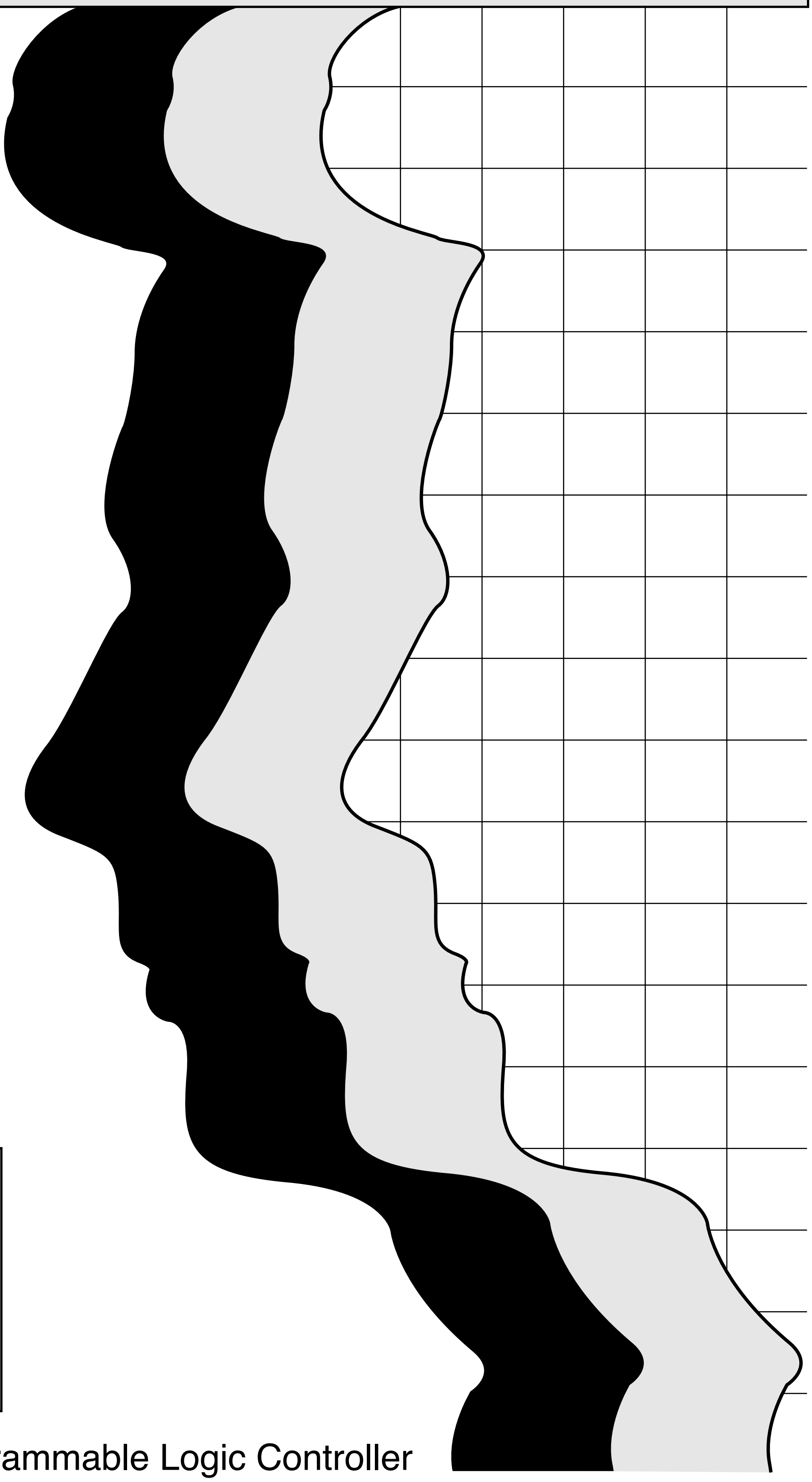
MITSUBISHI

type MELSECNET, MELSECNET/B Data Link System

Reference Manual



A
MELSEC

Mitsubishi Programmable Logic Controller

• SAFETY PRECAUTIONS •

(Always read before starting use.)

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 instructions given in this manual are concerned with this product. For the safety instructions of the programmable controller system, please read the CPU module user's manual.
In this manual, the safety instructions are ranked as "DANGER" and "CAUTION".

◇! DANGER	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 medium or slight personal injury or physical damage.

Note that the ⚠CAUTION level may lead to a serious consequence according to the circumstances. Always follow the instructions of both levels because they are important to personal safety.

Please store this manual in a safe place and make it accessible when required. Always forward it to the end user.

[Design Precautions]

◇! DANGER

- Make sure to see this manual for information about each station's operating status when a communication error occurs in the network. Erroneous outputs and malfunctions may result in serious accidents.
- When performing control operations to a PLC (modifying data) in operation by connecting a peripheral device or GX Developer to the CPU module or connecting personal computers to the intelligent functional modules, configure an interlocking circuit in a sequence program so that the safety of the overall system is maintained. Also, before performing other control operations (program modifications and operating status modifications (status control)) on the PLC in operation, be sure to read the manual thoroughly and confirm the safety. Especially if the above mentioned control operations are performed from an external device to a remote PLC, problems arising on the PLC side may not be dealt with immediately due to abnormal data communication. Thus, in addition to configuring an interlocking circuit in a sequence program, determine how the system should handle data communication errors between the PLC CPU and external devices.

⚠ CAUTION

- Do not bundle the control wires and communication cables with the main circuit or power wires, or install them close to each other. They should be installed at least 100 mm (3.94 in.) away from each other. Failure to do so may generate noise that may cause malfunctions.

[Installation Precautions]

⚠ CAUTION

- Use the PLC in the operating environment that meets the general specifications of this manual. Using the PLC in any other operating environments may cause electric shocks, fires or malfunctions, or may damage or degrade the product.
- **Install the module after securely inserting the module fastening latch on the bottom of the module into the installation hole of the base unit. (Be sure to screw the AnS series module to the base unit to the specified torque.) If the module is not installed properly, it may cause the module to malfunction, fail or fall off.**
- Before mounting or dismounting the module, make sure to shut off all phases of the external power supply. Failure to do so may damage the product.
- Do not directly touch the conducting parts and electronic parts of the module. This may cause the module to malfunction or fail.

[Wiring Precautions]

◈ DANGER

- Before starting any installation or wiring work, make sure to shut off all phases of the external power supply to the entire system. Failure to completely shut off the power supply to the system may cause electric shocks and damage the product.

⚠ CAUTION

- Solder coaxial cable connectors properly. Incomplete soldering may result in malfunctioning.
- Be careful not to let foreign particles such as chaff and wire chips get inside the module. They may cause a fire, mechanical breakdown or malfunction.
- The top surface of the module is covered with a protective film to prevent foreign objects such as wire chips from entering the module during wiring work. Do not remove this film until all the wiring work is complete. Before operating the system, be sure to remove the film to provide adequate heat ventilation.
- Make sure to place the communication and power cables to be connected to the module in a duct or fasten them using a clamp. If the cables are not placed in a duct or fastened with a clamp, their positions may become unstable and may move, or they may be pulled inadvertently. This may damage the module and the cables or cause the module to malfunction because of faulty cable connections.

[Wiring Precautions]

⚠ CAUTION

- When disconnecting the communication and power cables from the module, do not pull the cables by hand. When disconnecting a cable with a connector, hold the connector to the module by hand and pull it out to remove the cable. When disconnecting a cable connected to a terminal block, loosen the screws on the terminal block first before removing the cable. If a cable is pulled while being connected to the module, it may cause the module to malfunction or damage the module and cables.

[Setup and Maintenance Precautions]

⚠ CAUTION

- Please read this manual thoroughly and confirm the safety before starting online operations (especially, program modifications, forced outputs, and operating status modifications), which are performed by connecting the GX Developer via the MELSECNET network system to a running CPU module of other station. Performing incorrect online operations may damage the machinery or result in accidents.
- Never disassemble or modify the module. This may cause breakdowns, malfunctions, injuries or fire.
- When using a cellular phone, use it at least 25 cm (9.84 in.) away from the PLC. Failing to do so may cause malfunctions.
- Before mounting or dismounting the module, make sure to shut off all phases of the external power supply. Failure to do so may damage the module or result in malfunctions.
- Do not touch the terminals while the power is on. Doing so may cause malfunctions.
- Before cleaning the module or retightening the terminal screws and module installation screws, make sure to shut off all phases of the external power supply. Failure to completely shut off all phases of the external power supply may cause module breakdowns and malfunctions. If the screws are loose, it may cause the module to short-circuit, malfunction or fall off. If the screws are tightened excessively, it may damage the screws and cause the module to short circuit, malfunction or fall off.
- **Before touching the module, be sure to touch grounded metal, etc. to discharge static electricity from human body, etc.**
  Failure to do so may cause the module to fail or malfunction.

[Disposal Precautions]

⚠ CAUTION

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

REVISIONS

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

Print Date	*Manual Number	Revision
Dec., 1991	IB (NA) 66350-A	First edition
Jul., 1993	IB (NA) 66350-B	Correction CONTENTS, Section 1, 1.1, 1.2.2 to 1.2.4, 1.3.1, 1.3.2, 2.1.2, 2.2.2, 3.1.2, 3.2.2, 4, 4.1.1, 4.1.2., 5.2, 5.3, 5.3.1, 5.3.2, 5.3.7, 5.3.8, 5.5.1, 5.6, 6.2, 6.2.1 to 6.2.3, 6.3, 6.4, 8.8.2, 8.5.1, 8.5.2, 8.6, 8.7.2, 9.3.1, 10.3.1
Oct., 2003	IB (NA) 66350-C	Equivalent to Japanese version H Overall reexamination

INTRODUCTION

Thank you for choosing the Mitsubishi MELSEC-A Series of General Purpose Programmable Controllers. Please read this manual carefully so that the equipment is used to its optimum. A copy of this manual should be forwarded to the end User.

CONTENTS

1. FOREWORD

This manual describes the performance, functions, and programming procedure for the MELSEC-A Series MELSECNET, MELSECNET/B Data Link System.

(1) The MELSECNET Data Link System can use either fiber-optic cable or coaxial cable to link stations. The only difference between a system using fiber-optic cable and a system using coaxial cable is the allowable distance between two adjacent stations. Otherwise, the functions and operations are completely identical.

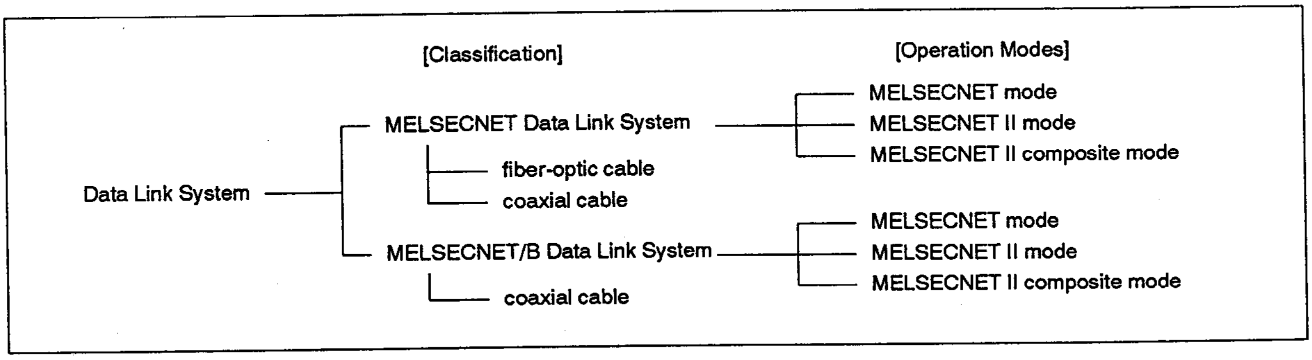
(2) The MELSECNET/B Data Link System controls link modules by using inexpensive twisted-wire pair cables.

This system can be made up of MELSEC-A series modules.

(3) Three operation modes are available with the MELSECNET and MELSECNET/B Data Link System. The operation mode is determined by the configuration of the connected data link modules and the link parameter settings. The three modes are as follows:

- MELSECNET mode
- MELSECNET II mode
- MELSECNET II composite mode

Refer to the manual for the individual link modules for details on the performance, functions, and operation of the link modules to be connected to the Data Link System.



REMARK

In this manual, the term "MELSECNET (II) Data Link System" refers to the system involving all of the available operation modes - MELSECNET mode, MELSECNET II mode, and MELSECNET composite mode.

1.1 Contents of This Manual

This manual explains the MELSECNET Data Link System and the MELSECNET/B Data Link System.

The MELSECNET Data Link System is explained in Section 2 and the MELSECNET/B Data Link System is explained in Section 3.

Other sections discuss both systems.

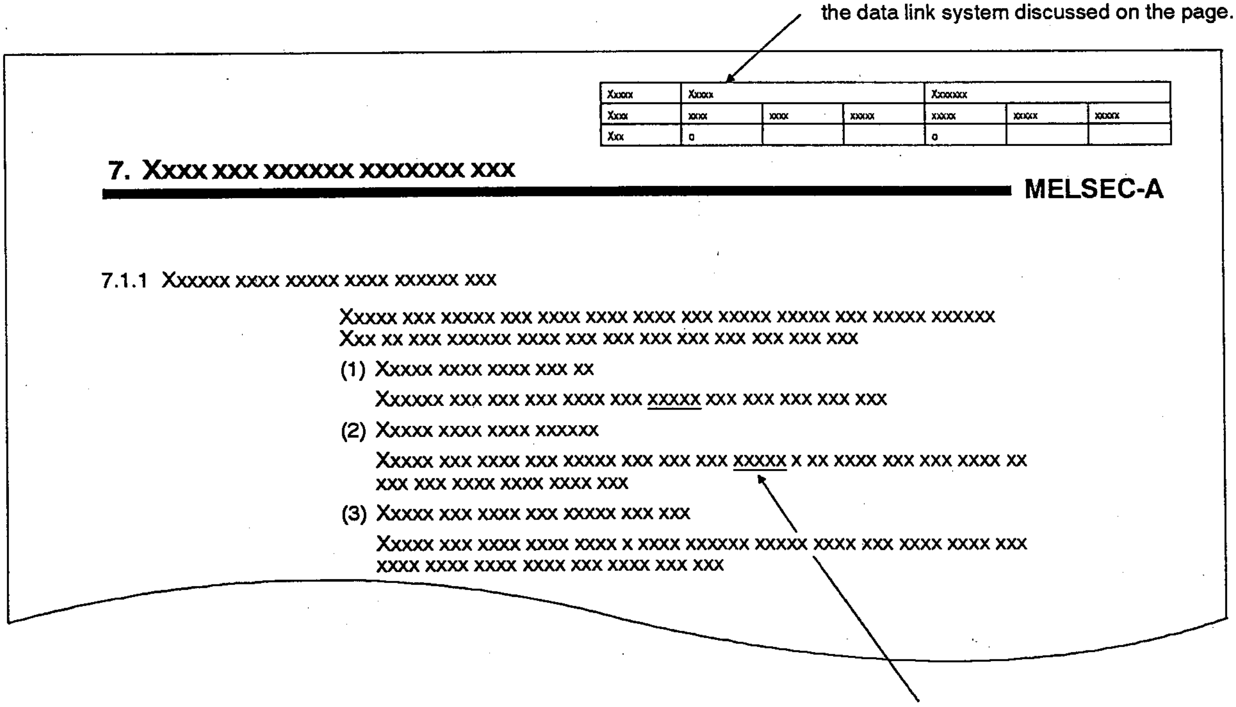
POINT

To avoid misunderstanding, the box in the upper right hand corner of a page indicates which system is being explained, as shown below:

However, when both systems are discussed on the same page, the MELSECNET Data Link is usually being discussed and the explanations (i.e., for a remote I/O station which does not exist in the MELSECNET/B Data Link System) are underlined.

When the MELSECNET/B Data Link System is used, ignore the underlined parts.

A circle is drawn in the box corresponding to the data link system discussed on the page.



When the MELSECNET/B Data Link System is used, ignore this part.

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	○	○	○	○	○	○

1.2 Basic Information About Data Link Systems

This section gives the basic information for using the MELSECNET and the MELSECNET/B Data Link Systems.

Read this section carefully before going on to the next section.

1.2.1 Master, local, and remote I/O stations

In a data link system, link modules are classified into master stations, local stations, and remote I/O stations as shown below:

(1) Master stations

Used to control slave stations (local stations and remote I/O stations).

A data link system must contain one master station.

(2) Local stations

Used to control I/O and special-function modules of the self by executing a program (to process the link data in B, W, and Y) in the self.

(3) Remote I/O stations

Used to control the I/O and special-functions modules of the self.

Remote I/O stations cannot be used in the MELSECNET/B Data Link System.

POINTS

(1) Set the link parameters for the MELSECNET and MELSECNET/B Data Link Systems to the master stations only.
The link parameters need not be set to the local and remote I/O stations.

(2) When the MELSECNET and MELSECNET/B Data Link Systems are used with the QnA or AnUCPU, the "number of modules" and "network refresh parameters" must be set to the master and local stations.
For the network parameter setting method, refer to the operating manual of the used GPP function software package or GX Developer.
For the QnACPU, the contents of the link special relays (M9200 to M9255) and link special registers (D9200 to D9255) can be confirmed using the special relays (SM1200 to SM1255) and special registers (SD1200 to SD1255).

(3) The software versions of the master station link modules that allow remote I/O stations to be connected in the MELSECNET/B Data Link System are indicated below.

A1SJ71T21B ········ "B" or later
A1SJ71AT21B ······· "A" or later
AJ71AT21B ········· "B" or later

REMARK

1) ∗ : An online I/O change indicates that I/O modules are changed without occurrence of "UNIT VERIFY ERROR" while the PLC power is on.

1.2.2 Outline of the MELSECNET and MELSECNET/B data link systems

Use a MELSEC-A series PC CPU to establish a data link system via fiber-optic, coaxial, or twisted-wire pair cables.

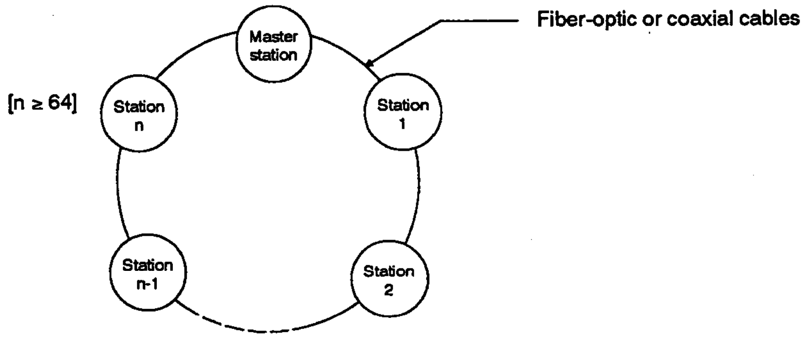
The MELSECNET Data Link System connects link modules using fiber-optic cables or coaxial cables.

The MELSECNET/B Data Link System connects link modules using twisted-wire pair cables.

(1) MELSECNET Data Link System

In the MELSECNET Data Link System, up to 64 slave stations (local and remote I/O stations) can be connected to a master station.

By using fiber-optic or coaxial cables, connect slave station 1 to the master station and slave station 2 to slave station 1.., creating a loop system until station n is connected to the master station.

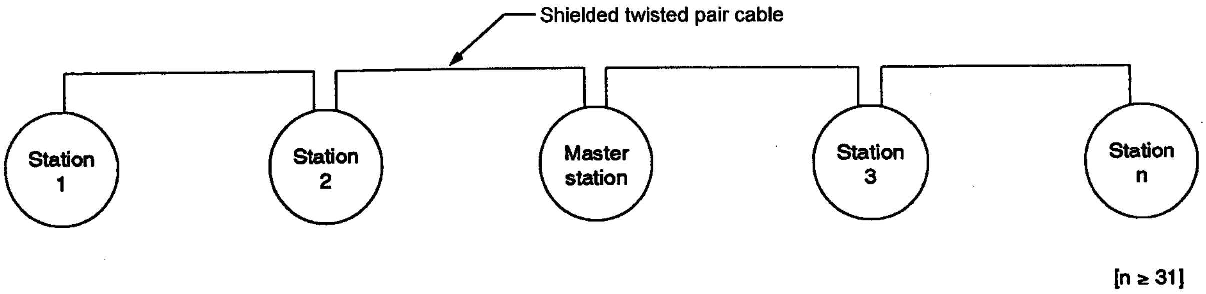


(2) MELSECNET/B Data Link System

In the MELSECNET/B Data Link System, up to 31 local stations can be connected to the master station.

(There are no remote I/O stations in the MELSECNET/B Data Link System.)

The master station and local stations are connected (by twisted-wire pair cables) as shown below:



1.2.3 Performance differences between the MELSECNET and MELSECNET/B data link systems

The following table gives the performance differences between the MELSECNET and MELSECNET/B Data Link Systems:

Table 1.1 Performance Differences between the MELSECNET Data Link System and MELSECNET/B Data Link System

Items	**MELSECNET Data Link System**			**MELSECNET/B Data Link System**
	Fiber-Optic Cable Data Link System		**Coaxial Cable Data Link System**	**Twisted-wire Pair Cable Data Link System**
	SI cable	**GI cable**		
Communication speeds	1.25 MBPS			125 KBPS/250 KBPS/ 500 KBPS/1 MBPS
Communication methods	Duplex loop			Bus system
Overall loop distances	Max.10 km (1 km station intervals)	Max.10 km (2 km station intervals)	Max.10 km (500 m station intervals)	Varies depending on the communications speed 125 KBPS: 1200 m 250 KBPS: 600 m 500 KBPS: 400 m 1 MBPS: 200 m
Number of connected stations	Max.65 units (1 master station, 64 local/remote I/O stations)			Max.32 units (1 master station, 31 local stations)
Demodulation methods	CMI method			NRZI method
RAS functions	The loopback function when an error or cable disconnection is detected, and the diagnostic function to check the link line of the self.			The diagnostic function to check the link line of the self.
Connector	Two-core plug (CA9003)	Single-core plug (CA9103S) Two-core plug (CA9003S)	• BNC-P-3-Ni, BNC-P-5 * equivalent • BNC-P-5DV-SA(01)	Terminal block
Cable used	SI -200/250	GI -50/125	3C-2V, 5C-2V or equivalent	Shielded twisted-wire pair cable
Transmission loss	Max.12 dB/km	Max. 3 dB/km	—	—
Sending level	−17 to −11dBm (peak value)	−17 to −10 dBm (peak value)	— —	— —
Receiving level	−32 to −11 dBm (peak value)	−29 to −10 dBm (peak value)	— —	— —

REMARK

1) *: Refer to Section 5.5 for the BNC-P-3-Ni, BNC-P-5 and BNC-P-5DV-SA(01).

1.2.4 The MELSECNET mode, MELSECNET II mode, and MELSECNET II composite mode

The Data Link System can operate in the MELSECNET mode, MELSECNET II mode, or the MELSECNET II composite mode.

In the MELSECNET mode, the data link system operates within the range of B/W0 to 3FF independently of the link module used for the master module.

In the MELSECNET II mode, the following link modules are used as the master and local stations and B/W400 and above are used for a data link.

- AnACPUP21/R21
- AnUCPU+AJ71AP21/R21
- A2ASCPU(S1)+A1SJ71AP21/R21
- Q2AS(H)CPU(S1)+A1SJ71AP21/R21
- AnACPU+AJ71AP21/R21
- QnACPU+AJ71AP21/R21
- A2USHCPU-S1+A1SJ71AP21/R21

The following describes the major improvements made to the MELSECNET mode (MELSECNET Data Link System) for the MELSECNET II mode:

- The data link device range was increased from B/W0 through to 3FF (1024 points) to B/W0 through FFF (4096 points) in the MELSECNET II mode.
- The maximum number of link points per station (master station and local station) was increased from 1024 bytes to 2048 bytes in the MELSECNET II mode.
- Connection of remote I/O stations is now impossible in the MELSECNET II mode.

In the MELSECNET II composite mode, the data link system works in much the same way as in the MELSECNET II mode.

In the MELSECNET II composite mode, the data link system can use (a) a link module in the MELSECNET mode, and (b) a remote I/O station.

The following describes the major differences between the three modes:

(1) Data link modules that can be used as the master station

(a) MELSECNET mode

MELSECNET mode-compatible data link modules

(A MELSECNET (II) mode-compatible data link module can also be used as the master station for MELSECNET mode operation.)

(b) MELSECNET II mode

MELSECNET (II) mode-compatible data link modules

(c) MELSECNET II composite mode

MELSECNET (II) mode-compatible data link modules

(2) Data link modules that can be used as a local station

(a) MELSECNET mode

MELSECNET mode- and MELSECNET (II) mode-compatible data link modules

(b) MELSECNET II mode

MELSECNET (II) mode-compatible data link modules

(c) MELSECNET II composite mode

MELSECNET mode- and MELSECNET (II) mode-compatible data link modules

(3) Possible to connect remote I/O stations

(a) MELSECNET mode

Yes

(b) MELSECNET II mode

No

(c) MELSECNET II composite mode

Yes

(4) Data link device range

The following describes the data link device range for each operation mode:

The data link range for inputs (X) and outputs (Y) is determined by the data link module used as the master station. The maximum value is indicated here. For example, if an A2NCPU or A2ACPU is used as the master station, the X/Y range that can be used for data link is 0 to 1FF (512 points).

(a) MELSECNET mode

X/Y : 0 to 7FF (2048 points)
B : 0 to 3FF (1024 points)
W : 0 to 3FF (1024 points)

The data link range for link relays (B) and link registers (W) is B/W0 to 3FF (1024 points) when a MELSECNET (II)-compatible data link module is connected as a local station.

(b) MELSECNET II mode

X/Y : 0 to 7FF (2048 points)
B : 0 to FFF (4096 points)
W : 0 to FFF (4096 points)

(c) MELSECNET II composite mode

X/Y : 0 to 7FF (2048 points)
B : 0 to FFF (4096 points)
W : 0 to FFF (4096 points)

The data link range for link relays (B) and link registers (W) if a MELSECNET-compatible data link module is connected as a local station is B/W0 to 3FF (2048 points).

(5) Link parameter types and the number of link points per station

(a) MELSECNET mode

1) Link parameter

One type

2) Maximum number of link points per station

Master station and local station : 1024 bytes/station

Remote I/O station : 512 bytes/station

(b) MELSECNET II mode

1) Link parameter

Two types (first half and second half)

Data link is only possible by setting the first half parameter.

2) Maximum link points per station

- For stations with only first half link parameters set:

  Master station and local station : 1024 bytes/station

- For stations with both first and second link parameters set:

  Master station and local station : 2048 bytes/station

(c) MELSECNET II composite mode

1) Link parameter

Two types (first half and second half)

If only the first half link parameters are set, the data link will function in the same way as the MELSECNET mode.

- First half link parameters should be assigned to master stations, local stations, and remote I/O stations.
- Second half link parameters should be assigned to master and local stations that are compatible with MELSECNET II mode.

  Second half link parameters cannot be assigned to remote I/O stations or MELSECNET mode-compatible local stations.

2) Maximum link points per station

- For stations with only first half link parameters set:

  Master station and local station : 1024 bytes/station

  Remote I/O station : 512 bytes/station

- For stations with both first and second link parameters set:

  Master station and local station : 2048 bytes/station

The information discussed above is summarized in Table 1.2.

Table 1.2 MELSECNET (II) Data Link Function Overview

Operation Mode / Item			MELSECNET Mode	MELSECNET II Composite Mode		MELSECNET II Mode	
Data link modules that can be used as a master station			A0J2HCPUP21/R21 AnNCPUP21/R21 AnNCPUP21-S3 A2NCPUP21-S4 AnACPUP21/R21 AnACPUP21-S3 A2ACPUP21-S4 AnACPU + AJ71AP21(S3)/R21 AnUCPU + AJ71AP21(S3)/R21 QnACPU + AJ71AP21(S3)/R21 AnSCPU + A1SJ71AP21/R21 AnASCPU + A1SJ71AP21/R21 QnASCPU + A1SJ71AP21/R21 A80BD-A2USH-S1 + A1SJ71AP21/R21 A2CCPUP21/R21	AnACPUP21/R21 AnACPUP21-S3 A2ACPUP21-S4 AnACPU + AJ71AP21(S3)/R21 AnUCPU + AJ71AP21(S3)/R21 QnACPU + AJ71AP21(S3)/R21 AnASCPU + A1SJ71AP21/R21 QnASCPU + A1SJ71AP21/R21 A80BD-A2USH-S1 + A1SJ71AP21/R21			
Data link modules that can be used as a local station			A0J2HCPUP21/R21 AnNCPUP21/R21 AnNCPUP21-S3 A2NCPUP21-S4 PC/AT + A70BD-J71AP22 AnACPUP21/R21 AnACPUP21-S3 A2ACPUP21-S4 AnACPU + AJ71AP21(S3)/R21 AnUCPU + AJ71AP21(S3)/R21 QnACPU + AJ71AP21(S3)/R21 AnSCPU + A1SJ71AP21/R21 AnASCPU + A1SJ71AP21/R21 QnASCPU + A1SJ71AP21/R21 A80BD-A2USH-S1 + A1SJ71AP21/R21 A2CCPUP21/R21			AnACPUP21/R21 AnACPUP21-S3 A2ACPUP21-S4 AnACPU + AJ71AP21(S3)/R21 AnUCPU + AJ71AP21(S3)/R21 QnACPU + AJ71AP21(S3)/R21 AnSCPU + A1SJ71AP21/R21 AnASCPU + A1SJ71AP21/R21 QnASCPU + A1SJ71AP21/R21 A80BD-A2USH-S1 + A1SJ71AP21/R21	
Possible to connect remote I/O stations			Yes	Yes		No	
Device range	Parameter (first half)	X ·Y	0 to 7FF	0 to 7FF		0 to 7FF	
		B	0 to 3FF	0 to 3FF		0 to FFF	
		W	0 to 3FF	0 to 3FF		0 to FFF	
	Parameter (second half)	X ·Y	—	—		—	
		B	—	α to FFF		α to FFF	
		W	—	α to FFF		α to FFF	
Link parameter type			1 type	2 types (Link parameter first half, second half)		2 types (Link parameter first half, second half)	
Max. number of link points per station	Master/local stations		1024 bytes/station	Setting of only first half link parameters	1024 bytes/ station	Setting of only first half link parameters	1024 bytes/ station
				Setting of both first and second half link parameters	2048 bytes/ station	Setting of both first and second half link parameters	2048 bytes/ station
	Remote I/O stations		512 bytes/station			—	

α : "The last number in first half" + 1
("0" if the first half range is "0".)

<table>
<tr><th colspan="3" rowspan="2">Operation Mode
Item</th><th colspan="5">MELSECNET/B Data Link System</th></tr>
<tr><th>MELSECNET Mode</th><th colspan="2">MELSECNET II Composite Mode</th><th colspan="2">MELSECNET II Mode</th></tr>
<tr><td colspan="3">Data link modules that can be used as a master station</td><td>AnNCPU + AJ71AT21B
AnACPU + AJ71AT21B
AnUCPU + AJ71AT21B
QnACPU + AJ71AT21B
AnSCPU + A1SJ71AT21B
AnASCPU + A1SJ71AT21B
QnASCPU + A1SJ71AT21B
A80BD-A2USH-S1 + A1SJ71AT21B</td><td colspan="4">AnACPU + AJ71AT21B
AnUCPU + AJ71AT21B
QnACPU + AJ71AT21B
AnASCPU + A1SJ71AT21B
QnASCPU + A1SJ71AT21B
A80BD-A2USH-S1 + A1SJ71AT21B</td></tr>
<tr><td colspan="3">Data link modules that can be used as a local station</td><td colspan="3">AnNCPU + AJ71AT21B
AnACPU + AJ71AT21B
AnUCPU + AJ71AT21B
QnACPU + AJ71AT21B
AnSCPU + A1SJ71AT21B
AnASCPU + A1SJ71AT21B
QnASCPU + A1SJ71AT21B
A80BD-A2USH-S1 + A1SJ71AT21B</td><td colspan="2">AnACPU + AJ71AT21B
AnUCPU + AJ71AT21B
QnACPU + AJ71AT21B
AnASCPU + A1SJ71AT21B
QnASCPU + A1SJ71AT21B
A80BD-A2USH-S1 + A1SJ71AT21B</td></tr>
<tr><td colspan="3">Possible to connect remote I/O stations</td><td>No</td><td colspan="2">No</td><td colspan="2">No</td></tr>
<tr><td rowspan="6">Device range</td><td rowspan="3">Parameter (first half)</td><td>X ·Y</td><td>0 to 7FF</td><td colspan="2">0 to 7FF</td><td colspan="2">0 to 7FF</td></tr>
<tr><td>B</td><td>0 to 3FF</td><td colspan="2">0 to 3FF</td><td colspan="2">0 to FFF</td></tr>
<tr><td>W</td><td>0 to 3FF</td><td colspan="2">0 to 3FF</td><td colspan="2">0 to FFF</td></tr>
<tr><td rowspan="3">Parameter (second half)</td><td>X ·Y</td><td>—</td><td colspan="2">—</td><td colspan="2">—</td></tr>
<tr><td>B</td><td>—</td><td colspan="2">α to FFF</td><td colspan="2">α to FFF</td></tr>
<tr><td>W</td><td>—</td><td colspan="2">α to FFF</td><td colspan="2">α to FFF</td></tr>
<tr><td colspan="3">Link parameter type</td><td>1 type</td><td colspan="2">2 types (Link parameter first half, second half)</td><td colspan="2">2 types (Link parameter first half, second half)</td></tr>
<tr><td rowspan="3">Max. number of link points per station</td><td colspan="2" rowspan="2">Master/local stations</td><td rowspan="2">1024 bytes/station</td><td>Setting of only first half link parameters</td><td>1024 bytes/ station</td><td>Setting of only first half link parameters</td><td>1024 bytes/ station</td></tr>
<tr><td>Setting of both first and second half link parameters</td><td>2048 bytes/ station</td><td>Setting of both first and second half link parameters</td><td>2048 bytes/ station</td></tr>
<tr><td colspan="2">Remote I/O stations</td><td colspan="3">—</td><td colspan="2">—</td></tr>
</table>

α : "The last number in first half" + 1
("0" if the first half range is "0".)

1.3 Applicable Link Modules and General Names

1.3.1 Applicable link modules

MELSECNET Data Link System

(1) CPU units

(a) Link modules compatible with MELSECNET mode

A0J2HCPUP21/R21
A1NCPUP21/R21
A1NCPUP21-S3
A2NCPUP21/R21
A2NCPUP21-S3
A2NCPUP21/R21-S1
A2NCPUP21-S4
A3NCPUP21/R21
A3NCPUP21-S3
A2CCPUP21/R21

(b) Link modules compatible with MELSECNET II mode

A2ACPUP21/R21
A2ACPUP21-S3
A2ACPUP21/R21-S1
A2ACPUP21-S4
A3ACPUP21/R21
A3ACPUP21-S3

(2) The following link modules can only be used for the MELSECNET Data Link System, installed in an I/O slot of the main or extension base unit:

(a) Link modules compatible with MELSECNET

A0J2P25/R25 (for remote I/O station)
A0J2P25-S3 (for remote I/O station)
AJ72P25/R25 (for remote I/O station)
AJ72P25-S3 (for remote I/O station)

(b) Link modules compatible with MELSECNET (II)

AJ71AP21/R21 (for master station/local station)
A1SJ71AP21/R21 (for master station/local station)
AJ71AP21-S3 (for master station/local station)

MELSECNET/B Data Link System

(1) The following link modules can only be used for the MELSECNET/B Data Link System, installed in an I/O slot of the main or extension base unit:

(a) Link module that supports the MELSECNET mode

A1SJ71AT21B (for master station/local station):
Only used with an A1SCPU

(b) Link module that supports the MELSECNET II mode

AJ71AT21B (for master station/local station)

POINT

Although the following link modules can be connected to the MELSECNET (II) data link system, they are not discussed in this manual:

Graphic operation terminal

A6BSW-S3, S4, S5 (bypass switch)

Personal computer board

Refer to the manual for these link modules for details.

1.3.2 General names of CPU

(1) AnNCPU
AnNCPU refers to the following link modules:

(a) A1NCPU
(b) A2NCPU
(c) A2NCPU-S1
(d) A3NCPU

(2) AnACPU
AnACPU refers to the following link modules:

(a) A2ACPU
(b) A2ACPU-S1
(c) A3ACPU

(3) AnUCPU
AnUCPU refers to the following link modules:

(a) A2UCPU
(b) A2UCPU-S1
(c) A3UCPU
(d) A4UCPU

(4) QnACPU
QnACPU refers to the following link modules:

(a) Q2ACPU
(b) Q2ACPU-S1
(c) Q3ACPU
(d) Q4ACPU

(5) ACPU
ACPU refers to all the CPUs listed in items (1) to (4), A0J2HCPU and A2CCPU.

(6) AnSCPU
AnSCPU refers to the following link modules:

(a) A1SJHCPU
(b) A1SHCPU
(c) A2SHCPU

(7) AnASCPU
AnASCPU refers to the following link modules:

(a) A2ASCPU
(b) A2ASCPU-S1
(c) A2USHCPU-S1

(8) QnASCPU
QnASCPU refers to the following link modules:

(a) Q2ASCPU
(b) Q2ASCPU-S1
(c) Q2ASHCPU
(d) Q2ASHCPU-S1

(9) AnNCPUP21/R21
AnNCPUP21/R21 refers to the following link modules:

(a) A1NCPUP21/R21
(b) A1NCPUP21-S3
(c) A2NCPUP21/R21
(d) A2NCPUP21-S3
(e) A2NCPUP21/R21-S1
(f) A2NCPUP21-S4
(g) A3NCPUP21/R21
(h) A3NCPUP21-S3

(10) AnACPUP21/R21
AnACPUP21/R21 refers to the following link modules:

(a) A2ACPUP21/R21
(b) A2ACPUP21-S3
(c) A2ACPUP21/R21-S1
(d) A2ACPUP21-S4
(e) A3ACPUP21/R21
(f) A3ACPUP21-S3

2. TWO-TIER SYSTEM IN THE MELSECNET DATA LINK SYSTEM

This section describes the MELSECNET Data Link System.

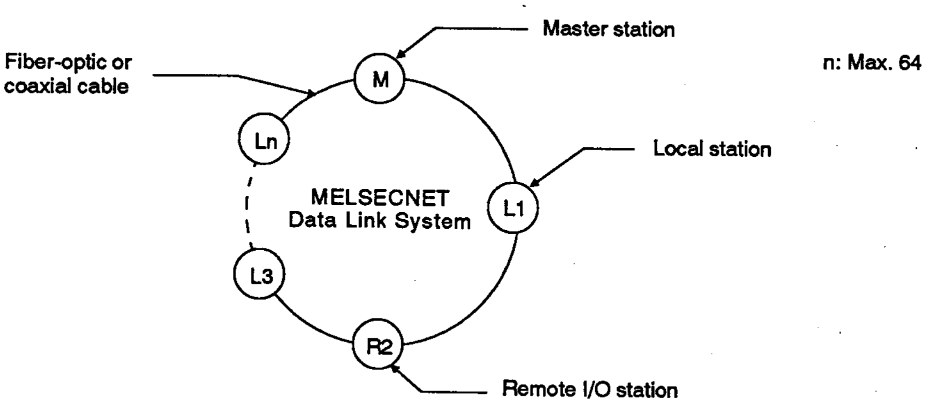
2.1 Outline of the MELSECNET Data Link System

2.1.1 Configuration of the data link system

The MELSECNET Data Link System connects link modules via fiber-optic or coaxial cables.

In the MELSECNET Data Link System, up to 64 slave (local and remote I/O) stations can be connected to a link module used as the master station.

Within the total range of 64 stations in total, combinations of local and remote I/O stations can be set without restrictions.



(1) Master station

The master station is the link module which controls the whole MELSECNET Data Link System.

The number of slave stations (Max. 64) connected and the device (B, W, X, Y) range for data linking are set using link parameters at the PC CPU in the master station.

The master station controls data communications in the MELSECNET Data Link System by using the set link parameters.

(2) Slave stations

There are two kinds of slave stations: local stations and remote I/O stations.

(a) Local stations

When two or more PC CPUs are connected in a data link system, local stations are used to increase (a) the number of I/O points, and (b) the program capacity.

(b) Remote I/O stations

Remote I/O stations are used to decrease wiring costs when data must frequently input/output from/to devices that are far away from a PC CPU.

The PC CPU in the master station controls the input and output of remote I/O stations.

2.1.2 Features of the data link system

(1) Cyclic transmission function

The cyclic transmission function periodically communicates data between a master station and slave stations (local stations and remote I/O stations).

Either 1 : n or 1 : 1 data communications is enabled by using the cyclic transmission function.

(a) 1 : n data communications

This refers to data communications (a) between the master station and all local stations, and (b) between local stations.

ON/OFF data and 16-bit data can both be communicated:

1) ON/OFF data is communicated using the link relay (B).

2) 16-bit data is communicated using the link register (W).

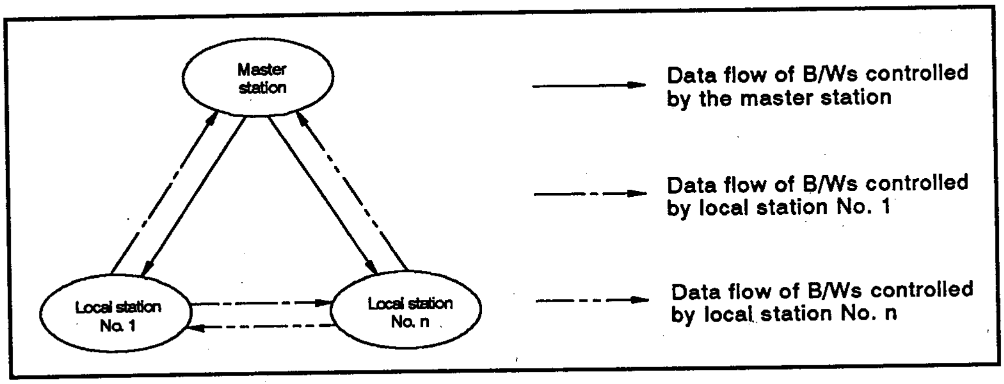


Fig. 2.1 B/W Data Flow in MELSECNET

(b) 1 : 1 data communications

This refers to 1 : 1 data communications (a) between the master station and a local station, and (b) between the master station and a remote I/O station.

ON/OFF data can be communicated using inputs (X) and outputs (Y).

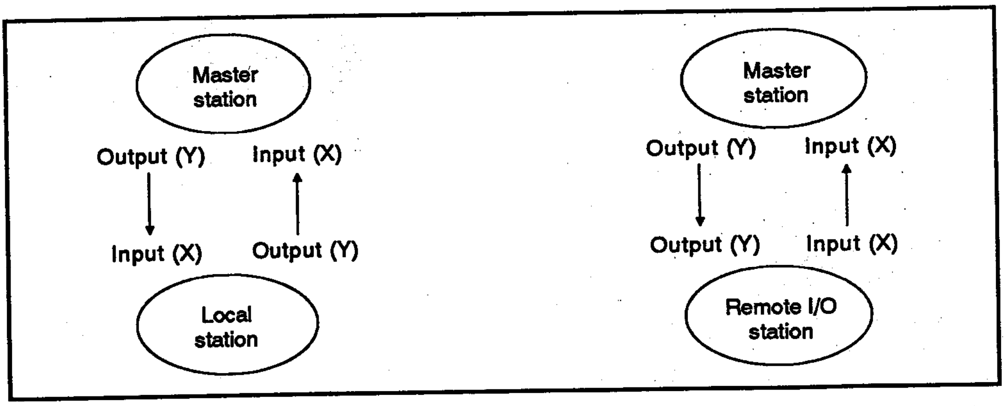


Fig. 2.2 X/Y Data Flow in MELSECNET (II)

(2) Transient transmission function

The transient transmission function reads/writes data from/to a device in a local station by the master station PC CPU or communicates data between a peripheral device connected to a PC CPU and a PC CPU in another station.

The transient transmission function executes the following types of processing:

(a) Read/write for devices (T, C, D, W) in a local station by the master station PC CPU

LORP and LWTP instructions in a sequence program are used for this processing.

(b) Read/write for buffer memory in a special function module loaded to a remote I/O station by the master station

RFRP and RTOP instructions in a sequence program are used for this processing.

(c) Accesses another station from a device such as a peripheral device or special-function module that is connected to the PC CPU.

The accessible station varies depending on which peripheral device or special-function module is installed in the master station, local station, or remote I/O station as shown in Table 2.1.

Table 2.1, however, gives stations which are generally accessible.

The manual of the used peripheral device or special-function module gives details about the functions that can be executed by the peripheral device or special-function module.

Table 2.1 Accessible Stations With a Peripheral Device

	Master Station	Local Station	Remote I/O Station
Master Station	Accessible	Accessible	Accessible
Local Station	Accessible	Not accessible	Not accessible
Remote I/O Station	Accessible	Not accessible	Not accessible

(3) Improved RAS (Reliability, Availability, Serviceability) functions

(a) Loopback function

If a cable breaks or the power supply to a slave station is turned off, the affected slave station is disconnected from the data link so that normal link operations are able to continue for other stations.

In the MELSECNET Data Link System, the fiber-optic cables or coaxial cables are doubled to make the loopback function possible. This double configuration allows data link operations to continue by switching the loop from forward to reverse if a cable breaks or the power to a slave station is turned off (see Section 5.3.4).

(b) Automatic return function

If an error occurs in a slave station, the corresponding station is disconnected from the data link system.
When a slave station (local station, remote I/O station), disconnected from the link due to an occurrence of a problem, it is automatically connected into the link when the station recovers the normal operating conditions (See Section 5.3.3).

(c) Error detection

1) The data link operation status is stored in special relays (M) and special registers (D) in a PC CPU.

Read these special relays (M) and special registers (D) to check the data link operation status.

2) Use the link monitor function of a peripheral device (A6GPP, A6PHP, A6HGP) to check the data link operation status.

(d) Self-diagnosis function

The self-diagnosis function checks the link module hardware, the fiber-optic cable or coaxial cable connection status, etc.

REMARK

The errors that makes the RAS functions valid are only cable breakage, slave station power-off, data link setting error, and the errors that can be detected by the self-diagnosis of the CPU module.
The RAS functions may not work depending on the fault of the data link module.

(4) Mixing MELSECNET mode-compatible modules and MELSECNET II mode-compatible modules

Modules intended for use in the MELSECNET mode and MELSECNET II mode Data Link System can be used in the MELSECNET Data Link System.

The MELSECNET Data Link System even allows MELSECNET mode-compatible modules and MELSECNET mode-compatible modules to be used in the same network MELSECNET mode-compatible modules can also be used in the MELSECNET Data Link System.

The MELSECNET Data Link System has parameters for setting its operation mode so that any combination of system configurations is possible.

The MELSECNET Data Link System has the following three operation modes: MELSECNET mode, MELSECNET II mode, and MELSECNET II composite mode.

Refer to Section 1.2 for details on the differences between these modes.

2.2 MELSECNET Data Link System

2.2.1 Overall configuration

(1) Two-tier system

In a two-tier system, up to 64 stations (local and remote I/O stations) can be connected to the master station with fiber-optic cable or coaxial cable.

Local and remote I/O stations are called slave stations.

(2) System configuration

The configuration of the two-tier system is illustrated in Fig. 2.1.

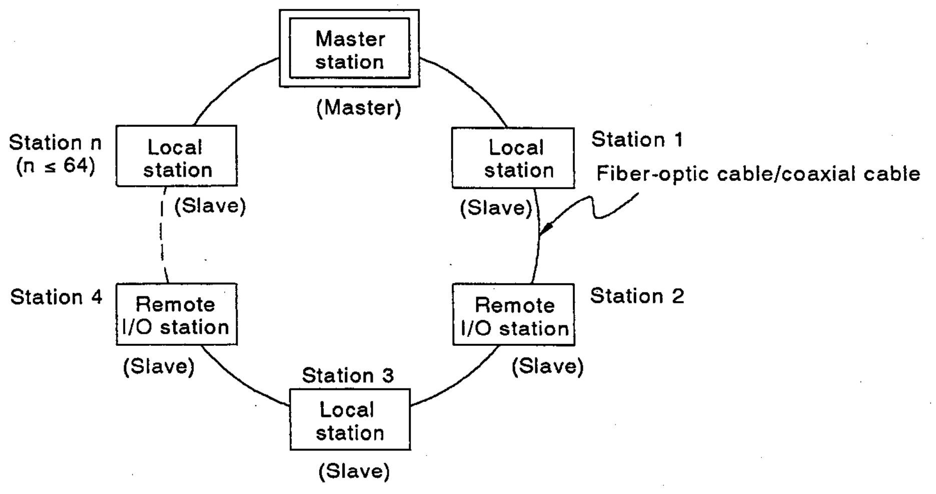
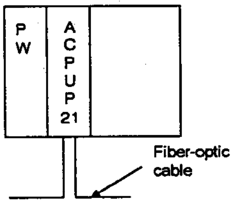
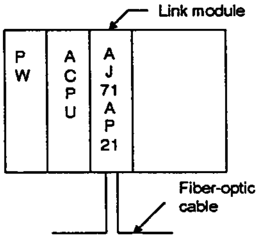
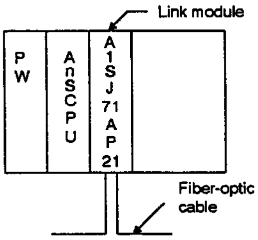
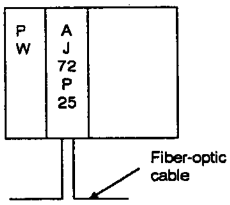
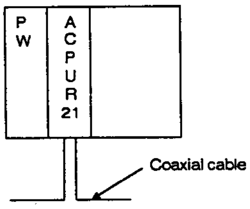
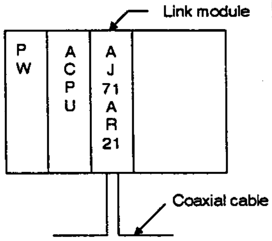
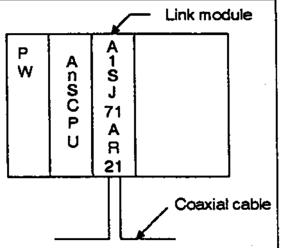
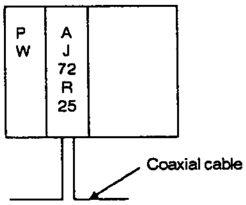


Fig. 2.3 Typical Two-Tier System

POINT

Remote I/O stations cannot be connected if the MELSECNET II mode is used.

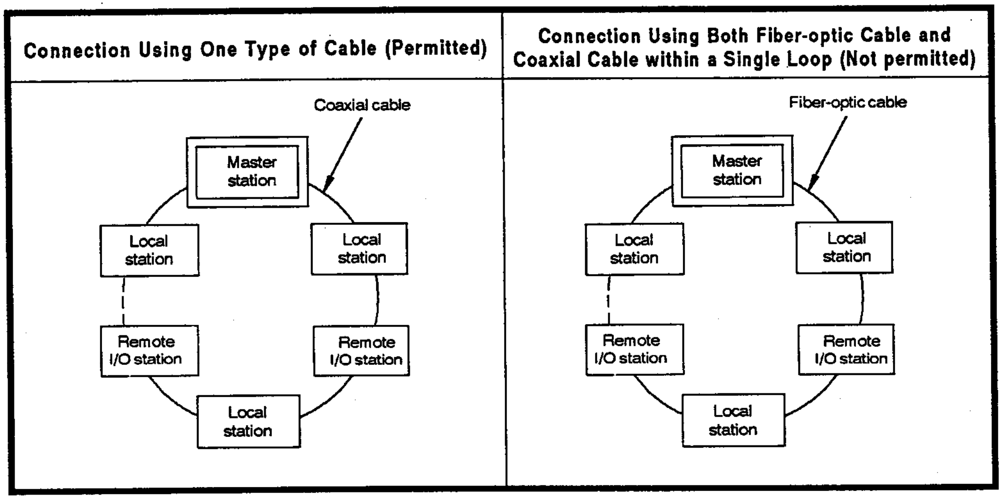
(a) The following table gives the configuration of a master station/local station and remote I/O station.

Type of Cable	**Master Stations / Local Stations**		**Remote I/O Station**
	CPU Module with a Link Function	**CPU Module + Link Module**	
Fiber-optic cable		 	
Coaxial cable		 	

2.2.2 Precautions when operating the data link system

(1) Fiber-optic cable and coaxial cable cannot be mixed in the same loop.

The same type of cable must be used for links within the same loop. Fiber-optic cable and coaxial cable cannot be mixed.



Connection Using One Type of Cable (Permitted)

Connection Using Both Fiber-optic Cable and Coaxial Cable within a Single Loop (Not permitted)

Fig. 2.5 Link Module Connection in Individual Links

(2) Number of link device points

The number of link device points (X, Y, B, W) that can be used for each local or remote I/O station is limited. Refer to Section 7.3.1 for more details.

(3) Link parameter settings

Set the link parameters in the master station to operate the data link system. The link parameters include the number of slave stations connected to the master station, the link device assignments, and the watchdog monitoring time.

(a) Number of slave stations

The total number of local and remote I/O stations connected in the MELSECNET Data Link System.

(b) Link device assignment

The range of link devices used for link data communication for each station (master, local, and remote I/O).

(c) Watchdog monitoring time

The maximum allowable time that local stations and remote I/O stations will take to determine whether the master station is operating normally.

(4) Operation mode in the MELSECNET data link system

Operation mode is determined according to the link unit which is connected to the MELSECNET data link system and link parameter setting. Section 1.2.4 gives details.

2.2.3 Data link modules

(1) For a system using fiber-optic cable

The data link modules that can be connected with fiber-optic cable are listed in Table 2.2.

Table 2.2 Data Link Modules Connectable with Fiber-Optic Cable

Module/ Unit	Type	Description	Applicable System								Remark
			Two-tier System								
			*1			*2		*3			
			M	L	R	M	L	M	L	R	
CPU unit	A0J2HCPUP21	CPU module with the link function	o	o					o		For master or local station: selection is determined by the setting of the station number setting switch
	A2CCPUP21										
	A1NCPUP21										
	A1NCPUP21-S3										
	A2NCPUP21										
	A2NCPUP21-S3										
	A2NCPUP21-S1										
	A2NCPUP21-S4										
	A3NCPUP21										
	A3NCPUP21-S3										
	A2ACPUP21	CPU module with the link function	o	o		o	o	o	o		
	A2ACPUP21-S3										
	A2ACPUP21-S1										
	A2ACPUP21-S4										
	A3ACPUP21										
	A3ACPUP21										
Data link module	A1SJ71AP21	Module used with any of the following CPUs to perform a data link A1SJHCPU, A1SHCPU A2SHCPU, A2ASCPU(S1) A2USHCPU-S1, Q2AS(H)CPU(S1)	o	o		*1 o	*1 o	*1 o	*1 o		To be loaded into an I/O slot in the base unit.
	A1SJ71AP21-S3										
	AJ71AP21	Module used with the CPU module having no link function (ACPU) to perform a data link	o	o		*2 o	*2 o	*2 o	*2 o		
	AJ71AP21-S3										
	A0J2P25	Compact module for remote I/O station			o					o	
	A0J2P25-S3										
	AJ72P25	Building-block module for remote I/O station									
	AJ72P25-S3										

o : Applicable
*1 : MELSECNET Mode
*2 : MELSECNET II Mode
*3 : MELSECNET II Composite Mode

REMARK

1) The M, L and R stations in Table 2.2 indicate the following stations.
   a) M station ··· Master station
   b) L station ··· Local station
   c) R station ··· Remote I/O station
2) ∗1: Applicable only when used with the A2US(H)CPU(S1) or Q2AS(H)CPU(S1).
3) ∗2: Applicable only when used with the AnACPU, AnUCPU or QnACPU.

(2) For a system using coaxial cable

The data link modules that can be connected with coaxial cable are listed in Table 2.3.

Table 2.3 Data Link Modules Connectable with Coaxial Cable

Module/ Unit	Type	Description	Applicable System								Remark
			Two-tier System								
			*1			*2		*3			
			M	L	R	M	L	M	L	R	
CPU unit	A0J2HCPUR21	CPU module with the link function	o	o					o		For master or local station: selection is determined by the setting of the station number setting switch
	A2CCPUR21										
	A1NCPUR21										
	A2NCPUR21										
	A2NCPUR21-S1										
	A3NCPUR21										
	A2ACPUR21	CPU module with the link function	o	o		o	o	o	o		
	A2ACPUR21-S1										
	A3ACPUR21										
Data link module	A1SJ71AR21	Module used with any of the following CPUs to perform a data link A1SJHCPU, A1SHCPU A2SHCPU, A2ASCPU(S1) A2USHCPU-S1, Q2AS(H)CPU(S1)	o	o		*1 o	*1 o	*1 o	o		To be loaded into an I/O slot in the base unit.
	AJ71AR21	Module used with the CPU module having no link function (ACPU) to perform a data link	o	o		*2 o	*2 o	*2 o	o		
	A0J2R25	Compact module for remote I/O station			o					o	
	AJ72R25	Building-block module for remote I/O station									

o : Applicable
*1 : MELSECNET Mode
*2 : MELSECNET II Mode
*3 : MELSECNET II Composite Mode

REMARK

1) The M, L and R stations in Table 2.3 indicate the following stations.
   - a) M station ··· Master station
   - b) L station ··· Local station
   - c) R station ··· Remote I/O station
2) ∗1: Applicable only when used with the A2US(H)CPU(S1) or Q2AS(H)CPU(S1).
3) ∗2: Applicable only when used with the AnACPU, AnUCPU or QnACPU.

3. A TWO-TIER SYSTEM USING THE MELSECNET/B DATA LINK SYSTEM

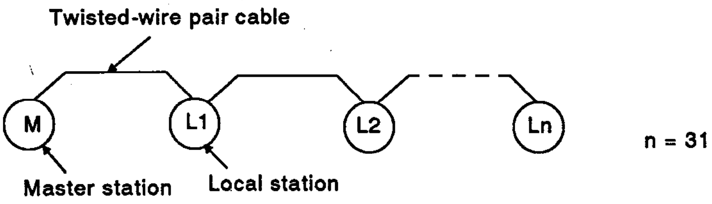
This section explains the MELSECNET/B Data Link System.

3.1 Basic Information About the MELSECNET/B Data Link System

3.1.1 Composition of the MELSECNET/B data link system

The MELSECNET/B Data Link System connects link modules using twisted-wire pair cables.

Up to 31 local stations can be used in a link which has one link module as the master station.



(1) Master station

The link module that controls the whole MELSECNET/B Data Link System is called a master station.

The number of connected slave stations (Max. 31) and the device (B, W, X, Y) ranges for data communications are set with link parameters at the PC CPU in the master station.

The master station controls data communications in a MELSECNET/B Data Link System in accordance with these set link parameters.

(2) Slave stations

Local stations are the only kind of slave station.

When two or more PC CPUs are connected in a data link system, local stations are used to increase (a) the number of I/O points, and (b) the program capacity.

3.1.2 Features of the data link system

The features of the MELSECNET/B Data Link System are described below.

(1) Cyclic transmission function

The cyclic transmission function periodically communicates data between a master station and slave stations (local stations).

Either 1 : n or 1 : 1 data communications is enabled by using the cyclic transmission function.

(a) 1 : n data communications

This refers to data communications (a) between the master station and all local stations, and (b) between local stations.

ON/OFF data and 16-bit data can both be communicated:

1) ON/OFF data is communicated using the link relay (B).
2) 16-bit data is communicated using the link register (W).

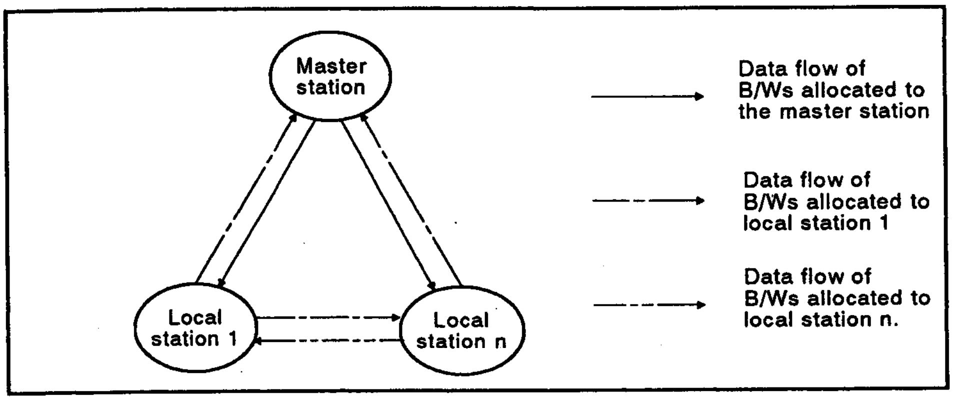


Fig. 3.1 B/W Data Flow

(b) 1 : 1 data communications

This refers to 1 : 1 data communications between a master station and a local station.

ON/OFF data can be communicated using inputs (X) and outputs (Y).

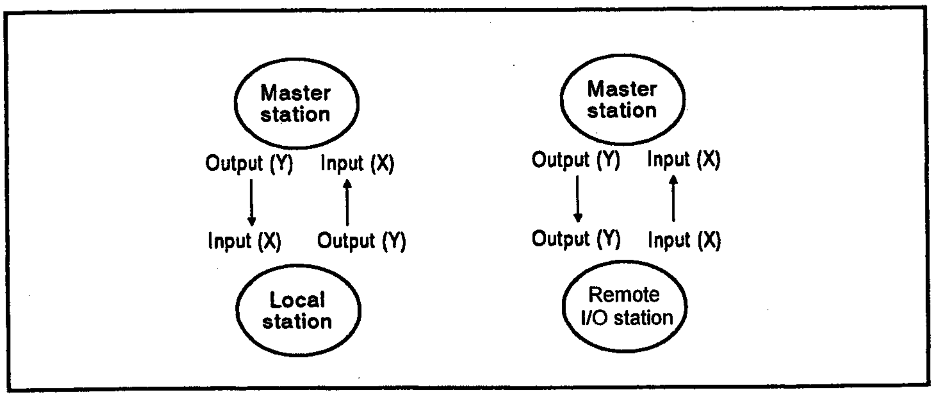


Fig. 3.2 Input (X) and Output (Y) Data Communications

(2) Transient transmission function

The transient transmission function (a) reads/writes data from/to a device in a local station by using a master station PC CPU, and (b) communicates data between a peripheral device connected to a PC CPU and a PC CPU in another station.

The transient transmission function executes the following types of processings:

(a) Communications between a master station and a local station

Read/write for devices (T, C, D and W) in a local station by a master station PC CPU.
LRDP/LWTP instructions in a sequence program are used for this processing at the master station.

(b) Communications between a master station and a remote I/o station
Read/write of data from/to the buffer memory of a special-function module connected to a remote I/O station is performed from a master station PLC CPU.
RFRP/RTOP* instructions in a sequence program are used at the master station.

(c) Access between a peripheral device or special-function module and another station
Another station is accessed from a peripheral device or special-function module connected to a PC CPU.
As Table 3.1 shows, the accessible station varies depending on the peripheral device or special-function module installed in a master, local or remote I/O station.
However, the stations in Table 3.1 are are basically accessible.
The manual of the used peripheral device or special-function module gives details about the functions that can be executed by that peripheral device or special-function module.

Table 3.1 Communicating Stations Available to Peripheral Devices and Special-Function Modules

Peripheral Device Connection Station / Access Target Station	Master Station	Local Station	Remote I/O Station
Master Station	Accessible	Accessible	Accessible
Local Station	Accessible	Inaccessible	Inaccessible
Remote I/O Station	Accessible	Inaccessible	Inaccessible

REMARK

1) *: When the AnACPU(P21/R21), AnUCPU or A2US(H)CPU(S1) is used, the LRDP/LWTP/RFRP/RTOP instructions of the dedicated instructions can also be used.
(For details of the LRDP/LWTP/RFRP/RTOP instructions, refer to the AnACPU/AnUCPU Programming Manual (Dedicated Instructions) IB-66251.)
When the QnACPU, Q2AS(H)CPU(S1) is used, the ZNRD/ZNWR/RFRP/RTOP instructions of the data link instructions can be used.
(For details of the ZNRD/ZNWR/RFRP/RTOP instructions, refer to the QCPU (Q Mode)/QnACPU Programming Manual (Common Instructions) SH-080039.)

(3) Improved RAS (Reliability, Availability, Serviceability) functions

(a) Automatic online return function

When a slave station (local station) where an error occurred returns to the link-enabled state, the station automatically restarts the data link operation (see Section 5.3.3).

(b) Error detection

1) The data link operating state is stored in special relays (M) and special registers (D) in a PC CPU.

The data link operating state (error detection) can be checked by reading the data stored in the special relays (M) and special registers (D).

2) The data link operating state (error detection) can also be checked by using the link monitor function at a peripheral device (A6GPP, A6PHP, or A6HGP).

(c) Self-diagnosis function

The self-diagnosis function of the data link module checks the link module hardware and twisted-wire pair cable connections.

(4) Three operating modes can be selected by setting the CPU module.

To satisfy various system configuration requirements, different operating modes can be selected for the MELSECNET/B Data Link System by setting link parameters.

The MELSECNET/B Data Link System has the following three operation modes: MELSECNET mode, MELSECNET II mode, and MELSECNET II composite mode.

Section 1.2 gives details about the differences among these modes.

(5) Switching the communication speed is enabled.

The communication speed can be set to 125K bps, 250K bps, 500K bps, or 1M bps.

The total link distance can be changed by switching the communication speed.

3.2 MELSECNET/B Data Link System

3.2.1 Overall configuration

(1) Two-tier system

In a two-tier system, up to 31 local stations can be connected to a master station by twisted-wire pair cables.

In a two-tier system, the relationship between a master station and local stations is analogous to a parent/child relationship.

(2) System configuration

Fig. 3.4 shows the system configuration of a two-tier system.

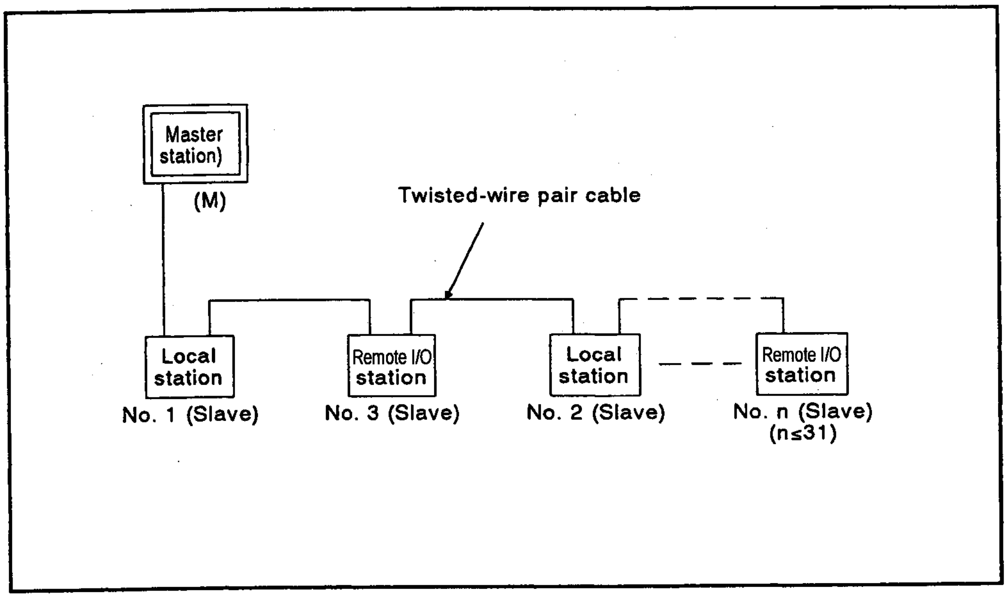


Fig. 3.3 Two-Tier System

POINTS

(1) Remote I/O stations cannot be connected to a MELSECNET/B Data Link System.

(2) The order of all stations (including master stations) can be freely decided in the MELSECNET/B Data Link System.

3.2.2 Precautions when operating a data link system

This section explains the precautions to take when operating a data link system.

(1) Number of link device points for one station

The number of link devices (X, Y, B, W) points that can be used at a local station is limited (see Section 7.3.1).

(2) Link parameter settings

Set the link parameters in the master station to operate the data link system.

The link parameters include the number of slave stations connected in the MELSECNET/B Data Link System, the link device allocations, and the watchdog monitoring time.

(a) Number of slave stations

The total number of local stations connected in the MELSECNET/B Data Link System.

(b) Link device allocations

The range of link devices used for data communications is set at each master and local station (see Section 7).

(c) Watchdog monitoring time

The maximum allowable time that local stations can take to determine whether a master station is operating normally (see Section 7.2).

(3) The operating mode of a MELSECNET/B Data Link System

The operating mode must be determined by the type of link modules used and the link parameter settings (see Section 1.2.4).

(4) Twisted-wire pair cable

The twisted-wire pair cable used for a MELSECNET/B Data Link System is KNPEV-SB 0.5SQ X 1P (see Section 5.6).

3.2.3 System devices

Table 3.2 shows the data link modules that can be used in the MELSECNET/B(II) Data Link System.

Table 3.2 Data Link Modules

O: Available

Link Module	CPU Module	Description		Applicable System								Remarks
				Two-tier system								
				MELSECNET mode			MELSECNET II mode		MELSECNET II composite mode			
		Program capacity	Number of I/O points	M station	L station	R station	M station	L station	M station	L station	R station	
AJ71AT21B	A0J2HCPU	8k steps	336 points	O	O					O		Use the station number setting switch to set the selection of master and local stations.
	A1NCPU	6k steps	256 points									
	A2NCPU	14k steps	512 points									
	A2NCPU-S1	14k steps	1024 points									
	A3NCPU	30k steps	2048 points									
	A2ACPU	14k steps	512 points	O	O		O	O	O	O		
	A2ACPU-S1	14k steps	1024 points									
	A3ACPU	30k steps	2048 points									
	A2UCPU	14k steps	512 points									
	A2UCPU-S1	14k steps	1024 points									
	A3UCPU	30k steps	2048 points									
	A4UCPU	30k steps	4096 points									
	Q2ACPU	28k steps	512 points									
	Q2ACPU-S1	60k steps	1024 points									
	Q3ACPU	92k steps	2048 points									
	Q4ACPU	124k steps	4096 points									
A1SJ71AT21B	A1SJHCPU	8k steps	256 points	O	O					O		
	A1SHCPU											
	A2SHCPU	14k steps	512 points									
	A2ASCPU	14k steps	512 points	O	O		O	O	O	O		
	A2ASCPU-S1	14k steps	1024 points									
	A2USHCPU-S1	30k steps	1024 points									
	Q2ASCPU	28k steps	512 points									
	Q2ASCPU-S1	60k steps	1024 points									
	Q2ASHCPU	28k steps	512 points									
	Q2ASHCPU-S1	60k steps	1024 points									
AJ72T25B	–	Remote I/O station module loaded into any of the following base units A32B, A35B, A38B				O					O	
A1SJ72T25B	–	Remote I/O station module loaded into any of the following base units A1S32B, A1S33B, A1S35B, A1S38B										

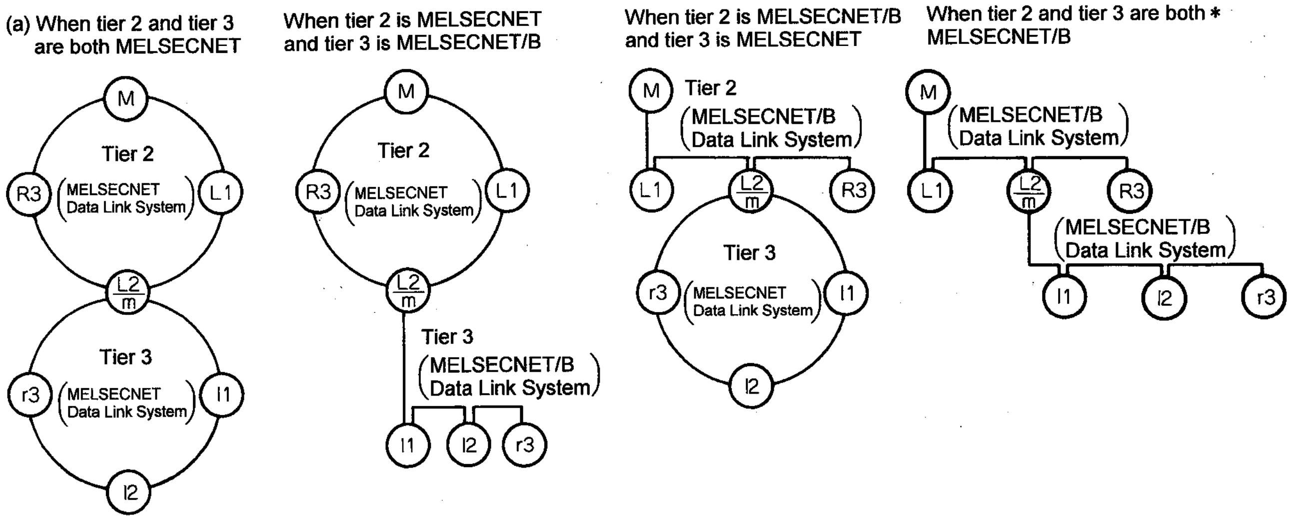
REMARK

1) The M, L and R stations in Table 3.2 indicate the following stations.
   - a) M station ··· Master station
   - b) L station ··· Local station
   - c) R station ··· Remote I/O station

4. COMPOSITION OF A THREE-TIER SYSTEM

In a three-tier system, a local station in the second tier is used as the master station for the third tier.

MELSECNET Data Link Systems and MELSECNET/B Data Link Systems can be used for the second and the third tiers. The allowable combinations are shown in Fig. 4.1 below.



M: Master station for the second tier, L1 and L2: Second-tier local stations, R3: Second-tier remote I/O station
m: Master station for the third tier, l1 and l2: Third-tier local stations, r3: Third-tier remote I/O station

Refer to Section 4.1.	Refer to Section 4.2.	Refer to Section 4.3.	Refer to Section 4.4.

Fig. 4.1 Three-Tier Systems

POINTS

(1) * : When the AnUCPU, QnACPU, A2ASCPU(S1), A2USHCPU-S1 or Q2AS(H)CPU(S1) is used, a three-tier system can be constructed by the MELSECNET/B Data Link Systems.
When any other CPU module is used, a three-tier system cannot be constructed by only the MELSECNET/B Data Link Systems.

(2) Third-tier local and remote I/O stations are called sub-slave stations and are controlled by the master station for the third tier.

4.1 Using the MELSECNET Data Link System to Make a Three-Tier System

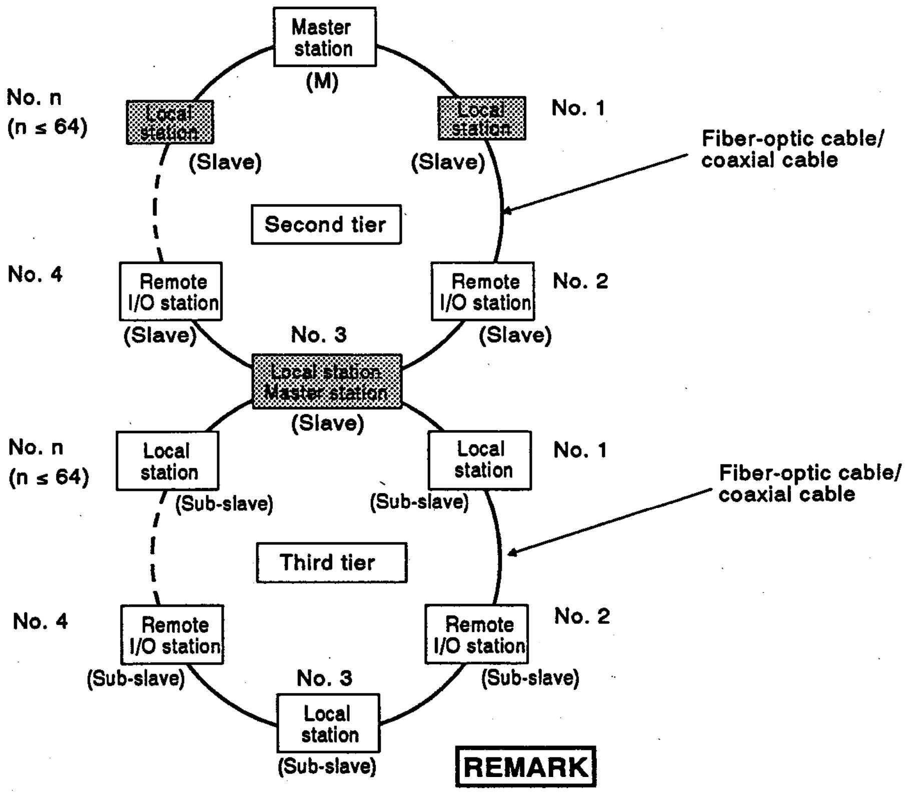
When MELSECNET Data Link Systems are used for the second and third tiers, fiber-optic or coaxial cables are used for connecting the stations.

(1) Up to 64 local and remote I/O stations can be connected to the master station for the second tier.

(2) Up to 64 local and remote I/O stations can be connected in the third tier when a second-tier local station is used as the master station for the third tier.

4.1.1 System configuration

Fig. 4.2 shows the configuration of a three-tier system.



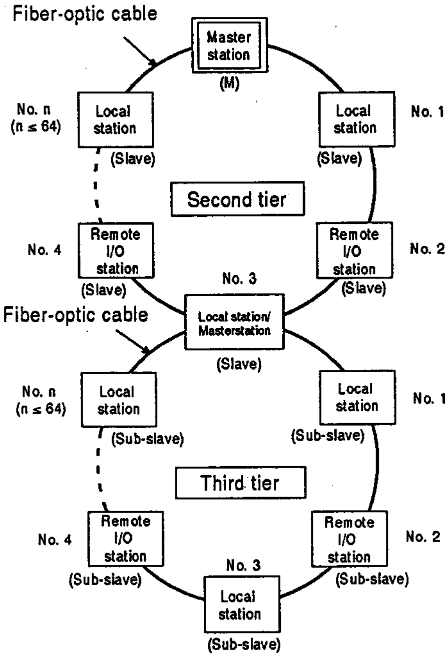
REMARK

Any local station indicated by shading can be used as the master station for a third tier.

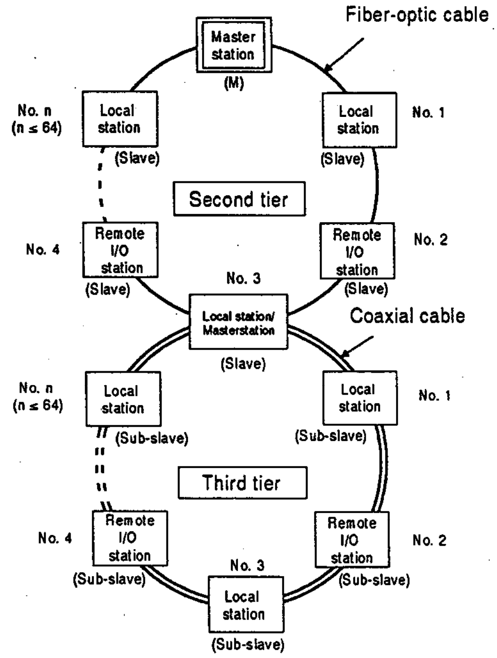
Fig. 4.2 MELSECNET Three-Tier System

In a three-tier system, the second and third tiers can use both fiber-optic and coaxial cables.

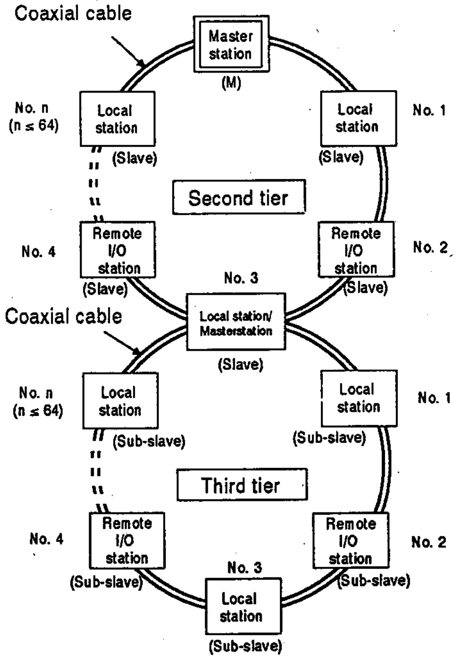
Combinations of fiber-optic and coaxial cables classified by tier are shown below.



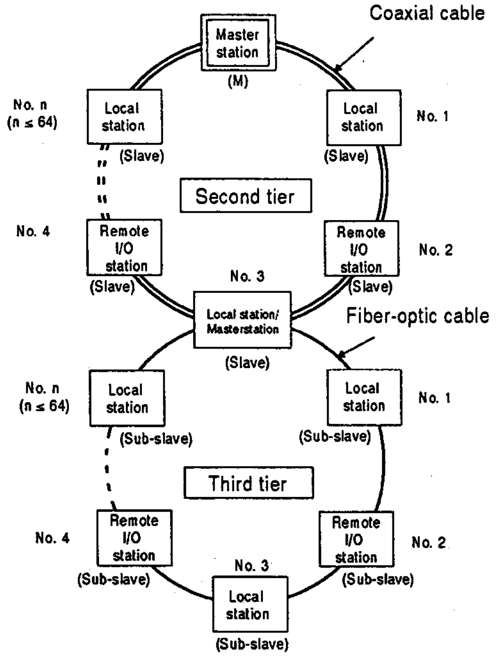
Fiber-optic cable/Fiber-optic cable



Fiber-optic cable/Coaxial cable



Coaxial cable/Coaxial cable



Coaxial fiber cable/Fiber-optic cable

POINTS

(1) The maximum number of tiers in a MELSECNET Data Link System is three.

(2) Remote I/O stations cannot be connected when the MELSECNET II mode is used.

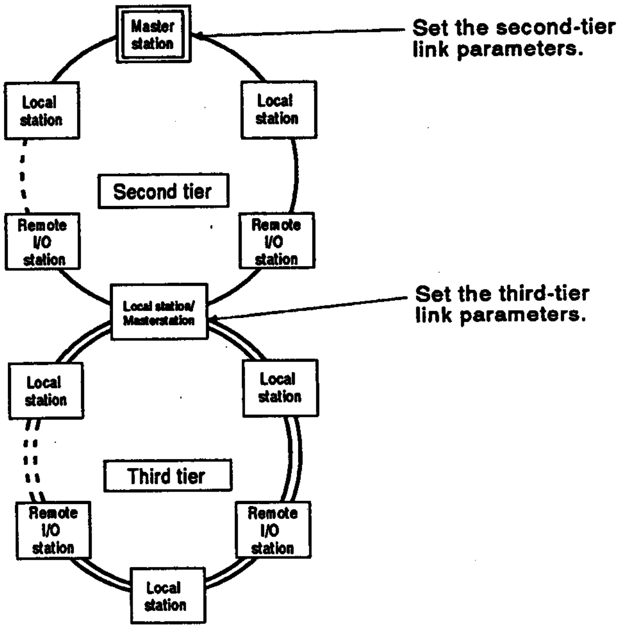
4.1.2 Precautions when using data links

This section explains the precautions to take when making a three-tier system using MELSECNET data links.

(1) Setting link parameters

In a three-tier system, it is necessary to set link parameters at both CPU modules in the master stations for the second and third tiers.

Sections 5.3.7 and chapter 7 give details about setting link parameters.



Set the second-tier link parameters.

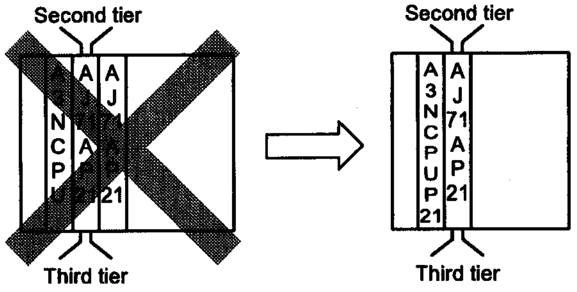
Set the third-tier link parameters.

(2) Limitations on use of link modules

(a) When the CPU module is other than the AnUCPU, A2ASCPU(S1), A2USHCPU-S1, QnACPU, and Q2AS(H)CPU(S1)

Only one of the following link modules can be used with a single CPU module. When constructing a three-tier system, use the CPU module having a link function with any of the following link modules.

- AJ71AP21
- AJ71AP21-S3
- A1SJ71AP21
- AJ71AR21
- A1SJ71AR21

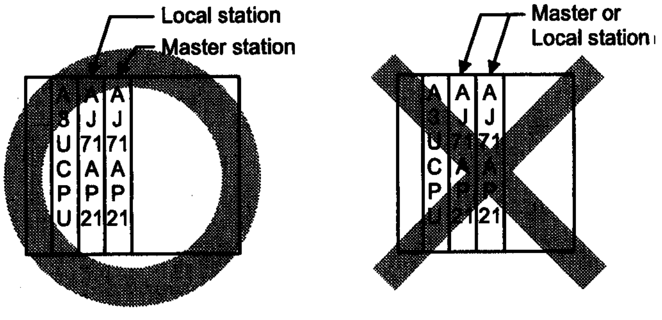


(b) When the CPU module is any of the AnUCPU, A2ASCPU(S1), A2USHCPU-S1, QnACPU, and Q2AS(H)CPU(S1)

A total of up to two of the following modules can be used with a single CPU module, one as a master station and the other as a local station.

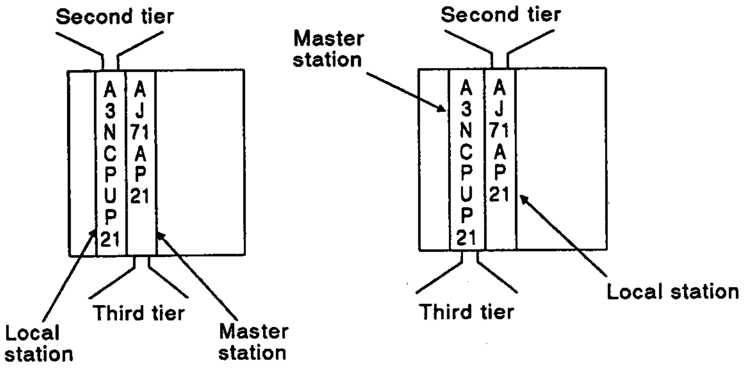
(Two modules cannot be used as master stations or local stations.)

- AJ71AP21
- AJ71AP21-S3
- A1SJ71AP21
- AJ71AR21
- A1SJ71AR21



(3) When a CPU module which has a link function is used as a master station

When a CPU module which has a link function is used with an AJ71AP21/R21 in a three-tier system, the CPU module which has the link function can be used as a master station and the AJ71AP21/R21 can be used as a local station.



An A[ ]ACPUP21/R21 whose model is as given below (or is later) can be used as a master station for the third tier.

POINTS

CPU modules with a link function which are older than the following can only be used as a local station.

CPU Modules With a Link Function	Version
A2ACPUP21	107CX
A2ACPUR21	107BX
A2ACPUP21-S1	107BY
A2ACPUR21-S1	107BY
A3ACPUP21	107CZ
A3ACPUR21	107BZ

4.1.3 System devices

Table 4.1 Link Modules Which Can be Used in a Three-Tier System

O: Available

Article Name	Type of Module	Applicable System																Remarks
		MELSECNET Data Links																
		Second Tier								Third Tier								
		MELSECNET Mode			MELSECNET II Mode		MELSECNET II Composite Mode			MELSECNET Mode			MELSECNET II Mode		MELSECNET II Composite Mode			
		M station	L station	R station	M station	L station	M station	L station	R station	L/m station	ℓ station	r station	L/m station	ℓ station	L/m station	ℓ station	r station	
CPU module with a link function	A0J2HCPUP21	○	○					○			○					○		These cannot be used as a master station for the third tier.
	A0J2HCPUR21																	
	A2CCPUP21																	
	A2CCPUR21																	
	A1NCPUP21	○	○					○		○	○					○		Use the station number setting switch to set the selection of master and local stations.
	A1NCPUP21-S3																	
	A1NCPUR21																	
	A2NCPUP21																	
	A2NCPUP21-S3																	
	A2NCPUR21																	
	A2NCPUP21-S1																	
	A2NCPUP21-S4																	
	A2NCPUR21-S1																	
	A3NCPUP21																	
	A3NCPUP21-S3																	
	A3NCPUR21																	
	A2ACPUP21	○	○		○	○	○	○		○	○		○	○	○	○		
	A2ACPUP21-S3																	
	A2ACPUR21																	
	A2ACPUP21-S1																	
	A2ACPUP21-S4																	
	A2ACPUR21-S1																	
	A3ACPUP21																	
	A3ACPUP21-S3																	
	A3ACPUR21																	

Table 4.1 Link Modules Which Can be Used in a Three-Tier System

O: Available

Article Name	Type of Module		Applicable System																Remarks
			MELSECNET Data Links																
			Second Tier								Third Tier								
			MELSECNET Mode			MELSECNET II Mode		MELSECNET II Composite Mode			MELSECNET Mode			MELSECNET II Mode		MELSECNET II Composite Mode			
			M station	L station	R station	M station	L station	M station	L station	R station	L/m station	ℓ station	r station	L/m station	ℓ station	L/m station	ℓ station	r station	
CPU module + link module	A1SJHCPU	A1SJ71AP21/R21	O	O					O			O					O		Use the station number setting switch to set the selection of master and local stations.
	A1SHCPU																		
	A2SHCPU																		
	A2ASCPU		O	O		O	O	O	O			O			O		O		
	A2ASCPU-S1																		
	A2USHCPU-S1																		
	A0J2HCPU	AJ71AP21/R21 AJ71AP21-S3	O	O					O			O					O		
	A1NCPU																		
	A2NCPU																		
	A2NCPU-S1																		
	A3NCPU																		
	A2ACPU		O	O		O	O	O	O			O			O		O		
	A2ACPU-S1																		
	A3ACPU																		
	A2UCPU		O	O		O	O	O	O		O	O		O	O	O	O		
	A2UCPU-S1																		
	A3UCPU																		
	A4UCPU																		
	Q2ASCPU	A1SJ71AP21/R21	O	O		O	O	O	O		O	O		O	O	O	O		
	Q2ASCPU-S1																		
	Q2ASHCPU																		
	Q2ASHCPU-S1																		
	Q2ACPU	AJ71AP21/R21 AJ71AP21-S3																	
	Q2ACPU-S1																		
	Q3ACPU																		
	Q4ACPU																		
CPU module having link function + link module	A1NCPUP21	AJ71AP21/R21 AJ71AP21-S3 AJ71AP22/R22 AJ71P22/R22									* O								Use the station number setting switch to set the selection of master and local stations. (AJ71AP22/R22 and AJ71P22/R22 cannot be used at the master station.)
	A1NCPUP21-S3																		
	A1NCPUR21																		
	A2NCPUP21																		
	A2NCPUP21-S3																		
	A2NCPUR21																		
	A2NCPUP21-S1																		
	A2NCPUP21-S4																		
	A2NCPUR21-S1																		
	A3NCPUP21																		
	A3NCPUP21-S3																		
	A3NCPUR21																		

*: The second tier can be used in the MELSECNET or MELSECNET II composite mode.

Table 4.1 Link Modules Which Can be Used in a Three-Tier System

O: Available

Article Name	Type of Module		Applicable System																Remarks
			MELSECNET Data Links																
			Second Tier								Third Tier								
			MELSECNET Mode			MELSEC NET II Mode		MELSECNET II Composite Mode			MELSECNET Mode			MELSEC NET II Mode		MELSECNET II Composite Mode			
			M station	L station	R station	M station	L station	M station	L station	R station	L/m station	ℓ station	r station	L/m station	ℓ station	L/m station	ℓ station	r station	
CPU module having link function + link module	A2ACPUP21	AJ72 P22/R22									O								
	A2ACPUR21																		
	A2ACPUP21-S1																		
	A2ACPUR21-S1																		
	A3ACPUP21																		
	A3ACPUR21																		
	A2ACPUP21	AJ71 AP21/R21									* O			* O		* O			
	A2ACPUR21																		
	A2ACPUP21-S1	AJ71 AP21-S3																	
	A2ACPUR21-S1																		
	A3ACPUP21	AJ72 P21/R21																	
	A3ACPUR21																		
Data Link Module	A0J2P25				O					O			O					O	
	A0J2P25-S3																		
	A0J2R25																		
	AJ72P25																		
	AJ72P25-S3																		
	AJ72R25																		

*: The second tier can be used in the MELSECNET, MELSECNET II or MELSECNET II composite mode.

Table 4.1 Link Modules Which Can be Used in a Three-Tier System

O: Available

Article Name	Type of Module		Applicable System																Remarks
			MELSECNET Data Links																
			Second Tier								Third Tier								
			MELSECNET Mode			MELSECNET II Mode		MELSECNET II Composite Mode			MELSECNET Mode			MELSECNET II Mode		MELSECNET II Composite Mode			
			M station	L station	R station	M station	L station	M station	L station	R station	L/m station	ℓ station	r station	L/m station	ℓ station	L/m station	ℓ station	r station	
CPU module having link function + link module (two modules)	A2ASCPU +A1SJ71AP21	A1SJ71 AP21/R21									*O			O		O			Use the station number setting switch to set the selection of master and local stations.
	A2ASCPU +A1SJ71AP21																		
	A2ASCPU-S1 +A1SJ71AP21																		
	A2ASCPU-S1 +A1SJ71AP21																		
	A2USHCPU-S1 +A1SJ71AP21																		
	A2USHCPU-S1 +A1SJ71AP21																		
	A2UCPU +AJ71AP21(S3)	AJ71 AP21/R21 AJ71 AP21-S3																	
	A2UCPU +AJ71AR21																		
	A2UCPU-S1 +AJ71AP21(S3)																		
	A2UCPU-S1 +AJ71AR21																		
	A3UCPU +AJ71AP21(S3)																		
	A3UCPU +AJ71AR21																		
	A4UCPU +AJ71AP21(S3)																		
	A4UCPU +AJ71AR21																		

*: The second tier can be used in the MELSECNET, MELSECNET II or MELSECNET II composite mode.

4.2 Data Link System When the Second Tier is MELSECNET and the Third Tier is MELSECNET/B

When the second tier is a MELSECNET Data Link System and the third tier is a MELSECNET/B Data Link System, the second tier is connected by fiber-optic cables or coaxial cables, and the third tier is connected by twisted-wire pair cables.

(1) Up to 64 local and remote I/O stations can be connected to a master station for the second tier.

(2) Up to 31 local stations can be connected in the third tier when a second-tier local station is used as the master station for the third tier.

4.2.1 System configuration

Fig. 4.3 shows the configuration of a three-tier system.

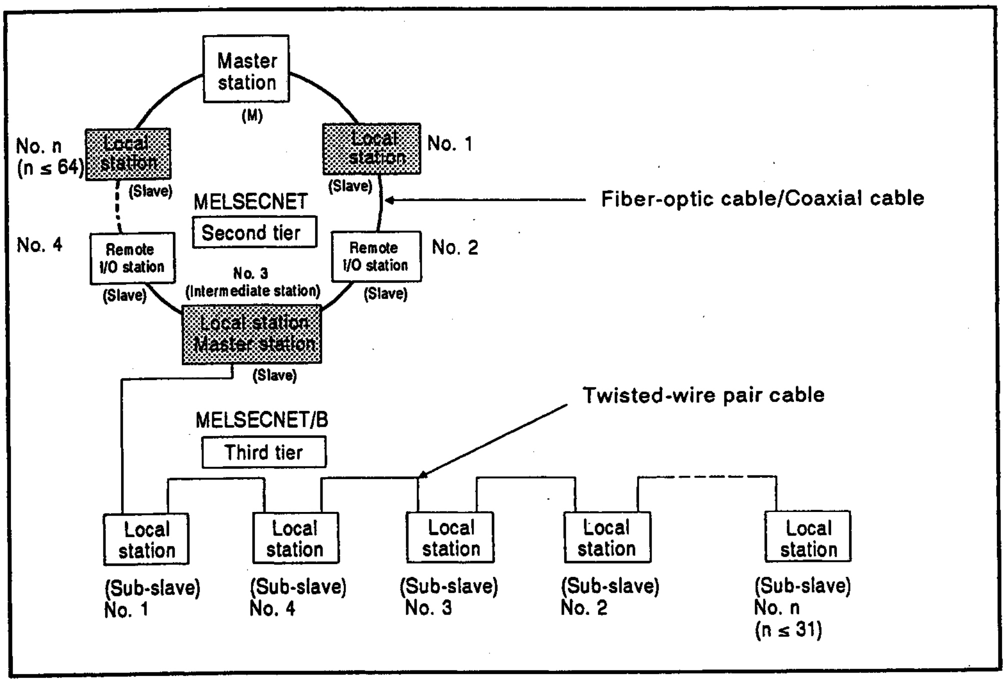


Fig. 4.3 Three-Tier System When the Second Tier is a MELSECNET Data Link System

POINTS

(1) Remote I/O stations cannot be connected to a MELSECNET/B Data Link System.

(2) The order of all stations (including master stations) can be freely designated in a MELSECNET/B Data Link System.

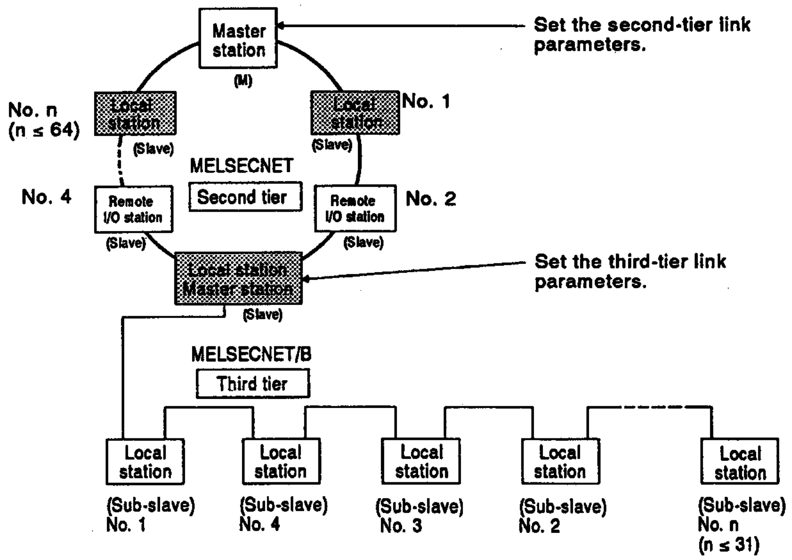
4.2.2 Precautions when using data links

This section explains the precautions to take when making a three-tier system.

(1) Setting link parameters

In a three-tier system, it is necessary to set link parameters at both CPU modules in the master stations for the second and third tiers.

Sections 5.3.7 and chapter 7 give details about setting link parameters.

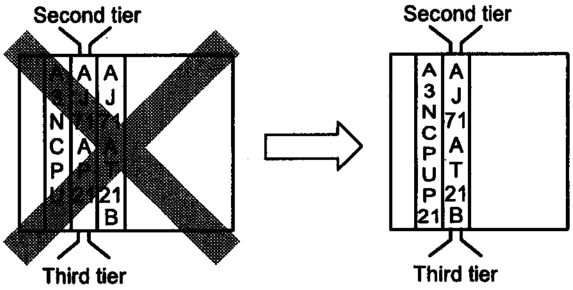


(2) Limitations on use of link modules

(a) When the CPU module is other than AnUCPU, A2ASCPU(S1), A2USHCPU-S1, QnACPU and Q2AS(H)CPU(S1)

Only one of the following link modules can be used with a single CPU module. When constructing a three-tier system, use the CPU module having a link function with any of the following link modules.

- AJ71AP21
- AJ71AP21-S3
- A1SJ71AP21
- AJ71AR21
- A1SJ71AR21
- AJ71AT21B
- A1SJ71AT21B



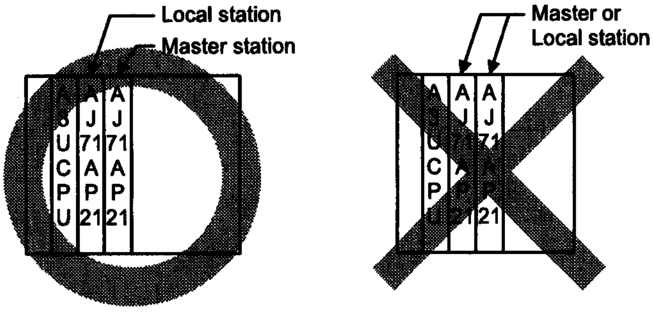
(b) When the CPU module is any of the AnUCPU, A2ASCPU(S1), A2USHCPU-S1, QnACPU, and Q2AS(H)CPU(S1)

A total of up to two of the following modules can be used with a single CPU module, one as a master station and the other as a local station.

(Two modules cannot be used as master stations or local stations.)

[For local station]
- AJ71AP21
- AJ71AP21-S3
- A1SJ71AP21
- AJ71AR21
- A1SJ71AR21

[For master station]
- AJ71AT21B
- A1SJ71AT21B



4.2.3 System devices

Table 4.2 Link Modules Which Can be Used in a Three-Tier System

O: Available

Article Name	Type of Module	Applicable System																Remarks
		MELSECNET Data Links								MELSECNET/B Data Links								
		Second Tier								Third Tier								
		MELSECNET Mode			MELSECNET II Mode		MELSECNET II Composite Mode			MELSECNET Mode			MELSECNET II Mode		MELSECNET II Composite Mode			
		M station	L station	R station	M station	L station	M station	L station	R station	L/m station	ℓ station	r station	L/m station	ℓ station	L/m station	ℓ station	r station	
CPU module with a link function	A0J2HCPUP21	O	O					O										These cannot be used as a master station for the third tier.
	A0J2HCPUR21																	
	A2CCPUP21																	
	A2CCPUR21																	
	A1NCPUP21	O	O					O										Use the station number setting switch to set the selection of master and local stations.
	A1NCPUP21-S3																	
	A1NCPUR21																	
	A2NCPUP21																	
	A2NCPUP21-S3																	
	A2NCPUR21																	
	A2NCPUP21-S1																	
	A2NCPUP21-S4																	
	A2NCPUR21-S1																	
	A3NCPUP21																	
	A3NCPUP21-S3																	
	A3NCPUR21																	
	A2ACPUP21	O	O		O	O	O	O										
	A2ACPUP21-S3																	
	A2ACPUR21																	
	A2ACPUP21-S1																	
	A2ACPUP21-S4																	
	A2ACPUR21-S1																	
	A3ACPUP21																	
	A3ACPUP21-S3																	
	A3ACPUR21																	

Table 4.2 Link Modules Which Can be Used in a Three-Tier System

O: Available

Article Name	Type of Module		Applicable System																Remarks
			MELSECNET Data Links								MELSECNET/B Data Links								
			Second Tier								Third Tier								
			MELSECNET Mode			MELSECNET II Mode		MELSECNET II Composite Mode			MELSECNET Mode			MELSECNET II Mode		MELSECNET II Composite Mode			
			M station	L station	R station	M station	L station	M station	L station	R station	L/m station	ℓ station	r station	L/m station	ℓ station	L/m station	ℓ station	r station	
CPU module + link module	A0J2HCPU	AJ71AP21 /R21 AJ71AP21 -S3	O	O					O										
	A1NCPU																		
	A2NCPU																		
	A2NCPU-S1																		
	A3NCPU																		
	A2ACPU		O	O		O	O	O	O										Use the station number setting switch to set the selection of master and local stations.
	A2ACPU-S1																		
	A3ACPU																		
	A2UCPU																		
	A2UCPU-S1																		
	A3UCPU																		
	A4UCPU																		
	Q2ACPU																		
	Q2ACPU-S1																		
	Q3ACPU																		
	Q4ACPU																		
	A1SJHCPU	A1SJ71 AT21B										O					O		
	A1SHCPU																		
	A2SHCPU																		
	A1NCPU	AJ71 AT21B																	
	A2NCPU																		
	A2NCPU-S1																		
	A3NCPU																		
	A2ASCPU	A1SJ71 AT21B										O			O		O		Use the station number setting switch to set the selection of master and local stations.
	A2ASCPU-S1																		
	A2USHCPU-S1																		
	Q2ASCPU																		
	Q2ASCPU-S1																		
	Q2ASHCPU																		
	Q2ASHCPU-S1																		
	A2ACPU	AJ71 AT21B																	
	A2ACPU-S1																		
	A3ACPU																		
	A2UCPU																		
	A2UCPU-S1																		
	A3UCPU																		
	A4UCPU																		
	Q2ACPU																		
	Q2ACPU-S1																		
	Q3ACPU																		
	Q4ACPU																		

Table 4.2 Link Modules Which Can be Used in a Three-Tier System

O: Available

Article Name	Type of Module		Applicable System																Remarks
			MELSECNET Data Links								MELSECNET/B Data Links								
			Second Tier								Third Tier								
			MELSECNET Mode			MELSECNET II Mode		MELSECNET II Composite Mode			MELSECNET Mode			MELSECNET II Mode		MELSECNET II Composite Mode			
			M station	L station	R station	M station	L station	M station	L station	R station	L/m station	ℓ station	r station	L/m station	ℓ station	L/m station	ℓ station	r station	
Data Link Module	A0J2P25				○					○									
	A0J2P25-S3																		
	A0J2R25																		
	AJ72P25																		
	AJ72R25																		
	A1SJ72T25B												○					○	
	AJ72T25B																		
CPU module having link function + link module	A1NCPUP21	AJ71AT21B									*1 ○								Use the station number setting switch to set the selection of master and local stations.
	A1NCPUP21-S3																		
	A1NCPUR21																		
	A2NCPUP21																		
	A2NCPUP21-S3																		
	A2NCPUR21																		
	A2NCPUP21-S1																		
	A2NCPUP21-S4																		
	A2NCPUR21-S1																		
	A3NCPUP21																		
	A3NCPUP21-S3																		
	A3NCPUR21																		
	A2ACPUP21	AJ71AT21B									*2 ○			*2 ○		*2 ○			
	A2ACPUR21																		
	A2ACPUP21-S1																		
	A2ACPUR21-S1																		
	A3ACPUP21																		
	A3ACPUR21																		
CPU module having link function + link module (two modules)	A2ASCPU +A1SJ71AP21	A1SJ71AT21B									*2 ○			*2 *3 ○		*2 *3 ○			
	A2ASCPU +A1SJ71AR21																		
	A2ASCPU-S1 +A1SJ71AP21																		
	A2ASCPU-S1 +A1SJ71AR21																		
	A2USHCPU-S1 +A1SJ71AP21																		
	A2USHCPU-S1 +A1SJ71AR21																		
	Q2ASCPU +A1SJ71AP21																		
	Q2ASCPU +A1SJ71AR21																		
	Q2ACPU-S1 +A1SJ71AP21																		
	Q2ACPU-S1 +A1SJ71AR21																		

*1: The second tier can be used in the MELSECNET or MELSECNET II composite mode.

*2: The second tier can be used in the MELSECNET, MELSECNET II or MELSECNET II composite mode.

*3: Applicable when the A1SJ71AT21B is used.

Table 4.2 Link Modules Which Can be Used in a Three-Tier System

O: Available

Article Name	Type of Module		Applicable System																Remarks
			MELSECNET Data Links								MELSECNET/B Data Links								
			Second Tier								Third Tier								
			MELSECNET Mode			MELSECNET II Mode		MELSECNET II Composite Mode			MELSECNET Mode			MELSECNET II Mode		MELSECNET II Composite Mode			
			M station	L station	R station	M station	L station	M station	L station	R station	L/m station	ℓ station	r station	L/m station	ℓ station	L/m station	ℓ station	r station	
CPU module having link function + link module (two modules)	Q2ASHCPU +A1SJ71AP21	A1SJ71 AT21B									*2 O			*2 *3 O		*2 *3 O			Use the station number setting switch to set the selection of master and local stations.
	Q2ASHCPU +A1SJ71AR21																		
	Q2ASHCPU-S1 +A1SJ71AP21																		
	Q2ASHCPU-S1 +A1SJ71AR21																		
	A2UCPU +AJ71AP21(S3)	AJ71 AT21B									*1 O			*1 O		*1 O			
	A2UCPU +AJ71AR21																		
	A2UCPU-S1 +AJ71AP21(S3)																		
	A2UCPU-S1 +AJ71AR21																		
	A3UCPU +AJ71AP21(S3)																		
	A3UCPU +AJ71AR21																		
	A4UCPU +AJ71AP21(S3)																		
	A4UCPU +AJ71AR21																		
	Q2ACPU +AJ71AP21(S3)																		
	Q2ACPU +AJ71AR21																		
	Q2ACPU-S1 +AJ71AP21(S3)																		
	Q2ACPU-S1 +AJ71AR21																		
	Q3ACPU +AJ71AP21(S3)																		
	Q3ACPU +AJ71AR21																		
	Q4ACPU +AJ71AP21(S3)																		
	Q4ACPU +AJ71AR21																		

*1: The second tier can be used in the MELSECNET or MELSECNET II composite mode.

*2: The second tier can be used in the MELSECNET, MELSECNET II or MELSECNET II composite mode.

*3: Applicable when the A1SJ71AT21B is used.

4.3 Data Link System When the Second Tier is MELSECNET/B and the Third Tier is MELSECNET

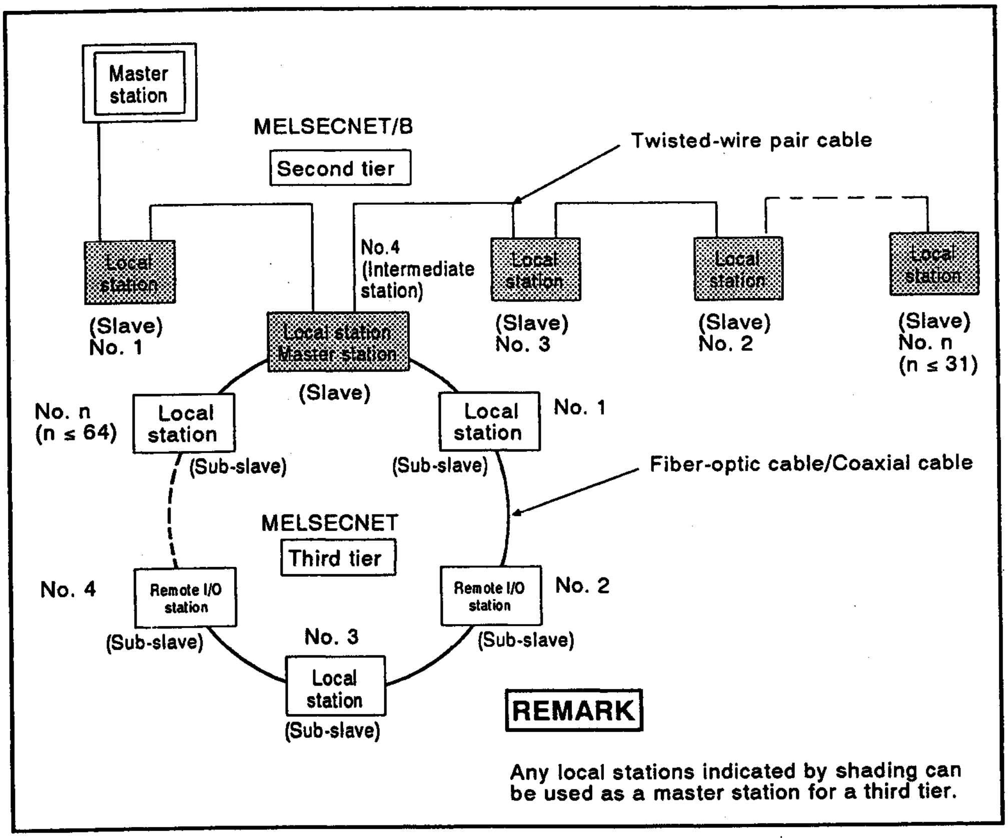
When the second tier is a MELSECNET/B Data Link System and the third tier is a MELSECNET Data Link System, the second tier is connected by twisted-wire pair cables, and the third tier is connected by fiber-optic cables or coaxial cables.

(1) Up to 31 local stations can be connected to a master station for the second tier.

(2) Up to 31 local stations can be connected in the third tier when a second-tier local station is used as the master station for the third tier.

4.3.1 System configuration

Fig. 4.4 shows the configuration of a three-tier system.



REMARK

Any local stations indicated by shading can be used as a master station for a third tier.

Fig. 4.4 Three-Tier System When the Second Tier is a MELSECNET/B Data Link System

POINTS

(1) Remote I/O stations cannot be connected to a MELSECNET/B Data Link System.

(2) The order of all stations (including master stations) can be freely designated in a MELSECNET/B Data Link System.

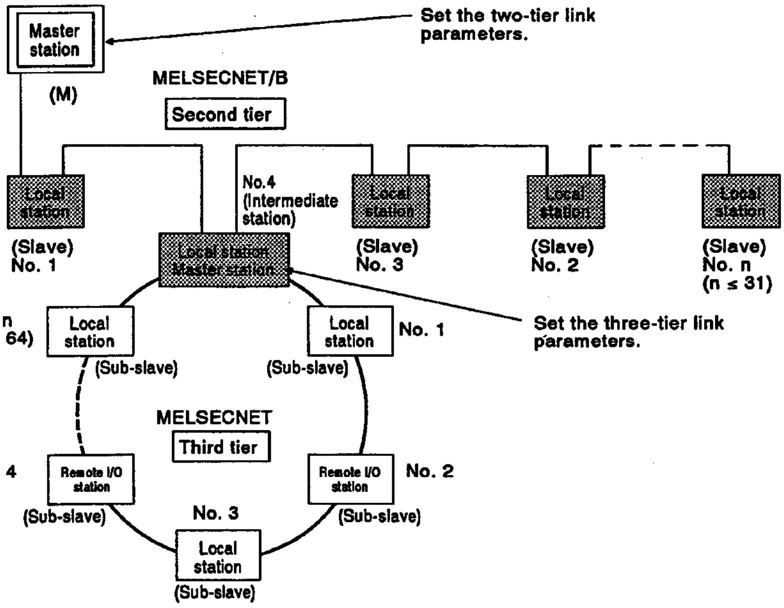
4.3.2 Precautions when using data link

This section explains the precautions to take when making a three-tier system.

(1) Setting link parameters

In a three-tier system, it is necessary to set link parameters at both CPU modules in the master stations for the second and third tiers.

Sections 5.3.7 and 7 give details about setting link parameter settings.

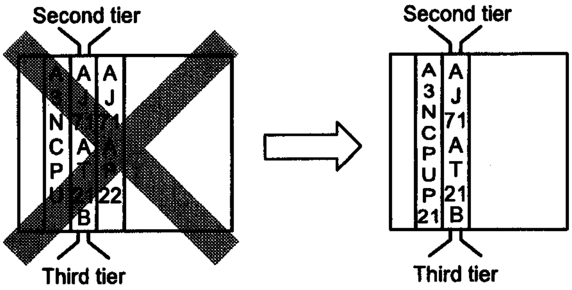


(2) Limitations on use of link modules

(a) When the CPU module is other than AnUCPU, A2ASCPU(S1), A2USHCPU-S1, QnACPU and Q2AS(H)CPU(S1)

Only one of the following link modules can be used with a single CPU module. When constructing a three-tier system, use the CPU module having a link function with any of the following link modules.

- AJ71AP21
- AJ71AP21-S3
- A1SJ71AP21
- AJ71AR21
- A1SJ71AR21
- AJ71AT21B
- A1SJ71AT21B



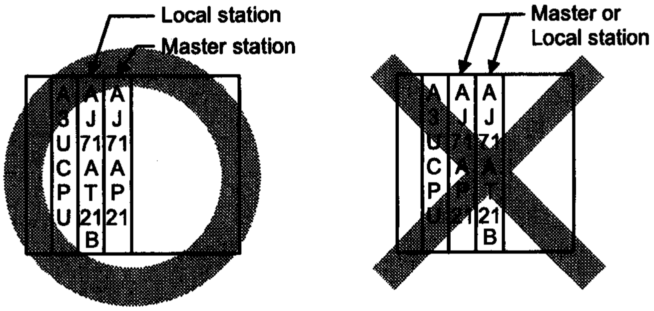
(b) When the CPU module is any of the AnUCPU, A2ASCPU(S1), A2USHCPU-S1, QnACPU, and Q2AS(H)CPU(S1)

A total of up to two of the following modules can be used with a single CPU module, one as a master station and the other as a local station.

(Two modules cannot be used as master stations or local stations.)

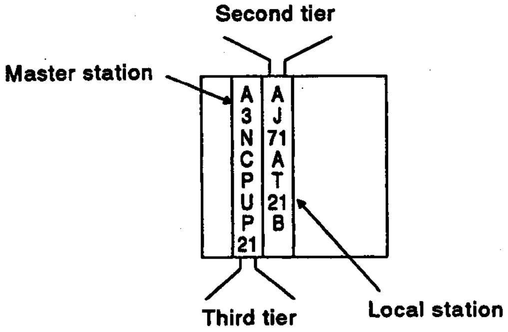
[For local station]
- AJ71AP21
- AJ71AP21-S3
- A1SJ71AP21
- AJ71AR21
- A1SJ71AR21

[For master station]
- AJ71AT21B
- A1SJ71AT21B



(3) When a CPU module with a link function is used as a master station

In a three-tier system where a CPU module with a link function and an AJ71AT21B are used together, the CPU module with a link function can be used as a master station for the third tier and the AJ71AT21B can be used as a local station for the second tier.



An A[ ]ACPUP21/R21 whose model is as given below (or is later) can be used as a master station for the third tier.

POINTS

CPU modules with a link function which are older than the following cannot be used in a three-tier system whose second tier is a MELSECNET Data Link System and third tier is a MELSECNET/B Data Link System.

CPU Modules With a Link Function	Version
A2ACPUP21	107CX
A2ACPUR21	107BX
A2ACPUP21-S1	107BY
A2ACPUR21-S1	107BY
A3ACPUP21	107CZ
A3ACPUR21	107BZ

4.3.3 System devices

Table 4.3 Link Modules Which Can be Used in a Three-Tier System

○: Available

Article Name	Type of Module	Applicable System																Remarks
		MELSECNET/B Data Links								MELSECNET Data Links								
		Second Tier								Third Tier								
		MELSECNET Mode			MELSECNET II Mode		MELSECNET II Composite Mode			MELSECNET Mode			MELSECNET II Mode		MELSECNET II Composite Mode			
		M station	L station	R station	M station	L station	M station	L station	R station	L/m station	ℓ station	r station	L/m station	ℓ station	L/m station	ℓ station	r station	
CPU module with a link function	A0J2HCPUP21										○					○		These cannot be used as a master station for the third tier.
	A0J2HCPUR21																	
	A2CCPUP21																	
	A2CCPUR21																	
	A1NCPUP21									○	○					○		Use the station number setting switch to set the selection of master and local stations.
	A1NCPUP21-S3																	
	A1NCPUR21																	
	A2NCPUP21																	
	A2NCPUP21-S3																	
	A2NCPUR21																	
	A2NCPUP21-S1																	
	A2NCPUP21-S4																	
	A2NCPUR21-S1																	
	A3NCPUP21																	
	A3NCPUP21-S3																	
	A3NCPUR21																	
	A2ACPUP21									○	○		○	○	○	○		
	A2ACPUP21-S3																	
	A2ACPUR21																	
	A2ACPUP21-S1																	
	A2ACPUP21-S4																	
	A2ACPUR21-S1																	
	A3ACPUP21																	
	A3ACPUP21-S3																	
	A3ACPUR21																	

Table 4.3 Link Modules Which Can be Used in a Three-Tier System

O: Available

Article Name	Type of Module		Applicable System																Remarks
			MELSECNET/B Data Links								MELSECNET Data Links								
			Second Tier								Third Tier								
			MELSECNET Mode			MELSECNET II Mode		MELSECNET II Composite Mode			MELSECNET Mode			MELSECNET II Mode		MELSECNET II Composite Mode			
			M station	L station	R station	M station	L station	M station	L station	R station	L/m station	ℓ station	r station	L/m station	ℓ station	L/m station	ℓ station	r station	
CPU module + link module	A1NCPU	AJ71 AP21/R21 AJ71 AP21-S3										O					O		
	A2NCPU																		
	A2NCPU-S1																		
	A3NCPU																		
	A2ACPU	AJ71 AP21/R21 AJ71 AP21-S3										O			O		O		Use the station number setting switch to set the selection of master and local stations.
	A2ACPU-S1																		
	A3ACPU																		
	A2UCPU																		
	A2UCPU-S1																		
	A3UCPU																		
	A4UCPU																		
	Q2ACPU																		
	Q2ACPU-S1																		
	Q3ACPU																		
	Q4ACPU																		
	A1SJHCPU	A1SJ71 AT21B	O	O					O										
	A1SHCPU																		
	A2SHCPU																		
	A2ASCPU																		
	A2ASCPU-S1																		
	A2USHCPU-S1																		
	Q2ASCPU																		
	Q2ASCPU-S1																		
	Q2ASHCPU																		
	Q2ASHCPU-S1																		
	A1NCPU	AJ71 AT21B	O	O					O										Use the station number setting switch to set the selection of master and local stations.
	A2NCPU																		
	A2NCPU-S1																		
	A3NCPU																		
	A2ACPU	AJ71 AT21B	O	O		O	O	O	O										To be loaded into an I/O slot in the base unit.
	A2ACPU-S1																		
	A3ACPU																		
	A2UCPU																		
	A2UCPU-S1																		
	A3UCPU																		
	A4UCPU																		
	Q2ACPU																		
	Q2ACPU-S1																		
	Q3ACPU																		
	Q4ACPU																		
Data Link Module	A0J2P25												O					O	
	A0J2P25-S3																		
	A0J2R25																		
	AJ72P25																		
	AJ72R25																		
	A1SJ72T25B				O					O									
	AJ72T25B																		

Table 4.3 Link Modules Which Can be Used in a Three-Tier System

O: Available

Article Name	Type of Module		Applicable System																Remarks
			MELSECNET/B Data Links								MELSECNET Data Links								
			Second Tier								Third Tier								
			MELSECNET Mode			MELSECNET II Mode		MELSECNET II Composite Mode			MELSECNET Mode			MELSECNET II Mode		MELSECNET II Composite Mode			
			M station	L station	R station	M station	L station	M station	L station	R station	L/m station	ℓ station	r station	L/m station	ℓ station	L/m station	ℓ station	r station	
CPU module having link function + link module	A1NCPUP21	AJ71AT21B									*1 O								Use the station number setting switch to set the selection of master and local stations.
	A1NCPUP21-S3																		
	A1NCPUR21																		
	A2NCPUP21																		
	A2NCPUP21-S3																		
	A2NCPUR21																		
	A2NCPUP21-S1																		
	A2NCPUP21-S4																		
	A2NCPUR21-S1																		
	A3NCPUP21																		
	A3NCPUP21-S3																		
	A3NCPUR21																		
	A2ACPUP21	AJ71AT21B									*2 O			*2 O		*2 O			
	A2ACPUP21-S3																		
	A2ACPUR21																		
	A2ACPUP21-S1																		
	A2ACPUP21-S4																		
	A2ACPUR21-S1																		
	A3ACPUP21																		
	A3ACPUP21-S3																		
	A3ACPUR21																		
CPU module having link function + link module (two modules)	A2ASCPU +A1SJ71AP21	A1SJ71AT21B									*2 O			*2 *3 O		*2 *3 O			Use the station number setting switch to set the selection of master and local stations.
	A2ASCPU +A1SJ71AR21																		
	A2ACPU-S1 +A1SJ71AP21																		
	A2ACPU-S1 +A1SJ71AR21																		
	A2USHCPU-S1 +A1SJ71AP21																		
	A2USHCPU-S1 +A1SJ71AR21																		
	Q2ASCPU +A1SJ71AP21																		
	Q2ASCPU +A1SJ71AR21																		
	Q2ASCPU-S1 +A1SJ71AP21																		
	Q2ASCPU-S1 +A1SJ71AR21																		
	Q2ASHCPU +A1SJ71AP21																		
	Q2ASHCPU +A1SJ71AR21																		
	Q2ASHCPU-S1 +A1SJ71AP21																		
	Q2ASHCPU-S1 +A1SJ71AR21																		

*1: The second tier can be used in the MELSECNET or MELSECNET II composite mode.

*2: The second tier can be used in the MELSECNET, MELSECNET II or MELSECNET II composite mode.

*3: Applicable when the A1SJ71AT21B is used.

Table 4.3 Link Modules Which Can be Used in a Three-Tier System

O: Available

Article Name	Type of Module		Applicable System																Remarks
			MELSECNET/B Data Links								MELSECNET Data Links								
			Second Tier								Third Tier								
			MELSECNET Mode			MELSECNET II Mode		MELSECNET II Composite Mode			MELSECNET Mode			MELSECNET II Mode		MELSECNET II Composite Mode			
			M station	L station	R station	M station	L station	M station	L station	R station	L/m station	ℓ station	r station	L/m station	ℓ station	L/m station	ℓ station	r station	
CPU module having link function + link module (two modules)	A2UCPU +AJ71AP21(S3)	AJ71 AT21B									*1 O			*1 O		*1 O			Use the station number setting switch to set the selection of master and local stations.
	A2UCPU +AJ71AR21																		
	A2UCPU-S1 +AJ71AP21(S3)																		
	A2UCPU-S1 +AJ71AR21																		
	A3UCPU +AJ71AP21(S3)																		
	A3UCPU +AJ71AR21																		
	A4UCPU +AJ71AP21(S3)																		
	A4UCPU +AJ71AR21																		
	Q2ACPU +AJ71AP21(S3)																		
	Q2ACPU +AJ71AR21																		
	Q2ACPU-S1 +AJ71AP21(S3)																		
	Q2ACPU-S1 +AJ71AR21																		
	Q3ACPU +AJ71AP21(S3)																		
	Q3ACPU +AJ71AR21																		
	Q4ACPU +AJ71AP21(S3)																		
	Q4ACPU +AJ71AR21																		

*1: The second tier can be used in the MELSECNET, MELSECNET II or MELSECNET II composite mode.

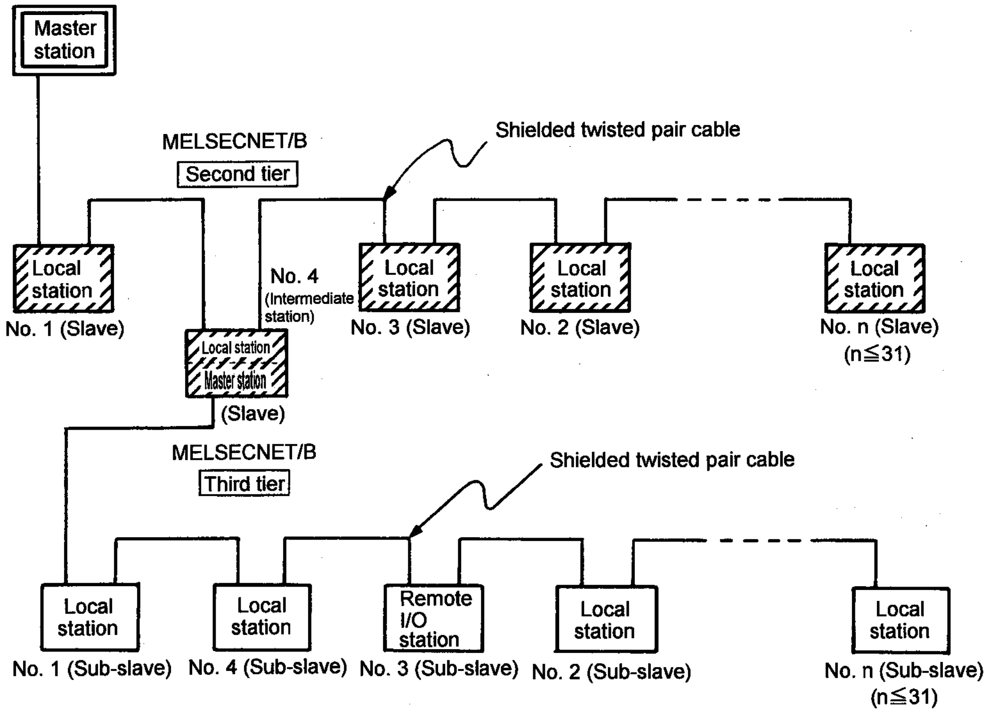
4.4 Using the MELSECNET/B Data Link System to Make a Three-Tier System

When both the second and third tiers are the MELSECNET/B Data Link Systems, connect the second and third tiers by shielded twisted pair cables.

(a) Up to 31 local and remote I/O stations can be connected to a master station for the second tier.
(b) Up to 31 local and remote I/O stations can be connected in the third tier when a second-tier local station is used as the master station for the third tier.

4.4.1 System configuration

Fig. 4.5 shows the configuration of a three-tier system.



REMARK

Any of the local stations indicated by shading can be used as a master station for a third tier.

Fig. 4.5 Three-Tier System Consisting of MELSECNET/B Data Link Systems

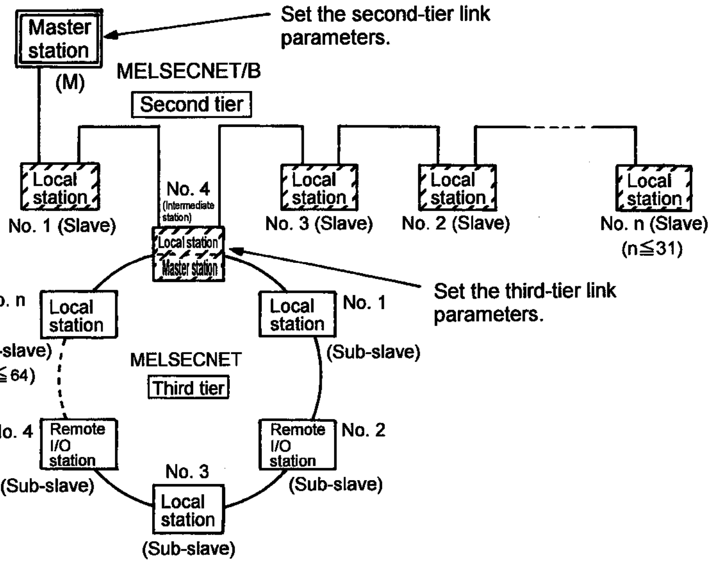
POINTS

(1) In the MELSECNET II mode, remote I/O stations cannot be connected.
(2) In the MELSECNET/B Data Link System, there are no specific order for stations including master stations.

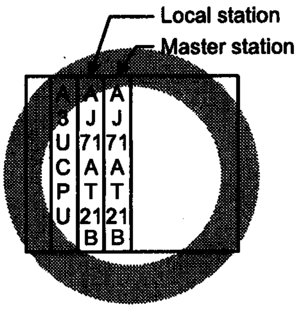
4.4.2 Precautions for using data links

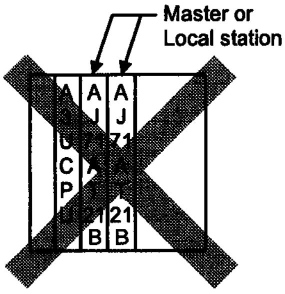
This section explains the precautions for a three-tier system.

(1) Setting link parameters
In a three-tier system, it is necessary to set link parameters at both CPU modules in the master stations for the second and third tiers.
Refer to Section 5.3.7 and Chapter 7 for link parameter settings.



(2) Limitations on use of link modules
A total of up to two of the following modules can be used with a single CPU module, one as a master station and the other as a local station.
(Two modules cannot be used as master stations or local stations.)
- AJ71AT21B
- A1SJ71AT21B





4.4.3 System devices

Table 4.4 Link Modules Which Can be Used in a Three-Tier System

O: Available

Article Name	Type of Module		Applicable System																Remarks
			MELSECNET/B Data Links																
			Second Tier								Third Tier								
			MELSECNET Mode			MELSEC NET II Mode		MELSECNET II Composite Mode			MELSECNET Mode			MELSEC NET II Mode		MELSECNET II Composite Mode			
			M station	L station	R station	M station	L station	M station	L station	R station	L/m station	ℓ station	r station	L/m station	ℓ station	L/m station	ℓ station	r station	
CPU module + link module	A1SJHCPU	A1SJ71AT21B	O	O					O			O					O		
	A1SHCPU																		
	A2SHCPU																		
	A1NCPU	AJ71AT21B																	
	A2NCPU																		
	A2NCPU-S1																		
	A3NCPU																		
	A2ASCPU	A1SJ71AT21B	O	O		O	O	O	O			O			O		O		Use the station number setting switch to set the selection of master and local stations. To be loaded into an I/O slot in the base unit.
	A2ASCPU-S1																		
	A2USHCPU-S1																		
	Q2ASCPU																		
	Q2ASCPU-S1																		
	Q2ASHCPU																		
	Q2ASHCPU-S1																		
	A2ACPU	AJ71AT21B																	
	A2ACPU-S1																		
	A3ACPU																		
	A2UCPU																		
	A2UCPU-S1																		
	A3UCPU																		
	A4UCPU																		
	Q2ACPU																		
	Q2ACPU-S1																		
	Q3ACPU																		
	Q4ACPU																		
Data Link Module	A1SJ71T25B				O					O			O					O	
	AJ72T25B																		

REMARK

1) The L/m, ℓ and r stations in Table 4.4 indicate the following stations.
   - a) L/m station ······· Master station
   - b) ℓ station ·········· Local station
   - c) r station ·········· Remote I/O station

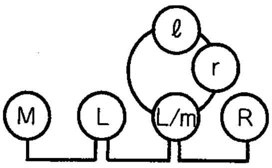


Table 4.4 Link Modules Which Can be Used in a Three-Tier System

○: Available

Article Name	Type of Module		Applicable System																Remarks
			MELSECNET/B Data Links																
			Second Tier								Third Tier								
			MELSECNET Mode			MELSECNET II Mode		MELSECNET II Composite Mode			MELSECNET Mode			MELSECNET II Mode		MELSECNET II Composite Mode			
			M station	L station	R station	M station	L station	M station	L station	R station	L/m station	ℓ station	r station	L/m station	ℓ station	L/m station	ℓ station	r station	
CPU module having link function + link module (two modules)	A2ASCPU +A1SJ71AT21B	A1SJ71 AT21B									○			*1 ○		*1 ○			Use the station number setting switch to set the selection of master and local stations. To be loaded into an I/O slot in the base unit.
	A2ASCPU-S1 +A1SJ71AT21B																		
	A2USHCPU-S1 +A1SJ71AT21B																		
	Q2ASCPU +A1SJ71AT21B																		
	Q2ACPU-S1 +A1SJ71AT21B																		
	Q2ASHCPU +A1SJ71AT21B																		
	Q2ASHCPU-S1 +A1SJ71AT21B																		
	A2UCPU +AJ71AT21B	AJ71 AT21B									○			○		*2 ○			
	A2UCPU-S1 +AJ71AT21B																		
	A3UCPU +AJ71AT21B																		
	A4UCPU +AJ71AT21B																		
	Q2ACPU +AJ71AT21B																		
	Q2ACPU-S1 +AJ71AT21B																		
	Q3ACPU +AJ71AT21B																		
	Q4ACPU +AJ71AT21B																		

*1: Applicable when the A1SJ71AT21B is used.

*2: The second tier can be used in the MELSECNET, MELSECNET II or MELSECNET II composite mode.

5. SPECIFICATIONS

This chapter describes the general specifications of the Data Link Systems and the performance specifications and functions of the link modules.

5.1 General Specifications

This section indicates the general specifications of the Data Link Systems.

Table 5.1 General Specifications

<table>
<tr><th>Item</th><th colspan="6">Specifications</th></tr>
<tr><td>Operating ambient temperature</td><td colspan="6">0 to 55°C</td></tr>
<tr><td>Storage ambient temperature</td><td colspan="6">-20 to 75°C</td></tr>
<tr><td>Operating ambient humidity</td><td colspan="6">10 to 90%RH, non-condensing</td></tr>
<tr><td>Storage ambient humidity</td><td colspan="6">10 to 90%RH, non-condensing</td></tr>
<tr><td rowspan="5">Vibration resistance</td><td rowspan="5">Conforming to JIS B 3502, IEC 61131-2</td><td></td><td>Frequency</td><td>Acceleration</td><td>Amplitude</td><td>Sweep count</td></tr>
<tr><td rowspan="2">Under intermittent vibration</td><td>10 to 57Hz</td><td>——</td><td>0.075mm (0.003in.)</td><td rowspan="4">10 times each in X, Y, Z directions (for 80 min.)</td></tr>
<tr><td>57 to 150Hz</td><td>9.8m/s²</td><td>——</td></tr>
<tr><td rowspan="2">Under continuous vibration</td><td>10 to 57Hz</td><td>——</td><td>0.035mm (0.001in.)</td></tr>
<tr><td>57 to 150Hz</td><td>4.9m/s²</td><td>——</td></tr>
<tr><td>Shock resistance</td><td colspan="6">Conforming to JIS B 3502, IEC 61131-2 (147 m/s², 3 times in each of 3 directions X, Y, Z)</td></tr>
<tr><td>Operating ambience</td><td colspan="6">No corrosive gases</td></tr>
<tr><td>Operating altitude</td><td colspan="6">2000m (6562ft.) max.</td></tr>
<tr><td>Installation location</td><td colspan="6">Inside control panel</td></tr>
<tr><td>Overvoltage category ∗1</td><td colspan="6">II max.</td></tr>
<tr><td>Pollution degree ∗2</td><td colspan="6">2 max.</td></tr>
</table>

∗1 : This indicates the section of the power supply to which the equipment is assumed to be connected between the public electrical power distribution network and the machinery within premises. Category II applies to equipment for which electrical power is supplied from fixed facilities.
The surge voltage withstand level for up to the rated voltage of 300 V is 2500 V.

∗2 : This index indicates the degree to which conductive material is generated in terms of the environment in which the equipment is used.
Pollution level 2 means only non-conductive pollution occurs. A temporary conductivity caused by condensing must be expected occasionally.

∗3 : Do not use or store the PLC under pressure higher than the atmospheric pressure of altitude 0m. Doing so can cause a malfunction.
When using the PLC under pressure, please contact your sales representative.

5.2 Performance Specifications

Table 5.2 gives the performance specifications of the MELSECNET and MELSECNET/B Data Link Systems.

Table 5.2 MELSECNET and MELSECNET/B Performance Specifications

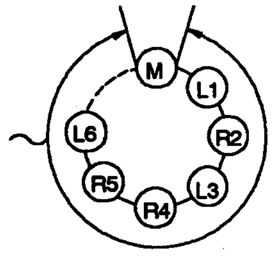
Item		MELSECNET Data Link System		
		Fiber-Optic Cable Data Link		
		MELSECNET Mode	MELSECNET II Mode	MELSECNET II Composite Mode
Max. number of link points used per station	Input (X)	Up to the maximum number of master station CPU module I/O points used *3 (Total number of slave station link points) = (Max.number of usable master station link points)		
	Output (Y)			
Max. number of link points in one system	B	1024 points (128 bytes)	4096 points (512 bytes)	
	W	1024 points	4096 points (8192 bytes)	
Max. number of link points per station	Master station	1024 bytes	1024 bytes (link parameters; first half)	
	Local station		1024 bytes (link parameters; second half)	
	Remote I/O station	512 bytes Number of I/O points: 512 points	—	512 bytes Number of I/O points: 512 points
System's allowable momentary power failure time		Within 20 msec		
Communication speed		1.25M bps		
Communications method		Half-duplex bit serial		
Synchronous method		Frame synchronous		
Transmission path method		Duplex loop		
Overall loop distance *1		For SI cable: Max. 10 km (32810 ft) (1 km (3281 ft) station intervals) For GI cable: Max. 10 km (32810 ft) (2 km (6562 ft) station intervals)		
Number of connectable stations		Max. 65 stations/loop (1 master station, 64 local/remote I/O stations)		
Demodulation method		CMI		
Transmission format		Conforms to HDLC (frame method)		
Error control system		Retry due to CRC (generating polynomial $X^{16} + X^{12} + X^5 + 1$) and time over		
RAS function		The loopback function checks error detection and cable breakage. The diagnostic function checks the self link line		
Connector		For SI cable: Two-core optical plug (CA9003) For GI cable: Two-core optical plug (CA9003S)		
Cable used		SI-200/250, GI-50/125		
Transmission loss		SI: Max. 12dB/km GI: Max. 3dB/km		
Sending level		SI: -17 to -11 dBm (peak value) GI: -17 to -10 dBm (peak value)		
Receiving level		SI: -32 to -11 dBm (peak value) GI: -29 to -10 dBm (peak value)		

REMARK

*1: Overall distances

- MELSECNET :Distance from the sending port of a master station to the receiving port of the same master station via slave stations.
- MELSECNET/B :Distance between the farthest link modules.

Overall distance



MELSECNET

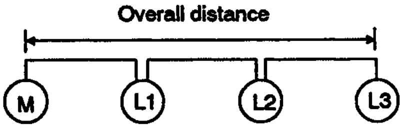


Table 5.2 MELSECNET and MELSECNET/B Performance Specifications (Continued)

MELSECNET Data Link System			MELSECNET/B Data Link System		
Coaxial Cable Data Link			Shielded Twisted-Wire Pair Data Link System		
MELSECNET Mode	MELSECNET II Mode	MELSECNET II Composite Mode	MELSECNET Mode	MELSECNET II Mode	MELSECNET II Composite Mode
Up to the maximum number of master station CPU module I/O points used [*2] (Total number of slave station link points) = (Max.number of usable master station link points)					
1024 points (128 bytes)	4096 points (512 bytes)		1024 points (128 bytes)	4096 points (512 bytes)	
1024 points (2048 bytes)	4096 points (8192 bytes)		1024 points (2048 bytes)	4096 points (8192 bytes)	
1024 bytes	1024 bytes (link parameters; first half) 1024 bytes (link parameters; second half)		1024 bytes	1024 bytes (link parameters; first half) 1024 bytes (link parameters; second half)	
512 bytes Number of I/O points: 512 points	—	512 bytes Number of I/O points: 512 points	512 bytes Number of I/O points: 512 points	—	512 bytes Number of I/O points: 512 points
Within 20/10 msec			20 msec		
1.25M bps			125K bps/250K bps/500K bps/1M bps		
Half-duplex bit serial					
Frame synchronous					
Duplex loop			Bus system		
Max. 10 km (32810 ft) (500 m (1640.5 ft) station intervals)			Varies depending on the communication speed (125K bps: 1200 m, 250K bps: 600 m, 500K bps: 400 m, 1M bps: 200 m)		
Max. 65 stations/loop (1 master station, 64 local/remote I/O stations)			Max. 32 stations/loop (1 master station, 31 local stations)		
CMI			NRZI method		
Conforms to HDLC (frame method)					
Retry due to CRC (generating polynomial $X^{16} + X^{12} + X^5 + 1$) and time over					
The loopback function checks error detection and cable breakage. The diagnostic function checks the self link line			The diagnostic function checks the self link line		
BNC-P-3-Ni, BNC-P-5, BNC-P-5DV-SA(01) equivalent			Terminal block		
3C-2V, 5C-2V equivalent			Shielded twisted-wire pair cable		
—			—		
—			—		
—			—		

*2: The A1SHCPU, A1SJHCPU, A2SHCPU, A2ASCPU(S1), A2USHCPU-S1, Q2ASCPU(S1), Q2ASHCPU(S1), A2UCPU(S1), A3UCPU, A4UCPU, Q2ACPU(S1), Q3ACPU, Q4ACPU or Q4ARCPU can use up to 2048 points.

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	○	○	○	○	○	○

5.3 Functions

Table 5.3 gives the functions of the MELSECNET and MELSECNET/B Data Link Systems.

Table 5.3 Data Link System Functions

Item	Description
	MELSECNET Data Link System
Cyclic transmission function	(1)The cyclic transmission function periodically communicates data between the master station and the slave stations (local station or remote I/O station). (2)Two pieces of data are required for the cyclic transmission function. One is the device that will be used for one-to-one communication between the master station and a local station, and the other is the device that will be used for communication between the master station and all local stations. (a) Devices used for one-to-one communication Inputs (X) and outputs (Y) are used for communication between the master station and a local station and the master station and a remote I/O station. (b) Devices used for communication between the master station and all local stations Link relays (B) and link registers (W) are used for communication between the master station and a local station or for communication between two local stations.
Transient transmission function	The transient transmission function executes communication upon receiving a request. (1)The master station executes an LRDP or LWTP instruction for read/write processing for the local station devices (T, C, D, W). (2)The master station executes an RFRP or RTOP instruction for read/write processing for the buffer memory area of a special function module loaded to a remote I/O station. (3)Access of a station from a device loaded in a PC CPU.
Automatic return function	If a local station or a remote I/O station is disconnected from the data link system due to a fault, this function automatically returns the disconnected station to the system when the normal operation state is restored.
Loopback function	Because of double configuration, if a cable breaks or a local or remote I/O station is disconnected from the system, the faulty loop or station is removed from the link so that the link is maintained with the normally operating stations.
Error detection	By reading the special relays and special registers, link errors are detected.
Self-diagnostic function	The self-diagnostic function checks link module hardware and link cables (fiber-optic cable/coaxial cable).
Extensive use of link relays (B) and link registers (W) in the three-tier system	(1)The range of link relays (B) and link registers (W) that can be used in a three-tier MELSECNET (II) Data Link System is as follows: MELSECNET mode : 1024 points (B/W0 to 3FF) MELSECNET II/MELSECNET II composite mode : 4096 points (B/W0 to FFF) (2)This function allows the use of the same device number in the third-tier loop if the available number of link relays and link registers in the third-tier loop is not sufficient.
MELSECNET mode/ MELSECNET II mode/ MELSECNET II composite mode	(1)The MELSECNET (II) Data Link System includes three different operation modes: MELSECNET mode, MELSECNET II mode, and MELSECNET II composite mode. (2)The operation mode should be selected to meet the data link module to be used. This feature allows data link for the entire MELSECNET II device range (B/W0 to FFF, 4096 points) while maintaining interchangeability with the conventional MELSECNET mode.

Description MELSECNET/B Data Link System	Reference Section
(1) The cyclic transmission function periodically communicates data between the master station and the slave stations (local station or remote I/O station). (2) Two pieces of data are required for the cyclic transmission function. One is the device that will be used for one-to-one communication between the master station and a local station, and the other is the device that will be used for communication between the master station and all local stations. (a) Devices used for one-to-one communication Inputs (X) and outputs (Y) are used for communication between the master station and a local station and the master station and a remote I/O station. (b) Devices used for communication between the master station and all local stations Link relays (B) and link registers (W) are used for communication between the master station and a local station or for communication between two local stations.	5.3.1
The transient transmission function executes communication upon receiving a request. (1) The master station executes an LRDP or LWTP instruction for read/write processing for the local station devices (T, C, D, W). (2) The master station executes an RFRP or RTOP instruction for read/write processing for the buffer memory area of a special function module loaded to a remote I/O station. (3) Access of a station from a device loaded in a PC CPU.	5.3.2
If a local station or a remote I/O station is disconnected from the data link system due to a fault, this function automatically returns the disconnected station to the system when the normal operation state is restored.	5.3.3
—	5.3.4
By reading the special relays and special registers, link errors are detected.	5.3.5
This function checks link module hardware and twisted-wire pair cables.	5.3.6
(1) The range of link relays (B) and link registers (W) that can be used in a three-tier MELSECNET (II) Data Link System is as follows: MELSECNET mode : 1024 points (B/W0 to 3FF) MELSECNET II/MELSECNET II composite mode : 4096 points (B/W0 to FFF) (2) This function allows the use of the same device number in the third-tier loop if the available number of link relays and link registers in the third-tier loop is not sufficient.	5.3.7
(1) The MELSECNET (II) Data Link System includes three different operation modes: MELSECNET mode, MELSECNET II mode, and MELSECNET II composite mode. (2) The operation mode should be selected to meet the data link module to be used. This feature allows data link for the entire MELSECNET II device range (B/W0 to FFF, 4096 points) while maintaining interchangeability with the conventional MELSECNET mode.	5.3.8

5.3.1 Cyclic transmission function

The cyclic transmission function periodically communicates data between the master station and the slave stations (local station or remote I/O station).

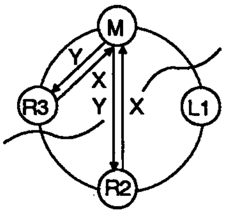
Two types of devices are required to execute the cyclic transmission function: devices (x = input, y = output) used for one-to-one communication between the master station and a local/remote I/O station and devices (B = link relays, W = link resistors) used for communication between the master station and all local stations.

(1) Devices used for one-to-one communication

Inputs (X) and outputs (Y) are used for communication between the master station and a local station and the master station and a remote I/O station.

(a) Communication between the master station and a remote I/O station

1) A master station receives ON/OFF data (inputs (X)) from an input module installed in a remote I/O station, and the master station outputs the operation results (outputs (Y)) (obtained by the master station sequence program) to the output module installed in the remote I/O station.



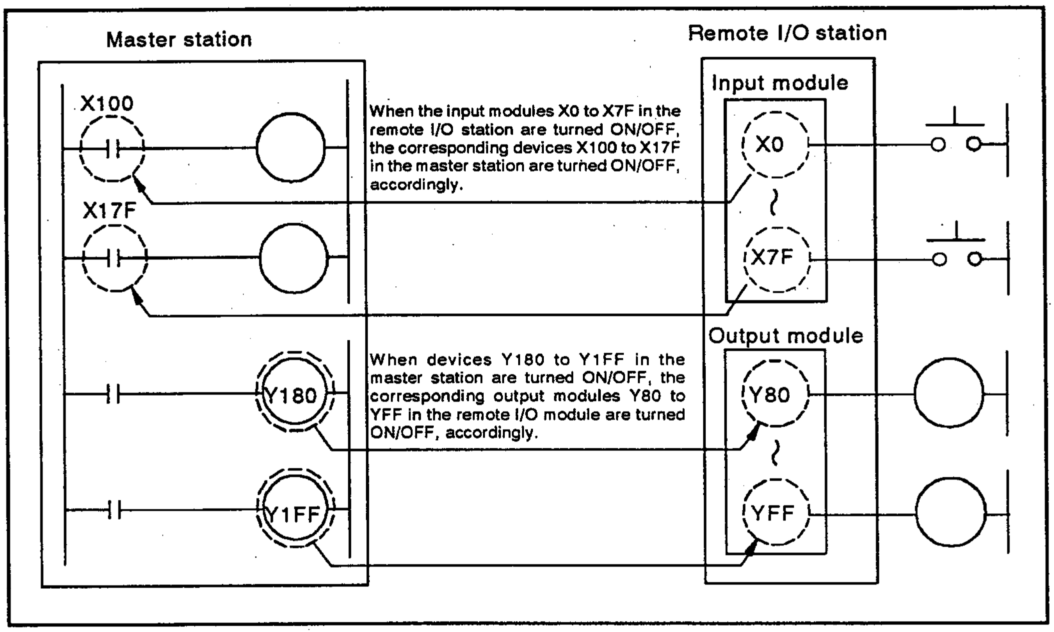
Receives ON/OFF data from an input module installed in the remote I/O station

Outputs the operation results obtained by the master station (M) sequence program

2) Use link parameters to allocate the ON/OFF data of the I/O modules loaded to the remote I/O station to the inputs (X) and outputs (Y) of the master station.

When the input module in the remote I/O station is turned ON, the input (X) allocated by the link parameter is also turns ON. When the output (Y) is turned ON by the master station, the output module in the remote I/O station turns ON.

Assume that inputs X100 to X17F in the master station are allocated to inputs X0 to X7F in the remote I/O station and that outputs Y180 to Y1FF in the master station are allocated to outputs Y80 to YFF in the remote I/O station. When input module X0 in the remote I/O station is turned ON, device X100 in the master station is turned ON. When device Y180 in the master station is turned ON, output module Y80 in the remote I/O station is turned ON.

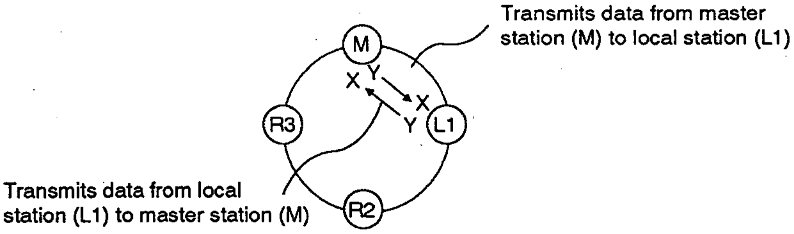


(b) Communication between the master station and a local station

1) Communicates data between a master station and a local station using some of I/O points in the master station and local stations for the data link.

(Data communications between local stations or between a local station and a remote I/O station is not possible.)

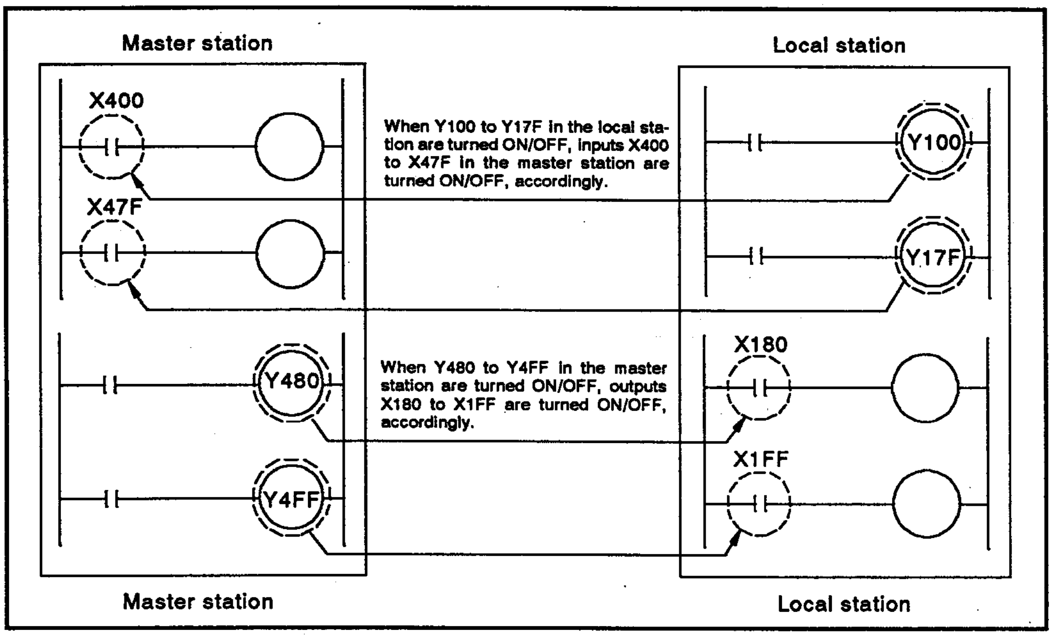
2) During data communications between a master station and a local station, the transmitter uses outputs (Y), and receiver inputs (X).



3) The inputs and outputs used for the data link are allocated by a link parameter.

The link parameter defines the correspondence between the master station inputs (X) and the local station outputs (Y) and between the master station outputs (Y) and the local station inputs (X).

Assume that inputs X400 to X47F in the master station are allocated to outputs Y100 to Y17F in a local station and that outputs Y480 to Y4FF in the master station are allocated to inputs X180 to X1FF in the local station. When output Y100 in the local station is turned ON, input X400 in the master station is turned ON. When output Y480 in the master station is turned ON, input X180 in the local station is turned ON.



(2) Communication between the master station and all local stations

Link relays (B) and link registers (W) are used for communication between the master station and a local station or for communication between two local stations.

Link relays (B) and link registers (W) are used by the master station and every local station.

Link relays (B) and link registers (W), using the range allocated to the station with a link parameter, send data to other station.

- Link relays (B) are internal relays for the data link and are used for sending ON/OFF data.
- Link registers (W) are data registers for the data link and are used for sending 16-bit data.
- Link relays (B) and link registers (W) handle different types of data. However, the range of device numbers usable for communication with other stations of the MELSECNET (II) data link system.

The following explains the range in which communication is possible with link relays (B) and link registers (W) in the MELSECNET mode:

In the MELSECNET II mode and MELSECNET II composite mode, although the function is basically the same, stations with which communication is possible will differ partly between the range allocated to the first half of the link parameter and the range allocated to the second half of the link parameter. Refer to Section 5.3.8 for more details.

(a) Two-tier system

1) The master station and the local stations can read the entire range of link relays (B) and link registers (W) allocated by the link parameter.

The read/write range of each station in the link is explained by the link example illustrated in Fig. 5.1.

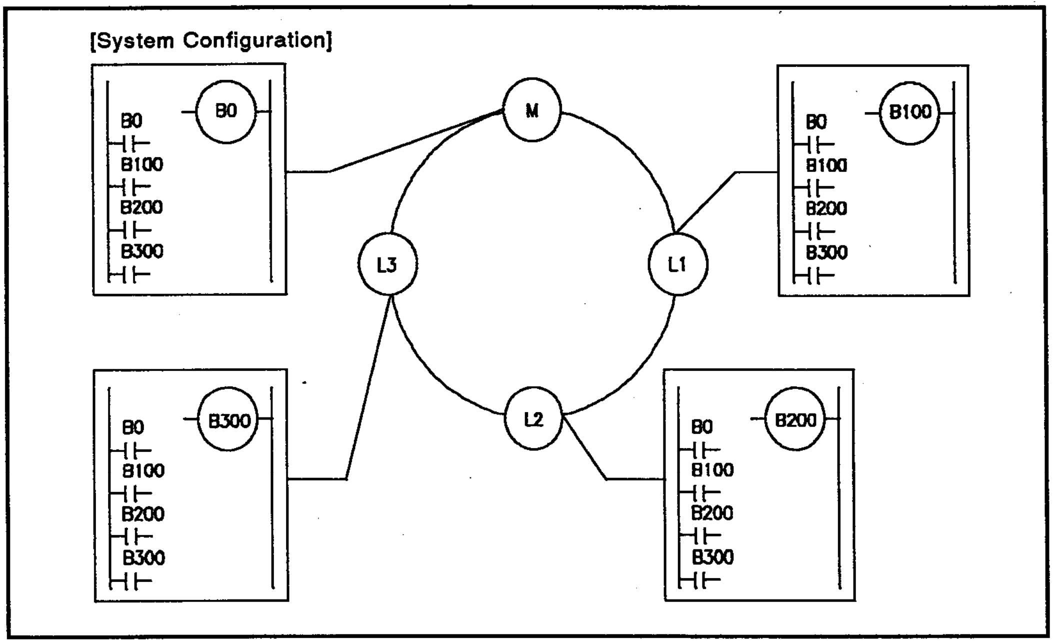


Fig. 5.1 Two-tier System Configuration

[Link parameter setting range]

B/W0 100 200 300 380 3FF

M	L1	L2	L3	Vacant

[Read/write permitted range]

(R) = Reading range (W) = Writing range ** = Internal relays (M) and data registers (D) area

Master station (M)

B/W0 100 200 300 380 3FF

M (W)	L1 (R)	L2 (R)	L3 (R)	**

When B0 is turned ON in the M station, for example, B0 in the L1, L2, and L3 stations is also turned ON.

Local station No. 1 (L1)

B/W0 100 200 300 380 3FF

M (R)	L1 (W)	L2 (R)	L3 (R)	**

When B100 is turned ON in the L1 station, for example, B100 in the M, L2, and L3 stations is also turned ON.

Local station No. 2 (L2)

B/W0 100 200 300 380 3FF

M (R)	L1 (R)	L2 (W)	L3 (R)	**

When B200 is turned ON in the L2 station, for example, B200 in the M, L1, and L3 stations is also turned ON.

Local station No. 3 (L3)

B/W0 100 200 300 380 3FF

M (R)	L1 (R)	L2 (R)	L3 (W)	**

When B300 is turned ON in the L3 station, for example, B300 in the M, L1, and L2 stations is also turned ON.

REMARK

In order to simplify the example, the same number of link relays (B) and link registers (W) were allocated. In actual use, different numbers of link relays (B) and link registers (W) can be allocated.

(b) Three-tier configuration

1) In the configuration of the three-tier system, the link parameters are set in the master station for the second tier and the master station for the third tier.

2) The master station and the local stations (including the master station for the third tier) in the second tier can read the entire range allocated by the link parameters set on the master station for the second tier.

   The L1/m station in Fig. 5.2, for example, can read the B/W0 to B/W37F range.

3) The local stations in the third tier can read the entire range allocated by the link parameters set on the master station for the third tier and the range allocated by the link parameters set on the master station for the second tier.

   The range allocated to the local stations in the second tier and the range allocated by the master station for different third tiers cannot be read.

   The I1 station in Fig. 5.2, for example, can read the B/W100 to B/W1FF range, which is allocated by the link parameters set on the L1/m, and the B/W0 to B/WFF range, which is allocated by the master station for the second tier.

   The read/write range of each station in the link is explained by the link example illustrated in Fig. 5.2.

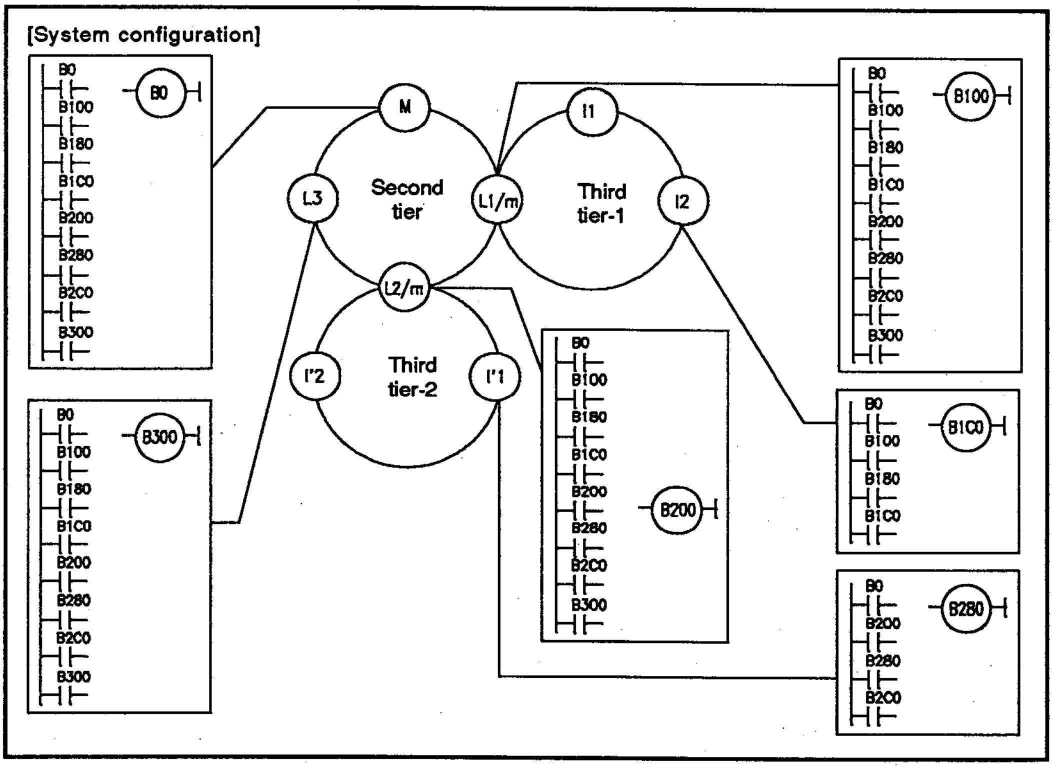
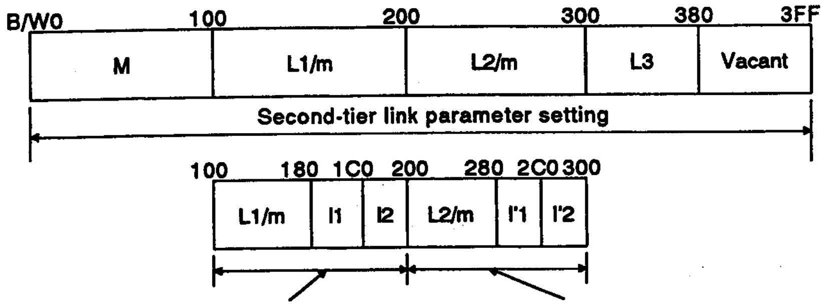


Fig. 5.2 Three-Tier System Configuration

[Link parameter setting range]



Link parameter setting for the master station (L1/m) for third tier-1

Link parameter setting for the master station (L2/m) for third tier-2

REMARK

In order to simplify the example, the same number of link relays (B) and link registers (W) were allocated. In actual use, different numbers of link relays (B) and link registers (W) can be allocated.

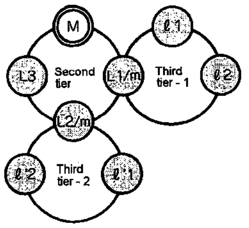
[Read/write permitted range]

(R) = Reading range

(W) = Writing range

** = Internal relays (M) and data registers (D) area

Master station (M) for the second tier



[Range where M can receive data]*

1) The M station writes data to the devices in the B/W0 to B/WFF range and sends it to the other stations.

2) The M station can receive data written to the devices in the B/W100 to B/W37F range by other stations.

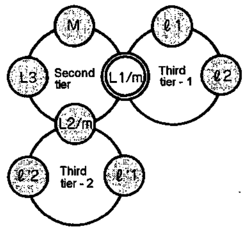
3) Devices in the B/W380 to B/W3FF range can be used instead of internal relays (M) and data registers (D).

B/W0 100 180 1C0 200 280 2C0 300 380 3FF

M (W)	L1/m (R)	l1 (R)	l2 (R)	L2/m (R)	l'1 (R)	l'2 (R)	L3 (R)	**

When B0 is turned ON in the M station, for example, B0 in L1/m station, l1 station, l2 station, L2/m station, l'1 station, l'2 station, and L3 station is turned ON.

Local station No. 1 (Master station (L1/m) for third tier-1)



[Range where L1/m can receive data]*

1) The L1/m station writes data to the devices in the B/W100 to B/W17F range and sends it to the other stations.

2) The L1/m station can receive data written to the devices in the B/W0 to B/WFF range and the B/W180 to B/W37F range by other stations.

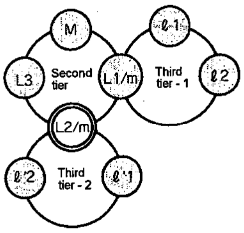
3) Devices in the B/W380 to B/W3FF range can be used instead of internal relays (M) and data registers (D).

B/W0 100 180 1C0 200 280 2C0 300 380 3FF

M (R)	L1/m (W)	l1 (R)	l2 (R)	L2/m (R)	l'1 (R)	l'2 (R)	L3 (R)	**

When B100 is turned ON in the L1/m station, for example, B100 in the M station, l1 station, l2 station, L2/m station, and L3 station is turned ON. Note that B100 in l'1 and l'2 stations is not turned ON.

Local station No. 2 (Master station (L2/m) for third tier-2)



[Range where L2/m can receive data]*

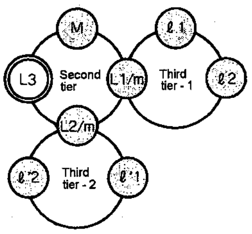
1) The L2/m station writes data to the devices in the B/W200 to B/W27F range and sends to other stations.
2) The L2/m station can receive data written to the devices in the B/W0 to B/W1FF range and the B/W280 to B/W37F range by other station.
3) Devices in the B/W380 to B/W3FF range can be used instead of internal relays (M) and data registers (D).

B/W0 100 180 1C0 200 280 2C0 300 380 3FF

M (R)	L1/m (R)	l1 (R)	l2 (R)	L2/m (W)	l'1 (R)	l'2 (R)	L3 (R)	**

When B200 is turned ON in the L2/m station, for example, B200 in the M station, L1/m station, l'1 station, l'2 station, and L3 station is turned ON. Note that B200 in l1 and l2 stations is not turned ON.

Local station No. 3 (L3)



[Range where L3 can receive data]*

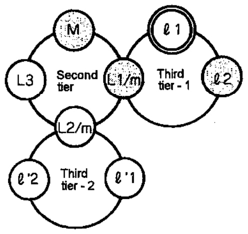
1) The L3 station writes data to the devices in the range of B/W300 to B/W37F range and sends to other stations.
2) The L3 station can receive data written to the devices in the B/W0 to B/W2FF range and the B/W280 to B/W37F range by other station.
3) Devices in the range of B/W380 to B/W3FF can be used instead of internal relays (M) and data registers (D).

B/W0 100 180 1C0 200 280 2C0 300 380 3FF

M (R)	L1/m (R)	l1 (R)	l2 (R)	L2/m (R)	l'1 (R)	l'2 (R)	L3 (W)	**

When B300 is turned ON in the L3 station, for example, B300 in the M station, L1/m station, and L2/m station is turned ON. Note that B300 in the l1 station, l2 station, l'1 station, and l'2 station is not turned ON.

Local station No. 1 (l1) in the third tier-1



[Range where ℓ1 can receive data]*

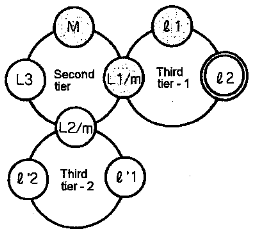
1) The l1 station writes data to the devices in the B/W180 to B/W1BF range and sends it to the other stations.
2) The l1 station can receive data written to the devices in the B/W0 to B/W17F range and the B/W1C0 to B/W1FF range by other stations.
3) Devices in the B/W200 to B/W3FF range can be used instead of internal relays (M) and data registers (D).

B/W0 100 180 1C0 200 280 2C0 300 380 3FF

M (R)	L1/m (R)	l1 (W)	l2 (R)	L2/m **	l'1 **	l'2 **	L3 **	**

When B180 is turned ON in the l1 station, for example, B180 in the M station, L1/m station, l2 station, L2/m station, and L3 station is turned ON. Note that B180 in the l'1 and l'2 stations is not turned on.

Local station No. 2 (l2) in third tier-1



1) The l2 station writes data to the devices in the B/W1C0 to B/W1FF range and sends it to the other stations.
2) The l2 station can receive data written to the devices in the B/W0 to B/W1BF range by other stations.
3) Devices in the B/W200 to B/W3FF range can be used instead of internal relays (M) and data registers (D).

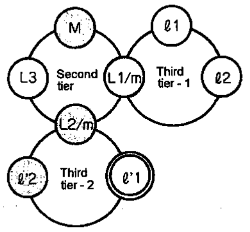
[Range where ℓ2 can receive data]*

B/W0 100 180 1C0 200 280 2C0 300 380 3FF

M (R)	L1/m (R)	l1 (R)	l2 (W)	L2/m **	l'1 **	l'2 **	L3 **	**

When B1C0 is turned ON in the l2 station, for example, B1C0 in the M station, L1/m station, l1 station, L2/m station, and L3 station is turned ON. Note that B1C0 in l'1 and l'2 stations is not turned ON.

Local station No. 1 (l'1) in third tier-2



1) The l'1 station writes data to the devices in the B/W280 to B/W2BF range and sends it to other stations.
2) The l'1 station can receive data written to the devices in the B/W0 to B/WFF range, the B/W200 to B/W27F range and the B/W2C0 to B/W2FF range by other station.
3) Devices in the B/W100 to B/W1FF range and the B/W300 to B/W3FF range can be used instead of internal relays (M) and data registers (D).

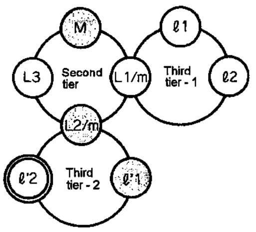
[Range where ℓ'1 can receive data]*

B/W0 100 180 1C0 200 280 2C0 300 380 3FF

M (R)	L1/m **	l1 **	l2 **	L2/m (R)	l'1 (W)	l'2 (R)	L3 **	**

When B280 is turned ON in the l'1 station, for example, B280 in the M station, L1/m station, L2/m station, l'2 station, and L3 station is turned ON. Note that B280 in l1 and l2 stations is not turned ON.

Local station No. 2 (l'2) in third tier-2



1) The l'2 station writes data to the devices in B/W2C0 to B/W2FF range and sends it to other stations.
2) The l'2 station can receive data written to the devices in the B/W0 to B/WFF range and the B/W200 to B/W2BF range by other station.
3) Devices in the B/W100 to B/W1FF range and the B/W300 to B/W3FF range can be used instead of internal relays (M) and data registers (D).

[Range where ℓ'2 can receive data]*

B/W0 100 180 1C0 200 280 2C0 300 380 3FF

M (R)	L1/m **	l1 **	l2 **	L2/m (R)	l'1 (R)	l'2 (W)	L3 **	**

When B2C0 is turned ON in the l'2 station, for example, B2C0 in the M station, L1/m station, L2/m station, l'1 station, and L3 station is turned ON. Note that B2C0 in the l1 station and l2 station, is not turned ON.

REMARK

1)*: ● indicates the range where data can be received.

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	o	o	o	o	o	o

5.3.2 Transient transmission function

The transient transmission function is used by the PC CPU in any master station to:

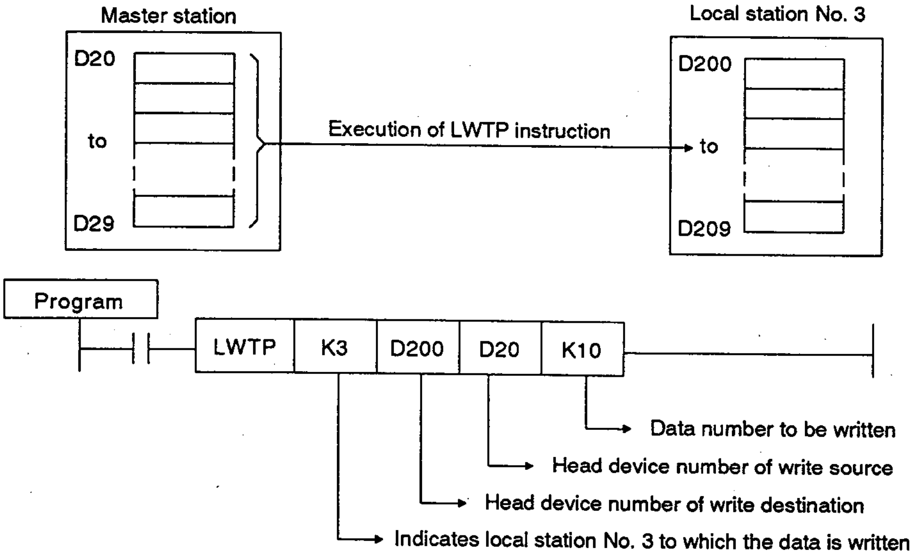
- Read/write from/to a devices (T, C, D, and W) in a local station;
- Read/write from/to the buffer of a special-function module in a remote I/O station;
- Enable communications using a peripheral device connected to the PC CPU in any station from/to the PC CPU in any other station.

(1) Read/write of devices (T, C, D, and W) in a local station by the master station

The transient transmission function reads data from or writes data to the link registers in the range set by the link parameter or to the devices (T, C, D) for which cyclic transmission is not possible.

An LRDP or LWTP instruction in the master station sequence program is executed for this read/write operation. Refer to Section 7.7 for more details on the LRDP and LWTP instructions.

Example:
Writing data from D20 through D29 in the master station to D200 through D209 in local station No. 3:



(2) Read/write of buffer memory in a special function module loaded to a remote I/O station

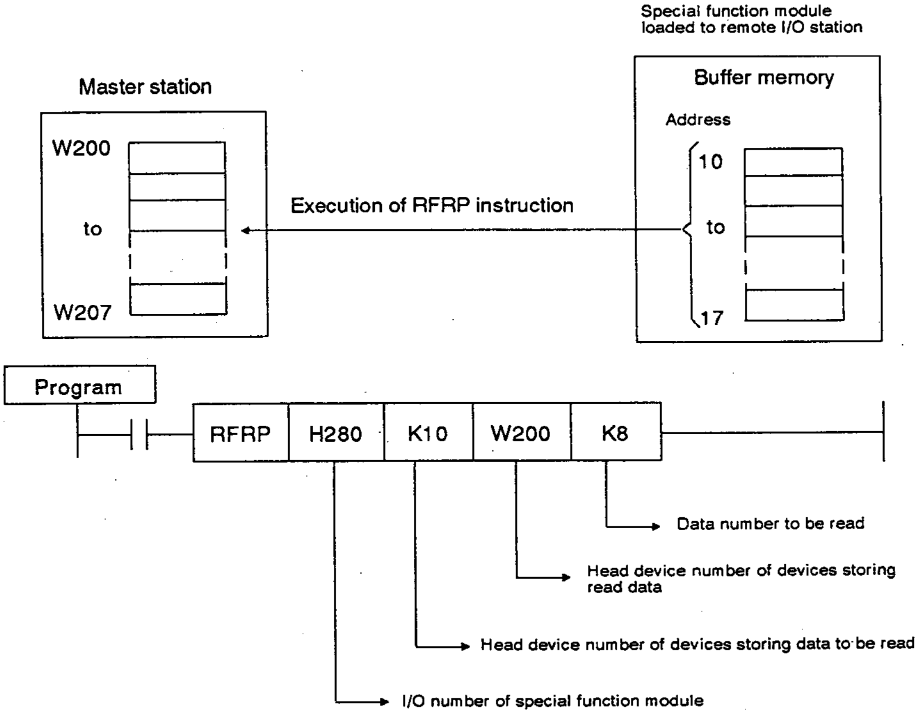
Use an RFRP or RTOP instruction for the read/write operation for a special function module loaded to a remote I/O station.

Data communication can only be executed between the master station and a remote I/O station when an RFRP or RTOP instruction is executed.

In order to use these instructions, link registers (W) must be allocated to the remote I/O station with the link parameter.

The buffer memory data is read or data is written to the buffer memory in the special function module loaded to the remote I/O station with the link registers. Refer to Section 9.8 for details on the RFRP and RTOP instructions.

Example:
Reading data from a special function module (X/Y280 to X/Y29F) loaded in remote I/O station No. 1:

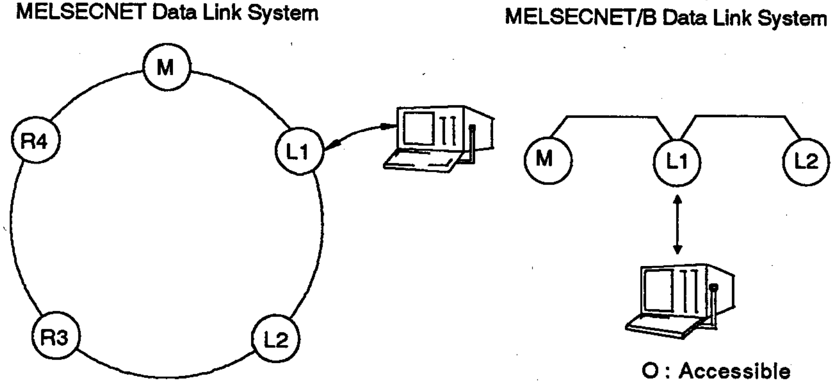


(3) Accessing another station with a peripheral device connected to PC CPU

The type of access source station (master station, local station, or remote I/O station) determines whether a station can be accessed.

The basic concept is illustrated in Fig. 5.3 Refer to the manuals for the peripheral device and module used for this operation for details on the executable functions.

- The master station can access itself, a local station, or a remote I/O station.
- A local station can access itself and the master station.
- A remote I/O station can only access the master station.



O : Accessible
X : Not accessible

Access Destination Station \ Access Source Station	M	L1	L2	R3	R4
M	O	O	O	O	O
L1	O	O	X	X	X
L2	O	X	O	X	X
R3	O	X	X	X	X
R4	O	X	X	X	X

Fig. 5.3 Accessibility Chart

In this system configuration, an A6GPP connected to L1 (local station No. 1) can execute the following operations for the master station.

- Program read/write
- Monitor
- Test
- Remote RUN/STOP/PAUSE control

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	○	○	○	○	○	○

5.3.3 Automatic return function

(1) Automatic return function

If a local station or a remote I/O station is disconnected from the data link system due to a fault, it is disconnected from the link to maintain the link with the normally operating stations.

The disconnected station is automatically returned to the system when the normal operation state is restored.

The function that makes this possible is the automatic return function.

(2) Setting for the use of automatic return function

It is possible to select whether or not the automatic return function will be set for use in the link modules for each station.

Refer to the User's Manual for the individual link module for details on the setting procedure.

(3) Returning disconnected station to data link

The method in which the disconnected station is returned to the data link varies depending on whether the automatic return function is set.

(a) Data link stopped due to an error in the master station

1) Automatic return function is set for the master station:

First, reset the master station. Then, reset all of the local and remote I/O stations for which the automatic return function is not set.

2) Automatic return function is not set for the master station:

First, reset all of the local and remote I/O stations for which the automatic return function is not set. Then, reset the master station.

(b) A local or remote I/O station is disconnected due to an error

Master Station Setting	Local/Remote I/O Station Setting	Conditions for Return
AR	AR	Returns automatically after the error is removed.
	UR	First, reset the master station. Then, reset all of the local and remote I/O stations for which the automatic return function is not set.
UR	AR	First, reset all of the local and remote I/O stations for which the automatic return function is not set. Then, reset the master station.
	UR	

AR : Automatic return function selected

UR : Automatic return function not selected

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	o	o	o	x	x	x

5.3.4 Loopback function

(1) Loopback function

The MELSECNET data link has a double configuration of link cables (fiber-optic or coaxial).

The loopback function uses the double configuration to isolate the error location and maintain the data link with the normally operating stations when a cable is broken or a local station or remote I/O station is disconnected.

POINTS

(1) In the MELSECNET and MELSECNET/B Data Link System, slave station and sub-slave station numbers should be assigned in order (station numbers ascending in the forward loop direction) for the loopback function.

(2) **The loopback function may not work depending on the fault of the data link module.**
Identify the faulty data link module in the following method.
1) **Check the LED indications (RUN LED off, ERROR LED on) of all data link modules for the faulty station.**
Refer to Section 10.4 for the ERROR LED indications.
2) Power all stations off, and power them on in due order, starting with the master station. At that time, check for the station where a normal data link will stop.
Replace the fault-detected data link module and then make sure that a data link returns to normal.

(2) Data link operating normally

Under normal operating status, the data link uses the forward loop. Loop data is sent/received in the following order: master station, station No. 1, station No. 2, etc.

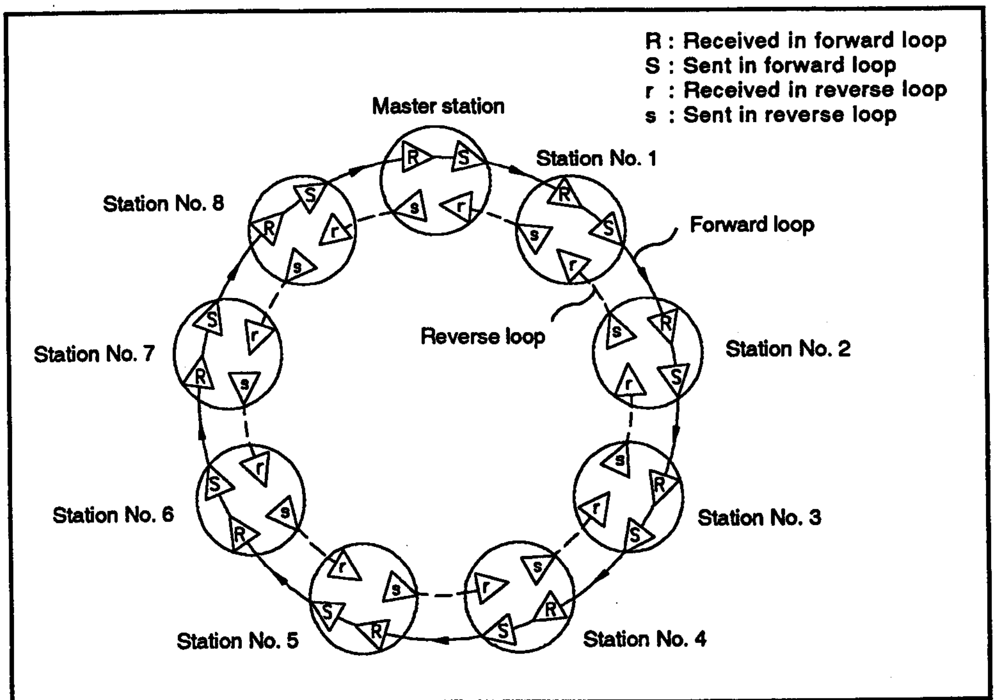


Fig. 5.4 Normal Data Link (When one master station and eight slave stations are used)

(3) Data link when the forward loop is faulty

If data link using the forward loop is disabled due to a broken cable or a problem with a forward loop cable connector, the loop is automatically switched from "forward" to "reverse" to maintain the data link.

In the reverse loop, link data is sent in the following order:
master station → station No. n → station No. (n-1), ...
Data link operation when a forward loop cable is broken or disconnected is illustrated in Fig. 5.5.

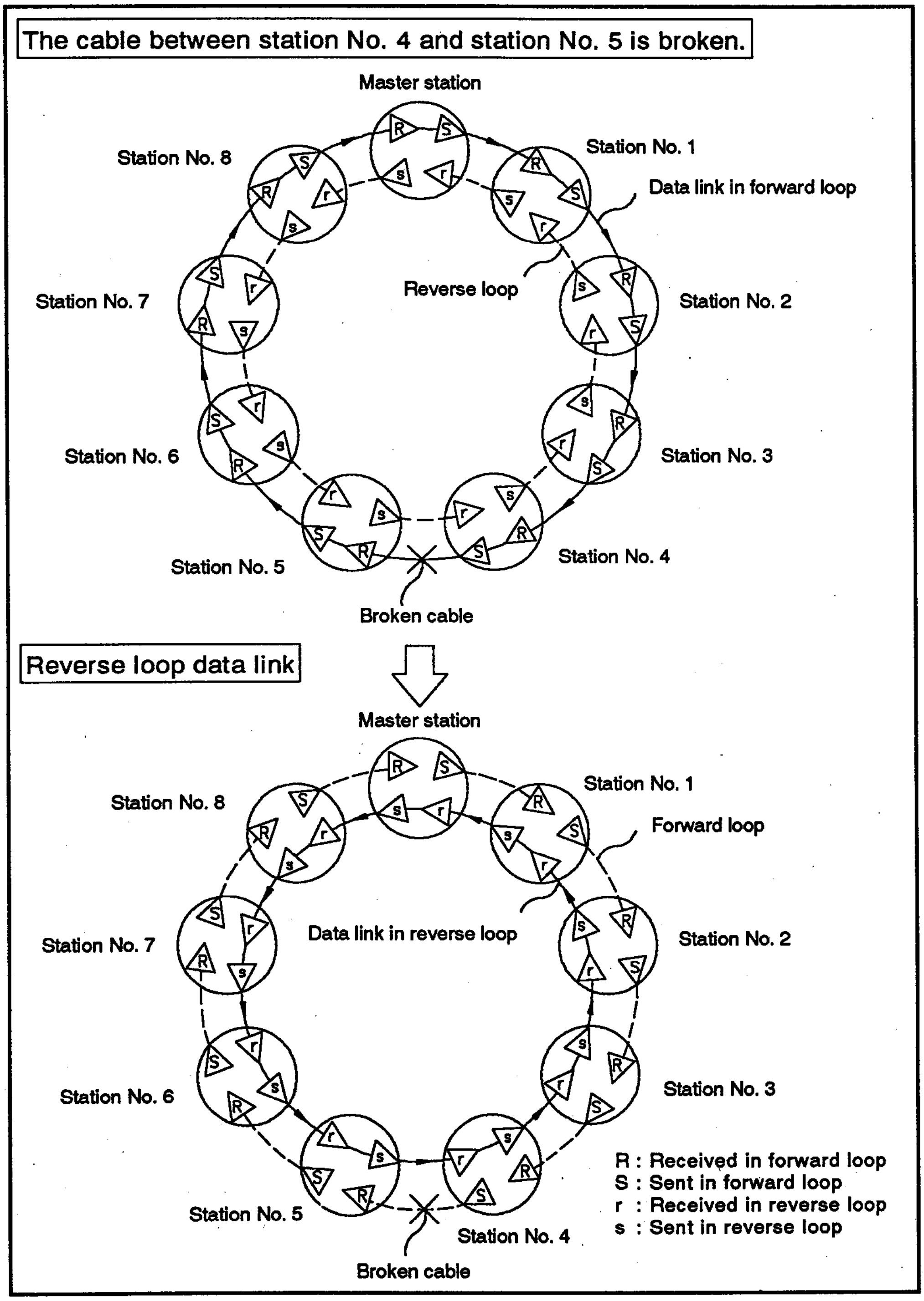


Fig. 5.5 Reverse Loop Data Link (When one master station and eight slave stations are used)

(4) Data link when both the forward and reverse loops are faulty

If both the forward and reverse loop is disabled due to broken cable or a faulty cable connector, the data link is still maintained in the loopback mode. At the broken cable, the link loops back toward the master station. Because of the establishment of the data link in the loopback mode, the stations ahead of the point where the link loops back are disconnected from the data link.

When the faulty point is corrected, the data link in the forward loop is recovered. The station will remain disconnected or return to the data link according to the setting of the automatic return function.

The cable between station No. 5 and station No. 6 in the forward loop and station No. 2 and station No. 3 in the reverse loop is broken.

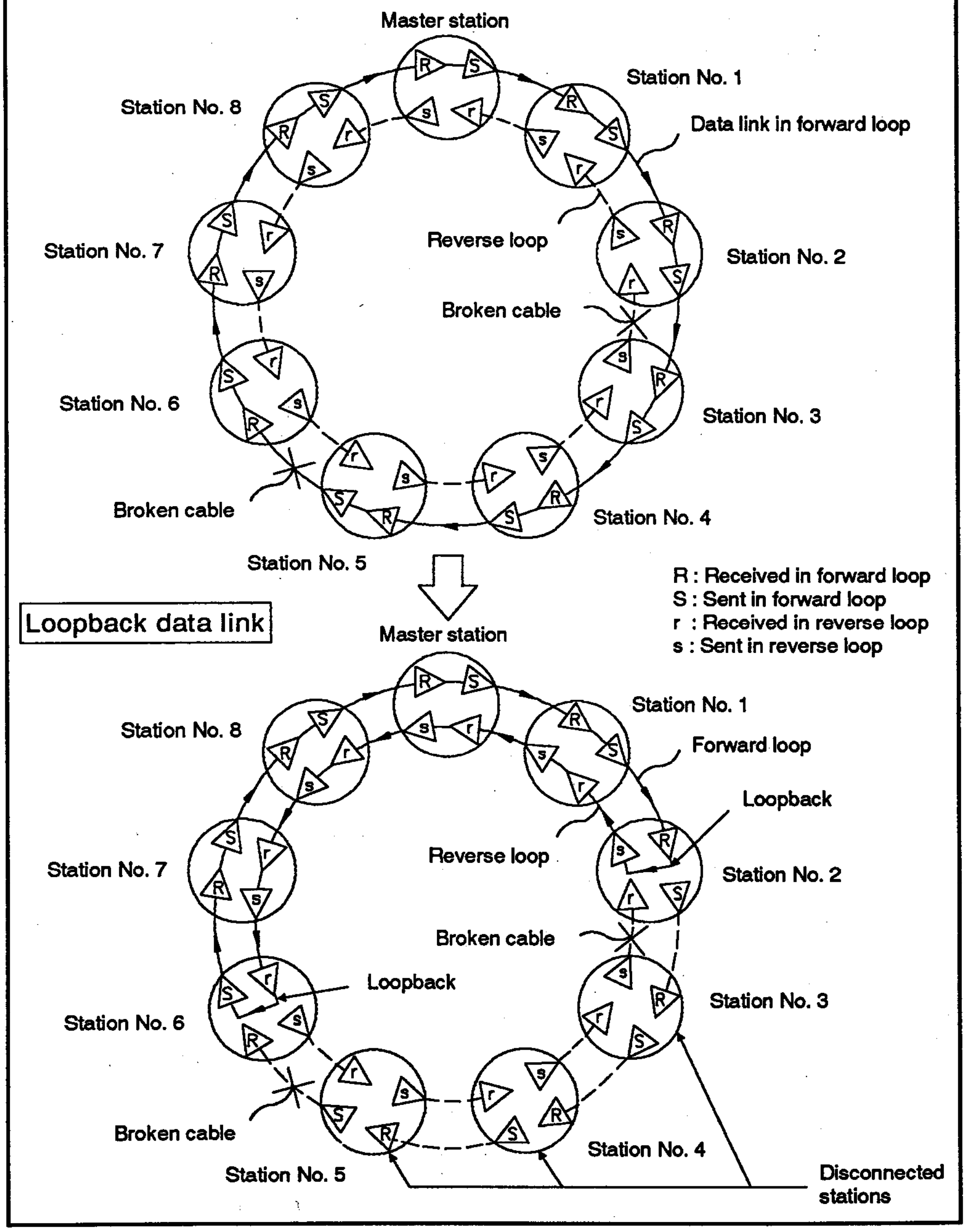


Fig. 5.6 Loopback Data Link (When one master station and eight slave stations are used)

(5) Data link when a power failure occurs with local station or remote I/O station

If the data link is disabled due to power failure at a local station or a remote I/O station, the data link is maintained with the normally operating stations in the loopback mode. At the point at which the power failure has occurred, the link loops back toward the master station. The station at which the power failure occurred is disconnected from the data link.

When the power supply to the disconnected station is turned on, the data link in the forward loop recovers. The station will remain disconnected or return to the data link according to the setting of the automatic return function.

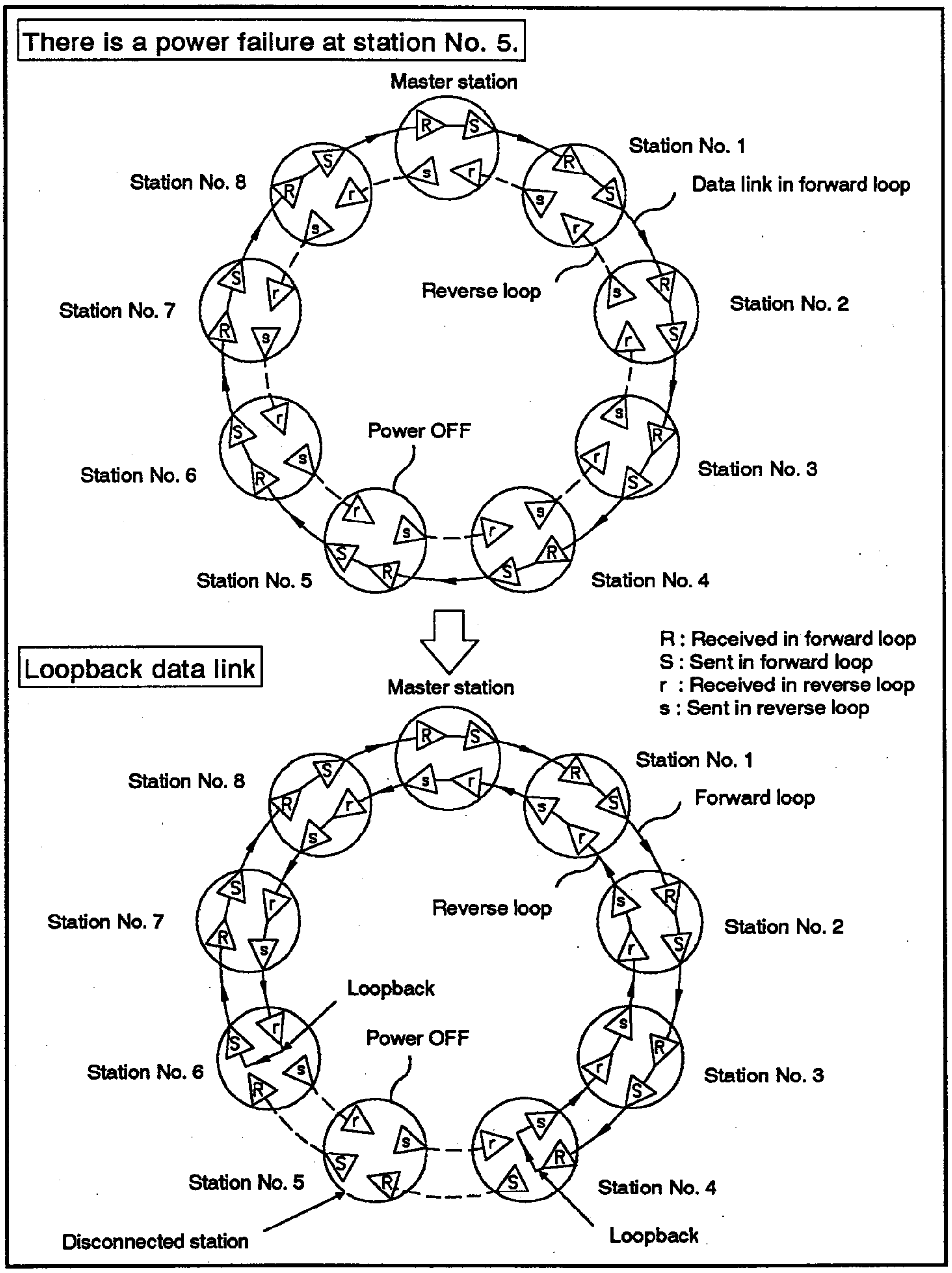


Fig. 5.7 Local Station or Remote Station Power Failure Data Link (When one master station and eight slave stations are used)

5.3.5 Fault detection function

In the data link system, the data link operation status is stored in the special relays (M) and special registers (D) so that it can be easily checked with a sequence program and peripheral device.

Some special relays (M) and special registers (D) can be read by the master station, while some can be read by a local station.

The following describes the major events that are detected by the fault detection function:

When a MELSECNET Data Link System is used

(1) Events checked by the master station

(a) Data communication status between the master station and a slave station (local station and remote I/O station)

- Stations at which a communication error is detected (D9228 to D9231).
- Stations at which initial communication, necessary for starting communication, has not been completed (D9224 to D9227).
- The operation status (RUN/STEP-RUN or STOP/PAUSE) of a local station (D9212 to D9215).

(b) Link parameter error

- Whether the link parameter is set or the set data is correct for the station itself (M9206).
- Compatibility (whether the B/W allocation range overlaps) between the link parameters set on a slave station (master station for the third tier) and those set for the station itself (M9207).

(c) Number of communication error occurrences

- The accumulated number of retries attempted after the occurrence of transmission errors (D9210).
- The accumulated number of receive error occurrences (D9240).

(d) Link card hardware error (M9210)

(e) Mode setting switch in the link card

- Whether the mode setting switch is set for online (0, 1) or offline test mode (2 - 7) (M9224).

(f) Data link status (M9225, M9226)

- Forward loop error (M9225)
- Reverse loop error (M9226)
- Whether data is sent via the forward loop, reverse loop, or forward/reverse loop (D9204).
- The stations where loopback occurs (D9205, D9206).
- Points at which errors occur in the forward loop line and reverse loop line (D9232 to D9239).

(2) Events checked by local stations

(a) Data communication status with the master station

- Whether cyclic communication is executed normally (M9246).
- Whether cyclic communication is executed normally with the master station for the third tier (if the local station is in the second tier) (M9247).
- Whether the link parameters are received from the master station (M9250).
- Whether the station can communicate with the master station (M9251).

(b) Data communication status with other stations

- A faulty station in the link other than the station itself (D9252 to D9255).
- The operation status (RUN/STEP-RUN or STOP/PAUSE) of local stations other than the station itself.

(c) Number of receive error occurrences

- The accumulated number of receive error occurrences (D9245).

(d) Link card hardware error (M9211)

(e) The setting position of mode setting switch in the link card (M9240)

(f) Data link status

- Forward loop error (M9241)
- Reverse loop error (M9242)
- Loopback in the station itself (M9243)

When a MELSECNET/B Data Link System is used

(1) States that can be checked by a master station

(a) Data communication state between a master station and a local station

- Stores the numbers of stations in which a communications error is detected (D9228 and D9229).
- Stores the stations which have not completed initial communications for the purpose of starting data communications (D9224 and D9225).
- Stores the operating state (RUN/STEP-RUN or STOP/PAUSE) of a local station (D9212 and D9213).

(b) Link parameter error

- Checks if (a) the link parameters for the self are not set, or (b) the set data contains an error (M9206).
- Checks the consistency of link parameters set for a slave station (master station for the third tier) with the self link parameters (if the B/W allocation range overlaps) (M9207).

(c) Number of communications errors

- Stores the accumulated number of retries attempted after the occurrence of transmission errors (D9210).
- Stores the accumulated number of receive errors (D9240).

(d) Link card hardware fault (M9210)

(e) Link card mode switch setting state

- Checks if the mode switch is set to online (0 or 1) or offline (2 to 7) (M9224).

(f) Data link state

Stores the data link state (D9204).

(2) States that can be checked by a local station

(a) Data communications state of the master station

- Checks if cyclic data communications is correctly executed (M9246).
- Checks if the master station for the second tier is correctly executing cyclic data communications when the self is a local station for the third tier (M9247).
- Checks if link parameters are received from a master station (M9250).
- Checks if the self is communicating data (M9251)

(b) Data communications with another station

- Checks if there are faulty local stations (other than the self) (D9252 and D9253).
- Checks the operating status (RUN/STEP-RUN or STOP/PAUSE) of local stations (other than the self).

(c) Number of receive errors

- Checks the number of receive errors (D9245).

(d) Link card hardware fault (M9211)

(e) Link card mode switch setting (M9240)

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	○	○	○	○	○	○

5.3.6 Self-diagnosis function

The self-diagnosis function checks the link module hardware, the fiber-optic cable or coaxial cable*connection status, etc.

The self-diagnosis function includes the following tests.

(1) Self loopback test

Checks the link module hardware independently, including the send/receive circuit for data communication

(2) Station-to-station test

Checks the cable and link module hardware for the two neighboring stations (master station ↔ local station, local station ↔ local station, etc.)

(3) Forward loop/reverse loop test

Checks the data link line for the forward loop, reverse loop, and loopback mode when the MELSECNET (II) Data Link System has been connected.

REMARK

1) *: The following cables are used for a data link:

- MELSECNET Data Link System : Fiber-optic cable
  : Coaxial cable
- MELSECNET/B Data Link System : Shielded twisted-wire pair cable

2) Refer to Section 8.7 for the self-diagnosis test method.

5.3.7 Extensive use of link relays (B) and link registers (W) in a three-tier system

Number of link relay (B) and link register (W) points that can be used in a system:

- MELSECNET mode: B/W0 to B/W 3FF (1024 points)
- MELSECNET II mode: B/W0 to B/W FFF (4096 points)
- MELSECNET II composite mode: B/W0 to B/W FFF (4096 points)

When there are two or more master stations in the second tier as illustrated in Fig. 5.8, the link relay and link register range can be expanded. In this case, the communication range that can be used is different from the communication range that can be used without expanding the range.

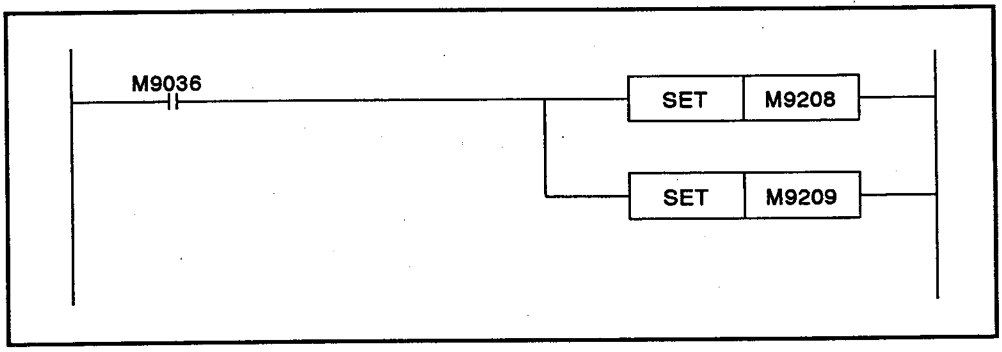
This section describes the link relay (B) and link register (W) range that can be expanded and the device range that can be used for data communication.

(1) Using expanded link relays (B) and link registers (W)

(a) Use the master station for the third tier to turn ON special relays M9208 and M9209. Both of these special relays must be turned ON to use the expanded link relays and link registers.

M9208	• Set whether the B/W data controlled master station for the third tier is sent to the local stations (sub-slave stations) in the third tier. • ON : Not sent • OFF : Sent
M9209	• Turn this ON when device ranges are not to be checked. • ON : Link parameters for the second and third tiers are not checked. • OFF : Link parameters for the second and third tiers are checked.

(b) Use the SET instruction to turn ON special relays M9208 and M9209 as illustrated below. Once turned ON, both of them should remain ON; never turn these special relays ON or OFF during control.



(2) Expanded link relay (B) and link register (W) range

The device range that is not allocated to the link parameters for the second tier can be allocated to the link parameters for the third tier (third tier-1, third tier-2, ... third tier-n). For this allocation, the same range can be allocated to different data link.

When 512 points of B/W0 to B/W1FF are used for the second tier (as illustrated in Fig. 3.12), the device range of B/W200 to B/W3FF can be allocated to the third-tier-1 link and also to the third-tier-2 link.

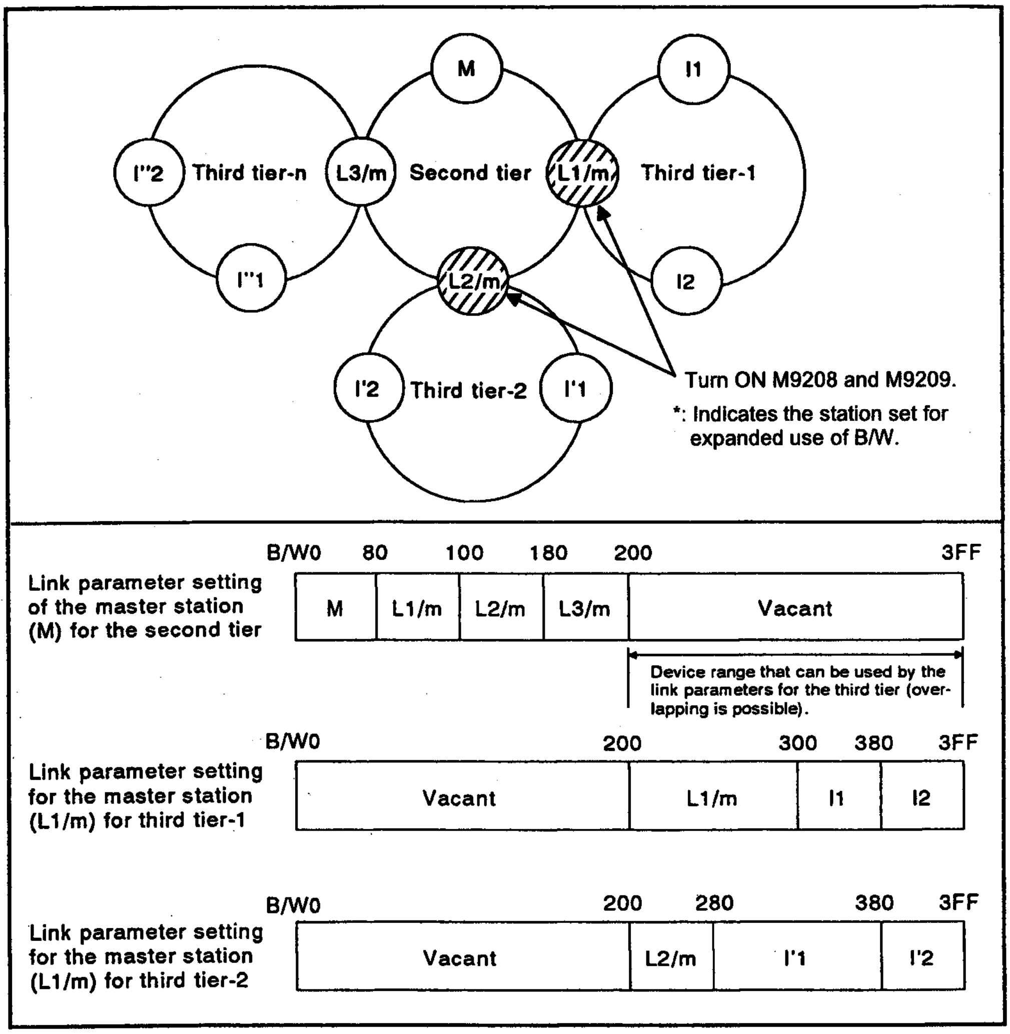


Fig. 5.8 Expanded Link Relay (B) and Link Register (W) Ranges

POINT

Since the L3/m station has not been set for expanded use of B/W, its communication range is as described in Section 5.3.1.

(3) Data communication range with expanded link relays (B) and link registers (W)

(a) Link relays (B) and link registers (W) used by the second-tier link cannot be used for sending data to the local stations in any of the third-tier links.

They can be used to send data to the master stations (L1/m, L2/m, ..., Ln/m) for the third tiers. This is because these master stations execute communication with the master station for the second tier, because they are local stations in the same link.

(b) The devices in the range set by the link parameters for the master station for the third tier cannot be used for sending data to the master station for and the local stations in the second-tier link.

The master station for the third tier can only receive data from the local stations in the link in which it is connected.

For example, L1/m can only receive data from I1 and I2.

The expanded link relay (B) and link register (W) device range that can be used for communication in the system configuration from Fig. 5.8 is summarized in Table 5.5.

Table 5.5 Communication Range when the Link Relay (B) and Link Register (W) Ranges are Expanded

*4	*3	*1 *2	M	L1/m	L2/m	L3/m	I1	I2	I'1	I'2	Remark
Master station (M) for the second tier	M	B/W0 to 7F	O	O	O	O					Reading is only possible for the stations (M, L1/m, L2/m, L3) connected in the second-tier link. Reading of data from the local stations (I1, I2, I'1, I'2) in the third-tier link is not possible.
	L1/m	B/W80 to FF	O	O	O	O					
	L2/m	B/W100 to 17F	O	O	O	O					
	L3	B/W180 to 1FF	O	O	O	O					
Master station (L1/m) for third-tier-1	L1/m	B/W200 to 2FF		O			O	O			Reading is only possible for the stations (L1/m, I1, I2) connected in the third-tier-1 link. Reading of data from other stations (M, L2/m, L3, I'1, I'2) is not possible.
	I1	B/W300 to 37F		O			O	O			
	I2	B/W380 to 3FF		O			O	O			
Master station (L1/m) for third-tier-2	L2/m	B/W200 to 27F			O				O	O	Reading is only possible for the stations (L2/m, I'1, I'2) connected in the third-tier-2 link. Reading of data from other stations (M, L1/m, L3, I1, I2) is not possible.
	I1	B/W280 to 37F			O				O	O	
	I2	B/W380 to 3FF			O				O	O	

*1 : Receive (data read) range
*2 : Device range
*3 : Send (data write) range
*4 : Link parameter setting station

POINT

Write a program for the master station for the third tier that recognizes the communication range for the stations in the second-tier link and those in the third-tier link.

With L1/m in Table 5.5, for example, the device range B/W80 to B/WFF is used for communication with the stations (M, L2/m, L3) connected in the second-tier link. Use device range B/W200 to B/W2FF for communication with the stations (I1, I2) in the third-tier-1 link.

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability		○	○		○	○

5.3.8 MELSECNET II mode and MELSECNET II composite mode

When a MELSECNET II mode-compatible link module is used as a master station, the operation mode for the MELSECNET Data Link System can be selected in the MELSECNET II mode or the MELSECNET II composite mode.

POINT

In the MELSECNET II mode, if a MELSECNET-compatible data link module is used as a slave station, communication with this station will stop.

(1) MELSECNET II mode

Select the MELSECNET II mode when only MELSECNET (II)-compatible data link modules are connected in the data link.

Remote I/O stations cannot be used in this mode.

If a remote I/O station is used, select the MELSECNET II composite mode.

(a) Up to 4096 data link points in the range of B/W0 to B/WFFF are possible.

(b) The maximum number of link points per master station or local station is 2048 bytes (up to 1024 bytes in the MELSECNET mode).

In the MELSECNET II mode, the first half link parameter and the second half link parameter can be allocated. Up to 1024 bytes can be allocated for each, meaning that up to 2048 bytes can be used for data link.

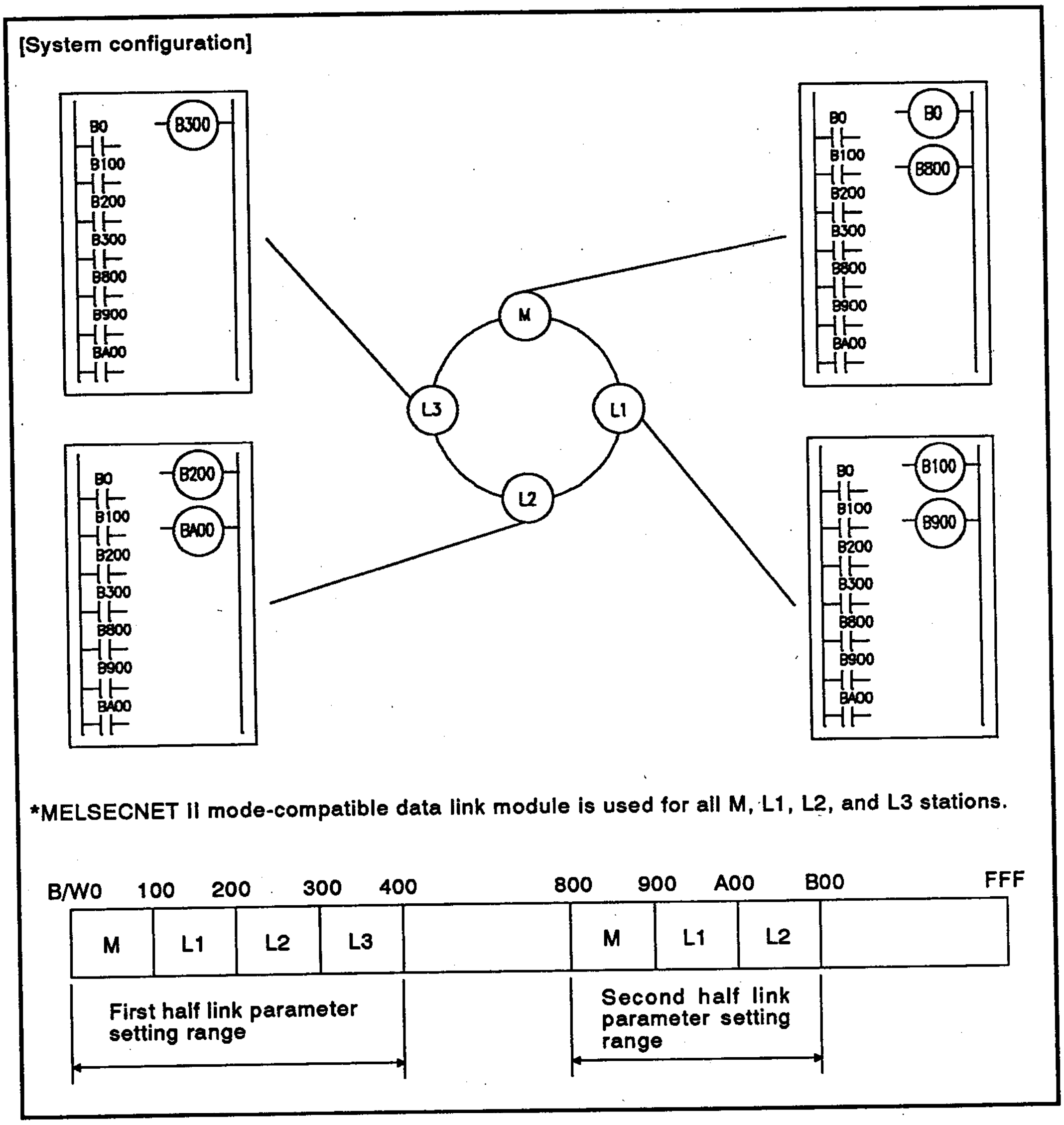
(c) It is possible to operate the data link system using only a first half link parameter. In this case, data sent from other stations can be received at the same time because data send/receive processing is executed at a time as to the first half range.

If the maximum number of link points per station is 1024 bytes or less, use the devices with only the first half link parameter. This will reduce the handshake processing load in sequence programs. Refer to Section 9.1 for more details.

POINT

If both the first and second half link parameters are allocated, the station for which only the first or second half link parameter device range allocation is made can read all of the data allocated to the first and second half link parameters.

With the link parameter setting illustrated in Fig. 5.9, only the first half link parameter is allocated for L3. However, L3 can read devices that are allocated to the second half link parameters used by other station.



*MELSECNET II mode-compatible data link module is used for all M, L1, L2, and L3 stations.

Fig. 5.9 System Using MELSECNET II Mode

(2) MELSECNET II composite mode

In the MELSECNET II composite mode, MELSECNET mode-compatible local stations and remote I/O stations can be connected to the master station (MELSECNET II mode-compatible data link module).

By selecting the MELSECNET II composite mode, data link modules used in the MELSECNET mode (previous MELSECNET Data Link System) and those compatible with the MELSECNET II mode can be used within the same data link.

(a) Up to 4096 points in the range of B/W0 to B/WFFF are possible for the data link.

(b) The maximum number of link points per master station or local station is 2048 bytes.

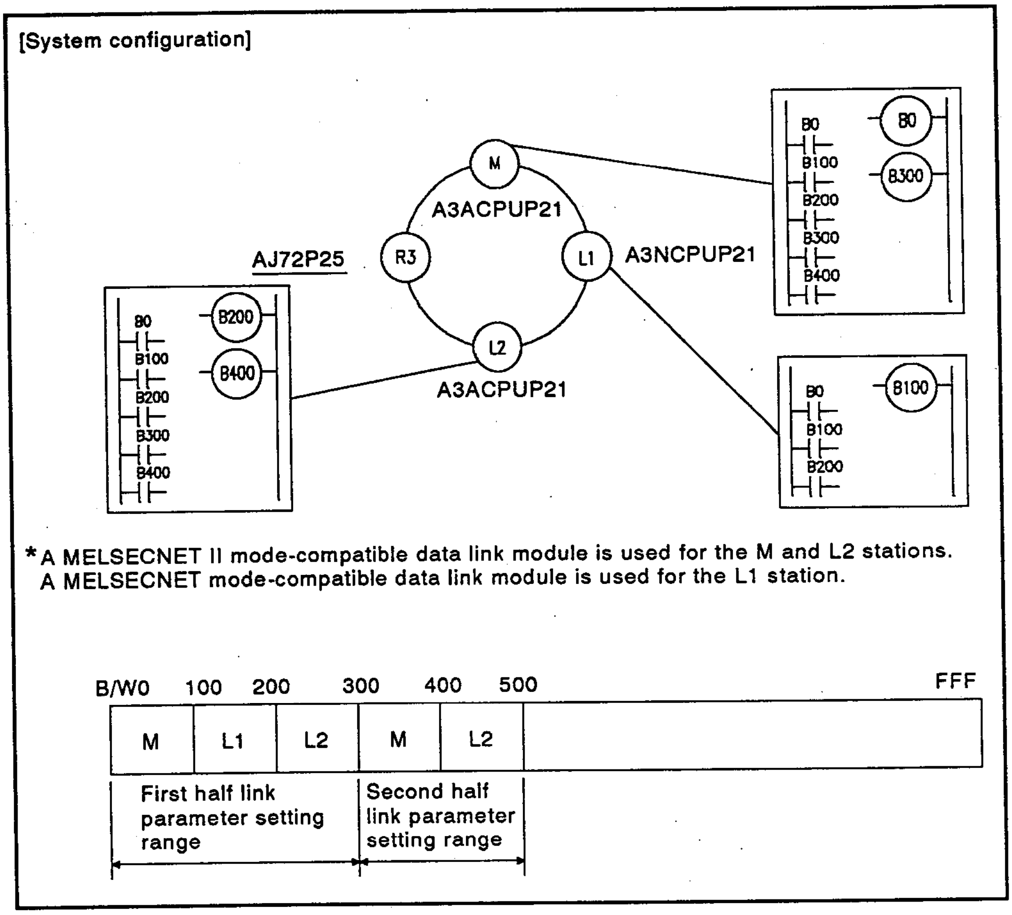
In the MELSECNET II composite mode, the first half link parameter and the second half link parameter can be allocated. Up to 1024 bytes can be allocated for each, meaning that up to 2048 bytes can be used for data link (1024 bytes for MELSECNET mode-compatible local station and 512 bytes for MELSECNET mode-compatible remote I/O station).

POINT

A MELSECNET mode-compatible local station can only read the device range (link relays and link registers) allocated to the first half link parameter. Devices allocated to the second half link parameter cannot be read.

L1 in Fig. 5.10, for example, cannot read the devices in the range of B/W300 to B/W4FF because it uses a MELSECNET mode-compatible data link module.

MELSECNET II mode-compatible master stations and local stations can read the devices in the range allocated to both the first and second half link parameters.



*A MELSECNET II mode-compatible data link module is used for the M and L2 stations.
A MELSECNET mode-compatible data link module is used for the L1 station.

Fig. 5.10 System Using MELSECNET II Composite Mode

REMARKS

(1) When a MELSECNET mode-compatible data link module is used for the master station, the system operates in the MELSECNET mode even if a MELSECNET II mode-compatible data link module is connected as a local station.

(2) When the MELSECNET mode link parameter is set while using an MELSECNET II mode-compatible data link module, the system will operate in the MELSECNET mode.

(3) When only the first half link parameter is set in the MELSECNET II composite mode, the system will operate in the MELSECNET mode.

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	o	o	o			

5.4 Fiber-Optic Cable Specifications

Fiber-optic cables require specialized techniques and special tools for fitting the connector plugs to the cable. When purchasing connector plugs, make sure that they are compatible with the sockets.

5.4.1 SI/GI-type fiber-optic cable

Table 5.6 SI/GI-type Fiber-optic Cable

Item		SI (Multi particulate glass)	H-PCF (Plastic clad)	GI (Quartz glass)
Interstation distance	10Mbps	1km	1km	2km
Transmission loss		12dB/km	6dB/km	3dB/km
Core diameter		200 μ m	200 μ m	50 μ m
Clad diameter		220 μ m	250 μ m	125 μ m
Primary membrane		250 μ m	—	—
Applicable connector		F06/F08 or equivalent (JIS C5975/5977 conformance)		

REMARK

Prepare the following types of optical cables.

- A type: Cable for connection inside control panel.
- B type: Cable for connections between outside control panels.
- C type: Cable for outdoor connections.
- D type: Cable for outdoor connections that have been reinforced.

There are special cables available for moveable applications and resistance to heat. Contact your Mitsubishi System Service for details.

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	o	o	o			

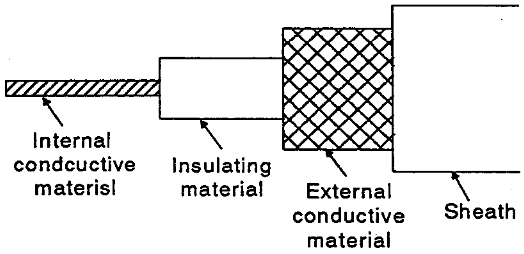
5.5 Coaxial Cable

This section gives the specifications of coaxial cable used for the coaxial data link.

The coaxial cables used are high-frequency coaxial cables "3C-2V" and "5C-2V" (conforming to JIS C 3501).

5.5.1 Coaxial cable

Table 5.7 Coaxial Cable

Item	3C-2V	5C-2V
Construction		
Cable diameter	5.4 mm (0.21 in)	7.4 mm (0.29 in)
Allowable bending radius	22 mm (0.87 in) or more	30 mm (1.18 in) or more
Internal conductive material diameter	0.5 mm (0.02 in) (Annealed copper wire)	0.8 mm (0.03 in) (Annealed copper wire)
Insulating material diameter	3.1 mm (0.12 in) (Polyethylene)	4.9 mm (0.19 in) (Polyethylene)
External conductive material diameter	3.8 mm (0.15 in) (Single annealed copper wire mesh)	5.6 mm (0.22 in) (Single annealed copper wire mesh)
Used jack type	227161-4	
Applicable connector plug	Connector plug for 3C-2V (BNC-P-3-Ni is recommended.)	Connector plug for 5C-2V (BNC-P-5 or BNC-P-5DV-SA(01) is recommended.)

REMARK

Consult nearest Mitsubishi representative with connector plug.

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	o	o	o			

5.5.2 Connector for the coaxial cable

The following explains the structure and connecting procedures of the connector for the coaxial cable.

(1) Structure of the BNC connector and the coaxial cable

Fig. 5.8 shows the structure of the BNC connector and the coaxial cable.

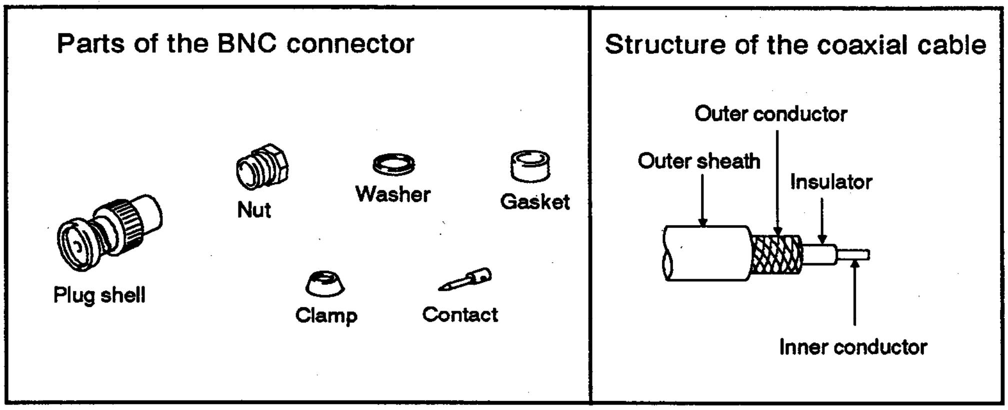
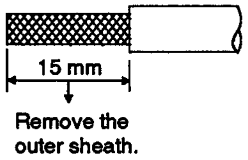


Fig. 5.8 Structure of the BNC Connector and the Coaxial Cable

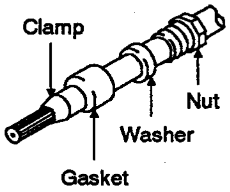
(2) Connecting the BNC connector with the coaxial cable

The following describes the procedure for connecting the BNC connector with the coaxial cable.

(a) Remove the outer sheath at the end of the coaxial cable as shown. Use caution not to damage the outer conductor.

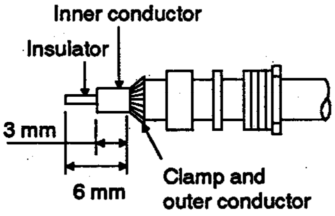


(b) Slip a nut, a washer, a gasket, and a clamp on the coaxial cable, and loosen the outer conductor.

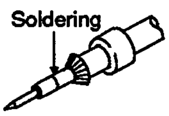


(c) Cut the outer conductor, insulator, and inner conductor to specified dimensions as shown.

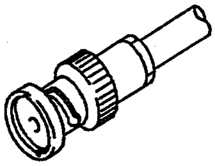
Cut the outer conductor and spread it on the taper of the clamp.



(d) Solder the contact to the tip of the inner conductor.



(e) Insert the contact assembly to the plug shell, and engage the plug shell with the nut.



POINT

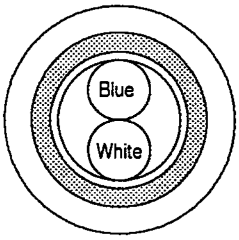
(1) Use caution as follows when soldering the contact to the inner conductor.
   - (a) Solder must not be protruding.
   - (b) The tail end of the contact and the cut end of the insulator must contact close to each other or the contact must not be cutting in the insulator.
   - (c) Apply solder quickly so that the insulator may not deform.

(2) **Before connecting or disconnecting the coaxial cable connector, be sure to touch a grounded metal object to discharge the static electricity from the human body.**
Failure to do so can fail the module.

5.6 Twisted-Wire Pair Cable

This section gives the specifications of the twisted-wire pair cable for a MELSECNET/B Data Link System.

Table 5.8 Shielded Twisted-Wire Pair Cable

Model Name	KNPEV-SB 0.5 SQ X 1P
Type of cable	Shielded twisted-wire pair cable
Number of cores	2
Conductive resistance (20°C)	3.94 MΩ/km or lower
Insulation resistance (20°C)	10 MΩkm or higher
Dielectric withstand voltage (V-min)	1000 VAC for one minute
Electrostatic capacity (1 KHz)	70 nF/km or less (on average)
Characteristic impedance (100 KHz)	110 ± 10Ω
Cross section	

REMARK

Consult nearest Mitsubishi representative with twisted-wire pair cable.

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	○	○	○	○	○	○

6. LINK DATA SEND/RECEIVE PROCESSING AND PROCESSING TIME

6.1 Link Data Communication Processing

6.1.1 Communication processing outline

In the Data Link System, the link data set as the link parameters on the master station is communicated repeatedly.

(1) Link module configuration

(a) A link module used in a master station or local station has a link data storage area, in which the link data to be communicated to other stations is stored, and the data memory storage area, in which the data used for processing within the station is stored.

(b) A link module used in a remote I/O station has a link data storage area in which the link data to be communicated to other stations is stored.

(2) Link data communication

Link data communication is executed in a link scan or a link refresh.

(a) A link scan is executed when link data is communicated between link modules (link data storage areas).

(b) A link refresh is executed when link data is communicated within a link module.

1) Link refresh for a master station or local station is executed when link data is communicated between the link data storage area and the data memory storage area.

2) Link refresh for a remote I/O station is executed when link data is communicated between the link data storage area and an I/O module or special function module.

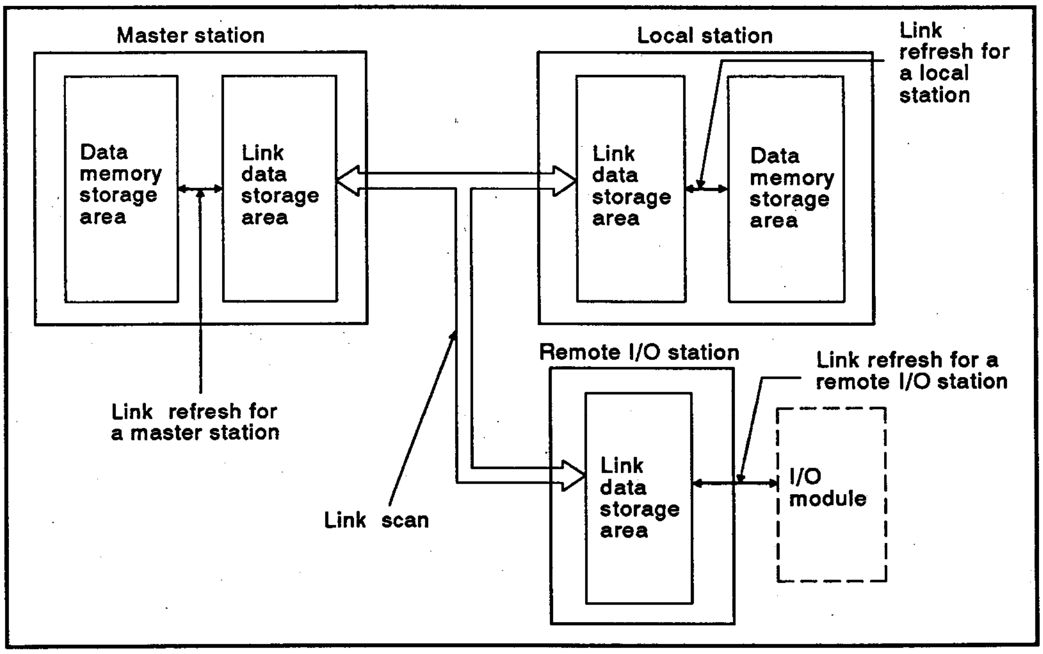


Fig. 6.1 Link Data Communications

6.1.2 Link refresh execution timing

(1) Immediately after the completion of a link scan

A link refresh will be executed when a link scan is completed. The sequence program will be interrupted.

(2) After the execution of an END instruction in sequence program

A link refresh will be executed only after an END instruction has been executed in a sequence program.

(3) At preset intervals

A link refresh will be executed in intervals defined by the user.

When a link refresh is executed as described in Item (1) or (3), only some of the communicated data will be updated because the link refresh is being executed during sequence program operation.

To prevent such a problem, use handshake processing between the data send station and data receive station to control communication. Refer to Section 9.1 for more details.

The link refresh execution timing possible for each link module is listed in Table 6.1.

Table 6.1 Link Module Classification by Link Refresh Timing

Link Module Name	Link Refresh Timing		
	After the Completion of a Link Scan	After the Execution of an END Instruction	At Preset Intervals
A1SHCPU +A1SJ71AP21/R21	○	○ *1	–
A2SHCPU +A1SJ71AP21/R21			
A0J2HCPUP21/R21			
AnNCPUP21(S3)/R21			
A2CCPUP21/R21			
A2ASCPU(S1) +A1SJ71AP21/R21	–	○	–
A2USHCPU-S1 +A1SJ71AP21/R21			
Q2ASCPU(S1) +A1SJ71AP21/R21			
Q2ASHCPU(S1) +A1SJ71AP21/R21			
AnACPUP21(S3)/R21			
AnUCPU +AJ71AP21(S3)/R21			
Q2ACPU(S1) +AJ71AP21(S3)/R21			
Q3ACPU +AJ71AP21(S3)/R21			
Q4ACPU +AJ71AP21(S3)/R21			
A0J2P25(S3)/R25	○	–	–
AJ72P25(S3)/R25			

POINTS

(1) An asterisk marks the cases in which a link refresh will be executed only after the execution of an END instruction in a sequence program in which the programs steps between step 0 and the END instruction are set by the sequence program as a link-refresh inhibited zone.

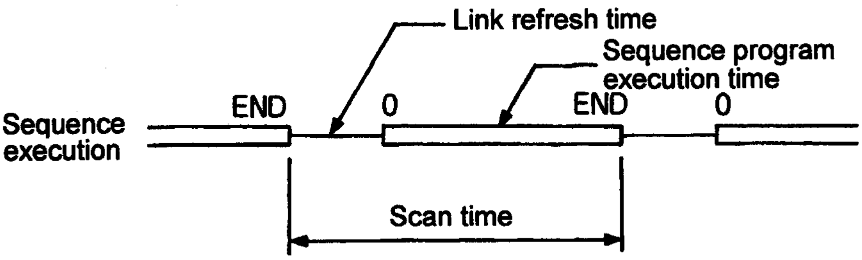
(2) The link refresh timing for the following modules is the same as the link refresh timing for the CPU module used as the master station for the first tier

- A1SJ71AT21B
- AJ71AT21B
- A1SJ71AP21/R21
- AJ71AP21/R21
- AJ71AP21-S3
- AJ71P22/R22
- AJ71AP22/R22

(3) A link scan does not influence the processing time (example: ACPU scan time) of a master station or local station. It is executed in parallel with master and local station processing.

(4) The processing time (scan time) of the master and local stations is increased by the link refresh time.

The following chart shows an example of executing link refresh processing after END processing.



(5) Link data communication is possible in any of the following ACPU states: RUN, STOP, PAUSE, SETP-RUN.

6.1.3 Link data during a communication error

The following describes how link data is processed when a communication error occurs.

- At the master station or local station at which the communication error occurred, operation processing continues and the data is maintaining as it was just before the occurrence of the communication error.
- If the communication error occurs with an output module loaded to a remote I/O station, all output points are turned OFF.
- In the link device range of a normally operating station at which link data is received from a station at which a communication error has occurred, the data is maintained as it was just before the occurrence of the communication error. Operation processing is executed with this data.

The following describes how the link data is processed according to the station (master, local, or remote I/O station) at which a communication error has occurred.

(1) When a communication error occurs at a master station

(a) Communications with all slave stations (local and remote I/O stations) are stopped.

(b) At the master station at which the communication error occurred, either M9210 is turned ON or "5" is set to D9204.

The data received from a slave station is maintained as it was just before the occurrence of the communication error. Operation processing is executed with this data.

In the special relays (M9224 to M9239) and special registers (D9202 to D9242) of the master station, the data is maintained as it was just before the occurrence of the communication error.

(c) At the local stations, M9250 and M9251 are turned ON.

At devices in the range of the data link, data is maintained as it was just before the occurrence of the communication error.

Operation processing is executed with this data.

(d) At the remote I/O stations, all of the output points of the output modules and special function modules loaded to that station are turned OFF.

(2) When a communication error occurs at a local station

(a) At the local station at which the communication error occurred, either M9211 is turned ON or M9250 and M9251 are turned ON.

Communication with normally operating stations continues.

In the special relays (M9240 to M9255) and special registers (D9243 to D9255) of the local station, the data is maintained as it was just before the occurrence of the communication error.

(b) The master station recognizes the station number at which the communication error has occurred by reading the data in M9237 and D9228 to D9231.

At the link devices which receive data from the local station at which the communication error has occurred, the data is maintained as it was just before the occurrence of communication error.

(c) Normally operating local stations recognize the station number at which the communication error has occurred by reading the data in M9255 and D9252 to D9255.

At the link devices which receive data from the local station at which the communication error has occurred, the data is maintained as it was just before the occurrence of communication error.

(d) All remote I/O stations operate normally.

(3) When a communication error occurs at a remote I/O station

(a) At the remote I/O station, all of the output points of the output modules and special function modules loaded to that station are turned OFF.

(b) The master station recognizes the station number at which the communication error has occurred by reading the data in M9231 and D9228 to D9231.

At the link devices which receive data from the local station at which the communication error has occurred, the data is maintained as it was just before the occurrence of communication error.

(c) All local stations operate normally.

6.2 Transmission Delay Time in Two-tier System

Calculate the transmission delay time in MELSECNET and MELSECNET/B data link system using the following times for the formulas given in Section 6.3.1.

- Link refresh processing time required for the master, local, and remote I/O stations
- Link scan time
- Scan time required for the master and local stations

(1) Link refresh processing time required for the master, local, and remote I/O stations

Link refresh processing time is required for link refresh (see Section 6.1.1).

Calculate the link refresh processing time using the formulas given in Section 6.2.2.

(2) Link scan time

Link scan time is required for link scan (see Section 6.1.1).

Calculate the link scan time using the formulas given in Section 6.2.2.

When data link is being executed, link scan time can be checked by monitoring link or data link special registers (D9207 to D9209) with a peripheral device.

(3) Scan time required for the master and local stations

Scan time is defined as the time required for operating a sequence program from step 0 to the next step 0.

It can be checked by monitoring ladder or special registers (D9017 to D9019) with a peripheral device.

REMARK

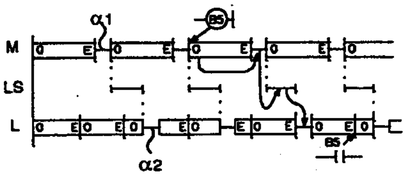
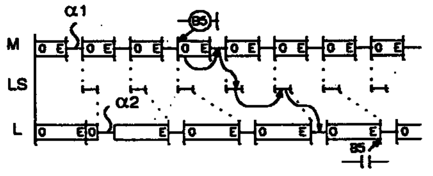
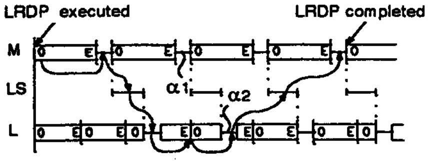
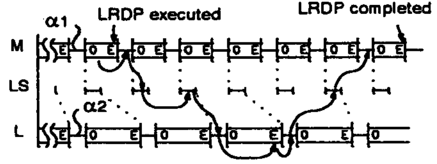
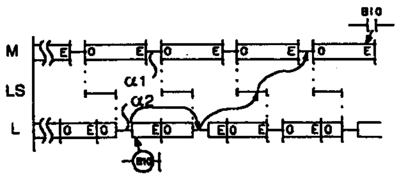
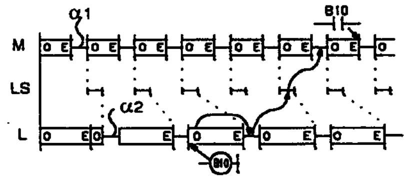
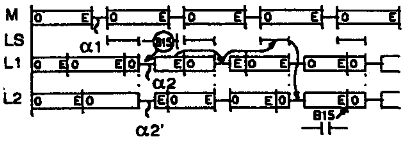
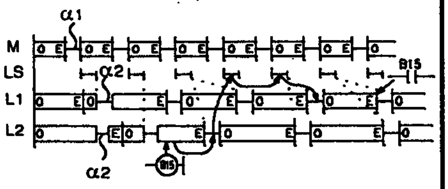
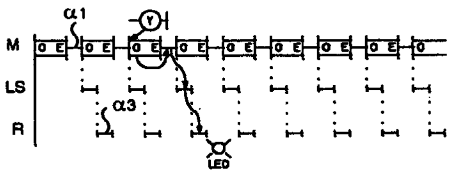
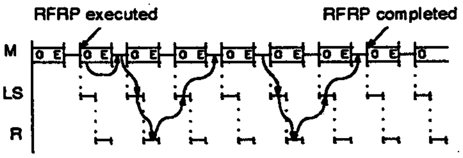
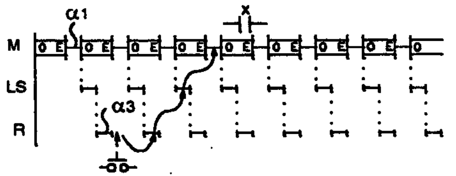
1) Refer to Section 9.3.1 for details of the data link special registers.
2) Refer to the ACPU Programming Manual (Common Instructions) for details of the special registers (D9017 to D9019).

6.2.1 Transmission delay time in a two-tier system

This section indicates the maximum transmission delay times in a data link in a data link system.

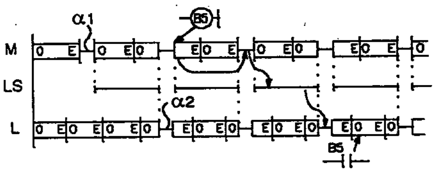
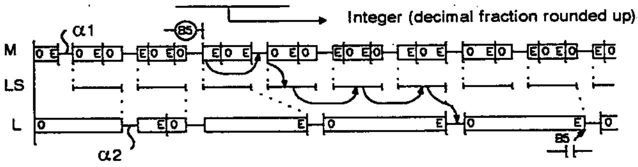
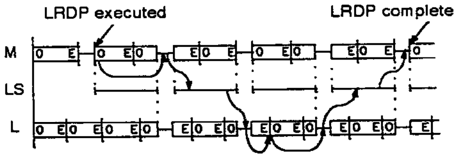
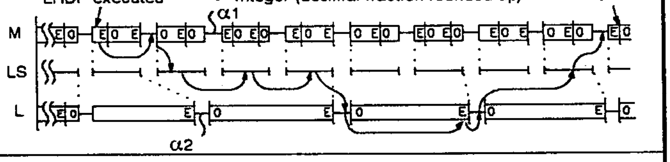
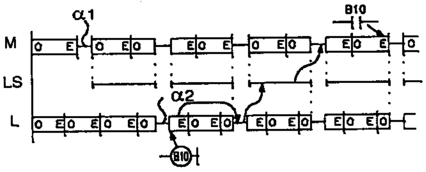
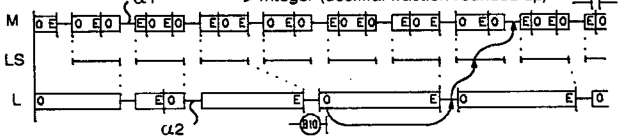
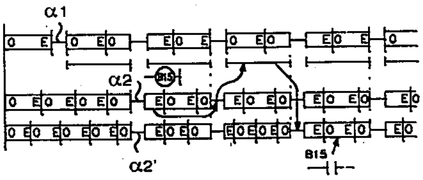
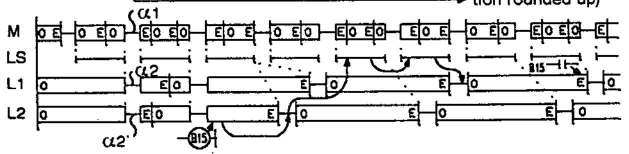
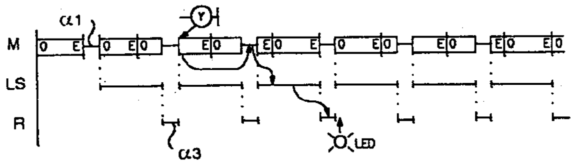
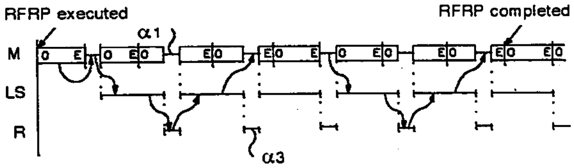
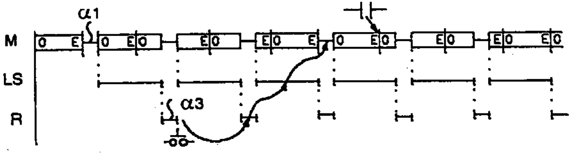
(1) The following table indicates the transmission delay times when the CPU used is of the type that immediately makes a link refresh after a link scan.

Table 6.2 Maximum Transmission Delay Time

		L < LS < M, LS < L < M	LS < M < L
Master station to local station	Link relay (B) Link register (W) Output (Y)	$M + \alpha_1 + LS + \alpha_2 + L$  	$M + \alpha_1 + (L + \alpha_2) \times 2$ 
	LRDP instruction LWTP instruction	$M \times 4 + \alpha_1 \times 4$  	$(M + \alpha_1) \times 2 + (M + \alpha_1) \times \left(\frac{(L + \alpha_2) \times 2}{M + \alpha_1}\right)$ Integer (decimal fraction rounded up) 
Local station to Master station	Link relay (B) Link register (W) Input (Y)	$M \times 4 + \alpha_1 \times 3 - LS - \alpha_2$  	$M \times 2 + \alpha_1 + (L + \alpha_2) \times 2 - LS$ 
Local station to Local station	Link relay (B) Link register (W)	$M \times 2 + \alpha_1 \times 2 - \alpha_2 + \alpha_2' + L2$  	$(L2 + \alpha_2) \times 2 + (L1 + \alpha_2') \times 2$ 
Master station to Remote I/O station	Output (Y)	$M + \alpha_1 + LS + \alpha_3$	
	RFRP instruction RTOP instruction	$M \times 6 + \alpha_1 \times 6$	
Remote I/O station to Master station	Input (X)	$M \times 4 + \alpha_1 \times 3 - \alpha_3 - LS$	

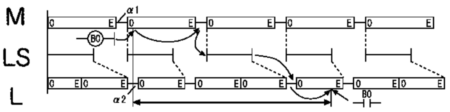
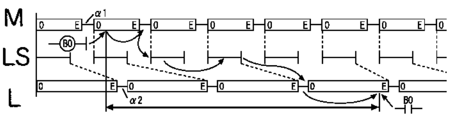
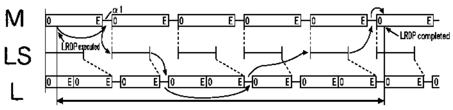
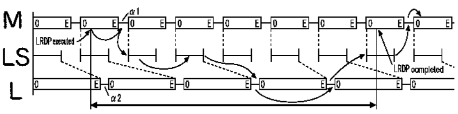
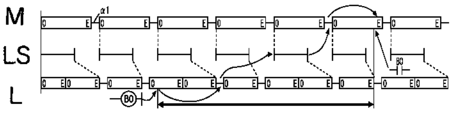
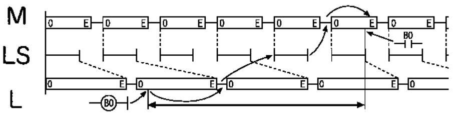
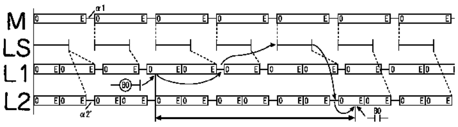
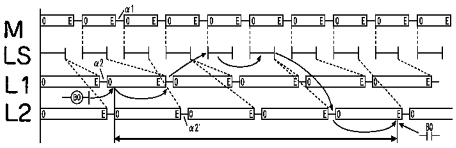
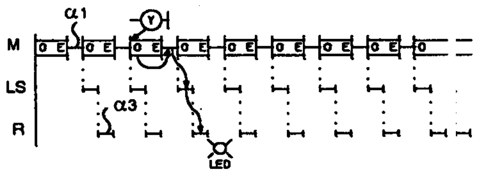
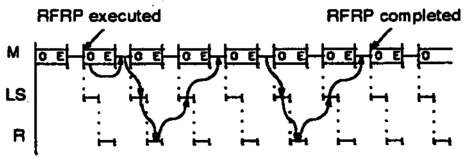
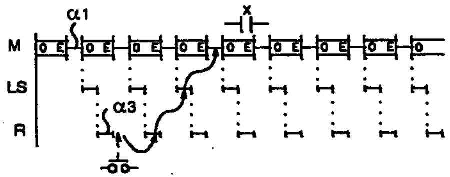
M : Sequence Program scan time in the master station
L : Sequence program scan time in a local station
LS: Data communication (send/receive) time

α1 : Link refresh time for the master station
α2: Link refresh time for a local station
α3: Link refresh time for a remote I/O station

M < L < LS, L < M < LS	M < LS < L
$LS \times 2 + \alpha_1 + \alpha_2 + L$ 	$LS + \alpha_1 + L + \alpha_2 + \underbrace{\left(\frac{L + \alpha_2 - \alpha_1}{LS + \alpha_1}\right)}_{\text{Integer (decimal fraction rounded up)}} \times (LS + \alpha_1)$ 
$LS \times 4 + \alpha_1 \times 4$ 	$(LS + \alpha_1) \times 2 + \underbrace{\left(\frac{L + \alpha_2}{LS + \alpha_1}\right)}_{\text{Integer (decimal fraction rounded up)}} \times (LS + \alpha_1) + M$ 
$M + \alpha_1 \times 3 + LS \times 2 - \alpha_2$ 	$(LS + \alpha_1) \times 2 + M + \underbrace{\left(\frac{L + \alpha_2 - \alpha_1}{LS + \alpha_1}\right)}_{\text{Integer (decimal fraction rounded up)}} \times (LS + \alpha_1) + \alpha_1$ 
$LS \times 2 + \alpha_1 \times 2 + LS + \alpha'_2 - \alpha_2$ 	$LS \times 2 + \alpha_1 + \underbrace{\left(\frac{LS + \alpha_2 - \alpha_1}{LS + \alpha_1}\right) \times (LS + \alpha_1) + \left(\frac{L1 + \alpha'_2 - \alpha_1}{LS + \alpha_1}\right)}_{\text{Integer (decimal fraction rounded up)}} \times (LS + \alpha_1) + \alpha_2 + L1$ 
$LS \times 2 + \alpha_1 + \alpha_3$	
$M + LS \times 5 + \alpha_1 \times 6$	
$M + LS \times 2 + \alpha_1 \times 3 - \alpha_3$	

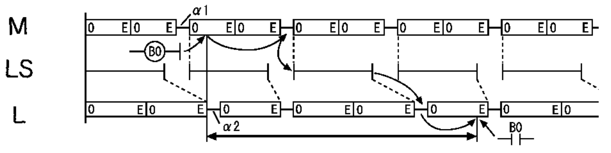
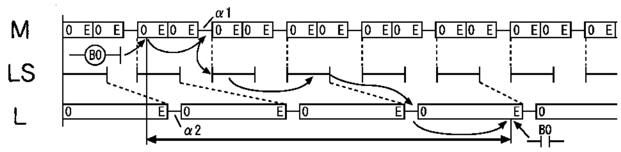
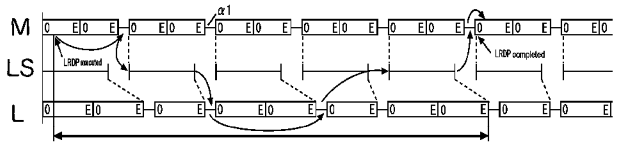
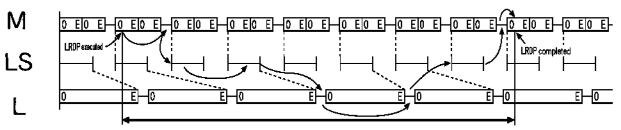
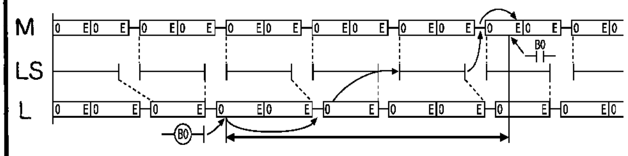
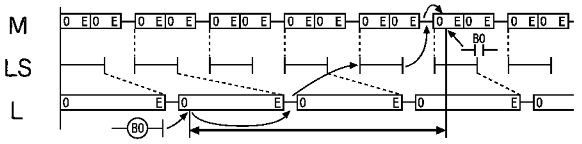
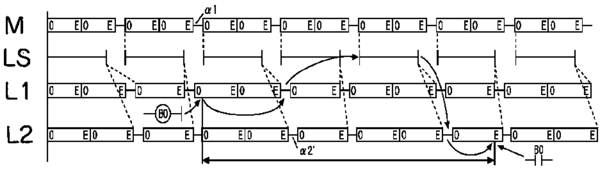
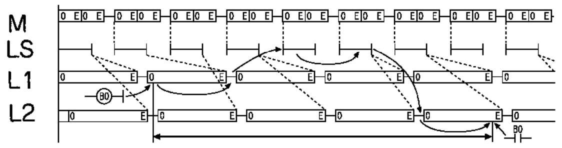
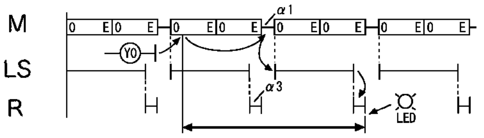
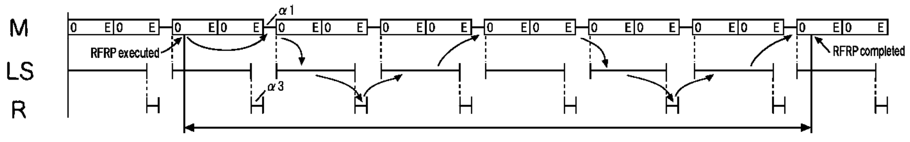
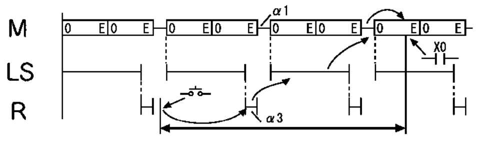
(2) The following table indicates the transmission delay times when the CPU used is of the type that makes a link refresh after END processing.

Table 6.3 Maximum Transmission Delay Time

		L < LS < M, LS < L < M	**LS < M < L**
Master station to local station	**Link relay (B)** **Link register (W)** **Output (Y)**	$M+\alpha 1+LS+L\times 2+\alpha 2$ 	$M+\alpha 1+L\times 3+\alpha 2\times 2$ 
	LRDP instruction **LWTP instruction**	$M\times 5+\alpha 1\times 5$ 	$(M+\alpha 1)\times 3+(L+\alpha 2)\times 3$ 
Local station to Master station	**Link relay (B)** **Link register (W)** **Input (Y)**	$M\times 4+\alpha 1\times 3+L$ 	$M\times 3+\alpha 1\times 2+L+\alpha 2$ 
Local station to Local station	**Link relay (B)** **Link register (W)**	$M\times 2+\alpha 1\times 2+L1+LS+L2\times 2+\alpha 2'$ 	$M+\alpha 1+L1+\alpha 2+L2\times 3+\alpha 2'\times 2$ 
Master station to Remote I/O station	**Output (Y)**	$M+\alpha_1+LS+\alpha_3$ 	
	RFRP instruction **RTOP instruction**	$M\times 6+\alpha_1\times 6$ 	
Remote I/O station to Master station	**Input (X)**	$M\times 4+\alpha_1\times 3-\alpha_3-LS$ 	

M : Sequence Program scan time in the master station
L : Sequence program scan time in a local station
LS: Data communication (send/receive) time

α1: Link refresh time for the master station
α2: Link refresh time for a local station
α3: Link refresh time for a remote I/O station

M < L < LS, L < M < LS	M < LS < L
M+ α1 +LS×2+L×2+ α2 	M+ α1 +LS+L×3+ α2×2 
(M+ α1)×5+LS×5 	(M+ α1)×3+LS×3+(L+ α2)×3 
M×4+ α1×3+LS×3+L 	M×3+ α1×2+LS×2+L+ α2 
(M+ α1)×2+LS×3+L1+L2×2+ α2' 	M+ α1+LS+L1+ α2+L2×3+ α2'×2 
M+ α1 +LS×2+ α3	
(M+ α1)×6+LS×6	
M×3+ α1×2+LS×2	

6.2.2 Link refresh time

The following describes the method used for calculating the link refresh processing time:

The symbols used for calculating the link refresh processing time are listed below:

B : Total number of link relays (B) used in all stations
W : Total number of link registers (W) used in all stations
X_0 : Total number of link inputs (X) allocated to the master station
Y_0 : Total number of link outputs (Y) allocated to the master station
X_1 : Total number of link inputs (X) allocated to the station in question
Y_1 : Total number of link outputs (Y) allocated to the station in question
α_1 to α_3 : Link refresh time
K_{M1}, K_{L1}, K_{R1} : Constants
K_{M2}, K_{L2}, K_{R2} : Bit-device constants
K_{M3}, K_{L3} : Word-device constants

When a MELSECNET Data Link System is used

(1) Master station

Use the following formula to calculate the link refresh time α_1 required for the master station:

$$\alpha_1 = k_{M1} + k_{M2} \times \frac{B + X_0 + Y_0}{2048} + k_{M3} \times \frac{W}{1024} \text{[ms]}$$

When the link operates in the MELSECNET II mode or the MELSECNET II composite mode, the total number of link relays (B) and link registers (W) is the sum of the link relays (B) and link registers (W) points set with the first half and the second half link parameter.

	Module Name		K_{M1}	K_{M2}	K_{M3}
Master station for the second tier	A0J2HCPUP21/R21	—	1.59	1.11	5.02
	AnNCPUP21/R21	—	0.8	1.0	4.1
	A2ACPUP21/R21(S1)	—	0.26	0.18	1.45
	A3ACPUP21/R21	—	0.20	0.14	1.09
	—	AnNCPUP21/R21+AJ71AP21(S3)/R21	0.8	1.0	4.1
	—	A2ACPU(S1)+AJ71AP21(S3)/R21	0.26	0.18	1.45
	—	A3ACPU+AJ71AP21(S3)/R21	0.20	0.14	1.09
	—	A2UCPU(S1)+AJ71AP21(S3)/R21	0.26	0.18	1.45
	—	A3UCPU+AJ71AP21(S3)/R21	0.20	0.14	1.09
	—	A4UCPU+AJ71AP21(S3)/R21	0.20	0.14	1.09
	—	A1SCPU+A1SJ71AP21/R21	1.52	1.53	6.57
	—	A1SJCPU-S3+A1SJ71AP21/R21	1.14	1.53	6.68
	—	A2SCPU+A1SJ71AP21/R21	1.06	1.49	6.60
	—	A1SHCPU+A1SJ71AP21/R21	0.55	0.51	3.82
	—	A1SJHCPU+A1SJ71AP21/R21	0.55	0.51	3.82
	—	A2SHCPU+A1SJ71AP21/R21	0.56	0.58	4.20
	—	A2CCPUP21/R21	1.59	1.11	5.02
	—	A2ASCPU(S1)+A1SJ71AP21/R21	0.66	0.64	4.38
	—	A2USHCPU-S1+A1SJ71AP21/R21	0.45	0.51	4.31
	—	Q2ASCPU(S1)+A1SJ71AP21/R21	0.95	0.51	4.53
	—	Q2ASHCPU(S1)+A1SJ71AP21/R21	0.51	0.53	4.18
	—	Q2ACPU(S1)+AJ71AP21(S3)/R21	0.97	0.51	4.56
	—	Q3ACPU+AJ71AP21(S3)/R21	0.81	0.61	4.37
	—	Q4ACPU+AJ71AP21(S3)/R21	0.43	0.82	4.54

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	o	o	o			

	Module Name		K_{M1}	K_{M2}	K_{M3}
Master station for the third tier	AnNCPUP21/R21	——	0.8	1.2	6.4
	A2ACPUP21/R21(S1)	——	0.54	0.54	4.32
	A3ACPUP21/R21	——	0.48	0.52	4.16
	——	AnNCPUP21/R21+AJ71AP21(S3)/R21	0.8	1.2	6.4
	——	A2ACPU(S1)+AJ71AP21(S3)/R21	0.54	0.54	4.32
	——	A3ACPU+AJ71AP21(S3)/R21	0.48	0.52	4.16
	——	A2UCPU(S1)+AJ71AP21(S3)/R21	0.54	0.54	4.32
	——	A3UCPU+AJ71AP21(S3)/R21	0.48	0.52	4.16
	——	A4UCPU+AJ71AP21(S3)/R21	0.48	0.51	4.16
	——	A2ASCPU(S1)+A1SJ71AP21/R21	0.34	1.02	4.42
	——	A2USHCPU-S1+A1SJ71AP21/R21	0.28	0.41	4.02
	——	Q2ASCPU(S1)+A1SJ71AP21/R21	0.43	1.28	5.30
	——	Q2ASHCPU(S1)+A1SJ71AP21/R21	0.28	0.83	4.17
	——	Q2ACPU(S1)+AJ71AP21(S3)/R21	0.50	1.12	5.26
	——	Q3ACPU+AJ71AP21(S3)/R21	0.39	1.00	5.83
	——	Q4ACPU+AJ71AP21(S3)/R21	0.45	0.82	3.89

POINT

Two types of link refresh are executed for the master station for the third tier: link refresh as a local station in the second tier and link refresh as a master station for the third tier.

(2) Local stations

Use the following formula to calculate the link refresh time α2 required for a local station:

$$\alpha_2 = K_{L1} + K_{L2} \times \frac{B + X_1 + Y_1}{2048} + K_{L3} \times \frac{W}{1024} \text{[ms]}$$

When the link operates in the MELSECNET II mode or the MELSECNET II composite mode, the total number of link relays (B) and link registers (W) is the sum of the link relays (B) and link registers (W) points set with the first half and the second half link parameter.

Module Name		K_{L1}	K_{L2}	K_{L3}
AnNCPUP21(S3)/R21	———	0.4	1.0	4.1
A2ACPUP21(S3)/R21(S1)	———	0.16	0.18	1.45
A3ACPUP21(S3)/R21	———	0.13	0.14	1.09
———	AnNCPUP21/R21+AJ71AP21(S3)/R21	0.4	1.0	4.1
———	A2ACPU(S1)+AJ71AP21(S3)/R21	0.16	0.18	1.45
———	A3ACPU+AJ71AP21(S3)/R21	0.13	0.14	1.09
———	A2UCPU(S1)+AJ71AP21(S3)/R21	0.16	0.18	1.45
———	A3UCPU+AJ71AP21(S3)/R21	0.13	0.14	1.09
———	A4UCPU+AJ71AP21(S3)/R21	0.13	0.14	1.09
———	A0J2HCPUP21/R21	1.00	1.20	5.05
———	A1SCPU+A1SJ71AP21/R21	1.09	1.36	6.53
———	A1SJCPU-S3+A1SJ71AP21/R21	0.77	1.30	6.58
———	A2SCPU+A1SJ71AP21/R21	0.65	1.44	6.54
———	A1SHCPU+A1SJ71AP21/R21	0.30	0.59	3.86
———	A1SJHCPU+A1SJ71AP21/R21	0.30	0.59	3.86
———	A2SHCPU+A1SJ71AP21/R21	0.32	0.64	4.23
———	A2CCPUP21/R21	1.00	1.20	5.05
———	A2ASCPU(S1)+A1SJ71AP21/R21	0.47	0.64	4.41
———	A2USHCPU-S1+A1SJ71AP21/R21	0.29	0.51	4.05
———	Q2ASCPU(S1)+A1SJ71AP21/R21	0.78	0.59	4.51
———	Q2ASHCPU(S1)+A1SJ71AP21/R21	0.34	0.54	4.20
———	Q2ACPU(S1)+AJ71AP21(S3)/R21	0.80	0.55	4.53
———	Q3ACPU+AJ71AP21(S3)/R21	0.74	0.50	4.28
———	Q4ACPU+AJ71AP21(S3)/R21	0.31	0.68	4.36

(3) Remote I/O stations

Use the following formula to calculate the link refresh time α3 required for a remote I/O station:

$$\alpha_3 = K_{R1} + K_{R2} \times \frac{X_1 + Y_1}{256} \text{ [ms]}$$

Module Name	K_{R1}	K_{R2}
AJ72P25(S3)/R25	0.6	0.9

When a MELSECNET/B Data Link System is used

(1) Master station

Use the following formula to calculate the link refresh time α1 required for a master station:

When the link operates in the MELSECNET II mode or the MELSECNET II composite mode, the total number of link relay (B) and link register (W) points is the sum of the link relay (B) and link register (W) points set with the first half and second half link parameters.

$$\alpha_1 = K_{M1} + K_{M2} \times \frac{B + X_0 + Y_0}{2048} + K_{M3} \times \frac{W}{1024} \text{[ms]}$$

	Module Name		K_{M1}	K_{M2}	K_{M3}
	CPU Module	Link Module			
Master station for the second tier	A1SCPU	A1SJ71AT21B	1.34	1.15	6.47
	A1SJCPU-S3		1.34	1.15	6.47
	A2SCPU		1.22	1.20	6.60
	A1SHCPU		0.62	0.48	3.79
	A1SJHCPU		0.62	0.48	3.79
	A2SHCPU		0.51	0.64	4.24
	A2ASCPU(S1)		0.69	0.47	4.38
	A2USHCPU-S1		0.44	0.51	4.05
	Q2ASCPU(S1)		0.95	0.68	4.60
	Q2ASHCPU(S1)		0.49	0.60	4.21
	AnNCPU	AJ71AT21B	0.8	1.0	4.1
	A2ACPU(S1)		0.26	0.18	1.45
	A3ACPU		0.20	0.14	1.09
	A2UCPU(S1)		0.26	0.18	1.45
	A3UCPU		0.20	0.14	1.09
	A4UCPU		0.20	0.14	1.09
	Q2ACPU(S1)		0.94	0.70	4.61
	Q3ACPU		0.91	0.52	4.24
	Q4ACPU		0.54	0.56	4.17
Master station for the third tier	A2ASCPU(S1)	A1SJ71AT21B	0.38	0.93	4.29
	A2USHCPU-S1		0.26	0.81	4.00
	Q2ASCPU(S1)		0.48	1.50	4.98
	Q2ASHCPU(S1)		0.31	0.98	4.39
	AnNCPU	AJ71AT21B	0.8	1.2	6.4
	A2ACPU(S1)		0.54	0.54	4.32
	A3ACPU		0.48	0.52	4.16
	A2UCPU(S1)		0.54	0.54	4.32
	A3UCPU		0.48	0.52	4.16
	A4UCPU		0.48	0.52	4.16
	Q2ACPU(S1)		0.48	1.50	4.98
	Q3ACPU		0.40	1.20	4.65
	Q4ACPU		0.31	0.98	4.39

POINT

At the master station for the third tier, link refresh processings for local stations for the second tier and master station for the third tier are executed.

(2) Local stations

Use the following formula to calculate the link refresh time α2 required for a local station:

When the link operates in the MELSECNET II mode or the MELSECNET II composite mode, the total number of link relay (B) and link register (W) points is the sum of the link relay (B) and link register (W) points set with the first half and second half link parameters.

$$\alpha_2 = K_{L1} + K_{L2} \times \frac{B + X_1 + Y_1}{2048} + K_{L3} \times \frac{W}{1024} \text{[ms]}$$

Module Name		K_{L1}	K_{L2}	K_{L3}
CPU Module	**Link Module**			
A1SCPU	A1SJ71AT21B	0.82	1.18	6.52
A1SJCPU-S3		0.82	1.18	6.52
A2SCPU		0.86	0.98	6.43
A1SHCPU		0.33	0.64	3.86
A1SJHCPU		0.33	0.64	3.86
A2SHCPU		0.32	0.67	4.22
A2ASCPU(S1)		0.47	0.54	4.22
A2USHCPU-S1		0.29	0.54	4.04
Q2ASCPU(S1)		0.76	0.69	4.50
Q2ASHCPU(S1)		0.41	0.51	4.13
AnNCPU	AJ71AT21B	0.4	1.0	4.1
A2ACPU(S1)		0.16	0.18	1.45
A3ACPU		0.13	0.14	1.09
A2UCPU(S1)		0.16	0.18	1.45
A3UCPU		0.13	0.14	1.09
A4UCPU		0.13	0.14	1.09
Q2ACPU(S1)		0.80	0.59	4.56
Q3ACPU		0.71	0.57	4.31
Q4ACPU		0.38	0.56	4.19

(3) Remote I/O stations

Use the following formula to calculate the link refresh time α3 required for a remote I/O station:

$$\alpha 3 = K_{R1} + K_{R2} \times \frac{X_1 + Y_1}{256} \text{[ms]}$$

Type	K_{R1}	K_{R2}
A1SJ71T25B	0.04	0.8
AJ71T25B		

6.2.3 Link data communication time (link scan)

When a MELSECNET Data Link System is used

(1) In the MELSECNET mode

LS = K + K_R x (Total number of remote I/O stations) + K_L x (Total number of local stations) + K_B [ms]

(2) In the MELSECNET II mode

LS = K + K_L x [Total number of local stations +
Number of local stations allocated to second half link parameters] + K_B [ms]

(3) In the MELSECNET II composite mode

LS = K + K_R x [Total number of remote I/O stations] + K_L [Total number of local stations +
Number of local stations allocated to second half link parameters] + K_B [ms]

(4) K and KL in the calculation expression change depending on the communication speed of the MELSECNET/B data link system.
Use the following table to obtain them.

[ms]

Communication speed setting	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	2.8

(5) Calculate the total number of link points (bytes) and use the following graph to obtain the K_B value.

$$\text{Total number of link points} = \frac{B+X_0+Y_0+(W \times 16)}{8192}$$

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability				o	o	o

When a MELSECNET/B Data Link System is used

(1) In the MELSECNET mode

$LS = K + K_R \times$ (Total number of remote I/O stations) $+ K_L \times$ (Total number of local stations) $+ K_B$ [ms]

(2) In the MELSECNET II mode

$LS = K + K_L \times$ [Total number of local stations +
Number of local stations allocated to second half link parameters] $+ K_B$ [ms]

(3) In the MELSECNET II composite mode

$LS = K + K_L \times$ [Total number of local stations +
Number of local stations allocated to second half link parameters] $+ K_B$ [ms]

(4) The following table gives the K and K_L values (used in the above formulas).

(These values vary depending on the communication speed setting.)

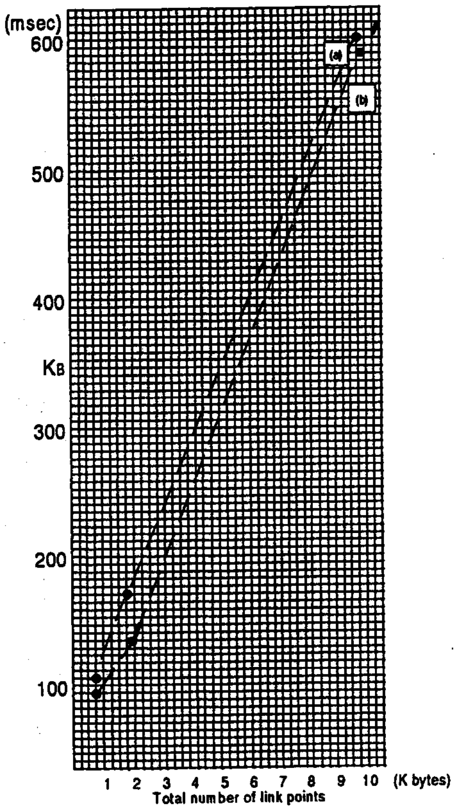
[ms]

Communication Speed	Constant	Total Number of Local 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
250K	K	5.8	6.3	6.8	7.3
	K_L	3.1	3.1	3.2	3.2
500K	K	5.8	6.3	6.8	7.3
	K_L	2.7	2.7	2.8	2.8
1M	K	5.8	6.3	6.8	7.3
	K_L	2.6	2.6	2.7	2.7

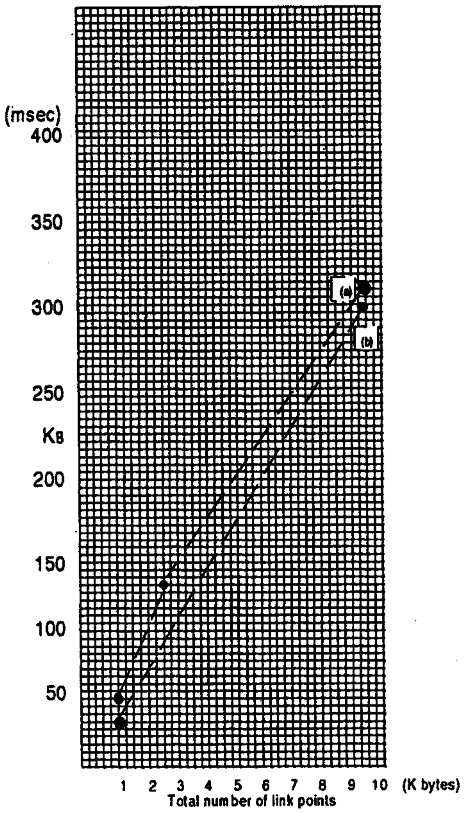
(5) Calculate the total number of link points (bytes), and use one of the graphs shown on the next page to obtain the K_B value.

$$\text{(Total number of link points)} = \frac{B + X_0 + Y_0 + (W + 16)}{8192}$$

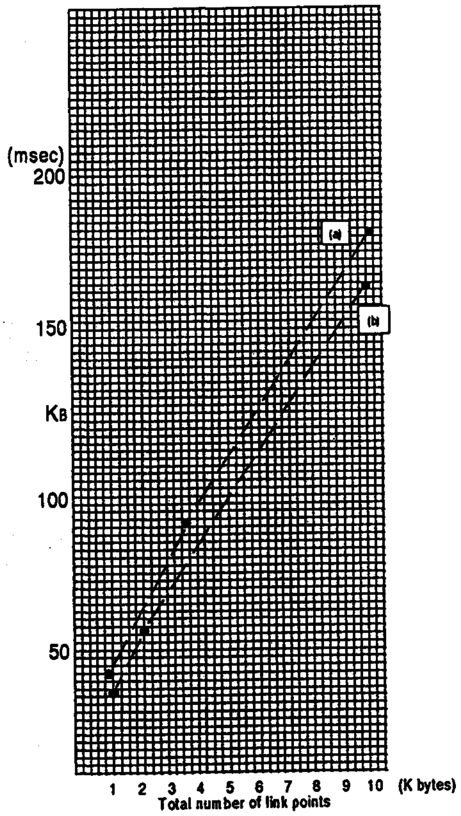
(1) Baud rate is set to 125K bps



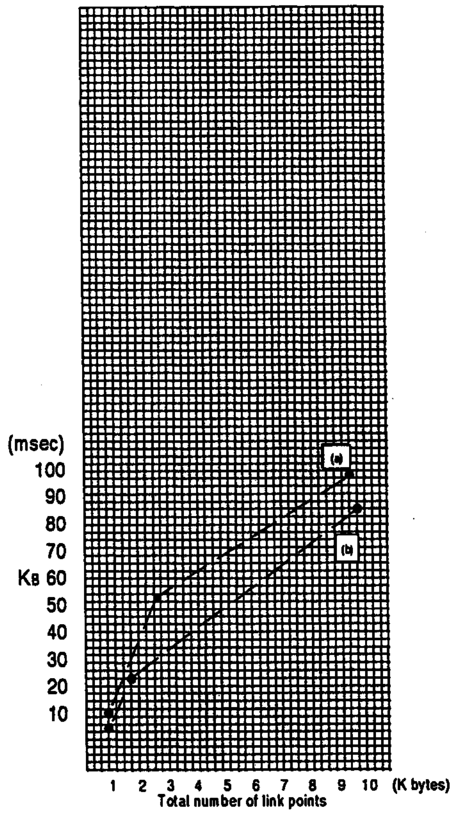
(2) Baud rate is set to 250K bps



(3) Baud rate is set to 500K bps



(4) Baud rate is set to 1M bps



6.3 Transmission Delay Time in Three-tier System

Calculate the transmission delay time for a three-tier system by adding the following delay factors to the transmission delay time obtained for the two-tier system.

(1) The transmission delay time between the master station for the second tier/local station in the second tier and the master station for the third tier.

Use the formulas in Section 6.2.3 to obtain this delay time.

(2) The transmission delay time between the master station for the third tier and the local station in the third tier.

Use the formulas in Section 6.2.3 to obtain this delay time.

(3) The time required for sending the data received from the second tier to the third tier.

Add either the scan time for the master station for the third tier or the link scan time for the third tier, whichever is longer.

However, if the master station for the third tier has selected the mode in which the link refresh is executed after the execution of an END instruction and the link scan time for the third tier is longer than the scan time for the master station for the third tier, add the following factor:

(Third tier scan time) + (Scan time for the master station for the third tier)

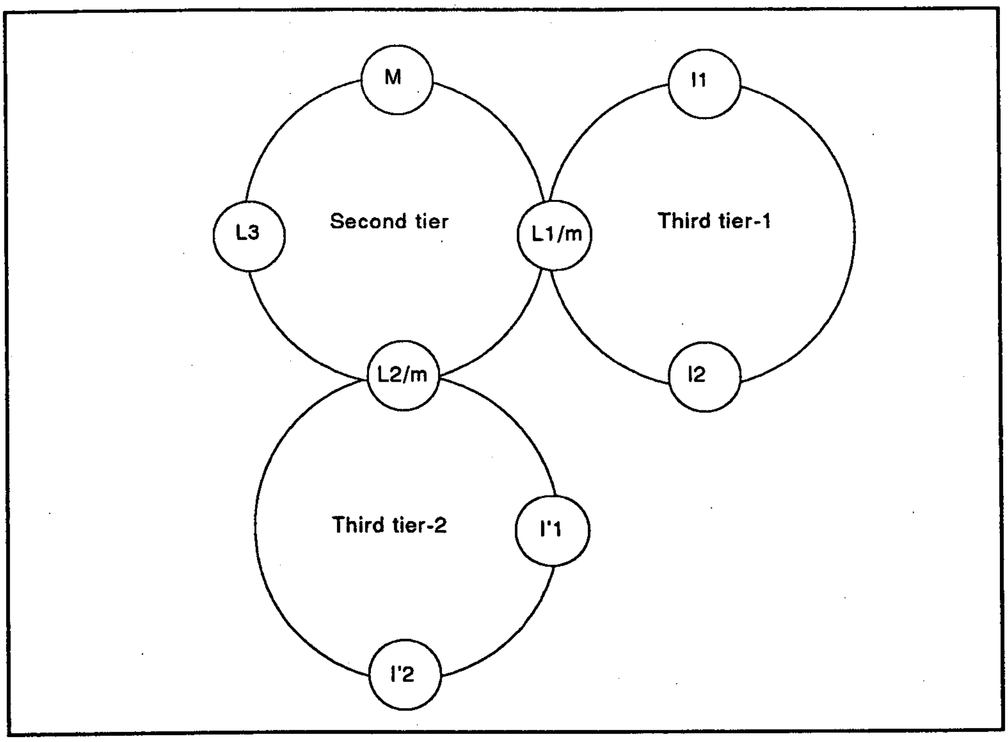


Fig. 6.2 Three-Tier System

Examples:

(1) To transmit B/W data from M to I1

(a) If (L1/m scan time) > (third tier-1 scan time)

(Transmission delay time from M to L1/m) + (Transmission delay time from L1/m to I1) + (L1/m scan time)

(b) If (L1/m scan time) < (third tier-1 scan time)

(Transmission delay time from M to L1/m) + (Transmission delay time from L1/m to I1) + (third tier-1 scan time)

(2) To transmit B/W data from I1 to M

(a) If (L1/m scan time) > (third tier-1 scan time)

(Transmission delay time from I1 to L1/m) + (Transmission delay time from L1/m to M) + (L1/m scan time)

(b) If (L1/m scan time) < (third tier-1 scan time)

(Transmission delay time from I1 to L1/m) + (Transmission delay time from L1/m to M) + (third tier-1 scan time)

(3) To transmit B/W data from I'1 to L3

(a) If (L2/m scan time) > (third tier-2 scan time)

(Transmission delay time from I'1 to L2/m) + (Transmission delay time from L2/m to L3) + (L2/m scan time)

(b) If (L2/m scan time) < (third tier-2 scan time)

(Transmission delay time from I'1 to L2/m) + (Transmission delay time from L2/m to L3) + (third tier-2 scan time)

When the master station for the third tier executes link refresh after the execution of an END instruction, add the L1/m scan time to the values obtained with calculation in Items (1)(b) or (2)(b). If Item (3)(b) was used for the calculation, add the L2/m scan time.

6.4 Time to Access Another Station from an External Device

This section describes the processing time when one station is accessed from another station.

(Section 6.2.3 gives details about the processing time of LRDP/LWTP and RFRP/RTOP.)

When a MELSECNET/B Data Link System is used, the transmission processing time varies depending on the set communication speed and the total number of stations.

To transfer a sequence program (6K steps) to another station from an external device using a MELSECNET/B Data Link System requires:

- 4 min 7 sec (Write to another station) *1
- 2 min 1 sec (Read from another station) *2
- 1 min 56 sec (Verification with another station) *2

The above data can be applied when the communication speed is set to 1M bps and the total number of stations is 32.

If either a larger sequence program is sent or the communication speed is set slower, the processing time will become longer.

If the total number of stations is less than 32, the processing time becomes shorter.

REMARKS

(1) *1: When the PC CPU (to which a sequence program is written) is set to STOP.

(2) *2: When the PC CPU is set to RUN.

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	○	○	○	○	○	○

7. DATA LINK SETTINGS

This chapter describes the setting of the number of modules and the setting of the network refresh parameters and link parameters, which are required for communications with other stations in the Data Link System.

7.1 Link Parameter Outline

Set the number of modules and the network refresh parameters only when the AnUCPU, QnACPU, A2ASCPU(S1), A2USHCPU-S1 or Q2AS(H)CPU(S1) is used.

The Data Link System can use any of the three operation modes listed below. The required operation can be selected according to the combinations of the data link modules connected in the link.

- **MELSECNET mode**
- **MELSECNET II mode**
- **MELSECNET II composite mode**

The following sections describe the link parameters to be set when using these operation modes.

Set the link parameters by using a peripheral device, and store them in the PC CPU of a master station.

Use the following peripheral devices or software (compatible with an AnACPU or later) to set link parameters for the MELSECNET II mode or the MELSECNET II composite mode:

- A6GPP + SW5GP-GPPAE system FD
- A6PHP + SW5GP-GPPAE system FD
- IBM PC/AT + SW0IX-GPPAE system FD
- GX Developer

The link parameters required to use the operation modes will be described.

POINTS

(1) For the AnUCPU, A2ASCPU(S1) or A2USHCPU-S1 use the following peripheral device or software compatible with the AnUCPU or later.
- A6GPP + SW0GP-GPPAUE system FD
- A6PHP + SW0GP-GPPAUE system FD
- GX developer

(2) For the QnACPU or Q2AS(H)CPU, use the following software compatible with the QnACPU.
- IBM PC/AT + SW0IX-GPPAUE system FD
- GX Developer

(3) **When using MELSECNET and MELSECNET/10 together, refer to the AnUCPU or QnACPU Corresponding MELSECNET/10 Reference Manual.**

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	○	○	○	○	○	○

7.2 Setting of the Number of Modules

Set the number, head I/O Nos. and others of the data link modules used with the AnUCPU, QnACPU, A2ASCPU(S1), A2USHCPU-S1 or Q2AS(H)CPU(S1).

Settings must be made to the master and local stations.

(1) Setting items

(a) Number of network modules

Set the number of data link modules used with the AnUCPU, QnACPU, A2ASCPU(S1), A2USHCPU-S1 or Q2AS(H)CPU(S1).

The setting range is 1 to 4.

(b) Valid module number for other station access

Set which module will be the target of other station access from the peripheral device (SW4GP-GPPA, SW0SRXV-GPPA, etc.) or special function module (AJ71C24-S8, AD51H-S3, etc.) incompatible with the AnUCPU, QnACPU, A2ASCPU(S1), A2USHCPU-S1 or Q2AS(H)CPU(S1).

The setting range is 1 to 4.

(c) Head I/O No.

Set the head I/O number (first three digits of four-digit hexadecimal representation) of the data link module loaded.

For example, set "5" if the I/O numbers are X/Y50 to 6F.

(d) Network module type

Select from the following the type of the data link module loaded.

5: MELSECNET II (master station)
6: MELSECNET II (local station)

(e) Network No.

This setting is not required for the MELSECNET II.

(2) Setting example

An example of setting the number of modules is given below.

(a) System configuration example

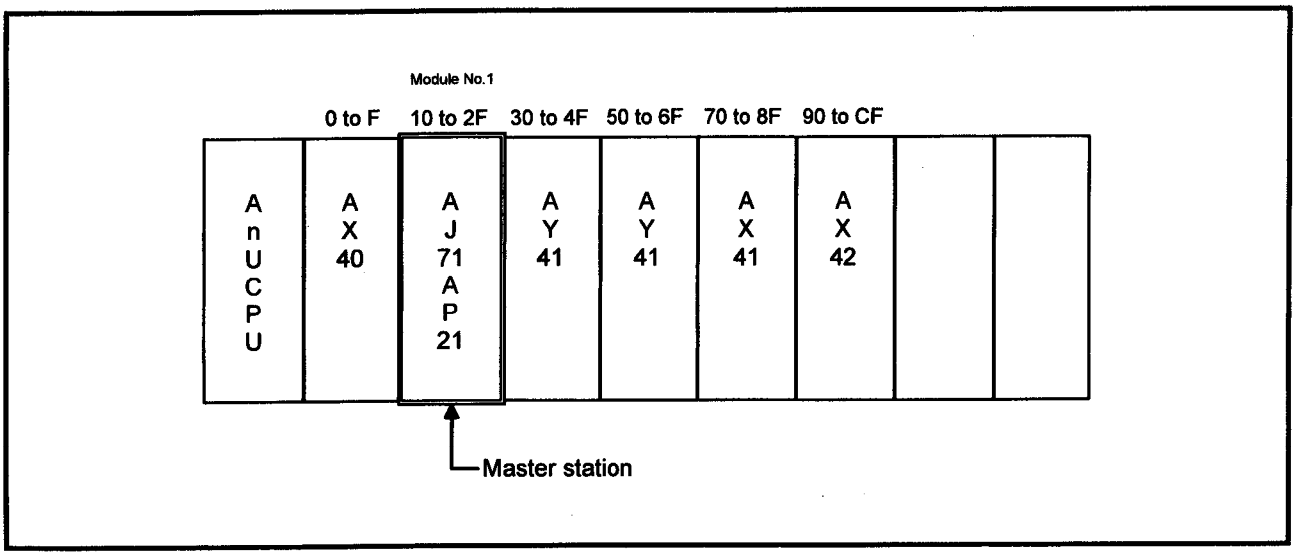
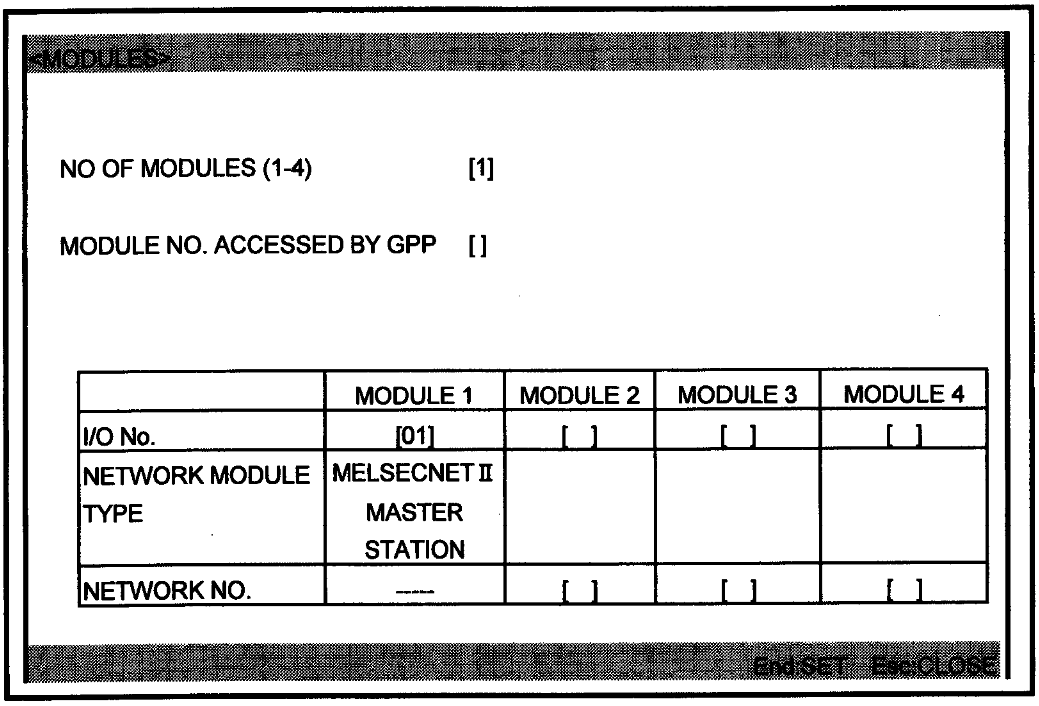


Fig. 7.1 System Configuration Example

(b) Setting screen

Fig. 7.2 shows the setting screen for the above system configuration example.



<MODULES>

NO OF MODULES (1-4) [1]

MODULE NO. ACCESSED BY GPP [ ]

	MODULE 1	MODULE 2	MODULE 3	MODULE 4
I/O No.	[01]	[ ]	[ ]	[ ]
NETWORK MODULE TYPE	MELSECNET II MASTER STATION			
NETWORK NO.	----	[ ]	[ ]	[ ]

Fig. 7.2 Screen for Setting the Number of Modules

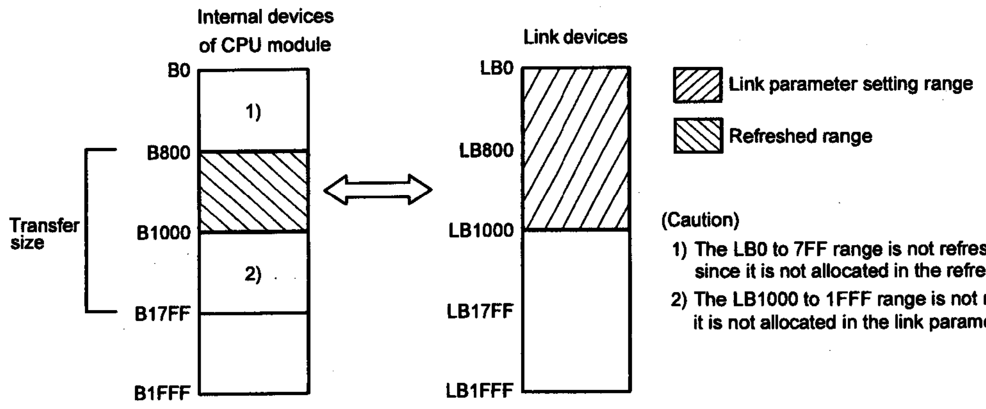
7.3 Network Refresh Parameters

The network refresh parameters are set to transfer the link device (LB, LW, LX, LY) which are stored in the data link module, to the devices that can be used in a sequence program.

In the network refresh parameters, set the head link device number of the data link module, the head device number of the AnUCPU, QnACPU, A2ASCPU(S1), A2USHCPU-S1 or Q2AS(H)CPU(S1), and the transfer size. The devices refreshed by this setting are those in the transfer size that begins with the head link device number and in the range allocated using the link parameter.

For example, LB800 to FFF of the data link module are refreshed by B800 to FFF of the AnUCPU, QnACPU, A2ASCPU(S1), A2USHCPU-S1 or Q2AS(H)CPU(S1) in the following settings.

<Network refresh parameters>
Head device No. : B800
Head link device No. : LB800
Transfer size : 4096 points (1000$_H$)
<Link parameter>
Allocation range : LB0 to FFF



(Caution)
1) The LB0 to 7FF range is not refreshed since it is not allocated in the refresh parameter.
2) The LB1000 to 1FFF range is not refreshed since it is not allocated in the link parameter.

POINT

Between data link modules, do not set the parameter for transfer between data links.
Use the parameter for transfer between data links when transferring link device data between the data link module (MELSECNET) and network module (MELSECNET/10).

(1) Default values

The default values of the network refresh parameters are allocated according to the setting of the number of modules.

No settings are required unless specific changes must be made to the default values.

Table 7.1 indicates the default values. The module Nos. correspond to the numbers in the setting of the number of modules.

Note that when a MELSECNET II data link module is loaded, it is always allocated to the area of module No. 1. If two MELSECNET II data link modules are loaded, they are allocated to the area of one module.

Table 7.1 Default Values of Network Refresh Parameters

Module / Number of Loaded Module	Module No.1	Module No.2
1	LB/LW0 to FFF→ B/W0 to FFF LX/LY0 to 7FF→ X/Y0 to 7FF	——
2	——	——

Note that when a MELSECNET II data link module is loaded, the default values of the network refresh parameters are allocated as described below.

1) Always allocated to the area of module No. 1.
2) If two MELSECNET II data link modules are loaded, they are allocated to the area of one module.
3) The MELSECNET II data link module is not refreshed since it does not have SB/SW. The data link information of the MELSECNET II is stored into M/D9200 to 9255.
4) LX/LY000 to 7FF of the MELSECNET II are allocated to the area of X/Y000 to 7FF.

For example, when network module No. 1 in the setting of the number of modules is set as the MELSECNET II master station as indicated in the example in Fig. 7.3, the default values of the network refresh parameters are allocated as described below.

1) The MELSECNET II master station set as module No. 1 in the setting of the number of modules is allocated to the area of module No. 1 indicated in Table 7.1.

	Module No. 1	**Module No. 2**	**Module No. 3**
Head I/O No.	[01]	[ ]	[ ]
Network module type	MELSECNET II master station	——	——
Network No.	——	——	——
Refresh range (Default values)	LB/LW0 to FFF→ B/W0 to FFF LX/LY0 to 7FF→ X/Y0 to 7FF	——	——

Fig. 7.3 Default Ranges of Network Refresh Parameters

(2) Setting items

As the setting items of the network refresh parameters, there are the refresh ranges of LB, LW, LX, LY, SB and SW and the setting of the error history area.

Each setting item will be described below.

Table 7.2 indicates the network refresh parameter setting items of the MELSECNET II.

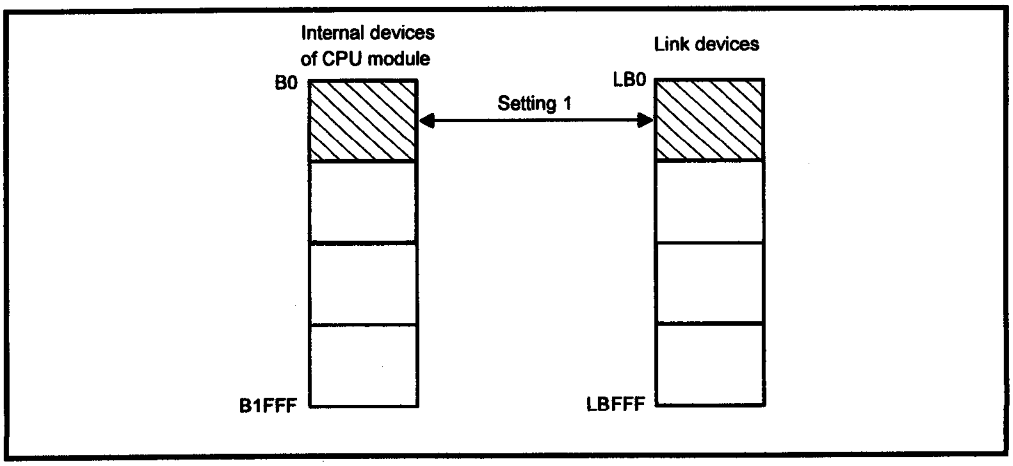
Table 7.2 Network Refresh Parameter Setting Items

Item	MELSECNET/10		MELSECNET II	
	Setting 1	Setting 2	Setting 1	Setting 2
LB ⟷ B transfer	O	O	O	×
LW ⟷ W transfer	O	O	O	×
LX ⟷ X transfer	O	O	O	×
LY ⟷ Y transfer	O	O	O	×
SB transfer device	O	×	×	×
SW transfer device	O	×	×	×
LB→ extension file register transfer	O	×	×	×
LW→ extension file register transfer	O	×	×	×
Error history area setting	O	×	×	×

O: Setting possible ×: Setting impossible

(a) Refresh range setting for LB

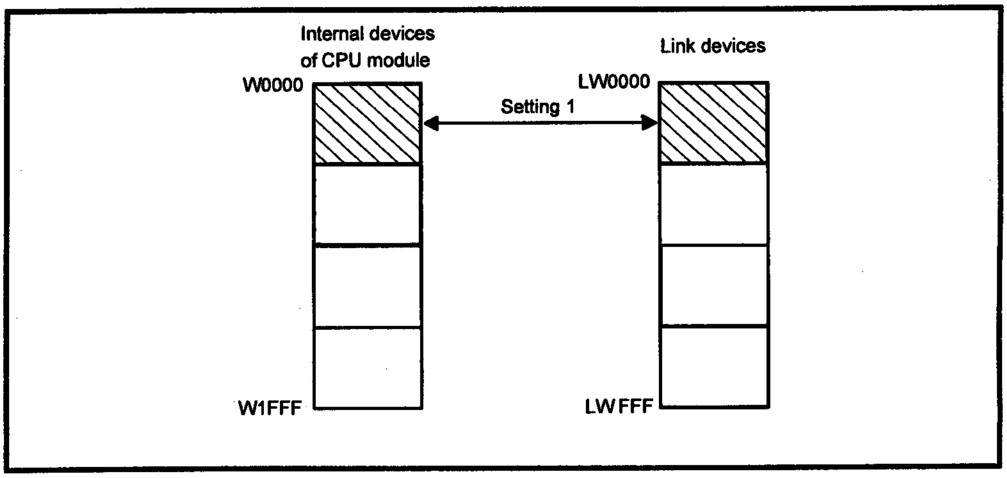
1) The refresh destinations of LB are the link relay (B).



2) The transfer size is in increments of 16 points.

(b) Refresh range setting for LW

1) The refresh destinations of LW are the link register (W).



2) The transfer size is in increments of 1 point.

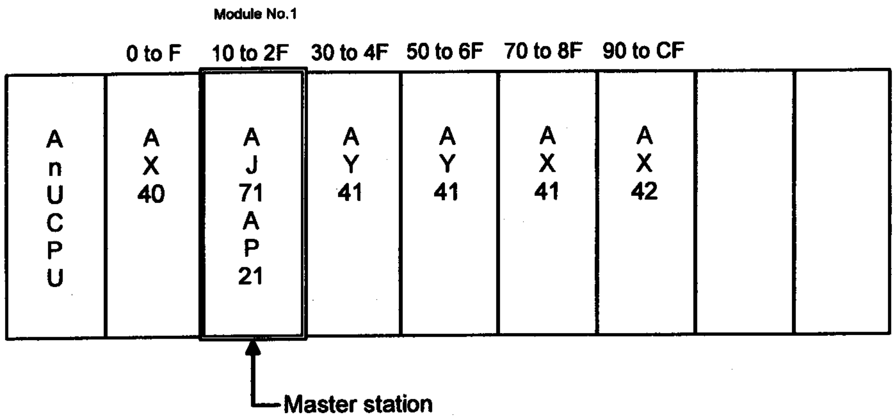
(c) Refresh range setting for LX/LY

1) The refresh destination of LX is the input (X), and that of LY is the output (Y). The actual I/O and later can be set as the refresh destination. **Since this area is also used for MELSECNET/10, MELSECNET/MINI, CC-Link, etc., make allocation without overlapping.**

2) The transfer size is in increments of 16 points.

(3) Setting example

In the system configuration exemplified in Fig. 7.4, an example of setting the network refresh parameters for allocating the refresh ranges in Table 7.3 is given below.



Setting of the number of modules

	Module No. 1	Module No. 2	Module No. 3	Module No. 4
Head I/O No.	[01]	[ ]	[ ]	[ ]
Network module type	MELSECNET II master station			
Network No.	——	[ ]	[ ]	[ ]

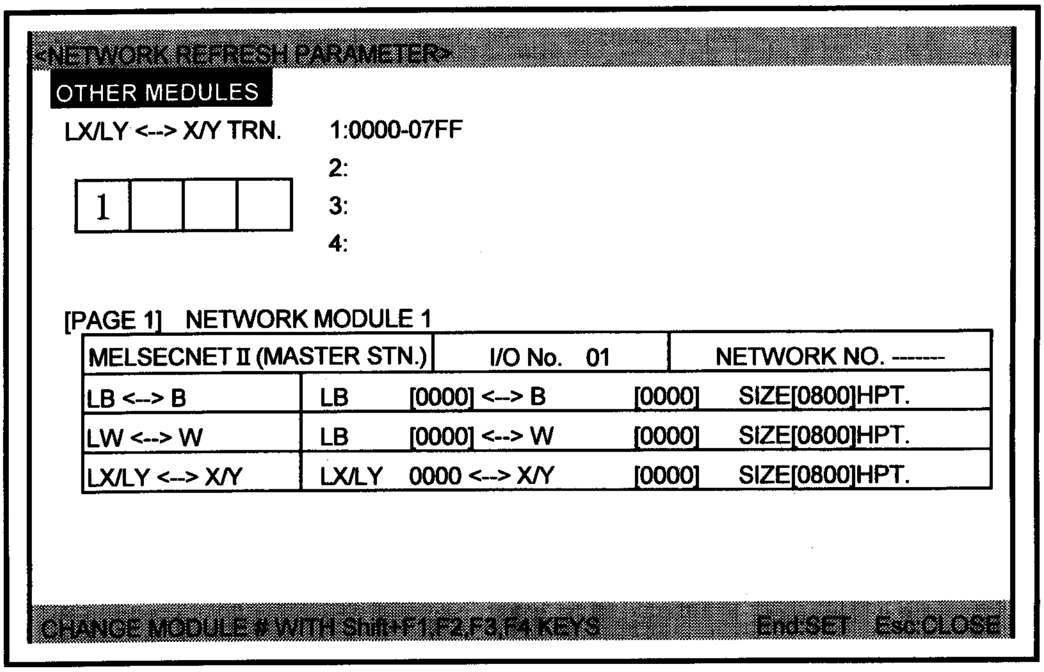
Fig. 7.4 System Configuration Example

Table 7.3 Refresh Ranges

Module Type	MELSECNET II Master Station Module No. 1	Module No. 2	Module No. 3
Refresh range	LB/LW0 to FFF→ B/W0 to FFF LX/LY0 to 7FF→ X/Y0 to 7FF	——	——

(b) Setting screens

Setting of network module No. 1



<NETWORK REFRESH PARAMETER>

OTHER MEDULES

LX/LY <--> X/Y TRN.

1:0000-07FF
2:
3:
4:

[PAGE 1] NETWORK MODULE 1

MELSECNET II (MASTER STN.)		I/O No. 01		NETWORK NO. -------	
LB <--> B	LB	[0000] <--> B	[0000]	SIZE[0800]HPT.	
LW <--> W	LB	[0000] <--> W	[0000]	SIZE[0800]HPT.	
LX/LY <--> X/Y	LX/LY	0000 <--> X/Y	[0000]	SIZE[0800]HPT.	

CHANGE MODULE # WITH Shift+F1,F2,F3,F4 KEYS End:SET Esc:CLOSE

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	○			○		

7.4 Link parameters

7.4.1 Link parameters to be set for the MELSECNET mode

When the MELSECNET mode is used, only one type of link parameter should be used.

On the LINK screen, set the data for the following items.

(1) Slave PC station

The total number of slave stations (local stations, remote I/O stations) to be connected in the link.

(2) WDT for link

Refer to Section 7.2 for details.

The watchdog time is the reference time used by the system to determine whether communication between the master station and every slave station (local stations and remote I/O stations) is being executed normally.

(3) Master station allocation

Allocate the device range (B/W0 to B/W3FF) to be used by the master station for writing data to the link relays (B) and link registers (W).

(4) Slave station type

Set the type of each slave station (local station or remote I/O station) to be connected.

(5) Local station allocation

(a) Allocate the device range (B/W0 to B/W3FF) to be used by a local station for writing data to the link relays (B) and link registers (W).

(b) Allocate the link range to be established with the outputs (Y) of a master station and the inputs (X) of a local station and the link range to be established with the inputs (X) of the master station and the outputs (Y) of a local station.

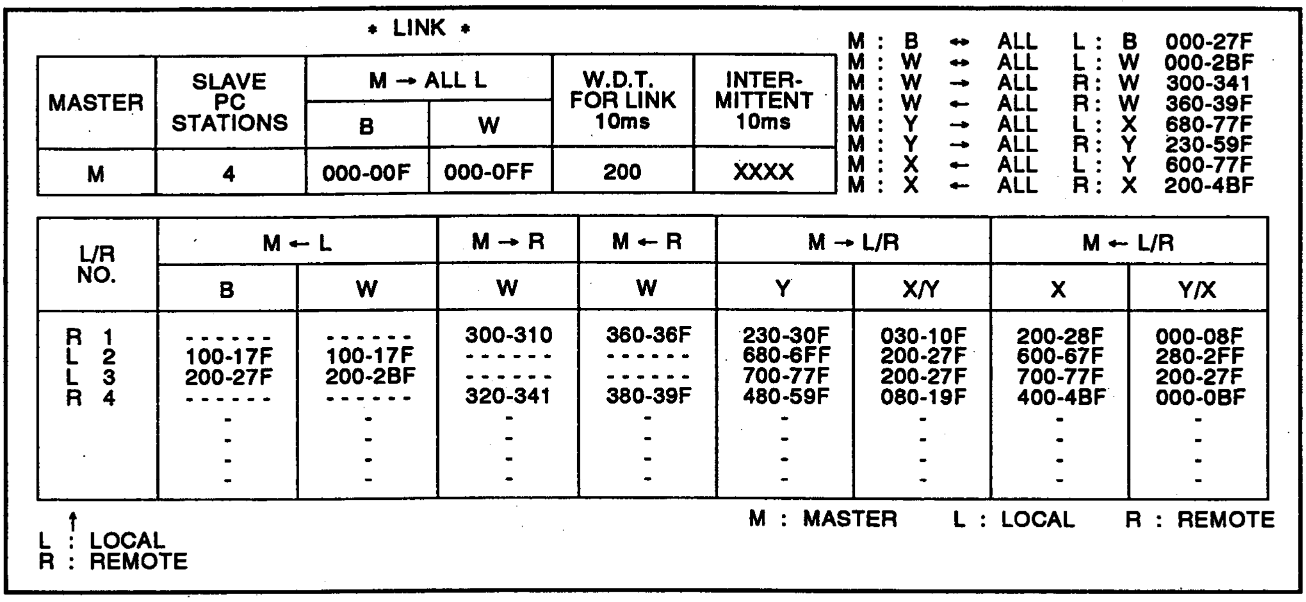
(6) Remote I/O station allocation

(a) Allocate the number of I/O module points to be loaded to each remote I/O stations.

(b) Allocate the link registers (W) to be used by the special function modules loaded in each of the remote I/O station for read/write processing.

REMARK

The GPP link parameter setting screen is illustrated below.



* LINK *

MASTER	SLAVE PC STATIONS	M → ALL L		W.D.T. FOR LINK 10ms	INTER-MITTENT 10ms
		B	W		
M	4	000-00F	000-0FF	200	XXXX

M : B ↔ ALL L : B 000-27F
M : W ↔ ALL L : W 000-2BF
M : W → ALL R : W 300-341
M : W ← ALL R : W 360-39F
M : Y → ALL L : X 680-77F
M : Y → ALL R : Y 230-59F
M : X ← ALL L : Y 600-77F
M : X ← ALL R : X 200-4BF

L/R NO.	M ← L		M → R	M ← R	M → L/R		M ← L/R	
	B	W	W	W	Y	X/Y	X	Y/X
R 1	------	------	300-310	360-36F	230-30F	030-10F	200-28F	000-08F
L 2	100-17F	100-17F	------	------	680-6FF	200-27F	600-67F	280-2FF
L 3	200-27F	200-2BF	------	------	700-77F	200-27F	700-77F	200-27F
R 4	------	------	320-341	380-39F	480-59F	080-19F	400-4BF	000-0BF
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-

↑
L : LOCAL
R : REMOTE

M : MASTER L : LOCAL R : REMOTE

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability		o			o	

7.4.2 Link parameters to be set for the MELSECNET II mode

When the MELSECNET II mode is used, two types of link parameter (first half and second half) are provided.

The system can be operated in the MELSECNET II mode with only the first half link parameters set.

The settings of the second half link parameters are only effective when more than 1024 bytes of link data are to be used by a station (master station or local station).

(1) First half link parameters

(a) Slave PC station

Allocate the total number of local stations to be connected. Remote I/O stations cannot be connected.

(b) WDT for link

Allocate the watchdog time. The watchdog time is the reference time used by the system to determine whether communication between the master station and every local station is being executed normally.

(c) Master station allocation

Allocate the device range (B/W0 to B/WFFF) to be used by the master station for writing data to the link relays (B) and link registers (W).

(d) Local station allocation

1) Allocate the device range (B/W0 to B/WFFF) to be used by a local station for writing data to the link relays (B) and link registers (W).

2) Allocate the link range to be established with the outputs (Y) of a master station and the inputs (X) of a local station and the link range to be established with the inputs (X) of the master station and the outputs (Y) of a local station.

(2) Second half link parameters

(a) Master station allocation

Allocate the device range to be used by the master station for writing data to the link relays (B) and link registers (W).

(b) Local station allocation

Allocate the device range to be used by the local station for writing data to the link relays (B) and link registers (W).

REMARK

The device range that can be allocated with the second half link parameters begins after the range allocated with the first half link parameters: "(final device number allocated with the first half link parameters) + 1".

If 0 points are allocated with the first half link parameters, allocation with the second half link parameters can begin from B0/W0.

POINT

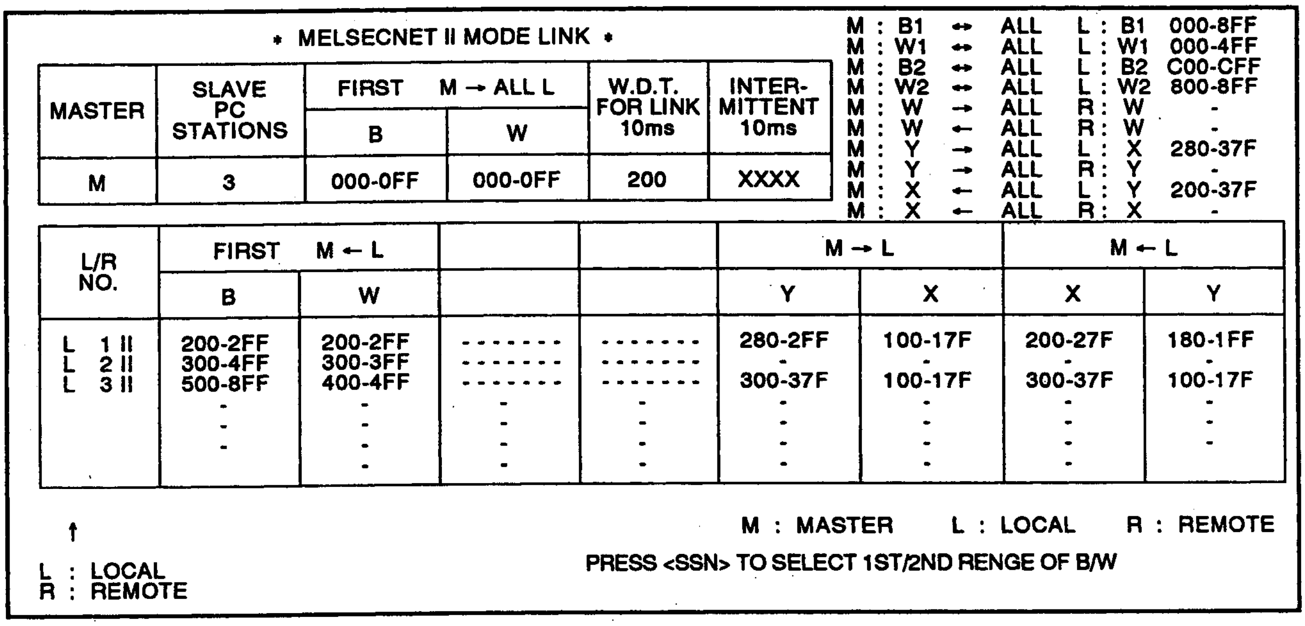
The following link parameters can be set in the MELSECNET II mode:

- 1024 bytes in the first half.
- 1024 bytes in the second half.

(3) Link parameter setting screens

The following shows the link parameter setting screens.

(a) First half link parameters



* MELSECNET II MODE LINK *

MASTER	SLAVE PC STATIONS	FIRST M → ALL L		W.D.T. FOR LINK 10ms	INTER-MITTENT 10ms
		B	W		
M	3	000-0FF	000-0FF	200	XXXX

```
M : B1 ↔ ALL  L : B1  000-8FF
M : W1 ↔ ALL  L : W1  000-4FF
M : B2 ↔ ALL  L : B2  C00-CFF
M : W2 ↔ ALL  L : W2  800-8FF
M : W  → ALL  R : W      -
M : W  ← ALL  R : W      -
M : Y  → ALL  L : X   280-37F
M : Y  → ALL  R : Y      -
M : X  ← ALL  L : Y   200-37F
M : X  ← ALL  R : X      -
```

L/R NO.	FIRST M ← L				M → L		M ← L	
	B	W			Y	X	X	Y
L 1 II	200-2FF	200-2FF	-------	-------	280-2FF	100-17F	200-27F	180-1FF
L 2 II	300-4FF	300-3FF	-------	-------	-	-	-	-
L 3 II	500-8FF	400-4FF	-------	-------	300-37F	100-17F	300-37F	100-17F
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-

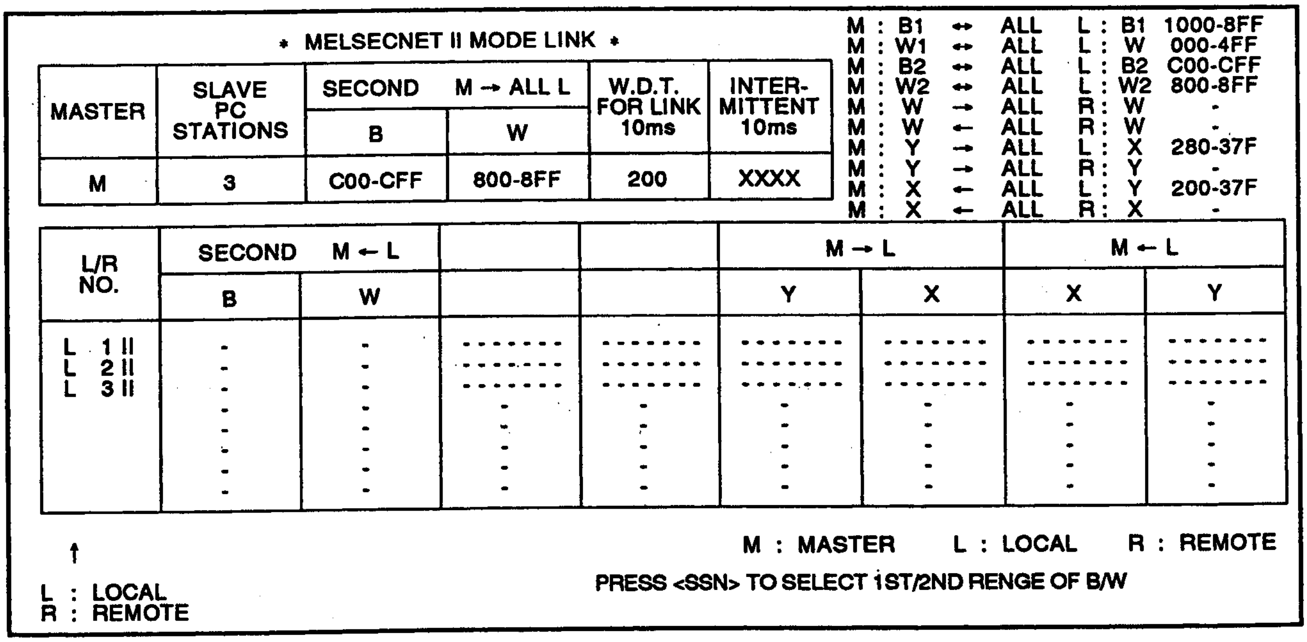
↑

L : LOCAL
R : REMOTE

M : MASTER L : LOCAL R : REMOTE

PRESS <SSN> TO SELECT 1ST/2ND RENGE OF B/W

(b) Second half link parameters



* MELSECNET II MODE LINK *

MASTER	SLAVE PC STATIONS	SECOND M → ALL L		W.D.T. FOR LINK 10ms	INTER-MITTENT 10ms
		B	W		
M	3	C00-CFF	800-8FF	200	XXXX

```
M : B1 ↔ ALL  L : B1  1000-8FF
M : W1 ↔ ALL  L : W   000-4FF
M : B2 ↔ ALL  L : B2  C00-CFF
M : W2 ↔ ALL  L : W2  800-8FF
M : W  → ALL  R : W      -
M : W  ← ALL  R : W      -
M : Y  → ALL  L : X   280-37F
M : Y  → ALL  R : Y      -
M : X  ← ALL  L : Y   200-37F
M : X  ← ALL  R : X      -
```

L/R NO.	SECOND M ← L				M → L		M ← L	
	B	W			Y	X	X	Y
L 1 II	-	-	-------	-------	-------	-------	-------	-------
L 2 II	-	-	-------	-------	-------	-------	-------	-------
L 3 II	-	-	-------	-------	-------	-------	-------	-------
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-

↑

L : LOCAL
R : REMOTE

M : MASTER L : LOCAL R : REMOTE

PRESS <SSN> TO SELECT 1ST/2ND RENGE OF B/W

7.4.3 Link parameters to be set for the MELSECNET II composite mode

When the MELSECNET II composite mode is used, two types of link parameters (first half and second half) are provided.

The system can be operated in the MELSECNET II composite mode with only the first half link parameters set. In this case, however, the device range used for data link is B/W0 to B/W3FF, and the system will operate on the same level as the MELSECNET mode system.

Allocate the range of addresses B/W 400 to FFF of the link relays (B) and link registers (W) to the second half link parameters.

First half link parameters

The same data as that set for the MELSECNET mode should be set for the first half link parameters.

(1) Slave PC station

The total number of slave stations (local stations, remote I/O stations) to be connected in the link.

(2) WDT for link

Refer to Section 7.5 for details.

The watchdog time is the reference time used by the system to determine whether communication between the master station and every slave station (local stations and remote I/O stations) is being executed normally.

(3) Master station allocation

Allocate the device range (B/W0 to B/W3FF) to be used by the master station for writing data to the link relays (B) and link registers (W).

(4) Slave station type

Set the type of each slave station (local station for the MELSECNET mode or remote I/O station for the MELSECNET II mode) to be connected.

(5) Local station allocation

(a) Allocate the device range (B/W0 to B/W3FF) to be used by a local station for writing data to the link relays (B) and link registers (W).

(b) Allocate the link range to be established with the outputs (Y) of a master station and the inputs (X) of a local station and the link range to be established with the inputs (X) of the master station and the outputs (Y) of a local station.

(6) Remote I/O station allocation

(a) Allocate the number of I/O module points to be loaded to each remote I/O station.

(b) Allocate the link registers (W) to be used by the special function modules loaded in each of the remote I/O station for read/write processing.

Second half link parameters

The same data as that set for the MELSECNET II mode should be set for the second half link parameters.

(1) Master station allocation

Allocate the device range to be used by the master station for writing data to the link relays (B) and link registers (W).

(2) Local station allocation

Allocate the device range to be used by the local station for writing data to the link relays (B) and link registers (W).

REMARK

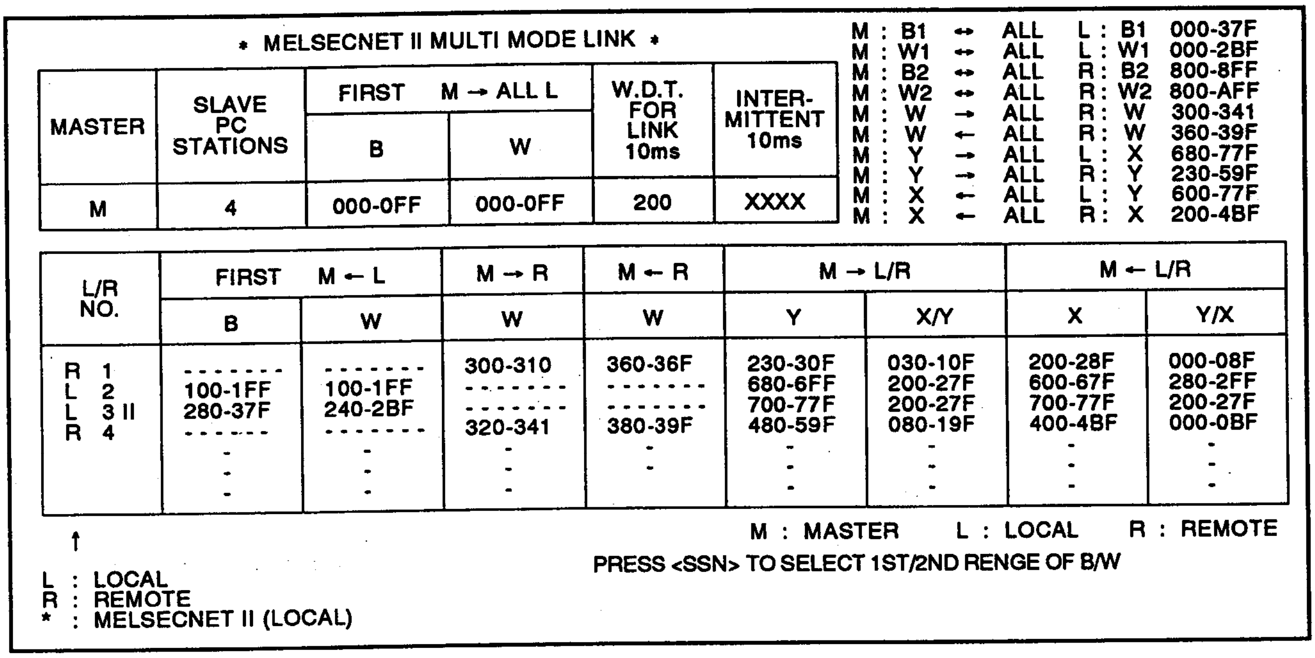
The device range that can be allocated with the second half link parameters begins after the range allocated with the first half link parameters: "(final device number allocated with the first half link parameters) + 1".

If 0 points are allocated with the first half link parameters, allocation with the second half link parameters can begin from B0/W0.

Link parameter setting examples

The following shows link parameter setting screens.

(a) First half link parameters



∗ MELSECNET II MULTI MODE LINK ∗

MASTER	SLAVE PC STATIONS	FIRST M → ALL L		W.D.T. FOR LINK 10ms	INTER-MITTENT 10ms
		B	W		
M	4	000-0FF	000-0FF	200	XXXX

M : B1 ↔ ALL L : B1 000-37F
M : W1 ↔ ALL L : W1 000-2BF
M : B2 ↔ ALL R : B2 800-8FF
M : W2 ↔ ALL R : W2 800-AFF
M : W → ALL R : W 300-341
M : W ← ALL R : W 360-39F
M : Y → ALL L : X 680-77F
M : Y → ALL R : Y 230-59F
M : X ← ALL L : Y 600-77F
M : X ← ALL R : X 200-4BF

L/R NO.	FIRST M ← L		M → R	M ← R	M → L/R		M ← L/R	
	B	W	W	W	Y	X/Y	X	Y/X
R 1	-------	-------	300-310	360-36F	230-30F	030-10F	200-28F	000-08F
L 2	100-1FF	100-1FF	-------	-------	680-6FF	200-27F	600-67F	280-2FF
L 3 II	280-37F	240-2BF	-------	-------	700-77F	200-27F	700-77F	200-27F
R 4	-------	-------	320-341	380-39F	480-59F	080-19F	400-4BF	000-0BF
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-		-	-	-	-

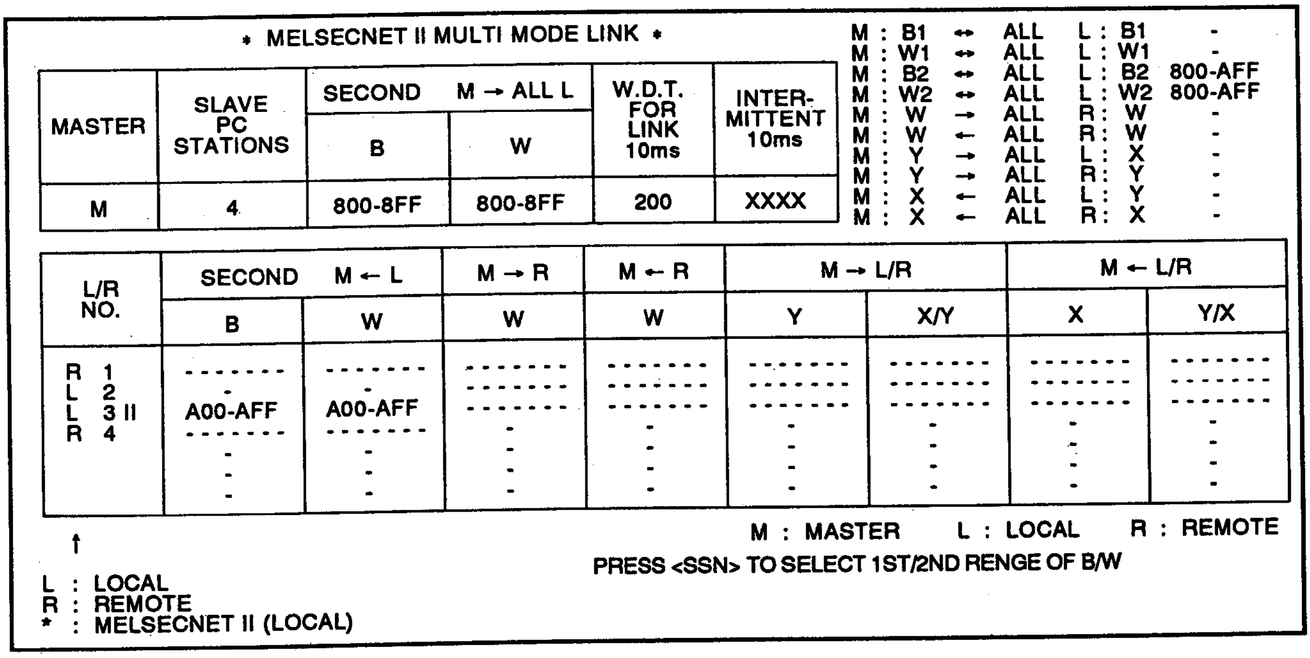
↑

L : LOCAL
R : REMOTE
∗ : MELSECNET II (LOCAL)

M : MASTER L : LOCAL R : REMOTE

PRESS <SSN> TO SELECT 1ST/2ND RENGE OF B/W

(b) Second half link parameters



∗ MELSECNET II MULTI MODE LINK ∗

MASTER	SLAVE PC STATIONS	SECOND M → ALL L		W.D.T. FOR LINK 10ms	INTER-MITTENT 10ms
		B	W		
M	4	800-8FF	800-8FF	200	XXXX

M : B1 ↔ ALL L : B1 -
M : W1 ↔ ALL L : W1 -
M : B2 ↔ ALL L : B2 800-AFF
M : W2 ↔ ALL L : W2 800-AFF
M : W → ALL R : W -
M : W ← ALL R : W -
M : Y → ALL L : X -
M : Y → ALL R : Y -
M : X ← ALL L : Y -
M : X ← ALL R : X -

L/R NO.	SECOND M ← L		M → R	M ← R	M → L/R		M ← L/R	
	B	W	W	W	Y	X/Y	X	Y/X
R 1	-------	-------	-------	-------	-------	-------	-------	-------
L 2	-	-	-------	-------	-------	-------	-------	-------
L 3 II	A00-AFF	A00-AFF	-------	-------	-------	-------	-------	-------
R 4	-------	-------	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-

↑

L : LOCAL
R : REMOTE
∗ : MELSECNET II (LOCAL)

M : MASTER L : LOCAL R : REMOTE

PRESS <SSN> TO SELECT 1ST/2ND RENGE OF B/W

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	o	o	o	o	o	o

7.5 WDT for Link

The watchdog time is the reference time used by the system to determine whether communication between the master station and every slave station (local stations and remote I/O stations) is being executed normally.

(1) If the link scan is repeatedly executed within the set watchdog time and the data link is established, the local stations and remote I/O stations determine that the master station is operating normal (data link normal).

(2) If the link scan is not repeated within the set watchdog time, the local and remote I/O stations determine that the master station is faulty (data link error) and the following processing is executed.

- (a) Master station
  - 1) Communication with all slave stations stops.

    If the automatic return function is selected, communication is retried.
  - 2) Receive data is maintained as it was just before the occurrence of the communication error.
  - 3) The value "5" is stored to special register D9204.
- (b) Local stations
  - 1) The ERROR LED "TIME" in the data link module lights.
  - 2) Receive data is maintained as it was just before the occurrence of the communication error.
  - 3) Special relay M9251 (link stop) is turned ON.
- (c) Remote I/O stations
  - 1) The ERROR LED "TIME" in the data link module lights.
  - 2) All output modules loaded to the remote I/O stations are turned OFF.

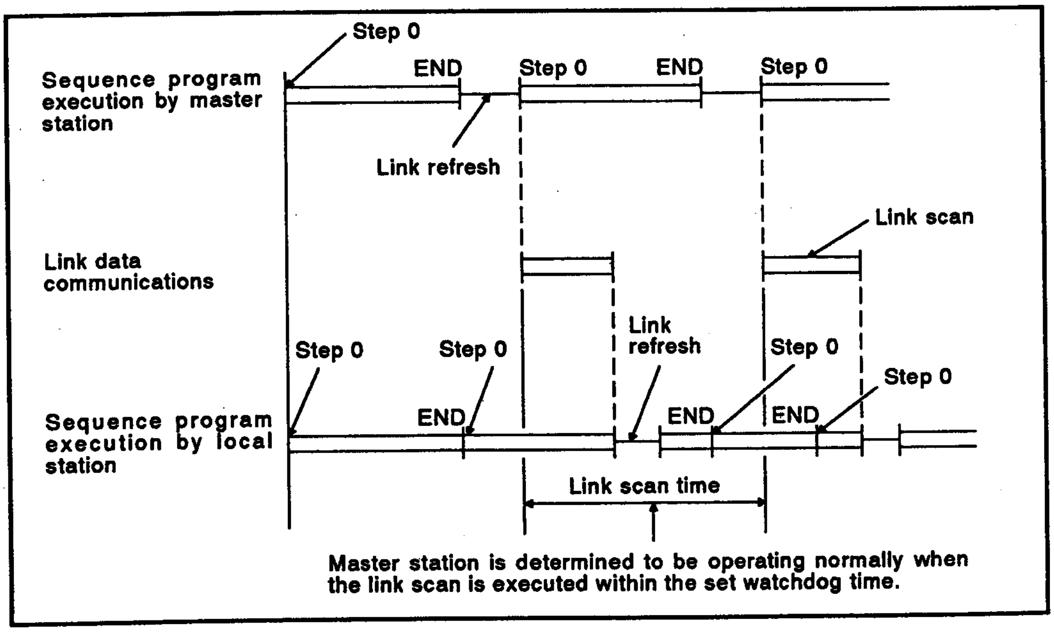


Fig. 7.5 Watchdog Time

(3) Setting the watchdog time

The watchdog time can be set between 10 and 2000 msec in units of 10 msec. The usual setting is 2000 msec.

The shortest watchdog time setting will turn off the outputs of a remote I/O station at which a communication error has occurred with as short a delay as possible.

Use following procedure to set the smallest watchdog time is described below.

(a) Set "200" (2000 msec) to "WDT for link" and write the setting to the master station.

(b) Use the link monitor function of the master station to operate the system and monitor link scan execution. Refer to Section 10.1.1 for details on the link scan function.

(c) Turn off the power supply to one of the slave stations so that the system operates in the loopback mode.

(d) Read the maximum link scan time.

(e) **Return to the link parameter screen, change the monitor time setting to the sum of the maximum link scan time value and 50ms, and write it to the master station again.**
However, when using the A70BD-J71P21/R21 or A7BD-J71AP21/R21 as the master station, set the monitor time to the sum of the maximum link scan time value and 250ms.

7.6 General Link Parameter Information

7.6.1 Maximum number of link points per station

(1) Master station and local stations

(a) MELSECNET mode

A maximum of 1024 bytes of link points can be used by a master or local station. Use the following formula to calculate the maximum number of link points for each individual station:

$$\frac{\text{(B points)} + \text{(Y points)}}{8} + \{2 \times \text{(W points)}\} \leq 1024 \text{ bytes}$$

(b) MELSECNET II mode or MELSECNET II composite mode

A maximum of 1024 bytes of link points can be allocated with the first half link parameters and a maximum of 1024 bytes can be allocated with the second half link parameters used by a master or local station. Use the following formula to calculate the maximum number of link points for each individual station:

First half link parameters

$$\frac{\text{(B points)} + \text{(Y points)}}{8} + \{2 \times \text{(W points)}\} \leq 1024 \text{ bytes}$$

Second half link parameters

$$\frac{\text{(B points)}}{8} + \{2 \times \text{(W points)}\} \leq 1024 \text{ bytes}$$

(2) Remote I/O stations

A maximum of 512 input points (X), a maximum of 512 output points (Y), and a maximum of 512 bytes of total link data can be allocated to a remote I/O station. Use the following formula to calculate the maximum number of link points for each individual station:

$$\frac{\text{(X points)} + \text{(Y points)}}{8} + \{2 \times \text{(W points)}\} \leq 512 \text{ bytes}$$

$$\text{(X points)} \leq 512 \text{ bytes}$$

$$\text{(Y points)} \leq 512 \text{ bytes}$$

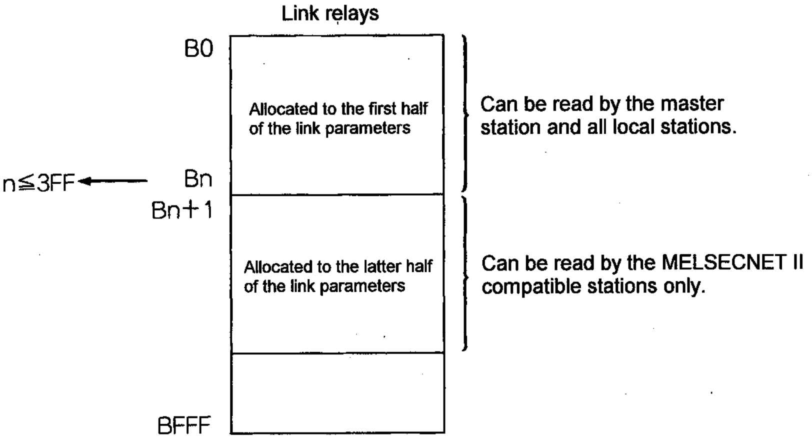
Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	○	○	○	○	○	○

7.6.2 Determining the link relay (B) allocation range

(1) Allocate link relays (B) in units of 16 points (B[ ][ ]0 to B[ ][ ]F).

(2) The device range that can be allocated with the second half link parameters begins after the range allocated with the first half link parameters: "(final device number allocated with the first half link parameters) + 1".

If 0 points are allocated with the first half link parameters, allocation with the second half link parameters can begin from B0.



7.6.3 Determining the link register (W) allocation range

Link registers (W) are used for communications between a master station and a local station and between a master station and a remote I/O station.

Allocate the link register in one-point units.

Allocate the link registers to (a) the area for communications between a master and local station, and (b) the area for communications between a master and remote I/O station separately, as shown below.

(1) Make the following divisions to make allocations with the link parameters in the MELSECNET mode or with the first half link parameters in the MELSECNET II composite mode:

(a) The area used by a master or local station to write data to itself (referred to as the "M/L area" in this manual).

(b) The area used by a special function module loaded to a remote I/O station for read/write (RFRP, RTOP instruction) (referred to as the "M/R area" in this manual).

Make the following divisions to split the M/R area into a read area and a write area:

1) The area used to read data from a remote I/O station to the master station (referred to as the "M ← R area" in this manual)

2) The area used to write data from the master station to a remote I/O station (referred to as the "M → R area" in this manual)

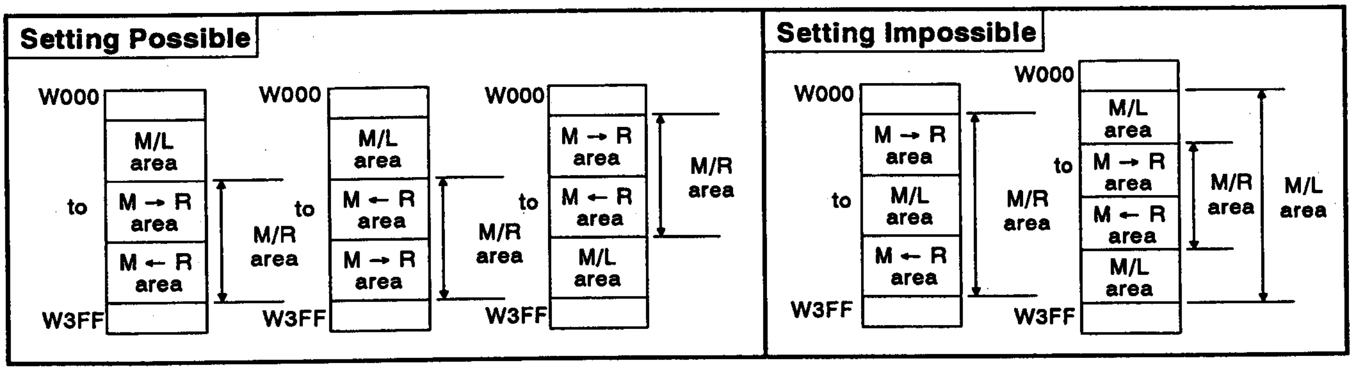


Fig. 7.6 Link Register (W) Allocation Range

(c) Consider the range used by the system when allocating the M → R area.

The system uses the M → R area to execute RFRP/RTOP instructions.

[Number of points used by the system]

Each link register (W) point is used for one special function module loaded to a remote I/O station.

[Range used by the system]

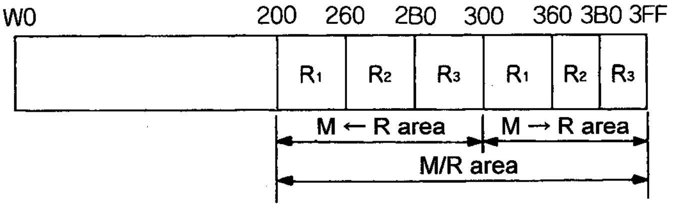
The range used by the system begins at the M → R area head device number allocated to each remote I/O station to one point less than the total number of use points: "number of use points - 1".

For example, when three special function modules are loaded to remote I/O station 2, the range W360 to W362 in the M → R area W360 to W3AF is used by the system.

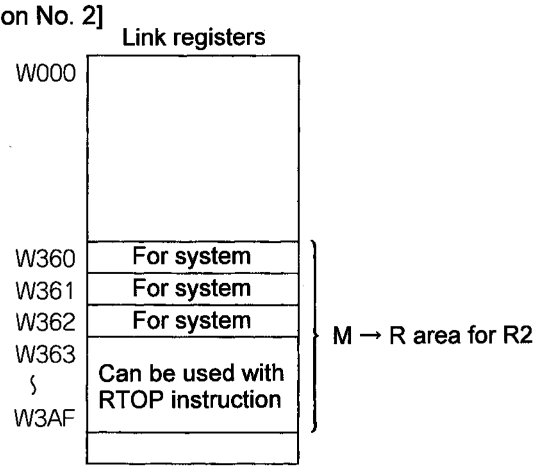
Example

When three special function modules are loaded into remote I/O station No. 2 with the link parameter values set as shown below, W360 to 362 are used by the system among the M → R area W360 to 3AF.

[Setting of link parameters]



[Allocation of remote I/O station No. 2]



(2) **The device range that can be allocated with the second half link parameters begins after the range allocated with the first half link parameters: "(final device number allocated with the first half link parameters) + 1".**

If 0 points are allocated with the first half link parameters, allocation with the second half link parameters can begin from W0.

POINTS

(1) When only the RFRP instruction is used, also set the M → R area used by the system in the link parameter.

(2) If the M → R area used by the system is used incorrectly in a user program, read/write of normal data cannot be performed when the RFRP/RTOP instruction is executed.

7.6.4 Determining the input (X) and output (Y) allocation range

Make the following divisions to the range that follows the range used by the master station I/O (I/O module loaded) to make allocation with the link parameters in the MELSECNET mode or with the first half link parameters in the MELSECNET II composite mode:

(1) The area used for communication between the master station and a local station (referred to as the "M/L area" in this manual).

(2) The area used for communication between the master station and a remote I/O station (referred to as the "M/R area" in this manual).

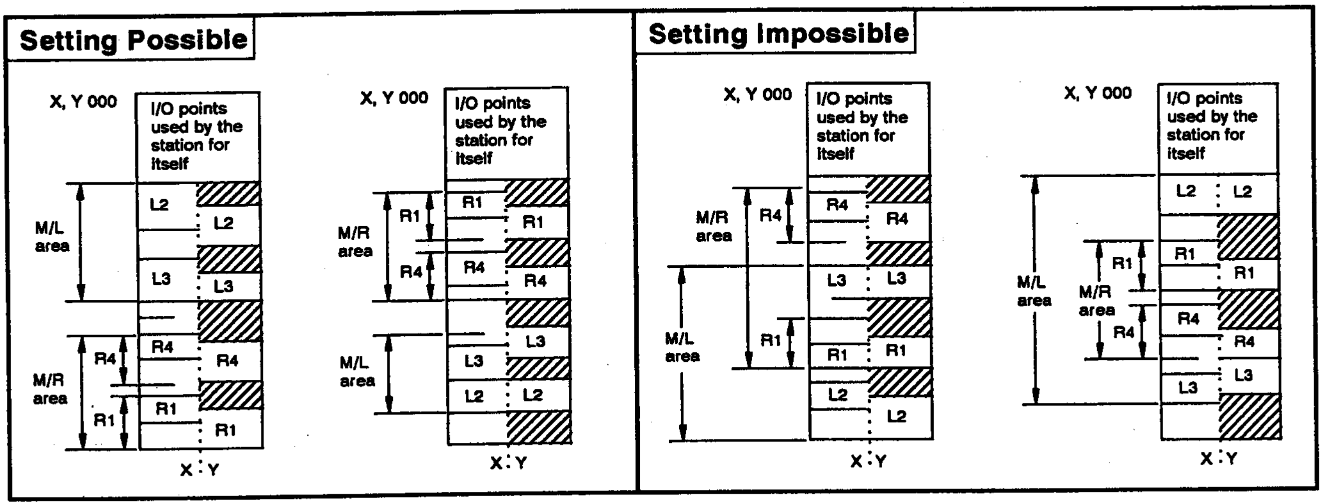


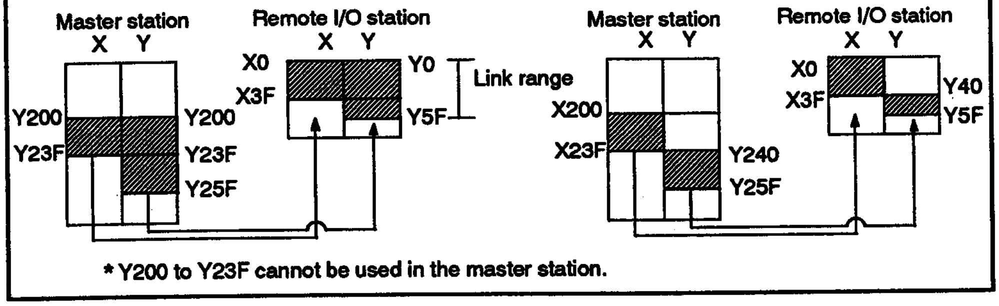
Fig. 7.7 Input (X) and Output (Y) Allocation Range

(3) Inputs (X) and outputs (Y) are allocated in units of 16 points (X[ ][ ]0 to X [ ][ ]F and Y[ ][ ]0 to Y[ ][ ]F).

POINT

When allocating inputs (X) and outputs (Y), make the I/O range allocated within the master and remote I/O station the same.

However, a number allocated to an input module cannot be allocated to an output module.



* Y200 to Y23F cannot be used in the master station.

REMARK

(1) Inputs (X) and outputs (Y) are allocated with the first half link parameters in the MELSECNET II mode.

(2) However, because remote I/O stations cannot be connected in the MELSECNET II mode, the range does not need to be divided as described above.

Since remote I/O stations cannot be connected in a MELSECNET/B data link system, the range does not need to be divided for M/L and M/R.

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	○			○		

7.7 Link Parameters in the MELSECNET Mode

Possible system configurations in the MELSECNET mode:

- System consisting of a master station and local stations (referred to as a "local system" in this manual).
- System consisting of a master station and remote I/O stations (referred to as a "remote I/O system" in this manual).
- System consisting of a master station, local stations, and remote I/O stations (referred to as a "local/remote I/O system" in this manual).

7.7.1 Device allocation for a local system and link parameter setting example

Allocation for a local system

When setting local system link parameters, the following points must be considered:

(1) Determine the link relay (B) and link register (W) allocation range for each master station and local station (refer to Sections 7.6.2 and 7.6.3).

(2) If the number of link relay (B) points is insufficient, check the use of inputs (X) and outputs (Y) for one-to-one data communication between the master station and a local station (refer to Section 7.6.4).

(3) Make sure that the number of link points per station does not exceed the following limits (refer to Section 7.6.1):

- Master station : 1024 bytes
- Local station : 1024 bytes

Link parameter setting example

Fig. 7.8 shows a link parameter setting of a local system when the MELSECNET mode is used.

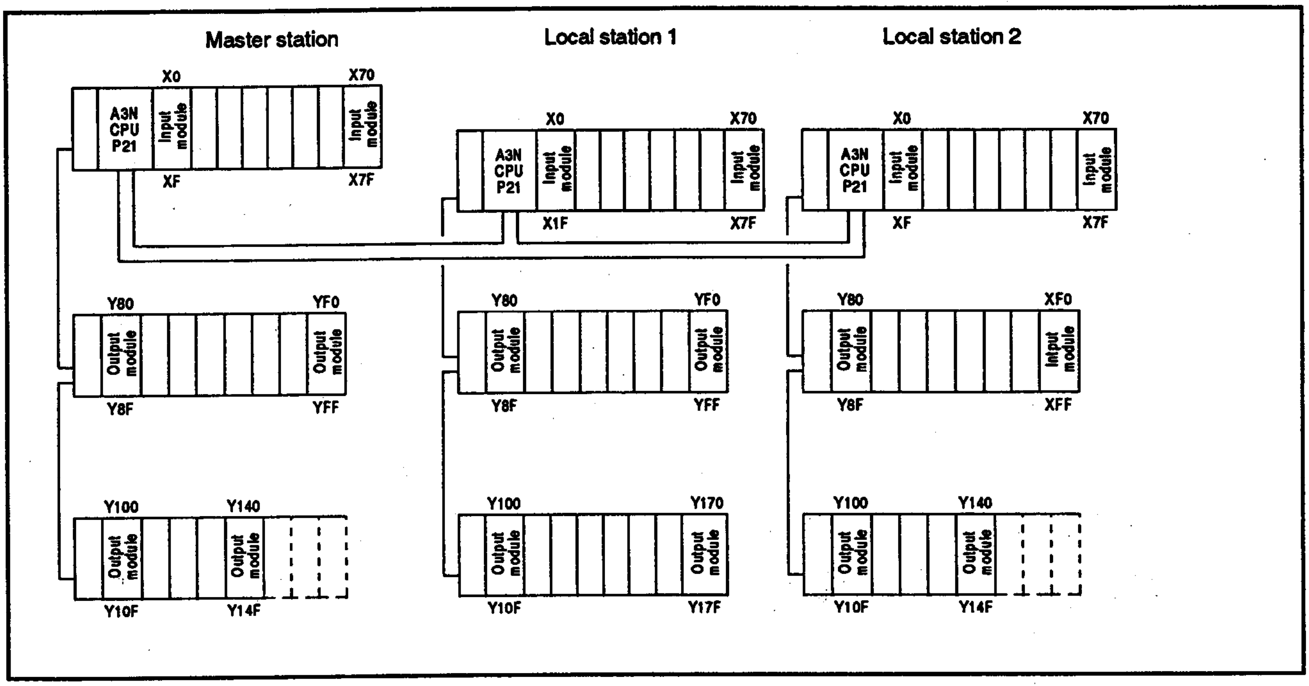
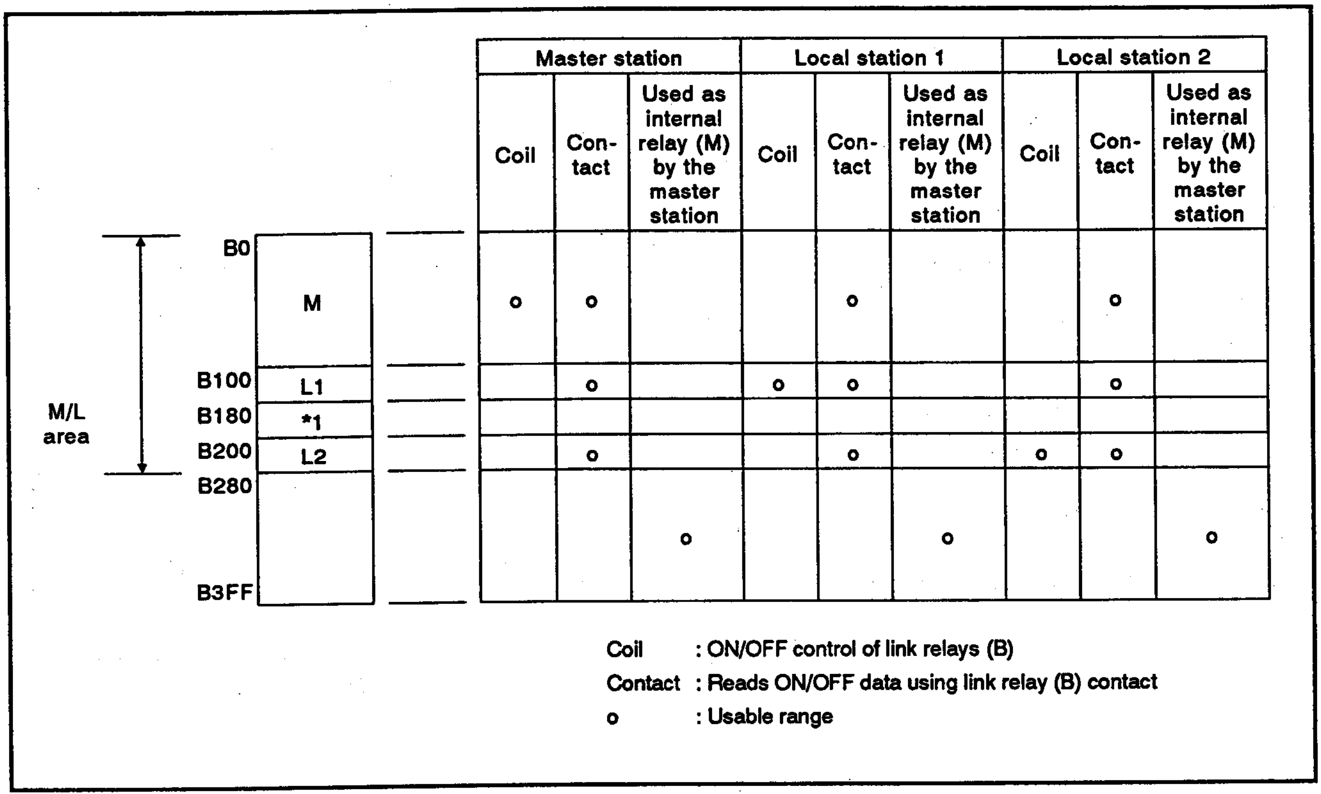


Fig. 7.8 System Configuration Example

(1) Allocating link relay (B)

(a) To allocate 256 points to a master station, 128 points to local station 1, and 128 points to local station 2:



	Master station			Local station 1			Local station 2		
	Coil	Con-tact	Used as internal relay (M) by the master station	Coil	Con-tact	Used as internal relay (M) by the master station	Coil	Con-tact	Used as internal relay (M) by the master station
B0 M	o	o			o			o	
B100 L1		o		o	o			o	
B180 *1									
B200 L2		o			o		o	o	
B280–B3FF			o			o			o

Coil : ON/OFF control of link relays (B)
Contact : Reads ON/OFF data using link relay (B) contact
o : Usable range

Fig. 7.9 Link Relay (B) Allocation Example

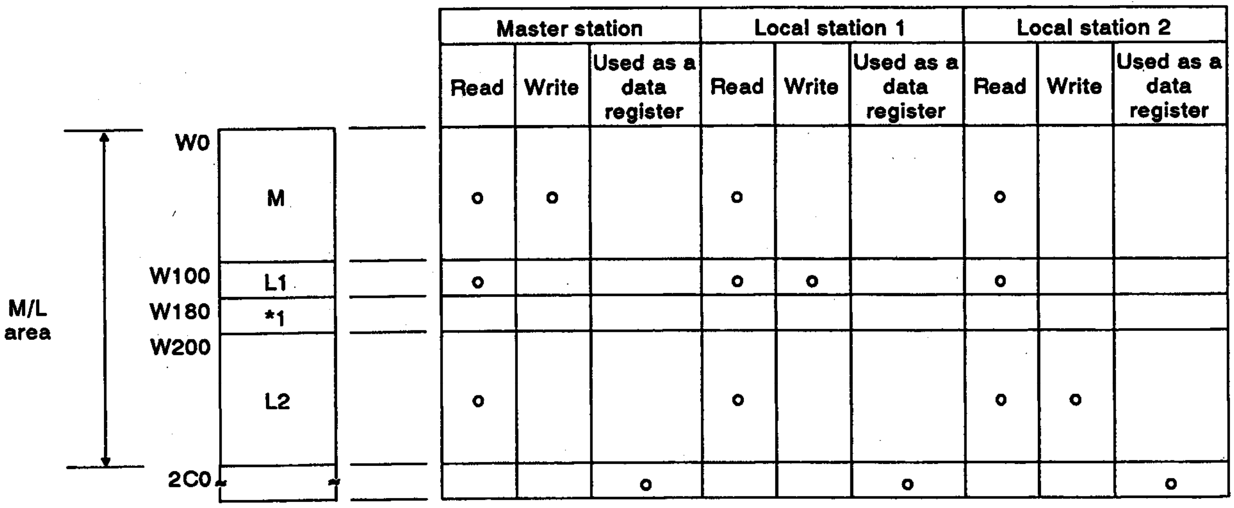
(b) The vacant area marked with an asterisk in the M/L area in Fig. 7.9 cannot be used in place of internal relay (M).

The M/L area is the range (B0 to 27F) from the minimum device number to the maximum device number allocated by the link parameters.

(2) Allocating link register (W)

(a) Allocation for a master station and local stations (M/L area)

To allocate 256 points to the master station, 128 points to local station 1, and 196 points to local station 2.



	Master station			Local station 1			Local station 2		
	Read	Write	Used as a data register	Read	Write	Used as a data register	Read	Write	Used as a data register
M	o	o		o			o		
L1	o			o	o		o		
*1									
L2	o			o			o	o	
			o			o			o

Read : Read word data
Write : Write word data
o : Usable range

Fig. 7.10 Link Register (W) Allocation Example

(b) In Fig. 7.10, the vacant area marked with *1 cannot be used as a data register (D) by the master station and local stations.

(3) Allocating inputs (X) and outputs (Y)

(a) The I/O range used for data link by a master station

The master station uses the I/O devices in the X/Y0 to X/Y14F range for itself.

The X/Y150 to X/Y7FF range can be used for the data link.

(b) Allocation for local stations

In this example, inputs (X) and outputs (Y) are not required because there is a vacant area in the link relay (B) allocation. However, to simplify the explanation, 128 input (X) points and 128 output (Y) points have been allocated.

1) Local station 1

Local station 1 uses the I/O devices in the X/Y0 to X/Y17F range for itself.

The X/Y180 to X/Y7FF range can be used for the data link.

2) Local station 2

Local station 2 uses I/O devices in the X/Y0 to X/Y14F range for itself.

The X/Y150 to X/Y7FF range can be used for the data link.

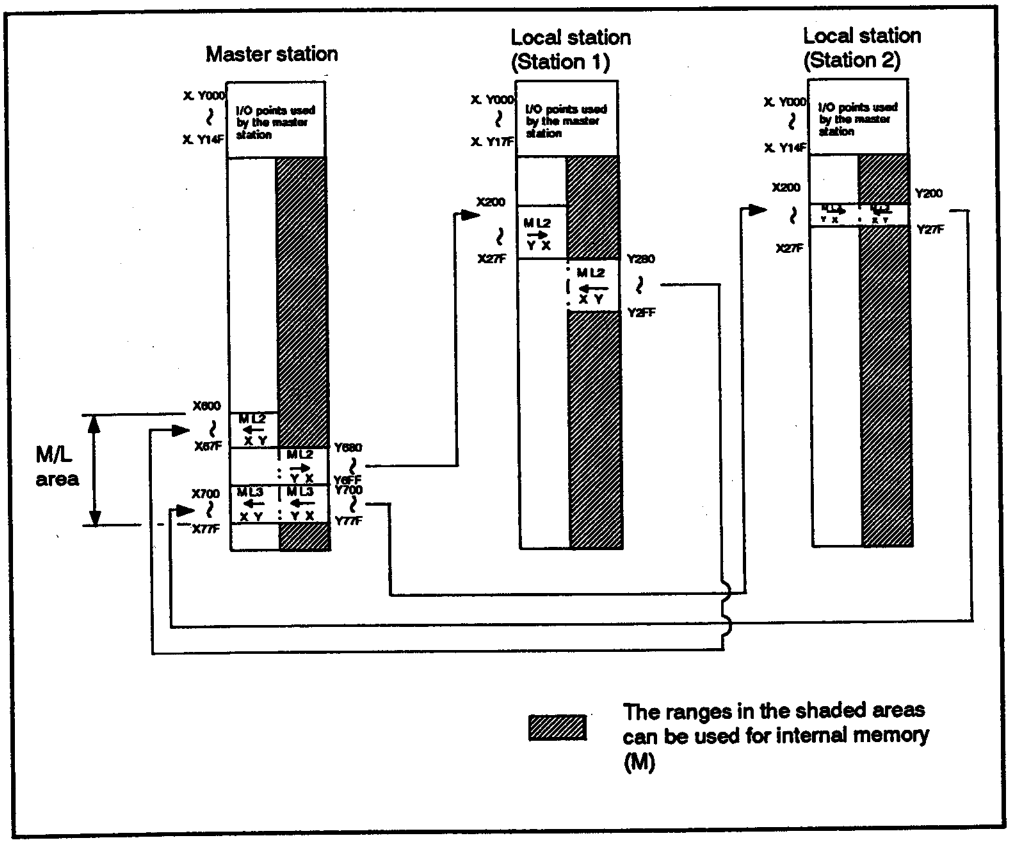
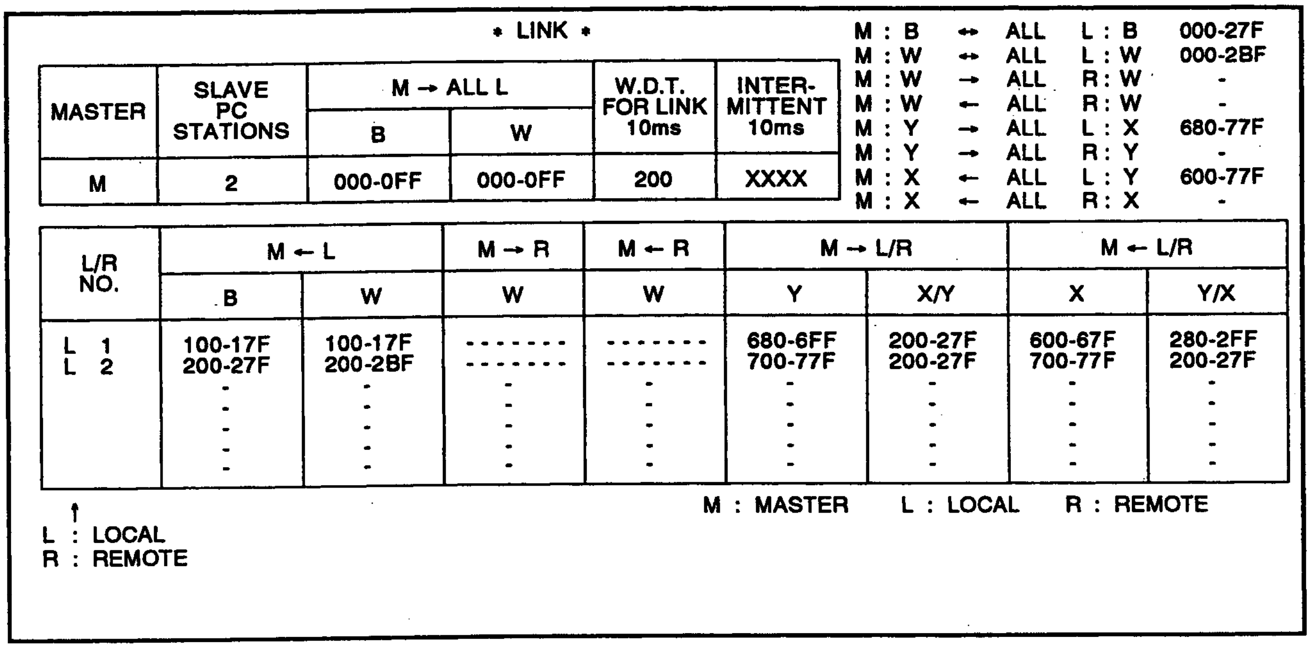


Fig.7.11 Inputs (X) and Outputs (Y) Allocation Example

(4) Link parameter setting

When the allocation of (1) to (3) is executed, set the link parameters as shown below.



* LINK *

MASTER	SLAVE PC STATIONS	M → ALL L		W.D.T. FOR LINK 10ms	INTER-MITTENT 10ms
		B	W		
M	2	000-0FF	000-0FF	200	XXXX

M : B	↔	ALL	L : B	000-27F
M : W	↔	ALL	L : W	000-2BF
M : W	→	ALL	R : W	-
M : W	←	ALL	R : W	-
M : Y	→	ALL	L : X	680-77F
M : Y	→	ALL	R : Y	-
M : X	←	ALL	L : Y	600-77F
M : X	←	ALL	R : X	-

L/R NO.	M ← L		M → R	M ← R	M → L/R		M ← L/R	
	B	W	W	W	Y	X/Y	X	Y/X
L 1	100-17F	100-17F	-------	-------	680-6FF	200-27F	600-67F	280-2FF
L 2	200-27F	200-2BF	-------	-------	700-77F	200-27F	700-77F	200-27F
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-

↑
L : LOCAL
R : REMOTE

M : MASTER L : LOCAL R : REMOTE

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	o			X		

7.7.2 Device allocation for a remote I/O system and link parameter setting example

Allocation for a remote I/O system

(1) Determine the first device number of the I/O module loaded to a remote I/O station.

The I/O numbers that can be allocated to a remote I/O station begins after the I/O numbers used for master station I/O (refer to Section 7.6.4).

(2) When a special function module is loaded to a remote I/O station, determine the link register (W) allocation range (M/R area) to be used for buffer memory read/write (RFRP/RTOP instruction) (refer to Section 7.6.3).

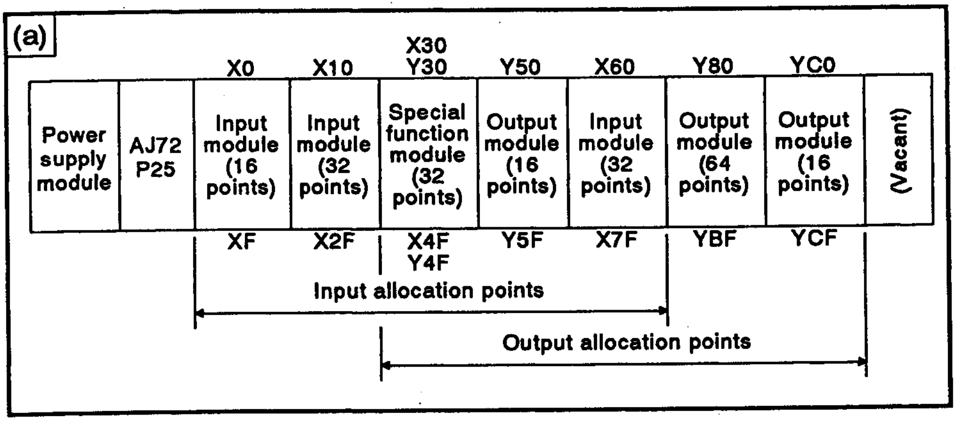
(3) Make sure that the number of link points per station does not exceed the following limit (refer to Section 7.3.1):

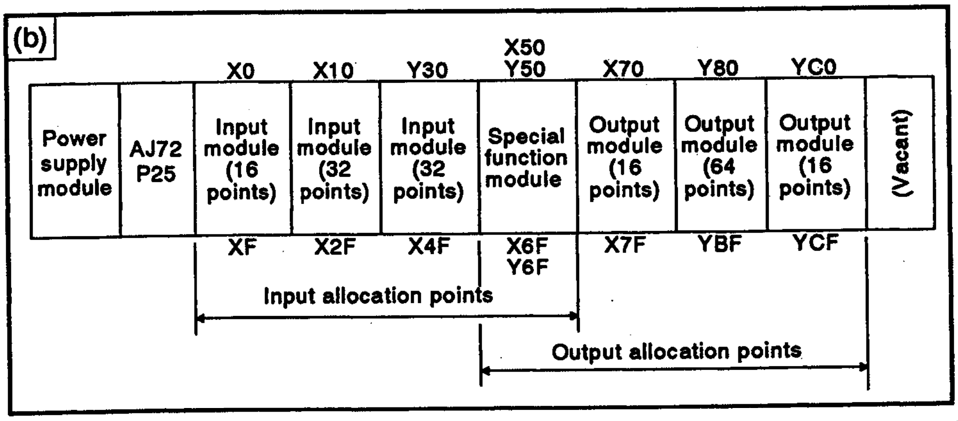
- Remote I/O station : 512 bytes

POINT

(1) If the M → R area used by the system to execute an RFRP/RTOP instruction is mistakenly used by a user program, data will not be able to be read/written correctly.

(2) The number of link points can be reduced by loading modules to a remote I/O station in groups of input modules, special function modules, and output modules as illustrated below. If the modules are loaded as illustrated in Item (b), a reduction of 16 input allocation points and 32 output allocation points can be achieved.





Link parameter setting example

Fig. 7.12 shows a link parameter setting of a remote I/O system when the MELSECNET mode is used.

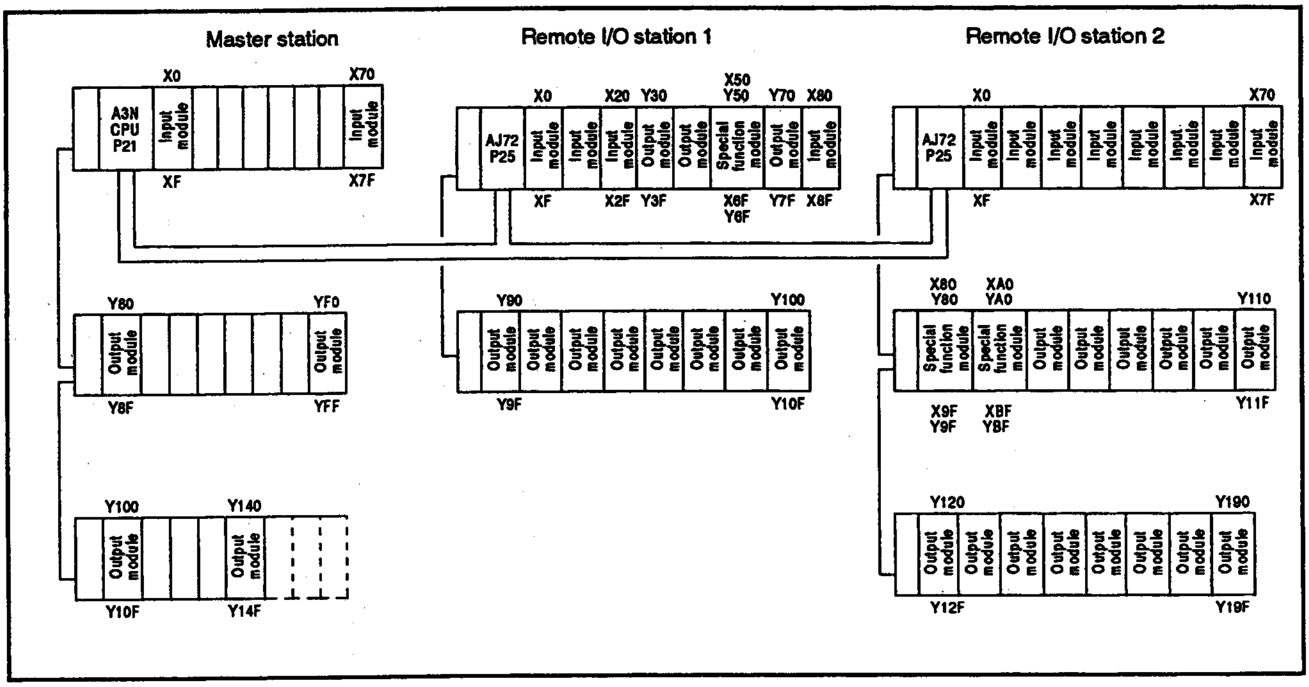


Fig. 7.12 System Configuration Example

(1) Allocating link relay (B)

Data link cannot be executed by using a link relay in a remote I/O system.

(2) Allocating link register (W)

(a) Allocation for remote I/O stations (M → R area, M ← R area)

1) Allocate the following number of points for remote I/O station 1 so that commands in a user program can be executed:

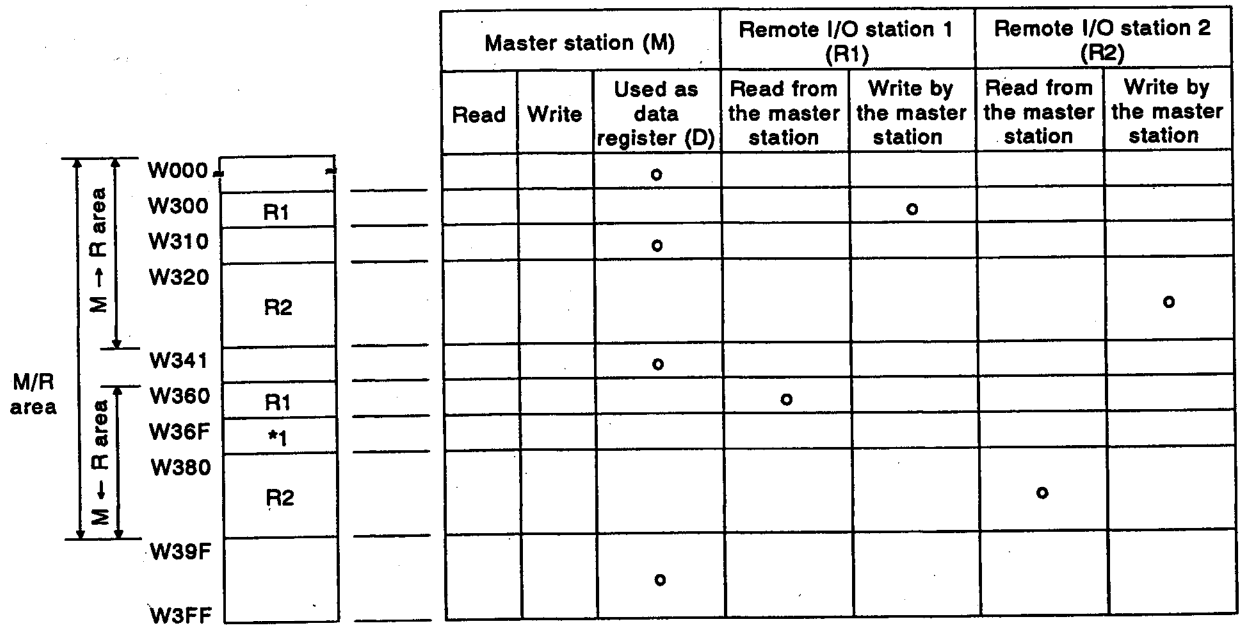
16 points for the RTOP command and 16 points for the RFRP command.

Station 1 requires 17 points (16 points (for RTOP) + 1 point (for OS)) for the M → R area because a special-function module is installed.

2) Allocate the following number of points for remote I/O station 2 so that commands in a user program can be executed:

32 points for the RTOP command and 32 points for the RFRP command.

Station 2 requires 34 points (32 points (for RTOP) + 2 points (for OS)) for the M → R area because two special-function modules are installed.



		Master station (M)			Remote I/O station 1 (R1)		Remote I/O station 2 (R2)	
		Read	Write	Used as data register (D)	Read from the master station	Write by the master station	Read from the master station	Write by the master station
W000				o				
W300	R1					o		
W310				o				
W320	R2							o
W341				o				
W360	R1				o			
W36F	*1							
W380	R2						o	
W39F–W3FF				o				

Read : Read word data

Write : Write word data

o : Usable range

Fig. 7.13 Link Register (W) Allocation Example

(b) In Fig. 7.13, the vacant area marked with *1 in the M ← R area cannot be used as a data register by the master station.

(3) Allocating inputs (X) and outputs (Y)

(a) Input and output range used for data link by master station

The master station uses I/O devices in the X/Y0 to X/Y14F range for itself. The X/Y150 to X/Y7FF range can be used for the data link.

(b) Remote I/O stations

1) Station 1

Inputs (X): X0 to X8F

Outputs (Y): Y30 to Y10F

2) Station 2

Inputs (X): X0 to XBF

Outputs (Y): Y80 to Y19F

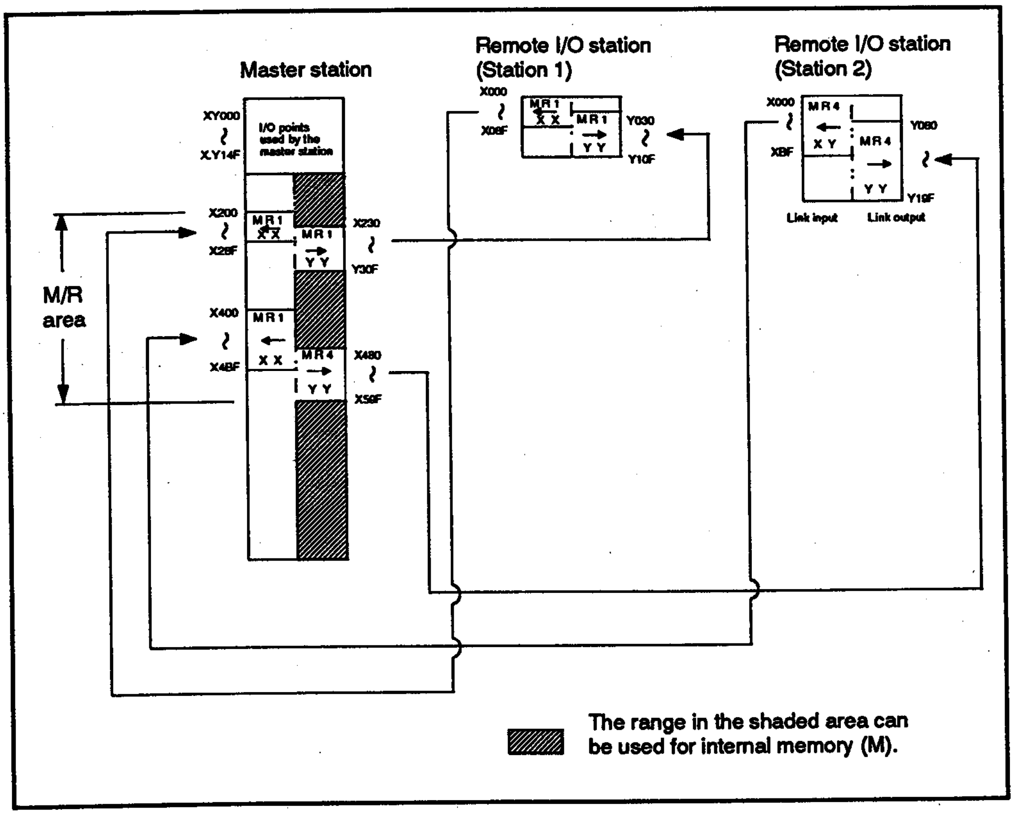
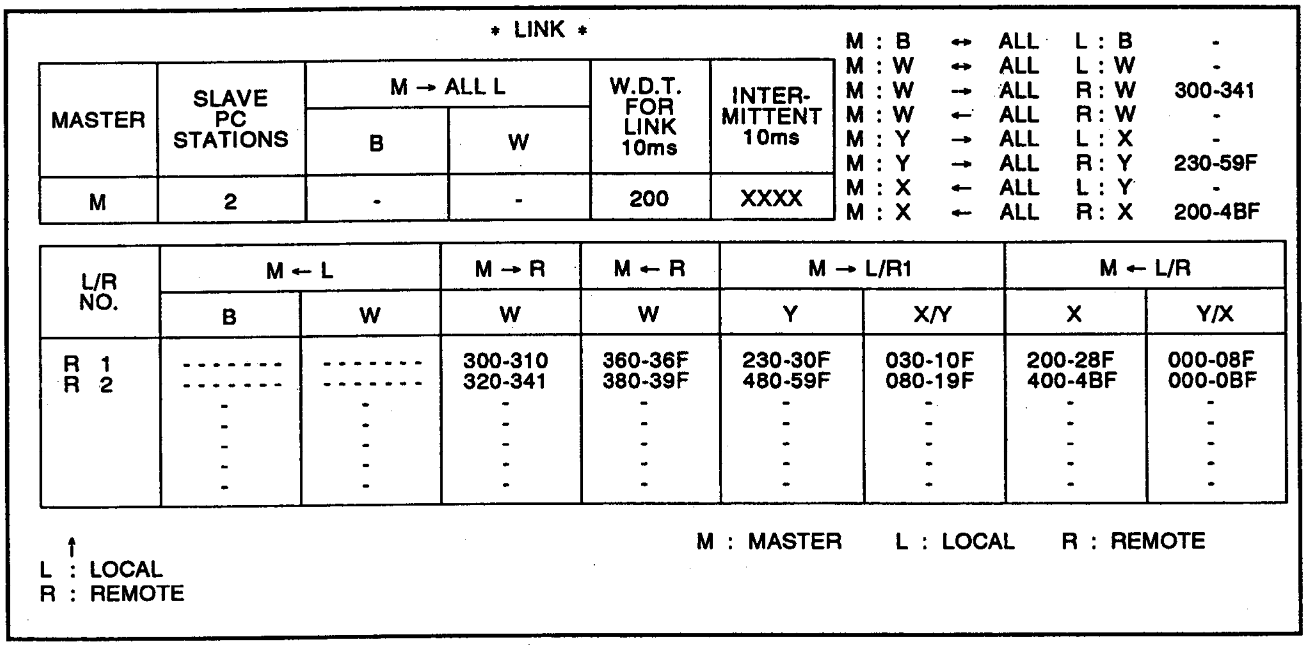


Fig.7.14 Inputs (X) and Outputs (Y) Allocation Example

(4) Link parameter setting

When the allocation of (1) to (3) is executed, set the link parameters as shown in the figure below.



* LINK *

MASTER	SLAVE PC STATIONS	M → ALL L		W.D.T. FOR LINK 10ms	INTER-MITTENT 10ms
		B	W		
M	2	-	-	200	XXXX

M : B	↔	ALL	L : B	-
M : W	↔	ALL	L : W	-
M : W	→	ALL	R : W	300-341
M : W	←	ALL	R : W	-
M : Y	→	ALL	L : X	-
M : Y	→	ALL	R : Y	230-59F
M : X	←	ALL	L : Y	-
M : X	←	ALL	R : X	200-4BF

L/R NO.	M ← L		M → R	M ← R	M → L/R1		M ← L/R	
	B	W	W	W	Y	X/Y	X	Y/X
R 1	- - - - - - -	- - - - - - -	300-310	360-36F	230-30F	030-10F	200-28F	000-08F
R 2	- - - - - - -	- - - - - - -	320-341	380-39F	480-59F	080-19F	400-4BF	000-0BF
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-

↑
L : LOCAL
R : REMOTE

M : MASTER L : LOCAL R : REMOTE

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	○		○			

7.7.3 Device allocation for a local/remote I/O system and link parameter setting example

Allocation for a local/remote I/O system

(1) Determine the link relay (B) allocation range for each master station and local station (refer to Section 7.6.2).

(2) When a special function module is loaded to a remote I/O station, link registers (W) are required for buffer memory read/write (RFRP/RTOP instruction).

Divide the link registers (W) and allocate them to the M/L area (for communication between the master station and a local station) and the M/R area (for communication between the master station and a remote I/O station)(refer to Section 7.6.3).

(3) For the allocation of the M/L area, determine the allocation range by dividing the area for each of a master station and local station.

(4) Divide the M/R area into the M ← R area and the M → R area to allocate it.

To connect more than one remote I/O station, allocate an M ← R area and an M → R area to each remote I/O station.

(a) For example, to connect three remote I/O stations, divide the M ← R area and M → R area into three stations as illustrated below.

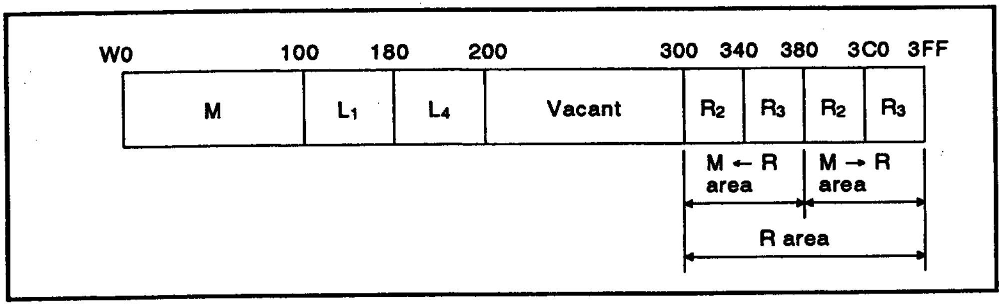


Fig. 7.15 Link Register (W) Allocation Example

(b) Consider the range used by the system when allocating the M → R area.

The system uses the M → R area to execute RFRP/RTOP instructions.

1) Number of points used by the system

Each link register (W) point is used for one special function module loaded to a remote I/O station.

2) Range used by the system

The range used by the system begins at the M → R area head device number allocated to each remote I/O station to one point less than the total number of use points: "number of use points - 1".

For example, when three special function modules are loaded to remote I/O station 2, the range W380 to W381 in the M → R area W380 to W3BF is used by the system as illustrated in Fig. 7.15.

(5) Allocate the input (X) and output (Y) range used for data link following the range used by the master station I/O.

(a) Divide the area used for data link into an M/R area (for communication between the master station and a remote I/O station) and an M/L area (for communication between the master station and a local station) to allocate the range.

(b) The M/L area is used when the number of link relay (B) points is insufficient. Therefore, it is not necessary to allocate the M/L area when there is sufficient number of link relay (B) points.

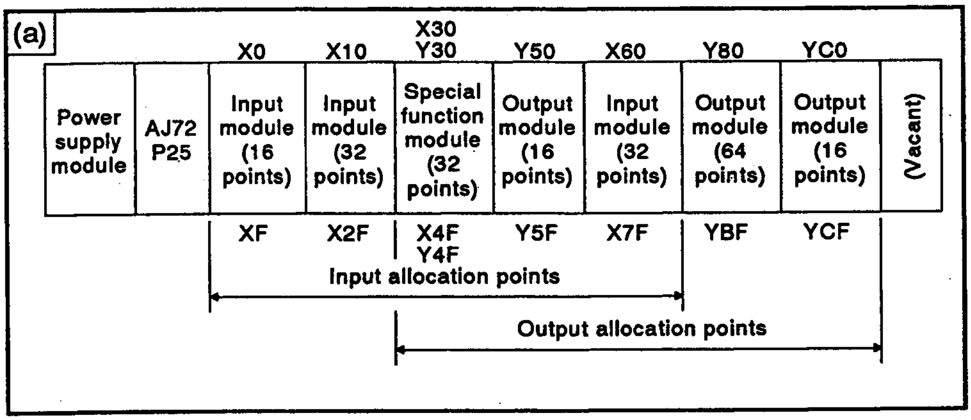
(6) Make sure that the number of link points per station does not exceed the following limits (refer to Section 7.6.1):

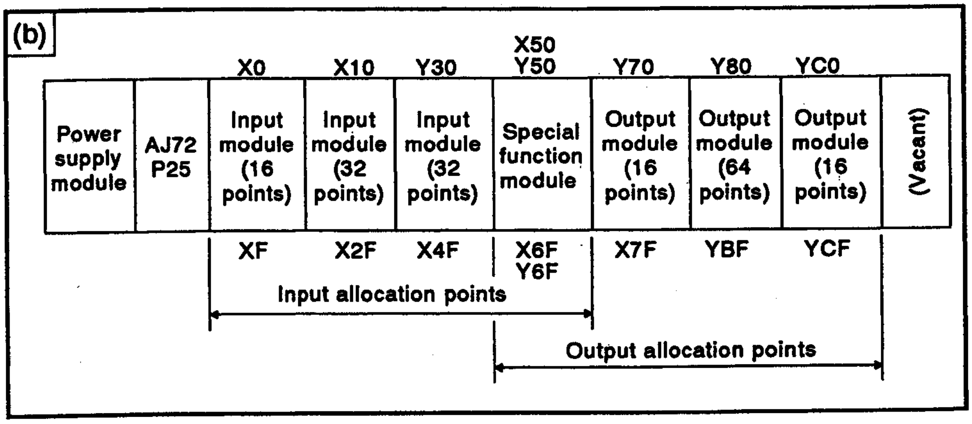
- Master station : 1024 bytes
- Local station : 1024 bytes
- Remote I/O station : 512 bytes

POINT

(1) If the M → R area used by the system to execute an RFRP/RTOP instruction is mistakenly used by a user program, data will not be able to be read/written correctly.

(2) The number of link points can be reduced by loading modules to a remote I/O station in groups of input modules, special function modules, and output modules as illustrated below. If the modules are loaded as illustrated in Item (b), a reduction of 16 input allocation points and 32 output allocation points can be achieved.





Link parameter setting example

The following explains the procedure for setting link parameters when a local/remote I/O system is used in the MELSECNET mode.

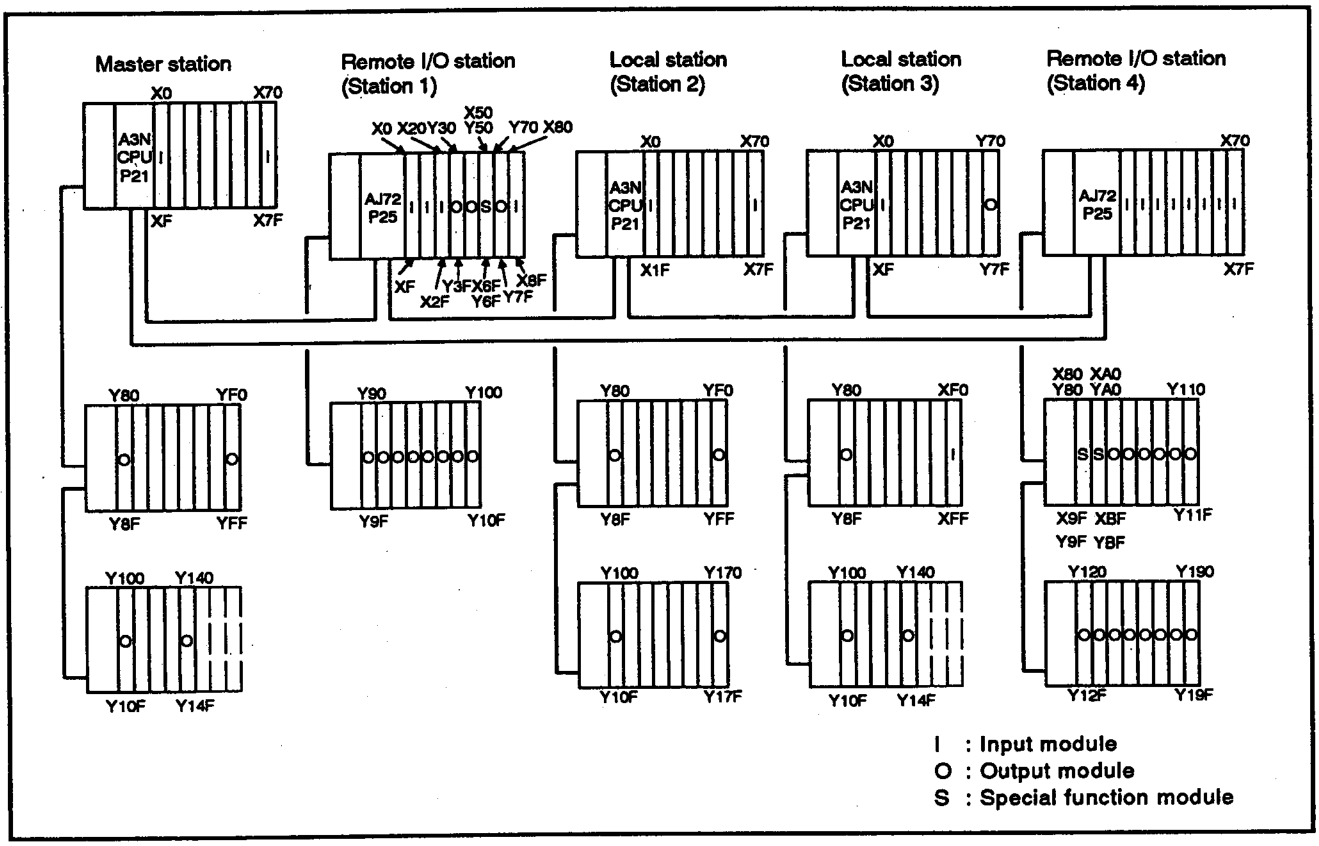
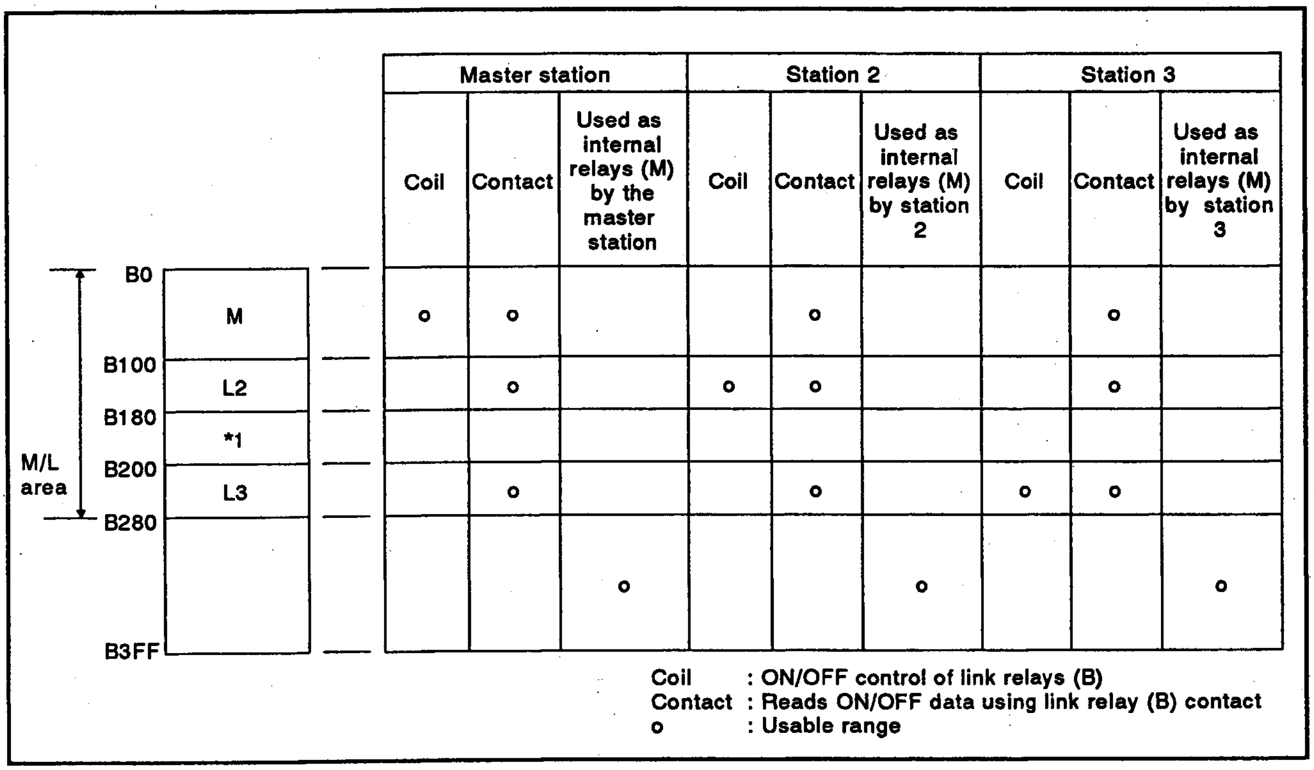


Fig. 7.16 System Configuration Example

(1) Allocating link relays (B)

(a) To allocate 256 points to the master station, 128 points to station 2 (local station), and 128 points to station 3 (local station)



	Master station			Station 2			Station 3		
	Coil	Contact	Used as internal relays (M) by the master station	Coil	Contact	Used as internal relays (M) by station 2	Coil	Contact	Used as internal relays (M) by station 3
M	o	o			o			o	
L2		o		o	o			o	
*1									
L3		o			o		o	o	
			o			o			o

Coil : ON/OFF control of link relays (B)
Contact : Reads ON/OFF data using link relay (B) contact
o : Usable range

Fig. 7.17 Link Relay (B) Allocation Example

(b) The vacant area marked with an asterisk in the M/L area cannot be used in place of internal relays (M).

The M/L area is the range (B0 to B27F) from the minimum device number to the maximum device number allocated with the link parameters.

(2) Allocating link registers (W)

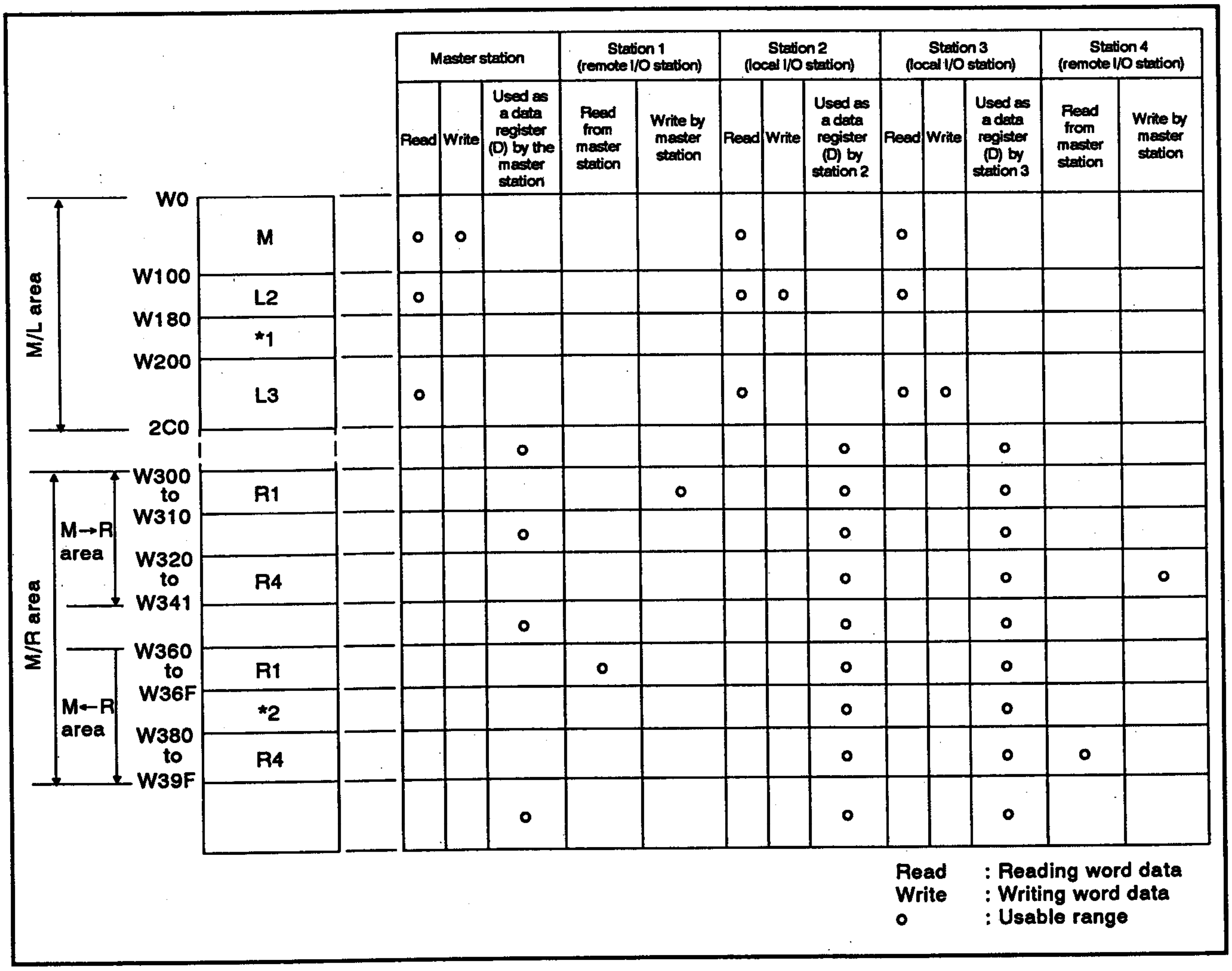
(a) Allocation for the master station and local stations (M/L area)

To allocate 256 points to the master station, 128 points to station 2 (local station), and 196 points to station 3 (local station)

(b) Allocation for the remote I/O station (M → R area, M ← R area)

For station 1 (remote I/O station), 16 points each are allocated to execute the RTOP instruction and the RFRP instruction. For station 1, 17 points (16 points for RTOP + 1 points for OS) are required for the M → R area, because one special function module is loaded.

For station 4 (remote I/O station), 32 points each are allocated to execute the RTOP instruction and the RFRP instruction. For station 2, 34 points (32 points for RTOP + 2 points for OS) are required for the M → R area, because two special function modules are loaded.



	Master station			Station 1 (remote I/O station)		Station 2 (local I/O station)			Station 3 (local I/O station)			Station 4 (remote I/O station)	
	Read	Write	Used as a data register (D) by the master station	Read from master station	Write by master station	Read	Write	Used as a data register (D) by station 2	Read	Write	Used as a data register (D) by station 3	Read from master station	Write by master station
M	o	o				o			o				
L2	o					o	o		o				
*1													
L3	o					o			o	o			
			o					o			o		
R1					o			o			o		
			o					o			o		
R4								o			o		o
			o					o			o		
R1				o				o			o		
*2								o			o		
R4								o			o	o	
			o					o			o		

Read : Reading word data
Write : Writing word data
o : Usable range

Fig. 7.18 Link Register (W) Allocation Example

(c) In Fig. 7.18, the M/L area marked with "*1" cannot be used as a data register (D) by the master station and local stations.

The vacant area of M ← R area marked with "*2" cannot be used as a data register (D) by the master station.

(3) Allocating inputs (X) and outputs (Y)

(a) Input and output range used for data link by the master station

The master station uses I/O devices in the X/Y0 to X/Y14F range for itself. For the data link, the X/Y150 to X/Y7FF range can be used.

(b) Remote I/O stations

1) Station 1

Inputs (X) : X0 to X8F

Outputs (Y) : Y30 to Y10F

2) Station 4

Inputs (X) : X0 to XBF

Outputs (Y) : Y80 to Y19F

(c) Local stations

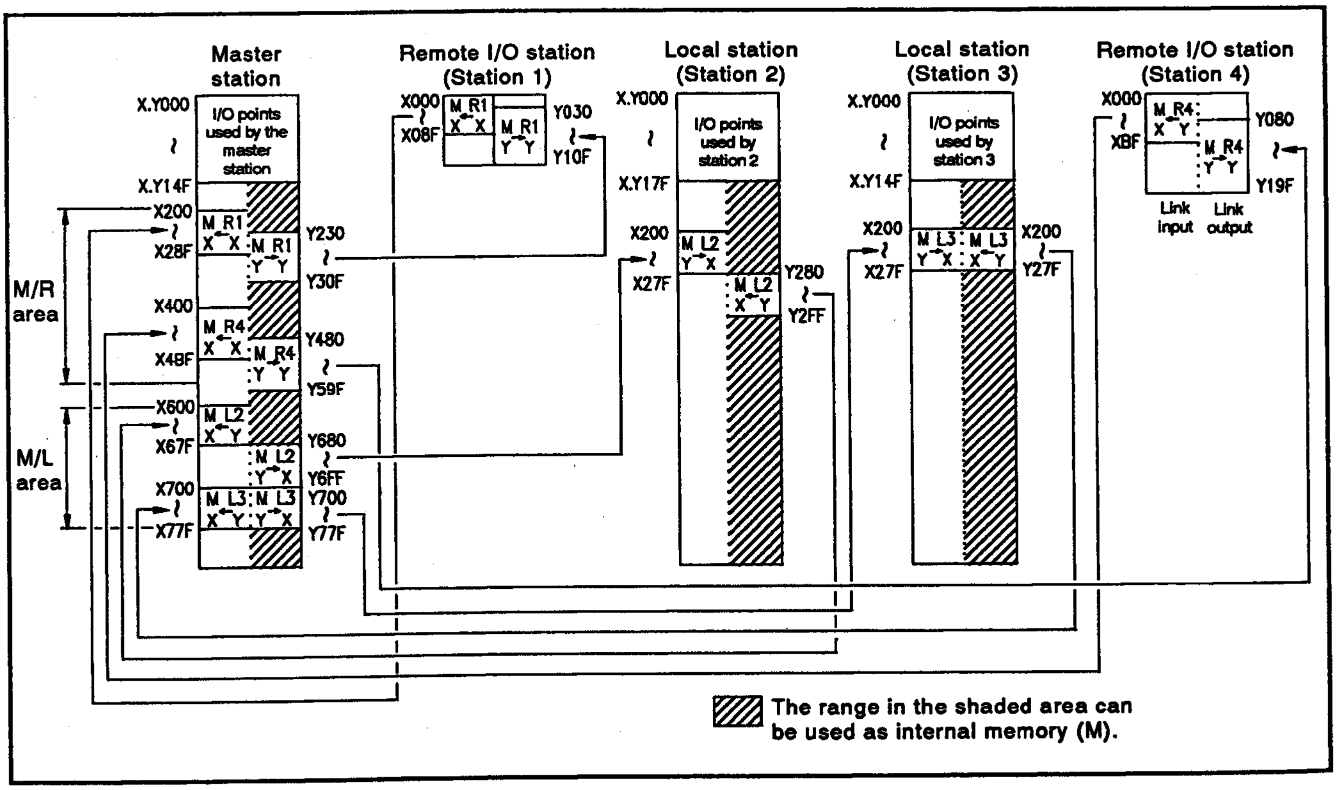
In this system example, inputs (X) and outputs (Y) are not required because there is vacant area in the link relay (B) allocation. However, to simplify the explanation, 128 input (X) points and 128 output (Y) points are allocated.

1) Station 2

Local station 2 uses I/O devices in the X/Y0 to X/Y17F range for itself. For the data link, the X/Y180 to X/Y7FF range can be used.

2) Station 3

Local station 3 uses I/O devices in the X/Y0 to X/Y14F range for itself. For the data link, the X/Y150 to X/Y7FF range can be used.



▨ The range in the shaded area can be used as internal memory (M).

Fig. 7.19 Input (X) and Output (Y) Allocation Example

(4) Link parameter setting example

* LINK *

MASTER	SLAVE PC STATIONS	M → ALL L		W.D.T. FOR LINK 10ms	INTER-MITTENT 10ms
		B	W		
M	4	000-0FF	000-0FF	200	XXXX

M : B ↔ ALL L : B 000-27F
M : W ↔ ALL L : W 000-2BF
M : W → ALL R : W 300-341
M : W ← ALL R : W 360-39F
M : Y → ALL L : X 680-77F
M : Y → ALL R : Y 230-59F
M : X ← ALL L : Y 600-77F
M : X ← ALL R : X 200-4BF

L/R NO.	M ← L		M → R	M ← R	M → L/R		M ← L/R	
	B	W	W	W	Y	X/Y	X	Y/X
R 1	-------	-------	300-310	360-36F	230-30F	030-10F	200-28F	000-08F
L 2			-------	-------	680-6FF	200-27F	600-67F	280-2FF
L 3	100-17F	100-17F	-------		700-77F	200-27F	700-77F	200-27F
R 4	200-27F	200-2BF	320-341	-------	480-59F	080-19F	400-4BF	000-0BF
	-------	-------	-		-	-	-	-
	-	-	-	380-39F	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-		-				
				-				

↑
L : LOCAL
R : REMOTE

M : MASTER L : LOCAL R : REMOTE

7.8 Link Parameters in the MELSECNET II Mode

(1) Determine whether both the first and second half link parameters are required.

(a) If allocations are made with both the first and second half link parameters, up to 2048 bytes can be allocated to each station.

If the link range is less than 1024 bytes per station, only the first half link parameters are required.

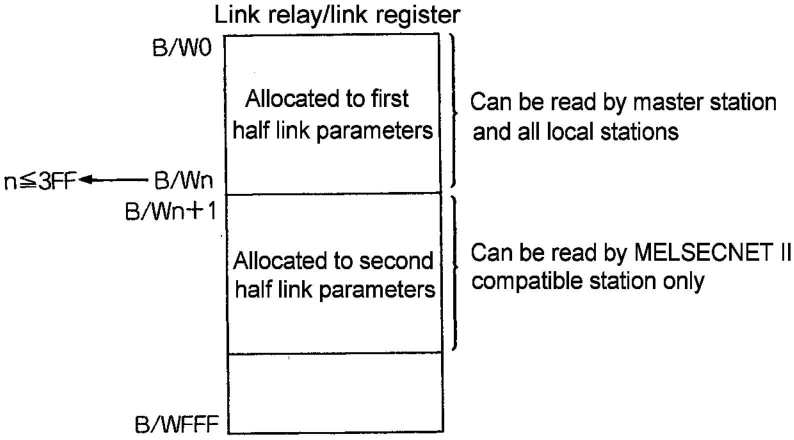
(b) Handshake processing is easier when the system is operated with only first half link parameters.

Handshake processing is required when both first and second half link parameters are set (refer to Section 9.1, Item (4), for details on handshake processing).

(c) The setting range of the first half link parameters is B0 to BFFF and W0 to WFFF.

(d) The device range that can be allocated with the second half link parameters begins after the range allocated with the first half link parameters: "(final device number allocated with the first half link parameters) + 1".

If 0 points are allocated with the first half link parameters, allocation with the second half link parameters can begin from B0/W0.



(2) Determine the link relay (B) and link register (W) allocation range for each master station and local station (refer to Sections 7.6.2 and 7.6.3).

(3) If the number of link relay (B) points is insufficient, check the use of inputs (X) and outputs (Y) for one-to-one data communication between the master station and a local station.

(4) Make sure that the number of link points per station does not exceed the following limits (refer to Section 7.6.1):

- Master station first half link parameters : 1024 bytes
- Master station second half link parameters : 1024 bytes
- Local station first half link parameters : 1024 bytes
- Local station second half link parameters : 1024 bytes

Link parameter setting example

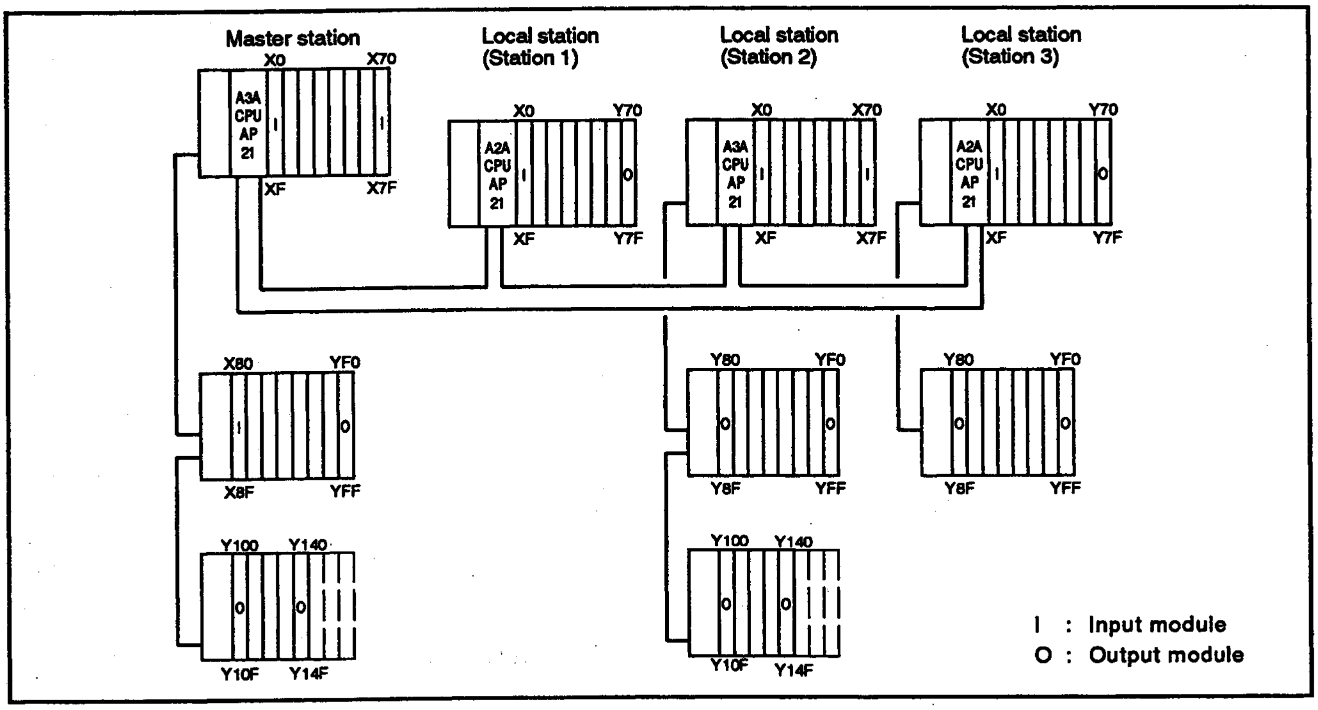


Fig. 7.20 Local System Configuration Example

(1) Number of allocation points

(a) Master station:

Link relays (B)	512 points	Link registers (W)	512 points

(b) Local station (station 1)

Link relays (B)	256 points	Link registers (W)	256 points

(c) Local station (station 2)

Link relays (B)	512 points	Link registers (W)	256 points

(d) Local station (station 3)

Link relays (B)	1024 points	Link registers (W)	256 points

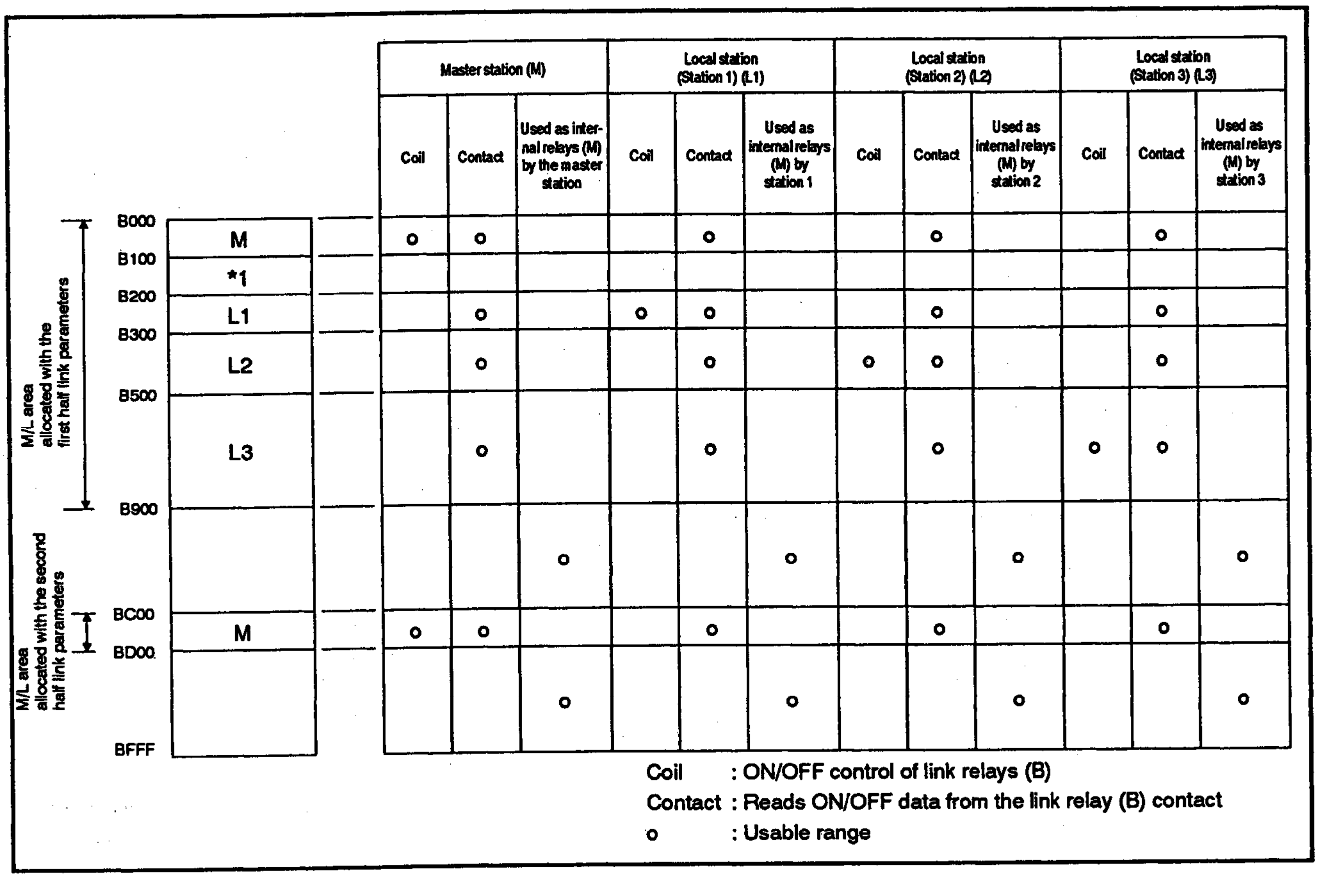
(2) Checking the ranges to be allocated with the first and second half link parameters

(a) Because the number of master station link points is 1088 bytes (512/8 + (5112 x 2) = 1088), both the first and second half link parameters are required.

To simplify this explanation, the number of link relays (B) and link registers (W) are halved and allocated with the first and second half link parameters. Although it is possible to allocate the link relays (B) with the first half link parameters and the link registers (W) with the second half link parameters, the link relays (B) used for handshake processing must be allocated with both the first and second half link parameters.

(b) Only the first half link parameters are required for the local stations (station 1 to station 3) because each station uses less than 1024 link points.

(3) Allocating link relays (B)



		Master station (M)			Local station (Station 1) (L1)			Local station (Station 2) (L2)			Local station (Station 3) (L3)		
		Coil	Contact	Used as internal relays (M) by the master station	Coil	Contact	Used as internal relays (M) by station 1	Coil	Contact	Used as internal relays (M) by station 2	Coil	Contact	Used as internal relays (M) by station 3
B000	M	o	o			o			o			o	
B100	*1												
B200	L1		o		o	o			o			o	
B300	L2		o			o		o	o			o	
B500	L3		o			o			o		o	o	
B900				o			o			o			o
BC00	M	o	o			o			o			o	
BD00				o			o			o			o
BFFF													

Coil : ON/OFF control of link relays (B)
Contact : Reads ON/OFF data from the link relay (B) contact
o : Usable range

Fig. 7.21 Link Relay (B) Allocation Example

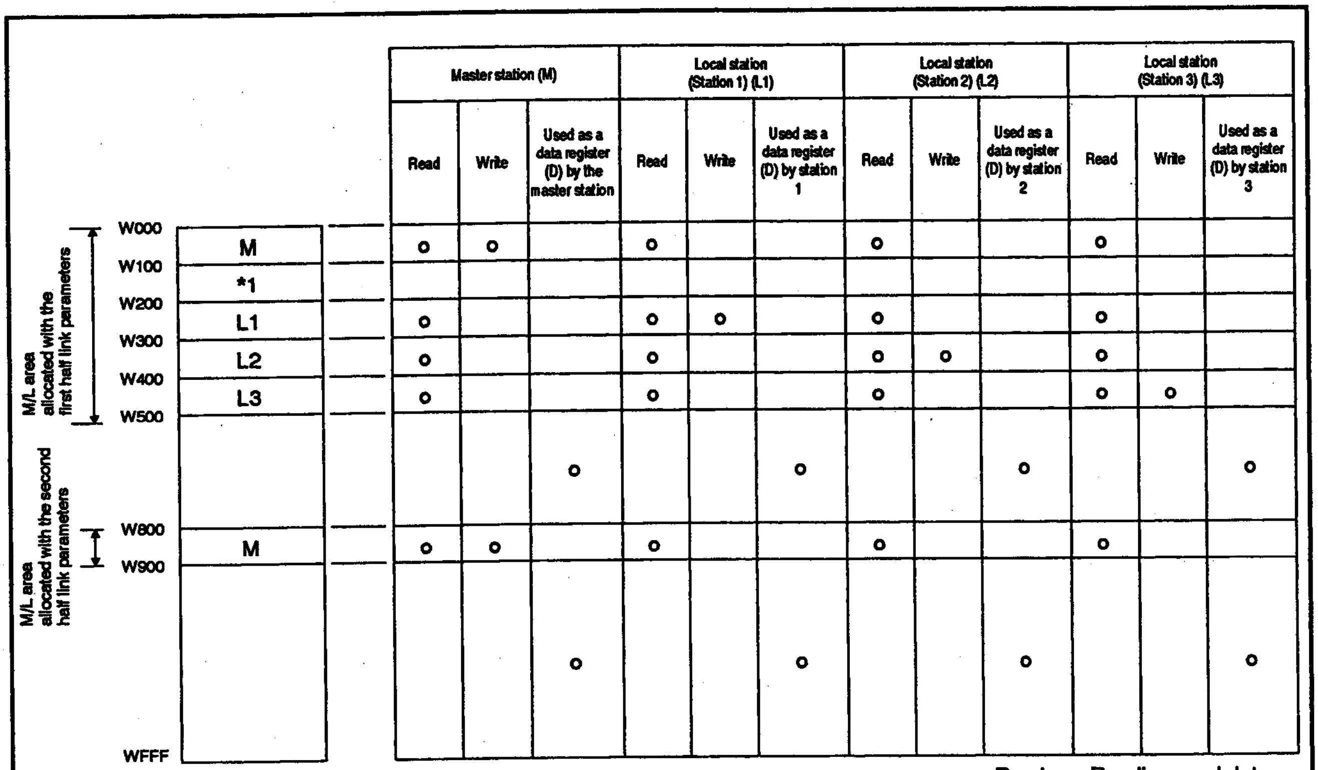
(a) The vacant area marked with an asterisk in the M/L area allocated with the first half link parameters cannot be used in place of internal relays (M).

This is also true for the vacant area in the M/L area allocated with the second half link parameters.

(b) The device range that can be allocated with second half link parameters begins after the range allocated with the first half link parameters: "(final device number allocated with the first half link parameters) + 1".

In Fig. 7.21, the link range can be allocated with the second half link parameters after B900 because the B000 to B8FF range is allocated with the first half link parameters.

(4) Allocating link registers (W)



		Master station (M)			Local station (Station 1) (L1)			Local station (Station 2) (L2)			Local station (Station 3) (L3)		
		Read	Write	Used as a data register (D) by the master station	Read	Write	Used as a data register (D) by station 1	Read	Write	Used as a data register (D) by station 2	Read	Write	Used as a data register (D) by station 3
W000	M	o	o		o			o			o		
W100	*1												
W200	L1	o			o	o		o			o		
W300	L2	o			o			o	o		o		
W400	L3	o			o			o			o	o	
W500				o			o			o			o
W800	M	o	o		o			o			o		
W900–WFFF				o			o			o			o

Read : Reading word data
Write : Writing word datat
o : Usable range

Fig. 7.22 Link Register (W) Allocation Example

(a) The vacant area marked with an asterisk in the M/L area allocated with the first half link parameters cannot be used in place of data registers (D).

This is also true for the vacant area in the M/L area allocated with the second half link parameters.

(b) The device range that can be allocated with the second half link parameters begins after the range allocated with the first half link parameters: "(final device number allocated with the first half link parameters) + 1".

In Fig. 7.22, the link range can be allocated with the second half link parameters after W500 because the W000 to W4FF range is allocated with the first half link parameters.

(5) Allocating inputs (X) and outputs (Y)

In this system example, inputs (X) and outputs (Y) are not required because there is vacant area in the link relay (B) allocation. However, to simplify the explanation, 128 input (X) points and 128 output (Y) points are allocated to local stations 1 and 3.

(a) Input and output range used for data link by master station

The master station uses I/O devices in the X/Y0 to X/Y14F range for itself. For the data link, the X/Y150 to X/Y7FF range can be used.

(b) Local station 1

For station 1 : X/Y0 to X/Y7F

For data link : X/Y180 to X/Y1FF

(c) Local station 3

For station 1 : X/Y0 to X/YFF

For data link : X/Y180 to X/Y7FF

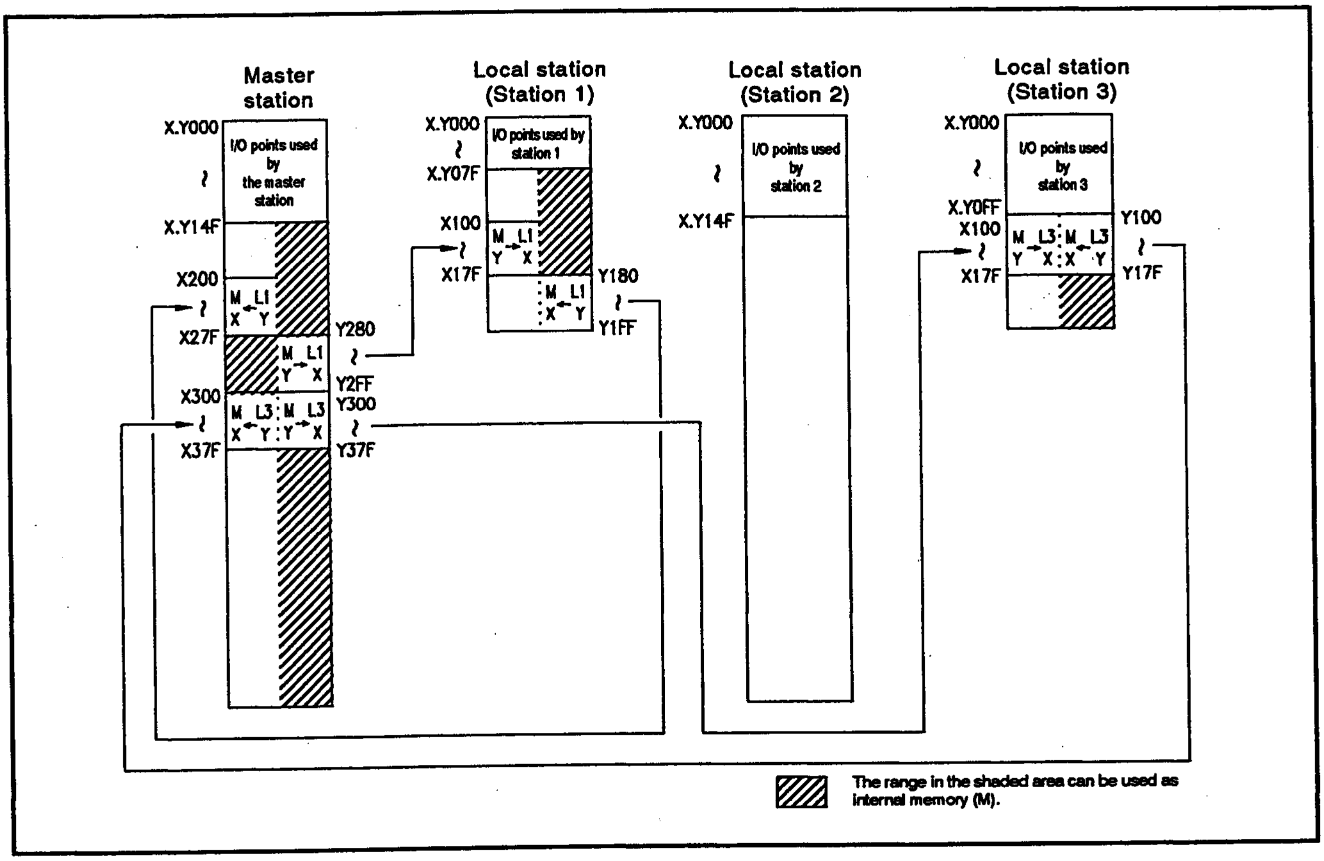
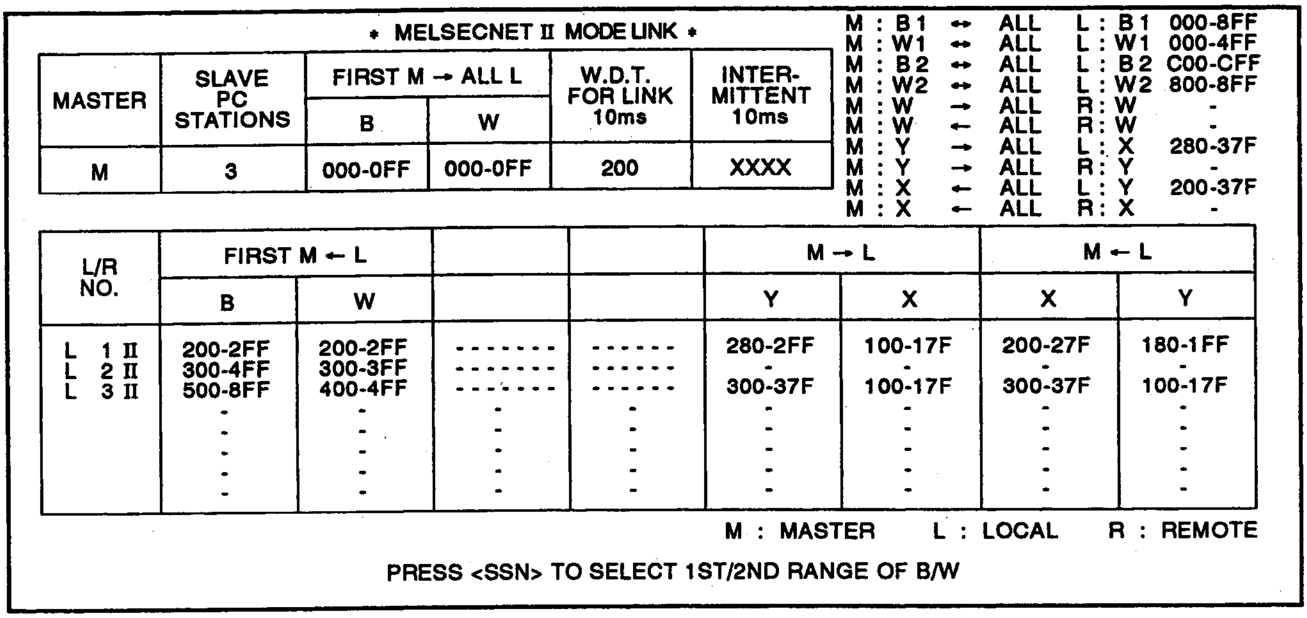


Fig. 7.23 Input (X) and Output (Y) Allocation Example

(6) Link parameter setting example

(a) First half link parameters



* MELSECNET II MODE LINK *

MASTER	SLAVE PC STATIONS	FIRST M → ALL L		W.D.T. FOR LINK 10ms	INTER-MITTENT 10ms
		B	W		
M	3	000-0FF	000-0FF	200	XXXX

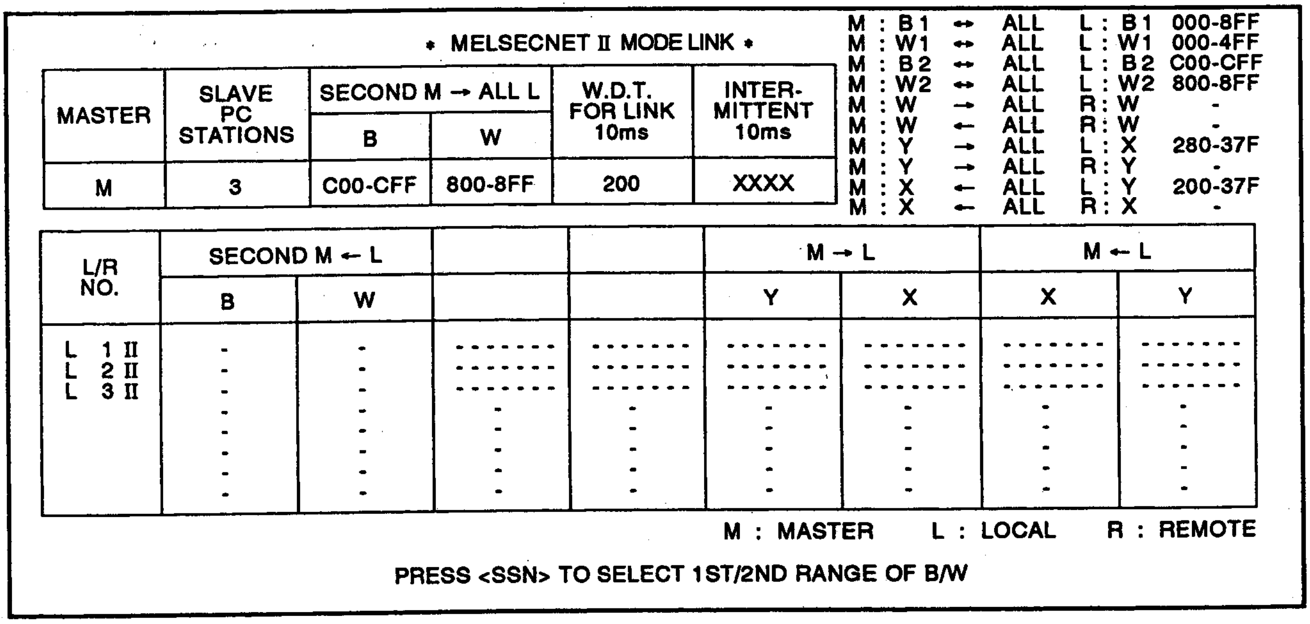
M : B1 ↔ ALL L : B1 000-8FF
M : W1 ↔ ALL L : W1 000-4FF
M : B2 ↔ ALL L : B2 C00-CFF
M : W2 ↔ ALL L : W2 800-8FF
M : W → ALL R : W -
M : W ← ALL R : W -
M : Y → ALL L : X 280-37F
M : Y → ALL R : Y -
M : X ← ALL L : Y 200-37F
M : X ← ALL R : X -

L/R NO.	FIRST M ← L				M → L		M ← L	
	B	W			Y	X	X	Y
L 1 II	200-2FF	200-2FF	-------	------	280-2FF	100-17F	200-27F	180-1FF
L 2 II	300-4FF	300-3FF	-------	------	-	-	-	-
L 3 II	500-8FF	400-4FF	-------	------	300-37F	100-17F	300-37F	100-17F
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-

M : MASTER L : LOCAL R : REMOTE

PRESS <SSN> TO SELECT 1ST/2ND RANGE OF B/W

(b) Second half link parameters



* MELSECNET II MODE LINK *

MASTER	SLAVE PC STATIONS	SECOND M → ALL L		W.D.T. FOR LINK 10ms	INTER-MITTENT 10ms
		B	W		
M	3	C00-CFF	800-8FF	200	XXXX

M : B1 ↔ ALL L : B1 000-8FF
M : W1 ↔ ALL L : W1 000-4FF
M : B2 ↔ ALL L : B2 C00-CFF
M : W2 ↔ ALL L : W2 800-8FF
M : W → ALL R : W -
M : W ← ALL R : W -
M : Y → ALL L : X 280-37F
M : Y → ALL R : Y -
M : X ← ALL L : Y 200-37F
M : X ← ALL R : X -

L/R NO.	SECOND M ← L				M → L		M ← L	
	B	W			Y	X	X	Y
L 1 II	-	-	-------	-------	-------	-------	-------	-------
L 2 II	-	-	-------	-------	-------	-------	-------	-------
L 3 II	-	-	-------	-------	-------	-------	-------	-------
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-

M : MASTER L : LOCAL R : REMOTE

PRESS <SSN> TO SELECT 1ST/2ND RANGE OF B/W

7.9 Link Parameters in the MELSECNET II Composite Mode

Possible system configurations in the MELSECNET II composite mode:

- System consisting of a master station and local stations (referred to as a "local system" in this manual).
- System consisting of a master station and remote I/O stations (referred to as a "remote I/O system" in this manual).
- System consisting of a master station, local stations, and remote I/O stations (referred to as a "local/remote I/O system" in this manual).

7.9.1 Device allocation for a local system

(1) Determine the link relay (B) and link register (W) range to be allocated with the first and second half link parameters for each MELSECNET II mode-compatible station.

Only first half link parameters are required for MELSECNET mode-compatible stations.

(a) The device range allocated with the first half link parameters can be read by the master station and all local stations. However, the range allocated with the second half link parameters can only be read by MELSECNET II mode-compatible stations.

Determine the allocation range according to the station with which communication will be executed.

(b) The setting range of the first half link parameters is B0 to B3FF and W0 to W3FF.

(c) The device range that can be allocated with the second half link parameters begins after the range allocated with the first half link parameters: "(final device number allocated with the first half link parameters) + 1".

If 0 points are allocated with the first half link parameters, allocation with the second half link parameters can begin from B0/W0.

(2) If the number of link relay (B) points is insufficient, check the use of inputs (X) and outputs (Y) for one-to-one data communication between the master station and a local station (refer to Section 7.6.4).

(3) Make sure that the number of link points per station does not exceed the following limits (refer to Section 7.6.1):

- Master station first half link parameters : 1024 bytes
- Master station second half link parameters : 1024 bytes
- Local station first half link parameters : 1024 bytes
- Local station second half link parameters : 1024 bytes

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	○		○			

7.9.2 Device allocation for a remote I/O system

(1) Determine the first device number of the I/O module loaded to a remote I/O station.

The I/O numbers that can be allocated to a remote I/O station begin after the I/O numbers used for master station I/O (refer to Section 7.6.4).

(2) When a special function module is loaded to a remote I/O station, determine the link register (W) allocation range (M/R area) to be used for buffer memory read/write (RFRP/RTOP instruction) (refer to Section 7.6.3). For the M/R area, the W0 to W3FF range can be used for the M/R area.

(a) Divide the M/R area into the M ← R area and the M → R area to allocate it.

To connect more than one remote I/O station, allocate an M ← R area and an M → R area to each remote I/O station.

For example, to connect three remote I/O stations, divide the M ← R area and M → R area into three stations as illustrated below.

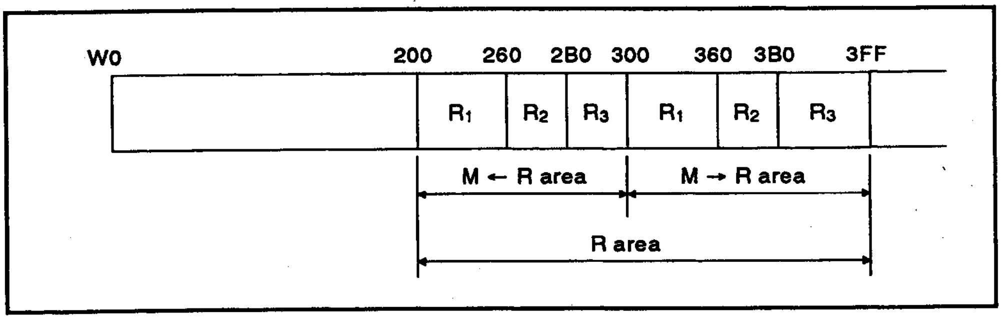


Fig. 7.24 Link Register (W) Allocation Example

(b) Consider the range used by the system when allocating the M → R area.

The system uses the M → R area to execute RFRP/RTOP instructions.

1) Number of points used by the system

Each link register (W) point is used for one special function module loaded to a remote I/O station.

2) Range used by the system

The range used by the system begins at the M ← R area head device number allocated to each remote I/O station to one point less than the total number of use points: "number of use points - 1".

For example, when three special function modules are loaded to remote I/O station 2, the range W360 to W362 in the M → R area W360 to W3AF is used by the system as illustrated in Fig. 7.24.

(3) Make sure that the number of link points per station does not exceed the following limit (refer to Section 7.6.1):

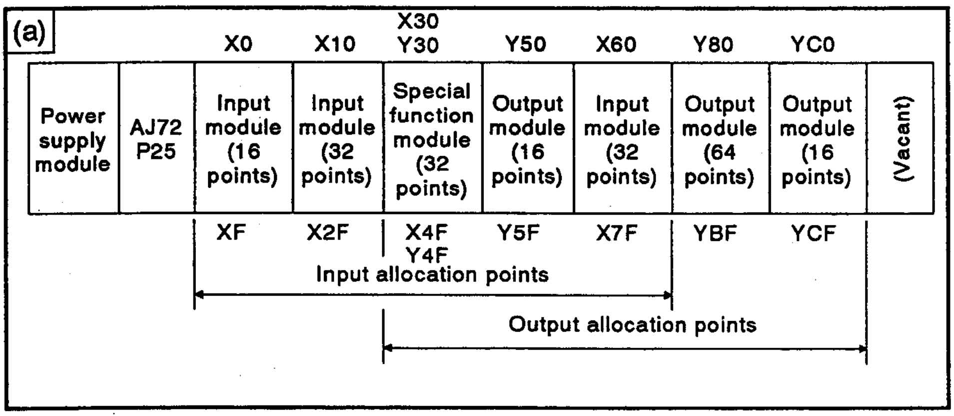
- Remote I/O station : 512 bytes

POINTS

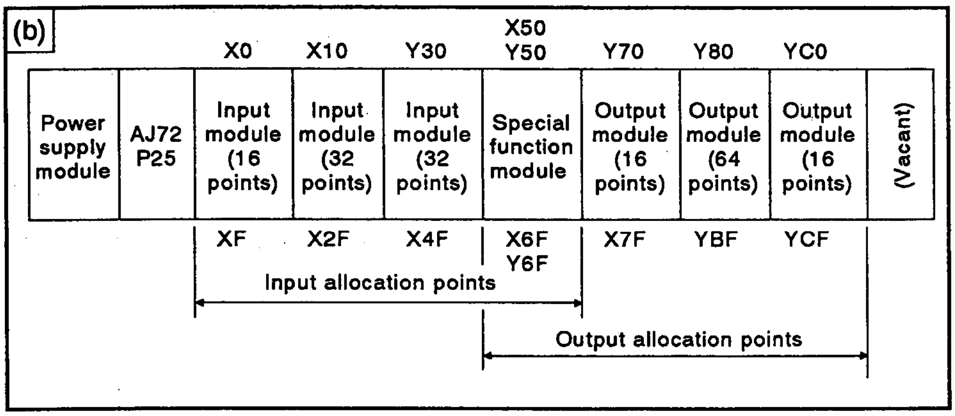
(1) If the M → R area used by the system to execute an RFRP/RTOP instruction is mistakenly used by a user program, data will not be able to be read/written correctly.

(2) The number of link points can be reduced by loading modules to a remote I/O station in groups of input modules, special function modules, and output modules as illustrated below. If the modules are loaded as illustrated in Item b, a reduction of 16 input allocation points and 32 output allocation points can be achieved.

(a)



(b)



REMARK

The same concept is used to set the link parameters for a remote I/O system configured in the MELSECNET II composite mode and a remote I/O system configured in the MELSECNET mode.

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability			o			x

7.9.3 Device allocation for the local/remote I/O system

(1) Determine the link relay (B) allocation range for each master station and local station (refer to Section 7.6.2).

(a) Determine the link relay (B) allocation range with the first and second half link parameters for each MELSECNET II mode-compatible station.

The device range allocated with the first half link parameters can be read by the master station and all local stations. However, the range allocated with the second half link parameters can only be read by MELSECNET II mode-compatible stations.

Determine the allocation range according to the station with which communication will be executed.

(b) The setting range of the first half link parameters is B0 to B3FF.

(c) The device range that can be allocated with the second half link parameters begins after the range allocated with the first half link parameters: "(final device number allocated with the first half link parameters) + 1".

If 0 points are allocated with the first half link parameters, allocation with the second half link parameters can begin from B0.

(2) When a special function module is loaded to a remote I/O station, link registers (W) are required for buffer memory read/write (RFRP/RTOP instruction).

Divide the link registers (W) in the W0 to W3FF range and allocate them with the first half link parameters so that they can be allocated to the M/L area (for communication between the master station and a local station) and the M/R area (for communication between the master station and a remote I/O station).

(3) For allocation of the M/L area, determine the allocation range by dividing the area for each of a master station and local station.

(a) Determine the link register (W) allocation range of the first and second half link parameters for each MELSECNET II mode-compatible station.

The device range allocated with the first half link parameters can be read by the master station and all local stations. However, the range allocated with the second half link parameters can only be read by MELSECNET II mode-compatible stations.

Determine the allocation range according to the station with which communication will be executed.

(b) The setting range of the first half link parameters is W0 to W3FF.

(c) The device range that can be allocated with the second half link parameters begins after the range allocated with the first half link parameters: "(final device number allocated with the first half link parameters) + 1".

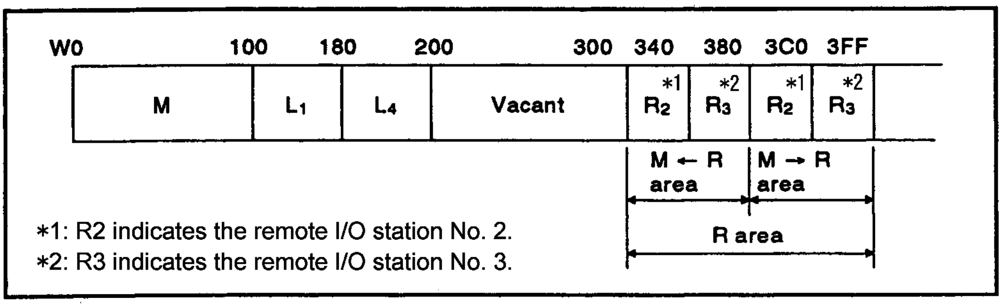
If 0 points are allocated with the first half link parameters, allocation with the second half link parameters can begin from B0/W0.

(4) Divide the M/R area into the M ← R area and the M → R area to allocate it.

Only the W0 to W3FF range can be used for the M/R area.

(a) To connect more than one remote I/O station, allocate an M ← R area and an M → R area to each remote I/O station.

For example, to connect two remote I/O stations, divide the M ← R area and M → R area into two stations as illustrated below.



*1: R2 indicates the remote I/O station No. 2.
*2: R3 indicates the remote I/O station No. 3.

Fig. 7.25 Link Register (W) Allocation Example

(b) Consider the range used by the system when allocating the M → R area.

The system uses the M R area to execute RFRP/RTOP instructions.

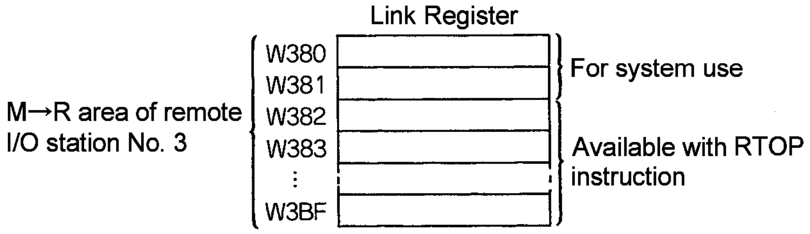
1) Number of points used by the system

Each link register (W) point is used for one special function module loaded to a remote I/O station.

2) Range used by the system

The range used by the system begins at the M → R area head device number allocated to each remote I/O station to one point less than the total number of use points: "number of use points - 1".

For example, when two special function modules are loaded to remote I/O station 3, the range W380 to W381 in the M → R area W380 to W3BF is used by the system as illustrated in Fig. 7.25.



(5) Allocate the input (X) and output (Y) range used for data link following the range used by the master station I/O.

(a) Divide the area used for data link into an M/R area (for communication between the master station and a remote I/O station) and an M/L area (for communication between the master station and a local station) to allocate the range.

(b) The M/L area is used when the number of link relay (B) points is insufficient. Therefore, it is not necessary to allocate the M/L area when there is sufficient number of link relay (B) points.

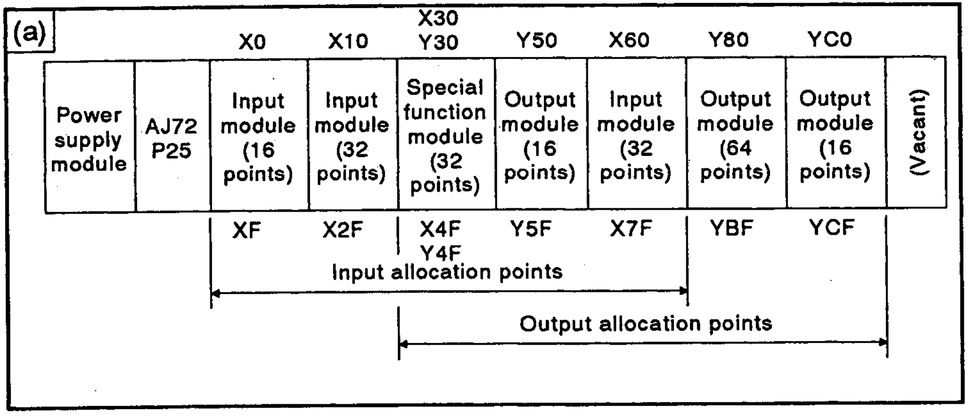
(6) Make sure that the number of link points per station does not exceed the following limits (refer to Section 7.6.1):

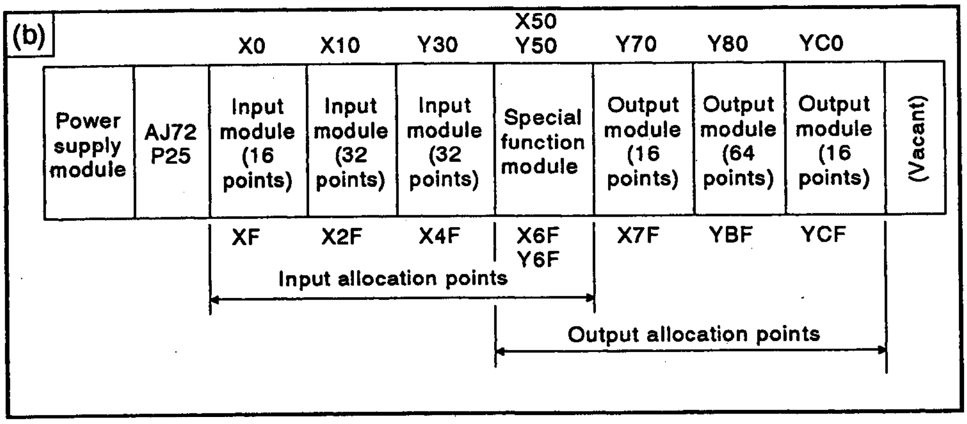
- Master station first half link parameters : 1024 bytes
- Master station second half link parameters : 1024 bytes
- Local station first half link parameters : 1024 bytes
- Local station second half link parameters : 1024 bytes
- Remote I/O stations : 512 bytes

POINTS

(1) If the M → R area used by the system to execute an RFRP/RTOP instruction is mistakenly used by a user program, data will not be able to be read/written correctly.

(2) The number of link points can be reduced by loading modules to a remote I/O station in groups of input modules, special function modules, and output modules as illustrated below. If the modules are loaded as illustrated in Item b, a reduction of 16 input allocation points and 32 output allocation points can be achieved.





REMARK

When all of the local stations are MELSECNET II mode-compatible, the master station and all of the local stations can be allocated with the second half link parameters to simplify handshake processing (refer to Section 9.1, Item (4), for details on handshake processing).

7.9.4 Link parameter setting example

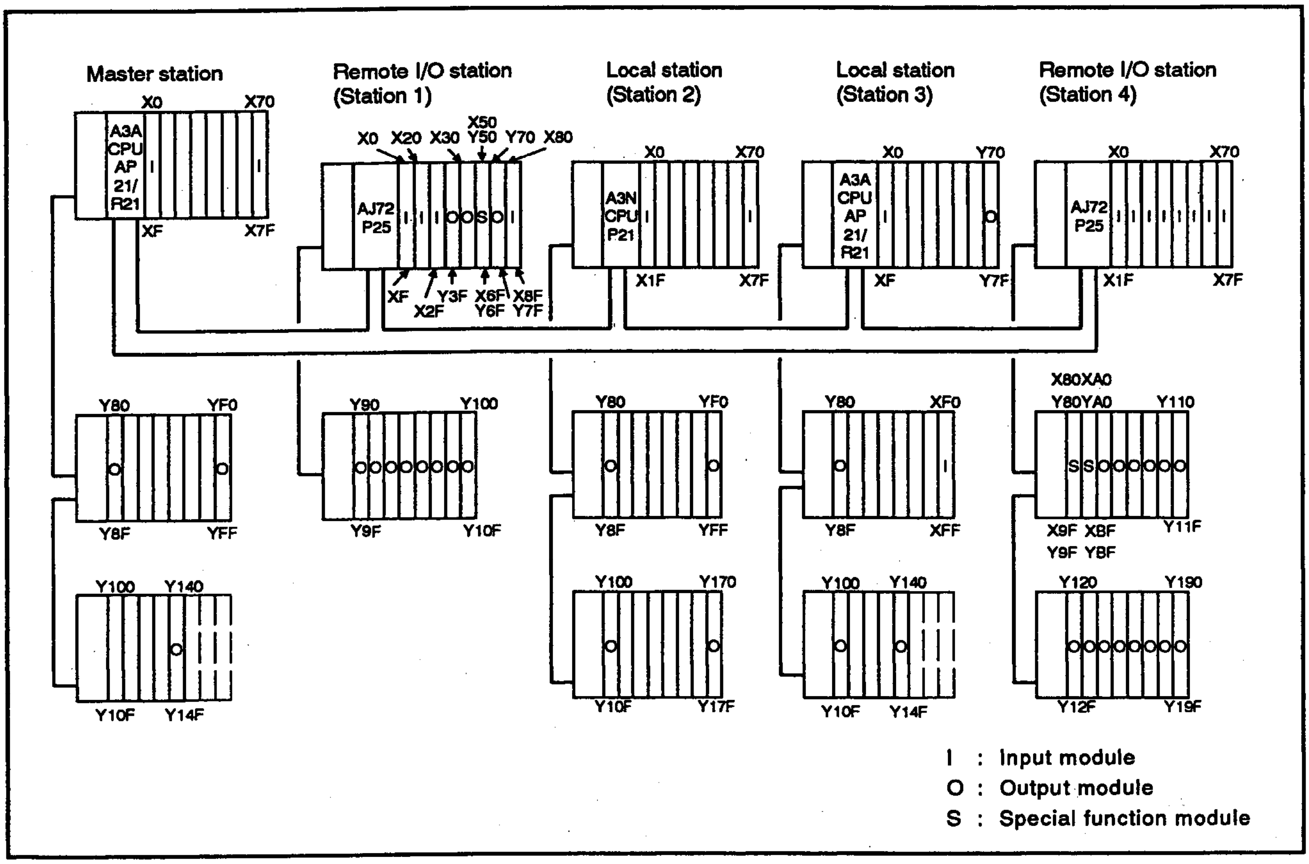


Fig. 7.26 Local/Remote I/O System Configuration Example

(1) Number of allocation points

(a) When a MELSECNET II mode-compatible PC CPU is loaded to the master station, the link relays (B) and link registers (W) should be allocated as follows:

For communication with stations 2 and 3 (all local stations):

Use the first half link parameters.

Link relays (B)	256 points	Link registers (W)	256 points

For communication with station 3 (MELSECNET II mode-compatible local station):

Use the second half link parameters.

Link relays (B)	256 points	Link registers (W)	256 points

(b) When a MELSECNET mode-compatible PC CPU is loaded to local station 2, the link relays (B) and link registers (W) should be allocated as follows:

Use the first half link parameters.

Link relays (B)	256 points	Link registers (W)	256 points

(c) When a MELSECNET II mode-compatible PC CPU is loaded to local station, the link relays (B) and link registers (W) should be allocated as follows:

For communication with the master station and local station 2 (master and all local stations):

Use the first half link parameters.

Link relays (B) 256 points	Link registers (W) 128 points

For communication with the master station (MELSECNET II mode-compatible station):

Use the second half link parameters.

Link relays (B) 256 points	Link registers (W) 256 points

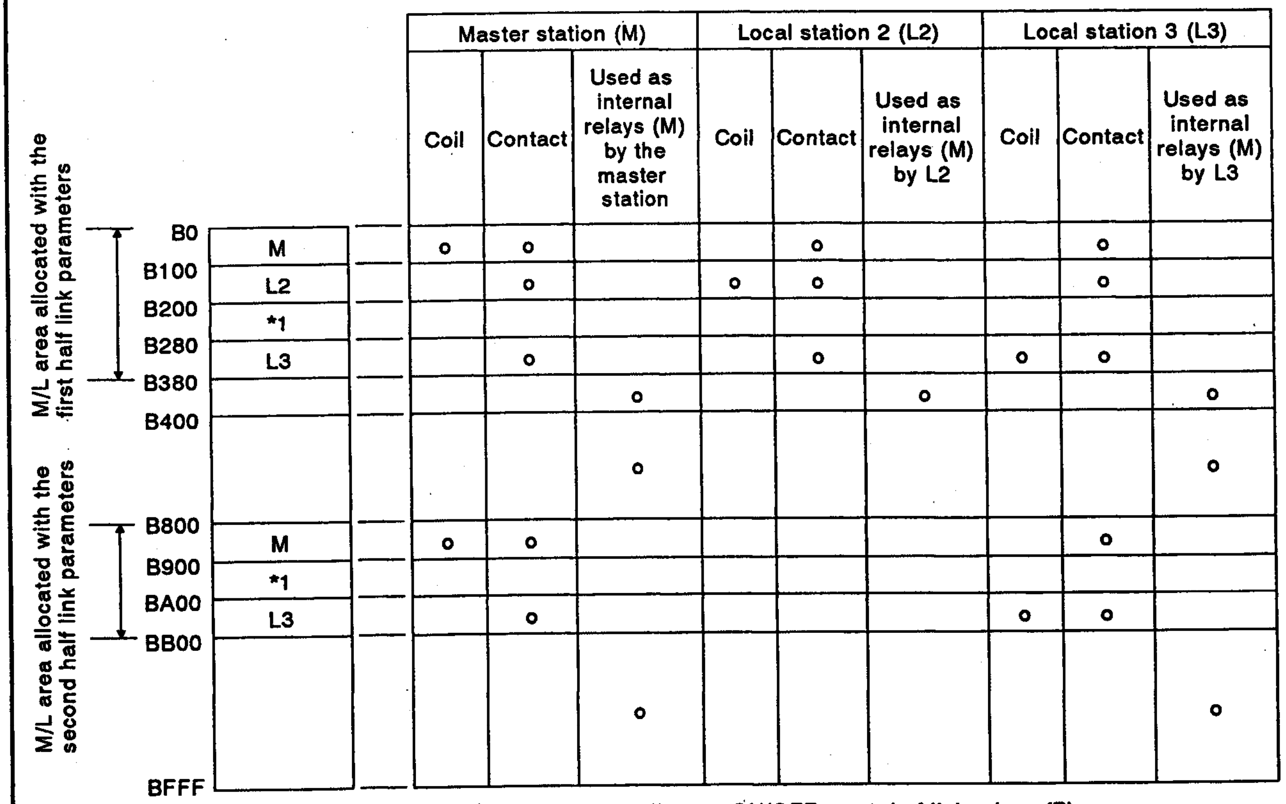
(2) Allocating link relays (B)

(a) Allocate the following number of link relay (B) points with the first half link parameters:

256 points for the master station, 256 points for local station 2, and 256 points for local station 3.

Allocate the following number of link relay (B) points with the second half link parameters:

256 points for the master station and 256 points for local station 3.



		Master station (M)			Local station 2 (L2)			Local station 3 (L3)		
		Coil	Contact	Used as internal relays (M) by the master station	Coil	Contact	Used as internal relays (M) by L2	Coil	Contact	Used as internal relays (M) by L3
B0	M	o	o			o			o	
B100	L2		o		o	o			o	
B200	*1									
B280	L3		o			o		o	o	
B380				o			o			o
B400				o						o
B800	M	o	o						o	
B900	*1									
BA00	L3		o					o	o	
BB00				o						o
BFFF										

Coil : ON/OFF control of link relays (B)
Contact : Reads ON/OFF data from the link relay (B) contact
o : Usable range

Fig. 7.27 Link Relay (B) Allocation Example

(b) The vacant areas marked with an asterisk in the M/L area allocated with the first half link parameters cannot be used in place of internal relays (M).

(c) The device range that can be allocated with the second half link parameters begins after the range allocated with the first half link parameters: "(final device number allocated with the first half link parameters) + 1".

In Fig. 7.27, the link range can be allocated with the second half link parameters after B900 because the B000 to B37F range is allocated with the first half link parameters.

(d) Because local station 2 is a MELSECNET mode-compatible station, it cannot use the B400 to BFFF range.

(3) Allocating link registers (W)

(a) Allocation for the master station and local stations (M/L area)

Allocate the following number of link register (W) points with the first half link parameters:

256 points for the master station (M), 256 points for local station 2 (L2), and 128 points for local station 3 (L3).

Allocate the following number of link register (W) points with the second half link parameters:

256 points for the master station (M) and 256 points for local station 3 (L3).

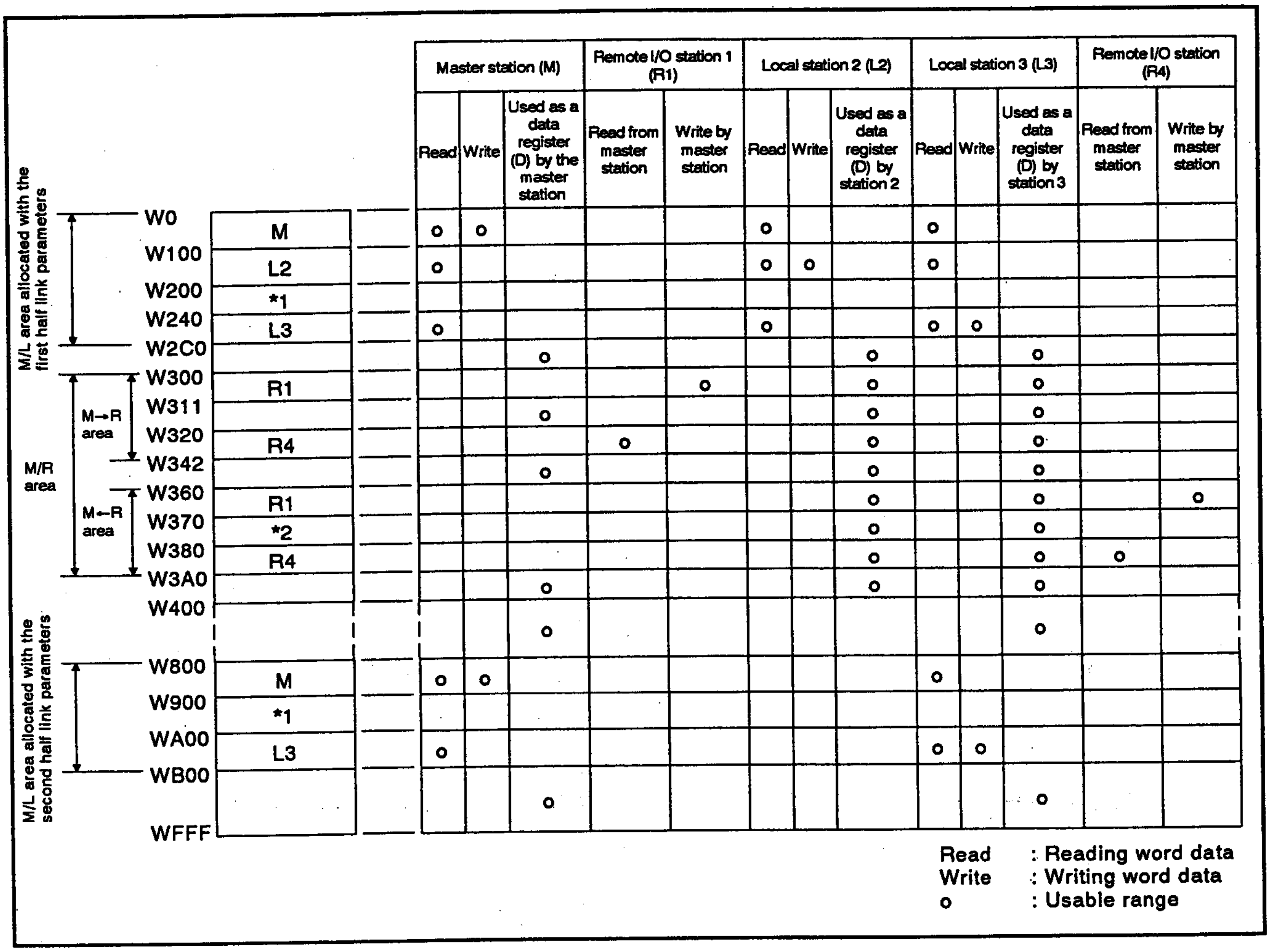
(b) Allocation for remote I/O stations (M → R area, M ← R area)

Allocate the following number of points for remote I/O station 1 (L1) so that instructions in a user program can be executed:

16 points for the RTOP instruction and 16 points for the RFRP instruction. Station 1 requires 17 points 1 for the M → R area because a special function module is loaded.

Allocate the following number of points for remote I/O station 4 (L4) so that instructions in a user program can be executed:

32 points for the RTOP instruction and 32 points for the RFRP instruction. Station 4 requires 34 points for the M → R area because two special function modules are loaded.



		Master station (M)			Remote I/O station 1 (R1)		Local station 2 (L2)			Local station 3 (L3)			Remote I/O station (R4)	
		Read	Write	Used as a data register (D) by the master station	Read from master station	Write by master station	Read	Write	Used as a data register (D) by station 2	Read	Write	Used as a data register (D) by station 3	Read from master station	Write by master station
W0	M	o	o				o			o				
W100	L2	o					o	o		o				
W200	*1													
W240	L3	o					o			o	o			
W2C0				o					o			o		
W300	R1					o			o			o		
W311				o					o			o		
W320	R4				o				o			o		
W342				o					o			o		
W360	R1								o			o		o
W370	*2								o			o		
W380	R4								o			o	o	
W3A0				o					o			o		
W400				o								o		
W800	M	o	o							o				
W900	*1													
WA00	L3	o								o	o			
WB00				o								o		
WFFF														

Read : Reading word data
Write : Writing word data
o : Usable range

Fig. 7.28 Link Register (W) Allocation Example

(c) In Fig. 7.28, the M/L area marked with "*1" and the M ← R area marked with "*2" cannot be used as a data register (D).

(d) Because local station 2 is a MELSECNET-compatible station, it cannot use the B400 to BFFF range.

(4) Allocating inputs (X) and outputs (Y)

(a) Input and output range used for data link by master station

The master station uses I/O devices in the X/Y0 to X/Y14F range for itself. For the data link, the X/Y150 to X/Y7FF range can be used.

(b) Remote I/O stations

1) Station 1

Inputs (X) : X0 to X8F
Outputs (Y) : Y30 to Y10F

2) Station 4

Inputs (X) : X0 to XBF
Outputs (Y) : Y80 to Y19F

(c) Local stations

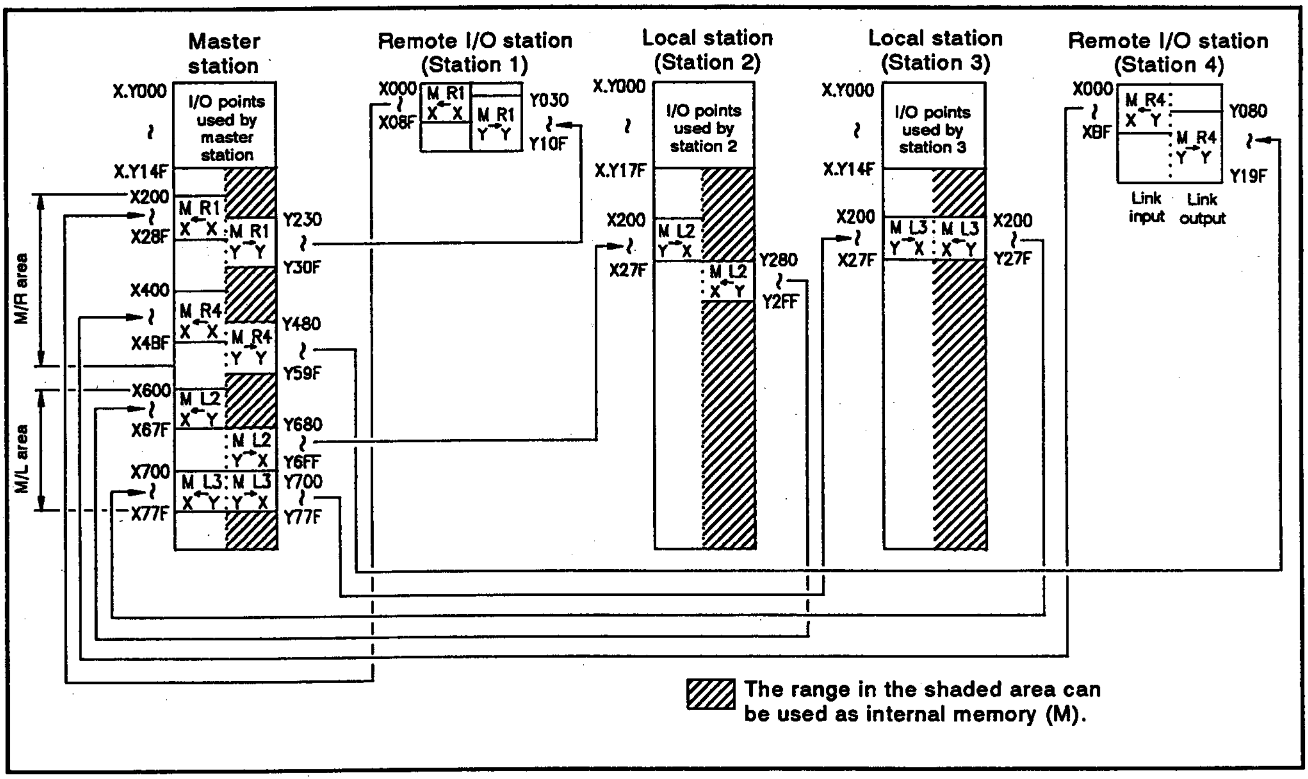
In this system example, inputs (X) and outputs (Y) are not required because there is vacant area in the link relay (B) allocation. However, to simplify the explanation, 128 input (X) points and 128 output (Y) points are allocated.

1) Station 2

Local station 2 uses I/O devices in the X/Y0 to X/Y17F range for itself. For the data link, the X/Y180 to X/Y7FF range can be used.

2) Station 3

Local station 3 uses I/O devices in the X/Y0 to X/Y14F range for itself. For the data link, the X/Y150 to X/Y7FF range can be used.

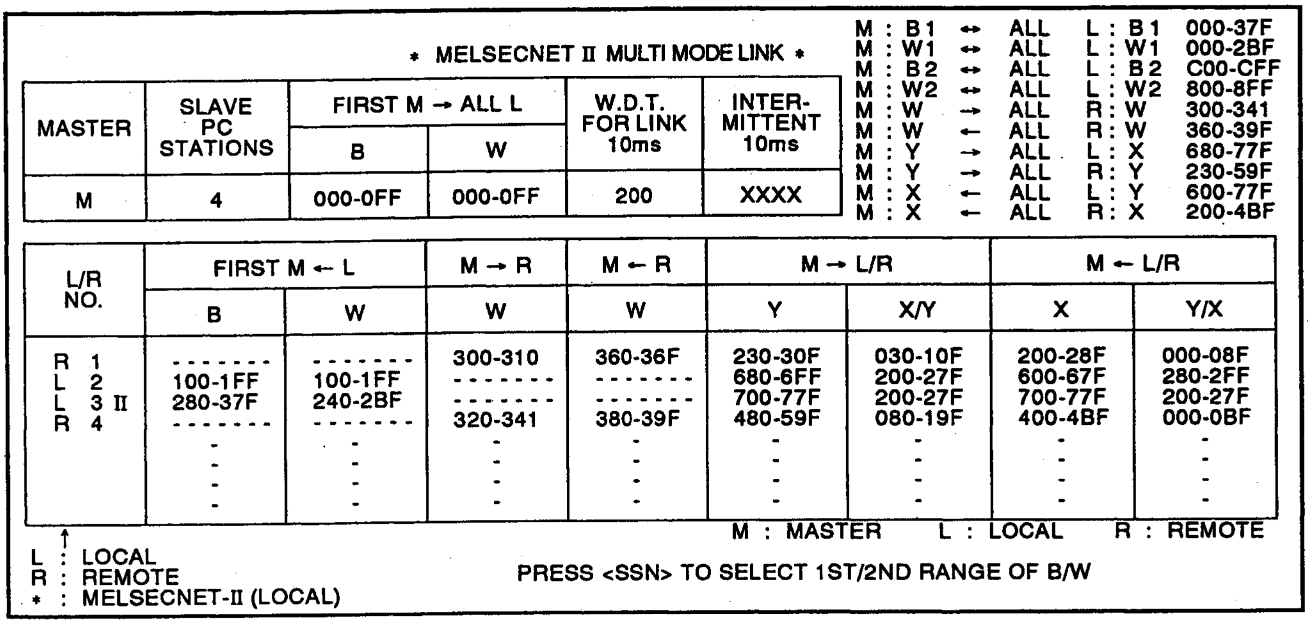


▨ The range in the shaded area can be used as internal memory (M).

Fig. 7.29 Input (X) and Output (Y) Allocation Example

(5) Link parameter setting

(a) First half link parameters



* MELSECNET II MULTI MODE LINK *

MASTER	SLAVE PC STATIONS	FIRST M → ALL L		W.D.T. FOR LINK 10ms	INTER-MITTENT 10ms
		B	W		
M	4	000-0FF	000-0FF	200	XXXX

M : B1 ↔ ALL L : B1 000-37F
M : W1 ↔ ALL L : W1 000-2BF
M : B2 ↔ ALL L : B2 C00-CFF
M : W2 ↔ ALL L : W2 800-8FF
M : W → ALL R : W 300-341
M : W ← ALL R : W 360-39F
M : Y → ALL L : X 680-77F
M : Y → ALL R : Y 230-59F
M : X ← ALL L : Y 600-77F
M : X ← ALL R : X 200-4BF

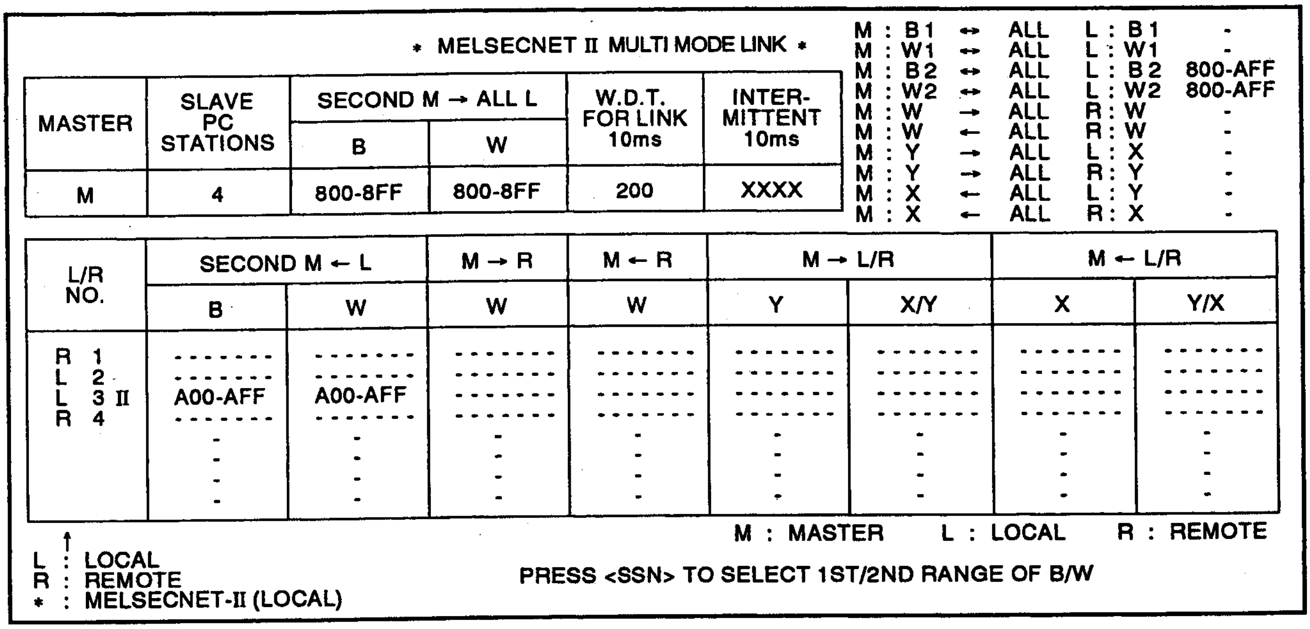
L/R NO.	FIRST M ← L		M → R	M ← R	M → L/R		M ← L/R	
	B	W	W	W	Y	X/Y	X	Y/X
R 1	-------	-------	300-310	360-36F	230-30F	030-10F	200-28F	000-08F
L 2	100-1FF	100-1FF	-------	-------	680-6FF	200-27F	600-67F	280-2FF
L 3 II	280-37F	240-2BF	-------	-------	700-77F	200-27F	700-77F	200-27F
R 4	-------	-------	320-341	380-39F	480-59F	080-19F	400-4BF	000-0BF
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-

M : MASTER L : LOCAL R : REMOTE

↑
L : LOCAL
R : REMOTE
* : MELSECNET-II (LOCAL)

PRESS <SSN> TO SELECT 1ST/2ND RANGE OF B/W

(b) Second half link parameters



* MELSECNET II MULTI MODE LINK *

MASTER	SLAVE PC STATIONS	SECOND M → ALL L		W.D.T. FOR LINK 10ms	INTER-MITTENT 10ms
		B	W		
M	4	800-8FF	800-8FF	200	XXXX

M : B1 ↔ ALL L : B1 -
M : W1 ↔ ALL L : W1 -
M : B2 ↔ ALL L : B2 800-AFF
M : W2 ↔ ALL L : W2 800-AFF
M : W → ALL R : W -
M : W ← ALL R : W -
M : Y → ALL L : X -
M : Y → ALL R : Y -
M : X ← ALL L : Y -
M : X ← ALL R : X -

L/R NO.	SECOND M ← L		M → R	M ← R	M → L/R		M ← L/R	
	B	W	W	W	Y	X/Y	X	Y/X
R 1	-------	-------	-------	-------	-------	-------	-------	-------
L 2	-------	-------	-------	-------	-------	-------	-------	-------
L 3 II	A00-AFF	A00-AFF	-------	-------	-------	-------	-------	-------
R 4	-------	-------	-------	-------	-------	-------	-------	-------
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-

M : MASTER L : LOCAL R : REMOTE

↑
L : LOCAL
R : REMOTE
* : MELSECNET-II (LOCAL)

PRESS <SSN> TO SELECT 1ST/2ND RANGE OF B/W

7.10 Allocating Link Devices for a Three-Tier System

7.10.1 Common information

(1) The link relay (B) and link register (W) range allocated to the master station for the third tier is the device range that can be allocated to the local stations in the second tier.

The link register (W) range allocated with the link parameters for the second tier and the vacant areas is the range (M/R area) that can be allocated to the remote I/O stations in the third tier.

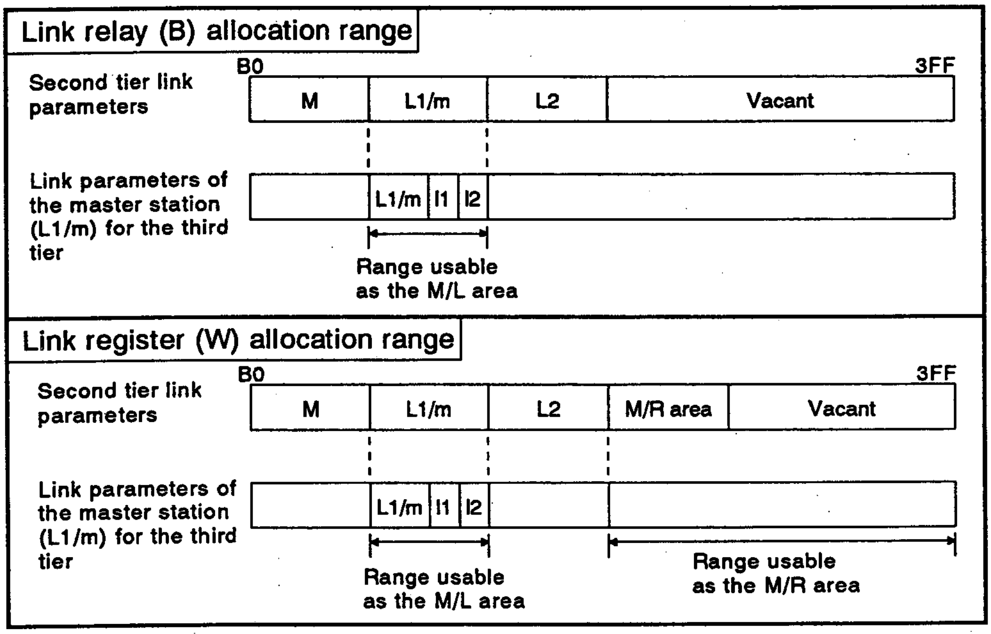


Fig. 7.30 Allocating Link Relays (B) and Link Registers (W)

(2) The input (X) and output (Y) range that can be allocated to the master station for the third tier is the area following the I/O range allocated for the use by the station itself. This is the same range as that allocated for the master station for the second tier.

If inputs (X) and outputs (Y) are used to establish a data link between the master station for the second tier and the master station for the third tier, the allocation range of the master station for the third tier should exclude this range.

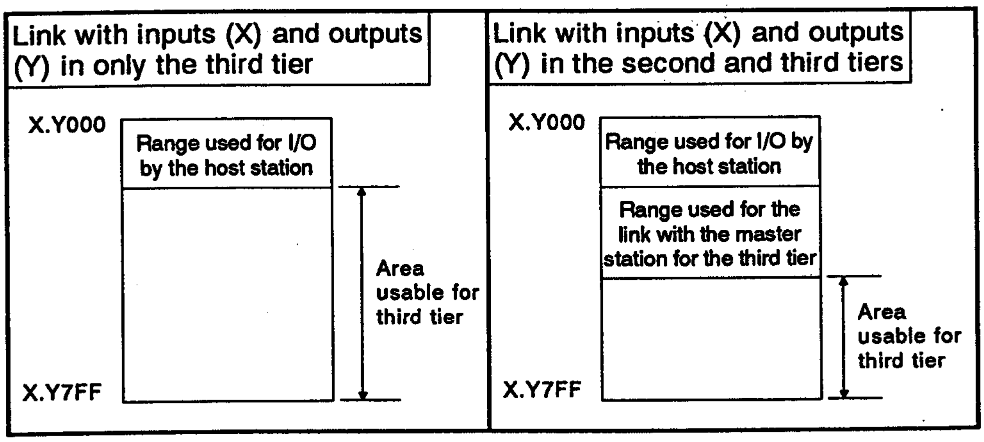


Fig. 7.31 Allocating Inputs (X) and Outputs (Y)

(3) Table 7.4 lists the operation mode combinations according to the operation modes set for the second tier and the third tier.

Table 7.4 Operation Mode Combinations

Second Tier Operation Mode / Third Tier Operation Mode	MELSECNET Mode	MELSECNET II Mode	MELSECNET II Composite Mode
MELSECNET mode	(1)	(4)	(7)
MELSECNET II mode	(2)	(5)	(8)
MELSECNET II composite mode	(3)	(6)	(9)

(4) When the MELSECNET II mode or MELSECNET II composite mode is selected, the link relay (B) and link register (W) range that can be allocated with the first and second half link parameters are as indicated below.

(a) The range allocated with the first half link parameters for the second tier should be allocated with the first half link parameters for the third tier.

The range allocated with the second half link parameters for the second tier should be allocated with the second half link parameters for the third tier.

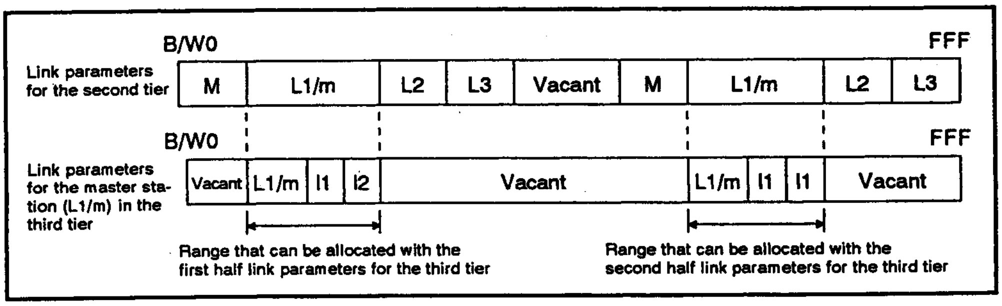


Fig. 7.32 When First and Second Half Link Parameters are Used for Device Allocation in the Second Tier

(b) When the selected mode only provides one type of link parameter (MELSECNET mode is selected by the master station for the second tier) or when the second half link parameters are not used for device allocation, the device range that can be allocated with the second half link parameters begins after the range allocated with the first half link parameters: "(final device number allocated with the first half link parameters) + 1".

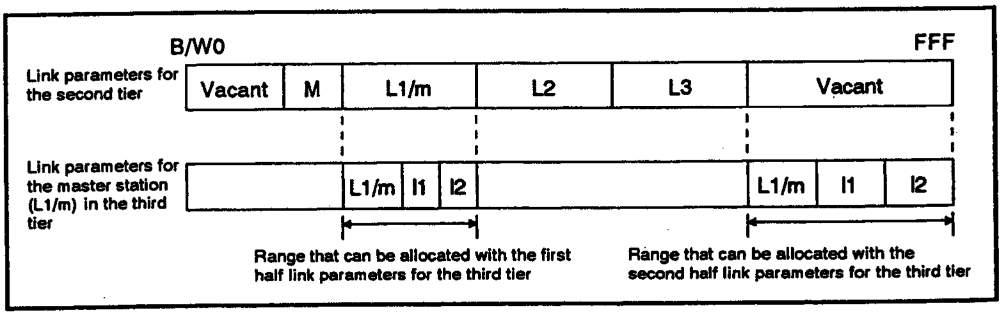


Fig. 7.33 When Only First Half Link Parameters are Used for Device Allocation in the Second Tier

(5) In a three-tier system, link relays (B) and link registers (W) can be allocated for the use in the third tier.

In the MELSECNET Data Link System, the link device ranges allocated for the second tier and the third tier are compared to check the correctness of the set ranges. This check is called the "matching" check.

In the matching check, the link relay (B) and link register (W) range allocated with the link parameters for the third tier are checked for whether or not it is within the range allocated for the use by the master station for the third tier. The results of the match check are stored to M9235 and D9220 to D9223 in the master station for the second tier and to M9270 in the master station for the third tier.

(a) The match check is executed using the parameters described in Table 7.5 according to the operation mode combinations of the second and third tiers.

For example, if the operation mode of the second tier is the MELSECNET II composite mode and the operation mode of the third tier is the MELSECNET II mode, the first half link parameters for the second tier is compared with the first half link parameters for the third tier and the second half link parameters for the second tier are compared with the second half link parameters for the third tier.

Table 7.5 Match Check of Link Parameter Settings

Second Tier Operation Mode and Link Parameters / Third Tier Operation Mode and Link Parameters		MELSECNET Mode Link Parameters	MELSECNET II Mode		MELSECNET II Composite Mode	
			First Half Link Parameters	Second Half Link Parameters	First Half Link Parameters	Second Half Link Parameters
MELSECNET mode link parameters		o	o	x	o	x
MELSECNET II mode	First half link parameters	o	o	x	o	x
	Second half link parameters	x	x	o	x	o
MELSECNET II composite mode	First half link parameters	o	o	x	o	x
	Second half link parameters	x	x	o	x	o

o: Match check is executed
x: Match check is not executed

(b) The following matching check is executed when there are differences between the types of link parameters set for the second tier and the types of link parameters set for the third tier.

1) When two types of link parameters are set for the second tier and one type of link parameters is set for the third tier:

The matching check is executed on the first half link parameters for the second tier and the first half link parameters for the third tier (including the MELSECNET mode).

The matching check is not executed for the second half link parameters for the second tier.

2) When one type of link parameters is set for the second tier and two types of link parameters are set for the third tier:

The match check is executed on the first half link parameters (including the MELSECNET mode) for the second tier and the first half link parameters for the third tier.

The second half link parameters for the third tier are checked for whether or not the device range begins after the range allocated with the first half link parameters for the second tier.

(c) When the range of link relays (B) and link registers (W) is extended (M9208 and M9209 ON), the matching check will not be executed.

Make sure that the link parameters allocated to the third tier are not also allocated to the second tier.

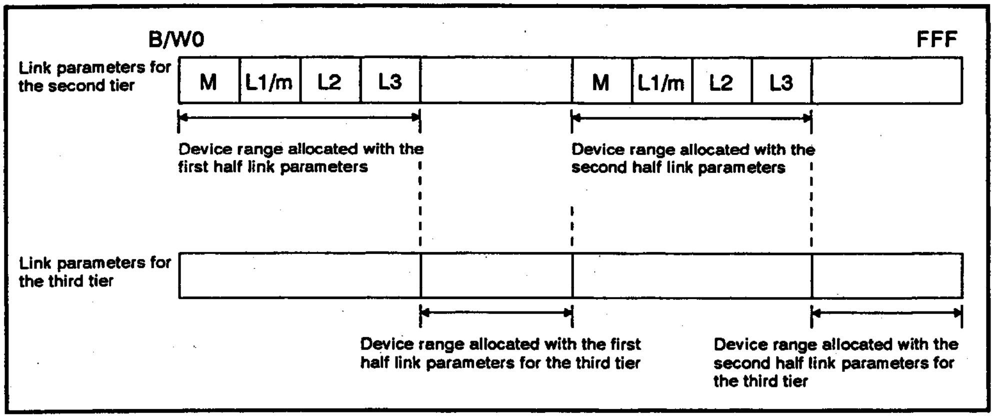


Fig. 7.34 Device Range Allocation when the Link Relay (B) and Link Register (W) Range is Extended

7.10.2 Using the MELSECNET mode in the second tier

(1) MELSECNET mode used in the third tier

(a) The range allocated for the master station for the third tier with the link parameters for the second tier is used for the M/L area of the third tier.

(b) The M/R area and the vacant area of the second tier is used for the M/R area of the third tier.

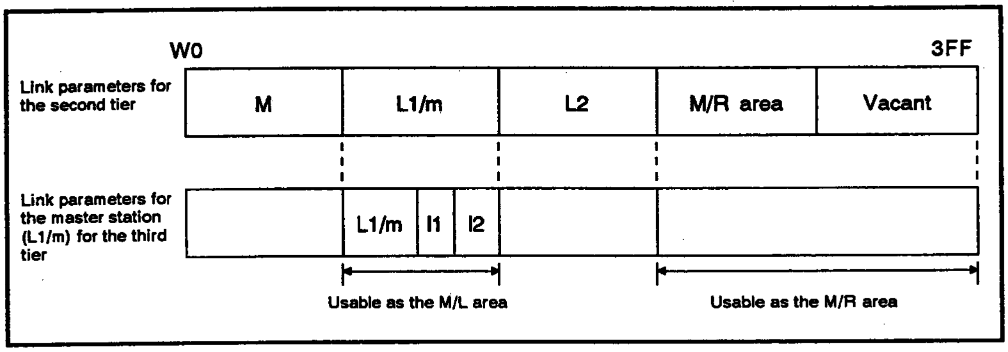


Fig. 7.35 Allocating Areas for a System Using the MELSECNET Mode for Both Tiers

(2) MELSECNET II mode used in the third tier

(a) The range allocated with the link parameters for the second tier for the master station for the third tier is used for the first half link parameters for the third tier.

(b) The vacant area that begins after the M/L area allocated with the link parameters for the second tier and the M/R area allocated with the same parameters is used for the second half link parameters for the third tier.

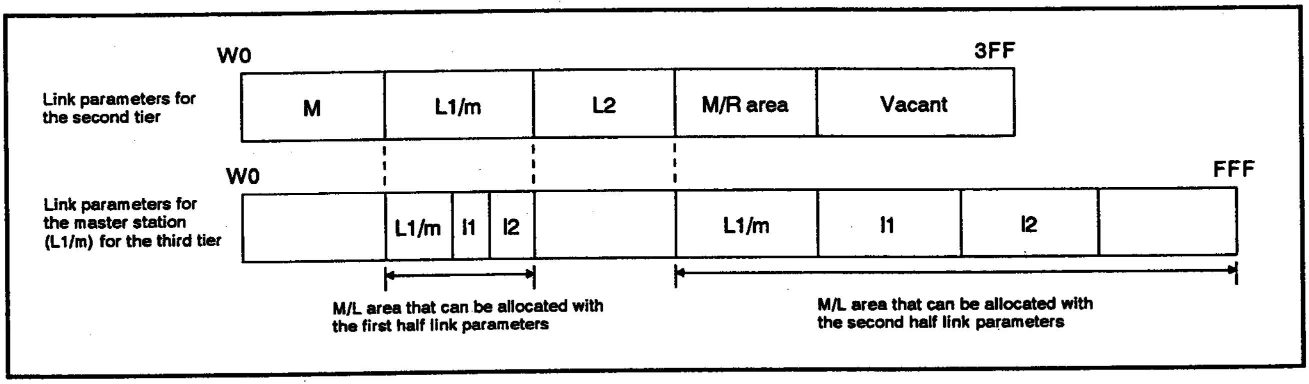


Fig. 7.36 Allocating Areas for a System Using the MELSECNET Mode and the MELSECNET II Mode

(3) MELSECNET II composite mode used in the third tier

(a) First half link parameters for the third tier

1) The range allocated for the master station for the third tier with the link parameters for the second tier is used for the M/L area.

2) The M/R area in the second tier and the vacant area in the W0 to W3FF range is used for the M/R area.

(b) The second half link parameters for the third tier can handle the vacant area that begins after the M/L area using the link parameters for the second tier as well as the M/R area for the second tier.

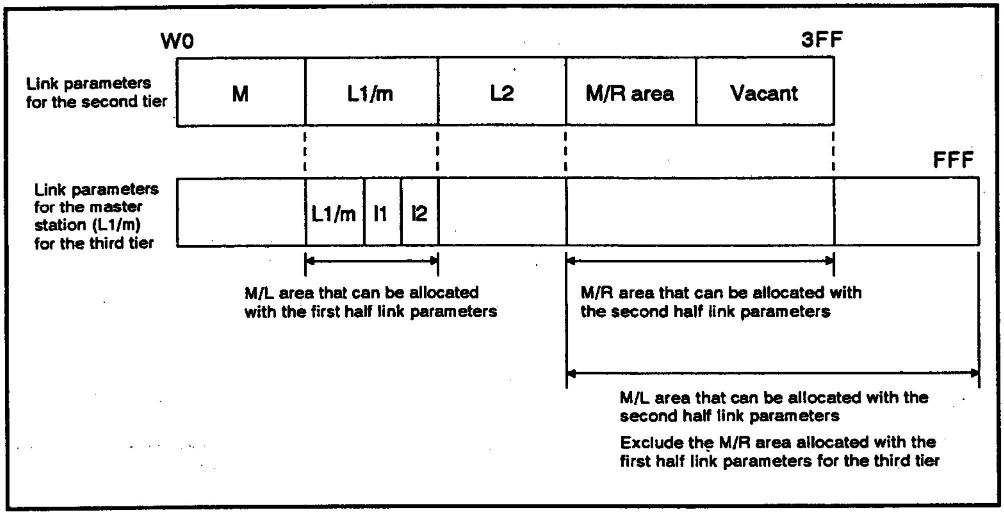


Fig. 7.37 Allocating Areas for a System Using the MELSECNET II Mode and the MELSECNET II Composite Mode

POINT

When connecting a remote I/O station in the third tier, allocate the device range with the range to be allocated for the M/R area for the third tier with the link parameters for the second tier.

The range that can be used for the M/R area is also the W0 to W3FF range when the MELSECNET II composite mode is used in the third tier. Therefore, the same action should be taken.

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability		o			o	

7.10.3 Using the MELSECNET II mode in the second tier

(1) MELSECNET mode used in the third tier

(a) The range allocated for the master station for the third tier with the first half link parameters for the second tier is used for the M/L area of the third tier.

The area allocated for the master station for the third tier with the second half link parameters for the third tier cannot be used.

(b) The area within the vacant area in the W0 to W3FF range allocated with the link parameters is used for the second tier for the M/R area for the third tier.

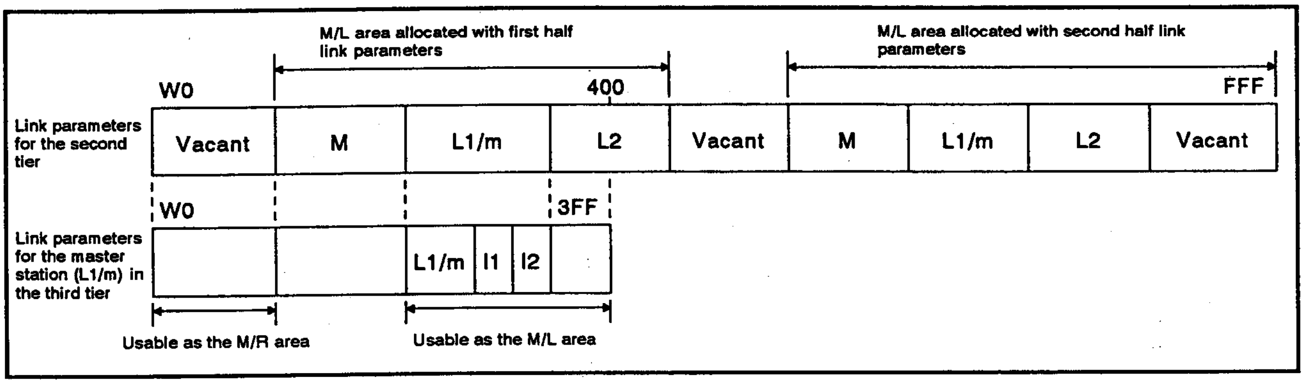


Fig. 7.38 Allocating Areas for a System Using the MELSECNET II Mode and the MELSECNET Mode

(2) MELSECNET II mode used in the third tier

(a) The range allocated for the master station with the first half link parameter for the second tier is used for the first half link parameters for the third tier.

(b) The area allocated for the master station in the second tier with the second half link parameters for the second tier is used for the second half link parameters for the third tier. If no area is set with the second half link parameters, use the area that begins after the M/L area allocated with the first half link parameters for the second tier.

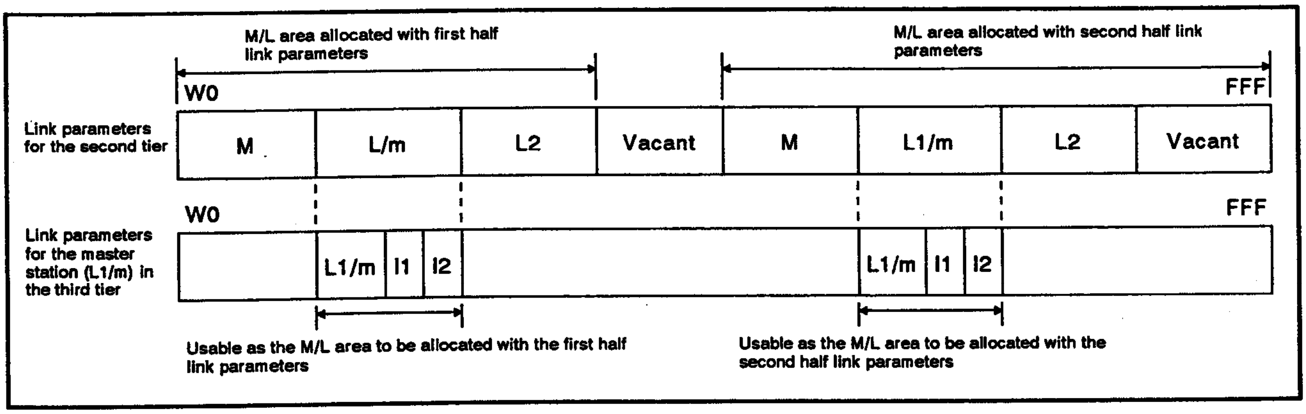


Fig. 7.39 Allocating Areas for a System Using the MELSECNET II Mode for Both Tiers

(3) MELSECNET II composite mode used in the third tier

(a) First half link parameter for the third tier

1) The range allocated for the master station for the third tier with the first half link parameters for the second tier is used for the M/L area.

2) The area within the vacant area in the W0 to W3FF range allocated with the link parameters is used for the second tier for the M/R area.

(b) The area allocated for the master station for the third tier with the second half link parameters for the second tier is used for the second half link parameters for the third tier.

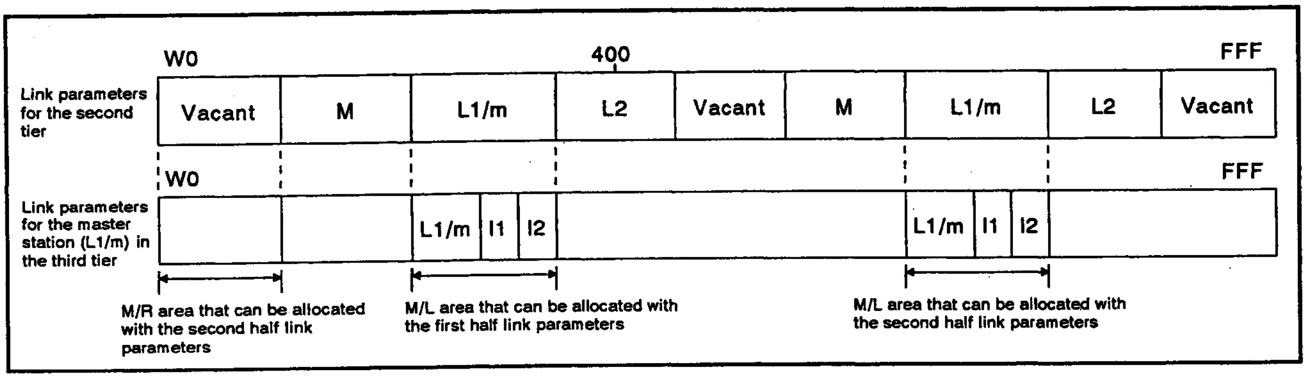


Fig. 7.40 Allocating Areas for a System Using the MELSECNET Mode II and the MELSECNET II Composite Mode

POINT

When the MELSECNET mode or the MELSECNET II composite mode is selected as the operation mode for the third tier, consider the following when allocating device ranges:

(1) The device range allocated for the master station in the third tier should be in the B0 to B3FF range and the W0 to W3FF range. If the device range exceeds this range, that is, if the B400 to BFFF range or W400 to WFFF range is allocated for the master station, the area cannot be allocated with the first half link parameter (including the MELSECNET mode link parameter) for the third tier.

(2) When an M/R area is required for the third tier, provide a vacant area in the W0 to W3FF range with the link parameters for the second tier.

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability			o			o

7.10.4 Using the MELSECNET II composite mode in the second tier

(1) MELSECNET mode used in the third tier

(a) The range allocated for the master station for the third tier with the first half link parameters for the second tier is used for the M/L area.

(b) The area within the vacant area in the W0 to W3FF range allocated with the link parameters for the second tier is used for the M/R area.

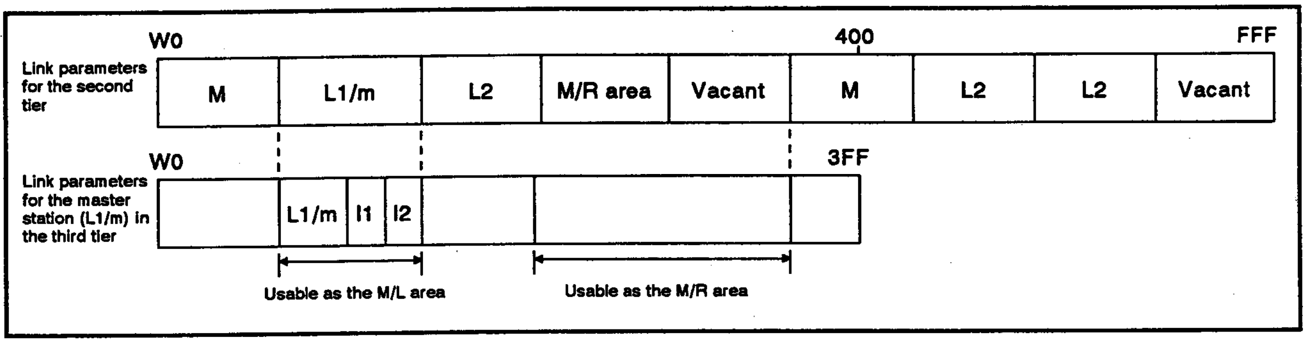


Fig. 7.41 Allocating Areas for a System Using the MELSECNET II Composite Mode and the MELSECNET Mode

(2) MELSECNET II mode used in the third tier

(a) The range allocated for the master station with the first half link parameter for the second tier is used for the first half link parameters for the third tier.

(b) The area allocated for the master station in the third tier with the second half link parameters for the second tier is used for the second half link parameters for the third tier.

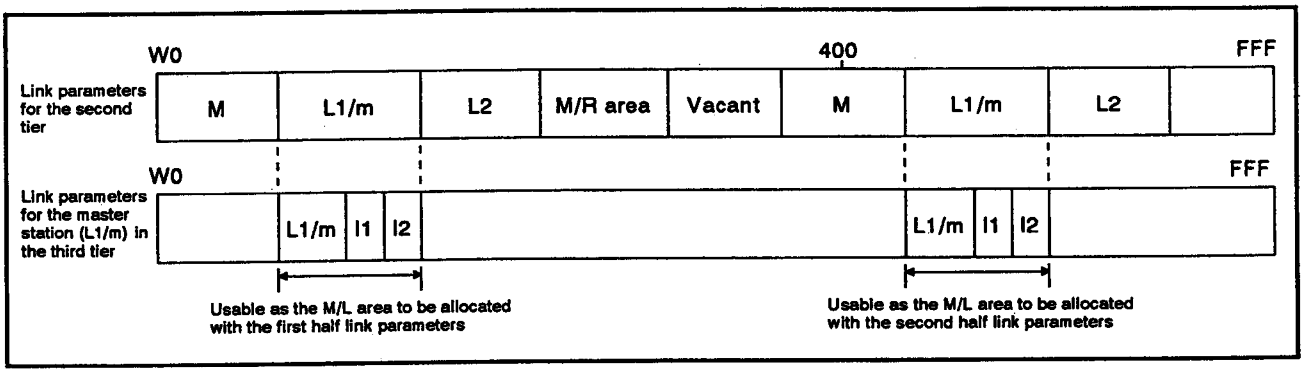


Fig. 7.42 Allocating Areas for a System Using the MELSECNET II Composite Mode and the MELSECNET II Mode

(3) MELSECNET II composite mode used in the third tier

(a) First half link parameter for the third tier

1) The range allocated for the master station for the third tier with the first half link parameters for the second tier is used for the M/L area.

2) The M/R area in the second tier and the vacant area in the W0 to W3FF range is used for the M/R area.

(b) The area allocated for the master station for the third tier with the second half link parameters for the second tier is used for the second half link parameters for the third tier.

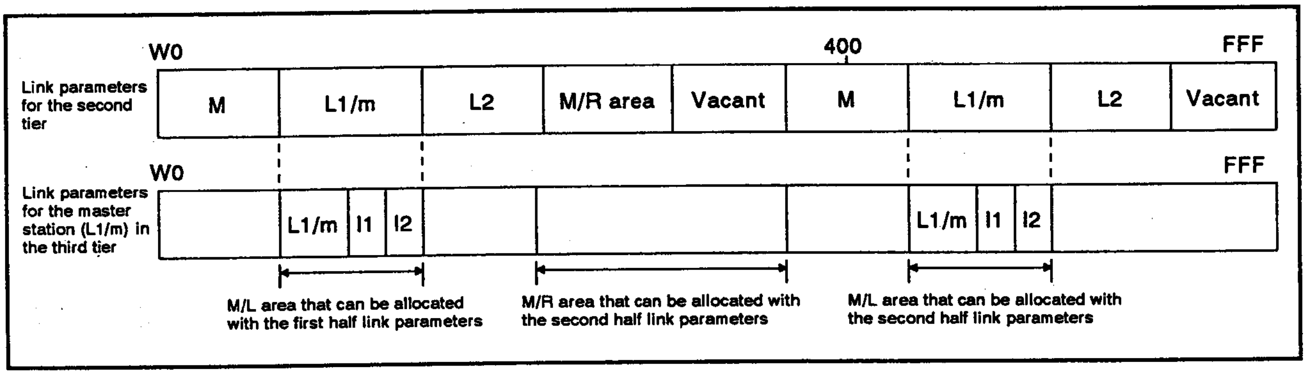


Fig. 7.43 Allocating Areas for a System Using the MELSECNET II Mode for Both Tiers

POINT

When the MELSECNET mode or the MELSECNET II composite mode is selected as the operation mode for the third tier, consider the following when allocating device ranges:

(1) The device range allocated for the master station in the third tier should be in the B0 to B3FF range and the W0 to W3FF range. If the device range exceeds this range, that is, if the B400 to BFFF range or W400 to WFFF range is allocated for the master station, the area cannot be allocated with the first half link parameter (including the MELSECNET mode link parameter) for the third tier.

(2) When the M/R area is required for the third tier, either provide a vacant area in the W0 to W3FF range with the link parameter for the second tier or use the M/R area for the second tier.

7.10.5 Link parameter setting example

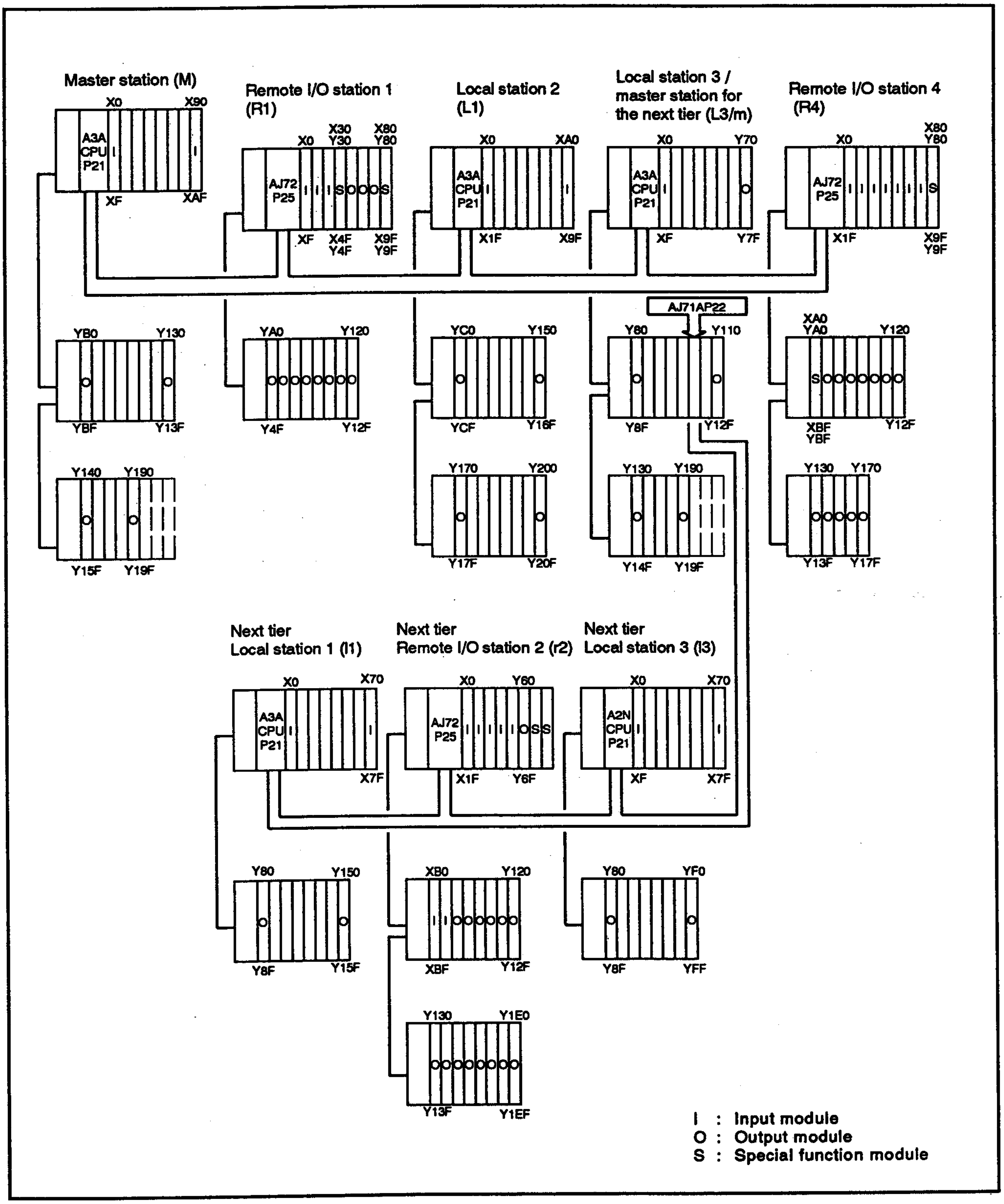


Fig. 7.44 Three-Tier Configuration Example

Table 7.6 Device Allocation at Each Station

		First Half Link Parameter				Second Half Link Parameter	
		M ↔ L		M → R	M ← R	B	W
		B	W				
M		256	256			256	256
R1				34	32		
L2		128	128			128	128
L3/m	m	128	128			128	128
	l1	128	128			128	128
	r2			34	32		
	l3	128	128				
R4				34	32		

(1) Checking the operation mode to be used

(a) Operation mode of the second tier: MELSECNET II composite mode

This is because all of the slave stations (local stations and remote I/O stations) are either MELSECNET mode-compatible or MELSECNET II mode-compatible.

(b) Operation mode of the third tier: MELSECNET II composite mode

This is because all of the slave stations (local stations and remote I/O stations) are either MELSECNET mode-compatible or MELSECNET II mode-compatible.

(2) Checking the device range to be allocated to the master station in the third tier with the link parameters for the second tier

(a) The following number of device points should be allocated:

First half link parameters:

Link relay (B):	384 points	Link registers (W):	384 points

Second half link parameters:

Link relay (B):	256 points	Link register (W):	256 points

(b) The following M/R areas are required:

M → R area: 34 points

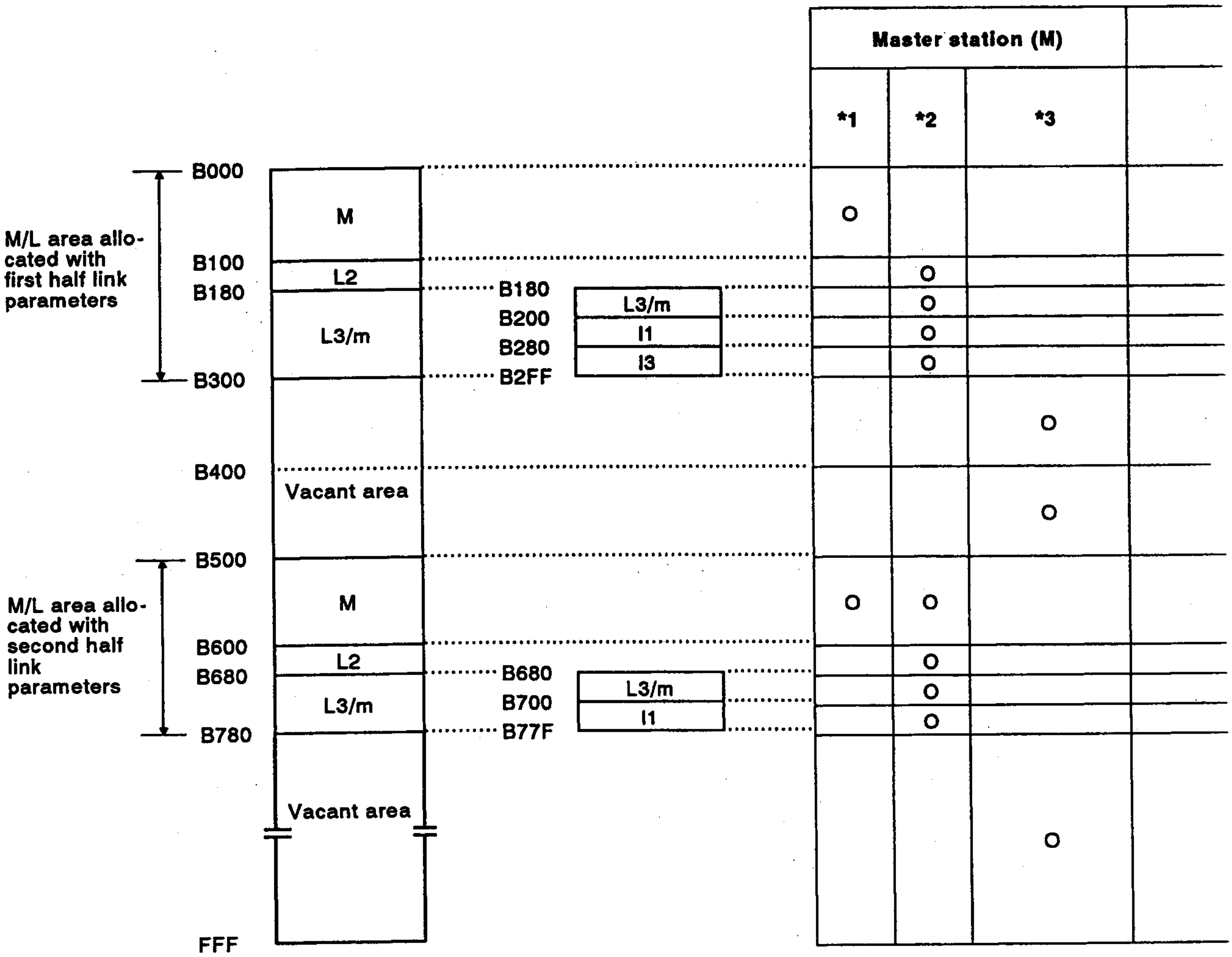
M ← R area: 32 points

A vacant area of at least 66 link register (W) points is required for the allocation of the M/R area for the third tier with the first half link parameters for the second tier.

Note: In the system configuration illustrated in Fig. 7.44, 132 points are allocated for the M/R area for the second tier. An M/R area of this range can be allocated.

MEMO

(3) Allocating link relays (B)



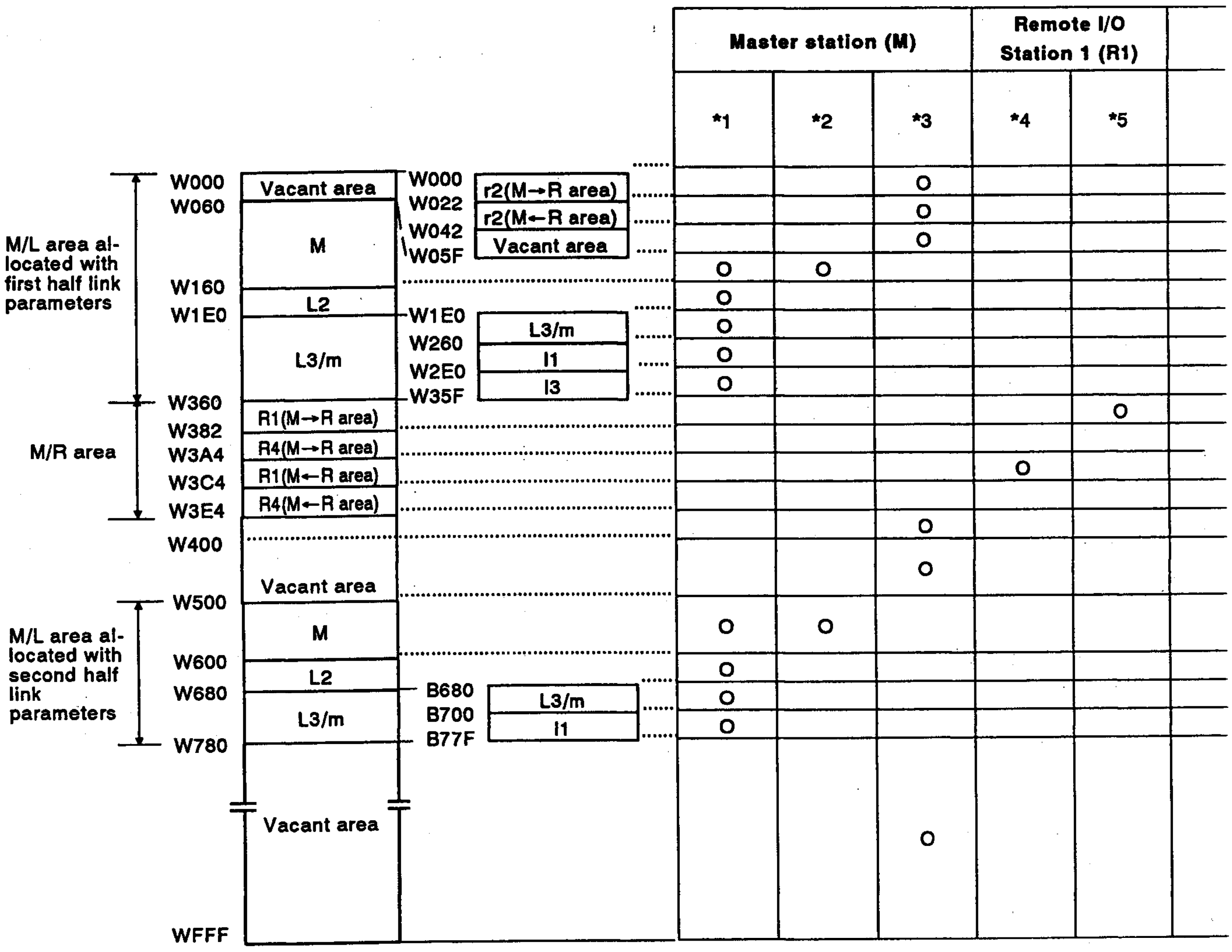
*1 : Coil .... ON/OFF control of link relays (B)
*2 : Contact . Reads ON/OFF data using link relay (B) contact
*3 : Used as internal relays (M) by the master station
O : Usable range

Fig. 7.45 Allocation Example of Link Relays (B)

	Local station 2 (L2)			Link using local station 3 (L3/m) as the master station for the third tierMaster station (L3/m)								
				Master station (L3/m)			Local station 1 (l1)			Local station 3 (l3)		
	*1	*2	*4	*1	*2	*5	*1	*2	*6	*1	*2	*7
		O			O				O			O
	O	O			O				O			
		O		O	O			O			O	
		O			O		O	O			O	
		O			O			O		O	O	
			O			O			O			O
			O			O			O			
		O			O			O				
	O	O			O				O			
		O		O	O			O				
		O			O		O	O				
			O			O			O			

*1 : Coil ....ON/OFF control of link relays (B)
*2 : Contact.. Reads ON/OFF data using link relay (B) contact
*3 : Used as internal relays (M) by the master station
*4 : Used as internal relays (M) by L2
*5 : Used as internal relays (M) by L3/m
*6 : Used as internal relays (M) by l1
*7 : Used as internal relays (M) by l3
O : Usable range

(4) Allocating link registers (W)



*1 : Read.......Reading word data
*2 : Write.......Writing word data
*3 : Used as a data register (D) by the master station
*4 : Read from master station
*5 : Write by master station
O : Usable range

Fig. 7.46 Allocation Example of Link Registers (W)

(a) Provide a vacant area in the W0 to W5F range with the link parameters for the third tier to allocate an M/R area for the third tier.

It is possible to allocate The M/R area can be allocated with W360 to W3E3 (the M/R area for the second tier).

	Local station 2 (L2)			Link using local station 3 (L3/m) as the master station for the seconedtier Master station											Remote I/O station 4 (R4)	
				Master station (L3/m)			Local station 1 (I1)			Remote I/O station 2 (r2)		Local station 3 (I3)				
	*1	*2	*6	*1	*2	*7	*1	*2	*8	*4	*5	*1	*2	*9	*4	*5
			O						O		O			O		
			O						O	O				O		
			O			O			O					O		
	O			O			O					O				
	O	O		O					O					O		
	O			O	O		O					O				
	O			O			O	O				O				
	O			O			O					O	O			
			O			O			O					O		
			O			O			O					O		O
			O			O			O					O		
			O			O			O					O	O	
			O			O			O					O		
			O			O			O							
	O			O			O									
	O	O		O					O							
	O			O	O		O									
	O			O			O	O								
			O			O			O							

*1 : Read ......Reading word data
*2 : Write ......Writing word data
*3 : Used as a data register (D) by the master station
*4 : Read from master station
*5 : Write by master station
*6 : Used as a data register (D) by L2
*7 : Used as a data register (D) by L3/m
*8 : Used as a data register (D) by I1
*9 : Used as a data register (D) by 13
O : Usable range

(4) Inputs (X) and outputs (Y)

(a) A memory map, after the allocation of inputs and outputs, is illustrated in Fig. 7.47.

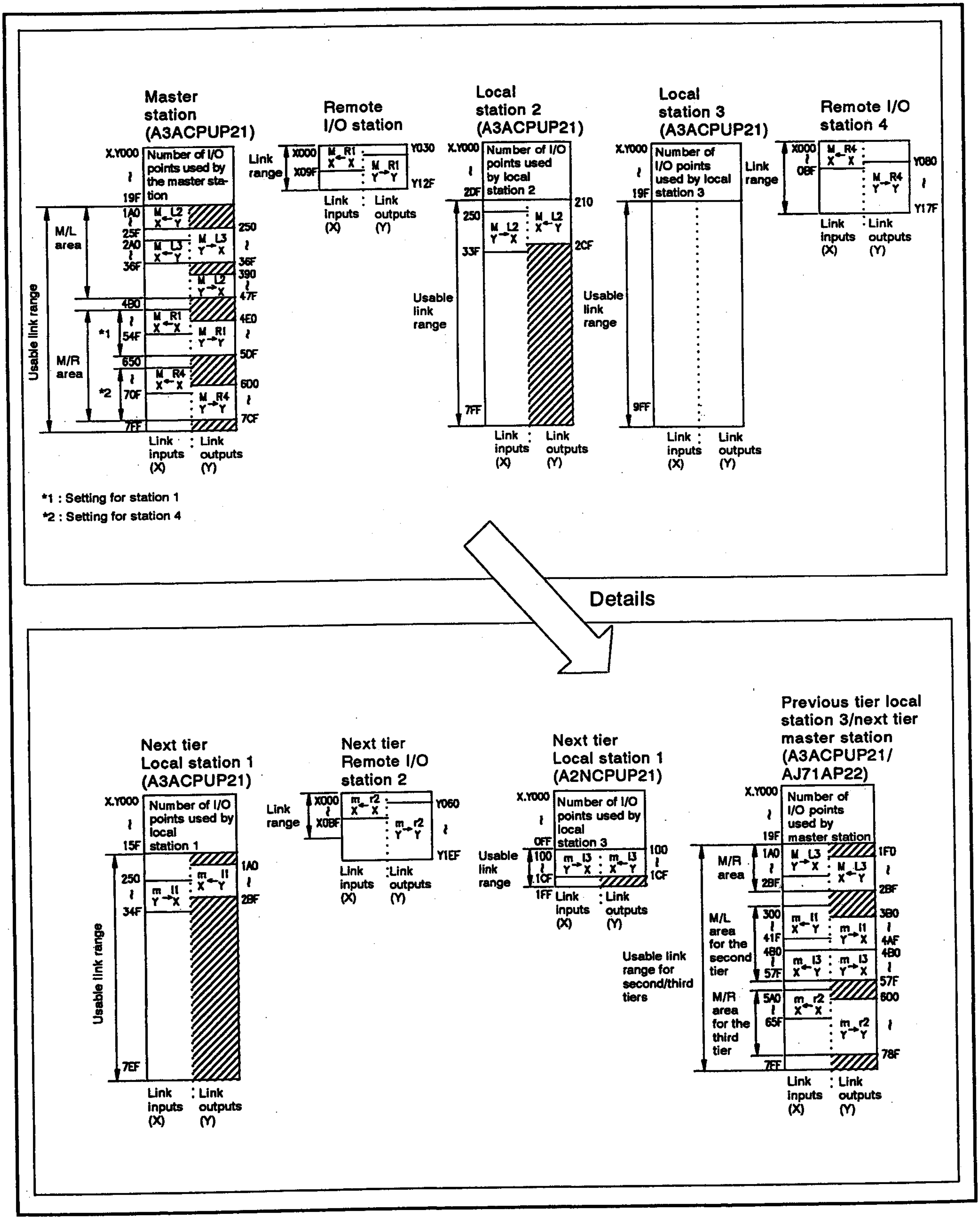
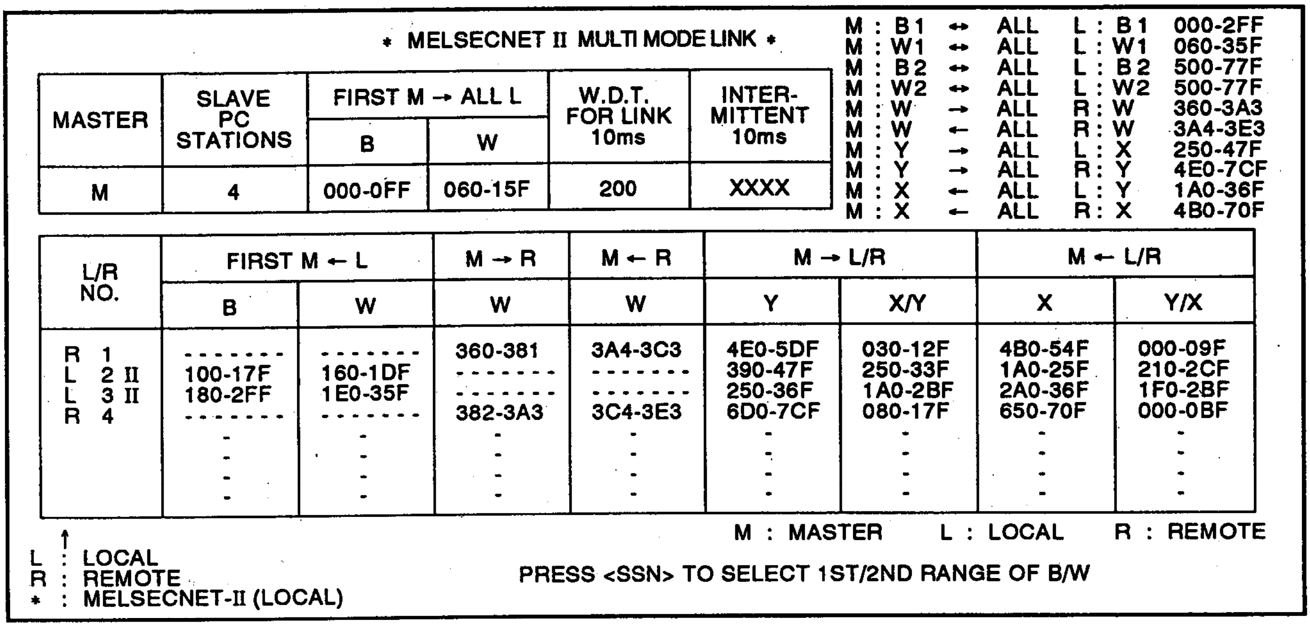


Fig. 7.47 Allocation Example of Inputs/Outputs

(5) Link parameter setting

(a) First half link parameters for the second tier



* MELSECNET II MULTI MODE LINK *

MASTER	SLAVE PC STATIONS	FIRST M → ALL L		W.D.T. FOR LINK 10ms	INTER-MITTENT 10ms
		B	W		
M	4	000-0FF	060-15F	200	XXXX

M : B1 ↔ ALL L : B1 000-2FF
M : W1 ↔ ALL L : W1 060-35F
M : B2 ↔ ALL L : B2 500-77F
M : W2 ↔ ALL L : W2 500-77F
M : W → ALL R : W 360-3A3
M : W ← ALL R : W 3A4-3E3
M : Y → ALL L : X 250-47F
M : Y → ALL R : Y 4E0-7CF
M : X ← ALL L : Y 1A0-36F
M : X ← ALL R : X 4B0-70F

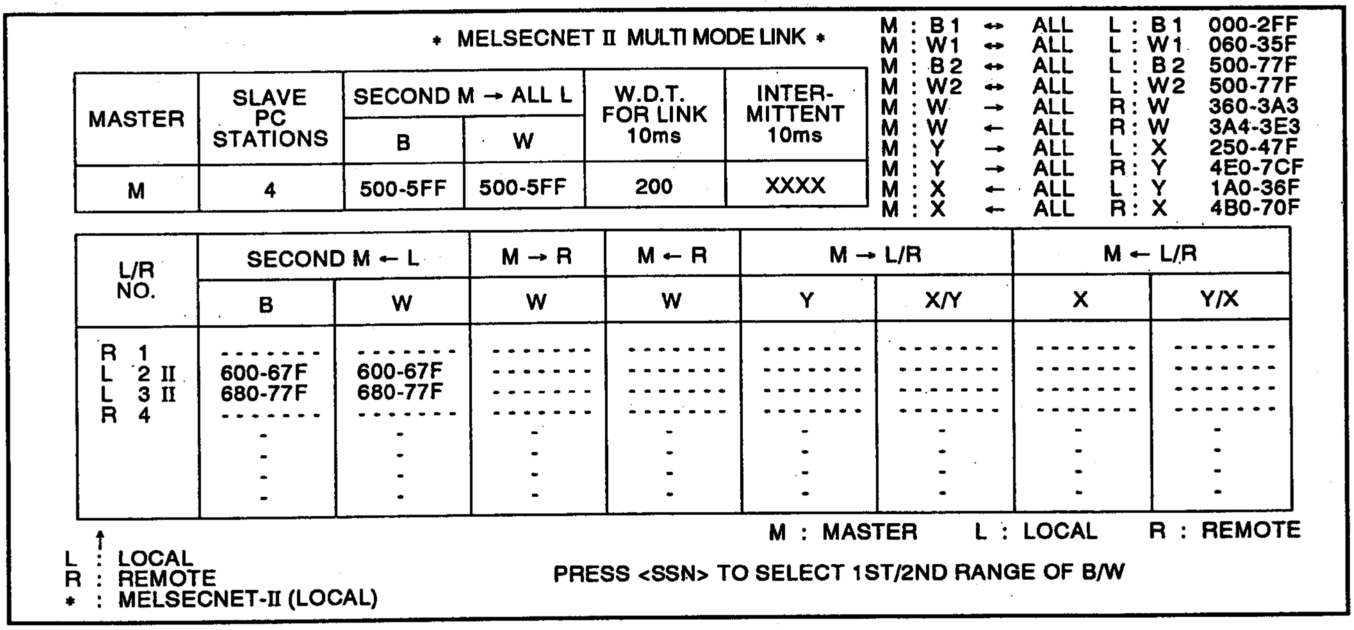
L/R NO.	FIRST M ← L		M → R	M ← R	M → L/R		M ← L/R	
	B	W	W	W	Y	X/Y	X	Y/X
R 1	-------	-------	360-381	3A4-3C3	4E0-5DF	030-12F	4B0-54F	000-09F
L 2 II	100-17F	160-1DF	-------	-------	390-47F	250-33F	1A0-25F	210-2CF
L 3 II	180-2FF	1E0-35F	-------	-------	250-36F	1A0-2BF	2A0-36F	1F0-2BF
R 4	-------	-------	382-3A3	3C4-3E3	6D0-7CF	080-17F	650-70F	000-0BF
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-

↑
L : LOCAL
R : REMOTE
* : MELSECNET-II (LOCAL)

M : MASTER L : LOCAL R : REMOTE

PRESS <SSN> TO SELECT 1ST/2ND RANGE OF B/W

(b) Second half link parameters for the second tier



* MELSECNET II MULTI MODE LINK *

MASTER	SLAVE PC STATIONS	SECOND M → ALL L		W.D.T. FOR LINK 10ms	INTER-MITTENT 10ms
		B	W		
M	4	500-5FF	500-5FF	200	XXXX

M : B1 ↔ ALL L : B1 000-2FF
M : W1 ↔ ALL L : W1 060-35F
M : B2 ↔ ALL L : B2 500-77F
M : W2 ↔ ALL L : W2 500-77F
M : W → ALL R : W 360-3A3
M : W ← ALL R : W 3A4-3E3
M : Y → ALL L : X 250-47F
M : Y → ALL R : Y 4E0-7CF
M : X ← ALL L : Y 1A0-36F
M : X ← ALL R : X 4B0-70F

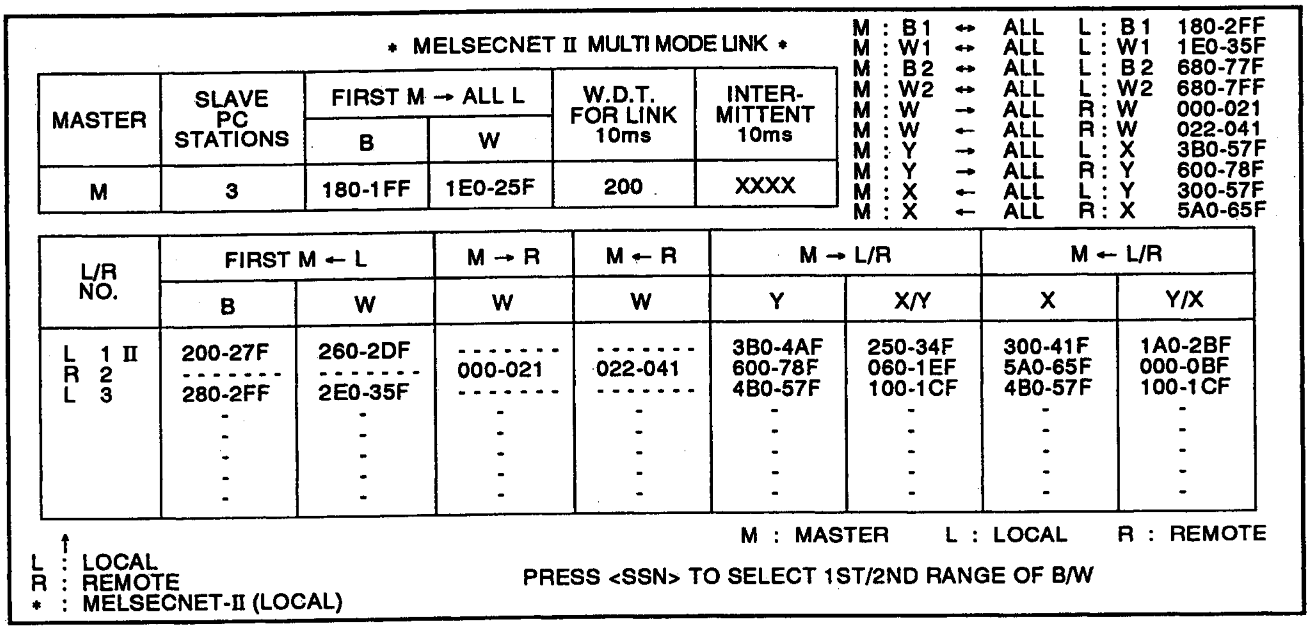
L/R NO.	SECOND M ← L		M → R	M ← R	M → L/R		M ← L/R	
	B	W	W	W	Y	X/Y	X	Y/X
R 1	-------	-------	-------	-------	-------	-------	-------	-------
L 2 II	600-67F	600-67F	-------	-------	-------	-------	-------	-------
L 3 II	680-77F	680-77F	-------	-------	-------	-------	-------	-------
R 4	-------	-------	-------	-------	-------	-------	-------	-------
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-

↑
L : LOCAL
R : REMOTE
* : MELSECNET-II (LOCAL)

M : MASTER L : LOCAL R : REMOTE

PRESS <SSN> TO SELECT 1ST/2ND RANGE OF B/W

(c) First half link parameters for the third tier



∗ MELSECNET II MULTI MODE LINK ∗

MASTER	SLAVE PC STATIONS	FIRST M → ALL L		W.D.T. FOR LINK 10ms	INTER-MITTENT 10ms
		B	W		
M	3	180-1FF	1E0-25F	200	XXXX

M : B1 ↔ ALL L : B1 180-2FF
M : W1 ↔ ALL L : W1 1E0-35F
M : B2 ↔ ALL L : B2 680-77F
M : W2 ↔ ALL L : W2 680-7FF
M : W → ALL R : W 000-021
M : W ← ALL R : W 022-041
M : Y → ALL L : X 3B0-57F
M : Y → ALL R : Y 600-78F
M : X ← ALL L : Y 300-57F
M : X ← ALL R : X 5A0-65F

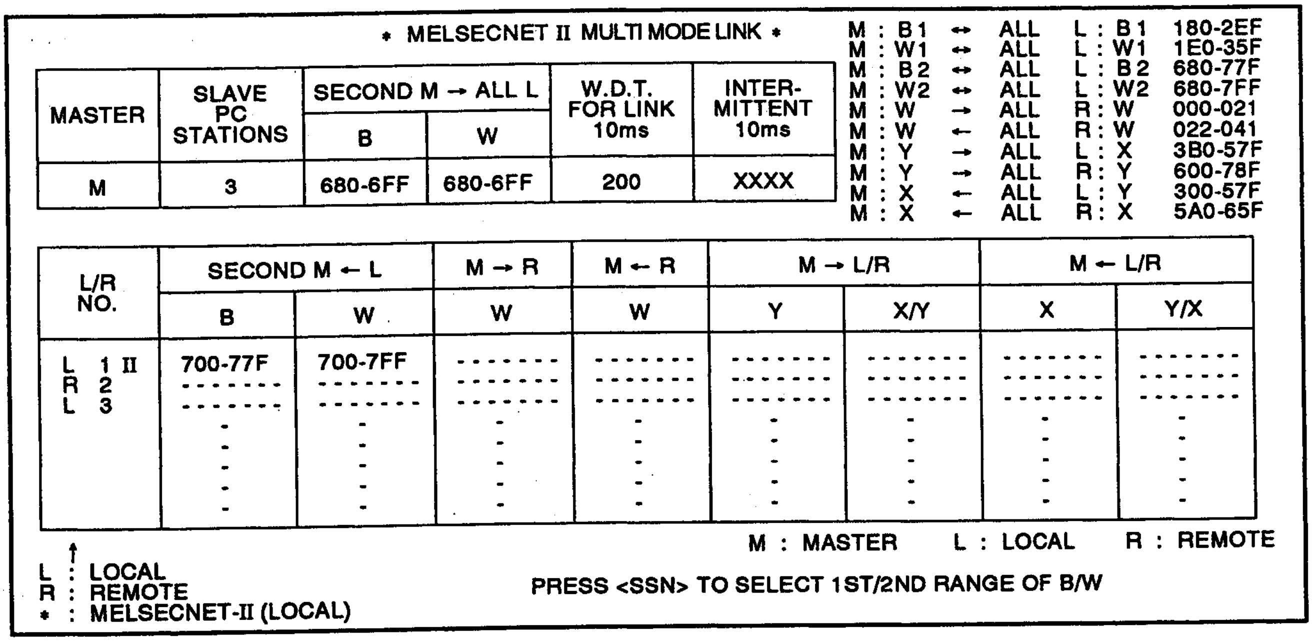
L/R NO.	FIRST M ← L		M → R	M ← R	M → L/R		M ← L/R	
	B	W	W	W	Y	X/Y	X	Y/X
L 1 II	200-27F	260-2DF	-------	-------	3B0-4AF	250-34F	300-41F	1A0-2BF
R 2	-------	-------	000-021	022-041	600-78F	060-1EF	5A0-65F	000-0BF
L 3	280-2FF	2E0-35F	-------	-------	4B0-57F	100-1CF	4B0-57F	100-1CF
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-

↑
L : LOCAL
R : REMOTE
∗ : MELSECNET-II (LOCAL)

M : MASTER L : LOCAL R : REMOTE

PRESS <SSN> TO SELECT 1ST/2ND RANGE OF B/W

(d) Second half link parameters for the third tier



∗ MELSECNET II MULTI MODE LINK ∗

MASTER	SLAVE PC STATIONS	SECOND M → ALL L		W.D.T. FOR LINK 10ms	INTER-MITTENT 10ms
		B	W		
M	3	680-6FF	680-6FF	200	XXXX

M : B1 ↔ ALL L : B1 180-2EF
M : W1 ↔ ALL L : W1 1E0-35F
M : B2 ↔ ALL L : B2 680-77F
M : W2 ↔ ALL L : W2 680-7FF
M : W → ALL R : W 000-021
M : W ← ALL R : W 022-041
M : Y → ALL L : X 3B0-57F
M : Y → ALL R : Y 600-78F
M : X ← ALL L : Y 300-57F
M : X ← ALL R : X 5A0-65F

L/R NO.	SECOND M ← L		M → R	M ← R	M → L/R		M ← L/R	
	B	W	W	W	Y	X/Y	X	Y/X
L 1 II	700-77F	700-7FF	-------	-------	-------	-------	-------	-------
R 2	-------	-------	-------	-------	-------	-------	-------	-------
L 3	-------	-------	-------	-------	-------	-------	-------	-------
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-

↑
L : LOCAL
R : REMOTE
∗ : MELSECNET-II (LOCAL)

M : MASTER L : LOCAL R : REMOTE

PRESS <SSN> TO SELECT 1ST/2ND RANGE OF B/W

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	o		o			

7.11 Allocating Inputs and Outputs to the Master Station in a Remote I/O System

When a remote I/O system is configured with the MELSECNET (II) Data Link System, there are restrictions for allocating inputs and outputs for the master station.

If the master station has only local stations linked to it, the allocation of inputs and outputs is done in the same manner as for an independent system.

REMARK

I/O addresses are automatically allocated by the PC CPU.

A peripheral device is not required to allocate inputs and outputs. However, allocating inputs and outputs with a peripheral device has the following advantages:

- **Saving I/O points (16 points) occupied by a vacant area.**
- **Reserving I/O points (32, 48, or 64 points) at vacant areas for future system expansion.**

7.11.1 I/O allocation restrictions

(1) Inputs and outputs must be allocated from the head address (X0/Y0) to the final address allocated to the remote I/O station.

Allocated I/O ranges differ depending on the order of the M/L area and the M/R area set by the link parameters.

(a) If the M/L area is allocated after the M/R area, it is not necessary to allocate inputs and outputs to the local station setting range (see Fig. 7.48(a)).

(b) If the M/L area is allocated after the M/R area, it is necessary to allocate inputs and outputs to the local station setting range (see Fig. 7.48(b)).

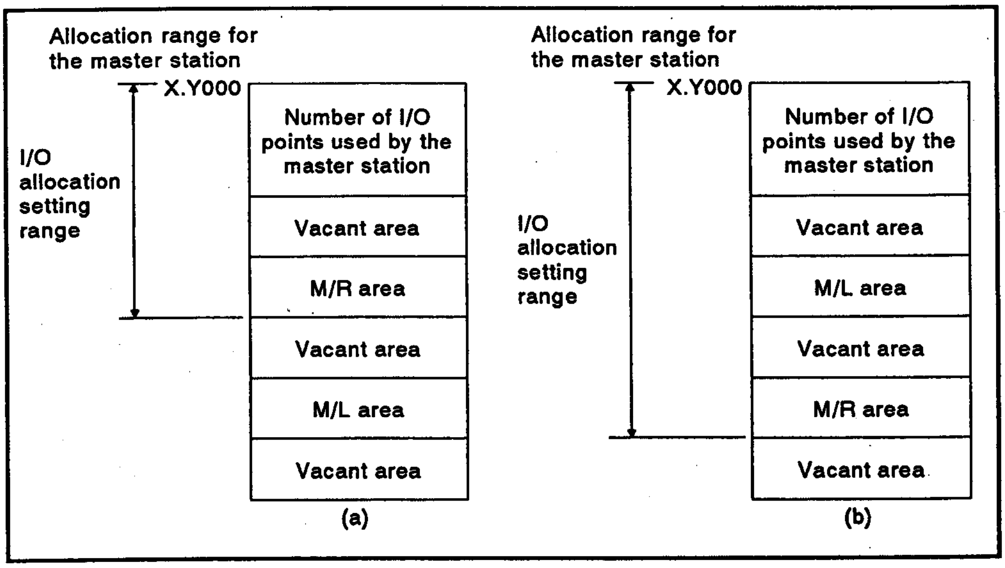


Fig. 7.48 I/O Allocation Setting Range

REMARK

When allocating inputs and outputs, the device range is set with the assumption that the input modules or output modules are loaded or that vacant slots exist corresponding to the ranges marked by asterisks in both items of Fig. 7.48 and in the "M/L area" in Item b of Fig. 7.48.

(2) When allocating inputs and outputs to a remote I/O station, a slot in which a module is loaded cannot be allocated as a vacant slot (S1: 0 points, S2: 16 points, S3, 32 points, S4: 48 points, S5: 64 points). If this is attempted, a "UNIT VERIFY ERROR" will occur.

	*1	*1	*1	*2	*1
AJ72P25	Input module 16 points	Output module 32 points	Special function module 32 points	Vacant	Input module 16 points

- Slots marked with "*1" cannot be allocated as a vacant slot (S1, S2, S3, S4, or S5) because an input or output module is loaded.
- The slot marked with "*2" can be allocated as a vacant slot.

(3) If slot 0 in a remote I/O station is vacant, a vacant slot of at least 16 points (S2, S3, S4, S5) must be allocated.

If S1 is set for such a vacant slot position, a "UNIT VERIFY ERROR" will occur.

AJ72P25	Vacant	Input module 16 points	Output module 32 points	Special function module 32 points	Input module 16 points

The vacant slot cannot be set as a 0 point vacant slot.

(4) When allocating inputs and outputs to a special function module, set the number of points of the module actually loaded. If an RFRP or RTOP instruction is executed and the wrong number of points set, an error will occur.

POINT

I/O allocation cannot be used to change the number of input or output points for an input or output module connected to an A0J2P25(S3)/R25 (compact remote I/O station module).

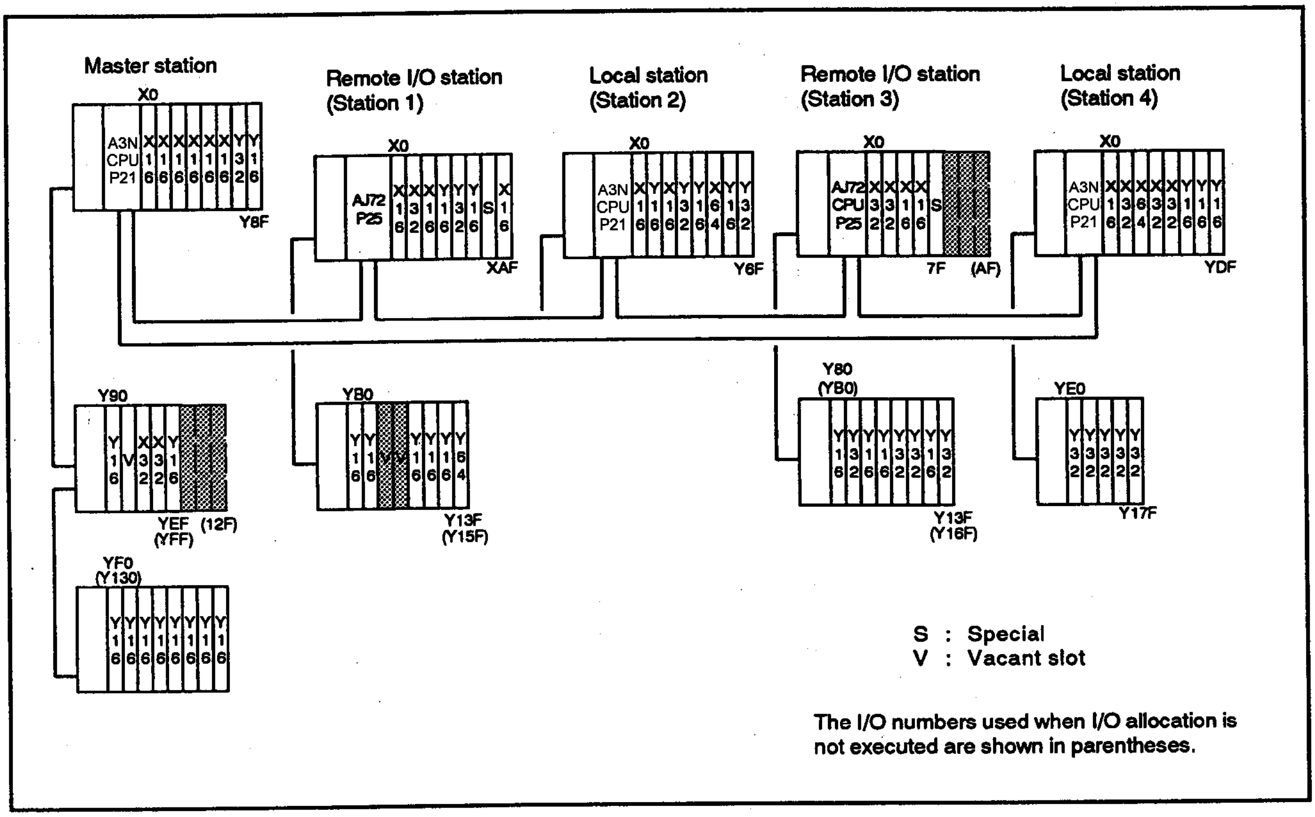
Allocate the same number of input and output points that are allocated to a remote I/O station configured with an A0J2P25(S3)/R25.

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	○		○			

7.11.2 I/O allocation example

When making allocations for a remote I/O station, first allocate inputs and outputs to the master station, and then set them with the "I/O LOCATING" screen on the A6GPP.

The following describes the procedure for setting "0 points" for a vacant slot (the shaded slots in Fig. 7.49) in the master station and the remote I/O stations. The system illustrated in Fig. 7.49 is used as an example.



S : Special
V : Vacant slot

The I/O numbers used when I/O allocation is not executed are shown in parentheses.

Fig. 7.49 System Example

The I/O allocation range varies depending on the ranges allocated for the M/L area and the M/R area.

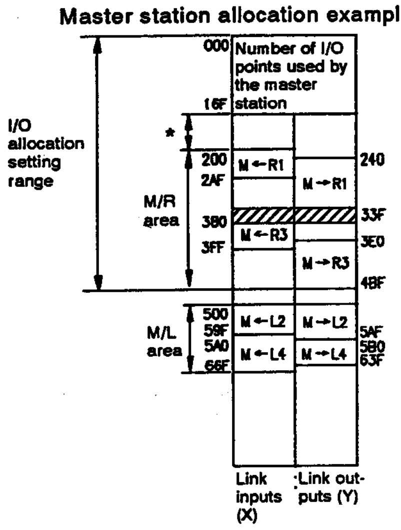
Refer to the I/O allocation example in Fig. 7.49.

(1) When the M/L area is allocated after the M/R area

When the M/L area is allocated after the M/R area in the link parameters, the I/O allocation is shown in the following example

(a) Link parameter I/O allocation example

Fig. 7.50 shows the link parameter I/O allocation



* The device range is set with the assumption that (a) input modules or output modules are installed, or (b) that vacant slots exist corresponding to the ranges marked by an asterisk.

Fig. 7.50 Allocation Example

When allocating inputs and outputs, the device range is set with the assumption that the input modules or output modules are loaded or that vacant slots exist corresponding to the ranges marked by asterisks in both items of Fig. 7.50 and in the "ML area" in Item (b) of Fig. 7.50.

(b) I/O allocation example

```
                         * I/O ALLOCATION *
                                                                                    VACANCY(S)
SLT I/O | SLT I/O | SLT I/O | SLT I/O | SLT I/O | SLT I/O | SLT I/O | SLT I/O |    1 :  0  PT.
NO. UNT | NO. UNT | NO. UNT | NO. UNT | NO. UNT | NO. UNT | NO. UNT | NO. UNT |    2 : 16  PT.
                                                                                    3 : 32  PT.
  0 X16 |  16 Y16 |  32 Y16 |  48 F32 |  64     |  80     |  96     | 112     |    4 : 48  PT.
  1 X16 |  17 Y16 |  33 F32 |  49 S 0 |  65     |  81     |  97     | 113     |    5 : 64  PT.
  2 X16 |  18 Y16 |  34 X16 |  50 S 0 |  66     |  82     |  98     | 114     |  X(X)
  3 X16 |  19 Y16 |  35 Y16 |  51 S 0 |  67     |  83     |  99     | 115     |    6 : 16  PT.
  4 X16 |  20 Y16 |  36 Y16 |  52 Y16 |  68     |  84     | 100     | 116     |    7 : 32  PT.
  5 X16 |  21 Y16 |  37 S 0 |  53 Y32 |  69     |  85     | 101     | 117     |    8 : 48  PT.
  6 Y32 |  22 Y16 |  38 S 0 |  54 Y16 |  70     |  86     | 102     | 118     |    9 : 64  PT.
  7 Y16 |  23 Y16 |  39 Y16 |  55 Y16 |  71     |  87     | 103     | 119     |  Y(Y)
  8 Y16 |  24 S64 |  40 Y16 |  56 Y32 |  72     |  88     | 104     | 120     |    A : 16  PT.
  9 S 0 |  25 S64 |  41 Y16 |  57 Y32 |  73     |  89     | 105     | 121     |    B : 32  PT.
 10 X32 |  26 S16 |  42 Y64 |  58 Y16 |  74     |  90     | 106     | 122     |    C : 48  PT.
 11 X32 |  27 X16 |  43 S64 |  59 Y32 |  75     |  91     | 107     | 123     |    D : 64  PT.
 12 Y16 |  28 X32 |  44 X32 |  60     |  76     |  92     | 108     | 124     |  S-UNIT(F)
 13 S 0 |  29 X16 |  45 X32 |  61     |  77     |  93     | 109     | 125     |    E : 16  PT.
 14 S 0 |  30 X16 |  46 X16 |  62     |  78     |  94     | 110     | 126     |    F : 32  PT.
 15 S 0 |  31 Y32 |  47 X16 |  63     |  79     |  95     | 111     | 127     |    G : 48  PT.
                                                                                    H : 64  PT.
                   PRESS <END>, WHEN SET
```

Slot numbers

0 to 23 : Allocation of I/O modules in the master station

24 to 26 : Range marked with an asterisk (170 to 1FF) in Fig. 7.50, Item (a)

27 to 42 : Allocation for remote I/O station 1

43 : Vacant slot between remote I/O stations 1 and 3 (shaded area in Fig. 7.50, Item (a))

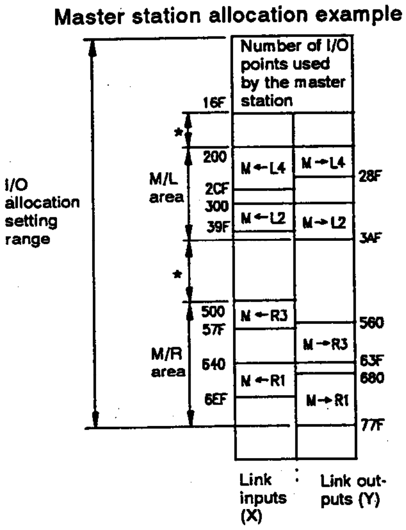
44 to 59 : Allocation for remote I/O station 3

(2) When the M/R area is allocated after the M/L area

When the M/R area is allocated after the M/L area in the link parameters, the I/O allocation is as shown in the following example.

(a) Link parameter I/O allocation example

Fig. 7.51 shows the link parameter I/O allocation



The device range is set with the assumption that (a) input modules or output modules are installed, or (b) that vacant slots exist corresponding to the ranges marked by an asterisk.

Fig. 7.51 Allocation Example

(b) I/O allocation example

* I/O ALLOCATION *

SLT NO.	I/O UNT	SLT NO.	I/O UNT	SLT NO.	I/O UNT	SLT NO.	I/O UNT	SLT NO.	I/O UNT	SLT NO.	I/O UNT	SLT NO.	I/O UNT	SLT NO.	I/O UNT
0	X16	16	Y16	32	S64	48	Y32	64	Y16	80		96		112	
1	X16	17	Y16	33	S64	49	Y16	65	S 0	81		97		113	
2	X16	18	Y16	34	S64	50	Y16	66	S 0	82		98		114	
3	X16	19	Y16	35	S64	51	Y32	67	Y16	83		99		115	
4	X16	20	Y16	36	S64	52	Y32	68	Y16	84		100		116	
5	X16	21	Y16	37	S64	53	Y16	69	Y16	85		101		117	
6	X16	22	Y16	38	S16	54	Y32	70	Y64	86		102		118	
7	X16	23	Y16	39	X32	55	X16	71		87		103		119	
8	X16	24	S64	40	X32	56	X32	72		88		104		120	
9	S 0	25	S64	41	X16	57	X16	73		89		105		121	
10	X32	26	S64	42	X16	58	Y32	74		90		106		122	
11	X32	27	S64	43	F32	59	Y16	75		91		107		123	
12	Y16	28	S64	44	S 0	60	Y16	76		92		108		124	
13	S 0	29	S64	45	S 0	61	F32	77		93		109		125	
14	S 0	30	S64	46	S 0	62	X16	78		94		110		126	
15	S 0	31	S64	47	Y16	63	Y16	79		95		111		127	

VACANCY(S)
1 : 0 PT.
2 : 16 PT.
3 : 32 PT.
4 : 48 PT.
5 : 64 PT.
X(X)
6 : 16 PT.
7 : 32 PT.
8 : 48 PT.
9 : 64 PT.
Y(Y)
A : 16 PT.
B : 32 PT.
C : 48 PT.
D : 64 PT.
S-UNIT(F)
E : 16 PT.
F : 32 PT.
G : 48 PT.
H : 64 PT.

PRESS <END>, WHEN SET

Slot numbers

0 to 23 : Allocation of I/O modules in the master station

24 to 38 : Range marked with an asterisk in both items of Fig. 7.51 and the local station setting range in Fig. 7.51, Item (b) (170 to 4FF)

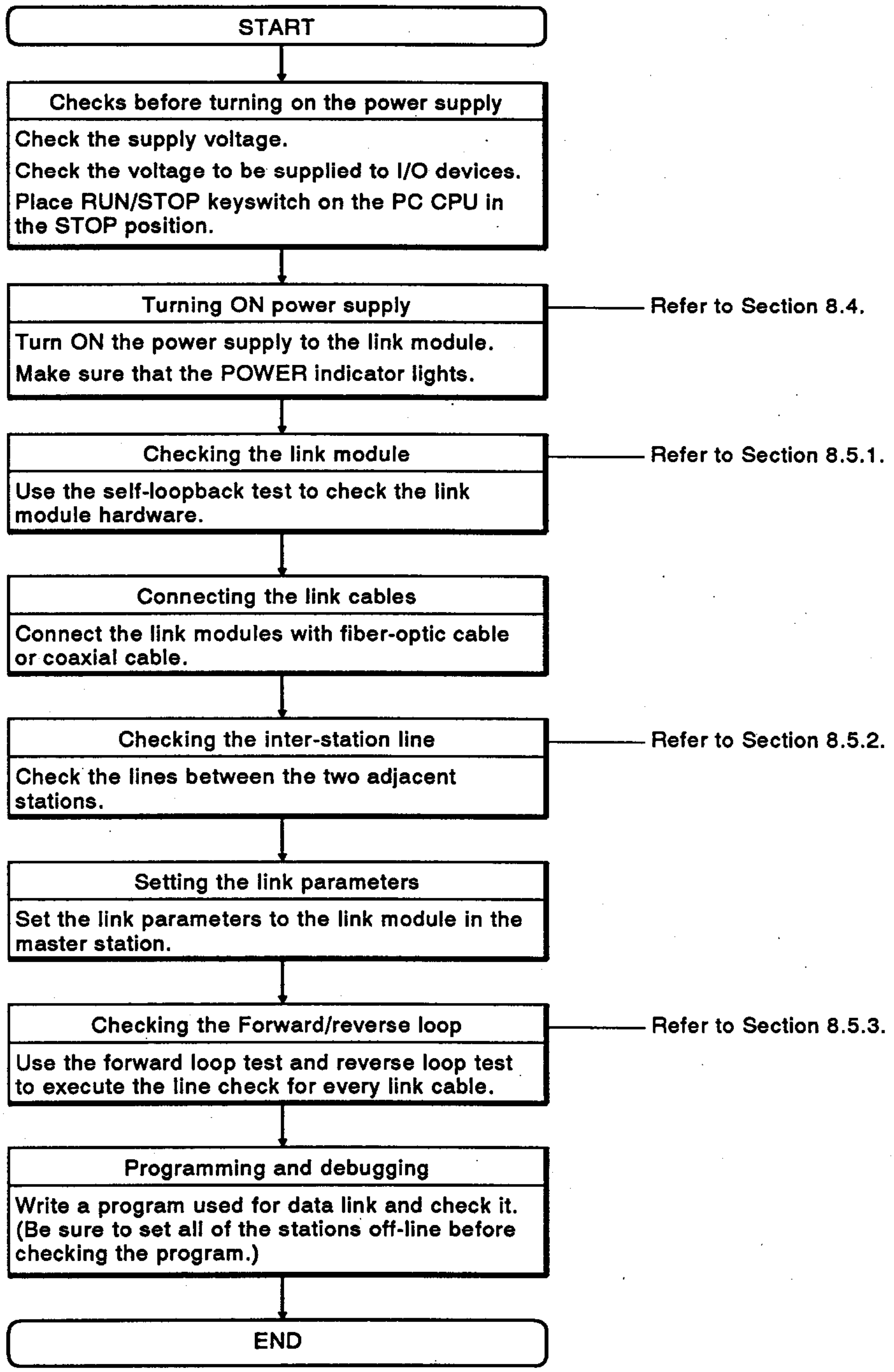
39 to 54 : Allocation for remote I/O station 3

55 to 70 : Allocation for remote I/O station 1

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	o	o	o	o	o	o

8. BEFORE STARTING OPERATION

8.1 General Preparatory Steps before Starting Operation



START

Checks before turning on the power supply

Check the supply voltage.

Check the voltage to be supplied to I/O devices.

Place RUN/STOP keyswitch on the PC CPU in the STOP position.

Turning ON power supply — Refer to Section 8.4.

Turn ON the power supply to the link module.

Make sure that the POWER indicator lights.

Checking the link module — Refer to Section 8.5.1.

Use the self-loopback test to check the link module hardware.

Connecting the link cables

Connect the link modules with fiber-optic cable or coaxial cable.

Checking the inter-station line — Refer to Section 8.5.2.

Check the lines between the two adjacent stations.

Setting the link parameters

Set the link parameters to the link module in the master station.

Checking the Forward/reverse loop — Refer to Section 8.5.3.

Use the forward loop test and reverse loop test to execute the line check for every link cable.

Programming and debugging

Write a program used for data link and check it. (Be sure to set all of the stations off-line before checking the program.)

END

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	o	o	o			

8.2 Setting the Link Module Station Numbers

8.2.1 Setting the link module station numbers in the MELSECNET data link system

Station numbers are assigned in ascending order in the forward loop direction, beginning with "00" (assigned to the master station). The maximum station number is "64".

In a three-tier system, the master station in each tier is assigned to station number "00". Slave station numbers are assigned in the ascending order in the forward loop direction.

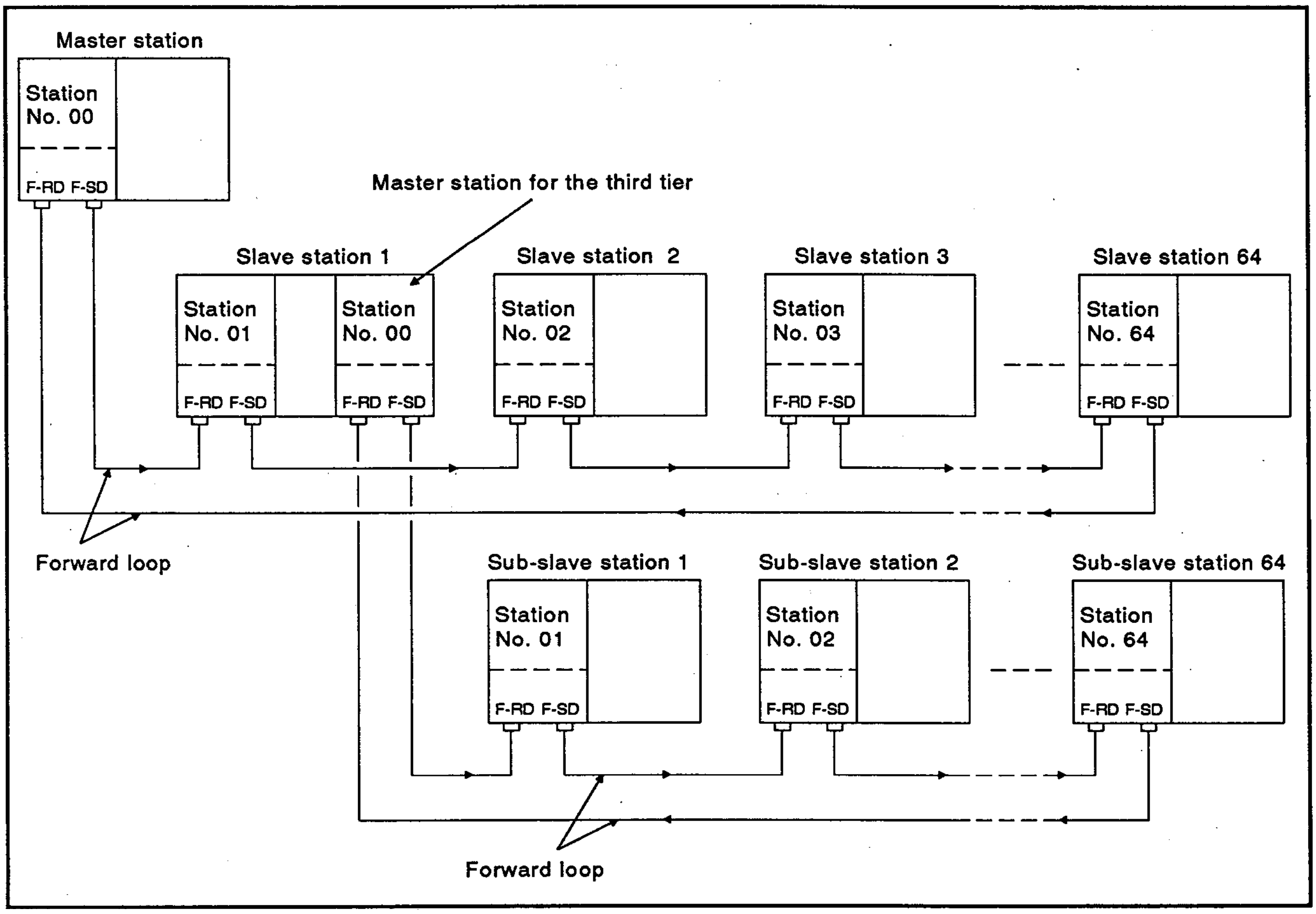


Fig. 8.1 Setting Link Module Station Numbers

REMARK

Refer to the manual for individual link modules for details on the procedure for setting the link module station numbers.

Precautions on setting the link module station numbers

(1) The station numbers must be consecutive.

If station numbers are not consecutive, more time will be required for the system to switch to the loopback mode when the power supply to a slave station is turned off. This means the loopback processing will not be executed within the period set for the watchdog timer, which, in turn, causes the entire data link system to stop.

Therefore, never skip station numbers as illustrated in Fig. 8.2.

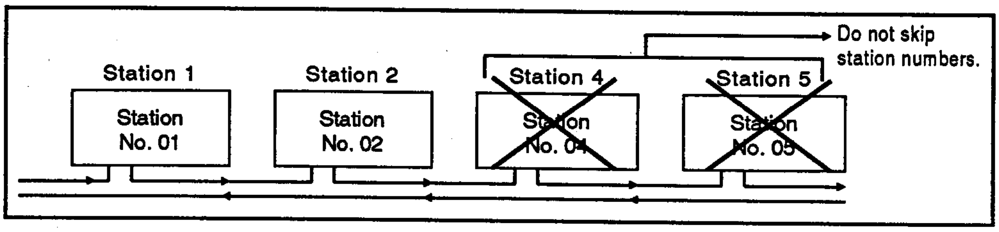
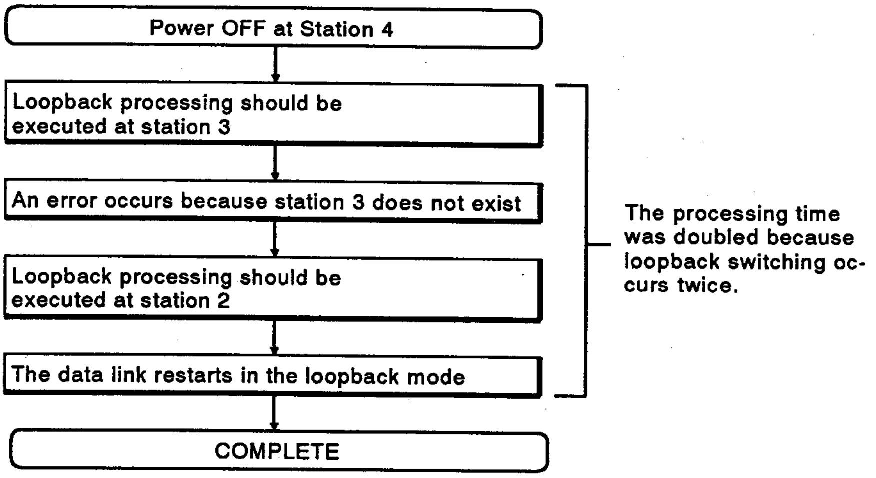


Fig. 8.2 Station Numbers Not Set Consecutively

Example:

The following flowchart illustrates the sequence that occurs when the system shown is Fig. 8.2 switches to the loopback mode due to the power supply at station 4 being turned off.



(2) Station numbers must be in ascending order.

Never set station numbers in the descending order as illustrated in Fig. 8.3.

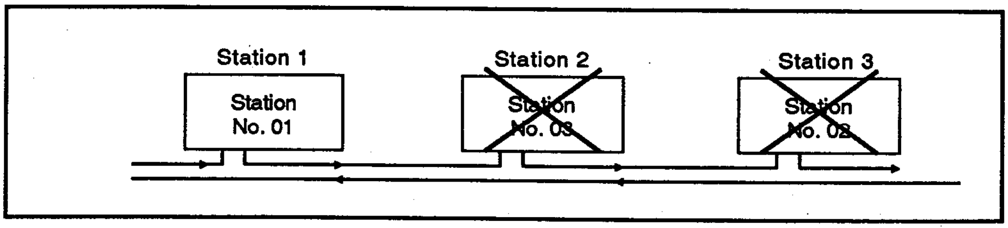
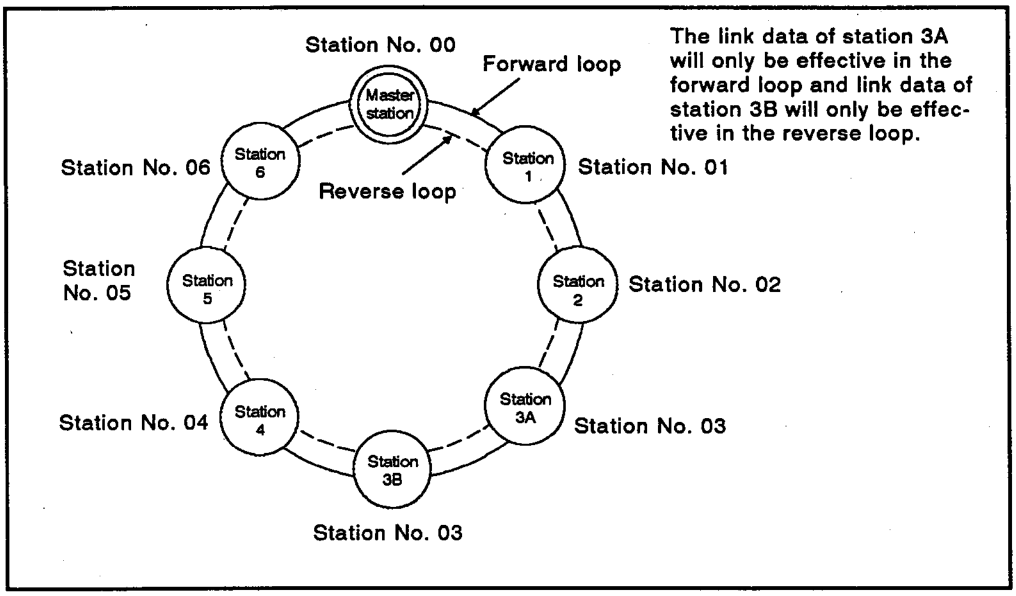


Fig. 8.3 Station Numbers Not Set in Ascending Order

(3) The station numbers in a single loop must all be different.

If the same station number is assigned to more than one station in the same loop, the link data of the station closer to the receive end of the master station becomes effective and the link data of the other station is ignored.

Therefore, never set the same station number twice in the same loop as illustrated in Fig. 8.4.



The link data of station 3A will only be effective in the forward loop and link data of station 3B will only be effective in the reverse loop.

Fig. 8.4 All Stations Not Assigned to Different Station Numbers

(4) The number of slave stations set with the link parameters must agree with the number of slave stations actually connected in the system.

(a) If the set number of slave stations is greater than the actual number of slave stations, the slave stations not actually present in the system will be considered as faulty stations.

(b) If the set number of slave stations is less than the actual number of slave stations, the data link will only be executed with the slave stations set with the link parameters. All other slave stations will be treated as off-line mode stations.

8.2.2 Setting the link module station numbers in the MELSECNET/B data link system

Set the master station number to 00 and a slave station number to 02, followed by other slave stations to 02...n (n ≤ 31).

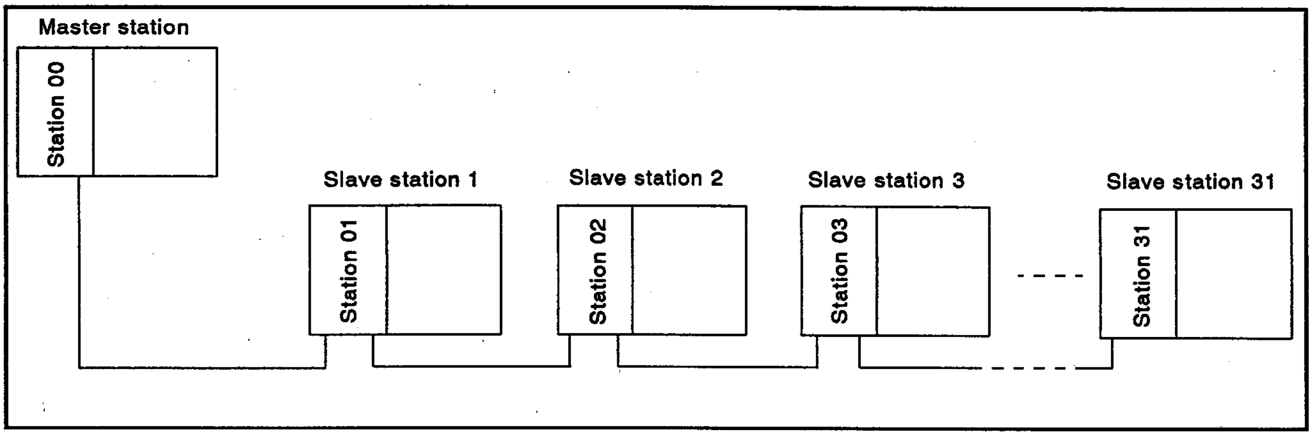


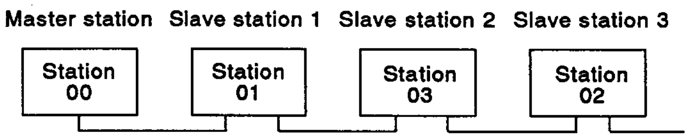
Fig. 8.5 Setting Link Module Station Numbers

REMARK

The manual of the used link module gives details about setting station numbers.

POINT

In the MELSECNET/B Data Link System, slave station numbers can be set in descending order as shown:

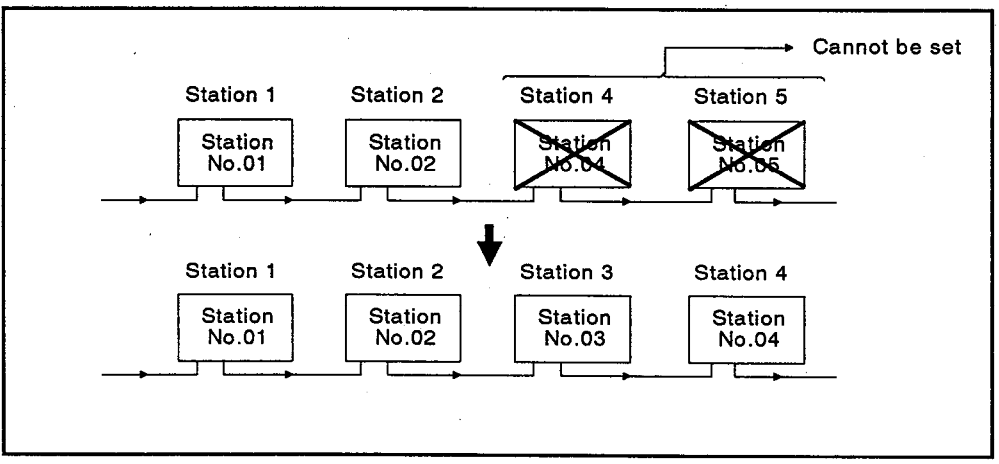


Precautions when setting station numbers

This section gives the precautions to take when setting station numbers.

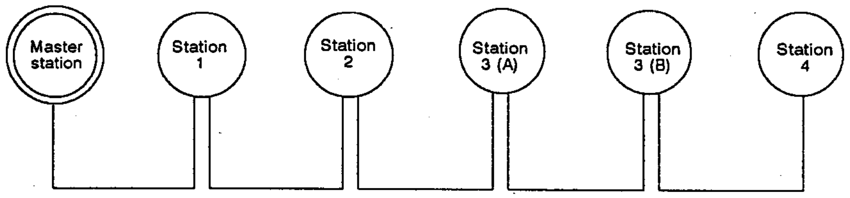
(1) Station numbers must be set consecutively

If station numbers are not set consecutively, the incorrectly set station numbers will be treated as faulty stations.



(2) The station numbers in a single loop must all be different.

If the same station number is allocated to more than one station in the same loop, data cannot be correctly sent because the stations with the same station number send data at the same time when they are designated.



When station 3 is designated to send data, data cannot be correctly sent to another station because both stations 3 (A) and (B) send data simultaneously.

(3) The number of slave stations set by the link parameters must match the number of slave stations actually used in the system.

(a) If the set number of slave stations is greater than the actual number of slave stations, the slave stations not actually used in the system will be considered as faulty stations.

(b) If the number of slave stations set is less than the actual number of slave stations, the data link will only be enabled with the slave stations set by the link parameters.

All other slave stations will be treated as off-line mode stations.

8.3 Setting the Communication Speed (Baud Rate)

The overall loop distance of the MELSECNET/B Data Link System is determined by the communication speed (baud rate).

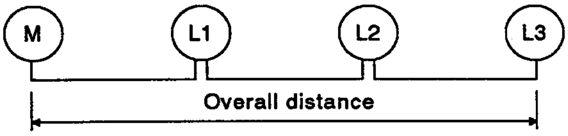
The relationship between set communication speeds and overall loop distances is shown in Table 8.1.

Table 8.1 Communication Speeds and Overall Loop Distances

Communication Speed (M bps)	Overall Loop Distance (m) (ft)
0.125	1200 (3937.2)
0.250	600 (1968.6)
0.500	400 (1312.4)
1.00	200 (656.2)

REMARK

The overall distance refers to the distance between the master station and the last slave station.



8.4 Fiber-Optic/Coaxial Cable Connection

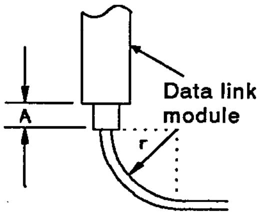
8.4.1 Precautions

(1) Securing space for the cables

The radius of the fiber-optic cables or coaxial cables must not be smaller than the allowable bend radius.

When connecting a fiber-optic cable or coaxial cable to a link module, make sure that there is enough space for the cable to be bent to a larger radius than the allowable bend radius.

Table 8.1 Allowable Bend Radius

	Cable		Connector A (mm)	Allowable Bend Radius r (mm)
	Coaxial cable	3C-2V	30	23
		5C-2V		30
	Fiber-optic cable	Standard cable for indoor use	45	45
		Reinforced cable for indoor use		85
		Standard cable for outdoor use		85
		Reinforced cable for outdoor use		140

(2) Doubling the link cables

Connect the fiber-optic cables or coaxial cables in a doubled configuration.

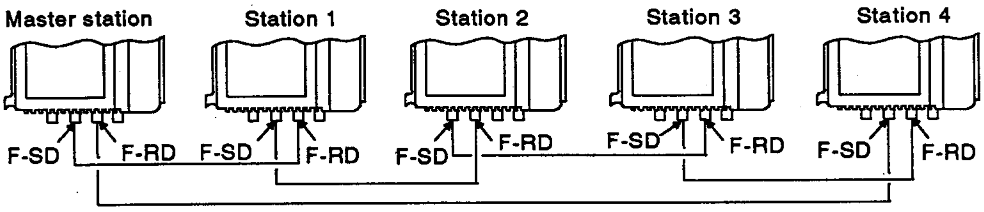
If the cables are not connected in both the forward or reverse loop or if the final station is not connected to the master station, the data link will be maintained at normally operating, correctly connected stations. However, if any problem occurs in the data link, it will be disabled as described on the next page.

(a) If the cables are connected in either the forward loop or the reverse loop, the data link will be disabled at all stations.

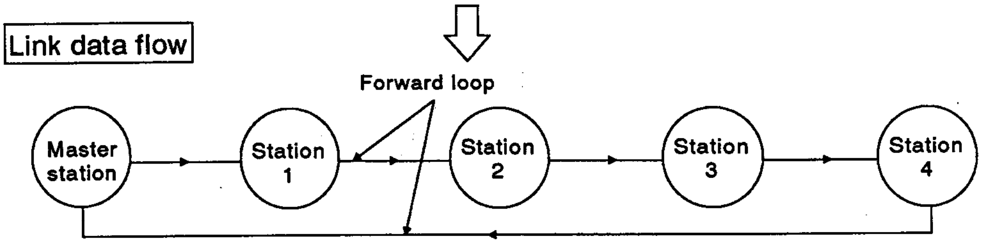
Example

In the following illustration, all stations in the data link will become disabled if the power supply to one station is turned off. The faulty station will not be detected by the link monitor.

Connection in forward loop only



Link data flow

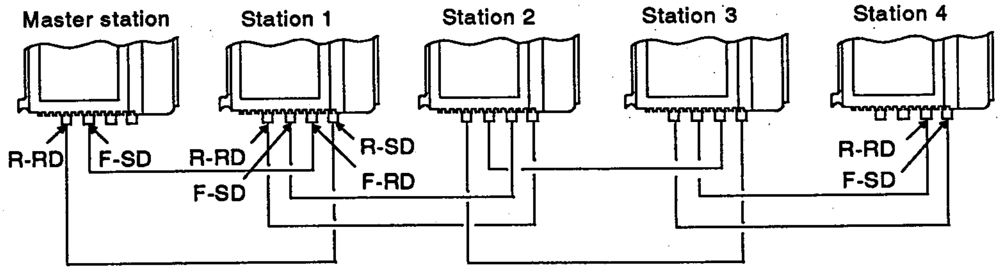


(b) If cables between F-RD of the master station and F-SD of the final station and between R-SD of the master station and R-RD of the final station are not connected, the data link will be established in the loopback mode. Therefore, when a problem occurs in a station, data link between that station and the final station is disabled.

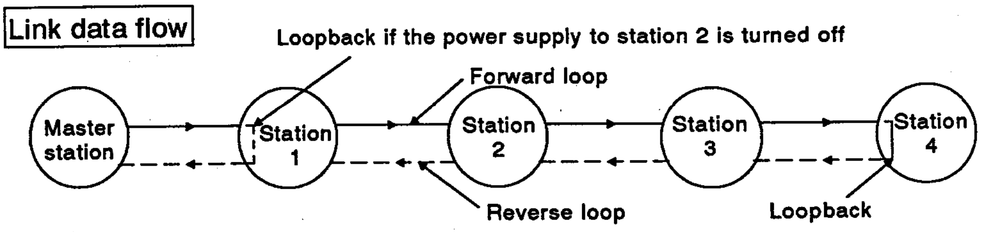
Example

In the following illustration, stations 2, 3, and 4 will be disabled if the power supply to station 2 is turned off.

Connection diagram when cables are not connected between F-RD of the master station and F-SD of the final station and between R-SD of the master station and R-RD of the final station



Link data flow

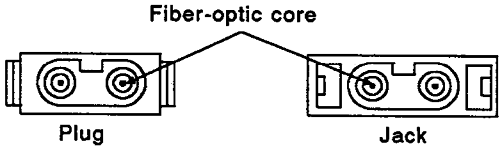


(3) Fiber-optic cables

When connecting fiber-optic cables, be very careful not to touch the fiber-optic cores of the plugs or jacks. Always protect them from dust and dirt.

Dirt, dust, or oil may adhere to the fiber-optic cores if they are touched. This will cause transmission loss to be increased and might preclude data link from operating normally.

Always store fiber-optic cables with protective caps on the plugs and sockets.



(4) Coaxial cables

The routing of the coaxial cables must be determined in advance so that the cable is kept separate from the main circuit line, which carry high voltage current.

Connecting (shorting) the FG terminals on the power supply module (the base unit where a link module is also installed) makes the system more resistant to extraneous noise.

8.4.2 Fiber-optic cable connections

(1) Connecting data link modules with fiber-optic cables

Connect the OUT connector of a data link module to the IN connector of the next data link module in order as illustrated in Fig. 8.6. The OUT connector in the final station should be connected to the IN connector of the master station.

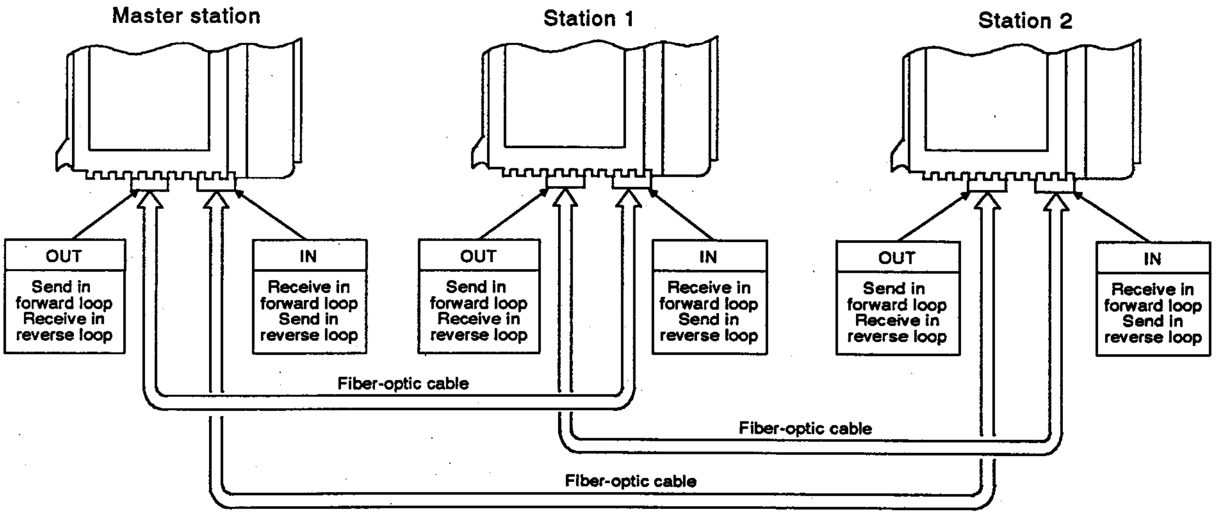
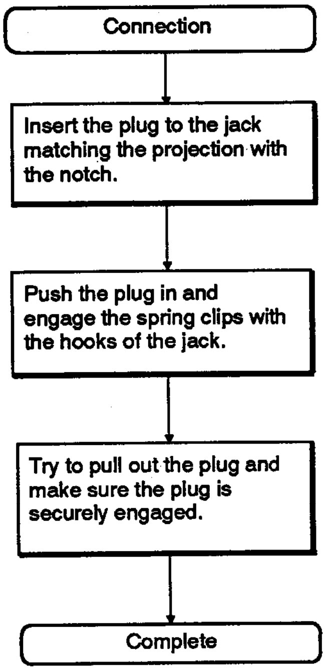


Fig. 8.6 Connecting Data Link Modules with Fiber-Optic Cables

(2) Connecting fiber-optic cables



Connection

Insert the plug to the jack matching the projection with the notch.

Push the plug in and engage the spring clips with the hooks of the jack.

Try to pull out the plug and make sure the plug is securely engaged.

Complete

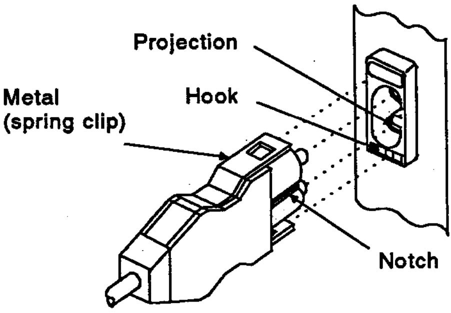


Fig. 8.7

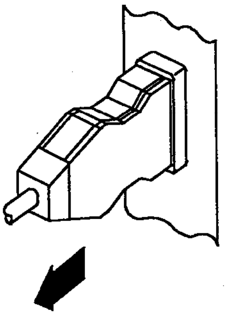
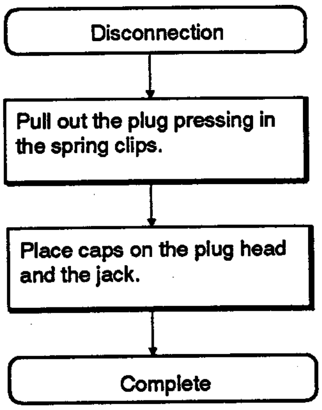


Fig. 8.8

(3) Disconnecting fiber-optic cables



Disconnection

Pull out the plug pressing in the spring clips.

Place caps on the plug head and the jack.

Complete

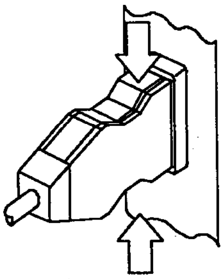


Fig. 8.9

8.4.3 Coaxial cable connection

(1) Connecting data link modules with coaxial cables

Connect the F-SD connector of a data link module to the F-RD connector of the next module and connect the R-RD connector of a data link module to the R-SD connector of the next module in order. The F-SD connector and R-RD connector of the final station should be connected to the F-RD connector and R-SD connector of the master station, respectively.

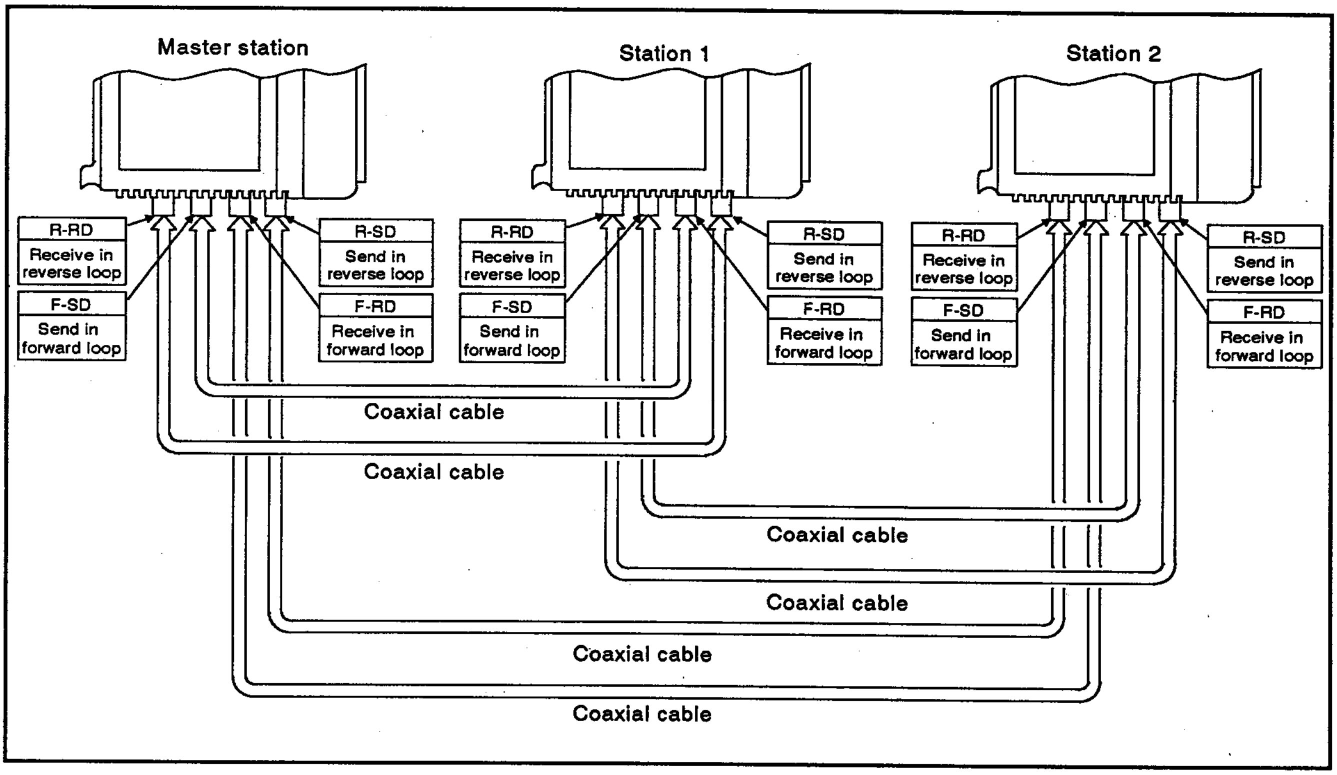


Fig. 8.10 Connecting Data Link Modules with Coaxial Cables

(2) Connecting coaxial cables

Connection

Engage the plug with the jack matching the groove of the plug with the projection of the jack.

Turn the jack clockwise (Fig. 8.11) till it stops and engages securely with the jack.

Complete

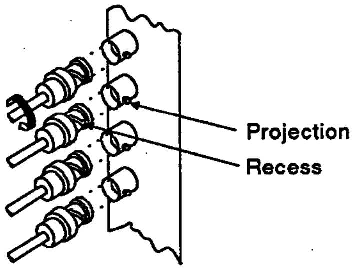


Fig. 8.11

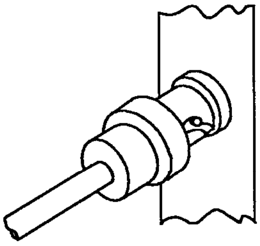


Fig. 8.12

(3) Disconnecting coaxial cable

Disconnection

Turn the plug anticlockwise till it is disengaged from the jack.

Pull off the plug.

Complete

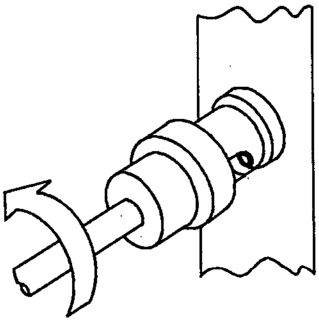


Fig. 8.13

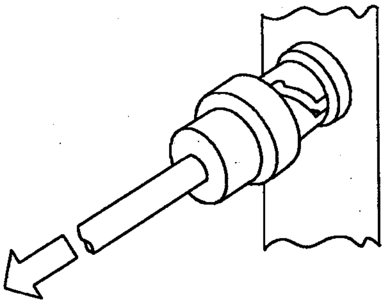


Fig. 8.14

8.5 Twisted-Wire Pair Cable Connections

This section explains how to connect twisted-wire pair cables.

8.5.1 Precautions when connecting twisted-wire pair cables

This section describes the precautions to take when connecting twisted-wire pair cables used for the MELSECNET/B Data Link System.

(1) Laying twisted-wire pair cables

When laying twisted-wire pair cables, follow the precautions given below to prevent extraneous noise and surge induction:

(a) Do not bundle twisted-wire pair cables with a high-tension or load-bearing cable.

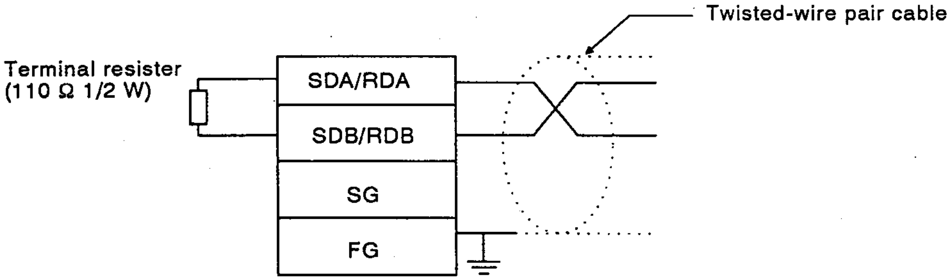
Keep the twisted-wire pair cables away (100 mm or more) from main circuit, high-tension, or load-bearing cables.

(b) Wire the remote module terminal block so there is enough distance between twisted-wire pair cables and the power supply and I/O signal cables.

(c) Do not use any part of a twisted-wire pair cable to supply power.

(2) Connecting a terminal resistor

It is necessary to connect a terminal resistor (110 Ω , 1/2 W) between SDA/RDA and SDB/RDB at both end stations of a MELSECNET/B Data Link System.



8.5.2 Connecting twisted-wire pair cables

Use twisted-wire pair cables to connect link modules as shown in Fig. 8.15. Attach terminal resistors to both end stations.

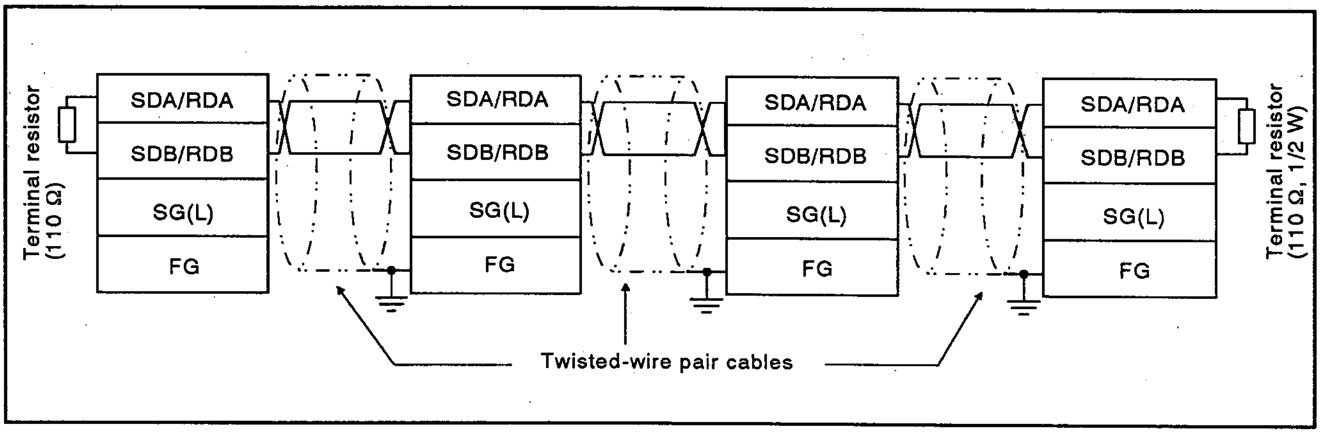


Fig. 8.15 Connections Using Twisted-Wire Pair Cables

REMARKS

(1) Use M4-size screws to connect twisted-wire pair cable to the terminal block.
Use a crimp terminal which matches the M4 screw.

(2) The tightening torque is 8 to 14 kg-cm.

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	o	o	o	o	o	o

8.6 Power ON Procedure

The power supply to the MELSECNET Data Link System must either be turned on to the entire system simultaneously or from the lowest tier to the highest tier.

(1) Two-tier system

In a two-tier system, turn on the power supply in the following order:

Slave stations (slave stations in the second tier) → Master station (master station for the second tier)

(2) Three-tier system

In the three-tier system, turn on the power supply in the following order:

Sub-slave stations (slave stations in the third tier) → Slave stations (slave stations in the second tier) → Master station (master station for the second tier)

REMARKS

(1) If the automatic return function is set for the master station and all of the slave stations, the power to the data link system does not to be turned on in the procedures other than those described above.

For example, if the automatic return function is set for the master station for the second tier and the master station for the third tier, the power supply can be turned on in the following order: Master station (master station for the second tier) → Slave stations (slave stations in the second tier including the master station for the third tier) → Sub-slave stations (local stations in the third tier).

(2) If the power supply to all stations is turned on simultaneously, a faulty station might be detected because of the differences in the power ON timing for the master station and the local stations.

If this occurs when the automatic return function is not set for the master station, communication might not be started normally. If the automatic return function is set for the master station, retry processing is executed and the number of retries is stored in D9210.

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	o	o	o	o	o	o

8.7 Self-Diagnosis Function

(1) The self-diagnosis function checks the data link module hardware and the fiber-optic cables and coaxial cables for breakage.

The following is checked by the self-diagnosis function:

Check Item	**Description**	**MEL-SECNET**	**MEL-SEC-NET/B**
Forward loop test	Every fiber-optic cable or coaxial cable in the data link system is checked. The forward loop, in which the data link is established during normal operation, is also checked.	O	×
Reverse loop test	Every fiber-optic cable or coaxial cable in the data link system is checked. The reverse loop, in which the data link is established when an error occurs, is also checked.	O	×
Station-to-station test (master station)	The fiber-optic cables or coaxial cables connecting the two stations are checked. For this check, the station with the lower station number is designated as the master station and the station with the higher number is designated as the slave station.	O	O
Station-to-station test (slave station)		O	O
Self-loopback test	The hardware of each individual link module, including the transmission and receive circuits, is checked.	O	O

O: Executable, ×: Not executable

8.7.1 Self-loopback test

(1) Self-loopback test

(a) The self-loopback test checks the hardware of each individual link module, including the transmission and receive circuits (forward loop and reverse loop).

1) In the MELSECNET Data Link System, connect the send and receive ports of the self with a fiber-optic or coaxial cable, as shown in Fig. 8.16.

2) In the MELSECNET/B Data Link System, perform this test with a single link module.

(b) If the data sent from the send end of the forward/reverse loop cannot be received at the receive end within the specified period, the loop is determined to be faulty.

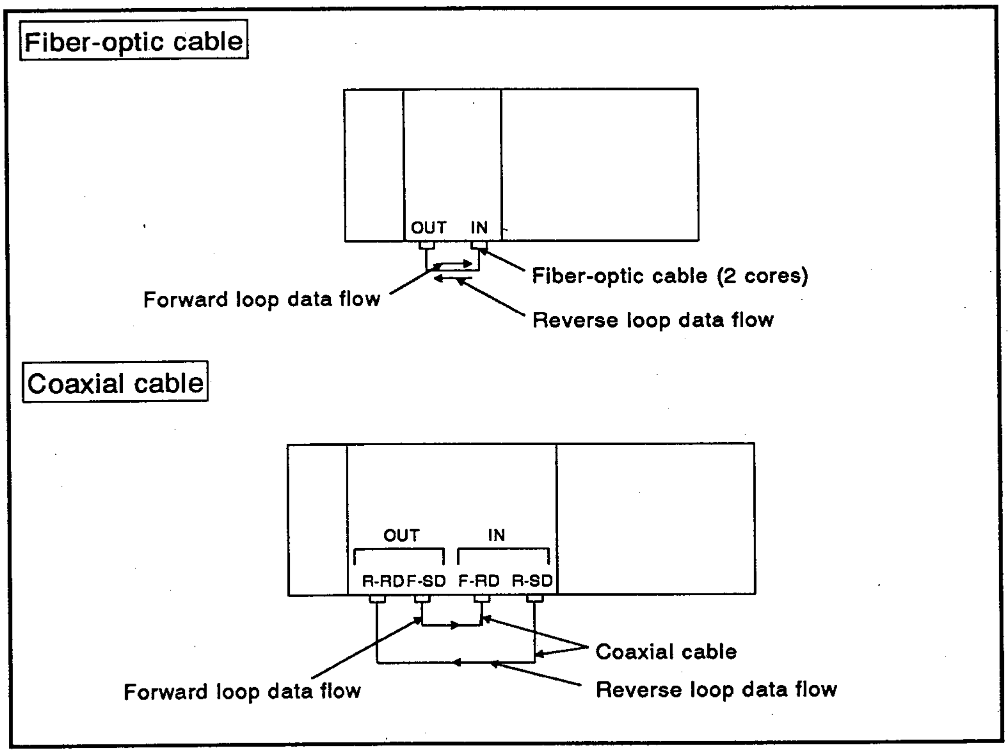
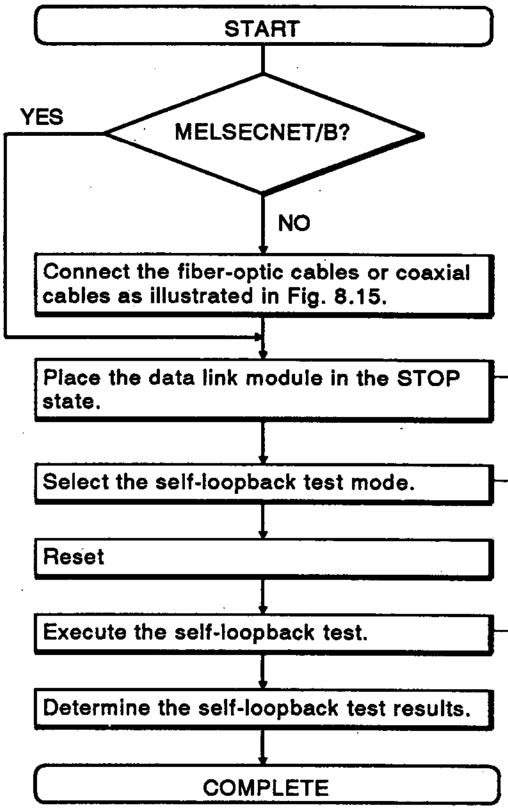


Fig. 8.16 Self-loopback Test

(2) Test sequence



When performing the self-loopback test for a remote I/O station, place the master station in the STOP state.

Set the mode select switch to the "7" position.

When performing the self-loopback test for a remote I/O station, place the master station in the STOP state.

(3) Test results

The test results are indicated by the LED indicators.

(a) Normal

If the test results are normal, the following LED indicators flash in order: CRC, OVER, AB.IF, TIME, DATA, UNDER

(b) Error

If an error is found, the corresponding LED indicator lights and the test is discontinued.

1) When the F.LOOP, R.LOOP, and TIME LED indicators are lit:
   i) The forward loop cable is broken.
   ii) The forward loop send end and receive end are not connected.
   iii) The forward loop send end is connected to the reverse loop send end and the reverse loop receive end is connected to the forward loop receive end.

(c) When the F.LOOP, R.LOOP, and DATA LED indicators are lit:

1) The reverse loop cable is broken.
2) The reverse loop send end and receive end are not connected.

(d) When an ERROR LED other than those stated above is lit:

1) The hardware is faulty.
2) A cable was disconnected during the test.
3) A cable was broken during the test.

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	o	o	o	o	o	o

8.7.2 Station-to-station test

(1) Station-to-station test

The station-to-station test checks the cable connections of two adjacent stations.

If the data sent from the master station link module is not returned from the slave station link module within the specified period, the loop is determined to be faulty.

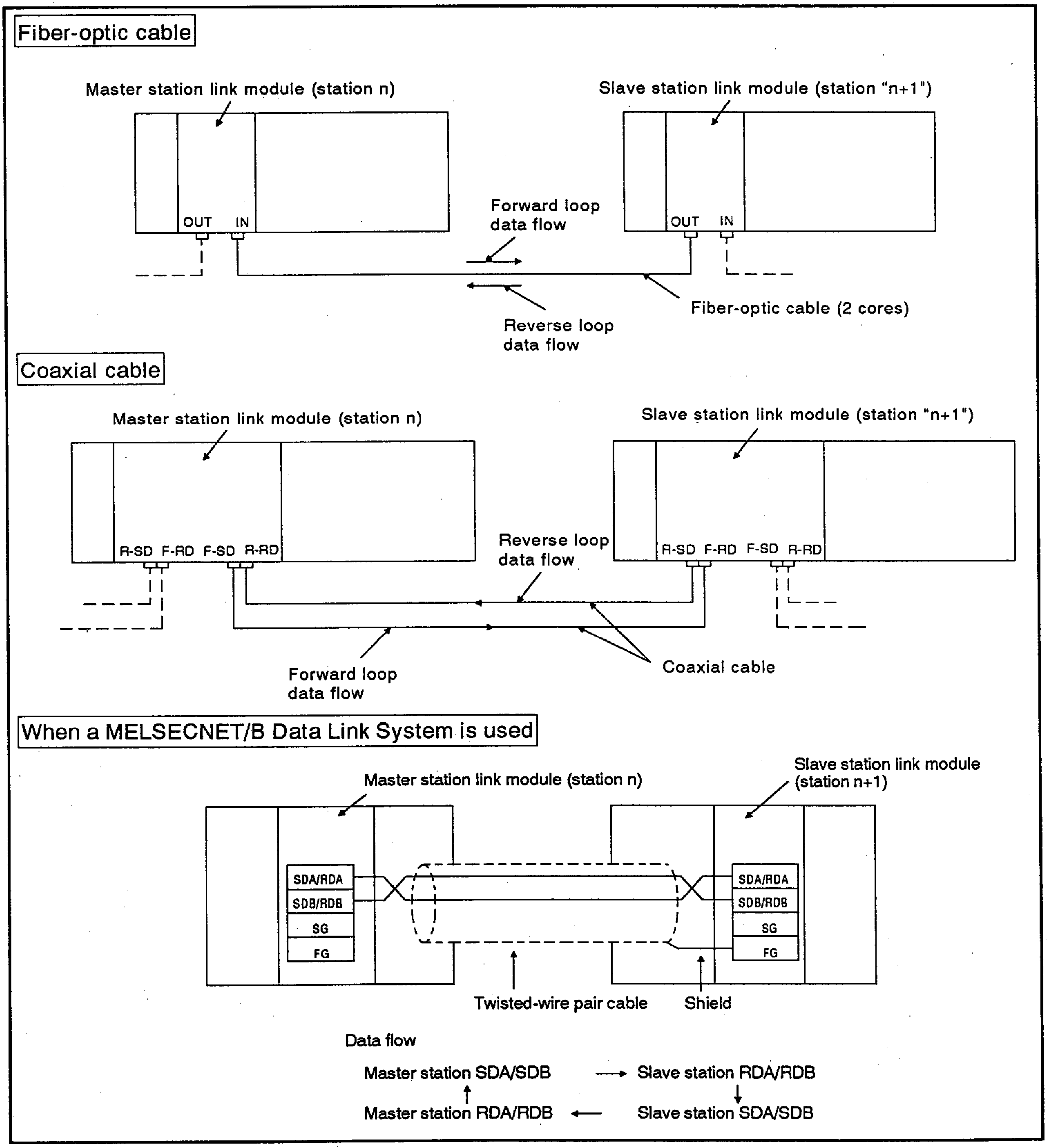
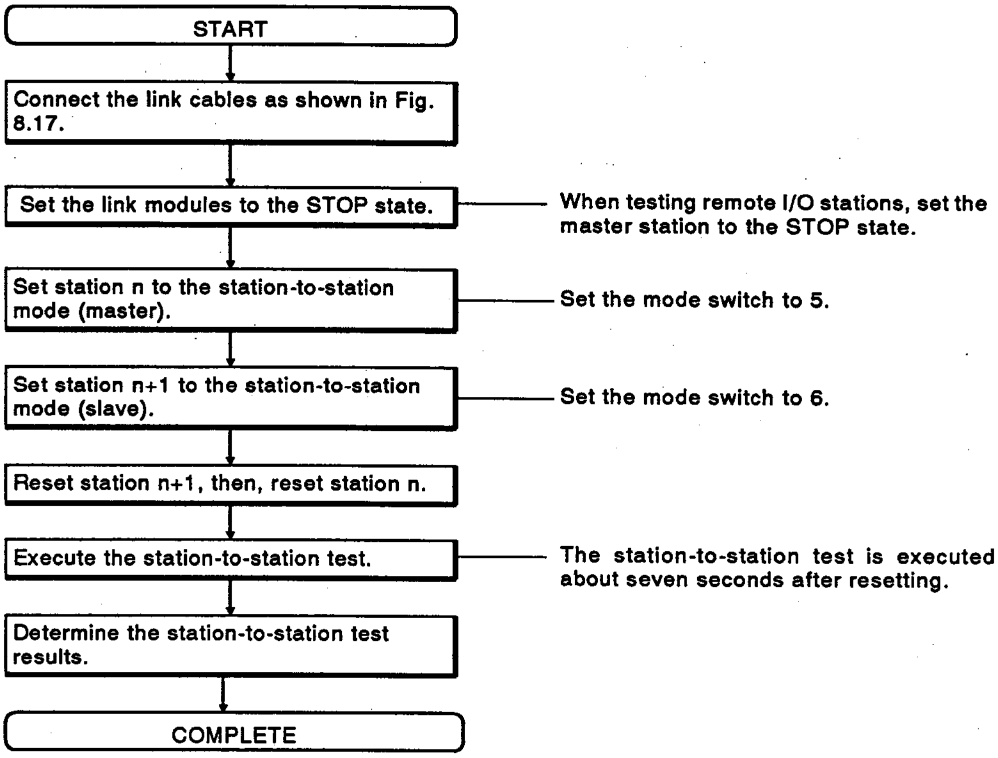


Fig. 8.17 Station-to-Station Test

(2) Test sequence



(3) Test results

The test results are indicated by the LED indicators.

(a) Normal

If the test results are normal, the following LED indicators flash in order: CRC, OVER, AB.IF, TIME, DATA, UNDER

(b) Error

If an error is found, the corresponding LED indicator lights and the test is discontinued.

1) When the F.LOOP, R.LOOP, and TIME LED indicators are lit:
   i) The forward loop cable is broken.
   ii) The forward loop send end and receive end are not connected.
   iii) The forward loop send end is connected to the reverse loop send end and the reverse loop receive end is connected to the forward loop receive end.

2) When the F.LOOP, R.LOOP, and DATA LED indicators are lit:
   i) The reverse loop cable is broken.
   ii) The reverse loop send end and receive end are not connected.

3) When an ERROR LED other than those stated above is lit:
   i) The hardware is faulty.
   ii) A cable was disconnected during the test.
   iii) A cable was broken during the test.

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	o	o	o			

8.7.3 Forward loop test and reverse loop test

POINT

When performed, the forward/reverse loop test needs the data link parameters. When making this test, write to the master station the data link parameters in which at least the total number of slave stations has been set as the minimum requirement.

(1) Forward loop test

(a) The forward loop test checks the forward loop after the stations are connected with fiber-optic cable or coaxial cable.

(b) If the data sent from the send end of the master station in the forward loop cannot be received in the forward loop at the receive end of the master station within the specified period, the loop is determined to be faulty.

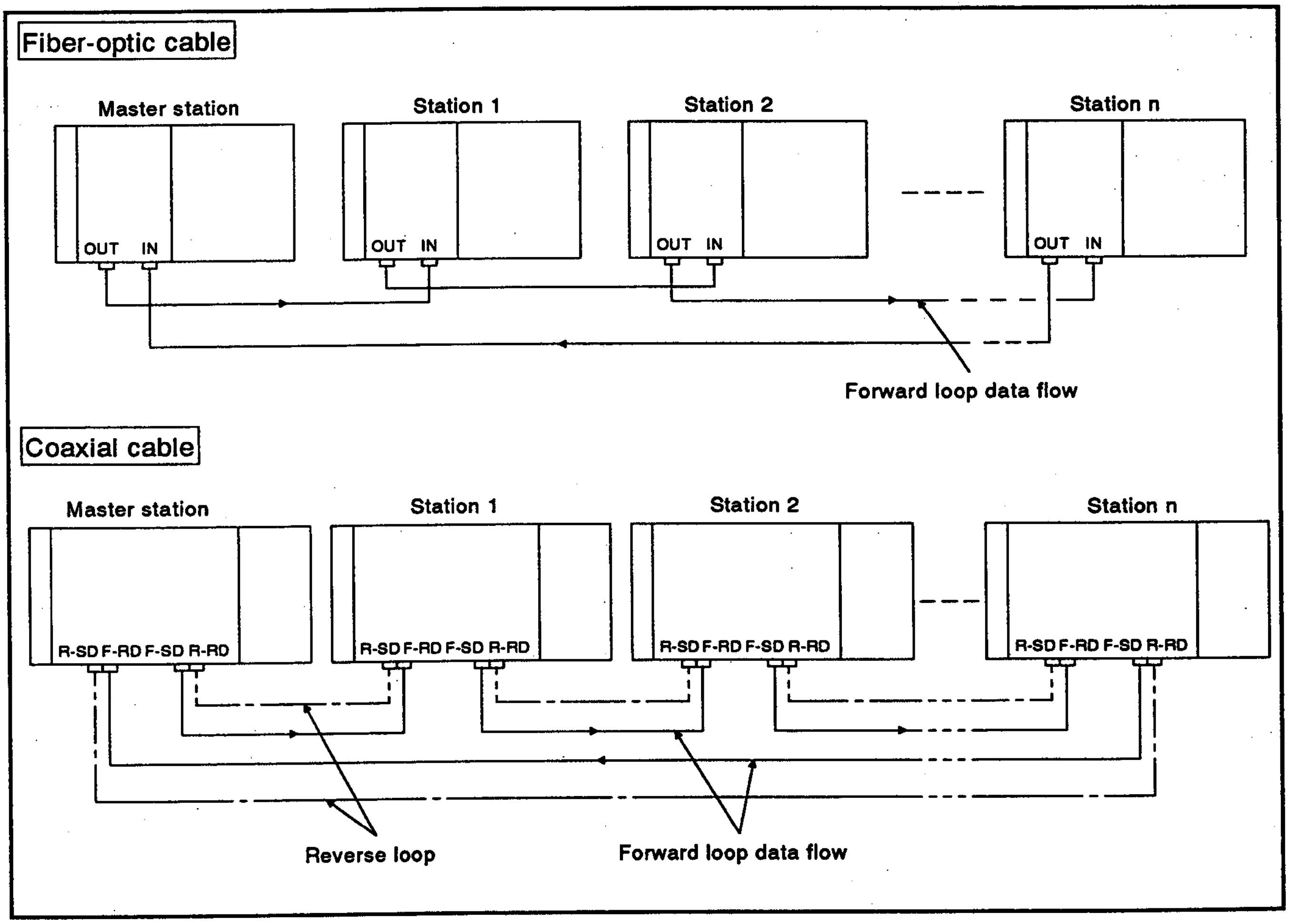


Fig. 8.18 Forward Loop Test

(2) Reverse loop test

(a) The reverse loop test checks the reverse loop after the stations are connected with fiber-optic cable or coaxial cable.

(b) If the data sent from the send end of the master station in the reverse loop cannot be received in the reverse loop at the receive end of the master station within the specified period, the loop is determined to be faulty.

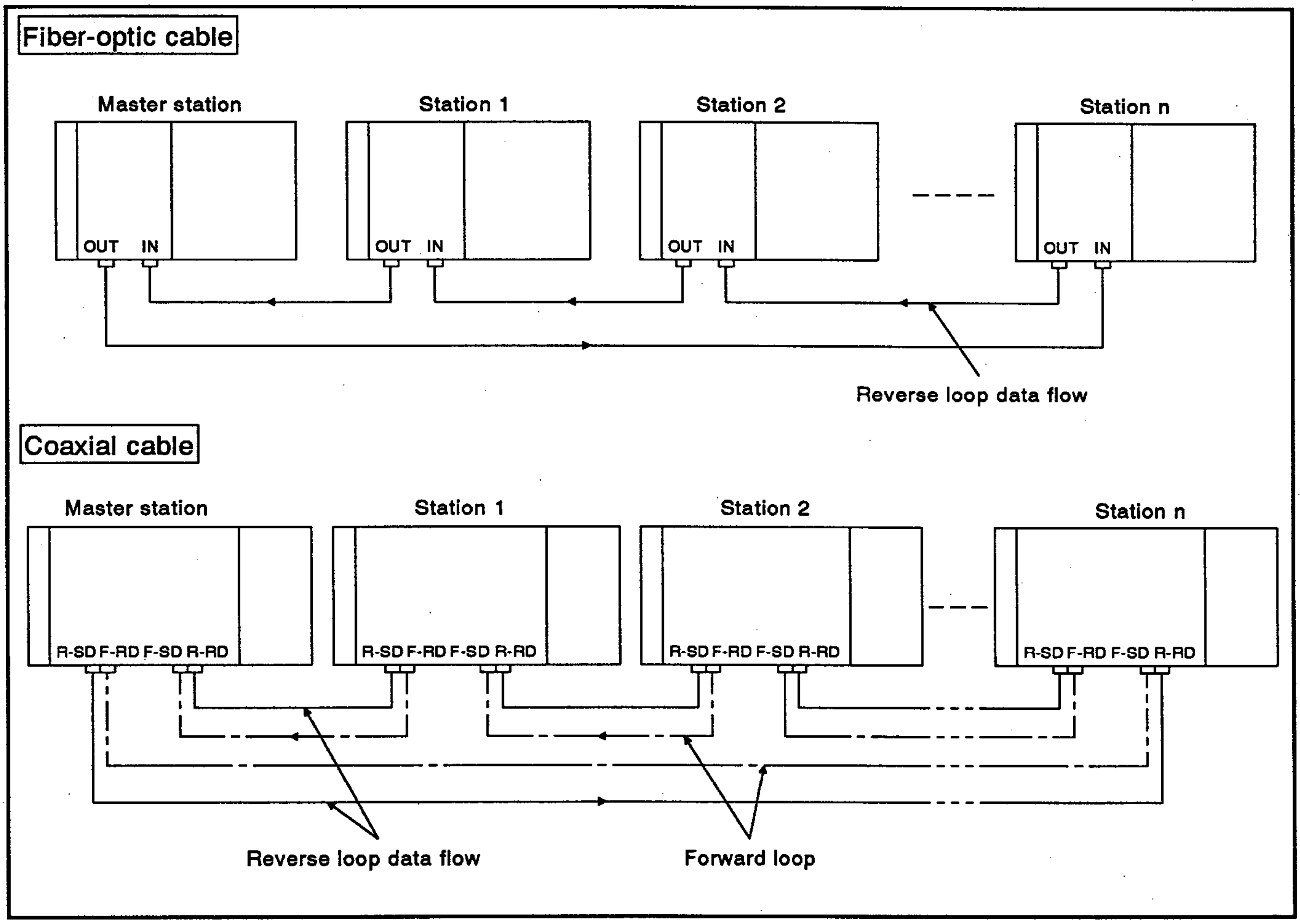
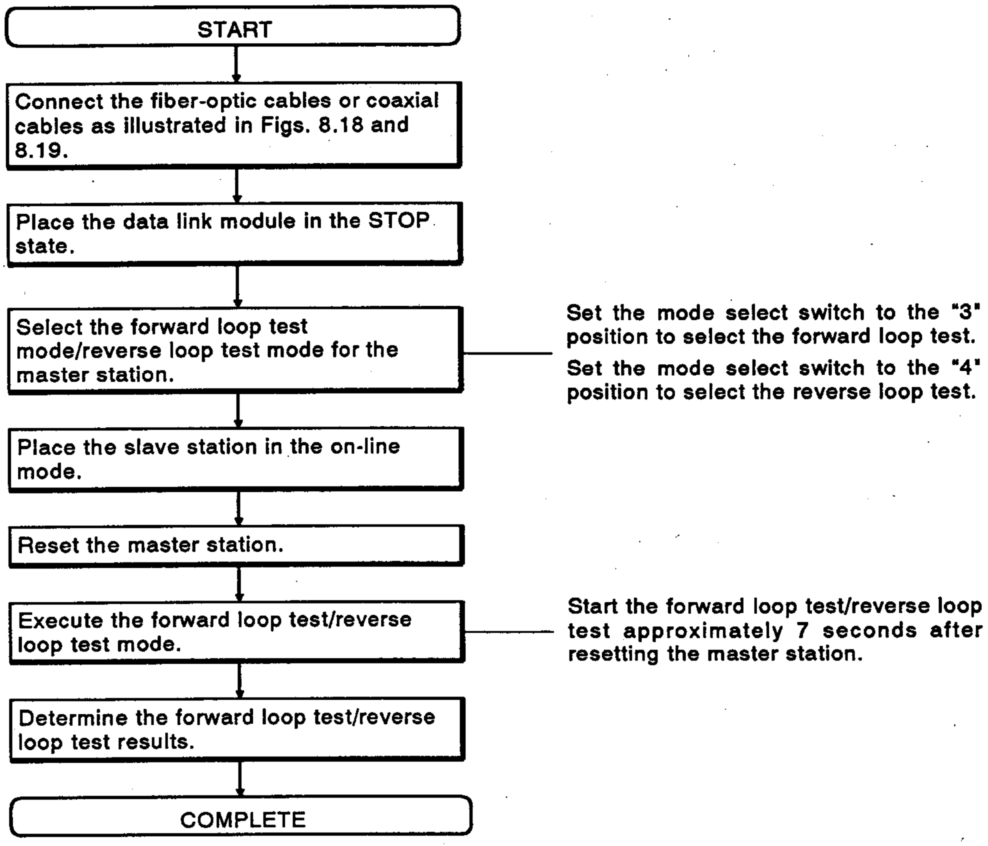


Fig. 8.19 Reverse Loop Test

(3) Test sequence



START

Connect the fiber-optic cables or coaxial cables as illustrated in Figs. 8.18 and 8.19.

Place the data link module in the STOP state.

Select the forward loop test mode/reverse loop test mode for the master station.

Set the mode select switch to the "3" position to select the forward loop test.

Set the mode select switch to the "4" position to select the reverse loop test.

Place the slave station in the on-line mode.

Reset the master station.

Execute the forward loop test/reverse loop test mode.

Start the forward loop test/reverse loop test approximately 7 seconds after resetting the master station.

Determine the forward loop test/reverse loop test results.

COMPLETE

(4) Test results

The test results are indicated by the LED indicators on the data link module or by the link monitor function of the GPP.

(a) Refer to Section 8.1 for details on the link monitor function of the GPP.

(b) The following describes the LED indicators.

1) Normal

If the test results are normal, the following LED indicators flash in order:

CRC, OVER, AB.IF, TIME, DATA, UNDER

2) Error

If an error is found, the corresponding LED indicator lights and the test is discontinued.

i) When the TIME and DATA LED indicators are lit:

- The setting for the watchdog timer is too short.

ii) When the TIME, DATA, and UNDER LED indicators are lit:

- Either the fiber-optic cable/coaxial cable is broken or a slave station is faulty.
- The master station (00) setting is made for more than one station.

POINT

If forward/reverse loop is faulty, the data link will be established in the reverse/forward loop or the loopback mode.

The forward/reverse loop data link will be recovered when the cause of the error is eliminated. The LED indicator will remain in the error state (lit) even after the forward/reverse loop data link is recovered. Reset the master station and execute the forward loop test and the reverse loop test before starting system operation.

9. PROGRAMMING

9.1 Precautions on Writing Programs

(1) Link devices to be used

Only the link devices (B, W, X, Y) allocated to each station with a link parameter can be used in a data link program.

(2) Writing failsafe programs

Interlock should be taken between the stations so that the data from other stations will only be used when the data link is operating normally. Use special relays M9200 to M9255 and special registers D9200 to D9255 to interlock.

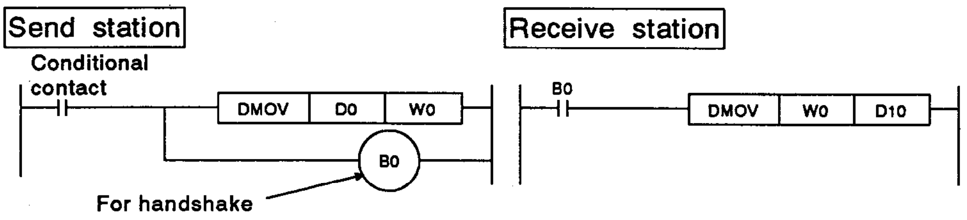
(3) Data link with the data of two or more words

Use the following procedure when writing two or more words of data to the link registers.

(a) When using a data link module that executes link refresh immediately upon the completion of a link scan, such as the AnNCPUP21/R21 or the A0J2CPUP23/R23, it is recommended to use the link relays to execute handshake processing so that the link register data can be read by other stations after the data is written to the link registers.

Example

A program to send the W0 and W1 data to another station:



(1) At the send station, B0 is turned ON when the data in D0 and D1 are transmitted to W0 and W1.

(2) At the receive station, the data is read while B0 is ON.

POINT

A link refresh is executed at the master station and local stations while an instruction is executed.

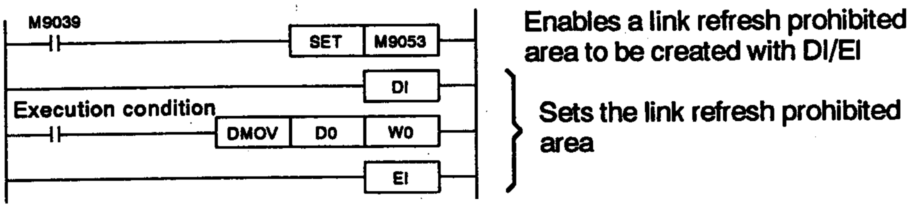
With an program example above, if a link refresh is executed when the D0 data is being transmitted to W0, the updated data for W0 is sent to the receive station. The data for W1 is sent to the receive station but it is not updated.

(b) Write the program as shown on the next page when a CPU, such as the AnNCPUP21/R21, with which link refresh execution disable setting is made with the ON/OFF switching of M9053 and the DI/EI instructions is used.

Example

The program to send W0 and W1 data to another station:

Send station



(4) Precautions on using the MELSECNET II mode or the MELSECNET II composite mode

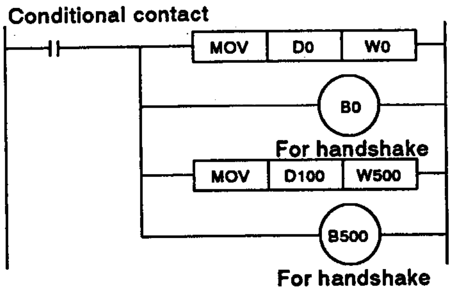
The time required for a link refresh to be executed may vary between the device range allocated with the first half link parameters and that allocated with the second half link parameters.

Handshake processing is required to receive the data written at the same time.

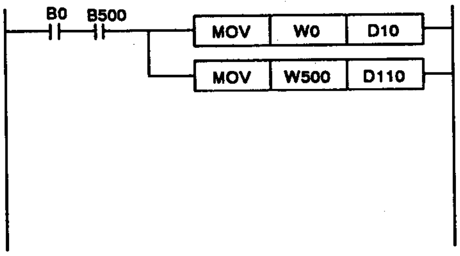
Example

The following illustrates a program that can receive W0 and W500, both of which were written at the same time. W0 to WFF and B0 to BFF are allocated with the first half link parameters and W500 to W5FF and B500 to B5FF are allocated with the second half link parameters.

Send station



Receive station



(1) At the send station, B0 is turned ON when the D0 data is transmitted to W0 and B500 is turned ON when the D100 data is transmitted to W500.

(2) At the receive station, the W0 data and W500 data are transmitted to

(5) Read/write of the special function module loaded in the remote I/O station

(a) Execute an RFRP or RTOP instruction after the remote I/O station has completed initial communications (refer to the ladder example in Section 9.8).

If an RFRP or RTOP instruction is executed before the completion of initial communications, an "OPERATION ERROR" will occur.

(b) If a receive error occurs while an RFRP or RTOP instruction is being executed, the handshake signal (YnE, YnF) might remain ON.

Therefore, the circuit must be written so that the handshake signal (YnE, YnF) and the special function module error signal $X_{n+1}D$ are turned OFF when a communication error occurs.

(6) Link data in disconnected stations

If a local station and/or remote I/O station is disconnected from the link due to power being turned off or reset operation, the data is maintained as it was just before the station was disconnected and retained by the other stations.

(7) Instructions that cannot be used in a data link program

Pulse instructions (PLS, SFTP, etc.) cannot be used for outputting the data to a remote I/O station or for communication between the master station and local stations.

Consider the transmission delay time (refer to Section 6.2) when writing the program.

(8) Precautions on executing transient transmission using link instructions

(a) LRDP, LWTP:

These instructions can only be used at one point within a same system. Two or more points cannot be executed simultaneously.

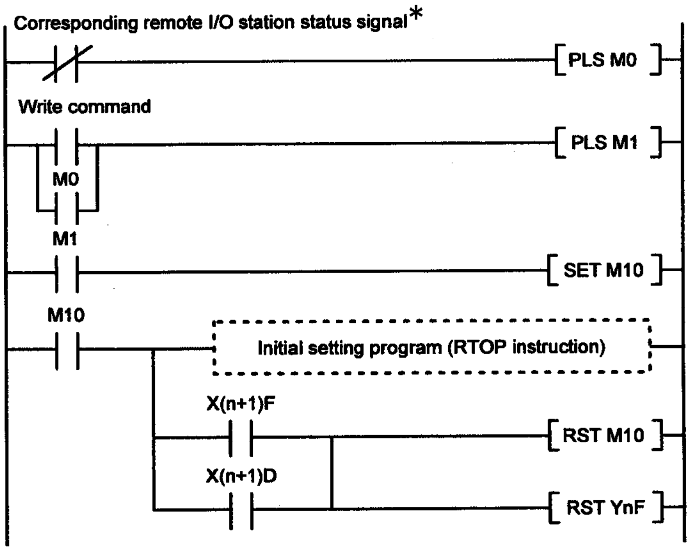
(b) RFRP, RTOP:

These instructions cannot be executed at two or more points for a single special function module.

(9) If initial settings have been made in a program for the buffer memory of the special-function module on the remote I/O station, write the program so that when only that remote I/O station is reset (by powering it off or by turning on the reset switch of the network module on the remote I/O station), the master station will detect that status and initial settings will be made to the special-function module again.
Initial settings are made to the special-function module when:

(a) A sampling cycle and a set data setting request are set on the A/D converter module A616AD.

(b) The number of channels and average processing are set on the A/D converter module A68AD.



* The operating status of the remote I/O station can be checked using the link special registers for remote I/O station fault (D9228 to D9231). When using the link special register for remote I/O station fault in a program, develop it in bit devices M, L, etc. using the MOV instruction. (Example: [MOV D9228 K4M1000], D9228 contents are developed in M1000 to M1015.)

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	○	○	○	○	○	○

9.2 Special Link Relays

9.2.1 Special link relays effective only for the master station

Table 9.1 MELSECNET Data Link Special Link Relays

Device Number	Name	Data	Description
M9200	LRDP instruction received	OFF : Unreceived ON : Received	• Turned ON when an LRDP (word device read) instruction is received. • Used in a user program as an interlock for an LRDP instruction. • Remains ON after the completion of word device read processing called by an LRDP instruction. Turned OFF with an RST instruction in a user program.
M9201	LRDP instruction completed	OFF : Uncompleted ON : Completed	• Turned ON after an LRDP (word device read) instruction has been executed. The execution results are stored in D9200. • Used as a conditional contact to reset M9200 and M9201 after the completion of word device read processing called by an LRDP instruction. • Turned OFF with an RST instruction in a user program after it has been turned ON.
M9202	LWTP instruction received	OFF : Unreceived ON : Received	• Turned ON when an LWTP (word device write) instruction is received. • Used in a user program as an interlock for an LWTP instruction. • Remains ON after the completion of word device write processing called by an LWTP instruction. Turned OFF with an RST instruction in a user program.
M9203	LWTP instruction completed	OFF : Uncompleted ON : Completed	• Turned ON after an LWTP (word device write) instruction has been executed. The execution results are stored in D9201. • Used as a conditional contact to reset M9202 and M9203 after the completion of word device write processing called by an LWTP instruction. • Turned OFF with an RST instruction in a user program after it has been turned ON.
M9206	Link parameter error in the station itself	OFF : Normal ON : Error	• Turned ON when link parameter of the station itself is not set or the setting is incorrect. • Automatically turned OFF when link parameter is set correctly.
M9207	Link parameter check result	OFF : Normal ON : Error	• Goes ON if a lower tier link uses device ranges (B, W) outside the range set by a master station, in the upper tier link, for itself. • Check is executed only when M9209 is ON.
M9208	B and W transmission range for the master station (lower tier master stations only)	OFF : To the second and third tiers ON : To the second tier only	• Sets whether the B and W data controlled by the master station in the upper tier is sent to the local stations (sub-slave stations) in the lower tier. • OFF : B and W data in the master station is sent to the sub-slave stations. • ON : B and W data in the master station is not sent to the sub-slave stations.
M9209	Link parameter check instruction (lower tier link master stations only)	OFF : Check executed ON : Check not executed	• To be turned ON when the link devices (B and W) used by the upper tier and the link devices (B and W) used by the lower tier are not compared for "match". • When M9209 is OFF, the link parameters for the upper tier and the link parameters for the lower tier are checked.

Table 9.1 MELSECNET Data Link Special Link Relays (Continued)

Device Number	Name	Data	Description
M9210	Link card error (master station)	OFF : Normal ON : Error	• Turned ON when the link card hardware is faulty.
M9224	Link status	OFF : Offline ON : Online, station-to-station test, or self-loopback test	• Turned ON when the master station is offline, in the station-to-station test mode, or in the self-loopback test mode. • Turned OFF when the master station is reset after being placed in the online mode.
M9225	Forward loop error	OFF : Normal ON : Error	• Turned ON when any of the following occurs in the forward loop line between the master station and the final station: • Broken cable • Forward loop receive end error in the master station data link module • Forward loop send end error in the data link module of the final local station • Turned ON when the station-to-station test, including the final station, is executed during the data link. • Turned OFF automatically when the error state is eliminated.
M9226	Reverse loop error	OFF : Normal ON : Error	• Turned ON when any of the following occurs in the forward loop line between the master station and the final station 1: • Broken cable • Reverse loop receive end error in the master station data link module • Reverse loop send end error in the data link module of the final local station • Turned ON when the station-to-station test, including station 1, is executed during the data link. • Turned OFF automatically when the error state is eliminated.
M9227	Loop test status	OFF : Not being executed ON : Forward loop test or reverse loop test being executed	• Turned ON when a forward loop test or reverse loop test is being executed for the master station.
M9232	Local station operating status	OFF : RUN or STEP RUN status ON : STOP or PAUSE status	• ON/OFF status depends on the operation status of the local station. • Turned ON when the status of any local station in the loop changes to STOP or PAUSE. • Turned OFF automatically when the status of all local stations changes to RUN or STEP RUN. That is, M9232 is turned OFF when bits D9212 to D9215 are all OFF.
M9233	Local station error detected	OFF : No error ON : Error detected	• Turned ON when a local station in the executed loop detects an error in another station (M9255 ON). • Turned OFF automatically when the faulty station is returned to the normal state or the data link returns to the normal status by switching the loop line. That is, M9233 is turned OFF when bits D9216 to D9219 are all OFF.
M9235	Local station or remote I/O station parameter error detected	OFF : No error ON : Error detected	• Turned ON in the following cases: Local station : The device range (link relays and link registers) outside the range allocated to the master station in the lower tier is allocated with the link parameters for the lower tier. Remote I/O station : Error in I/O allocation or neither inputs (X) nor outputs (Y) are set with the link parameters. • Turned OFF when the error is eliminated by correcting the link parameters. That is, M9235 is turned OFF when bits D9220 to D9223 are all OFF.

Table 9.1 MELSECNET Data Link Special Link Relays (Continued)

Device Number	Name	Data	Description
M9236	Local station or remote I/O station initial communication status	OFF : Not communicating ON : Communicating	• Turned ON while a local station and/or remote I/O station is communicating the initial setting data (link parameter) to the master station to execute data link processing. • Automatically turned OFF when the communication for initial data setting has been completed. That is, M9236 is turned OFF when bits D9224 to D9227 are all OFF.
M9237	Local station or remote I/O station error	OFF : Normal ON : Error	• Turned ON when an error occurs with one local station or remote I/O station within the loop. (The relay is turned ON while a station-to-station test is being executed for a local station or a remote I/O station and the data link is operating.) • Automatically turned OFF when the faulty station returns to the normal status or the data link returns to the normal status by switching the loop line. That is, M9237 is turned OFF when bits D9228 to D9231 are all OFF.
M9238	Local station or remote I/O station forward/reverse loop error	OFF : Normal ON : Error	• Turned ON when an error occurs in the forward loop line or reverse loop line of the local stations and remote I/O stations. That is, M9238 is turned OFF when bits D9232 to D9239 are all OFF.

Table 9.2 MELSECNET/B Data Link Special Link Relays

Device Number	Name	Data	Description
M9200	LRDP instruction received	OFF : Unreceived ON : Received	• Turned ON when an LRDP (word device read) instruction is received. • Used in a user program as an interlock for an LRDP instruction. • Remains ON after the completion of word device read processing called by an LRDP instruction. Turned OFF with an RST instruction in a user program.
M9201	LRDP instruction completed	OFF : Uncompleted ON : Completed	• Turned ON after an LRDP (word device read) instruction has been executed. The execution results are stored in D9200. • Used as a conditional contact to reset M9200 and M9201 after the completion of word device read processing called by an LRDP instruction. • Turned OFF with an RST instruction in a user program after it has been turned ON.
M9202	LWTP instruction received	OFF : Unreceived ON : Received	• Turned ON when an LWTP (word device write) instruction is received. • Used in a user program as an interlock for an LWTP instruction. • Remains ON after the completion of word device write processing called by an LWTP instruction. Turned OFF with an RST instruction in a user program.
M9203	LWTP instruction completed	OFF : Uncompleted ON : Completed	• Turned ON after an LWTP (word device write) instruction has been executed. The execution results are stored in D9201. • Used as a conditional contact to reset M9202 and M9203 after the completion of word device write processing called by an LWTP instruction. • Turned OFF with an RST instruction in a user program.
M9206	Link parameter error in the station itself	OFF : Normal ON : Error	• Turned ON when link parameter of the station itself is not set or the setting is incorrect. • Turned OFF with an RST instruction in a user program.
M9207	Link parameter check result	OFF : Normal ON : Error	• Goes ON if a lower tier link uses device ranges (B, W) outside the range set by a master station, in the upper tier link, for itself. • Check is executed only when M9209 is ON.
M9208	B and W transmission range for the master station (lower tier master stations only)	OFF : To the second and third tiers ON : To the second tier only	• Sets whether the B and W data controlled by the master station in the upper tier is sent to the local stations (sub-slave stations) in the lower tier. • OFF : B and W data in the master station is sent to the sub-slave stations. • ON : B and W data in the master station is not sent to the sub-slave stations.
M9209	Link parameter check instruction (lower tier link master stations only)	OFF : Check executed ON : Check not executed	• To be turned ON when the link devices (B and W) used by the upper tier and the link devices (B and W) used by the lower tier are not compared for "match". • When M9209 is OFF, the link parameters for the upper tier and the link parameters for the lower tier are checked.
M9210	Link card error (master station)	OFF : Normal ON : Error	• Turned ON when the link card hardware is faulty.
M9224	Link status	OFF : Offline ON : Online, station-to-station test, or self-loopback test	• Turned ON when the master station is offline, in the station-to-station test mode, or in the self-loopback test mode. • Turned OFF when the master station is reset after being placed in the online mode.

Table 9.2 MELSECNET/B Data Link Special Link Relays (Continued)

Device Number	Name	Data	Description
M9232	Local station operating status	OFF : RUN or STEP RUN status ON : STOP or PAUSE status	• ON/OFF status depends on the operation status of the local station. • Turned ON when the status of any local station in the loop changes to STOP or PAUSE. • Turned OFF automatically when the status of all local stations changes to RUN or STEP RUN. That is, M9232 is turned OFF when bits D9212 to D9215 are all OFF.
M9233	Local station error detected	OFF : No error ON : Error detected	• Turned ON when a local station in the executed loop detects an error in another station (M9255 ON). • Automatically turned OFF when the faulty station is returned to the normal state or the data link returns to the normal status by switching the loop line. That is, M9233 is turned OFF when bits D9216 to D9219 are all OFF.
M9235	Local station parameter error detected	OFF : No error ON : Error detected	• Turned ON when the bit device range (link relays and link registers) outside the range allocated to a master station for the lower tier is allocated with the link parameters for the lower tier. • Turned OFF when the error is eliminated by correcting the link parameters. That is, M9235 is turned OFF when bits D9220 to D9223 are all OFF.
M9236	Local station initial communications status	OFF : Not communicating ON : Communicating	• Turned ON while a local station is communicating the initial setting data (link parameters) to a master station to execute data link processing. • Automatically turned OFF when the communication for initial data setting has been completed. That is, M9236 is turned OFF when bits D9224 to D9227 are all OFF.
M9237	Local station error	OFF : Normal ON : Error	• Turned ON when an error occurs at one local station within the loop. (The relay is turned ON while a station-to-station test is being executed for a local station and the data link is operating.) • Automatically turned OFF when the faulty station returns to normal. That is, M9237 is turned OFF when bits D9228 and D9229 are all OFF.

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	o	o	o	o	o	o

9.2.2 Special link relays effective only for local stations

Table 9.3 MELSECNET Data Link Special Link Relays

Device Number	Name	Data	Description
M9204	LRDP instruction completed	OFF : Uncompleted ON : Completed	• Turned ON by a local station upon the completion of word device read processing called by an LRDP instruction.
M9205	LWTP instruction completed	OFF : Uncompleted ON : Completed	• Turned ON by a local station upon the completion of word device write processing called by an LRDP instruction.
M9211	Link card error (local station)	OFF : Normal ON : Error	• Turned ON when the link card hardware is faulty.
M9240	Link status	OFF : Online ON : Offline, station-to-station test, or self-loopback test	• Turned ON when the station itself is offline, in the station-to-station test mode, or in the self-loopback test mode. • Turned OFF when the station itself is reset after being placed in the online mode.

M9241	Forward loop error	OFF : Normal
		ON : Error
			• Turned ON when any of the following occurs in the forward loop line between the station itself and the preceding station:
			  • Broken cable
			  • Forward loop receive end error in the station itself data link module
			  • Forward loop send end error in the data link module of the proceding station
			• Turned OFF automatically when the error state is elimnated.

M9242	Reverse loop error	OFF : Normal
		ON : Error
			• Turned ON when any of the following occurs in the reverse loop line between the station itself and the next station:
			  • Broken cable
			  • Reverse loop receive end error in the data link module of the station itself
			  • Reverse loop send end error in the data link module of the next station
			• Turned OFF automatically when the error state is elimnated.

M9243	Loopback executed	ON : Not-executed OFF : Executed	• Turned ON when loopback is executed by the station itself.
M9246	Data unreceived	OFF : Received ON : Unreceived	• Turned ON when the data from the master station has not been received.
M9247	Data unreceived	OFF : Received ON : Unreceived	• In the three-tier system, M9247 is turned ON when the data from the master station for the third tier has not been received by a sub-slave station. That is, M9247 is ON while M9208 is ON.
M9250	Parameter unreceived	OFF : Received ON : Unreceived	• Turned ON when the link parameters have not been received from the master station. • Automatically turned OFF when the link parameter is received. • The master station sends the link parameters to each local station every time the loop line is switched. • Only effective while the loop line in which the data link is executed is online.
M9251	Link break	OFF : Normal ON : Break	• ON/OFF status depends on whether the station itself stopped the data link. • Turned ON when the data link is established in neither the forward loop line nor the reverse loop line. • Turned OFF automatically when the data link returns to the normal state. • Only effective while the loop line in which the data link is executed is online.

Table 9.3 MELSECNET Data Link Special Link Relays (Continued)

Device Number	Name	Data	Description
M9252	Loop test status	OFF : Not executed ON : Forward loop test or reverse loop test is being executed.	• Remains ON while the station itself is in the forward loop test mode or the reverse loop test mode.
M9253	Master station operating status	OFF : RUN or STEP RUN status ON : STOP or PAUSE status	• ON/OFF status depends on the operation status of the master station. • Turned ON when the status of a master station is either STOP or PAUSE. • Turned OFF when the status of the master station changes to RUN or STEP RUN.
M9254	Operating status of other local stations	OFF : RUN or STEP RUN status ON : STOP or PAUSE status	• ON/OFF status depends on the operation status of a local station other than the station itself. • Turned ON when the status of a local station in the loop (other than the station itself) is either STOP or PAUSE. • Not turned ON when the status of the station itself is either STOP or PAUSE. • Automatically turned OFF when the status of a local station in the loop (other than the station itself) changes to RUN or STEP RUN.
M9255	Error status of other local stations	OFF : Normal ON : Error	• ON/OFF status depends on the operation status of a local station other than the station itself. • Turned ON when an error occurs with one local station in the loop (other than the station itself). • Automatically turned OFF when the faulty station returns to the normal state or the data link returns to the normal state by switching the loop line. That is, M9255 is turned OFF when bits D9252 to D9255 are all OFF.

Table 9.4 MELSECNET/B Data Link Special Link Relays

Device Number	Name	Data	Description
M9204	LRDP instruction completed	OFF : Uncompleted ON : Completed	• Turned ON by a local station upon the completion of word device read processing called by an LRDP instruction.
M9205	LWTP instruction completed	OFF : Uncompleted ON : Completed	• Turned ON by a local station upon the completion of word device write processing called by an LRDP instruction.
M9211	Link card error (local station)	OFF : Normal ON : Error	• Turned ON when the link card hardware is faulty.
M9240	Link status	OFF : Online ON : Offline, station-to-station test, or self-loopback test	• Turned ON when the station itself is offline, in the station-to-station test mode, or in the self-loopback test mode. • Turned OFF when the station itself is reset after being placed in the online mode.
M9246	Data unreceived	OFF : Received ON : Unreceived	• Turned ON when the data from the master station has not been received.
M9247	Data unreceived	OFF : Received ON : Unreceived	• In the three-tier system, M9247 is turned ON when the data from the master station for the third tier has not been received by a sub-slave station. That is, M9247 is ON while M9208 is ON.
M9250	Parameter unreceived	OFF : Received ON : Unreceived	• Turned ON when the link parameters have not been received from the master station. • Automatically turned OFF when the link parameter is received. • Only effective while the loop line in which the data link is executed is online.
M9251	Link break	OFF : Normal ON : Break	• ON/OFF status depends on whether the station itself stopped the data link. • Automatically turned OFF when the data link returns to the normal status. • Only effective while the loop line in which the data link is executed is online.
M9253	Master station operating status	OFF : RUN or STEP RUN status ON : STOP or PAUSE status	• ON/OFF status depends on the operation status of a master station. • Turned ON when the status of the master station is either STOP or PAUSE. • Turned OFF when the status of the master station changes to RUN or STEP RUN.
M9254	Operating status of other local stations	OFF : RUN or STEP RUN status ON : STOP or PAUSE status	• ON/OFF status depends on the operation status of a local station other than the station itself. • Turned ON when the status of a local station in the loop (other than the station itself) is either STOP or PAUSE. • Not turned ON when the status of the station itself is either STOP or PAUSE. • Automatically turned OFF when the status of a local station in the loop (other than the station itself) changes to RUN or STEP RUN. That is, M9254 is turned OFF when bits D9248 and D9249 are OFF.
M9255	Error status of other local stations	OFF : Normal ON : Error	• ON/OFF status depends on the operation status of a local station other than the station itself. • Turned ON when an error occurs with one local station in the loop (other than the station itself). • Automatically turned OFF when the faulty station returns to the normal state or the data link returns to the normal state by switching the loop line. That is, M9255 is turned OFF when bits D9252 to D9253 are all OFF.

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	o	o	o	o	o	o

9.3 Special Link Registers

9.3.1 Special link registers effective only for the master station

Table 9.5 MELSECNET Data Link Special Link Registers

Device Number	Name	Data	Description
D9200	LRDP execution result	0 : Normal 2 : LRDP instruction setting fault 3 : Corresponding station error 4 : LRDP cannot be executed in the corresponding station	Stores the execution result of an LRDP (word device read) instruction (M9201 ON). • LRDP instruction setting fault: Faulty setting of the LRDP instruction constant, source, and/or target. • Corresponding station error: The designated station is not executing data link processing. • LRDP instruction cannot be executed by thecorrespopnding station:thestation designated with the LRDP instruction is set with the link parameters as a remorte I/O station.
D9201	LWTP execution result	0 : Normal 2 : LWTP instruction setting fault 3 : Corresponding station error 4 : LWTP cannao be executed in the corresponding station	Stores the execution result of an LWTP (word device write) instruction (M9203 ON). • LWTP instruction setting fault: Faulty setting of the LWTP instruction constant, source, and/or target. • Corresponding station error: The designated station is not executing data link processing. • LWTP instruction cannot be executed by thecorrespopnding station:thestation designated with the LWTP instruction is set with the link parameters as a remorte I/O station.
D9202	Local station link type	Stores the status of station 1 to station 16	Stores whether a slave station is compatible with the MELSECNET mode or MELSECNET II mode. • MELSECNET II-compatible station : "1" • MELSECNET-compatible station : "0"
D9203		Stores the status of station 17 to station 32	
D9241		Stores the status of station 33 to station 48	
D9242		Stores the status of station 49 to station 64	

DEVICE NUMBER	Bit															
	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
D9202	L16	L15	L14	L13	L12	L11	L10	L9	L8	L7	L6	L5	L4	L3	L2	L1
D9203	L32	L31	L30	L29	L28	L27	L26	L25	L24	L23	L22	L21	L20	L19	L18	L17
D9241	L48	L47	L46	L45	L44	L43	L42	L41	L40	L39	L38	L37	L36	L35	L34	L33
D9242	L64	L63	L62	L61	L60	L59	L58	L57	L56	L55	L54	L53	L52	L51	L50	L49

Table 9.5 MELSECNET Data Link Special Link Registers (Continued)

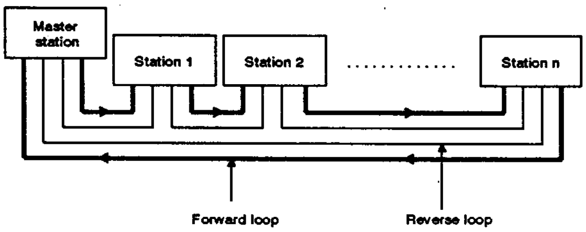
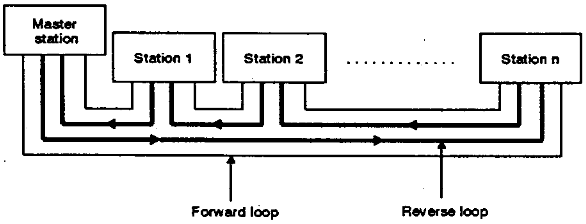
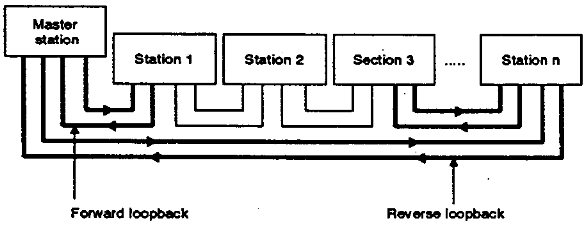
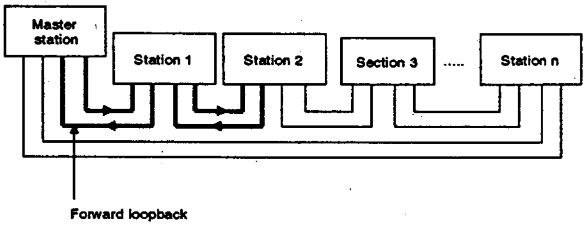
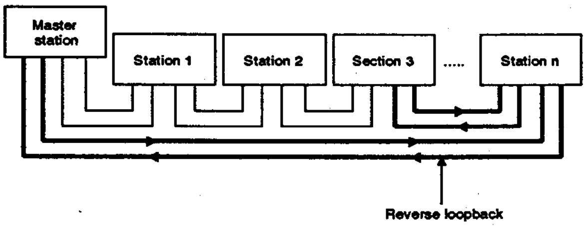
Device Number	Name	Data	Description
D9204	Link status	0 : Data link in forward loop 1 : Data link in reverse loop 2 : Loopback in forward/ reverse direction 3 : Loopback in forward direction 4 : Loopback in reverse direction 5 : Data link impossible	Stores the current path of the data link. (1) Forward loop  (2) Reverse loop  • Forward/reverse loop  • Forward loopback  • Reverse loopback  • "5" is stored because the watchdog timer setting is too small. • The data in D9204 is updated each time the link status changes.

Table 9.5 MELSECNET Data Link Special Link Registers (Continued)

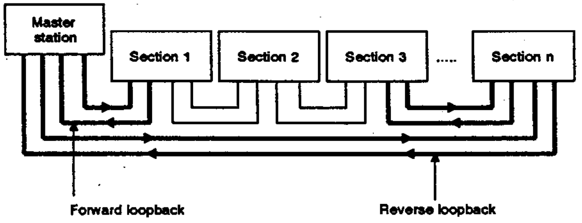
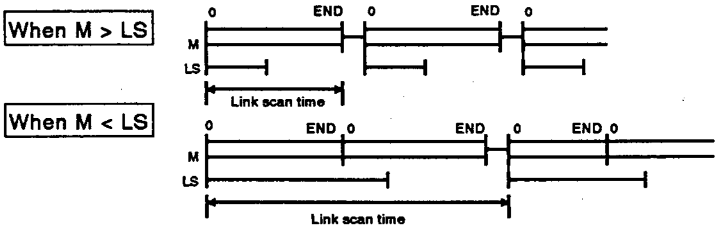
Device Number	Name	Data	Description
D9205	Loopback execution station	Station executing forward loopback	• Stores the number of local station or remote I/O station at which loopback is being executed.  Example: "1" is stored in D9205 and "3" is stored in D9206. • The values stored in D9205 and D9206 are not reset to "0" when the data link returns to the normal state (data link in forward loop). • Reset the PC CPU to return the set values to "0".
D9206	Loopback execution station	Station executing reverse loopback	
D9207	Link scan time	Maximum value	• Stores the time used for data link processing (link scan time) by all of the local stations and remote I/O stations in the loop currently being used for data link. • Link scan time definition:  M : Sequence program scan time by master station LS : Link scan time (data link processing)
D9208		Minimum value	
D9209		Current value	
D9210	Retry count	Total number stored	• Stores the total number of retries conducted when a transmission error occurs. • Definition of retry processing: If data is lost or becomes unreliable due to the occurrence of a data transmission processing error, the same data is sent again. • Counting stops if the number of retries exceeds the maximum limit "FFFF$_H$". • Execute reset operation to clear the data to "0".
D9211	Loop switching count	Total number stored	• Stores the total number of times that the forward loop is switched to a reverse loop or to loopback. • Counting stops if the number of switches exceeds the maximum limit "FFFF$_H$". • Execute reset operation to clear the data to "0".

Table 9.5 MELSECNET Data Link Special Link Registers (Continued)

<table>
<tr><th>Device Number</th><th>Name</th><th>Data</th><th>Description</th></tr>
<tr><td>D9212</td><td rowspan="4">Local station operation status</td><td>Stores the status of station 1 to station 16</td><td rowspan="4">

- Stores the status of all local stations that are in STOP or PAUSE.

<table>
<tr><th rowspan="2">DEVICE NUMBER</th><th colspan="16">Bit</th></tr>
<tr><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>D9212</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>D9213</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>D9214</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>D9215</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>

- When the status of a local station changes to STOP or PAUSE, the corresponding bit is set.

The bit status of remote I/O station always remains "0", indicating RUN.

Example:
When the operation status of station 7 changes to the STOP, "1" is set to bit 6 of D9212. When D9212 is monitored, its value is "64 (40H)".
</td></tr>
<tr><td>D9213</td><td>Stores the status of station 17 to station 32</td></tr>
<tr><td>D9214</td><td>Stores the status of station 33 to station 48</td></tr>
<tr><td>D9215</td><td>Stores the status of station 49 to station 64</td></tr>
<tr><td>D9216</td><td rowspan="4">Local station error detection</td><td>Stores the status of station 1 to station 16</td><td rowspan="4">

- Stores the numbers of the station that detect the occurrence of an error at another station.

<table>
<tr><th rowspan="2">DEVICE NUMBER</th><th colspan="16">Bit</th></tr>
<tr><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>D9216</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>D9217</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>D9218</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>D9219</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>

- When a normally operating local station detects an error at another local station, the bit corresponding to the normally operating station is set. The bit status of remote I/O station always remains "0".

Example:
When station 5 detects that station 4 is faulty, "1" is set to bit 4 of D9216. When D9216 is monitored, its value is "16 (10H)".

- When the faulty station recovers normal operating status or when the loop line is switched so that the data link returns to normal operating status, the bit is automatically reset to "0".
</td></tr>
<tr><td>D9217</td><td>Stores the status of station 17 to station 32</td></tr>
<tr><td>D9218</td><td>Stores the status of station 33 to station 48</td></tr>
<tr><td>D9219</td><td>Stores the status of station 49 to station 64</td></tr>
<tr><td>D9220</td><td rowspan="4">Local station parameter mismatched or remote I/O station input/output allocation error</td><td>Stores the status of station 1 to station 16</td><td rowspan="4">

- Stores the numbers of the stations at which a link parameter error sent from the master station is detected by another local or remote I/O station.

<table>
<tr><th rowspan="2">DEVICE NUMBER</th><th colspan="16">Bit</th></tr>
<tr><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>D9220</td><td>L/R 16</td><td>L/R 15</td><td>L/R 14</td><td>L/R 13</td><td>L/R 12</td><td>L/R 11</td><td>L/R 10</td><td>L/R 9</td><td>L/R 8</td><td>L/R 7</td><td>L/R 6</td><td>L/R 5</td><td>L/R 4</td><td>L/R 3</td><td>L/R 2</td><td>L/R 1</td></tr>
<tr><td>D9221</td><td>L/R 32</td><td>L/R 31</td><td>L/R 30</td><td>L/R 29</td><td>L/R 28</td><td>L/R 27</td><td>L/R 26</td><td>L/R 25</td><td>L/R 24</td><td>L/R 23</td><td>L/R 22</td><td>L/R 21</td><td>L/R 20</td><td>L/R 19</td><td>L/R 18</td><td>L/R 17</td></tr>
<tr><td>D9222</td><td>L/R 48</td><td>L/R 47</td><td>L/R 46</td><td>L/R 45</td><td>L/R 44</td><td>L/R 43</td><td>L/R 42</td><td>L/R 41</td><td>L/R 40</td><td>L/R 39</td><td>L/R 38</td><td>L/R 37</td><td>L/R 36</td><td>L/R 35</td><td>L/R 34</td><td>L/R 33</td></tr>
<tr><td>D9223</td><td>L/R 64</td><td>L/R 63</td><td>L/R 62</td><td>L/R 61</td><td>L/R 60</td><td>L/R 59</td><td>L/R 58</td><td>L/R 57</td><td>L/R 56</td><td>L/R 55</td><td>L/R 54</td><td>L/R 53</td><td>L/R 52</td><td>L/R 51</td><td>L/R 50</td><td>L/R 49</td></tr>
</table>

Example:
When station 5 (local station) is set as a remote I/O station, "1" is set for bit 4 of D9220. When D9220 is monitored, its value is "16 (10H)".

- When the link parameter settings is corrected and the status of the master station is switched from STOP to RUN, the bit is automatically reset to "0".
</td></tr>
<tr><td>D9221</td><td>Stores the status of station 17 to station 32</td></tr>
<tr><td>D9222</td><td>Stores the status of station 33 to station 48</td></tr>
<tr><td>D9223</td><td>Stores the status of station 49 to station 64</td></tr>
</table>

Table 9.5 MELSECNET Data Link Special Link Registers (Continued)

<table>
<tr><th>Dvice Number</th><th>Name</th><th>Data</th><th>Description</th></tr>
<tr><td>D9224</td><td rowspan="4">Initial communication between local and/or remote I/O stations</td><td>Stores the status of station 1 to station 16</td><td rowspan="4">

- Stores the number of the local or remote I/O stations communicating initial data (link parameters)

<table>
<tr><th rowspan="2">DEVICE NUMBER</th><th colspan="16">Bit</th></tr>
<tr><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>D9224</td><td>L/R
16</td><td>L/R
15</td><td>L/R
14</td><td>L/R
13</td><td>L/R
12</td><td>L/R
11</td><td>L/R
10</td><td>L/R
9</td><td>L/R
8</td><td>L/R
7</td><td>L/R
6</td><td>L/R
5</td><td>L/R
4</td><td>L/R
3</td><td>L/R
2</td><td>L/R
1</td></tr>
<tr><td>D9225</td><td>L/R
32</td><td>L/R
31</td><td>L/R
30</td><td>L/R
29</td><td>L/R
28</td><td>L/R
27</td><td>L/R
26</td><td>L/R
25</td><td>L/R
24</td><td>L/R
23</td><td>L/R
22</td><td>L/R
21</td><td>L/R
20</td><td>L/R
19</td><td>L/R
18</td><td>L/R
17</td></tr>
<tr><td>D9226</td><td>L/R
48</td><td>L/R
47</td><td>L/R
46</td><td>L/R
45</td><td>L/R
44</td><td>L/R
43</td><td>L/R
42</td><td>L/R
41</td><td>L/R
40</td><td>L/R
39</td><td>L/R
38</td><td>L/R
37</td><td>L/R
36</td><td>L/R
35</td><td>L/R
34</td><td>L/R
33</td></tr>
<tr><td>D9227</td><td>L/R
64</td><td>L/R
63</td><td>L/R
62</td><td>L/R
61</td><td>L/R
60</td><td>L/R
59</td><td>L/R
58</td><td>L/R
57</td><td>L/R
56</td><td>L/R
55</td><td>L/R
54</td><td>L/R
53</td><td>L/R
52</td><td>L/R
51</td><td>L/R
50</td><td>L/R
49</td></tr>
</table>

- When a local station or a remote I/O station is communicating initial setting data (link parameters), the bit corresponding to the station numberm is set.
  Example:
  When station 23 and station 45 are communicating initial setting data (link parameters), "1" is set to bit 6 of D9225 and bit 12 of D9226. When D9225 is monitored, its value is "64 (40H)" and when D9226 is monitored, its value is "4096 (1000H)".
- When the communication of initial setting data is complete, the bit is automatically reset to "0".

</td></tr>
<tr><td>D9225</td><td>Stores the status of station 17 to station 32</td></tr>
<tr><td>D9226</td><td>Stores the status of station 33 to station 48</td></tr>
<tr><td>D9227</td><td>Stores the status of station 49 to station 64</td></tr>
<tr><td>D9228</td><td rowspan="4">Local station or remote I/O station error</td><td>Stores the status of station 1 to station 16</td><td rowspan="4">

- Stores the number of the station (local station or remote I/O station) in the data link that is determined by the master station to be faulty.
- A station is determined to be faulty if the data returned from it to the master station is not received within the specified length of time.

<table>
<tr><th rowspan="2">DEVICE NUMBER</th><th colspan="16">Bit</th></tr>
<tr><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>D9228</td><td>L/R
16</td><td>L/R
15</td><td>L/R
14</td><td>L/R
13</td><td>L/R
12</td><td>L/R
11</td><td>L/R
10</td><td>L/R
9</td><td>L/R
8</td><td>L/R
7</td><td>L/R
6</td><td>L/R
5</td><td>L/R
4</td><td>L/R
3</td><td>L/R
2</td><td>L/R
1</td></tr>
<tr><td>D9229</td><td>L/R
32</td><td>L/R
31</td><td>L/R
30</td><td>L/R
29</td><td>L/R
28</td><td>L/R
27</td><td>L/R
26</td><td>L/R
25</td><td>L/R
24</td><td>L/R
23</td><td>L/R
22</td><td>L/R
21</td><td>L/R
20</td><td>L/R
19</td><td>L/R
18</td><td>L/R
17</td></tr>
<tr><td>D9230</td><td>L/R
48</td><td>L/R
47</td><td>L/R
46</td><td>L/R
45</td><td>L/R
44</td><td>L/R
43</td><td>L/R
42</td><td>L/R
41</td><td>L/R
40</td><td>L/R
39</td><td>L/R
38</td><td>L/R
37</td><td>L/R
36</td><td>L/R
35</td><td>L/R
34</td><td>L/R
33</td></tr>
<tr><td>D9231</td><td>L/R
64</td><td>L/R
63</td><td>L/R
62</td><td>L/R
61</td><td>L/R
60</td><td>L/R
59</td><td>L/R
58</td><td>L/R
57</td><td>L/R
56</td><td>L/R
55</td><td>L/R
54</td><td>L/R
53</td><td>L/R
52</td><td>L/R
51</td><td>L/R
50</td><td>L/R
49</td></tr>
</table>

- When data is not received within the specified length of time, the bit corresponding to the station number of the local station is set.
  Example:
  When an error at station 3 causes it to fail to return the data to the master station, "1" is set for bit 2 of D9228. When D9228 is monitored, its value is "4".
- When the loop line becomes faulty, "1" is set for the bits if the stations downstream the faulty point or for all local stations.
- When the master station becomes faulty or the setting for the watchdog timer is too small, "1" is set for the bits corresponding to all local stations.
- When the faulty station recovers normal operating status or when the loop line is switched so that the data link returns to normal operating status, the bit is automatically reset to "0".

</td></tr>
<tr><td>D9229</td><td>Stores the status of station 17 to station 32</td></tr>
<tr><td>D9230</td><td>Stores the status of station 33 to station 48</td></tr>
<tr><td>D9231</td><td>Stores the status of station 49 to station 64</td></tr>
</table>

Table 9.5 MELSECNET Data Link Special Link Registers (Continued)

<table>
<tr><th>Device Number</th><th>Name</th><th>Data</th><th>Description</th></tr>
<tr><td>D9232</td><td rowspan="8">Local station or remote I/O station loop error</td><td>Stores the status of station 1 to station 8</td><td rowspan="8">

- Stores the station number of the local and remote I/O stations at which an error is detected in the forward loop line or reverse loop line.

<table>
<tr><th rowspan="2">DEVICE NUMBER</th><th colspan="16">Bit</th></tr>
<tr><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 rowspan="2">D9232</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td></tr>
<tr><td colspan="2">L/R 8</td><td colspan="2">L/R 7</td><td colspan="2">L/R 6</td><td colspan="2">L/R 5</td><td colspan="2">L/R 4</td><td colspan="2">L/R 3</td><td colspan="2">L/R 2</td><td colspan="2">L/R 1</td></tr>
<tr><td rowspan="2">D9233</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td></tr>
<tr><td colspan="2">L/R 16</td><td colspan="2">L/R 15</td><td colspan="2">L/R 14</td><td colspan="2">L/R 13</td><td colspan="2">L/R 12</td><td colspan="2">L/R 11</td><td colspan="2">L/R 10</td><td colspan="2">L/R 9</td></tr>
<tr><td rowspan="2">D9234</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td></tr>
<tr><td colspan="2">L/R 24</td><td colspan="2">L/R 23</td><td colspan="2">L/R 22</td><td colspan="2">L/R 21</td><td colspan="2">L/R 20</td><td colspan="2">L/R 19</td><td colspan="2">L/R 18</td><td colspan="2">L/R 17</td></tr>
<tr><td rowspan="2">D9235</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td></tr>
<tr><td colspan="2">L/R 32</td><td colspan="2">L/R 31</td><td colspan="2">L/R 30</td><td colspan="2">L/R 29</td><td colspan="2">L/R 28</td><td colspan="2">L/R 27</td><td colspan="2">L/R 26</td><td colspan="2">L/R 25</td></tr>
<tr><td rowspan="2">D9236</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td></tr>
<tr><td colspan="2">L/R 40</td><td colspan="2">L/R 39</td><td colspan="2">L/R 38</td><td colspan="2">L/R 37</td><td colspan="2">L/R 36</td><td colspan="2">L/R 35</td><td colspan="2">L/R 34</td><td colspan="2">L/R 33</td></tr>
<tr><td rowspan="2">D9237</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td></tr>
<tr><td colspan="2">L/R 48</td><td colspan="2">L/R 47</td><td colspan="2">L/R 46</td><td colspan="2">L/R 45</td><td colspan="2">L/R 44</td><td colspan="2">L/R 43</td><td colspan="2">L/R 42</td><td colspan="2">L/R 41</td></tr>
<tr><td rowspan="2">D9238</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td></tr>
<tr><td colspan="2">L/R 56</td><td colspan="2">L/R 55</td><td colspan="2">L/R 54</td><td colspan="2">L/R 53</td><td colspan="2">L/R 52</td><td colspan="2">L/R 51</td><td colspan="2">L/R 50</td><td colspan="2">L/R 49</td></tr>
<tr><td rowspan="2">D9239</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td><td>R</td><td>F</td></tr>
<tr><td colspan="2">L/R 64</td><td colspan="2">L/R 63</td><td colspan="2">L/R 62</td><td colspan="2">L/R 61</td><td colspan="2">L/R 60</td><td colspan="2">L/R 59</td><td colspan="2">L/R 58</td><td colspan="2">L/R 57</td></tr>
</table>

F: Forward loop line
R: Reverse loop line

- When an error is detected at a local station and/or remote I/O station in the forward loop line or the reverse loop line, the corresponding bit is set.

Example:
When an error is detected in the forward loop line at station 5, "1" is set for bit 8 of D9232. When D9232 is monitored, its value is "256 (100H)".

This error will have been caused by one of the following:

(a) A faulty connection of the forward loop cable connecting station 4 and station 5

(b) A fault of the forward loop receive end of data link module in station 5

(c) A fault of the forward loop send end of data link module in station 4

- With errors other than loop line errors, such as hardware errors and data communication errors, only the error involved with the loop line currently being used will be detected. The error status is retained.
- When data link is executed again with the loop line in which an error was detected, the bit data is automatically reset to "0" provided that the fault has been removed.

</td></tr>
<tr><td>D9233</td><td>Stores the status of station 9 to station 16</td></tr>
<tr><td>D9234</td><td>Stores the status of station 17 to station 24</td></tr>
<tr><td>D9235</td><td>Stores the status of station 25 to station 32</td></tr>
<tr><td>D9236</td><td>Stores the status of station 33 to station 40</td></tr>
<tr><td>D9237</td><td>Stores the status of station 41 to station 48</td></tr>
<tr><td>D9238</td><td>Stores the status of station 49 to station 56</td></tr>
<tr><td>D9239</td><td>Stores the status of station 57 to station 64</td></tr>
<tr><td>D9240</td><td>Receive error detection count</td><td>Stores the total number of receive error occurrences</td><td>

- Stores the number of times that the following errors are detected in the loop line currently being used:

CRC, AB.IF, OVER

- Counting stops if the number of receive error occurrences exceeds the maximum limit "FFFF_H".
- Execute the reset operation to clear the data to "0".

</td></tr>
</table>

Table 9.6 MELSECNET/B Data Link Special Link Registers

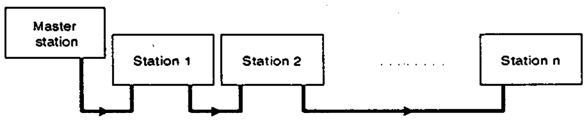
<table>
<tr><th>Device Number</th><th>Name</th><th>Data</th><th>Description</th></tr>
<tr><td>D9200</td><td>LRDP execution result</td><td>0 : Normal
2 : LRDP instruction setting fault
3 : Corresponding station error</td><td>Stores the execution result of an LRDP (word device read) instruction (M9201 ON).
• LRDP instruction setting fault:
Faulty setting of the LRDP instruction constant, source, and/or target.
• Corresponding station error:
The designated station is not executing data link processing.</td></tr>
<tr><td>D9201</td><td>LWTP execution result</td><td>0 : Normal
2 : LWTP instruction setting fault
3 : Corresponding station error</td><td>Stores the execution result of an LWTP (word device write) instruction (M9203 ON).
• LWTP instruction setting fault:
Faulty setting of the LWTP instruction constant, source, and/or target.
• Corresponding station error:
The designated station is not executing data link processing.</td></tr>
<tr><td>D9202</td><td rowspan="2">Local station link type</td><td>Stores the status of station 1 to station 16</td><td rowspan="2">Stores whether a slave station is compatible with the MELSECNET mode or MELSECNET II mode.
• MELSECNET II-compatible station : "1"
• MELSECNET-compatible station : "0"
<table>
<tr><th rowspan="2">DEVICE NUMBER</th><th colspan="16">Bit</th></tr>
<tr><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>D9202</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>D9203</td><td>0</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>
</table></td></tr>
<tr><td>D9203</td><td>Stores the status of station 17 to station 31</td></tr>
<tr><td>D9204</td><td>Link status</td><td>0 : Data link
5 : Data link impossible</td><td>Stores the current path of the data link.
(1) Forward loop

• "5" is stored because the watchdog timer setting is too small.
• The data in D9204 is updated each time the link status changes.</td></tr>
</table>

Table 9.6 MELSECNET/B Data Link Special Link Registers (Continued)

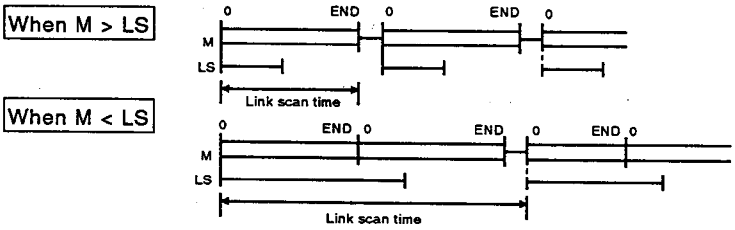
Device Number	Name	Data	Description
D9207	Link scan time	Maximum value	• Stores the time used for data link processing (link scan time) by all of the local stations and remote I/O stations in the loop currently being used for data link. • Link scan time definition:  M : Sequence program scan time by master station LS : Link scan time (data link processing)
D9208		Minimum value	
D9209		Current value	
D9210	Retry count	Total number stored	• Stores the total number of retries conducted when a transmission error occurs. • Definition of retry processing: If data is lost or becomes unreliable due to the occurrence of a data transmission processing error, the same data is sent again. • Counting stops if the number of retries exceeds the maximum limit "FFFF$_H$". • Execute reset operation to clear the data to "0".

Table 9.6 MELSECNET/B Data Link Special Link Registers (Continued)

<table>
<tr><th>Device Number</th><th>Name</th><th>Data</th><th>Description</th></tr>
<tr><td>D9212</td><td rowspan="2">Local station operation status</td><td>Stores the status of station 1 to station 16</td><td rowspan="2">• Stores the status of all local stations that are in STOP or PAUSE.
<table>
<tr><th rowspan="2">DEVICE NUMBER</th><th colspan="16">Bit</th></tr>
<tr><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>D9212</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>D9213</td><td>0</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>
</table>
• When the status of a local station changes to STOP or PAUSE, the corresponding bit is set.
Example:
When the operation status of station 7 changes to the STOP, state, 1 is set to bit 6 of D9212. When D9212 is monitored, its value is 64 (40H).</td></tr>
<tr><td>D9213</td><td>Stores the status of station 17 to station 31</td></tr>
<tr><td>D9216</td><td rowspan="2">Local station error detection</td><td>Stores the status of station 1 to station 16</td><td rowspan="2">• Stores the numbers of the station that detect the occurrence of an error at another station.
<table>
<tr><th rowspan="2">DEVICE NUMBER</th><th colspan="16">Bit</th></tr>
<tr><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>D9216</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>D9217</td><td>0</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>
</table>
• When a normally operating local station detects an error at another local station, the bit corresponding to the normally operating station is set. The bit status of remote I/O station always remains "0".
Example:
When station 5 detects that station 4 is faulty, "1" is set to bit 4 of D9216. When D9216 is monitored, its value is "16 (10H)".
• When the faulty station recovers normal operating status or when the loop line is switched so that the data link returns to normal operating status, the bit is automatically reset to "0".</td></tr>
<tr><td>D9217</td><td>Stores the status of station 17 to station 31</td></tr>
<tr><td>D9220</td><td rowspan="2">Local station parameter mismatched or remote I/O station input/output allocation error</td><td>Stores the status of station 1 to station 16</td><td rowspan="2">• Stores the numbers of the stations at which a link parameter error sent from the master station is detected by another local or remote I/O station.
<table>
<tr><th rowspan="2">DEVICE NUMBER</th><th colspan="16">Bit</th></tr>
<tr><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>D9220</td><td>L/R 16</td><td>L/R 15</td><td>L/R 14</td><td>L/R 13</td><td>L/R 12</td><td>L/R 11</td><td>L/R 10</td><td>L/R 9</td><td>L/R 8</td><td>L/R 7</td><td>L/R 6</td><td>L/R 5</td><td>L/R 4</td><td>L/R 3</td><td>L/R 2</td><td>L/R 1</td></tr>
<tr><td>D9221</td><td>L/R 0</td><td>L/R 31</td><td>L/R 30</td><td>L/R 29</td><td>L/R 28</td><td>L/R 27</td><td>L/R 26</td><td>L/R 25</td><td>L/R 24</td><td>L/R 23</td><td>L/R 22</td><td>L/R 21</td><td>L/R 20</td><td>L/R 19</td><td>L/R 18</td><td>L/R 17</td></tr>
</table>
• When the link parameter settings is corrected and the status of the master station is switched from STOP to RUN, the bit is automatically reset to "0".</td></tr>
<tr><td>D9221</td><td>Stores the status of station 17 to station 31</td></tr>
</table>

Table 9.6 MELSECNET/B Data Link Special Link Registers (Continued)

<table>
<tr><th>Device Number</th><th>Name</th><th>Data</th><th>Description</th></tr>
<tr><td>D9224</td><td rowspan="2">Initial communication between local stations/ remote I/O stations</td><td>Stores the status of station 1 to station 16</td><td rowspan="2">• Stores the number of the local stations/remote I/O stations communicating initial setting data (link parameters)
<table>
<tr><th rowspan="2">DEVICE NUMBER</th><th colspan="16">Bit</th></tr>
<tr><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>D9224</td><td>L/R16</td><td>L/R15</td><td>L/R14</td><td>L/R13</td><td>L/R12</td><td>L/R11</td><td>L/R10</td><td>L/R9</td><td>L/R8</td><td>L/R7</td><td>L/R6</td><td>L/R5</td><td>L/R4</td><td>L/R3</td><td>L/R2</td><td>L/R1</td></tr>
<tr><td>D9225</td><td>0</td><td>L/R31</td><td>L/R30</td><td>L/R29</td><td>L/R28</td><td>L/R27</td><td>L/R26</td><td>L/R25</td><td>L/R24</td><td>L/R23</td><td>L/R22</td><td>L/R21</td><td>L/R20</td><td>L/R19</td><td>L/R18</td><td>L/R17</td></tr>
</table>
• When a local stations/remote I/O stations is communicating initial setting data (link parameters), the bit corresponding to the station numberm is set.
Example:
When station 23 is communicating initial setting data (link parameters), 1 is set to bit 6 of D9225.
When D9225 is monitored, its value is 64 (40_H).
• When the initial setting data has been communicated, the bit is automatically reset to "0".</td></tr>
<tr><td>D9225</td><td>Stores the status of station 17 to station 31</td></tr>
<tr><td>D9228</td><td rowspan="2">Local station/ remote I/O station error</td><td>Stores the status of station 1 to station 16</td><td rowspan="2">• Stores the number of the local stations/remote I/O stations in the data link that is determined by a master station to be faulty.
• A station is determined to be faulty if the data returned from it to the master station is not received within the specified length of time.
<table>
<tr><th rowspan="2">DEVICE NUMBER</th><th colspan="16">Bit</th></tr>
<tr><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>D9228</td><td>L/R16</td><td>L/R15</td><td>L/R14</td><td>L/R13</td><td>L/R12</td><td>L/R11</td><td>L/R10</td><td>L/R9</td><td>L/R8</td><td>L/R7</td><td>L/R6</td><td>L/R5</td><td>L/R4</td><td>L/R3</td><td>L/R2</td><td>L/R1</td></tr>
<tr><td>D9229</td><td>0</td><td>L/R31</td><td>L/R30</td><td>L/R29</td><td>L/R28</td><td>L/R27</td><td>L/R26</td><td>L/R25</td><td>L/R24</td><td>L/R23</td><td>L/R22</td><td>L/R21</td><td>L/R20</td><td>L/R19</td><td>L/R18</td><td>L/R17</td></tr>
</table>
• When data is not received within the specified length of time, the bit corresponding to the station number of the local station/remote I/O station is set.
Example:
When an error at station 3 causes it to fail to return the data to the master station, "1" is set for bit 2 of D9228.
When D9228 is monitored, its value is "4".
• When the loop line becomes faulty, "1" is set for the bits of the stations after the fault or for all local stations/remote I/O stations.
• When the master station becomes faulty or the setting for the watchdog timer is too small, "1" is set for the bits corresponding to all local stations/remote I/O stations.
• When a master station becomes fauly or the setting for the watching timer is too small, 1 is set for the bits corresponding to all local stations/remote I/O stations.
• when the faulty station returns to nomal, the bit is automatically reset to "0".</td></tr>
<tr><td>D9229</td><td>Stores the status of station 17 to station 31</td></tr>
<tr><td>D9240</td><td>Receive error detection count</td><td>Stores the total number of receive errors</td><td>• Stores the number of times that the following errors are detected in the loop line currently being used:
CRC, AB.IF, OVER
• Counting stops if the number of receive error occurrences exceeds the maximum limit "$FFFF_H$".
• Execute the reset operation to clear the data to "0".</td></tr>
</table>

9.3.2 Special link registers effective only for local stations

Table 9.7 MELSECNET Data Link Special Link Registers

<table>
<tr><th>Device Number</th><th>Name</th><th>Data</th><th>Description</th></tr>
<tr><td>D9243</td><td>Station number data of the station itself</td><td>Stores a station number (0 to 64)</td><td>• Stores the station number assigned to the local station itself.
• Used by a local station to check its own station number.</td></tr>
<tr><td>D9244</td><td>Slave station number data</td><td>Stores a slave station number</td><td>• Used by a local station to check the total number of slave stations in the loop.</td></tr>
<tr><td>D9245</td><td>Receive error detection count</td><td>Stores the total number of receive error occurrences</td><td>• Stores the number of times that the following errors are detected in the loop line currently being used:
CRC, AB.IF, OVER
• Counting stops if the number of receive error occurrences exceeds the maximum limit "FFFFH".
• Execute the reset operation to clear the data to "0".</td></tr>
<tr><td>D9248</td><td rowspan="4">Local station operating status</td><td>Stores the status of station 1 to station 16</td><td rowspan="4">• Stores the number of the local stations, excluding the station itself, whose status is either STOP or PAUSE.
<table>
<tr><th rowspan="2">DEVICE NUMBER</th><th colspan="16">Bit</th></tr>
<tr><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>D9248</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>D9249</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>D9250</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>D9251</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>
• When the status of a local station is either STOP or PAUSE, the corresponding bits are set. When the status of the local station changes to RUN or STEP RUN, the bit is automatically reset to "0". The bit status of remote I/O station always remains "0".
Example:
"When the statuses of local station 7 and local station 15 are either STOP or PAUSE, "1" is set to bit 6 and bit 14 of D9248. When D9248 is monitored, its value is "16448 (4040H)".
• The bit corresponding to the station itself is not set regardless of the status of the station itself.</td></tr>
<tr><td>D9249</td><td>Stores the status of station 17 to station 32</td></tr>
<tr><td>D9250</td><td>Stores the status of station 33 to station 48</td></tr>
<tr><td>D9251</td><td>Stores the status of station 49 to station 64</td></tr>
<tr><td>D9252</td><td rowspan="4">Local station error status</td><td>Stores the status of station 1 to station 16</td><td rowspan="4">• Stores the number of the local station in the loop at which a fault is detected.
• Only a faulty local station can be detected by another local station. The bit status of remote I/O station always remains "0".
<table>
<tr><th rowspan="2">DEVICE NUMBER</th><th colspan="16">Bit</th></tr>
<tr><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>
• Only a faulty local station can be detected by another local station. The bit status of remote I/O station always remains "0".
• When a fault is detected at a local station (other than the station itself) the corresponding bit is set.
Example:
When local station 12 is faulty, "1" is set to bit 11 of D9252. When D9252 is monitored, its value is "2048 (500H)".
• When the faulty station recovers normal operating status or when the loop line is switched so that the data link returns to normal operating status, the bit is automatically reset to "0".</td></tr>
<tr><td>D9253</td><td>Stores the status of station 17 to station 32</td></tr>
<tr><td>D9254</td><td>Stores the status of station 33 to station 48</td></tr>
<tr><td>D9255</td><td>Stores the status of station 49 to station 64</td></tr>
</table>

Table 9.8 MELSECNET Data Link Special Link Registers

<table>
<tr><th>Device Number</th><th>Name</th><th>Data</th><th>Description</th></tr>
<tr><td>D9243</td><td>Station number data of the station itself</td><td>Stores a station number (0 to 64)</td><td>• Stores the station number assigned to the local station itself.
• Used by a local station to check its own station number.</td></tr>
<tr><td>D9244</td><td>Slave station number data</td><td>Stores a slave station number</td><td>• Used by a local station to check the total number of slave stations in the loop.</td></tr>
<tr><td>D9245</td><td>Receive error detection count</td><td>Stores the total number of receive errors</td><td>• Stores the number of times that the following errors are detected in the loop line currently being used:
CRC, AB.IF, OVER
• Counting stops if the number of receive error occurrences exceeds the maximum limit "FFFFH".
• Execute the reset operation to clear the data to "0".</td></tr>
<tr><td>D9248</td><td rowspan="2">Local station operating status</td><td>Stores the status of station 1 to station 16</td><td rowspan="2">• Stores the number of the local stations, excluding the station itself, whose status is either STOP or PAUSE.
<table>
<tr><th rowspan="2">DEVICE NUMBER</th><th colspan="16">Bit</th></tr>
<tr><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>D9248</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>D9249</td><td>0</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>
</table>
• When the status of a local station is either STOP or PAUSE, the corresponding bits are set. When the status of the local station changes to RUN or STEP RUN, the bit is automatically reset to "0". The bit status of remote I/O station always remains "0".
Example:
"When the statuses of local station 7 and local station 15 are either STOP or PAUSE, "1" is set to bit 6 and bit 14 of D9248. When D9248 is monitored, its value is "16448 (4040H)".
• The bit corresponding to the station itself is not set regardless of the status of the station itself.</td></tr>
<tr><td>D9249</td><td>Stores the status of station 17 to station 31</td></tr>
<tr><td>D9252</td><td rowspan="2">Local station error status</td><td>Stores the status of station 1 to station 16</td><td rowspan="2">• Stores the number of the local station in the loop at which a fault is detected.
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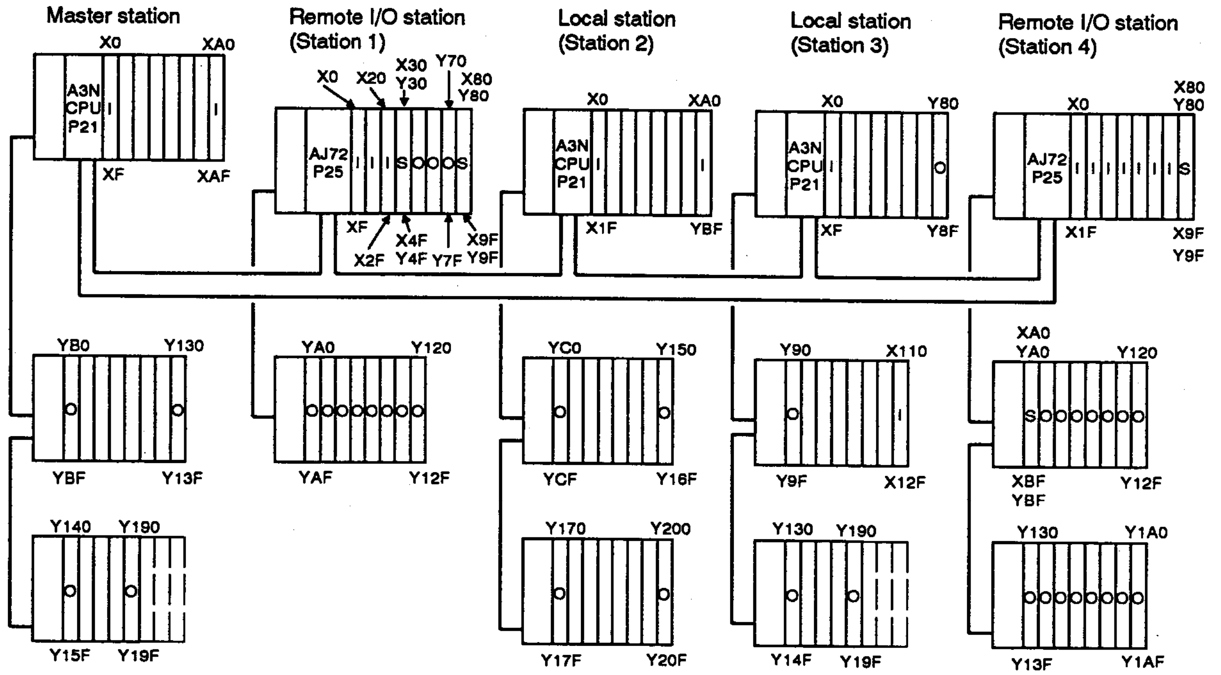
<table>
<tr><th rowspan="2">DEVICE NUMBER</th><th colspan="16">Bit</th></tr>
<tr><th>b15</th><th>b14</th><th>b13</th><th>b12</th><th>b11</th><th>b10</th><th>b9</th><th>b8</th><th>b7</th><th>b6</th><th>b5</th><th>b4</th><th>b3</th><th>b2</th><th>b1</th><th>b0</th></tr>
<tr><td>D9252</td><td>L16</td><td>L15</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>0</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>
</table>
• When a fault is detected at a local station (other than the station itself) the corresponding bit is set.
Example:
When local station 12 is faulty, "1" is set to bit 11 of D9252. When D9252 is monitored, its value is "2048 (500H)".
• When the faulty station recovers normal operating status or when the loop line is switched so that the data link returns to normal operating status, the bit is automatically reset to "0".</td></tr>
<tr><td>D9253</td><td>Stores the status of station 17 to station 31</td></tr>
</table>

9.4 Data Link Program Using Inputs (X) and Outputs (Y)

This section explains a programming method for data link between the master station and local station and between the master station and remote I/O station using link inputs (X) and link outputs (Y).

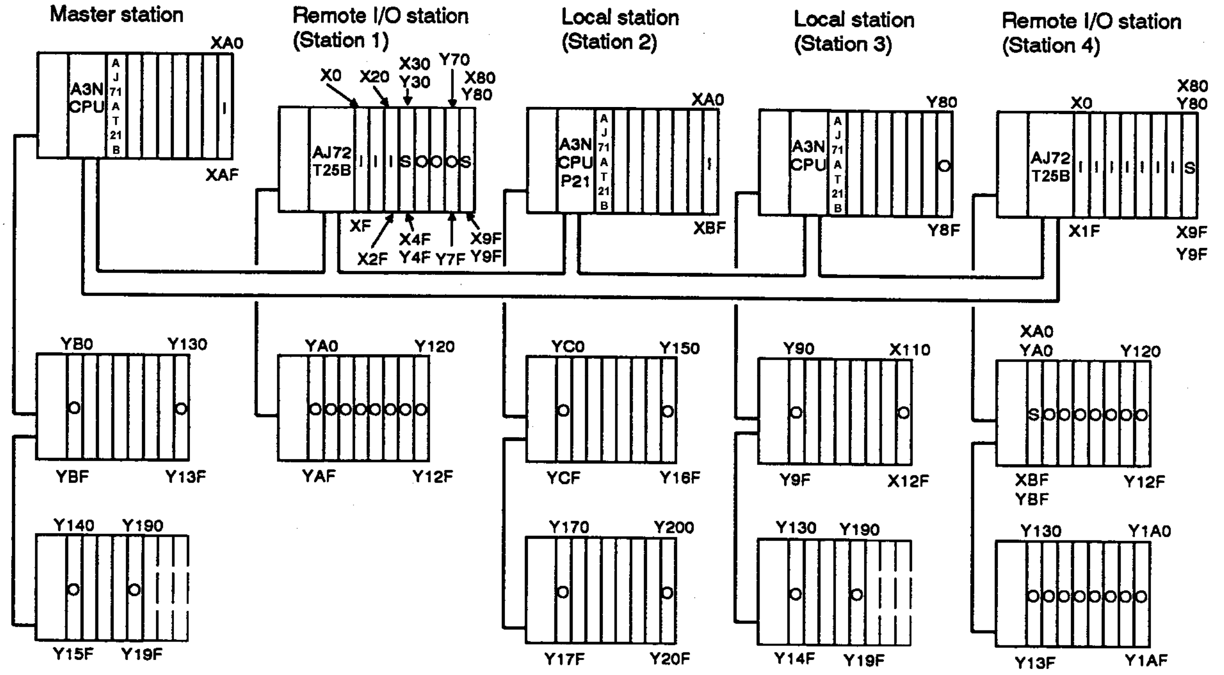
[System configuration]

[For MELSECNET data link system]



I : Input module
O : Output module
S : Special function module

[For MELSECNET/B data link system]



I : Input module
O : Output module
S : Special function module

Fig. 9.1 System Configuration

[Link device allocation]

* LINK *

MASTER	SLAVE PC STATIONS	M → ALL L		W.D.T. FOR LINK 10ms	INTER-MITTENT 10ms
		B	W		
M	4	000-05F	000-083	20	XXXX

M : B	↔	ALL	L : B	000-15F
M : W	↔	ALL	L : W	000-186
M : W	→	ALL	R : W	200-294
M : W	←	ALL	R : W	300-3C1
M : Y	→	ALL	L : X	260-47F
M : Y	→	ALL	R : Y	580-7FF
M : X	←	ALL	L : Y	1A0-3BF
M : X	←	ALL	R : X	500-76F

L/R NO.	M ← L		M → R	M ← R	M → L/R1		M ← L/R	
	B	W	W	W	Y	X/Y	X	Y/X
R 1	-------	-------	200-23F	300-33F	700-7FF	030-12F	6D0-76F	000-09F
L 2	060-18F	0A0-0FF	-------	-------	390-47F	250-33F	1A0-25F	210-2CF
L 3	0E0-15F	100-186	-------	-------	260-36F	1B0-2BF	2A0-3BF	300-41F
R 4	-------	-------	250-294	340-3C1	580-6AF	080-1AF	500-5BF	000-0BF
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-

↑
L : LOCAL
R : REMOTE

M : MASTER L : LOCAL R : REMOTE

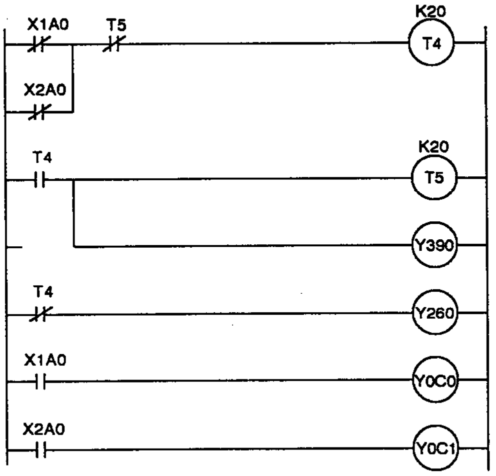
Fig. 9.2 Link Device Allocation

[Program example 1] ..... Data link between the master station and a local station

Master station program

To turn Y260 (X1B0 of local station 3) ON when the T4 contact is OFF and to turn Y390 (X250 of local station 2) ON when the T4 contact is ON.

To turn YC0 ON when X1A0 (Y210 of local station 2) is ON, and to turn YC1 ON when X2A0 (Y300 of local station 3) ON.



Turns the T4 contact ON/OFF every 2 seconds. The ON/OFF cycle stops when both X1A0 and X2A0 are ON.

Turns Y390 ON when the T4 contact is ON.

Turns Y260 ON when the T4 contact is OFF.

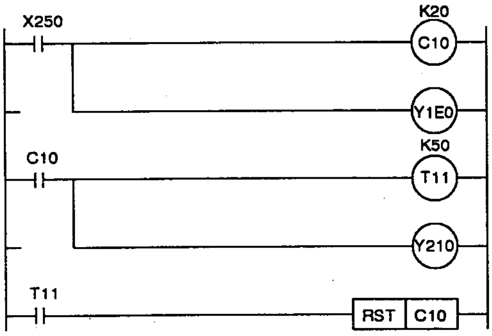
Turns YC0 ON when X1A0 is ON.

Turns YC1 ON when X2A0 is ON.

Local station 2 program

To turn Y1E0 ON when X250 (Y390 of the master station) is ON.

To turn Y210 (X1A0 of the master station) ON when X250 is turned from OFF to ON 20 times.



Counts the times that X250 is turned from OFF to ON with C10.

Turns Y1E0 ON when X250 is ON.

T11 times out 5 seconds after C10 counts out.

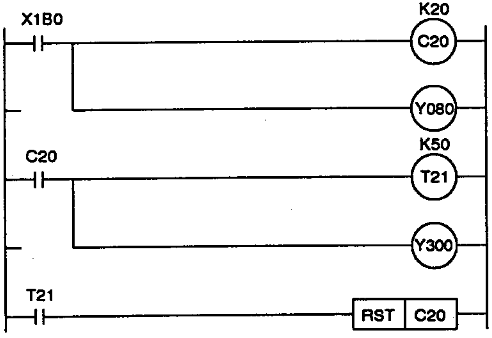
Turns Y210 ON when C11 counts out.

Resets C10 when T11 times out.

Local station 3 program

To turn Y80 ON when X1B0 (Y260 of the master station) is ON.

To turn Y300 (X2A0 of the master station) ON when X1B0 is turned from OFF to ON 20 times.



Counts the times that X1B0 is turned from OFF to ON with C20.

Turns Y80 ON when X1B0 is ON.

T21 times out 5 seconds after C20 counts out.

Turns Y300 ON when C20 counts out.

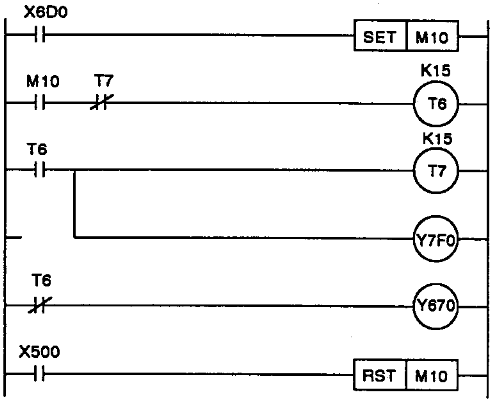
Resets C20 when T21 times out.

[Program example 2]

Master station program

To flash Y120 (Y7F0 of the master station) of remote I/O station 1 and to flash Y170 (Y670 of the master station) of remote I/O station 4 at intervals of 1 second by turning X0 (X6D0 of master station) of remote I/O station 1 ON.

Flashing stops when X0 (X500 of the master station) of remote I/O station 4 is turned ON.



Stores when X6D0 (X0 of remote I/O station 1) is turned ON.

Turns the T6 contact ON/OFF in intervals of 1.5 seconds when M10 is ON.

Turns Y7F0 (Y120 of remote I/O station 4) ON while the T6 contact is ON.

Turns Y670 (Y170 of remote I/O station 1) ON while the T6 contact is OFF.

Turns M10 OFF when X500 (X0 of remote I/O station 4) is turned ON.

9.5 Data Link Program Using Link Relays (B)

The following shows a program with which "Y140" of the master station, "YC0" of the local station No. 2, and "Y70" of the local station No. 3 are turned on by link relays in order.

[System configuration]

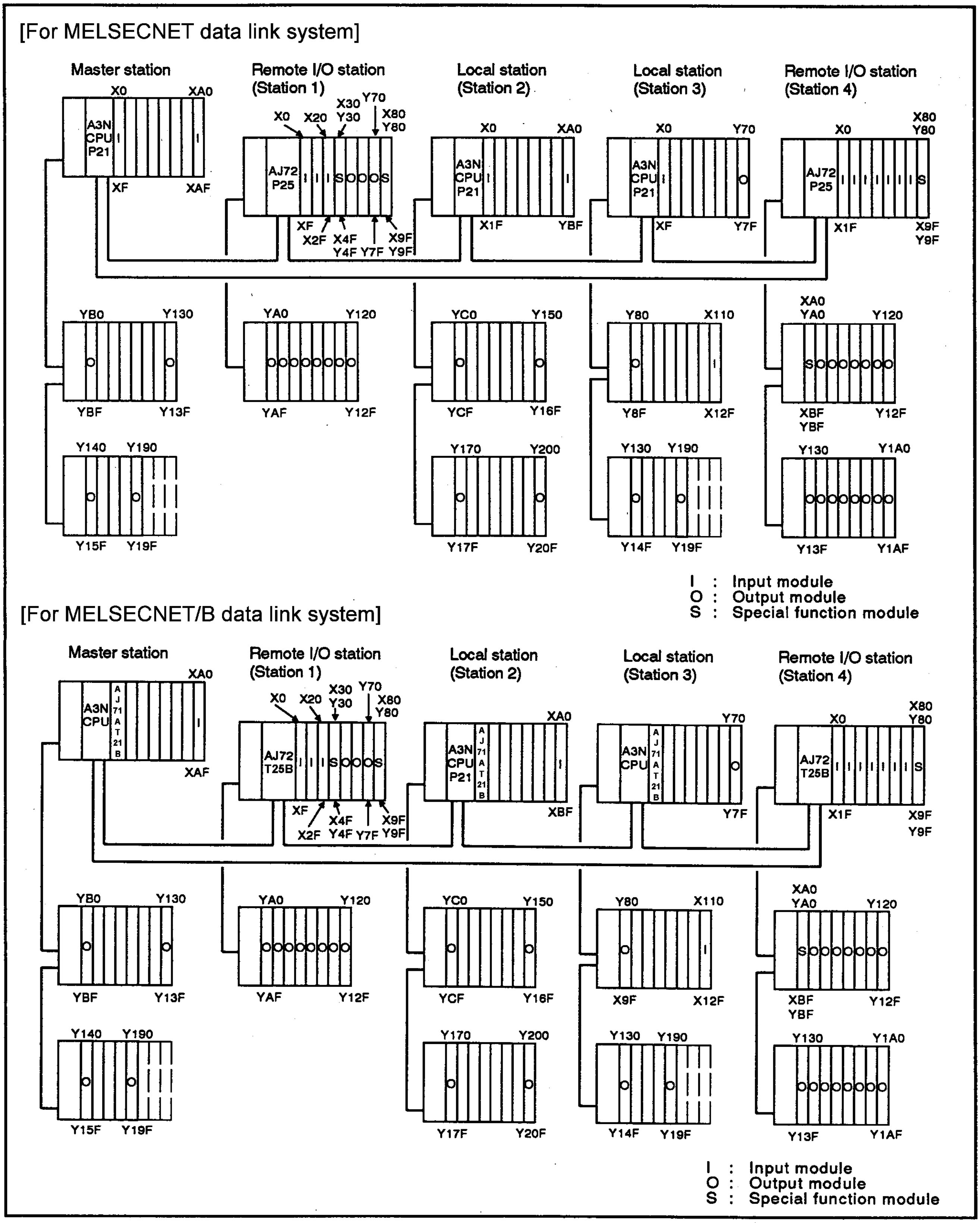


Fig. 9.5 System Configuration

[Link device allocation]

* LINK *

MASTER	SLAVE PC STATIONS	M → ALL L		W.D.T. FOR LINK 10ms	INTER-MITTENT 10ms
		B	W		
M	4	000-05F	000-083	20	XXXX

M : B	↔	ALL	L : B	000-15F
M : W	↔	ALL	L : W	000-186
M : W	→	ALL	R : W	200-294
M : W	←	ALL	R : W	300-3C1
M : Y	→	ALL	L : X	260-47F
M : Y	→	ALL	R : Y	580-7FF
M : X	←	ALL	L : Y	1A0-3BF
M : X	←	ALL	R : X	500-76F

L/R NO.	M ← L		M → R	M ← R	M → L/R1		M ← L/R	
	B	W	W	W	Y	X/Y	X	Y/X
R 1	-------	-------	200-23F	300-33F	700-7FF	030-12F	6D0-76F	000-09F
L 2	060-18F	0A0-0FF	-------	-------	390-47F	250-33F	1A0-25F	210-2CF
L 3	0E0-15F	100-186	-------	-------	260-36F	1B0-2BF	2A0-3BF	300-41F
R 4	-------	-------	250-294	340-3C1	580-6AF	080-1AF	500-5BF	000-0BF
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-

↑
L : LOCAL
R : REMOTE

M : MASTER L : LOCAL R : REMOTE

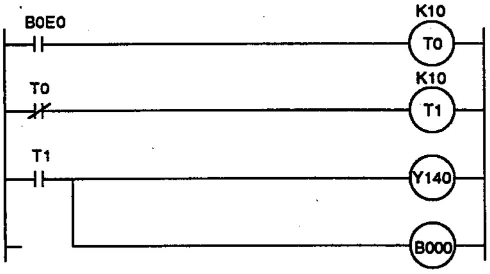
Fig. 9.6 Link Device Allocation

[Program example]

Master station program

To turn Y140 and B0 ON when T1 times out and to turn Y140 and B0 OFF 1 second after BE0 is turned ON.

(B0: Instruction to turn YC0 of local station 2 ON/OFF)



T0 times out 1 second after BE0 is turned ON. (BE0 is turned ON/OFF by local station 3)

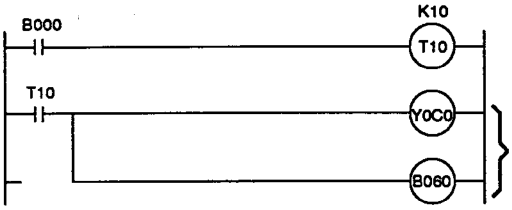
T1 times out 1 second after T0 is turned OFF.

Turns Y140 and B0 ON when T1 times out.

Local station 2 program

To turn YC0 and B60 ON 1 second after B0 of the master station is turned ON.

(B60: Instruction to turn Y70 of local station 3 ON/OFF)



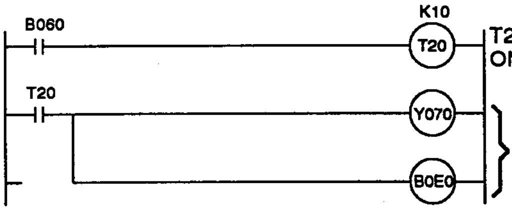
T10 times out 1 second after B0 is turned ON. (B0 is turned ON/OFF by the master station)

Turns YC0 and B60 ON when T10 times out.

Local station 3 program

To turn Y70 and BE0 ON 1 second after B60 of the local station 2 is turned ON, and to turn Y70 and BE0 OFF when B60 is turned OFF.

(BE0: Instruction to turn Y140 and B0 of the master station ON/OFF)



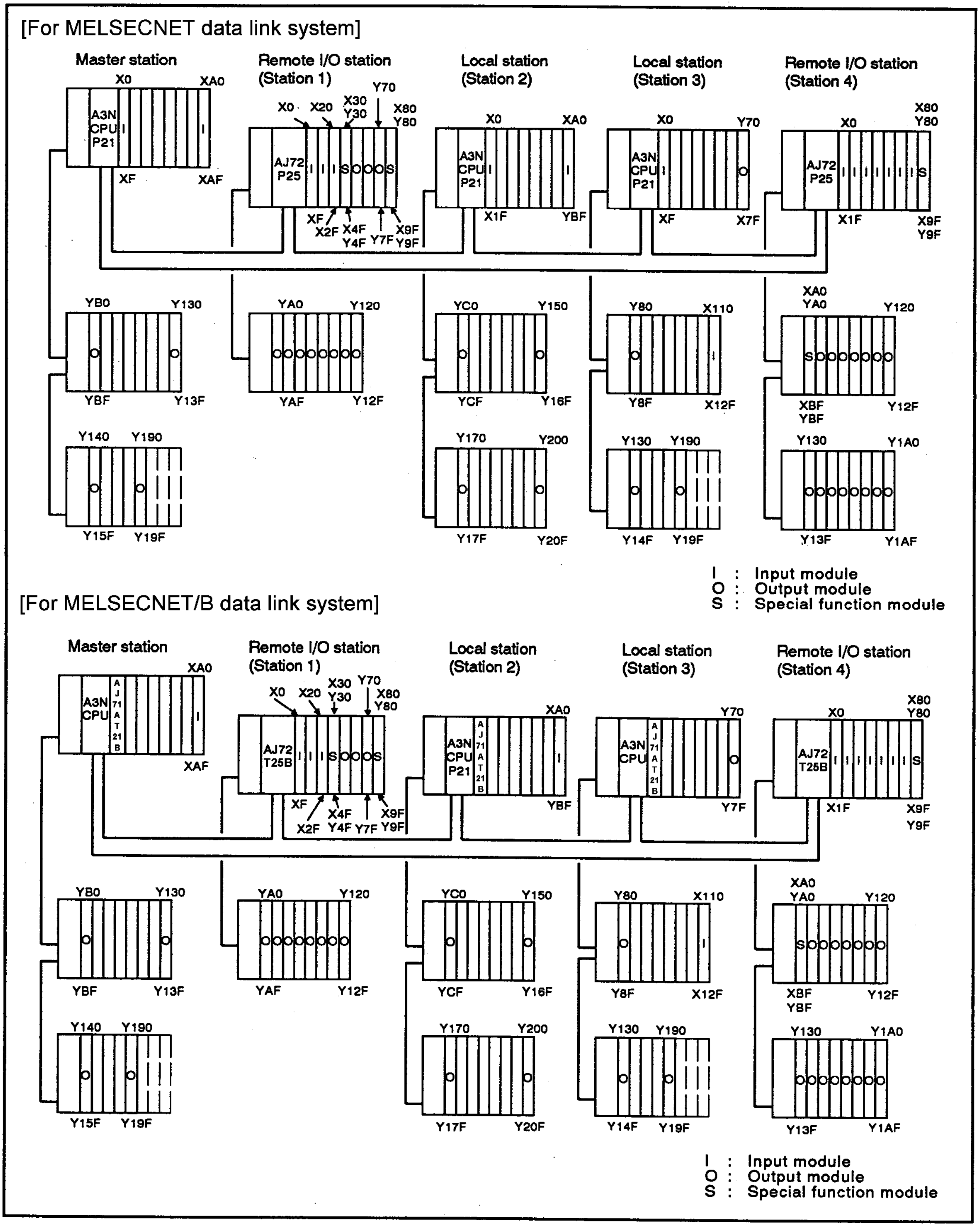
T20 times out 1 second after B60 is turned ON. (B60 is turned ON/OFF by local station 2)

Turns Y70 and BE0 ON when T20 times out.

9.6 Data Link Program Using Link Registers (W)

The following shows a program with which the link register contents (0 to 10) written by the master station are read by the local station No. 2 and "YD0" to "YD2" are turned on/off according to the contents.

[System configuration]


[For MELSECNET data link system]

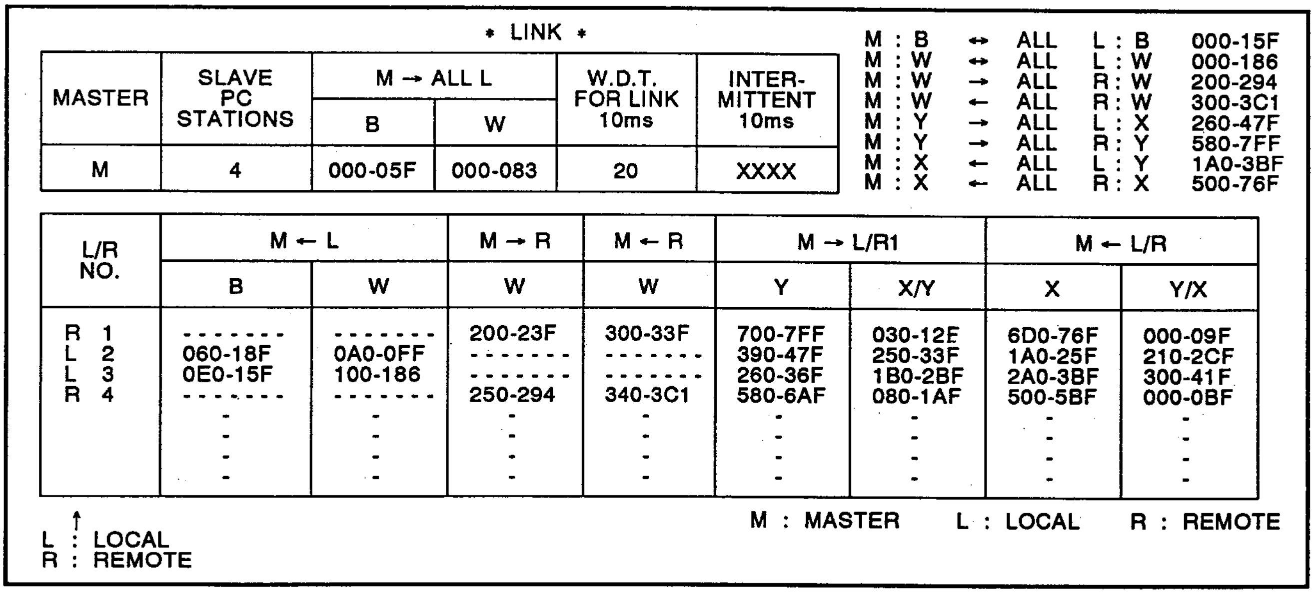
I : Input module
O : Output module
S : Special function module

[For MELSECNET/B data link system]

I : Input module
O : Output module
S : Special function module

Fig. 9.7 System Configuration

[Link device allocation]



* LINK *

MASTER	SLAVE PC STATIONS	M → ALL L		W.D.T. FOR LINK 10ms	INTER-MITTENT 10ms
		B	W		
M	4	000-05F	000-083	20	XXXX

M : B ↔ ALL L : B 000-15F
M : W ↔ ALL L : W 000-186
M : W → ALL R : W 200-294
M : W ← ALL R : W 300-3C1
M : Y → ALL L : X 260-47F
M : Y → ALL R : Y 580-7FF
M : X ← ALL L : Y 1A0-3BF
M : X ← ALL R : X 500-76F

L/R NO.	M ← L		M → R	M ← R	M → L/R1		M ← L/R	
	B	W	W	W	Y	X/Y	X	Y/X
R 1	-------	-------	200-23F	300-33F	700-7FF	030-12F	6D0-76F	000-09F
L 2	060-18F	0A0-0FF	-------	-------	390-47F	250-33F	1A0-25F	210-2CF
L 3	0E0-15F	100-186	-------	-------	260-36F	1B0-2BF	2A0-3BF	300-41F
R 4	-------	-------	250-294	340-3C1	580-6AF	080-1AF	500-5BF	000-0BF
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-

↑
L : LOCAL
R : REMOTE

M : MASTER L : LOCAL R : REMOTE

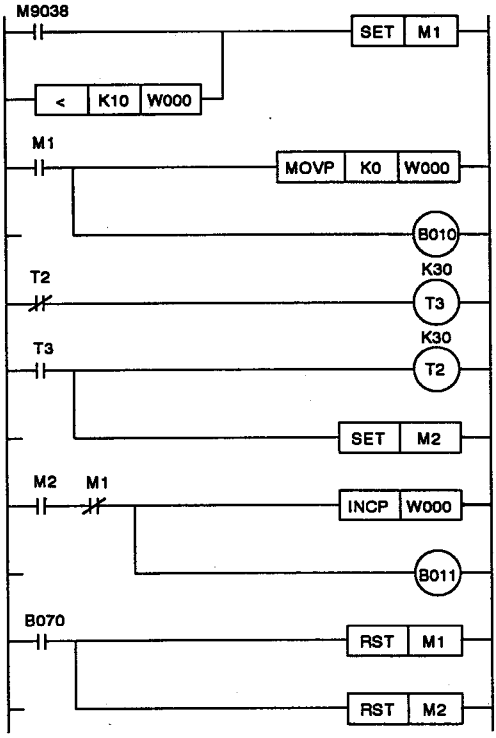
Fig. 9.8 Link Device Allocation

[Program example]

Master station program

To store "0 to 10" to W0

(B10 and B11 are used for handshaking between the master station and local station 2)



Turns the initialization flag (M1) of W0 ON at the start of CPU module run and 10 < W0.

Initializes W0 data to "0".

Turns B10 ON when the initialization of the W0 data has been completed.

The value of W0 is increased by "1" every 6 seconds.

Turns B11 ON when an INCP instruction has been executed (addition of "1" to W0 data).

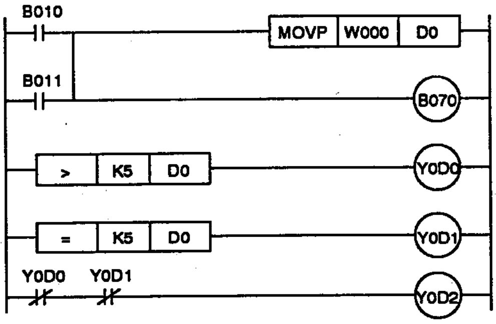
Turns M1 and M2 OFF when the W0 data has been read by local station 2 (B70 turned ON).

Local station 2 program

To turn YD0, YD1, and YD2 ON when the W0 data is sent from the master station

ON conditions:

YD0 ..... W0 < 5
YD1 ..... W0 = 5
YD2 ..... W0 > 5



Transmits the W0 data to D0 when the initialization of W0 by the master station has been completed and an INCP instruction has been executed.

Turns B70 ON when the W0 data has been transmitted to D0.

Turns YD0 ON if D0 < 5.

Turns YD1 ON if D0 = 5.

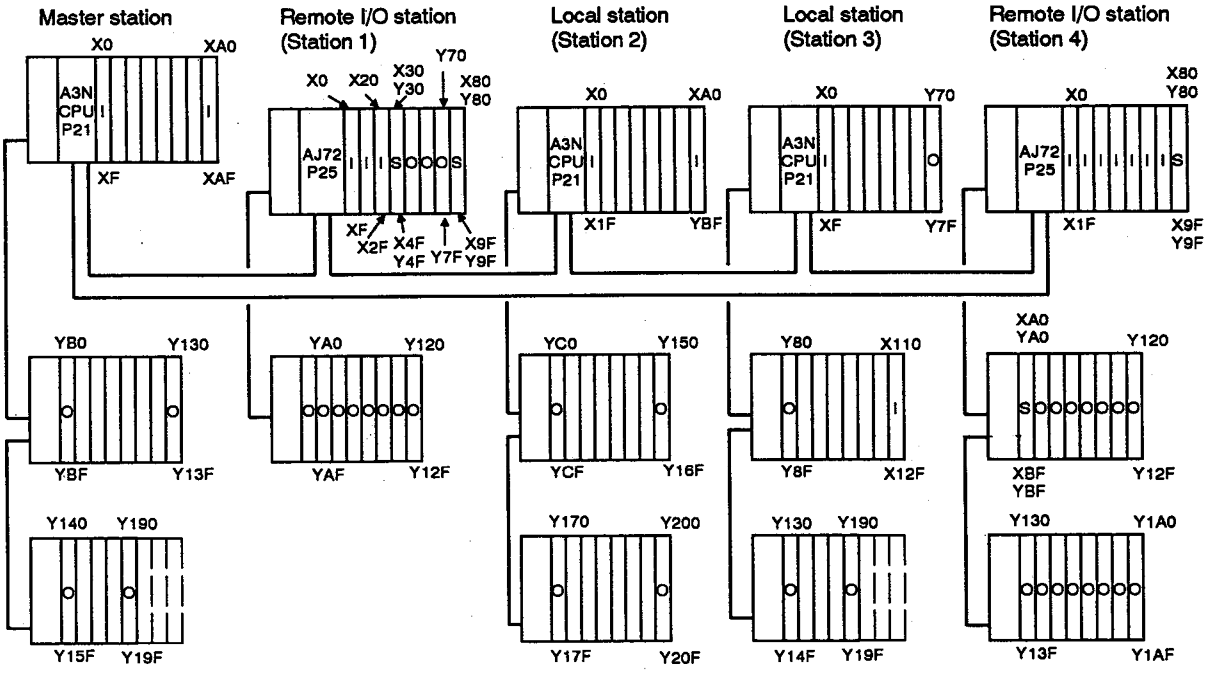
Turns YD2 ON if D0 > 5 (both YD0 and YD1 OFF).

9.7 Read/Write Program for a Word Device from the Master Station to a Local Station

The following shows a program with which data is read from/written to the word device of the local station from the master station using the LRDP/LWTP instruction.

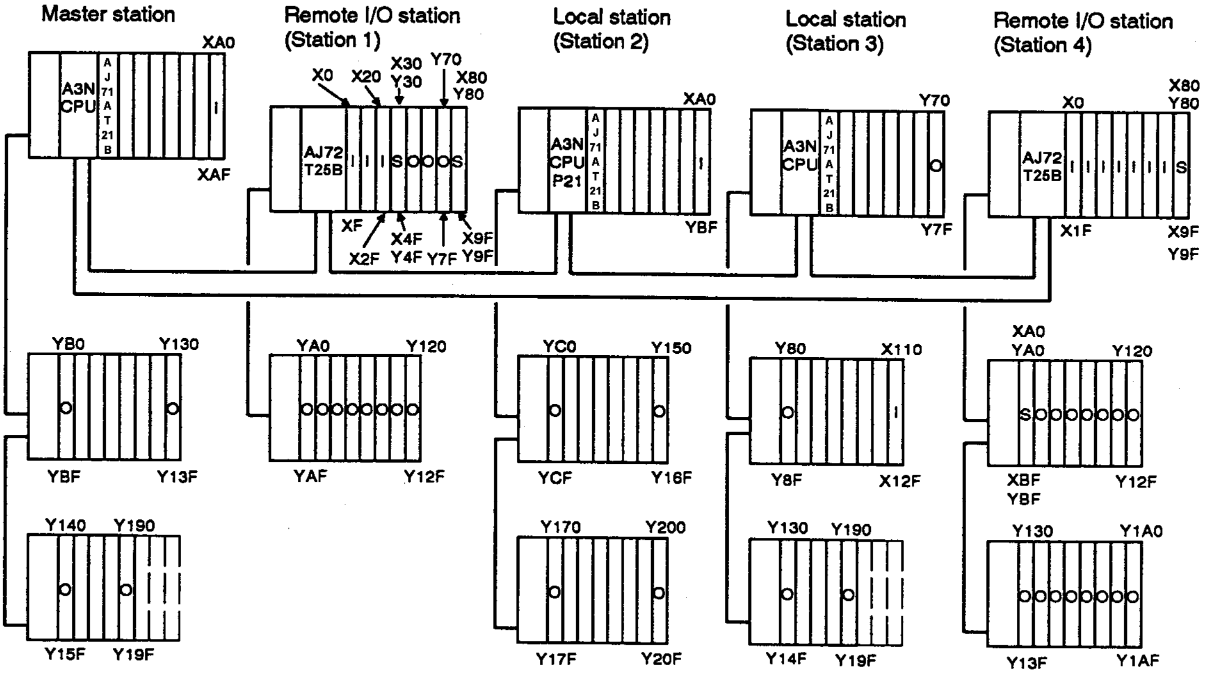
[System configuration]

[For MELSECNET data link system]



I : Input module
O : Output module
S : Special function module

[For MELSECNET/B data link system]



I : Input module
O : Output module
S : Special function module

Fig. 9.9 System Configuration

[Link device allocation]

* LINK *

MASTER	SLAVE PC STATIONS	M → ALL L		W.D.T. FOR LINK 10ms	INTER-MITTENT 10ms
		B	W		
M	4	000-05F	000-083	20	XXXX

M : B	↔	ALL	L : B	000-15F
M : W	↔	ALL	L : W	000-186
M : W	→	ALL	R : W	200-294
M : W	←	ALL	R : W	300-3C1
M : Y	→	ALL	L : X	260-47F
M : Y	→	ALL	R : Y	580-7FF
M : X	←	ALL	L : Y	1A0-3BF
M : X	←	ALL	R : X	500-76F

L/R NO.	M ← L		M → R	M ← R	M → L/R1		M ← L/R	
	B	W	W	W	Y	X/Y	X	Y/X
R 1	-------	-------	200-23F	300-33F	700-7FF	030-12F	6D0-76F	000-09F
L 2	060-18F	0A0-0FF	-------	-------	390-47F	250-33F	1A0-25F	210-2CF
L 3	0E0-15F	100-186	-------	-------	260-36F	1B0-2BF	2A0-3BF	300-41F
R 4	-------	-------	250-294	340-3C1	580-6AF	080-1AF	500-5BF	000-0BF
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-

M : MASTER   L : LOCAL   R : REMOTE

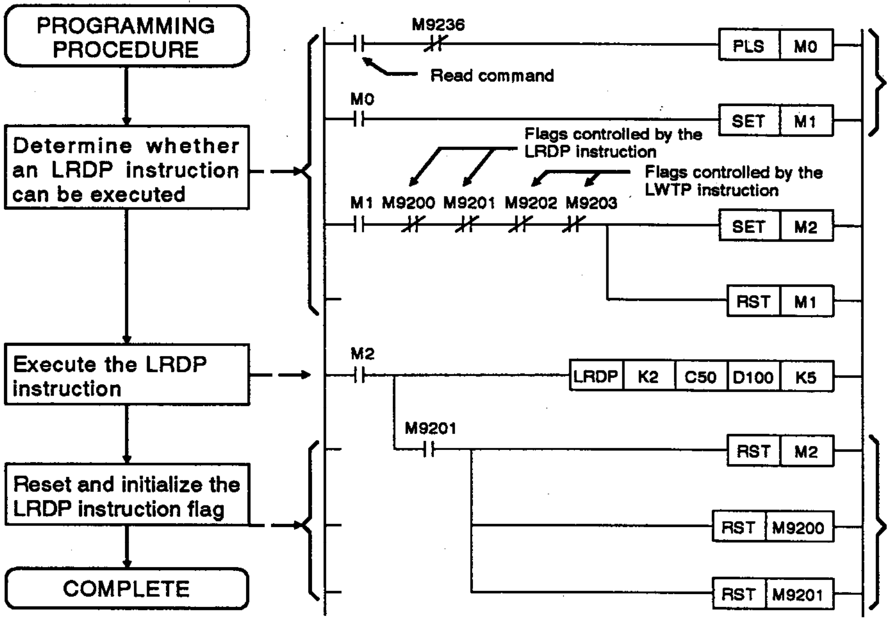
↑
L : LOCAL
R : REMOTE

Fig. 9.10 Link Device Allocation

(1) Read program (LRDP instruction)

[Program example]

To execute an LRDP instruction when the read command is changed from OFF to ON



Turns M1 ON when the read command is changed from OFF to ON.

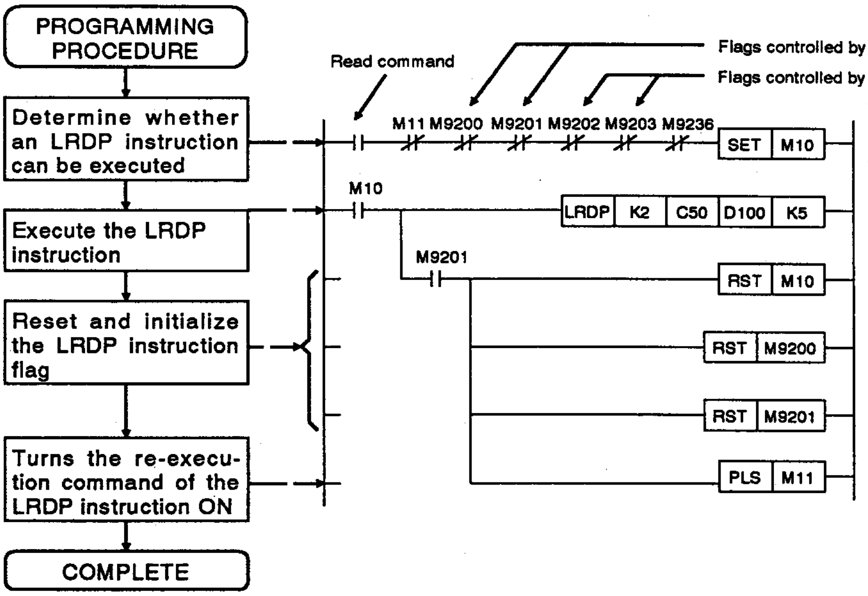
Turns M2 (execution command) ON when an LRDP instruction can be executed.

Turns M1 OFF.

Reads the current values of C50 to C54 of local station 2 to D100 to D104 of the master station.

Resets and initializes M2, M9200, and M9201 when an LRDP instruction has been executed.

To execute an LRDP instruction while the read command is ON



Turns M10 (execution start instruction) ON when an LRDP instruction can be executed.

Reads the current values of C50 to C54 of local station 2 to D100 to D104 of the master station.

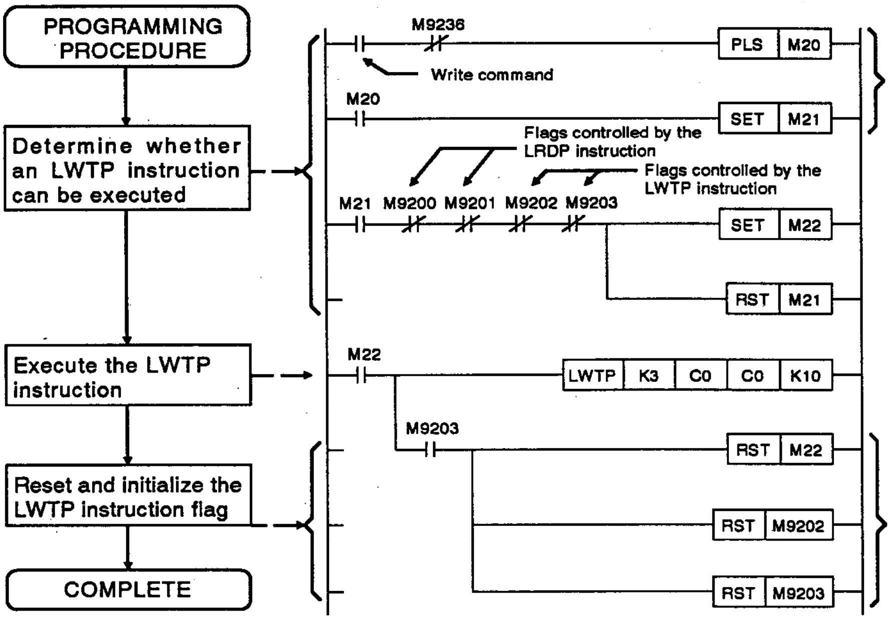
Resets and initializes M10, M9200, and M9201 when an LRDP instruction has been executed.

Generates a pulse to execute the LRDP instruction again.
(M10 is turned ON when M11 is turned OFF)

(2) Write program (LWTP instruction)

[Program example]

To execute an LWTP instruction when the write command is changed from OFF to ON



Turns M21 ON when the write command is changed from OFF to ON.

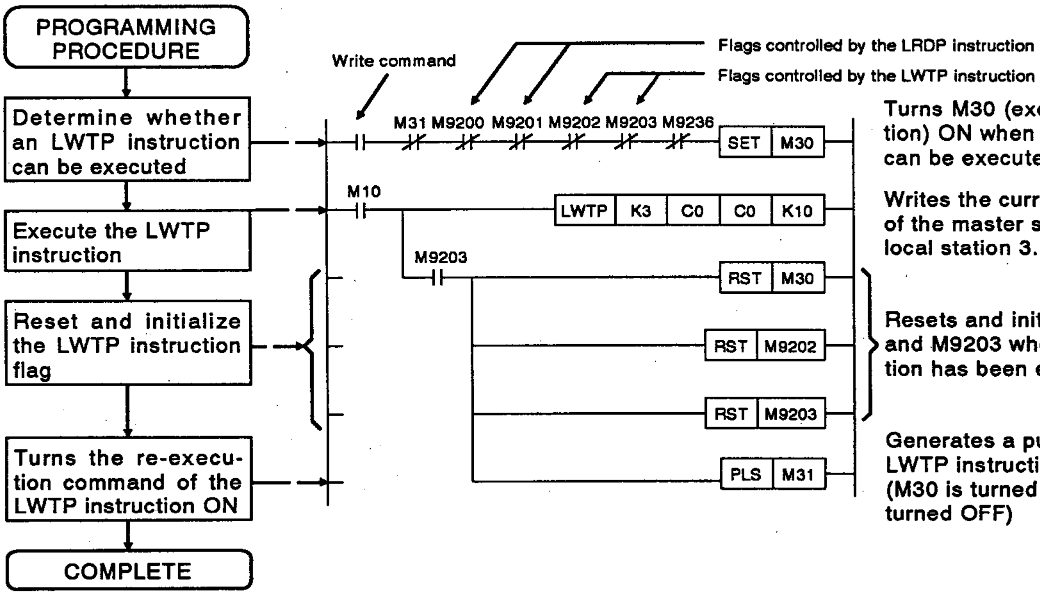
Turns M22 (execution command) ON when an LWTP instruction can be executed.

Turns M21 OFF.

Writes the current values of C0 to C9 of the master station to C0 to C9 of local station 3.

Resets and initializes M22, M9202, and M9203 when an LWTP instruction has been executed.

To execute an LWTP instruction while the write command is ON



Turns M30 (execution start instruction) ON when an LWTP instruction can be executed.

Writes the current values of C0 to C9 of the master station to C0 to C9 of local station 3.

Resets and initializes M30, M9202, and M9203 when an LWTP instruction has been executed.

Generates a pulse to execute the LWTP instruction again.
(M30 is turned ON when M31 is turned OFF)

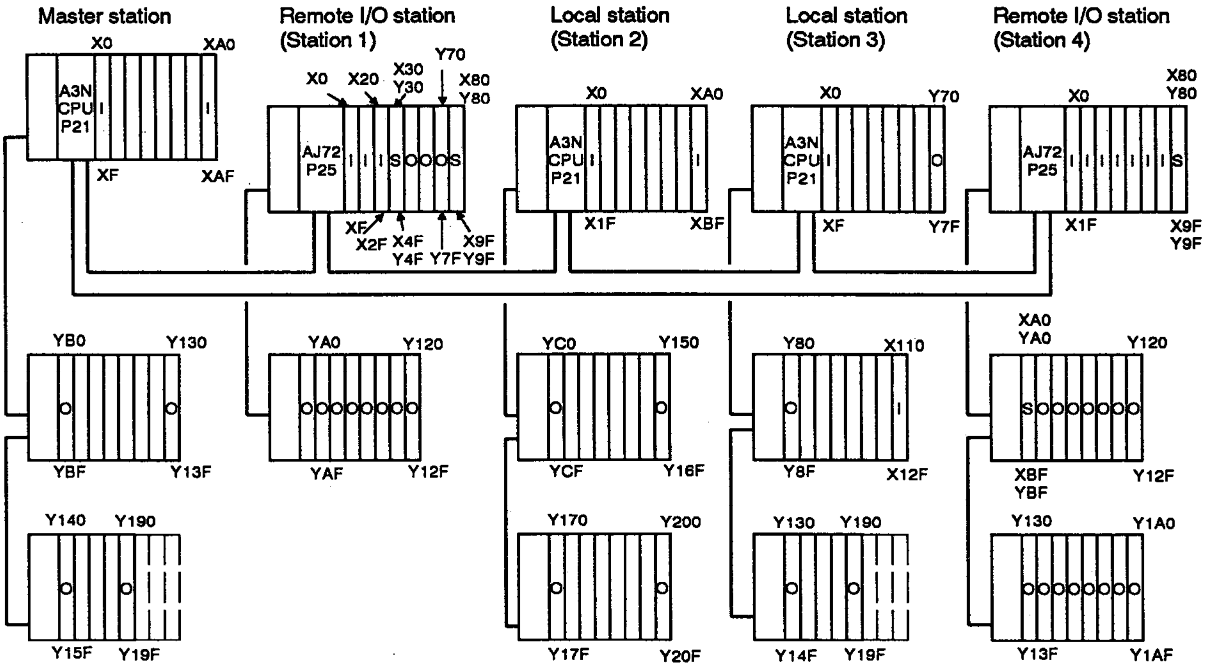
Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	o		o	o		o

9.8 Read/Write Program from a Remote I/O Station to a Special Function Module

This section explains programs by which data of the special function module mounted on the remote I/O station are read from or written to the master station.

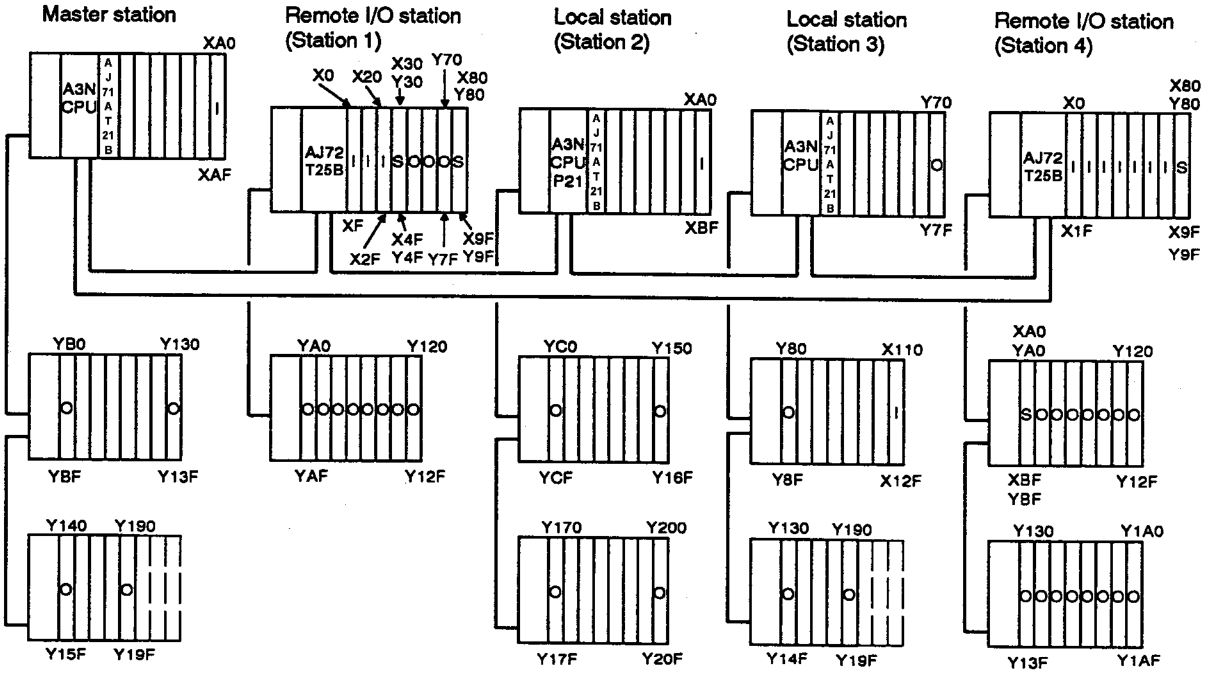
[System configuration]

[For MELSECNET data link system]



I : Input module
O : Output module
S : Special function module

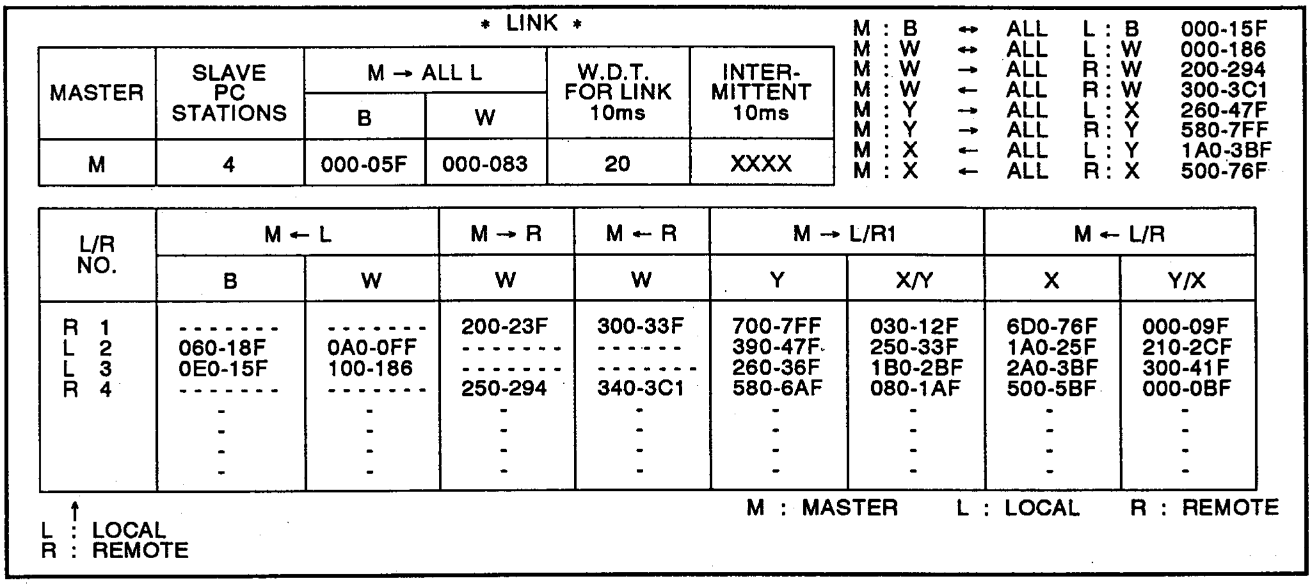
[For MELSECNET/B data link system]



I : Input module
O : Output module
S : Special function module

Fig. 9.10 System Configuration

[Link device allocation]



* LINK *

MASTER	SLAVE PC STATIONS	M → ALL L		W.D.T. FOR LINK 10ms	INTER-MITTENT 10ms
		B	W		
M	4	000-05F	000-083	20	XXXX

M : B	↔	ALL	L : B	000-15F
M : W	↔	ALL	L : W	000-186
M : W	→	ALL	R : W	200-294
M : W	←	ALL	R : W	300-3C1
M : Y	→	ALL	L : X	260-47F
M : Y	→	ALL	R : Y	580-7FF
M : X	←	ALL	L : Y	1A0-3BF
M : X	←	ALL	R : X	500-76F

L/R NO.	M ← L		M → R	M ← R	M → L/R1		M ← L/R	
	B	W	W	W	Y	X/Y	X	Y/X
R 1	-------	-------	200-23F	300-33F	700-7FF	030-12F	6D0-76F	000-09F
L 2	060-18F	0A0-0FF	-------	------	390-47F	250-33F	1A0-25F	210-2CF
L 3	0E0-15F	100-186	-------	-------	260-36F	1B0-2BF	2A0-3BF	300-41F
R 4	-------	-------	250-294	340-3C1	580-6AF	080-1AF	500-5BF	000-0BF
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-

↑
L : LOCAL
R : REMOTE

M : MASTER L : LOCAL R : REMOTE

Fig. 9.11 Link Device Allocation

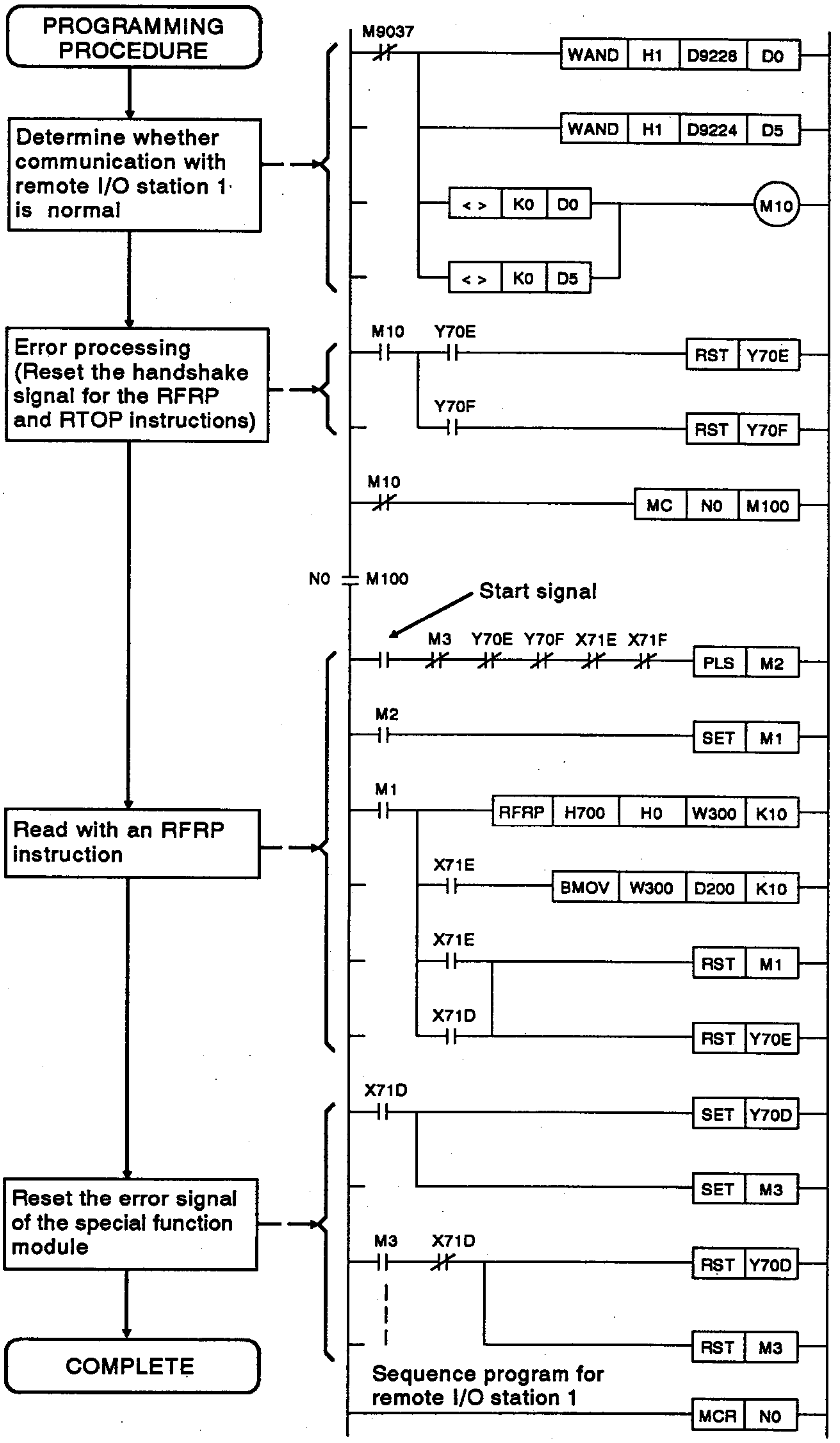
REMARK

In the M → R area of remote I/O stations 1 and 4, two points (W200 and W201, W250 and W251) from the head device are used by the system. These points cannot be used for a user program. Refer to Section 7.3.3 for more details.

9.8.1 Read program (RFRP instruction)

[Program example 1]

To execute an RFRP instruction one time when the start signal is changed from OFF to ON



Detects that remote I/O station 1 is faulty Faulty when b0 of D9228 is "1").

Detects that parameters are being communicated with remote I/O station 1. (Parameter is being communicated when b0 of D9224 is "1").

Turns M10 ON when remote I/O station 1 is faulty or parameters are being communicated.

Resets handshake signals Y70E (YnE) and Y70F (YnF) if a communication error occurs during the execution of an RFRP instruction or an RTOP instruction by remote I/O station 1.

Turns M1 ON if the start signal is turned ON while an RFRP instruction or an RTOP instruction is not being executed.

Stores 10-word data in addresses 0 to 9 of the special function module loaded to X/Y30 to X/Y4F of the remote I/O station to W300 to W309 of the master station.

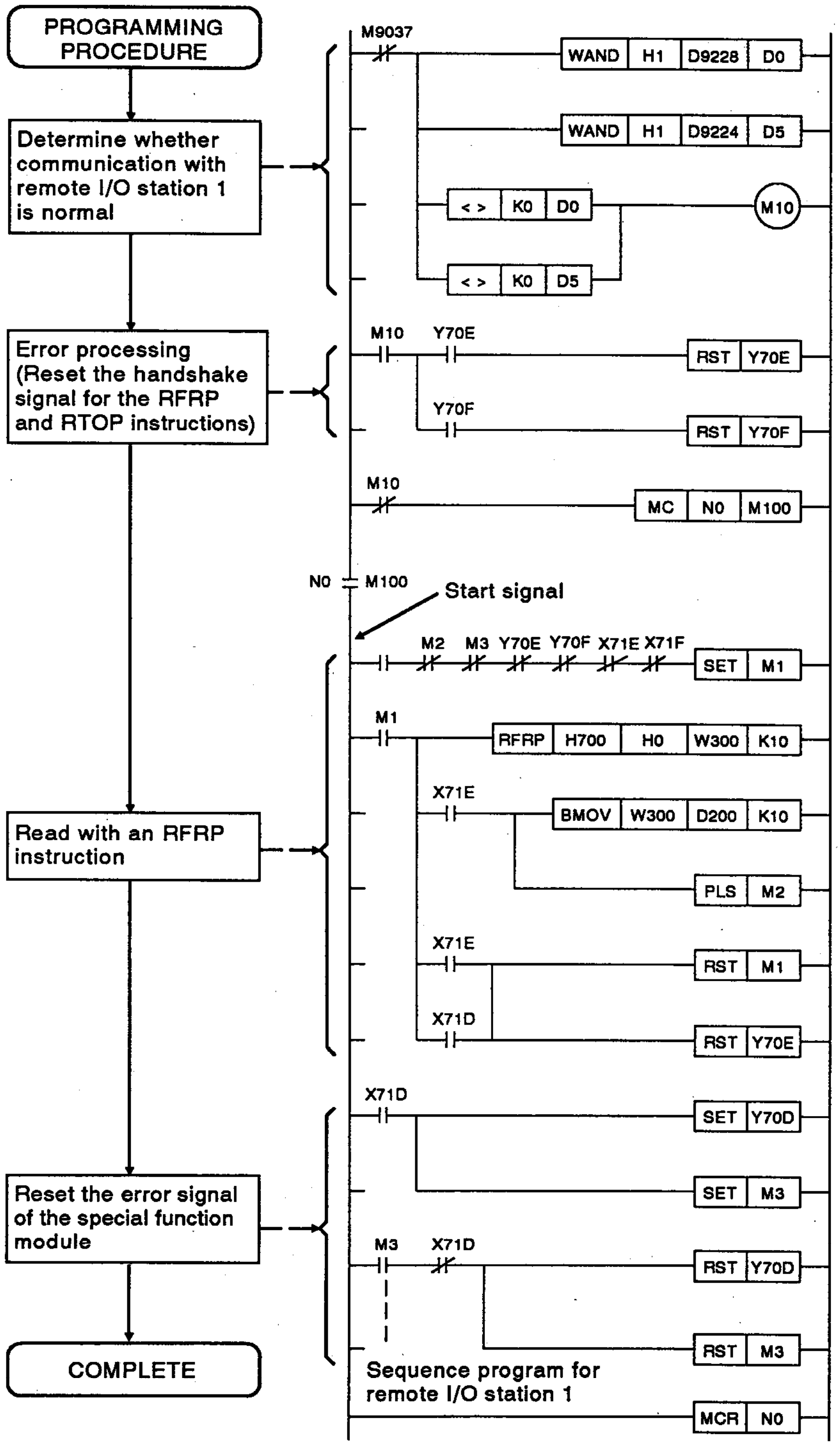
Stores the data in W300 to W309 to D200 to D209 when reading, called by an RFRP instruction, is completed.

Resets and initializes handshake signal Y70E when reading, called by an RFRP instruction, has been completed or an RFRP instruction cannot be executed (special function module error).

Resets error signal X71D of the special function module.

[Program example 2]

To execute an RFRP instruction while the start signal is ON



Detects that remote I/O station 1 is faulty (Faulty when b0 of D9228 is "1").

Detects that parameters are being communicated with remote I/O station 1 (Parameter is being communicated when b0 of D9224 is "1").

Turns M10 ON when remote I/O station 1 is faulty or parameters are being communicated.

Resets handshake signals Y70E (YnE) and Y70F (YnF) if a communication error occurs during the execution of an RFRP instruction or an RTOP instruction by remote I/O station 1.

Turns M1 ON if the start signal is turned ON while an RFRP instruction or an RTOP instruction is not being executed.

Stores 10-word data in addresses 0 to 9 of the special function module loaded to X/Y30 to X/Y4F of the remote I/O station to W300 to W309 of the master station.

Stores the data in W300 to W309 to D200 to D209 after a read, called by an RFRP instruction, has been completed.

Generates a pulse to positively reset M1. M1 is turned ON when M2 is turned OFF.

Resets and initializes handshake signal Y70E when reading, called by an RFRP instruction, has been completed or an RFRP instruction cannot be executed (special function module error).

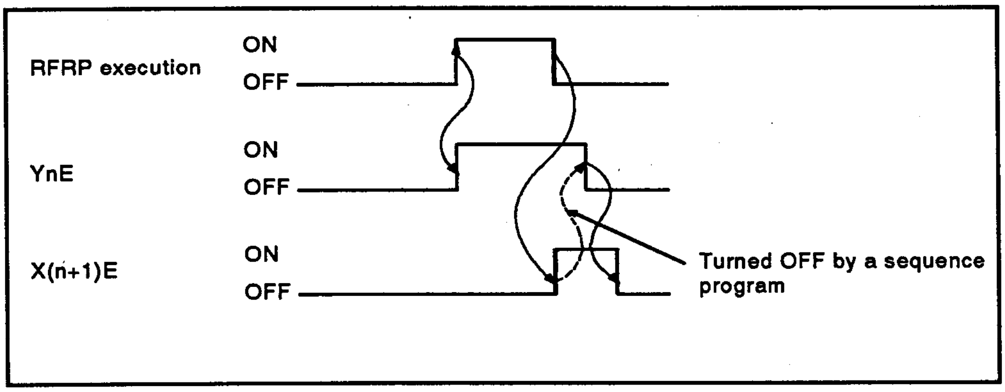
Resets error signal X71D of the special function module.

[Precautions]

(1) To execute an RFRP instruction, always take interlock for YnE and X(n+1)E*. Also, be careful not to designate an RFRP and RTOP instruction at two or more positions within a single special function module.

* "n" is the device number of the master station that corresponds to the I/O number of the slot in which a special function module is loaded. "n" is also the upper two digits of the three digits displayed for the 16 points of the first half link parameters.

YnE and X(n+1)E are turned ON/OFF as illustrated below:



(2) The RFRP start signal must be turned ON by a SET instruction.

If an OUT or PLS instruction is used, the RFRP instruction will not be executed correctly.

(3) YnE and the RFRP start signal must be reset after reading is complete.

Reading cannot be executed again if YnE and the RFRP instruction have not been reset.

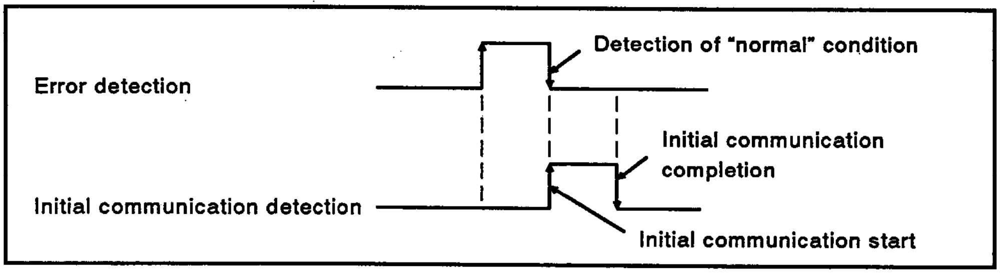
(4) Refer to the manual for the individual special function module for details on buffer memory addresses.

(5) Write an error detection circuit in a sequence program to check the operation from when an error has occurred to when the initial communication is completed when a local or remote I/O station has caused an error.

(a) The bit in D9228 to D9231 corresponds to a local station or a remote I/O station and can be used to determine whether an error has occurred in that station. "1" indicates the occurrence of error.

(b) The bit in D9224 to D9227 corresponds to a local station or a remote I/O station and can be used to determine whether initial communication is being executed by that station. "1" indicates that initial communication is being executed.

(c) The occurrence of an error and the execution of initial communication in a local station or a remote I/O station are detected according to the following timing:



(d) The error detection program must be written before the initial communication detection program.

If initial communication detection program is written first, the occurrence of errors and the execution of initial communication will not be detected.

(6) When RFRP and RTOP instructions cannot be executed because the special function module is faulty, X(n+1)D is turned ON.

(a) X(n+1)D is turned OFF if YnD is turned ON.

(b) If X(n+1)D is turned ON, a special function module might be faulty or the module might not be loaded correctly. Check the special function module at which the error occurred.

(7) Write the following circuit to turn YnD ON/OFF:

(a) YnD is turned ON when X(n+1)D is turned ON.

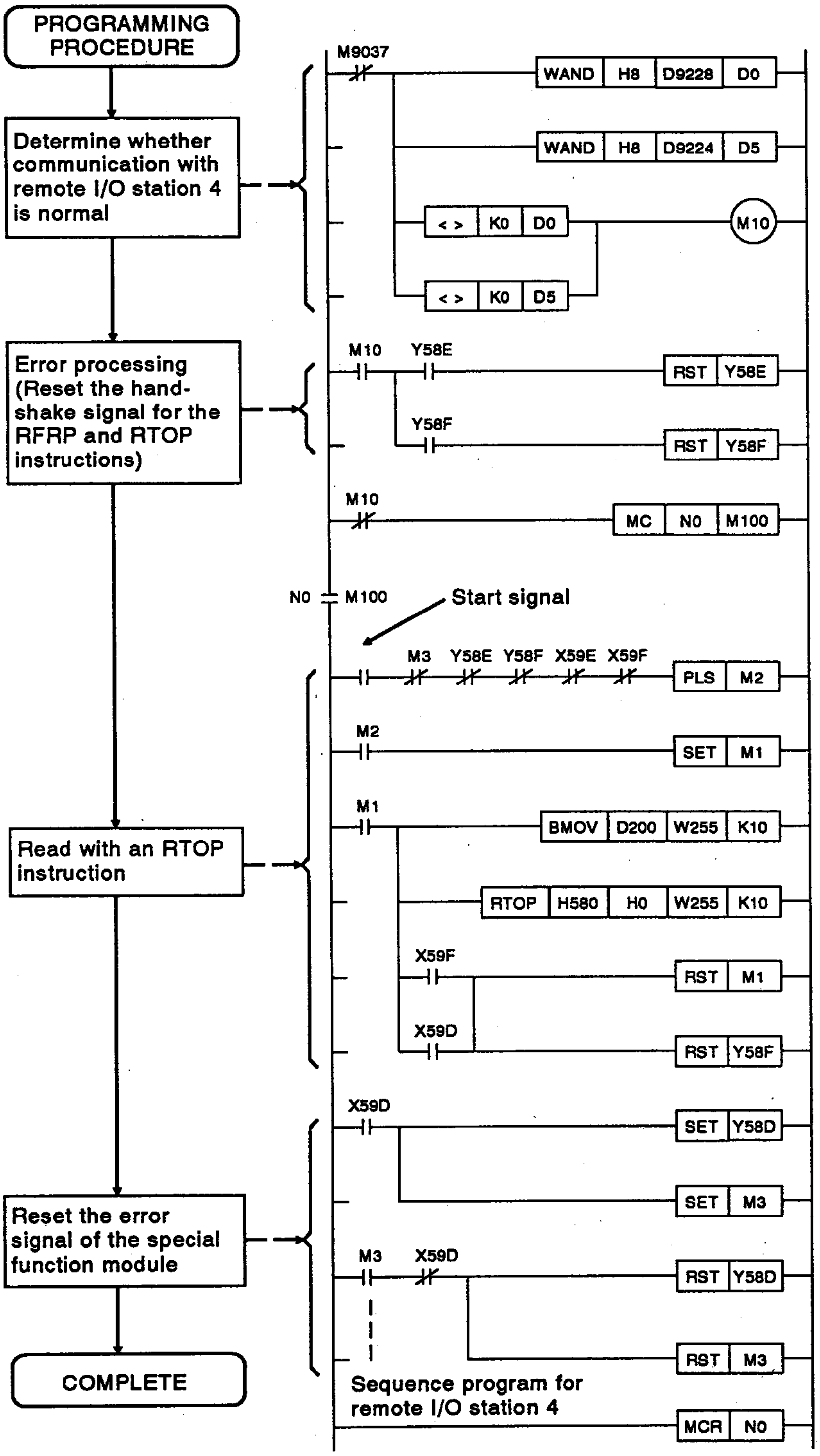
(b) YnD is turned OFF one time when X(n+1)D is turned OFF.

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	o		o			

9.8.2 Write program (RTOP instruction)

[Program example 1]

To execute an RTOP instruction one time when the start signal is changed from OFF to ON



Detects that remote I/O station 4 is faulty (Faulty when b3 of D9228 is "1").

Detects that parameters are being communicated with remote I/O station 4 (Parameter is being communicated when b3 of D9224 is "1").

Turns M10 ON when remote I/O station 4 is faulty or parameters are being communicated.

Resets handshake signals Y58E (YnE) and Y58F (YnF) if a communication error occurs during the execution of an RFRP instruction or an RTOP instruction by remote I/O station 4.

Turns M1 ON if the start signal is turned ON while an RFRP instruction or an RTOP instruction is not being executed.

Stores the data in D200 to D209 to W255 to W25E.

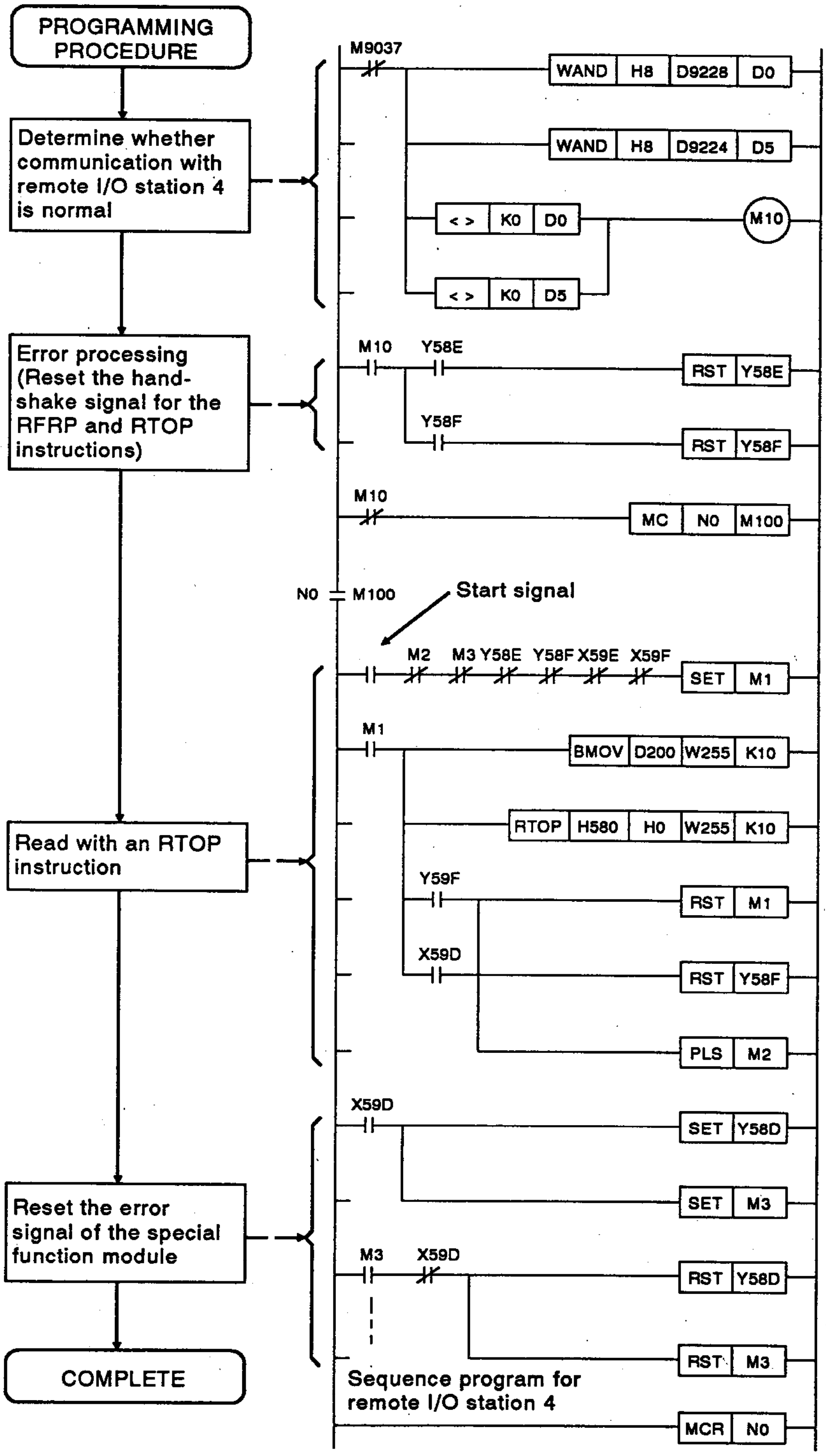
Writes the data in W255 to W25E of the master station to addresses 0 to 9 of the special function module loaded in X/Y80 to X/Y9F of remote I/O station 4.

Resets and initializes handshake signal Y58F when Writing, called by an RFRP instruction, has been completed or an RFRP instruction cannot be executed (special function module error).

Resets error signal X59D of the special function module.

[Program example 2]

To execute an RTOP instruction while the start signal is ON



Detects that remote I/O station 4 is faulty (Faulty when b3 of D9228 is "1").

Detects that parameters are being communicated with remote I/O station 4 (Parameter is being communicated when b3 of D9224 is "1").

Turns M10 ON when remote I/O station 4 is faulty or parameters are being communicated.

Resets handshake signals Y58E (YnE) and Y58F (YnF) if a communication error occurs during the execution of an RFRP instruction or an RTOP instruction by remote I/O station 4.

Turns M1 ON if the start signal is turned ON while an RFRP instruction or an RTOP instruction is not being executed.

Stores the data in D200 to D209 to W255 to W25E.

Writes the data in W255 to W25E of the master station to addresses 0 to 9 of the special function module loaded in X/Y80 to X/Y9F of remote I/O station 4.

Resets and initializes handshake signal Y58F when writing, called by an RTOP instruction, has been completed or an RTOP instruction cannot be executed (special function module error).

Generates a pulse to positively reset M1. M1 is turned ON when M2 is turned OFF.

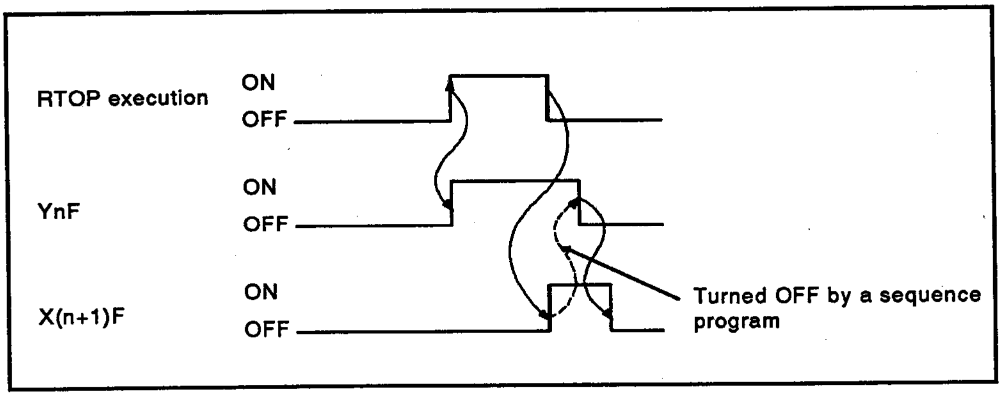
Resets error signal X59D of the special function module.

[Precautions]

(1) To execute an RTOP instruction, always take interlock for YnF and X(n+1)F*. Also, be careful not to designate an RFRP and RTOP instruction at two or more positions within a single special function module.

* "n" is the device number of the master station that corresponds to the I/O number of the slot in which a special function module is loaded. "n" is also the upper two digits of the three digits displayed for the 16 points of the first half link parameters.

YnF and X(n+1)F are turned ON/OFF as illustrated below:



(2) The RTOP start signal must be turned ON by a SET instruction.

If an OUT or PLS instruction is used, the RTOP instruction will not be executed correctly.

(3) YnF and the RTOP start signal must be reset after reading is complete.

Reading cannot be executed again if YnF and the RTOP instruction have not been reset.

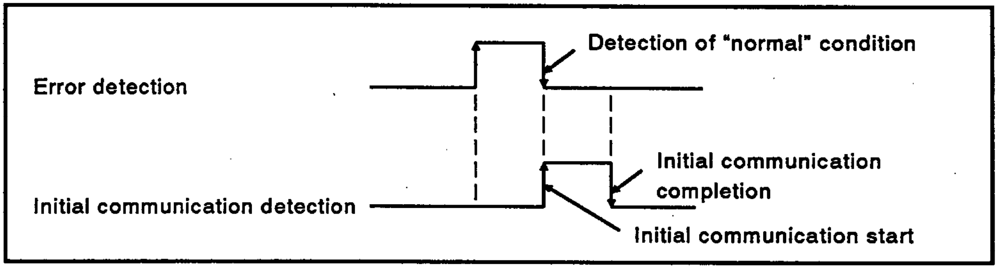
(4) Refer to the manual for the individual special function module for details on buffer memory addresses.

(5) Write an error detection circuit in a sequence program to check the operation from when an error has occurred to when the initial communication is completed when a local or remote I/O station has caused an error.

(a) The bit in D9228 to D9231 corresponds to a local station or a remote I/O station and can be used to determine whether an error has occurred in that station. "1" indicates the occurrence of error.

(b) The bit in D9224 to D9227 corresponds to a local station or a remote I/O station and can be used to determine whether initial communication is being executed by that station. "1" indicates that initial communication is being executed.

(c) The occurrence of an error and the execution of initial communication in a local station or a remote I/O station are detected according to the following timing:



(d) The error detection program must be written before the initial communication detection program.

If initial communication detection program is written first, the occurrence of errors and the execution of initial communication will not be detected.

(6) When RFRP and RTOP instructions cannot be executed because the special function module is faulty, X(n+1)D is turned ON.

(a) X(n+1)D is turned OFF if YnD is turned ON.

(b) If X(n+1)D is turned ON, a special function module might be faulty or the module might not be loaded correctly. Check the special function module at which the error occurred.

(7) Write the following circuit to turn YnD ON/OFF:

(a) YnD is turned ON when X(n+1)D is turned ON.

(b) YnD is turned OFF one time when X(n+1)D is turned OFF.

[Link device allocation]

* LINK *

MASTER	SLAVE PC STATIONS	M → ALL L		W.D.T. FOR LINK 10ms	INTER-MITTENT 10ms
		B	W		
M	4	000-05F	000-083	20	XXXX

M : B ↔ ALL L : B 000-15F
M : W ↔ ALL L : W 000-186
M : W → ALL R : W 200-294
M : W ← ALL R : W 300-3C1
M : Y → ALL L : X 260-47F
M : Y → ALL R : Y 580-7FF
M : X ← ALL L : Y 1A0-3BF
M : X ← ALL R : X 500-76F

L/R NO.	M ← L		M → R	M ← R	M → L/R1		M ← L/R	
	B	W	W	W	Y	X/Y	X	Y/X
R 1	-------	-------	200-23F	300-33F	700-7FF	030-12F	6D0-76F	000-09F
L 2	060-18F	0A0-0FF	-------	-------	390-47F	250-33F	1A0-25F	210-2CF
L 3	0E0-15F	100-186	-------	-------	260-36F	1B0-2BF	2A0-3BF	300-41F
R 4	-------	-------	250-294	340-3C1	580-6AF	080-1AF	500-5BF	000-0BF
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-

↑
L : LOCAL
R : REMOTE

M : MASTER L : LOCAL R : REMOTE

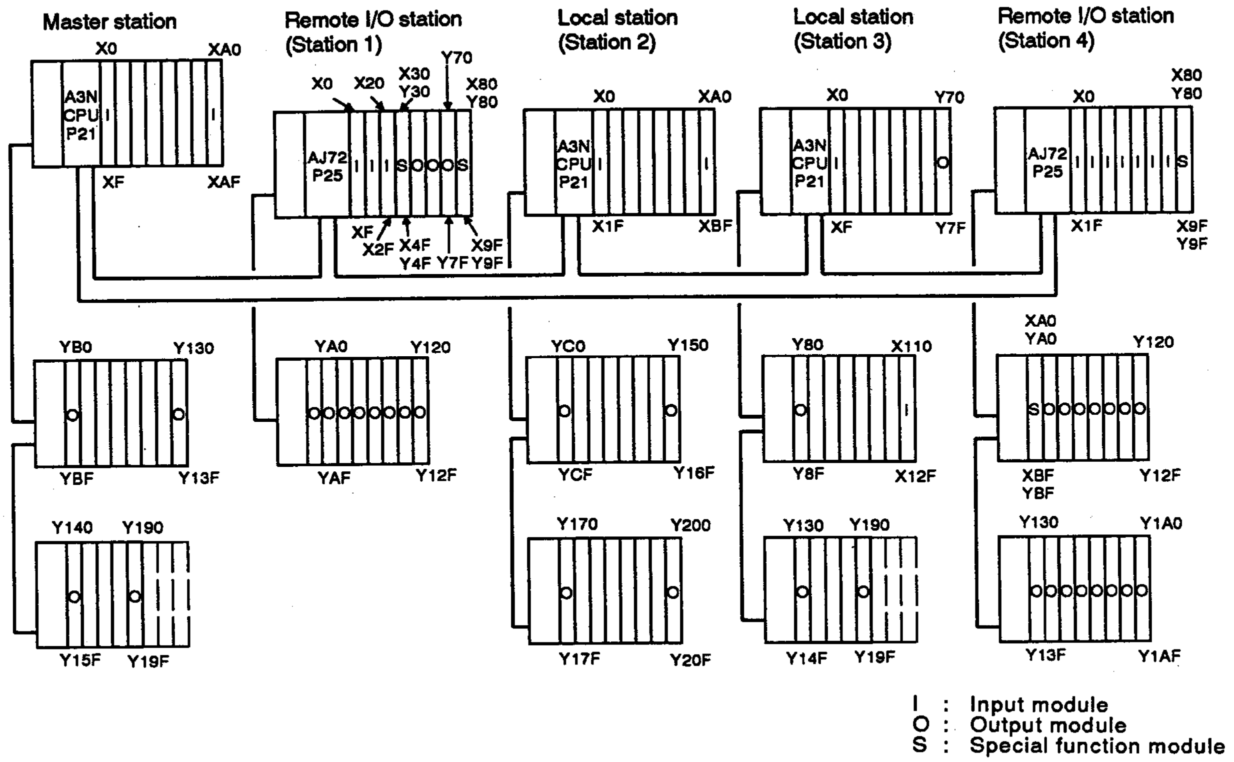
Fig. 9.12 Link Device Allocation

9.9 Fault Detection Program

The following shows a program with which a faulty station is detected by the master station when an error occurs in any of the local station/remote I/O station No. 1 to 4.

[System configuration]

[For MELSECNET data link system]



[For MELSECNET/B data link system]

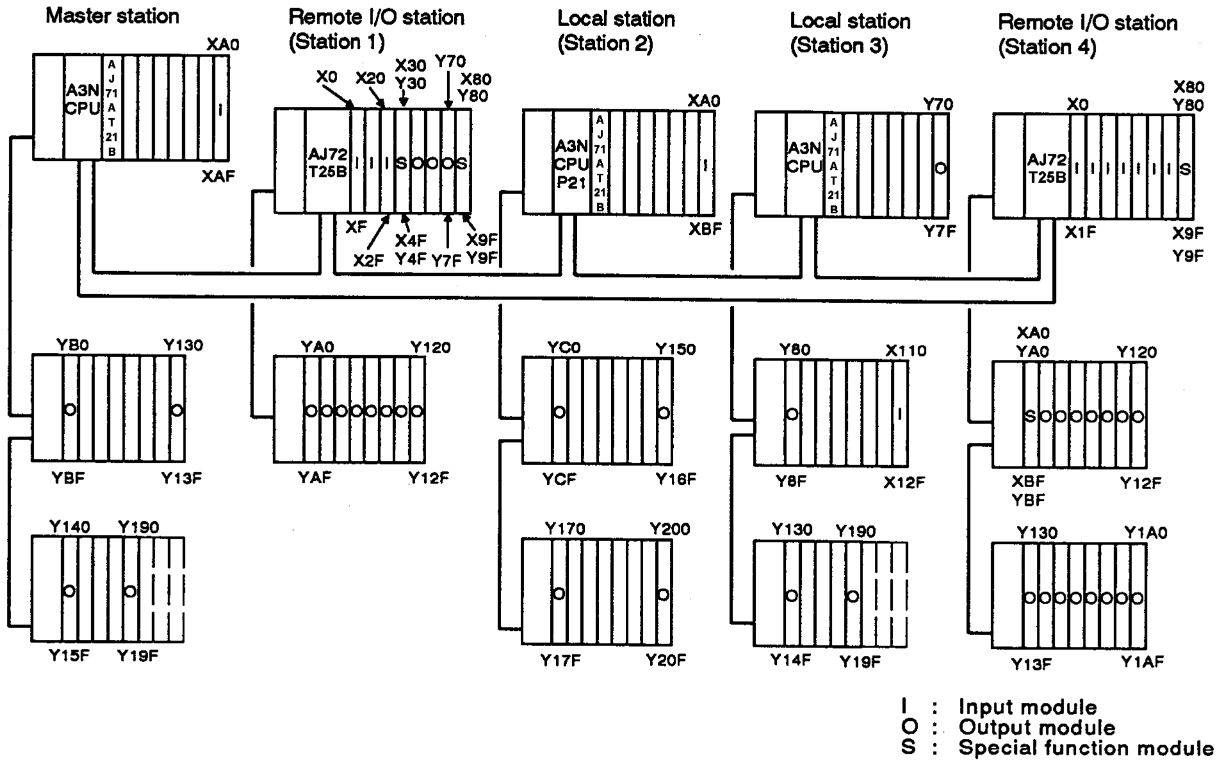
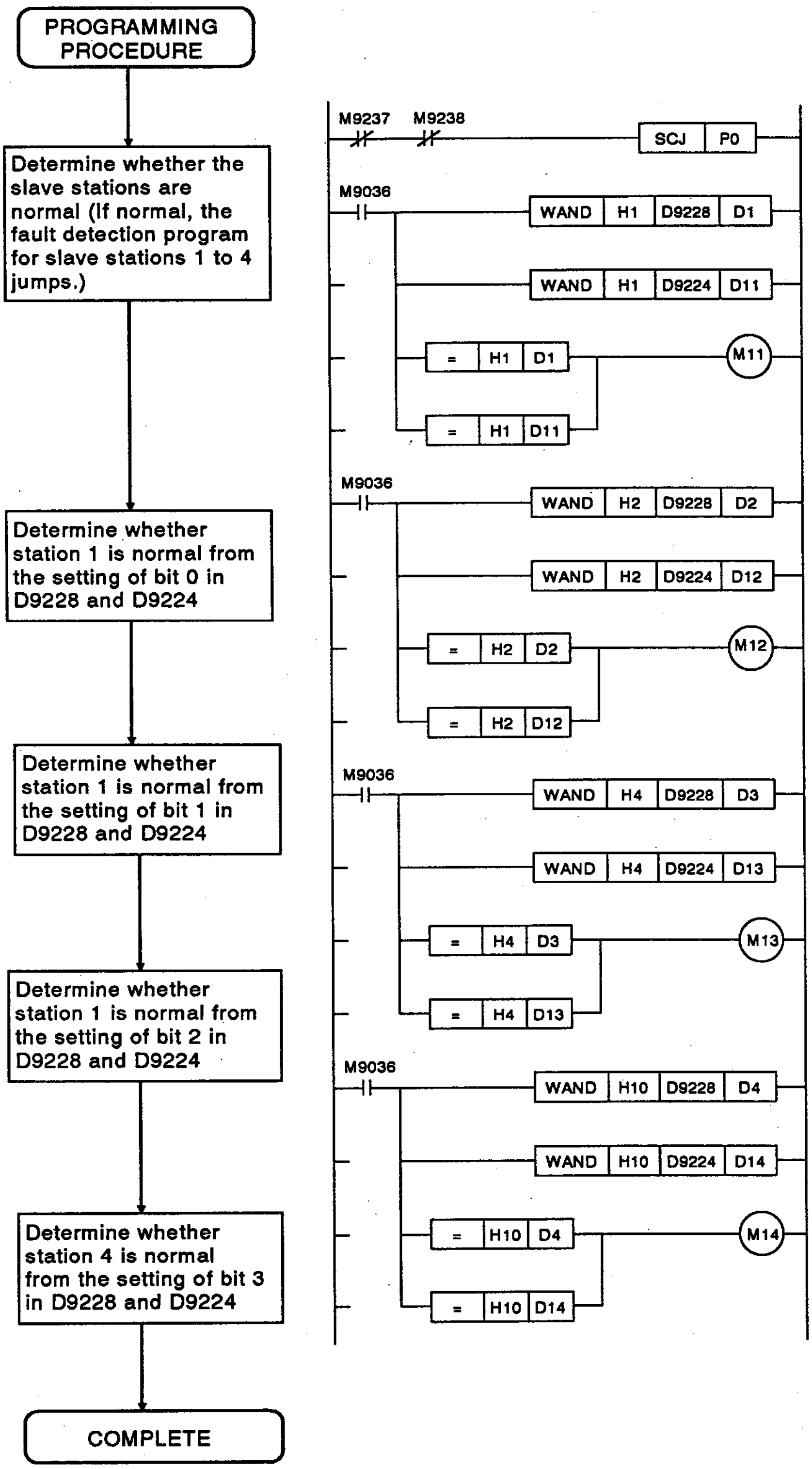


Fig. 9.13 System Configuration

[Program example]



If slave stations 1 to 4 (local stations, remote I/O stations) are normal, the sequence jumps to P0.

Sets all of the bit data in D9228 to "0" except for b0 (station 1).

Sets all of the bit data in D9224 to "0" except for b0 (station 1).

Turns M11 ON if b0 in D9224 or D9228 is "1" (faulty).

Sets all of the bit data in D9228 to "0" except for b1 (station 2).

Sets all of the bit data in D9224 to "0" except for b1 (station 2).

Turns M12 ON if b1 in D9224 or D9228 is "1" (faulty).

Sets all of the bit data in D9228 to "0" except for b2 (station 3).

Sets all of the bit data in D9224 to "0" except for b2 (station 3).

Turns M13 ON if b2 in D9224 or D9228 is "1" (faulty).

Sets all of the bit data in D9228 to "0" except for b3 (station 4).

Sets all of the bit data in D9224 to "0" except for b3 (station 4).

Turns M14 ON if b3 in D9224 or D9228 is "1" (faulty).

10. TROUBLESHOOTING

To improve the reliability of the system, it is very important to use reliable equipment. In addition to this, the maintainability of each piece of equipment is another very important factor.

If a problem occurs during the data link operation, check the link status following the steps below:

(1) Use the GPP function of the A6GPP, A6PHP, or IBM PC/AT to execute link monitoring, and locate the fault.

When an A7PU is used, monitor the special link relays and link registers to locate the faulty point.

(2) Check the LED and confirm what kind of fault occurred.

The corresponding ERROR LED on the link module goes ON when a hardware fault occurs.

(3) Check the data link cable connections.

Refer to Section 8.2 for details on checking the cable connections.

10.1 GPP Link Monitor Function

The link monitoring function (one of the GPP functions) checks several aspects of the data link operation. These are the data link system loop state, master and slave station states, and the scan time.

(a) Master station link monitor

Connect the A6GPP/A6PHP/IBM PC/AT to the master station.

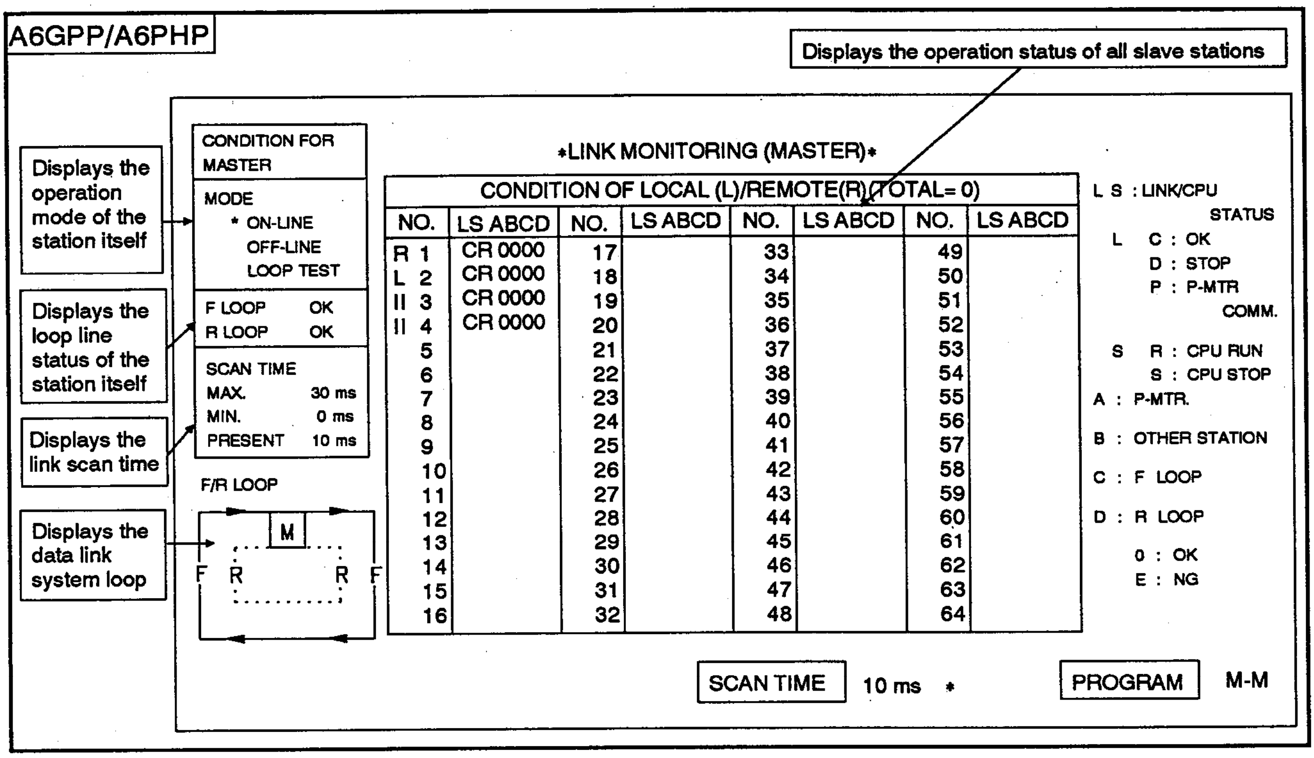
(b) Local station link monitor

Connect the A6GPP/A6PHP/IBM PC/AT to a local station.

(c) Remote I/O station link monitor

Connect the A6GPP/A6PHP/IBM PC/AT to a remote I/O station.

10.1.1 Master station link monitor



A6GPP/A6PHP

Displays the operation status of all slave stations

Displays the operation mode of the station itself

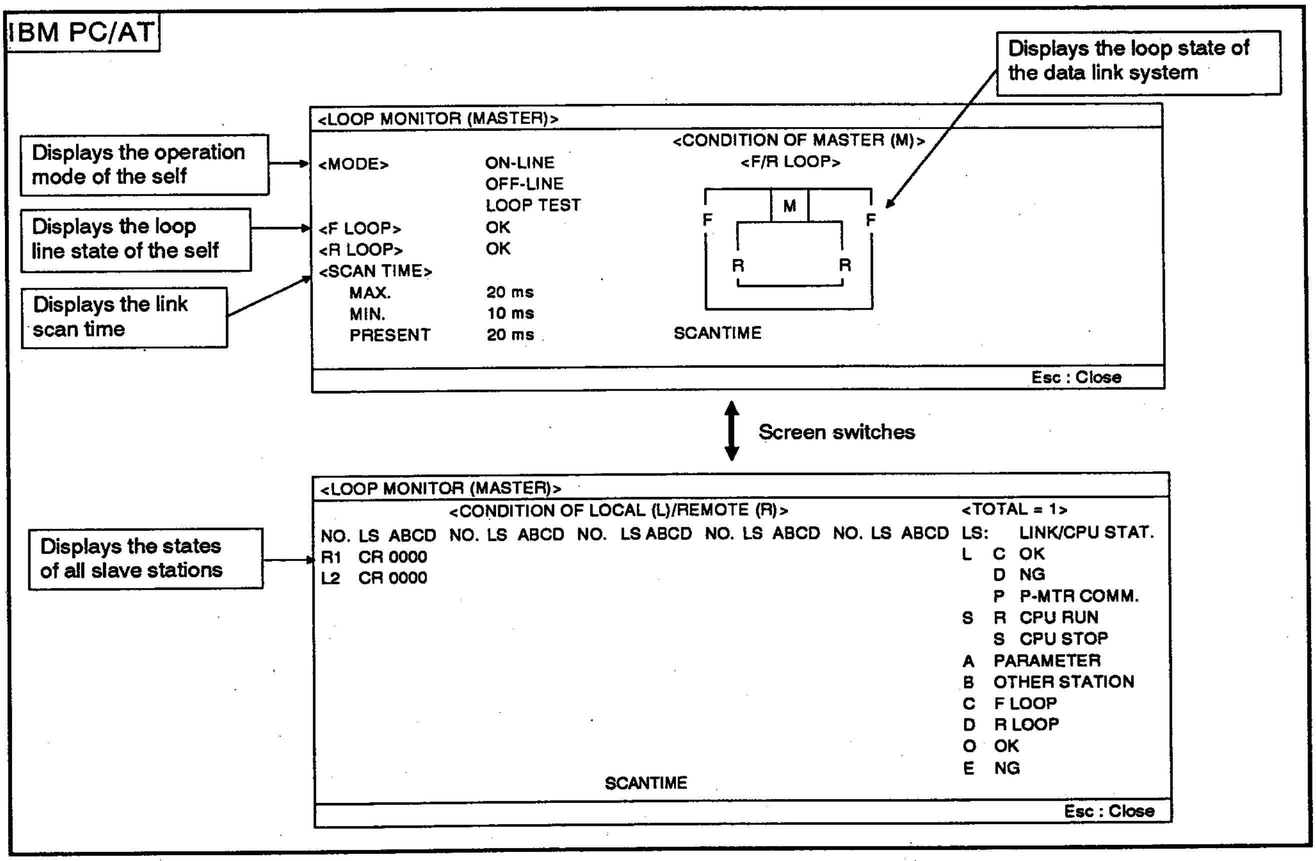
Displays the loop line status of the station itself

Displays the link scan time

Displays the data link system loop

```
CONDITION FOR            *LINK MONITORING (MASTER)*
MASTER
                  CONDITION OF LOCAL (L)/REMOTE(R)(TOTAL= 0)            L S : LINK/CPU
MODE             NO.  LS ABCD  NO.  LS ABCD  NO.  LS ABCD  NO.  LS ABCD          STATUS
 * ON-LINE       R 1  CR 0000  17            33            49           L   C : OK
   OFF-LINE      L 2  CR 0000  18            34            50               D : STOP
   LOOP TEST     II 3 CR 0000  19            35            51               P : P-MTR
                 II 4 CR 0000  20            36            52                     COMM.
F LOOP    OK       5           21            37            53
R LOOP    OK       6           22            38            54           S   R : CPU RUN
                   7           23            39            55               S : CPU STOP
SCAN TIME          8           24            40            56           A : P-MTR.
MAX.     30 ms     9           25            41            57
MIN.      0 ms    10           26            42            58           B : OTHER STATION
PRESENT  10 ms    11           27            43            59
                  12           28            44            60           C : F LOOP
F/R LOOP          13           29            45            61
      M           14           30            46            62           D : R LOOP
F  R       R  F   15           31            47            63
                  16           32            48            64               0 : OK
                                                                            E : NG

                       SCAN TIME  10 ms  *          PROGRAM   M-M
```



IBM PC/AT

Displays the loop state of the data link system

Displays the operation mode of the self

Displays the loop line state of the self

Displays the link scan time

```
<LOOP MONITOR (MASTER)>
                                       <CONDITION OF MASTER (M)>
<MODE>          ON-LINE                      <F/R LOOP>
                OFF-LINE
                LOOP TEST                        M
<F LOOP>        OK                       F               F
<R LOOP>        OK
<SCAN TIME>                                  R       R
   MAX.         20 ms
   MIN.         10 ms
   PRESENT      20 ms                    SCANTIME
                                                              Esc : Close
```

Screen switches

Displays the states of all slave stations

```
<LOOP MONITOR (MASTER)>
              <CONDITION OF LOCAL (L)/REMOTE (R)>                 <TOTAL = 1>
NO. LS ABCD  NO. LS ABCD  NO.  LS ABCD  NO. LS ABCD  NO. LS ABCD  LS:   LINK/CPU STAT.
R1  CR 0000                                                       L  C  OK
L2  CR 0000                                                          D  NG
                                                                     P  P-MTR COMM.
                                                                  S  R  CPU RUN
                                                                     S  CPU STOP
                                                                  A  PARAMETER
                                                                  B  OTHER STATION
                                                                  C  F LOOP
                                                                  D  R LOOP
                                                                  O  OK
                                                                  E  NG
                          SCANTIME
                                                                      Esc : Close
```

Fig. 10.1 Master Station Link Monitor Screen (A6GPP/A6PHP/IBM PC/AT connected to the master station)

(1) Host station operation mode

(a) Displays the master station operation status

1) ONLINE:

Master station mode setting is ONLINE (automatic return function set/not set).

2) OFFLINE:

Master station mode setting is OFFLINE, SELF-LOOPBACK TEST, or STATION-TO-STATION TEST.

3) LOOP TEST:

Master station mode setting is FORWARD LOOP TEST or REVERSE LOOP TEST.

(b) The selected operation mode is stored in M9224 and M9227.

(2) Loop line status of the station itself

(a) Displays the forward loop (F loop) and reverse loop (R loop) status of the master station.

1) OK : Loop line is normal.

2) NG : Loop line is faulty.

(b) The loop line status is stored in M9225 and M9226.

(3) Link scan time

(a) Displays the required link scan time between the master station and a local station.

1) AX : Displays the maximum link scan time.

2) MIN : Displays the minimum link scan time.

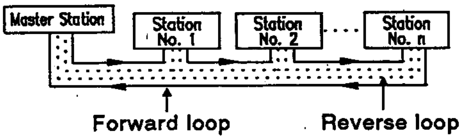
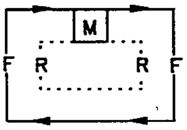
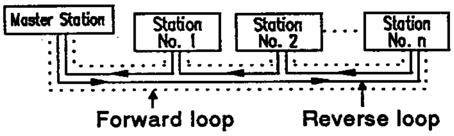
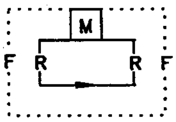
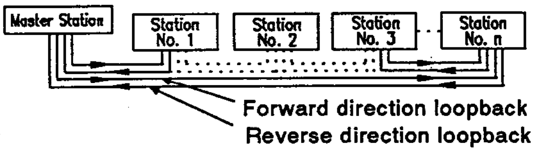
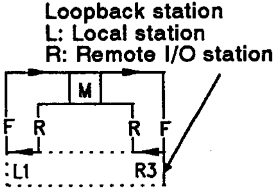
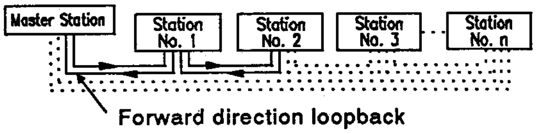
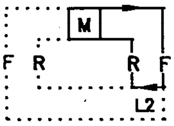
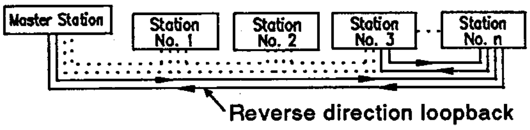
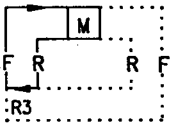
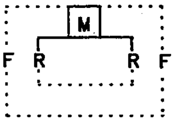
3) PRESENT : Displays the presently required link scan time.

(b) The link scan time is stored in D9207 to D9209.

(4) Data link system loop status

(a) The table on the following page illustrates how the status of loop currently being used for the link is displayed.

Table 10.1 Data Link Status

Data Link Status	GPP/PHP Screen Display
Data link in forward loop 	
Data link in reverse loop 	
Loopback in forward/reverse direction 	
Loopback in forward direction 	
Loopback in reverse direction 	
Data link impossible	

(b) The loop line status and loopback station are stored in the following registers:

1) Loop line status : D9204

2) Loopback station : D9205, D9206

(5) Operation status of all slave stations (local and remote I/O stations)

The following describes how the status of all of the slave stations in the system is displayed:

"L" column: Status of present data link

"C": Communicating normally

"D": Disconnected due to communication stop

Possible causes for "D" being displayed:

(1) The power supply to the disconnected station is FF.

(2) The disconnected station was reset.

(3) An error occurred that caused PC CPU operations to stop.

(4) A MELSECNET-compatible local or remote I/O station has been connected to a station number that has been set with link parameters as a MELSECNET (II)-compatible station (local station).

(5) The station was disconnected as part of loopback processing.

"P": Parameter communication with master station

Link parameter communication is only executed once when starting communications.

Possible causes for "P" being displayed continuously:

(1) A remote I/O station is connected to a station number set with the link parameters as the MELSECNET mode local station.

(2) A local station is connected to a station number set as a remote I/O station.

(3) A remote I/O station is connected to a station number set as a MELSECNET-compatible local station with link parameters in the MELSECNET II composite mode.

"C" and "D" data are stored in special data registers D9224 to D9227.

(This data is the same as the data in D9224 and D9225 when a MELSECNET/B Data Link System is used.)

"P" data is stored in special data registers D9228 to D9231.

(This data is the same as the data in D9228 and D9229 when a MELSECNET/B Data Link System is used.)

"S" column: Present CPU operation status

"R" : Run status

"S" : Stop status

"R" will always be displayed for a remote I/O station.

The data displayed in the "S" column is stored in special data registers D9212 to D9215.

(This data is the same as the data in D9212 and D9213 when a MELSECNET/B Data Link System is used.)

"A" column: An error will occur with the master station for the third tier if there is an error in the third tier link parameters set for the station in question.

For example, an error will occur if neither inputs (X) nor outputs (Y) are set with the link parameters or if the I/O module is not loaded in the slots as allocated by the master station I/O allocation.

"0" : Normal

"E" : Error

The data displayed in the "A" column is stored in special data registers D9220 to D9223.

(This data is the same as the data in D9220 and D9221 when a MELSECNET/B Data Link System is used.)

"B" column: Displays whether a local station has detected an error at another local station.

"0" : Error has not been detected.

"E" : Error has been detected.

"0" will always be displayed for a remote I/O station.

The data displayed in the "B" column is stored in special data registers D9216 to D9219.

(This data is the same as the data in D9216 and D9217 when a MELSECNET/B Data Link System is used.)

"C" column: Displays the forward loop line status of each slave station.

"0" : Normal

"E" : Error

The data displayed in the "C" column is stored in special data registers D9232 to D9239.

(This data is the same as the data in D9232 to D9235 when a MELSECNET/B Data Link System is used.)

"D" column: Displays the reverse loop line status of each slave station.

"0" : Normal

"E" : Error

The data displayed in the "C" column is stored in special data registers D9232 to D9239.

(This data is the same as the data in D9232 to D9235 when a MELSECNET/B Data Link System is used.)

POINT

(1) Forward/reverse loop errors of the master station and slave stations are detected at the receive end.

Possible causes for forward/reverse loop errors:

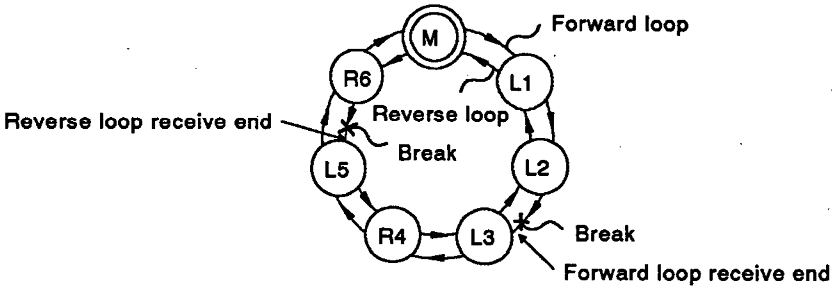
(a) Broken or loose loop cable connection

(b) Faulty hardware at receive end

(c) Faulty hardware at send end

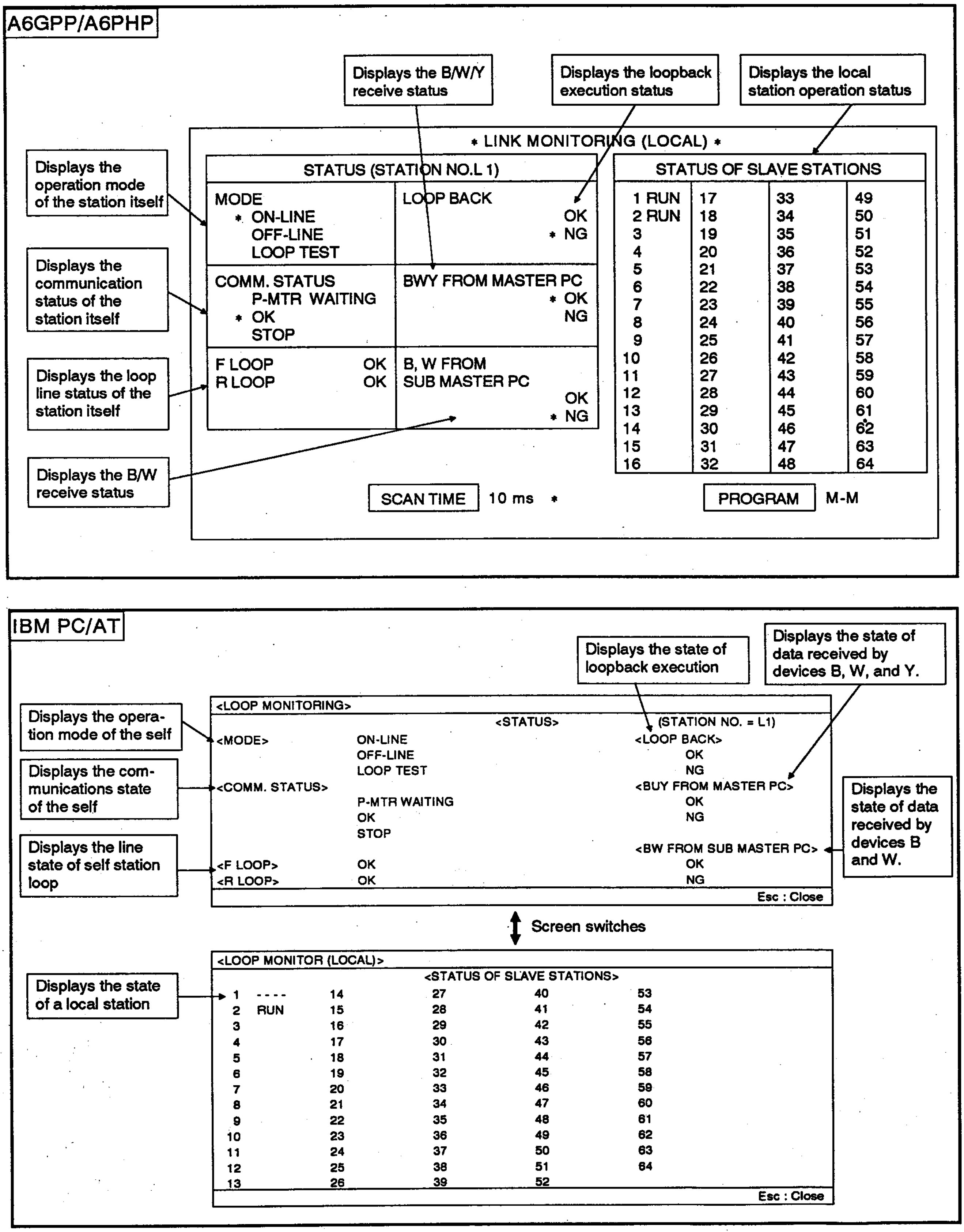
In the system configuration illustrated below, if the forward loop of L3 becomes faulty, the forward loop cable that connects L2 to L3 might be broken or loose, the hardware at the forward loop send end of L2 might be faulty, or the hardware at the forward loop receive end of L3 might be faulty.

If the cable that connects L5 and R6 is broken or loose, a reverse loop error for L5 will occur.



(2) If the status of a slave station displayed in "L" column is "D", the previous data in the "S", "A", "B", "C", and "D" columns will remain unchanged.

10.1.2 Local station link monitor



```
A6GPP/A6PHP

                      * LINK MONITORING (LOCAL) *
 STATUS (STATION NO.L 1)                    STATUS OF SLAVE STATIONS
 MODE                  | LOOP BACK          |  1 RUN  17   33   49
   * ON-LINE           |              OK    |  2 RUN  18   34   50
     OFF-LINE          |            * NG    |  3      19   35   51
     LOOP TEST         |                    |  4      20   36   52
 COMM. STATUS          | BWY FROM MASTER PC |  5      21   37   53
     P-MTR WAITING     |            * OK    |  6      22   38   54
   * OK                |              NG    |  7      23   39   55
     STOP              |                    |  8      24   40   56
 F LOOP            OK  | B, W FROM          |  9      25   41   57
 R LOOP            OK  | SUB MASTER PC      | 10      26   42   58
                       |              OK    | 11      27   43   59
                       |            * NG    | 12      28   44   60
                                            | 13      29   45   61
                                            | 14      30   46   62
                                            | 15      31   47   63
                                            | 16      32   48   64

        SCAN TIME   10 ms   *                  PROGRAM   M-M
```

```
IBM PC/AT

<LOOP MONITORING>
                                  <STATUS>              (STATION NO. = L1)
<MODE>               ON-LINE                            <LOOP BACK>
                     OFF-LINE                                 OK
                     LOOP TEST                                NG
<COMM. STATUS>                                          <BUY FROM MASTER PC>
                     P-MTR WAITING                            OK
                     OK                                       NG
                     STOP
                                                        <BW FROM SUB MASTER PC>
<F LOOP>             OK                                       OK
<R LOOP>             OK                                       NG
                                                                  Esc : Close
```

```
<LOOP MONITOR (LOCAL)>
                          <STATUS OF SLAVE STATIONS>
  1   ----      14        27        40        53
  2   RUN       15        28        41        54
  3             16        29        42        55
  4             17        30        43        56
  5             18        31        44        57
  6             19        32        45        58
  7             20        33        46        59
  8             21        34        47        60
  9             22        35        48        61
 10             23        36        49        62
 11             24        37        50        63
 12             25        38        51        64
 13             26        39        52
                                                                  Esc : Close
```

Fig. 10.2 Local Station Link Monitor Screen (A6GPP/A6PHP/IBM PC/AT connected to local station)

(1) Operation mode of the station itself

(a) Displays the local station operation status

1) ONLINE:

Local station mode setting is ONLINE (automatic return function set/not set).

2) OFFLINE:

Local station mode setting is OFFLINE, SELF-LOOPBACK TEST, or STATION-TO-STATION TEST.

3) LOOP TEST:

Local station mode setting is FORWARD LOOP TEST or REVERSE LOOP TEST.

(b) The selected operation mode is stored in M9240 and M9252.

(2) Communication status of the station itself

(a) Displays the communication status of the host local station itself.

1) P-MTR WAITING:

Awaiting parameter data to be sent from the master station.

2) OK: Normal communication is being executed.

3) STOP:

The local station itself is disconnected and communication has been stopped.

(b) The current communication status is stored in M9250 and M9251.

(3) Loop line status of the station itself

(a) Displays the forward loop (F loop) and reverse loop (R loop) status of the local station itself.

Only OK is displayed when a MELSECNET/B Data Link System is used.

1) OK: Loop line is normal.

2) NG: Loop line is faulty.

(b) The loop line status is stored in M9241 and M9242.

(4) Loopback execution status

(a) Displays whether loopback has been executed by the local station itself.

1) OK (executed):

Loopback has been executed by the local station itself.

2) NG (not executed):

Loopback has not been executed by the local station itself.

(b) The loopback execution status is stored in M9243.

(5) B/W/Y receive status

(a) Displays whether the link relays (B), link registers (W), and link outputs (Y) are being received from the master station.

1) OK (receiving):

B, W, and Y are being received from the master station in the cyclic communication mode.

2) NG (not receiving):

The local station itself is disconnected and B, W, and Y are not being received from the master station.

(b) The B/W/Y receive status is stored in M9246.

(6) B/W receive status (local station in three-tier system)

(a) Displays whether a local station in the third tier is receiving the link relays (B) and link registers (W) from the master station for the second tier.

1) OK (receiving):

B and W are being received from the master station for the second tier in the cyclic communication mode.

2) NG (not receiving):

The local station itself is in a status in which B and W are not being received from the master station for the second tier. Reception will be disabled when M9247 is turned ON.

(b) The B/W receive status is stored in M9247.

(7) Local station operation status

(a) Displays the operation status of the local station.

1) RUN : Station in RUN status
2) STOP : Station in STOP status
3) DOWN : Station is disconnected from the link

(b) The operation status of remote I/O stations will always be RUN.

(c) The data of local station operation status is stored in D9248 to D9251 and D9252 to D9255.

(This data is the same as the data in D9248, D9249, D9252, and D9253 when a MELSECNET/B Data Link System is used.)

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	o		o			

10.1.3 Remote I/O station link monitor

This section describes the link monitor data for the following two link monitor functions:

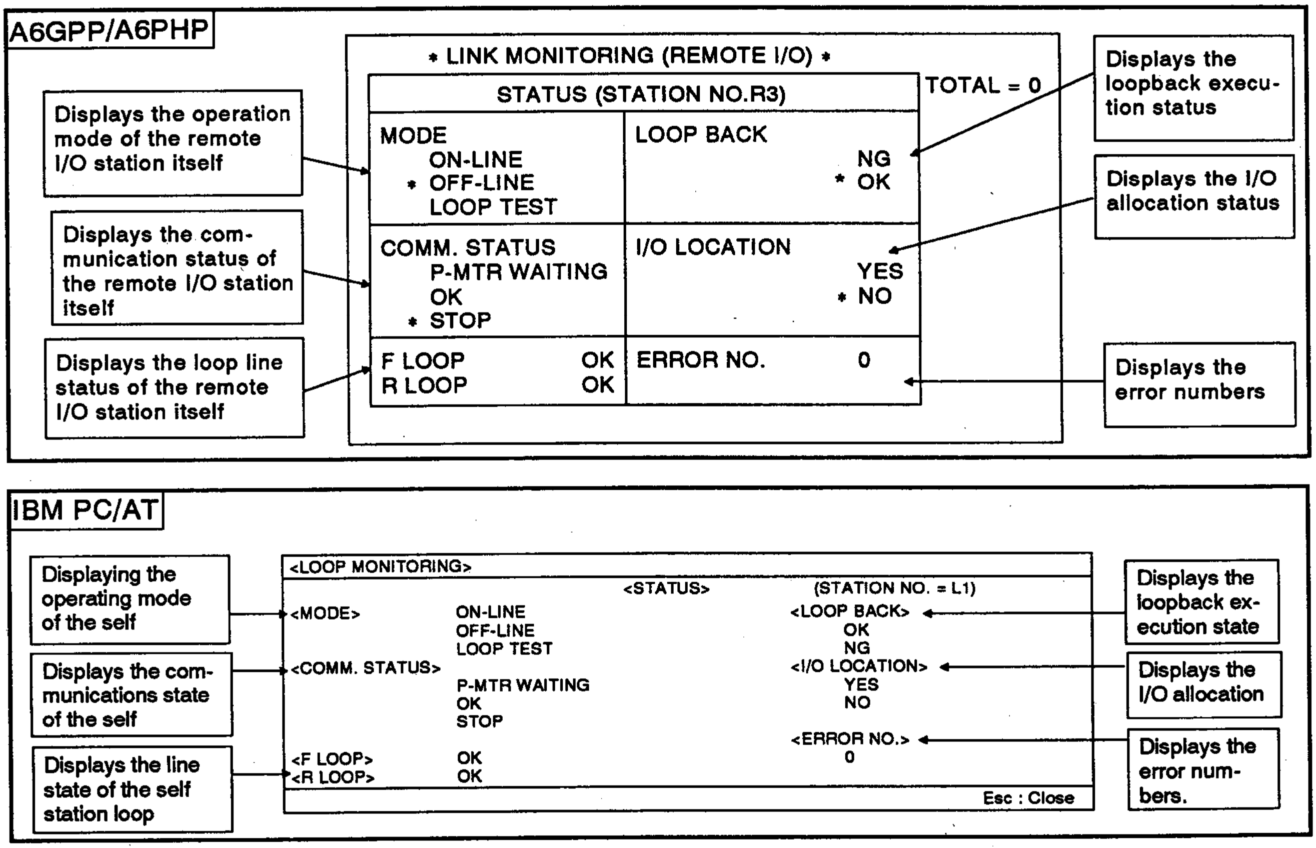
(a) Loop monitor:

The data link status of the remote I/O station itself.

(b) Batch monitor:

The data link status of the devices that are sent/received by the remote I/O stations themselves (batch monitored).

[Loop Monitor]



```
        * LINK MONITORING (REMOTE I/O) *
 STATUS (STATION NO.R3)                      TOTAL = 0
 MODE                   LOOP BACK
     ON-LINE                          NG
   * OFF-LINE                       * OK
     LOOP TEST
 COMM. STATUS           I/O LOCATION
     P-MTR WAITING                   YES
     OK                            * NO
   * STOP
 F LOOP           OK    ERROR NO.         0
 R LOOP           OK
```

```
<LOOP MONITORING>
                                 <STATUS>         (STATION NO. = L1)
<MODE>             ON-LINE                         <LOOP BACK>
                   OFF-LINE                          OK
                   LOOP TEST                         NG
<COMM. STATUS>                                     <I/O LOCATION>
                   P-MTR WAITING                     YES
                   OK                                NO
                   STOP
                                                   <ERROR NO.>
<F LOOP>           OK                                0
<R LOOP>           OK
                                                        Esc : Close
```

Fig. 10.3 Loop Monitor Screen

(1) Operation mode of the station itself

(a) Displays the remote I/O station operation status

1) ONLINE:

Remote I/O station mode setting is ONLINE (automatic return function set/not set).

2) OFFLINE:

Remote I/O station mode setting is OFFLINE, SELF-LOOPBACK TEST, or STATION-TO-STATION TEST.

3) LOOP TEST:

Remote I/O station mode setting is FORWARD LOOP TEST or REVERSE LOOP TEST.

(2) Communication status of the station itself

(a) Displays the communication status of the remote I/O station itself.

1) P-MTR WAITING:

Awaiting parameter data to be sent from the master station.

2) OK: Normal communication is being executed.

3) STOP:

The remote I/O station itself is disconnected and communication has been stopped.

(3) Loop line status of the station itself

(a) Displays the forward loop (F loop) and reverse loop (R loop) status of the remote I/O station itself.

1) OK: Loop line is normal.

2) NG: Loop line is faulty.

(4) Loopback execution status

(a) Displays whether loopback has been executed by the remote I/O station itself.

1) OK (executed):

Loopback has been executed by the remote I/O station itself.

2) NG (not executed):

Loopback has not been executed by the remote I/O station itself.

(5) I/O allocation status

(a) Displays whether I/O allocation has been performed by the master station.

1) YES:

I/O allocation has been performed by the master station.

2) NO:

I/O allocation has not been performed by the master station.

(6) Error numbers

Error Number	Error Description	Counter Measure
10	A special function module loaded to a remote I/O station does not occupy 32 points.	Remove the special function modules that do not occupy 32 I/O points.
11	Special function module hardware error.	Replace the special function module.
12	The number of words read by an RFRP instruction exceeds the link register (W) range specified with the link parameters.	• Change the link register (W) range set with the link parameters. • Change the number of words to be read by an RFRP instruction.
13	The number of words written by an RTOP instruction exceeds the link register (W) range specified with the link parameters.	• Change the link register (W) range set with the link parameters. • Change the number of words to be read by an RTOP instruction.
14	An RFRP instruction has been executed when a special function module was faulty.	Special function module hardware error.
15	An RTOP instruction has been executed when a special function module was faulty.	Special function module hardware error.
20	Blown fuse in the I/O module.	Replace the fuse in the I/O module loaded to the remote I/O station.
21	I/O module verify error (The I/O module data in the remote I/O station is different from the data recognized when the power was turned ON.) (1)The I/O module is not secure. (2)The I/O module has been removed or another I/O module has been loaded during operation.	• Check or replace the I/O module. • Reset the master station or the remote I/O station.
22	Neither inputs (X) nor outputs (Y) have been specified with the parameters.	Check the I/O modules in the remote I/O station and set the parameters again.
23	I/O allocation error.	Check the link allocation for the I/O modules and the master station and correct the I/O allocation.
24	Remote I/O station specification error.	Check if the remote I/O station number is set with the link parameters as a local station and correct the setting.

(7) Station number

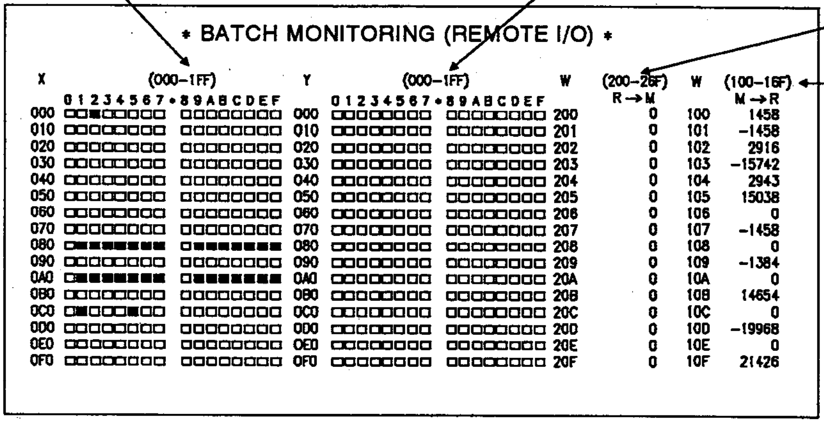
Displays the station number of the remote I/O station to which the GPP is connected.

(8) Number of slave stations

Displays the total number of local and remote I/O stations connected in the loop.

[Batch Monitor]

A6GPP/A6PHP



Displays the ON/OFF status of inputs (X)

Displays the ON/OFF status of outputs

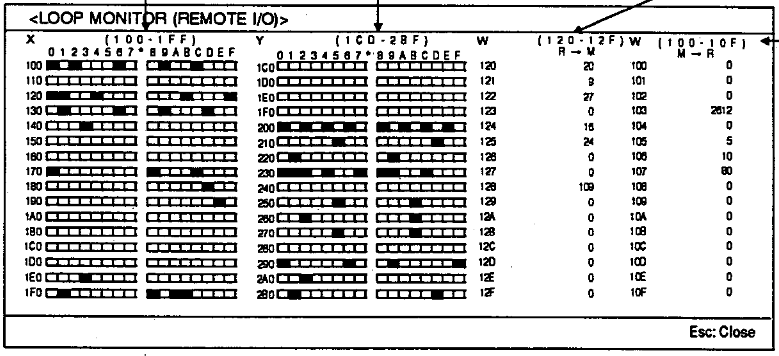
Displays the link registers (W) for RFRP instructions

Displays the link registers (W) for RTOP instructions

```
* BATCH MONITORING (REMOTE I/O) *

X     (000-1FF)            Y     (000-1FF)            W   (200-20F)  W   (100-10F)
  0 1 2 3 4 5 6 7 * 8 9 A B C D E F   0 1 2 3 4 5 6 7 * 8 9 A B C D E F   R→M            M→R
000                        000                        200     0      100     1458
010                        010                        201     0      101    -1458
020                        020                        202     0      102     2916
030                        030                        203     0      103   -15742
040                        040                        204     0      104     2943
050                        050                        205     0      105    15038
060                        060                        206     0      106        0
070                        070                        207     0      107    -1458
080                        080                        208     0      108        0
090                        090                        209     0      109    -1384
0A0                        0A0                        20A     0      10A        0
0B0                        0B0                        20B     0      10B    14654
0C0                        0C0                        20C     0      10C        0
0D0                        0D0                        20D     0      10D   -19968
0E0                        0E0                        20E     0      10E        0
0F0                        0F0                        20F     0      10F    21426
```

IBM PC/AT



Displaying the ON/OFF state of input (X)

Displaying the ON/OFF state of output (Y)

Displaying the link register (W) used for an RFRP instruction

Displaying the link register (W) used for an RTOP instruction

```
<LOOP MONITOR (REMOTE I/O)>
X      (100-1FF)           Y      (1C0-2BF)           W  (120-12F) W  (100-10F)
  0 1 2 3 4 5 6 7 * 8 9 A B C D E F   0 1 2 3 4 5 6 7 * 8 9 A B C D E F   R→M          M→R
100                        1C0                        120    20     100      0
110                        1D0                        121     9     101      0
120                        1E0                        122    27     102      0
130                        1F0                        123     0     103   2812
140                        200                        124    16     104      0
150                        210                        125    24     105      5
160                        220                        126     0     106     10
170                        230                        127     0     107     80
180                        240                        128   109     108      0
190                        250                        129     0     109      0
1A0                        260                        12A     0     10A      0
1B0                        270                        12B     0     10B      0
1C0                        280                        12C     0     10C      0
1D0                        290                        12D     0     10D      0
1E0                        2A0                        12E     0     10E      0
1F0                        2B0                        12F     0     10F      0

                                                                  Esc: Close
```

Fig. 10.4 Batch Monitor Screen

REMARK

Use SW□SRV-GPPA/SW□IVD-GPPA/SW□NX-GPPA when connecting a peripheral device to the remote I/O station.
GX Developer cannot be connected to the remote I/O station.

(1) ON/OFF status of inputs (X)

(a) Displays the ON/OFF status of inputs (X) sent from a remote I/O station to the master station.

1) ■: ON status

2) □: OFF status

(b) If the remote I/O station is online, the device numbers at the master station are used for the display.

If the remote I/O station is offline, the device numbers at the host remote I/O station are used for the display.

(2) ON/OFF status of outputs (Y)

(a) Displays the ON/OFF status of outputs (Y) sent from the master station to a remote I/O station.

1) ■: ON status

2) □: OFF status

(b) If the remote I/O station is online, the device numbers at the master station are used for the display.

If the remote I/O station is offline, the device numbers at the remote I/O station itself are used for the display.

(3) Link registers (W) for RFRP instructions

(a) Displays the data in the area set for data transmission from the remote I/O station itself to the master station.

(4) Link registers (W) for RTOP instructions

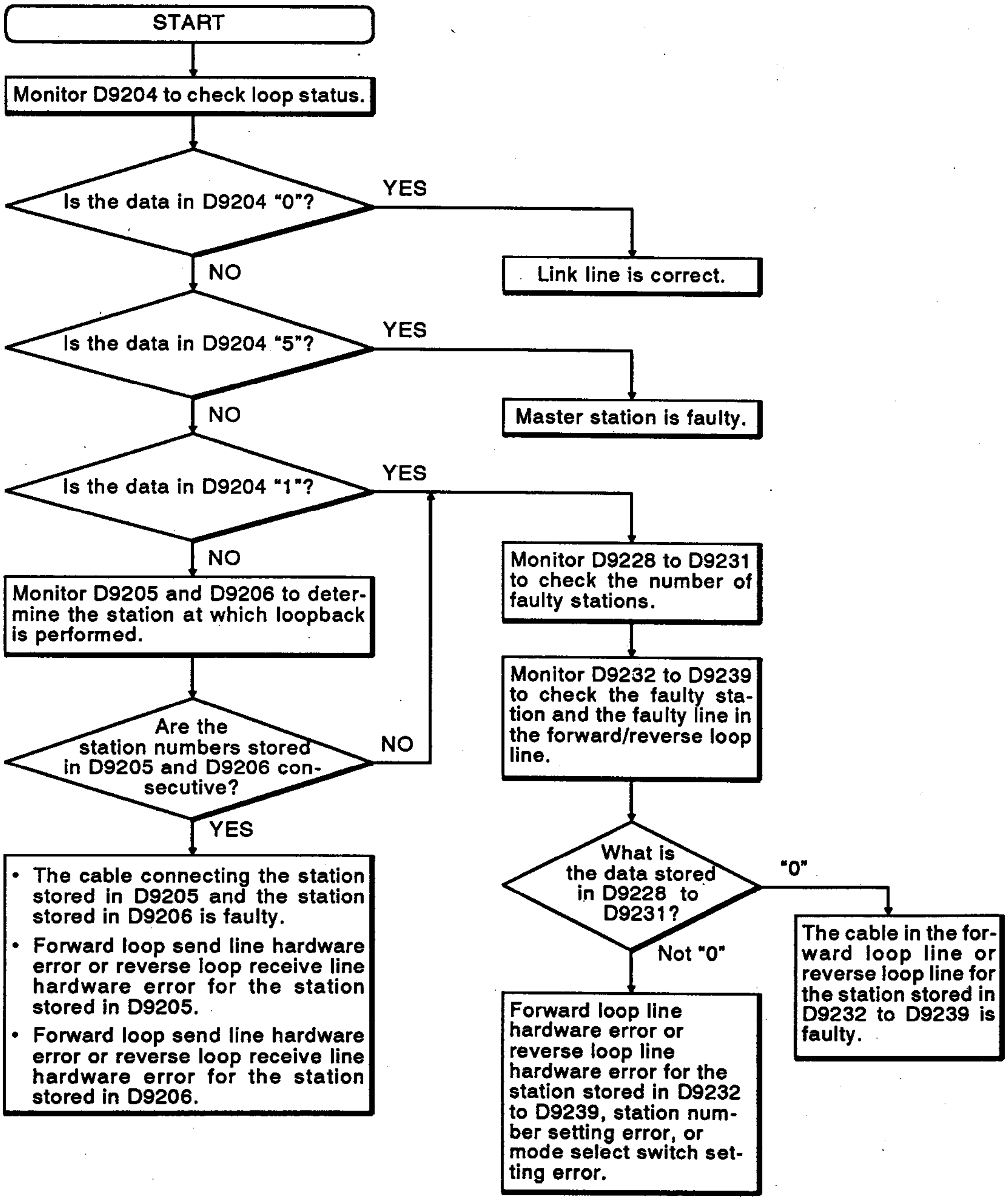
(a) Displays the data in the area set for data transmission from the master station to the remote I/O station itself.

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	o	o	o	o	o	o

10.2 Monitoring the Special Relays and Special Registers Used for the Link

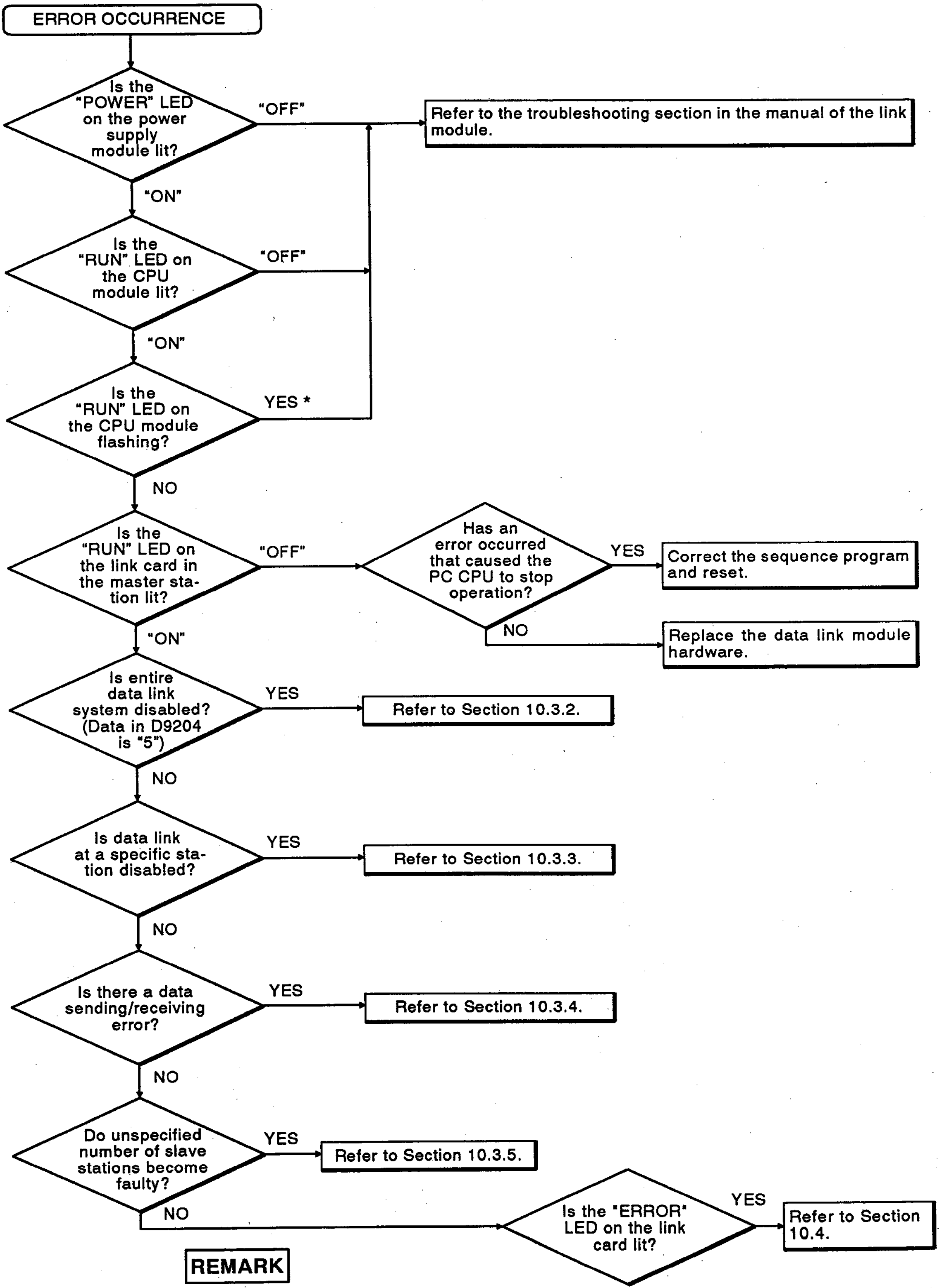
Faulty stations in the MELSECNET Data Link System can be found by using an A7PU to monitor the special relays and special registers used for the link. When a A6GPP/A6PHP/IBM PC/AT is available, use the link monitoring function as explained in Section 10.1.

Refer to Sections 9.2 and 9.3 for details on special relays and special registers.



10.3 Troubleshooting Flowchart

10.3.1 General troubleshooting flowchart

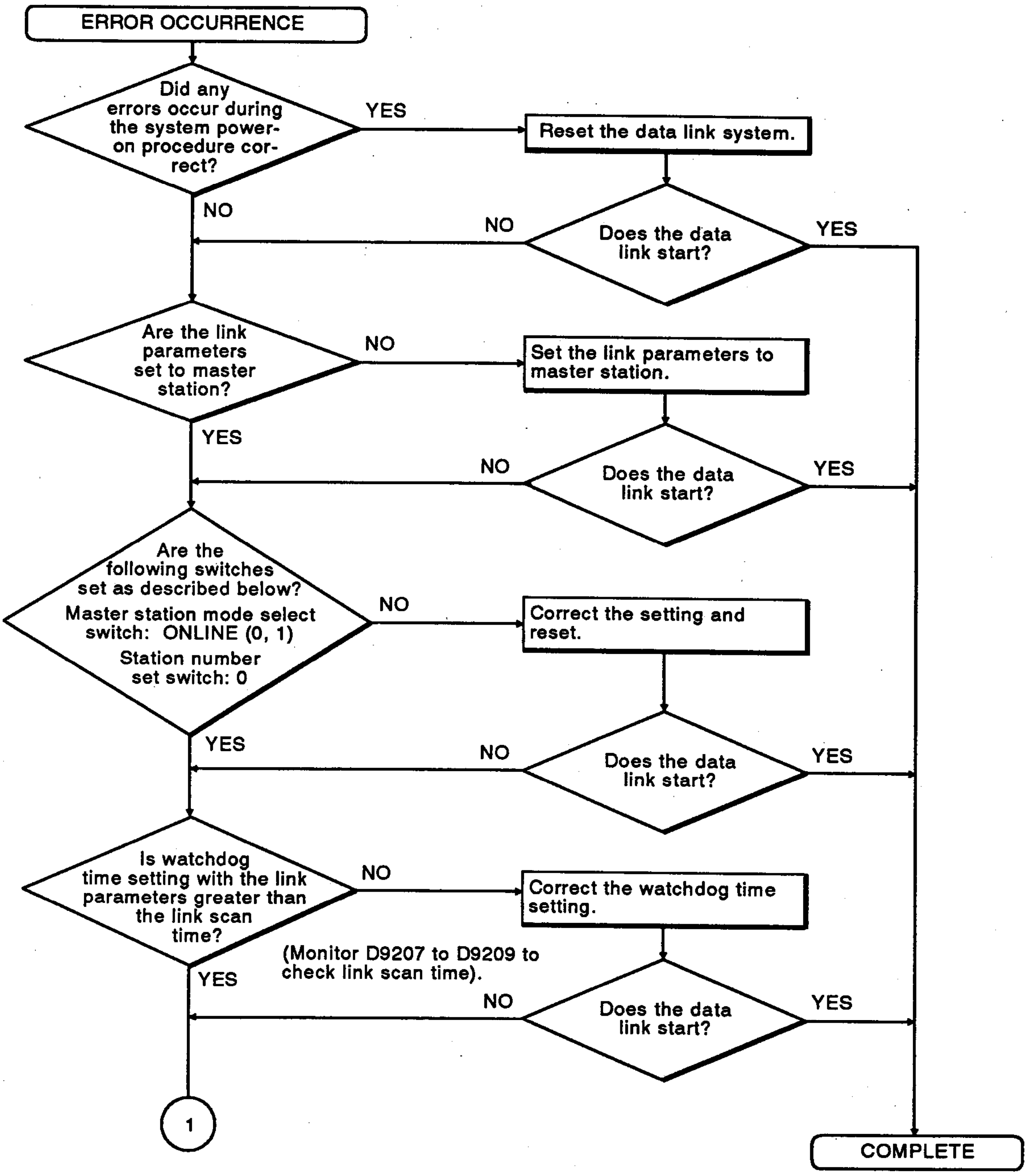


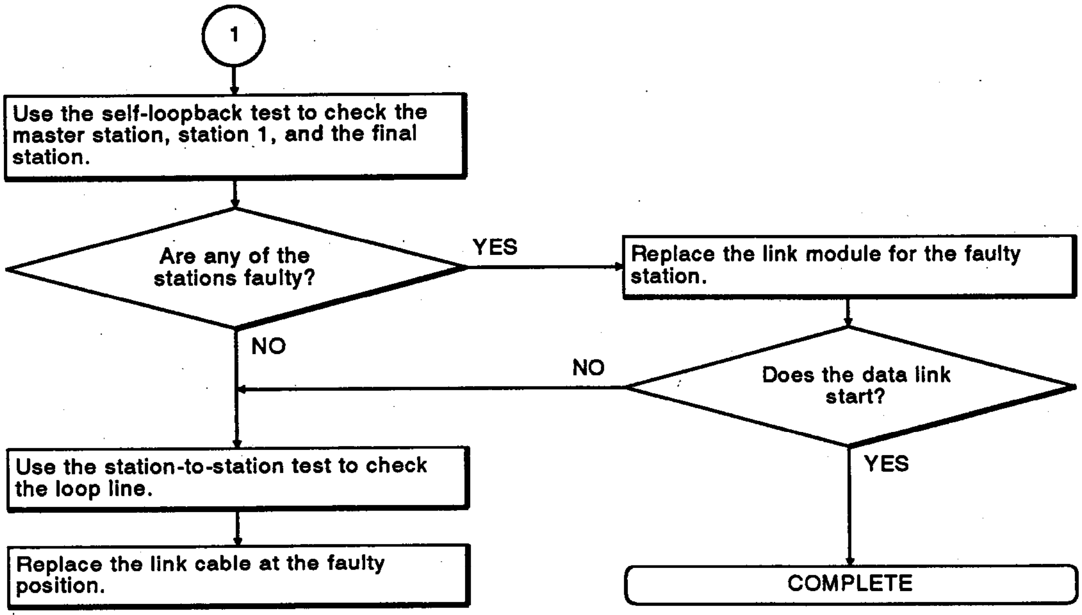
REMARK

*: When mode setting, station number setting, or baud rate setting for link module is not normal, "SP UNIT LAY ERR" causes by switching a CPU module from STOP to RUN.

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	○	○	○	○	○	○

10.3.2 Troubleshooting flowchart for when the data link is disabled throughout the entire system



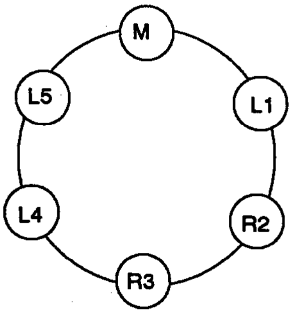


POINT

If the power supplies of the local and/or remote I/O stations on either side of a normally operating local or remote I/O station are turned off simultaneously (within 100 msec), the data link for the entire system might be disabled.

If the automatic return function is set for these stations, data communication resumes immediately. However, if the automatic return function is not set for these stations, they will remain disconnected. The CPU for each disconnected station must be reset in order to return them to the data link.

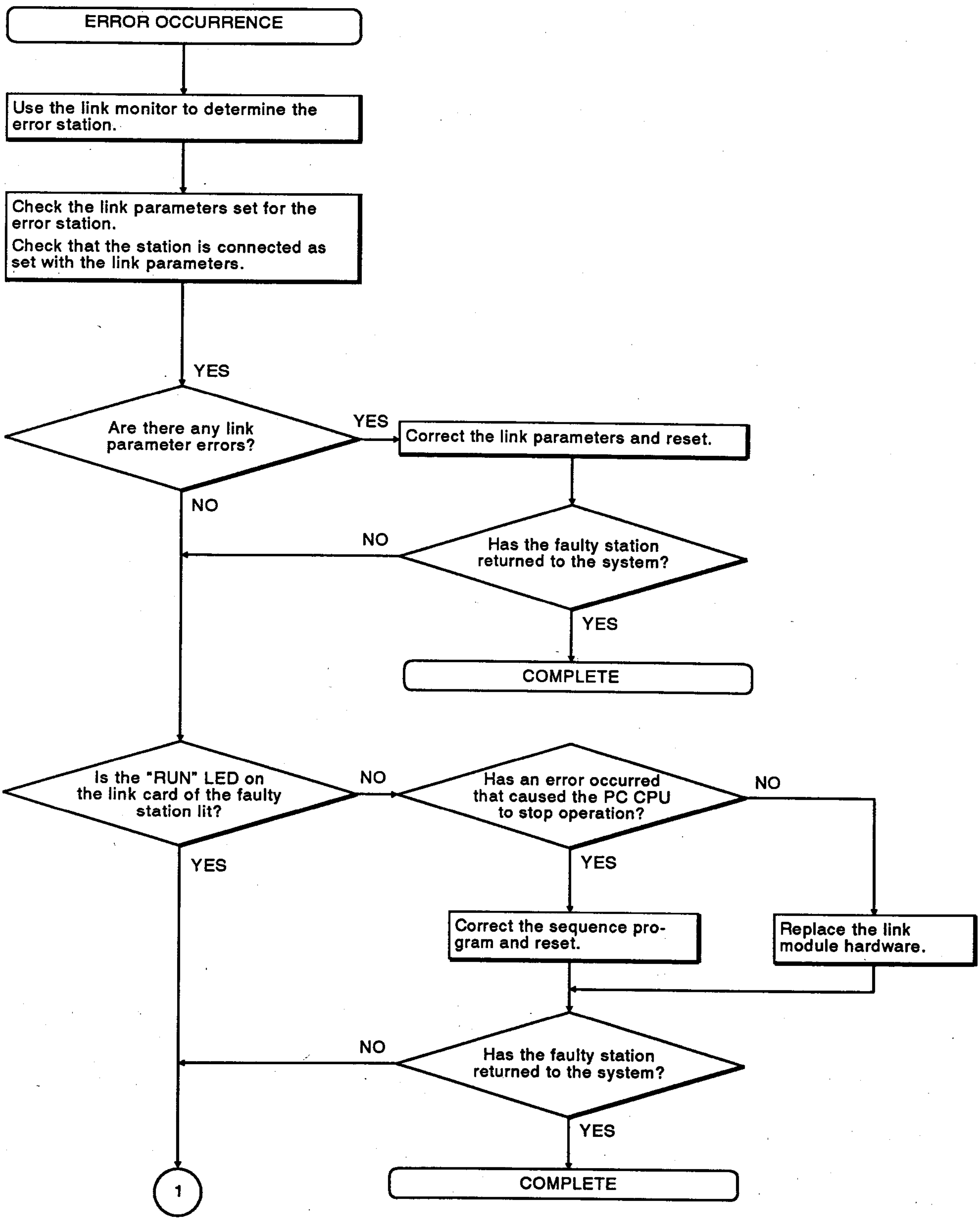
Example:

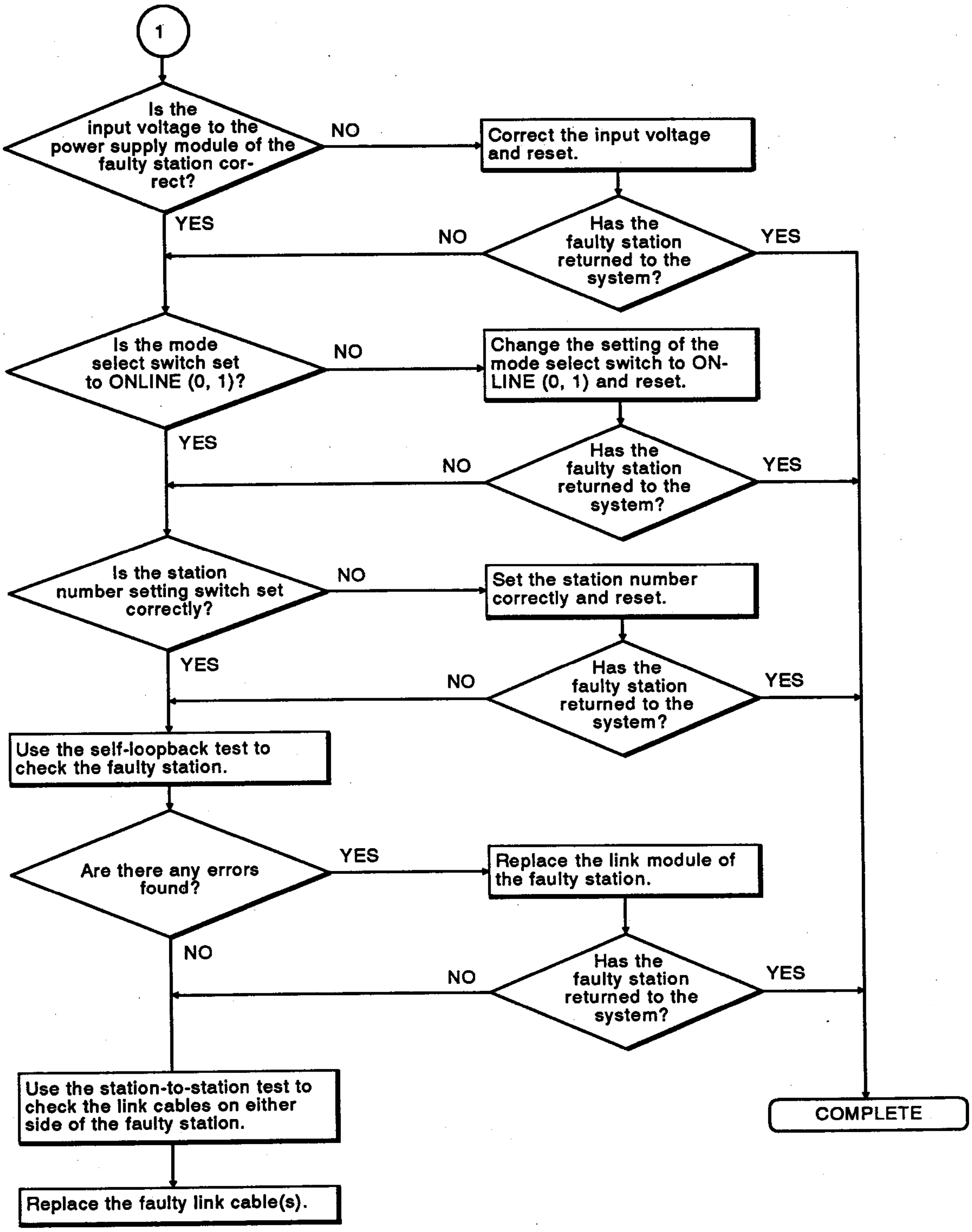


If power supply to L1 and R3 is turned off simultaneously (within 100 msec) while R2 is operating normally, the data link for the entire system might be disabled.

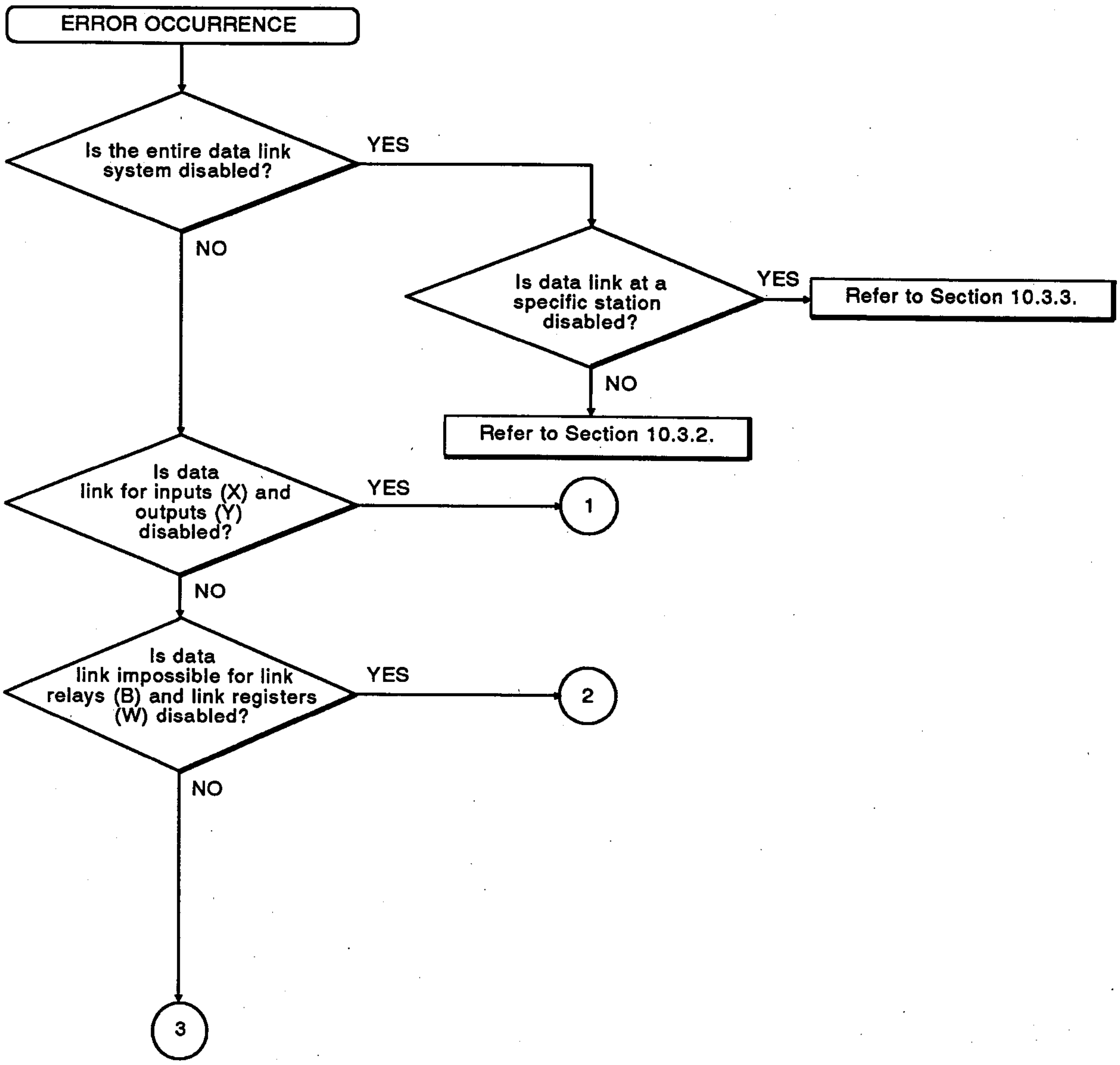
Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	○	○	○	○	○	○

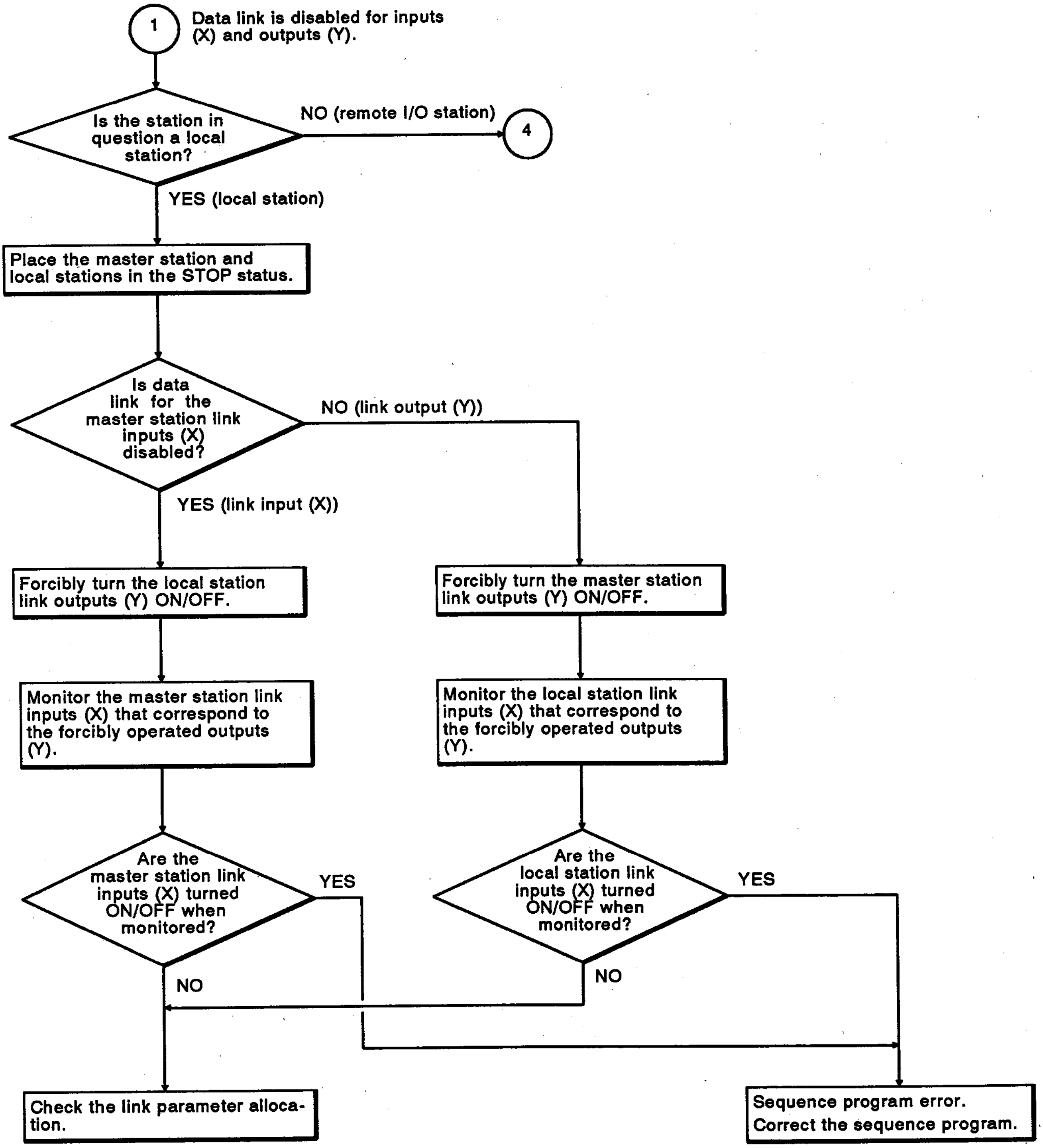
10.3.3 Troubleshooting flowchart for when the data link is disabled at a specific station

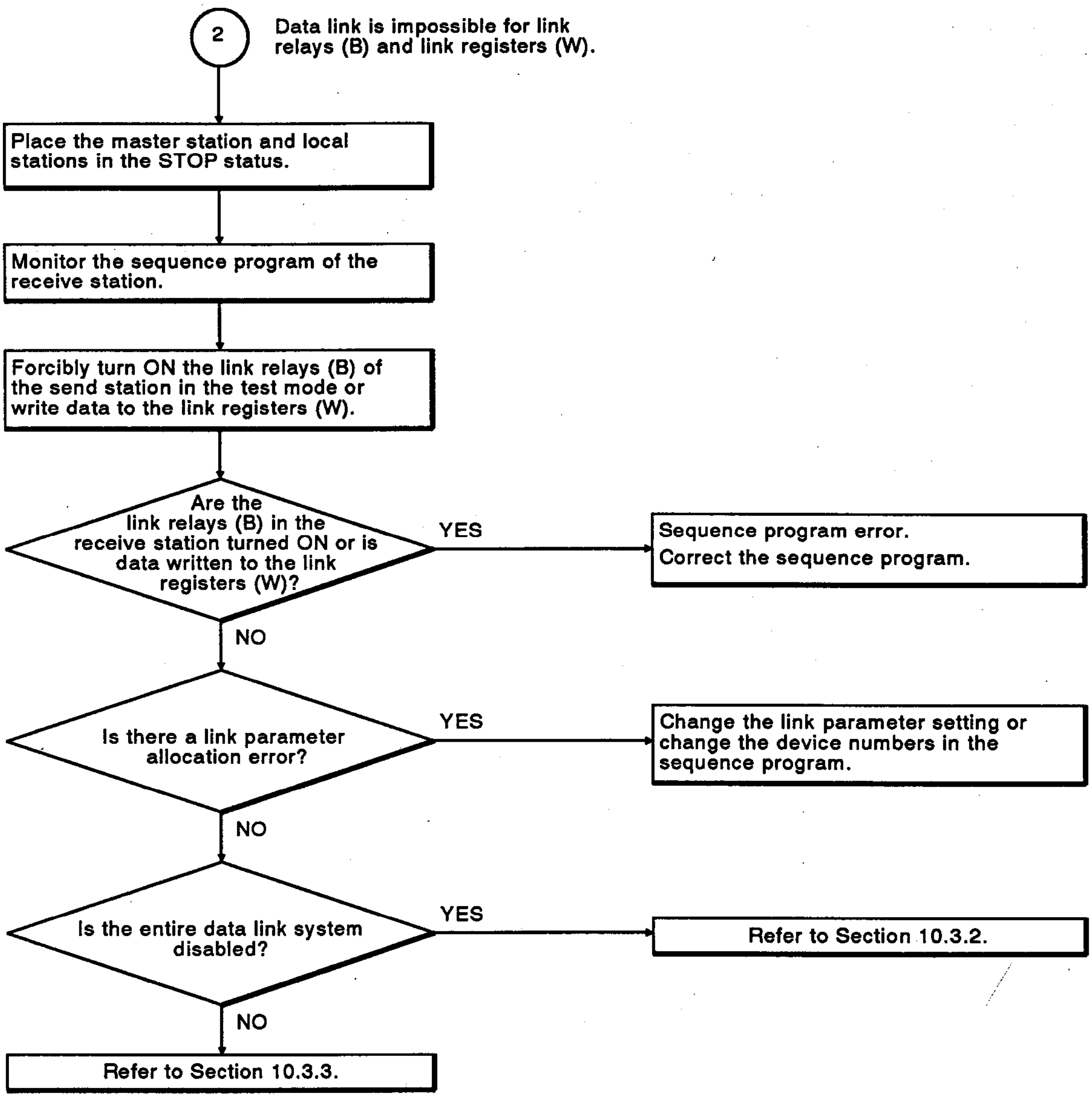


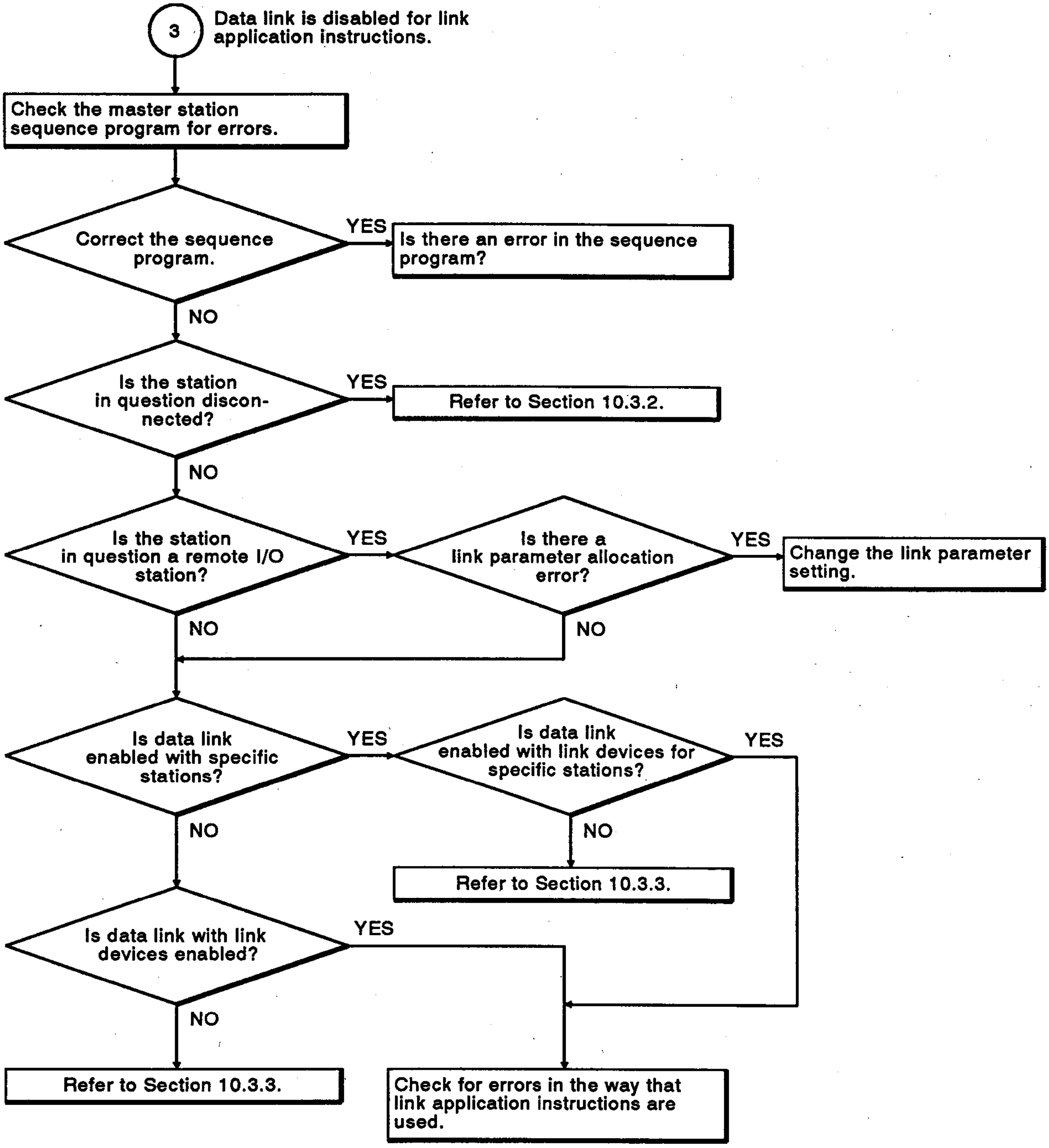

1
Is the input voltage to the power supply module of the faulty station correct?
NO
Correct the input voltage and reset.
YES
NO
Has the faulty station returned to the system?
YES
Is the mode select switch set to ONLINE (0, 1)?
NO
Change the setting of the mode select switch to ONLINE (0, 1) and reset.
YES
NO
Has the faulty station returned to the system?
YES
Is the station number setting switch set correctly?
NO
Set the station number correctly and reset.
YES
NO
Has the faulty station returned to the system?
YES
Use the self-loopback test to check the faulty station.
Are there any errors found?
YES
Replace the link module of the faulty station.
NO
NO
Has the faulty station returned to the system?
YES
Use the station-to-station test to check the link cables on either side of the faulty station.
COMPLETE
Replace the faulty link cable(s).

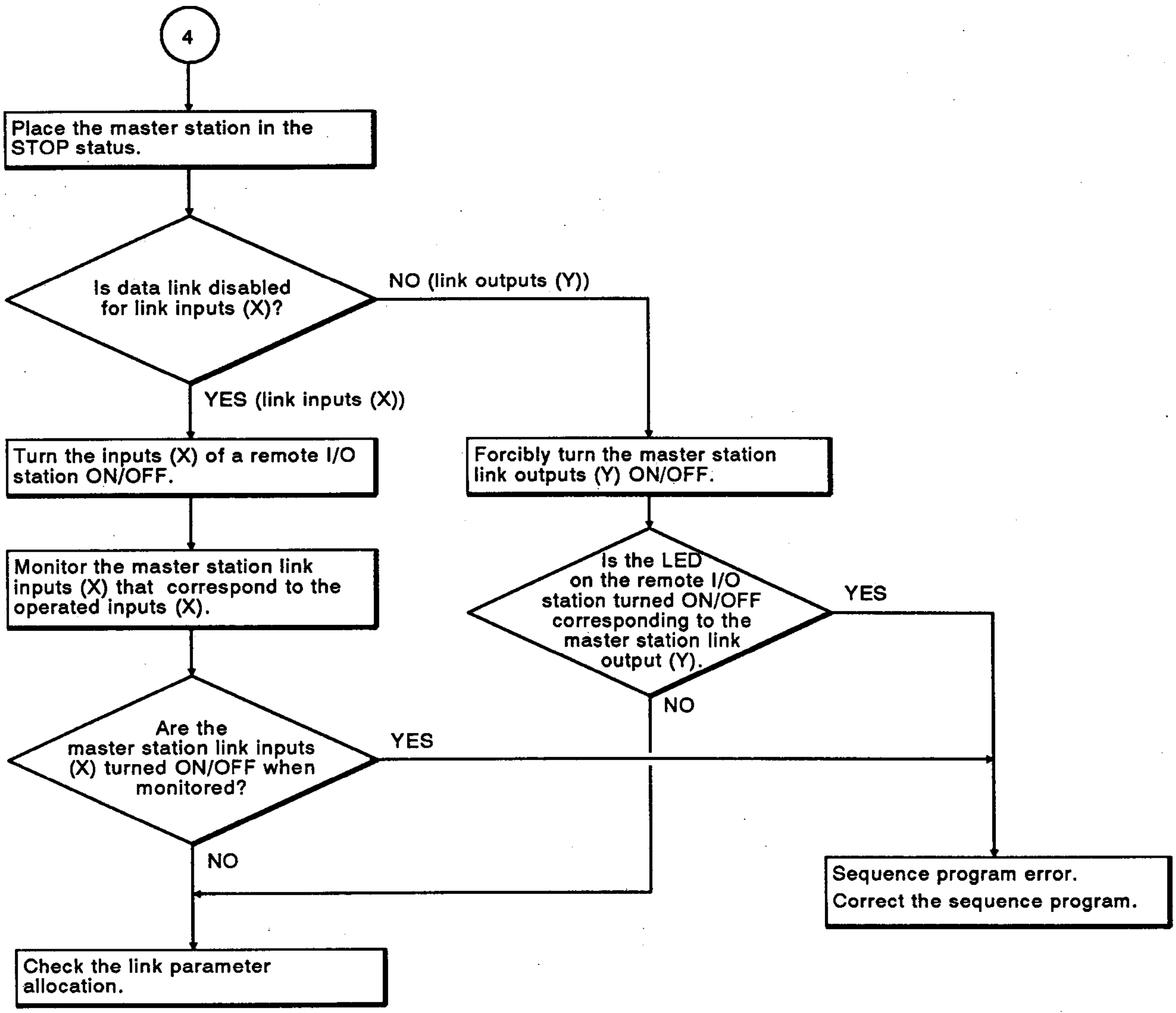
10.3.4 Troubleshooting flowchart for when a data send/receive error occurs




1
Data link is disabled for inputs (X) and outputs (Y).
Is the station in question a local station?
NO (remote I/O station)
4
YES (local station)
Place the master station and local stations in the STOP status.
Is data link for the master station link inputs (X) disabled?
NO (link output (Y))
YES (link input (X))
Forcibly turn the local station link outputs (Y) ON/OFF.
Forcibly turn the master station link outputs (Y) ON/OFF.
Monitor the master station link inputs (X) that correspond to the forcibly operated outputs (Y).
Monitor the local station link inputs (X) that correspond to the forcibly operated outputs (Y).
Are the master station link inputs (X) turned ON/OFF when monitored?
YES
NO
Are the local station link inputs (X) turned ON/OFF when monitored?
YES
NO
Check the link parameter allocation.
Sequence program error. Correct the sequence program.

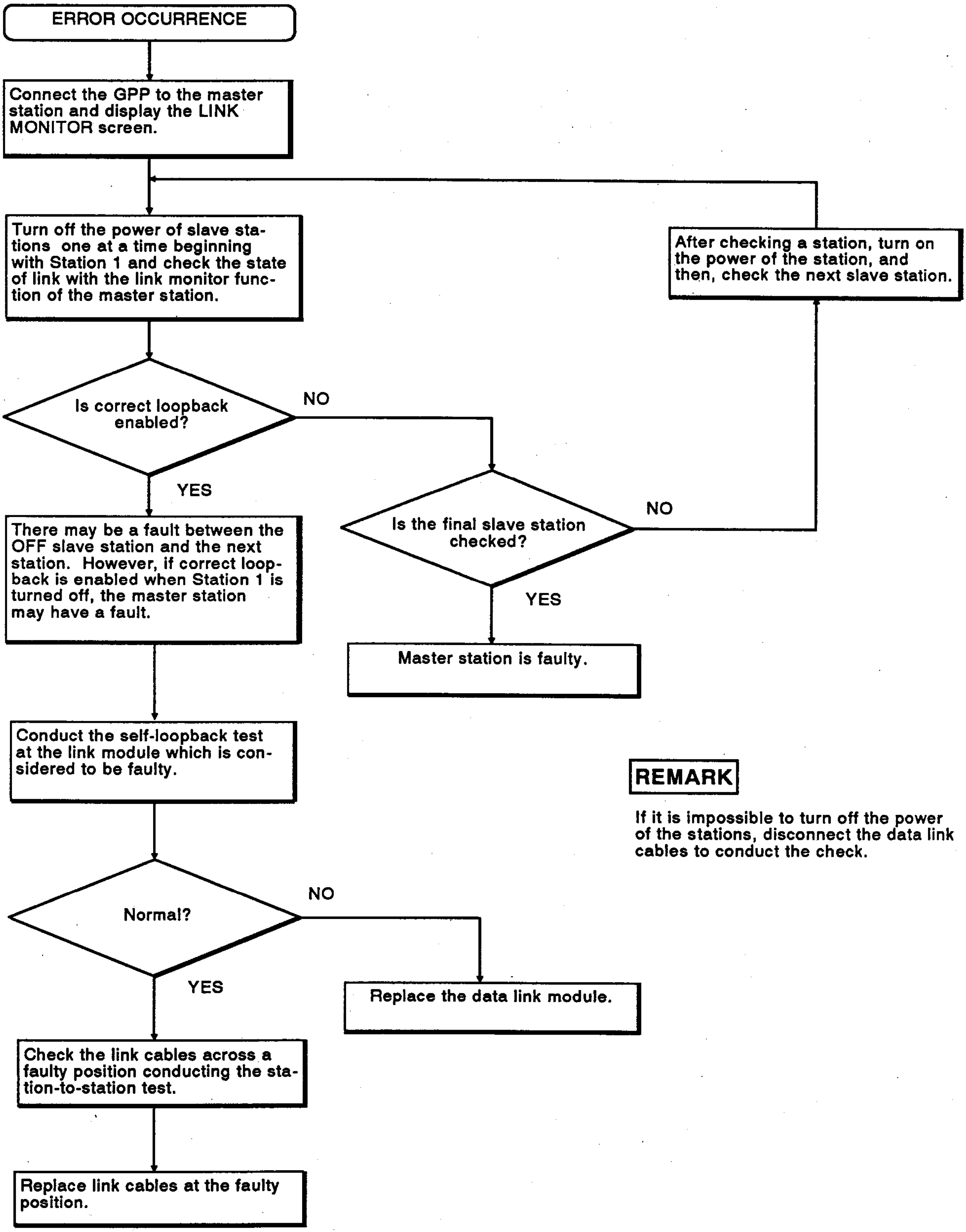

2
Data link is impossible for link relays (B) and link registers (W).
Place the master station and local stations in the STOP status.
Monitor the sequence program of the receive station.
Forcibly turn ON the link relays (B) of the send station in the test mode or write data to the link registers (W).
Are the link relays (B) in the receive station turned ON or is data written to the link registers (W)?
YES
Sequence program error.
Correct the sequence program.
NO
Is there a link parameter allocation error?
YES
Change the link parameter setting or change the device numbers in the sequence program.
NO
Is the entire data link system disabled?
YES
Refer to Section 10.3.2.
NO
Refer to Section 10.3.3.


3
Data link is disabled for link application instructions.
Check the master station sequence program for errors.
Correct the sequence program.
YES
Is there an error in the sequence program?
NO
Is the station in question disconnected?
YES
Refer to Section 10.3.2.
NO
Is the station in question a remote I/O station?
YES
Is there a link parameter allocation error?
YES
Change the link parameter setting.
NO
NO
Is data link enabled with specific stations?
YES
Is data link enabled with link devices for specific stations?
YES
NO
NO
Refer to Section 10.3.3.
Is data link with link devices enabled?
YES
NO
Refer to Section 10.3.3.
Check for errors in the way that link application instructions are used.


4
Place the master station in the STOP status.
Is data link disabled for link inputs (X)?
NO (link outputs (Y))
YES (link inputs (X))
Turn the inputs (X) of a remote I/O station ON/OFF.
Forcibly turn the master station link outputs (Y) ON/OFF.
Monitor the master station link inputs (X) that correspond to the operated inputs (X).
Is the LED on the remote I/O station turned ON/OFF corresponding to the master station link output (Y).
YES
NO
Are the master station link inputs (X) turned ON/OFF when monitored?
YES
NO
Sequence program error.
Correct the sequence program.
Check the link parameter allocation.

Data Link System	MELSECNET			MELSECNET/B		
Operating Mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode	MELSECNET mode	MELSECNET II mode	MELSECNET II composite mode
Applicability	o	o	o			

10.3.5 Troubleshooting flowchart for when unspecified number of slave stations become faulty



REMARK

If it is impossible to turn off the power of the stations, disconnect the data link cables to conduct the check.

10.4 Error LED Indicators

Display	Error Name	Error Detection Status	Possible Causes
CRC	CRC error (cyclic redundancy check)	ON	• The code of received data is checked. • This error might occur depending on the timing in which the station sending the data is disconnected from the link. • Cable fault, noise, etc. caused the error.
OVER	Overrun error	ON	• A set of received data has overwritten the previous set of data before it was processed. • A hardware error with the data link module receive circuit has occurred. • Note: In a system in which local stations and remote I/O stations are connected, the "OVER" LED on the remote I/O station will be lit dimly when there is no error.
AB.IF	Abort invalid frame error	ON	• "1" bits are received continuously and the limit is exceeded or the length of received data is shorter than the specified length. • This error might occur depending on the timing in which the station sending the data is disconnected from the link. • Short watchdog time setting, cable fault, noise, etc. caused the error.
TIME	Time check error	ON	• The data link watchdog timer in the master station operates. An error has occurred at a local station or a remote I/O station. • Short watchdog time setting, cable fault, noise, etc. caused the error.
DATA	Data check error	ON	• Error code data is received (can only be lit in the test mode). • Cable fault, noise, etc. caused the error.
UNDER	Underrun error	ON	• Send data internal processing is not being performed at regular intervals. • A hardware error with the data link module send circuit has occurred.
F.LOOP	Forward loop error	ON	• The forward loop line has a fault or the power supply to the adjacent stations has been turned off. • The forward loop line cable is broken or not connected.
R.LOOP	Reverse loop error	ON	• The reverse loop line has a fault or the power supply to the adjacent stations has been turned off. • The reverse loop line cable is broken or not connected.

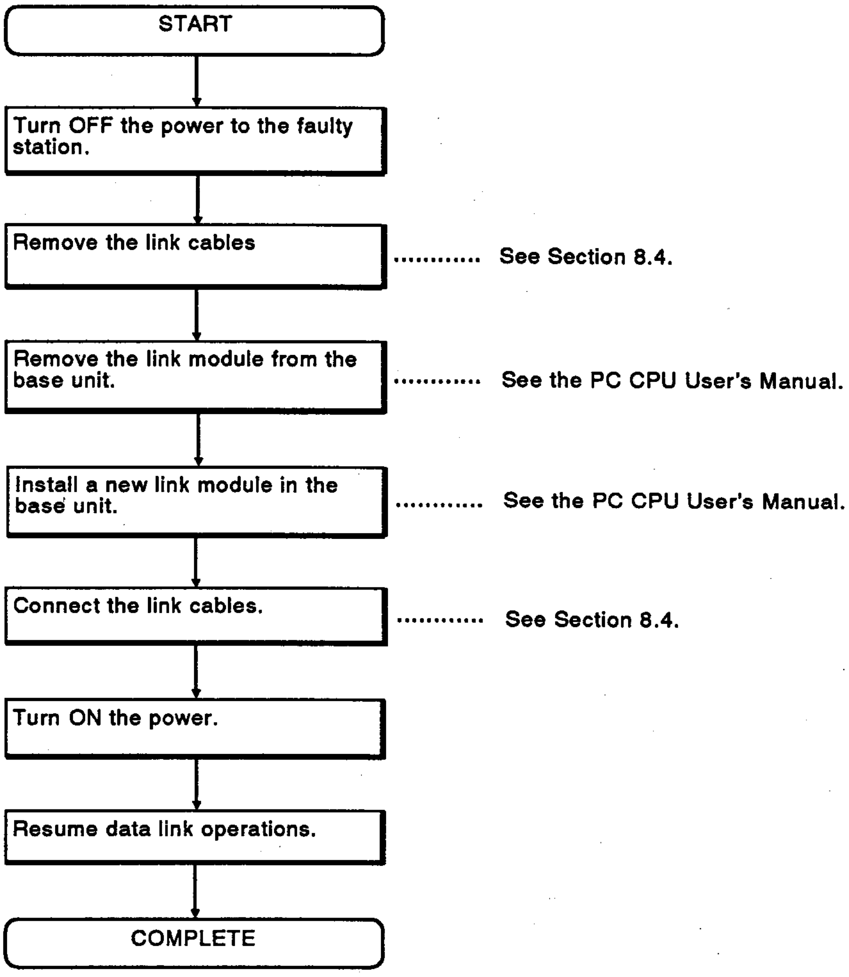
10.5 Replacing a Faulty Station's Link Module

This section explains how to replace the link module in a faulty station.

When a MELSECNET Data Link System is used

Since the link cables are doubled in a MELSECNET Data Link System, the loopback function enables data link operations even if power to a local or remote I/O station is turned OFF.

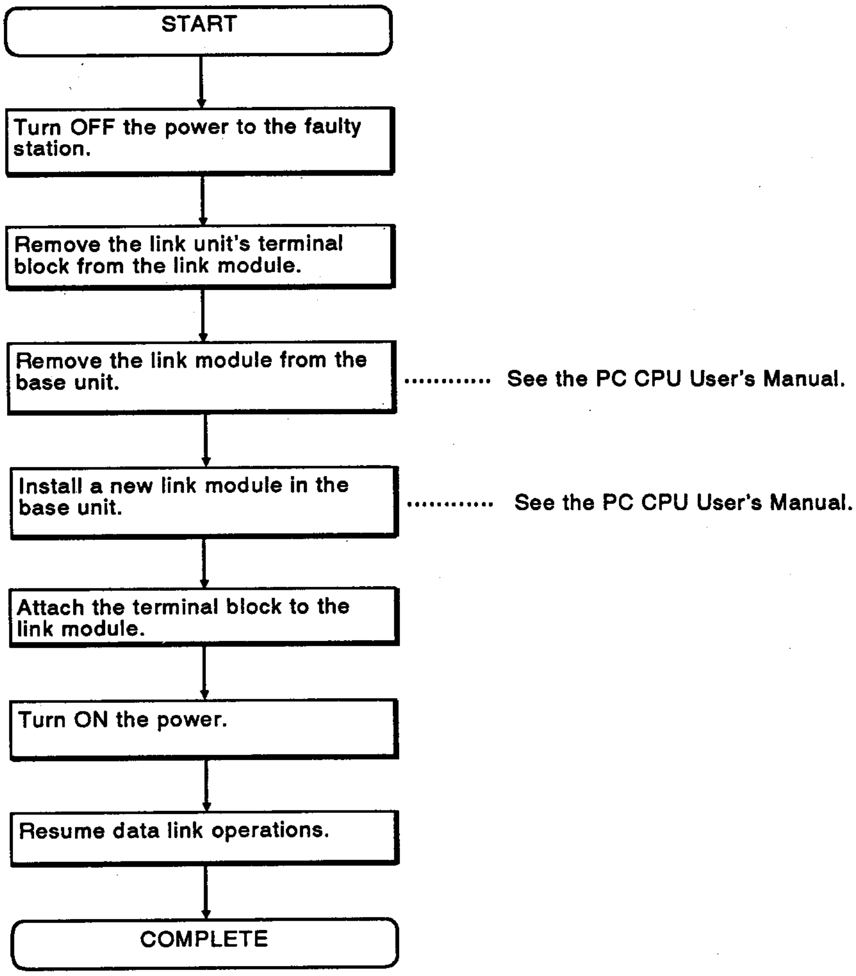
Replace the link module of a faulty station as given below:



When a MELSECNET/B Data Link System is used

In a MELSECNET/B Data Link System, since the link cables for both send and receive operations are connected to the same terminal block, data link operations can continue even if power to one of the local stations is turned OFF.

Replace the faulty station's link module as shown below:



START

Turn OFF the power to the faulty station.

Remove the link unit's terminal block from the link module.

Remove the link module from the base unit. .... See the PC CPU User's Manual.

Install a new link module in the base unit. .... See the PC CPU User's Manual.

Attach the terminal block to the link module.

Turn ON the power.

Resume data link operations.

COMPLETE

WARRANTY

Please confirm the following product warranty details before starting use.

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 dealer or Mitsubishi Service Company. Note that if repairs are required at a site overseas, on a detached island or remote place, expenses to dispatch an engineer shall be charged for.

[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 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 possible 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 chance loss and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to damages caused by any cause found not to be the responsibility of Mitsubishi, chance losses, lost profits incurred to the user by Failures of Mitsubishi products, damages and secondary damages caused from special reasons regardless of Mitsubishi's expectations, compensation for accidents, and compensation for damages to products other than Mitsubishi products and other duties.

5. Changes in product specifications

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

6. Product application

(1) In using the Mitsubishi MELSEC programmable logic controller, the usage conditions shall be that the application will not lead to a major accident even if any problem or fault should occur in the programmable logic controller device, and that backup and fail-safe functions are systematically provided outside of the device for any problem or fault.

(2) The Mitsubishi general-purpose programmable logic controller has been designed and manufactured for applications in general industries, etc. Thus, applications in which the public could be affected such as in nuclear power plants and other power plants operated by respective power companies, and applications in which a special quality assurance system is required, such as for Railway companies or National Defense purposes shall be excluded from the programmable logic controller applications.

Note that even with these applications, if the user approves that the application is to be limited and a special quality is not required, application shall be possible.

When considering use in aircraft, medical applications, railways, incineration and fuel devices, manned transport devices, equipment for recreation and amusement, and safety devices, in which human life or assets could be greatly affected and for which a particularly high reliability is required in terms of safety and control system, please consult with Mitsubishi and discuss the required specifications.

type MELSECNET, MELSECNET/B Data Link System

Reference Manual

MODEL	MELSECNET/B-R-E
MODEL CODE	13JF70
IB(NA)66350-C(0310)MEE	

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