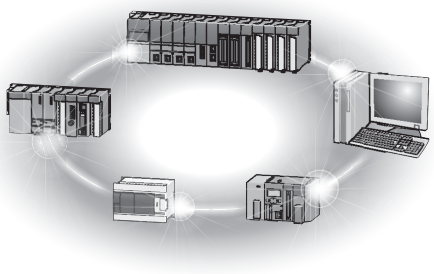
MITSUBISHI ELECTRIC

Mitsubishi Programmable Controller

MELSECNET, MELSECNET/B Local Station Data Link Module User's Manual

-A1SJ71AP23Q
-A1SJ71AR23Q
-A1SJ71AT23BQ



●SAFETY PRECAUTIONS●

(Always read these instructions before using this product)

Before using this product, please read this manual and the relevant manuals introduced in this manual carefully and pay full attention to safety to handle the product correctly.
The precautions given in this manual are concerned with this product only. For the safety precautions of the programmable controller system, please read the User's Manual for the CPU module used.

In this manual, the safety precautions are classified into two levels: "⚠WARNING" and "⚠CAUTION".

⚠WARNING	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.

Note that the ⚠CAUTION level may lead to a serious consequence according to the circumstances. Observe the precautions of both levels because they are important for personal and system safety.

Please save this manual to make it accessible when required and always forward it to the end user.

[DESIGN PRECAUTIONS]

⚠WARNING

- For each station's operating status in the case of a communication error in the network, refer to this manual.
  A malfunction due to a communication error may result in an accident.
- To control a running programmable controller (data modification) by connecting GX Developer to a CPU module or connecting a personal computer to an intelligent function module (special function module), create an interlock circuit on the sequence program so that the entire system will function safely all the time.
  Also, before performing any other controls (e.g. program modification, operating status change (status control)) to the programmable controller, read the manual carefully and ensure the safety. Especially, in the case of controlling a remotely-located programmable controller from an external device, a programmable controller side problem could not be resolved immediately due to data communication failure.
  To prevent this, establish corrective procedures for communication failure between the external device and the programmable controller CPU, as well as creating an interlock circuit on the program.

⚠CAUTION

- Do not install the control lines and/or communication cables together with the main circuit or power cables, and also do not bring them close to each other.
  Keep a distance of 100mm (3.94 inch) or more between them. Failure to do so may cause a malfunction due to noise.

[INSTALLATION PRECAUTIONS]

⚠CAUTION

- Use the programmable controller in the environment conditions given in the general specifications of the User's Manual for the CPU module used.
  Failure to do so may cause an electric shock, fire, malfunction, or damage to or deterioration of the product.
- Insert the module fixing projection into the module fixing hole in the base unit to mount the module.(For the AnS series module, fix it to the base unit with screws within the specified torque.)
  Incorrect module mounting may cause a malfunction, failure, or drop of the module.
- Be sure to shut off all phases of the external power supply used by the system before mounting or removing the module.
  Failure to do so may damage the module.
- Do not directly touch any conductive part or electronic component of the module.
  Doing so may cause a malfunction or failure of the module.

[WIRING PRECAUTIONS]

⚠WARNING

- Be sure to shut off all phases of the external power supply before installation or wiring.
  Failure to do so may result in an electric shock or damage to the product.

⚠CAUTION

- Properly solder a connector for coaxial cable.
  Failure to do so may cause malfunction.
- Be careful to prevent foreign matter such as dust or wire chips from entering the module.
  Failure to do so may cause a fire, failure or malfunction.
- Be sure to place the communication cables or power cables in a duct or clamp them.
  If not, dangling cables may swing or inadvertently be pulled, resulting in damage to the module or cables, or malfunctions due to poor cable contact.

[WIRING PRECAUTIONS]

⚠CAUTION

- When disconnecting a communication cable or power cable, do not pull it by holding the cable part. To disconnect the cable, hold its connector that is plugged into the module. Loosen screws for a terminal block before disconnecting a cable for connecting terminal block. Pulling the cable part with the cable still connected to the module may damage the module and/or cable, or cause malfunctions due to poor cable contact.

[START-UP AND MAINTENANCE PRECAUTIONS]

⚠CAUTION

- Do not disassemble or remodel each of the modules. Doing so may cause failure, malfunctions, personal injuries and/or a fire.
- When using a wireless communication device such as a mobile phone, keep a distance of 25cm (9.85 inch) or more from the programmable controller in all directions. Failure to do so may cause malfunctions.
- Be sure to shut off all phases of the external power supply used by the system before mounting or removing the module. Not doing so may damage the product.
- Do not touch terminals during power-on. Doing so may cause malfunctions.
- Be sure to shut off all phases of the external power supply used by the system before cleaning or retightening the terminal screw or module mounting screw. Not doing so may cause a failure or malfunction of the module. If the screw is too loose, it may cause a drop, short circuit or malfunction. Excessive tightening may cause damage to the screw and/or module, resulting in a drop, short circuit or malfunction.
- Before handling the module, touch a grounded metal object to discharge the static electricity from the human body. Not doing so may cause a failure or malfunction of the module.

[DISPOSAL PRECAUTIONS]

⚠CAUTION

- When disposing of the product, treat it as industrial waste.

●CONDITIONS OF USE FOR THE PRODUCT●

(1) Mitsubishi programmable controller ("the PRODUCT") shall be used in conditions;
i) where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident; and
ii) where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.

(2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries.
MITSUBISHI SHALL HAVE NO RESPONSIBILITY OR LIABILITY (INCLUDING, BUT NOT LIMITED TO ANY AND ALL RESPONSIBILITY OR LIABILITY BASED ON CONTRACT, WARRANTY, TORT, PRODUCT LIABILITY) FOR ANY INJURY OR DEATH TO PERSONS OR LOSS OR DAMAGE TO PROPERTY CAUSED BY the PRODUCT THAT ARE OPERATED OR USED IN APPLICATION NOT INTENDED OR EXCLUDED BY INSTRUCTIONS, PRECAUTIONS, OR WARNING CONTAINED IN MITSUBISHI'S USER, INSTRUCTION AND/OR SAFETY MANUALS, TECHNICAL BULLETINS AND GUIDELINES FOR the PRODUCT.
("Prohibited Application")
Prohibited Applications include, but not limited to, the use of the PRODUCT in;
- Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.
- Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.
- Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.

Notwithstanding the above, restrictions Mitsubishi may in its sole discretion, authorize use of the PRODUCT in one or more of the Prohibited Applications, provided that the usage of the PRODUCT is limited only for the specific applications agreed to by Mitsubishi and provided further that no special quality assurance or fail-safe, redundant or other safety features which exceed the general specifications of the PRODUCTs are required. For details, please contact the Mitsubishi representative in your region.

REVISIONS

*The manual number is given on the bottom left of the cover.

Print Date	*Manual Number	Revision
Mar., 2007	SH(NA)-080670ENG-A	First edition
Oct., 2007	SH(NA)-080670ENG-B	Correction Section 2.2, 3.1
Aug., 2010	SH(NA)-080670ENG-C	Correction SAFETY PRECAUTIONS, Section 2.2, 3.2.1, 3.2.2, 3.4.2, 7.2, Appendix 4.2, WARRANTY Addition CONDITIONS OF USE FOR THE PRODUCT
Apr., 2011	SH(NA)-080670ENG-D	Correction Section 3.6.4, 3.6.5, 7.2, 8.1.2, Appendix 4.2
Oct., 2011	SH(NA)-080670ENG-E	Correction SAFETY PRECAUTIONS, COMPLIANCE WITH THE EMC AND LOW VOLTAGE DIRECTIVES, GENERIC TERMS AND ABBRERVIATIONS, Chapter 1, Section 1.1, 2.2
Dec., 2014	SH(NA)-080670ENG-F	Correction COMPLIANCE WITH THE EMC AND LOW VOLTAGE DIRECTIVES, HOW TO READ THIS MANUAL, Chapter 1, Section 1.1, 2.2, Chapter 3, Section 5.1, 5.3, 6.2.1, 7.2, 8.1.4, Appendix 4.2 Addition Appendix 3

Japanese Manual Version SH-080669-G

INTRODUCTION

Thank you for choosing the Mitsubishi MELSEC-AnS Series of General Purpose Programmable Controllers.
Before using the equipment, please read this manual carefully to develop full familiarity with the functions and performance of the AnS series programmable controller you have purchased, so as to ensure correct use.

CONTENTS

ABOUT MANUALS

The following manuals are also related to this product.
Order them by referring to the table below as necessary.

Related manual

Manual name	Manual No. (Model code)
Type MELSECNET, MELSECNET/B Data Link System Reference Manual This manual explains specifications, data link setting, preparatory procedures before operation, programming, and troubleshooting of the MELSECNET or MELSECNET/B data link system. (Sold separately)	IB-66350 (13JF70)

COMPLIANCE WITH THE EMC AND LOW VOLTAGE DIRECTIVES

(1) Method of ensuring compliance

To ensure that Mitsubishi programmable controllers maintain EMC and Low Voltage Directives when incorporated into other machinery or equipment, certain measures may be necessary. Please refer to one of the following manuals.

- User's manual for the CPU module used
- Safety Guidelines
  (This manual is included with the CPU module or the base unit.)

The CE mark on the side of the programmable controller indicates compliance with EMC and Low Voltage Directives.

(2) Additional measures

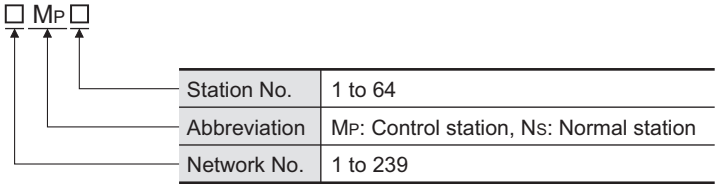
To ensure that this product maintains EMC and Low Voltage Directives, please refer to one of the manuals listed in (1).

The following explains how to interpret the symbols for network station types that are used in the text, tables, and figures.

(1) MELSECNET or MELSECNET/B data link system

Abbreviation of network type	Description
M station	Master station for the second tier
L station	Local station in the second tier
R station	Remote I/O station in the second tier
L/m station	Local station in the second tier/master station for the third tier
l station	Local station in the third tier
r station	Remote I/O station in the third tier

(2) MELSECNET/H network system



(Example)

- Network No.1, control station, station No.1 ··· 1MP1
- Network No.1, normal station, station No.2 ··· 1NS2

(3) When using this product in the system of L series

Where there is no difference between Q series and L series, the description is given for Q series only; in reading this manual, substitute "Q" with "L" where appropriate. Here are examples of how to substitute the character:

Description in this manual (Q)	After substitution (L)
Q series	L series
QA1S5□B	LA1S5□B
QA1S6□B	LA1S6□B
QCPU	LCPU

GENERIC TERMS AND ABBRERVIATIONS

This manual describes the MELSECNET or MELSECNET/B local station data link module using the following generic terms and abbreviations, unless otherwise specified.

Generic term/ abbreviation	Description
GX Developer	Generic product name for SWnD5C-GPPW-E, SWnD5C-GPPW-EA, SWnD5C-GPPW-EV, and SWnD5C-GPPW-EVA. ("n" means version 4 or later.) "-A" and "-V" mean "volume license product" and "version-upgrade product" respectively.
GX Works2	Generic product name of SWnDNC-GXW2-E ("n" represents the version.)
MELSECNET	Abbreviation for the MELSECNET data link system
MELSECNET/B	Abbreviation for the MELSECNET/B data link system
MELSECNET/H	Abbreviation for the MELSECNET/H network system
MELSECNET (II)	Generic term for the MELSECNET or MELSECNET/B data link system
Local module	Abbreviation for the A1SJ71AP23Q or A1SJ71AR23Q type MELSECNET local station data link module and the A1SJ71AT23BQ type MELSECNET/B local station data link module
Link module	Abbreviation for the MELSECNET or MELSECNET/B data link module
QA1S5□B	Another term for the QA1S51B extension base unit
QA1S6□B	Generic term for the QA1S65B and QA1S68B extension base units

DEFINITIONS OF TERMINOLOGY

The following explains definitions of the terms used in this manual.

Term	Description
RAS	Abbreviation for Reliability, Availability, and Serviceability. This term is used to express the overall usability of automation systems.
Master station	Station that controls slave stations (local station and remote I/O station) connected to the data link system. It sets the link parameter for the data link system. One master station is required per data link system. The station No. of the master station is set to "00".
Local station	Station that controls the I/O module or intelligent function module (special function module) of the host station in the program of the host station, incorporating link data (B, W, X) of the data link system.
Remote I/O station	Station that controls the I/O module or special function module of the host station in the program of the master station.

PACKING LIST

The followings are included in the package.

Model	Product name	Quantity
A1SJ71AP23Q	A1SJ71AP23Q type MELSECNET local station data link module (Applicable cable: optical fiber cable)	1
A1SJ71AR23Q	A1SJ71AR23Q type MELSECNET local station data link module (Applicable cable: coaxial cable)	1
A1SJ71AT23BQ	A1SJ71AT23BQ type MELSECNET/B local station data link module (Applicable cable: shielded twisted pair cable)	1
	Terminating resistor (110Ω, 1/2W)	1

CHAPTER1 OVERVIEW

This manual describes the specification, function, preparatory procedures before operation, programming, and troubleshooting of the following data link module (hereinafter referred to as a local module).

- A1SJ71AP23Q type MELSECNET local station data link module
- A1SJ71AR23Q type MELSECNET local station data link module
- A1SJ71AT23BQ type MELSECNET/B local station data link module

When applying a program example introduced in this manual to the actual system, make sure to examine the applicability and confirm that it will not cause system control problems.

The local module can mount the Q series programmable controller as a local station in the second tier or local station in the third tier of the MELSECNET or MELSECNET/B data link system.
Mount the local module to the following base unit.

- QA1S5□B extension base unit
- QA1S6□B extension base unit

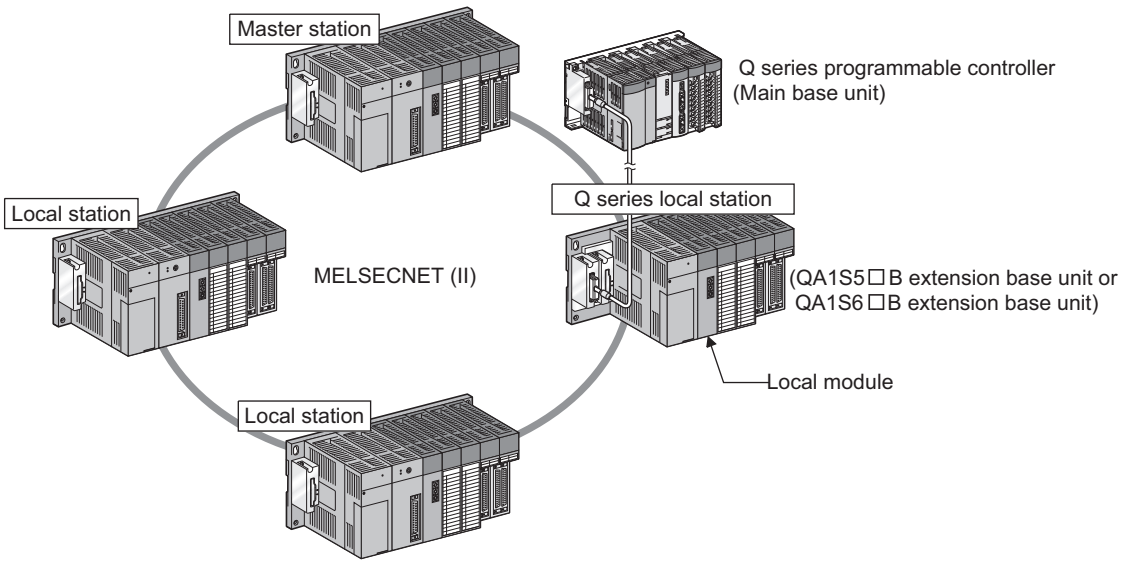


Figure 1.1 MELSECNET or MELSECNET/B data link system

POINT

(1) This manual describes necessary information to add or replace a Q series local station in the MELSECNET or MELSECNET/B data link system.
For the details of the MELSECNET or MELSECNET/B data link system, refer to the following manual.
☞ Type MELSECNET, MELSECNET/B Data Link System Reference Manual.

(2) Where there is no difference between Q series and L series, the description is given for Q series only; substitute "Q" with "L" where appropriate.

1.1 Features

This section describes features of a local module.

(1) Cyclic transmission function

The data can be communicated between master and local stations cyclically.

(a) 1: n communication (B/W communication)

Data is communicated between the master station and a local station and between local stations.

In this communication, ON/OFF information and 16-bit data are communicated.

1) The ON/OFF information is communicated by link relays (B).

2) The 16-bit data is communicated by link registers (W).

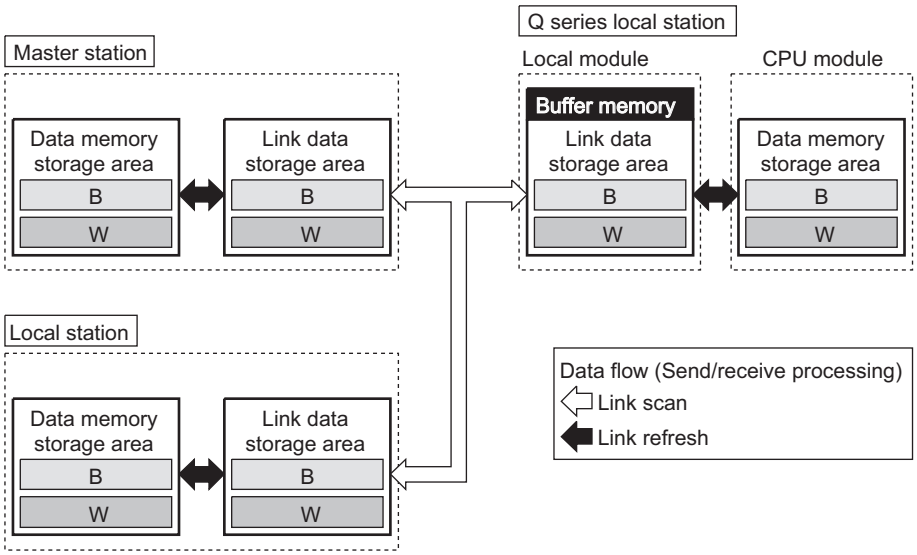


Figure 1.2 B/W communication data flow

(b) 1:1 communication (X/Y communication)

The one-to-one data communication is performed between the master station and a local station.

The ON/OFF information can be communicated using the input (X)/output (Y).

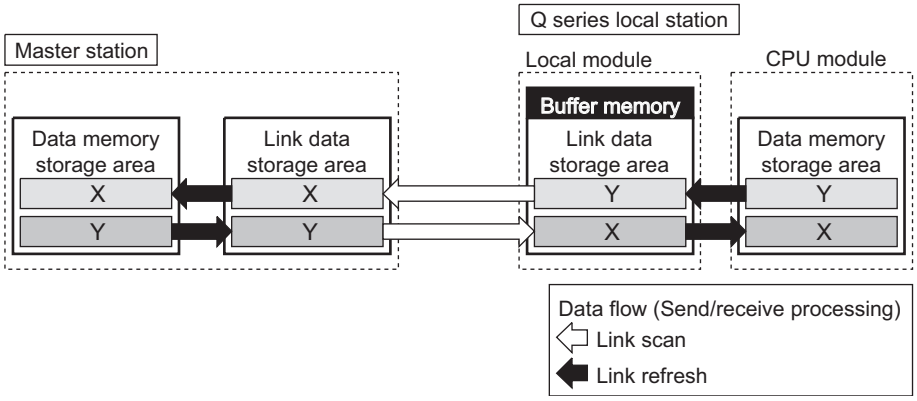


Figure 1.3 X/Y communication data flow

(c) Link refresh of link data

The method of link refresh for a Q series local station and the master station is different from that of link refresh for an A/QnA series local station.

1) Q series local station

Refresh is performed in the sequence program.

☞ CHAPTER 7 PROGRAMMING

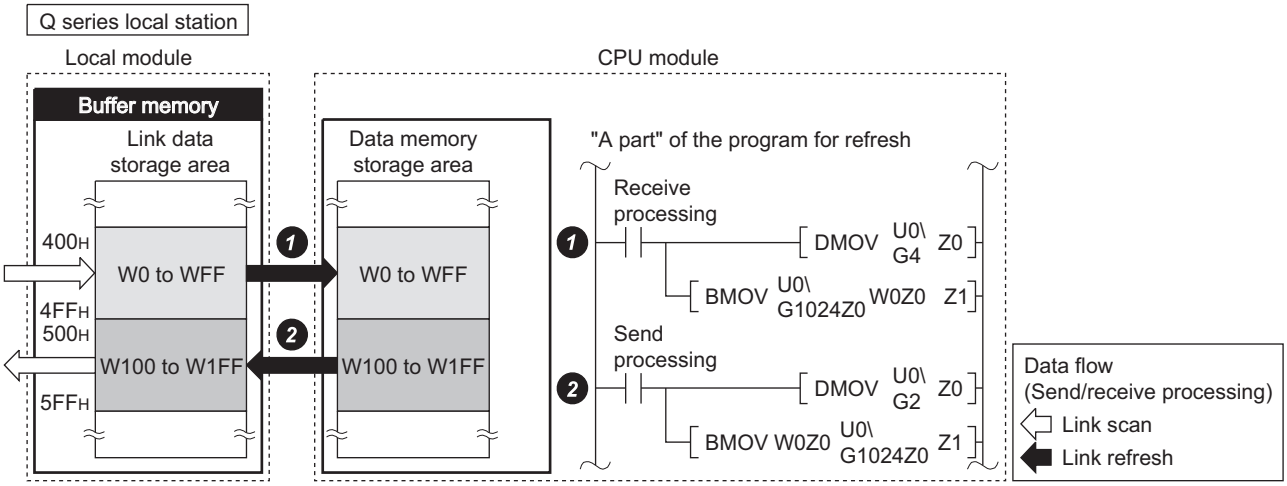


Figure 1.4 Link refresh of link data (Q series local station)

2) Master station and A/QnA series local station

The data is refreshed automatically at either of the following timing.

- Upon completion of link scan
- Only after execution of the END instruction in the sequence program

For the AnUCPU, QnACPU, A2US(H)CPU(S1) and Q2AS(H)CPU(S1), refresh ranges can be changed with refresh parameters.

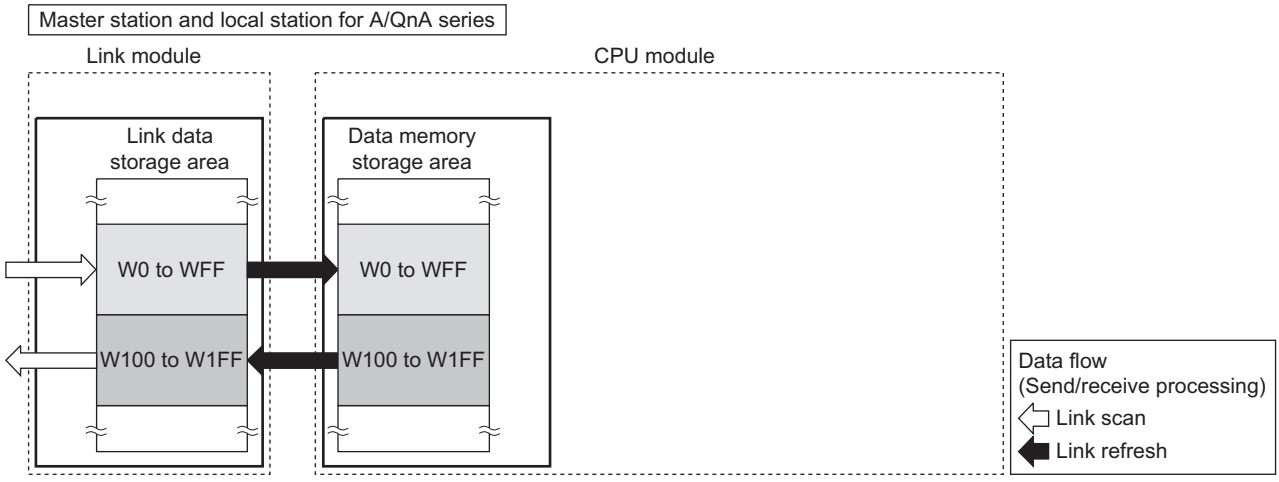


Figure 1.5 Link refresh of link data (Master station and A/QnA series local station)

(2) Transient transmission function

(a) Communication from a master station to a local station
By executing the LRDP/LWTP instruction in the sequence program of the master station, data can be read from or written to local station devices (T, C, D, W).

(b) LRDP/LWTP instruction receive processing
A Q series local station and an A/QnA series local station are different in processing at the time of accepting the LRDP/LWTP instruction.

1) Q series local station
The receive processing is performed to the LRDP/LWTP instruction in a sequence program.
☞ CHAPTER 7 PROGRAMMING

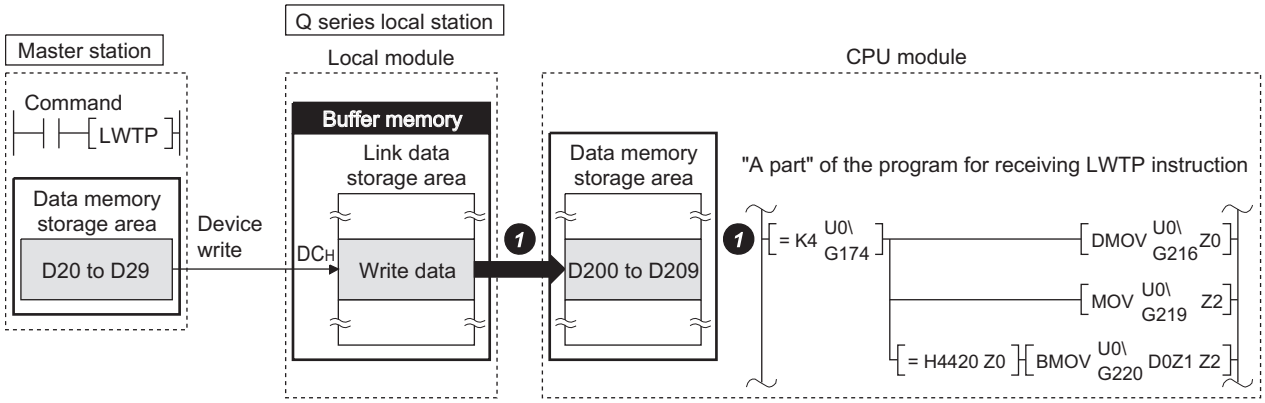


Figure 1.6 LWTP instruction receive processing (Q series local station)

2) A/QnA series local station
The receive processing is performed to the LRDP/LWTP instruction in the system.
(The program for receiving LRDP/LWTP instruction is not required.)

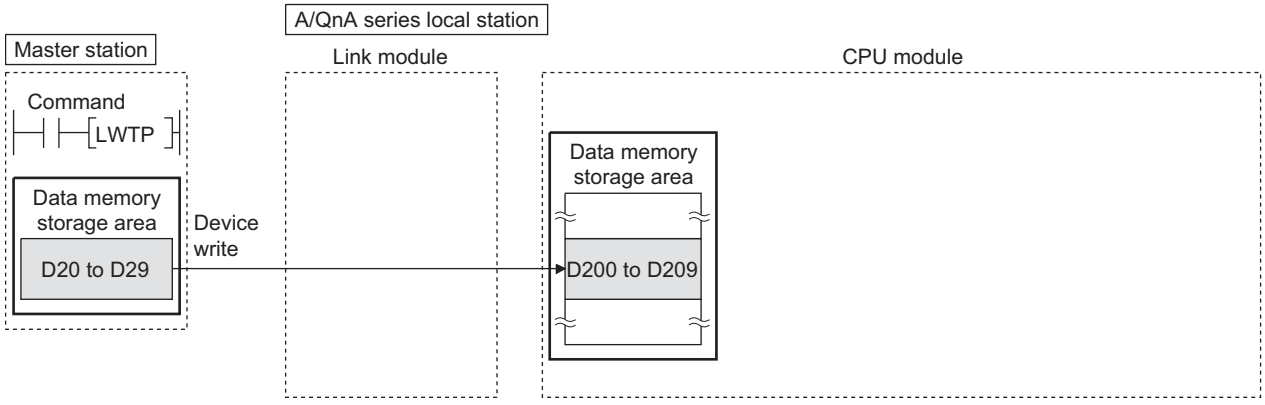


Figure 1.7 LWTP instruction receive processing (A/QnA series local station)

POINT

(1) Access to another station from peripherals or intelligent function module
Access to another station is not allowed for any peripheral (GX Developer, GOT, etc.) and intelligent function module (e.g. serial communication module) connected to a Q series local station.
Also, any peripheral and special function module connected to the master station cannot access any Q series local station.
☞ Section 4.2 Transient Transmission Function

(3) RAS function

(a) Automatic return function
When a local station disconnected due to a data link error is recovered, the station automatically returns to the network and restarts data link.

(b) Loopback function (Not provided for the MELSECNET/B data link system)
A faulty part such as a disconnected cable or a faulty station is disconnected from the network to continue data link among normally operating stations.

(c) Error detection function
Data of the special relay (for link) and special register (for link) of a local module are refreshed into CPU module devices.
With the refreshed devices, the data link status or a faulty part can be checked.
Note that the network diagnostics of GX Developer is not available for Q series local stations. Check the data link status or a faulty part in the above-mentioned way.

(d) Self-diagnostic function
The hardware or cable wiring of a local module can be checked.

(4) A program for refresh and a program for receiving LRDP/LWTP instruction can be created easily with A/QnA to Q conversion support tool (Version 1.02 or later)

A tool to create a program for refreshing link data and a program for receiving LRDP/LWTP instruction is prepared.
When using the A/QnA to Q conversion support tool, a new project can be automatically created by inputting the module mounting position or refresh destination specification of link data on the screen. The new project includes a program for refresh and a program for receiving LWTP instruction.
For details on the A/QnA to Q conversion support tool, please consult your local Mitsubishi representative.
To create a program used for L series by means of the A/QnA to Q conversion support tool, refer to the following:
☞ Appendix 3 Steps to Create a Program for L Series

CHAPTER2 SYSTEM CONFIGURATION

This chapter describes the system configuration of a local module.

2.1 Overall System Configuration

(1) MELSECNET data link system

MELSECNET data link system is a system which connects the master station and slave stations (local station and remote I/O station) via an optical fiber cable or a coaxial cable.

- Up to 64 local and remote I/O stations in total can be connected to one master station for the second tier.
- Up to 64 local and remote I/O stations in total can be connected to one master station for the third tier.

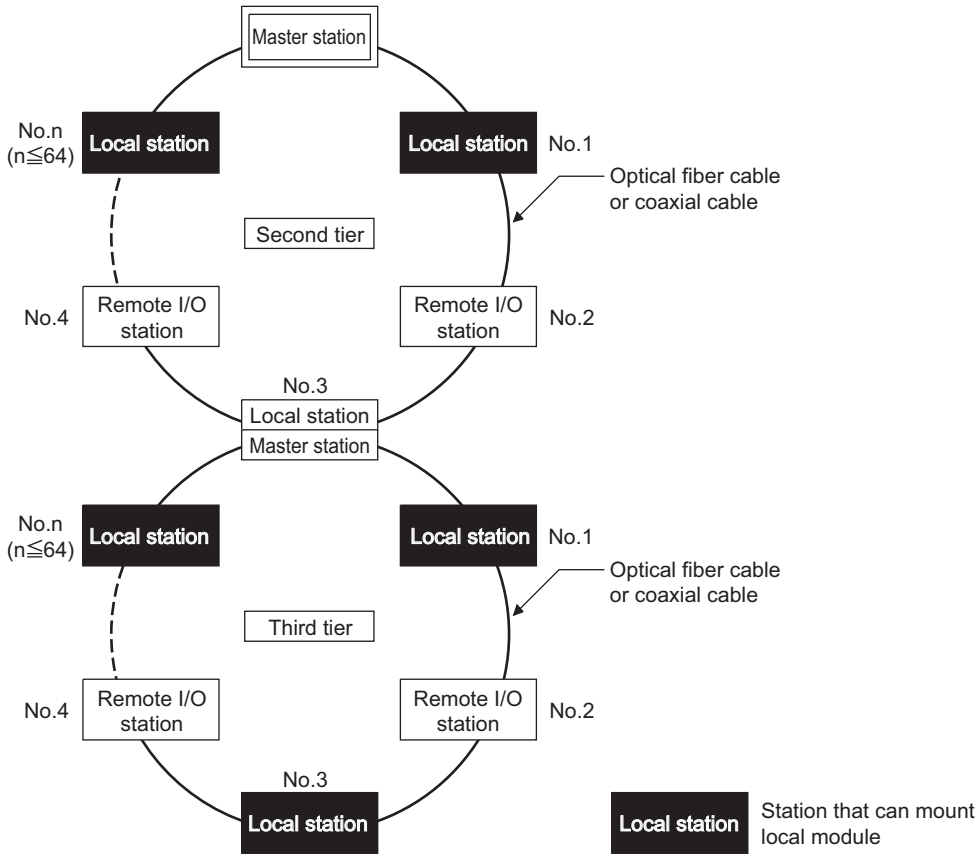


Figure 2.1 MELSECNET data link system

POINT

A local module cannot be the master station or a remote I/O station since it is a module dedicated to a local station.

(2) MELSECNET/B data link system

MELSECNET/B data link system is a system which connects the master station and slave stations (local station and remote I/O station) via a shielded twisted pair cable.

- Up to 31 local and remote I/O stations in total can be connected to one master station for the second tier.
- Up to 31 local and remote I/O stations in total can be connected to one master station for the third tier.

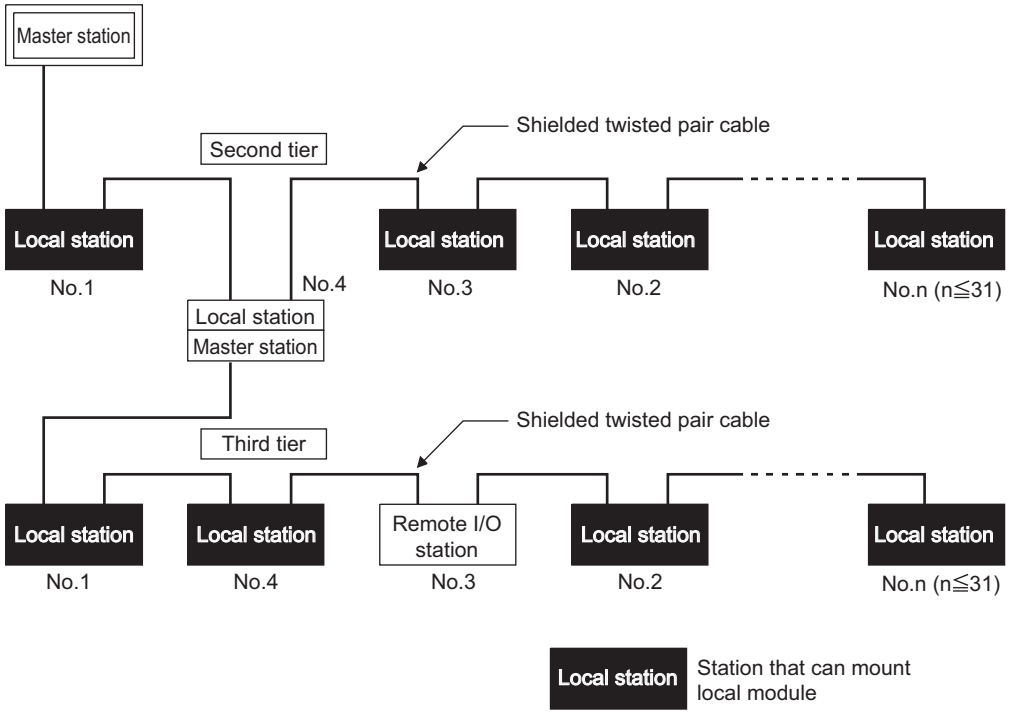


Figure 2.2 MELSECNET/B data link system

POINT

A local module cannot be the master station or a remote I/O station since it is a module dedicated to a local station.

Remark

The following shows the combination of the three-tier system other than (1) and (2) in this section.

(1) When second tier is MELSECNET and third tier is MELSECNET/B

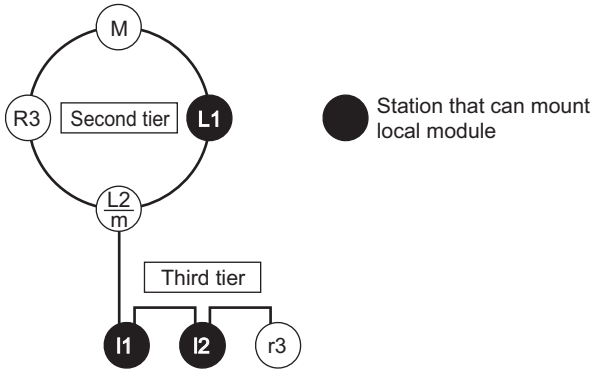


Figure 2.3 When second tier is MELSECNET and third tier is MELSECNET/B

(2) When second tier is MELSECNET/B and third tier is MELSECNET

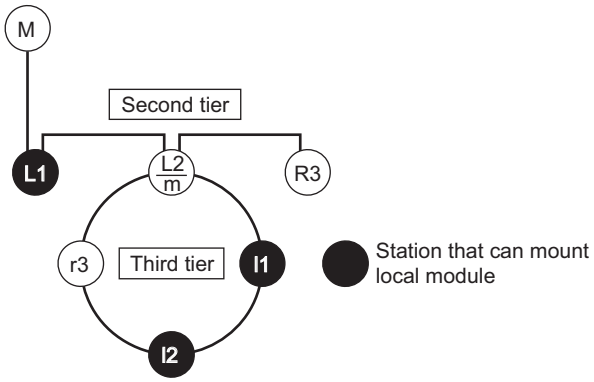


Figure 2.4 When second tier is MELSECNET/B and third tier is MELSECNET

2.2 Applicable Systems

This section describes applicable systems.

2.2.1 Applicable system for Q series

This section describes the applicable system for Q series.

(1) Mountable modules and number of mountable modules

(a) Mountable modules
High Performance model CPU and Universal model QCPU with a serial number (first five digits) of "13102" or later (excluding the QnUDPVCPU)
QA1S5□B, QA1S6□B, or "QA6□B + A-A1S module conversion adapter"

(b) Number of mountable modules
☞ QCPU User's Manual (Hardware Design, Maintenance and Inspection)

POINT

- Depending on the combination with other modules or the number of mounted modules, power supply capacity may be insufficient. Pay attention to the power supply capacity before mounting modules, and if the power supply capacity is insufficient, change the combination of the modules.
- Mount a module within the number of I/O points for the CPU module. If the number of slots is within the available range, the module can be mounted on any slot.

(c) When the module is used in a MELSECNET/H remote I/O station
The local module cannot be used in a MELSECNET/H remote I/O station. Mount the module with a CPU module of the master station.

(2) Support of a multiple CPU system

When the local module is used in the multiple CPU system, refer to the following first:
☞ "PRECAUTIONS FOR USE OF AnS/A SERIES MODULE" in the QCPU User's Manual (Multiple CPU System)

For AnS series compatible I/O modules and special function modules, set up the identical CPU module as the control CPU.

(3) Supported software packages

Using a local module requires GX Developer or GX Works2.
For the version of software package compatible with the CPU module used, refer to the following:

- With the single CPU system
  ☞ QCPU User's Manual (Hardware Design, Maintenance and Inspection)
- With the multiple CPU system
  ☞ QCPU User's Manual (Multiple CPU System)

2.2.2 Applicable system for L series

This section describes the applicable system for L series.

(1) Mountable modules and number of mountable modules

(a) Mountable modules
LCPU with a serial number (first five digits) of "16112" or later
LA1S extension base unit

(b) Number of mountable modules
☞ MELSEC-L LA1S Extension Base Unit User's Manual

POINT

- Depending on the combination with other modules or the number of mounted modules, power supply capacity may be insufficient. Pay attention to the power supply capacity before mounting modules, and if the power supply capacity is insufficient, change the combination of the modules.
- Mount a module within the number of I/O points for the CPU module. If the number of slots is within the available range, the module can be mounted on any slot.

(2) Supported software package

For the supported version of software package, refer to the following:
☞ MELSEC-L LA1S Extension Base Module User's Manual

CHAPTER3 SPECIFICATIONS

This chapter describes performance specifications and function list of a local module.
For general specifications, refer to the following manual.
☞ User's manual for the CPU module used (Hardware Design, Maintenance and Inspection)

3.1 Performance Specifications

This section describes the performance specifications of the MELSECNET or MELSECNET/B data link system and the local module.

(1) Performance specifications of MELSECNET data link system and A1SJ71AP23Q

Table 3.1 Performance specifications of MELSECNET data link system and A1SJ71AP23Q

Item		Specifications		
		MELSECNET data link system		
		MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Maximum applicable link points per station	Input (X)	Up to the maximum number of I/O points for the CPU module used in the master station is applicable. (The total number of link points for slave station is equal to the number of link using points for the master station)		
	Output (Y)			
Maximum link points in a system	Link relay (B)	1024 points (128 byte)	4096 points (512 byte)	
	Link register (W)	1024 points (2048 byte)	4096 points (8192 byte)	
Maximum link points per station	Master station	1024 byte	1024 byte (First half of link parameters) 1024 byte (Latter half of link parameters)	
	Local station			
	Remote I/O station	512 byte Number of I/O points: 512 points	-	512 byte Number of I/O points: 512 points
Communication speed		1.25Mbps		
Communication method		Half duplex bit serial method		
Synchronization method		Frame synchronization method		
Transmission path		Duplex loop		
Overall cable distance		Up to 10km (Station-to-station 1km)		
Number of connected stations		Up to 65 (Master station: 1, The total number of local stations and remote I/O stations: 64)		
Modulation method		CMI method		
Transmission format		Conforming to HDLC (Frame format)		
Error control system		Retries due to CRC (generating polynomial $X^{16} + X^{12} + X^5 + 1$) and time out		
RAS function		•Loopback function due to error detection and cable break •Diagnostic function including link line check of host station etc.		
Connector		2-core optical connector plug (User prepared*1)		
Applicable cable		Optical fiber cable (User prepared*1)		
Number of I/O occupied points		32 points (Intelli: 32 points)		
Internal current consumption (5VDC)		0.33A		
Weight		0.30kg		

* 1 Connecting an optical fiber cable with a connector requires professional skills and special tools. Also, a connector dedicated to an optical fiber cable is required. For purchase, contact your local Mitsubishi Electric System Service or representative.

(2) Performance specifications of MELSECNET data link system and A1SJ71AR23Q

Table 3.2 Performance specifications of MELSECNET data link system and A1SJ71AR23Q

Item		Specifications		
		MELSECNET data link system		
		MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Maximum applicable link points per station	Input (X)	Up to the maximum number of I/O points for the CPU module used in the master station is applicable. (The total number of link points for slave station is equal to the number of link using points for the master station)		
	Output (Y)			
Maximum link points in a system	Link relay (B)	1024 points (128 byte)	4096 points (512 byte)	
	Link register (W)	1024 points (2048 byte)	4096 points (8192 byte)	
Maximum link points per station	Master station	1024 byte	1024 byte (First half of link parameters) 1024 byte (Latter half of link parameters)	
	Local station			
	Remote I/O station	512 byte Number of I/O points: 512 points	-	512 byte Number of I/O points: 512 points
Communication speed		1.25Mbps		
Communication method		Half duplex bit serial method		
Synchronization method		Frame synchronization method		
Transmission path		Duplex loop		
Overall cable distance		Up to 10km (Station-to-station 500m)		
Number of connected stations		Up to 65 (Master station: 1, The total number of local stations and remote I/O stations: 64)		
Modulation method		CMI method		
Transmission format		Conforming to HDLC (Frame format)		
Error control system		Retries due to CRC (generating polynomial $X^{16} + X^{12} + X^5 + 1$) and time out		
RAS function		•Loopback function due to error detection and cable disconnection •Diagnostic function including link line check of host station etc.		
Connector		Connector plug for 3C-2V (User prepared): •BNC-P-3-NiCAu-CF (DDK Ltd.) Connector plug for 5C-2V (User prepared): •BNC-P-5-NiCAu-CF (DDK Ltd.) •BNC-P-5DV SA(41) (HIROSE ELECTRIC CO., LTD.)		
Applicable cable		Cables equivalent to 3C-2V or 5C-2V (User prepared)		
Number of I/O occupied points		32 points (Intelli: 32 points)		
Internal current consumption (5VDC)		0.80A		
Weight		0.33kg		

(3) Performance specifications of MELSECNET/B data link system and A1SJ71AT23BQ

Table 3.3 Performance specifications of MELSECNET/B data link system and A1SJ71AT23BQ

Item		Specifications		
		MELSECNET/B data link system		
		MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Maximum applicable link points per station	Input (X)	Up to the maximum number of I/O points for the CPU module used in the master station is applicable. (The total number of link points for slave station is equal to the number of link using points for the master station)		
	Output (Y)			
Maximum link points in a system	Link relay (B)	1024 points (128 byte)	4096 points (512 byte)	
	Link register (W)	1024 points (2048 byte)	4096 points (8192 byte)	
Maximum link points per station	Master station	1024 byte	1024 byte (First half of link parameters) 1024 byte (Latter half of link parameters)	
	Local station			
	Remote I/O station	512 byte Number of I/O points: 512 points	-	512 byte Number of I/O points: 512 points
Communication speed		125kbps/250kbps/500kbps/1Mbps		
Communication method		Half duplex bit serial method		
Synchronization method		Frame synchronization method		
Transmission path		Bus method		
Overall cable distance		Changed due to communication speed (125kbps: 1200m, 250kbps: 600m, 500kbps: 400m, 1Mbps: 200m)		
Number of connected stations		Up to 32 (Master station: 1, The total number of local stations and remote I/O stations: 31)		
Modulation method		NRZI method		
Transmission format		Conforming to HDLC (Frame format)		
Error control system		Retries due to CRC (generating polynomial $X^{16} + X^{12} + X^5 + 1$) and time out		
RAS function		Diagnostic function including link line check of host station etc.		
Connector		Terminal block		
Applicable cable		Shielded twisted pair cable (User prepared)		
Number of I/O occupied points		32 points (Intelli: 32 points)		
Internal current consumption (5VDC)		0.66A		
Weight		0.22kg		

Remark

Overall cable distance

(1) MELSECNET data link system

The overall cable distance refers to a distance from OUT of the master station to IN of the master station via a slave station.

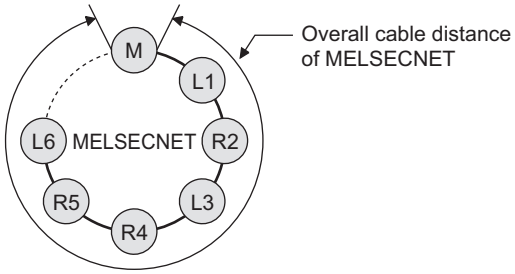


Figure 3.1 Overall cable distance of MELSECNET

(2) MELSECNET/B data link system

The overall cable distance refers to a distance between stations at both ends.
The overall cable distance of the MELSECNET/B data link system is determined depending on communication speed.
The communication speed is set by the communication speed setting switch of each link module.

☞ Section 5.3 Part Names and Settings

Table 3.4 Communication speed and overall cable distance

Communication speed	Overall cable distance
125kbps	1200m
250kbps	600m
500kbps	400m
1Mbps	200m

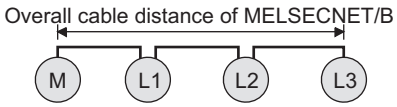


Figure 3.2 Overall cable distance of MELSECNET/B

3.2 Cable Specifications

This section describes the specifications of a cable used in the MELSECNET or MELSECNET/B data link system.

3.2.1 Optical fiber cable

The following shows the specifications of an optical fiber cable used in the MELSECNET data link system.
For details of the optical fiber cable specifications, refer to the catalogs of optical fiber cables.
Connecting an optical fiber cable with a connector requires professional skills and special tools. Also, a connector dedicated to optical fiber cables is required.
Optical fiber cables with connectors can be purchased in Mitsubishi Electric System Service or representative.
In addition, they can provide installation service. Contact your local Mitsubishi Electric System Service or representative.

Table 3.5 Specifications of optical fiber cable

Item	SI (Multicomponent glass)	H-PCF (Plastic clad)
Station-to-station distance	1km	1km
Transmission loss	12dB/km	6dB/km
Core diameter	200 μ m	200 μ m
Clad diameter	220 μ m	250 μ m
Primary film	250 μ m	-
Applicable connector	Connectors equivalent to F06/F08 (Conforming to JIS C 5975/5977)	

Remark

(1) Types of optical fiber cables are as follows:
A type: Cable for connecting the inside of a control panel
B type: Cable for connecting control panels inside
C type: Cable for connecting control panels outside
D type: Reinforced cable for connecting control panels outside
Since there are cables for specific use including move and heat resistance, contact Mitsubishi Service or representative.

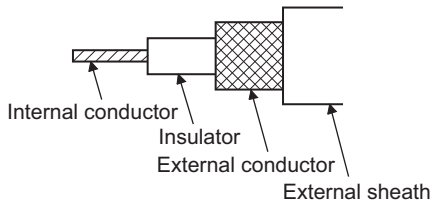
3.2.2 Coaxial cable

The following shows the specifications of a coaxial cable used in the MELSECNET data link system.
As for a coaxial cable, use "3C-2V" or "5C-2V" (conforming to JIS C 3501) of a high-frequency coaxial cable.

(1) Specifications of coaxial cable

The following shows the specifications of a coaxial cable.
As for a coaxial cable, choose the one which meets the operating ambient temperature (0 to 55℃) described in the general specification.

Table 3.6 Specifications of coaxial cable

Item	3C-2V	5C-2V
Structure		
Cable diameter	5.4mm	7.4mm
Allowable bend radius	22mm or more	30mm or more
Diameter of internal conductor	0.5mm (Annealed copper wire)	0.8mm (Annealed copper wire)
Diameter of insulator	3.1mm (Polyethylene)	4.9mm (Polyethylene)
Diameter of external conductor	3.8mm (Single annealed copper wire mesh)	5.6mm (Single annealed copper wire mesh)
Applicable connector plug	Connector plug for 3C-2V: •BNC-P-3-NiCAu-CF (DDK Ltd.)	Connector plug for 5C-2V: •BNC-P-5-NiCAu-CF (DDK Ltd.) •BNC-P-5DV SA(41) (HIROSE ELECTRIC CO., LTD.)

(2) Connection of connector for coaxial cable

The following shows how to connect a BCN connector (connector plug for coaxial cable) and a cable.

(a) Components of BNC connector and coaxial cable

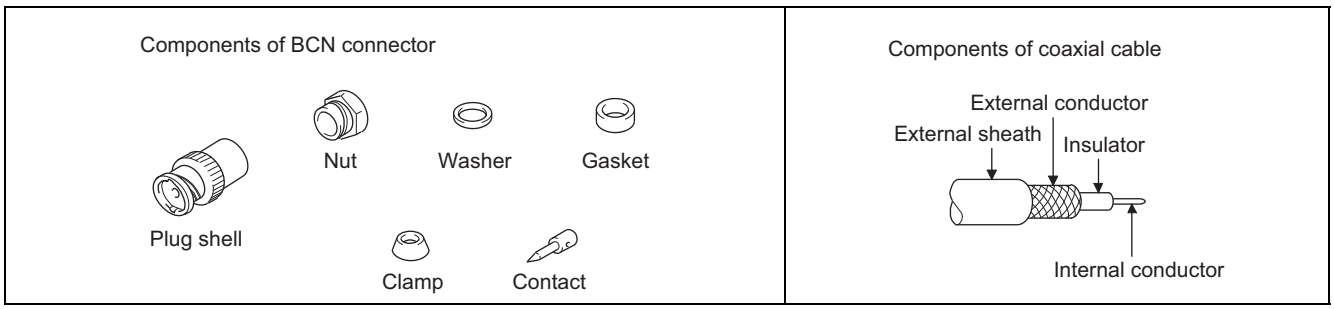
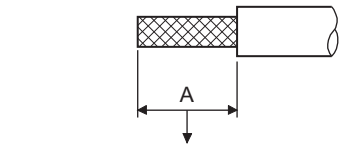


Figure 3.3 Components of BNC connector and coaxial cable

(b) How to connect BNC connector and coaxial cable

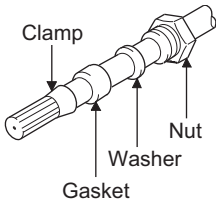
1) Remove external sheath of a coaxial cable as shown below.
Be careful not to damage an external conductor.



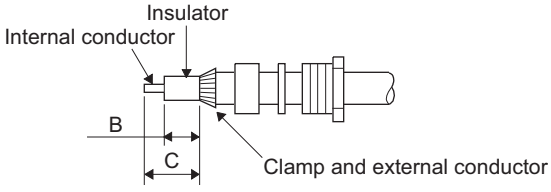
Measures for removing external sheath

Cable	A
3C-2V	15mm
5C-2V	10mm

2) Put a nut, washer, gasket, and clamp through the coaxial cable and unravel the external conductor.

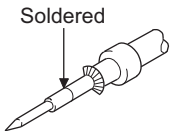


3) Cut the external conductor, insulator, and internal conductor in the following dimensions.
As for the external conductor, cut it in the same dimensions as taper part of the clamp, and smooth it down to the clamp.

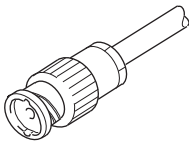


Cable	B	C
3C-2V	3mm	6mm
5C-2V	5mm	7mm

4) Solder a contact to the internal conductor.



5) Insert a contact assembly in 4) to a plug shell and screw a nut into the plug shell.



POINT

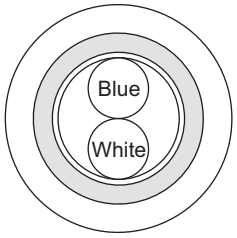
(1) When soldering an internal conductor and a contact, pay attention to the following points.
- Do not swell up the soldered part.
- Properly solder a contact and an insulator of the cable without making space between them or soldering them too tight.
- Perform soldering immediately so as not to modify the insulator.

(2) Before removing/mounting the coaxial cable connector, be sure to touch a grounded metal object to discharge the static electricity from the human body. Not doing so may cause failure of the module.

3.2.3 Shielded twisted pair cable

The following shows the specifications of a shielded twisted pair cable used in the MELSECNET/B data link system.

Table 3.7 Specifications of shielded twisted pair cable

Item	Description
Model name	KNPEV-SB 0.5SQ × 1P
Cable	Shielded twisted pair cable
Core	2-core
Conductor resistance (20℃)	39.4Ω/km or less
Insulation resistance (20℃)	10MΩ ▪ km or more
Dielectric withstand voltage V-min	1000VAC 1 minute
Capacitance (1KHz)	70nF/km or less on average
Characteristic impedance (100KHz)	110 ± 10Ω
Cross section	
Maker	TOA ELECTRIC INDUSTRIAL CO., LTD

3.3 Function List

This section describes a function list of a local module.

Table 3.8 Function list

Function		Description	Reference section
Cyclic transmission	1: n communication (B/W communication)	Data is communicated between the master station and a local station and between local stations. Note that Q series local stations refresh link data using the sequence program.	Section 4.1.1
	1:1 communication (X/Y communication)	The 1:1 data communication is performed between the master station and a local station. Note that Q series local stations refresh link data using the sequence program.	Section 4.1.2
Transient transmission	LRDP/LWTP instruction	By executing the LRDP/LWTP instruction in the sequence program of the master station, data can be read from or written to local station devices (T, C, D, W). Note that Q series local stations handle the reception of the LRDP/LWTP instruction with the sequence program.	Section 4.2
RAS function	Automatic return	When a local station disconnected due to a data link error is recovered, the station automatically returns to the network and restarts data link.	Section 4.3.1
	Loopback	Disconnects a faulty part such as a disconnected cable or a faulty station from the network to continue data link among normally operating stations. (Not provided for the MELSECNET/B data link system)	Section 4.3.2
	Error detection	Refreshes a special relay (for link) and special register (for link) of a local module to a device of the CPU. The data link status or faulty part can be checked by using the refreshed device. Note that the network diagnostics of GX Developer is not available for Q series local stations. Check the data link status or a faulty part in the above-mentioned way.	Section 4.3.3
	Self-diagnostics	Checks the hardware or cable wiring of a local module.	Section 5.5

POINT

(1) Access to another station from peripheral or intelligent function module
Access to another station is not allowed for any peripheral (GX Developer, GOT, etc.) and intelligent function module (e.g. serial communication module) connected to a Q series local station.
Also, any peripheral and special function module connected to the master station cannot access any Q series local station.
☞ Section 4.2 Transient Transmission Function

3.4 I/O Signal for Programmable Controller CPU

3.4.1 List of I/O signal

The following shows the list of I/O signal of a local module to the programmable controller CPU.
The I/O signal is assigned, assuming that start I/O number of a local module is "0000".
Replace it with the I/O signal of a slot where the local module is mounted.
Note that a local module cannot be mounted to the main base unit.
The device X is an input signal from a local module to the programmable controller CPU, and the device Y is an output signal from the programmable controller to a local module.

Table 3.9 List of I/O signal

Signal direction Local module → Programmable controller CPU		Signal direction Programmable controller CPU → Local module	
Device No.	**Signal name**	**Device No.**	**Signal name**
X0	Link status OFF: Online ON: Offline, station-to-station test, or self-loopback test	Y0	Use prohibited
X1	B/W initial value setting status OFF: B/W initial value setting completed ON: B/W initial value setting in execution	Y1	
X2	Use prohibited	Y2	
X3		Y3	
X4		Y4	
X5		Y5	
X6		Y6	
X7	Refresh ready status OFF: refresh not requested ON: Refresh requested	Y7	
X8	Use prohibited	Y8	
X9		Y9	
XA		YA	
XB		YB	
XC		YC	
XD		YD	
XE		YE	
XF		YF	

Table 3.9 List of I/O signal(Continued)

Signal direction Local module → Programmable controller CPU		Signal direction Programmable controller CPU → Local module	
Device No.	Signal name	Device No.	Signal name
X10	Use prohibited	Y10	CPU operating status OFF: STOP status, ERROR status ON: RUN status
X11		Y11	Refresh in execution OFF: Refresh not executed ON: Refresh in execution
X12		Y12	Use prohibited
X13		Y13	
X14		Y14	
X15		Y15	
X16		Y16	Refresh request OFF: Refresh not requested ON: Refresh requested
X17		Y17	Use prohibited
X18		Y18	
X19		Y19	
X1A		Y1A	
X1B		Y1B	
X1C		Y1C	
X1D		Y1D	
X1E		Y1E	
X1F		Y1F	

POINT

Do not turn ON "use prohibited" signals among I/O signals for the programmable controller CPU.
Doing so may cause malfunction of the programmable controller system.

3.4.2 Details of I/O signal

The following shows details of I/O signal of a local module.

(1) Link status (X0)

The link status is turned ON when the host station is offline, station-to-station test, or self-loopback test.
The link status is turned OFF when setting the host station online and turning power supply ON from OFF or resetting the CPU module.

(2) B/W initial value setting status (X1), Refresh ready status (X7), CPU operating status (Y10), Refresh in execution (Y11), and Refresh request (Y16)

Operations of link refresh are shown below.
For the programming, refer to the following.
☞ CHAPTER 7 PROGRAMMING

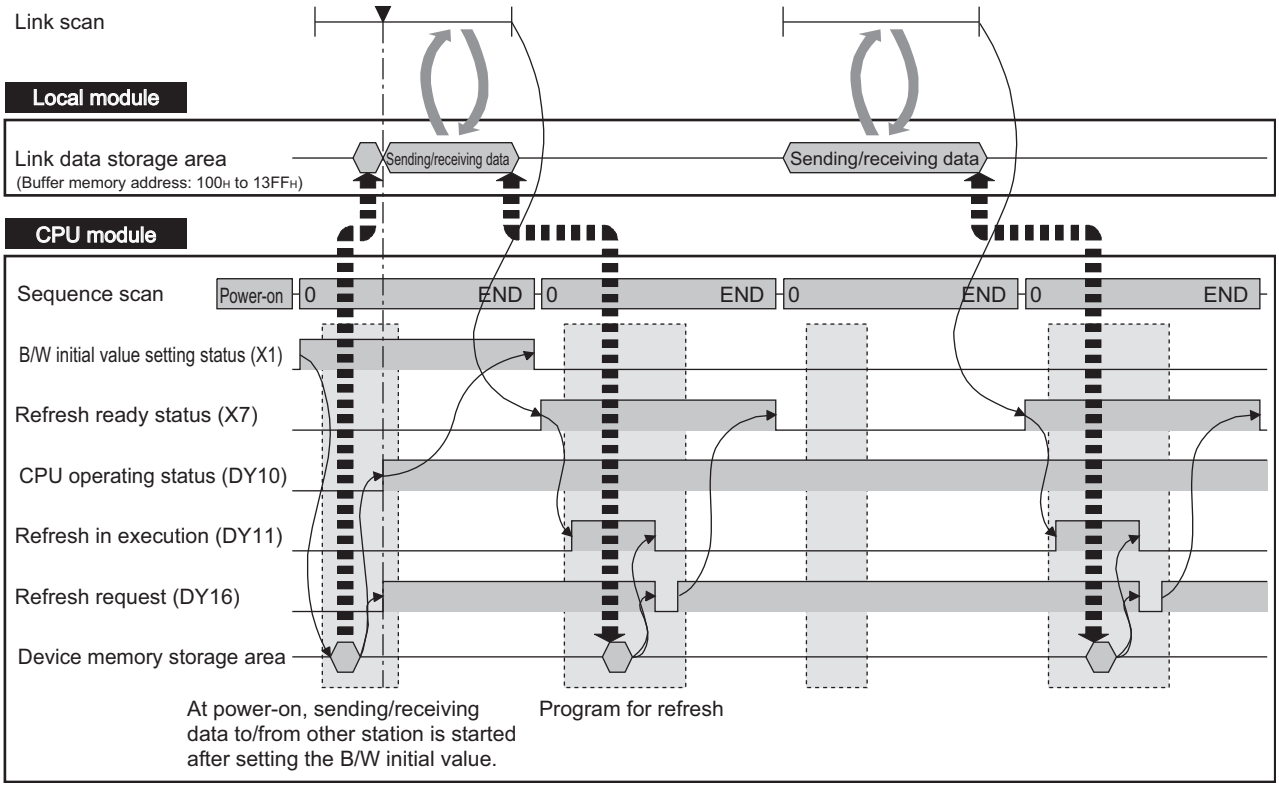


Figure 3.4 Operation of link refresh

(a) Turning power supply ON from OFF or resetting the CPU module

1) A local module turns ON the B/W initial value setting status (X1).
2) The B/W device of the CPU module is written to the B/W device of the local module in a sequence program.
3) When CPU operating status (DY10) and Refresh request (DY16) are turned ON in a sequence program after writing the initial value to the B/W device of the local module, a Q series local station starts data communication with other stations.

POINT

(1) After turning power supply ON from OFF or resetting the CPU module, be sure to transfer the initial value of the B/W device to a local module before a Q series local station communicates data with other stations.

(2) When turning power supply ON from OFF or resetting the CPU module at the STOP status of the CPU module, data communication with other stations is not started.
The master station treats a local station as a faulty station (relevant bit in D9228 to D9231 is turned ON).
When executing a program for refresh (Y10=ON) at the RUN status of the CPU module, data communication with other stations is started.

(b) Link refresh of link data

1) A local module turns ON Refresh ready status (X7) when a link scan is completed and refresh is ready.
During a sequence scan when Refresh ready status (X7) is turned ON, a Q series local station stops data communication with other stations.

2) In a sequence program, turn ON Refresh in execution (DY11) and refresh devices for the local module and the CPU module using the following area.
   - Presence or absence of refresh information table (Buffer memory address: 0_H, 1_H)
   - Refresh information table (Buffer memory address: 2_H to 27_H)
   - Link data storage area (Buffer memory address: 100_H to $13FF_H$)

3) After refresh is completed, turn OFF Refresh in execution (DY11) and Refresh request (DY16) in the sequence program.

4) When the refresh request (DY16) is turned ON by sequence programs, the refresh ready status (X7) is turned OFF.
After sequence scans where the refresh ready status (X7) is turned OFF, Q series local stations restart data sending/receiving from other stations.

POINT

Read/write the buffer memory from/to the sequence scan where Refresh ready status (X7) is ON.
When the sequence scan is read/written to/from the sequence scan where Refresh ready status (X7) is OFF, the sequence scan time for the host station may be prolonged, or the CPU module may stop due to SP.UNIT DOWN.

3.5 Buffer Memory List

The following shows a buffer memory list of a local module.

Table 3.10 Buffer memory list

Address		Name			Initial value	Readable/ Writable*1	Reference section
Hexadecimal	Decimal						
0H to 1H	0 to 1	Presence or absence of refresh information table			0	R	Section 3.6.2
2H	2	Refresh information table (First half of link parameters)	Host station send range of W	Start number (0 to FFF)			Section 3.6.3
3H	3			Points (in units of words)			
4H	4		Other station send range (1) of W	Start number (0 to FFF)			
5H	5			Points (in units of words)			
6H	6		Other station send range (2) of W	Start number (0 to FFF)			
7H	7			Points (in units of words)			
8H	8		Host station send range of B	Start number (0 to FF0)			
9H	9			Points (in units of words)			
AH	10		Other station send range (1) of B	Start number (0 to FF0)			
BH	11			Points (in units of words)			
CH	12		Other station send range (2) of B	Start number (0 to FF0)			
DH	13			Points (in units of words)			
EH	14		Host station send range of Y	Start number (0 to 7F0)			
FH	15			Points (in units of words)			
10H	16		System area (Use prohibited)		-	-	-
11H	17		Host station receive range of X	Start number (0 to 7F0)	0	R	Section 3.6.3
12H	18			Points (in units of words)			
13H	19		System area (Use prohibited)		-	-	-
14H	20	Refresh information table (Latter half of link parameters)	Host station send range of W	Start number (0 to FFF)	0	R	Section 3.6.3
15H	21			Points (in units of words)			
16H	22		Other station send range (1) of W	Start number (0 to FFF)			
17H	23			Points (in units of words)			
18H	24		Other station send range (2) of W	Start number (0 to FFF)			
19H	25			Points (in units of words)			
1AH	26		Host station send range of B	Start number (0 to FF0)			
1BH	27			Points (in units of words)			
1CH	28		Other station send range (1) of B	Start number (0 to FF0)			
1DH	29			Points (in units of words)			
1EH	30		Other station send range (2) of B	Start number (0 to FF0)			
1FH	31			Points (in units of words)			
20H	32	Refresh information table (Send range of master station for the second tier)	Send range of master station for second tier (first half) of W	Start number (0 to FFF)			
21H	33			Points (in units of words)			
22H	34		Send range of master station for second tier (first half) of B	Start number (0 to FF0)			
23H	35			Points (in units of words)			
24H	36		Send range of master station for second tier (latter half) of W	Start number (0 to FFF)			
25H	37			Points (in units of words)			
26H	38		Send range of master station for second tier (latter half) of B	Start number (0 to FF0)			
27H	39			Points (in units of words)			

Table 3.10 Buffer memory list(Continued)

Address		Name		Initial value	Readable/ Writable*1	Reference section
Hexadecimal	Decimal					
28H to ABH	40 to 171	System area (Use prohibited)		-	-	-
ACH	172	LRDP instruction receive request		0	R	Section 3.6.4
ADH	173	System area (Use prohibited)		-	-	-
AEH	174	LWTP instruction receive request		0	R	Section 3.6.5
AFH	175	System area (Use prohibited)		-	-	-
B0H to D7H	176 to 215	LRDP instruction work area		0	R/W	Section 3.6.4
B8H to FFH	216 to 255	LWTP instruction work area				Section 3.6.5
100H to 103H	256 to 259	Link data storage area	Special relay (for link) (M9200 to M9255)	0	R	Section 3.6.6
104H to 10FH	260 to 271		System area (Use prohibited)	-	-	-
110H to 147H	272 to 327		Special register (for link) (D9200 to D9255)	0	R	Section 3.6.7
148H to 14FH	328 to 335		System area (Use prohibited)	-	-	-
150H to 1CFH	336 to 463		Input (X0 to X7FF)	0	R/W	Section 3.6.8
1D0H to 24FH	464 to 591		Output (Y0 to Y7FF)			
250H to 34FH	592 to 847		Link relay (B0 to BFFF)			Section 3.6.9
350H to 3FFH	848 to 1023		System area (Use prohibited)	-	-	-
400H to 13FFH	1024 to 5119		Link register (W0 to WFFF)	0	R/W	Section 3.6.10

* 1 Indicates whether reading/writing can be performed with a sequence program.
R: Readable, W: Writable

3.6 Details of Buffer Memory

This section describes details of a buffer memory of a local module.

3.6.1 Precautions

(1) Reading/writing a buffer memory

Read/write the buffer memory from/to the sequence scan where Refresh ready status (X7) is ON.

When the sequence scan is read/written to/from the sequence scan where Refresh ready status (X7) is OFF, the sequence scan time for the host station may be prolonged, or the CPU module may stop due to SP.UNIT DOWN.

(2) Buffer memory batch monitor/test of GX Developer

Buffer memory batch monitor/test of GX Developer cannot be used.

When executing buffer memory batch monitor/test of GX Developer, the sequence scan time for the host station may be prolonged, or the CPU module may stop due to SP.UNIT DOWN.

In addition, when the host station is offline, station-to-station test or self-loopback test, a communication error occurs to GX Developer.

When monitoring/testing link data storage area of a buffer memory, monitor/test the device of the refresh target CPU module.

Devices of the CPU module can be checked by the device batch monitor/test of GX Developer.

3.6.2 Presence or absence of refresh information table

Validity/invalidity of each table of refresh information table (buffer memory address: 2H to 27H) is stored.
The refresh information table is created at the time of receiving link parameters from the master station.

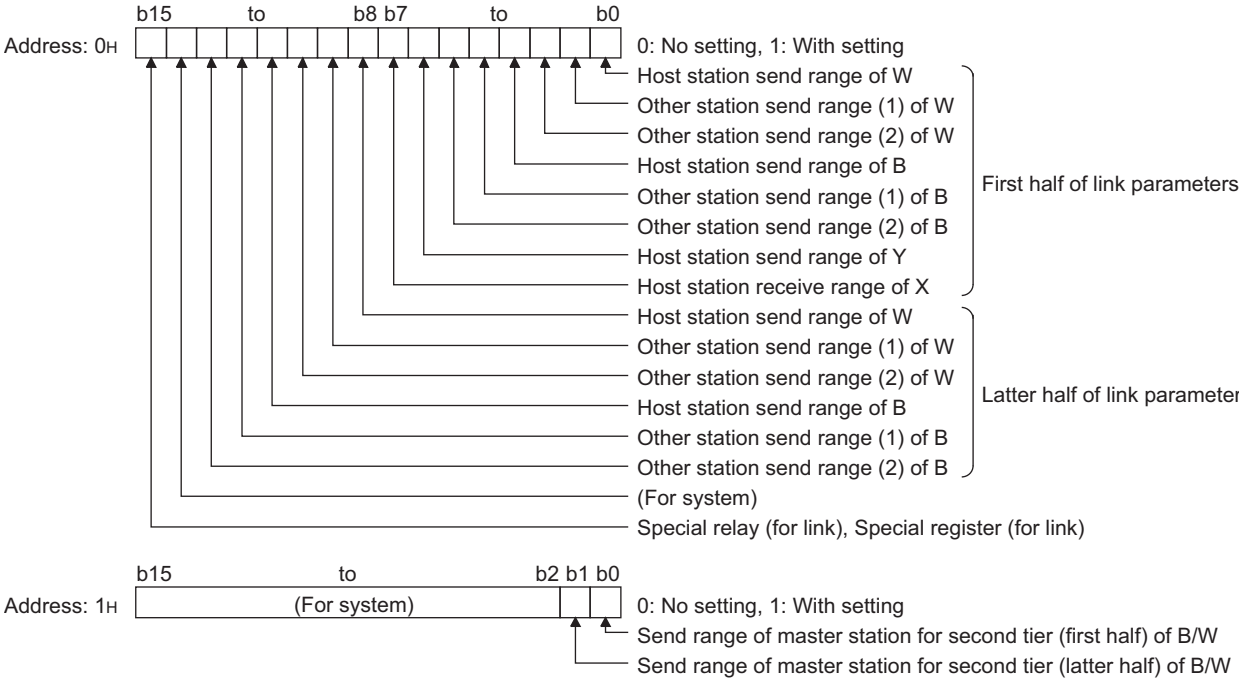


Figure 3.5 Presence or absence of refresh information table

3.6.3 Refresh information table

The refresh information table is stored.
Refresh devices of the local module and CPU module using the refresh information table in a sequence program.
☞ CHAPTER 7 PROGRAMMING

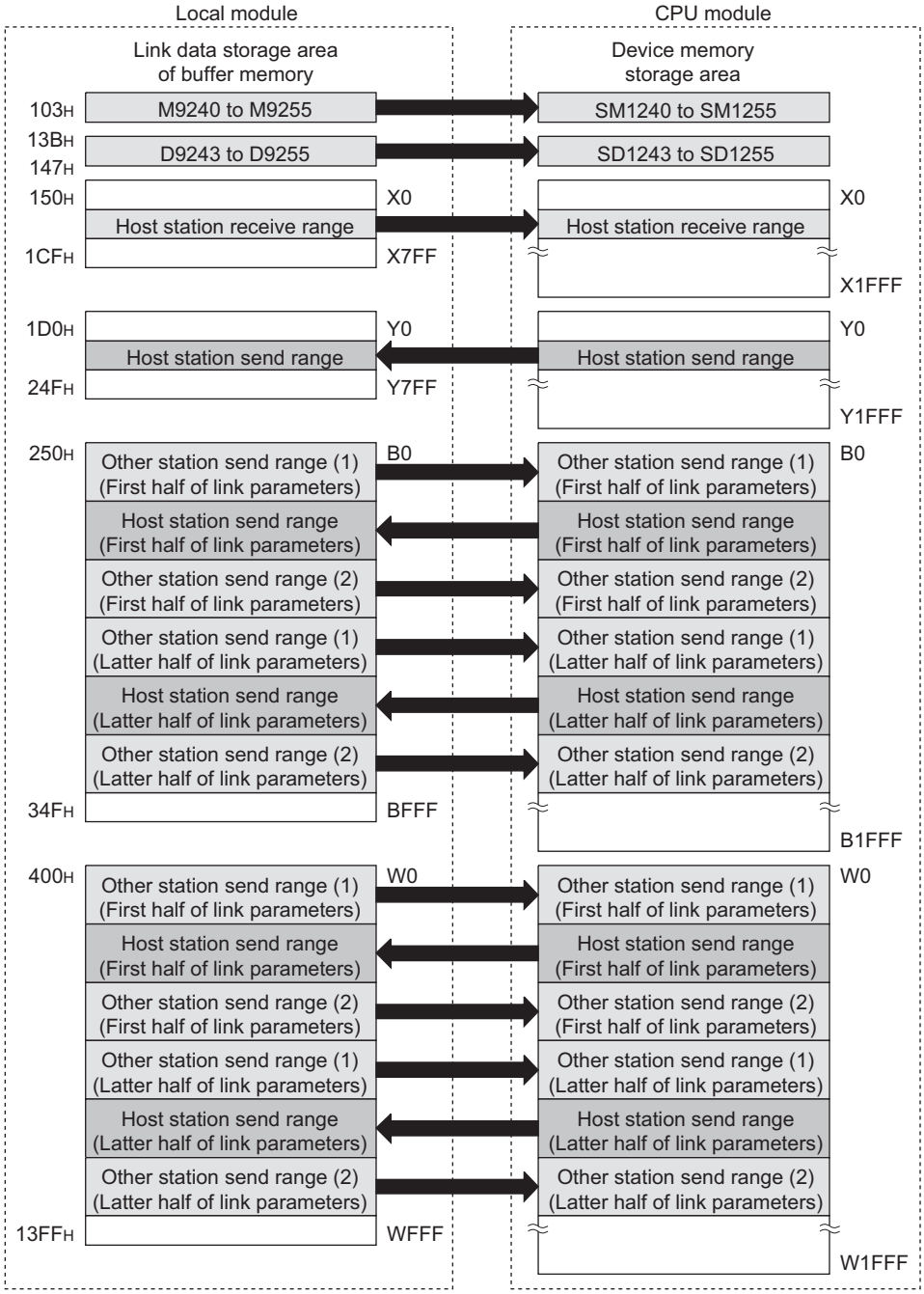


Figure 3.6 Refresh image

(1) Each station send range of B/W

When a local module is a local station in the second tier (L1 station), each station send range of B/W is stored as follows:

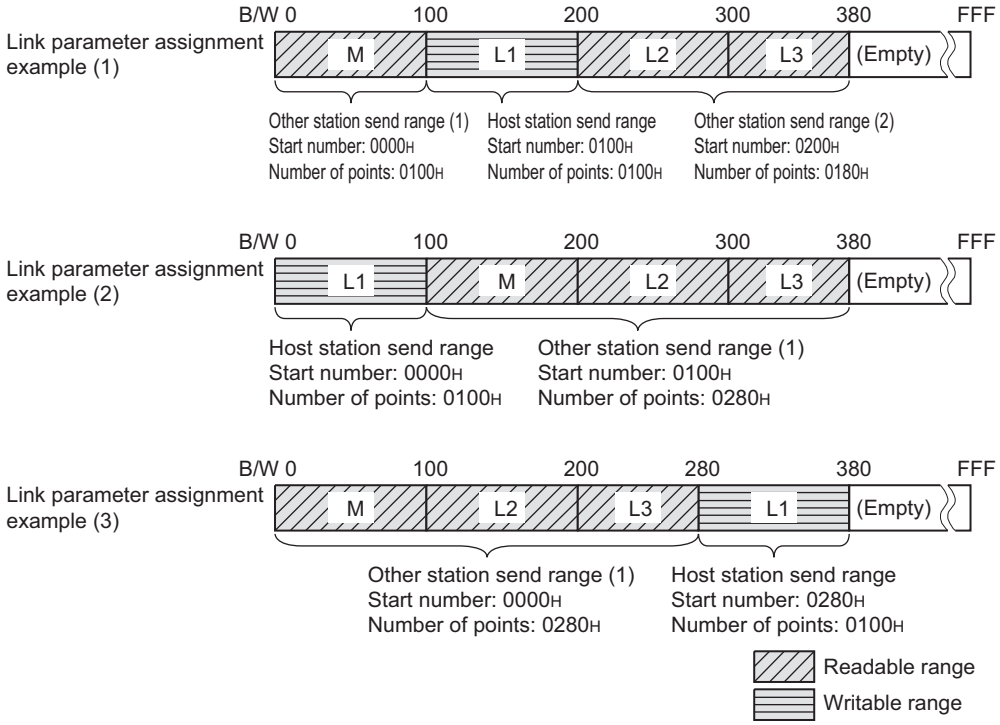


Figure 3.7 Each station send range of B/W for refresh information table

(2) Storage example of refresh information table

The following shows the storage example of refresh information table for the case where link parameters are set as shown below and a local module is a local station in the second tier (L1 station).

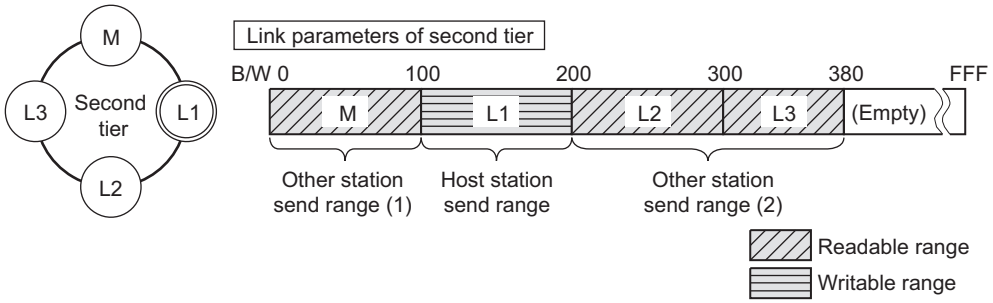


Figure 3.8 Link parameter setting

Table 3.11 Storage example of refresh information table

Address		Name			Stored value
Hexadecimal	Decimal				
2H	2	Refresh information table (First half of link parameters)	Host station send range of W	Start number (0 to FFF)	0100H
3H	3			Points (in units of words)	0100H
4H	4		Other station send range (1) of W	Start number (0 to FFF)	0000H
5H	5			Points (in units of words)	0100H
6H	6		Other station send range (2) of W	Start number (0 to FFF)	0200H
7H	7			Points (in units of words)	0180H
8H	8		Host station send range of B	Start number (0 to FF0)	0100H
9H	9			Points (in units of words)	0100H
AH	10		Other station send range (1) of B	Start number (0 to FF0)	0000H
BH	11			Points (in units of words)	0100H
CH	12		Other station send range (2) of B	Start number (0 to FF0)	0200H
DH	13			Points (in units of words)	0180H

3.6.4 LRDP instruction receive request/receive result/work area

When a device read (LRDP instruction) is requested to a Q series local station from the master station, execute receive processing to the LRDP instruction in a sequence program.

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The following shows operations of a local module at the time of receiving the LRDP instruction.

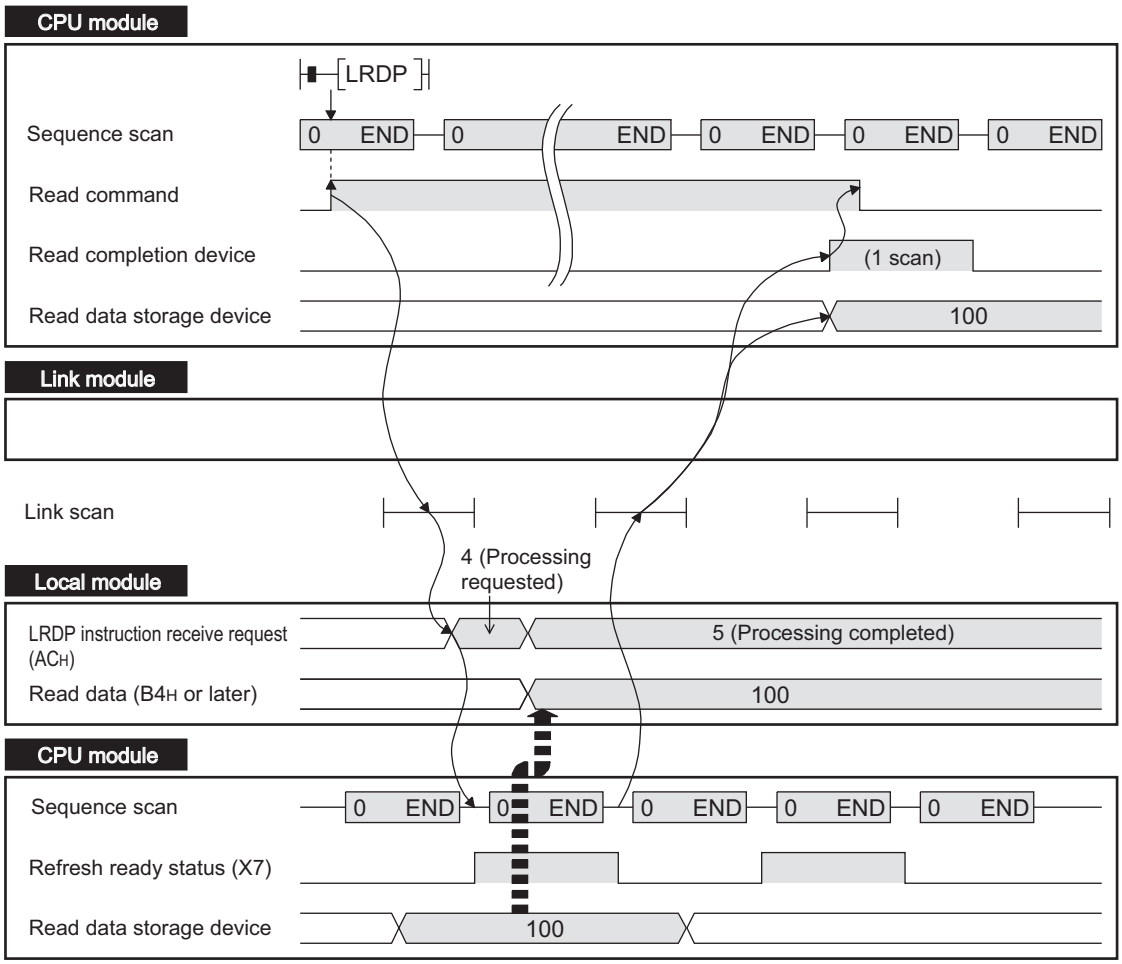


Figure 3.9 Operation of local module at the time of receiving LRDP instruction

(1) LRDP instruction receive request (Buffer memory address: ACH)

The receive request for the LRDP instruction is stored.
4: Processing requested (System sets it when LRDP instruction is accepted.)
5: Processing completed (User has to set it after the read data is stored.)
Other than the above: No request

(2) LRDP instruction work area (Buffer memory address: B0H to D7H)

When the LRDP instruction receive request (buffer memory address: ACH) is "4", the requested content of the LRDP instruction is stored into the following area.

1) Read the read data (buffer memory address: B4H to D7H) of a local module to the devices of the CPU module using the following area in a sequence program.
2) After reading data, set "5" to the LRDP instruction receive request (buffer memory address: ACH).
3) Send the data which is stored in the read data (buffer memory address: B4H to D7H) to the master station.

Table 3.12 LRDP instruction work area

Address Hexadecimal (Decimal)	Item	Description
B0H(176)	Read start device name*1	Stores a start device name (device code) of the CPU module. 544EH: T 434EH: C 4420H: D 5720H: W
B1H(177)	Read start device No.*1	Stores a start device No. of the CPU module.
B2H(178)	System area (Use prohibited)	-
B3H(179)	Read data length	Stores the number of data to be read. 1 to 32 (Word)
B4H to D7H (180 to 215)	Read data	Stores the data to be read.

* 1 Stored value when start device is D100

Table 3.13 Stored value when start device is D100

Address Hexadecimal (Decimal)	Item (description)	Stored value
B0H(176)	Read start device name (D)	4420H
B1H(177)	Read start device No. (100)	0064H

3.6.5 LWTP instruction receive request/receive result/work area

When a device write (LWTP instruction) is requested to a Q series local station from the master station, execute receive processing to the LWTP instruction in a sequence program.

☞ CHAPTER 7 PROGRAMMING

The following shows operations of a local module at the time of receiving the LWTP instruction.

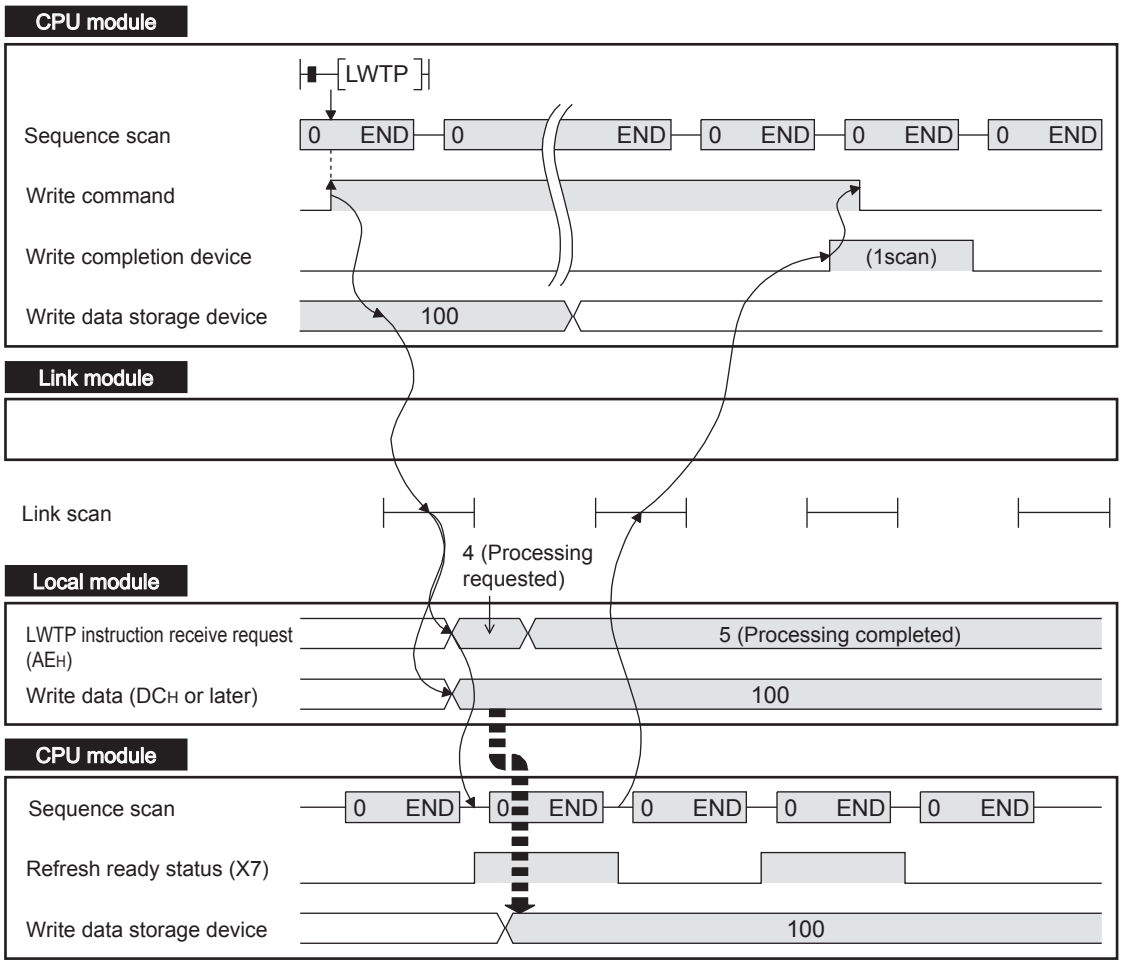


Figure 3.10 Operation of local module at the time of receiving LWTP instruction

(1) LWTP instruction receive request (Buffer memory address: AEH)

The receive request for the LWTP instruction is stored.
4: Processing requested (System sets it when LWTP instruction is accepted.)
5: Processing completed (User has to set it after the write data is stored.)
Other than the above: No request

(2) LWTP instruction work area (Buffer memory address: D8H to FFH)

When the LWTP instruction receive request (buffer memory address: AEH) is "4", the requested content of the LWTP instruction is stored into the following area.)

1) Write the write data of a local module to the device of the CPU module (buffer memory address: DCH to FFH) using the following area in a sequence program.
2) After writing data, set "5" to the LWTP instruction receive request (buffer memory address: AEH).
3) The processing completion is notified to the master station.

Table 3.14 LWTP instruction work area

Address Hexadecimal (Decimal)	Item	Description
D8H(216)	Write start device name*1	Stores a start device name (device code) of the CPU module. 544EH: T 434EH: C 4420H: D 5720H: W
D9H(217)	Write start device No.*1	Stores a start device No. of the CPU module.
DAH(218)	System area (Use prohibited)	-
DBH(219)	Write data length	Stores the number of write data. 1 to 32 (Word)
DCH to FFH (220 to 255)	Write data	Stores the write data.

* 1 Stored value when start device is D100

Table 3.15 Stored value when start device is D100

Address Hexadecimal (Decimal)	Item (description)	Stored value
D8H(216)	Write start device name (D)	4420H
D9H(217)	Write start device No.(100)	0064H

3.6.6 Special relay (for link) (M9200 to M9255)

Data of a special relay (for link) (M9200 to M9255) is stored.
Refresh devices of the CPU module and the data in this area in a sequence program.
The following shows refresh of special relay (for link) (M).
For details of a special relay (for link), refer to the following.
☞ Appendix 1 List of Special Relays (for Link)

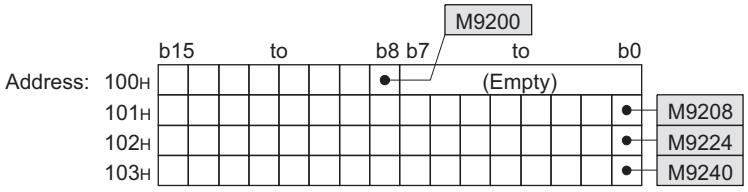


Figure 3.11 Special relay (for link) (M9200 to M9255)

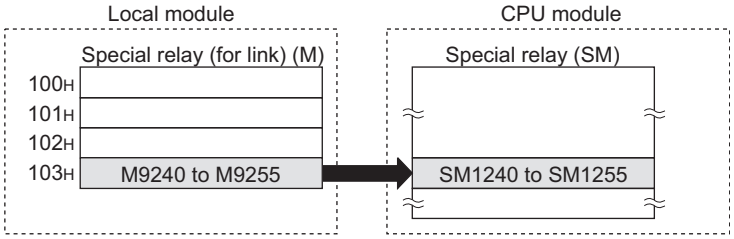


Figure 3.12 Refresh of special relay (for link) (M)

3.6.7 Special register (for link) (D9200 to D9255)

Data of a special register (for link) (D9200 to D9255) is stored.
Refresh devices of the CPU module and the data in this area in a sequence program.
The following shows refresh of special register (for link) (D).
For details of a special register (for link), refer to the following.
☞ Appendix 2 List of Special Registers (for Link)

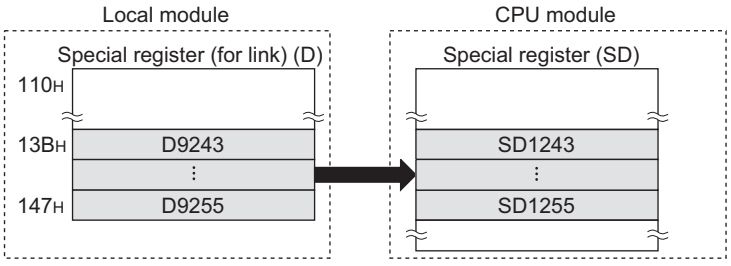


Figure 3.13 Refresh of special register (for link) (D)

3.6.8 Input (X0 to X7FF) and output (Y0 to Y7FF)

Data of input (X0 to X7FF) and output (Y0 to Y7FF) of X/Y communication is stored. Refresh devices of the CPU module and the data in this area using the following area in a sequence program.

- Presence or absence of refresh information table (Buffer memory address: 0H, 1H)
- Refresh information table (Buffer memory address: 2H to 27H)

The following shows the refresh of input (X) and output (Y) when link parameters are set as follows:

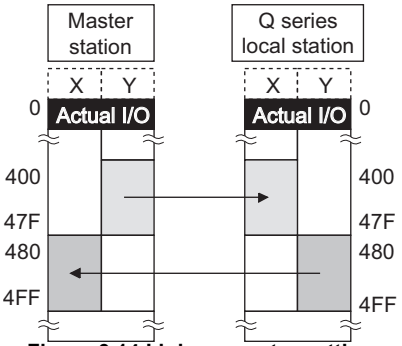


Figure 3.14 Link parameter setting

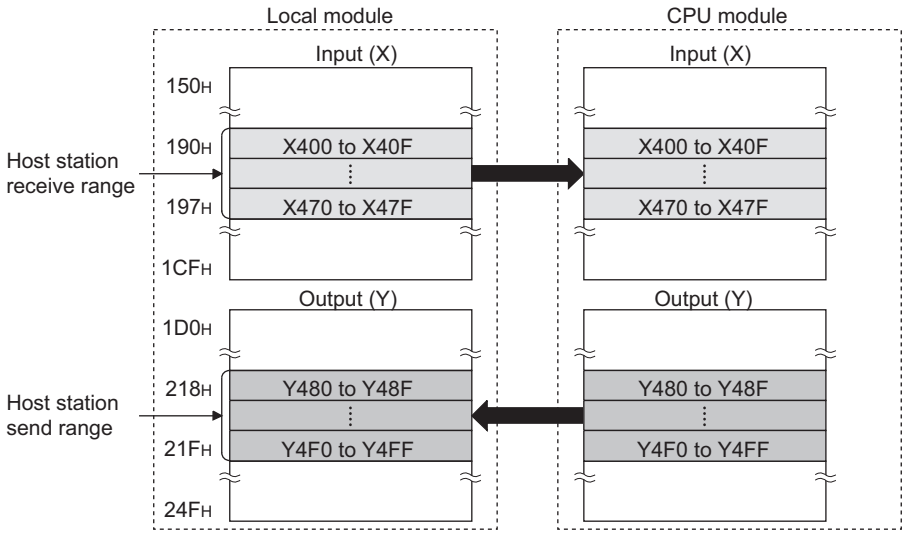


Figure 3.15 Refresh of input (X) and output (Y)

3.6.9 Link relay (B0 to BFFF)

The data of a link relay (B0 to BFFF) for the B/W communication is stored.
Refresh devices of the CPU module and the data in this area using the following area in a sequence program.

- Presence or absence of refresh information table (Buffer memory address: 0H, 1H)
- Refresh information table (Buffer memory address: 2H to 27H)

The following shows the refresh of a link relay (B) for the case where link parameters are set as shown below and a local module is a local station in the third tier (I1 station).

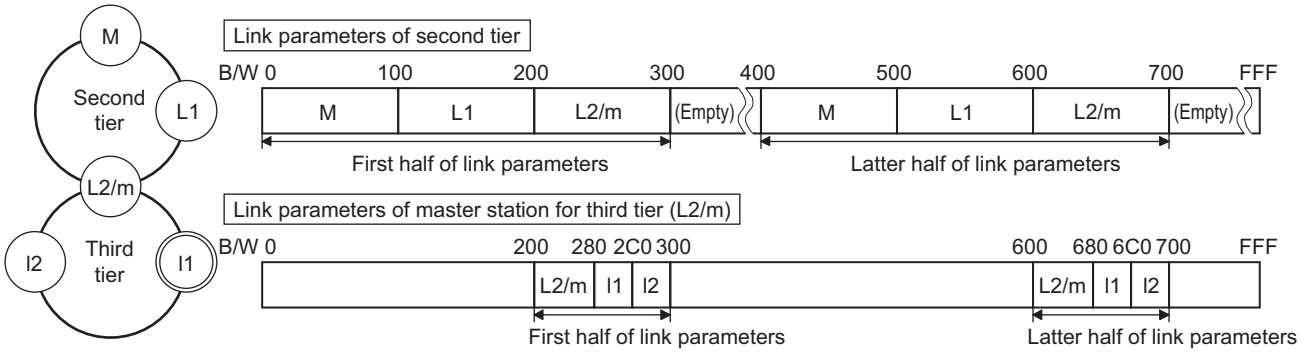


Figure 3.16 Link parameter setting

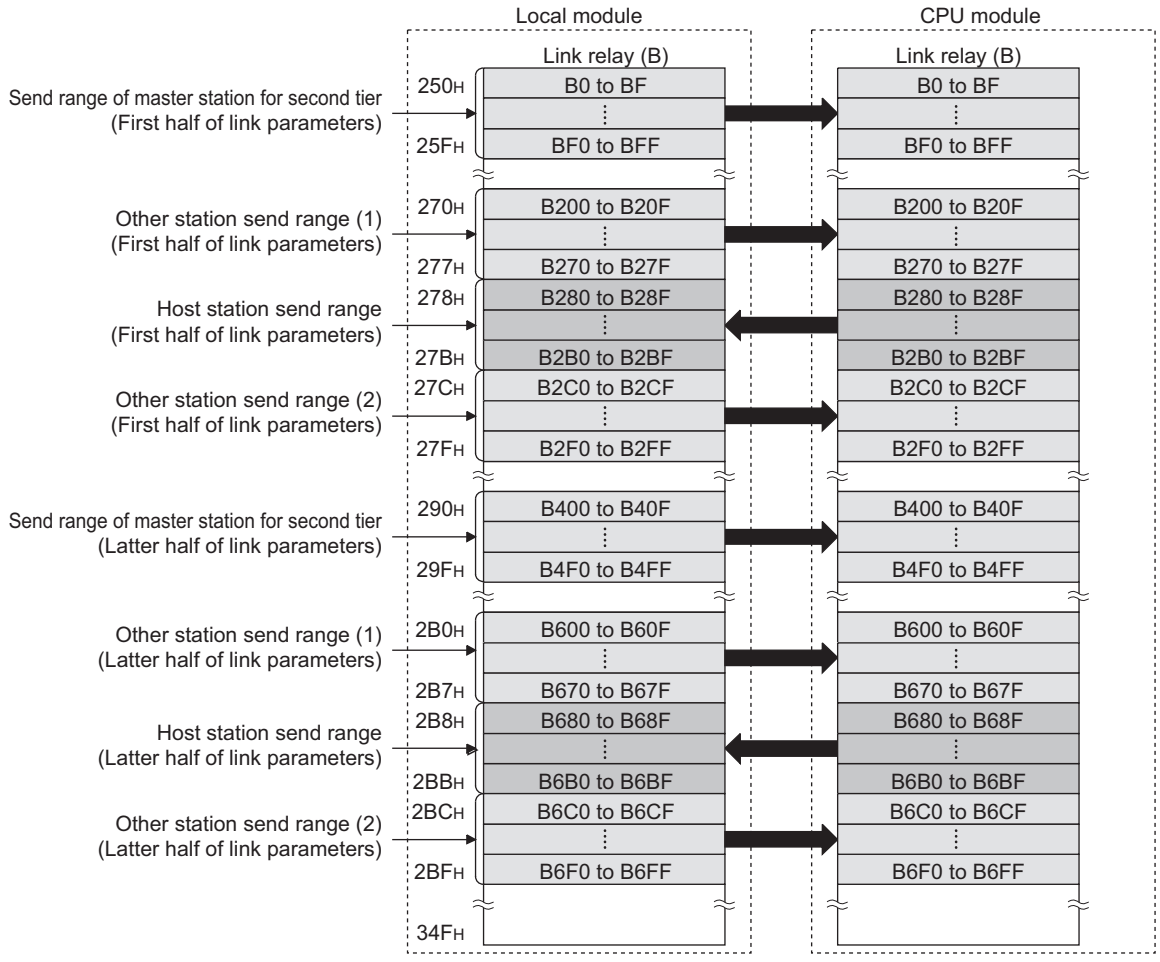


Figure 3.17 Refresh of link relay (B)

3.6.10 Link register (W0 to WFFF)

The data of a link register (W0 to WFFF) for the B/W communication is stored.
Refresh devices of the CPU module and the data in this area using the following area in a sequence program.

- Presence or absence of refresh information table (Buffer memory address: 0H, 1H)
- Refresh information table (Buffer memory address: 2H to 27H)

The following shows the refresh of a link register (W) for the case where link parameters are set as shown below and a local module is a local station in the third tier (I1 station).

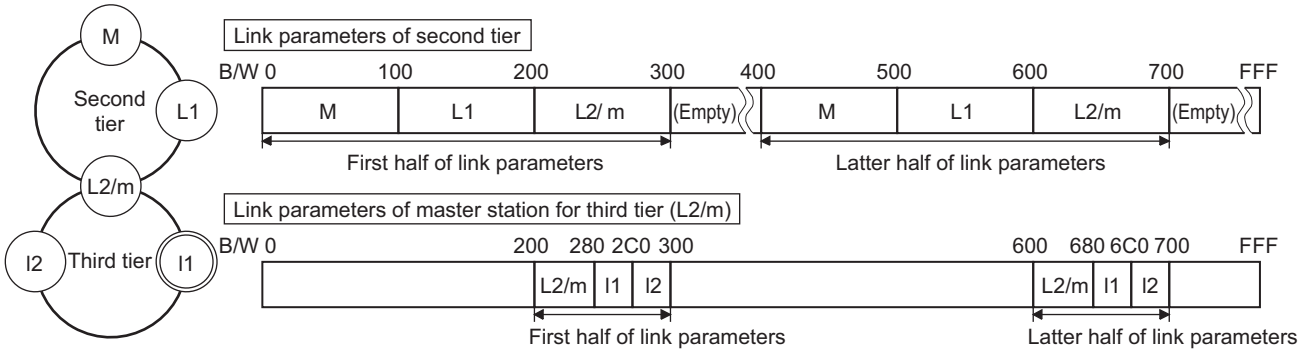


Figure 3.18 Link parameter setting

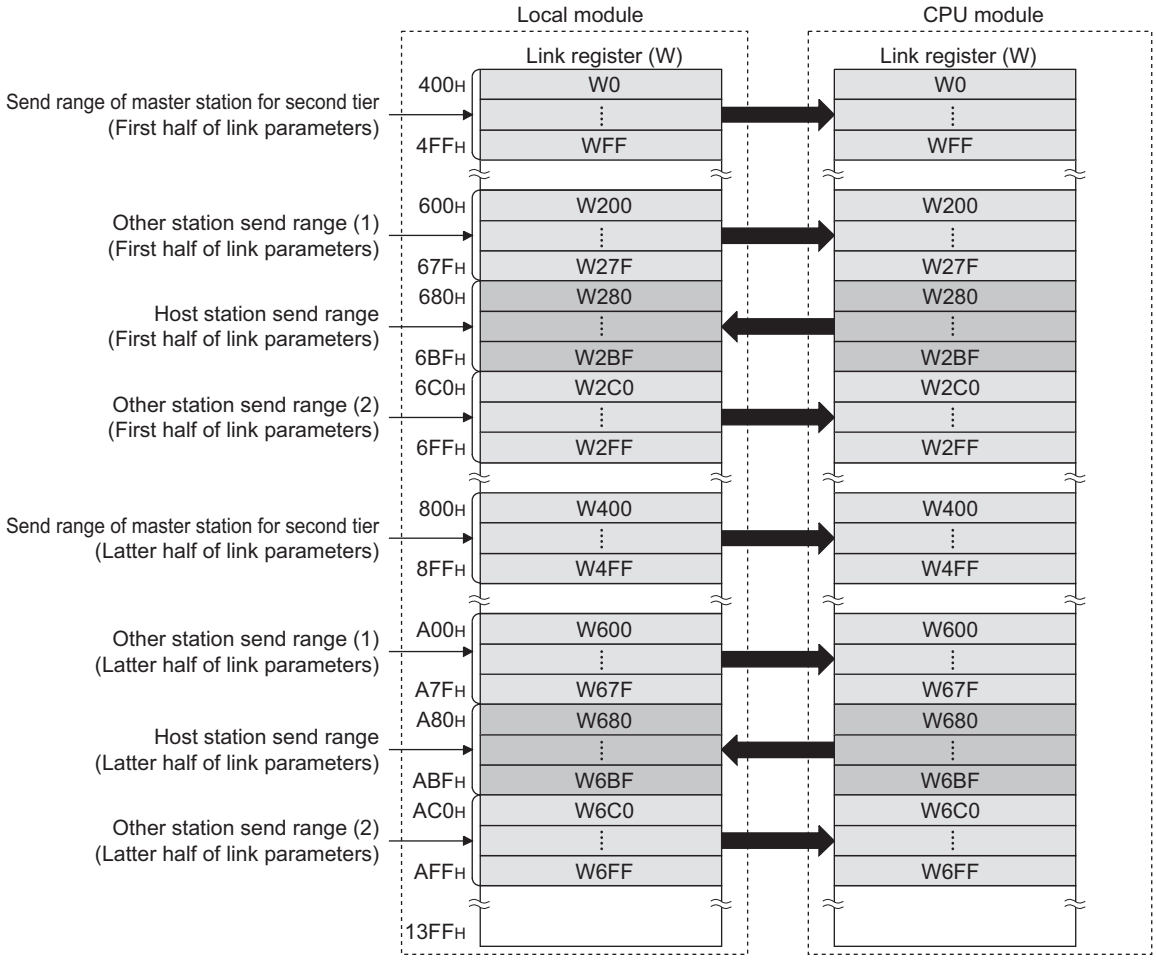


Figure 3.19 Refresh of link register (W)

CHAPTER4 FUNCTIONS

This chapter describes the functions of the local module.

4.1 Cyclic Transmission Function

This function allows cyclic data communication between master and local stations.

4.1.1 1 : n communication (B/W communication)

Data are written to the host station send range in the link relay (B) and link register (W), and they are sent to other stations.
The link relay (B) handles ON/OFF information, and the link register (W) sends and receives 16-bit data.

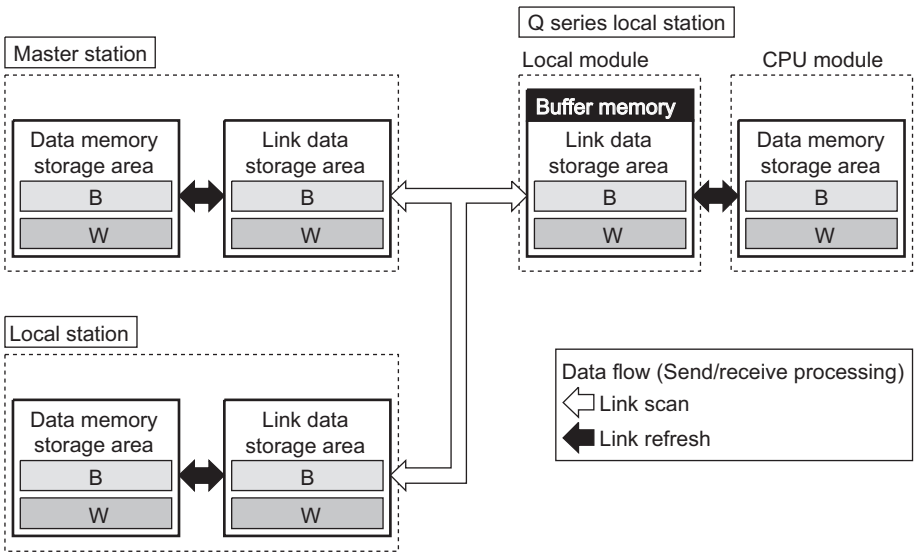


Figure 4.1 B/W communication data flow

(1) Each station send range in B/W

Each station send range in B/W is set up with link parameters of the master station. The following explains a link parameter setting example and send/receive ranges for local modules.

(a) Link parameter setting example

Link parameters must be set to the master station for the second tier (M) and the master station for the third tier (L2/m).

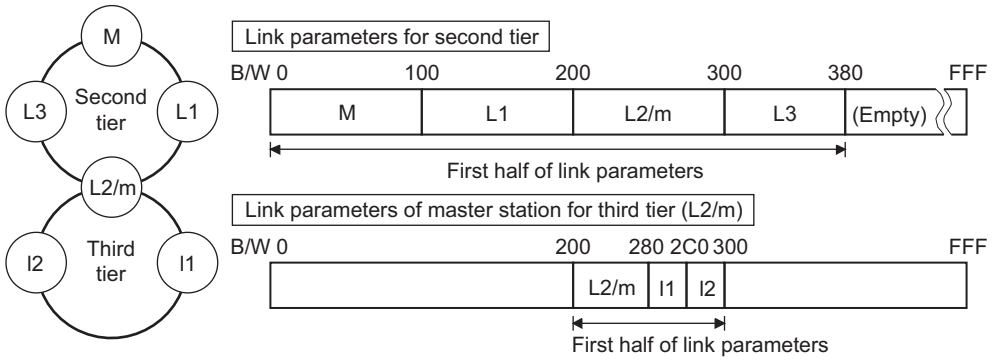


Figure 4.2 Link parameter setting example

(b) Send/receive ranges when the local module is on the second-tier local station (L1)

1) L1 station writes data into the range of B/W100 to 1FF, and sends them to other stations.

2) It can receive data written by other stations within the ranges of B/W0 to FF and B/W200 to 37F.

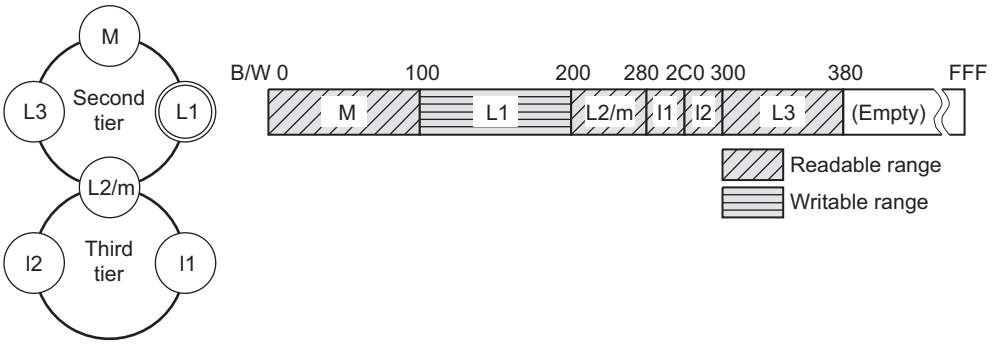


Figure 4.3 Send/receive ranges when the local module is on the second-tier local station (L1)

(c) Send/receive ranges when the local module is on the third-tier local station (I1)

1) I1 station writes data into the range of B/W280 to 2BF, and sends them to other stations.

2) It can receive data written by other stations within the ranges of B/W0 to FF, B/W200 to 27F, and B/W2C0 to 2FF.

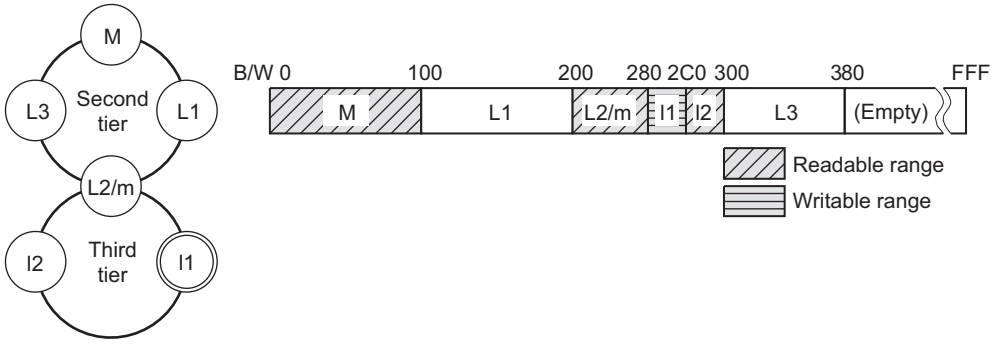


Figure 4.4 Send/receive ranges when the local module is on the third-tier local station (I1)

(2) Link refresh of link data

Q series local stations refresh link data using the sequence program. Note that refresh is not executed when the CPU module is in STOP status.

☞ CHAPTER 7 PROGRAMMING

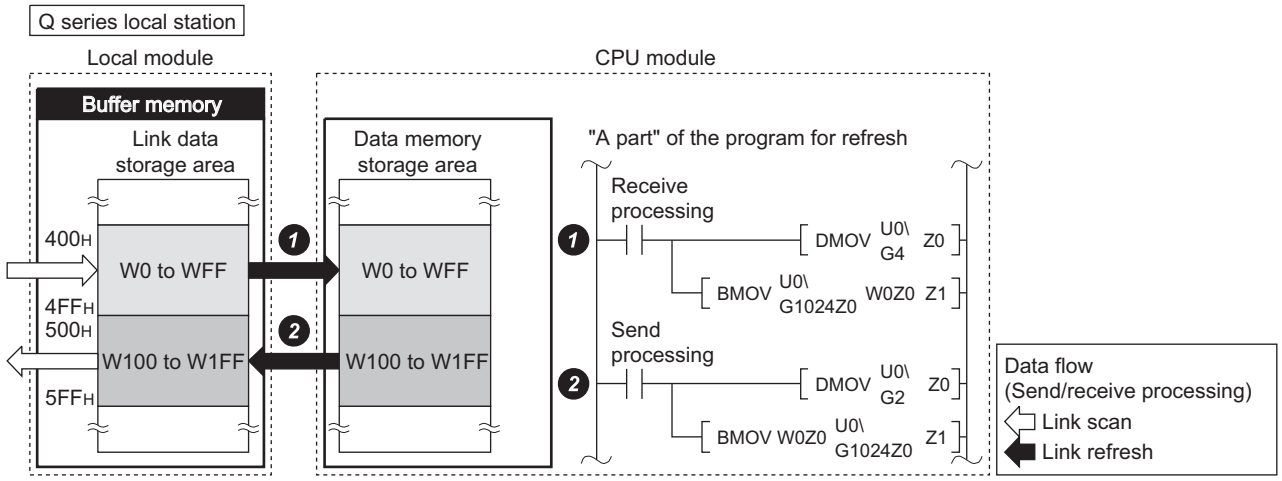


Figure 4.5 Link refresh of link data (Q series local station)

(3) B/W communication example

The following illustrates an example where link relay (B) data are transferred between the master station and a Q series local station (L1).

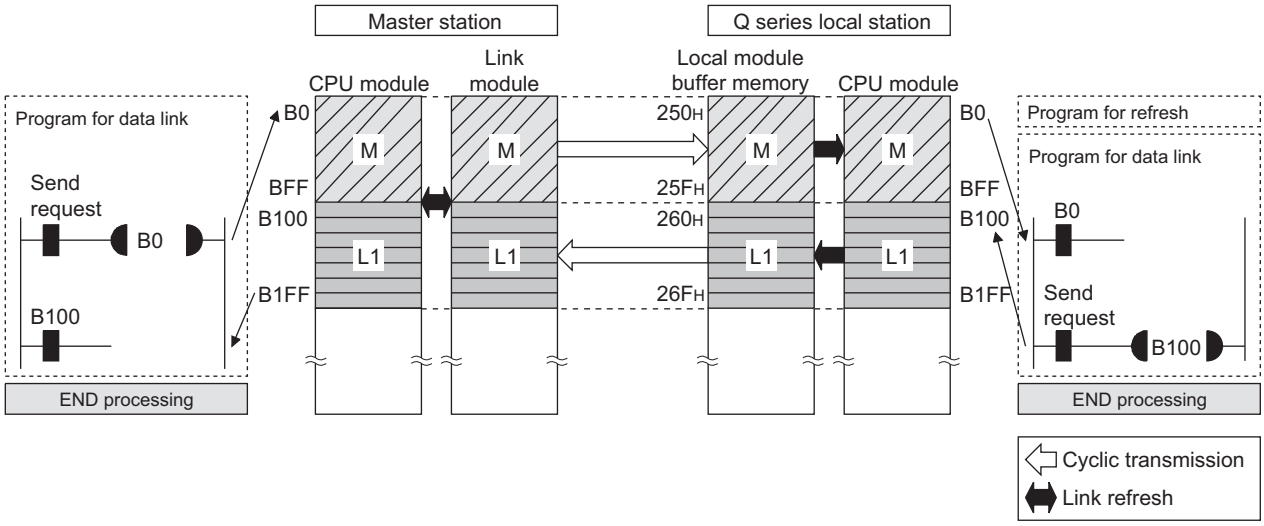


Figure 4.6 B/W communication example

4.1.2 1 : 1 communication (X/Y communication)

Using a part of the I/O points assigned to a master station and a local station, one-to-one data communication is performed between the master and local stations.
The sending and receiving sides are regarded as output (Y) and input (X) respectively.

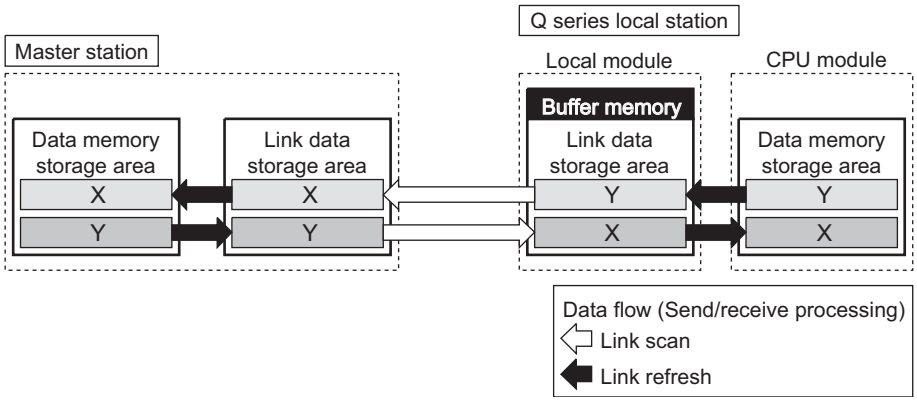


Figure 4.7 X/Y communication data flow

(1) I/O ranges in X/Y

The I/O ranges of X/Y are set up with link parameters of the master station.

(2) Link refresh of link data

Q series local stations refresh link data using the sequence program. Note that refresh is not executed when the CPU module is in STOP status.
☞ CHAPTER 7 PROGRAMMING

(3) X/Y communication example

The following illustrates an example where input (X) and output (Y) data are transferred between the master station and a Q series local station.

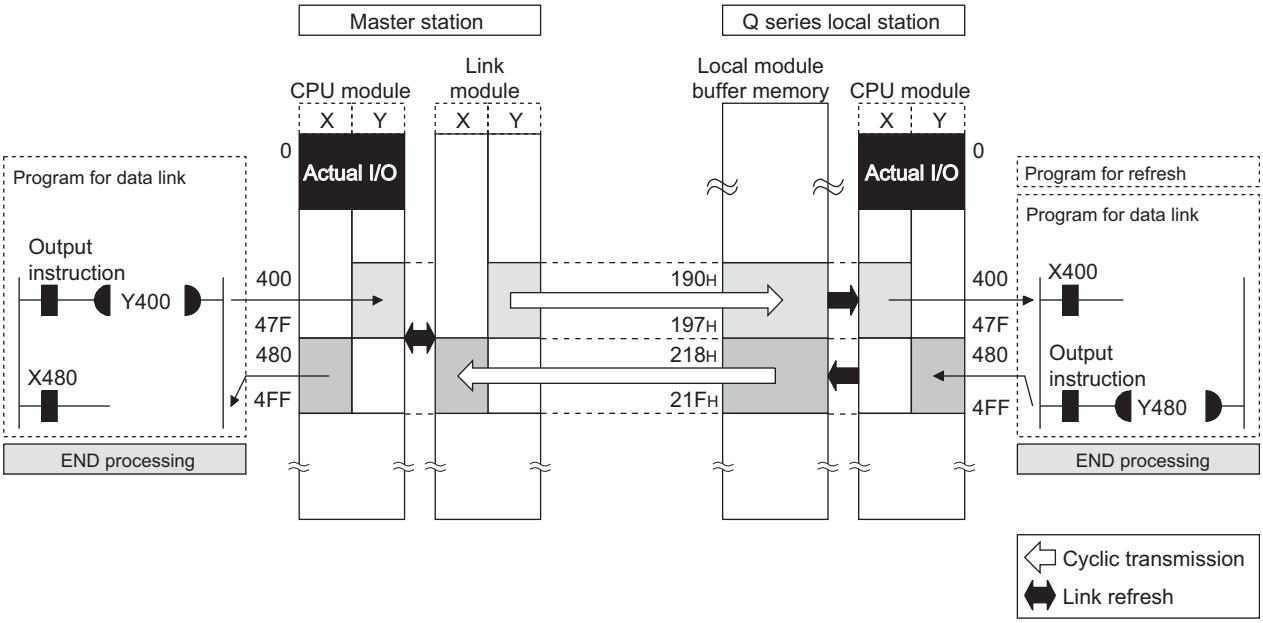


Figure 4.8 X/Y communication example

4.2 Transient Transmission Function

When a transient request is made, this function allows data communication between a master station and a local station.

(1) Communication from a master station to a local station

(a) Communication from a master station to a local station
By executing the LRDP/LWTP instruction in the sequence program of the master station, data can be read from or written to local station devices (T, C, D, W).

(b) LRDP/LWTP instruction receive processing
Q series local stations handle the reception of the LRDP/LWTP instruction with the sequence program.
If the LRDP/LWTP instruction is received when the CPU module is in STOP status, the local module will send an error response to the master station (4: LRDP/LWTP inexecutable on the station).
☞ CHAPTER 7 PROGRAMMING

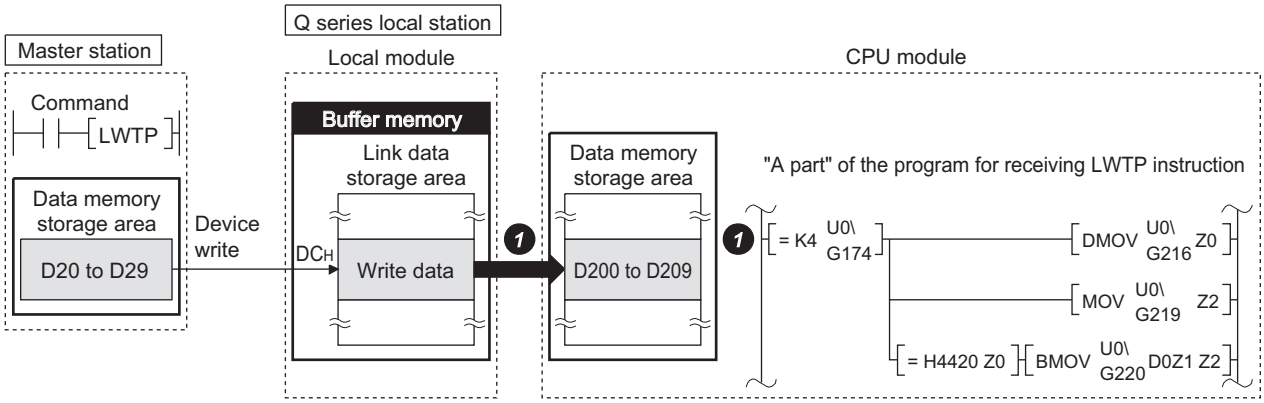


Figure 4.9 LWTP instruction receive processing (Q series local station)

(2) Access from a peripheral or intelligent function module to another station

Access to another station is not allowed for any peripheral (GX Developer, GOT, etc.) and intelligent function module (e.g. serial communication module) connected to a Q series local station.

Also, any peripheral and special function module connected to the master station cannot access any Q series local station.

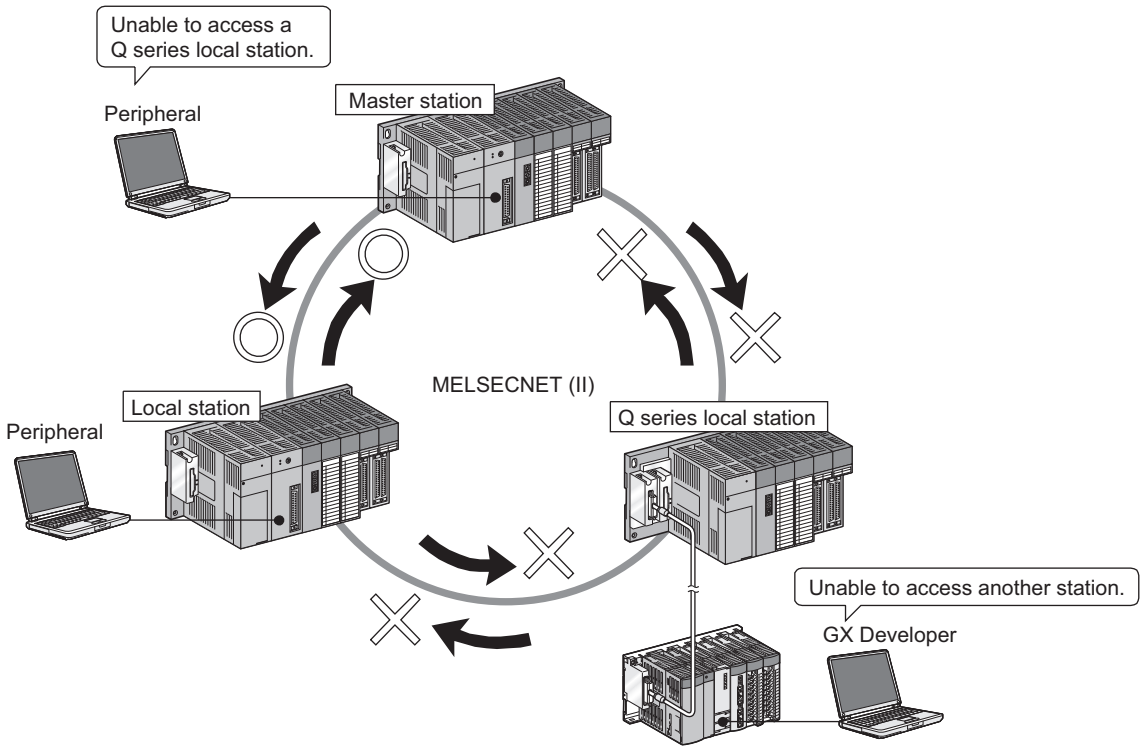


Figure 4.10 Access from a peripheral or intelligent function module to another station

Remark

Peripherals and special function modules connected to a CPU module can access another station via MELSECNET (II).

The table below shows which station is accessible from a station with a peripheral. For executable functions, refer to the following manual.

☞ Manual for the relevant peripheral or special function module.

Table 4.1 Station accessible from a station with a peripheral

Station with peripheral (Access source)	Accessible station (Access destination)			
	Master station	Local station (A/QnA series)	Local station (Q series)	Remote I/O station
Master station	○	○	×	○ *1
Local station (A/QnA series)	○	× (○ for host)	×	×
Local station (Q series)	×	×	×	×
Remote I/O station	○	×	×	×

○: Accessible, ×: Not accessible

* 1 Not accessible when GX Developer is used.

4.3 RAS Functions

This chapter explains the RAS functions.

4.3.1 Automatic return function

When a local station disconnected due to a data link error is recovered, this function allows the station to automatically return to the network and to restart data link.
The automatic return function is set by the mode setting switch of each link module.
☞ Section 5.3 Part Names and Settings
Conditions for reconnecting a disconnected station vary depending on whether the automatic return function is supported or not, as shown below.

(1) When data link is interrupted due to an error in a master station

Table 4.2 Conditions for reconnecting a disconnected station depending on whether the automatic return function is supported or not

Automatic return function		Conditions for reconnecting a disconnected station (local station)
Master station	Local station	
Supported	Supported	Automatically reconnected after the faulty part of the master station is corrected.
	Not supported	Take actions to correct the faulty part of the master station. Reset the master station, and then the disconnected station.
Not supported	Supported	Automatically reconnected after the faulty part of the master station is corrected.
	Not supported	Take actions to correct the faulty part of the master station. Reset the disconnected station, and then the master station.

(2) When a station is disconnected due to an error occurred in the station

Table 4.3 Conditions for reconnecting a disconnected station depending on whether the automatic return function is supported or not

Automatic return function		Conditions for reconnecting a disconnected station (local station)
Master station	Local station	
Supported	Supported	Automatically returns after the faulty part of the disconnected station is corrected.
	Not supported	Take actions to correct the faulty part of the disconnected station. Reset the disconnected station.
Not supported	Supported	Take actions to correct the faulty part of the disconnected station. Reset the disconnected station and the local station without automatic return function, and then the master station.
	Not supported	

4.3.2 Loopback function

This function disconnects a faulty part such as a disconnected cable or a faulty station from the network, allowing data link to continue among normally operating stations. (Not provided for the MELSECNET/B data link system)
Normally, data link is performed using the forward loop.

(1) When an error occurs on the forward loop

When a cable disconnection or a cable connector failure occurs on the forward loop, data link using the forward loop is not executable.
In such a case, the system automatically switches the line from the forward loop to the reverse loop to continue data link.

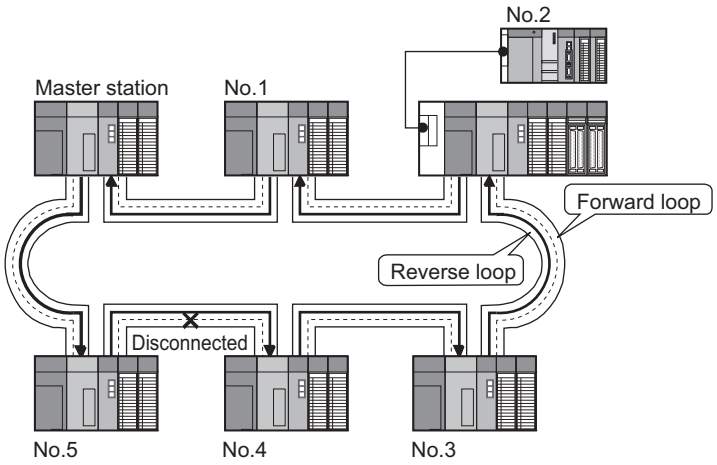


Figure 4.11 When an error occurs on the forward loop

(2) When errors occur on the forward and reverse loops

When cable disconnections or cable connector failures occur on the forward and reverse loops, data link using these loops is not executable.
Viewing from the master station, loopback occurs at the station just before the fault, and data link is performed among data-link-executable stations only. (All stations located between the faulty stations are disconnected.)

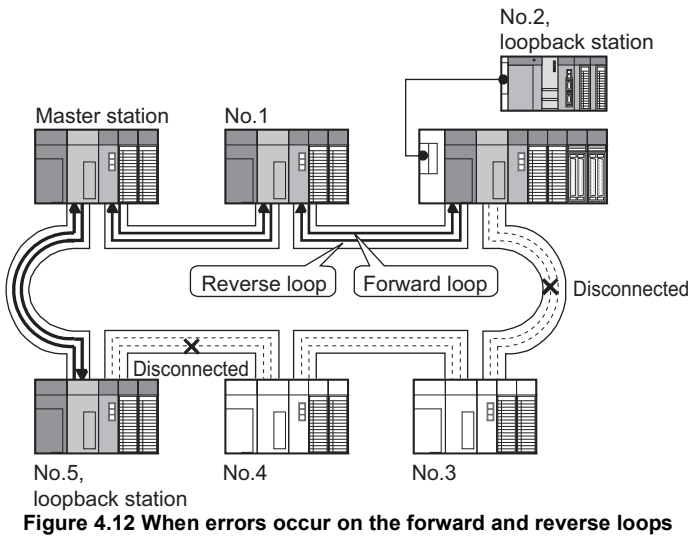


Figure 4.12 When errors occur on the forward and reverse loops

(3) When a local station is powered down

When power of a local station is turned OFF, data link is disabled.
Viewing from the master station, loopback occurs at the station just before the faulty station, and data link is performed among data-link-executable stations only. (The power-off station is disconnected.)

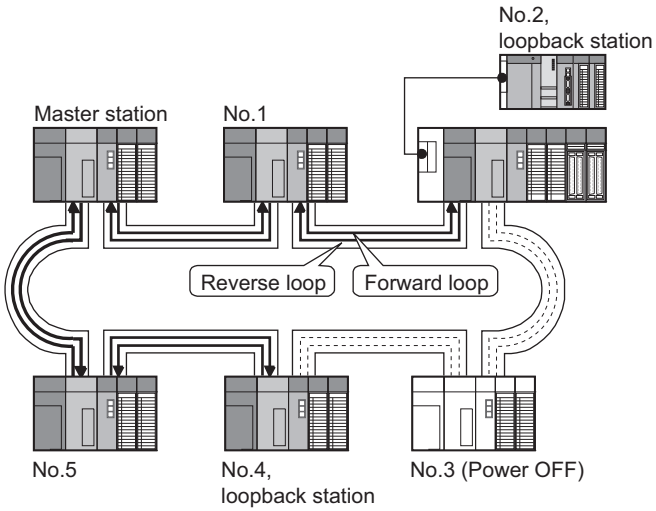


Figure 4.13 When a local station is powered down

4.3.3 Error detection function

Data of the special relay (for link) and special register (for link) of a local module are refreshed into CPU module devices.
With the refreshed devices, the data link status or a faulty part can be checked.
For details of the special relay (for link) and special register (for link), refer to the following.

☞ ▪ Appendix 1 List of Special Relays (for Link)
▪ Appendix 2 List of Special Registers (for Link)

Note that the network diagnostics of GX Developer is not available for Q series local stations. Check the data link status or a faulty part in the above-mentioned way.

CHAPTER5 PREPARATORY PROCEDURES BEFORE OPERATION

This chapter describes the procedures up to connect a local module to the network and wiring procedures.

5.1 Implementation and Installation

This section describes handling precautions, from unpacking to installation of the local module.
For details of the implementation and installation of the local module, refer to the following:

- For Q series
  ☞ QCPU User's Manual (Hardware Design, Maintenance and Inspection)
- For L series
  ☞ MELSEC-L LA1S Extension Base Unit User's Manual

5.1.1 Handling precautions

The following describes precautions for handling the single local module.

(1) Do not drop or give strong impact on the module, since its case is made of resin.

(2) Do not remove a printed-circuit board of the module from a case. Doing so may cause failure.

(3) Be careful to prevent foreign matter such as wire chips from entering the module top at the time of wiring.

(4) Tighten a module mounting screw or a terminal screw within the following range.

Table 5.1 Screw tightening torque

Screw	Tightening torque range
Terminal screw for cable terminal block (M3.5 screw)	59 to 88N・cm
Mounting screw for cable terminal block (M3.5 screw)	59 to 88N・cm
Module mounting screw (M4 screw)	78 to 118N・cm

5.2 Preparatory Procedures before Operation

This section describes the outline of preparatory procedures before operation.

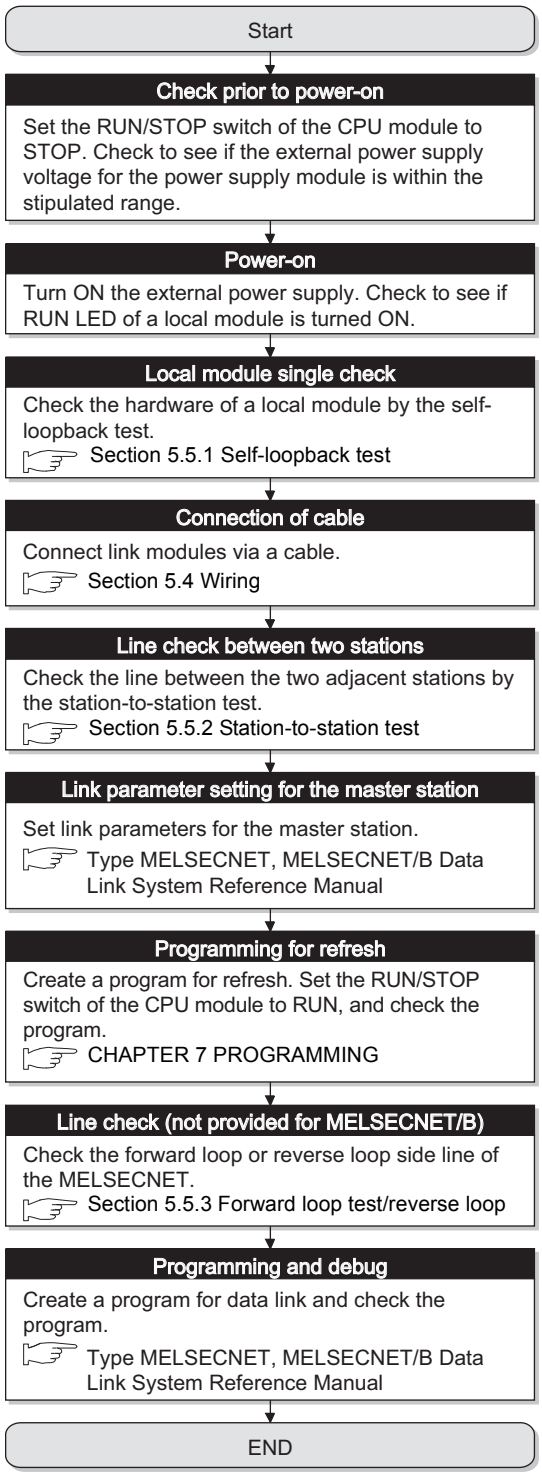


Figure 5.1 Preparatory procedures before operation

POINT

The link parameter setting (refresh parameter) is not required for a Q series local station since refresh is performed in a sequence program.

5.3 Part Names and Settings

This chapter describes the part names and settings of the local module.

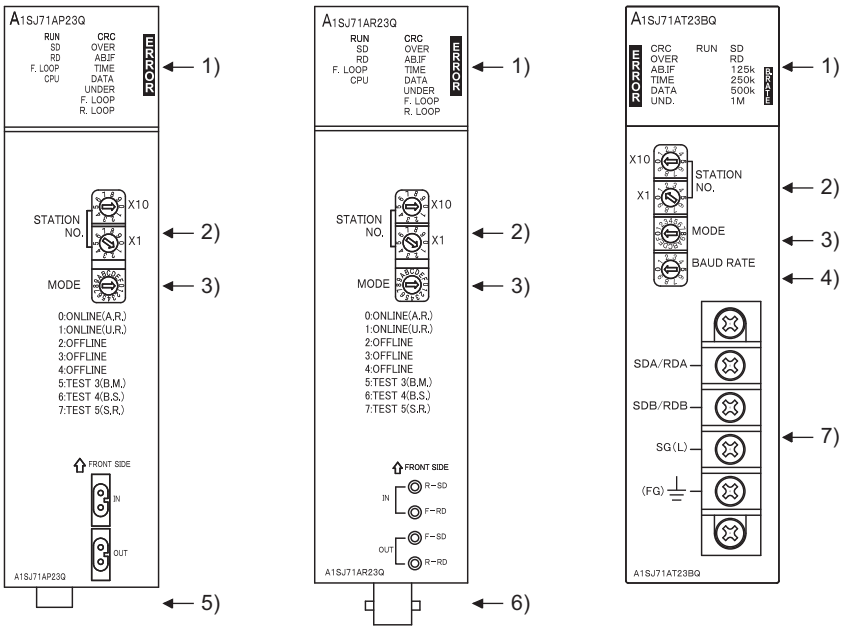


Figure 5.2 Outside drawing of local module

Table 5.2 Part names and settings

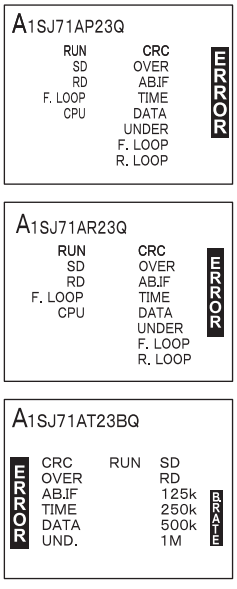
No.	Name	Description		
		Name	**Status**	**Description**
1)	LED 	RUN	ON	Data link normal
		SD		Data sending
		RD		Data receiving
		F.LOOP		Forward loop side receives data (OFF: Reverse loop side receives data)
		CPU		Communication with CPU module in execution
		125k	ON	Setting status of communication speed (A1SJ71AT23BQ)
		250k		
		500k		
		1M		
		CRC	ON (OFF if normal)	Code check error of receive data
		OVER		The processing of receive data has been delayed.
		AB.IF		•"1" has been received consecutively more than stipulated times. •Receive data length is shorter than stipulated length.
		TIME		Data link monitoring time is over.
		DATA		The data of error code has been received.
		UNDER		Internal processing of send data is not executed constantly.
		UND.		
		F.LOOP		Receive error at forward loop side
		R.LOOP		Receive error at reverse loop side

Table 5.2 Part names and settings(Continued)

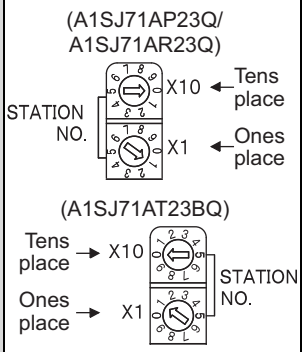
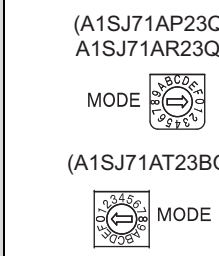
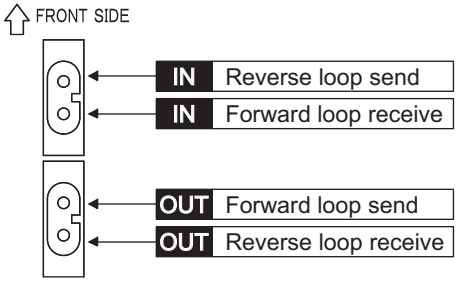
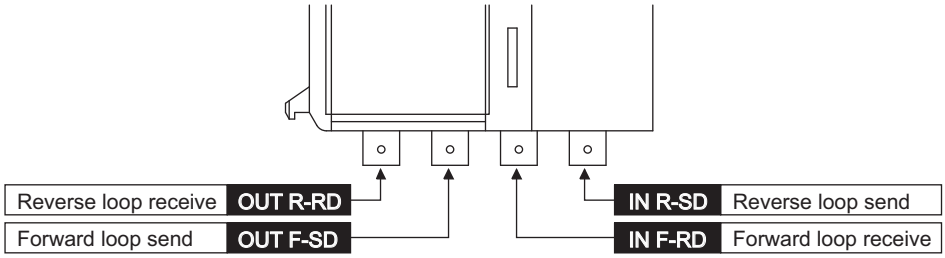
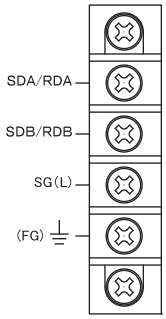
<table>
<tr><th>No.</th><th>Name</th><th>Description</th></tr>
<tr><td>2)</td><td>Station No. setting switch
  </td><td>Sets station No. of the local module.(Factory default setting: 1) (Refer to ☞ (1) in this section)
•A1SJ71AP23Q/A1SJ71AR23Q
1 to 64: Station No.
(If other than above is set, the local module goes into offline status (X0=ON).)
•A1SJ71AT23BQ
1 to 31: Station No.
(If other than above is set, the local module goes into offline status (X0=ON).)</td></tr>
<tr><td>3)</td><td>Mode setting switch
  </td><td>Sets operation mode.(Factory default setting: 0)
<table>
<tr><th>No.</th><th>Item</th><th>Description</th></tr>
<tr><td>0</td><td>Online</td><td>Data link (with automatic return function)</td></tr>
<tr><td>1</td><td>Online</td><td>Data link (without automatic return function)</td></tr>
<tr><td>2</td><td>Offline</td><td>Disconnects host station.</td></tr>
<tr><td>3</td><td>-</td><td rowspan="2">Unusable (If set, the local module goes into offline status (X0=ON.))</td></tr>
<tr><td>4</td><td>-</td></tr>
<tr><td>5</td><td>Station-to-station test (Executing station)</td><td rowspan="2">Checks a line between two adjacent stations.</td></tr>
<tr><td>6</td><td>Station-to-station test (Other station)</td></tr>
<tr><td>7</td><td>Self-loopback test</td><td>Checks the hardware including transmission circuit in a single local module.</td></tr>
<tr><td>8 to F</td><td>-</td><td>Unusable (If set, the local module goes into offline status (X0=ON).)</td></tr>
</table></td></tr>
<tr><td>4)</td><td>Communication speed setting switch (A1SJ71AT23BQ)</td><td>Sets communication speed.
<table>
<tr><th>No.</th><th>Communication speed</th></tr>
<tr><td>0</td><td>125kbps</td></tr>
<tr><td>1</td><td>250kbps</td></tr>
<tr><td>2</td><td>500kbps</td></tr>
<tr><td>3</td><td>1Mbps</td></tr>
<tr><td>4 to F</td><td>Unusable (If set, the local module goes into offline status (X0=ON).)</td></tr>
</table></td></tr>
<tr><td>5)</td><td>Connector (A1SJ71AP23Q)</td><td>Connects an optical fiber cable.
  </td></tr>
</table>

Table 5.2 Part names and settings(Continued)

No.	Name	Description
6)	Connector (A1SJ71AR23Q)	Connects a coaxial cable. 
7)	Terminal block (A1SJ71AT23BQ)	Connects a shielded twisted pair cable. 

(1) Station No. setting

(a) MELSECNET data link system

Set "00" to the station No. of the master station, and set station No. (01→ 02・・・n(n ≦ 64) to slave stations starting from the one next to the master station.

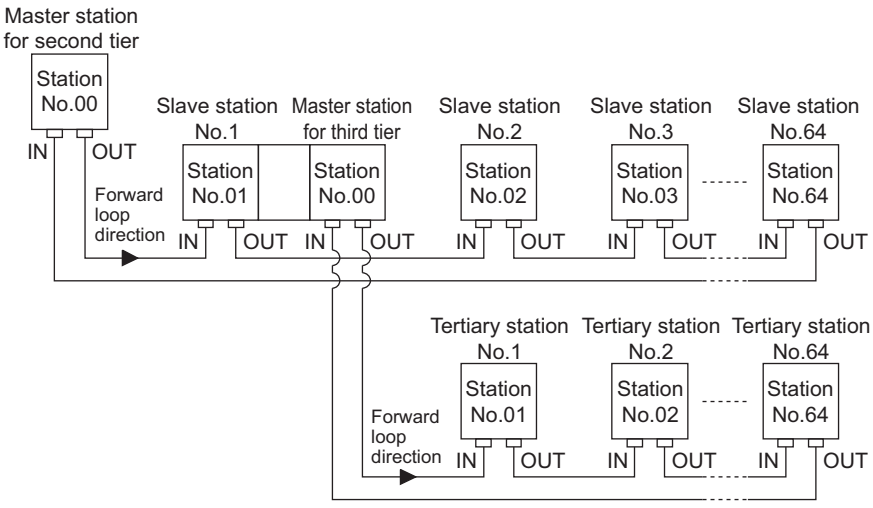


Figure 5.3 Station No. setting of MELSECNET data link system

POINT

(1) Set station No. from the smallest number in order.
(2) Do not skip any station No., since it has to be set in number order.
(3) Set station No. so as not to overlap with other station No. in the same tier.

(b) MELSECNET/B data link system

Set "00" to the station No. of the master station, and set station No. (01→ 02・・・n(n ≦ 31) to slave stations starting from the one next to the master station.

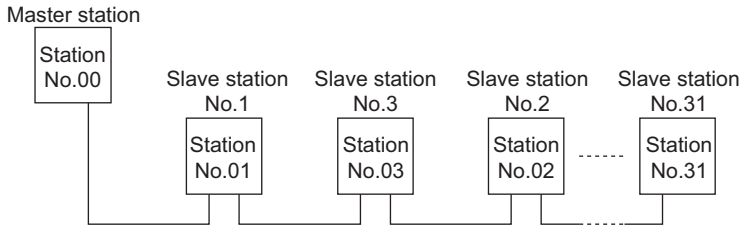


Figure 5.4 Station No. setting of MELSECNET/B data link system

POINT

(1) The station No. can be set regardless of station number order. (There is no restriction on connection order of stations including the master station.)

(2) Do not skip any station No., since it has to be set in number order.

(3) Set station No. so as not to overlap with other station No. in the same tier.

5.4 Wiring

This section describes precautions for connecting and wiring cables.

5.4.1 Optical fiber cable

The following describes how to connect an optical fiber cable with the local module.

(1) Precautions for wiring

(a) Securing of wiring space
When an optical fiber cable is connected with the local module, a cable bend radius is restricted.
For details, check the specifications of the cable to be used.

(b) Laying an optical fiber cable
When laying an optical fiber cable, do not directly touch an optical fiber core of a plug or jack, and prevent dirt or dust from attaching it.
If oil from hand, dirt, or dust is attached, transmission loss may increase, resulting in failure at data link.
In addition, do not remove the cover from a connector of the module before installing an optical fiber cable.

(c) Connecting/disconnecting an optical fiber cable
Be sure to shut off all phases of the external power supply used by the system.

(2) Connection of cable

(a) Connection method
An optical fiber cable connects OUT and IN as shown below. (OUT of the last station is connected to IN of the master station.)

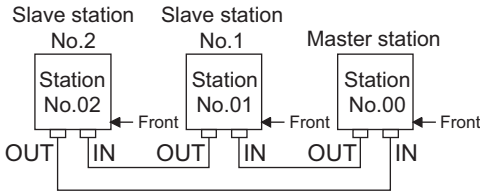


Figure 5.5 Connection method

(b) Connecting an optical fiber cable

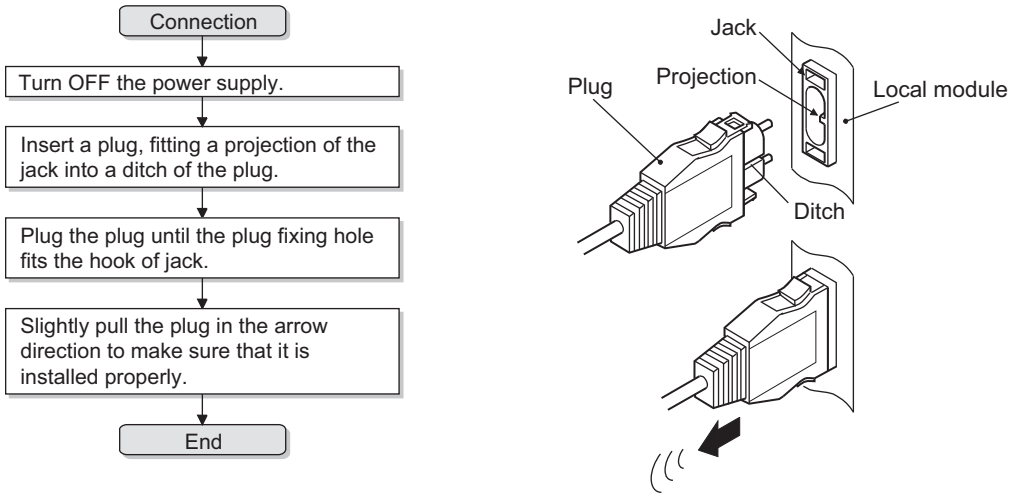


Figure 5.6 Connecting an optical fiber cable

(c) Disconnecting an optical fiber cable

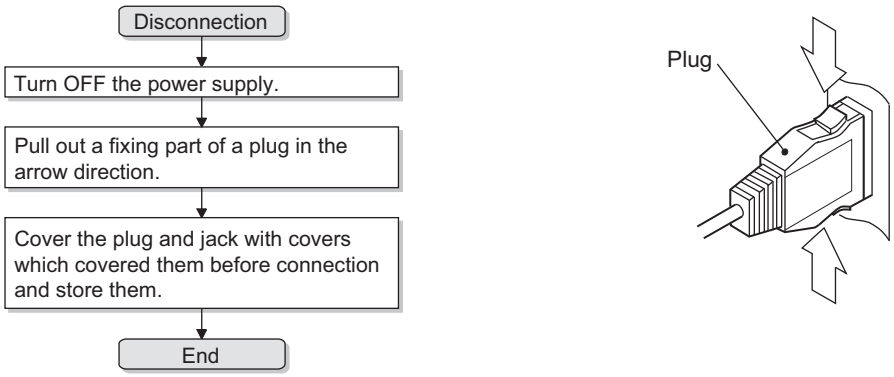


Figure 5.7 Disconnecting an optical fiber cable

5.4.2 Coaxial cable

The following describes how to connect a coaxial cable with the local module.

(1) Precautions for wiring

(a) Securing of wiring space
When a coaxial cable is connected with the local module, a cable bend radius is restricted.

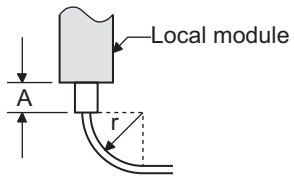


Figure 5.8 Allowable bend radius of coaxial cable

Table 5.3 Allowable bend radius of coaxial cable

Applicable cable		Connector part A(mm)	Allowable bend radius r(mm)
Coaxial cable	3C-2V	30	23
	5C-2V		30

(b) Laying a coaxial cable
When laying a coaxial cable, keep a distance of 100mm (3.94 inch) or more from other power cables or control cables.
In addition, connecting FGs of the power supply module of the base unit where the local module is mounted strengthens measures against noise.

(c) Connecting/disconnecting a coaxial cable
Be sure to shut off all phases of the external power supply used by the system.

(2) Connection of cable

(a) Connection method
A coaxial cable connects OUT(F-SD, R-RD) and IN(F-RD, R-SD) as shown below. (OUT(F-SD, R-RD) of the last station is connected to IN(F-RD, R-SD) of the master station.)

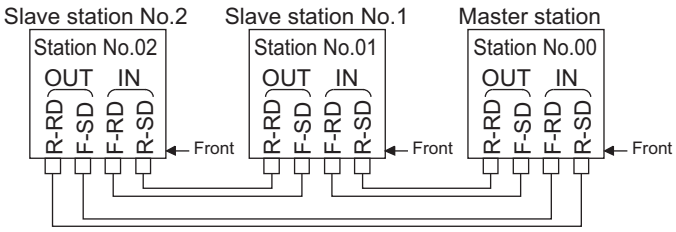


Figure 5.9 Connection method

(b) Connecting a coaxial cable

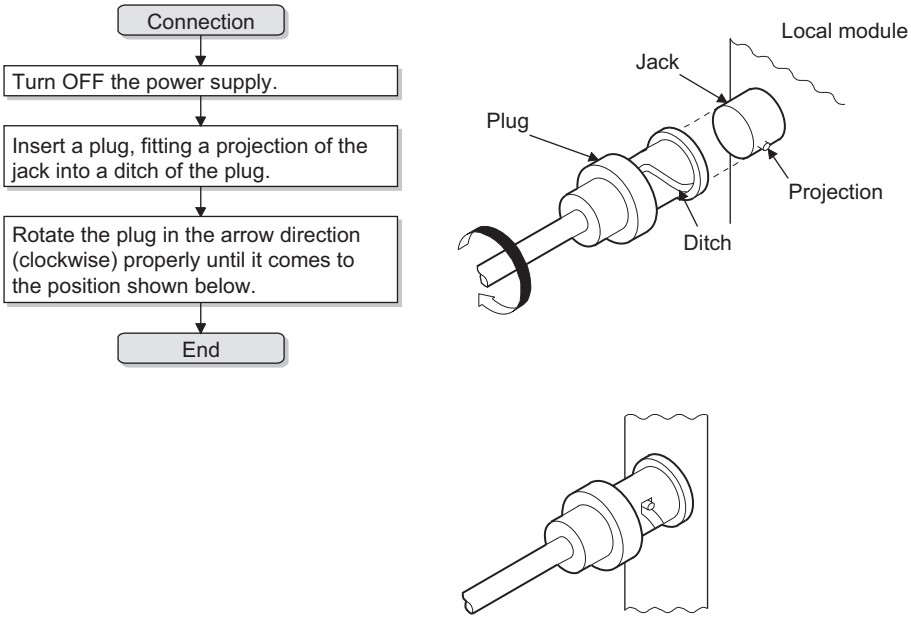


Figure 5.10 Connecting a coaxial cable

(c) Disconnecting a coaxial cable

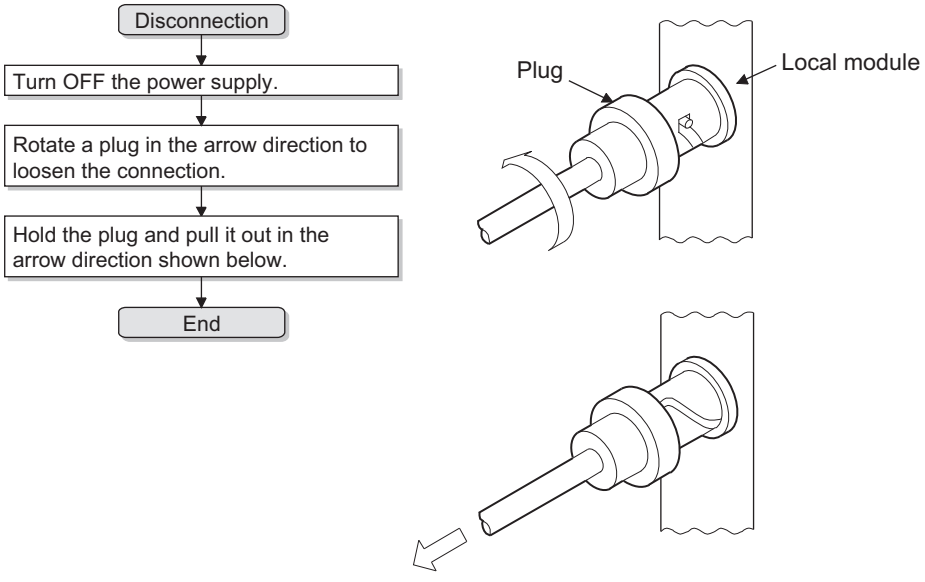


Figure 5.11 Disconnecting a coaxial cable

5.4.3 Shielded twisted pair cable

The following describes how to connect a shielded twisted pair cable with the local module.

(1) Precautions for wiring

(a) Laying shielded twisted pair cable
When laying a shielded twisted pair cable, pay attention to the following points so that it will not be affected by noise or surge induction.

1) Do not install a shielded twisted pair cable together with the main circuit, high-voltage cable, or load line, and also do not bring them closer to each other. (Keep a distance of 100mm (3.94 inch) or more between them.)

2) Do not use a part of shielded twisted pair cable (for example, one pair among three pairs) as a cable for power supply.

(b) Connection of terminating resistor
For the stations at both ends of the MELSECNET/B data link system, connect SDA/RDA and SDB/RDB with an attached terminating resistor (110Ω, 1/2W). (Refer to ☞ (2) in this section)

(c) Connecting/disconnecting a shielded twisted pair cable
Be sure to shut off all phases of the external power supply used by the system.

(2) Connection of cable

A shielded twisted pair cable is connected as shown below.
In addition, use a terminating resistor for stations at both ends.

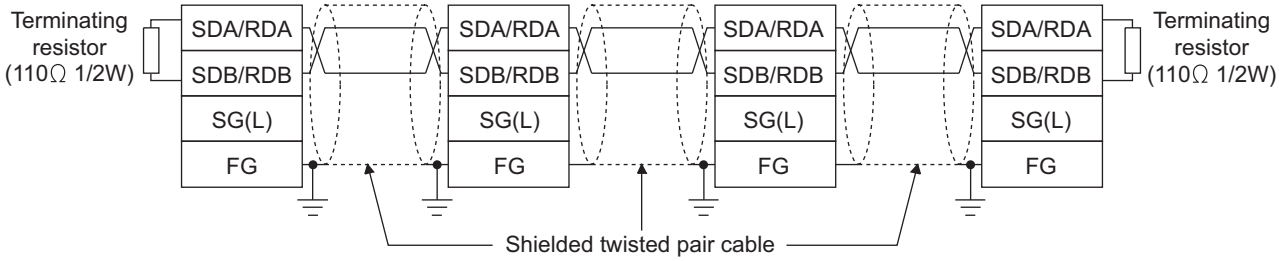


Figure 5.12 Connection method

5.5 Self-diagnostic Test

The self-diagnostic test checks the hardware or cable wiring of a local module.

Table 5.4 Items of self-diagnostic test

Item	Description	Reference section
Self-loopback test	Checks the hardware including transmission circuit in a single local module.	Section 5.5.1
Station-to-station test (Executing station)	Checks a line between two adjacent stations. A test is performed to a line between two stations assuming that the station which has the small station No. is the executing station and the other is the other station.	Section 5.5.2
Station-to-station test (Other station)		
Forward loop test (Not provided for the MELSECNET/B)	Checks a forward loop side line of the MELSECNET after connecting all stations by a cable.	Section 5.5.3
Reverse loop test (Not provided for the MELSECNET/B)	Checks a reverse loop side line of the MELSECNET after connecting all stations by a cable.	

5.5.1 Self-loopback test

The self-loopback test checks the hardware including transmission circuit in a single local module.
The hardware is judged by whether the data sent from the send side can be received by the receive side in a given time.

(1) System configuration

(a) MELSECNET(A1SJ71AP23Q)
An optical fiber cable connects the OUT and IN of the local module.

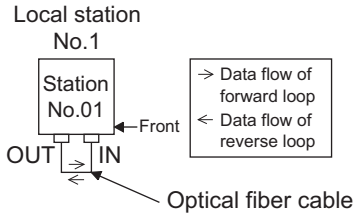


Figure 5.13 MELSECNET(A1SJ71AP23Q)

(b) MELSECNET(A1SJ71AR23Q)
A coaxial cable connects the OUT and IN of the local module.

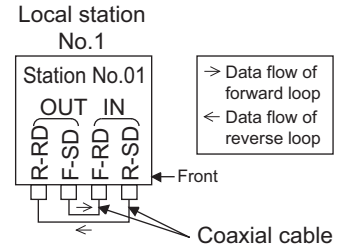


Figure 5.14 MELSECNET(A1SJ71AR23Q)

(c) MELSECNET/B(A1SJ71AT23BQ)
There is no need to connect a cable or terminating register to the local module.

(2) Switch setting

Set the RUN/STOP switch of the CPU module to STOP, and set the DIP switch on the front of the link module as follows:
(☞ Section 5.3 Part Names and Settings)

Table 5.5 Switch setting

Item		No. (Set value)	Description
Local station No.1	Station No. setting switch	01	Station No.1
	Mode setting switch	7	Self-loopback test

(3) Execution of test

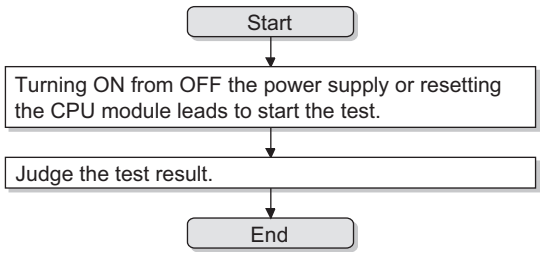


Figure 5.15 Execution of test

(4) Judge of test result

The LED displays the test result.

(a) When normal

ERROR LED is turned ON and OFF repeatedly in a cycle of "CRC→OVER→AB.IF→TIME→DATA→UNDER→CRC→ ▪▪▪ ".

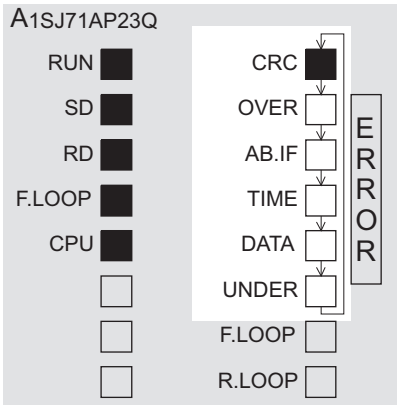


Figure 5.16 When normal

(b) When failed

The LED which corresponds to the error is turned ON, and the test is canceled.

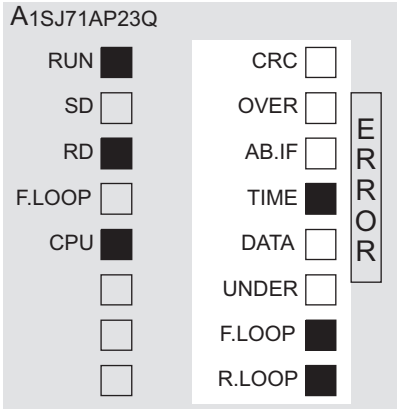


Figure 5.17 When failed

1) When three LEDs (F.LOOP, R.LOOP, and TIME) are turned ON
   - A forward loop cable is disconnected
   - The send side and receive side of forward loop are not connected by a cable
   - The send side of a forward loop and the send side of a reverse loop and the receive side of a forward loop and the receive side of a reverse loop are connected

2) When three LEDs (F.LOOP, R.LOOP, and DATA) are turned ON
   - A reverse loop cable is disconnected
   - The send side and receive side of a reverse loop are not connected by a cable

3) When ERROR LED other than above 1) and 2) is turned ON
   - Hardware failure
   - A cable is disconnected during the test
   - A cable is broken during the test

5.5.2 Station-to-station test

The station-to-station test checks a line between two adjacent stations.
A test is performed to a line between two stations assuming that the station which has the small station No. is the executing station and the other is the other station.
The line is judged by whether the data sent from the executing station can be sent from the other station in a given time.

(1) System configuration

(a) MELSECNET(A1SJ71AP23Q)
An optical fiber cable connects OUT of the executing station and IN of the other station.

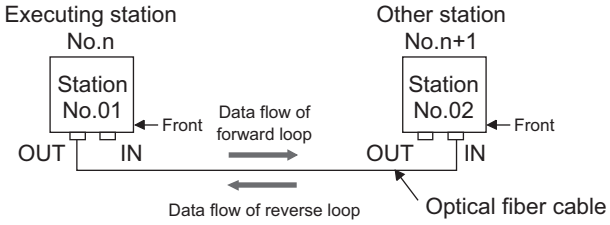


Figure 5.18 MELSECNET(A1SJ71AP23Q)

(b) MELSECNET(A1SJ71AR23Q)
A coaxial cable connects OUT of the executing station and IN of the other station.

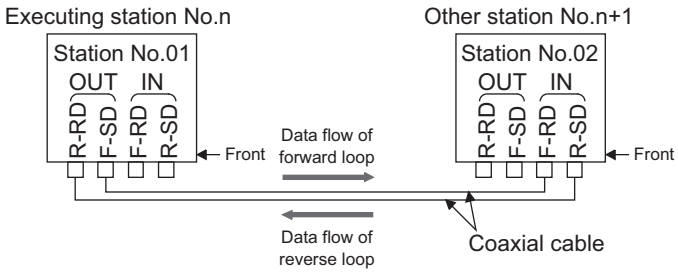


Figure 5.19 MELSECNET(A1SJ71AR23Q)

(c) MELSECNET/B(A1SJ71AT23BQ)

The connection of the MELSECNET/B(A1SJ71AT23BQ) is as follows:

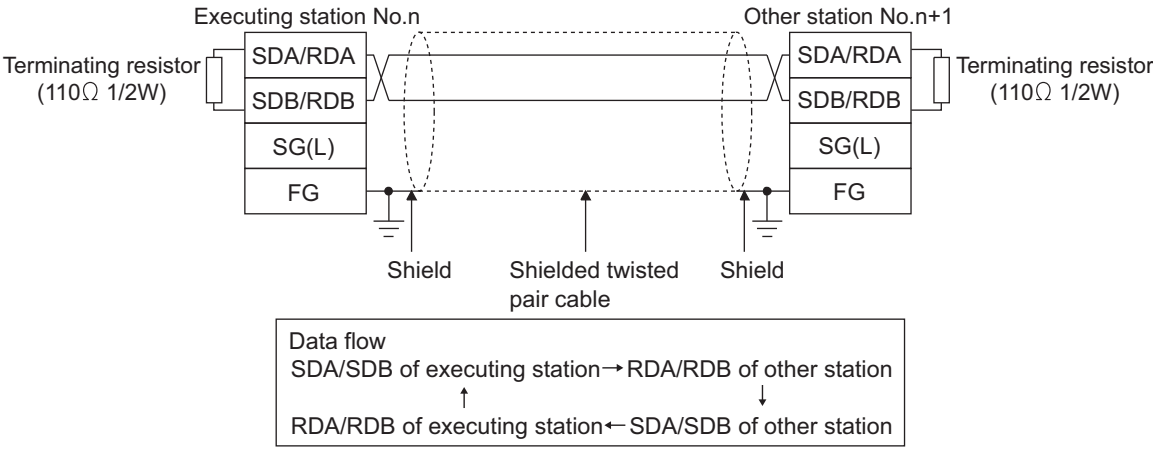


Figure 5.20 MELSECNET/B(A1SJ71AT23BQ)

(2) Switch setting

Set the RUN/STOP switch of the CPU module to STOP, and set the DIP switch on the front of the link module as follows:

(☞ Section 5.3 Part Names and Settings)

Table 5.6 Switch setting

Item		No. (Set value)	Description
Executing station No. n	Station No. setting switch	01	Station No.1
	Mode setting switch	5	Station-to-station test (Executing station)
Other station No. n + 1	Station No. setting switch	02	Station No.2
	Mode setting switch	6	Station-to-station test (Other station)

(3) Execution of test

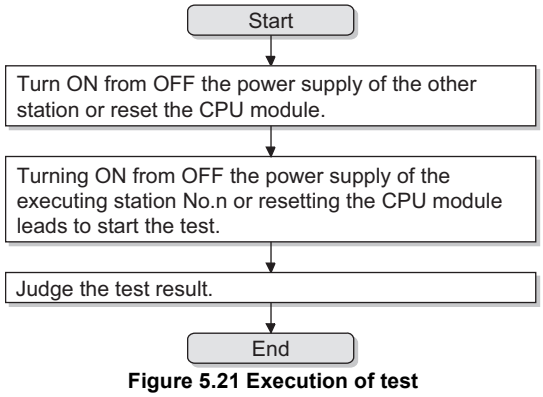


Figure 5.21 Execution of test

(4) Judge of test result

The LED of the executing station displays the test result.

(a) When normal

ERROR LED is turned ON and OFF repeatedly in a cycle of "CRC→OVER→AB.IF→TIME→DATA→UNDER→CRC→ ▪▪▪ ".

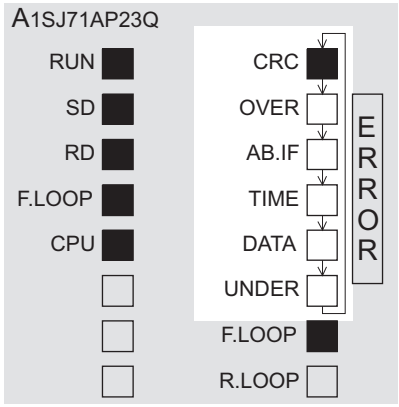


Figure 5.22 When normal

(b) When failed

The LED which corresponds to the error is turned ON, and the test is canceled.

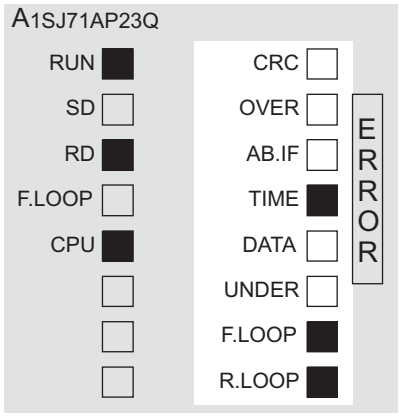


Figure 5.23 When failed

1) When two LEDs (F.LOOP and TIME) are turned ON
   - A forward loop cable is disconnected
   - The send side and receive side of forward loop are not connected by a cable

2) When three LEDs (F.LOOP, R.LOOP, and TIME) are turned ON
   - A reverse loop cable is disconnected
   - The send side and receive side of a reverse loop are not connected by a cable
   - The send side of a forward loop and the send side of a reverse loop are connected, and the receive side of a forward loop and the receive side of a reverse loop are connected.

3) When ERROR LED other than above 1) and 2) is turned ON
   - Hardware failure
   - A cable is disconnected during the test
   - A cable is broken during the test

5.5.3 Forward loop test/reverse loop test

The forward loop test/reverse loop test checks a forward or reverse loop side line of the MELSECNET after connecting all stations via a cable. (Not provided for the MELSECNET/B data link system)

- Forward loop test
  The line is judged by whether the data sent from a forward loop send side of the master station can be received by a forward loop receive side of the master station.
- Reverse loop test
  The line is judged by whether the data sent from a reverse loop send side of the master station can be received by a reverse loop receive side of the master station.

POINT

(1) Execute a forward or reverse loop line test, setting a Q series local station to the RUN status (Y10=ON).
If the test is conducted in STOP status (Y10=OFF), the master station treats the Q series local station as a faulty station (relevant bit in D9228 to D9231 is turned ON).However, the test is normally conducted.

(2) Set link parameters for the master station when executing a forward or reverse loop back test.(At least set the total number of slave stations)

(1) System configuration

(a) MELSECNET(A1SJ71AP23Q)
An optical fiber cable connects the OUT and IN of all stations.

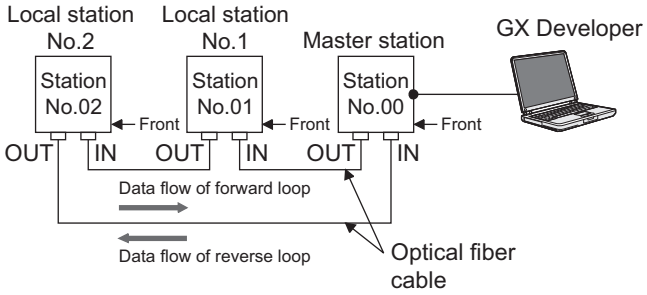


Figure 5.24 MELSECNET(A1SJ71AP23Q)

(b) MELSECNET(A1SJ71AR23Q)

A coaxial cable connects the OUT and IN of all stations.

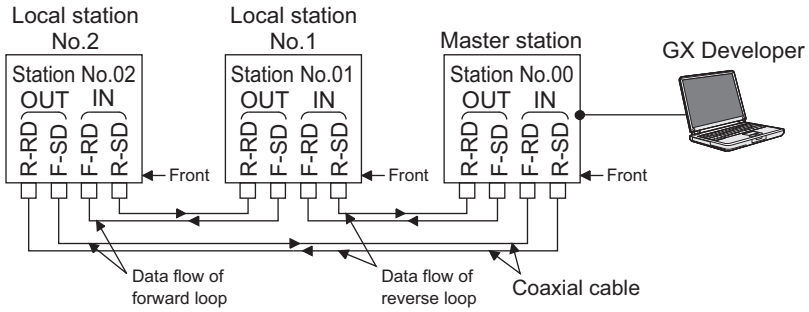


Figure 5.25 MELSECNET(A1SJ71AR23Q)

(2) Switch setting

Set the RUN/STOP switch of the CPU module to STOP, and set the DIP switch on the front of the link module as follows:

(☞ Section 5.3 Part Names and Settings)

Table 5.7 Switch setting

Item		No. (Set value)	Description
Master station	Station No. setting switch	00	Station No.0
	Mode setting switch	3	Forward loop test
		4	Reverse loop test
Slave stations No.1 and No.2 (Local stations No.1 and No.2)	Station No. setting switch	01, 02	Station No.1 and 2
	Mode setting switch	0	Online (with automatic return function)

(3) Execution of test

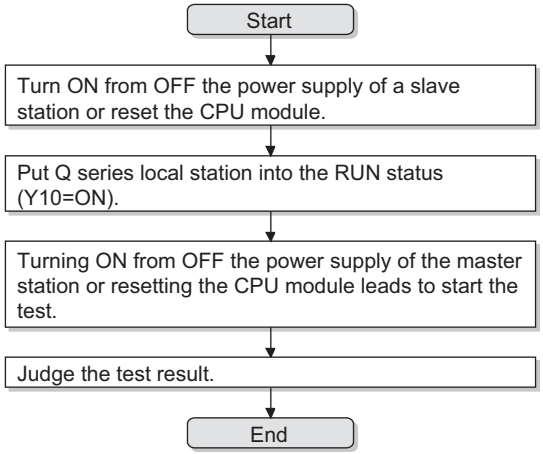


Figure 5.26 Execution of test

(4) Judge of test result

The LED of the master station displays the test result.

(a) When normal

ERROR LED is turned ON and OFF repeatedly in a cycle of "CRC→OVER→AB.IF→TIME→DATA→UNDER→CRC→ ▪▪▪ ".

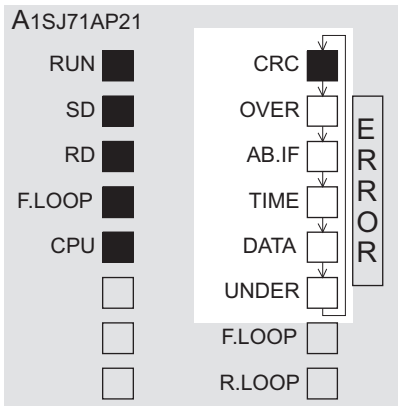


Figure 5.27 When normal

(b) When failed

The LED which corresponds to the error is flashed, and the test is canceled.

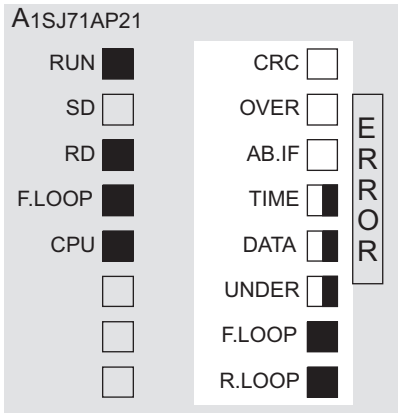


Figure 5.28 When failed

1) When LEDs (TIME, DATA, and UNDER) are flashing
   - Hardware failure
   - Loopback due to cable disconnection or error of slave stations
   - The master station (00) is set for more than one station.
   - Short monitoring time

POINT

When a forward/reverse loop has an error, data link is switched to the one performed by a reverse/forward loop.
When the forward/reverse loop returns normal, data link is performed by it. However, LED display shows an error.
Perform a forward or reverse loop test after resetting the master station.

CHAPTER6 LINK DATA SEND/RECEIVE PROCESSING AND PROCESSING TIME

This chapter describes how link data are sent or received in the data link system, and its processing time.

6.1 Link Data Send/Receive Processing

6.1.1 Send/receive processing overview

The data link system repeatedly sends and receives link data set with the link parameters of the master station.

(1) Link module configuration

A link module has a link data storage area that is provided for link data communication with other stations, and a data memory storage area that is used for processing of its own station data.
The link data storage area of a Q series local station uses the buffer memory.

(2) Link data transfer

Link data are sent or received by link scan and link refresh.

(a) Link scan means link data transfer between link modules (between the link data storage areas).

(b) Link refresh is link data transfer performed inside a link module.

1) When using CPU modules with the link function on the master and local stations
Link data are sent and received between the link data storage area and the data memory storage area.

2) When using a CPU module and a link module (including the local module)
Link data are sent and received between the link data storage area of the link module and the data memory storage area of the CPU module.

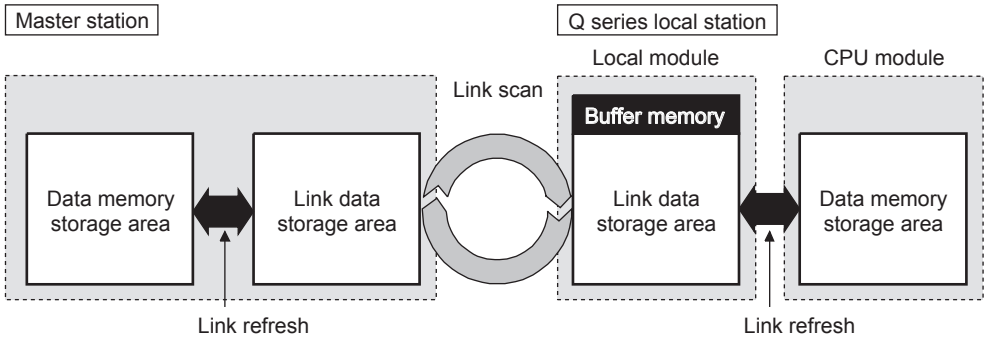


Figure 6.1 Link data transfer

6.1.2 Link refresh timing

A Q series local station executes a program for refresh to perform link refresh after completion of a link scan.

☞ Section 3.4.2 Details of I/O signal

The following illustrates the link refresh timing of a Q series local station.

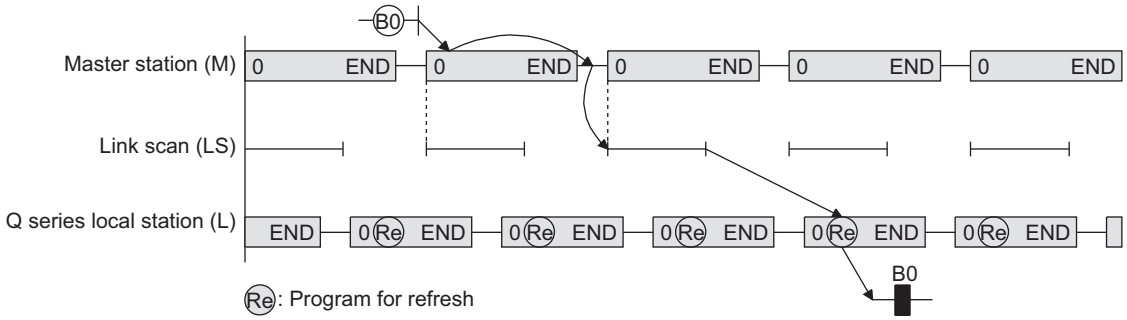


Figure 6.2 Link refresh timing

POINT

(1) Execute the program for refresh at the beginning of the sequence program.

(2) For the link refresh timing of the master and other local stations, refer to the following.

☞ Type MELSECNET, MELSECNET/B Data Link System Reference Manual

6.1.3 Link data handling in the case of a communication error

When a communication error occurs, link data are handled as follows. (The same for a communication error of the station connected to the bypass switch.)

- The communication error station holds link data immediately before the communication error.
- The normally operating station holds link data immediately before the communication error, in the send range of the communication error station.

(1) When a master station has a communication error

Data communications with all stations are stopped.

(a) Master station (Communication error station)

1) M9210 turns ON, or "5" is stored in D9204.
2) Data immediately before the communication error are held in the areas, M9224 to M9239 and D9202 to D9242.
3) The master station holds the data that have been received from local stations and that were present immediately before the communication error.

(b) Q series local station

1) M9250 and M9251 turn ON.
2) The station holds the data that have been received from other stations and that were present immediately before the communication error.

(2) When a Q series local station has a communication error

Data communications are continued among normally operating stations.

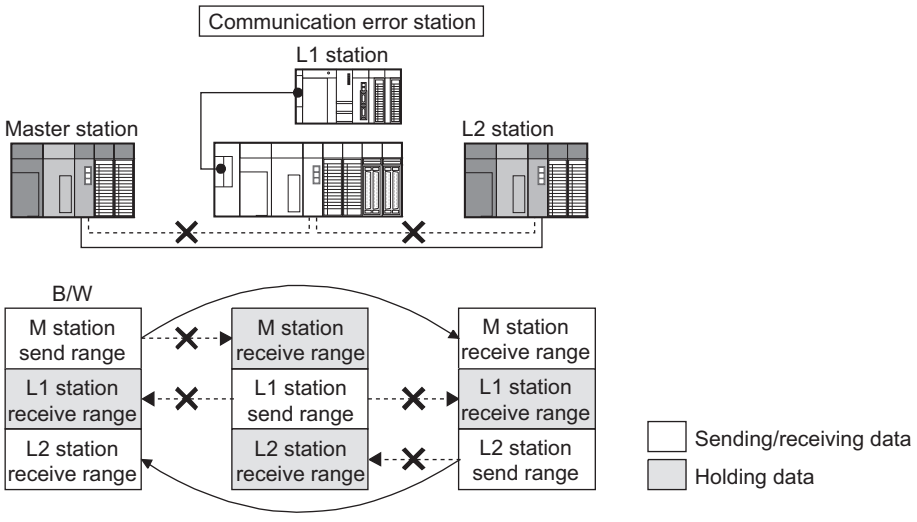


Figure 6.3 When a Q series local station (L1) has a communication error

(a) Q series local station (Communication error station)

1) M9250 and M9251 turn ON.

2) The areas, M9241 to M9255 (except for M9250 and M9251) and D9243 to D9255 store the data immediately before the communication error.

3) The station holds the data that have been received from other stations and that were present immediately before the communication error.

(b) Master station (Normally operating station)

1) The station No. of the communication error station can be checked in M9237 and D9228 to D9231.

2) The mater station holds the data that have been received from the communication error station and that were present immediately before the communication error.

(c) Local station (Normally operating station)

1) The station No. of the communication error station can be checked in M9255 and D9252 to D9255.

2) The local station holds the data that have been received from the communication error station and that were present immediately before the communication error.

6.2 Transmission Delay Time

6.2.1 Transmission delay time

The transmission delay time in the MELSECNET or MELSECNET/B data link system is calculated by the following formulas.

Table 6.1 Maximum transmission delay time for L < LS< M, or LS < L < M

Item		L < LS < M, or LS < L < M
Master station ↓ Local station	Link relay (B) Link register (W) Output (Y)	M + α1 + LS + L × 2 + α2 [ms]
	LRDP/LWTP instruction	M × 5 + α1 × 5 [ms]
Local station ↓ Master station	Link relay (B) Link register (W) Output (Y)	M × 4 + α1 × 3 + L [ms]
Local station ↓ Local station	Link relay (B) Link register (W)	M × 2 + α1 × 2 + L1 + LS + L2 × 2 + α2' [ms]

Table 6.2 Maximum transmission delay time for LS < M < L

Item		LS < M < L
Master station ↓ Local station	Link relay (B) Link register (W) Output (Y)	M + α1 + L × 3 + α2 × 2 [ms]
	LRDP/LWTP instruction	(M + α1) × 3 + (L + α2) × 3 [ms]
Local station ↓ Master station	Link relay (B) Link register (W) Output (Y)	M × 3 + α1 × 2 + L + α2 [ms]
Local station ↓ Local station	Link relay (B) Link register (W)	M + α1 + L1 + α2 + L2 × 3 + α2' × 2 [ms]

Table 6.3 Maximum transmission delay time for M < L < LS, or L < M < LS

Item		M < L < LS, or L < M < LS
Master station ↓ Local station	Link relay (B) Link register (W) Output (Y)	M + α1 + LS × 2 + L × 2 + α2 [ms]
	LRDP/LWTP instruction	(M + α1) × 5 + LS × 5 [ms]
Local station ↓ Master station	Link relay (B) Link register (W) Output (Y)	M × 4 + α1 × 3 + LS × 3 + L [ms]
Local station ↓ Local station	Link relay (B) Link register (W)	(M + α1) × 2 + LS × 3 + L1 + L2 × 2 + α2' [ms]

Table 6.4 Maximum transmission delay time for M ＜ LS＜ L

Item		M ＜ LS ＜ L
Master station ↓ Local station	Link relay (B) Link register (W) Output (Y)	M + α1 + LS + L × 3 + α2 × 2 [ms]
	LRDP/LWTP instruction	(M + α1) × 3 + LS × 3 + (L + α2) × 3 [ms]
Local station ↓ Master station	Link relay (B) Link register (W) Output (Y)	M × 3 + α1 × 2 + LS × 2 + L + α2 [ms]
Local station ↓ Local station	Link relay (B) Link register (W)	M + α1 + LS + L1 + α2 + L2 × 3 + α2' × 2 [ms]

M: Sequence program scan time of master station *1

L: Sequence program scan time of local station *1

LS: Data transmission time *2

α1: Link refresh time of master station

α2: Link refresh time of local station

α2': Link refresh time of local station (receiving side)

* 1 Can be checked by the ladder monitor of GX Developer or the monitor of the special registers (D9017 to D9019).
* 2 Can be checked by the link monitor of GX Developer or the monitor of the master station's special registers (for link) (D9207 to D9209) when the data link is established.

POINT

In this section, transmission delay time in the two-tier system is explained.
For transmission delay time in the three-tier system, the elements shown below must be added.
For details on transmission delay time in the three-tier system, refer to the following manual.

☞ Type MELSECNET, MELSECNET/B Data Link System Reference Manual

- Delay time in transmission from master or local station in second tier to master station for third tier
- Delay time in transmission from master for third tier to local station in third tier
- Time taken for sending data received from second tier to third tier

6.2.2 Link refresh time

Link refresh processing time of a local station is calculated by the following formula.

$$\alpha 2 = 1.5 + 0.3 \times N + 0.0035 \times \{ (B + X + Y) \div 16 + W \} \text{ [ms]}$$

$\alpha 2$: Link refresh time of local station

N: Number of FROM/TO instructions and intelligent function module device accesses, which refreshed link data in a sequence scan when Refresh ready status (X7) was ON

B: Total points of refreshed B

W: Total points of refreshed W

X: Total points of refreshed X

Y: Total points of refreshed Y

6.2.3 Link data send/receive time (Link scan)

Link data send/receive time is calculated by the following formulas.

(1) MELSECNET data link system

(a) In MELSECNET mode

LS = K + K_R × (Total No. of remote I/O slave stations) + K_L × (Total No. of local slave stations) + K_B [ms]

(b) In MELSECNET II mode

LS = K + K_L × (Total No. of local slave stations + No. of local stations assigned to latter half of link parameters) + K_B [ms]

(c) In MELSECNET II composite mode

LS = K + K_R × (Total No. of remote I/O slave stations) + K_L
× (Total No. of local slave stations + No. of local stations assigned to latter half of link parameters) + K_B [ms]

(d) Obtain values for K, K_R, and K_L in the formulas from the following table.

Table 6.5 Constants (K, K_R, K_L)

Constant	Total number of slave stations							
	1 to 8	9 to 16	17 to 24	25 to 32	33 to 40	41 to 48	49 to 56	57 to 64
K	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
K_R	1.3	1.3	1.4	1.4	1.5	1.5	1.6	1.6
K_L	2.0	2.0	2.1	2.1	2.2	2.2	2.3	2.3

(e) Calculate the total link points (number of bytes), and obtain a value for K_B from the graph.

(Total link points) = {B + X_0 + Y_0 + (W × 16)} ÷ 8192 [Kbyte]

B: Total points for link relays (B) that are used on all stations
W: Total points for link registers (W) that are used on all stations
Xo: Total points for link inputs (X) that are assigned to master station
Yo: Total points for link outputs (Y) that are assigned to master station

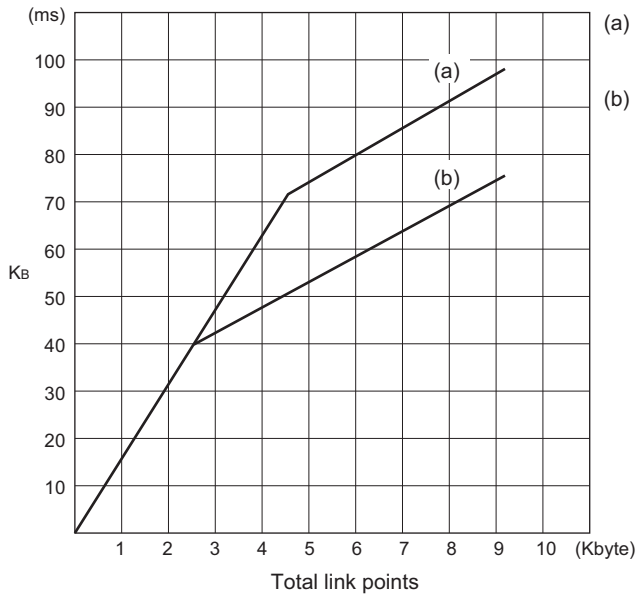


Figure 6.4 Constant (K_B)

(2) MELSECNET/B data link system

(a) In MELSECNET mode

LS = K + K_R × (Total No. of remote I/O slave stations) + K_L × (Total No. of local slave stations) + K_B [ms]

(b) In MELSECNET II mode

LS = K + K_L × (Total No. of local slave stations + No. of local stations assigned to latter half of link parameters) + K_B [ms]

(c) In MELSECNET II composite mode

LS = K + K_R × (Total No. of remote I/O slave stations) + K_L
× (Total No. of local slave stations + No. of local stations assigned to latter half of link parameters) + K_B [ms]

(d) K, K_L, and K_R in the formulas vary depending on the communication speed of the MELSECNET/B data link system. Obtain values for them from the following table.

Table 6.6 Constants (K, K_L, K_R)

Communication speed setting (bps)	Constant	Total number of slave stations			
		1 to 8	9 to 16	17 to 24	25 to 31
125k	K	6.7	7.2	7.7	8.2
	K_L	3.8	3.8	3.9	3.9
	K_R	3.9	3.9	4.0	4.0
250k	K	5.8	6.3	6.8	7.3
	K_L	3.1	3.1	3.2	3.2
	K_R	3.1	3.2	3.3	3.3
500k	K	5.8	6.3	6.8	7.3
	K_L	2.7	2.7	2.8	2.8
	K_R	2.9	2.9	3.0	3.0
1M	K	5.8	6.3	6.8	7.3
	K_L	2.6	2.6	2.7	2.7
	K_R	2.8	2.8	2.9	2.9

(e) Calculate the total link points (number of bytes), and obtain a value for K_B from the graph for the set communication speed (one of 1) to 4)).

(Total link points) = {B + X_0 + Y_0 + (W × 16)} ÷ 8192 [Kbyte]

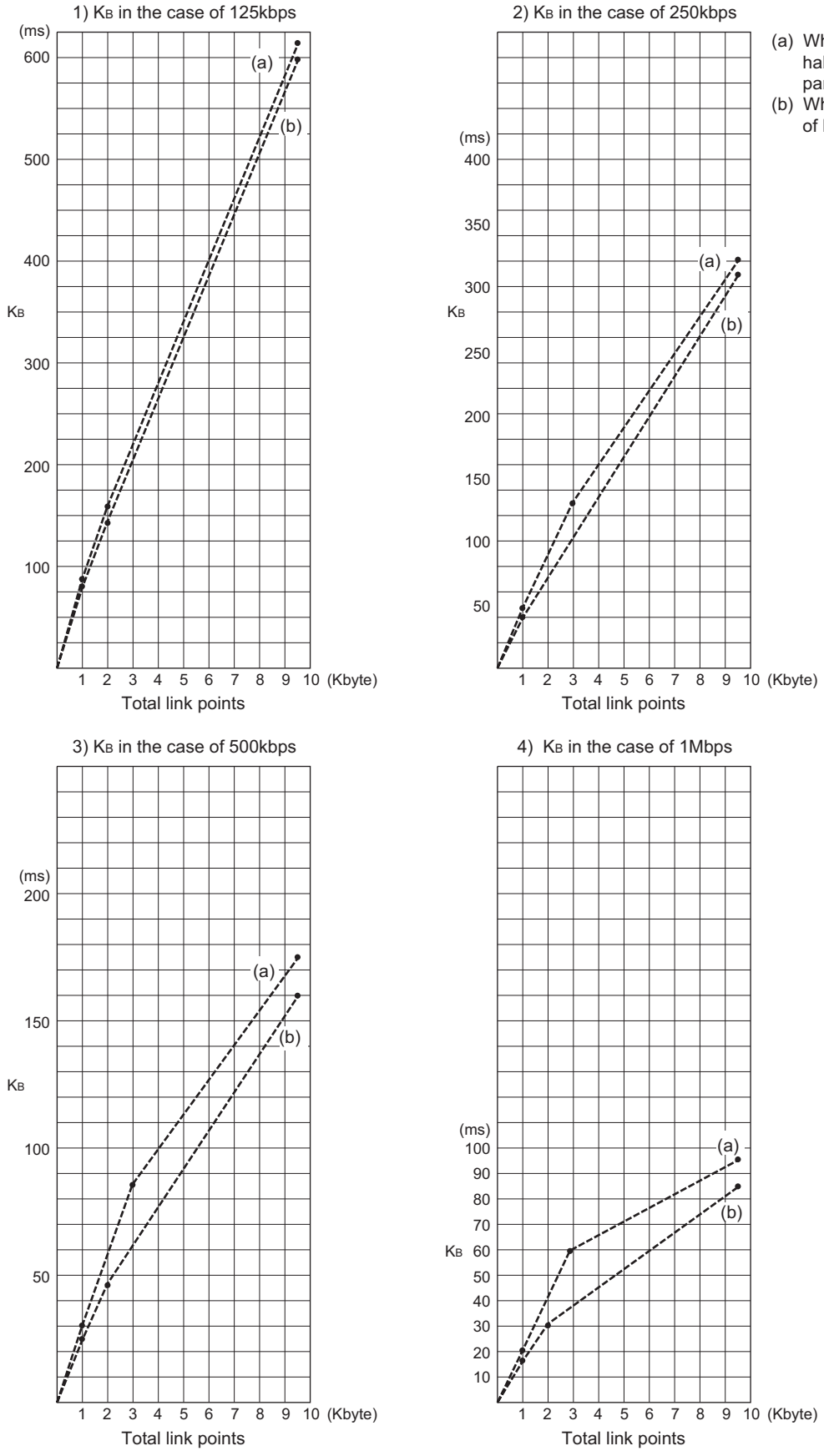


Figure 6.5 Constant (KB)

CHAPTER7 PROGRAMMING

This chapter describes a program for refreshing the local module and for receiving LRDP/LWTP instruction.

7.1 System Configuration and Setting Conditions

Program examples given here are based on the following system configuration and setting conditions.

(1) System configuration

The following figure shows that a 32-point module is installed to each slot. (The points for an empty slot is 16.)

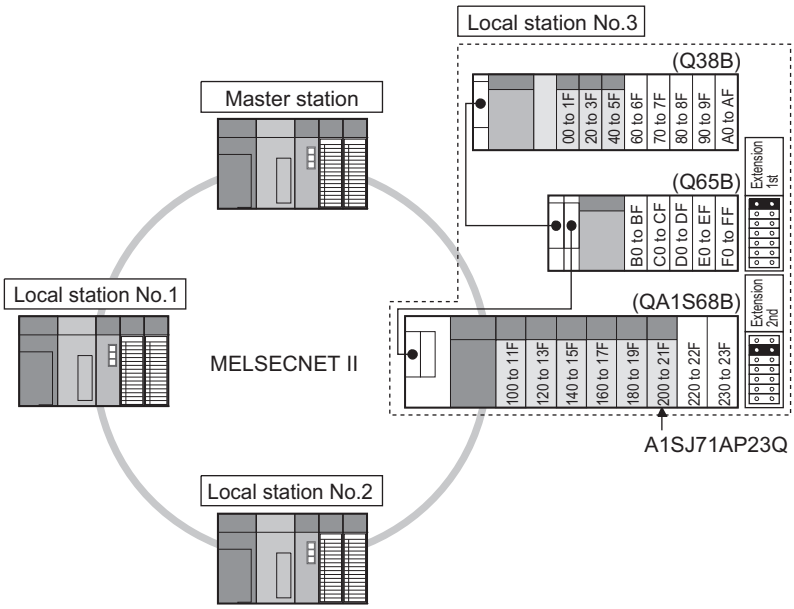


Figure 7.1 System configuration

(2) Switch setting

Set the DIP switches on the front face of the link module as shown below.

(☞ Section 5.3 Part Names and Settings)

Table 7.1 Switch setting

Item		Number (Set value)	Description
Master station	Station No. setting switch	00	Station No.0
	Mode setting switch	0	Online (with automatic return function)
Local stations No.1 to No.3	Station No. setting switch	01 to 03	Station No.1 to No.3
	Mode setting switch	0	Online (with automatic return function)

(3) Wiring

Connect each optical fiber cable between OUT and IN as illustrated below. (OUT of local station No.3 must be connected to IN of the master station.)

(☞ Section 5.4 Wiring)

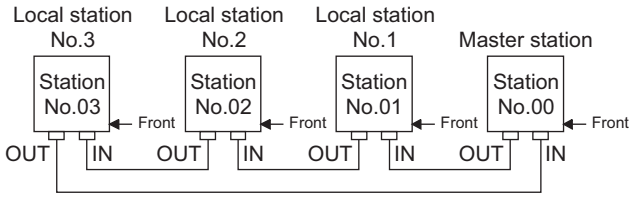
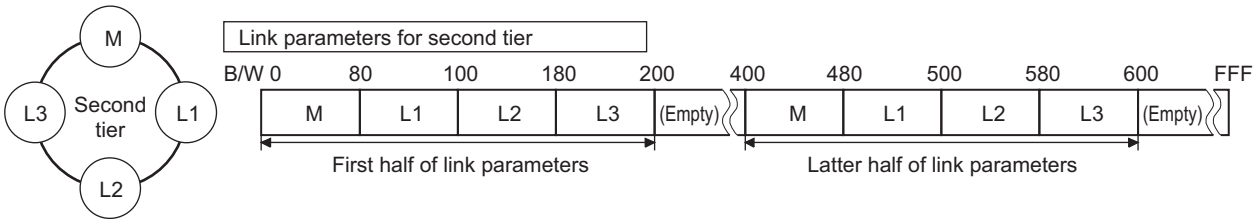


Figure 7.2 Wiring

(4) Link parameter setting of the master station

Link parameters are set to the master station as shown below.



L/R station No.	Send range for each station First half B			Send range for each station First half W			Send range for each station Second half B			Send range for each station Second half W		
	Points	Start	End	Points	Start	End	Points	Start	End	Points	Start	End
M 0	128	0000	007F	128	0000	007F	128	0400	047F	128	0400	047F
IL 1	128	0080	00FF	128	0080	00FF	128	0480	04FF	128	0480	04FF
IL 2	128	0100	017F	128	0100	017F	128	0500	057F	128	0500	057F
IL 3	128	0180	01FF	128	0180	01FF	128	0580	05FF	128	0580	05FF

Figure 7.3 Link parameter setting of the master station

7.2 Program for Refresh and for Receiving LRDP/LWTP Instruction

This section explains the program for refresh and for receiving LRDP/LWTP instruction.
Execute this program at the beginning of the sequence scan.

(1) Adding new data to a project

Newly add a program given in (3) and (4) to the project.

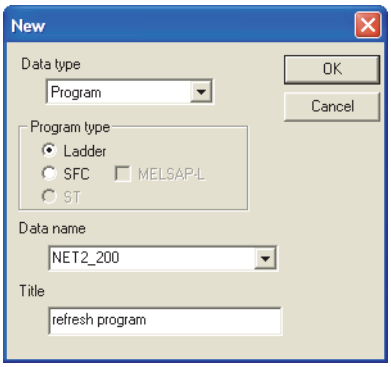


Figure 7.4 Adding new data to a project

(2) Setting PLC parameter

Select [PLC parameter] - [Program], and set the program for refresh and for receiving LRDP/LWTP instruction (program name: NET2_200) as the first sequence scan.

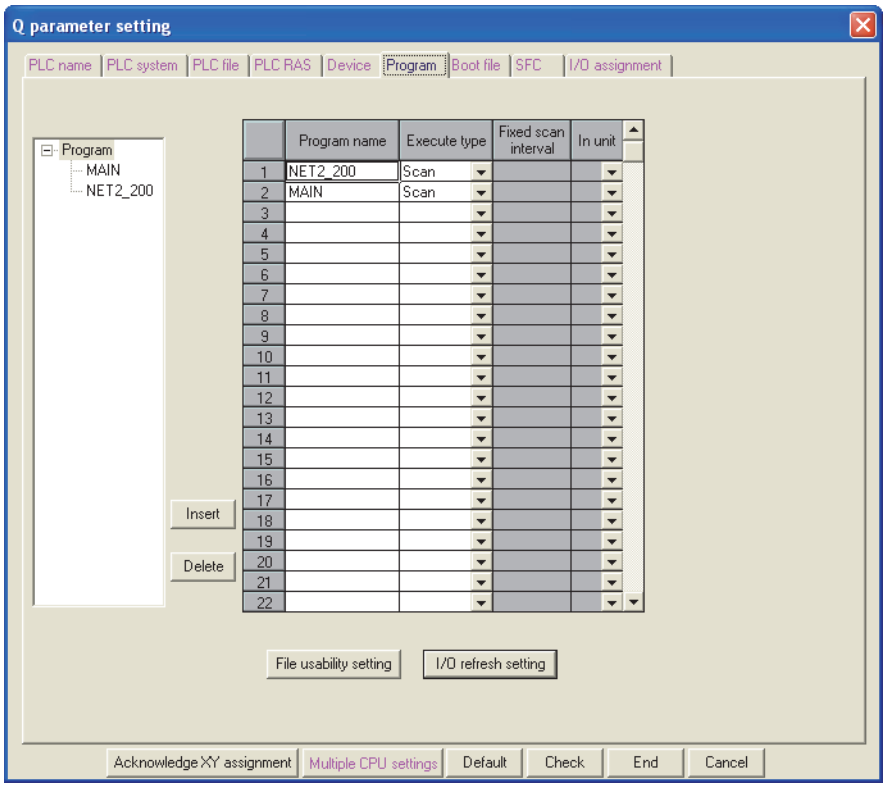


Figure 7.5 Setting PLC parameter

(3) Program example 1

(a) Program overview

1) Program for refresh

The following areas are refreshed according to the refresh information table (Buffer memory address: 2H to 27H).

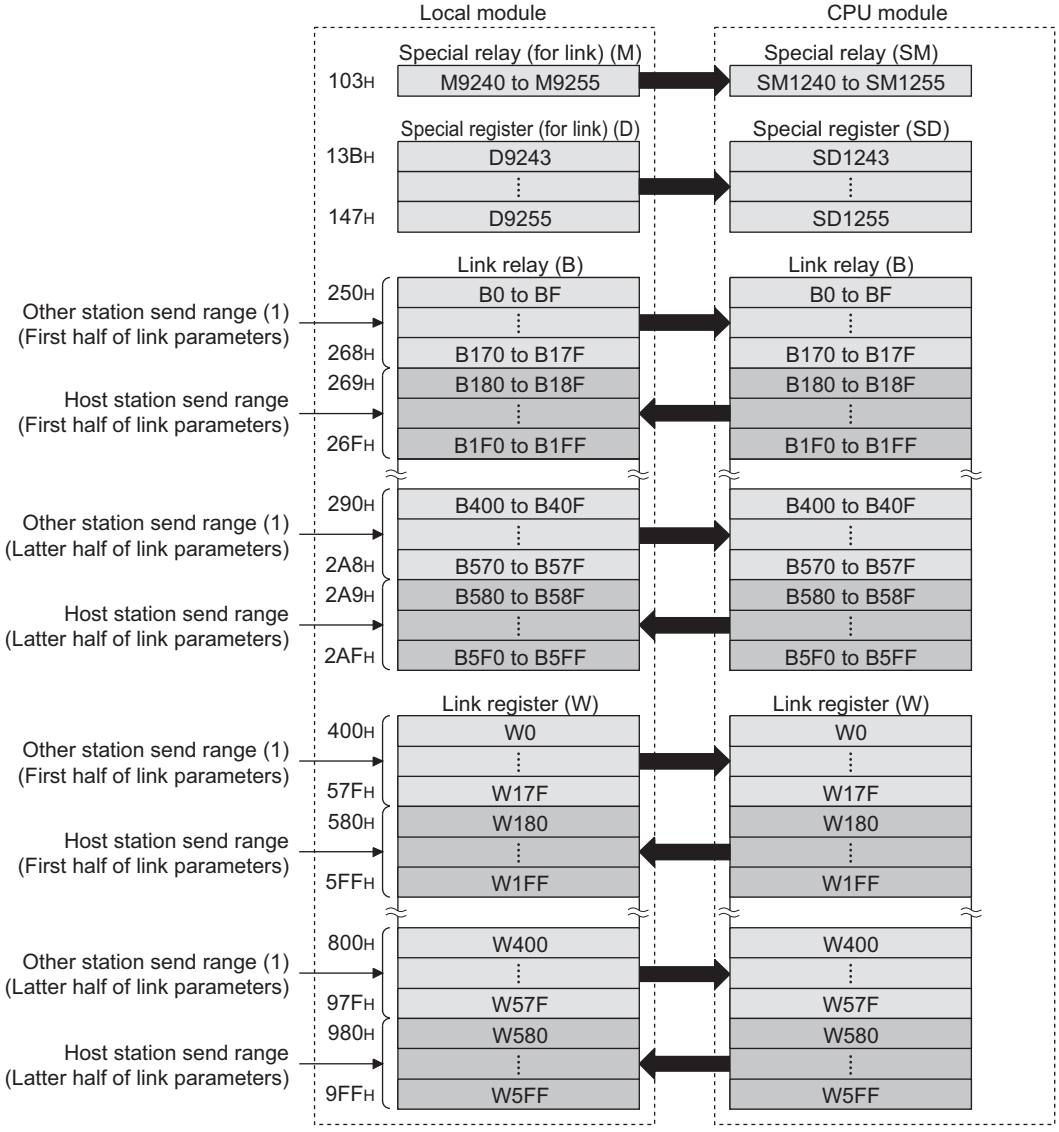


Figure 7.6 Program for refresh

2) Program for receiving LRDP/LWTP instruction

Upon reception of a LRDP/LWTP instruction request, relevant processing is performed.

(b) Device list

Devices used in the program are shown.

Note that the local module is mounted in the position indicated as I/O No. X/Y200 to X/Y21F.

Table 7.2 Device list

Device	Description
X200	Link status
X201	B/W initial value setting status
X207	Refresh ready status
Y210	CPU operating status
Y211	Refresh in execution
Y216	Refresh request
Link data	-
X1000 to X17FF*1	Input
Y1000 to Y17FF*1	Output
B0 to BFFF*1	Link relay
W0 to WFFF*1	Link register
LRDP/LWTP instruction target	-
T0 to T2047*2	Timer
C0 to C1023*2	Counter
D0 to D6144*2	Data register
W0 to WFFF*2	Link register
SM400	Always ON
SM402	After RUN, ON for 1 scan only
SD2040 to SD2041*3	Presence or absence of refresh information table (Protects device values.)
SD2042 to SD2044*3	Z0 to Z2 save area (Protects device values.)
SM1240 to SM1255	Special relay (for link) (M9240 to M9255)
SD1243 to SD1255	Special register (for link) (D9243 to D9255)
Z0	• When link data are sent/received Index register for device start number specification • On the receive processing of the LRDP/LWTP instruction Index register for start device name specification
Z1	• When link data are sent/received Index register for device points specification • On the receive processing of the LRDP/LWTP instruction Index register for start device No. specification
Z2	• When link data are sent/received Index register for bit device start number specification (a register equivalent to Z0, whose unit is converted from bit to word for index modification in link data storage area when the start number of the bit device is stored in Z0) • On the receive processing of the LRDP/LWTP instruction Index register for data length specification

* 1 The range of device use varies depending on the link parameters of the master station.

* 2 The range of device use varies depending on the start devices and the points that are specified by the LRDP/LWTP instruction of the master station.

* 3 Can be replaced with other devices as necessary.
However, to avoid wrong replacements, we recommend using the program examples described in the manual without changes.

(c) Program example

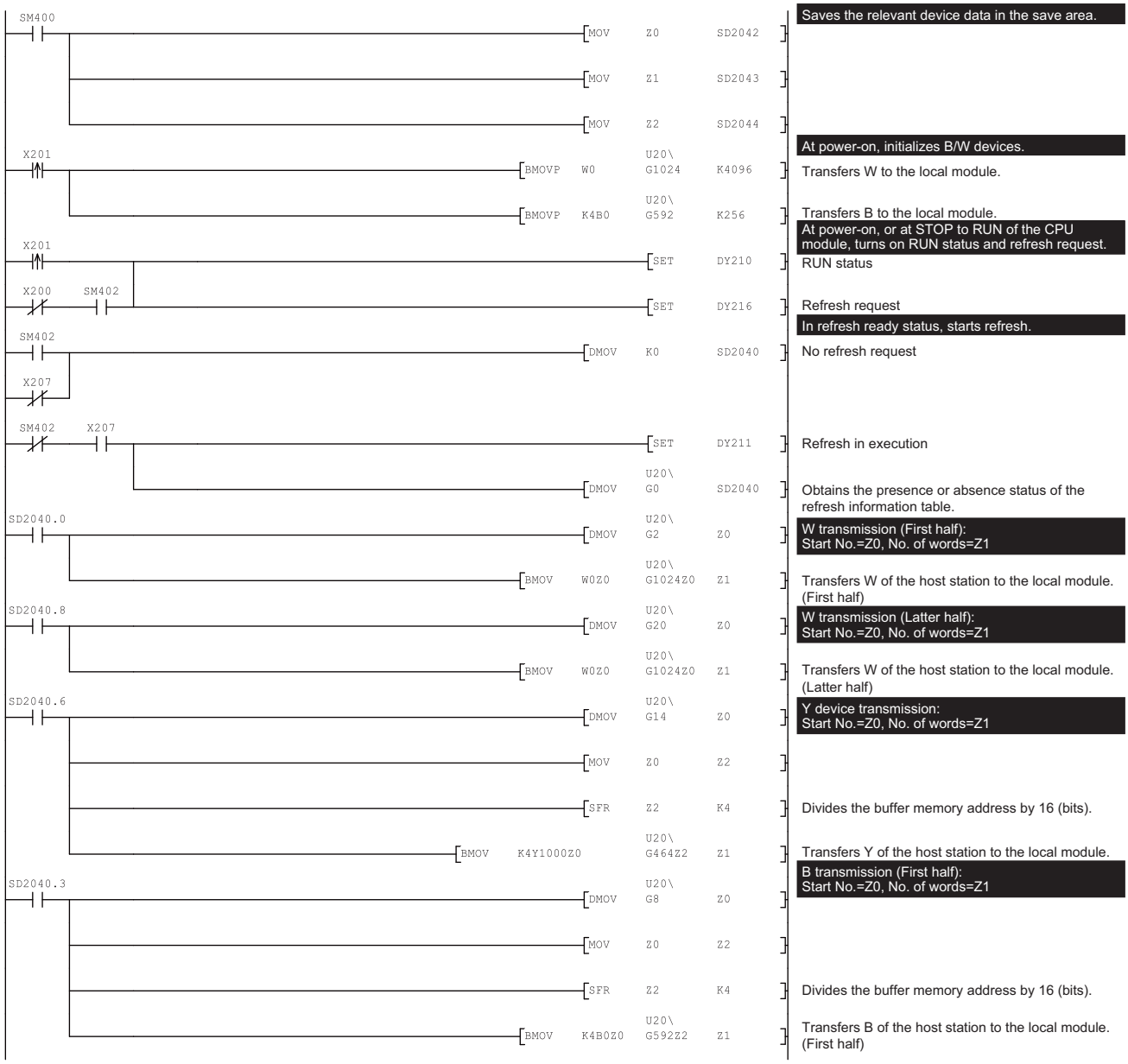


Figure 7.7 Program example

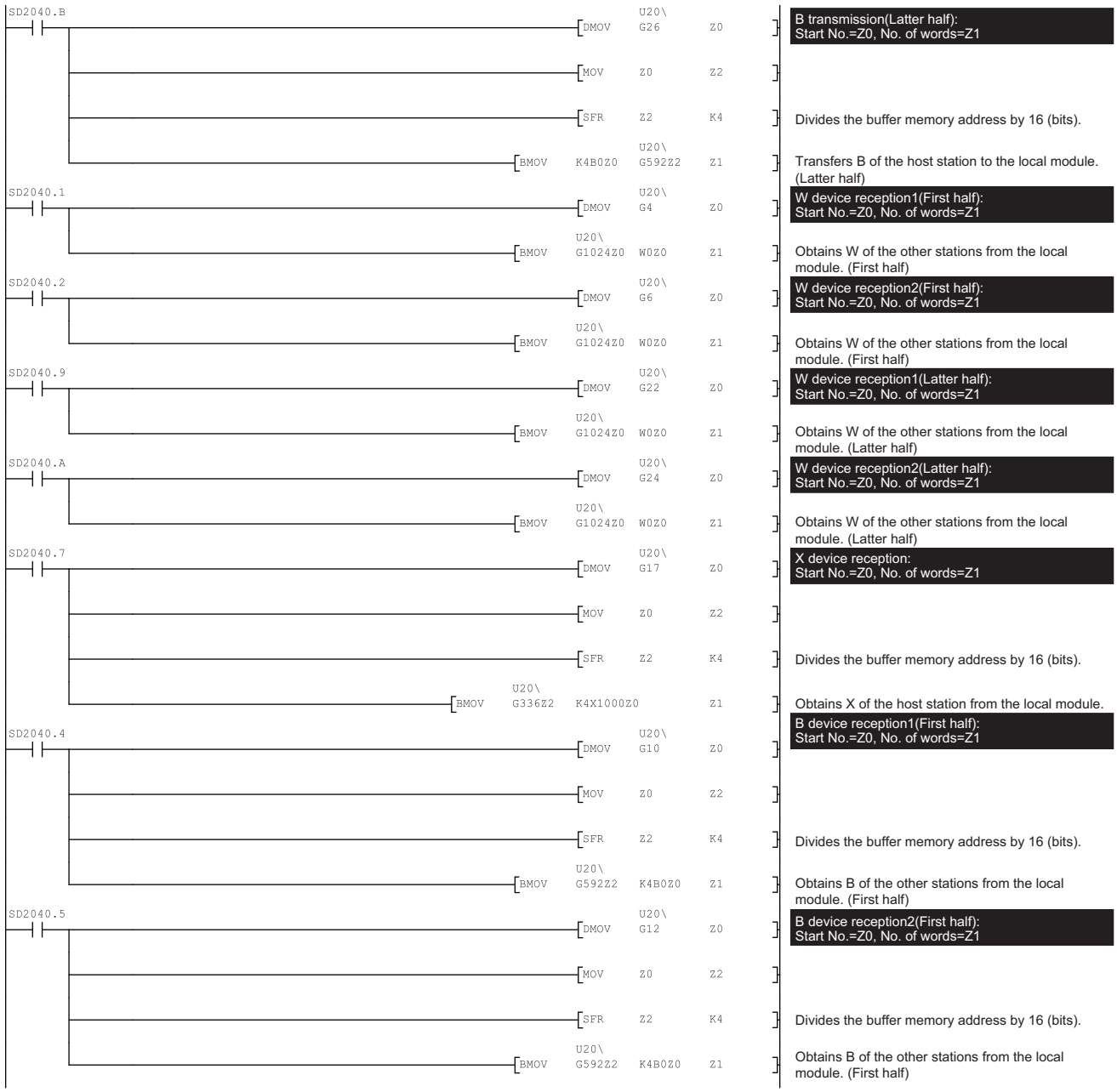


Figure 7.8 Program example (Continued)

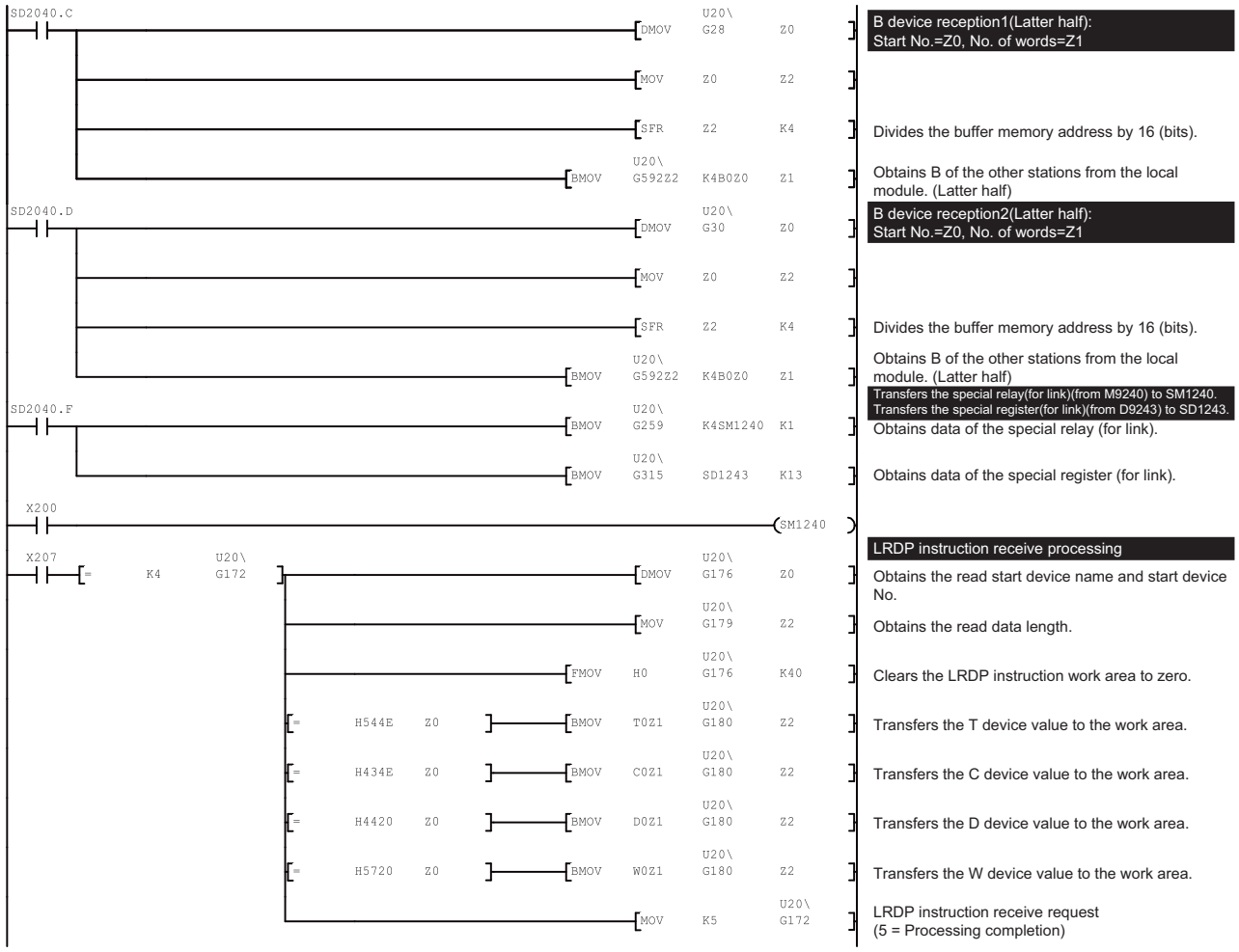


Figure 7.9 Program example (Continued)

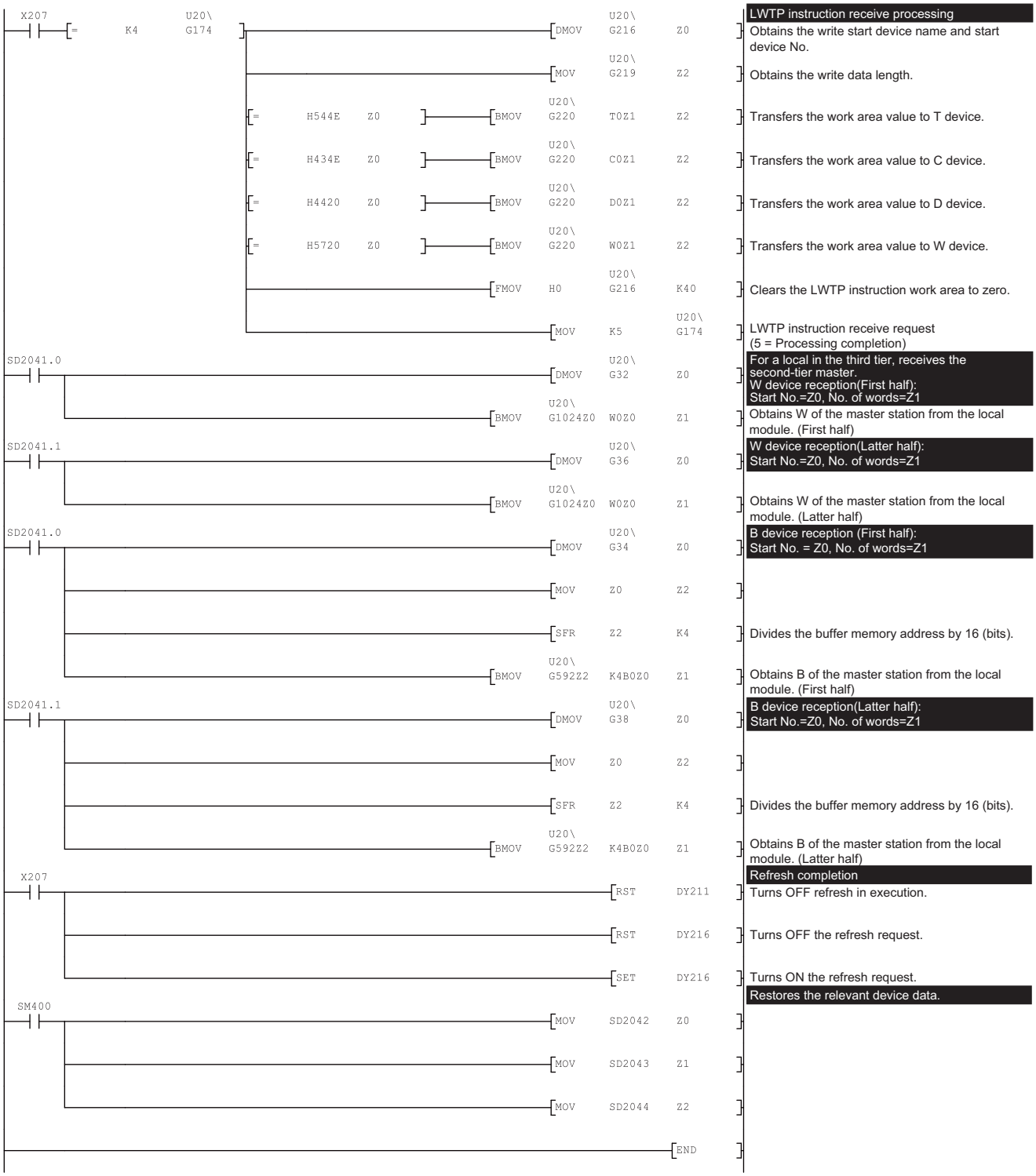


Figure 7.10 Program example (Continued)

POINT

(1) After writing the program to the CPU module, turn OFF and ON the power supply or reset the CPU module.
When the CPU module's RUN/STOP switch is set to RUN, the Q series local station starts sending/receiving data to/from other stations. (Refresh ready status (X7) turns ON/OFF.)

(2) Check the program for refresh.
<Examples of checking the program for refresh>
Check the following in the device batch monitor/test of GX Developer.
- Change the B/W0 value of the master station, and check if the B/W0 value of local station No.3 is changed.
- Change the B/W180 value of local station No.3, and check if the B/W180 value of the master station is changed.

(3) For programs for data link with other stations and the LRDP/LWTP instruction, refer to the following manual.
☞ Type MELSECNET, MELSECNET/B Data Link System Reference Manual

(4) Program example 2

(a) Program overview
This example program runs in a manner similar to program example 1.
In program example 2, the refresh information table (Buffer memory address: 2H to 27H) is saved in W devices.
Compared with program example 1, the number of accesses to the intelligent function module devices (U□\G□) is reduced. (Sequence scan time can be shortened by approx. 1ms.)
However, the saved W device values will not be protected.

(b) Device list

Devices used in the program are shown.

Note that the local module is mounted in the position indicated as I/O No. X/Y200 to X/Y21F.

Table 7.3 Device list

Device		Description
X200		Link status
X201		B/W initial value setting status
X207		Refresh ready status
Y210		CPU operating status
Y211		Refresh in execution
Y216		Refresh request
Link data		-
	X1000 to X17FF*1	Input
	Y1000 to Y17FF*1	Output
	B0 to BFFF*1	Link relay
	W0 to WFFF*1	Link register
LRDP/LWTP instruction target		-
	T0 to T2047*2	Timer
	C0 to C1023*2	Counter
	D0 to D6144*2	Data register
	W0 to WFFF*2	Link register
W1002 to W1027		Save area for refresh information table (Not protect device values.)
SM400		Always ON
SM402		After RUN, ON for 1 scan only
SM1240 to SM1255		Special relay (for link) (M9240 to M9255)
SD1243 to SD1255		Special register (for link) (D9243 to D9255)
SD2040 to SD2041*3		Presence or absence of refresh information table (Protects device values.)
SD2042 to SD2044*3		Z0 to Z2 save area (Protects device values.)
Z0		• When link data are sent/received Index register for device start number specification • On the receive processing of the LRDP/LWTP instruction Index register for start device name specification
Z1		• When link data are sent/received Index register for device points specification • On the receive processing of the LRDP/LWTP instruction Index register for start device No. specification
Z2		• When link data are sent/received Index register for bit device start number specification (a register equivalent to Z0, whose unit is converted from bit to word for index modification in link data storage area when the start number of the bit device is stored in Z0) • On the receive processing of the LRDP/LWTP instruction Index register for data length specification

* 1 The range of device use varies depending on the link parameters of the master station.

* 2 The range of device use varies depending on the start devices and the points that are specified by the LRDP/LWTP instruction of the master station.

* 3 Can be replaced with other devices as necessary.
However, to avoid wrong replacements, we recommend using the program examples described in the manual without changes.

(c) Program example

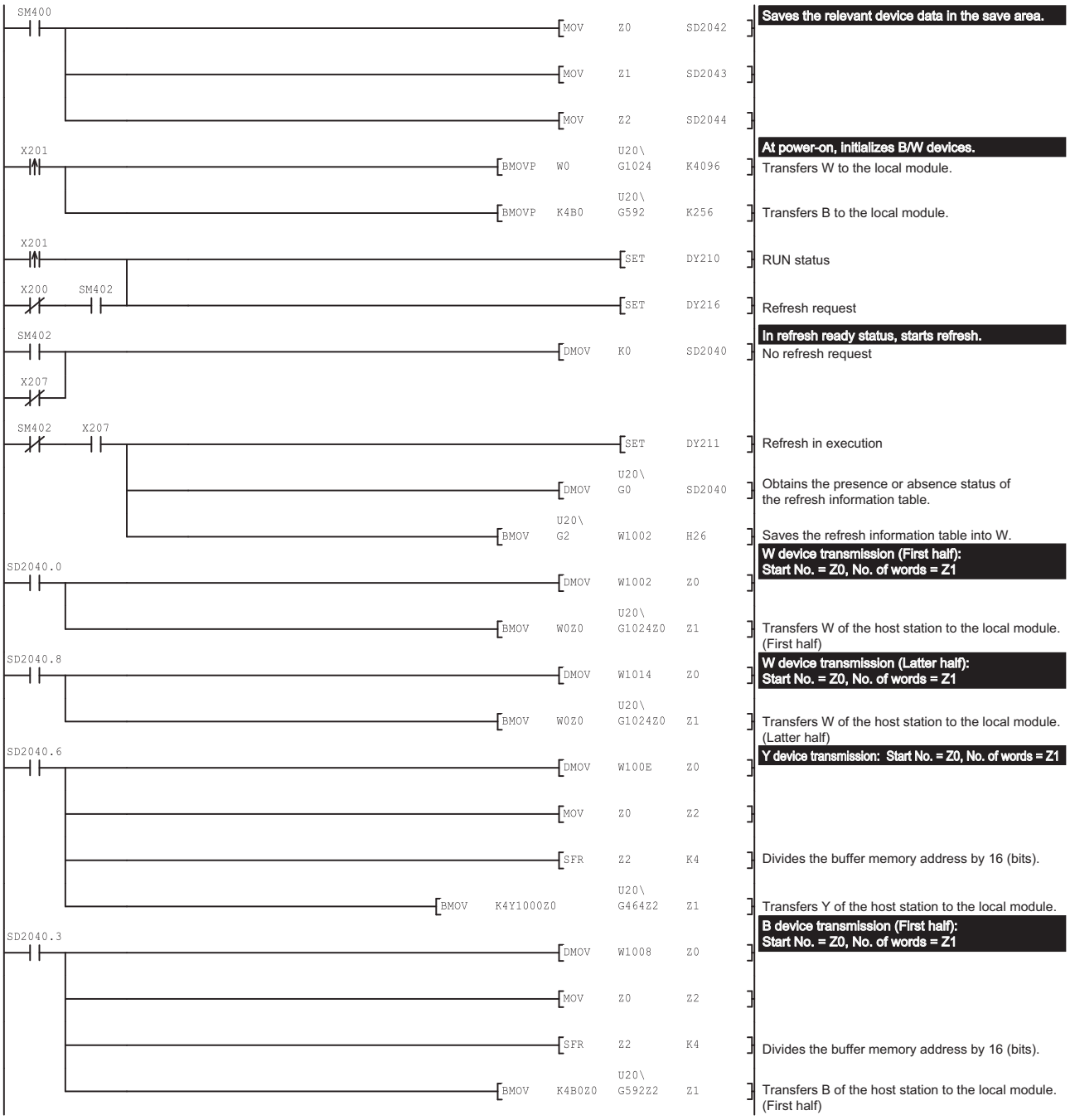


Figure 7.11 Program example

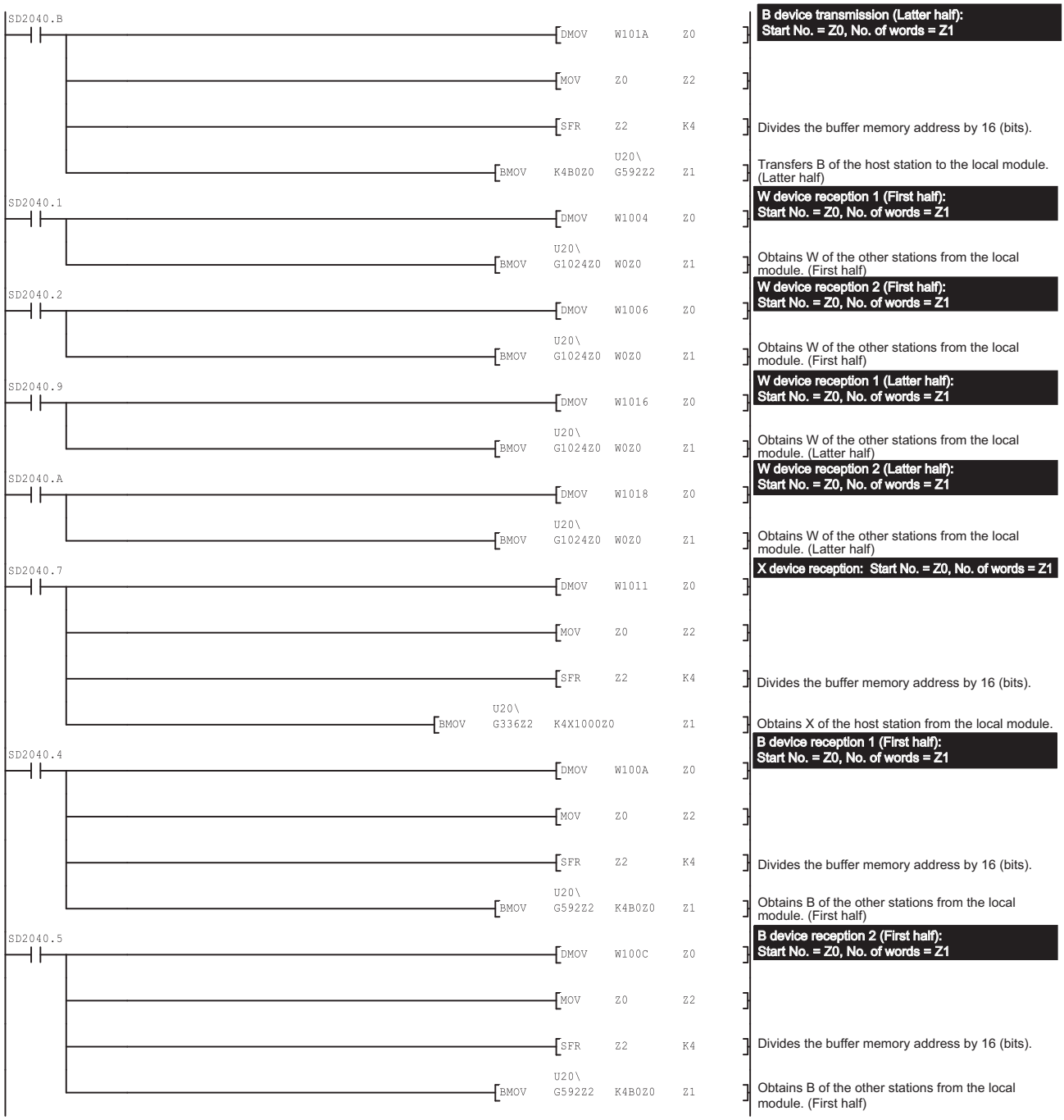


Figure 7.12 Program example (Continued)

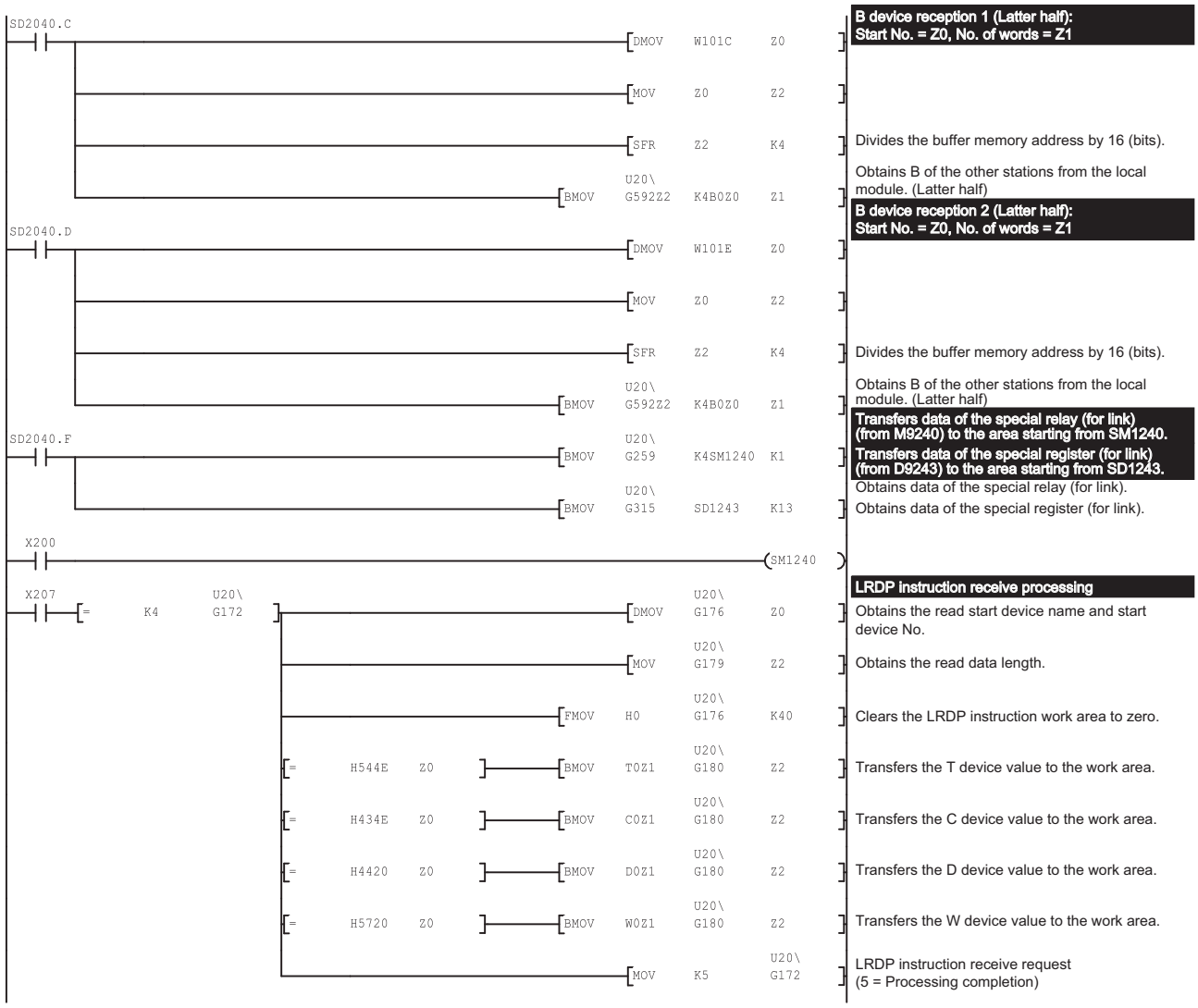


Figure 7.13 Program example (Continued)

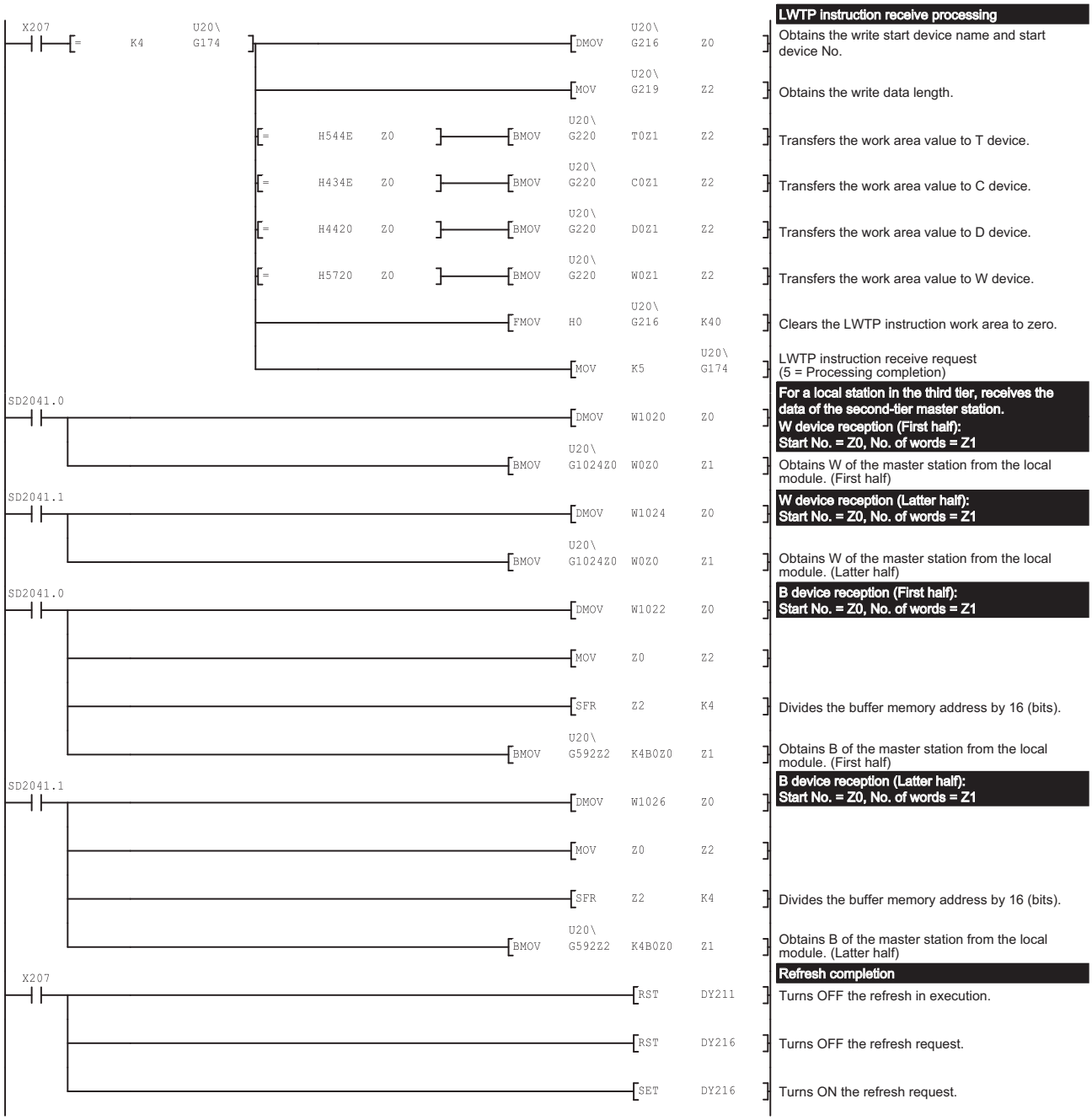


Figure 7.14 Program example (Continued)

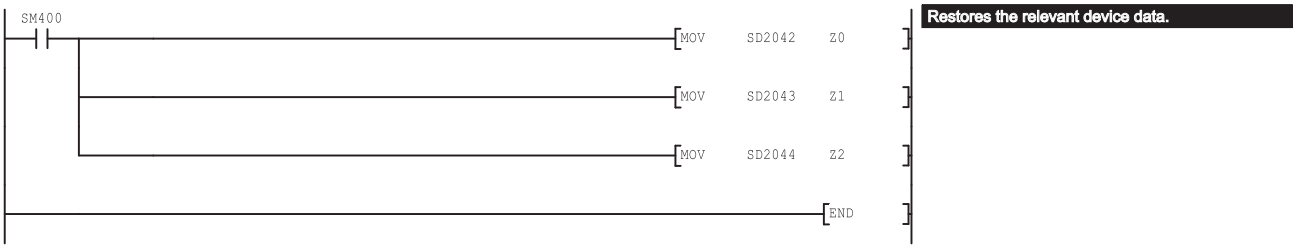


Figure 7.15 Program example (Continued)

POINT

(1) After writing the program to the CPU module, turn OFF and ON the power supply or reset the CPU module.
When the CPU module's RUN/STOP switch is set to RUN, the Q series local station starts sending/receiving data to/from other stations. (Refresh ready status (X7) turns ON/OFF.)

(2) Check the program for refresh.
<Examples of checking the program for refresh>
Check the following in the device batch monitor/test of GX Developer.
- Change the B/W0 value of the master station, and check if the B/W0 value of local station No.3 is changed.
- Change the B/W180 value of local station No.3, and check if the B/W180 value of the master station is changed.

(3) For programs for data link with other stations and the LRDP/LWTP instruction, refer to the following manual.
☞ Type MELSECNET, MELSECNET/B Data Link System Reference Manual

CHAPTER8 TROUBLESHOOTING

This chapter explains how to check the data link status and error details.

(1) For the master station

(a) Connect GX Developer to identify a faulty part.
☞ Section 8.2 Connecting GX Developer to Master Station for Error Checking

(b) Use the special relay (for link) or special register (for link) of a CPU module to identify a faulty part.
☞ Type MELSECNET, MELSECNET/B Data Link System Reference Manual

(c) When the master station is faulty, check the error with the ERROR LED.
☞ Section 8.3 Checking Error with LEDs of Link Module on Faulty Station

(2) For Q series local stations

(a) Data of the special relay (for link) and special register (for link) of a local module are refreshed into CPU module devices.
The faulty part can be checked by using the refreshed devices.

☞ ・ Appendix 1 List of Special Relays (for Link)
・ Appendix 2 List of Special Registers (for Link)

Note that the network diagnostics of GX Developer is not available for Q series local stations. Check the fault by the above method.

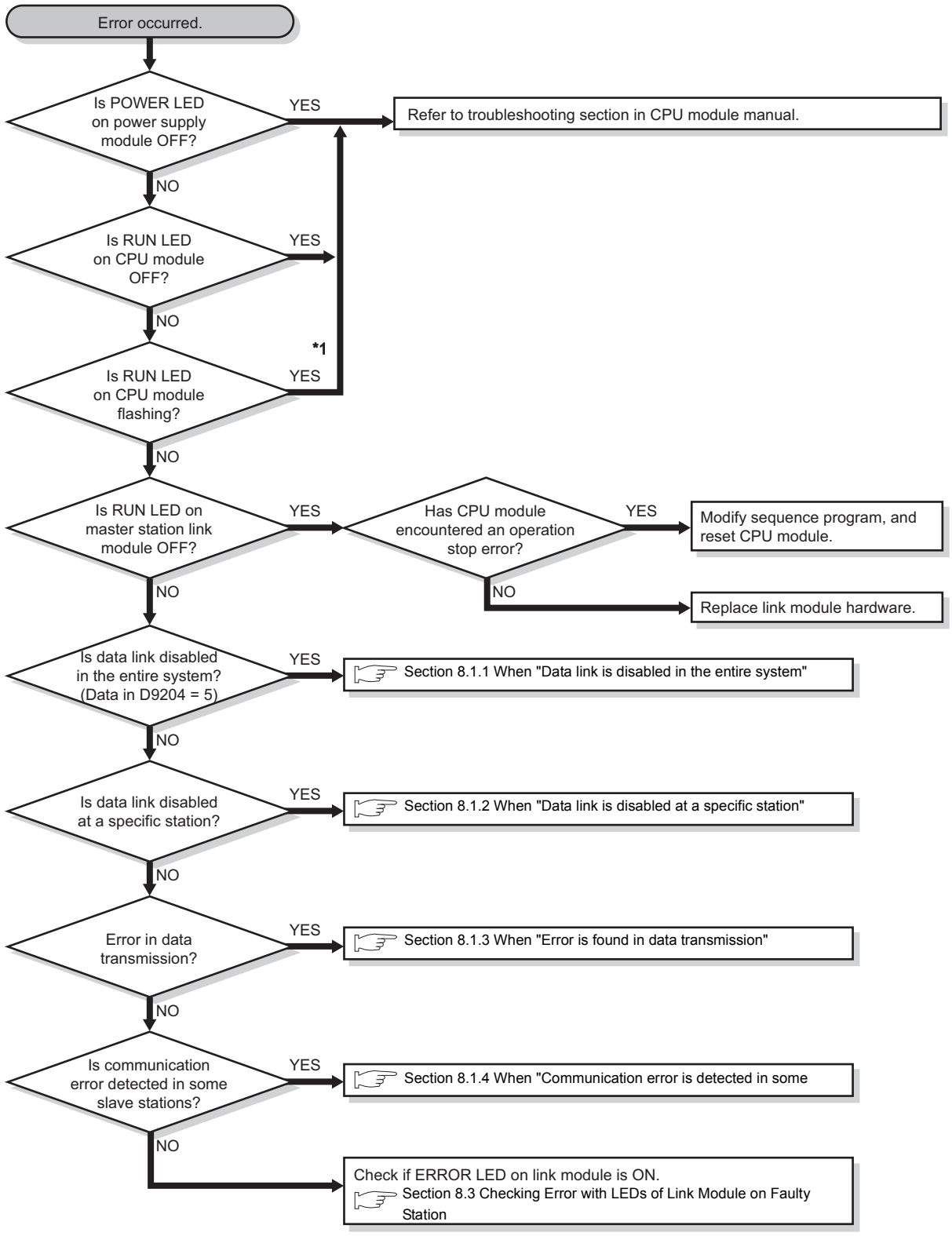
(b) When a Q series local station is faulty, check the error with the ERROR LED that is lit.
☞ Section 8.3 Checking Error with LEDs of Link Module on Faulty Station

(c) Check for proper cable connection.(☞ Section 5.4 Wiring)

1) In the MELSECNET data link system, are the slave stations connected in order of station No. starting from the master station (01 → 02 ・・・ n (n ≦ 64)) in the forward loop direction?
2) Isn't any station No. skipped in the setting?
3) Isn't any station No. duplicated in the same tier?

(d) Check the program for refresh and for receiving LRDP/LWTP instruction.
☞ Section 8.4 Checking the Program for Refresh

8.1 Troubleshooting Flowchart



*1 If the mode, station No. or communication speed of the link module is not set correctly, "SP.UNIT LAY ERR." will occur when the CPU module status changes from STOP to RUN.

Figure 8.1 Troubleshooting Flowchart

8.1.1 When "Data link is disabled in the entire system"

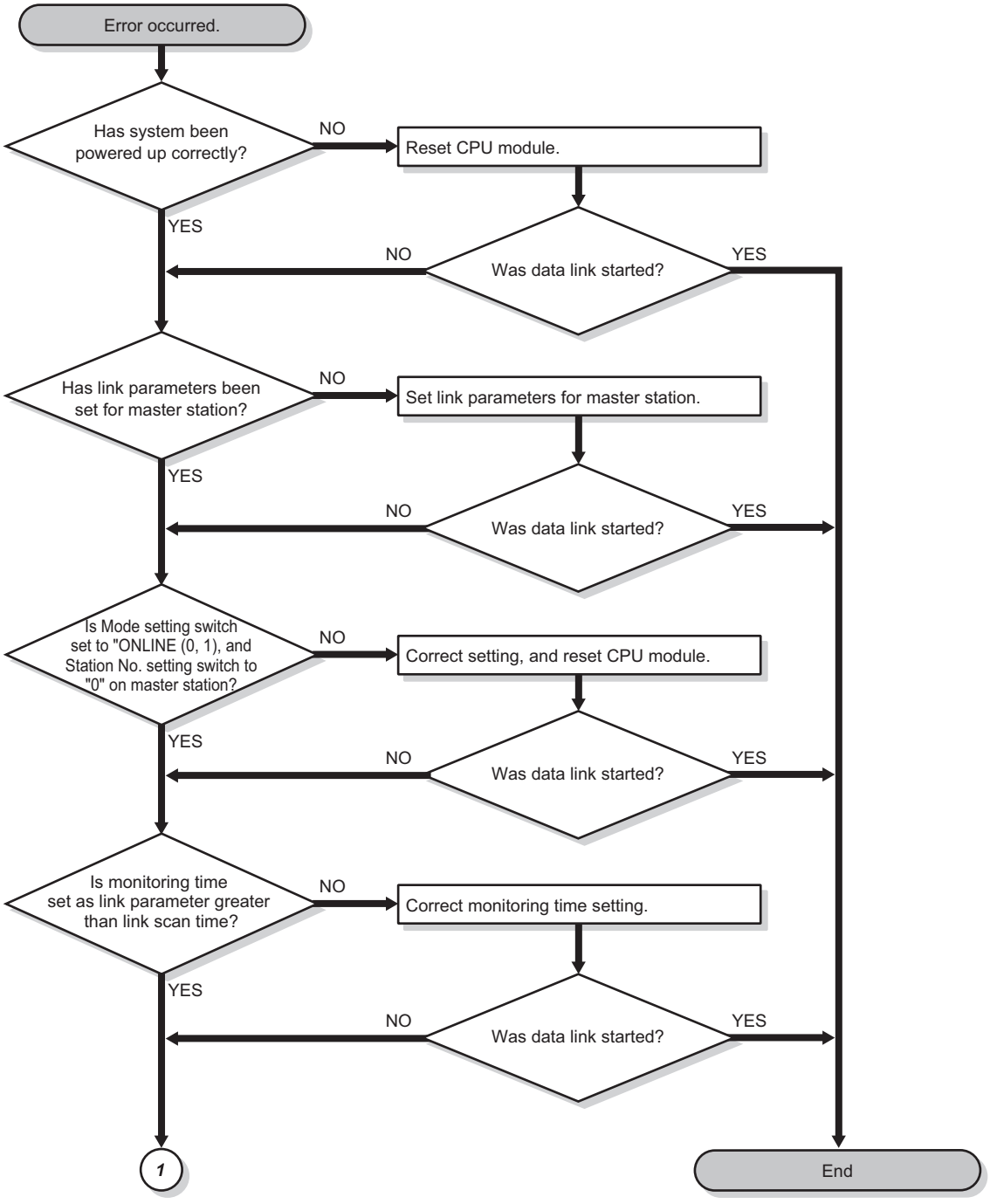


Figure 8.2 When "Data link is disabled in the entire system"

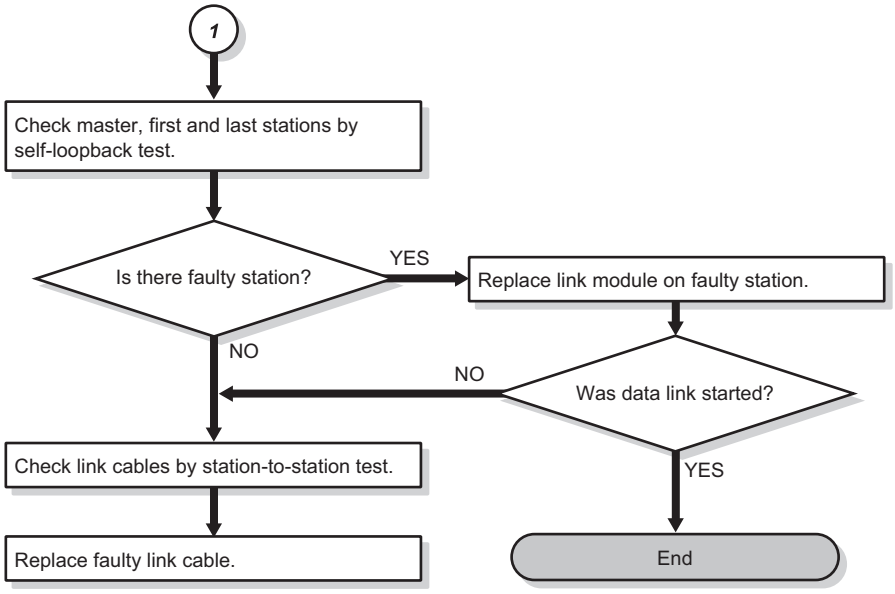
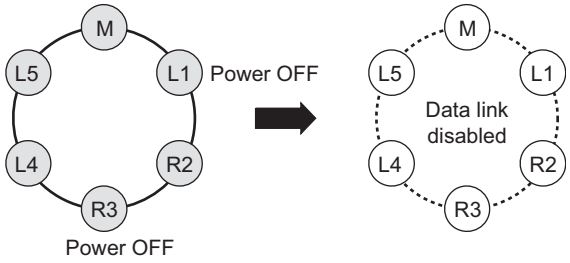


Figure 8.3 When "Data link is disabled in the entire system" (Continued)

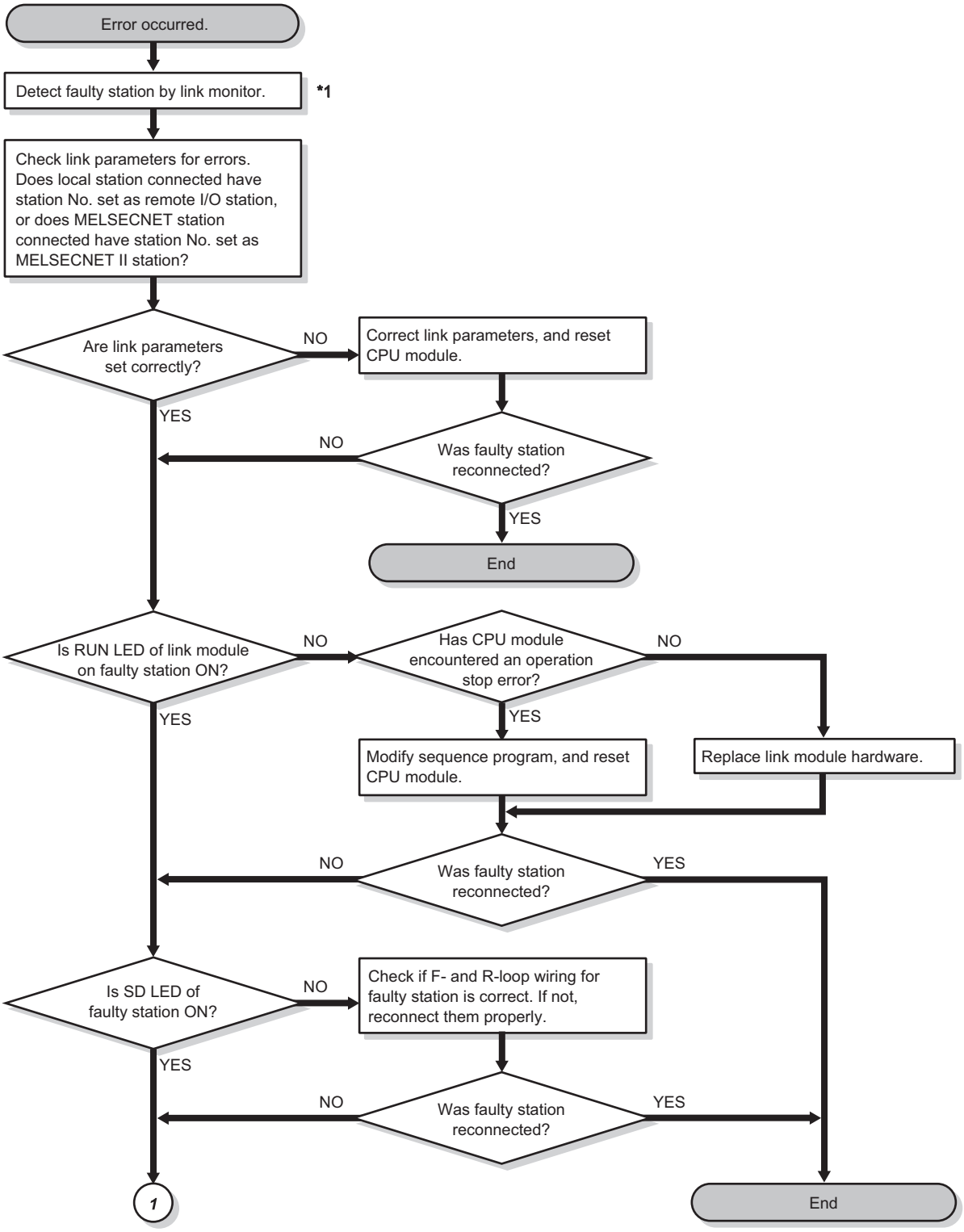
POINT

In the MELSECNET data link system, if two stations located on both sides of a normally operating station are powered OFF or ON at the same time (within 100ms), data link may be disabled in the entire system.
Stations with the automatic return function will be reconnected to the network automatically.
Stations without the automatic return function remain disconnected from the network. To reconnect these stations, reset the CPU module.
(Example)



If L1 and R3 are powered OFF at the same time (within 100ms) with R2 operating normally in the above system, data link may be disabled in the entire system.

8.1.2 When "Data link is disabled at a specific station"



*1 If a faulty station was detected, first check whether the link cable of the station is disconnected or not. If disconnected, shut off all phases of the external power supply used in the system, and then connect the link cable.

Figure 8.4 When "Data link is disabled at a specific station"

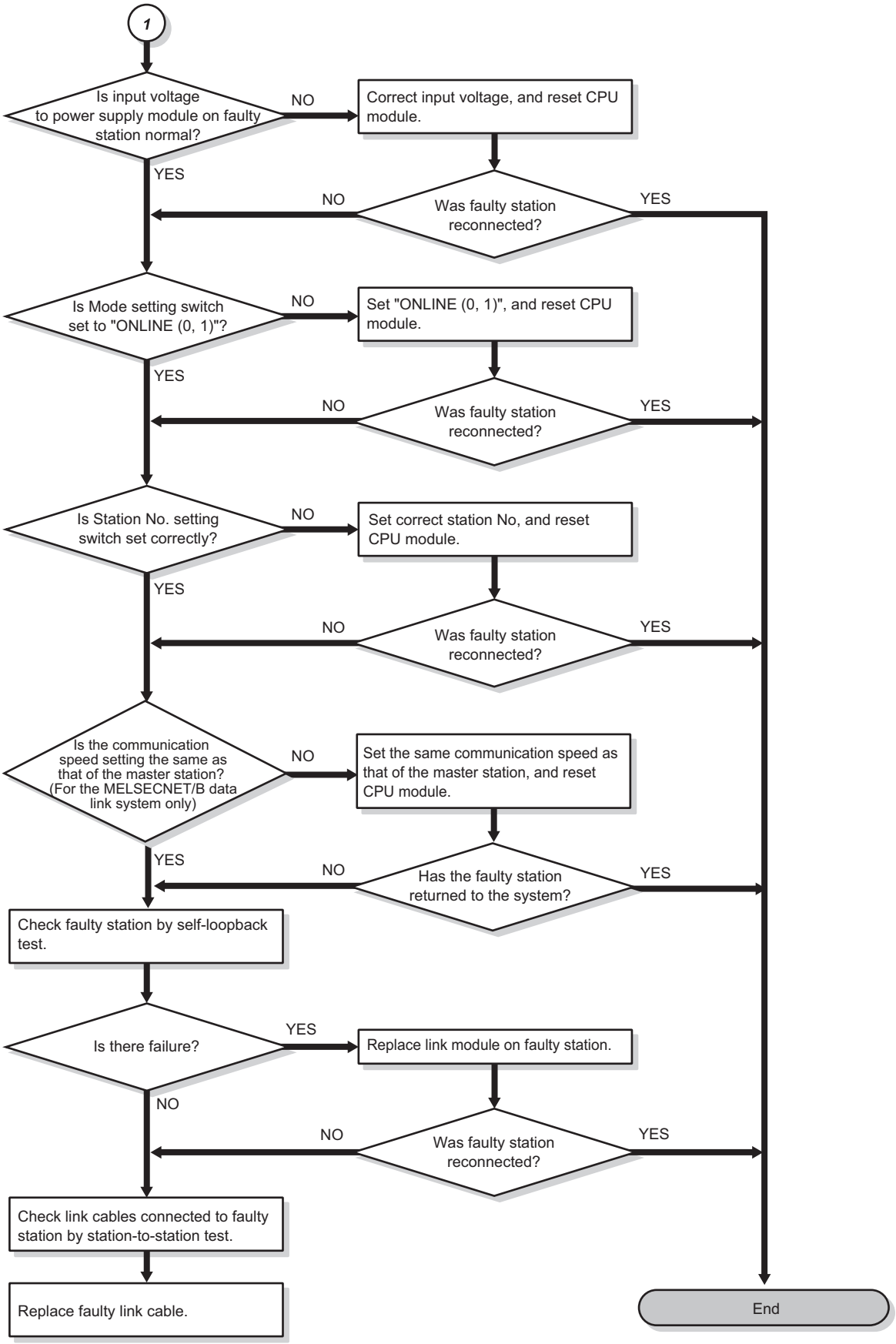


Figure 8.5 When "Data link is disabled at a specific station" (Continued)

8.1.3 When "Error is found in data transmission"

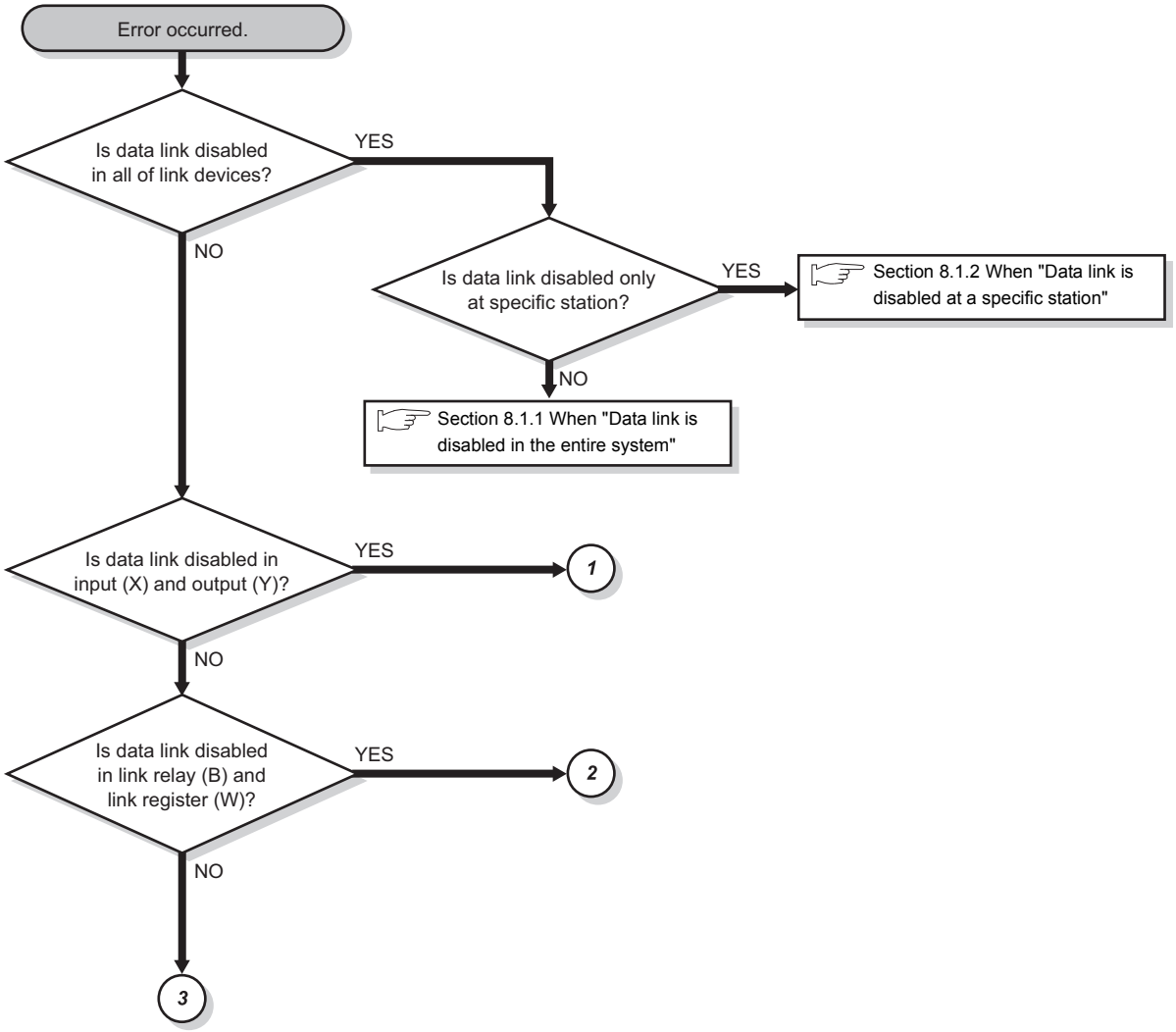


Figure 8.6 When "Error is found in data transmission"

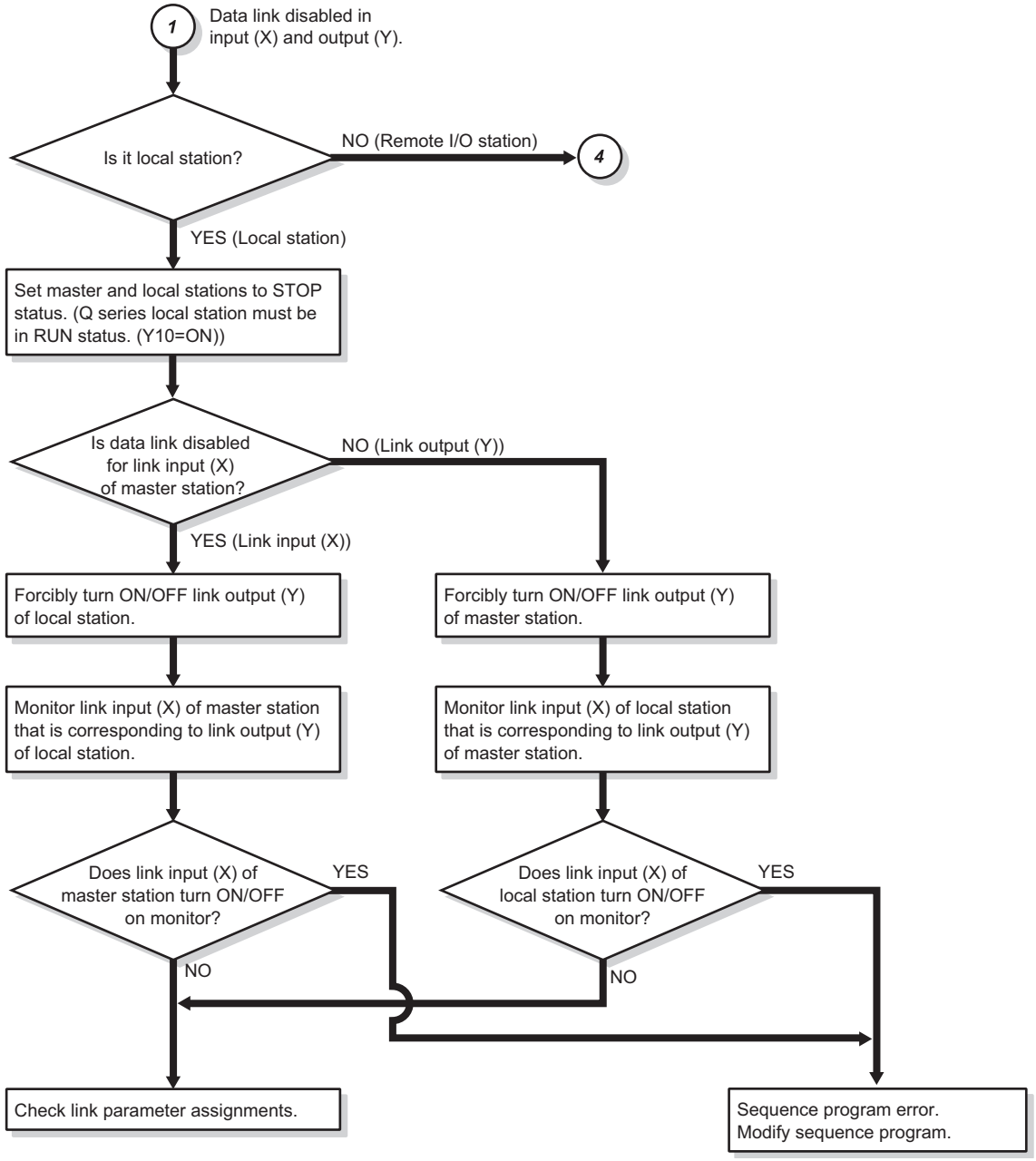


Figure 8.7 When "Error is found in data transmission" (Continued)

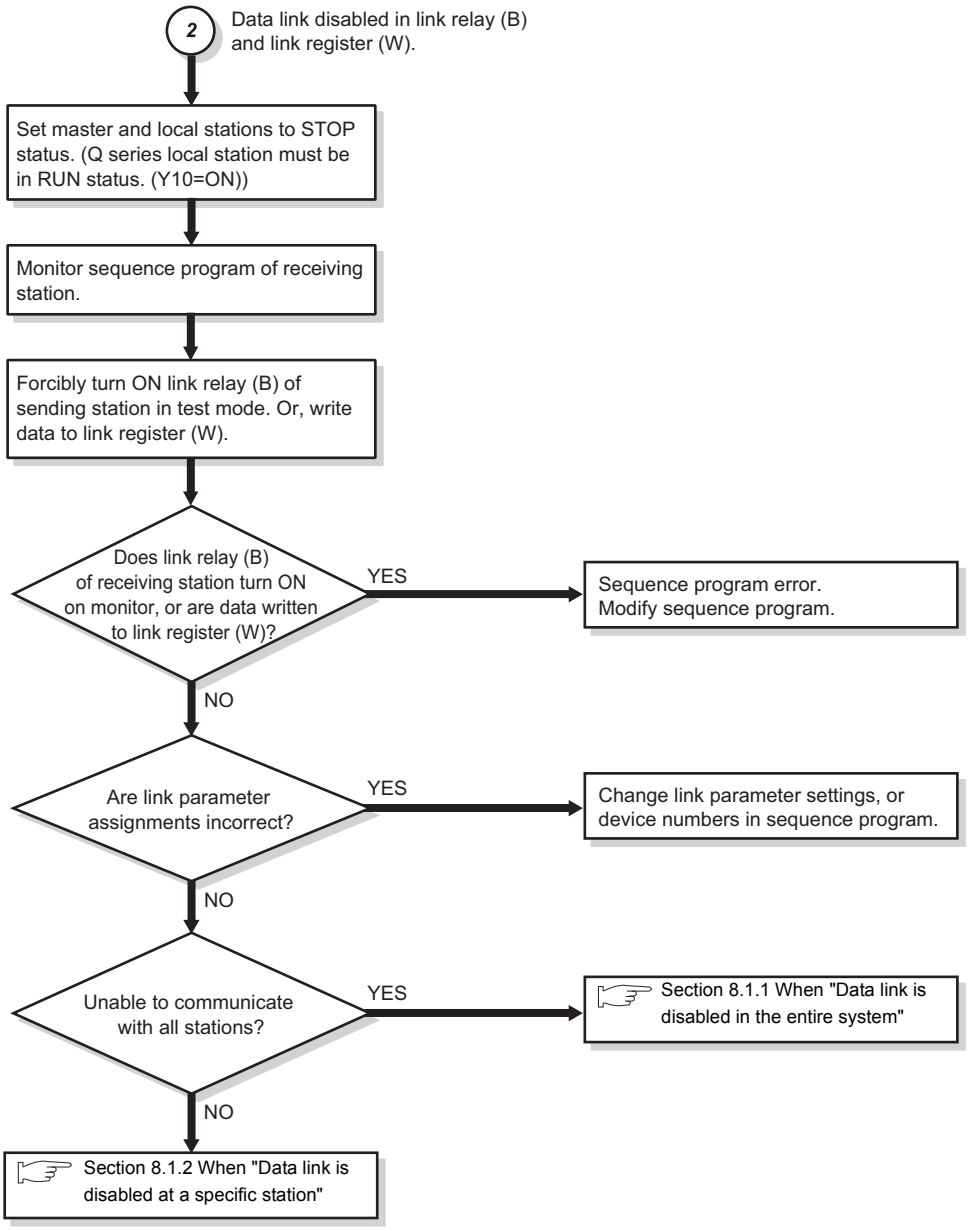


Figure 8.8 When "Error is found in data transmission" (Continued)

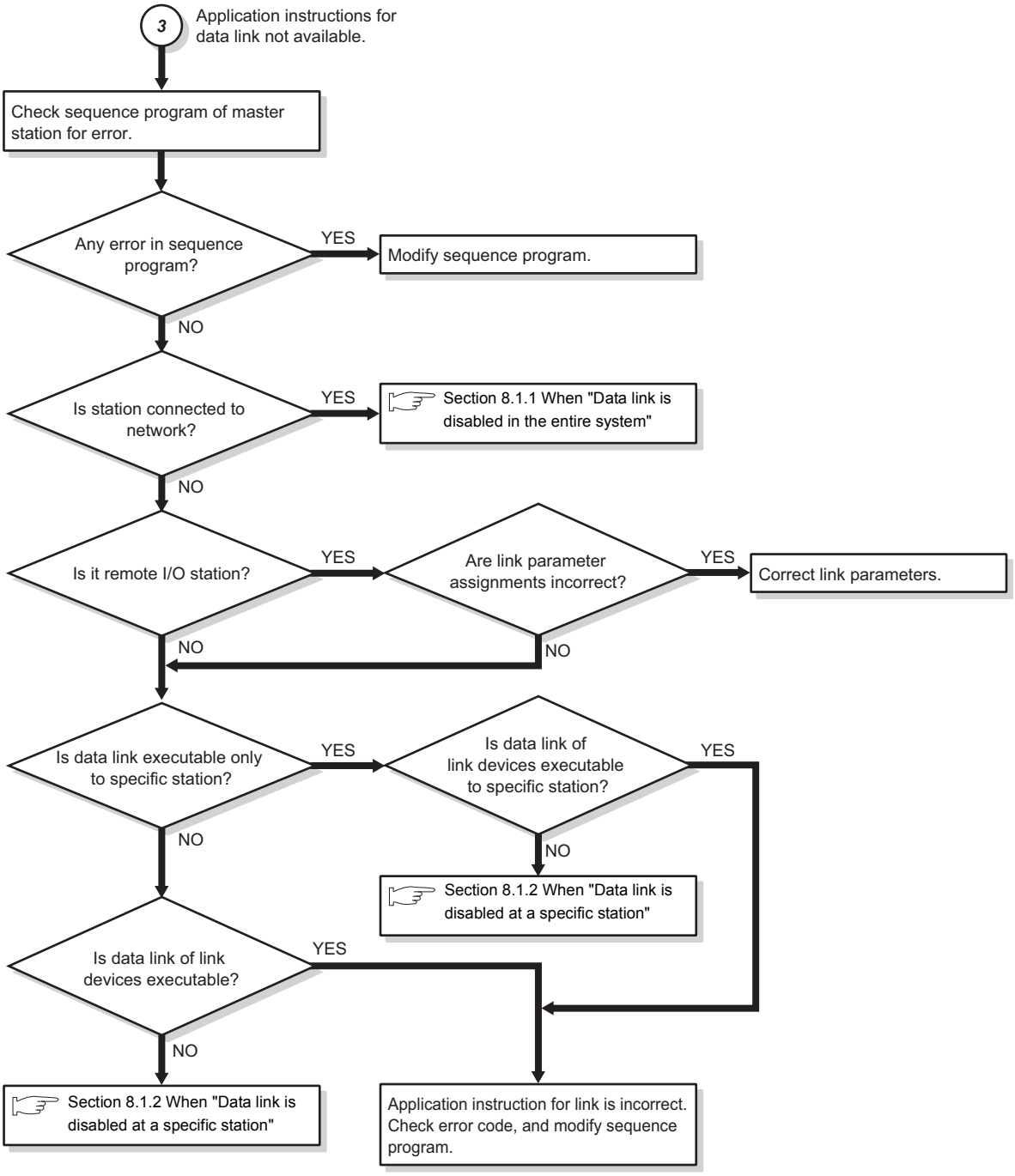


Figure 8.9 When "Error is found in data transmission" (Continued)

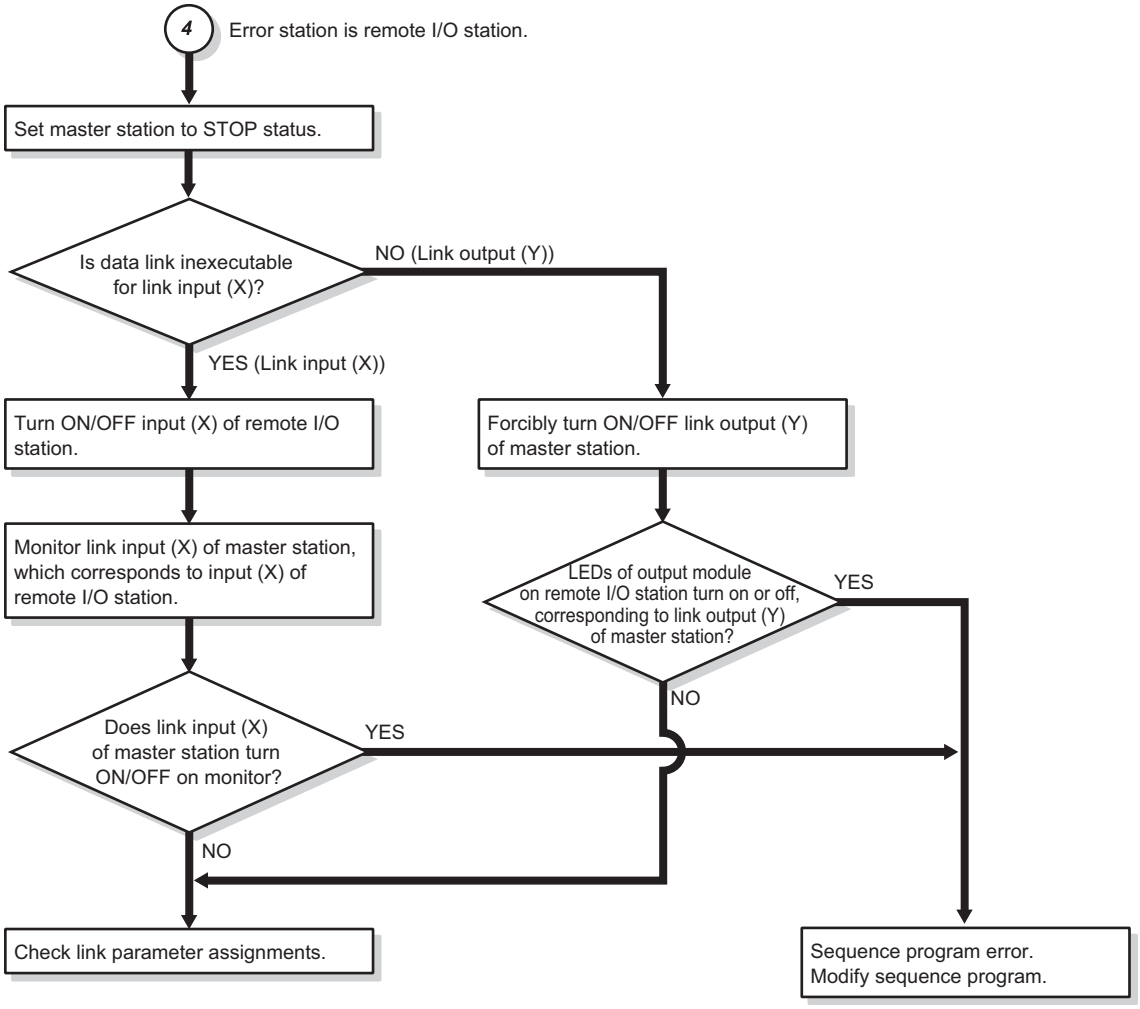
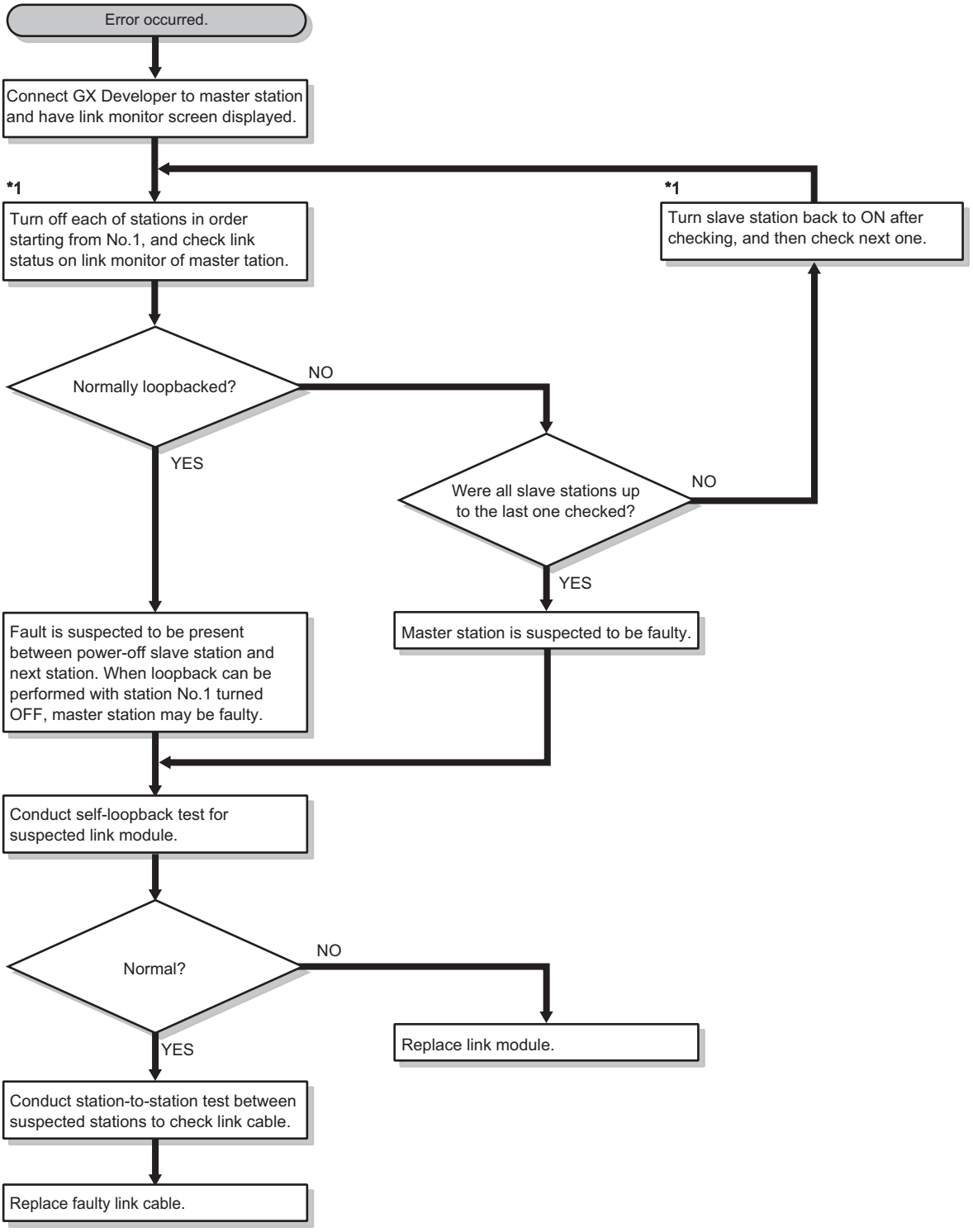


Figure 8.10 When "Error is found in data transmission" (Continued)

8.1.4 When "Communication error is detected in some slave stations"



*1 If programmable controller cannot be turned OFF, disconnect link cable.

Figure 8.11 When "Communication error is detected in some slave stations"

8.2 Connecting GX Developer to Master Station for Error Checking

By connecting GX Developer to the master station, faults can be checked using the network diagnostics.
For operation of the network diagnostics, refer to the following manual.

☞ GX Developer Version□Operating Manual

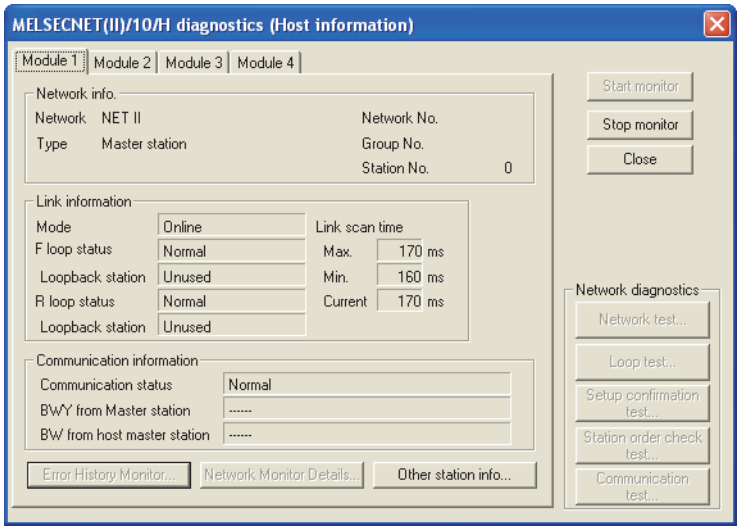


Figure 8.12 Network diagnostics (Host information)

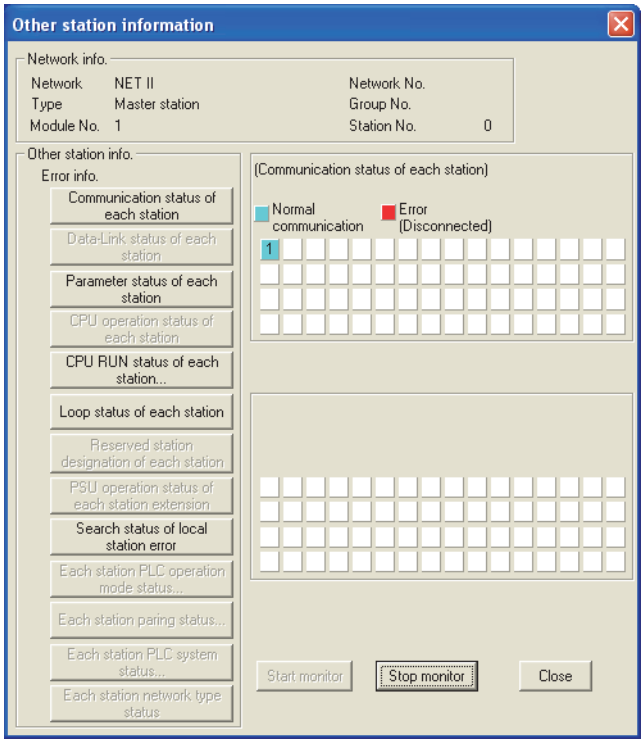


Figure 8.13 Network diagnostics (Other station information)

8.3 Checking Error with LEDs of Link Module on Faulty Station

Any of the following LEDs will light up when an error occurs.

Table 8.1 ERROR LEDs

Indication	Name	Error-detected status	Description
CRC	CRC error (Cyclic redundancy check)	ON	Code check error of receive data <Cause> •Data-sending station was disconnected at the timing. •Cable fault, noise, etc.
OVER	Overrun error		Received data were overwritten with another data received next due to delay in loading. <Cause> Hardware failure in receiving part of link module
AB.IF	Abort invalid frame error		"1" has been received consecutively more than stipulated times. Receive data length is shorter than stipulated length. <Cause> •Data-sending station was disconnected at the timing. •Monitoring time too short, cable fault, noise, etc.
TIME	Time check error		Data link monitoring time is over. <Cause> Monitoring time too short, cable fault, noise, etc.
DATA	Data check error		Data containing erroneous code have been received. <Cause> Cable fault, noise, etc.
UNDER	Underrun error		Internal processing of send data is not executed constantly. <Cause> Hardware failure in sending part of link module
F.LOOP	Forward loop error		Forward loop line has an error. Adjacent station was powered OFF. <Cause> Forward loop cable disconnection, or incomplete cable connection
R.LOOP	Reverse loop error		Reverse loop line has an error. Adjacent station was powered OFF. <Cause> Reverse loop cable disconnection, or incomplete cable connection

8.4 Checking the Program for Refresh

This section explains how to check the program for refresh and for receiving LRDP/LWTP instruction.

Execute the program at the beginning of the sequence scan.
When using the example program introduced in this manual, do not change it except for the following.(☞ CHAPTER 7 PROGRAMMING)

- Change the I/O signals and intelligent function module device I/O numbers depending on the module position.
- Change the link data refresh destination to prevent duplication with a device of the CPU module, which is used for refresh parameters for the MELSECNET/H network module.

Table 8.2 Checking of the program for refresh and for receiving LRDP/LWTP instruction

Symptom	Check	Action
Host station remains disconnected, not starting data communication (cyclic transmission) with other stations.	Is CPU operating status (DY10) ON?	Turn ON CPU operating status (DY10).
	Is host station CPU module in STOP status?	Set host station CPU module to RUN.
	Is it in offline status (X0=ON)?	•Set it to online status (Set Mode setting switch to 0 or 1.) •Check station No., mode setting, and communication speed setting.
Link data of host station (normal) not sent to other stations.	Is link data refresh destination duplicated with CPU module device, which is used for refresh parameters of MELSECNET/H network module?	Change refresh destination of link data.
	Was Refresh request (DY16) turned ON from OFF after termination of refresh?	•After termination of refresh, reset Refresh request (DY16) and set it again. •Always use direct access output (DY16).
	Is each station send range stored in Refresh information table (Buffer memory address: 2H to 27H)?	While Refresh ready status (X7) is OFF, turn ON Refresh request (DY16).
In spite of latch setting of host station B/W devices, 0 data (OFF data) are sent to other stations.	Were initial B/W device values transferred to local module before data communication with other stations?	Transfer initial B/W device values to local module before data communication with other stations.
	After B/W initial value setting status (X1) turned ON, was CPU operating status (DY10) turned ON?	After B/W initial value setting status (X1) turned ON, turn ON CPU operating status (DY10).
Long sequence scan (Link refresh time is longer than calculated time.)	Was Refresh in execution (DY11) turned ON before starting refresh? Also, was Refresh in execution (DY11) turned OFF after termination of refresh?	•Before starting refresh, turn ON Refresh in execution (DY11). •When terminating refresh, reset Refresh in execution (DY11). •Always use direct access output (DY11).

APPENDICES

Appendix 1 List of Special Relays (for Link)

A special relay (for link) turns ON/OFF due to various causes that are generated during data link.
Special relays (for link) are used in the sequence program, and data link error status can be checked by monitoring them.

The following table lists the special relays (for link) available for Q series local stations.
For those used in master and A/QnA series local stations, refer to the following manual.
☞ Type MELSECNET, MELSECNET/B Data Link System Reference Manual

Table App.1 List of special relays (for link)

Buffer memory address (Bit No.)		No.	Name	Description	Details
Hexadecimal	Decimal				
103H (b1)	259 (b1)	M9241 *1	Forward loop line error	OFF: Normal ON: Error	•Turns ON when any of the following errors occurs on the forward loop line between the host and preceding stations. •Cable disconnection •Error in the forward loop receiving part of the host station link module •Error in the forward loop sending part of the preceding station link module •Automatically turns OFF when the error status returns to normal.
103H (b2)	259 (b2)	M9242 *1	Reverse loop line error	OFF: Normal ON: Error	•Turns ON when any of the following errors occurs on the reverse loop line between the host and the next stations. •Cable disconnection • Error in the reverse loop receiving part of the host station link module •Error in the reverse loop sending part of the next station link module •Automatically turns OFF when the error status returns to normal.
103H (b3)	259 (b3)	M9243 *1	Loopback execution	OFF: Not in execution ON: In execution	•Turns ON while the host station is executing loopback.
103H (b6)	259 (b6)	M9246	Data unreceived	OFF: Received ON: Unreceived	•Turns ON when data have not been received from the master station.
103H (b7)	259 (b7)	M9247	Data unreceived	OFF: Received ON: Unreceived	•Turns ON, in the three-tier system, when a local station has not received data from the master station on the higher link.(M9247 is ON when M9208 of the master station is ON.)
103H (b10)	259 (b10)	M9250	Parameter unreceived	OFF: Received ON: Unreceived	•Turns ON when link parameters have not been received from the master station. •Automatically turns OFF upon normal reception of the link parameters. •The master station sends link parameters to each local station when switching the loop line. •Valid when the data-linking loop line is online.

Table App.1 List of special relays (for link) (Continued)

Buffer memory address (Bit No.)		No.	Name	Description	Details
Hexadecimal	Decimal				
103H (b11)	259 (b11)	M9251	Link halt	OFF: Normal ON: Halt	•Controlled according to the data link halt status of the host station. •Turns ON when data link is not performed on both the forward and reverse loop lines. •Automatically turns OFF when data link returns to normal. •Valid when the data-linking loop line is online.
103H (b12)	259 (b12)	M9252 *1	Loop test status	OFF: Not in execution ON: In execution	•Turns ON while the host station is executing the forward/reverse loop test.
103H (b13)	259 (b13)	M9253	Master station operating status	OFF: RUN, STEP RUN ON: STOP, PAUSE	•Controlled according to the system operation status of the master station. •Turns ON when the master station is in STOP or PAUSE status. •Turns OFF when the master station is in RUN or STEP RUN status.
103H (b14)	259 (b14)	M9254	Operating status of local stations except host	OFF: RUN, STEP RUN ON: STOP, PAUSE	•Controlled according to the system operation status of the local stations except for the host station. •Turns ON when any local station except for the host station in the loop is placed in STOP or PAUSE status. •Does not turn ON even if the host station enters STOP or PAUSE status. •Automatically turns OFF when the local stations except for the host station are placed in RUN or STEP RUN status.(When all bits in D9248 to D9251 turn OFF, M9254 turns OFF.)
103H (b15)	259 (b15)	M9255	Errors of local stations except host	OFF: Normal ON: Error	•Controlled according to the error detection status of the local stations except for the host station. •Turns ON when any one of the local stations except for the host station goes down in the loop. •Automatically turns OFF when the faulty station returns to normal, or when data link returns to normal by loop line switching. (When all bits in D9252 to D9255 turn OFF, M9255 turns OFF.)

* 1 Used for the MELSECNET data link system only.

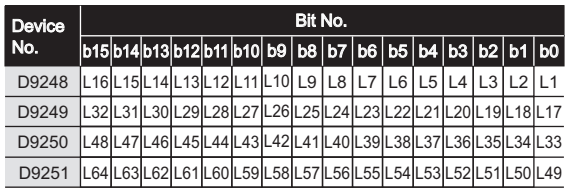
Appendix 2 List of Special Registers (for Link)

Data link information is stored as numeric values into the special registers (for link). The special registers (for link) are used in the sequence program, and error locations and causes can be checked by monitoring them.

The following table lists the special registers (for link) available for Q series local stations. For those used in master and A/QnA series local stations, refer to the following manual.

☞ Type MELSECNET, MELSECNET/B Data Link System Reference Manual

Table App.2 List of special registers (for link)

Buffer memory address (Bit No.)		No.	Name	Description	Details
Hexadecimal	Decimal				
13BH	315	D9243	Host station No. information	Stores station No. (0 to 64)	•Stores station No. of the host station. •Useful for local station to check station No. of the host station.
13CH	316	D9244	Total number of slave stations	Stores the number of slave stations.	•Used for local stations to detect the number of slave stations in the loop.
13DH	317	D9245	Receive error detection count	Stores the accumulated total of receive errors.	•Stores the accumulated counts of CRC, OVER, and ABIF detections. •Detected errors are counted up to "FFFFH" and then counting is stopped. •Resetting the CPU module clears the count to "0".
140H	320	D9248	Local station operating status	Stores status data of station No.1 to No.16	•Stores station Nos. of STOP- or PAUSE-status local stations except for the host station, into the corresponding bits in the special registers (for link) as shown below.  •If a local station other than the host station goes down, data before the failure will be held. When the corresponding bit in D9252 to D9255 is "0", the relevant bit in the above special registers is enabled. •If the host station goes down, data before the failure will be also held. •Bits corresponding to the station Nos. of STOP or PAUSE status local stations (except for host station) turn to "1". (Example) When local stations No.7 and No.15 are in STOP or PAUSE, bit 6 and bit 14 in D9248 are "1". By monitoring D9248, "16448 (4040H)" is identified. •When the status of a local station except for the host station changes to RUN or STEP RUN, the corresponding bit automatically turns to "0". •Bits corresponding to the host and remote I/O stations always store "0".
141H	321	D9249		Stores status data of station No.17 to No.32	
142H	322	D9250 *1		Stores status data of station No.33 to No.48	
143H	323	D9251 *1		Stores status data of station No.49 to No.64	

Device No.	Bit No.															
	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
D9248	L16	L15	L14	L13	L12	L11	L10	L9	L8	L7	L6	L5	L4	L3	L2	L1
D9249	L32	L31	L30	L29	L28	L27	L26	L25	L24	L23	L22	L21	L20	L19	L18	L17
D9250	L48	L47	L46	L45	L44	L43	L42	L41	L40	L39	L38	L37	L36	L35	L34	L33
D9251	L64	L63	L62	L61	L60	L59	L58	L57	L56	L55	L54	L53	L52	L51	L50	L49

Table App.2 List of special registers (for link) (Continued)

<table>
<tr><th colspan="2">Buffer memory address (Bit No.)</th><th rowspan="2">No.</th><th rowspan="2">Name</th><th rowspan="2">Description</th><th rowspan="2">Details</th></tr>
<tr><th>Hexadecimal</th><th>Decimal</th></tr>
<tr><td>144H</td><td>324</td><td>D9252</td><td rowspan="4">Local station error status</td><td>Stores status data of station No.1 to No.16</td><td rowspan="4">•Stores station Nos. of faulty local stations except for the host station in the loop, into the corresponding bits in the special registers (for link) as shown below.
•Error detection is performed only for local stations other than the host station. Remote I/O station data are "0" and are not changed.

<table><tr><th>Device No.</th><th colspan="16">Bit No.</th></tr><tr><th></th><th>b15</th><th>b14</th><th>b13</th><th>b12</th><th>b11</th><th>b10</th><th>b9</th><th>b8</th><th>b7</th><th>b6</th><th>b5</th><th>b4</th><th>b3</th><th>b2</th><th>b1</th><th>b0</th></tr><tr><td>D9252</td><td>L16</td><td>L15</td><td>L14</td><td>L13</td><td>L12</td><td>L11</td><td>L10</td><td>L9</td><td>L8</td><td>L7</td><td>L6</td><td>L5</td><td>L4</td><td>L3</td><td>L2</td><td>L1</td></tr><tr><td>D9253</td><td>L32</td><td>L31</td><td>L30</td><td>L29</td><td>L28</td><td>L27</td><td>L26</td><td>L25</td><td>L24</td><td>L23</td><td>L22</td><td>L21</td><td>L20</td><td>L19</td><td>L18</td><td>L17</td></tr><tr><td>D9254</td><td>L48</td><td>L47</td><td>L46</td><td>L45</td><td>L44</td><td>L43</td><td>L42</td><td>L41</td><td>L40</td><td>L39</td><td>L38</td><td>L37</td><td>L36</td><td>L35</td><td>L34</td><td>L33</td></tr><tr><td>D9255</td><td>L64</td><td>L63</td><td>L62</td><td>L61</td><td>L60</td><td>L59</td><td>L58</td><td>L57</td><td>L56</td><td>L55</td><td>L54</td><td>L53</td><td>L52</td><td>L51</td><td>L50</td><td>L49</td></tr></table>
•Bits corresponding to the station Nos. of faulty local stations (except for host station) turn to "1".
(Example) When local station No.12 is faulty, bit 11 in D9252 turns to "1".
By monitoring D9252, "2048 (800H)" is identified.
•Automatically turns to "0s" when faulty stations return to normal, or when data link returns to normal by loop line switching.</td></tr>
<tr><td>145H</td><td>325</td><td>D9253</td><td>Stores status data of station No.17 to No.32</td></tr>
<tr><td>146H</td><td>326</td><td>D9254 *1</td><td>Stores status data of station No.33 to No.48</td></tr>
<tr><td>147H</td><td>327</td><td>D9255 *1</td><td>Stores status data of station No.49 to No.64</td></tr>
</table>

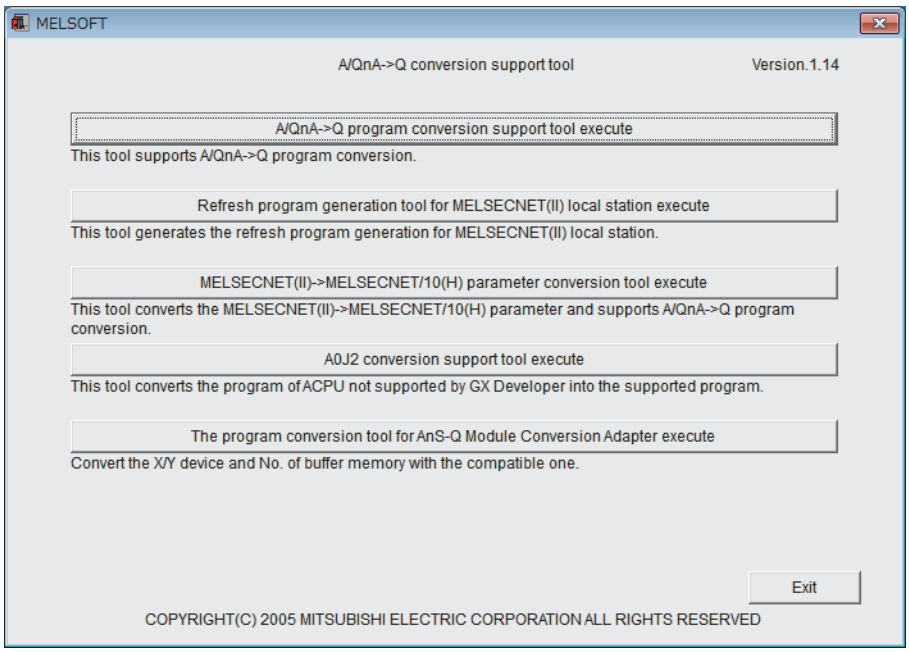
* 1 Used for the MELSECNET data link system only.

Appendix 3 Steps to Create a Program for L Series

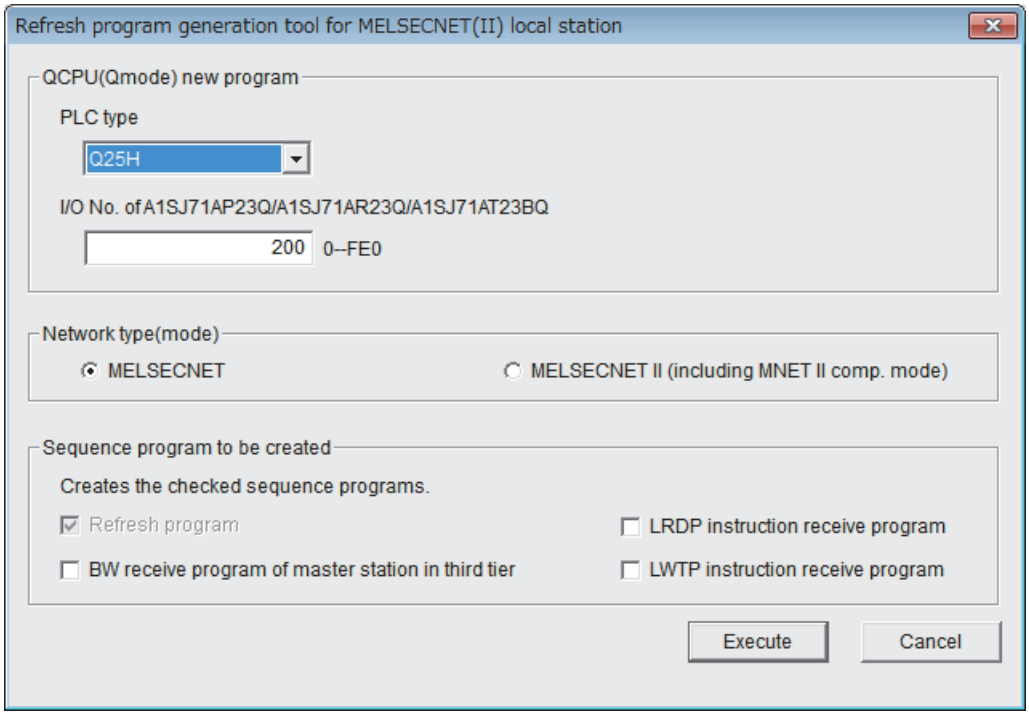
This section shows the steps to create a program for L series.
Using a program of A/QnS series for L series requires A/QnA to Q conversion support tool.

(1) Launch A/QnA to Q conversion support tool.

(2) In the menu window, select "Refresh program generation tool for MELSECNET(II) local station execute".

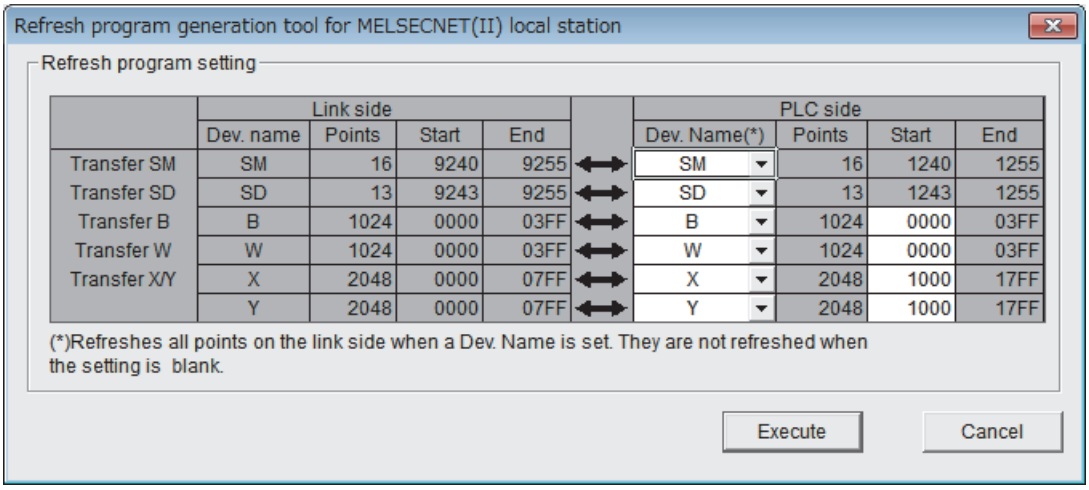


(3) In the "Refresh program generation tool for MELSECNET (II) local station" window, prepare the conditions for a new program.



Item		Description
PLC type		Select "Q25H".
I/O No. of A1SJ71AP23Q/A1SJ71AR23Q/ A1SJ71AT23BQ		Enter the I/O number of the slot on which the local module is mounted. This setting is intended for the start number of a module to be accessed by the FROM/TO instruction. Before entering the I/O number, check the actual system. An I/O number different from that of the actually mounted module can cause the CPU module to stop.
Network type (mode)		Select the network type (mode) that is set up in the network parameters in the master station.
Sequence program to be created	BW receive program of master station in third tier	Check the box if a station into which the refresh program is to be included is a third tier local station.
	LRDP instruction receive program LWTP instruction receive program	Check the box if the program of the master station includes the transient instruction to be given to "Station on which a local station data link module is mounted".

(4) Set up the devices on the PLC side for link refresh.



(a) Setting up "Transfer SM" and "Transfer SD"
Set up the devices on the PLC side that refresh the special relays (for link) and the special registers (for link) of the MELSECNET (II) local station.
For the devices that bear the name SM or SD, the device number is fixed.
For devices with the other names, the device number can be set at any number.
If the "Dev.Name" field is left blank, link refresh is not carried out.

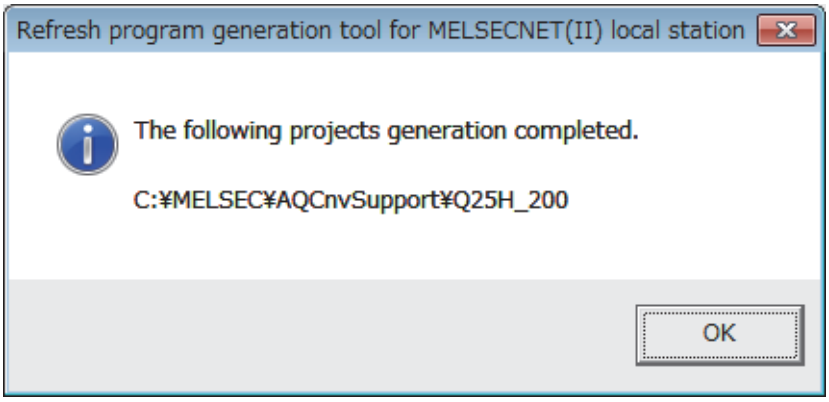
(b) Setting up "Transfer B", "Transfer W", and "Transfer X/Y"
Set up the devices on the PLC side that refresh the corresponding link device.
Setting the start number results in the following points being occupied automatically:

- B and W: 1024 points (in MELSECNET mode[*1])
  4096 points (in MELSECNET (II) composite mode[*1])
- X and Y: 2048 points

The devices within the range of both "Refresh program setting" here and "Network range assignment" of the master station are subject to link refresh.

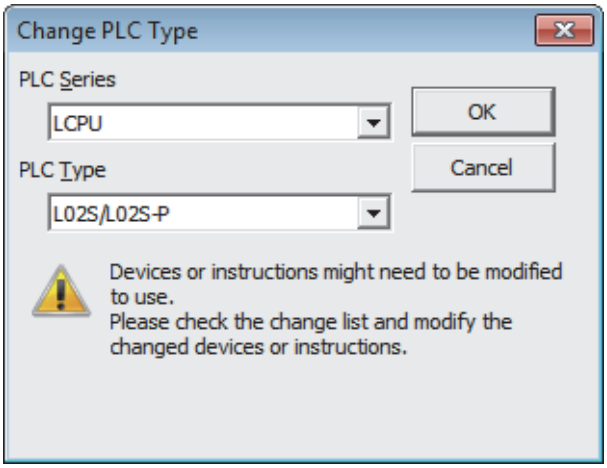
* 1 Network type (mode) to be selected in Step (3).

(5) Check the destination to save the project of the generated link refresh.
Be sure to check the destination because it cannot be arbitrarily specified.



(6) Start up GX Works2 and open the project generated with A/QnA to Q conversion support tool.
[Project] → [Open Other Data] → [Open Other Project]

(7) Since the opened project is set to QCPU, change the type to LCPU.
[Project] → [Change PLC Type]



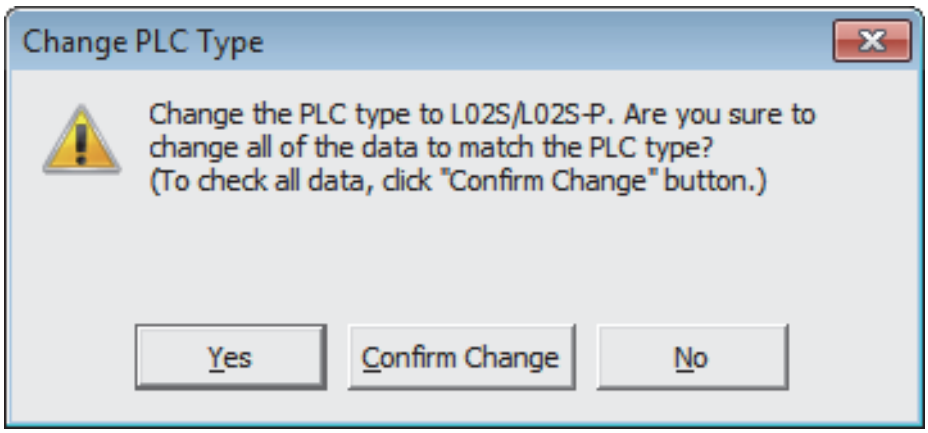
Item	Description
PLC Series	Select "LCPU".
PLC Type	Select the LCPU to be used.

Click "OK" button.

POINT

A refresh program created with A/QnA to Q conversion support tool generates the program utilizing SM1224, which turns to SM1255 by changing the PLC type with GX Works2.
After changing the PLC type with GX Works2, substitute SM1255 in the ladder program with SM1224.

(8) In the confirmation window that appears (shown below), click "Yes" button.



Appendix 4 Replacing Local Station from A/QnA Series to Q Series

This section describes replacement of a local station from A/QnA series to Q series.

Appendix 4.1 Differences between Q series and A/QnA series local stations

The following table shows differences between Q series and A/QnA series local stations. When replacing an A/QnA series local station with a Q series one, pay attention to the following.

Table App.3 Differences between Q series and A/QnA series local stations

Item	Description	
	Q series local station	A/QnA series local station
Link refresh	Refreshes data with the sequence program. ☞ CHAPTER 7 PROGRAMMING Link parameter setting (refresh parameters) is not required.	Automatically refreshes data at either of the following timing. •Upon completion of link scan •Only after execution of the END instruction in the sequence program For the AnUCPU, QnACPU, A2US(H)CPU(S1) and Q2AS(H)CPU(S1), refresh ranges can be changed with refresh parameters.
	Does not refresh data when the CPU module is in STOP status.	
Operation after power OFF → ON, or resetting CPU module (CPU module is in STOP.)	Starts data communication with other stations by executing the program for refresh (Y10 = ON) with the CPU module set to RUN. Until then, the master station treats the Q series local station as a faulty station (relevant bit in D9228 to D9231 is turned ON).	Starts data communications with other stations.
LRDP/LWTP instruction receive processing	Handles the received instruction with the sequence program. ☞ CHAPTER 7 PROGRAMMING	Handles the received instruction by the system. (The program for receiving LRDP/LWTP instruction is not required.)
	If the LRDP/LWTP instruction is received when the CPU module is in STOP status, sends an error response to the master station (4: LRDP/LWTP inexecutable on the station).	
Access from peripheral to host station	The following are not available. •Buffer memory batch monitor/test •Network diagnostics of GX Developer	Not particularly restricted.
Access from peripheral to other stations *1	Unable to access other stations. •Master station → Q series local station •Q series local station → Master station	•The master station can access A/QnA series local stations. •A/QnA series local stations can access the master station.
Network diagnostics of GX Developer	Unable to use the network diagnostics of GX Developer. The data link status or fault location can be checked by refreshing the special relay (for link) and special register (for link) of the local module into CPU module devices.	Can use the network diagnostics of GX Developer.

Table App.3 Differences between Q series and A/QnA series local stations(Continued)

Item	Description	
	Q series local station	A/QnA series local station
Forward loop test Reverse loop test	Place the Q series local station into RUN status (Y10 = ON) to conduct the test. ☞ Section 5.5.3 Forward loop test/reverse loop test If the test is conducted in STOP status (Y10 = OFF), the master station treats the Q series local station as a faulty station (relevant bit in D9228 to D9231 is turned ON). However, the test is normally conducted.	Place the A/QnA series local station into STOP status to conduct the test.
Replacement for special relay (for link)	LRDP instruction receive request (Buffer memory address: ACH)	LRDP instruction completion (M9204)
	LWTP instruction receive request (Buffer memory address: AEH)	LWTP instruction completion (M9205)
	Hardware failure (RUN LED: OFF)	Link card failure (M9211)
	Link status (X0)	Link status (M9240)

* 1 When replacing with a Q series local station, the following alternative solution can be applied to GOT communications.

Table App.4 Alternative solution for GOT communications

Before replacement	Alternative solution
GOT is connected to master station to access A/QnA series local station.	•Send/receive the link data of the devices that are used for access from the GOT. Change the setting so that the GOT can access the devices refreshed on the host station. •If the number of link points is insufficient, install another local module to the QA1S6□B extension base unit where the Q series local station is mounted.
GOT is connected to A/QnA series local station to access master station.	

Appendix 4.2 When utilizing an existing project of the A/QnA series local station

The following explanation is provided for the case of utilizing an existing project of the A/QnA series local station.

(1) Link parameter setting (Refresh parameters)

The link parameter setting (refresh parameters) is not required for a Q series local station since refresh is performed in a sequence program.

☞ CHAPTER 7 PROGRAMMING

Pay attention to the refresh destination of link data to avoid duplication with CPU module devices used for other modules.

POINT

Changing the PLC type to QCPU (Q mode) or LCPU results in the link parameter setting (refresh parameters) being deleted.

(2) Program for data link

The existing program for data link can be utilized.
However, since some operation such as sequence scans are different between Q series and A/QnA series local stations, the program may not be used as it is.
Be sure to check the operation.

Memo

Appendix 5 Program for Refresh when Using Multiple Local Modules

This section explains a refresh program for the case where multiple local modules are installed to a Q series programmable controller.

Adding a Q series local station to the existing system or replacing an existing one allows data sharing with the MELSECNET/H, using the Q series local station as a relay station. Also, installing multiple local modules can increase the maximum link points per station.

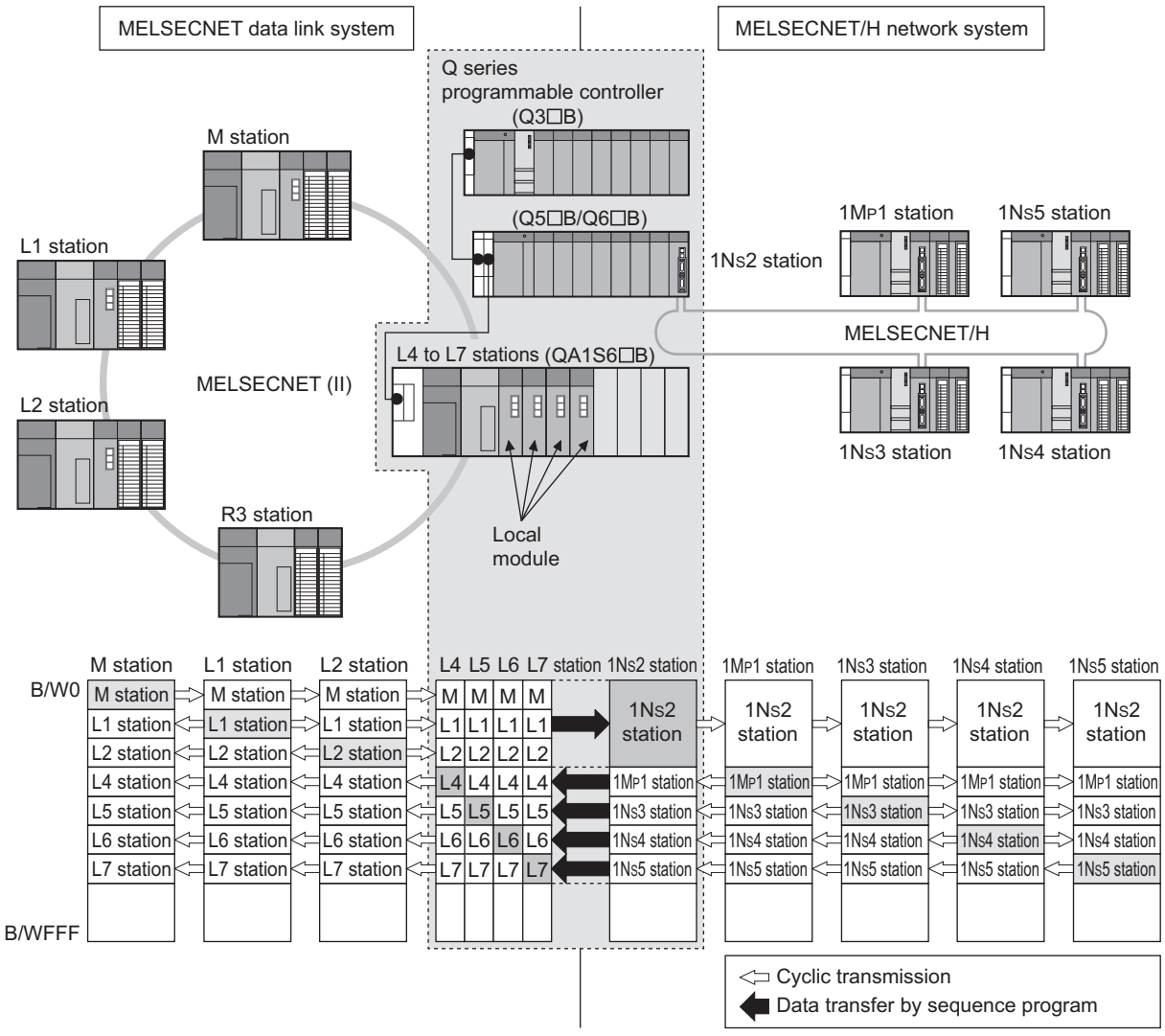


Figure App.1 Data sharing between MELSECNET(II) and MELSECNET/H

Appendix 5.1 System configuration and setting conditions

Program examples given here are based on the following system configuration and setting conditions.

(1) System configuration

The following figure shows that a 32-point module is installed to each slot. (The points for an empty slot is 16.)

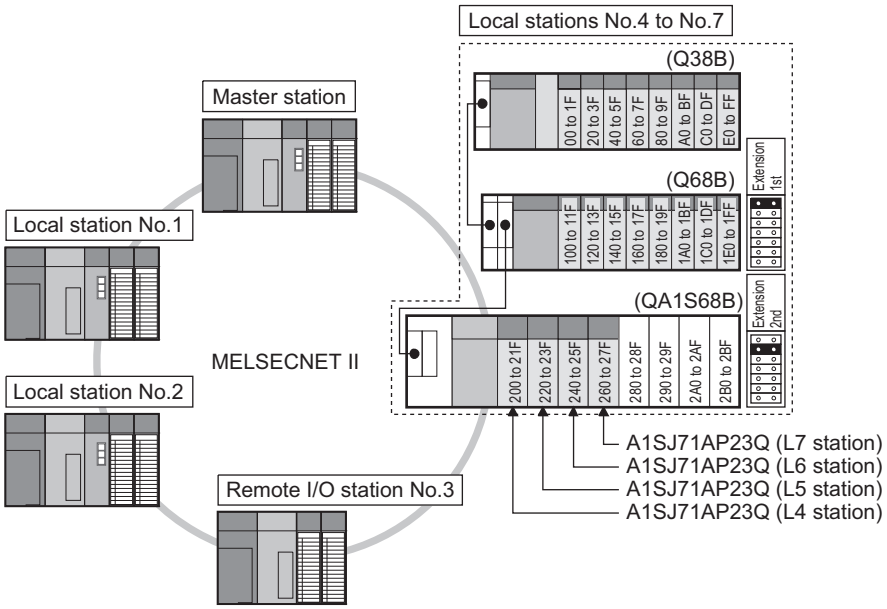


Figure App.2 System configuration

(2) Switch setting

Set the DIP switches on the front face of the link module as shown below.

(☞ Section 5.3 Part Names and Settings)

Table App.5 Switch setting

Item		Number (Set value)	Description
Master station	Station No. setting switch	00	Station No.0
	Mode setting switch	0	Online (with automatic return function)
Local stations No.1 and No.2	Station No. setting switch	01 to 02	Station No.1 to No.2
	Mode setting switch	0	Online (with automatic return function)
Remote I/O station No.3	Station No. setting switch	03	Station No.3
	Mode setting switch	0	Online (with automatic return function)
Local stations No.4 to No.7	Station No. setting switch	04 to 07	Station No.4 to No.7
	Mode setting switch	0	Online (with automatic return function)

(3) Wiring

Connect each optical fiber cable between OUT and IN as illustrated below. (OUT of local station No.7 must be connected to IN of the master station.) (☞ Section 5.4 Wiring)

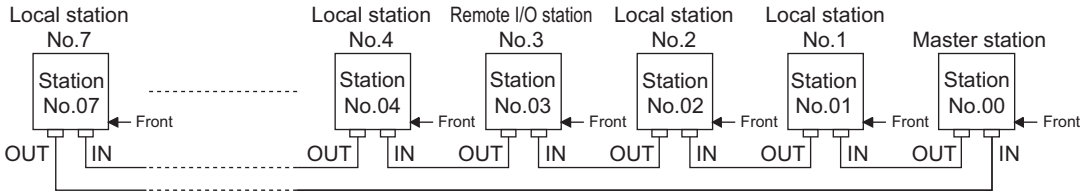
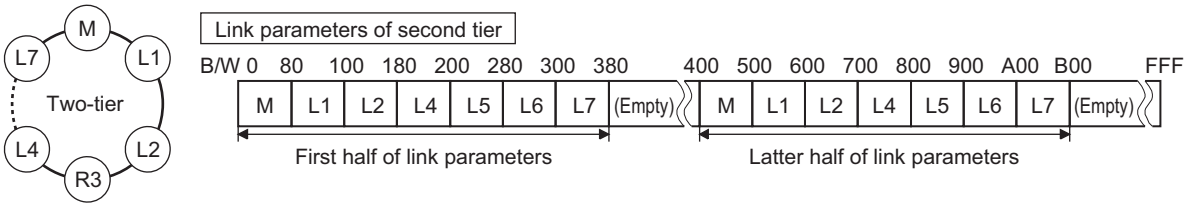


Figure App.3 Wiring

(4) Link parameter setting of the master station

Link parameters are set to the master station as shown below.



L/R station No.	Send range for each station First half B			Send range for each station First half W			M station -> R station W			M station <- R station W		
	Points	Start	End	Points	Start	End	Points	Start	End	Points	Start	End
M 0	128	0000	007F	128	0000	007F						
L 1	128	0080	00FF	128	0080	00FF						
L 2	128	0100	017F	128	0100	017F						
R 3												
L 4	128	0180	01FF	128	0180	01FF						
L 5	128	0200	027F	128	0200	027F						
L 6	128	0280	02FF	128	0280	02FF						
L 7	128	0300	037F	128	0300	037F						

L/R station No.	Send range for each station Second half B			Send range for each station Second half W								
	Points	Start	End	Points	Start	End	Points	Start	End	Points	Start	End
M 0	256	0400	04FF	256	0400	04FF						
L 1	256	0500	05FF	256	0500	05FF						
L 2	256	0600	06FF	256	0600	06FF						
R 3												
L 4	256	0700	07FF	256	0700	07FF						
L 5	256	0800	08FF	256	0800	08FF						
L 6	256	0900	09FF	256	0900	09FF						
L 7	256	0A00	0AFF	256	0A00	0AFF						

Figure App.4 Link parameter setting of the master station

Appendix 5.2 Program for refresh

This section introduces programs for refresh.
Execute the programs for refresh at the beginning of the sequence program.

(1) Adding new data to a project

To the project, add new programs.

- L4_ADD (Program for using multiple modules)
- L4_PROG (Program for refreshing local station No.4)
- L5_PROG (Program for refreshing local station No.5)
- L6_PROG (Program for refreshing local station No.6)
- L7_PROG (Program for refreshing local station No.7)

(2) Setting PLC parameter

Select [PLC parameter] - [Program], and set the programs for refresh as the first sequence scans.

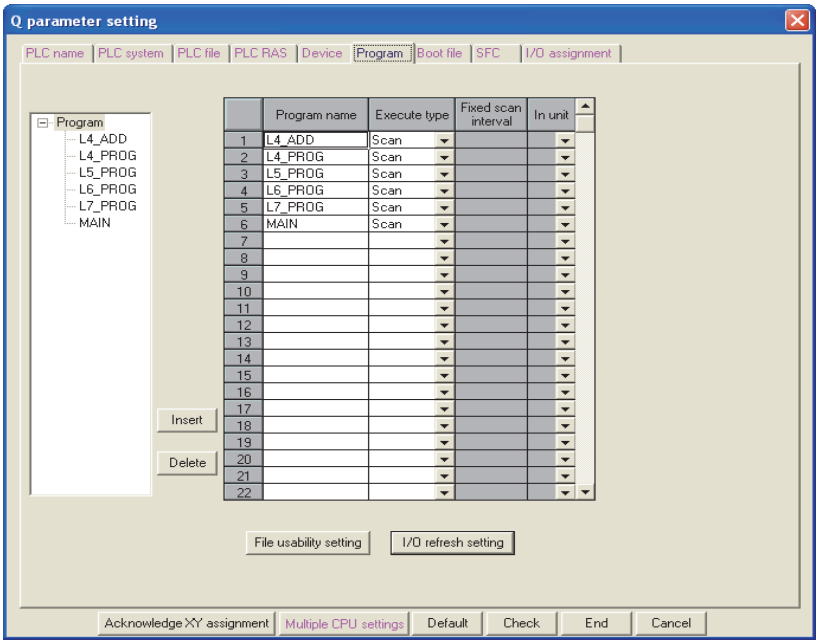


Figure App.5 Setting PLC parameter

(3) Program examples

(a) Program overview

1) Refresh range of local station No.4
All areas are refreshed according to the refresh information table (Buffer memory address: 2H to 27H).

2) Refresh range of local stations No.5 to No.7
The areas of the host station send ranges in B/W and Y and the host station receive range in X are refreshed according to the refresh information table (Buffer memory address: 2H to 27H).
The following areas are not refreshed.
- Other station send range (1) and (2) in B/W
- Send range of master station for second tier in B/W
- Special relay (for link)
- Special register (for link)

An example of link register (W) data transfer is shown below.

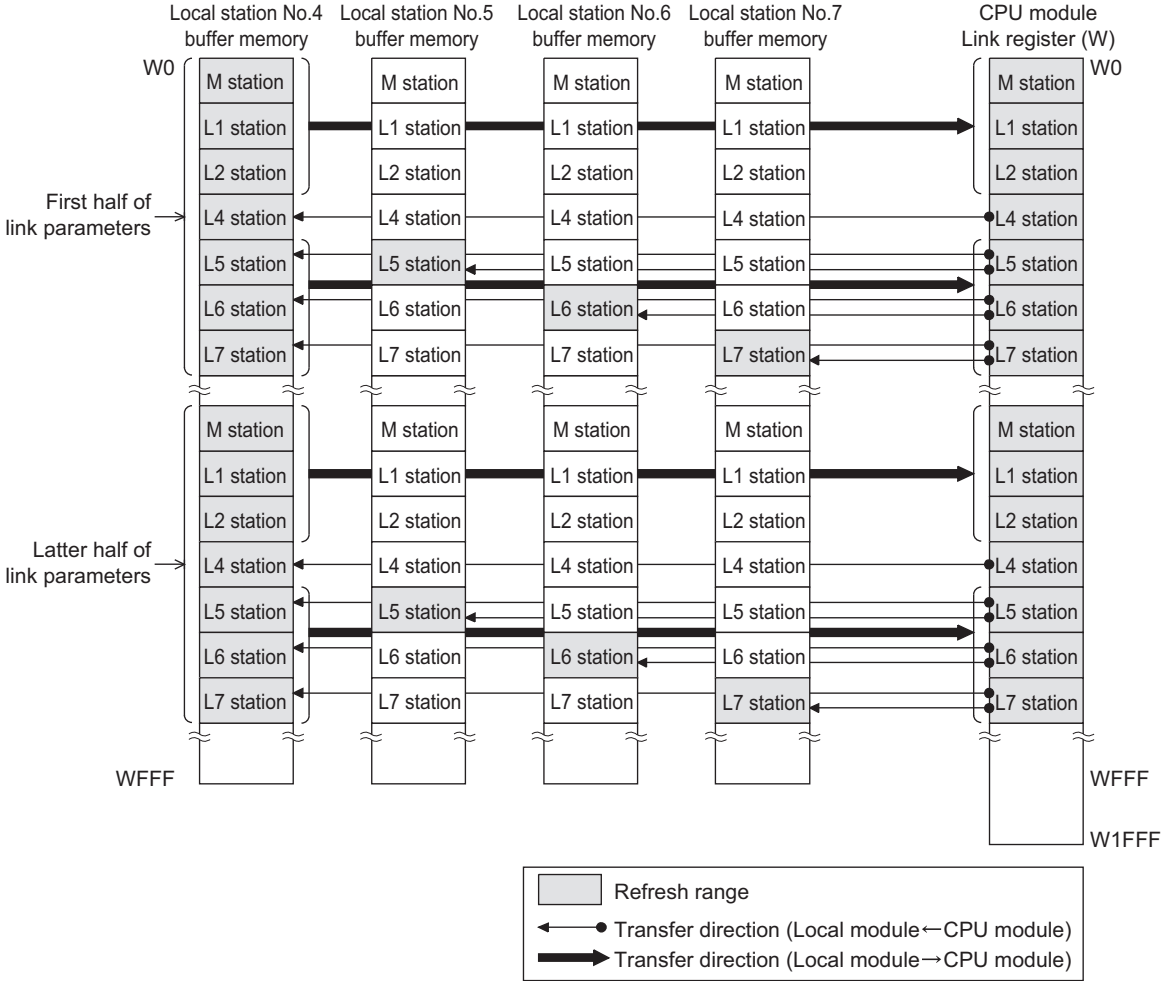


Figure App.6 Example of link register (W) data transfer

3) Refresh information table range of use
   - For local station No.4, all ranges are used.
   - For local stations No.5 to No.7, the area shown below is used.
     Note that Presence or absence of refresh information table (Buffer memory address: 0H, 1H) uses the shaded parts in the figure below.

Table App.6 Refresh information table range for local stations No.5 to No.7

Address		Name		
Hexadecimal	Decimal			
0H to 1H	0 to1	Presence or absence of refresh information table		
2H	2	Refresh information table (First half of link parameters)	Host station send range in W	Start number (0 to FFF)
3H	3			Points (in units of words)
8H	8		Host station send range in B	Start number (0 to FF0)
9H	9			Points (in units of words)
EH	14		Host station send range in Y	Start number (0 to 7F0)
FH	15			Points (in units of words)
11H	17		Host station receive range in X	Start number (0 to 7F0)
12H	18			Points (in units of words)
14H	20	Refresh information table (Latter half of link parameters)	Host station send range in W	Start number (0 to FFF)
15H	21			Points (in units of words)
1AH	26		Host station send range in B	Start number (0 to FF0)
1BH	27			Points (in units of words)

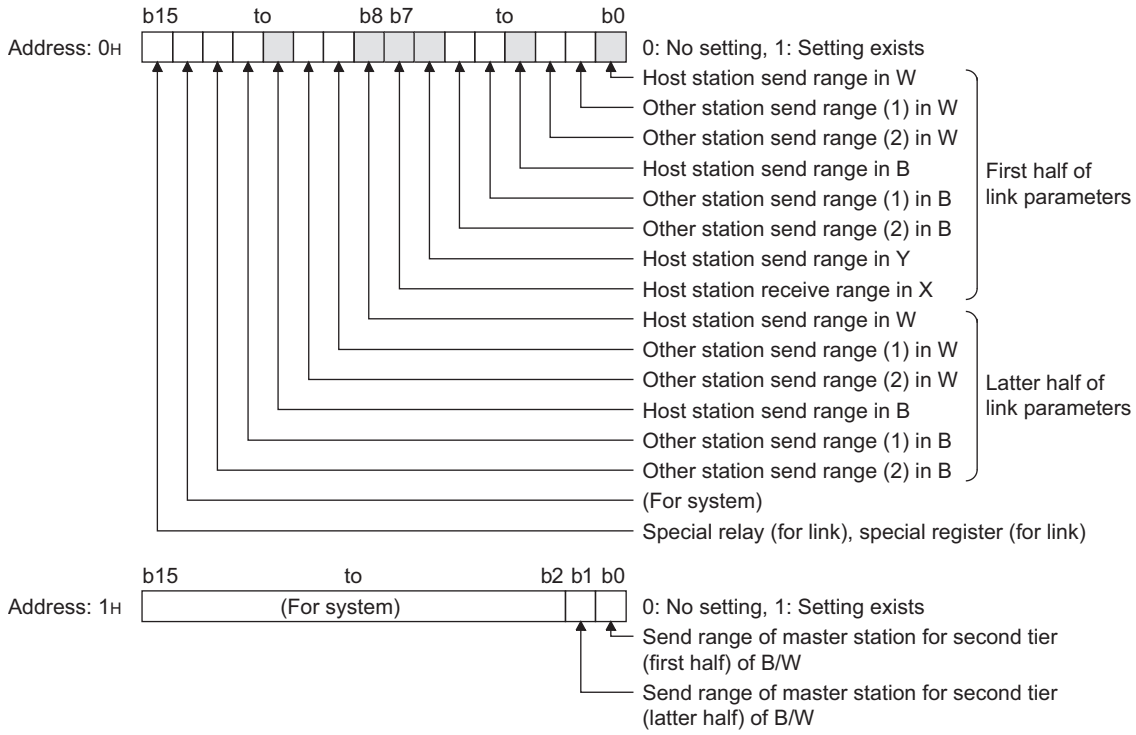


Figure App.7 "Presence or absence of refresh information table" ranges for local stations No.5 to No.7

(b) Device list

Devices used in the program are shown.

Each of the local modules is mounted in the position represented by the following I/O No.

- Local module of local station No.5 (X/Y220 to X/Y23F)
- Local module of local station No.6 (X/Y240 to X/Y25F)
- Local module of local station No.7 (X/Y260 to X/Y27F)

Table App.7 Device list

Device	Description	
X201	For local station No.4	B/W initial value setting status
X207		Refresh ready status
Y210		CPU operating status
Y211		Refresh in execution
Y216		Refresh request
X221	For local station No.5	B/W initial value setting status
X227		Refresh ready status
Y230		CPU operating status
Y231		Refresh in execution
Y236		Refresh request
X241	For local station No.6	B/W initial value setting status
X247		Refresh ready status
Y250		CPU operating status
Y251		Refresh in execution
Y256		Refresh request
X261	For local station No.7	B/W initial value setting status
X267		Refresh ready status
Y270		CPU operating status
Y271		Refresh in execution
Y276		Refresh request
B0 to BFFF*1	Link relay (Link data)	
B1000 to B101F*2	Presence or absence of refresh information table	
W0 to WFFF*1	Link register (Link data)	
W1002 to W1027	For local station No.4	Refresh information table save area (Does not protect device values.)
W1032 to W1057	For local station No.5	
W1062 to W1087	For local station No.6	
W1092 to W10B7	For local station No.7	
SM400	Always ON	
SM1240 to SM1255	Special relay (for link) (M9240 to M9255)	
SD1243 to SD1255	Special register (for link) (D9243 to D9255)	
SD2040 to SD2044*2	Save area for B1000 to B101F and Z0 to Z2 (Protects device values.)	
Z0	Index register for device start number specification	
Z1	Index register for device points specification	
Z2	Index register for bit device start number specification (a register equivalent to Z0, whose unit is converted from bit to word for index modification in link data storage area when the start number of the bit device is stored in Z0)	

* 1 The range of device use varies depending on the link parameters of the master station.

* 2 Can be replaced with other devices as necessary.
However, to avoid wrong replacements, we recommend using the program examples described in the manual without changes.

(c) Program example for local station No.4

1) Program name: L4_ADD

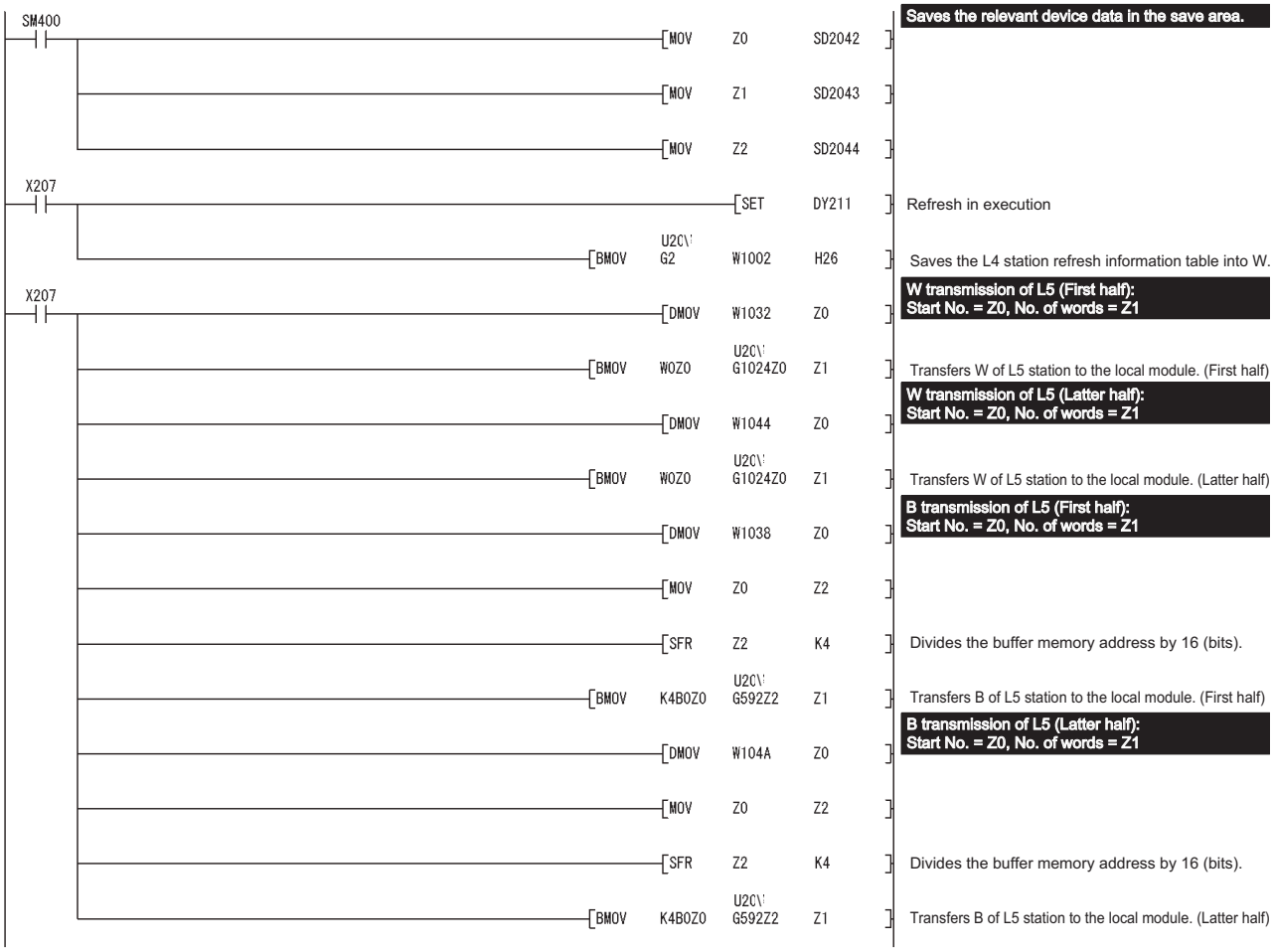


Figure App.8 Program name: L4_ADD

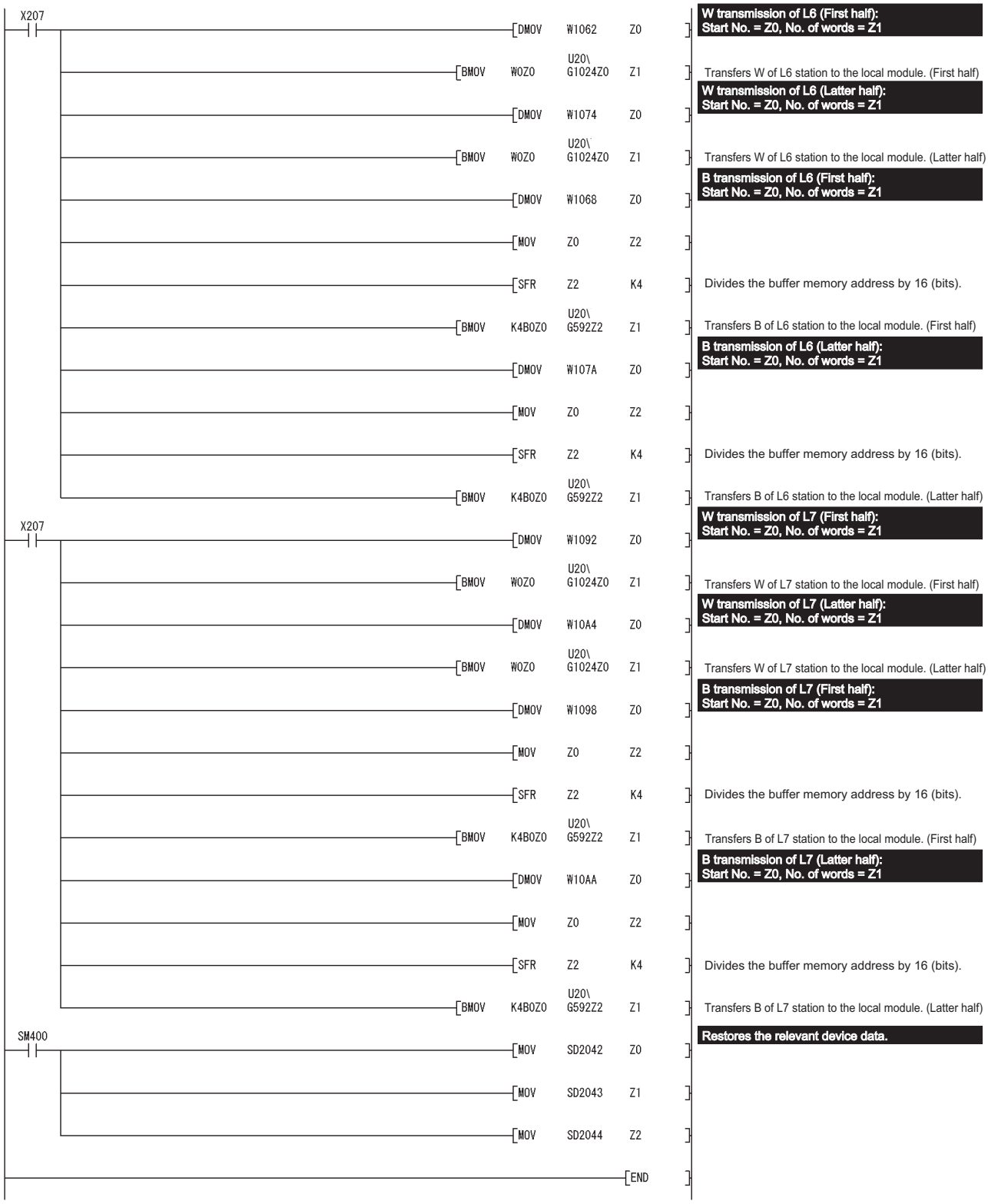


Figure App.9 Program name: L4_ADD (Continued)

2) Program name: L4_PROG

The same as the following program

☞ Section 7.2 (4) Program example 2

(d) Program example for local stations No.5 to No.7
(Program name: L5_PROG, L6_PROG, L7_PROG)
Except for one instruction addition shown below, each of the programs is the same as L4_PROG.
However, change the I/O signals and intelligent function module device I/O numbers depending on the module position.
- Local module of local station No.5 (X/Y220 to X/Y23F)
- Local module of local station No.6 (X/Y240 to X/Y25F)
- Local module of local station No.7 (X/Y260 to X/Y27F)

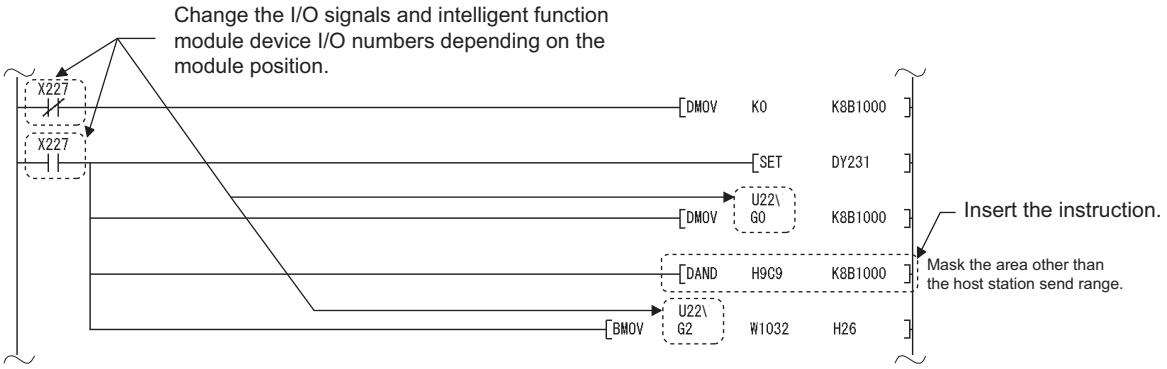


Figure App.10 In the case of L5_PROG

POINT

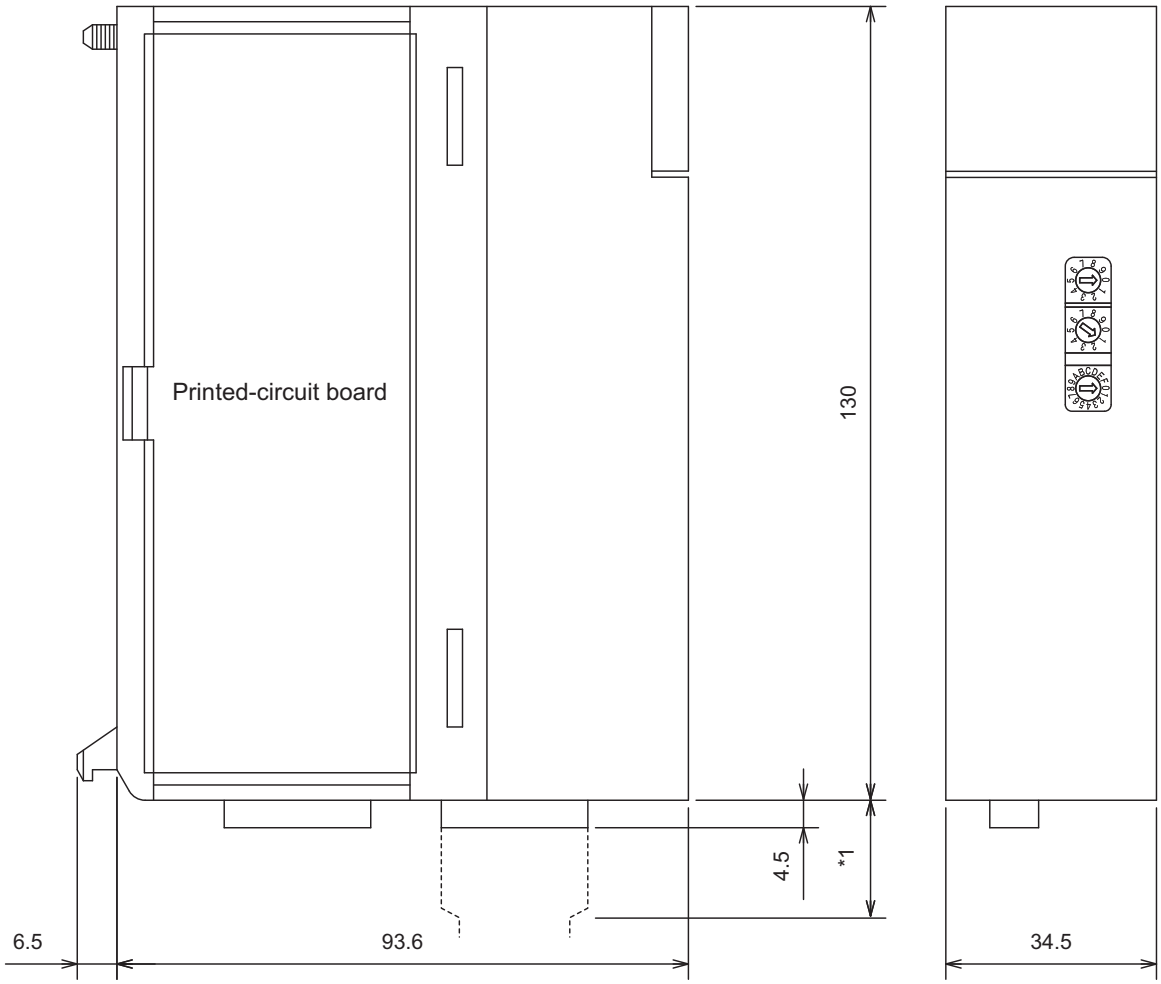
(1) After writing the program to the programmable controller, turn OFF and ON the power supply or reset the CPU module.
When the CPU module's RUN/STOP switch is set to RUN, the Q series local station starts sending/receiving data to/from other stations. (Refresh ready status (X7) turns ON/OFF.)

(2) Check the program for refresh.
<Examples of checking the program for refresh>
Check the following in the device batch monitor/test of GX Developer.
- Change the B/W0 value of the master station, and check if the B/W0 value of local station No.4 is changed.
- Change the B/W180 value of local station No.4, and check if the B/W180 value of the master station is changed.

(3) For programs for data link with other stations, refer to the following manual.
☞ Type MELSECNET, MELSECNET/B Data Link System Reference Manual

Appendix 6 External Dimensions

Appendix 6.1 A1SJ71AP23Q

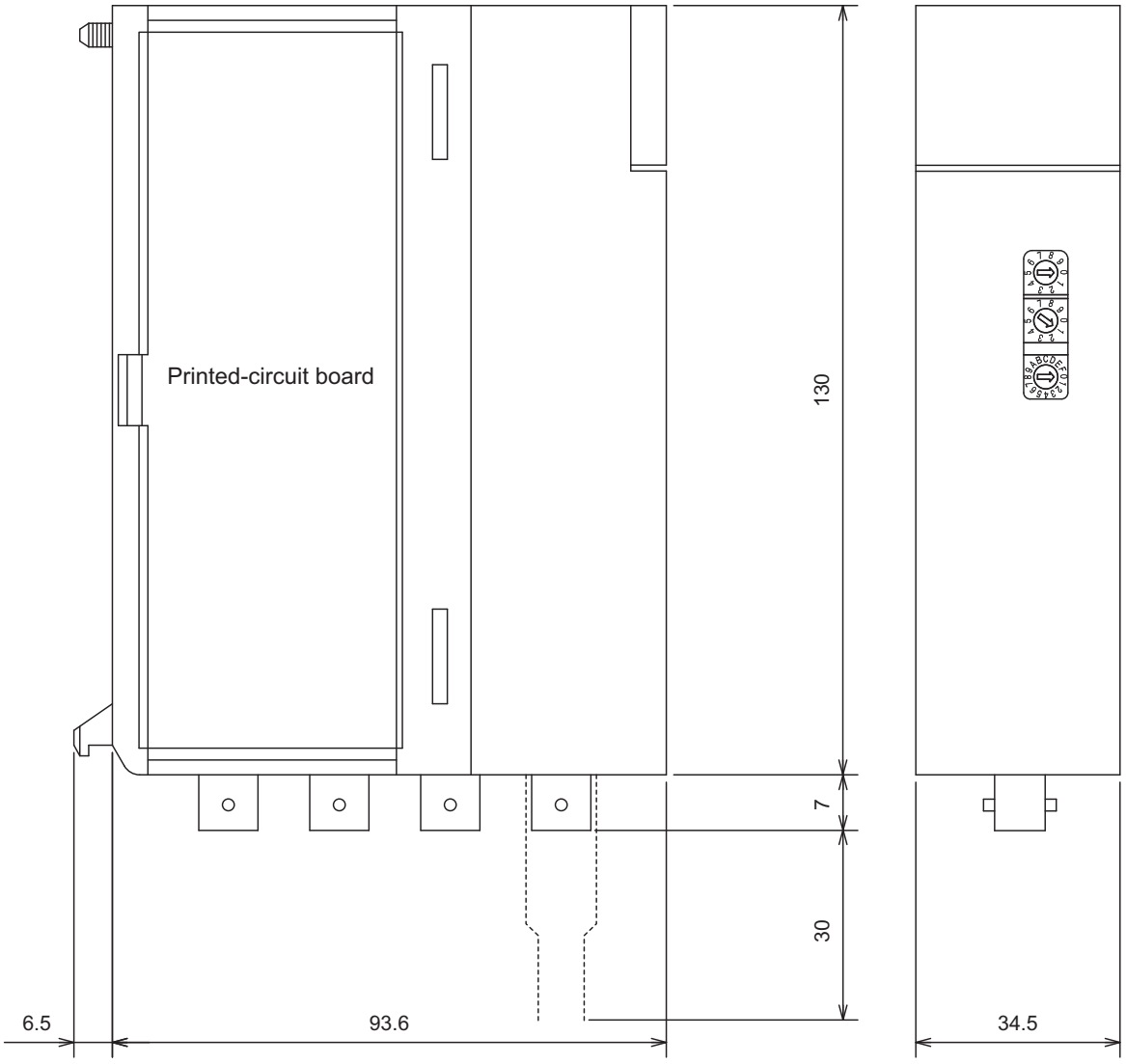


Unit: mm

Figure App.11 A1SJ71AP23Q

* 1 For details, please consult your local Mitsubishi Electric System Service or representative.

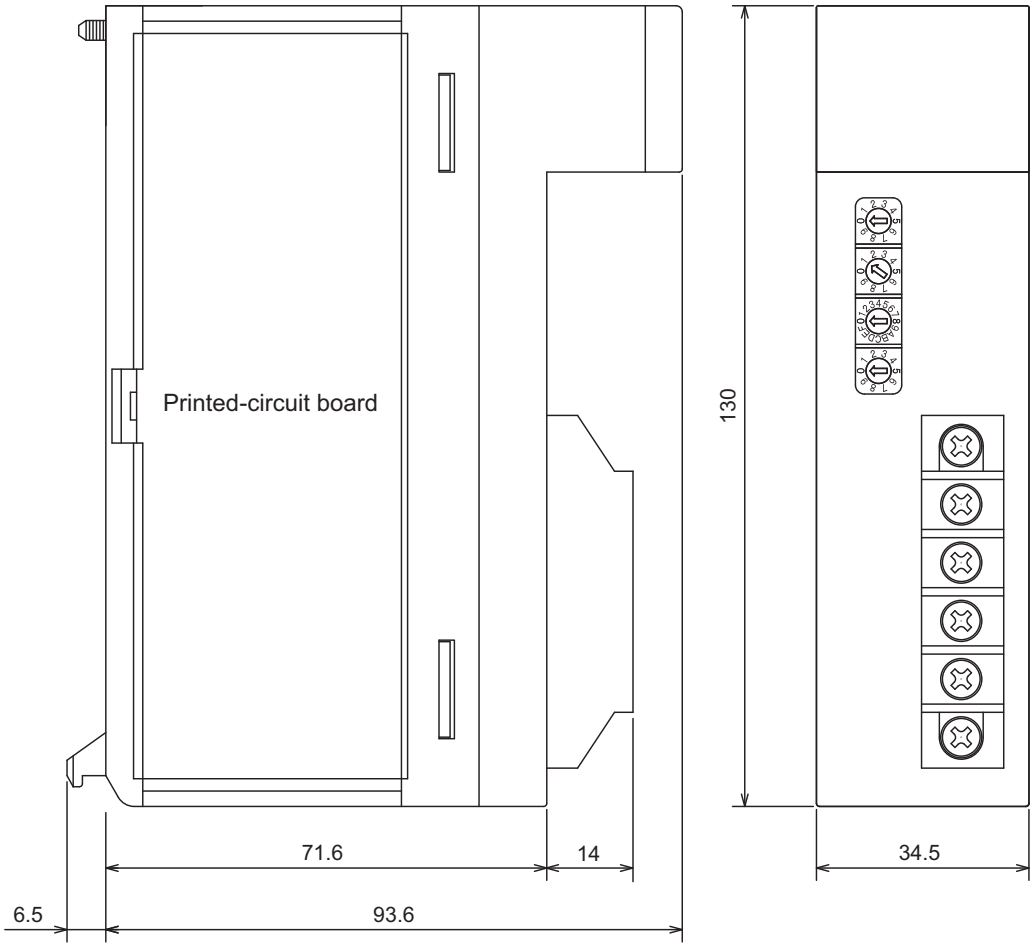
Appendix 6.2 A1SJ71AR23Q



Unit: mm

Figure App.12 A1SJ71AR23Q

Appendix 6.3 A1SJ71AT23BQ



Unit: mm

Figure App.13 A1SJ71AT23BQ

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WARRANTY

Please confirm the following product warranty details before using this product.

1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the sales representative or Mitsubishi Service Company.

However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.

[Gratis Warranty Term]

The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place. Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.

[Gratis Warranty Range]

(1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.

(2) Even within the gratis warranty term, repairs shall be charged for in the following cases.

1. Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
2. Failure caused by unapproved modifications, etc., to the product by the user.
3. When the Mitsubishi product is assembled into a user's device, Failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
4. Failure that could have been avoided if consumable parts (battery, backlight, fuse, etc.) designated in the instruction manual had been correctly serviced or replaced.
5. Failure caused by external irresistible forces such as fires or abnormal voltages, and Failure caused by force majeure such as earthquakes, lightning, wind and water damage.
6. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
7. Any other failure found not to be the responsibility of Mitsubishi or that admitted not to be so by the user.

2. Onerous repair term after discontinuation of production

(1) Mitsubishi shall accept onerous product repairs for seven (7) years after production of the product is discontinued. Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.

(2) Product supply (including repair parts) is not available after production is discontinued.

3. Overseas service

Overseas, repairs shall be accepted by Mitsubishi's local overseas FA Center. Note that the repair conditions at each FA Center may differ.

4. Exclusion of loss in opportunity and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation of damages caused by any cause found not to be the responsibility of Mitsubishi, loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products, special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products, replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

5. Changes in product specifications

The specifications given in the catalogs, manuals or technical documents are subject to change without prior notice.

SH(NA)-080670ENG-F

SH(NA)-080670ENG-F(1412)MEE
MODEL: A1SJ71AP23Q-U-SY-E
MODEL CODE: 13JR98

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