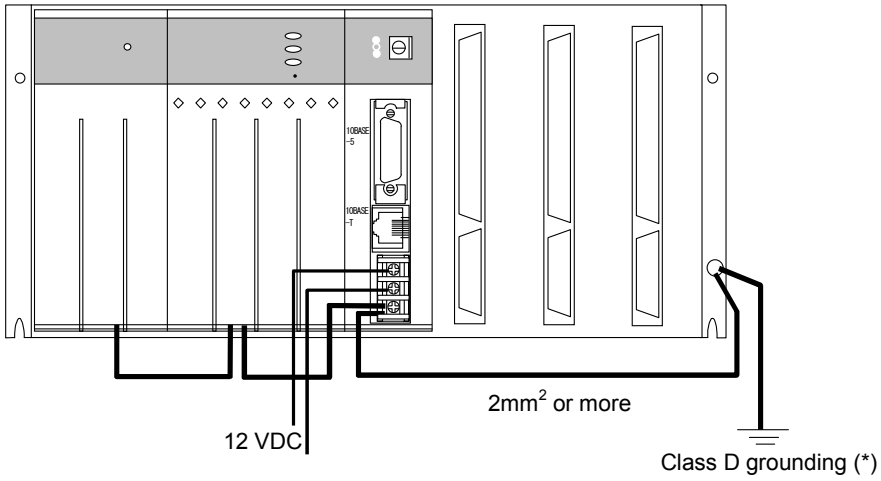
- Dust or other foreign matter might accumulate on the connector, resulting in poor contact. Immediately after the module is unpacked, perform the mounting and wiring procedures.
- To prevent the module from being damaged, observe the following precautions when you mount or demount the module:
  - Before 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.



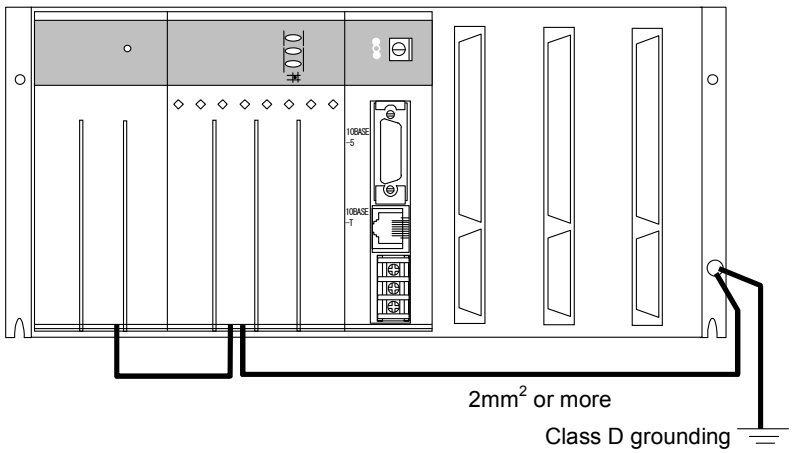
3.3 Ground Wiring

Perform ground wiring as described below.

• Ground wiring example for 10BASE-5



Ground wiring for 10BASE-T (Do not perform wiring to the FG terminal of the SV.LINK module.)



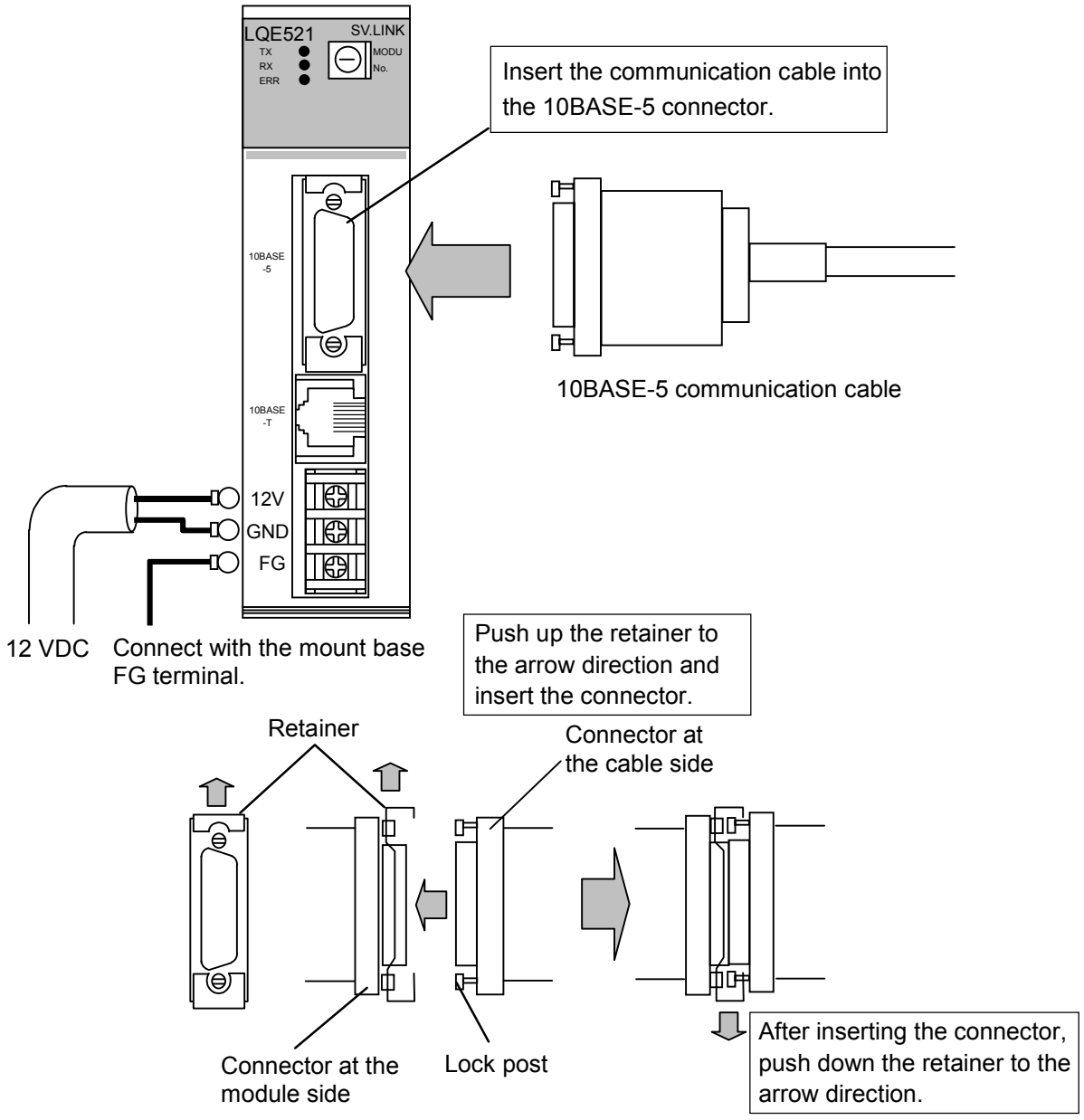
NOTICE

- For communication using the 10BASE-5, perform class D grounding for the FG terminal of the SV.LINK module through the FG terminal of the mount base.
- Use a ground wire with a wire diameter of 2 mm^2 or more.
- While the power supply is ON, do not touch the 10BASE-5 connector. The system may malfunction due to static electricity.

(*) 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

(1) Wiring for 10BASE-5



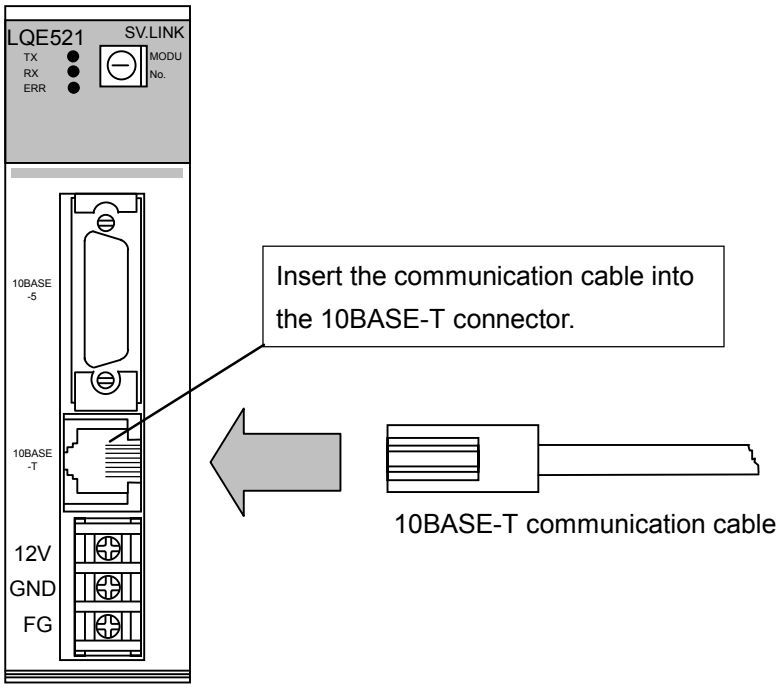
NOTICE

- This hardware unit may malfunction if it is connected poorly or has a broken line. After connecting the 10BASE-5 connector, check whether the locking post is locked by the retainer.
- Do not touch the 10BASE-5 connector during power-on. Otherwise, the system may malfunction due to static electricity, etc.

NOTICE

- The following 12 VDC external power supply is recommended. Use the recommended power supply.
  Power supply model name: HK-25A-12 (manufacturer: Densei-Lambda K.K.)
- When the two ET.NET modules LQE020 and LQE520 are installed, no SV.LINK module can be installed.
- When ET.NET module LQE720 is installed, no SV.LINK module can be installed.
- When mounting the SV.LINK module and ET.NET module on the same mount base, perform setup so that the main module and submodule are distinctively defined.
  Example: If the ET.NET module is defined as the main module, be sure to define the SV.LINK module as the submodule. If the ET.NET module is defined as the submodule, be sure to define the SV.LINK module as the main module.
- A total of up to two modules (ET.NET and SV.LINK modules) can be mounted on the same mount base.
- Even if no ET.NET module is installed, you can mount only one SV.LINK module.

(2) Wiring for 10BASE-T



NOTICE

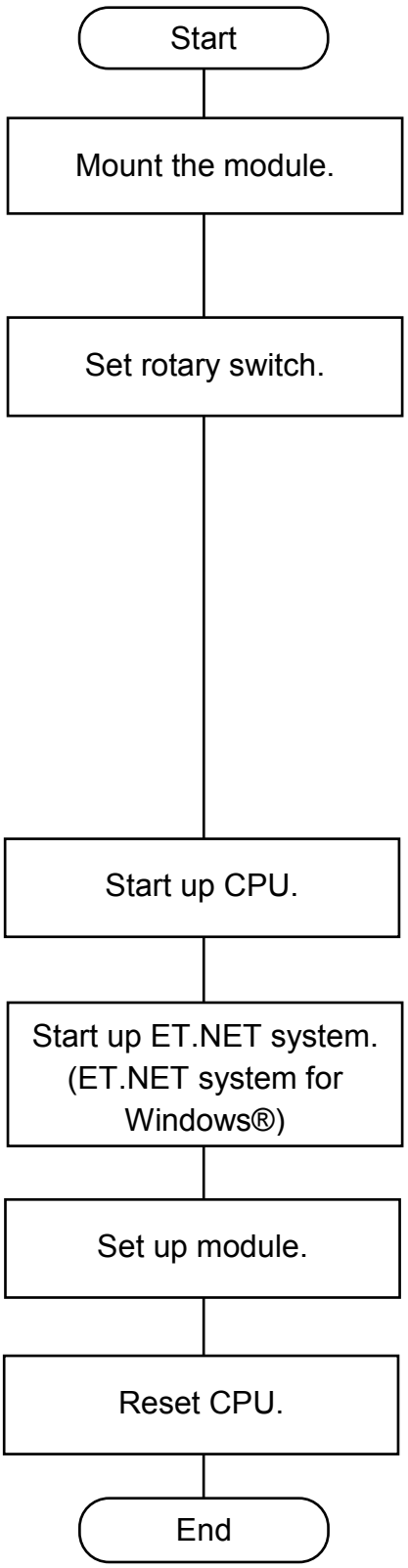
- When using 10BASE-T, do not wire the FG terminal.
- There are two types of 10BASE-T twisted-pair cable available: straight cable and cross cable. The user should choose one of these two types according to the requirements of the hardware unit to which this product is to be connected.

Hardware unit	Cable type
Hub	Straight
MELSEC (direct connection)	Cross

This Page Intentionally Left Blank

4 OPERATION

4.1 Start-up Procedure



Start up the system according to the following procedure.

[1] Switch off the CPU or LPU power supply and mount the SV.LINK module.

[2] Set the module number setting switch of the SV.LINK module according to the following table.

Switch setting		Contents
Main	Sub	
0	1	10BASE-5 communication
2	3	10BASE-T communication
4	5	Error
6	7	Error
8	9	Error
A	B	Error
C	D	Error
E	F	Error

[3] Switch on the power supply of the 10mini CPU unit or S10V LPU unit.

[4] Connect the CPU or LPU to the tool system by the RS-232C interface cable and start up the ET.NET system or S10V ET.NET system.

[5] For the SV.LINK module, set the IP address or subnet mask as required.

[6] Reset the CPU or LPU or switch on and off the power supply. Press the reset switch of the CPU for one second or more.

4.2 Installing and Setting Up the System

4.2.1 Installing

To operate the SV.LINK, the SV.LINK must be set by using the ET.NET system tool. Install the system according to the following procedure.

(1) Installing the S10mini ET.NET system

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

NOTICE

Before installing the S10mini ET.NET system, be sure to exit all the currently open Windows® programs. Do not forget to exit anti-virus software and other memory-resident programs. If you install the S10mini ET.NET system without exiting such programs, an error may occur during installation. If such an error occurs, first uninstall the S10mini ET.NET system as directed in "4.2.2 Uninstalling," exit all the Windows® programs, and then install the S10mini ET.NET system again.

(2) Installing the S10V ET.NET system

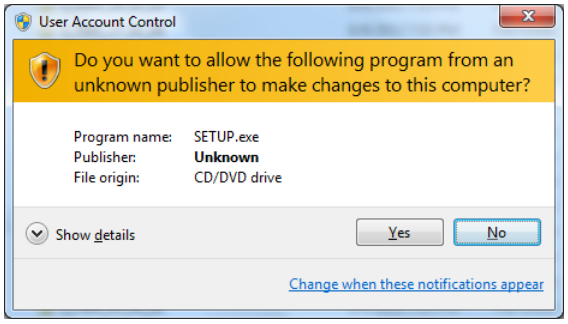
To install the S10V ET.NET system, you must execute the setup program that is stored in the S10V ET.NET system DISK1 folder on the CD.

Double-click "setup.exe" that is stored in the DISK1 folder on the S10V ET.NET 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 ET.NET SYSTEM] – [S10V ET.NET SYSTEM] from the [Start] menu on the Windows® screen. Click and hold the right mouse button on the [S10V ET.NET 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 ET.NET 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 ET.NET 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 ET.NET system cannot be installed on a per-user basis. To install the S10V ET.NET 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 ET.NET 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 ET.NET 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 ET.NET system. In this case, click the Yes button to set off overwriting.

NOTICE

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

4.2.2 Uninstalling

The existing S10V ET.NET 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 "ET.NET SYSTEM" (for S10mini controllers) or "S10V ET.NET 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 "ET.NET SYSTEM" (for S10mini controllers) or "S10V ET.NET 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 ET.NET 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 ET.NET system, perform the following procedure:

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

(2) The [Communication type] window is displayed. The [Communication type] window described in Figure 4-1 will be shown when the ET.NET system is S-7890-29. The [Communication type] window described in Figure 4-2 will be shown when the ET.NET system is S-7895-29 and the version is 01-01 or earlier. The [[S10V] ET.NET] window described in Figure 4-3 will be shown when the ET.NET system is S-7895-29 and the version is 02-00 or later.

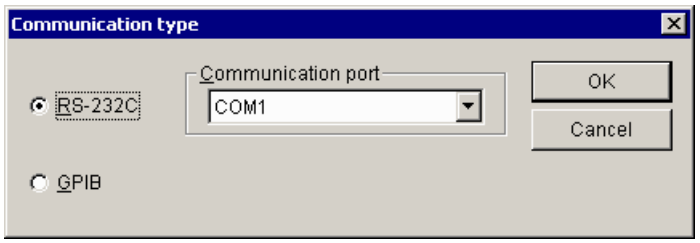


Figure 4-1 [Communication Type] Window (S10mini ET.NET System)

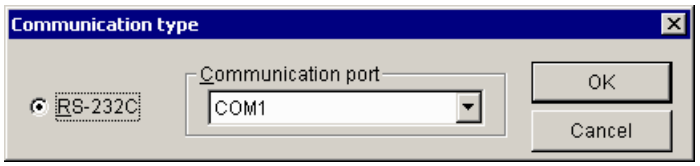


Figure 4-2 [Communication Type] Window (S10V ET.NET System Ver. 01-01)

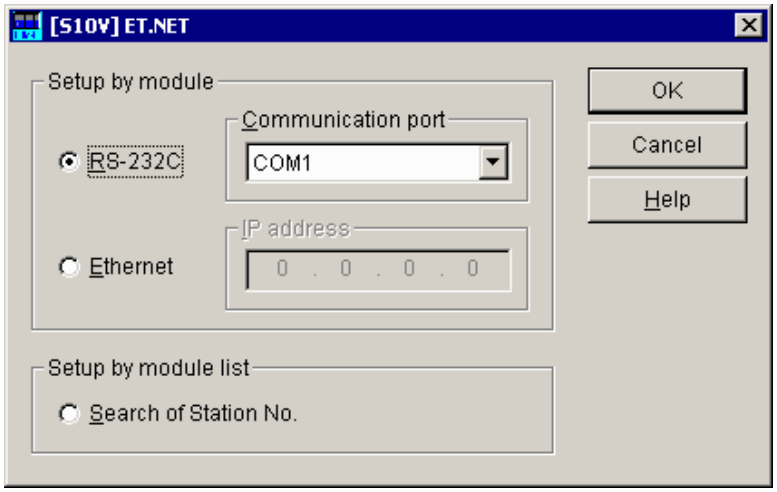


Figure 4-3 [[S10] ET.NET] Window (S10V ET.NET System Ver. 02-00 or later)

See “4.3 Commands” for further operations when the ET.NET system is S-7890-29 or S7895-29 and the version is 01-01 or earlier. And see “4.4 Commands (S-7895-29 Version 02-00 or later)” when the ET.NET system is S-7895-29 and the version is 02-00 or later.

NOTICE

Confirm the version of the ET.NET system in the [Version information (ET.NET)] window. The [Version information (ET.NET)] window will be displayed by selecting “Version information (ET.NET)” in the icon located in the upper left corner of the [ET.NET SYSTEM] window or [[S10V] ET.NET] window.

4.2.4 Shutting down the system

In the [ET.NET SYSTEM] or [[S10V] ET.NET] window (see Figure 4-3 and Figure 4-4), click the [×] or [Close] button.

4.3 Commands

4.3.1 Changing connecting PCs

Function: Specify the communication type between PCs and personal computers.
Operation: The operation procedure is described below.

(1) The [Communication type] window will be displayed by clicking the Change connection button in the [ET.NET SYSTEM] window or the [[S10] ET.NET] window, or displayed automatically during the start-up process of the ET.NET system.

(2) Click the [RS-232C] radio button, and select a [Communication port] from the menu that pulls down, and click the OK button.
To leave the current setting unchanged, click the Cancel button.

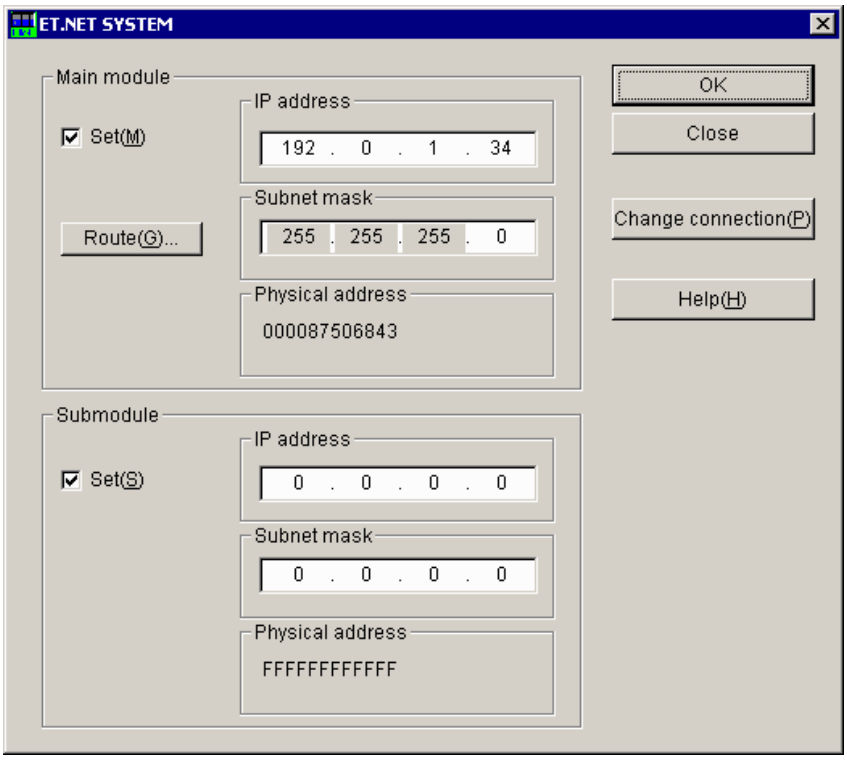
NOTICE

- The S10mini does not support GP-IB. Select “RS232C” on the [Communication type] window.
- The S10V does not support GP-IB. “GP-IB” is not displayed on the [Communication type] window.

4.3.2 IP address and subnet mask setting

Function: Set the IP addresses and subnet masks of the main module and the sub-module.
Operation: The operating procedure is shown below.

(1) Start up the [ET.NET SYSTEM] ([S10V] ET.NET) window. Set “IP address” and “Subnet mask.”



(This window is displayed when no submodule is mounted.)

Figure 4-4 [ET.NET SYSTEM] ([[S10V] ET.NET]) Window

(2) After completing the above setting, click the OK button. To cancel the setting, click the Close button.

NOTICE

On the [ET.NET SYSTEM] or [[S10V] ET.NET] window, the setting and the display method vary depending on whether the ET.NET module is installed or not as shown in the following table.

Installation status	IP address	Subnet mask	Route information	Physical address
Installed	Settable (The contents of setting are displayed.)	Settable (The contents of setting are displayed.)	Settable (Button is displayed.)	Can be referenced. (Physical address is displayed.)
Not installed	Settable (The contents of setting are displayed.)	Settable (The contents of setting are displayed.)	Not settable (Button is not displayed.)	Cannot be referenced. (FFFFFFFF is displayed.)

4.3.3 Route information setting

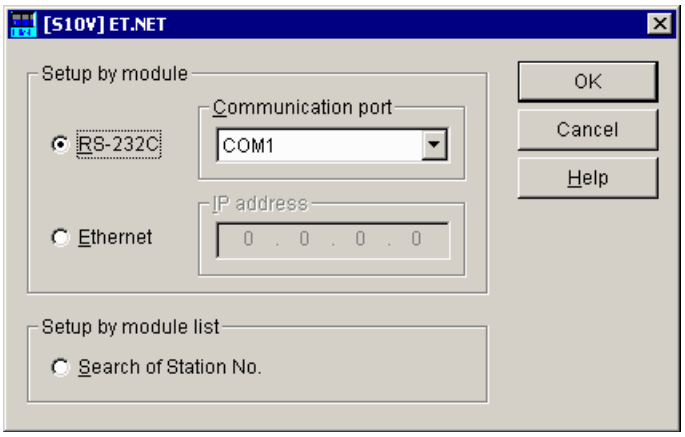
In the SV.LINK, the communication through a router is not supported. Any route information setting is not required.

4.4 Commands (S-7895-29 Version 02-00 or later)

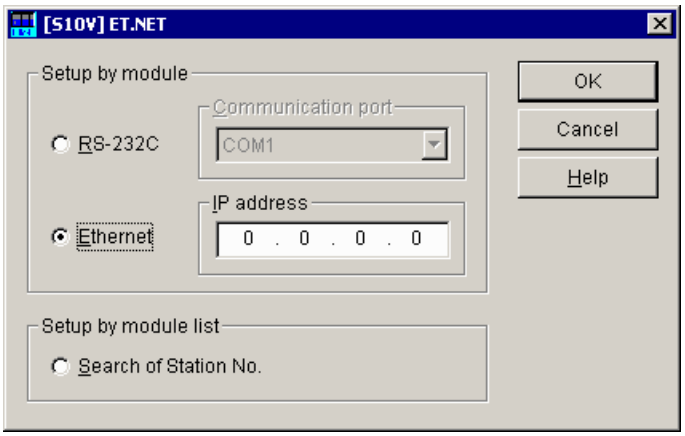
4.4.1 Changing Connecting PCs

Function: Specify the communication type between PCs and personal computers.
Operation: The operation procedure is described below.

(1) Select the type of communication between PCs and personal computer in the ET.NET system startup window.
- RS-232C connection
  Click the [RS-232C] radio button and select a [Communication port] from the menu that pulls down.



- Ethernet connection
  Click the [Ethernet] radio button and enter the IP address of the PCs that is connected.



(2) Click the OK button when the setup has completed. The [Setup by module] window will then appear.

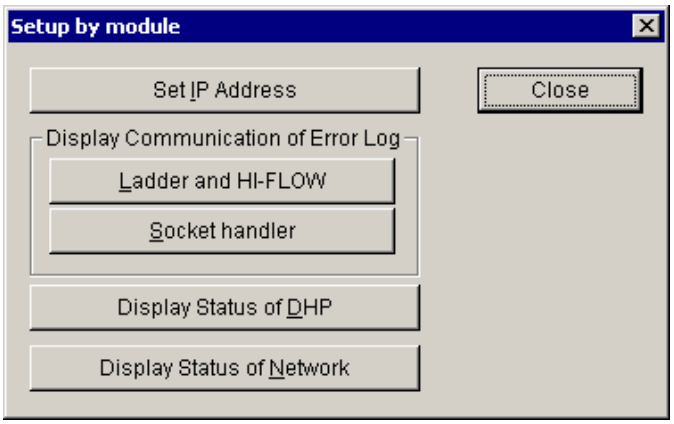
NOTICE
The “Search of Station No.” is a function dedicated to SV.LINK (LQE720). This function is not available for ET.NET (LQE521).

4.4.2 Setup by module

Function: Display the requested window.
Operation: The procedure used is shown below.

(1) Click the [RS-232C] or [Ethernet] radio button in the [[S10V] ET.NET] window and click the OK button.

(2) The [Setup by module] window will then appear.



(3) If you want to set IP address and other information for the SV.LINK module, click the Set IP Address button.

(4) If you want to exit the [Setup by module] window, click the Close button.

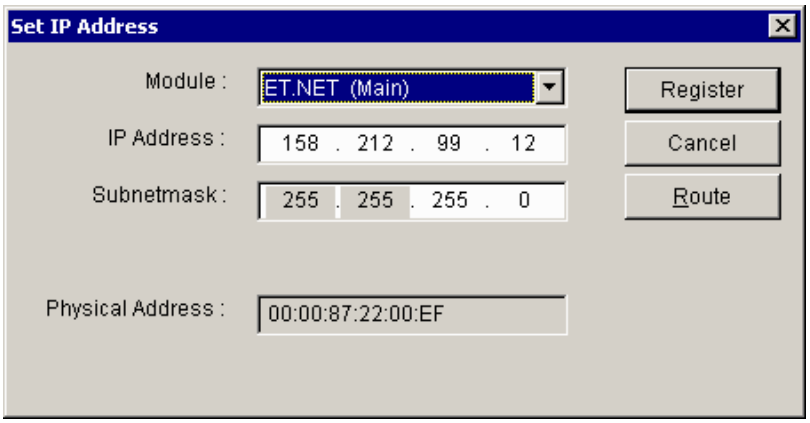
NOTICE
SV.LINK is not supporting the following commands. Therefore, the following commands cannot be executed. ● Ladder and HI-FLOW (Display Communication of Error Log) ● Socket handler (Display Communication of Error Log) ● Display Status of DHP ● Display Status of Network

4.4.3 IP address setting

Function: Set an IP address and other information for the SV.LINK module.
Operation: The procedure used is shown below.

(1) Click the Set IP Address button in the [Setup by module] window.

(2) The [Set IP Address] window will then appear. Set the desired IP address and other information.



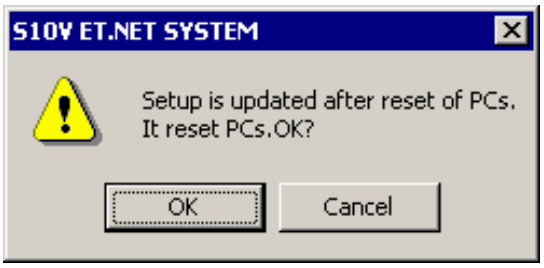
- Module
  Select the SV.LINK module you want to set up. Since the device uses the ET.NET system, it will display "ET.NET" instead of "SV.LINK." If so, take "ET.NET" as "SV.LINK."

Possible choice	Remarks
ET.NET (Main)	Default
ET.NET (Sub)	

- IP Address/Subnetmask
  Set an IP address, and subnet mask for the SV.LINK module. For details, see "6.3 System Definition Information."
- Physical Address
  The 48-bit address to which the SV.LINK module is assigned is displayed in this box. If no SV.LINK module is installed for this physical address, either of the values "00:00:00:00:00:00" and "FF:FF:FF:FF:FF:FF" is displayed instead.

(3) When the above step is completed, click the Register button if you want to save all the settings and entries thus far made. If not, click the Cancel button.

(4) Click the Register button. The following message will then appear:



To reset the PCs, click the OK button. Then, the newly set IP address and route information will become effective.

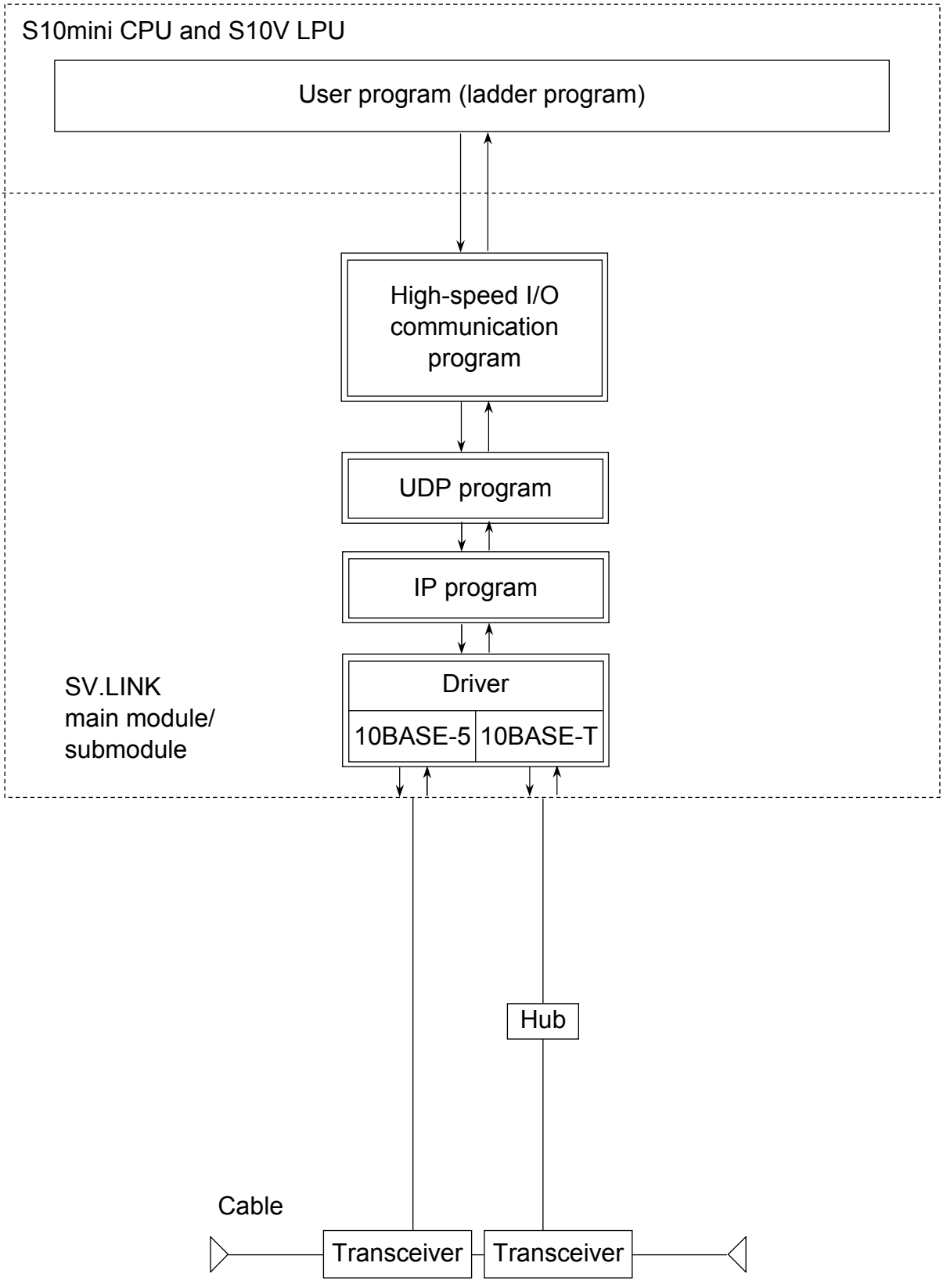
4.4.4 Routing information

In the SV.LINK, the communication through a router is not supported.
Any route information setting is not required.

This Page Intentionally Left Blank

5 PROGRAMMING

5.1 Software Configuration of SV.LINK



5.2 SV.LINK System Programs

This section describes the system programs shown in "5.1 Software Configuration of SV.LINK."
The system programs are classified into the four types listed below. All program runs on a SV.LINK module.

- High-speed I/O communication program
- UDP program
- IP program
- Driver

5.2.1 High-speed I/O communication program

The high-speed I/O communication program uses the MELSEC's fixed-buffer communication function (asynchronous) to transmit the data from a user-defined transmission area and writes the data received from the MELSEC to a reception area.
The UDP port opening signal, UDP transmissions, and UDP receptions are passed to the UDP program via memory interface and processed.

5.2.2 UDP program

The UDP program as a higher-level protocol manages high-speed transmission/reception of a large amount of data.
The UDP program has the following functions:

- Connectionless communication
- Simultaneous communication
- Packet-based data transmission

5.2.3 IP program

The IP program as a low-level protocol conducts logical connection of communication paths.
The IP program has the following functions:

- Disassembling or reassembling data according to the maximum packet length
- Exchanging IP address and physical address

5.2.4 Driver

The driver controls the communication circuit, and sends data to and receives data from lines (transceivers).
The driver has the following functions:

- CRC (Cyclic Redundancy Check) for transmission/reception of data
- Data collision detection during transmission/reception and retransmission

5.3 User-created Program

This section describes about the software that the user must create.

5.3.1 Ladder program

The user must create the following ladder programs:

- Communication parameter setup
  Sets the transmission/reception area and other communication parameters for the BD registers (BD000 through BD03F).
- Communication start and stop
  After completion of communication parameter setup, set the communication delay time and start flag in the SV.LINK module. Setting the start flag enables SV.LINK to start communications.

5.4 Status and Communication Parameter Areas

This section details the status areas, which indicate the SV.LINK status, and the communication parameter areas, which are required for communications with the MELSEC.
As the status and communication parameter areas, BD registers of from BD000 to BD03F are used. The registers BD000 through BD03F are reserved for SV.LINK although some unused areas are contained. When SV.LINK is used, do not use the above areas for any other purposes. Use the same areas (BD000 through BD03F) no matter whether the SV.LINK module is defined as the main module or submodule.
The SV.LINK module checks for communication parameter rationality the moment the user starts a communication process. If any communication parameter is in error, the SV.LINK module does not start communications (the ERR LED glows and the module operation comes to a stop).

(1) Status areas
The status areas store the error codes for errors that are caused during communications and counts of the number of cyclic communications carried out since a reset/power-on reset.

Register number	Area name	Area description	Remarks
BD000	Error code	Stores the error codes for errors that are caused during communications. While normal communications are maintained, the value 0 is stored. For detailed error code descriptions, see "7.3.3 Communication error codes."	(*1)
BD001	Cyclic communication counter (count)	Holds a count of the number of communications carried out with the MELSEC.	(*2)
BD002	Reserved for future use		
BD003	Reserved for future use		
BD004	Reserved for future use		
BD005	Reserved for future use		
BD006	Reserved for future use		
BD007	Reserved for future use		

(*1) If communication recovery is achieved through retries after the occurrence of a communication error, the error code area is cleared to zero (0). In such an instance, the previously encountered errors can be referenced by viewing the error code trace area. For the error code trace area, see "7.3.3 Communication error codes."
(*2) This counter holds a count of the number of communications that have been carried out since power ON. It is cleared to zero (0) when a power outage occurs.

(2) Basic parameter areas

These areas are used to set the basic parameters required for cyclic communications. Be sure to set values in all the areas without omissions. If a certain area is left undefined (e.g., a setting of 0 is employed), a parameter setting error may occur.

Register number	Area name	Area description	Remarks
BD008	Status display/control register address	Y, Q, R, M, K, G, and E registers	(*1)
BD009	Communication response wait time (ms)	50 to 10,000 ms (Digits below 10 are cut off.)	
BD00A	Cyclic communication retry count	0 to 10	
BD00B	Reserved for future use	To be fixed at 0.	
BD00C	Cyclic communication protocol setting	To be fixed at 0.	
BD00D	MELSEC side IP address	Any setting (in hexadecimal notation)	(*2)
BD00E	Communication data endian conversion	0: endian conversion effected; 1: no endian conversion	(*3)
BD00F	Reserved for future use	To be fixed at 0.	

(*1) When an error occurs, the specified register bit is set. This ensures that the error is detected by a ladder program. All the registers outside the acceptable setting range are in setting error. For the assignments for the registers, see under “Status display/control register assignments” (next page). For the setup procedure, see item (6).

(*2) Enter a hexadecimal number to specify the IP address of the MELSEC, which is the remote station to communicate with.

Example: When the IP address of MELSEC is 162.0.9.194, the setting is HA20009C2 because 162 = HA2, 0 = H00, 9 = H09, and 194 = HC2.

(*3) Only the bit areas can be subjected to endian conversion between big endian and little endian. Word areas will not be subjected to endian conversion even if the endian conversion option is enabled.

Status display/control register assignments

Bit number	Type	Area name	Area description	Remarks
0	Status display register	Error flag	Set when an error occurs. (If any one is ON, this flag is turned on.)	(*1)
1		Parameter setting error flag	Set when an error occurs.	(*2)
2		Communication port opening error flag	Set when an error occurs.	(*3)
3		Cyclic communication error flag	Set when an error occurs.	(*4)
4		Reserved for future use		
5		Reserved for future use		
6		Communication port closing flag	Set when an error occurs.	(*5)
7		Reserved for future use		
8	Control register	Reserved for future use		
9		Reserved for future use		
A		Reserved for future use		
B		Reserved for future use		
C		Reserved for future use		
D		Reserved for future use		
E		Reserved for future use		
F		Cyclic communication stop flag	When the flag value is “1,” the communications stop. (The value “0” should normally be used. Change the value when stopping the communications for facility adjustment or like purposes.)	

(*1) This bit is set to “1” when one of bits 1 through 3 is set to “1” and “0” when all of them are set to “0.”

(*2) This bit is set to “1” when a communication parameter error is detected. Note the BD000 register error code and take an appropriate remedial action as suggested in “7.3.3 Communication error codes.”

(*3) This bit is set to “1” when an error occurs in opening the SV.LINK internal communication port. The bit is reset (= “0”) when error recovery is achieved. Note the BD000 register error code and take an appropriate remedial action as suggested in “7.3.3 Communication error codes.”

(*4) This bit is set to “1” when an error occurs during communication. The bit is reset (= “0”) when error recovery is achieved. Note the BD000 register error code and take an appropriate remedial action as suggested in “7.3.3 Communication error codes.”

(*5) This bit is set to “1” if an error occurs in closing the SV.LINK internal communication port. The bit is reset (= “0”) when error recovery is achieved. Note the BD000 register error code and take an appropriate remedial action as suggested in “7.3.3 Communication error codes.”

(3) Local station transmission/reception start address setup areas

The areas for setting the transmission/reception start address of the local station are indicated below. Up to four areas can be specified for each of transmission and reception. Perform setup so as to meet the requirements.

Register number	Area name	Setting range
BD010	Cyclic transmission area 1	Bit registers: X, Y, J, Q, R, M, G, and E registers Word registers: DW and FW registers (*)
BD011	Cyclic transmission area 2	
BD012	Cyclic transmission area 3	
BD013	Cyclic transmission area 4	
BD014	Cyclic reception area 1	
BD015	Cyclic reception area 2	
BD016	Cyclic reception area 3	
BD017	Cyclic reception area 4	
BD018	Reserved for future use	To be fixed at 0.
BD019	Reserved for future use	To be fixed at 0.
BD01A	Reserved for future use	To be fixed at 0.
BD01B	Reserved for future use	To be fixed at 0.
BD01C	Reserved for future use	To be fixed at 0.
BD01D	Reserved for future use	To be fixed at 0.
BD01E	Reserved for future use	To be fixed at 0.
BD01F	Reserved for future use	To be fixed at 0.

(*) The simultaneous use of bit and word registers is an allowable practice. For the procedure for specifying the transmission/reception areas, see item (6).

NOTICE

- Although the parameters are checked at startup, they are not checked for a duplicate of areas 1 through 4 and transmission/reception areas. The user should exercise area management so as to avoid area duplication. Also, note that crossover use of registers is not checked for (the crossover use of registers means that, if, for instance, a 16-word transmission beginning with YFC0 is specified, the areas YFC0 through YFFF and Q000 through Q0BF would be actually transmitted). To prevent unexpected operations, you should perform setup so as to avoid the crossover use of registers.
- I/O data transmission/reception cannot be invoked simply by setting the above areas. For the transmission/reception of I/O data, it is necessary to complete word count setup as indicated in item (5), “Transmission/reception word count setup areas.”

(4) Remote station (MELSEC) transmission/reception start address setup areas

The areas for setting the transmission/reception start address of the remote station (MELSEC) are indicated below. Up to four areas can be set for each of write and read. The contents of these areas are merely used for the area check that is performed at the beginning of communications (for checking whether the S10mini or S10V and MELSEC agree in bit/word register). Therefore, the data will not be written to the areas specified as explained here and the data will not be read from the areas specified as explained here. The areas used for transmissions from the MELSEC and the areas used for the storage of data received by the MELSEC both depend on the design of the MELSEC application program.

Register number	Area name	Setting range
BD020	Cyclic write area 1	Bit registers: X, Y, M, B, and F registers Word registers: D, W, and R registers (*)
BD021	Cyclic write area 2	
BD022	Cyclic write area 3	
BD023	Cyclic write area 4	
BD024	Cyclic read area 1	
BD025	Cyclic read area 2	
BD026	Cyclic read area 3	
BD027	Cyclic read area 4	
BD028	Reserved for future use	To be fixed at 0.
BD029	Reserved for future use	To be fixed at 0.
BD02A	Reserved for future use	To be fixed at 0.
BD02B	Reserved for future use	To be fixed at 0.
BD02C	Reserved for future use	To be fixed at 0.
BD02D	Reserved for future use	To be fixed at 0.
BD02E	Reserved for future use	To be fixed at 0.
BD02F	Reserved for future use	To be fixed at 0.

(*) The simultaneous use of bit and word registers is an allowable practice. For the procedure for setting the write/read areas, see item (7).

NOTICE

- Although the parameters are checked at startup, they are not checked for a duplicate of the areas 1 through 4 and write/read areas. The user should exercise area management so as to avoid area duplication.
- Local station and remote station (MELSEC) transmission/reception start address setup areas must agree in bit/word register. If they do not agree, a parameter setting error occurs and SV.LINK stops its communications.

(5) Transmission/reception word count setup areas

The areas for setting the number of words to be transmitted/received are indicated below. Perform setup so as to meet the requirements. The term "transmission/reception" refers to S10mini's or S10V's transmissions and receptions. If a certain area is set to "0," that area will not be used for transmission or reception.

Register number	Area name	Setting range
BD030	Cyclic transmission area 1 word count	Bit register: 0 to 64 words (640 points) Word register: 0 to 256 words (*)
BD031	Cyclic transmission area 2 word count	
BD032	Cyclic transmission area 3 word count	
BD033	Cyclic transmission area 4 word count	
BD034	Cyclic reception area 1 word count	
BD035	Cyclic reception area 2 word count	
BD036	Cyclic reception area 3 word count	
BD037	Cyclic reception area 4 word count	
BD038	Reserved for future use	To be fixed at 0.
BD039	Reserved for future use	To be fixed at 0.
BD03A	Reserved for future use	To be fixed at 0.
BD03B	Reserved for future use	To be fixed at 0.
BD03C	Reserved for future use	To be fixed at 0.
BD03D	Reserved for future use	To be fixed at 0.
BD03E	Reserved for future use	To be fixed at 0.
BD03F	Reserved for future use	To be fixed at 0.

(*) The maximum permissible number of transmission/reception words is 256 for a total of four areas.

(6) Status display/control register and local station transmission/reception start area settings
The table below shows the settings for specifying the local station areas:

Register name	Category (bit/word)	Setting		
		High-order word	Low-order word (register number)(*)	
			Minimum value	Maximum value
X	Bit	H5820	H0000	H0FF0
Y	Bit	H5920	H0000	H0FF0
J	Bit	H4A20	H0000	H0FF0
Q	Bit	H5120	H0000	H0FF0
R	Bit	H5220	H0000	H0FF0
M	Bit	H4D20	H0000	H0FF0
K	Bit	H4B20	H0000	H0FF0
G	Bit	H4720	H0000	H0FF0
E	Bit	H4520	H0000	H0FF0
DW	Word	H4457	H0000	H0FFF
FW	Word	H4657	H0000	H0BFF

(*) When setting a bit register, be sure to select a setting of 0 for the lowest digit of a register number. If a setting of other than 0 is selected, a parameter setting error occurs.

Example: The setting for “DWA00” selection is H44570A00.

(7) Remote station (MELSEC) write/read start area settings
The table below shows the settings for specifying the remote station areas:

Register name	Category (bit/word)	Setting		
		High-order word	Low-order word (register number)(*)	
			Minimum value	Maximum value
X	Bit	H5820	H0000	H07F0
Y	Bit	H5920	H0000	H07F0
M	Bit	H4D20	H0000	H07F0
B	Bit	H4220	H0000	H0FF0
F	Bit	H4620	H0000	H07F0
D	Word	H4420	H0000	H17FF
W	Word	H5720	H0000	H0FFF
R	Word	H5220	H0000	H0FFF

(*) When setting a bit register, be sure to select a setting of 0 for the lowest digit of a register number. If a setting of other than 0 is selected, a parameter setting error occurs.

Example: The setting for “R0FA0” selection is H52200FA0.

5.5 Communication Start Procedure and Communication Delay Time Setup

5.5.1 Communication start procedure

This section describes the procedure for starting the SV.LINK module.
SV.LINK cannot be set to start communicating with the MELSEC simply by setting the IP address and setting the parameters in the BD register. It does not start communicating with the MELSEC until a value other than "0" is written to the start flag in the module's internal memory. The start flag is described below:

Module type	Address and description	Setting
Main module	bit 15 0 H873B00 Communication start/stop flag (1 word)	= 0: Stops the communication. ≠ 0: Starts the communication. (The value reverts to 0 upon a reset/power-on reset.)
Submodule	bit 15 0 H8F3B00 Communication start/stop flag (1 word)	

When a value other than 0 is written only once to the start flag, the communication starts. After the communication is started, there is no need to write a value other than 0 to the start flag.

NOTICE

After necessary communication parameters are set in the BD register, be sure to start communication by writing a value other than 0 to the setting start flag. If communication is started with undefined parameter values, a parameter error or abnormal operation results.

5.5.2 Communication delay time setup

The communication delay time is the elapsed time between one transmission from the S10mini or S10V to the MELSEC and the next. The default setting is 30 ms. The setting needs to be changed only when you want to use a different communication delay time setting. The associated setup area is the SV.LINK module's internal memory as is the case with the start flag. The communication delay time setup area description is given below:

Module type	Address and description	Setting
Main module	bit 15 0 H873B02 Communication delay time (ms) (1 word)	Setting range: 0 to 1000 ms • When the value 0 is selected, a setting of 30 ms is used. • If the selected value is greater than 1000 ms, a setting of 1000 ms is used. • The value is reset (= "0") upon a reset/power-on reset.
Submodule	bit 15 0 H8F3B02 Communication delay time (ms) (1 word)	

Although the setting is variable in 1 ms units, the actual delay time is determined by disregarding digits below 10 due to SV.LINK internal timer limitations. When the selected value is between 1 and 9 ms, however, a setting of 10 ms applies.

Examples: When the communication delay time is set to 8 ms, the operation will be performed at a communication delay time setting of 10 ms. When it is set to 67 ms, it will be performed at a communication delay time setting of 60 ms.

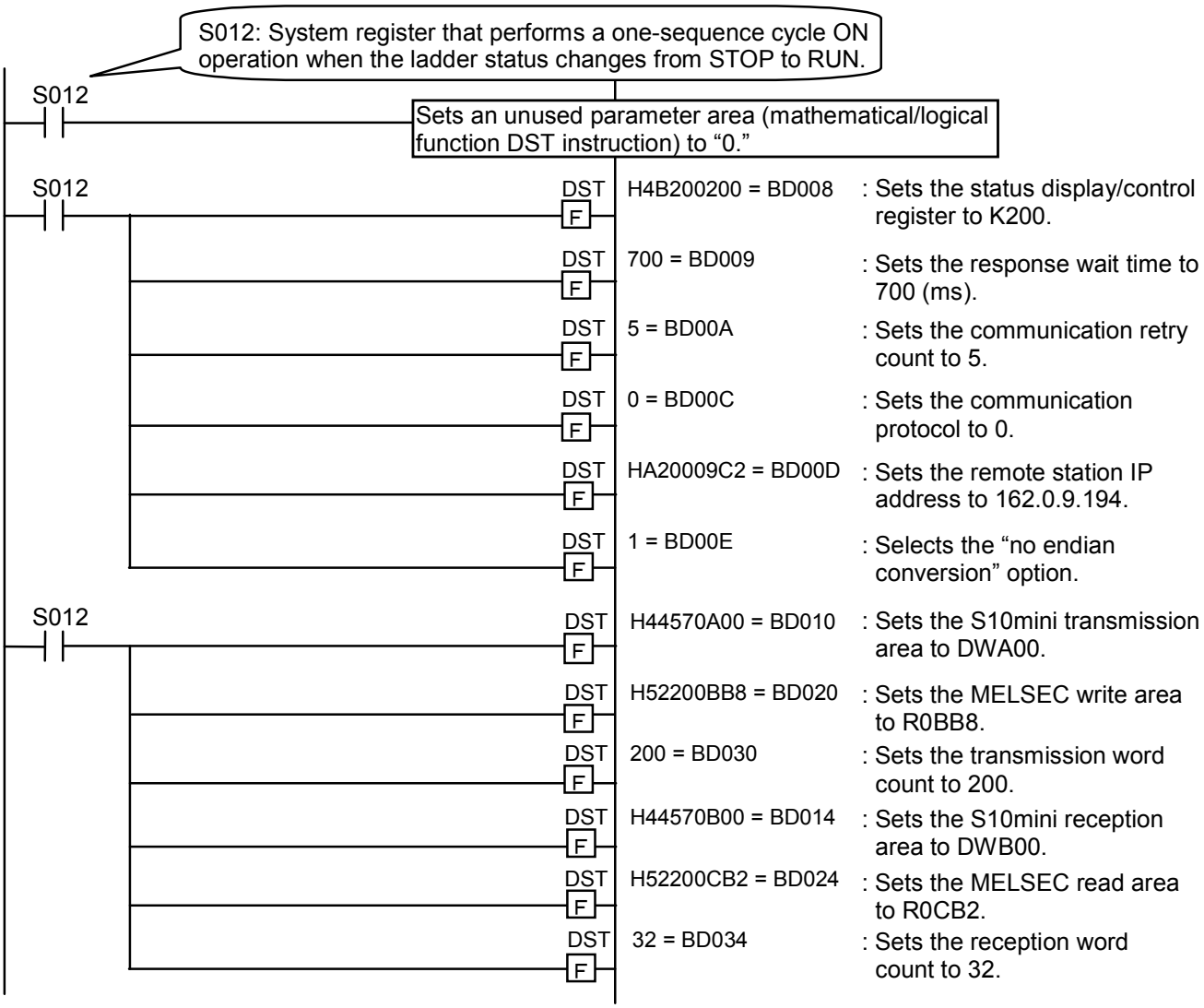
5.6 Ladder Program Example

This section shows an example ladder program that sets the communication parameters and starts communication with the following settings:

Communication parameter settings:

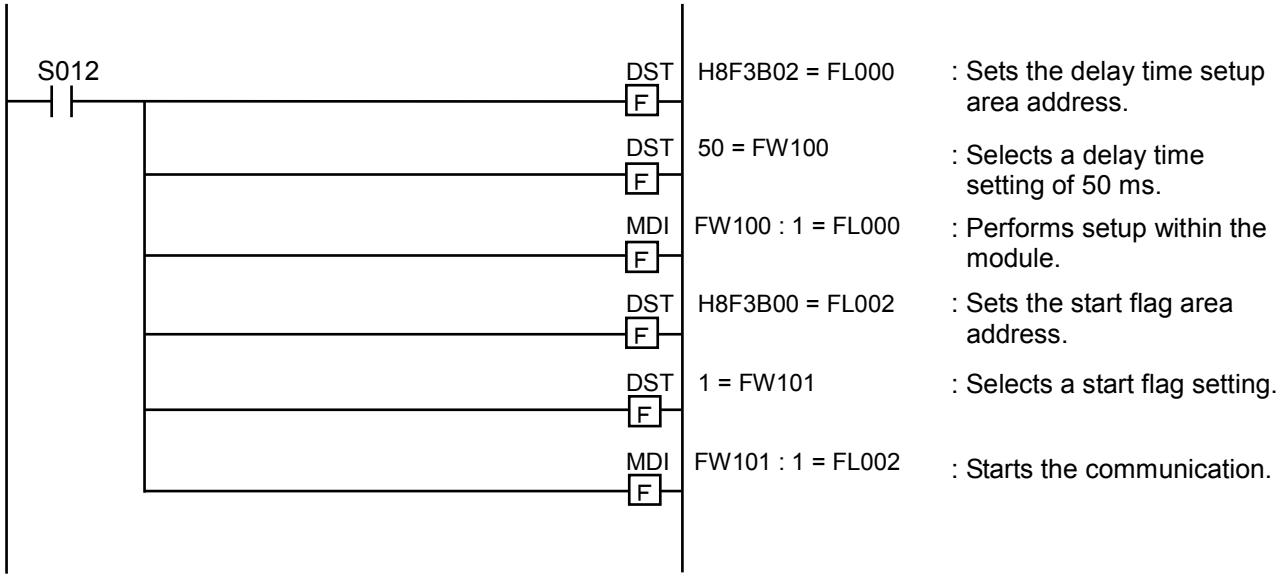
Module type: Submodule
Status display/control register: K200
Communication response wait time: 700 ms
Cyclic communication retry count: 5
Remote station IP address: 162.0.9.194
Endian conversion: No endian conversion
Local station transmission area 1: DWA00
Local station reception area 1: DWB00
Remote station write area 1: R0BB8
Remote station read area 1: R0CB2
Transmission word count: 200
Reception word count: 32
Communication delay time: 50 ms
Set all parameters other than indicated above to “0.”

5.6.1 Program example in a combination with the S10mini CPU



(continued on next page.)

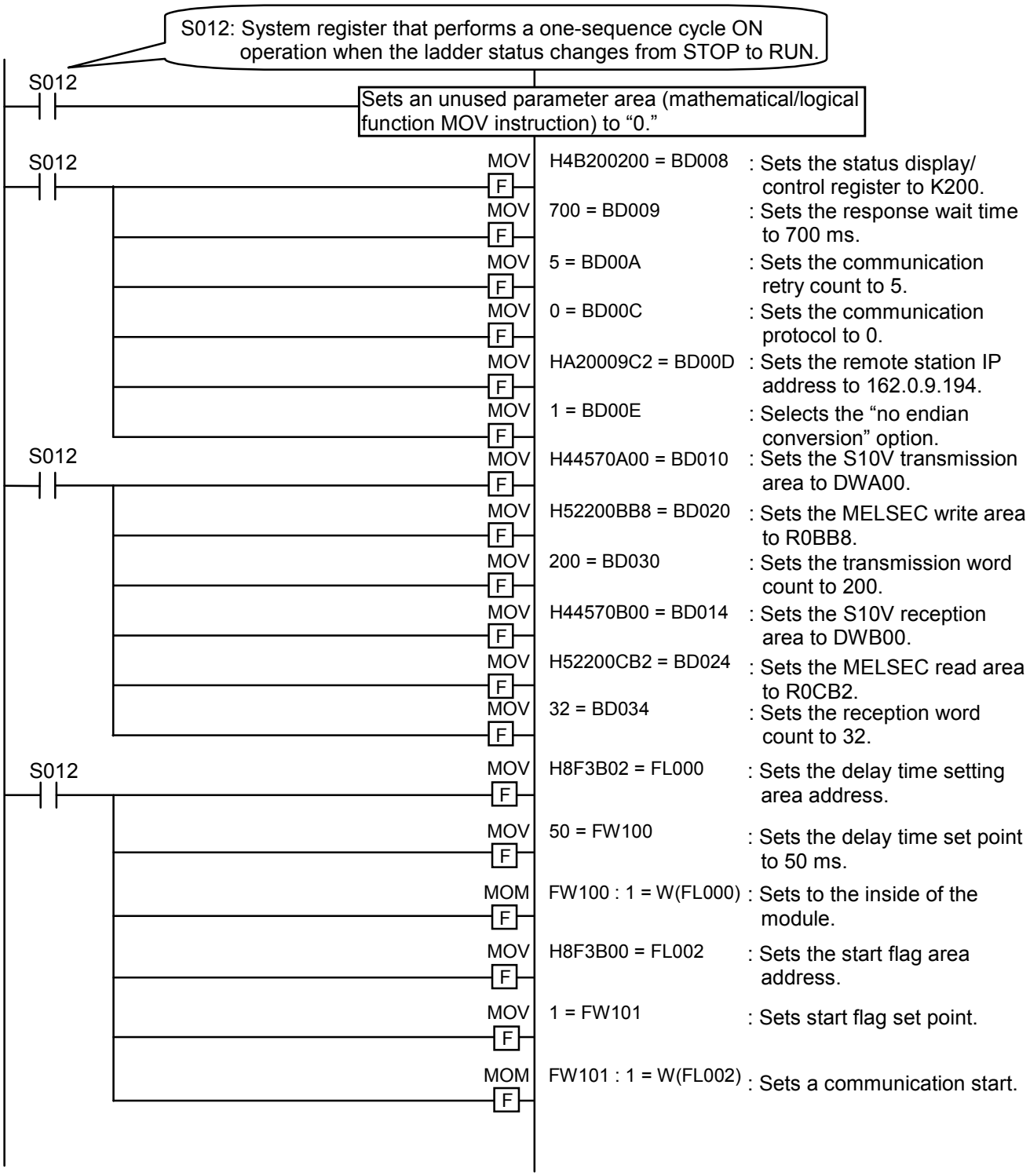
(continued from the previous page):



* In the above program example, the FL000, FL002, FW100, and FW101 registers are used. When applying the program to actual plant equipment, change the registers as needed to use registers that are not used by the other circuits.

NOTICE
After necessary communication parameters are set in the BD register, be sure to start communication by writing a value other than 0 to the setting start flag. If communication is started with undefined parameter values, a parameter error or abnormal operation results.

5.6.2 Program example in a combination with the S10V LPU



* In the program example, the FL000, FL100, FW100, and FW101 registers are used. When the program is applied to actual facilities, replace them with registers that are not used in other circuits.

NOTICE
After setting the required communication parameters in the DB register, be sure to write a value other than 0 into the setting start flag and start communication. If the communication is started when the parameters are unstable, a parameter error or operation error may occur.

5.7 Relationship to S10mini CPU and S10V LPU Module

The SV.LINK module performs the following operations according to the ladder program operation setting and the mode setting of the S10mini CPU and the S10V LPU modules. The ladder program operation setting is performed with the switch at the front of the module. The mode setting is performed with the switch at the front for the S10mini or by the system tool for the S10V. For the usage of the tool system, refer to the "S10V USER'S MANUAL BASIC MODULE (manual number SVE-1-100)."

		MODE	
		NORM	SIMU
LADDER	STOP	Stop	Stop
	RUN	Communication	Communication

In the following case, the SV.LINK module stops communication.

- The S10mini CPU or S10V LPU has gone down for some reason.
  At this time, "CPU DOWN" is displayed on the indicator of the S10mini CPU and the ERR LED of the S10V LPU comes on.

6 USER GUIDE

6.1 System Configuration of 10BASE-5

As shown in Figure 6-1, a basic configuration consists of a single coaxial cable of up to 500 m and stations connected to this cable. Each station is connected to the coaxial cable via a transceiver cable and a transceiver. (The station means S10mini or S10V and MELSEC.) This basic configuration is also called a segment; up to two stations (one unit of the S10mini or S10V and MELSEC each) can be connected in one segment.
When the distance between stations exceeds 500 m, the number of segments can be increased by branching by using repeaters (see Figure 6-2). This figure shows an example of a system in which the maximum distance between stations does not exceed 1,500 m. Configure the system so that no more than two repeaters are connected between the S10mini or S10V and MELSEC. Figure 6-3 is an example in which the maximum distance between stations is 2,500 m. A repeater to which a link cable (up to 500 m) is attached is counted as one repeater, which is called a link segment.
The parameters related to system configuration are listed below.

Item	Specification
Maximum segment length	500 m
Maximum number of transceivers in segment	100
Maximum distance between stations	2,500 m or less (excluding transceiver cable)
Maximum number of stations in system	2 (S10mini or S10V, MELSEC each)
Maximum length of transceiver cable	50 m
Maximum number of repeaters in route between stations	2

NOTICE

- Connect a repeater to a coaxial cable via a transceiver cable and a transceiver.
- A repeater can be attached to a transceiver at any position in the coaxial segment.
- Do not attach a station to a link cable.
- The distance between attached transceivers shall be a multiple of 2.5 (m).

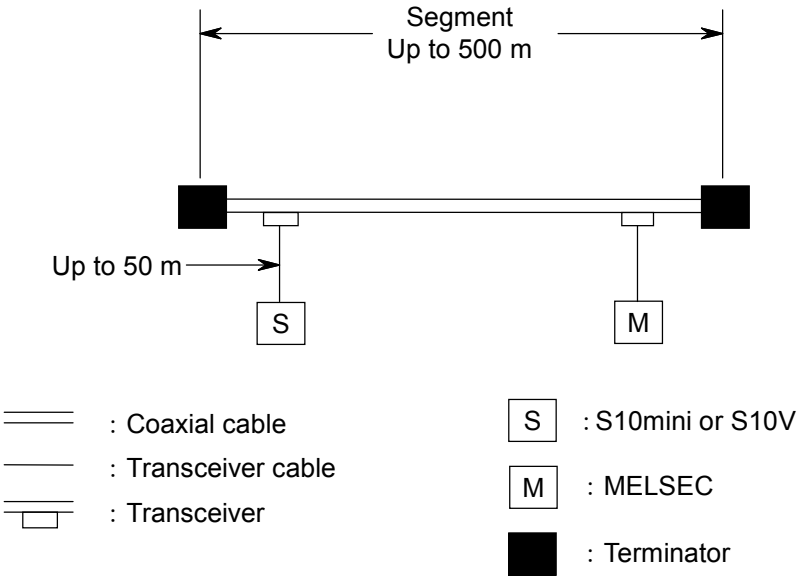


Figure 6-1 Minimum Configuration (No Repeater Used and Segment Length of Up to 500 m)

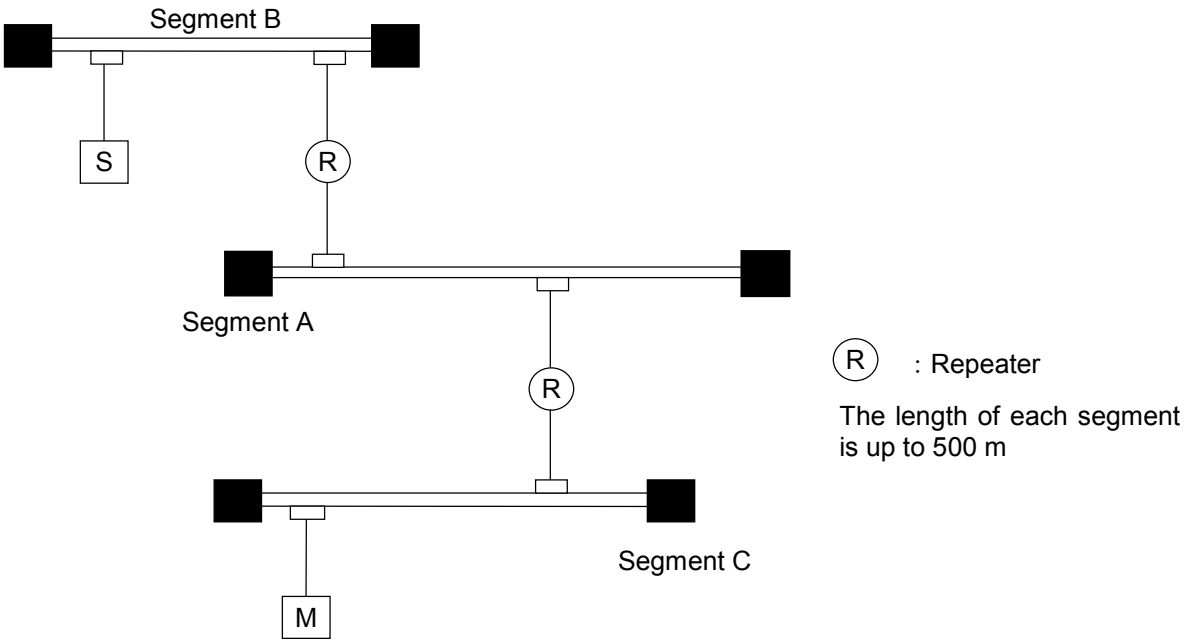


Figure 6-2 Medium-scale Configuration (Repeaters Used and Distance between Transceivers of Up to 1,500 m)

NOTICE
● The number of repeaters between the S10mini or S10V and MELSEC shall be two(2) or less. ● The number of segments to which two or more repeaters can be connected shall be one(1).

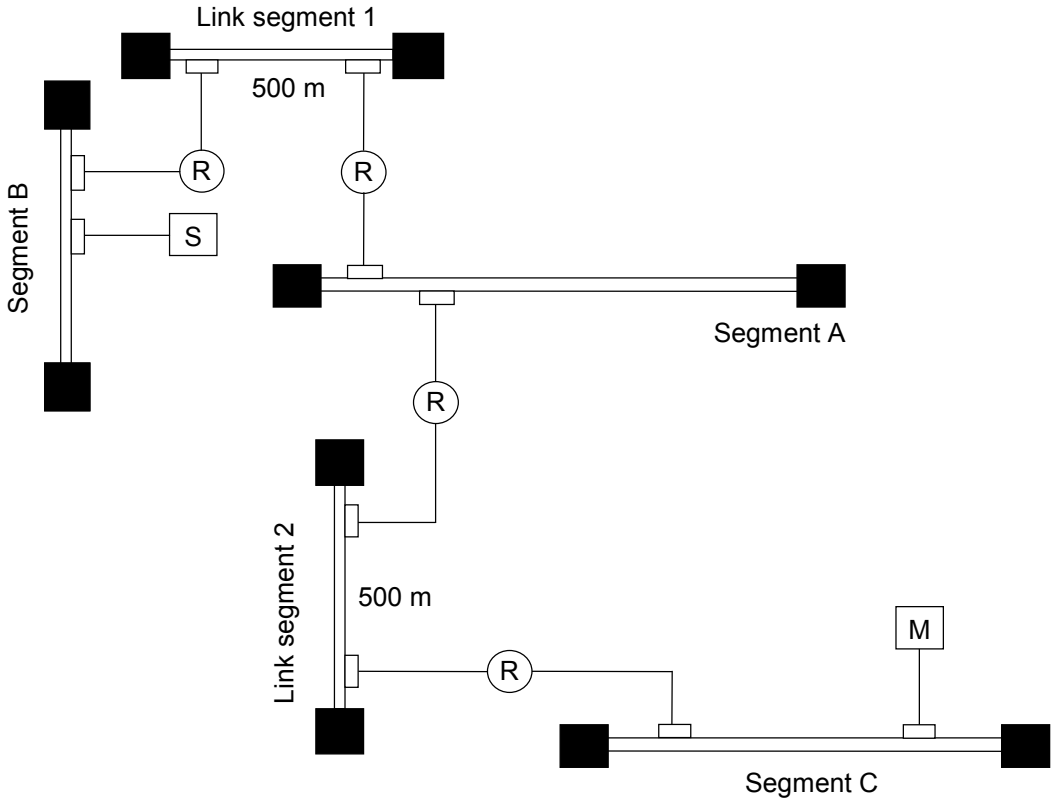


Figure 6-3 Large-scale Configuration (Repeaters and Link Segments Used and Distance between Transceivers of Up to 2,500 m)

NOTICE
● The maximum length of a link segment is 500 m. ● Do not attach a station to a link segment. ● The number of repeaters between the S10mini or S10V and MELSEC shall be two(2) or less. ● The number of segments to which two or more repeaters can be connected shall be one(1). ● A link segment including the repeaters at both ends is regarded as one repeater.

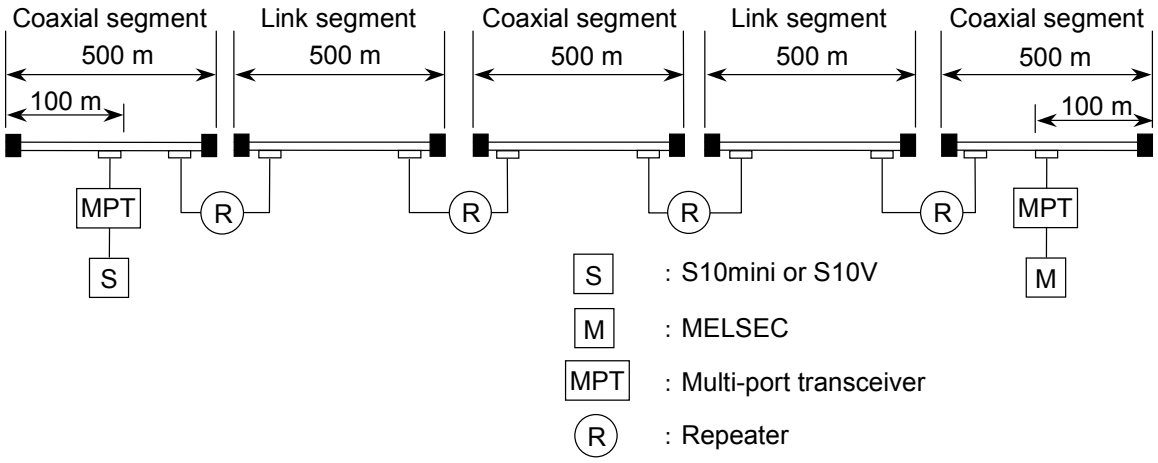
NOTICE

Restrictions on multi-port transceiver installation positions

- When multi-port transceivers are installed on the most distant coaxial cable segment in a system in which the maximum length of coaxial cables is 2,500 m (five segments), data delay time increases due to the installation. To avoid this, restrictions are placed on the multi-port transceiver installation positions. The maximum distance between stations via multi-port transceivers decreases by 100 m (in terms of coaxial cable length) if it passes one single multi-port transceiver. For this reason, there is the following restriction on the coaxial cable length (L [m]) of the route from a station to another station:

  L [m] ≤ 2,500 [m] - 100 × N [m]

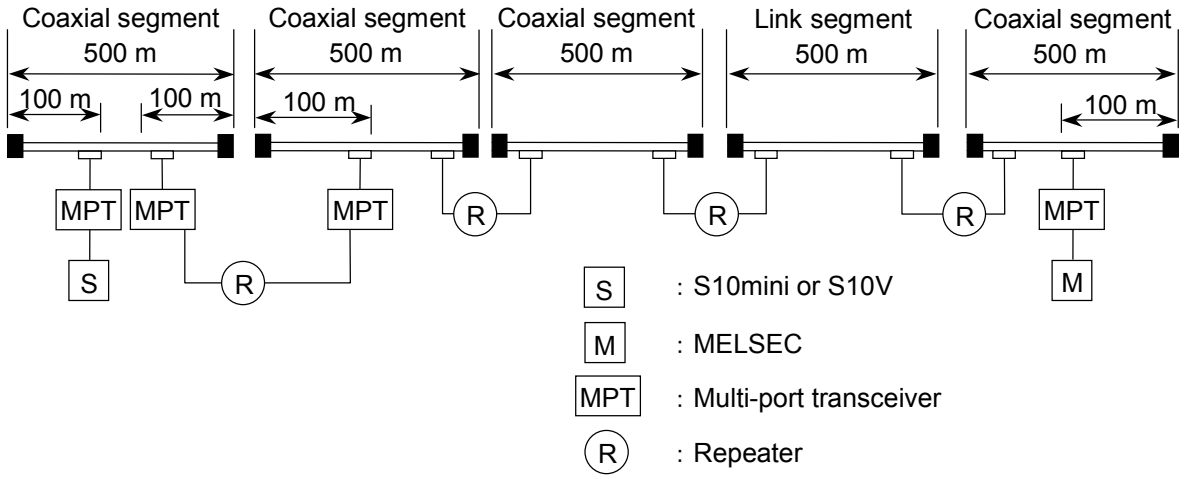
  N: Total number of passing multi-port transceivers
- In a system consisting of coaxial cables of 2,500 m in total, set a multi-port transceiver 100 m or more inside from the most distant coaxial cable terminator (such terminator position decreasing the distance between stations).



(cont.)

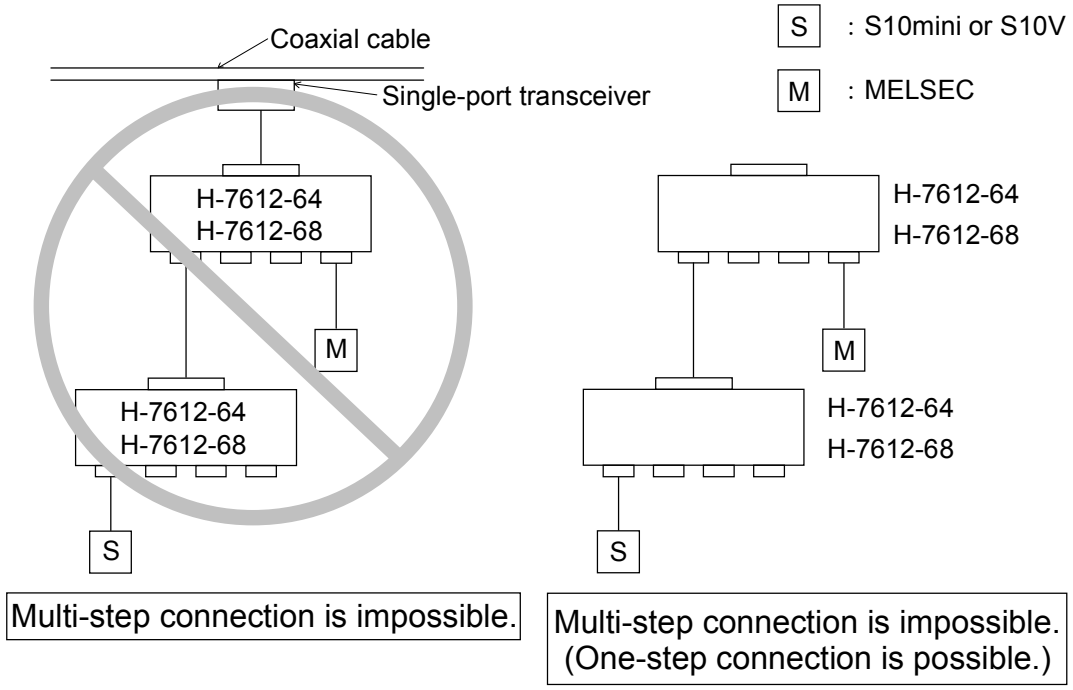
NOTICE

- When connecting a repeater between segments by using multi-port transceivers, it is also necessary to set the multi-port transceivers at the positions decreasing the distance between the most distant stations by 100 m each time in passes one of the multi-port transceiver.



NOTICE

- When multi-port transceivers (H-7612-64/H-7612-68) are used in network mode, multi-step connection is impossible due to the restrictions on transmission characteristics.



- In network mode, use the following specified device types as the single-port transceivers connected at higher level than multi-port transceivers, so that the condition to operate on the 12 VDC power supplied from the multi-port transceivers is assured:
  - HLT-200TB (manufactured by Hitachi Cable, Ltd.)
  - HLT-200 (manufactured by Hitachi Cable, Ltd.)
  - HLT-200TZ (manufactured by Hitachi Cable, Ltd.)
  - HLT-200TD (manufactured by Hitachi Cable, Ltd.)

6.2 10BASE-T System Configuration

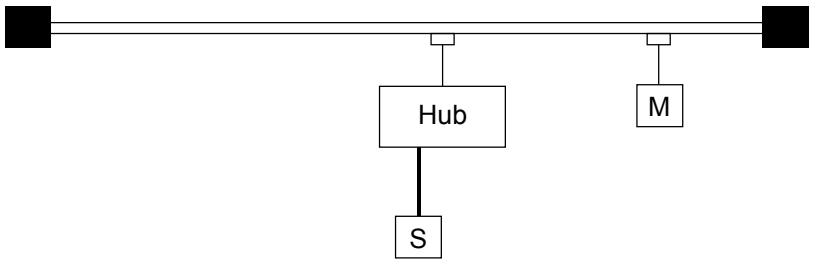
A crossed twisted-pair cable (10BASE-T) can be used to make a direct connection between the S10mini and MELSEC. The maximum permissible cable length for such a connection is 100 m.

: Twisted-pair cable (up to 100 m, crossed cable)

S : S10mini or S10V

M : MELSEC

When a hub (multiport repeater) is connected to a transceiver via a transceiver cable (AUI cable), the S10mini connected to the hub is connected to the MELSEC that is connected to the transceiver.
When connecting a station to the hub, use a straight twisted-pair cable (10BASE-T).



: Twisted-pair cable (up to 100 m, straight cable)

: Terminator

: Transceiver cable

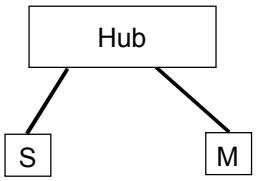
: Coaxial cable

S : S10mini or S10V

M : MELSEC

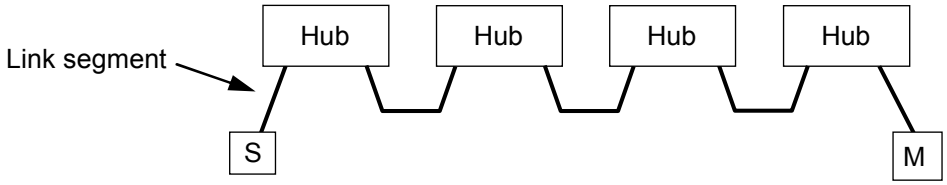
: Transceiver

If the distance between the S10mini or S10V and MELSEC is short, the S10mini or S10V and MELSEC can be connected to a hub with a straight twisted-pair cable (10BASE-T) without having to use a coaxial cable or transceiver.

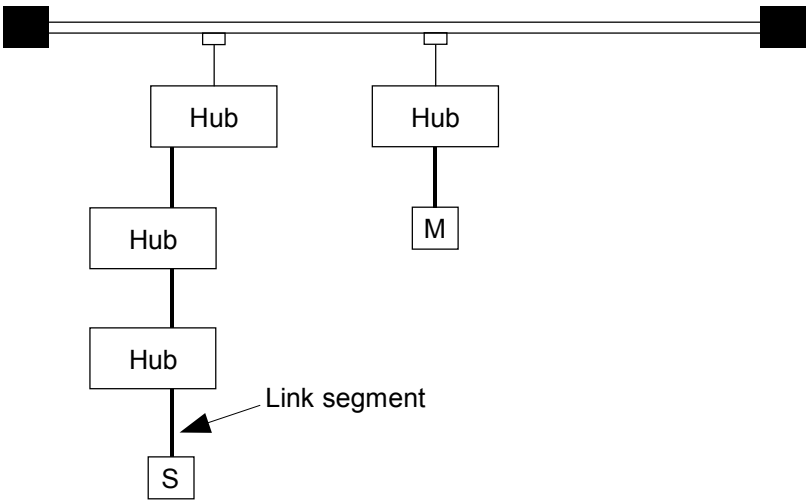


NOTICE

Constraints on multi-Hub connection
When a multi-hub connection is used, limit the number of hubs between the S10mini or S10V and MELSEC to four and the number of link segments to five.



When a coaxial cable is used for connection purposes, limit the number of hubs between the S10mini or S10V and MELSEC to four and the number of segments to five (the number of coaxial segments to three).



6.3 System Definition Information

Set the items ② and ③ below for SV.LINK (LQE521). Ensure that the item ② setting is not identical to that for MELSEC. As regards item ③, however, select the same setting for the S10mini or S10V and MELSEC.

① Physical address —— An original number is set for each SV.LINK ROM.
② IP address
③ Subnetwork mask ┐ Define these items for each SV.LINK by using the ET.NET system tool
④ Route information —— This item cannot be set because SV.LINK does not support communications via router link.

NOTICE
No dedicated setup tool is provided for SV.LINK. For IP address and subnet mask settings, use the ET.NET system tool.

6.3.1 Physical address

A 48-bit physical address is assigned to each SV.LINK. This is a unique address which is set on the ROM; the user cannot change it. An example of a physical address (in hexadecimal) is shown below.
Example: 00008700B001

6.3.2 IP address

The IP address used for TCP/IP and UDP/IP is a 32-bit logical address. An IP address consists of a network number and a host number. There are three types of address assignment depending on the number of hosts.

- Class A (The high-order one bit of the network number is set to 0.)

Network number (8 bit)	Host number (24 bits)

- Class B (The high-order two bits of the network number are set to 10 in binary.)

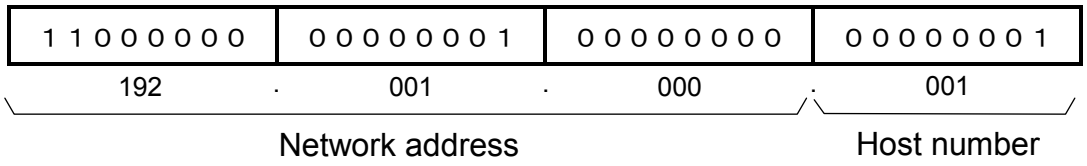
Network number (16 bit)	Host number (16 bits)

- Class C (The high-order three bits of the network number are set to 110 in binary.)

Network number (24 bit)	Host number (8 bits)

An IP address is represented in decimal; the eight-bit values are delimited from each other by a period (“.”). For example, an IP address of class C is represented as shown below.

For class C



A network is determined by a network number. Define a unique host number for each host in the network. For instance, assume that the number 192.001.000 is selected as the network number.

Since the S10mini or S10V and MELSEC belong to the same network, assign them the unique host numbers 1 and 2. The resulting station IP addresses are as shown below:

S10mini or S10V: 192.001.000.001

MELSEC: 192.001.000.002

6.3.3 Subnet mask

When the IP address is divided into subnets, the boundary between subnet work No. and local host No. is defined by subnet mask. When using the subnet at a value other than the default, use the subnet on the supposition that it may be a broadcast address as shown in the following example.

(Example) For class B

IP address	Subnet mask	Broadcast address
128.123.000.001	255.255.000.000	128.123.255.255
128.123.001.001	255.255.255.000	128.123.001.255

6.3.4 Route information

In the SV.LINK, the communication through a router is not supported. Accordingly, do not set route information. (Even if route information is set for the SV.LINK by the ET.NET system tool, the route information setting function is invalidated.)

6.4 Communication Cycle

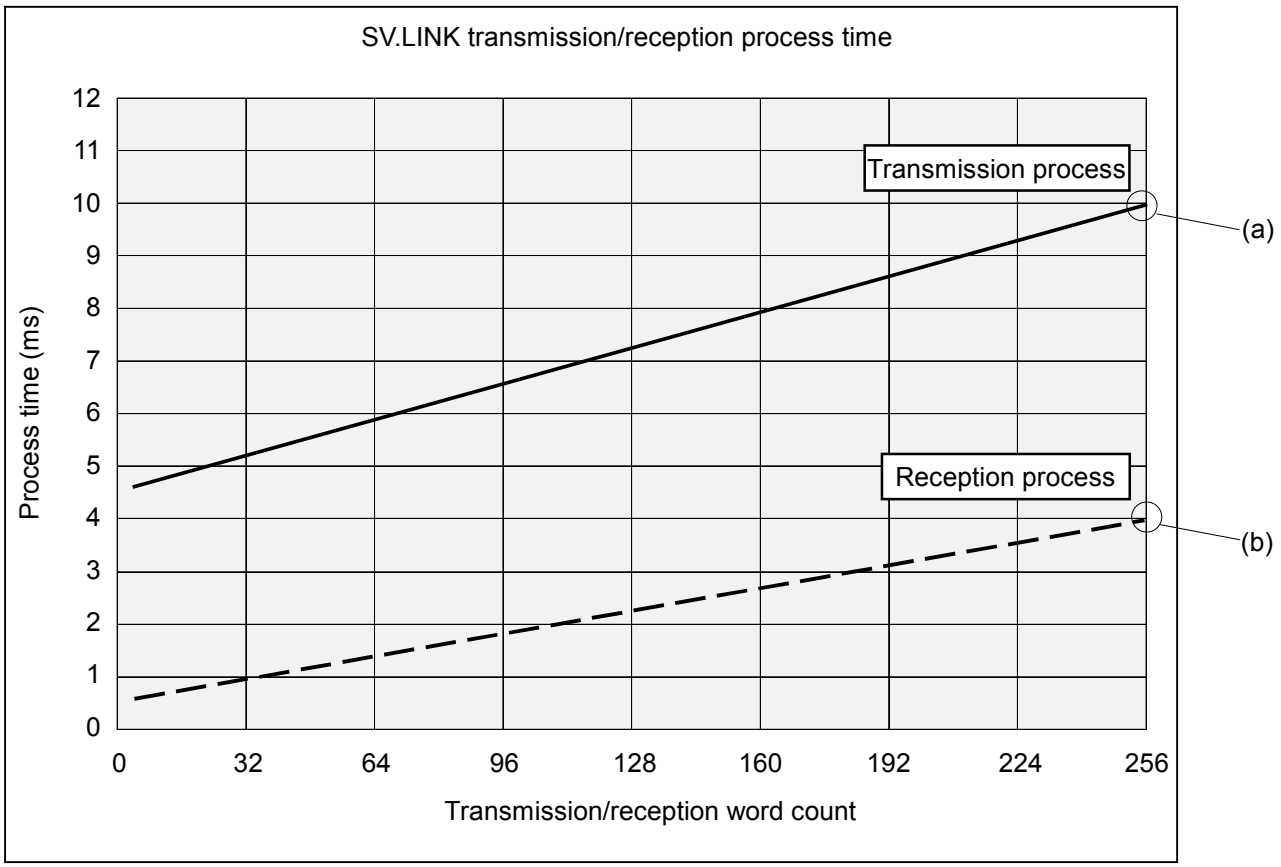
The SV.LINK communication cycle is determined by the transmission/reception word count, communication delay time, and MELSEC response time.
The communication cycle calculation formula is shown below:

Communication cycle (ms) = transmission process time (ms) + reception process time (ms) + communication delay time (ms) + MELSEC response time (ms)

Transmission process time
and reception process time: Determine these values from the following "SV.LINK transmission/reception process time" graph.
Communication delay time: Determine this value as indicated in "5.5.2 Communication delay time setup."
MELSEC response time: This value depends on the MELSEC application program. Refer to the MELSEC documentation.

Example: Communication cycle in situations where 256-word transmissions and 256-word receptions are performed at a communication delay time setting of 50 ms
Communication cycle (ms) =
10 + 4 + 50 + MELSEC response time = 64 + MELSEC response time (ms)
Values determined from the graph below

The following graph shows SV.LINK's transmission and reception process times. Characteristic curve (a) in the graph indicates that the transmission process time is about 10 ms when the transmission word count is 256 words. Characteristic curve (b) indicates that the reception process time is about 4 ms when the reception word count is 256 words.



6.5 Limitations

The following limitations are imposed on the use of SV.LINK:

(1) Simultaneous use of SV.LINK and ET.NET modules

When mounting the SV.LINK module and ET.NET module on the same mount base, perform setup so that the main module and submodule are distinctively defined. If both of them are defined as main modules or submodules, they do not normally operate because the CPU or LPU cannot distinguish between ET.NET and SV.LINK.

Example: When the ET.NET module is defined as the main module, be sure to define the SV.LINK module as the submodule. When it is defined as the submodule, be sure to define the SV.LINK module as the main module.

Also, note that no more than two modules (ET.NET and SV.LINK modules) can be mounted on the same mount base.

You should also keep in mind that only one SV.LINK module can be mounted even if no ET.NET module is mounted.

(2) Dedicated line

If the line is highly loaded, the communication cycle may extend, adversely affecting the equipment operations. To avoid such a problem, ensure that the physical line between the S10mini or S10V and MELSEC is exclusively used for high-speed I/O communications. Do not connect this physical line to a device other than the S10mini or S10V and MELSEC. When using two high-speed I/O communication channels, provide a physical line for each channel.

(3) I/O data consistency guarantee unit

Owing to hardware limitations, I/O data consistency is guaranteed on an individual word basis. The contents of numeric data longer than a longword cannot be guaranteed. Therefore, do not exchange data longer than a longword with the MELSEC.

(4) Communication response wait time and communication delay time

Although the communication response wait time and communication delay time settings are both variable in 1-ms units, the actual settings are determined by disregarding digits below 10 due to SV.LINK internal timer limitations. When the selected value is between 1 and 9 ms, however, the following special rules apply to the operation:

Communication response wait time: The digits below 10 are disregarded so that the operation is performed at a wait time setting of 0 ms.

Communication delay time: The operation is performed at a setting of 10 ms.

(5) Communication start timing

The communication parameters are read and checked when the communication starts. Be sure to set the communication parameters in the BD register before starting the communication (by writing a value other than 0 to the communication start flag in the SV.LINK internal memory). If the communication is started before completion of communication parameter setup, a parameter error or abnormal operation may result.

(6) Communication performance

When a total of 256 words is received, its reception process performed within SV.LINK takes up to 4 ms. Therefore, if the MELSEC transmits data at an interval of shorter than 4 ms, SV.LINK may fail to receive the data. Create an application in such a manner that the MELSEC does not transmit frames at intervals of shorter than 4 ms.

(7) Communication process

The specifications for the SV.LINK communication process are such that SV.LINK does not start a new transmission until it receives data from the MELSEC in response to the previous transmission. Therefore, if the data from the MELSEC turns out to be undefined due, for instance, to noise and cannot normally be received, the reception wait state may persist. To avoid such a problem, be sure to set the communication parameters for the communication response wait time and retry count. The settings for these parameters should be increased to the fullest possible extent without exceeding the limit imposed on the equipment.

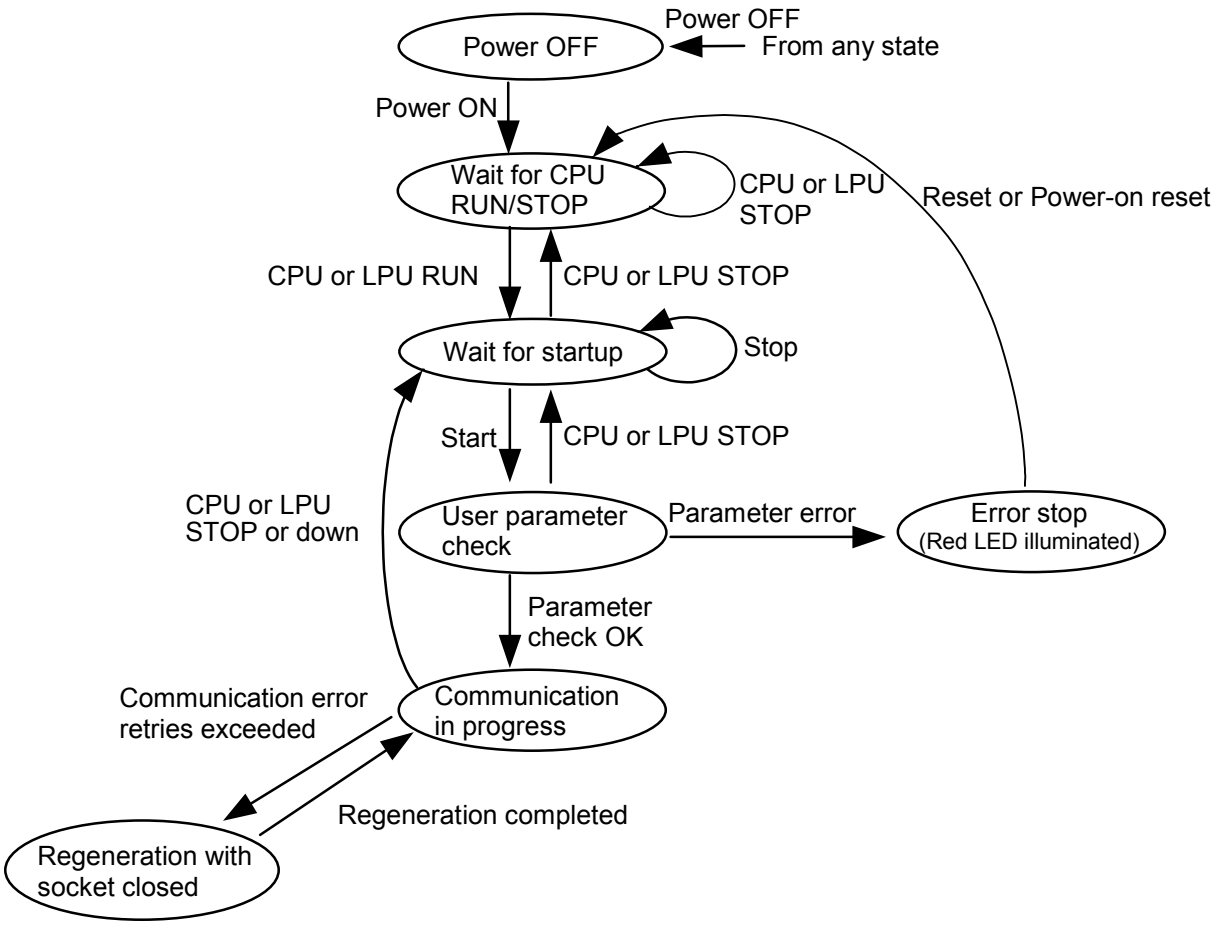
(8) Limitation on functions

SV.LINK uses the same hardware as ET.NET. However, SV.LINK does not support the following ET.NET functions:

- Socket handler's interfacing with a user program
  → If a socket handler is erroneously issued to SV.LINK, a socket driver timeout occurs (error code = 0xF012).
- Communication with a tool system
  → If an attempt is made to establish a connection using SV.LINK, the message "Line error" appears on the tool's system display screen.
- Communication via a router
  → Data frames sent from SV.LINK will not be forwarded beyond a router.

6.6 SV.LINK State Transitions

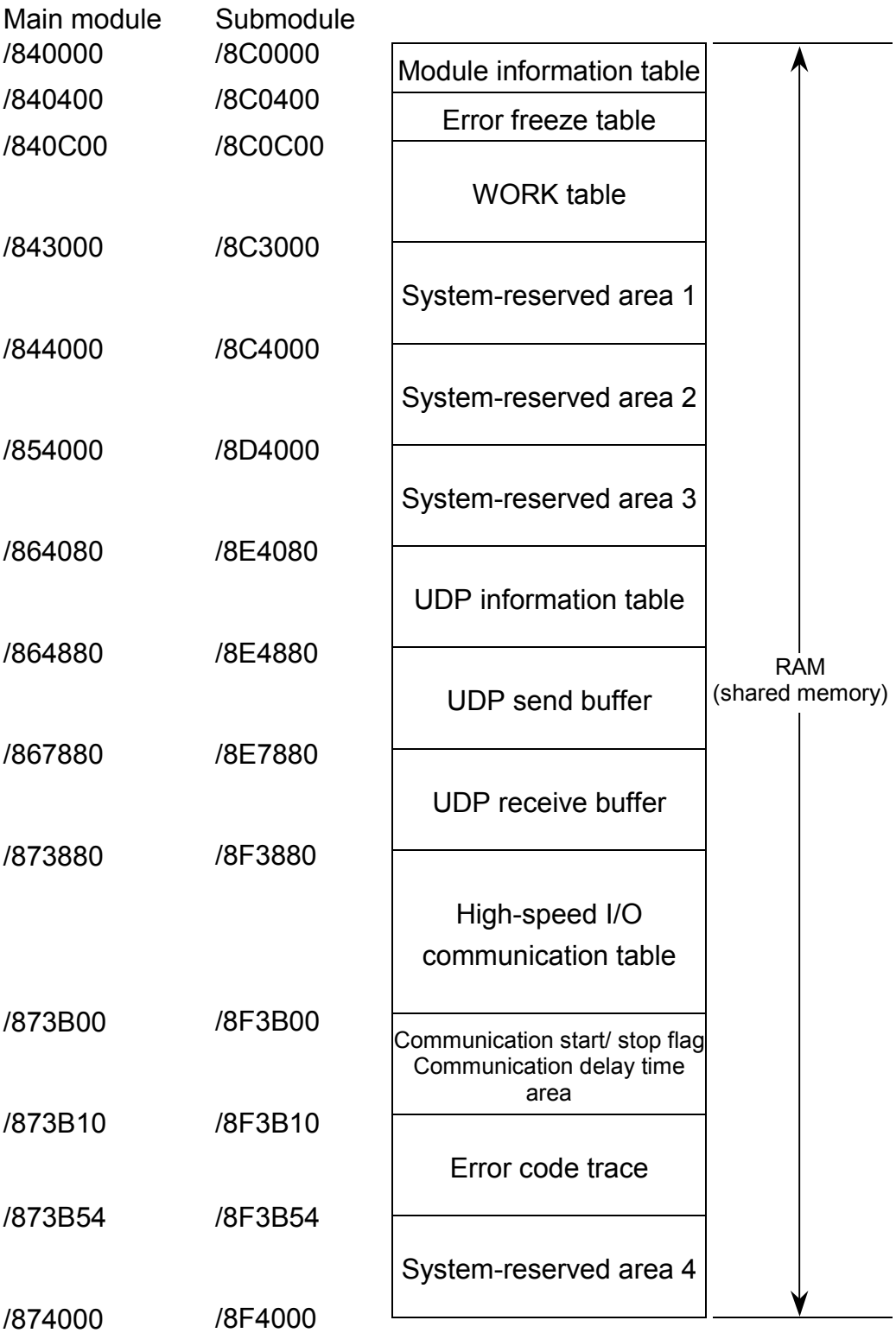
SV.LINK state transitions are indicated below:



List of state transition event types

No.	Event type	Event name
1	Instruction from ladder	Start or stop
2	Detection by module	Parameter check OK or error
3		Communication error retries exceeded or regeneration completed
4	User operation	Power ON or OFF
5		CPU or LPU RUN or STOP
6		Reset or power-on reset
7	CPU or LPU detection	CPU or LPU down

6.7 Memory Map of SV.LINK Module



This Page Intentionally Left Blank

7 MAINTENANCE

7.1 Maintenance Inspection

To use the S10mini or S10V in an optimum condition, check the items listed below. Make this check at routine inspection or periodic inspection (twice or more per year).

(1) Module appearance
Check that no fissure or crack exists in the module case. If the case has such a damage, there is a possibility that the internal circuit may also be damaged, resulting in a system malfunction.

(2) Indicator's ON status and indication
From the indicator status, check that no special fault exists.

(3) Looseness of mounting screws and terminal base screws
Check that the mounting screws and terminal base screws of the module are not loose. If any of these screws is found to be loose, tighten it. Such a loose screw may result in a system malfunction or a burn-out due to overheating.

(4) Module replacement
Hot swapping of modules will lead to hardware or software damage. Be sure to replace a module in a power OFF state.

(5) Cable sheath condition
Check that the cable sheath is not abnormal. A peeled sheath may cause a system malfunction or electric shock, or may result in a burn-out due to short circuit.

(6) Dust sticking condition
Check if dust and dirt collects on the module. If dust collects on the module, remove it with a vacuum cleaner. Dust on the module may short the internal circuit, resulting in a burn-out.

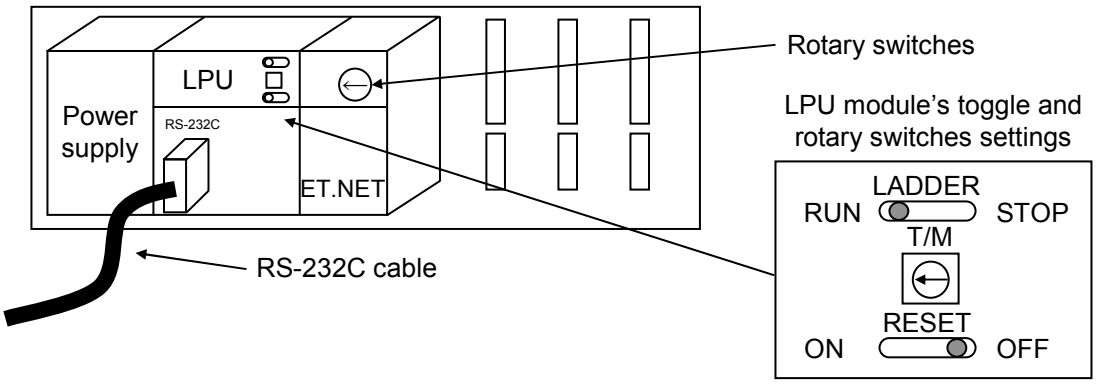
(7) Power supply voltage
Check that neither the internal power supply of the module nor the external power supply to it is out of the specified range. If the power supply voltage deviates from the rating, a system malfunction may result.

NOTICE
Static electricity may damage the module. Before starting the work, discharge all electrostatic charge from your body.

7.1.1 Replacing or adding on the module

- What you should get in preparation
  ① Personal computer (with Hitachi's S10V ET.NET System installed in it)
  ② RS-232C cable
  ③ New or add-on ET.NET module (LQE521)
  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.)

- 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 ET.NET 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 Hitachi's S10V ET.NET System and make a hand-written record of the currently used IP address. (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 ET.NET module to be replaced.
  ⑦ Replace the existing ET.NET module with the new one and set the new ET.NET 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. Then, set the same IP address as you recorded in Step ④, by using the S10V ET.NET System.

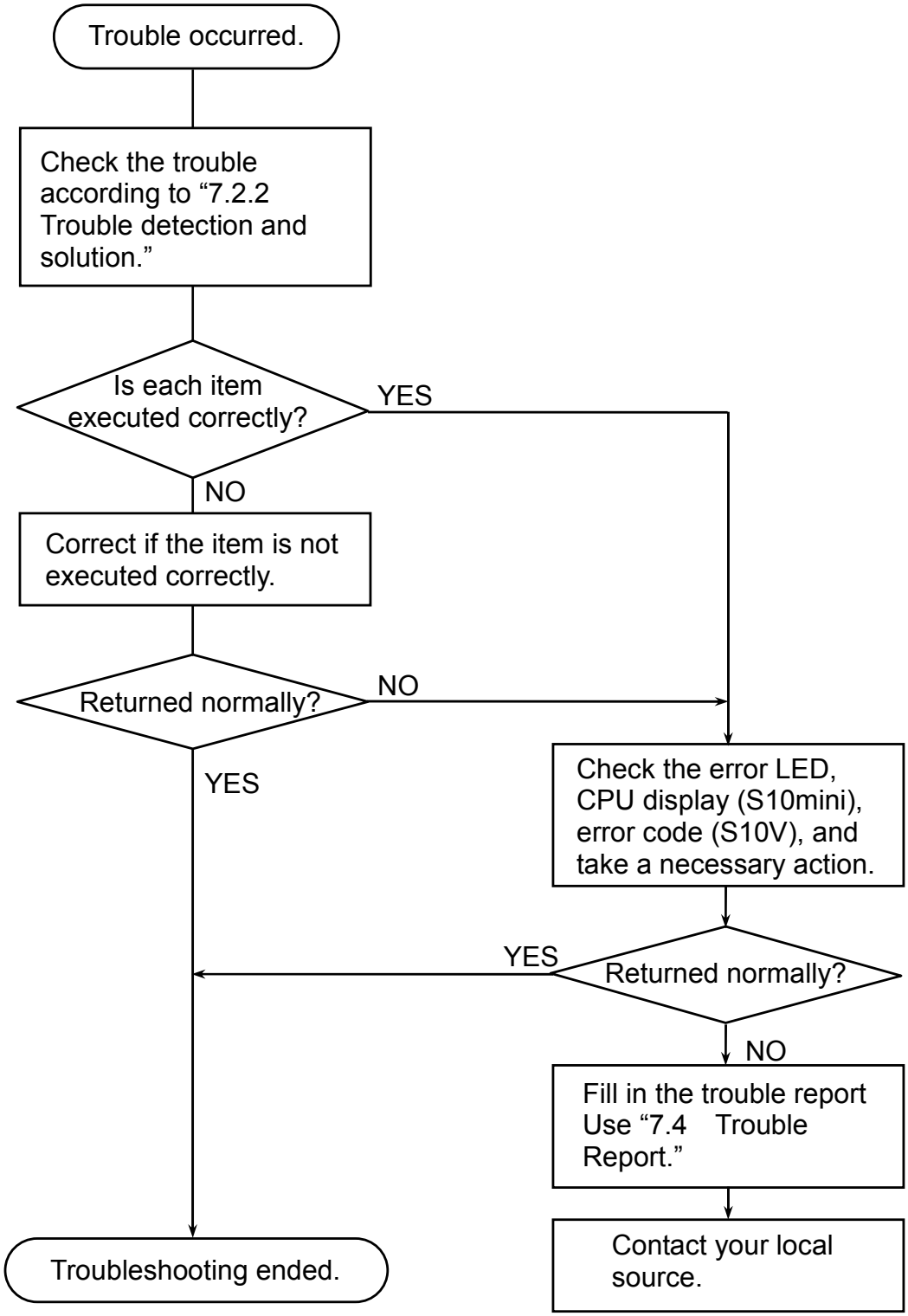
⑨ Check that the set IP address is identical to the one that was recorded in Step ④.
⑩ Reset the LPU module by setting the RESET switch in ON position and then in OFF position at its front.
⑪ Turn off the power supply of the controller unit.
⑫ Remove the RS-232C cable from both the personal computer and LPU module, which were connected together in Step ③.
⑬ Connect to the new ET.NET 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 ET.NET 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 ET.NET 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 ET.NET module in place according to the instructions given under "3.2 Mounting the Module."
④ Set the add-on ET.NET 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 ET.NET 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 IP address for the add-on ET.NET module by using the S10V ET.NET System.
⑥ Turn off the power supply of the controller unit and connect the connecting cables to the add-on ET.NET module.
⑦ Set the LPU module's LADDER and T/M switches in the same way as you wrote down in Step ①.
⑧ Remove the RS-232C cable from both the personal computer and LPU module, which were connected together in Step ⑤.
⑨ Turn on the power supply of the controller unit and check that the add-on ET.NET module is running normally.

7.2 Troubleshooting

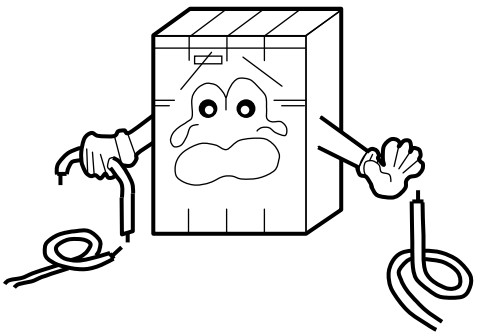
7.2.1 Procedure



7.2.2 Trouble detection and solution

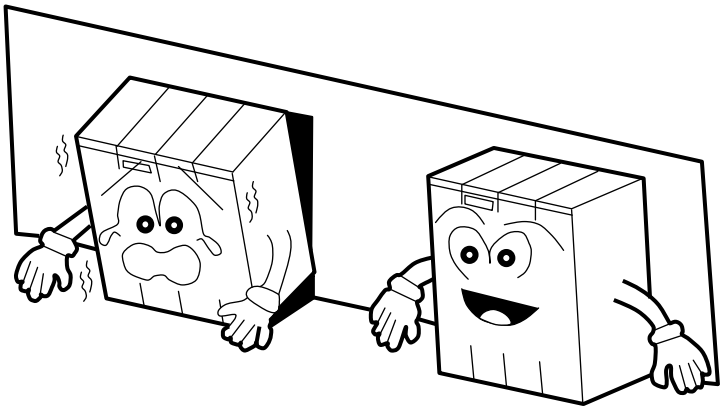
(1) Is the cabling correctly?

- Check cables for disconnection or incorrect connection.
- Check that a cable with shielded ground wire is used as the transceiver cable.



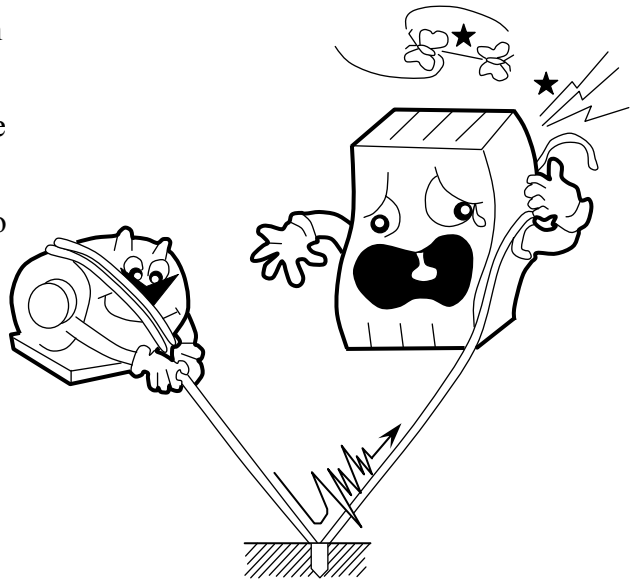
(2) Are the modules mounted correctly?

- Check that the SV.LINK module is left-justified with no idle slot between the modules.
- Check that no set screws loosen.



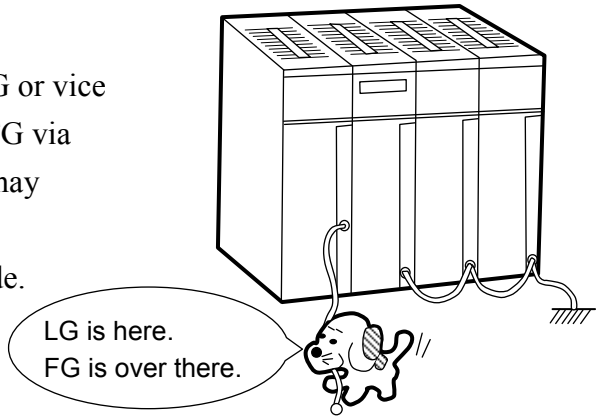
(3) Is grounding correctly?

- Do not ground the SV.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.



(4) 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.



7.3 Errors and Actions To Be Taken

7.3.1 CPU LED display messages

In the S10mini, when an event or error occurs in the SV.LINK module, the corresponding message shown in the following table is displayed on the indicator of the CPU module. The contents of display are classified by main setting and sub setting of the SV.LINK module.
In the S10V, error information is collected but an error is not displayed on the LPU module. The collected error information can be referenced from the tool system. For details, see "7.3.2 Hardware errors" and "7.3.3 Communication error codes."

Module	Display message	Explanation	User action
Main	SVM @. @	The SV.LINK module (main) was started up normally.	This is not an error.
	SVM □□□□	A hardware error was detected on the board of the SV.LINK module (main).	See "7.3.2 Hardware errors."
Sub	SVS @. @	The SV.LINK module (sub) was started up normally.	This is not an error.
	SVS □□□□	A hardware error was detected on the board of the SV.LINK module (sub).	See "7.3.2 Hardware errors."

- The "@. @" above indicates the version and revision of the SV.LINK module.
- The "□□□□" indicates the error display data in "7.3.2 Hardware errors."

7.3.2 Hardware errors

When the SV.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 error codes shown in the following table are displayed by selecting the error log from the tool system. And the error LED comes on and error freeze information is collected. The SV.LINK module operation is stopped.
For the starting method for the tool system and the display method for error log information in the S10V, refer to the "S10V USER'S MANUAL BASIC MODULE (manual number SVE-1-100)."

CPU display (S10mini)	Error code (S10V)	Contents of error	Action to be taken
BUS	/0010	Bus error	Reset the CPU. If the error display does not disappear when the CPU is returned to the original status, the SV.LINK module may be faulty. Replace the module.
ADDR	/0011	Address error	
ILLG	/0012	Illegal instruction error	
ZERO	/0013	Division by zero error	
PRIV	/0014	Privilege violation	
FMAT	/0016	Format error	
SINT	/0017	Spurious interrupt	
EXCP	/0018	Unused exception	
PTY	/0019	Parity error	
MDSW	/0100	Module number setting switch setting error	Set the module number setting switch once again according to the "4.1 Start-up Procedure." After that, reset the switch or switch off and on the power supply.
ROM1	/0102	ROM1 sum error	The SV.LINK module may be faulty. Replace the module.
RAM1	/0103	RAM1 compare error	
RAM2	/0105	RAM2 compare error	
ROM3	/010B	ROM3 sum error	
IPNG	/0113	IP address not registered	Register the IP address. After that, perform resetting or switch off and on the power supply.
MAC	/0114	MAC address not registered	The SV.LINK module may be faulty. Replace the module.
PRG	/0112	Micro program error	
PRAM	/0201	Communication parameter setting error	The set point of a communication parameter is incorrect. Set the communication parameter again according to "5.4 Status and Communication Parameter Areas." After that, perform resetting and turn off and on the power supply.

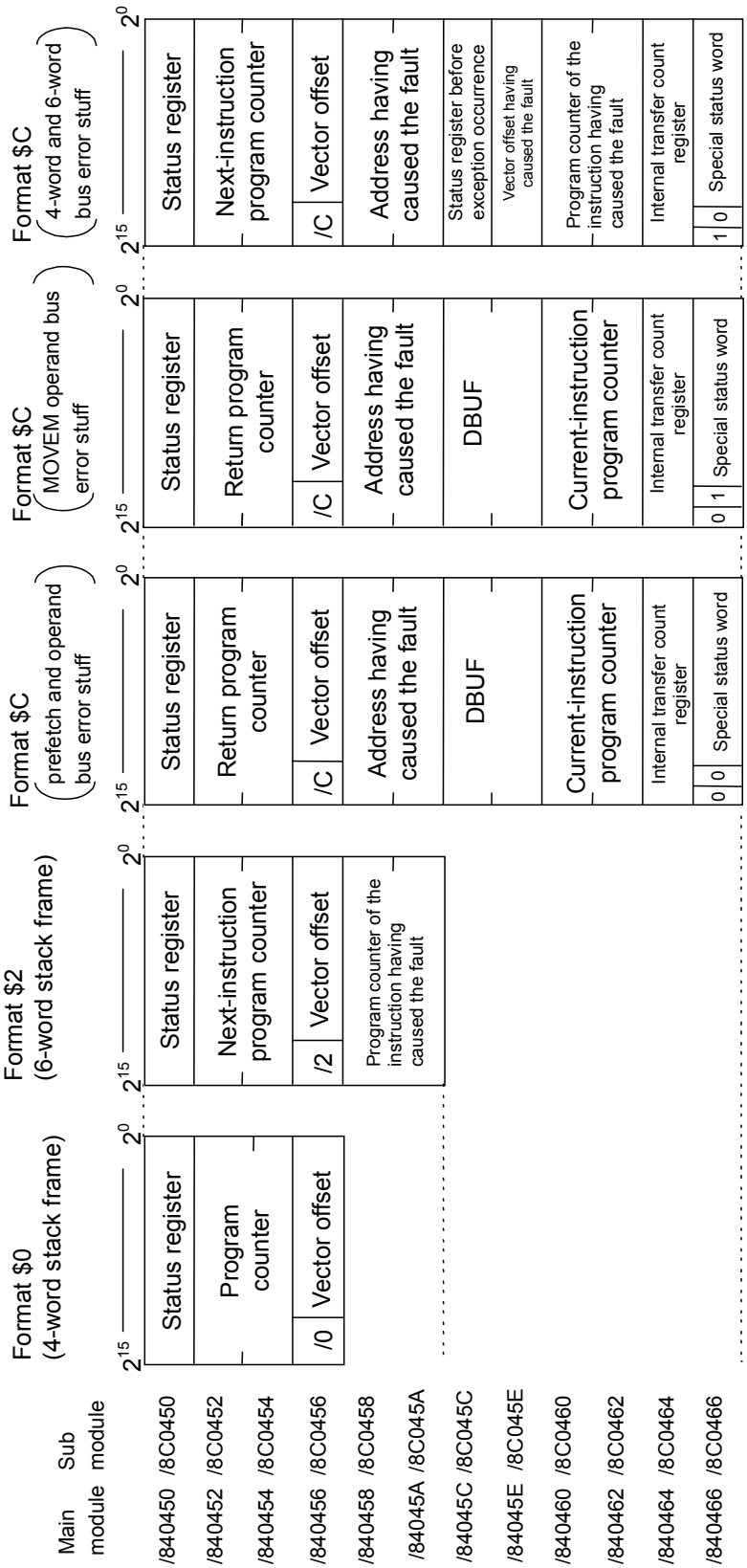
If the SV.LINK module detects a hardware error, the error LED lights and error freeze information is registered, and the operation of the SV.LINK module stops. If an error having a number between 11 and 19 in the following table occurs, only the error code is registered in the freeze information area and the value 0 is entered in all the other areas.

Main module	Submodule	2^{31} —— 2^{16} 2^{15} —— 2^{0}
/840400	/8C0400	Error code | ——
/840404	/8C0404	——
/840410	/8C0410	D0 register
/840414	/8C0414	D1 register
/840418	/8C0418	D2 register
/84041C	/8C041C	D3 register
/840420	/8C0420	D4 register
/840424	/8C0424	D5 register
/840428	/8C0428	D6 register
/84042C	/8C042C	D7 register
/840430	/8C0430	A0 register
/840434	/8C0434	A1 register
/840438	/8C0438	A2 register
/84043C	/8C043C	A3 register
/840440	/8C0440	A4 register
/840444	/8C0444	A5 register
/840448	/8C0448	A6 register
/84044C	/8C044C	A7 register
/840450	/8C0450	Stack frames (4 words, 6 words, bus error)
/8404FC	/8C04FC	

No.	Code	Error
1	0010H	Bus error
2	0011H	Address error
3	0012H	Invalid instruction
4	0013H	Division by zero
5	0014H	Privilege violation
6	0016H	Format error
7	0017H	Spurious interrupt
8	0018H	Unused exception (CHK, TRAPV, L1010, etc.)
9	0019H	Parity error
10	001AH	Power failure notice
11	0100H	Module number setting switch error
12	0102H	ROM1 sum error
13	0103H	RAM1 compare error
14	0105H	RAM2 compare error
15	010BH	ROM3 sum error
16	0112H	Microprogram error
17	0113H	IP address not registered
18	0114H	MAC address error
19	0201H	Communication parameter setting error

Note: The details of the stack frames are shown on the next page.

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



7.3.3 Communication error codes

When a parameter setting error or communication error is detected, the associated information is stored in the error code section (BD000) of the status area within the BD register. The error codes are listed below:

No.	Error name	Error code		Remedy
		High-order word	Low-order word	
1	Control register setting error	H1100	H0000	A parameter setting was in error. See "5.4 Status and Communication Parameter Areas," and correct the communication parameter setting. Then perform a reset or power-on reset.
2	Communication response wait time setting error	H1101	H0000	
3	Communication retry count setting error	H1102	H0000	
4	Cyclic communication protocol setting error	H1103	H0000	
5	Remote station IP address setting error	H1104	H0000	
6	Endian conversion setting error	H1105	H0000	
7	Module number setting error	H1106	H0000	
8	Local station transmission/reception start address setting error	H1107	H0000	
9	Remote station transmission/reception start address setting error	H1108	H0000	
10	Bit/word mismatch error	H1109	H0000	
11	Transmission/reception data size setting error	H110A	H0000	
12	Port opening error	H1200	Hxxxx	See the table below and take an appropriate remedial action. If the error recurs later, replace the SV.LINK module. The "xxxx" portion represents an internal error code. For the meanings of internal error codes, see the table below.
13	Port closing error	H1201	Hxxxx	
14	Cyclic communication data transmission error	H2301	Hxxxx	
15	Cyclic communication data reception error	H2302	Hxxxx	
16	Cyclic communication timeout error	H2303	H0000	The MELSEC was stopped or the preselected wait time (BD009) was too short. Correct the setting.
17	Cyclic communication data size error	H2304	H0000	The S10mini or S10V and MELSEC did not agree in word count. Correct the setting.
18	Cyclic communication response error	H2305	H0000	An improper method was employed for communications. Review the user program on the MELSEC side.

List of SV.LINK module internal error codes (which are the "Hxxxx" portion in the above error code table)

Error code	Description	Cause	Remedy
0xFFF0	Address error Network error	A transmission was directed to the local station's IP address.	Review the IP address specified for the remote station (BD00D of the BD register) and perform setup again.
		An Ethernet-level error (e.g., collision) occurred during a transmission.	Check the connectors, cable, and remote station for abnormalities. Also, check the wiring to ensure that the cable is not affected by noise.
		The cable was disconnected.	Check that the cable is properly connected to the connectors.

The error code (BD000) in the status area, which is mentioned on the previous page, is cleared to zero when error recovery is achieved, for instance, by a communication retry operation. Previously encountered errors can be confirmed by viewing the error code trace area indicated below. The error code trace area stores the codes for up to sixteen most recently encountered errors. If a seventeenth error occurs, it overwrites the oldest error occurrence recording. Also, note that the error code trace area is cleared when a reset or power-on reset is performed.

Error code trace area

Address (submodule)		
0x873B10(0x8F3B10)	Write pointer	···Case number (0 to 15) to be written next
+0x02	(Reserved for future use)	
+0x04	Error code (longword) Case No. 0	
+0x08	Error code Case No. 1	
+0x0A	Error code Case No. 2	
	:	
	:	
	:	
+0x40	Error code Case No. 15	
+0x44		

7.4 Trouble Report

Fill out this form and submit it to local source.

Your company name			Person in charge	
Data and time of occurrence	(year / month / day / hour / minute)			
Where to make contact	Address			
	Telephone			
	FAX			
	E-mail			
Model of defective module			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				