HITACHI PROGRAMMABLE CONTOROLLER

H-SERIES

Intelligent Ethernt Interface Module 2

Instruction Manual

Type : LAN-ETH2

NOTICE : Make sure to have this manual available to the person directly responsible for use and maintenance of this unit. After installation and initialization, file the manual for future reference.

HITACHI

NJI-426B(X)

○ Warranty period and coverage

The warranty period is the shorter period either 18 months from the date of manufacture or 12 months from the date of installation.
However within the warranty period, the warranty will be void if the fault is due to;

(1) Incorrect use as directed in this manual and the application manual.
(2) Malfunction or failure of external other devices than this unit.
(3) Attempted repair by unauthorized personnel.
(4) Natural disasters.

The warranty is for the PLC only, any damage caused to third party equipment by malfunction of the PLC is not covered by the warranty.

○ Repair

Any examination or repair after the warranty period is not covered. And within the warranty period any repair and examination which results in information showing the fault was caused by any of the items mentioned above, the repair and examination cost are not covered. If you have any questions regarding the warranty please contact either your supplier or the local Hitachi Distributor. (Depending on failure part, examination might be impossible.)

○ Ordering parts or asking questions

When contacting us for repair, ordering parts or inquiring about other items, please have the following details ready before contacting the place of purchase.

(1) Model
(2) Manufacturing number (MFG no.)
(3) Details of the malfunction

Safety Precautions

Read this manual and related documents thoroughly before installing, operating, performing preventive maintenance or performing inspection, and be sure to use the unit correctly. Use this product after acquiring adequate knowledge of the unit, all safety information, and all cautionary information. Also, make sure this manual enters the possession of the chief person in charge of safety maintenance.
Safety caution items are classified as “Danger” and “Caution” in this document.

DANGER : Cases where if handled incorrectly a dangerous circumstance may be created, resulting in possible death or severe injury.

CAUTION : Cases where if handled incorrectly a dangerous circumstance may be created, resulting in possible minor to medium injury to the body, or only mechanical damage.

However, depending on the circumstances, items marked with CAUTION may result in major accidents.

In any case, they both contain important information, so please follow them closely.

Icons for prohibited items and required items are shown below:

: Indicates prohibited items (items that may not be performed). For example, when open flames are prohibited, is shown.

: Indicates required items (items that must be performed). For example, when grounding must be performed, is shown.

1. About installation

⚠ CAUTION
• Use this product in an environment as described in the catalog and this document. If this product is used in an environment subject to high temperature, high humidity, excessive dust, corrosive gases, vibration or shock, it may result in electric shock, fire or malfunction. • Perform installation according to this manual. If installation is not performed adequately, it may result in dropping, malfunction or an operational error in the unit. • Do not allow foreign objects such as wire chips to enter the unit. They may become the cause of fire, malfunction or failure.

2. About wiring

REQUIRED

- Always perform grounding (FE terminal).
  If grounding is not performed, there is a risk of electric shocks and malfunctions.

CAUTION

- Connect power supply that meets rating.
  If a power supply that does not meet rating is connected, fire may be caused.
- The wiring operation should be performed by a qualified personnel.
  If wiring is performed incorrectly, it may result in fire, damage, or electric shock.

3. Precautions when using the unit

DANGER

- Do not touch the terminals while the power is on.
  There is risk of electric shock.
- Structure the emergency stop circuit, interlock circuit, etc. outside the programmable controller (hereinafter referred to as PLC).
  Damage to the equipment or accidents may occur due to failure of the PLC.
  However, do not interlock the unit to external load via relay drive power supply of the relay output module.

CAUTION

- When performing program change, forced output, RUN, STOP, etc., while the unit is running, be sure to verify safety.
  Damage to the equipment or accidents may occur due to operation error.
- Supply power according to the power-up order.
  Damage to the equipment or accidents may occur due to malfunctions.

4. About preventive maintenance

DANGER
• Do not connect the ⊕, ⊖ of the battery in reverse. Also, do not charge, disassemble, heat, place in fire, or short circuit the battery. There is a risk of explosion or fire.

PROHIBITED
• Do not disassemble or modify the unit. These actions may result in fire, malfunction, or malfunction.

CAUTION
• Turn off the power supply before removing or attaching module/unit. Electric shock, malfunction or failure may result.

Revision History

No.	Description of Revision	Date of Revision	Manual Number
1	The first edition	2002/11	NJI-426(X)
2	Correct the error in writing.	2003/01	NJI-426A(X)
3	Table 1.1.1 and Paragraph 3.2 is changed. Correct the Figure 5.1.2.7	2003/05	NJI-426B(X)

Table of contents

Chapter 1 Introduction

Thank you adoption Hitachi programmable controller H series.

This manual is written about dealing of the intelligent ethernet interface module 2 (LAN-ETH2) for Hitachi programmable controller H series.

When this book is perused, use it for the creation of a program, the installation operation and maintenance inspection.

And there is the following thing as a manual of a related apparatus. Please show to it.

Table 1.1 The list of documentation

Items	Name of documentation	Number of Manual
Specification of all CPU module	CPU module (by hardware) CPU module (by software)	NB-322D NB-323D
Programming software	LADDER EDITOR for Windows®(Windows®95/98/NT4)	NJI-206/299
Intelligent ethernet interface module 2	LAN-ETH2 application manual (this book)	NJI-426

*The last character of the manual number may be modified when the product is revised.

*Notes. The contents of this manual may be modified without previous notice.

1.1 Before using

This product is manufactured carefully. After purchase, check the following items immediately.

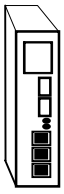
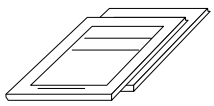
(1) Is a type the same as the thing that orderd it ?

(2) Is not there a place where is damaged while transporting ?

(3) Are the packing goods complete ?

If you find any inconvenience, inquire it to your agent.

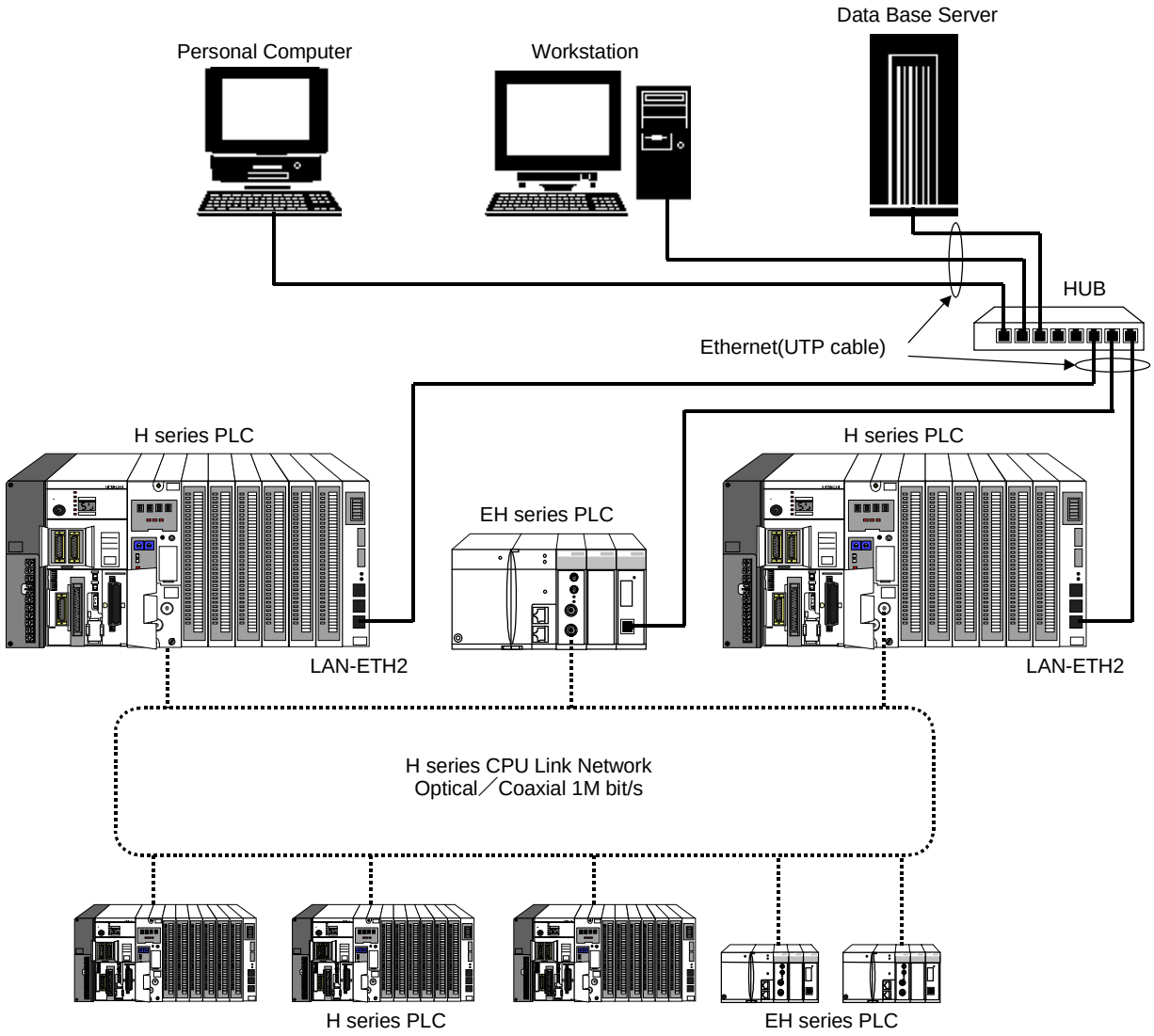
Table 1.1.1 LAN-ETH2 List of packing conents

No.	Products Name	Model number	Outlook	Quantitiy	Notes
1	Intelligent ethernet interface module 2	LAN-ETH2		1	**(CAUTION)** **Please confirm the form of CPU module, Before this module is used . To use this module, CPU of the (2) of paragraph 1.4.1 description is needed.**
2	10 BASE T connector cap	-	-	1	Mounted on the module
3	Application manual (this book)	NJI-426*(X)		1	When this manual is revised, "*" mark of "NJI-426*(X)" is updated.
4	Ferrite core	SFC-10		1	For CE marking (EMC restriction). Please refer to paragraph 3.2 "Example for installation and laying of cable" for the mounting method.

1.2 Product location

LAN-ETH2 is H series module which is used to connect H series PLC to a CSMA/CD method Local Area Network based on IEEE802.3.

LAN-ETH2 operates as a station in network. LAN-ETH2 connected in network makes possible to communicate among H series PLC, workstation and personal computers.



1.3 Feature

(1) Because LAN-ETH2 is a general purpose LAN, it has varios connectable equipments(CSMA/CD 10 BASE T based on IEEE802.3).

(2) It is possible to communicate with other equipments in high speed.(10Mbps)

(3) You can select a communication protocol according to yor needs(TCP/IP or UDP/IP).

(4) It is possible to make several connections at once(6 for message communication and 2 for communication with task code).

(5) You can send in broadcast on UDP/IP.

1.4 Notes to use

1.4.1 General notes

(1) After applying the power to LAN-ETH2 module or press RESET switch, it takes about 8 seconds until the module is ready. Please be care of this waiting time when you construct a system.

(2) Because LAN-ETH2 module reads and writes CPU internal output directly same as like BASIC module, please use CPU module corresponding to BASIC module.(*1)
If you use CPU module which is not correspond to BASIC module, LAN-ETH2 does not operate normally.

(3) Because many internal outputs are used in message communication, we recommend to use enhance CPU that is higher than H-1002(memory 48K words).
If you transmit a large amount of data with a memory cassette with small capacity, you might be make a cpmplex ladder program.

(4) Please fix to the base firmly with the module fixation screw (two places) when you mount this module.

(5) Static electricity may cause a serious trouble on LAN-ETH2 module. When you touch a terminal chassis, connector, module mounting screw and so on, dishcarge static electricity in your hands with an earth stick in advance.

(6) The parts in LAN-ETH2 module and base mounting connector pin is not for user maintenance. Be careful not to touch them.

(7) Never mount LAN-ETH2 on the base and remove it from the base when power is applied because the operation may cause trouble on the module. In the worst case,the whole system may be downed.

(8) Be sure to earth FG terminal of power module in a base what LAN-ETH2 is mounted with less than 100Ω safety and to prevent a fault operation with noise.

(9) In case of constructing network system using LAN-ETH2, it is necessary to use software according to connected equipment (workstation, personal computer etc.). Please check up your system in detail and prepare (purchase or make newly) the needed software.

(10) Please note the allocation of IP address and the logical port number when you make the network system of existing add LAN-ETH2.
There is a possibility that the inconvenience is generated in the network system if an improper value is set.

(11) LAN-ETH2 can be mounted up to two on a basic base simultaneously and can’t be mounted on extended base.
LAN-ETH2 does not operate normally when three or more LAN-ETH2 are mounted on a basic base.
The mount capacity varies according to the other modules (ex. LAN-ETH, BASIC-H, LAN-SNH(This is product for Japan only) etc.), so that be sure to set module configuration post when you use the system.

*1) Type : CPU2-**H, CPU3-40H or CPU module that is printed “FOR BASIC”

1.4.2 No response of Task code communication

［Phenomenon］

If the timeout of the task code communication is not observed when the communication interrupts in the task code communication processing by pulling out the cable, the communication might not be able to be restarted. Please do the following measures. The task port timeout watch time is recommended to be set in a proper value according to the communication system even if there is no above-mentioned problem.

［Cause］

The host (PC and workstation, etc.) detects the communication error by pulling out the cable, it closes the connection and open the connection again. At this time, host's TCP/IP software automatically increases one on logical port number, and opens the connection normally (for instance, Winsock). However, LAN-ETH2 disregards data from the host who opens again to wait for data from the host by the logical port number before, becomes no response, and the communication stops.

［Measures］ Please execute (1) and (2) as below.

(1) Timeout watch of task port on LAN-ETH2 side
Please set appropriate time according to the communication system at the timeout time usually.
Please refer to “5.1.2 IP address setting”.

(2) Transmit the termination command at first, when the host open the connection and communicates with task code.
If the termination command is received, LAN-ETH2 breaks off the processing of the request task code received before, and becomes initial of the following task code waiting.
Please refer to “5.2.2 Communication protocol and flame format”.
* Please put the interval of 50ms or more in the following task request after transmitting the termination command.

(Note)

By doing measures of above-mentioned (1) and (2), the timeout can usually work when the line is intercepted, the communication can be restarted. In this case, ERR LED lights (*1).

(*1) There are the following two kinds of cases at time until ERR LED lights.

- 20 second later
- (20 second + time-out time of task port) later

However, there is unusually a case which does not become a timeout according to the timing of the line interception but becomes no response. ERR LED can not be lighted in this case. The task code communication cannot be restarted, because it is not possible to open the connection.
In LADDER EDITOR for Windows®, "Communication abnormality (109)" is displayed, and it is not possible to connect.

Disposal : When no response occurred, the communication can be restarted by doing the following processing.

Press the RESET switch of LAN-ETH2. Or, the software reset function is executed.
(Refer to "6.1 Software reset")

1.4.3 Close procedure of message communication

Please close the connection on the client side (active) and the server side (passive), as follow procedure. That is, closing from the other side (Generally, it is a client) one by one. The close operation might not be able to normalize, when the connection is closed at the same time by both.

Close procedure

(1) Basic close procedure
① The connection is closed by the client.
② The server confirms the close request from the client.
③ The connection is closed by the server.

(2) Close procedure of LAN-ETH2
(2-1) Procedure to which LAN-ETH2 closes previously
① The connection is closed by LAN-ETH2.
② The other station confirms the close request from LAN-ETH2.
③ The connection is closed by the other station.

(2-2) Procedure to which LAN-ETH2 closes later (*)
① The connection is closed by the other station.
② LAN-ETH confirms the close request from the other station.
③ The connection is closed by LAN-ETH2.
(*) When the other station can't confirm the close request, please close the connection by this procedure, even if LAN-ETH2 is client.

(Note) In LAN-ETH2, it is possible to close by resetting the open request flag. The close request of the other station can be confirmed in status area 4.
Please refer to “5.3.3 Processing of connection open/close”.

1.4.4 Notes using on H-4010 (CPU3-40H)

When you use LAN-ETH2 with H-4010 (CPU3-40H), please note the following.

(1) Please do not access "LAN-ETH2" at the same time by two task code ports when software revision of H-4010 is before "M". In this case, an abnormal communication are generated and the communication stops occasionally. Please see the manual (NJI-279*) of H-4010 about H-4010 software revision.

(2) When DIP SW is operated according to the following procedures, communicate is correctly done.
However, in H-4010, if the power supply is not turned on again , the communication is not correctly done.
A). DIP SW of LAN-ETH2 is set besides normal operation mode and the power supply is turned on.
B). It keeps for about 20 seconds or more.
C). DIP SW is set in normal operation mode, and reset SW is pushed.
After the operation of above (A)(B)(C), it is not possible to communicate by the Ethernet.
In case of "LADDER EDITOR for Windows", it is displayed as "Communication error" and can't connect to H-4010.
Please turn on the power supply again after setting "IP address" etc. to set LAN-ETH in normal operation mode.

(4) When "IP address" is set according to the following procedures, "IP address" is stored in special internal output (from WRF022 to WRF031). However, in H-4010, if the power supply is not turned on again, "IP address" is not stored in special internal output.
A). The "IP address" setting of LAN-ETH2 is executed.
B). DIP SW is changed to the normal operation mode, and reset SW is pushed.

1.4.5 Network equipment

The network equipment (HUB and twisted-pair cable, etc.) which connects LAN-ETH2 must use the one with reliability to the coming from outside noise. There is a possibility to interfere to the communication when the equipment influenced easily by the coming from outside noise is used.

Note
In a part of maker's HUB, the response might worsen. In that case, please inquire of the shop or sales of the nearest.

1.4.6 Mis-setting of module configuration post

LAN-ETH2, LAN-ETH, ELINK-H, SUMINET-3200 communication I/F module (LAN-SNH, this is a product for Japan only) and BASIC module (BASIC-H) can be installed up to 2 among basic bases. In this case, module configuration post of each module must be set as shown in the description in “3.1.2 Set of module configuration post”. Be careful please not to operate normally when you mistake setting a module configuration post of LAN-ETH2. Especially, WDE LED lights occasionally when the "IP address" etc. is set by mistake.

1.5 Term and abbreviation

Table 1.5.1 shows the term and abbreviation in this manual.

Table 1.5.1 Term and abbreviations

Term / abbreviation	Explanation
Task code	This is original communication protocol for H-series PLC.
Task code connection	This is connection for task code communication.

1.6 Difference with LAN-ETH

Table 1.6.1 Difference with LAN-ETH

	Difference	Reference section
(1)	10 BASE 5 (Coaxial cable) is not supported.	“4.1 Structure”
(2)	The position of a module configuration post moved to the dip switch on the front side from the module side.	“4.1 Structure”
(3)	**Setting the gateway address for the message communication became only one kind.** (LAN-ETH sets 32 kinds.)	“5.3.1 Transmision parameter [q] Routing information”
(4)	The default value of "IP address" was changed as follows. **Own IP address : 192.168.0.1 ← 192.0.0.1** **IP address of other station : 192.168.0.254 ← 192.0.0.255**	“5.1.2 IP address setting”
(5)	The content of the error is understood from the blinking frequency of STAS LED.	“4.3 Status LED”
(6)	Setting of “IP address” etc. can be done from the personal computer. However, the following environment is necessary. Personal computer : Windows95, Windows98, WindowsMe, Windows2000, WindowsXp Connected cable : WVCB02H+EH-RS05, or EH-VCB02 Software : “LAN-ETH2 IP address set tool” (Please contact our sales about details.)	“5.1.2 IP address setting (7)IP address information setting (Port 1)”
(7)	The subnet mask is not supported.	

Chapter 2 Specifications

2.1 General Specifications

Table 2.1.1 General specification

Item	Specification
Internal power consumption	5 V DC 1.1Amax (Supplied by power module)
Operating ambient temperature and humidity	0 ~ 55 °C, 20 ~ 90 % RH (no condensation)
Storage ambient temperature and humidity	−10 ~ 75 °C, 10 ~ 90 % RH (no condensation)
Noise resistance	Noise voltage 1,500 Vpp, noise width 100 ns, 1 μs static electricity noise is up to 3000V on metallic face
Vibration resistance	Conforms to JIS C 0911
Environment	No corrosive gas, oil. Dust is normal.
Structure	Open type module case
Cooling	natural cooling
Number of occupation slots	1 slot width
I/O assignment	"COMM"
Dimensions, Weight	210H × 35W ×130D(mm), About 0.4 kg

2.2 Performance Specifications

Table 2.2.1 Performance specification

Item		Specification
Interface		10 BASE T
Communication method	Standard for ethernet	Based on IEEE802.3
	Transmit modulation method	Base band
	Media Access method	CSMA/CD
	Baud rate	10 M bps
	Communication protocol	TCP/IP, UDP/IP
	Maximum message length	1024 byte
Port no. of message communication		max 6
Port no. of communication with task code		max 2

2.3 Functional Specifications

Table 2.3.1 Functional specification

Function	Contents
Message communication	• It is possible to send/receive data of internal output area by LADDER PROGRAM. • It is possible to know the receipt of data by LADDER PROGRAM.
Communication with task code	• Conformed to H series task code rule. • LADDERPROGRAM of data transmitting and receiving instruction is not necessary. • It is possible to access to CPU in network through CPU link.
Test function	• Internal loop back test and external loop back test is possible. • Send/receive test is possible.

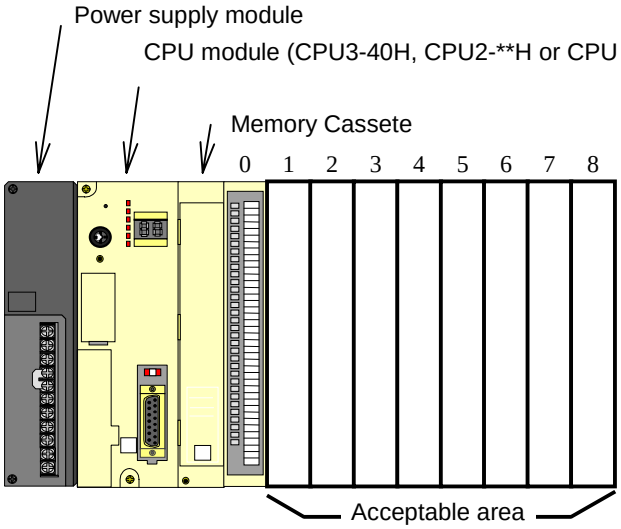
MEMO

Chapter 3 Installation and System configuration

3.1 Installation and setting

3.1.1 Installing location and notes on installing

LAN-ETH2 can be installed any slot on basic base except slot 0 and occupies 1 slot as installation space. It can not be installed to extend base.



Basic base type	acceptable slot No.
BSU-09H	slot 1 ~ 8
BSU-05H	slot 1 ~ 4
BSU-02H	slot 1

Figure 3.1.1.1 About acceptable area

You can install LAN-ETH2 up to 2 (maximum) on basic base.

However, the number of LAN-ETH2 can be limited under influence of other modules.

Please see "3.1.2 Set of module configuration post" to verify and set the necessities before installing the module.

3.1.2 Set of module configuration post

LAN-ETH2, SUMINET-3200 communication I/F module (LAN-SNH, this is a product for Japan only) and BASIC module can be installed up to 2 among basic base. In this case, module configuration post of each module must be set as the below table. The slot installing point is no effect, but one installed nearer to CPU module is considered as the 1st.

Table 3.1.2.1 Setting of module configuration post

1st / 2nd	BASIC-H	LAN-SNH	LAN-ETH	LAN-ETH2
BASIC-H	impossible	2-3 short / no setting	2-3 short / no setting	Dip switch OFF / no setting
LAN-SNH	no setting / 2-3 short	2-3 short / 1-2 short	2-3 short / 1-2 short	Dip switch OFF / 1-2 short
LAN-ETH	no setting / 2-3 short	2-3 short / 1-2 short	2-3 short / 1-2 short	Dip switch OFF / 1-2 short
LAN-ETH2	no setting / Dip switch OFF	2-3 short / Dip switch ON	2-3 short / Dip switch ON	Dip switch OFF / Dip switch ON

(Note) Setting of the module configuration post of LAN-ETH2 is ON/OFF of the dip switch. (Please refer to "4.2.2 Setting of module switch 2")

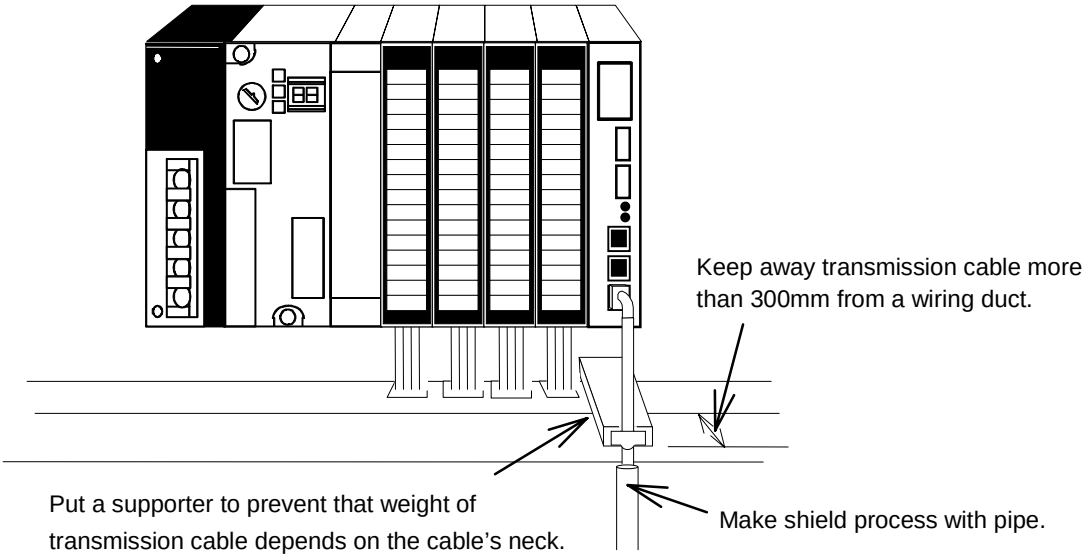
Please refer to the manual of each module for "1-2(2-3) short".

3.2 Example for installation and laying of cable

10 BASE T in network of CSMA/CD based on IEEE 802.3 are high speed transmission path for slight current, 10M bit/s. Lay a transmission cable paying attention as the following especially.

(1) Never set transmission cable in a wiring duct with power line or I/O wiring duct.
(2) Keep space about 300mm between a transmission cable and other wiring duct.
If possible, lay the transmission cable not to be parallel with other wiring duct.
(3) According to your needs, put the cable in metal pipe for shield processing.
(4) In certain case, putting Ferrite core in a cable is effective to prevent induction noise from occurring.

Grounding example



In a certain case, inserting Ferrite core to transmission cable is effective to prevent induction noise in transmission line.

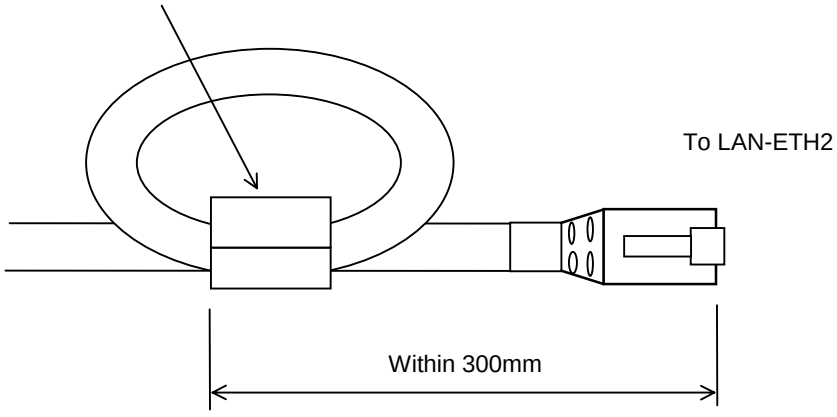


Figure 3.2.1 Grounding example

3.3 Basic system configuration

Using LAN-ETH2, you can make a network system among the equipments has specification for network of CSMA/CD based on IEEE 802.3.

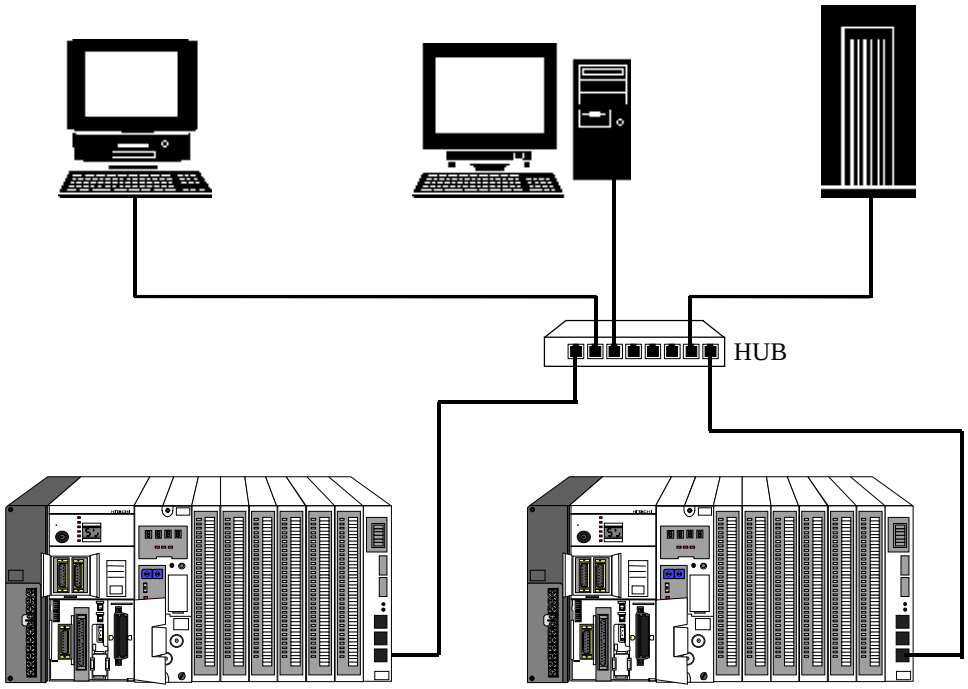


Figure 3.3.1 General system configuration

The connector form is RJ-45 (8pin) type to connect LAN-ETH2 to a network physically.
Please use the general UTP cable or STP cable of a category 5 standard for communication cable.

Supplement)	UTP cable : Cable that is composed only with a twisted wire. STP cable : Cable that is composed with the inside twisted wire and the outside shield that protects the inside twisted wire.

3.4 Extended system configuration

When H series PLC mounting H series CPU Link is used as gateway, it makes communication with task code among hosts on ethernet (workstation, personal computer, etc) and CPU linked via CPU Link network.

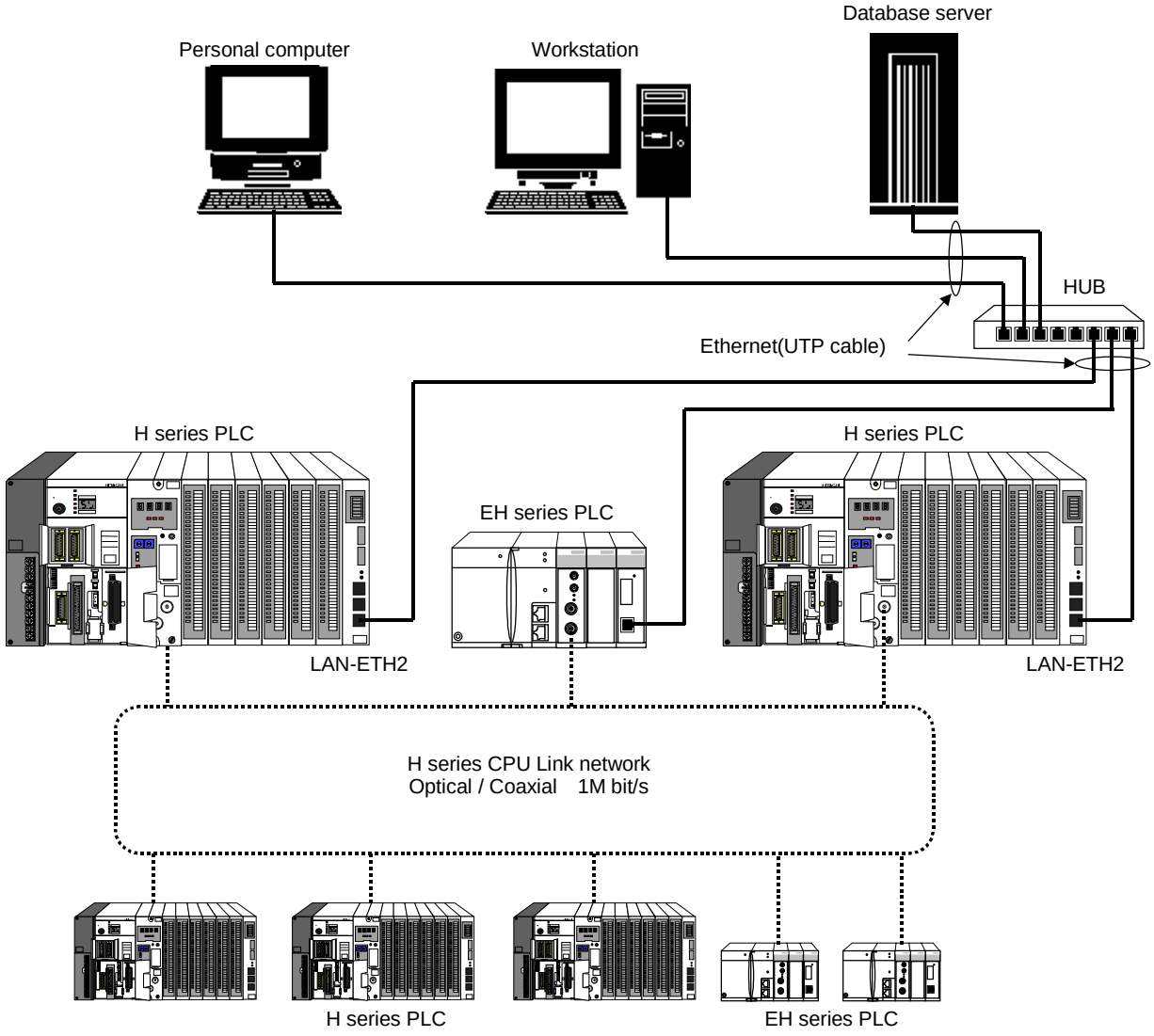


Figure 3.4.1 Extended system configuration

Note

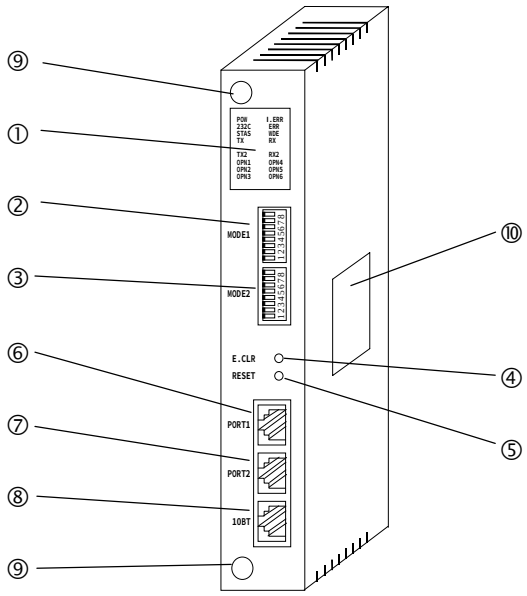
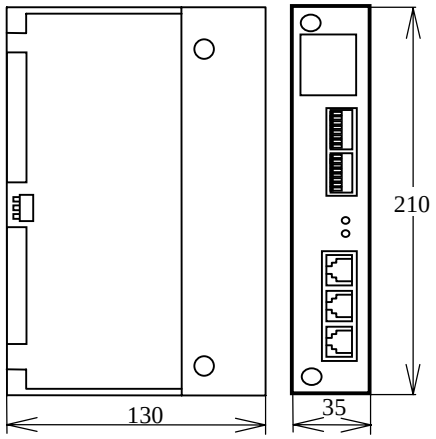
There are 2 types of H series CPU Link. One of them has coaxial type transmission path (LINK-H, LINK-SH), and the other has optical (OLINK-H, OLINK-SH). But it is prohibited to use both type of link in a CPU Link network.

Point - What is communication with task code ? -

- There are the communication protocol between a communication module and host computer in H series.
  In protocol for H series, task code (command code) and transmission control procedure are specified definitely.
  In protocol, a command code is assigned to each function, such as I/O control, CPU control, memory read/write.
  By sending this code (task code) what you need to H series PLC, you can use a function you need without making a program on H series PLC side.
- LAN-ETH2 supports the function for communication with task code on TCP/IP or UDP/IP. In others, there is Intelligent serial port module (COMM-2H) that supports communication with task code on RS-232C, etc.
  And, CPU module peripheral port (PERIPHERAL) also supports communication with task code on RS-232C.

Chapter 4 Name and function of each part

4.1 Structure

Name and function of each part		
	Type	LAN-ETH2
	Weight	0.4 kg
	Dimension(mm)	

No.	Name	Function
1	Status LED	Indicates the status of LAN-ETH2. Please refer to “4.3 Status LED”.
2	Mode swirch 1 (MODE1)	Mode change of IP address setting mode, test mode etc. Please refer to “4.2 Setting of mode switch”.
3	Mode switch 2 (MODE2)	Setting of module configuration post. Please refer to “4.2 Setting of mode switch”.
4	Error clear switch (E.CLR)	Make error flag and ERR LED clear.
5	Reset switch (RESET)	Make LAN-ETH2 hardware reset.
6	Port 1 (PORT1)	RS-232C communication port for IP address setting and diagnosis. Please refer to “5.1.2 IP address setting”.
7	Port 2 (PORT2)	No use.
8	Ethernet port (10BT)	Port of 10BASE T.
9	Module mounting screw	A screw to mount the module to basic base.
10	Revsion name plate	Product revision No. is described.

4.2 Setting of mode switch

Setting of mode switch is read at the time of applying power or pressing down RESET switch.
Even if you change the setting while the module is in operation, the mode does not change.

4.2.1 Setting of mode switch 1

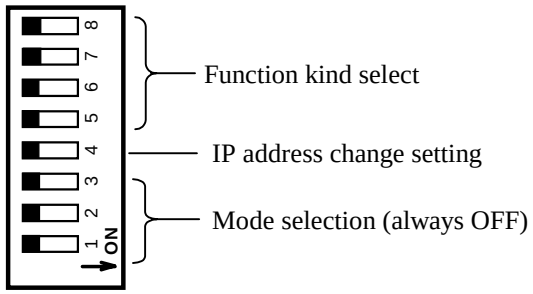


Table 4.2.1.1 Description of mode switch 1

	Name	Setting of switch	
		OFF	ON
8 ~ 5	Function kind select	(see inner table)	
4	IP address change setting	Possible to change	Impossible to change
3 ~ 1	Mode selection	Normal operation	**Don't set to ON (ON is a mode only for maintenance)**

SW No.				Function
5	6	7	8	
OFF	OFF	OFF	OFF	Normal operation
OFF	OFF	OFF	**ON**	Internal loop back test (Note 1)
OFF	OFF	**ON**	OFF	External loop back test (Note 2)
OFF	OFF	**ON**	**ON**	Send/Receive test (Note 3)
OFF	**ON**	OFF	OFF	IP address default value setting
OFF	**ON**	OFF	**ON**	Reference of IP address reading
OFF	**ON**	**ON**	OFF	IP address user value setting
OFF	**ON**	**ON**	**ON**	Don't change this status
ON	OFF	OFF	OFF	IP address user value setting (Note 4)
ON	**	**	**	Don't change this status

(Note 1) Please execute the internal loop back test without connecting the cable.
(Note 2) Please execute the external loop back test with connecting test module only.
If the other modules are connected, it may cause an error.
(Note 3) In send/receive test, a set of LAN-ETH2 or ethernet equipment is necessary as other station.
(Note 4) IP address can be set from port 1.

4.2.2 Setting of mode switch 2

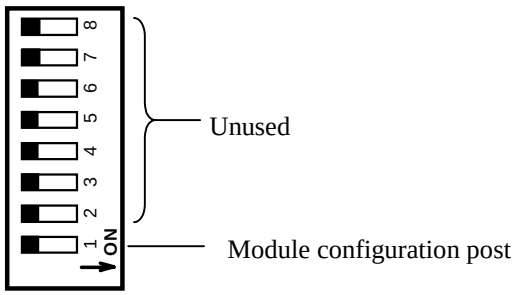


Table 4.2.2.1 Description of mode switch 2

No.	Name	Setting of switch	
		OFF	ON
8	Unused	Always OFF	
7			
6			
5			
4			
3			
2			
1	**Module configuration post**	**1st mounted**	**2nd mounted**

Switch No.2-8 is unused. Please give switches No.2-8 as turning off.

4.3 Status LED

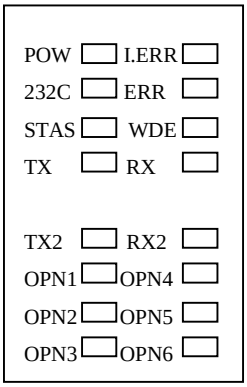


Figure 4.3.1 Status LED

Table 4.3.1 Description of status LED

LED	Information	Turn on (Blinking)	Turn off
POW	Normal operation	Operate	Stop
232C	Port 2 is set RS232C. (*1)	Power ON	Power OFF
I.ERR	Unused	—	—
ERR	Various error detection	Error	Normal
STAS	Status display	Normal (Error kind)	Non error
WDE	Module hardware error	Error	Normal
TX	10BT Port data transmitting	Transmitting	No data
RX	10BT Port data receiving	Receiving	No data
TX2	Unused	—	—
RX2	Unused	—	—
OPN1	State of connection 1 opening	Open	Close
OPN2	State of connection 2 opening	Open	Close
OPN3	State of connection 3 opening	Open	Close
OPN4	State of connection 4 opening	Open	Close
OPN5	State of connection 5 opening	Open	Close
OPN6	State of connection 6 opening	Open	Close

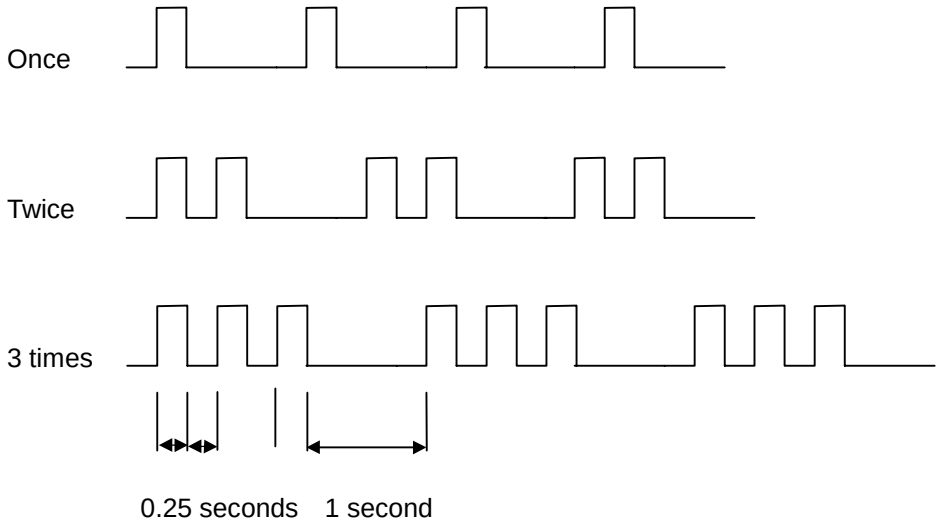
*1) RS-232C is a reservation function, and it is unused in this module.

ERR LED lights in the following states, and STAS LED blinks at the same time.

	Error information	Blinking time of STAS
1	Open error of message communication	Once
2	Transmit error of message communication	Twice
3	Receive error of message communication	3 times
4	Transmission parameter error	4 times
5	IP address error	5 times
6	Communication error with task code	6 times
7	Test function error	7 times

Blinking method of STAS LED

STAS LED blinks for 0.25 seconds interval and then turn off for 1 second.
The above is repeated.



4.4 Port 1 (PORT1)

IP address can be set from this port.
IP address can be set with the software by connecting to RS232C port of the personal computer.

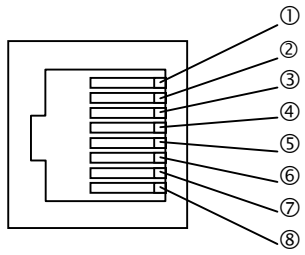


Table 4.4.1 Signal table of PORT1 (RS-232C)

Pin No.	Signal	Direction		Function
		Port 1	Host	
①	SG1	←→		Signal ground
②		–		NC
③		–		NC
④		–		NC
⑤	SD1	–→		Transmit data
⑥	RD1	←–		Receive data
⑦	DR1	←–		Receive request (When DR1 is high level, host is transmitting)
⑧	RS1	–→		Transmit request (When RS1 is high level, it is possible to receive)

4.5 10BASE-T port (10BT)

Ethernet interface port.

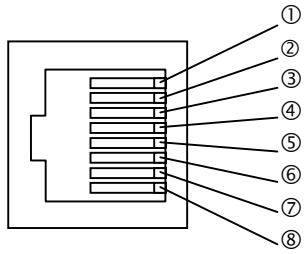


Table 4.5.1 Signal table of 10BT port (Ethernet)

Pin No.	Signal	Direction		Function
		Port	Host	
①	TD+	–→		Transmit data +
②	TD-	–→		Transmit data -
③	RD+	←–		Receive data +
④		–		NC
⑤		–		NC
⑥	RD-	←–		Receive data -
⑦		–		NC
⑧		–		NC

MEMO

Chapter 5 Communication function

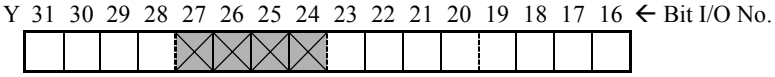
5.1 Before to communicate

5.1.1 Control register and status register

In H series CPU, LAN-ETH2 is I/O assigned as ”COMM”. When you make settings, specify data in internal I/O area with LADDER PROGRAM, and set data by handshake using control and status register.

(“S “ is a slot No. to install LAN-ETH2.)

(1) Control register WY00S1 (Y00S16 ~ Y00S31)



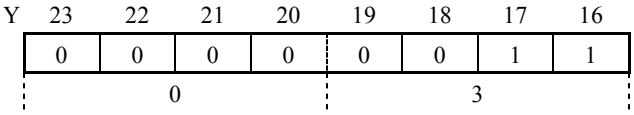
Bit 16–23 : Top I/O No. of setting area

Head I/O number of the internal output of WR area which used as a set area on setting of transmision parameter and of IP address is set in this bit.

Bit 16–23	Description
H00 ~ HC3	Specify upper 2 figures in I/O No. of WR used as setting area.

(Example) In case of using WR0300-WR035C as transmission parameter area (similar with IP address set).

"03" which corresponds to the high rank of head I/O No. two digits is specified from bit 16 for 23 by the binary.



Bit 24–27 : Reserved

Always set "0".

Bit 28 : Software reset request bit

This bit is used to execute the software reset of LAN-ETH2. This bit is operated according to the reset sequence of paragraph 6.1.

Please note the matters as follows, as well as hardware reset (RESET button pressing).

① "54" or "51" error might be displayed in CPU module.

② WDE LED of LAN-ETH2 does not light.

Bit 28	Description
0	No operation
1	Software reset of this module is requested.

Bit 29 : ERR clear request bit

ERR LED is turned off by setting "1" in this bit with ERR LED lights(X00S09=1). Moreover, the X00S09 bit is set to "0" at the same time as turning off ERR LED.

This bit is operated according to the reset sequence of paragraph 6.2.

Bit 29	Description
0	No operation
1	Error information is deleted, and ERR LED is turned off.

Bit 30 : IP address set request bit

This bit becomes effective at IP address set mode.

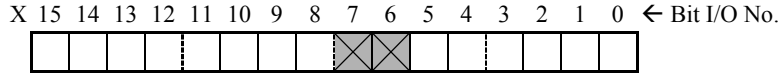
Bit 30	Description
0	No operation
1	Setting IP address is requested for this module.

Bit 31 : Request bit for configuration of transmission parameter

It is necessary to set transmission parameter by using this bit when the message communication function is used.

Bit 31	Description
0	No operation
1	Setting configuration of transmission parameter is requested for this module.

(2) Status register WX00S0 (X00S00 ~ X00S15)



The subordinate position six bits of the status register have a different definition between setting of IP address and setting of configuration of transmission parameter.

Bit 0-5 :

"0" means "no error" and "1" means "error".

The error detection condition of each bit is as follows.

[Bit 0] The internal output area to use as a set area is mistake.

[Bit 1] You requested the configuration of transmission parameter, when the connection used by the message communication is already opened.

[Bit 2] IP address of "H00000000" or "HFFFFFFFF" is specified.

[Bit 3] Port number of "H00000000" is specified.

[Bit 4] You detect sum error in the preservation data of the flash memory.

[Bit 5] You requested the setting of IP address, when MODE1 switch is set besides the setting of IP address information.

Bit No.	Setting of IP address	Configuration of transmission parameter
0	Top word number error flag	Top word number error flag
1	Undefined	Error flag when connection is opening
2	IP address error flag	Undefined
3	Port number error flag	Undefined
4	FLASH sum error flag	Undefined
5	Prohibition error flag to write FLASH	Undefined

Bit 6-7 : Undefined flag

Always set "0".

Bit 8 : Software reset response flag

It is the flag which answers "Software reset request bit" of the control register.

Bit 8	Description
0	There is no software reset demand. Or software reset has be executed.
1	Software reset request reception inside

Bit 9 : ERR LED lighting flag

Lighting/turning off ERR LED is displayed. Please refer to "7.3 Error LED measure" for the condition of the ERR LED lighting.

Bit 9	Description
0	ERR LED is being turned off.
1	ERR LED is lighting.

Bit 10 : Completion of configuration of IP address

When the function related to the IP address setting is effective, whether processing ended normally or processing terminated abnormally is displayed.

Bit 10	Description
0	Setting was incompleted (Error end**).**
1	Setting was completed (Normal end).

Bit 11 : Configuration error of IP address

When the function related to the IP address setting is effective, the presence of the error is displayed.

Bit 11	Description
0	No error
1	Error

Bit 12 : Response of configuration of IP address

When the function related to the IP address setting is effective, It is the flag which answers "IP address set request bit" of the control register.

Bit 12	Description
0	There is no IP addres set request. Or IP addres set request has be executed.
1	IP addres set request reception inside

Bit 13: Completion of configuration of transmission parameter

When you set the configuration of transmission parameter, whether processing ended normally or processing terminated abnormally is displayed.

Bit 13	Description
0	Setting was incompleted (Error end**).**
1	Setting was completed (Normal end).

Bit 14: Configuration error of transmission parameter

When you set the configuration of transmission parameter, whether the error is or not is displayed.

Bit 14	Description
0	No error
1	Error

Bit 15: Response of configuratin of transmission parameter

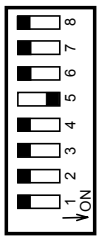
When you set the configuration of transmission parameter, It is the flag which answers " Request bit for comfiguration of transmission parameter " of the control register.

Bit 15	Description
0	There is no request bit for configuration of transmission parameter. Or the configuration of transmission parameter has be executed.
1	Request for configuration of transmission parameter reception inside

5.1.2 IP address information setting

You can not set IP address information in normal operation mode. Please change operation mode by mode switch.
The function related with IP address setting is shown in following.

Table 5.1.2.1 Function related with IP address setting

No.	Operation mode	MODE1 setting switch (*1)	Description
1	IP address information setting		IP address is set newly. Set the information of IP address etc. in IP address seting area, and handshake. Contents of setting is set as special internal output (*2) in normal operation.
2	Reference of IP address setting		IP address setting is read. IP address information is read to IP address reading area.
3	IP address default setting		IP address returns to default value. IP address : 192.168.0.1 IP address of other station to set : 192.168.0.254 Task port 1 : 3004.1(TCP/IP) Task port 2 : 3005.1(TCP/IP) Task port time out observation (*3) : 0 (No observation)
4	IP address information setting (PORT1)		IP address is newly set by the operation from the personal computer by way of the PORT 1. It is necessary to install IP address set software in the personal computer.(*4) Contents of setting is set as special internal output (*2) in normal operation.

*1 When you change a setting of MODE setting switch, press RESET switch or apply power again.

*2 Special internal output No. differs according to a slot to install LAN-ETH2.

Slot 1	WRF022 ~ WRF023	Slot 2	WRF024 ~ WRF025
Slot 3	WRF026 ~ WRF027	Slot 4	WRF028 ~ WRF029
Slot 5	WRF02A ~ WRF02B	Slot 6	WRF02C ~ WRF02D
Slot 7	WRF02E ~ WRF02F	Slot 8	WRF030 ~ WRF031

(Ex.) When installing LAN-ETH2 to slot 1

	b15	b0
WRF022	C0	00
WRF023	00	01

*3 Task port timeout observation is observation of the time from creating connection to the first request task code, or from response task code to next request task code. When it is tine out, it is considered that other station is down and the connection released (closed).

*4 Please contacts our sales about IP address set software.

The following information is necessary at the time of communication. The information is written to FLASH memory in LAN-ETH2, and the module operates according to the setting until these information is changed to new information.

Table 5.1.2.2 IP address information

I/O No,*1	Items			Default value	
WR**00	Own IP address			192.168.0.1	HC0A80001
02	Send/receive test		IP address of other station	192.168.0.254	HC0A800FE
			Logical port No.	4000	H0FA0
05	Communication with task code	Task port 1	Own logical port No.	3004	H0BBC
			Sevice type*2	1 (TCP/IP)	H0001
07		Task port 2	Own logical port No.	3005	HBBD
			Sevice type *2	1 (TCP/IP)	H0001
09		Timeout observation*3		0 (No observation)	H0000

*1 The display of "**" corresponds to the value set in "Top I/O No. of setting area" of the control register.

*2 "1" is set in the service type when TCP/IP is used and "0" is set when UDP/IP is used.

*3 The task port timeout observation time becomes set value x 1s. However, there is no observation when the task port timeout observation time is set to "0".

(1) Operation of IP address information

It is necessary to make handshake program based on the time shown in Figure 5.1.2.1 so that the user may set, and read IP address information.

①-⑤ of the figure below corresponds to the number of each diagram of next paragraph (2) - (4).

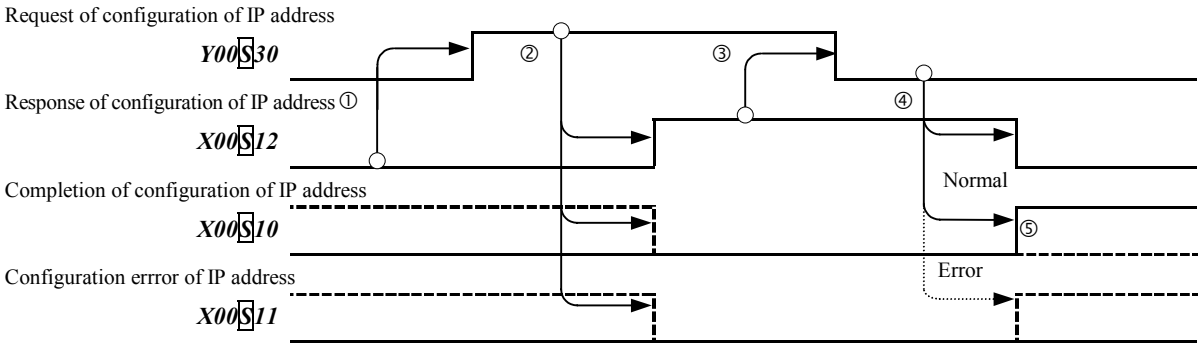


Figure 5.1.2.1 Timechart of handshake program

(2) Set procedure of IP address information

It is necessary to change the operation mode to "Internet Protocol address information setting" and to secure the internal output area to store set information, when the user may set Internet Protocol address information. And, IP address information is set in this module by executing handshake program after necessary information is set in the internal output area.

Operation mode	MODE1 setting switch
IP address information setting	

IP address information storage area

	Set information
WR**00	
	:
	:
WR**0B	:

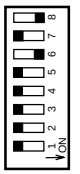
		①	②	③	④⑤
Control register					
WY00S1	00------**	01------**	01------**	00------**	00------**
Status register					
WX00S0	---0--	---0--	---100	---100	---0XX--

No.	Description (Please refer along with Figure 5.1.2.1.)
①	The area of WR(internal output) that the subordinate position two digits of the I/O number start by 00 is made a head by the user program, and IP address information is set in the area for 12 consecutive words beforehand. The user program sets the high rank two digits of above-mentioned WR area in the control register. The user program confirms IP address set response flag (X00S12) of the status register is "0", and sets "1" in IP address set demand bit (Y00S30) of the control register.
②	This module detects that "IP address set request bit (Y00S30)" is set to "1". This module reads IP address information set in WR**00-WR**0B, and sets "1" in IP address set response flag (X00S12). At this time, both flags are cleared in "0" regardless of the state of IP address set completion flag (X00S10) and IP address set error flag (X00S11) (However, when ERR LED lights, ERR LED maintains lighting).
③	The user program confirms IP address set response flag (X00S12) of the status register became "1", and clears IP address set request bit (Y00S30) of the control register in "0".
④	This module detects IP address set request bit (Y00S30) becoming "0", and clears IP address set response flag (X00S12) in "0".
⑤	When IP address information is correctly set, this module sets "1" in IP address set completion flag (X00S10). This module informs that the error occurred by lighting ERR LED at the same time as setting "1" in IP address set error flag (X00S11) when there are some inconveniences in IP address information. IP address set completion flag (X00S10) maintains "0" when the error occurs, and IP address information set till then is never updated. Details of the error factor are set in X00S00~X00S05.

Figure 5.1.2.2 Set procedure of IP address information

(3) Reading IP address information

It is necessary to change the operation mode to "Refer to Internet Protocol address set value" to read a set value of IP address information, and to secure the internal output area to store read information. And, IP address information can be read by executing handshake program.

Operation mode	MODE1 setting switch
IP address information reading	

IP address information storage area

WR**00	Read information
	:
	:
WR**0B	:

		①	②	③	④⑤
Control register					
WY00S1	00------**	01------**	01------**	00------**	00------**
Status register					
WX00S0	---0--	---0--	---100	---100	---0XX--

No.	Description (Please refer along with Figure 5.1.2.1.)
①	The area of WR(internal output) that the subordinate position two digits of the I/O number start by 00 is made a head by the user program, and IP address information is set in the area for 12 consecutive words beforehand. The user program sets the high rank two digits of above-mentioned WR area in the control register. The user program confirms IP address set response flag (X00S12) of the status register is "0", and sets "1" in IP address set demand bit (Y00S30) of the control register.
②	When this module detects "1" of IP address set request bit (Y00S30), this module set "1" in IP address set response flag (X00S12). At this time, both flags are cleared in "0" regardless of the state of IP address set completion flag (X00S10) and IP address set error flag (X00S11) (However, when ERR LED lights, ERR LED maintains lighting).
③	The user program confirms IP address set response flag (X00S12) of the status register became "1", and clears IP address set request bit (Y00S30) of the control register in "0".
④	This module detects I P address set request bit (Y00S30) becoming "0", and clears IP address set response flag (X00S12) in "0".
⑤	An existing fixed value is stored in the WR area specified by the control register when IP address information is correctly read, and this module sets "1" in IP address set completion flag (X00S10). This module informs that the error occurred by lighting ERR LED at the same time as setting "1" in IP address set error flag (X00S11) when the error occurs at the time of reading IP address information. When the error occurs, IP address set completion flag (X00S10) maintains "0". Details of the error factor are set in X00S00~X00S05.

Figure 5.1.2.3 Reading procedure of IP address information

(4) Set procedure of default IP address

It is necessary to change the operation mode to "IP address default setting" to return IP address information to the default value, and to secure the internal output area to store IP address information on default. And, IP address information can be returned to the state of default by executing handshake program.

Operation mode	MODE1 setting switch
IP address default setting	

IP address information storage area

WR**00	Read information
	:
	:
WR**0B	:

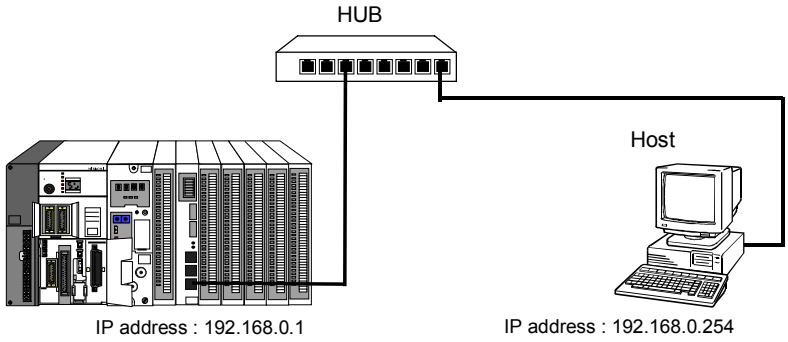
		①	②	③	④⑤
Control register					
WY00S1	00------**	01------**	01------**	00------**	00------**
Status register					
WX00S0	---0--	---0--	---100	---100	---0XX--

No.	Description (Please refer along with Figure 5.1.2.1.)
①	The area of WR(internal output) that the subordinate position two digits of the I/O number start by 00 is made a head by the user program, and IP address information is set in the area for 12 consecutive words beforehand. The user program sets the high rank two digits of above-mentioned WR area in the control register. The user program confirms IP address set response flag (X00S12) of the status register is "0", and sets "1" in IP address set demand bit (Y00S30) of the control register.
②	When this module detects "1" of IP address set request bit (Y00S30), this module set "1" in IP address set response flag (X00S12). At this time, both flags are cleared in "0" regardless of the state of IP address set completion flag (X00S10) and IP address set error flag (X00S11) (However, when ERR LED lights, ERR LED maintains lighting).
③	The user program confirms IP address set response flag (X00S12) of the status register became "1", and clears IP address set request bit (Y00S30) of the control register in "0".
④	This module detects I P address set request bit (Y00S30) becoming "0", and clears IP address set response flag (X00S12) in "0".
⑤	IP address information on default is stored in the WR area specified by the control register when IP address information on default is correctly set, and this module sets "1" in IP address set completion flag (X00S10). This module informs that the error occurred by lighting ERR LED at the same time as setting "1" in Internet Protocol address set error flag (X00S11) when the error occurs.When the error occurs, IP address set completion flag (X00S10) maintains "0". Details of the error factor are set in X00S00~X00S05.

Figure 5.1.2.4 Set procedure of default IP address

(5) Example of IP address information setting

When this module is mounted on slot No.1 in the network composition shown in Figure 5.1.2.5, and the head of a set area is specified for WR0200, an actual set example is explained.



Send/receive test logical port No. : 4000
Task port 1
Logical port No. : 3004
Communication protocol : TCP/IP
Task port 2
Logical port No. : 3005
Communication protocol : TCP/IP

Figure 5.1.2.5 Example of network composition

(a) Initial value of control register

The I/O number of two digits of the high rank of the internal output of WR area used as IP address informational set area is specified for bit 16-23 by the binary value. All the values set in bit 24-31 are assumed to be "0" for convenience' sake.

	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	← Bit I/O No.
Y1xx*1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	(BIN)
WY001	0				0				0				2				(HEX)

*1 : The part of "xx" corresponds to bit I/O number.

(b) IP address information setting value

The internal output of WR area where the I/O number of 12 words in total is consecutive is used to set IP address information.

I/O No.	Item			Set value (HEX)		Description
WR0200	Own IP address			C0	A8	192.168.0.1 in hexadecimal
				00	01	
02	Send/receive test		Other station IP address	C0	A8	192.168.0.254 in hexadecimal
				00	FE	
04			Logiacl port No.	0F	A0	4000 in hexadecimal
05	Task code communication	Task port 1	Own logical port No.	0B	BC	3004 in hexadecimal
			Service type	00	01	TCP/IP
07		Task port 2	Own logical port No.	0B	BD	3004 in hexadecimal
			Service type	00	01	TCP/IP
09		Timeout observation		00	00	No observation

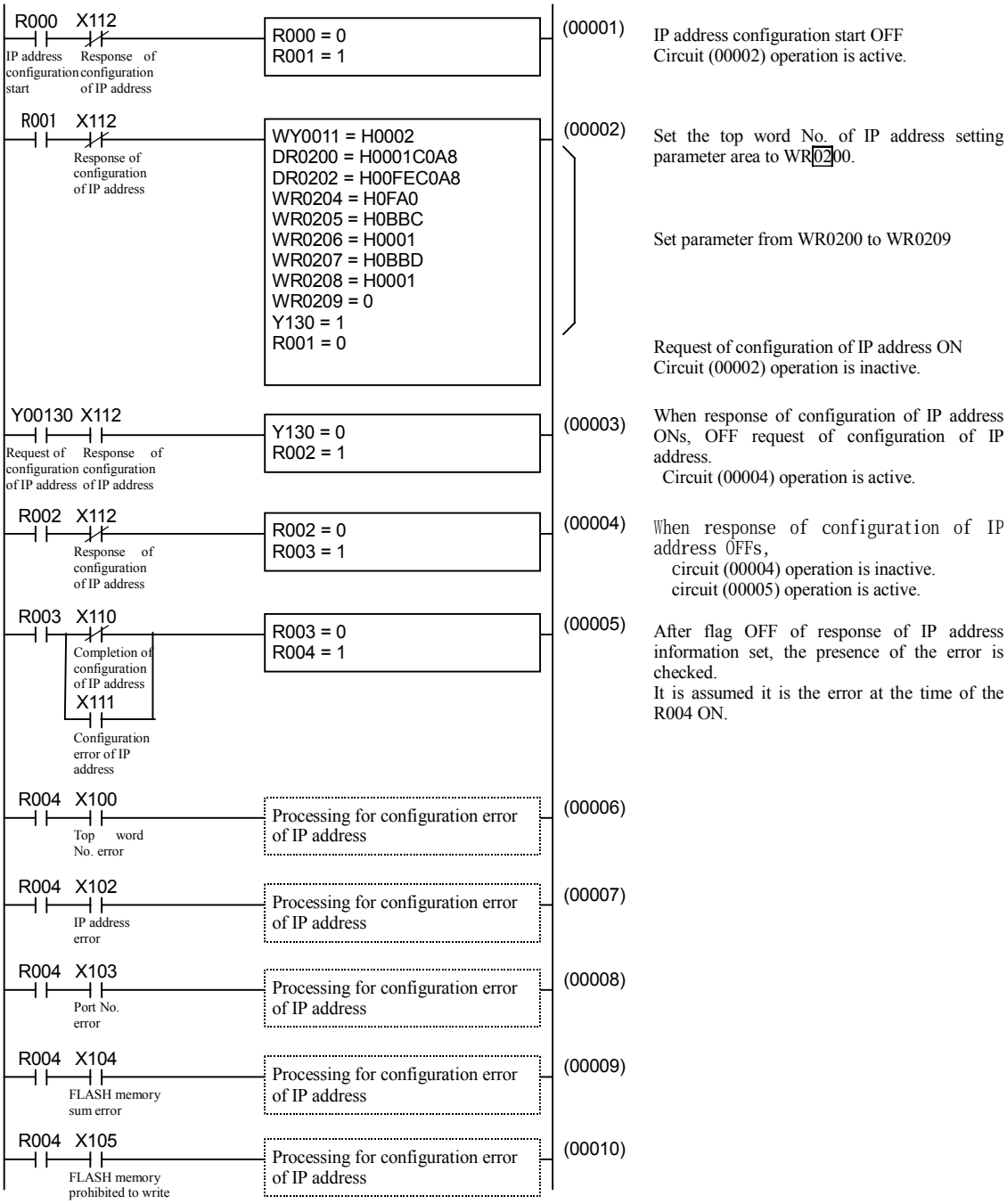
Note
If shutdown happens while IP address is rewritten, it may be considered as FLASH memory sum error or WDE.
In this case, apply power pressing E.CLR switch, and set IP address again.

(6) Example for IP address configuration program

Sample program 1 IP address configuration

Executed by turning on R0.

Slot No.	0	1	2	~	8
LAN-ETH2 Mounted position	X		-	-	-



Note

This program is a sample for operation and can not be necessarily used in the environment of all customers.
If you apply this program to your system, please check safety of whole system etc. carefully.

(7) IP address information setting (PORT1)

Figure 5.1.2.6 shows the composition when the personal computer sets IP address by way of RS232C of port 1.
The example of operating the outline when IP address is changed from "192.168.0.1" to "192.168.0.9" is shown.

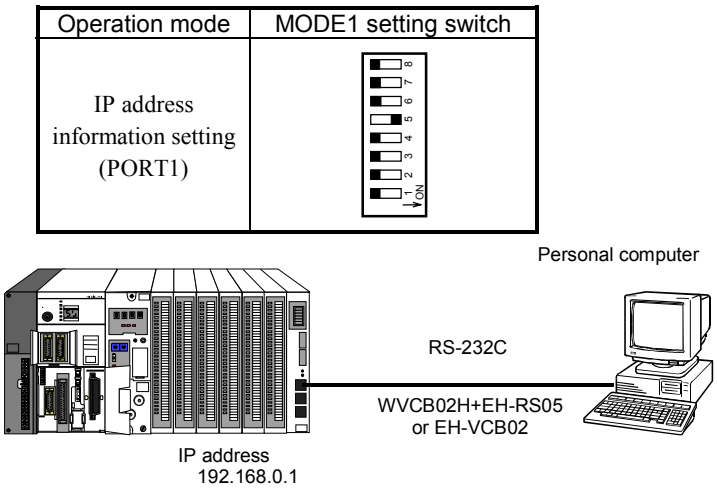


Figure 5.1.2.6 IP address set composition

① IP address set tool is started (*1)
② The value of the module is automatically read now and the value is set in current value column and setting value column. (State of Figure 5.1.2.7)
③ The cursor is matched to the settimg value column, and each parameter is changed.
④ When "Transmission" button is pushed, the changed parameter is written in the module.
⑤ When "Reception" button is pushed, the current value is read from the module.
Whether the parameter was correctly changed is confirmed.

Supplementation

(1) The value is read from the module now when IP address setting tool is started, and the value is set in the current value column and the setting value column now.
(2) When "Default value copy" button is pushed, the default value is set in the setting value column.
(3) When "Setting value save" button is pushed, the data of the setting value column is saved as a file.
(4) When "Setting value load" button is pushed, the data is read from the file which was saved by "setting value save", and that data is set in the "setting value column".

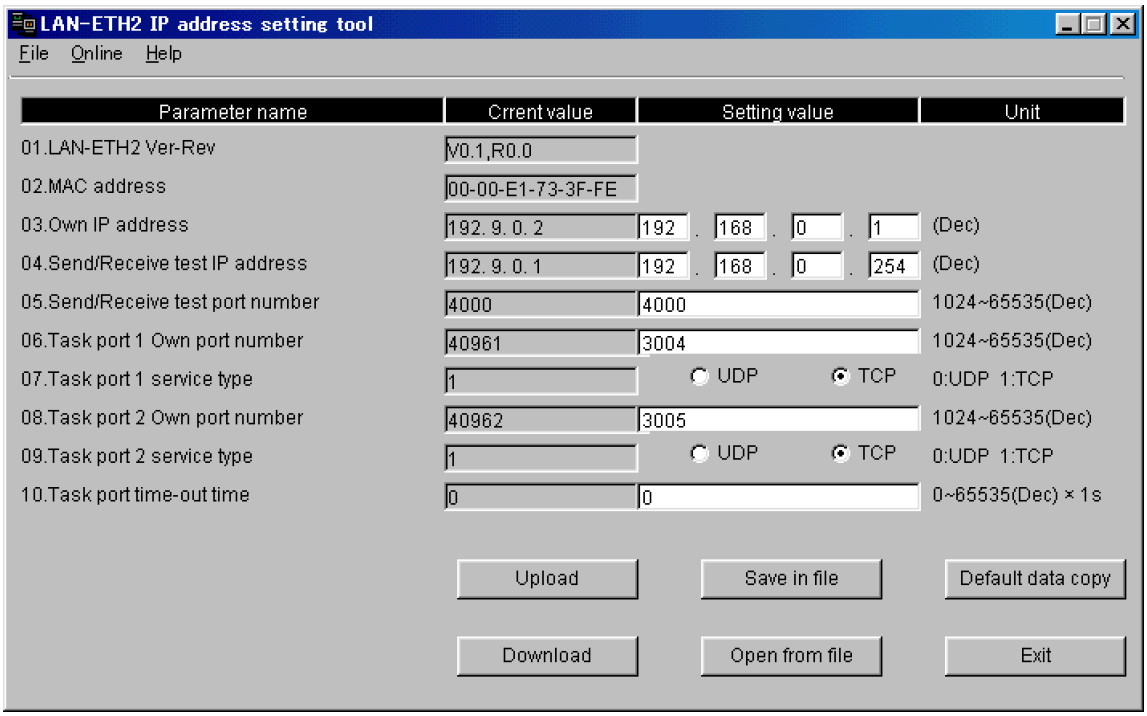


Figure 5.1.2.7 Screen of IP address setting tool

*1 Please contacts our sales about IP address set software.

5.2 Communication with task code

There is a communication protocol named as Task code that is H series original commands. You can make communication with task code through LAN-ETH2. This module has two connection ports for the task code communication.

Please refer to the manual of the COMM module and CPU module for details of the task code.

Feature of task code communication

- You need not to make ladder program to communicate with task code.
- Reading/writing of ladder program is possible between the host computer and CPU module. Moreover, data can be set in an internal output of CPU module, and the data of an internal output be monitored.
- After detaching header information etc. on TCP (Or, UDP) frame which the host computer issued, this module passes the demand task code to H series CPU module. After header information etc. on TCP (Or, UDP) frame are added by this module, the response task code which H series CPU module issued is sent back to the host computer for this.
- The task code communication processing does not influence at the scanning time of ladder program. Therefore, the system can be constructed by separating the control and control.

5.2.1 Outline

This communication protocol regulates communication with task code between host computer and LAN-ETH2. H series module based on this communication protocol are CPU module, COMM module, Remote I/O local station module, GPIB module, and CPU link module. Excepting for CPU link module, user can connect host with them.

The generality of H series communication rule is shown in figure 5.2.1.1.

Function for user

I/O control CPUcontrol Memory read/write Response

Logical level	Assortment of task code		
	Rule for each task code		
	Rule for H series network		
Data link level	TCP/IP UDP/IP	Transmission control procedure1, 2 Correspomding to Fieldnet	Transmission control procedure 1, 2
Physical level	IEEE 802.3	RS-232C, RS-422	GPIB
Module name	LAN-ETH2	CPU module COMM, Remote I/Olocal station	GPIB

It is necessary to understand the specification of the halftone screen part, when you make the host program.

Figure 5.2.1.1 Generality of H series protocol

This module uses the procedure which is called a one side start at the data link level. As for this one side start, only the host computer side can start the communication for the module of H series. That is, the task code communication protocol supported by this module is a passive protocol of always returning the response based on the demand from the host computer.

You can use 5 functions of H series communication rule shown in below.

(1) CPU control : CPU module run control, occupation, status read etc.
(2) I/O control : I/O monitor, forced output etc.
(3) Memory read : Reading from program memory etc.
(4) Memory write : Writing to program memory, program clear etc.
(5) Response : Response from CPU module for task code etc.

Please refer to **H series CPU module manual (software edition) "6.4 task code specification"** for details of the task code (command code) and refer to the next paragraph respectively for the data format.

5.2.2 Communication protocol and flame format

When the task code communication function is used in this module, either communication protocol is used among UDP/IP or TCP/IP. The communication protocol is selected by setting the service type. Please refer to "Table 5.1.2.2 IP address information" for the service type.

It is necessary to generate data in the application program of the host computer based on the frame format shown in Figure 5.2.2.1 when communicating the task code between this module and the host computer. This data is handled as a binary.

(a)	(b)	(c)	(d)

(a) Termination command	Size : 1 byte
Execution and the interruption of the task code processing are told to CPU module. It is set by the application of the host computer. The command is the following three kinds. H00 **:** When the request task code is transmitted to CPU module, this value is used. CPU module executes processing to the demand task code added to this command, and replies the response task code. HFF **:** When the request task code issued before is cut, this value is used. H01 ~ HFE **:** This module does not move "receiving request task code (d)" to CPU, and this module annul this request task code.	
(b) Through No.	Size : 1 byte
It is a serial number added to the request task code. It is set by the application of the host computer. This serial number added to the demand task code is set in the response task code as it is and this module replies to the host computer. Please use this No., when you control the correspondence between the demand task code which the host computer sends, and the response task code from this module.	
(c) LUMP address	Size : 4 byte
H series network address. Please refer to “5.2.3” for detail.	
(d) Request/Response task code	Size : 244 byte maximum
H series communication protocol. Please refer to **H series CPU module manual (software edition) "6.4 task code specification"** for details.	

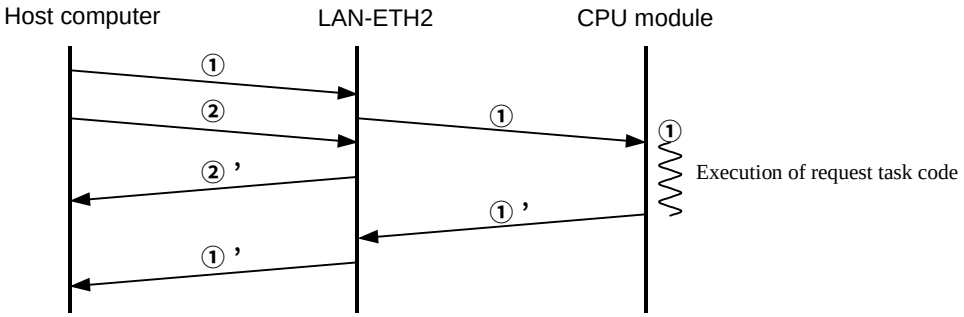
Figure 5.2.2.1 Flame format

Note

The data form to be able to treat this module is only a binary. ASCII data form is not handled.

While CPU module is executing processing to demand task code ①, when you receive the following demand task code ②, this module replies from a pertinent port busy response ② 'to the request task code of ②.

(① 'is normal response of the demand task code of ①.)



5.2.3 H series network address

It is necessary to decide the address in the network in H series communication system which shows in Figure 5.2.3.1 to specify fixed CPU from the host.

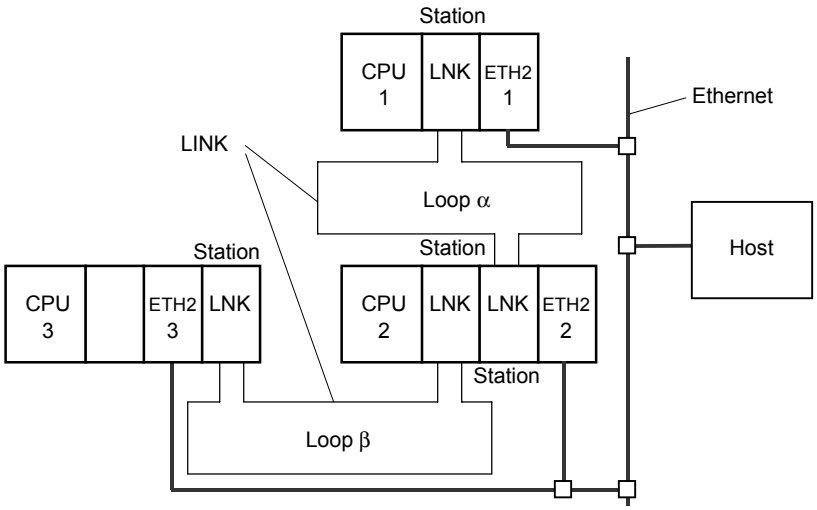
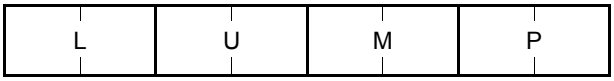


Figure 5.2.3.1 Example of H series communication system configuration

H series network address is composed of the hexadecimal number eight digits (four bytes) as shown in Figure 5.2.3.2. Moreover, details of each item are shown in Table 5.2.3.1.



L : Loop No. (Loop No. of CPU link)
U : Unit No. (Station No. of CPU link)
M : Module No.
P : Port No.

Figure 5.2.3.2 Network address

Table 5.2.3.1 Details of network address

① Loop No. (L)

Item	Loop No.
CPU link loop 1	H01
CPU link loop 2	H02
No CPU link	HFF

② Unit No. (U)

Item	Unit No.
CPU link ST No.0	H00
CPU link ST No.63	H3F
No CPU link	HFF

(Note) When loop No. is HFF, unit No. should be HFF. The opposite is also similar.

③ Module No. (M)

Please specify "00" always.

④ Port No. (P)

Please specify "00" always.

In the example of Figure 5.2.3.1, of H series communication system configuration, the example of setting the network address is shown in Table 5.2.3.2 when communicating from the host with each CPU the task code.

Table 5.2.3.2 Example of setting network address

No.	By way of LAN-ETH2	CPU	Network address
1	ETH2-1	CPU1	HFFFF0000
2		CPU2	H01010000
3		CPU3	(can not access)
4	ETH2-2	CPU1	H02000000
5		CPU2	HFFFF0000
6		CPU3	H01000000
4	ETH2-3	CPU1	(can not access)
5		CPU2	H01050000
6		CPU3	HFFFF0000

5.2.4 Occupation

In H series, it is possible to access a CPU module belongs to communication from several hosts. So, we made a status "occupation" to prevent to contend for writing to a CPU module. There are 3 types in occupation.

(1) No occupation

No host occupies CPU for read/write. You can execute I/O monitor.

(2) READ occupation

4 hosts can occupy CPU at once (maximum). But when one of them occupy CPU to write, the others can not occupy CPU to read. The hosts can do I/O monitor, I/O forced set/reset, program reading etc. in READ occupation.

(3) WRITE occupation

When any host does not READ occupation, only 1 host can do this occupation. The host can do I/O monitor, I/O forced set/reset, program reading/writing etc..

Table 5.2.4.1 shows the necessity of occupation when executing each task code.

Table 5.2.4.1 Needed occupation for each task code

Task code	Contents	Occupation	Remarks
H10	CPU status read	NO	
H11	Control CPU run/stop	NO	
H16	Occupation/Release of CPU	NO	
H17	Forced occupation release	NO	
H18	Set and read of RTC (calender and clock)	NO	Only CPU2-**H and H-4010 are effective.
H20	Program memory all clear	WRITE occupation	
H23	Program transmission by specifying address	WRITE occupation	
H26	Writing of memory assignment	WRITE occupation	
H27	Parameter change complete	WRITE occupation	
H28	Timer/counter setting change	WRITE occupation	
H31	Program reading by specifying address	READ occupation	
H33	Last circuit search	READ occupation	
H35	Reading of memory assignment	READ occupation	
H40	Monitoring by specifying I/O No. (N point)	NO	(Note 3)
H42	Forced set/reset by specifying I/O No. (N point)	READ occupation	
H44	Monitoring by specifying I/O No. (Random N point)	NO	(Note 3)
H45	Forced set/reset by specifying I/O No. (Random)	READ occupation	
H82	Extended program transmission by specifying address	WRITE occupation	Only H-4010 standard mode is effective.
H84	Extended writing of memory assignment	WRITE occupation	
H85	Extended timer/counter setting change	WRITE occupation	
H89	Extended program reading by specifying address	WRITE occupation	
H8B	Extended last circuit search	READ occupation	
H8C	Extended reading of memory assignment	READ occupation	
HA0	Monitoring by specifying I/O No. (N point)	NO	Only CPU2-**H and H-4010 are effective.
HA2	Forced set/reset by specifying I/O No. (N point)	NO	
HA4	Monitoring by specifying I/O No. (Random N point)	NO	
HA5	Forced set/reset by specifying I/O No. (Random)	NO	

<Note> 1. **Be sure to release occupation after the process occupying CPU completes.**

2. Task codes "18", "A0", "A2", "A4", and "A5" is applicable when CPU2-**type or H-4010 is used. Task code error response (01H) will return in case of other CPU type.
3. Caution response (02H) returns for task code "40" and "44", but the operation will execute normally.
4. The task code "82" -"8C" can be used in only H4010 standard mode.

5.2.5 Task code communication matrix

TCP/IP Host side (transmit to the bold column at the time of normal process)

Item No.	Event No.	A Connection open request	B Task code command send request	C Communication complete	D Communication error	E Communication timeout	F Receipt of task code response	G Termination command send request	H Connection release request	I Task code response timeout
1	Waiting for connection open	Connection open process →2								
2	Distinction of the result of connection open				Error report →1	Error report →1				
				→3						
3	Waiting for task code command send request		Send process →4				Data break →3	Termination command send →8	Connection release process →7	
4	Distinction of the result of task code command send				Connection release process error report →7	Connection release process error report →7				
				→5						
5	Waiting for task code response receive							Termination command send →8	Connection release process →7	Error report →3
							→6			
6	Distinction of the result of task code receive			Receive process →3	Connection release process error report →7	Connection release process error report →7				
7	Distinction of the result of connection release				Error report →1	Error report →1				
				→1						
8	Distinction of the result of termination of command send				Connection release process error report →7	Connection release process error report →7				
				→3						

1. When connection is released, send the shutdown transmission (It is FIN packet at the transmission level).

TCP/IP Module side

Item No.	Event No.	A Connection	B Disconnection	C Disconnection complete	D Receipt of request task code from host	E Receipt of response task code from CPU	F Receipt of termination command from host	G Error command from host	H CPU error	I Timeout of User specified timer	J Timeout of response waiting timer for 60 seconds
1	Waiting for connection	User specified timer start →2				Data break					
2	Waiting for request task code from host				Request task code send to CPU Response waiting timer for 60 second start	Data break	Data break	Data break		Disconnect	
			→4		→3					→4	
3	Waiting for response task code from CPU				Busy response send to host	Response task code send to host User specified timer start		Data break	Network error response send to host		Network error response send to host
			→4			→2	→2		→2		→2
4	Waiting for disconnection complete										
				→1							

Abnormal command : termination command is 01H ~ FEH.

UDP/IP Host side (transmit to the bold column at the time of normal process)

	Event No.	A	B	C	D	E	F	G
Item No.		Request of task code command sending	Communication complete	Communication error	Communication timeout	Receiving of task code response	Termination command send request	Task code response timeout
1	Waiting for request of task code command send	Task code command send				Data break	Termination command send	
		→2				→1	→5	
2	Distinction of the result of task code command send			Error report	Error report			
			→3	→1	→1			
3	Waiting for receiving of task code response						Termination command send	Error report
						→4	→5	→1
4	Distinction of the result of task code response receive		Receive process	Error report	Error report			
			→1	→1	→1			
5	Distinction of the result of termination response receive			Error report	Error report			
			→1	→1	→1			

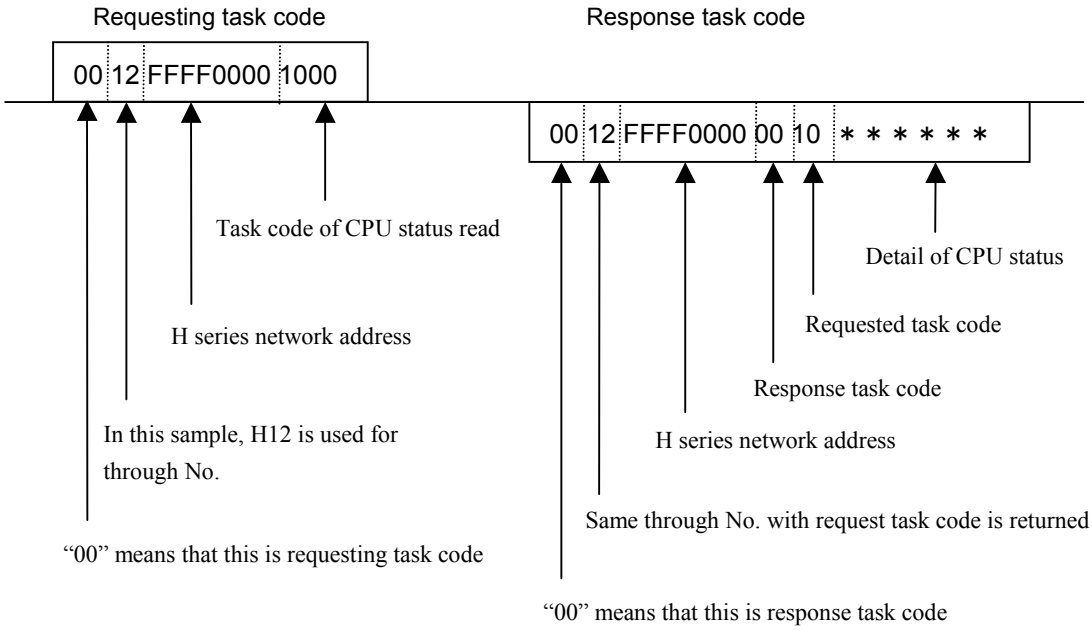
TCP/IP Module side

	Event No.	A	B	C	D	E	F
Item No.		Receipt of request task code from host	Receipt of response task code from CPU	Receipt of termination command from host	Error command from host	CPU error	Timeout of response waiting timer for 60 seconds
1	Waiting for request task code from host	Request task code send to CPU Response waiting timer for 60 second start	Data break	Data break	Data break		
		→2					
2	Waiting for response task code from CPU	Busy response send to host	Response task code send to host		Data break	Network error response send to host	Network error response send to host
			→1	→1		→1	→1

Abnormal command : termination command is 01H ~ FEH.

5.2.6 Example of task code issue

An example for communication in which a requesting task code and a response task code are issued to see status information to H series CPU.



Please refer to "6.4 task code specification" of H series CPU module manual (software edition), for detail of the task code.

5.2.7 Sample program of host computer

[Note on using]

- This sample program operates with the personal computer with which LAN-ETH2 and Ethernet LAN are connected, and is a sample for CPU module where LAN-ETH2 is mounted and the Visual Basic application of the task code to communicate program.
- Please acknowledge beforehand that it is not the one to promise our company to support concerning the operation guarantee and the content.
- Though this sample program confirms the operation in the environment of the our company possession personal computer, it is not the one that it was guaranteed to operate in all the environments.
- This Visual Basic making environment and operation confirmation situation in our company are as follows.

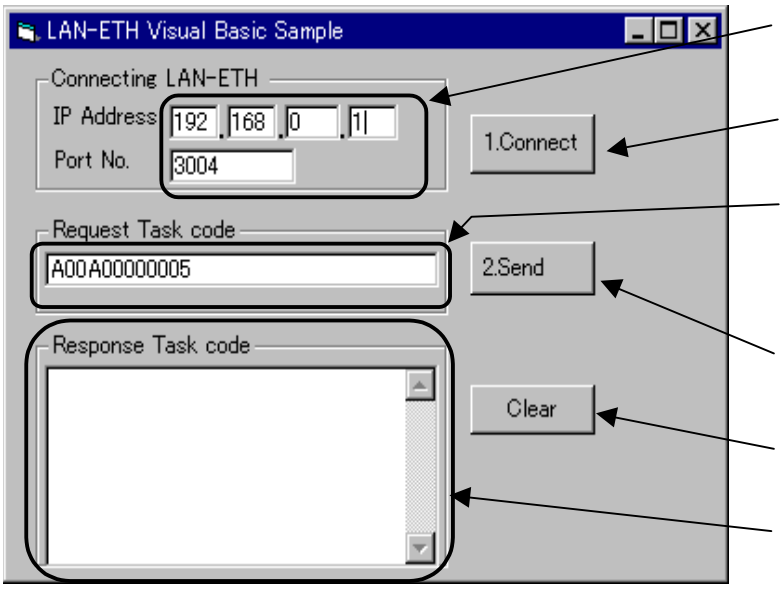
Microsoft Visual Basic 5.0 EnterPrize
Windows 32Bit Application compilation
FLORA1010

- Ethernet usually uses "Winsock control" which is the Visual Basic ActiveX control to communicate by the application software made with Visual Basic. The Winsock control is included as Visual Basic developer tool and the control which improves convenience is marketed. It is necessary to know these controls well to make the Ethernet communication application program. A document on the market and the Microsoft Co. are recommended to be used to support.
- This sample does not contain various error processing in the program operation. When an actual application is made, error processing is recommended to be added.
- When this sample program is used, setting IP address information on LAN-ETH is needed. Especially, please specify TCP/IP about the task code service type. Please refer to "5.1.2 IP address setting" for the method of setting IP address information.

Please refer to the manual related to H series for the task code.

[Screen composition]

Each numerical value in the screen reaches the default value when this sample program starts.



①IP address and the port number of LAN-ETH2 which communicates are input.

②Cliclk to connect TCP/IP
(There is no response.)

③The request task code issued to CPU where LAN-ETH is mounted is input by the hexadecimal number.
H series network address (LUMP) is not needed to input.

④When the input request task code is send, this button is clicked.

⑤The display of the response task code is cleared when this button is clicked.

⑥The response task code to the sending request task code is displayed. The LUMP address is not displayed.

[Sample program list]

```
' Termination command (H00)+through No. (H00)+LUMP address (FFFF0000) setting
Private Const HEADER = "0000FFFF0000"

Private Sub Form_Load()
    Text1.Text = 158
    Text2.Text = 213
    Text3.Text = 83
    Text4.Text = 1
    Text5.Text = 3004
    Text6.Text = "A00A00000005"
    Text7.Text = ""
End Sub

Private Sub Command1_Click()
    Ipaddr = Text1.Text + "." + Text2.Text + "." + Text3.Text + "." + Text4.Text
' Designation of IP address of other station
    Winsock1.RemoteHost = Ipaddr
' Designation of Port No. of other station
    Winsock1.RemotePort = Text5.Text
' Open the connection
    Winsock1.Connect
End Sub

Private Sub Command2_Click()
    Dim Bin() As Byte
' Calling the "AscToBin" which converts the input request task code to the binary.
    Call AscToBin(HEADER & Text6.Text, Bin)
' Sending of data which was converted to binary
    Winsock1.SendData Bin
End Sub

Private Sub AscToBin(ByVal Data As String, ByRef Bin() As Byte)
    Dim i&
' "0" is added at the end, when the character string length is an odd number.
    If Len(Data) Mod 2 Then
        Data = Data & "0"
    End If
    ReDim Bin(0 To Len(Data) / 2 - 1)
' Binary conversion and stored in the buffer
    For i = 0 To Len(Data) / 2 - 1
        Bin(i) = "&h" & Mid(Data, i * 2 + 1, 2)
    Next
End Sub
```

```
Private Sub Winsock1_DataArrival(ByVal bytesTotal As Long)
    Dim Bin() As Byte, i&, buf$, h$
    Winsock1.GetData Bin
    If bytesTotal >= 2 Then
        For i = 6 To bytesTotal - 1
            h = Hex(Bin(i))
' After the conversion to hexadecimal, 0 is added if that is one digit.
            If Len(h) = 1 Then
                buf = buf & "0" & h & " "
            Else
                buf = buf & h & & " "
            End If
        Next
' Display of response task code
        Text7.Text = buf
    End If
End Sub

Private Sub Command3_Click()
' The display of the response task code is clear.
    Text7.Text = ""
End Sub
```

5.3 Message communication

5.3.1 Transmission parameter

It is necessary to set the definition of the internal output area as "Transmission parameter" which is set as other station IP address and is used to transmit/receive the message, when the message communication function is used in this module.

Transmission parameter area uses 213 words of continuous internal output (WR) maximum. The following shows the parameter configuration.

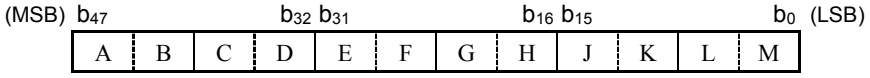
Table 5.3.1.1 Transmission parameter

WR**			R/W	Description	
00 - 02	Own station physical address	3 words	R	[a]	LAN-ETH2 sets physical address of own station
03 - 04	Own station IP address	2 words	R	[b]	LAN-ETH2 sets IP address of own station
05	Control area	Control area 1	W	[c]	Open request for each connection
06		Control area 2	W		Request of sending and response of receiving for each connection
07	Status area	Status area 1	R	[d]	Open completed and error of each connection
08		Status area 2	R		Response of sending and error of each connection
09		Status area 3	R		Receive existence and error of each connection
0A		Status area 4	R		Close request from other station of each connection
0B		Connection 1 Status area	R	[e]	Error information for each connection
0C		Connection 2 Status area	R		Errors at the time of configuration of
0D		Connection 3 Status area	R		transmission parameter, open/close and
0E		Connection 4 Status area	R		sending/receiving data are set.
0F		Connection 5 Status area	R		
10		Connection 6 Status area	R		
11	Timeout observation timer seting		R	(f)	For active open and message communication
12	Reserve				Not for use
13	Connection 1	Own station logical port No.	W	[g]	Specify the own station logical port No. of connection 1.
14	parameter setting area	Other station IP address	W	[h]	Specify IP address of other station for connection 1
15	（11 words in total）				
16		Other station logical port No.	W	[j]	Specify logical port No. of other station for connection 1.
17		Send buffer I/O type	W	[k]	Specify send buffer I/O type
18		Send buffer top No.	W	[m]	Specify send buffer top No.
19		Send buffer area length	W	[j]	Specify send buffer area length
1A		Receive buffer I/O type	W	[k]	Specify receive buffer I/O type
1B		Receive buffer top No.	W	[m]	Specify receive buffer top No.
1C		Receive buffer area length	W	[n]	Specify receive buffer area length
1D		Service type	W	[p]	Specify communication protocol and open status.
1E - 28	Connection 2 parameter setting area		W		Same with connection 1
29 - 33	Connection 3 parameter setting area		W		Same with connection 1
34 - 3E	Connection 4 parameter setting area		W		Same with connection 1
3F - 49	Connection 5 parameter setting area		W		Same with connection 1
4A - 54	Connection 6 parameter setting area		W		Same with connection 1
55	Routing information 1	Other station IP address	W	[q]	When routing information area isn't used or isn't
56					used up to class 32, set H0000 in 4 words in the top
57		Gateway IP address	W		of unused area.
58					LAN-ETH2 ignores the data written in behind
59 - 5C	Routing information 2		W		H0000 in 4 words.
:	:				**Only gateway IP address set in routing information 1**
:	:				**becomes effective. Gateway IP address of routing**
D1 - D4	Routing information 32		W		**information 2-32 is unused.**

(1) Explanation for each transmission parameter

[a] Physical address

This module sets the own physical address (48 bits) to transmission parameter area in the form of Figure 5.3.1.1. This physical address is read only for regardless of the operation mode.

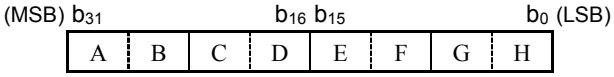


	b15			b0
WR**00	A	B	C	D
01	E	F	G	H
02	J	K	L	M

Figure 5.3.1.1 Physical address storage form

[b] IP address of own station

This module sets own IP address (32 bits) to transmission parameter area in the form of Figure 5.3.1.2. This IP address is only for reading in the normal operation mode.



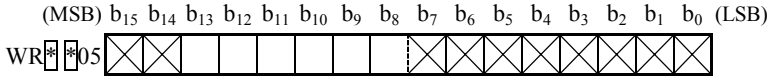
	b15			b0
WR**03	A	B	C	D
04	E	F	G	H

Figure 5.3.1.2 IP address storage form

[c] Control area

When the communication relation processing to use the message communication function is requested of this module, this area is used. This area is set by user program.

Control area 1



Bit 8-13 : Connection open request bit

It is a bit which requests the open processing of each connection for the message communication.

Bit	Corresponding connection	Set value and explanation	
		1	0
8	Connection 1	Open processing is requested	Open processing is not requested
9	Connection 2	Open processing is requested	Open processing is not requested
:	:	:	:
13	Connection 6	Open processing is requested	Open processing is not requested

Bit 0-7, 14-15 : Reserved bit

Always set "0".

Control area 2

Bit 0-5 : Receive response bit

This bit is used to notify to have finished saving the receiving data in the receiving buffer to other internal output areas. There is a corresponding bit of each connection for the message communication.

Bit	Corresponding connection	Set value and explanation	
		1	0
0	Connection 1	Receiving response is notified	Receiving response is not notified
1	Connection 2	Receiving response is notified	Receiving response is not notified
:	:	:	:
5	Connection 6	Receiving response is notified	Receiving response is not notified

Bit 8-13 : Send request bit

It is a bit which requests the data transmission of each connection for the message communication. There is a corresponding bit of each connection.

Bit	Corresopnding connection	Set value and explanation	
		1	0
8	Connection 1	Data sending is requested.	Data sending is not requested.
9	Connection 2	Data sending is requested.	Data sending is not requested
:	:	:	:
13	Connection 6	Data sending is requested.	Data sending is not requested

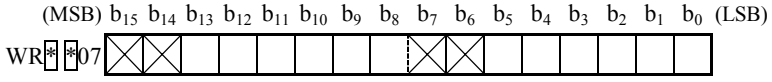
Bit 6-7, 14-15 : Reserved bit

Always set "0".

[d] Status area

When the user refers to various information on this module needed to process the communication relation to use the message communication function from the user program, this area is used.

Status area 1



Bit 0-5 : Open error flag

The status of the open error which occurs by each connection for the message communication is stored.

Bit	Corresopnding connection	Set value and explanation	
		1	0
0	Connection 1	There is open error.	There is no open error.
1	Connection 2	There is open error.	There is no open error.
:	:	:	:
5	Connection 6	There is open error.	There is no open error.

Bit 8-13 : Open status flag

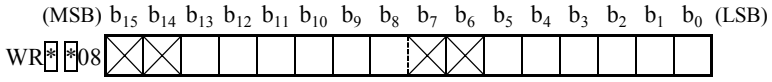
The status of open/close of each connection for the message communication is stored.

Bit	Corresopnding connection	Set value and explanation	
		1	0
8	Connection 1	Opening	Closing
9	Connection 2	Opening	Closing
:	:	:	:
13	Connection 6	Opening	Closing

Bit 6-7, 14-15 : Reserved bit

Always set "0".

Status area 2



Bit 0-5 : Send error flag

When this module cannot send data, it is detected as send error.

Bit	Corresopnding connection	Set value and explanation	
		1	0
0	Connection 1	There is a send error.	There is no send error.
1	Connection 2	There is a send error.	There is no send error.
:	:	:	:
5	Connection 6	There is a send error.	There is no send error.

Bit 8-13 : Send response flag

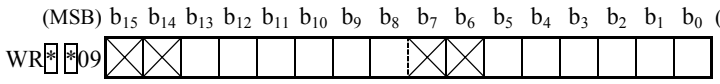
This module is notified to have accepted the sending request to the sending request from the user program. There is a corresponding bit of each connection.

Bit	Corresopnding connection	Set value and explanation	
		1	0
8	Connection 1	There is a send response.	There is no send response.
9	Connection 2	There is a send response.	There is no send response.
:	:	:	:
13	Connection 6	There is a send response.	There is no send response.

Bit 6-7, 14-15 : Reserved bit

Always set "0".

Status area 3



Bit 0-5 : Receive error flag

When this module cannot receive data, it is detected as receive error.

Bit	Corresopnding connection	Set value and explanation	
		1	0
0	Connection 1	There is a receive error.	There is no receive error.
1	Connection 2	There is a receive error.	There is no receive error.
:	:	:	:
5	Connection 6	There is a receive error.	There is no receive error.

Bit 8-13 : Receive flag

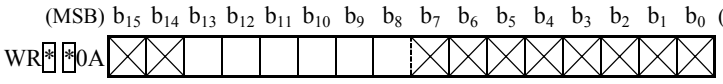
The data which this module received is notified to have been stored in the specified reception buffer area. There is a corresponding bit of each connection.

Bit	Corresopnding connection	Set value and explanation	
		1	0
8	Connection 1	There is a reception.	There is no reception.
9	Connection 2	There is a reception.	There is no reception.
:	:	:	:
13	Connection 6	There is a reception.	There is no reception.

Bit 6-7, 14-15 : Reserved bit

Always set "0".

Status area 4



Bit 8-13 : Close request flag

It is a flag which notifies the closing request of the connection from the other station on the opening connection.

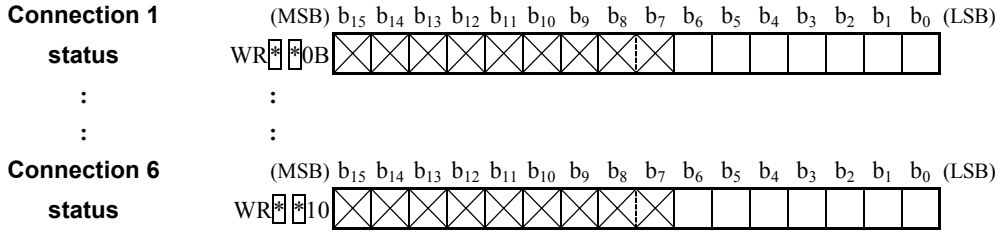
Bit	Corresopnding connection	Set value and explanation	
		1	0
8	Connection 1	Close request from other station	No close request from other station
9	Connection 2	Close request from other station	No close request from other station
:	:	:	:
13	Connection 6	Close request from other station	No close request from other station

Bit 0-7, 14-15 : Reserved bit

Always set "0".

[e] Status area of each connection

It is such an area where notifies error occurrence at the time of the normal operation and at the time of transmission parameter setting mainly. You read out the value of these status areas with user program.



[Transmission parameter setting]

Bit 0: I/O type error flag

When I/O types other than WR(H0A), WL(H0B), and WM(H0C) are specified as a transmission buffer or a receiving buffer, it becomes an error.

Bit 1 : I/O No. error flag

When the I/O number outside the range is specified for the I/O type specified as a transmission buffer or a receiving buffer, it becomes an error.

Bit 2 : Buffer length error flag

When the specified size of receving buffer or transmission buffer is out of 4-516(H04-H204) word, it becomes an error.

Bit 3 : Area error flag

When the IP address information area, the transmission parameter area, and the sending/receiving buffer exceeds the upper bound value, it becomes an error. Moreover, when the transmission parameter area and the sending/receiving buffer overlaps, it becomes an error.

Bit 4 : IP address error flag

The error is detected by the following conditions.

1) When "H00000000" or "HFFFFFFFF" is set in other station IP address.
2) When own IP address and the other station IP address are the same.

Bit 5 : Logical port No. error flag

The error is detected by the following conditions.

1) When "H00000000" is set in the other station logical port number.
2) When the logical port number and the other station logical port number for the task code communication are the same.

Bit 6 : Service type error flag

When the service type which cannot be used is specified, it becomes an error.

Bit	Description	
	1	0
0	I/O type error	None
1	I/O No. error	None
2	Buffer length error	None
3	Area error	None
4	IP address error	None
5	Logical port No. error	None
6	Service type error	None

Bit 7-15 : Reserved bit

Always set "0".

[Message sending/receiving processing]

Bit 0 : Receive buffer overflow flag

When receiving data exceeds the specified reception buffer area length, it becomes error.

Bit 1 : Send byte number error flag

The error is detected by the following conditions.

1) When the number of sending bytes is set to "0".

2) When the number of sending bytes exceed the sending buffer area length.

Bit 2 : Timeout error flag

When the transmission processing time exceeds the timeout value in transmission parameter, it becomes an error.

Bit 7 : Communication error flag

When the transmission processing terminates abnormally due to the trouble of the communication line though this module executed the transmission processing, it becomes an error.

Bit	Description	
	1	0
0	Receive buffer overflow error	None
1	Send byte number error	None
2	Tiemout error	None
7	Communication error	None

Bit 3-6, 8-15 : Reserved bit

Always set "0".

[f] Timeout observation timer value (Recommended value : 32 second = "H0020")

The time limit of timeout observation at the time of active open and sending message is specified with second. Set the plenty time considering the congestion of network and the performance of the other station. If you do not need to observe timeout, set H0000=0 second. The available range is H0000 to HFFFF (0 to 65535).

[g] Own station logical port No.

Set the own station logical port number of a pertinent connection.

[h] Other station IP address

Set the other station IP address of a pertinent connection.

[j] Other station logical port No.

Set the other station logical port number of a pertinent connection.

[k] I/O type

Set the type of the internal output used as a sending/receiving buffer area. Table 5.3.1.2 shows the I/O type which can be specified.

Table 5.3.1.2 I/O type

I/O type	I/O type value
WR	H0A
WL	H0B
WM	H0C

[m] I/O number

Set top I/O number of the internal output used as a sending/receiving buffer area. Table 5.3.1.3 shows the range of the I/O number which can be specified.

Table 5.3.1.3 Specifying range for I/O No.

I/O type	I/O type value	Specifying range for I/O No
WR	H0A	Refer to note.
WL	H0B	0 ~ H03FF, H1000 ~ H13FF
WM	H0C	0 ~ H03FF

Note : Set Specifying range is different according to the memory cassette type.

Table 5.3.1.4 Specifying range for WR I/O

Memory cassette type	Specifying range for I/O No
RAM-04H, RAM2-04H RAM-08H, RAM2-08H, RAM3-08H	0 ~ H03FF
RAM-16H, RAM2-16H, RAM3-16H ROM-16H, ROM2-16H	0 ~ H43FF
RAM-48H, RAM2-48H, RAM3-48H ROM2-48H	0 ~ HC3FF

[n] Buffer length

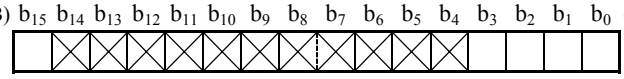
Set the data size which added 4 words to data length of sending/receiving, as word unit. The range of the buffer area length which can be specified is H0005-H0204(5-516) word.

For instance, the data size which can send and receive becomes 1 word, when H0005 is specified for this area.

[p] Service type

Specify the type of the service used by a pertinent connection.

(MSB) b_{15} b_{14} b_{13} b_{12} b_{11} b_{10} b_9 b_8 b_7 b_6 b_5 b_4 b_3 b_2 b_1 b_0 (LSB)



Bit 0 : Opening type specification bit

In the opening type, there are "Active open" and "Passive open". Specify the opening form used.

Bit 1 : Other station specification bit

In the passive opened connection, "The other party bureau is specified" or "The other party bureau is not specified" can be selected. Specify them based on the communication procedure used.

Bit 2 : Communication protocol specification bit

Select the communication protocol used by a pertinent connection.

Bit 3 : Bi-direction communication specification bit

You can select "Bi-direction communication" or "One direction communication" for one connection. Specify them based on the communication procedure used.

Bit 15 : Connection effective/ineffective specification bit

Specify whether to use a pertinent connection.

Bit	Description	
	1	0
0	Active open	Passive open
1	the other station is fixed	the other station is not fixed
2	TCP/IP is used.	UDP/IP is used.
3	Either sending or reception is used by one connection.	Both sending and reception is used by one connection.
15	A pertinent connection is used.	A pertinent connection is not used.

Bit 4-14 : Reserved bit

Always set "0".

Note

- When you specify "One direction communication", the data delivery confirmation by the user program cannot be done. Therefore, we recommend "Bi-direction communication", if there is no restriction in customer's network environment and communication procedure.
- Even if the connection opening processing and the data transmission demand, etc. are done with "A pertinent connection is not used" specified, this module does not process anything.

There is a limitation in the combination which can be set about the service type. Moreover, the item which should be set according to the set service type is different. Table 5.3.1.5 and Table 5.3.1.6 show this combination. "○" in the table is a necessary item for transmission parameter to set and "×" in the table is a unnecessary item for transmission parameter to set. In addition, please set bureau Internet Protocol address and the port number regardless of the service type setting.

Table 5.3.1.5 Available combination (TCP/IP)

No.	Service			Setting item				Service type
	Other station specify	Open type	Communicate direction	Other station IP address	Other station logical port No.	Send buffer	Receive buffer	Set value
1	Fix	Active	Send/Receive	○	○	○	○	H8007
2	Fix	Active	Send	○	○	○	○	H800F
3	Fix	Passive	Send/Receive	○	○	○	○	H8006
4	Fix	Passive	Receive	○	○	○	○	H800E
5	Unfix	Passive	Send/Receive	×	×	○	○	H8004
6	Unfix	Passive	Receive	×	×	○	○	H800C

Table 5.3.1.6 Available combination (UDP/IP)

No.	Service			Setting item				Service type
	Other station specify	Open type	Communicate direction	Other station IP address	Other station port No.	Send buffer	Receive buffer	Set value
1	Fix	-	Send/Receive	○	○	○	○	H8002(Note1)
2	Fix	-	Send/Receive	○	○	○	○	H8003(Note1)
3	Fix	-	Send	○	○	○	○	H800B
4	Fix	-	Receive	○	○	○	○	H800A
5	Broad-cast	-	Send	×	○	○	○	H8009
6	Unfix	-	Receive	×	×	○	○	H8008

Note 1) Setting H8002 and H8003 of the service type become the same operations.

[p-1] Active open and passive open

It is necessary to establish the logical transmission line of connection beforehand before the initiation of the data sending and receiving processing, when the TCP/IP communication protocol is used in the message communication. There are two kinds of establishment forms of the connection, and even when which form is used, it is necessary to request the opening processing from the user program to this module.

- Active open is a method that own station issues open request to the other station has already waited for communication open and establishes a connection.
- Passive open is a method that own station waits for connection open and the connection is established when open request from other station is received.

Note : Own station in the explanation here indicates this module. The other station indicates the network equipment which communicates about this module.

Point
- When the other station is passive open, own station must be active. And own station is passive open, the other must be active.
- In general, it is known that the communication processing procedure by which establishment and cutting the connection are frequently repeated becomes a factor to make the system instability. "10 seconds or more" is recommended to be secured in this module at waiting time from cutting the connection to the repeated establishment.

[p-2] About the operation when the other station is not fixed

When you specify passive open in TCP/IP or receive only in UDP/IP, it is possible to make message communication with any other station without specifying the other station. In this case, this module sets IP address and logical port No. of the other station in send/receive data after other station is decided to send/receive data buffer. Use them to verify the other station.

[p-3] Broadcast send

In the UDP/IP, the broadcast transmission can be used.

When you specify broadcast send in UDP/IP, it is possible to send same data to several other stations, which have same logical No. and are located on a network, in receive status. It is useful for simultaneously sending from user program.

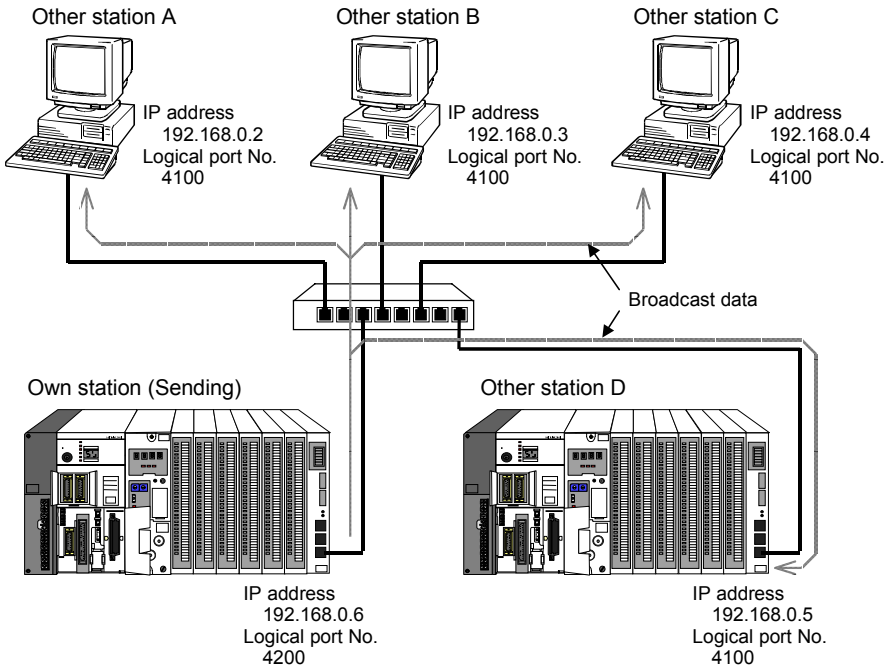


Figure 5.3.1.3 UDP/IP broadcast send

[q] Routing information

In generally, when network is logically divided into two or more segments, communication equipment with gateway function exists in the network.*1 The user should specify IP address of the gateway equipment for this module beforehand when communicating with the other station where this module belongs to other segments the message.

*1 : The gateway equipment might be unnecessary in case of the network composition installed in a single segment.

When the network in Figure 5.3.1.5 is composed, it is necessary to set IP address of the default gateway equipment in this module to transmit data to the other station which belongs from this module to segment B.

IP address of the default gateway equipment (32 bits) is stored in the transmission parameter area in the form of Figure 5.3.1.4.

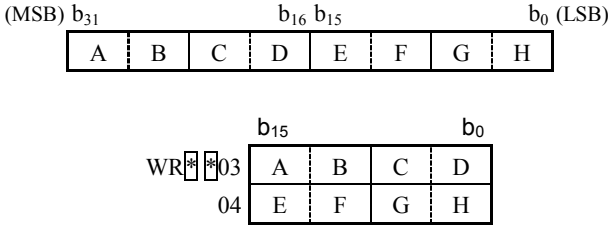


Figure 5.3.1.4 Default gateway IP address storage form

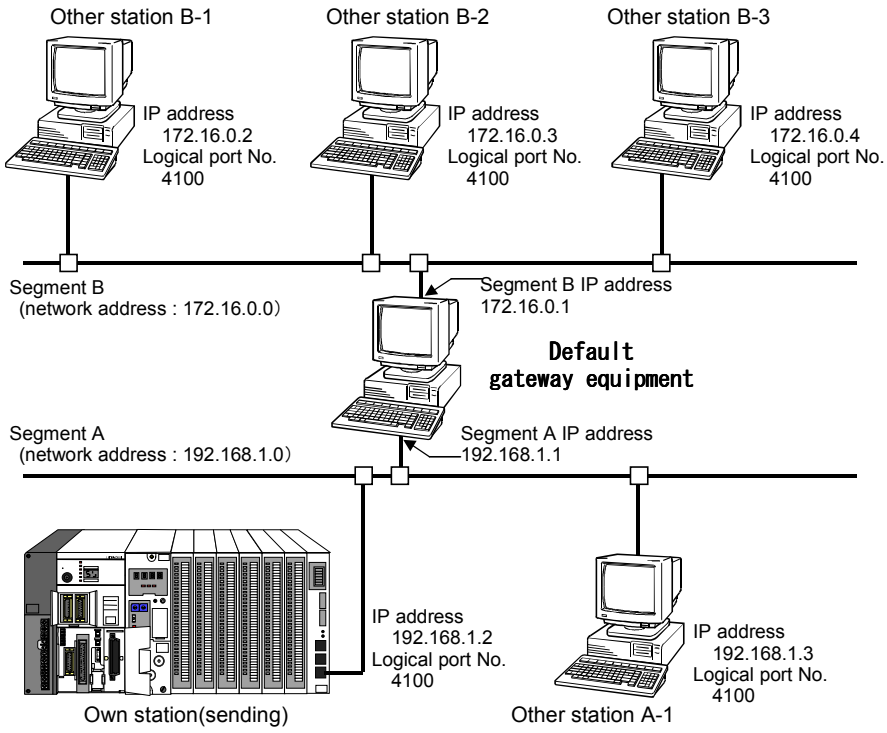


Figure 5.3.1.5 Communication example across subnet

Note

- **IP address which can be set in this module as gateway information becomes only one.** Therefore, when you make this module participate in the network connected with two or more segments, please make the network a composition that the communication across between segments ends in one gateway.

5.3.2 Configuration of transmission parameter

The handshake procedure to set parameter in communication tools is explained. The user must make the user program based on the procedure shown in Figure 5.3.2.1.

When the number of other station is below six nodes, You only have to make the user program which sets transmission parameter only once after turning on the power supply.

On the other hand, while the PLC system is operating when the message communication with the other station more than seven nodes is necessary, whenever the other station is switched, it is necessary to change setting transmission parameter.

Note

- The connection for the communication of all messages should be closing when transmission parameter is changed. The error is detected while the line is opening when transmission parameter is changed when the connection for one or more-message communication is an opening, and transmission parameter is not changed.

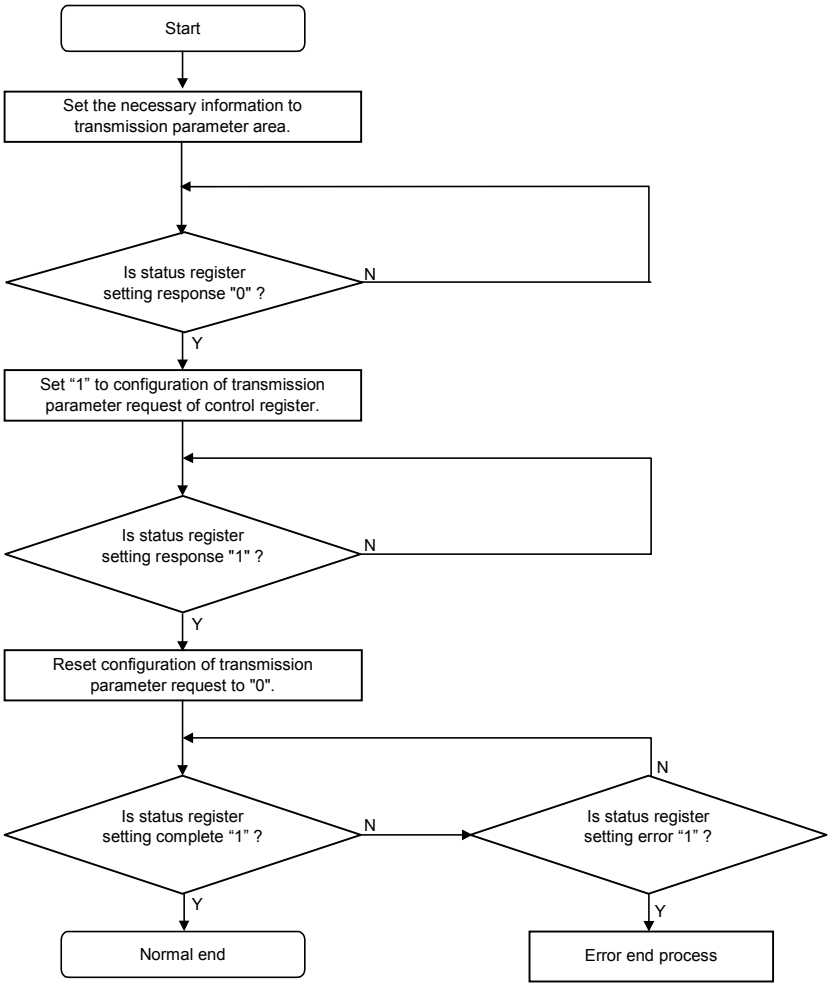
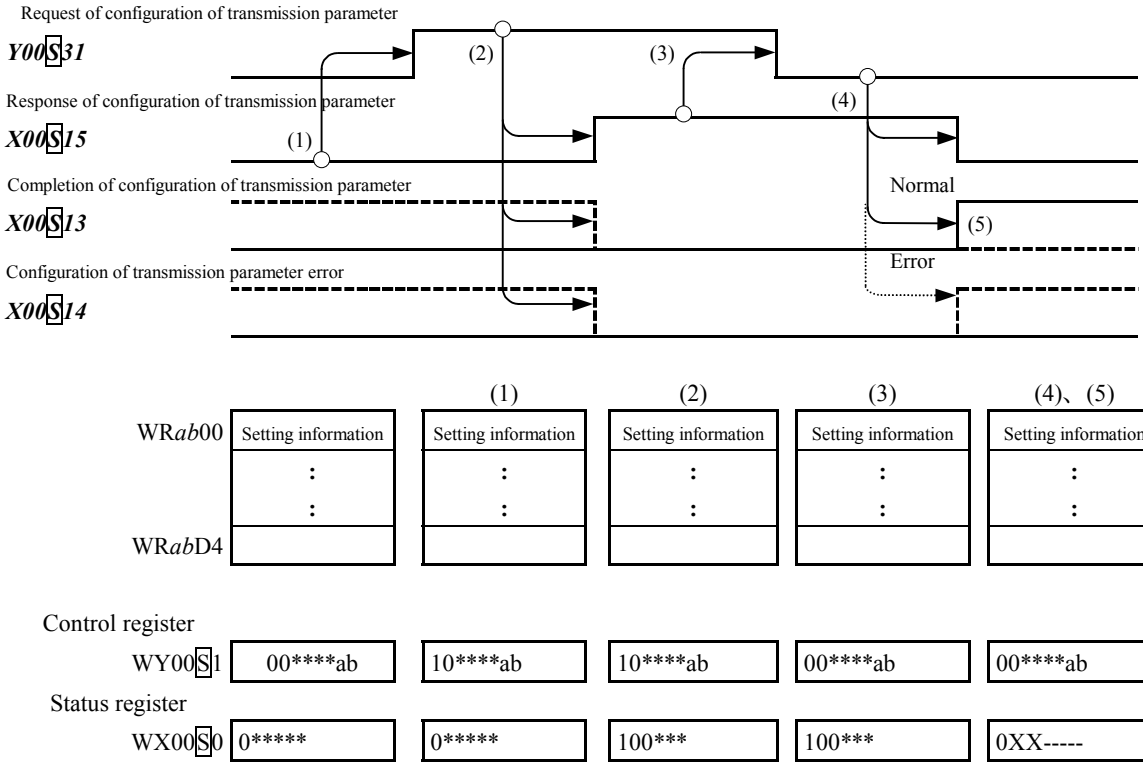


Figure 5.3.2.1 Configuraion of transmission parameter procedure

(1) Procedure of configuration of transmission parameter

In order that the user sets up the transmission parameter, The communication parameter area where stores the information (the data) to sets up it is secured in the internal output area. You make the handshake program in proportion to the time chart that shows it below, after necessary information is stored in the communication parameter area. By implementing the handshake program that you made, the transmission parameter can be set up to this module.



No.	Description
(1)	The area of WR(internal output) that the subordinate position two digits of the I/O number start by 00 is made a head by the user program, and transmission parameter is set in the area beforehand. Set “0” to all parameter area of unused connection. The user program sets the high rank two digits of above-mentioned WR area in the control register. The user program confirms the response of configuration of transmission parameter flag (X00S15) of the status register is "0", and sets "1" in request of configuration of transmission parameter bit (Y00S31) of the control register.
(2)	This module detects that "IP address set request bit (Y00S31)" is set to "1". This module reads information of configuration of transmission parameter and sets "1" in response of configuration of transmision parameter flag (X00S15). At this time, completion flag of configuration of transmission parameter (X00S13) and error flag of configuration of transmission parameter (X00S14) are cleared in "0" (However, when ERR LED lights, ERR LED maintains lighting).
(3)	The user program confirms response flag of configuration of transmission parameter (X00S15) of the status register became "1", and clears request bit of configuration of transmission parameter (Y00S31) of the control register in "0".
(4)	This module detects request bit of configuration of transmission parameter (Y00S31) becoming "0", and clears response flag of configuration of trnamission parameter (X00S15) in "0", and .set completion flag of configuration of transmissin parameter (X00S13) in "1".
(5)	When there are some inconveniences in information of configuration of transmisiion parameter, completion flag of configuration of transmission parameter (X00S13) maintains "0". This module informs that the error occurred by lighting ERR LED at the same time as setting "1" in error flag of configuration of transmission parameter (X00S14). Details of the error factor are set in X00S00~X00S05 and status area of each connection (WR*ab*0B - WR*ab*10).

Figure 5.3.2.2 Time chart and the explanation

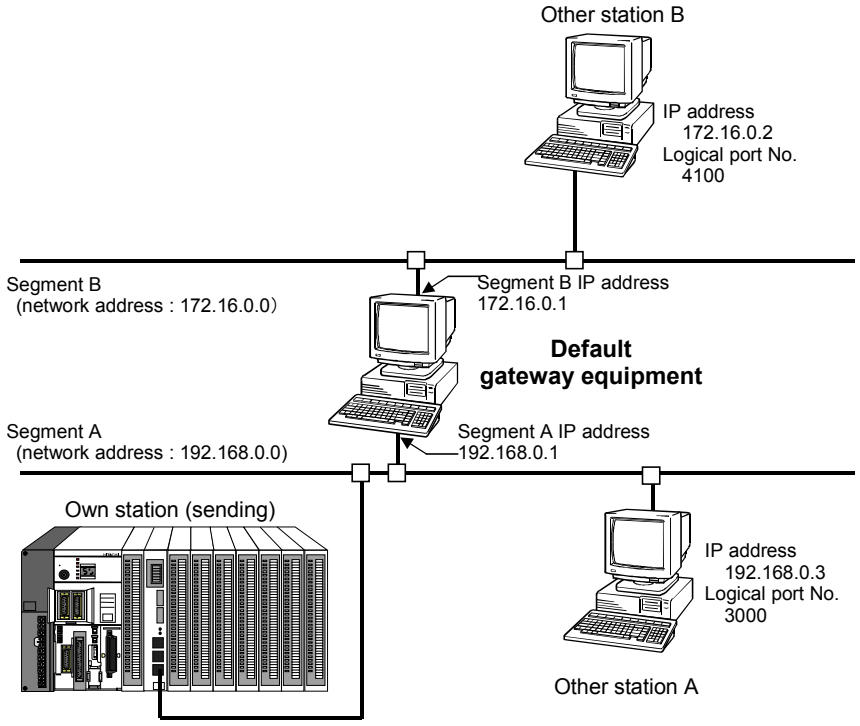
Note
- This module requires about 8 seconds in the processing time after the power supply turned on or reset.
- Transmission parameter set request cannot be accepted while processing initial. Please make the program after considering the initial processing time of this module for making the user program.

(2) Example for configuration of transmission parameter

The transmission parameter setting when this module is used by the equipment composition shown in Figure 5.3.2.3 is explained.

This module is mounted on slot No.1 on a basic base.

The internal output area which starts from WR0300 is secured as a transmission parameter area.



IP address : 192.168.0.2
Logical port No.
Connection 1 : 4101 (Send/Receive with other station A, TCP/IP, Active open)
Connection 2 : 4102 (Send/Receive with other station B, UDP/IP)
Connection 3 : 4103 (Broadcast send, UDP/IP)
Connection 4 : 4104 (Receive with any other station, TCP/IP, Passive open)
Connection 5 : 4105 (Unused)
Connection 6 : 4106 (Unused)

Figure 5.3.2.3 Example of composing equipment

(2-1) Control register (WY0011)

Y01 31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16 ← Bit I/O No.
0				0				0				3			(Hex)

(2-2) Transmission parameter area (WR0300 ~)

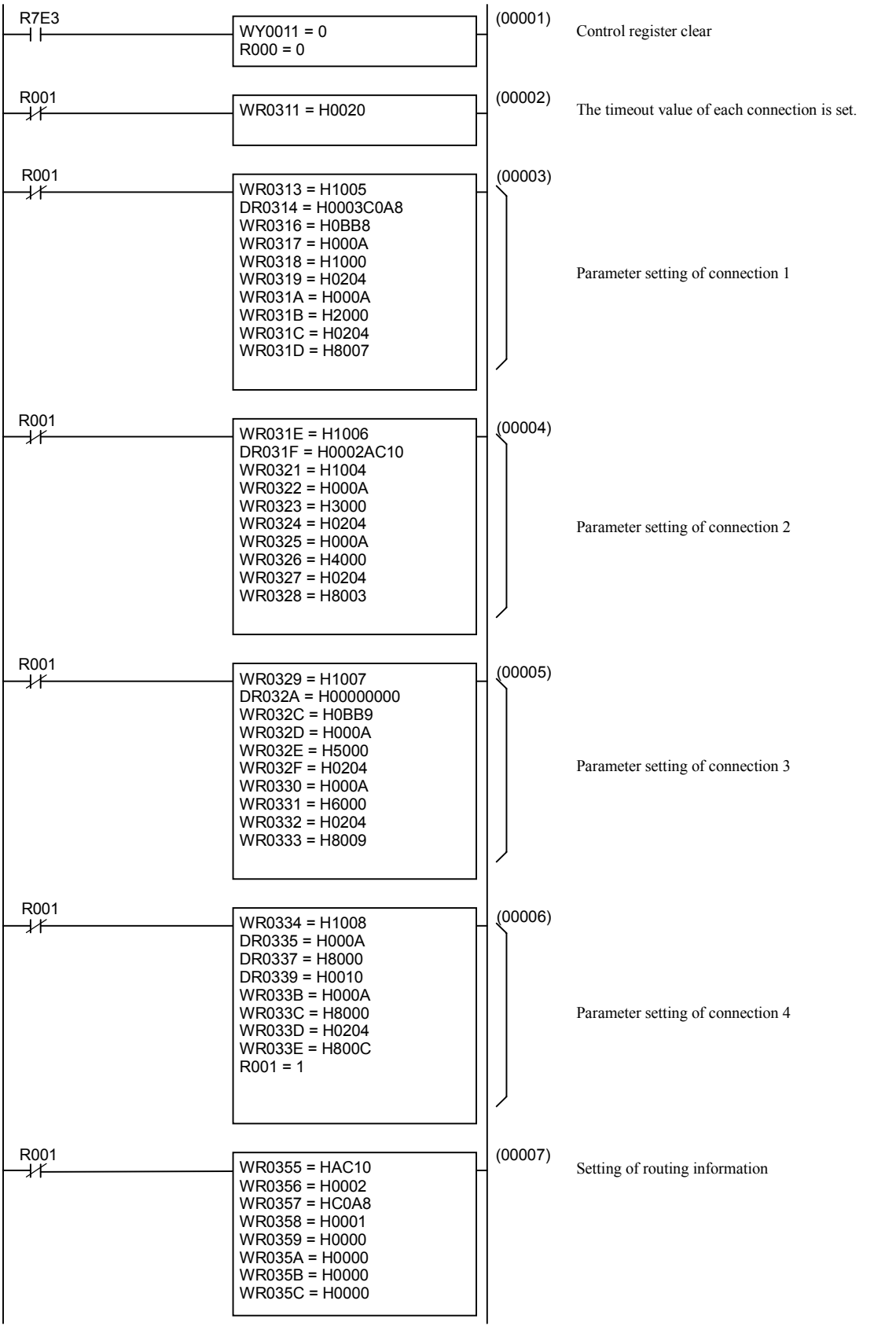
WR0300		Hex	
00 - 02	Own station physical address	**********	LAN-ETH2 sets physical address of own station
03	Own station IP address	H0002	LAN-ETH2 sets IP address of own station
04		HC0A8	(192.168.0.2)
05	Control area	****	Open request for each connection
06		****	Request of sending and response of receiving for each connection
07	Status area	****	Open completed and error of each connection
08		****	Response of sending and error of each connection
09		****	Receive existence and error of each connection
0A		****	Close request from other station of each connection
0B		****	Error information for each connection Errors at the time of configuration of transmission parameter, open/close and sending/receiving data are set.
0C		****	
0D		****	
0E		****	
0F		****	
10		****	
11	Timeout observation timer setting	H0020	Set 32 second as timeout value
12	Reserved	----	Not for use
13	Connection 1	H1005	Specify the own station logical port No. of connection 1
14	parameter setting area	HC0A8	Specify IP address of other station for connection 1
15	(11 words in total)	H0003	(192.168.0.3)
16		H0BB8	Specify logical port No. of other station for connection 1.
17		H000A	Specify send buffer I/O type. (WR)
18		H1000	Specify send buffer top No. (WR1000)
19		H0204	Specify send buffer area length. (WR1000-1203)
1A		H000A	Specify receive buffer I/O type. (WR)
1B		H2000	Specify receive buffer top No. (WR2000)
1C		H0204	Specify receive buffer area length. (WR2000-2203)
1D		H8007	TCP/IP, Active open, Send/Receive
1E	Connection 2	H1006	Specify the own station logical port No. of connection 2
1F	parameter setting area	HAC10	Specify IP address of other station for connection 2
20	(11 words in total)	H0002	(172.16.0.2)
21		H1004	Specify logical port No. of other station for connection 2.
22		H000A	Specify send buffer I/O type. (WR)
23		H3000	Specify send buffer top No. (WR3000)
24		H0204	Specify send buffer area length. (WR3000-3203)
25		H000A	Specify receive buffer I/O type. (WR)
26		H4000	Specify receive buffer top No. (WR4000)
27		H0204	Specify receive buffer area length. (WR4000-4203)
28		H8003	UDP/IP, Send/Receive
29	Connection 3	H1007	Specify the own station logical port No. of connection 3
2A	parameter setting area	H0000	Specify IP address of other station for connection 3
2B	(11 words in total)	HC000	(Brouadcast send)
2C		H0BB9	Specify logical port No. of other station for connection 3.
2D		H000A	Specify send buffer I/O type. (WR)
2E		H5000	Specify send buffer top No. (WR5000)
2F		H0204	Specify send buffer area length.. (WR5000-5203)
30		H000A	Specify receive buffer I/O type. (WR)
31		H6000	Specify receive buffer top No. (WR6000)
32		H0204	Specify receive buffer area length. (WR6000-6203)
33		H8009	UDP/IP, Broadcast send

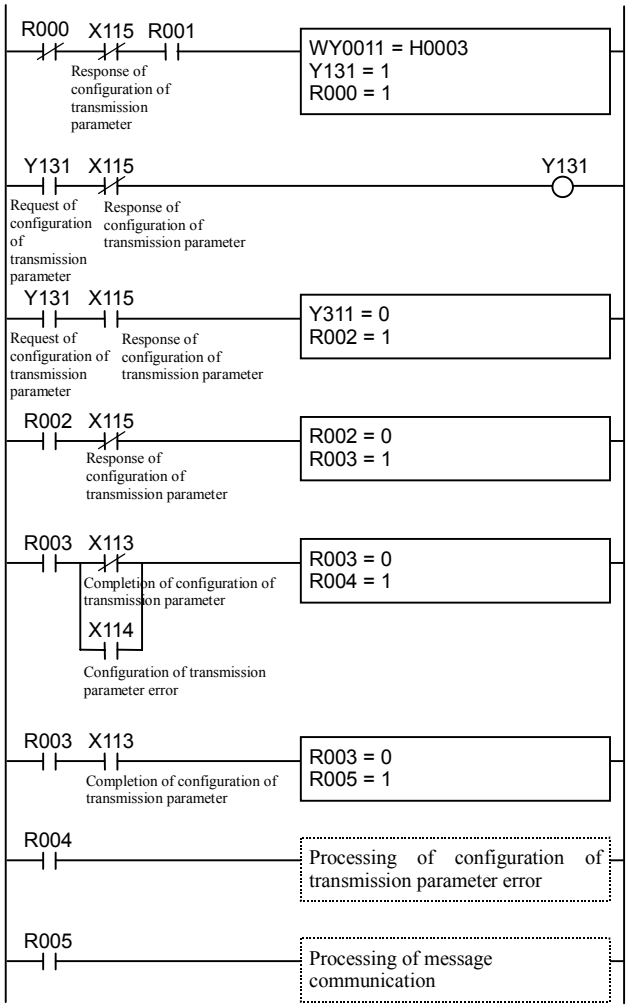
34	Connection 4	H1008	Specify the own station logical port No. of connection 4
35	parameter setting area	0	Specify IP address of other station for connection 4
36	(11 words in total)	0	(Broadcast send)
37		0	Specify logical port No. of other station for connection 4
38		H000A	Transmission buffer is not used.
39		H7000	Dummy (WR7000)
3A		H0010	Dummy (WR7000 - 700F)
3B		H000A	Specify receive buffer I/O type. (WR)
3C		H8000	Specify receive buffer top No. (WR8000)
3D		H0204	Specify receive buffer area length. (WR8000 - 8203
3E		H800C	TCP/IP、Any other station, Passive open, Receive only
3F - 49	Connection 5	0	Unused
	parameter setting area	(Unused, all “0”)	
4A - 54	Connection 6	0	Unused
	parameter setting area	(Unused, all “0”)	
55	Other station IP address	HAC10	Other station IP address (172.16.0.2)
56		H0002	
57	Default IP address	HC0A8	IP address of subnet A (192.168.0.1)
58		H0001	
59	End of routing information	H0000	End of routing information
5A		H0000	4 words ”H0000”
5B		H0000	
5C		H0000	

(2-3) Example of user program

Sample program 2 | Configuration of transmission parameter

Slot No.	0	1	2	~	8
LAN-ETH2 Mounted position			-	-	-





Set the top word No. of configuration of transmission parameter area to WR0300.
Set the request of configuration of transmission parameter to “1”.
Circuit (00008) is active.

Request of configuration keeps “1” until a response of configuration of transmission parameter becomes “1”.

When response of configuration or transmission parameter is set to “1”, request of configuration of transmission parameter is cleared in “0”.
Circuit (00011) operation is active.

Response of configuration of transmission parameter is cleared in “0”, circuit (00011) operation is inactive.
Circuit (00012) operation is active.

After R003 is set to “1”, when completion of configuration of transmission parameter is in the state of "0", and "1" was set to configuration of transmission parameter setting error flag, circuit (00014) operation is active.

After R003 is set to “1”, when completion of configuration of transmission parameter is set to “1”, Transmission parameter setting becomes completion.

Note

This program is a sample for operation and can not be necessarily used in the environment of all customers.
If you apply this program to your system, please check safety of whole system etc. carefully.

5.3.3 Processing of connection open/close

It is explained about open/close processing of the connection in this clause. It is necessary to make the handshake program in proportion to the time chart that shows it in figure 5.3.3.1, to request open/close processing from this module.

(1) Processing outline

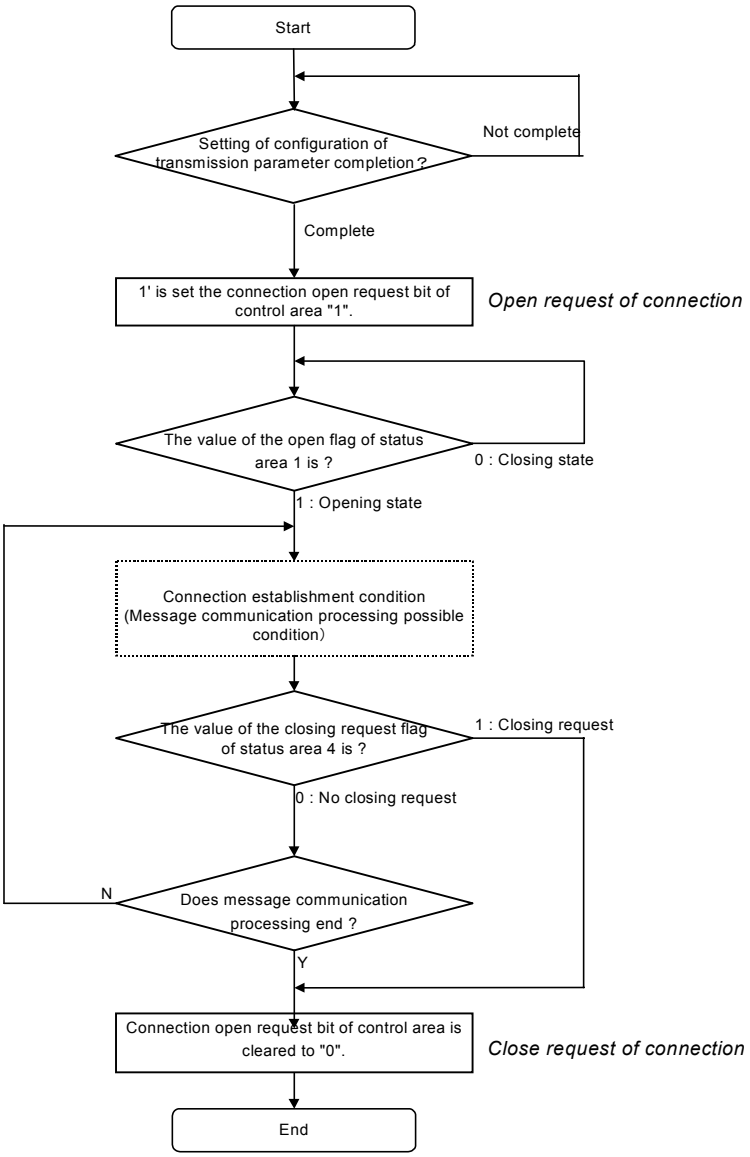


Figure 5.3.3.1 Flow chart of open/close processing of connection

Open/close condition for each connection of this module can confirm with OPN LED.

Note

- Closing connection from the other station might be requested in connection establishment state. In this case, please do the closing request processing of the connection from this module side.
- Please confirm that the data sending and receiving handshake of a proper connection is completing before closing processing without fail. In the case that it tried to close the connection in the data sending and receiving handshake midway, closing processing does sometimes not end normal.

(2) Open/close procedure

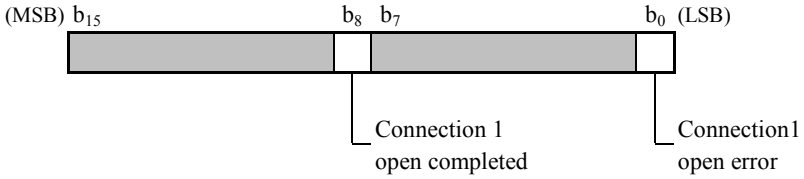
Open/close request processing is done by the handshake using control area and status area specified by the transmission parameter.

The range of transmission parameter is from WR0300, and it is explained the example of opening/closing connection 1 with (a) ~ (d). Furthermore, this module shall be mounted in slot No. 1.

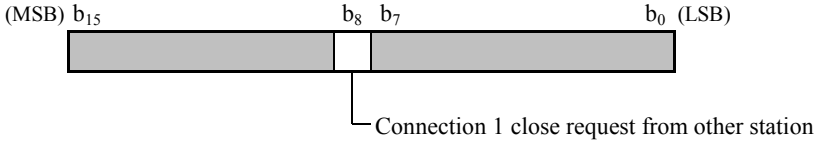
(a) Control area and status area

It is explained about the inside output area and corresponding bit that must refer to/operate it at the time of open/closing request of the connection.

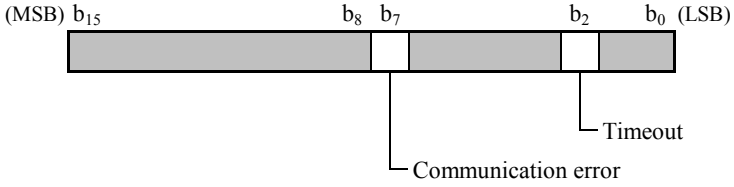
Status area 1 (WR0307, please read only)



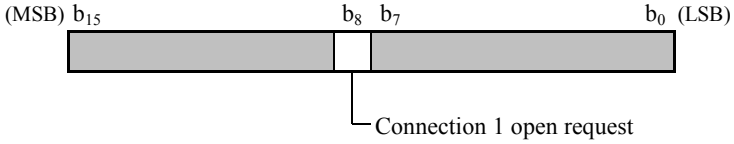
Status area 4 (WR030A, please read only)



Connection 1 status area (WR030B, please read only)



Control area 1 (WR0305, please write only)



(b) Open/close sequence

(b-1) Open process sequence

The open processing sequence of case that the proper connection of this module is designated in active station is shown in figure 5.3.3.2.

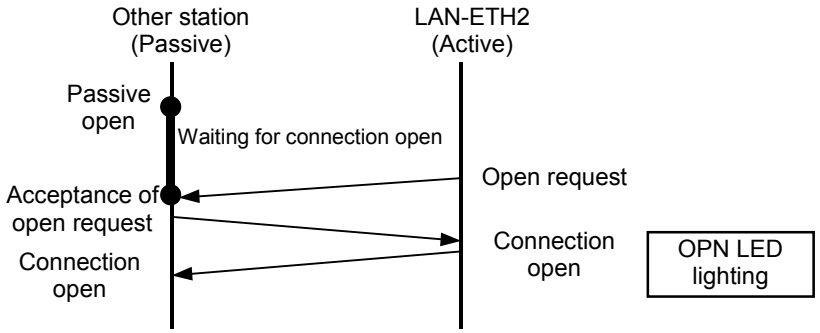
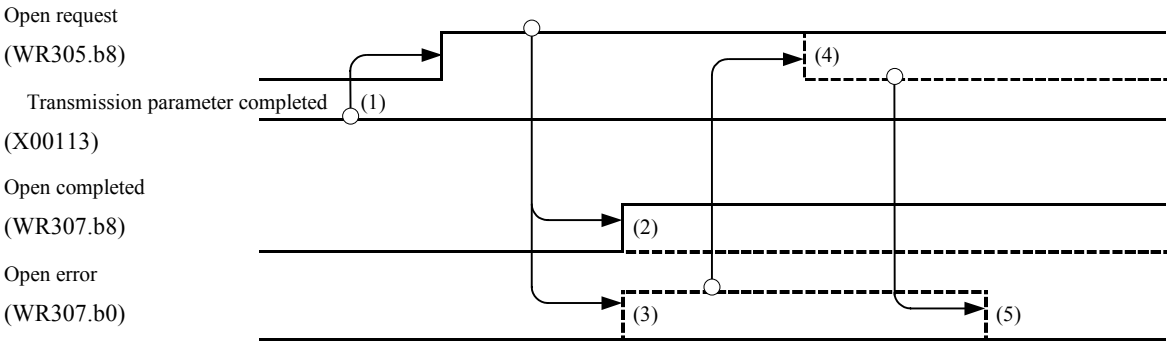


Figure 5.3.3.2 Open process sequence (Active station)

The handshake procedure that conformed to the sequence of figure 5.3.3.2 is shown in figure 5.3.3.3.



No.	Description	Process
(1)	Please set open request bit in "1", after the transmission parameter setting completion flag is set to "1", in the case that the connection is opened.	Normal
(2)	This module starts open processing, when that the open request bit of "1" is detected. When open processing ends normal, this module sets "1" to the open flag. In this condition, the data sending and receiving becomes possible	
(3)	When open processing ends abnormally, this module sets "1" to open error flag and lights ERR LED. Furthermore, "0" is held to open completion flag at this time.	Error
(4)	When open error is occurred, clear the open request bit in “0” by user program.	
(5)	This module resets a open error flag in "0", when that the open request bit of "0" became is confirmed. However, ERR LED holds lighting.	

Figure 5.3.3.3 Time chart and the explanation

The open processing sequence of case that the proper connection of this module is designated in passive station is shown in figure 5.3.3.4

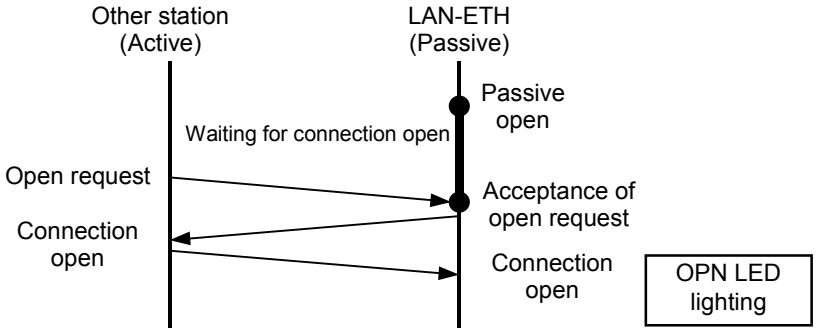
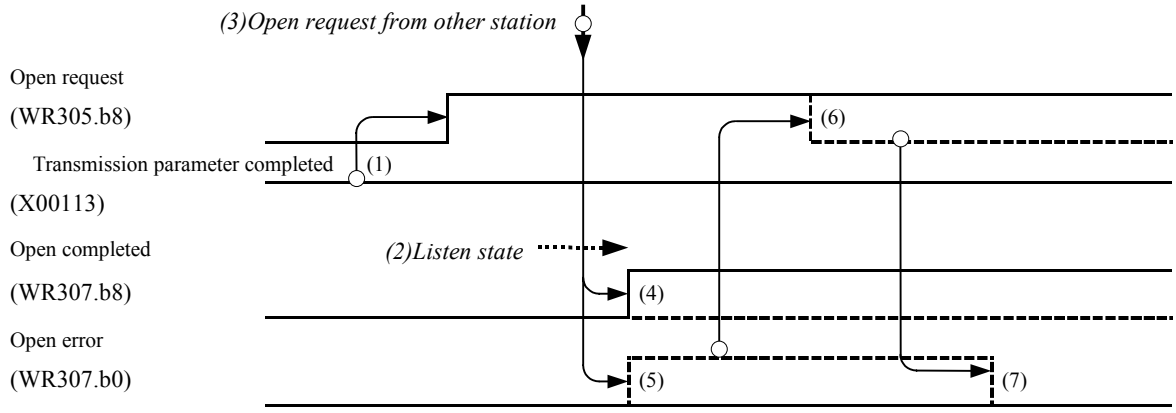


Figure 5.3.3.4 Open process sequence (Paasive station)

The handshake procedure that conformed to the sequence of figure 5.3.3.4 is shown in figure 5.3.3.5.



No.	Description	Process
(1)	Please set open request bit in "1", after the transmission parameter setting completion flag is set to "1", in the case that the connection is opened passively.	Normal
(2)	This module become the state of waiting for opening. when that the open request bit of "1" is detected.	
(3)	This module starts open processing, when it receives the open request form other station.	
(4)	When open processing ends normally, this module sets "1" to open flag. In this state, Data sending/receiving becomes possible.	
(5)	When open processing ends abnormal, this module sets "1" to open error flag and lights ERR LED. Furthermore, "0" is held to open completion flag at this time.	Error
(6)	When open error is occurred, clear the open request bit in “0” by user program.	
(7)	This module resets a open error flag in "0", when that the open request bit of "0" became is confirmed. However, ERR LED holds lighting.	

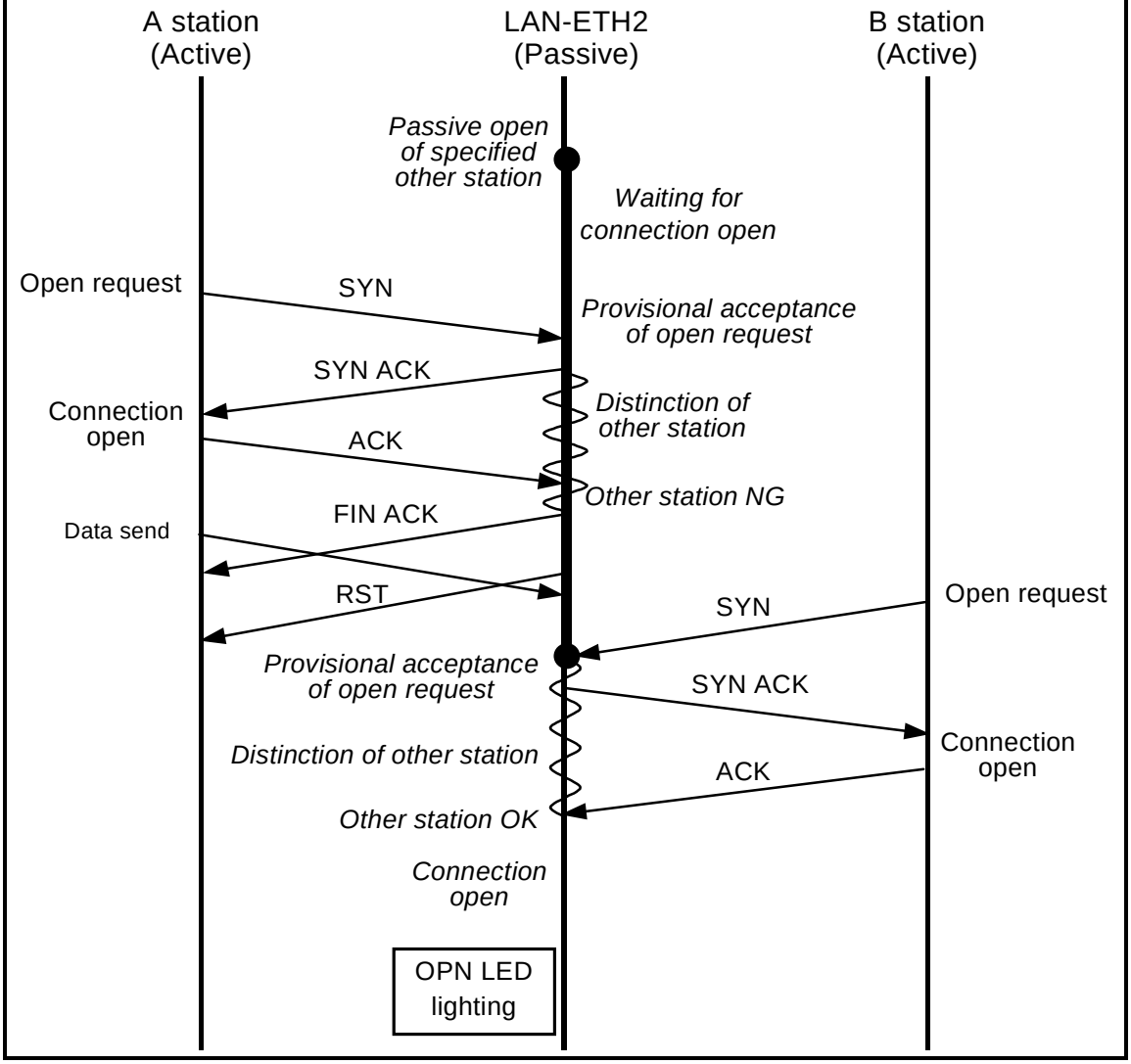
Figure 5.3.3.5 Time chart and the explanation

Note (1)

After the connection is established, data is send and received only between the specified other, when the service type is selected that in TCP, other station is fixed. However, the connection might be established between no specified other station. This originates the fact that the other station distinction is processed after the connection is established.

It is assumed that this module specifies the other station for B station and is waiting for opening the connection. At this time, when A station outside specification issues the opening request to this module, a normal response replies, and the connection between this module and A station is established. Next, this module starts the distinction processing of the other station. Here, because this module concludes that the other station of connection establishment is not B station, and then the connection closing request is issued at once.

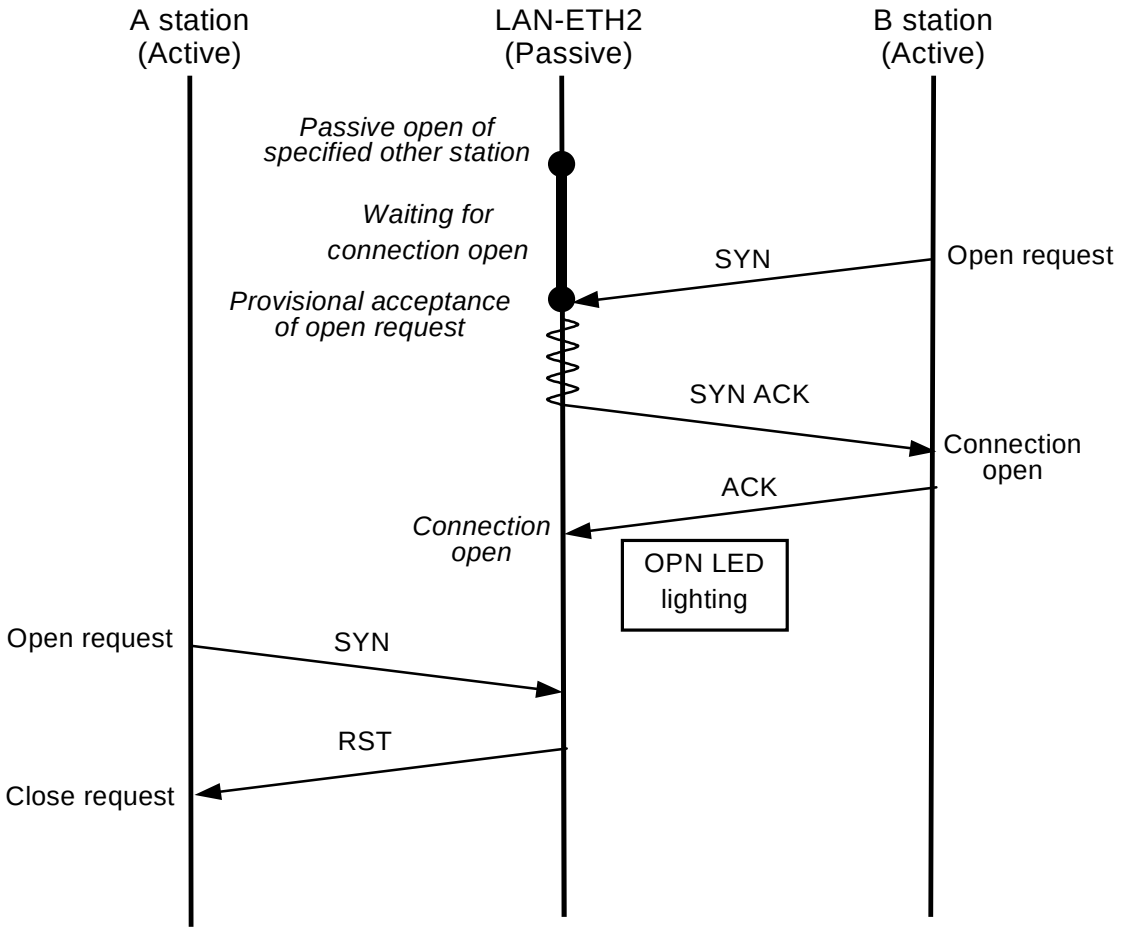
It is possible to send data to this module because A station is recognizing that the connection is established for a little period when this module processes the distinction of the other station. However, because this module is not able to send the data to A station and is not able to receive the data from A station, this module does not reply to A station. Please close the connection in the communication application of A station when you fall into such a state.



Note(2)

LAN-ETH2 is waiting for opening the connection with a specified other station as shown below. After the connection is opened by the opening request of B station, even if unspecified station open the connection, the request of A station is refused.

Afterwards, please close the connection once, and open the connection again, when A station send and does not receive the response. Moreover, please close the connection without leaving the connection opening when you do not send and receive.



(b-2) Close sequence

You do not need to concerned with an activity station or passive station in closing processing.

The processing sequence of case that closes a proper connection from this module side is shown in figure 5.3.3.6.

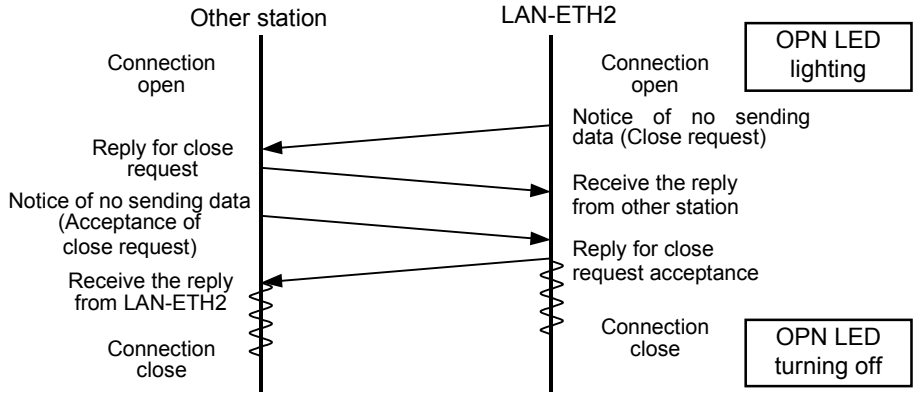
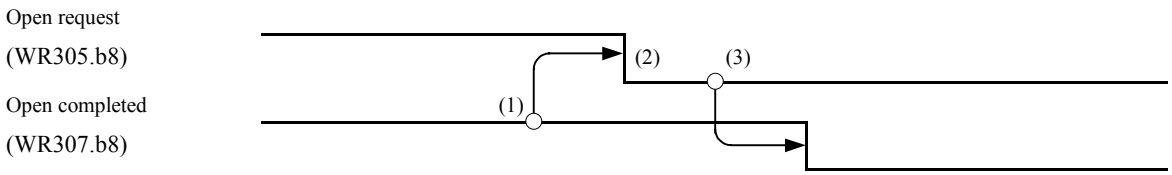


Figure 5.3.3.6 Close sequence (1)

The handshake procedure that conformed to the sequence of figure 5.3.3.6 is shown in figure 5.3.3.7



No.	Description
(1)	You confirmed that proper connection is opened by user program.
(2)	Clear the open request bit in “0” to close connection.
(3)	This module detects that open request bit is set to "0", this module starts closing process. After closing process end normally, open flag clear in “0”.

Figure 5.3.3.7 Time chart and explanation

The processing sequence of case that closes a proper connection from the other station is shown in figure 5.3.3.8.

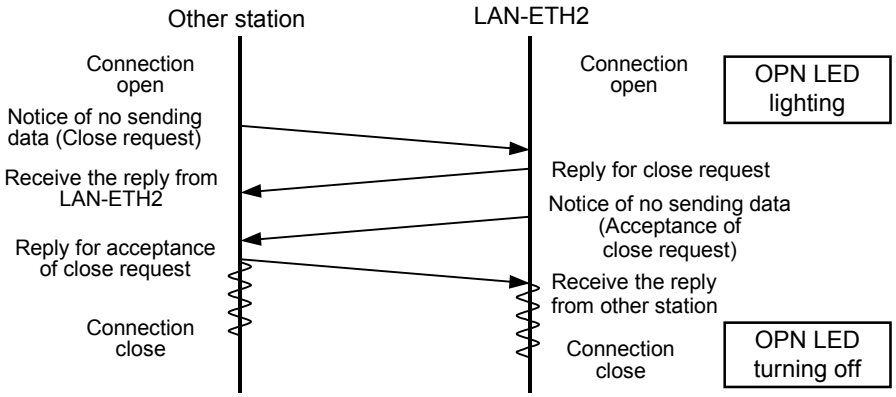
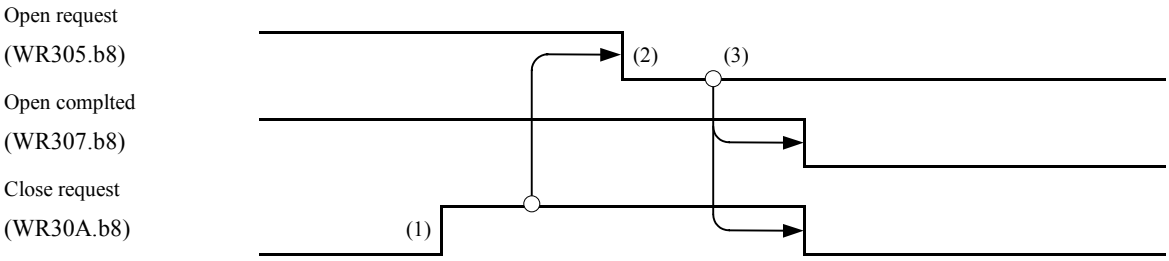


Figure 5.3.3.8 Close sequence (2)

The handshake procedure that conformed to the sequence of figure 5.3.3.8 is shown in figure 5.3.3.9



No.	Descripyion
(1)	This module sets the closing requestflag to "1", when it receives the closing request from he other station.
(2)	User program clears the open request bit in "0", when this module may close the connection to the closing request from the other station.
(3)	This module detects that open request bit is set to "0", this module starts closing process. After closing process end normally, open flag and close request flag clear in “0”.

Figure 5.3.3.9 Time chart and explanation

Note

In the connection close processing in TCP/IP, a period until actually changing in the state of the connection close after the close sequence ends in general and fixed time have been installed (wavy line part in Figure 5.3.3.6 and Figure 5.3.3.8). That period is defined as TIME_WAIT value, and the value of about two minutes might be set in general telecommunications equipment.

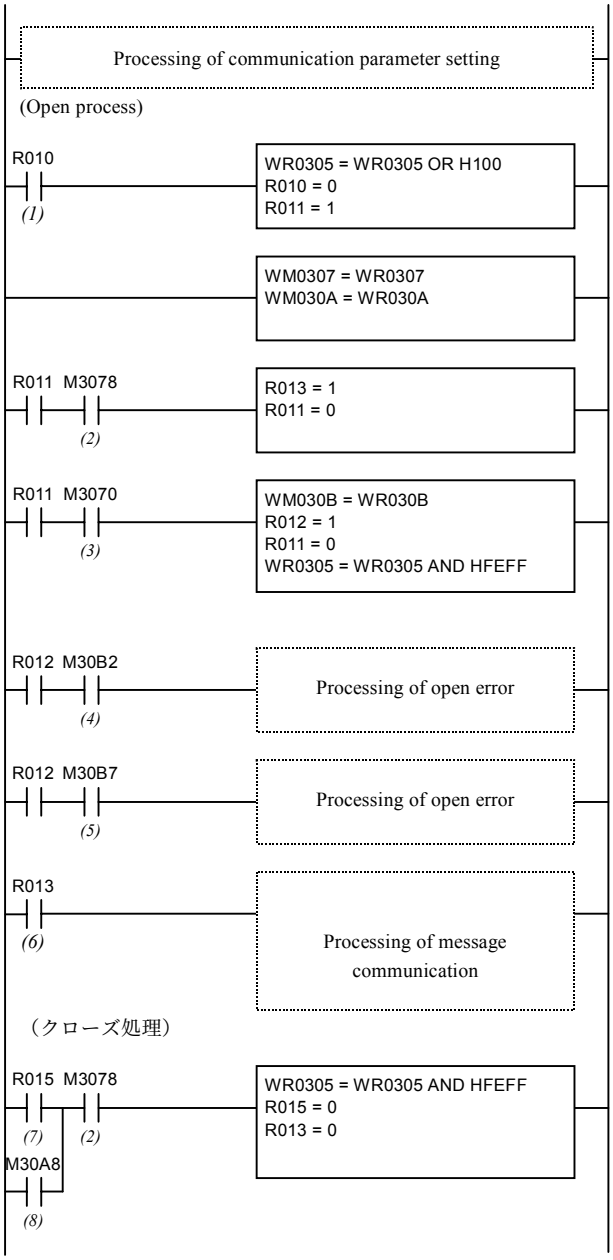
This means the telecommunications equipment needed for two minutes or more exists as an interval from the connection close to the repeated opening of the connection of time in general telecommunications equipment.

To prevent such a trouble beforehand, the interval from the connection close to the re-opening have room enough for the specification of the other station telecommunications equipment.

(d) Sample program of Open/Close

Sample program 3 Open/Close process

Slot No.	0	1	2	~	8
LAN-ETH2 Mounted position	X		-	-	-



The open request process begins, when "1" is set in the open start bit.

(0000n)
"1" is set in the connection 1 open request bit.

(0000n+1)
The content of status area 1 is saved in WM0307 at every scanning unconditionally.

(0000n+2)

(0000n+3)
When the open error occurs, the error details data is stored in WM030B.
The open request bit is cleared in "0".

(0000m)
The open request bit of connection 1 is cleared in "0".

Description of I/O comment

No.	I/O	I/O comment	No.	I/O	I/O comment
(1)	R010	Open start bit	(5)	M30B7	Communication errror
(2)	M3078	Opne flag	(6)	R013	Ready bit of message communication
(3)	M3070	Open error flag	(7)	R015	Close start bit
(4)	M00B2	Timeout flag	(8)	M30A8	Close request bit

Note
This program is a sample for operation and can not be necessarily used in the environment of all customers.
If you apply this program to your system, please check safety of whole system etc. carefully.

5.3.4 Processing of message send

It is explained about message send processing in this clause. Message sending is executed by user program. Furthermore, it is necessary that corresponding connection be opened beforehand when you send message.

(1) Processing outline

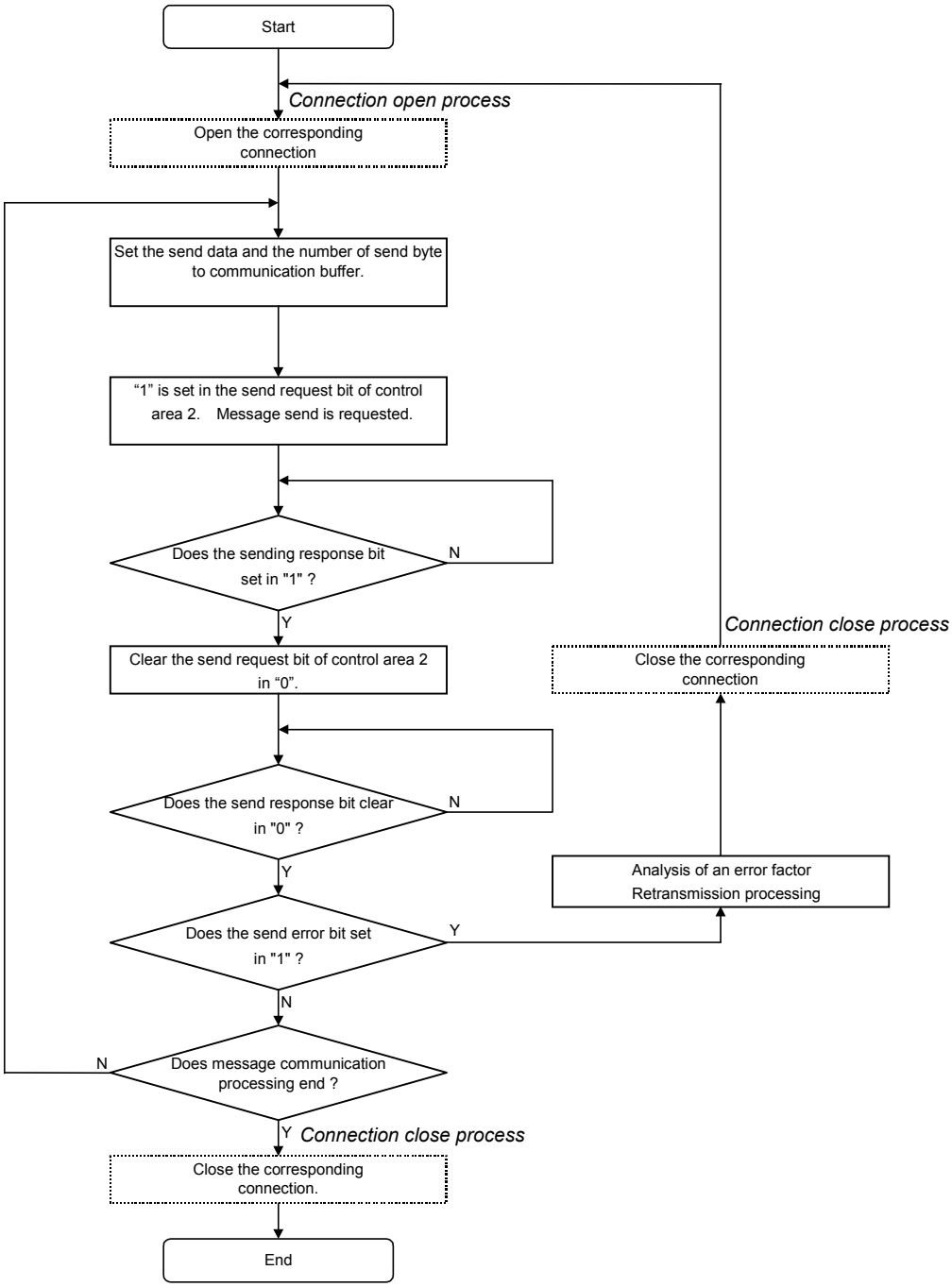


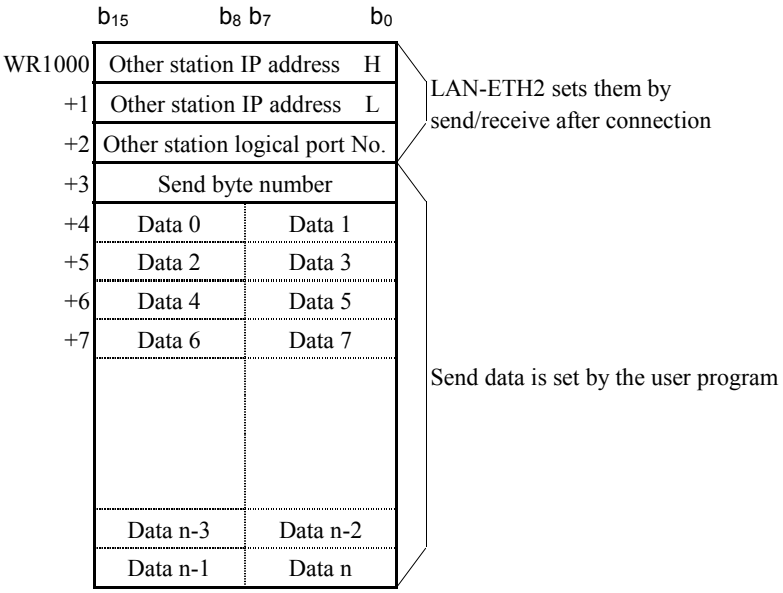
Figure 5.3.4.1 Flow chart of message send processing

(2) Message send procedure

Message sending request processing is done by the handshake using control area and status area specified by the transmission parameter.

The range of transmission parameter is from WR0300, the range of send buffer is from WR1000, and it is explained the example of sending message on connection 1 with (a) ~ (d). Furthermore, this module shall be mounted in slot No. 1.

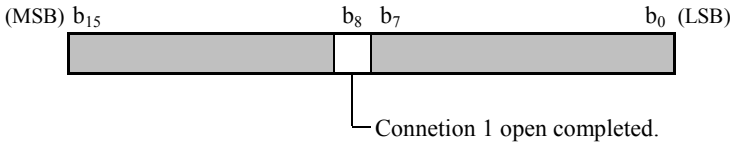
(a) Send buffer composition



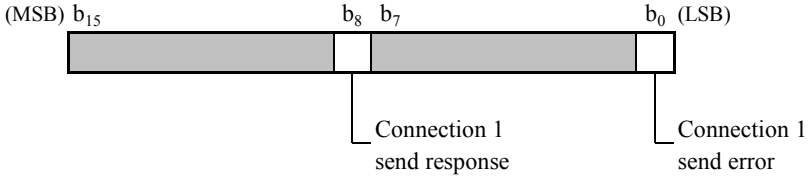
(b) Control area and status area

It is explained about the area and corresponding bit that must refer to/operate it at the time of the send processing request of the message.

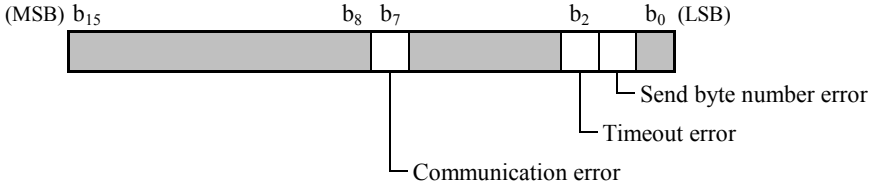
Status area 1 (WR0307, read only)



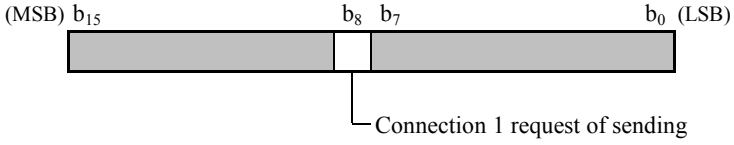
Status area 2 (WR0308, read only)



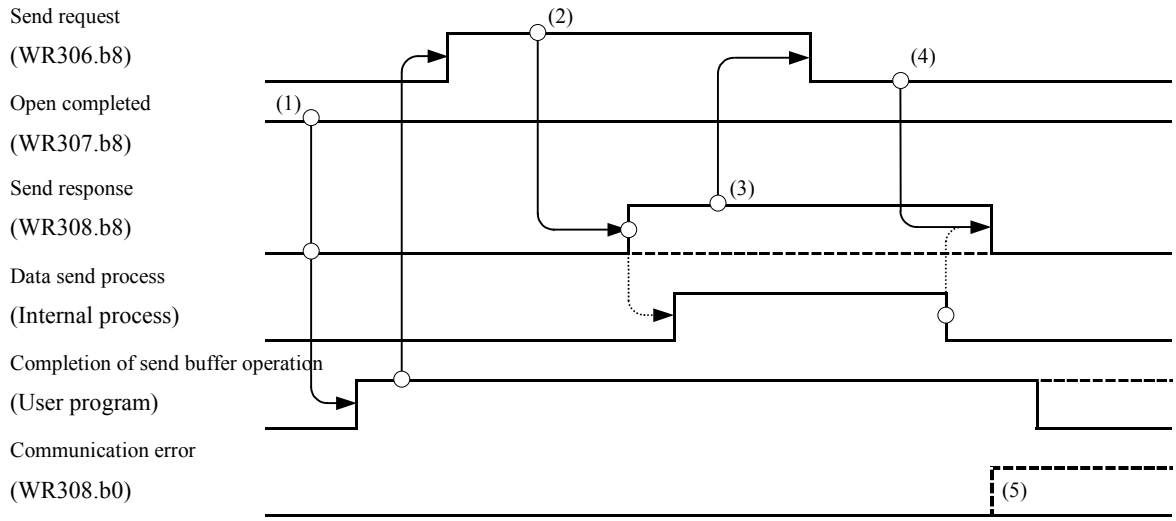
Connection 1 status area (WR030B, read only)



Control area 2 (WR0306, write only)



(c) Handshake procedure



No.	Description
(1)	After you confirmed that the opening completion flag is "1" and the sending response flag are "0", and set the sending data and the number of sending bytes in the send buffer. Set "1" in the send request bit after completing the preparation for the send buffer.
(2)	After it is confirmed that the sending request bit is set in "1", this module takes the send data and sets "1" in the send response notification flag. This module starts sending data after 2ms (maximum), after setting "1" in sending response flag.
(3)	Clear the sending request bit in "0" by user program, after confirming the sending response notification flag was set in "1".
(4)	If the sending request bit is "0" after the data sending ends, this module clears the sending response notification flag in "0".
(5)	When abnormality is detected in the sending processing, this module sets error information on each connection in the status area, and lights ERR LED. Afterwards, this module informs the user of the set of "1" in the send error flag, and the occurrence of abnormality.

Figure 5.3.4.2 Time chart and explanation

Note

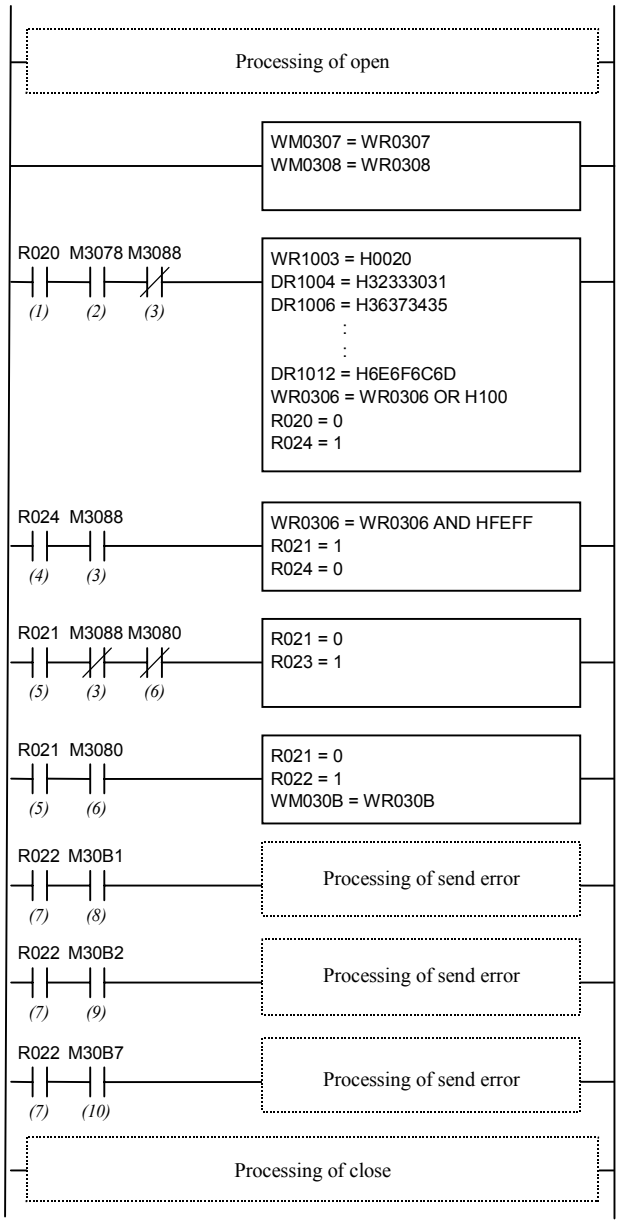
Close the connection to clear the sending error flag in "0", after the sending error occurs. Open the connection before sending again, and execute the user program based on the procedure of Figure 5.3.4.2.

Even if the sending error flag is cleared in "0", ERR LED which lighted at the time of the sending error is not turned off. Please execute the sample program of "6.2 Error clear" to turn off ERR LED.

(d) Sample program

Sample program 4 | Message send process

Slot No.	0	1	2	~	8
LAN-ETH2 Mounted position	X		-	-	-



(0000n)
At every scanning unconditionally,
The content of status area 1 is saved in WM0307.
The content of status area 2 is saved in WM0308.

(0000n+2)
The number of transmission bytes is set in WR1003.
The transmission data is set in WR1004-WR1013.
"1" is set in transmission request bit (WR3006.bit8) of the connection 1.

(0000n+3)
After it is confirmed that "1" was set in transmission response notification flag of connection 1 (M03088), the transmission request bit of the connection 1 is cleared in "0".

(0000n+4)
The message transmission processing ended normally.

(0000n+5)
When the transmission error occurs, the error details data is stored in WM030B.

Description of I/O comment

No.	I/O	I/O comment	No.	I/O	I/O comment
(1)	R020	Message send start bit	(6)	M3080	Send error flag
(2)	M3078	Open flag	(7)	R022	Error analysis bit
(3)	M3088	Response flag of sending	(8)	M30B1	Send byte number error flag
(4)	R024	Operation completion bit of transmission buffer	(9)	M30B2	Timeout error flag
(5)	R021	Normal/error judgement bit	(10)	M30B7	Communication error flag

Note
This program is a sample for operation and can not be necessarily used in the environment of all customers.
If you apply this program to your system, please check safety of whole system etc. carefully.

5.3.5 Processing of message receive

It is explained about message receive processing in this clause. Message receiving is executed by user program. Furthermore, it is necessary that corresponding connection is opened beforehand when you receive message.

(1) Processing outline

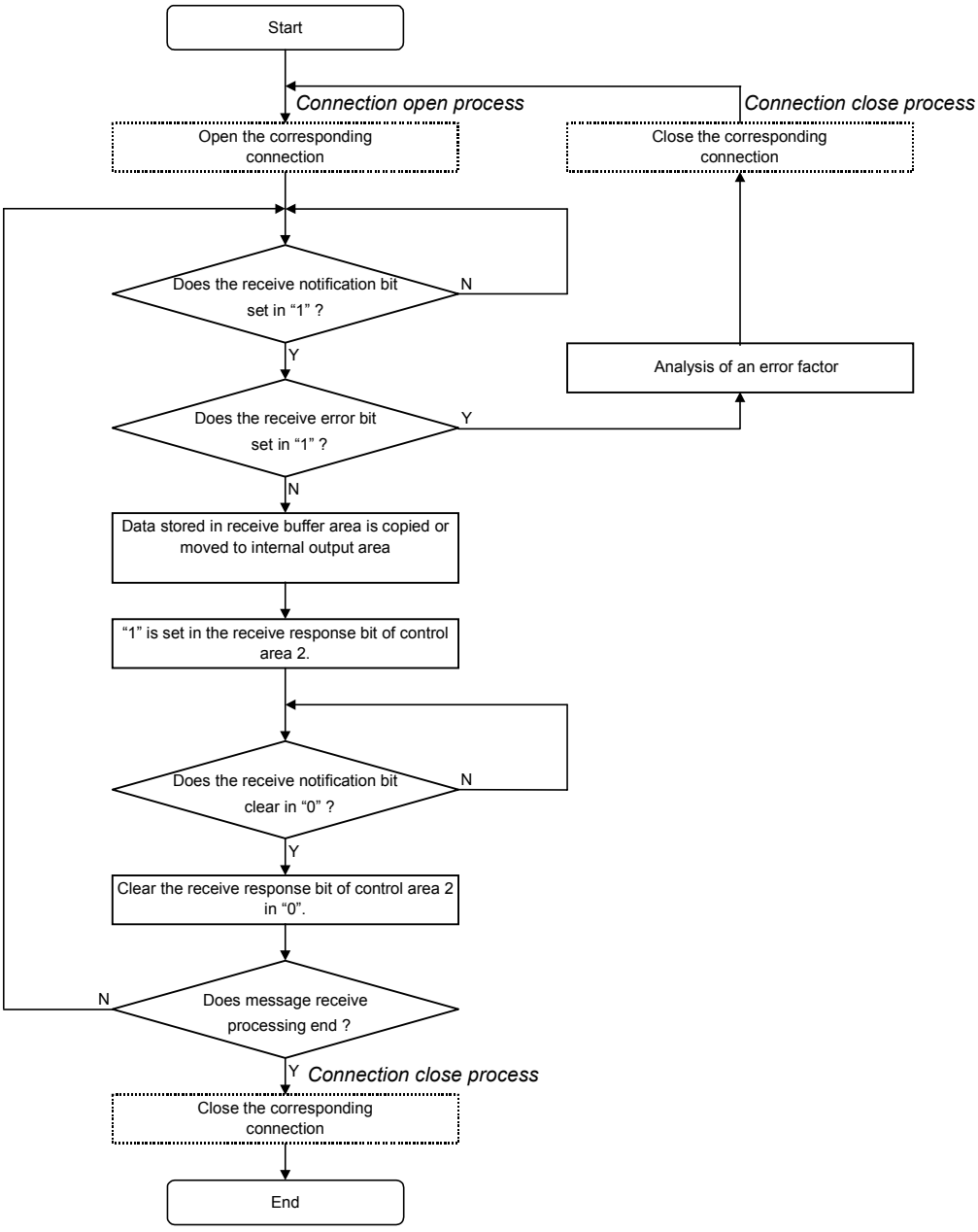


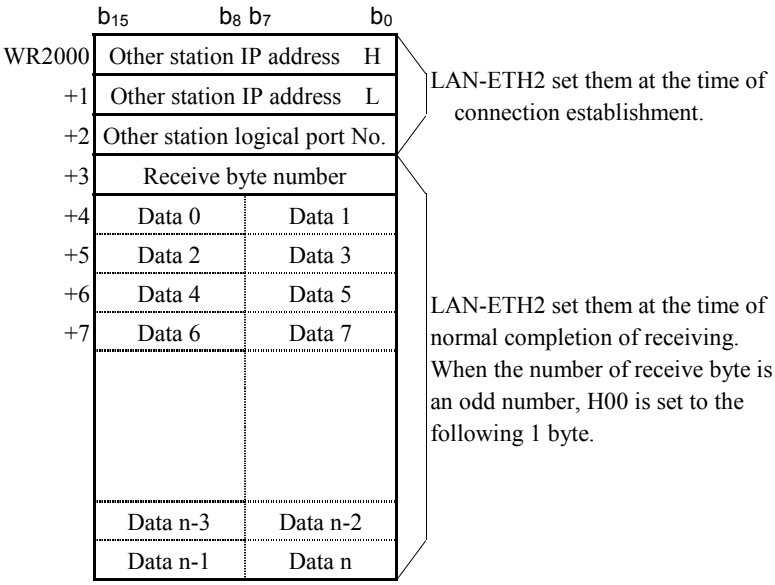
Figure 5.3.5.1 Flow chart of message receive processing

(2) Message receive procedure

Message receiving request processing is done by the handshake using control area and status area specified by the transmission parameter.

The range of transmission parameter is from WR0300, the range of receive buffer is from WR2000, and it is explained the example of receiving message on connection 1 with (a) - (d). Furthermore, this module shall be mounted in slot No. 1.

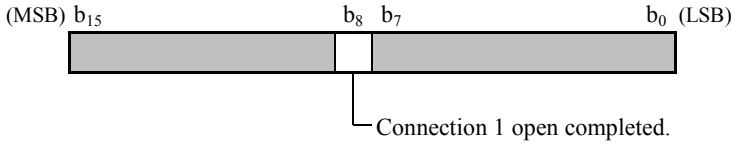
(a) Receive buffer composition



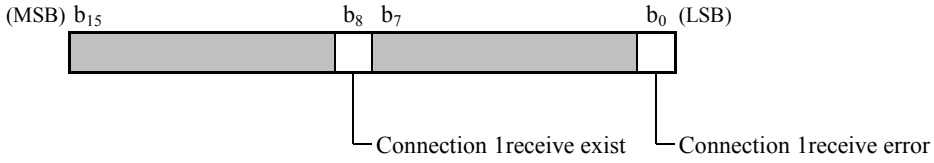
(b) Control area and status area

It is explained about the area and corresponding bit that must refer to/operate it at the time of the receive processing request of the message.

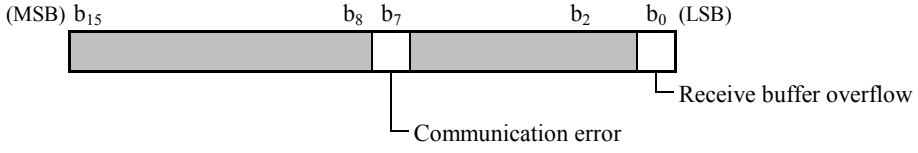
Status area 1 (WR0307, read only)



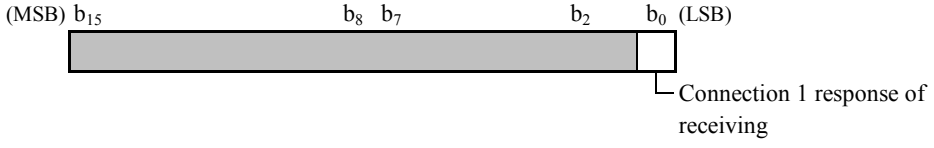
Status area 3 (WR0309, read only)



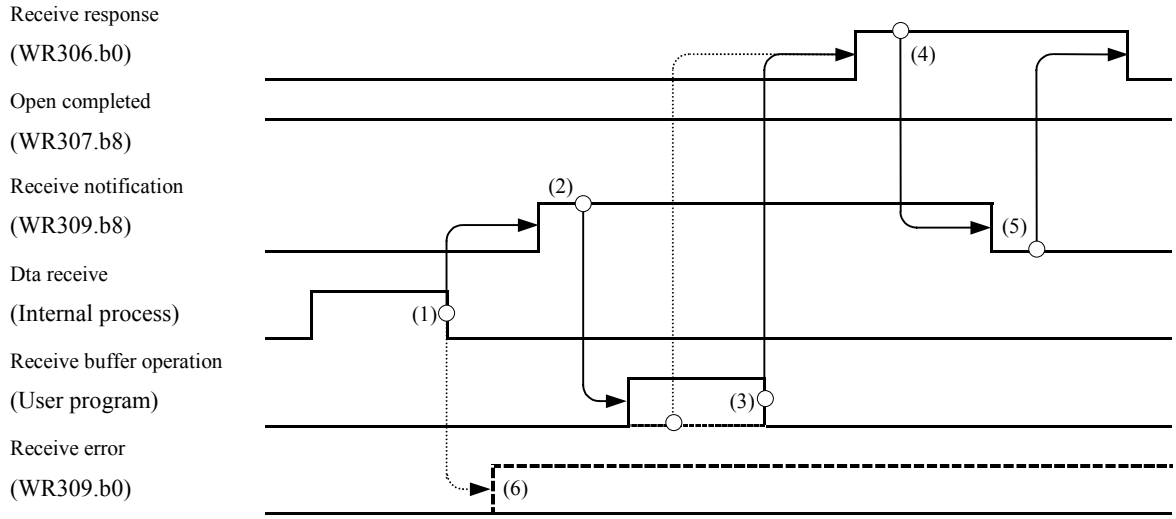
Connection 1 status area (WR030B, read only)



Control area 2 (WR0306, write only)



(c) Handshake procedure



No.	Description
(1)	When this module receives data, "1" is set in the reception notification flag.
(2)	After the user program confirms the reception notification flag is set in "1", then that copies or moves the data of receiving buffer to an internal output area.
(3)	After it is confirmed that the receiving request bit is set in "1", this module takes the receive data and sets "1" in the receive response notification flag.
(4)	When it is confirmed that "1" was set in the reception response bit, this module clears the reception notification flag in "0".
(5)	Clear the receiving request bit in "0" by user program, after confirming the receiving response notification flag was set in "1".
(6)	This module sets error information on each connection in the status area and lights ERR LED, when abnormality is detected at the time of receiving data. Afterwards, this module informs the user of the set of "1" in the send error flag, and the occurrence of abnormality. Because "1" is set in the reception notification flag on detecting error, please execute the operation of (3) and (5) as well as normally processing.

Figure 5.3.5.2 Time chart and explanation

Note

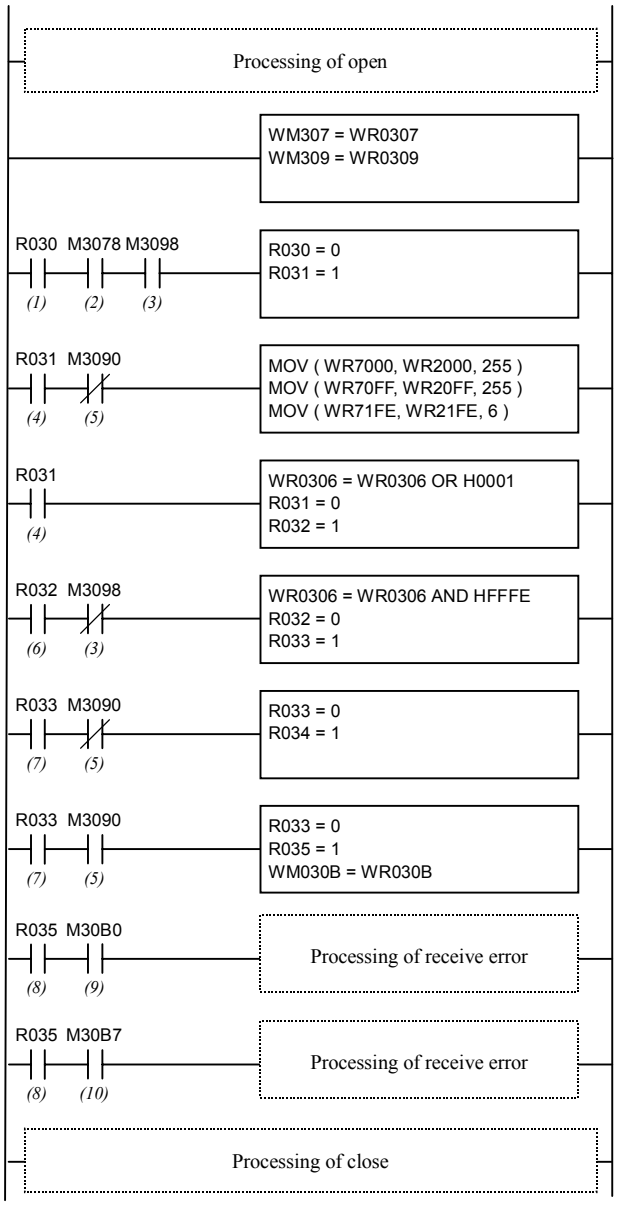
Close the connection to clear the receiving error flag in "0", after the receiving error occurs. Open the connection before receiving again.

Even if the receiving error flag is cleared in "0", ERR LED which lighted at the time of the receiving error is not turned off. Please execute the sample program of "6.2 Error clear" to turn off ERR LED.

(d) Sample program

Sample program 5 | Message receive process

Slot No.	0	1	2	~	8
LAN-ETH2 Mounted position			-	-	-



(0000n)
At every scanning unconditionally,
The content of status area 1 is saved in WM0307.
The content of status area 3 is saved in WM0309

(0000n+1)
After it is confirmed that "1" was set in receiving notification flag of connection 1 (M03089), receive buffer operation circuit (0000n+2) is active.

(0000n+2)
After it is confirmed that receive error flag is “0”, receive data is moved to WR7000 – wr7203.

(0000n+3)
After the catch of reception data is completed, "1" is set at receive response bit (WR0306, bit 0) of connection 1.

(0000n+4)
After it is confirmed that "0" was set in receiving notification flag of connection 1, and receive response bit of connection 1 is cleared in “0”.

(0000n+5)
Receive processing is completed.

(0000n+6)
When the receive error occurs, the error details data is stored in WM030B.

Description of I/O comment

NO.	I/O	I/O comment	No.	I/O	I/O comment
(1)	R030	Message receive bit	(6)	R032	Next circuit active bit
(2)	M3078	Open flag	(7)	R033	Completion bit of receive processing
(3)	M3098	Response flag of receiving	(8)	R035	Error processing active
(4)	R031	Operation start bit of receive buffer	(9)	M30B0	Receive buffer overflow
(5)	M3090	Receivie error flag	(10)	M30B7	Communication error flag

Note
This program is a sample for operation and can not be necessarily used in the environment of all customers.
If you apply this program to your system, please check safety of whole system etc. carefully.

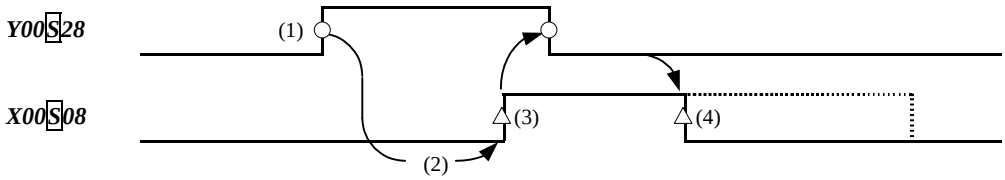
MEMO

Chapter 6 Other function

6.1 Software reset

It is necessary to make the program which does handshake program shown in Figure 6.1.1 when this module is reset in software. Please refer to paragraph 5.1.1 with the bit assign of the control register and the status register.

Use of software reset function



○ : Set by user Δ : Set by LAN-ETH2

No.	Explanation
(1)	Please set "1" in software reset request bit (***Y00S28***) when the reset processing is necessary.
(2)	When the software reset request bit is detected becoming "1", this module sets "1" in software reset response flag (***X00S08***).
(3)	In ladder program, the software reset request response flag is observed. Please clear the software reset request bit in "0" when you detect the software reset response flag becoming "1".
(4)	This module clears the software reset response flag in "0", and begins the reset processing of the LAN-ETH2 module, when the software reset request bit is detected becoming "0".

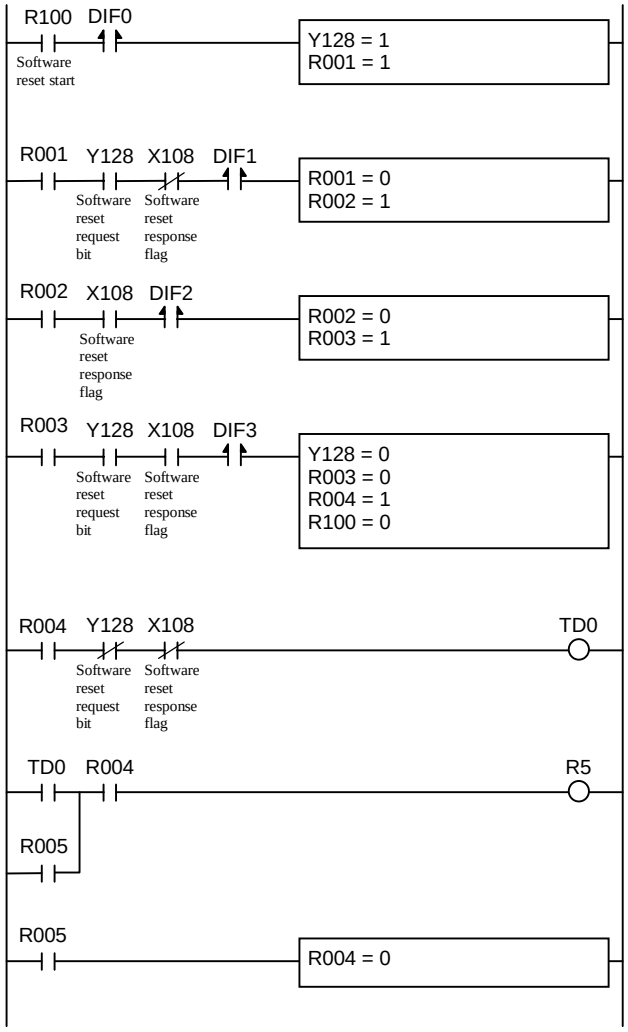
Figure 6.1.1 Reset sequense and its explanation

Reference
- The error display of CPU module might become "54" or "51" as well as time when the RESET switch was pushed.
- WDE LED never lights.

Note
- The software reset function usually becomes effective only at the operation mode. Please push the RESET switch when you reset this module which is the operation excluding the operation mode usually.
- The ethernet communication port is intercepted immediately after the reset processing is begun when the software reset processing is executed at the time of communicating in the ethernet communication port.

Sample program 6 Software reset

Slot No.	0	1	2	~	8
LAN-ETH2 Mounted position			-	-	-



If "1" is set in R100,
circuit (00002) operation is active.

If software reset response flag (X108) is "0",
circuit (00002) operation is inactive.
circuit (00003) operation is active.

If software reset response flag (X108) becomes "1",
circuit (00003) operation is inactive.
circuit (00004) operation is active.

If Y128 "=1" and X108 "=1" was detected,
the software reset request bit is clear "0".
circuit (00004) operation is inactive.
circuit (00005) operation is active.

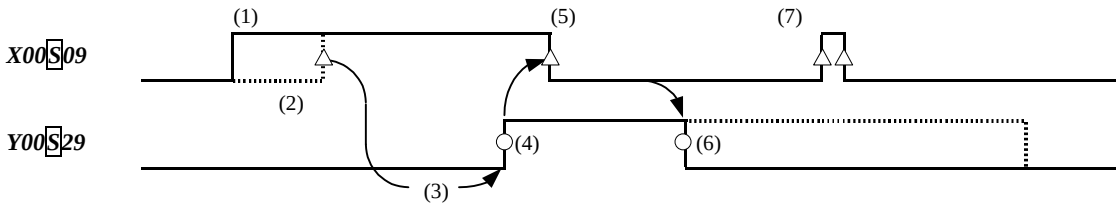
After 100ms, TD0 is turned on from the timing of the software reset processing beginning.

Note
This program is a sample for operation and can not be necessarily used in the environment of all customers.
If you apply this program to your system, please check safety of whole system etc. carefully.

6.2 Error clear

It is necessary to make the program which does handshake program shown in Figure 6.2.1 when various errors of this module are cleared. Please refer to paragraph 5.1.1 with the bit assign of the control register and the status register.

Use of error clear function



○ : Set by user Δ: Set by LAN-ETH2

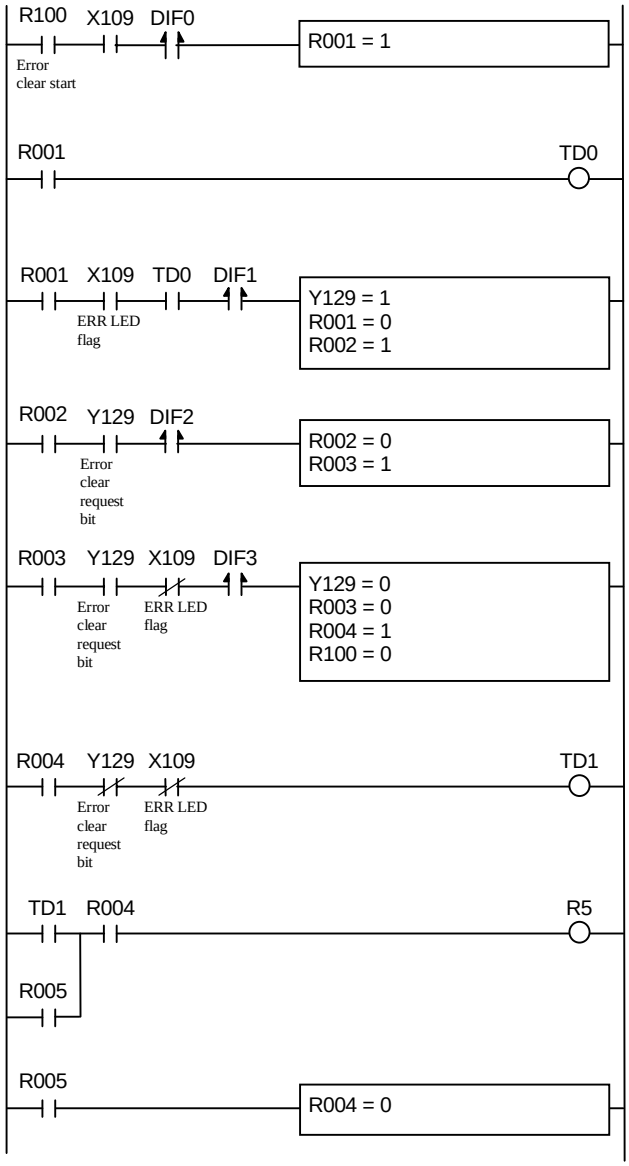
No.	Explanation
(1)	It is shown that the module detected the error (ERR LED lighting).
(2)	The waiting time of 500ms or more is secured until moving to the following processing after the ERR LED lighting is detected. Meanwhile, please remove the error factor.
(3)	After 500ms or more is waited after ERR LED lighting flag (X00S09) is set, the value of Y00S29 is read.
(4)	The user sets "1" in the error clear bit.
(5)	This module clears the ERR LED lighting flag (ERR LED turning off).
(6)	The user must clear the error clear bit in "0" after confirming ERR LED lighting flag (X00S09) was cleared.
(7)	After setting "1" in the ERR LED lighting flag, this module clears "0" at once when this module detects the error with "1" set in the error clearness bit. ERR LED lights and immediately turns off.

Figure 6.2.1 Time chart and its explanation

Note
- The error clear function usually becomes effective only at the operation mode. Please push the E.CLR switch when you clear the error of this module which is the operation excluding the operation mode usually.
- The error occurs again even if a clear error is executed when the error factor remains.

Sample program 7 Error clear

Slot No.	0	1	2	~	8
LAN-ETH2 Mounted position			-	-	-



Note

This program is a sample for operation and can not be necessarily used in the environment of all customers.
If you apply this program to your system, please check safety of whole system etc. carefully.

6.3 Test function

The test to check hardware including the transmitting and receiving circuit of this module is explained. A set change of the MODE switch is necessary to use each test function. After the MODE switch setting is changed, set the MODE switch content is read to this module by after the power supply is turned on or depressing the RESET switch.

> Note
> The operation mode does not change only by changing the state of ON/OFF of the MODE switch.

6.3.1 Internal loop back test

The loop back is tested in Ethernet communication IC of this module. When the RESET switch is pushed after "Internal loop back test" is selected with the MODE switch, the test is begun. POW LED blinks while testing.

This module is out of order at a high probability, when this test terminates abnormally. Please contact our service agency or a relative manufacture promptly.

[Examination content] The loop back is tested in an internal circuit of this module.

[Dip switch setting]

Operation mode	MODE1 switch
Internal loop back test	 Only Bit8 is turned on.

[Examination procedure]

(a) The MODE1 dip switch of the tested LAN-ETH2 is set in the internal loop back test mode.
Please connect neither TP cable nor the loop back connector with Ethernet port (10BT).

(b) When the power supply of PLC where the tested LAN-ETH2 is mounted is turned on, the examination is begun.

(c) When the dip switch setting is changed with the power supply of PLC where the tested LAN-ETH2 is mounted turned on, the internal loop back test is begun by depressing the RESET button of the machine which is examined.

(d) The examination is repeated until the power supply is turned off.

[The examination time required] About 30 seconds

[LED display and method of judging diagnosis result] Show in table 6.3.1.1

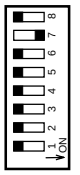
Table 6.3.1.1 LED display and diagnosis result judgment when internal loop back test is executed.

POW	STAS	ERR	State or diagnosis result
Green, Blinking	Lighting	Turning off	Normal end of examination
	Turning off	Lighting	Abormal end of examination

6.3.2 External loop back test

[Examination content] The test to turn the test signal with HUB is done.

[Dip switch setting]

Operation mode	MODE1 switch
External loop back test	 Only Bit7 is turned on.

[Examination procedure]

(a) Please prepare HUB.

(b) The MODE1 dip switch of the tested LAN-ETH2 is set in the external loop back test mode.
Please connect Ethernet port (10BT) and HUB.

(c) When the power supply of PLC where the tested LAN-ETH2 is mounted is turned on, the examination is begun.

(d) When the dip switch setting is changed with the power supply of PLC where the machine which is examined is mounted turned on, the external loop back test is begun by depressing the RESET button of the tested LAN-ETH2.

(d) The examination is repeated until the power supply is turned off.

[The examination time required] About 30 seconds

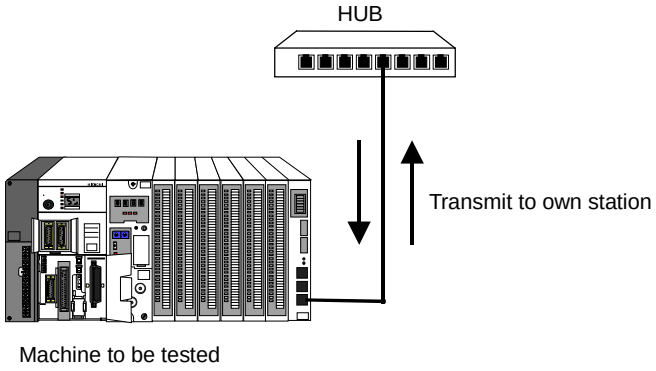


Figure 6.3.2.1 External loop back test composition

[LED display and method of judging diagnosis result] Show in table 6.3.2.1

Table 6.3.2.1 LED display and diagnosis result judgment when external loop back test is executed.

POW	STAS	ERR	State or diagnosis result
Green, Blinking	Lighting	Turning off	Normal end of examination
	Turning off	Lighting	Abormal end of examination

(*) Tx/Rx LED lights during executing the test. That is because this module transmits and receives the diagnosis packet.

Note
Please do not connect equipments other than the test module with HUB when you execute the external loop back test. It might become an error when connecting.

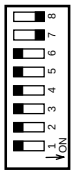
6.3.3 Send/receive test

It is necessary to select either from among two kinds of equipment compositions to execute the send/receive test.
Equipment composition 1 : PLC which mounts LAN-ETH2 is used by two sets.
Equipment composition 2 : PLC which mounts LAN-ETH2 and telecommunications equipment in accordance with send/receive test specification (*1) are used.

The following items become common specifications which do not affect the equipment composition.

- Dip switch setting of machine to be examined
- UDP message format
- LED display and method of judging diagnosis result
- The examination time required

[Dip switch setting]

Operation mode	MODE1 switch
Send/receive test	 Bit7 and bit8 are turned on.

[UDP message format]

The UDP message which the machine which is examined sends on the line is shown below.

0	1	2	3	4	5	·····	1023 Byte
Command	Data byte number	Message					
H01	H03FD	H00	H01	H02	·····		HFC

[LED display and method of judging diagnosis result] Show in table 6.3.3.1

Table 6.3.3.1 LED display and diagnosis result judgment when send/receive test is executed.

POW	STAS	ERR	State or diagnosis result
Green, Blinking	Lighting	Turning off	Normal end of examination
	Turning off	Lighting	Abormal end of examination

(*) Tx/Rx LED lights during executing the test. That is because this module transmits and receives the diagnosis packet.

[The examination time required] About 30 seconds

(*1) The send/receive test specification is the following.

- UDP/IP should be able to be used as a communication protocol.
- The message data which the tested LAN-ETH2 transmits should be able to be sent back to that as it is.

(1) PLC which mounts LAN-ETH2 is used by two sets

[Examination content]

It is tested to turn the UDP message between the tested LAN-ETH2 and LAN-ETH2 of the normal operation mode (other station for the examination).

[Examination procedure]

(a) Please set setting information with the I/O assign of LAN-ETH2, setting the equipment, and parameter in communication tools referring to the examination composition of Figure 6.3.3.1.

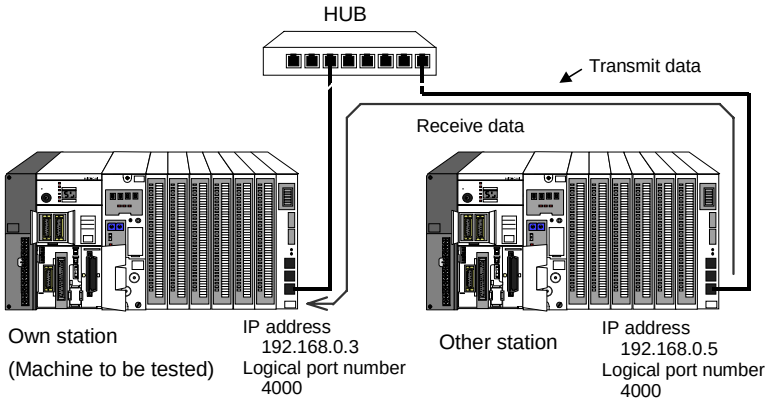
(b) LAN-ETH2 of the other station for the examination is started in the normal operation mode.

(c) When the power supply of PLC where the tested LAN-ETH2 is mounted is turned on, the examination is begun.

(d) When the dip switch setting is changed with the power supply of PLC where the tested LAN-ETH2 is mounted turned on, the external loop back test is begun by depressing the RESET button of the tested LAN-ETH2.

(d) The examination is repeated until the power supply is turned off.

[Examination composition] Show in figure 6.3.3.1



Fogure 6.3.3.1 Sned/receive test composition (1)

(2) PLC which mounts LAN-ETH2 and telecommunications equipment in accordance with send/receive test specification (the following communication specification) are used.

[Examination content]

It is tested to turn the UDP message between LAN-ETH2 and the personal computer.

[Communication specification]

UDP/IP should be able to be used as a communication protocol.

The message data which the tested LAN-ETH2 transmits should be able to be sent back to that as it is.

[Examination procedure]

(a) Please set setting information with the I/O assign of LAN-ETH2, setting the equipment, and parameter in communication tools referring to the examination composition of Figure 6.3.3.1.

(b) Please start the application which meets the communication specification.

(c) When LAN-ETH2 is reset, the send/receive test is begun.

[Examination composition] Show in figure 6.3.3.2

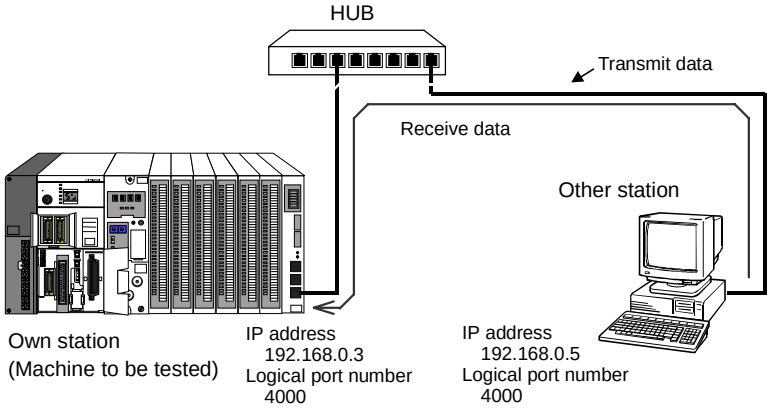


Figure 6.3.3.2 Sned/receive test composition (2)

Chapter 7 Maintenance,Check,Troubleshooting

Check the module daily or regularly in order to use LAN-ETH2 in best condition and keep the system run normally.

7.1 Daily check

Check the following item (Table 7.1.1) on running condition.

As to H series PLC, see the application manual (Hardware edition) or the instruction manual.

Table 7.1.1 Daily check item

Check item	Check LED	Normal	Error	Cause
Power status	POW LED	ON	OFF	•Defectiveness of connection between module and base connector. •Electric power capacity shortage of power supply module. •Breakdown of power supply module.
Hardware	WDE LED	OFF	ON	•Fatal breakdown of hardware
System software	WDE LED	OFF	ON	•Malfunction of system software by excessive noise, etc.
Communication parameter*1	ERR LED STAS LED	OFF OFF	ON Blinking *2	•Setting of inappropriate parameter. Please refer to "Status area in each connection (Page 5-27)" for details.
Error of application*1	ERR LED STAS LED	OFF OFF	ON Blinking *2	•Communication error happened. Please refer to "Status area 1-4, status area in each connection (Page 5-25 ~ 5-27)" for details.
Hardware of PLC system	ERR LED	OFF	Blinking	•Breakdown of CPU module or base. •Malfunction of hardware according to excessive noise, etc.

*1 : A peripheral equipment such as LADDER Editor for Windows® is necessary to investigate details of an abnormal cause.

*2 : The outline of the error can be distinguished according to the blinking times of STAS LED.

Please refer to "4.3 Status LED" for details.

7.2 Regular check

Execute the following checks (Table 7.2.1) once half of a year. But check these items more frequently according to your using condition.

Table 7.2.1 Regular check item

Check item	Check target	Contents
Mounting of module	Module mounting screws Base connector	•Are the module mounting screw tightened ? •Is not the connector pin curved ?
Condition of transmission cable	UTP or STP cable	•Is the cable applied irregular weight ? •Are neither the power cable nor the I/O cable stored in the same duct ?
Appearance of module	This module	•Do not fine partiles of metal, etc. adhere to the main body case? •Is not the ventilation hole of top and bottom of main body case blocked? •Is not the main body case corroded, and remarkably transformed?
Using condition	Temparature, humidity, the others	Is the module used in normal condition (temparature, humidity)? Is the vibration kept in acceptable range ?

Danger

- Please work with the power supply of PLC system turned off, whenever a regular check is executed. Otherwise, it causes the dread of the electric shock and the breakdown of the PLC equipment.

7.3 Error LED and measure

Following table shows the indication and the measure in case an error occurs in communication between LAN-ETH2 and other station.

(1) Status LED

If an error occurs while LAN-ETH2 is operating, WDE LED or ERR LED of status LED lights and STAS LED blinks. Following tables shows error contents and measures.

Table 7.3.1 Error contents and measures

No.	Lighting LED	Error contents	When errors are detected, LAN-ETH2 :	Measure
1	WDE	There is a fault of hardware in LAN-EHT2.	can not operation.	•Apply power or reset with RESET switch or reset with software reset. •Malfunction of hardware, if it doesn't recover.
2	WDE, OPN2	Sum error of IP address		•Set IP address once again after applying power supply with E.CLR switch on. (*3) •Malfunction of hardware, if it doesn't recover.
3	ERR LED (*1)	An error occurs at the time of configuration IP address and transmission parameter.	can not communication with other station.	•Correct the setting according to the contents of status register or status register every connection and set again. •Clear the error with E.CLR switch.
4		An error occurs at the time connection opens.	stop to communication.	•Correct the error according to status area in each connection. •Close connection. •Clear the error with E.CLR switch. **If these errors frequently occur, remove causes of the errors by loop back test, etc.**
5		An error occurs at the time of sending.		
6		An error occurs at the time of receiving data.		
7		An error occurs during a test.	-	•Check network, other equipments and LAN-ETH2. And take a necessary measure. •Clear the error with E.CLR switch.
8	ERR LED blinking	Timeout error of system bus	can not operation.	•Apply power or reset with RESET switch or reset with software reset. •Malfunction of LAN-ETH2 module, CPU module or base, if it does not recover.

(*1) An error may occur when line is busy, send/receive and open/close are executed simultaneously. Seeing consideration for making program, make program which has retry function.

(*2) Please refer to "4.3 Status LED" about the error display by the blinking number of STAS LED.

(*3) Please set IP address once again, because the module becomes condition active possibility, after the power supply is input while set up MODE1 switch to IP address setting mode and pushing the E. CLR switch.

(2) Status area

The bit, corresponding to connection, in status area 1,2,3 (WR**07 ~ 09) is ON, when ERR LED of status LED lights. (** are two figures from the left end of WR I/O No. specified in control register.)

Table 7.3.2 Status area (ERR LED lighting)

Status area	Error contents	Cause of error	Measure
1	Open error	•An error occurs at the time of connection open.	•Correct the setting according to status area every connection. After close the connection once, open the connection again and start communication.
2	Message send error	•An error occurs at the time of sending a message.	
3	Message receive error	•An error occurs at the time of receiving a message.	

(3) Status area in each connection

①In case an error occurs in status area 1,2,3 :

The bit, corresponding to the error, in status area (WR**0B ~ 10) in each connection ONs in order to give information of the error content. (See the items “5.3.1 Transmission parameter”. ** are two figures from the left end of WR I/O No. specified in control register.)

Table 7.3.3 Status area in each connection (ERR LED lights)

Bit position	Error contents	Cause of error	Measure
0	Receive buffer overflow	•The received data is larger than receive buffer capacity.	•Confirm transmission parameter, check network line, and take to necessary measure. •Check your program.
1	Send byte number error	•Send byte number is 0. •Send byte number is larger than receive buffer capacity. •Send byte number is over maximum send byte number.	
2	Timeout	•Processing wasn’t completed within the specified time.	
7	Communication error	•An error occurs during communication processing.	

Receive buffer overflow occurs in case receive is not executed in spite of normal communication. At the time of receive, execute receive handshake processing immediately and make user program to read receive data.

ERR LED lights in case a communication error occurs in communication with task code, but you need to be careful because the bit of each error doesn’t show “1”.

②In case an error occurs at the time of configuration of transmission parameter :

The bit, corresponding to the error, in status area (WR**0B ~ 10) in each connection ONs in order to give information of the error content. (See the items “5.3.1 Transmission parameter”. ** are two figures from the left end of WR I/O No. specified in control register.)

Table 7.3.4 Status area in each connection (Transmission parameter sets)

Bit position	Error content	Cause of error	Measure
0	I/O type error	•A bit except H0A to H0C is specified.	Correct the parameter and set transmission parameter again.
1	I/O No. error	•No. beyond the limit in each I/O kind is specified.	
2	Buffer length error	•The size of send/receive buffer excepting for H4 to H204 word is set.	
3	Area error	•IP address setting area, configuration of transmission parameter area, and send/receive buffer is over the limit of memory. •Transmission parameter and send/receive buffer are duplicated each other.	
4	IP address error	•IP address excepting for H00000001 to HFFFFFFFE is specified. •Other IP address is the same as own IP address.	
5	Port NO. error	•Logical port number excepting for H0001 to HFFFF is specified. •Task code service is the same as logical port No. of message communication.	
6	Service type error	•The service type is incorrect.	

(4) Status register (WX00S0)

The bit, corresponding to an error content, in status register ONs in case an error occurs in parameter at the time of IP address setting and/or configuration of transmission parameter. (See the items of "5.1.1 Control register and status register".)

① At the time of IP address setting

Table 7.3.5 Status register (IP address set)

Bit position	Error content	Cause of error	Measure
0	Top word number error	•The value of WR**00 specified in control register is over the range.	Correct the parameter and set it again.
2	IP address error	•IP address excepting for H00000001 to HFFFFFFFE is specified. •Other station IP address is set to the same as own station IP address.	
3	Port number error	•Logical port No. excepting for H0001 to HFFFF is specified. •Task code port 1, 2 and send/receive test port are duplicated.	
4	FLASH sum error	•At the time reading IP address information, the content is sum error.	Apply the power again or press down RESET switch. Or, Set IP address information again after applying the power supply on pushing E.CLR switch. If an error occurs in spite of restarting the module, the hardware is broken.
5	Prohibition to write to FLASH	•DIP switch is set to prohibit to write when you write default value and user setting value.	Position the switch to permit to write and set the value again.

② At the time of configuration of transmission parameter

Table 7.3.6 Status register (Configuration of transmission parameter)

Bit position	Error content	Cause of error	Measure
0	Top word number error	•The value of WR**00 specified in control register is over the range.	Correct the parameter and set it again.
1	Error in connection opening	•Request of setting ONs when one of connection 1 to 6 opens.	Close connection and set the parameter again.

7.4 Troubleshooting

Following table shows troubleshooting in case a system using LAN-ETH2 dose not run normally.

7.4.1 Cause of error and analyzing method

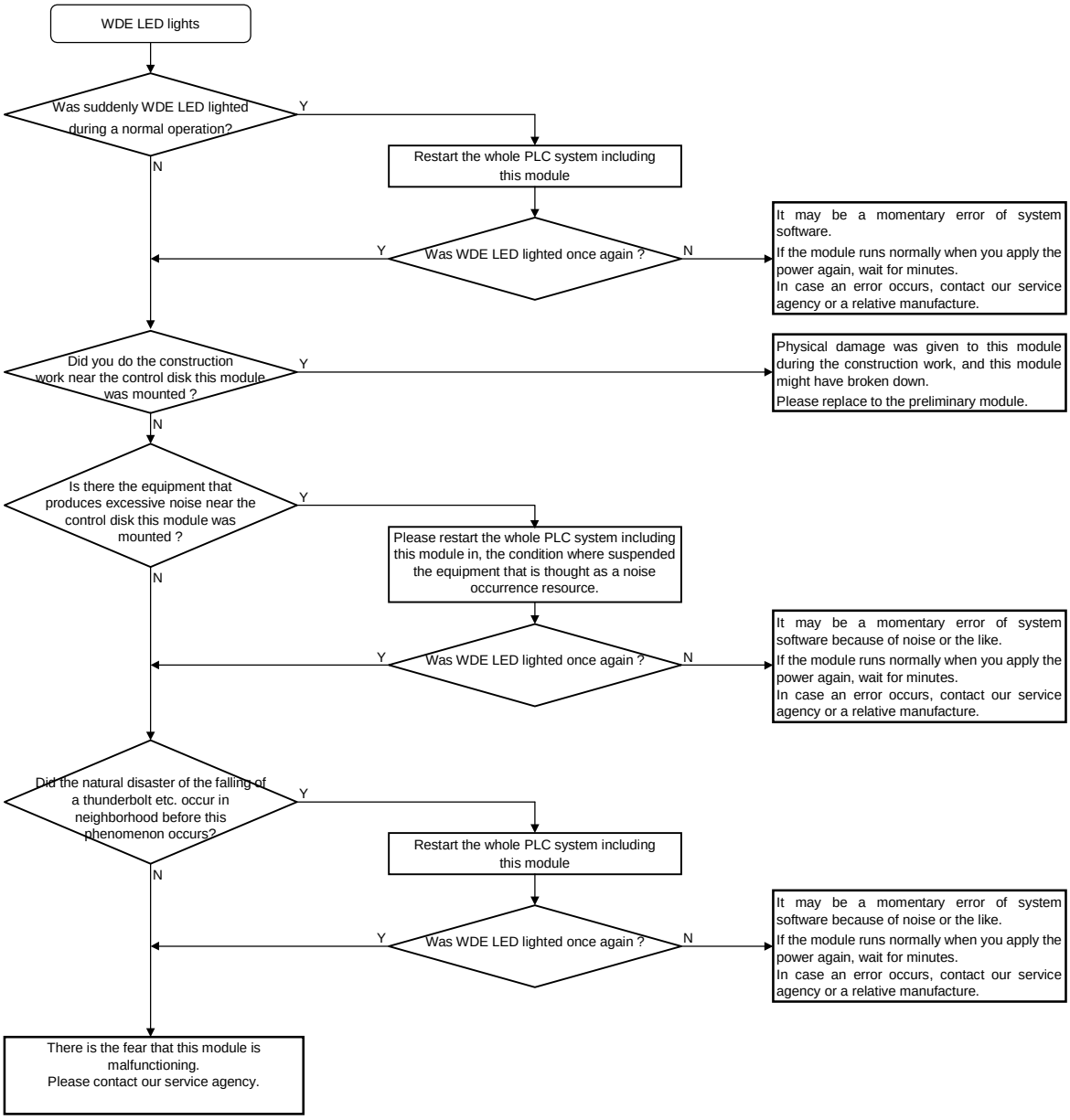
Table7.4.1 Cause of error and analyzing method

Cause	Trouble contents	Analyzing method
Trouble of LAN-ETH2	Defective components	Make the module self-diagnose at the time of loop back test and send/receive test, applying the power.
	Defective manufacturing	
Mistake in setting of LAN-ETH2	I/O assignment	Confirm assignment of “COMM” from peripheral equipment.
	Mounting position	Mount LAN-ETH2 to basic base excepting for 0 slot.
	Mode setting switch	Confirm the switch is set for normal operation.
	Module configuration post	Confirm the module is set right.
	Configuration of IP address	
Fault related to transmission cable	Bad connection of cable	Check your own eyes or execute external loop test.
	Disconnection of cable	
	Transmission distance is over the limit	100m of within between module and HUB
	Cable out of the standard	Check a form and a character of the cable.
Trouble in PLC	CPU module	Execute trouble shooting for each module.
	Memory cassette	
	Base, power	
Trouble of connection equipments	Fault in hardware	Execute trouble shooting for each equipment.
	Error in software	
	Other	
Trouble of application program	Mistake in system specification	Check the specification.
	Error in software	Check user application program.
Trouble of in using condition	Temperature of using surrounding, humidity, noise	Measure and arrange the using condition.
	Vibration, other bad environment	

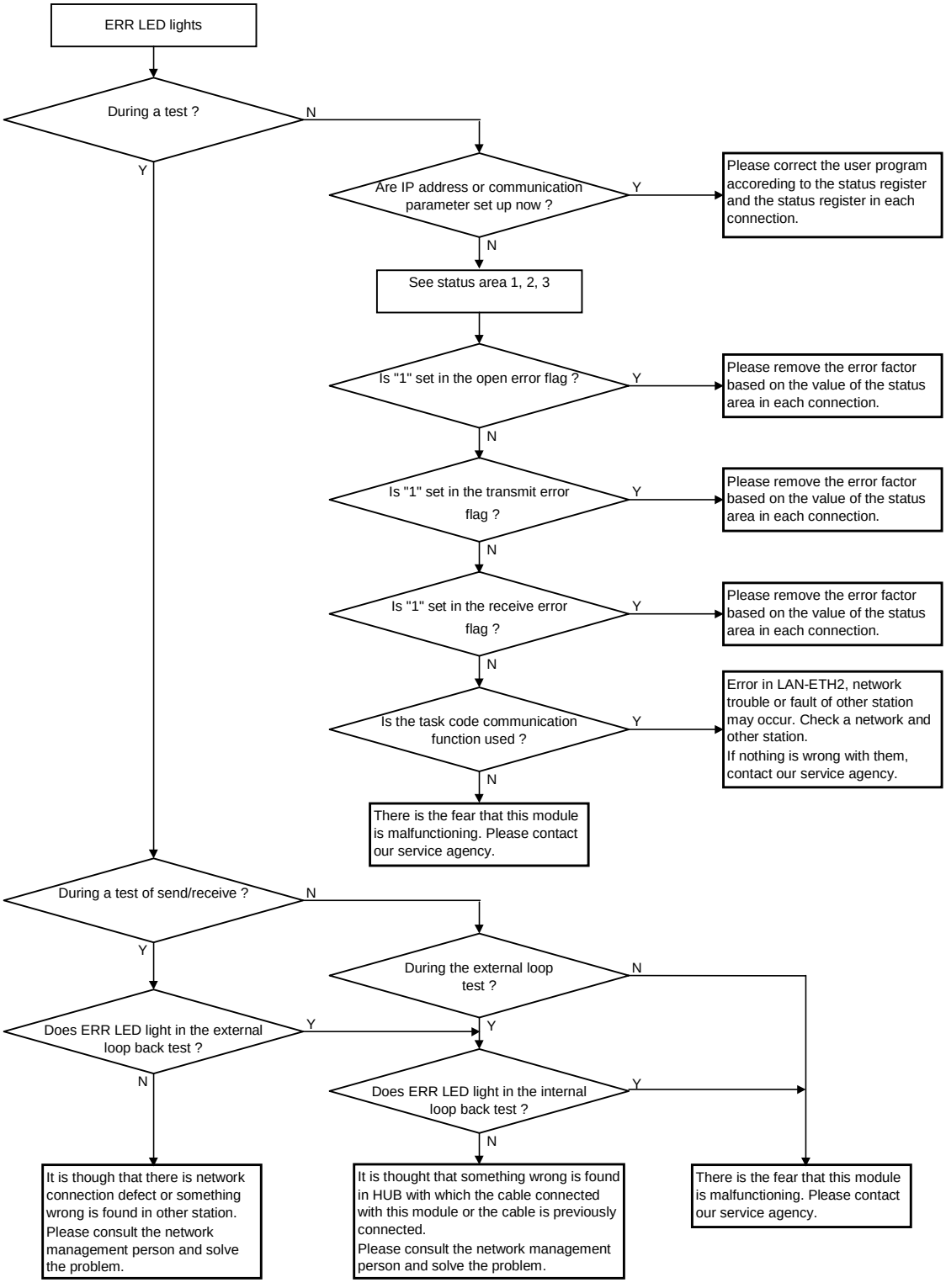
7.4.2 Troubleshooting flow chart

The following flow charts show the troubleshooting when errors occur.

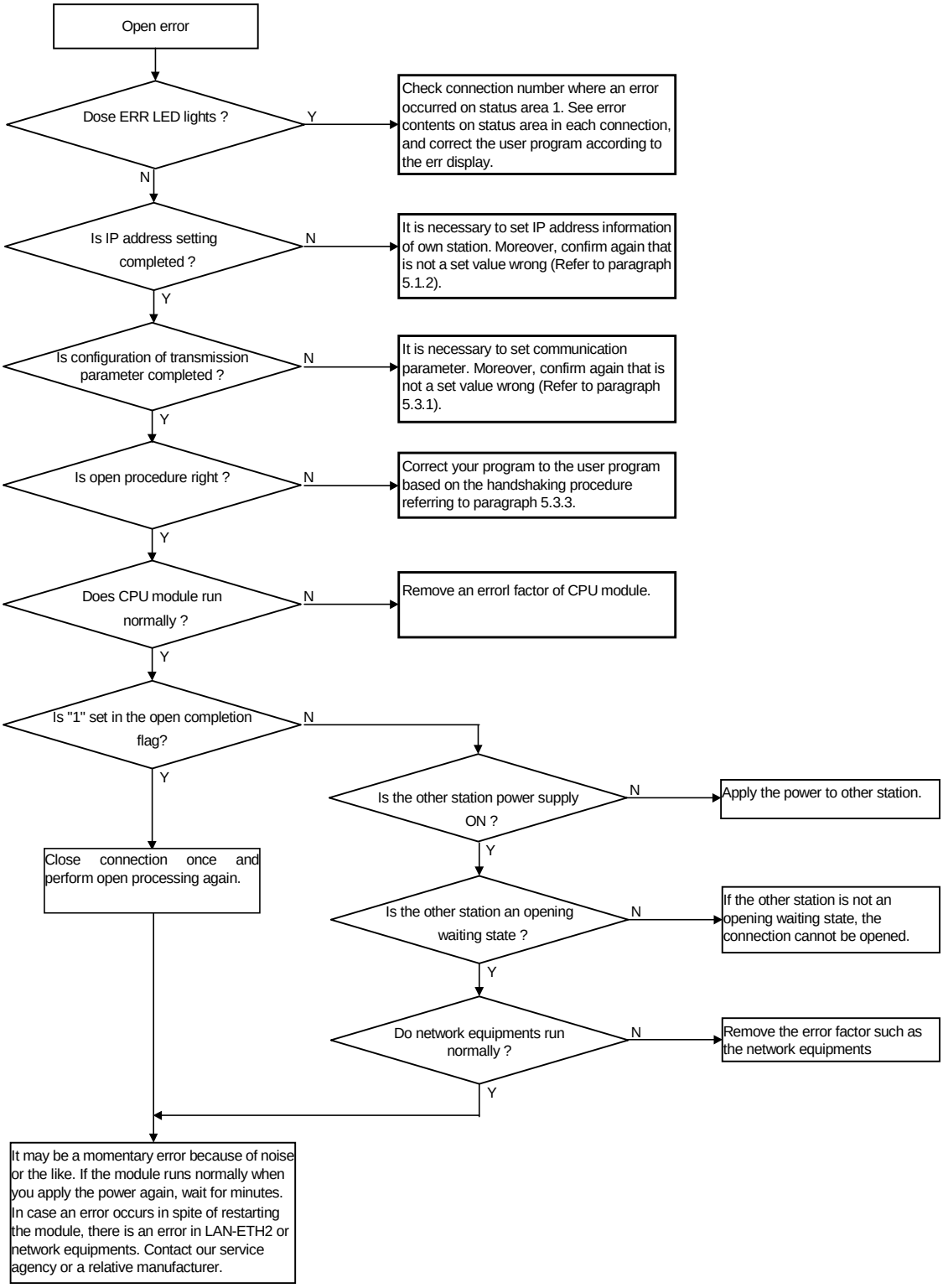
(1) WDE LED ligthing



(2) ERR LED lighting



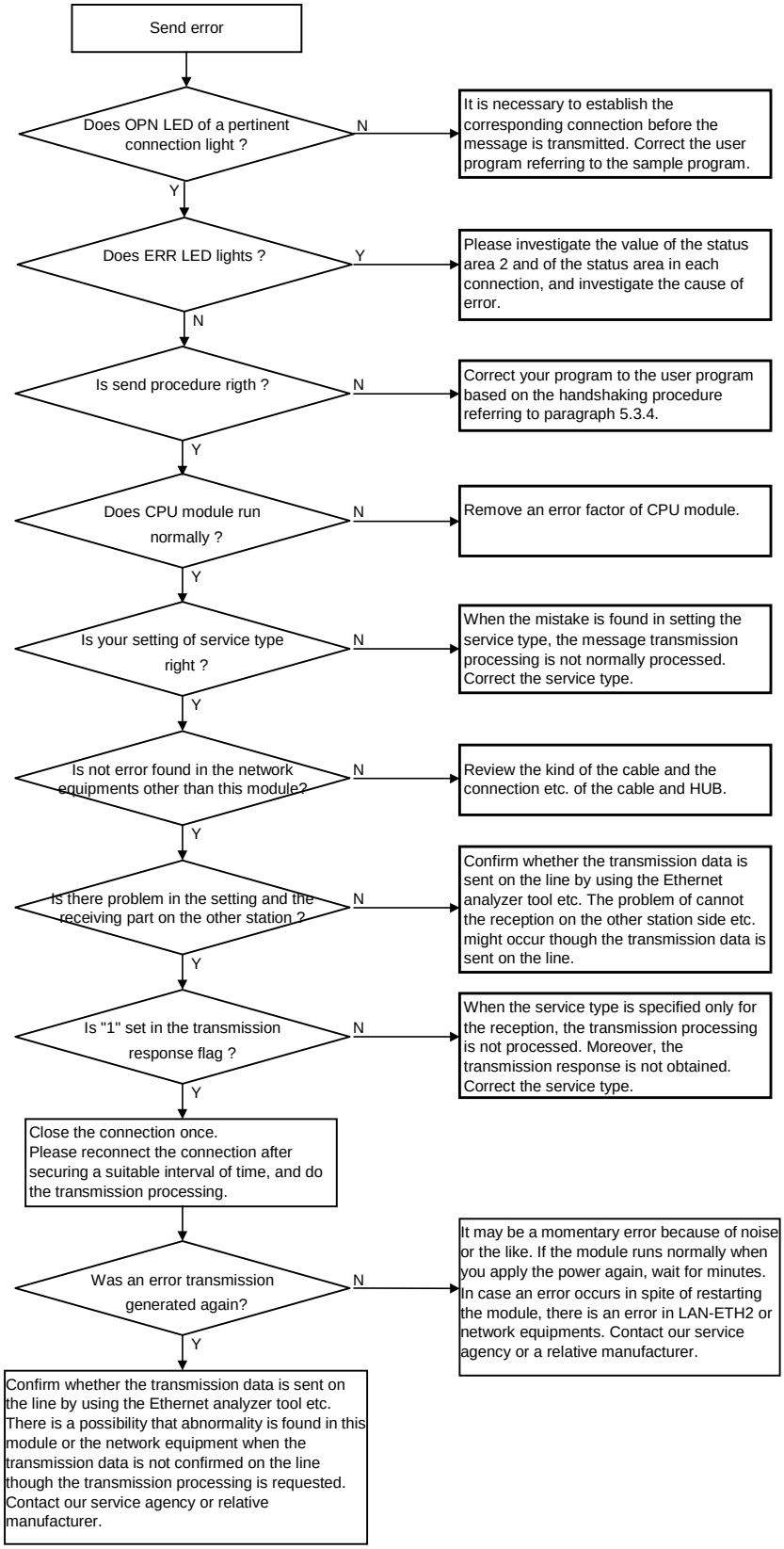
(3) Open error (Only active side)



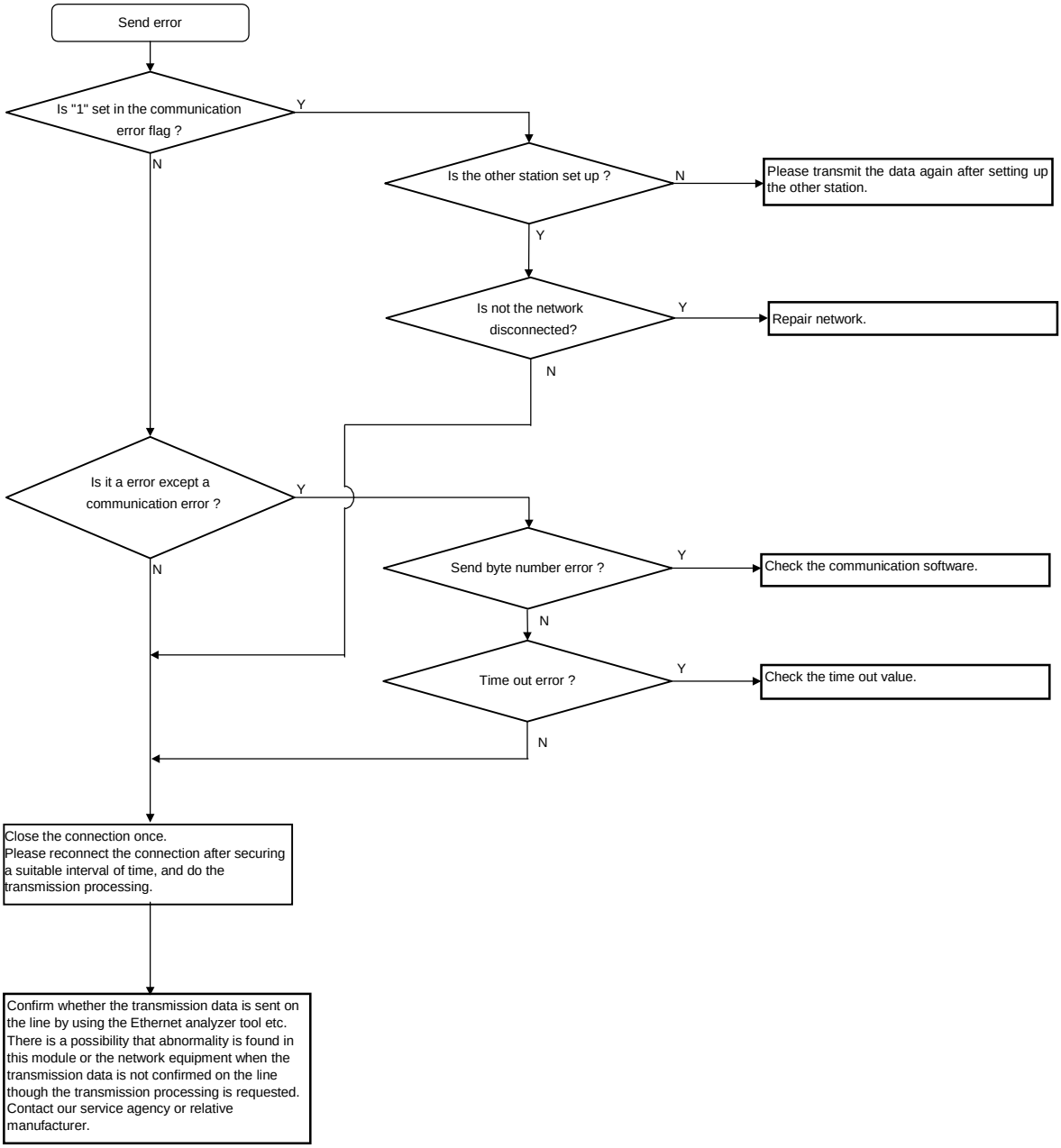
Refernce

It seems that the debugging efficiency of the communication procedure improves rapidly when there is a tool that can observe the status of the open/close processing and of the communication data.

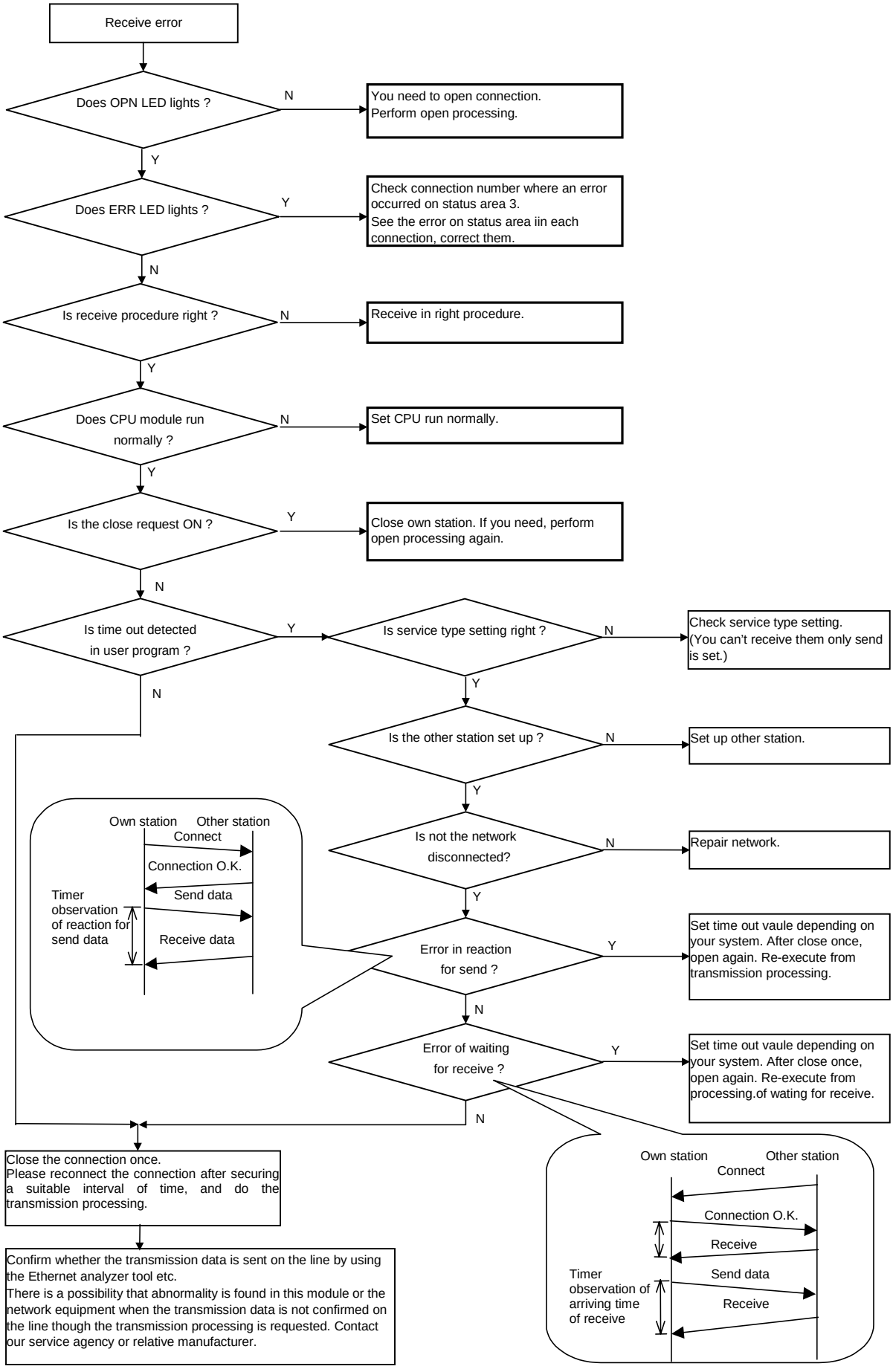
(4) Send error


Send error
Does OPN LED of a pertinent connection light ?
N
It is necessary to establish the corresponding connection before the message is transmitted. Correct the user program referring to the sample program.
Y
Does ERR LED lights ?
Y
Please investigate the value of the status area 2 and of the status area in each connection, and investigate the cause of error.
N
Is send procedure rigth ?
N
Correct your program to the user program based on the handshaking procedure referring to paragraph 5.3.4.
Y
Does CPU module run normally ?
N
Remove an error factor of CPU module.
Y
Is your setting of service type right ?
N
When the mistake is found in setting the service type, the message transmission processing is not normally processed. Correct the service type.
Y
Is not error found in the network equipments other than this module?
N
Review the kind of the cable and the connection etc. of the cable and HUB.
Y
Is there problem in the setting and the receiving part on the other station ?
N
Confirm whether the transmission data is sent on the line by using the Ethernet analyzer tool etc. The problem of cannot the reception on the other station side etc. might occur though the transmission data is sent on the line.
Y
Is "1" set in the transmission response flag ?
N
When the service type is specified only for the reception, the transmission processing is not processed. Moreover, the transmission response is not obtained. Correct the service type.
Y
Close the connection once.
Please reconnect the connection after securing a suitable interval of time, and do the transmission processing.
Was an error transmission generated again?
N
It may be a momentary error because of noise or the like. If the module runs normally when you apply the power again, wait for minutes. In case an error occurs in spite of restarting the module, there is an error in LAN-ETH2 or network equipments. Contact our service agency or a relative manufacturer.
Y
Confirm whether the transmission data is sent on the line by using the Ethernet analyzer tool etc. There is a possibility that abnormality is found in this module or the network equipment when the transmission data is not confirmed on the line though the transmission processing is requested. Contact our service agency or relative manufacturer.

Send error (In case of ERR LED lighting)



(5) Receive error

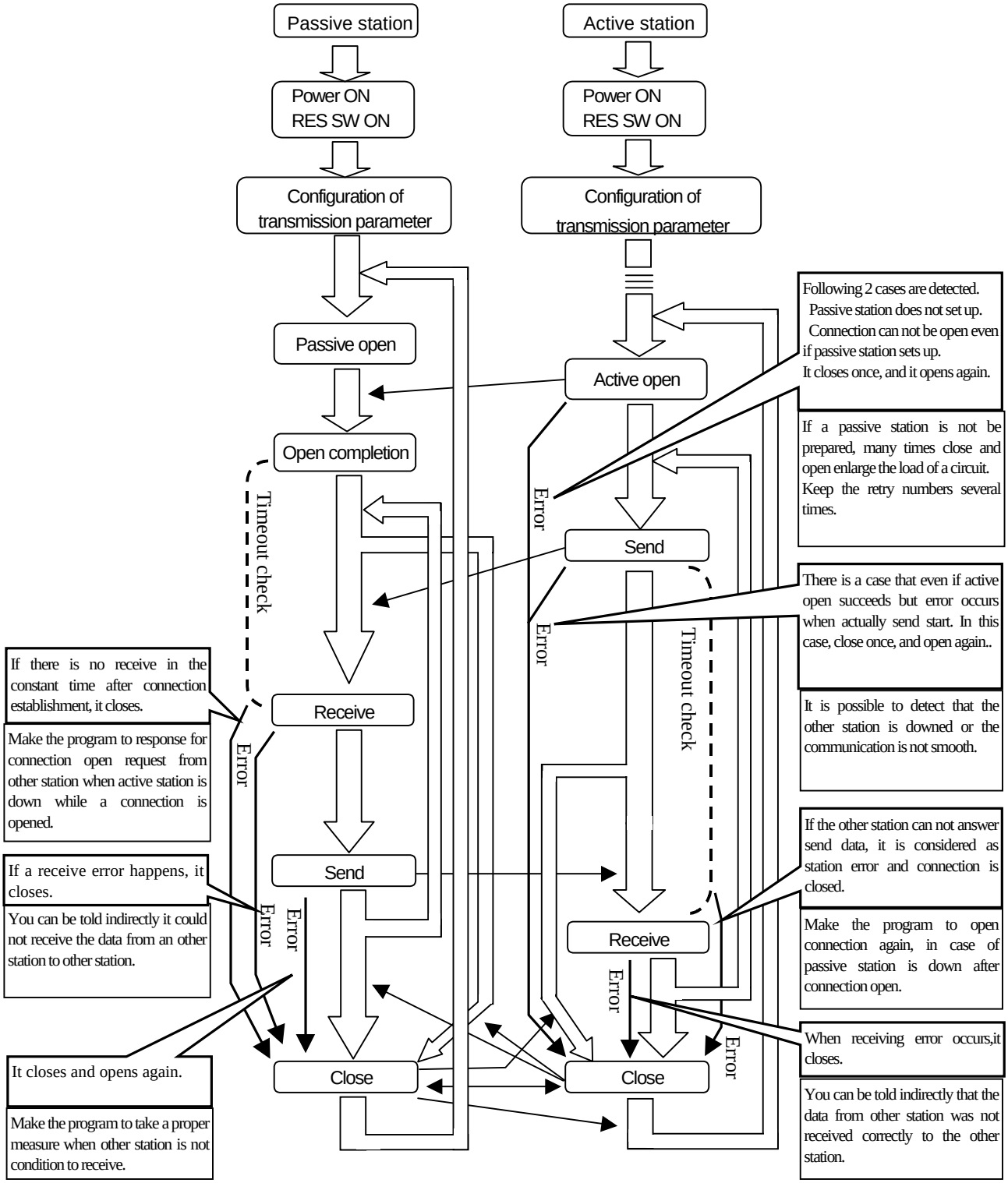


Receive error (In case of ERR LED lighting)

Chapter 8 Sample program

8.1 Consideration for programming

When you make a program that is communicated with LAN-ETH2, the error may occur and the corresponding method must be considered. They are shown in the following figure.

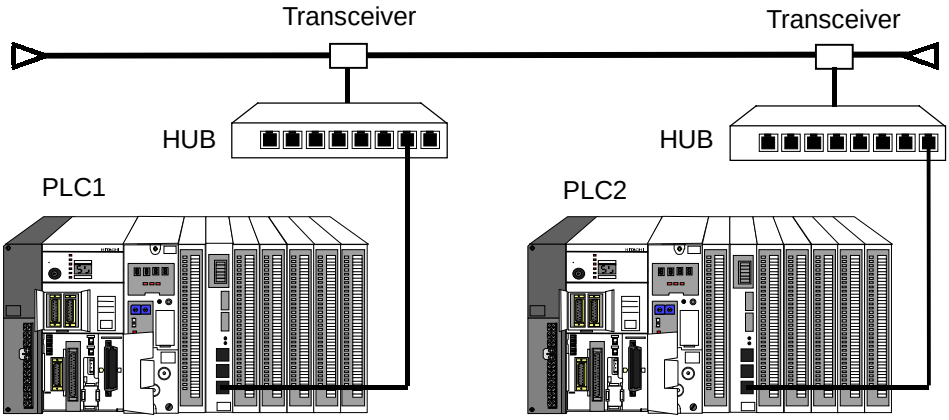


- If it opens again after closing connection once, please take more than 500ms for waiting time.
- The connection that received a requirement for close, must close own connection and open it again.

8.2 Message communication

This sample program describes the example of message communication using 2 set of the H series PLC.

(a) System configuration



(b) Configuration of H series equipment (PLC1 and PLC2 common)

Equipment	Type
Power module	AVRC-08H
CPU module	CPU2-20H
Module	LAN-ETH2
Memory cassete	RAM2-48H
Basic base	BSU-05H

(c) Setting of LAN-ETH2

	Item	LAN-ETH2 Node-A	LAN-ETH2 Node-B
1	IP address of own station	158.213.81.213	158.213.81.216
2	Logical port number	3000	3000
3	MODE1 switch	All OFF	All OFF
4	MODE2 switch	All OFF	All OFF
5	Ladder program name	TEST T	TEST R

(d) I/O Assignment (PLC1 and PLC2 common)

		0	1	2	3	4
CPU2-20H	RAM2-48H		COMM			

(e) Explanation for operation

When CPU module does RUN, port 1 of Node-B (passive side) waits for an opening of connection.

After M0 (communication beginning/stop switch) becomes "1", Node-A opens connection 1 and demands the connection establishment of connection 1 of Node-B. When the connection between Node-A and Node-B is established, Node-A transmits the message.

Node-B stores the receiving message to the receiving table, if the receiving message is normal. The receiving area is a ring buffer. That is, when the message is received on the state of no empty area for receiving data, the receiving message is overwritten in the first part in the receiving area.

After Node-B stored the data on receiving table, Node-B sends a normal answer to Node-A.

If receiving data is error, Node-B sends an error answer to Node-A. At this time, the data of the receiving table is not updated.

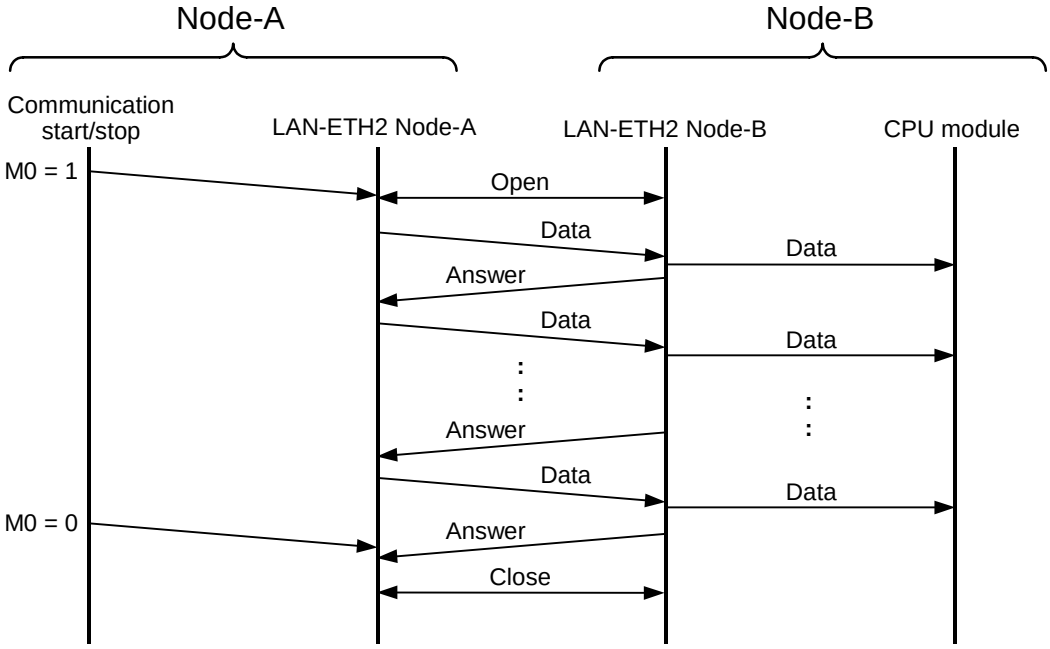
If an answer is normal, Node-A sends the next data to Node-B. If an answer is error, Node-A sends the last data again to Node-B.

This sample program repeats the above procedure.

When M0 of Node-A becomes "0", the connection cutting processing is started after the communication is completed.

Please set "1" in M0 if you want to restart the communication processing.

When various errors occur in communication processing, the error factor is stored in status work area (WM30-WM34). Moreover, the communication is repeated according to the error factor.

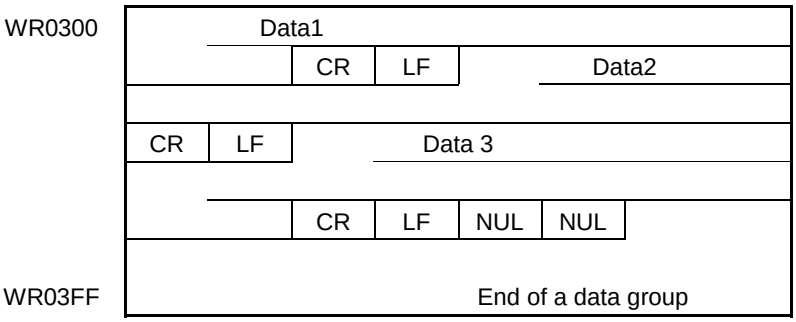


(f) Data format

The data length which contains the end code becomes an even number byte.

(g) Answer format

(h) Receiving table



(e) Internal output area

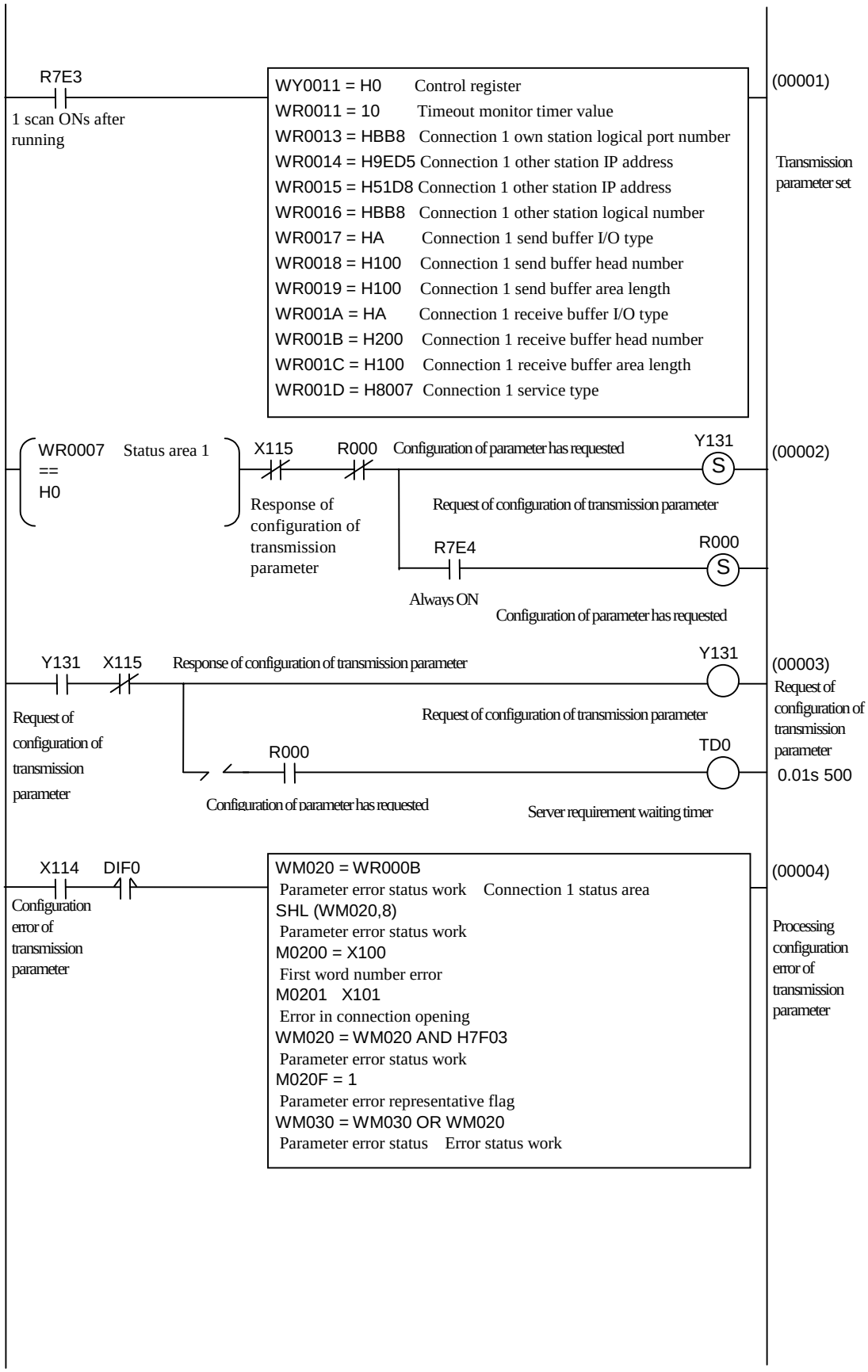
(e-1) Node-A (The active side)

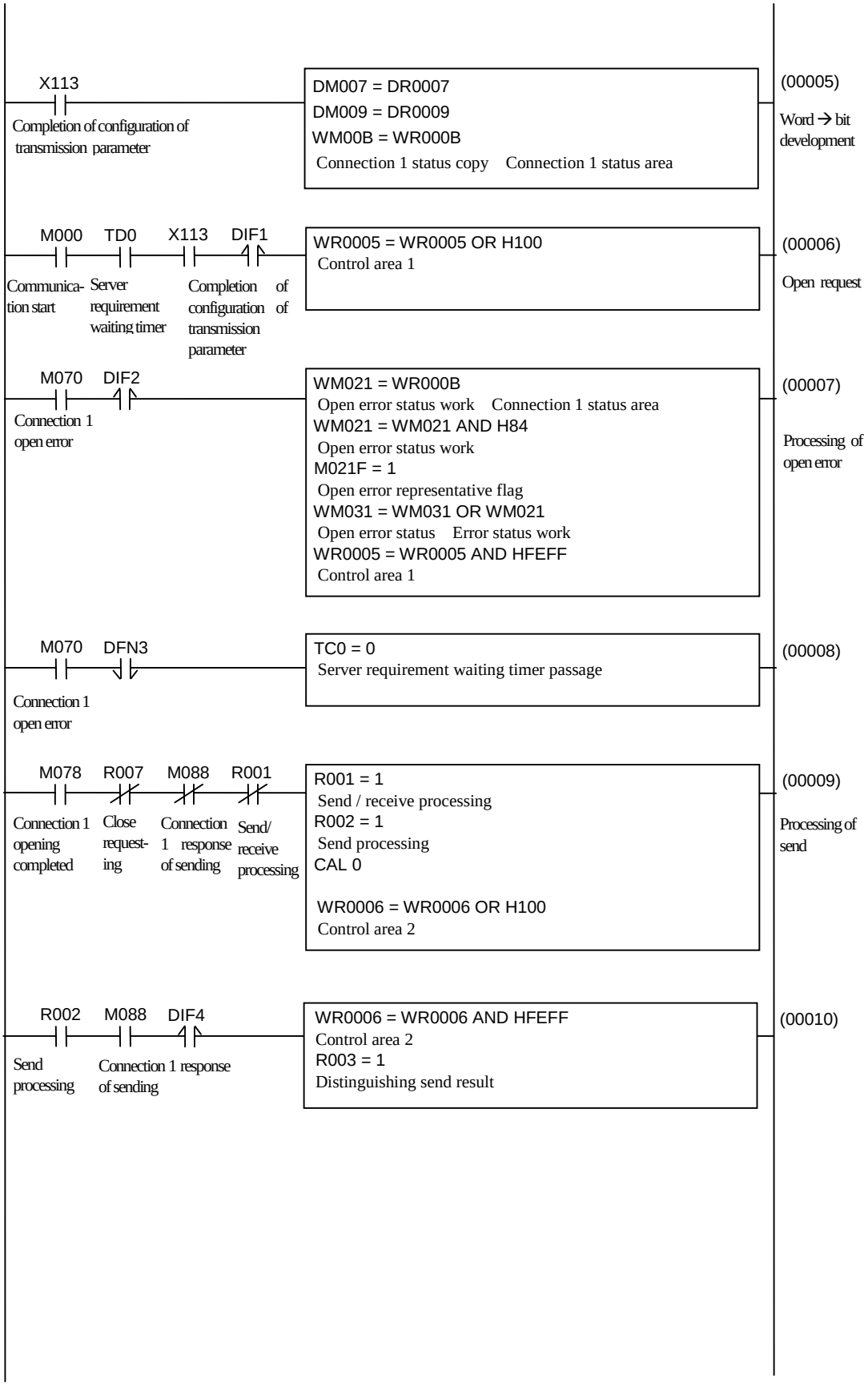
WR0000 ~ 00D4	Configuration area of transmission parameter		**[Details of WM032]**
WR00E0	Communication counter	M0321	Error of the number of send byte
WR00E1	Send data number	M0322	Timeout
WR0100 ~ 1FF	Send buffer	M0327	Communication error
WR0200 ~ 2FF	Receive buffer	M032F	Send error representative flag
WM007 ~ 00B	Work area		
WM020 ~ 024	Work area		**[Details ofWM033]**
		M0330	Receive bufer overflow
	[Error status area]	M0337	Communication error
WM030	Configuration error status of transmission parameter	M033F	Receive error representative flag
WM031	Open error status		
WM032	Send error status		**[Details of WM034]**
WM033	Receive error status	M0340	Error of the number of receiving byte
WM034	Ladder detection error status	M0341	Receiving of NAK
M0000	Communication start/stop switches (manual)	M0342	Receiving of error answer cord
		M0344	Answer timeout
	[Details of WM030]	M034F	Ladder detection error representative flag
M0300	Top word number error		
M0301	Error in connection opening		**[Status flag]**
M0308	I/O type error	R000	Configuration of transmission parameter has requested
M0309	I/O number error	R001	Send/receive processing
M030A	Buffer length error	R002	Send processing
M030B	Area error	R003	distinguishing send result
M030C	IP address error	R004	Receive processing
M030D	Port number error	R005	Fatal error occurs
M030E	Service type error	R006	Close condition is completed
M030F	Configuration error representative flag of transmission parameter	R007	Close requesting
		R008	Reset processing
	[Details of WM031]		
M312	Timeout	TD000	Server requirement waiting timer
M317	Communication error	TD001	Answer monitor timer
M31F	Open error representative flag	CU002	Response timeout counter

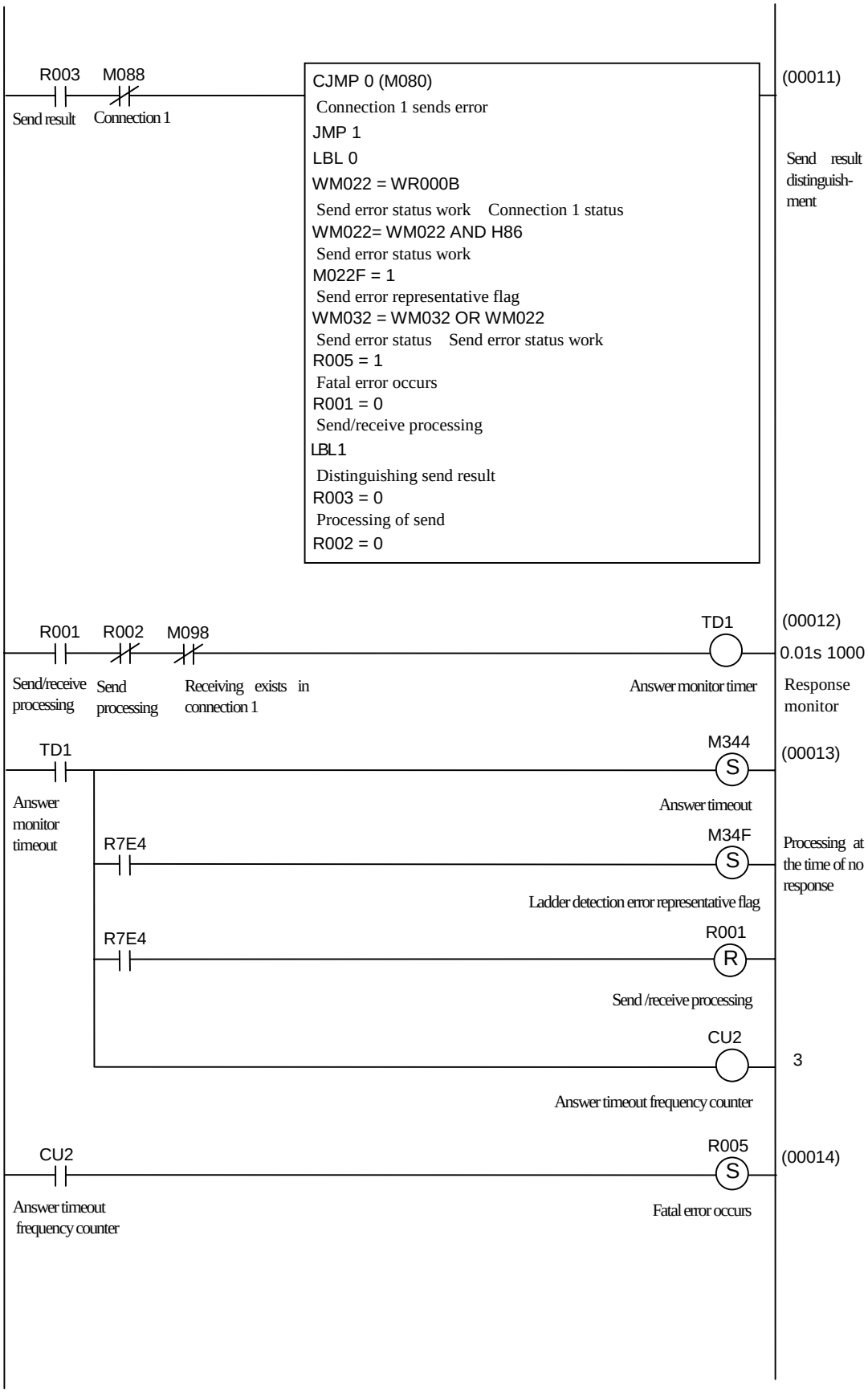
(e-2) Node-B (The passive side)

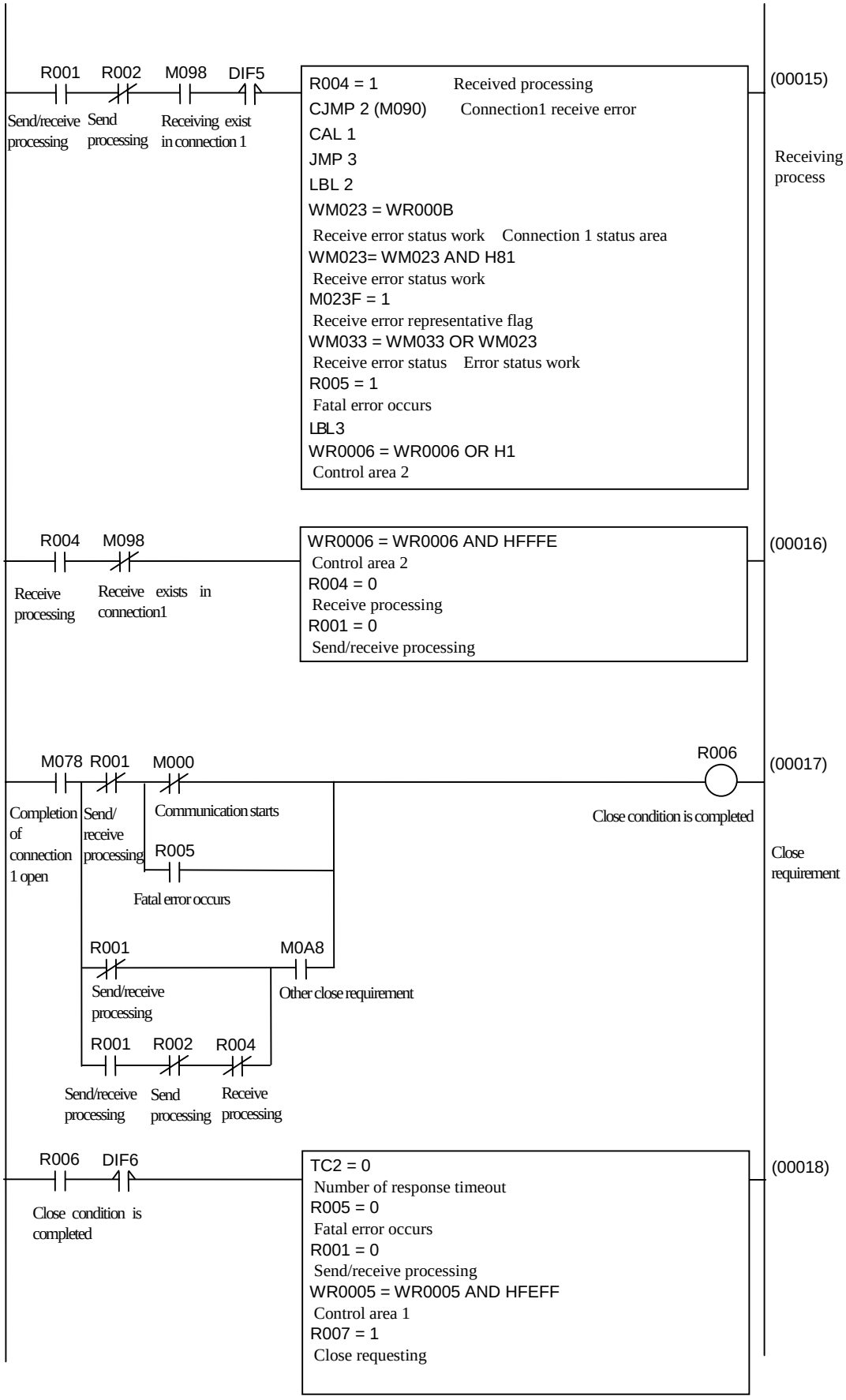
WR0000 ~ 00D4	Configuration area of transmission parameter		**[Details of WM032]**
WR00E0	Communication counter	M0321	Error of the number of send byte
WR00E1	Data words number in the receiving table	M0322	Timeout
WR00E2 ~ 00E4	Work area	M0327	Communication error
WR0100 ~ 1FF	Send buffer	M032F	Send error representative flag
WR0200 ~ 2FF	Receive buffer		
WR0300 ~ 03FF	receive table		**[Details of WM033]**
WM007 ~ 00B	Work area	M0330	Receive bufer overflow
WM020 ~ 024	Work area	M0337	Communication error
		M033F	Receive error representative flag
	[Error status area]		
WM030	Configuration error status of transmission parameter		**[Details of WM034]**
WM031	Open error status	M0340	Error of the number of receiving byte
WM032	Send error status	M0343	Termination code error
WM033	Receiving error status	M0345	Active side operation monitor timer timeout
WM034	Ladder detection error status	M034F	Ladder detection error representative flag
	[Details of WM030]		**[Status flag]**
M0300	Top word number error	R000	Configuration of transmission parameter has requested
M0301	Error in connection opening	R001	Send/receive processing
M0308	I/O tyoe error	R002	Complete of receiving process
M0309	I/O number error	R003	Send processing
M030A	Buffer length error	R004	Distinguishing send processing result
M030B	Area error	R005	Fatal error occurs
M030C	IP address error	R006	Close requesting
M030D	Port number error	R007	Reset processing
M030E	Service type error		
M030F	Configuration error representative flag of transmission parameter		
		SS000	WAIT timer for retry
	[Details of WM031]	TD001	Active side operation monitor timer
M312	Timeout		
M317	Communication error		
M31F	Open error representative flag		

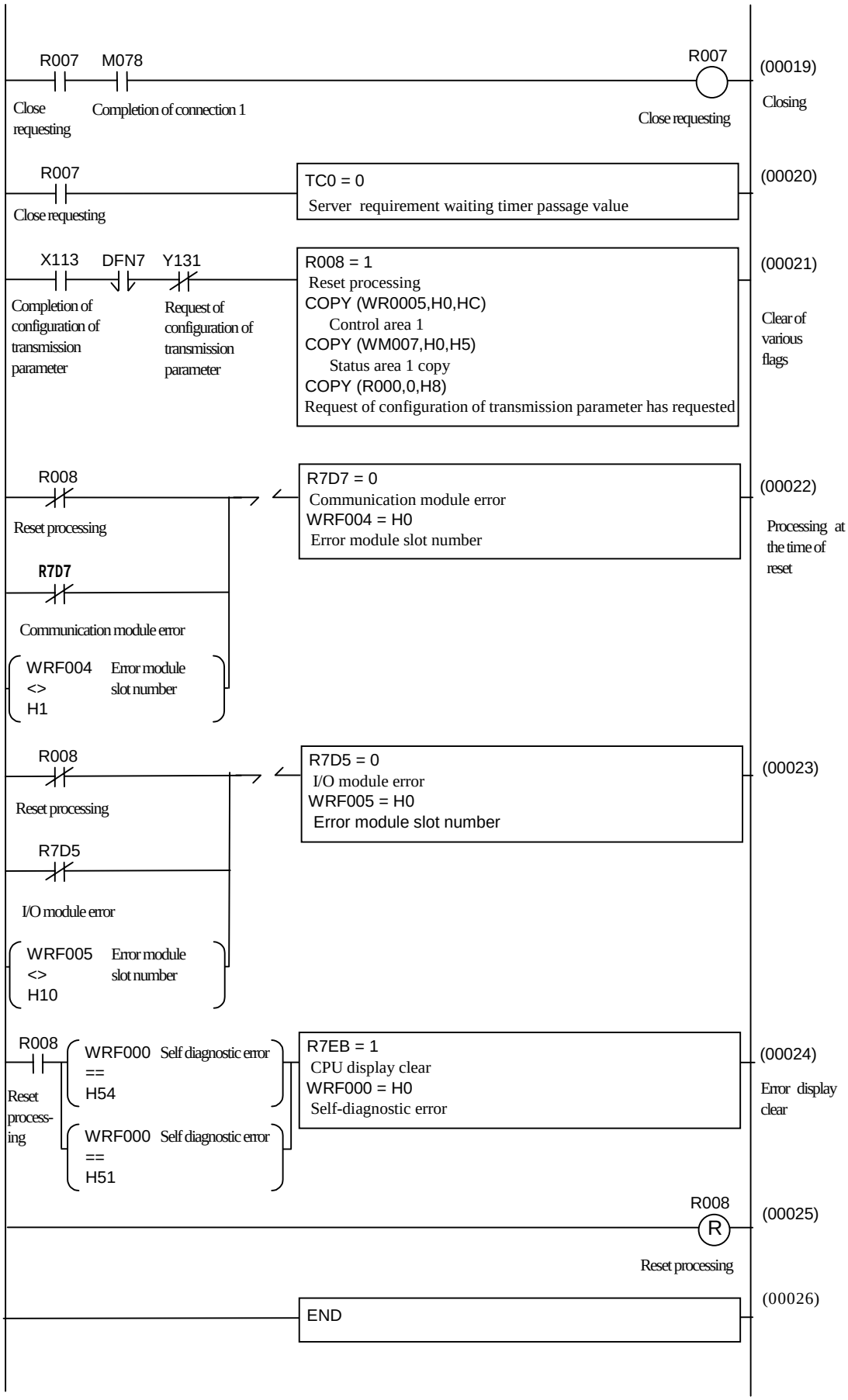
(Active side) TEST T

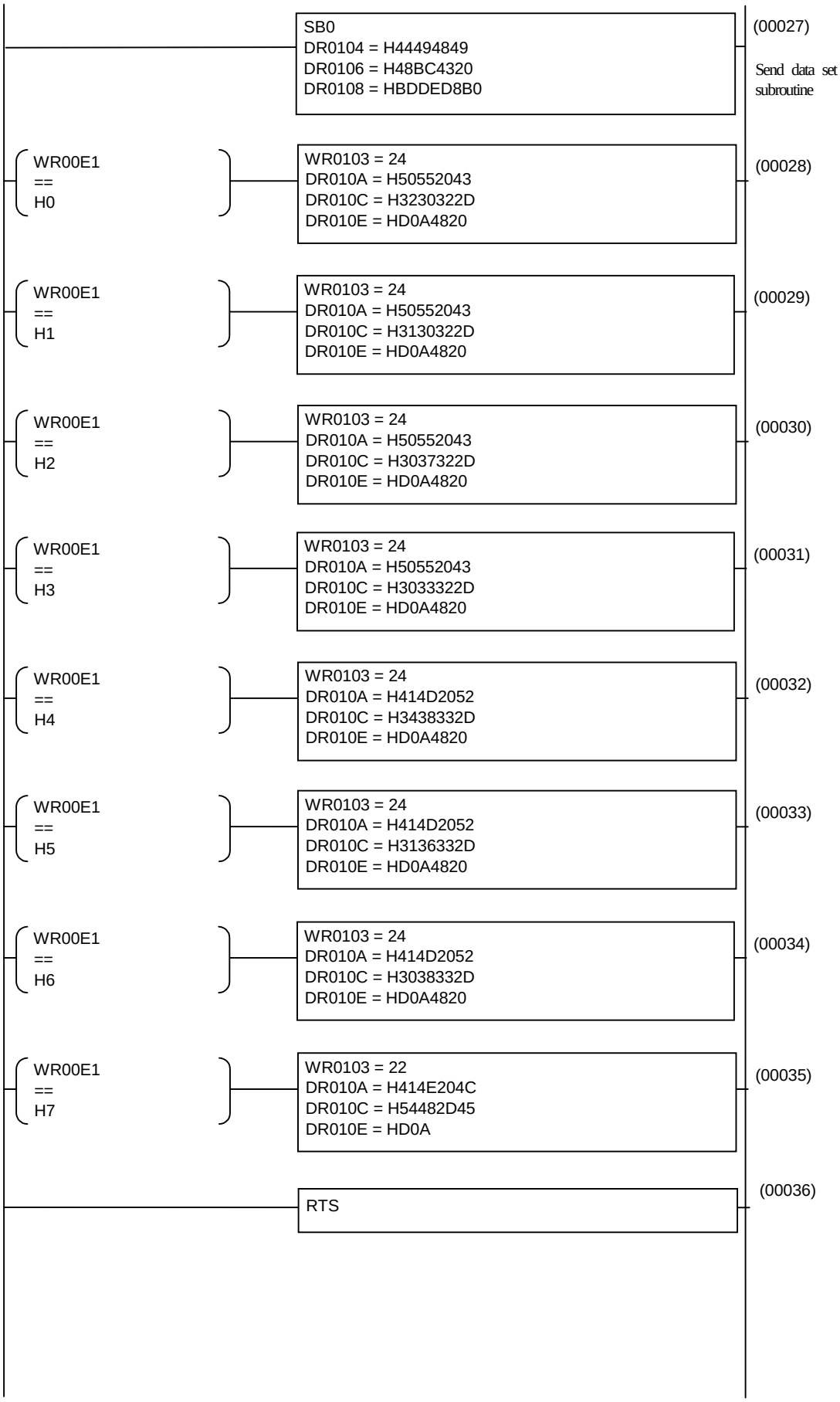


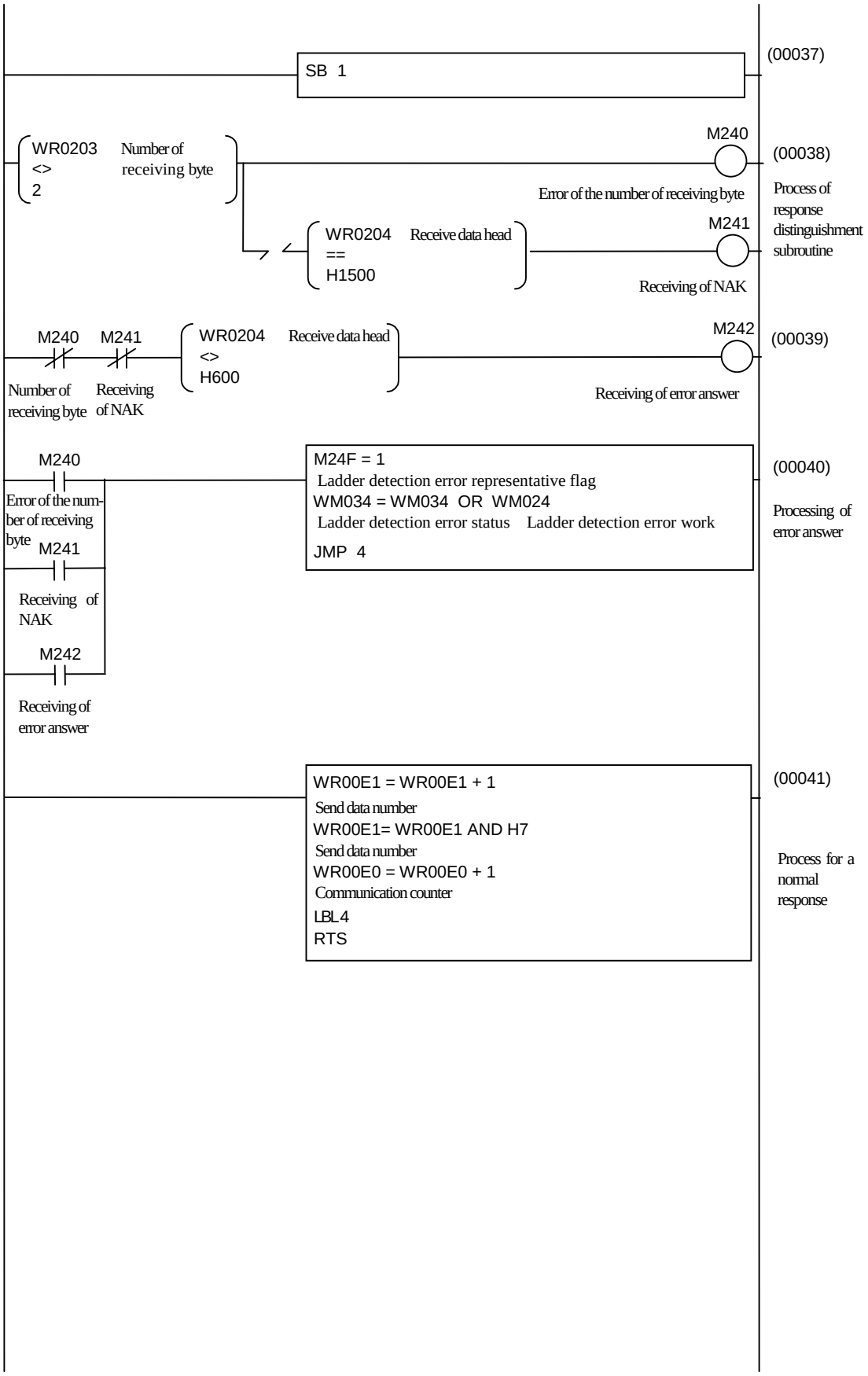

X113
Completion of configuration of transmission parameter
DM007 = DR0007
DM009 = DR0009
WM00B = WR000B
Connection 1 status copy Connection 1 status area
(00005)
Word → bit development
M000
Communication start
TD0
Server requirement waiting timer
X113
Completion of configuration of transmission parameter
DIF1
WR0005 = WR0005 OR H100
Control area 1
(00006)
Open request
M070
Connection 1 open error
DIF2
WM021 = WR000B
Open error status work Connection 1 status area
WM021 = WM021 AND H84
Open error status work
M021F = 1
Open error representative flag
WM031 = WM031 OR WM021
Open error status Error status work
WR0005 = WR0005 AND HFEFF
Control area 1
(00007)
Processing of open error
M070
Connection 1 open error
DFN3
TC0 = 0
Server requirement waiting timer passage
(00008)
M078
Connection 1 opening completed
R007
Close requesting
M088
Connection 1 response of sending
R001
Send/ receive processing
R001 = 1
Send / receive processing
R002 = 1
Send processing
CAL 0
WR0006 = WR0006 OR H100
Control area 2
(00009)
Processing of send
R002
Send processing
M088
Connection 1 response of sending
DIF4
WR0006 = WR0006 AND HFEFF
Control area 2
R003 = 1
Distinguishing send result
(00010)


R003
M088
Send result
Connection 1
CJMP 0 (M080)
Connection 1 sends error
JMP 1
LBL 0
WM022 = WR000B
Send error status work Connection 1 status
WM022= WM022 AND H86
Send error status work
M022F = 1
Send error representative flag
WM032 = WM032 OR WM022
Send error status Send error status work
R005 = 1
Fatal error occurs
R001 = 0
Send/receive processing
LBL1
Distinguishing send result
R003 = 0
Processing of send
R002 = 0
(00011)
Send result distinguish-ment
R001
R002
M098
Send/receive processing
Send processing
Receiving exists in connection 1
TD1
Answer monitor timer
(00012)
0.01s 1000
Response monitor
TD1
Answer monitor timeout
M344
S
Answer timeout
(00013)
R7E4
M34F
S
Ladder detection error representative flag
Processing at the time of no response
R7E4
R001
R
Send /receive processing
CU2
3
Answer timeout frequency counter
CU2
Answer timeout frequency counter
R005
S
Fatal error occurs
(00014)

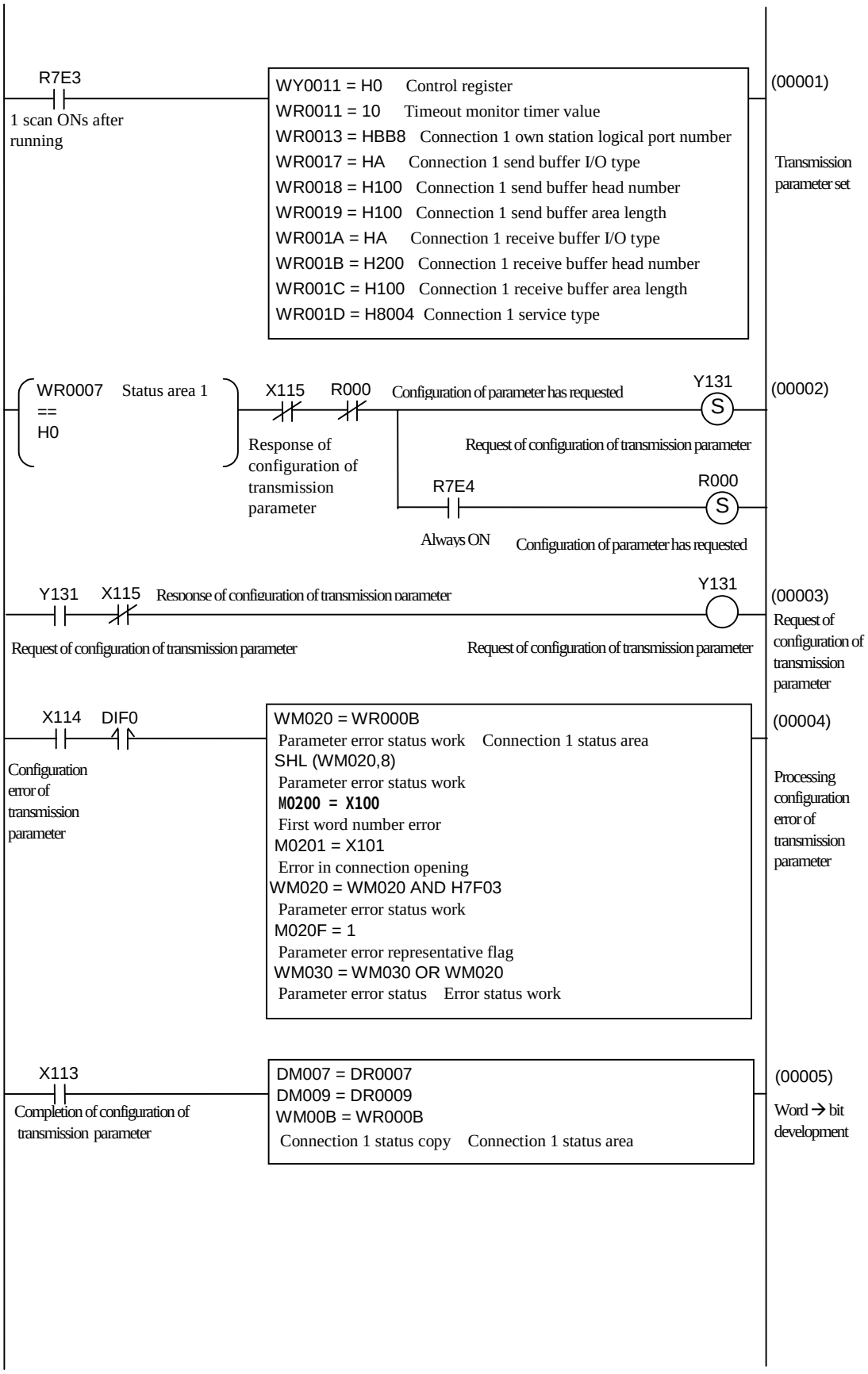

R001
R002
M098
DIF5
Send/receive processing
Send processing
Receiving exist in connection 1
R004 = 1
Received processing
CJMP 2 (M090)
Connection1 receive error
CAL 1
JMP 3
LBL 2
WM023 = WR000B
Receive error status work
Connection 1 status area
WM023= WM023 AND H81
Receive error status work
M023F = 1
Receive error representative flag
WM033 = WM033 OR WM023
Receive error status
Error status work
R005 = 1
Fatal error occurs
LBL3
WR0006 = WR0006 OR H1
Control area 2
(00015)
Receiving process
R004
M098
Receive processing
Receive exists in connection1
WR0006 = WR0006 AND HFFFE
Control area 2
R004 = 0
Receive processing
R001 = 0
Send/receive processing
(00016)
M078
R001
M000
R006
Completion of connection 1 open
Send/ receive processing
Communication starts
Close condition is completed
(00017)
R005
Fatal error occurs
Close requirement
R001
M0A8
Send/receive processing
Other close requirement
R001
R002
R004
Send/receive processing
Send processing
Receive processing
R006
DIF6
Close condition is completed
TC2 = 0
Number of response timeout
R005 = 0
Fatal error occurs
R001 = 0
Send/receive processing
WR0005 = WR0005 AND HFEFF
Control area 1
R007 = 1
Close requesting
(00018)

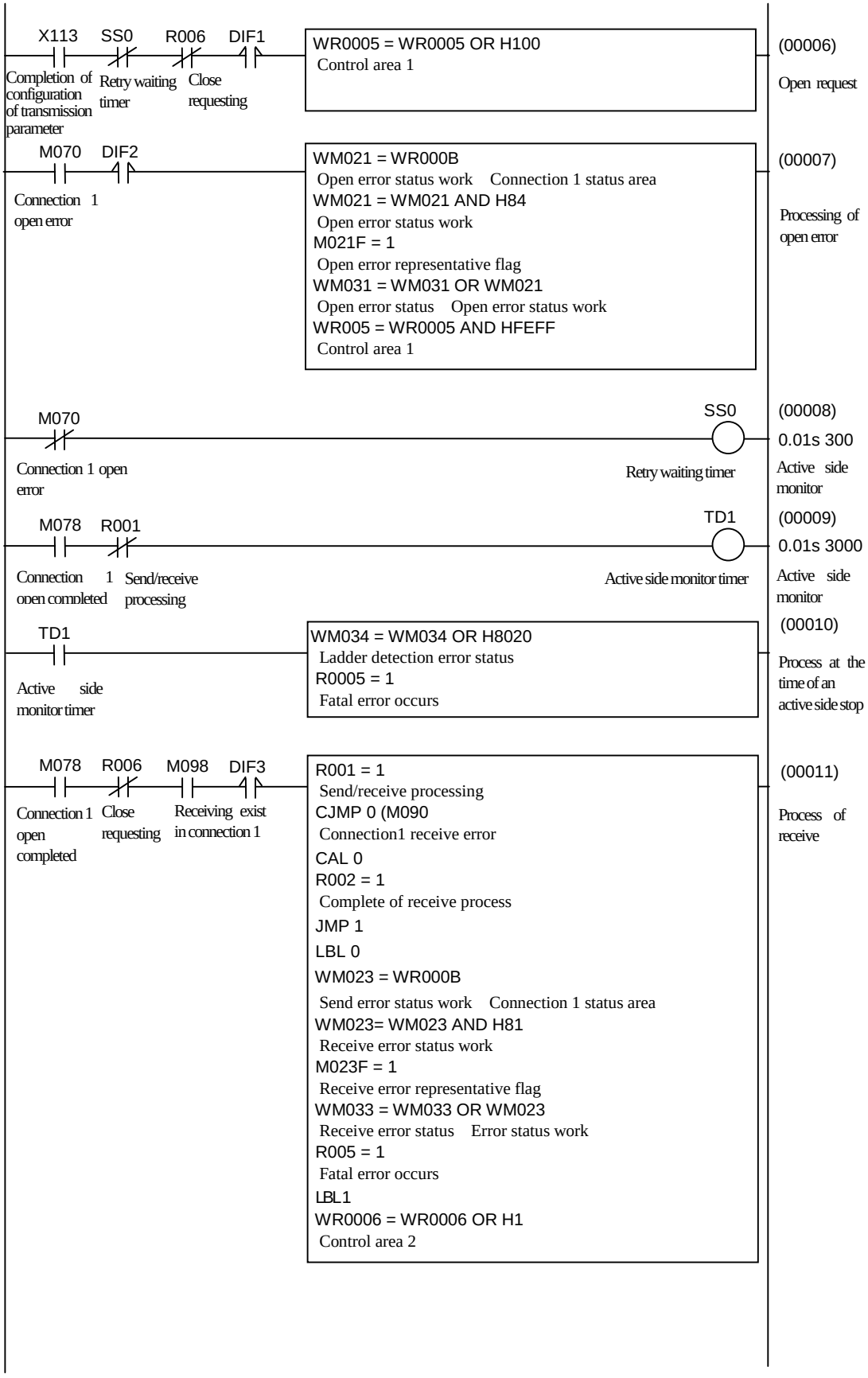

R007
M078
Close requesting
Completion of connection 1
R007
Close requesting
(00019)
Closing
R007
Close requesting
TC0 = 0
Server requirement waiting timer passage value
(00020)
X113
DFN7
Y131
Completion of configuration of transmission parameter
Request of configuration of transmission parameter
R008 = 1
Reset processing
COPY (WR0005,H0,HC)
Control area 1
COPY (WM007,H0,H5)
Status area 1 copy
COPY (R000,0,H8)
Request of configuration of transmission parameter has requested
(00021)
Clear of various flags
R008
Reset processing
R7D7 = 0
Communication module error
WRF004 = H0
Error module slot number
(00022)
Processing at the time of reset
R7D7
Communication module error
WRF004 <> H1
Error module slot number
R008
Reset processing
R7D5 = 0
I/O module error
WRF005 = H0
Error module slot number
(00023)
R7D5
I/O module error
WRF005 <> H10
Error module slot number
R008
Reset processing
WRF000 == H54
Self diagnostic error
WRF000 == H51
Self diagnostic error
R7EB = 1
CPU display clear
WRF000 = H0
Self-diagnostic error
(00024)
Error display clear
R008
R
Reset processing
(00025)
END
(00026)

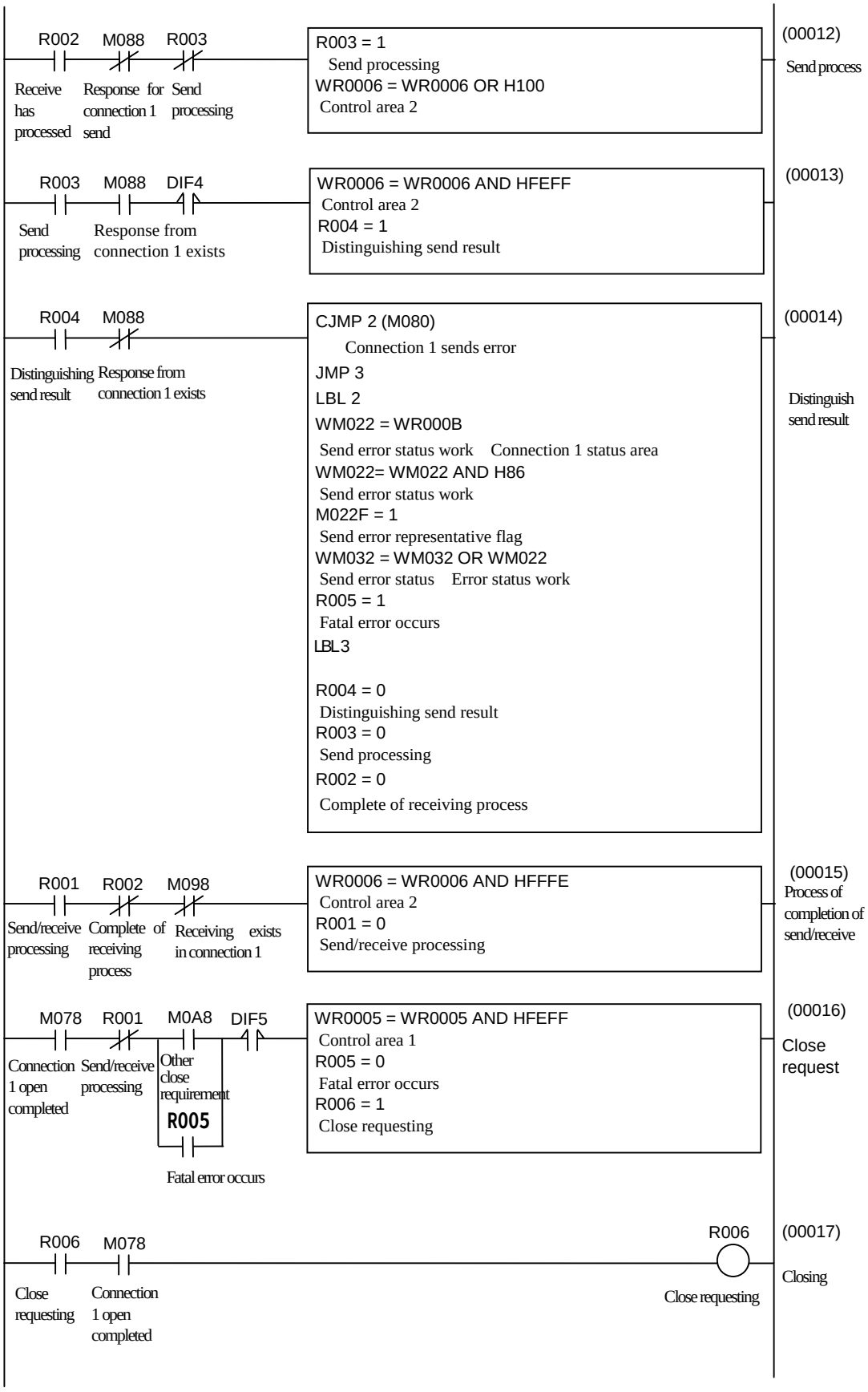

SB0
DR0104 = H44494849
DR0106 = H48BC4320
DR0108 = HBDDED8B0
(00027)
Send data set subroutine
WR00E1 == H0
WR0103 = 24
DR010A = H50552043
DR010C = H3230322D
DR010E = HD0A4820
(00028)
WR00E1 == H1
WR0103 = 24
DR010A = H50552043
DR010C = H3130322D
DR010E = HD0A4820
(00029)
WR00E1 == H2
WR0103 = 24
DR010A = H50552043
DR010C = H3037322D
DR010E = HD0A4820
(00030)
WR00E1 == H3
WR0103 = 24
DR010A = H50552043
DR010C = H3033322D
DR010E = HD0A4820
(00031)
WR00E1 == H4
WR0103 = 24
DR010A = H414D2052
DR010C = H3438332D
DR010E = HD0A4820
(00032)
WR00E1 == H5
WR0103 = 24
DR010A = H414D2052
DR010C = H3136332D
DR010E = HD0A4820
(00033)
WR00E1 == H6
WR0103 = 24
DR010A = H414D2052
DR010C = H3038332D
DR010E = HD0A4820
(00034)
WR00E1 == H7
WR0103 = 22
DR010A = H414E204C
DR010C = H54482D45
DR010E = HD0A
(00035)
RTS
(00036)

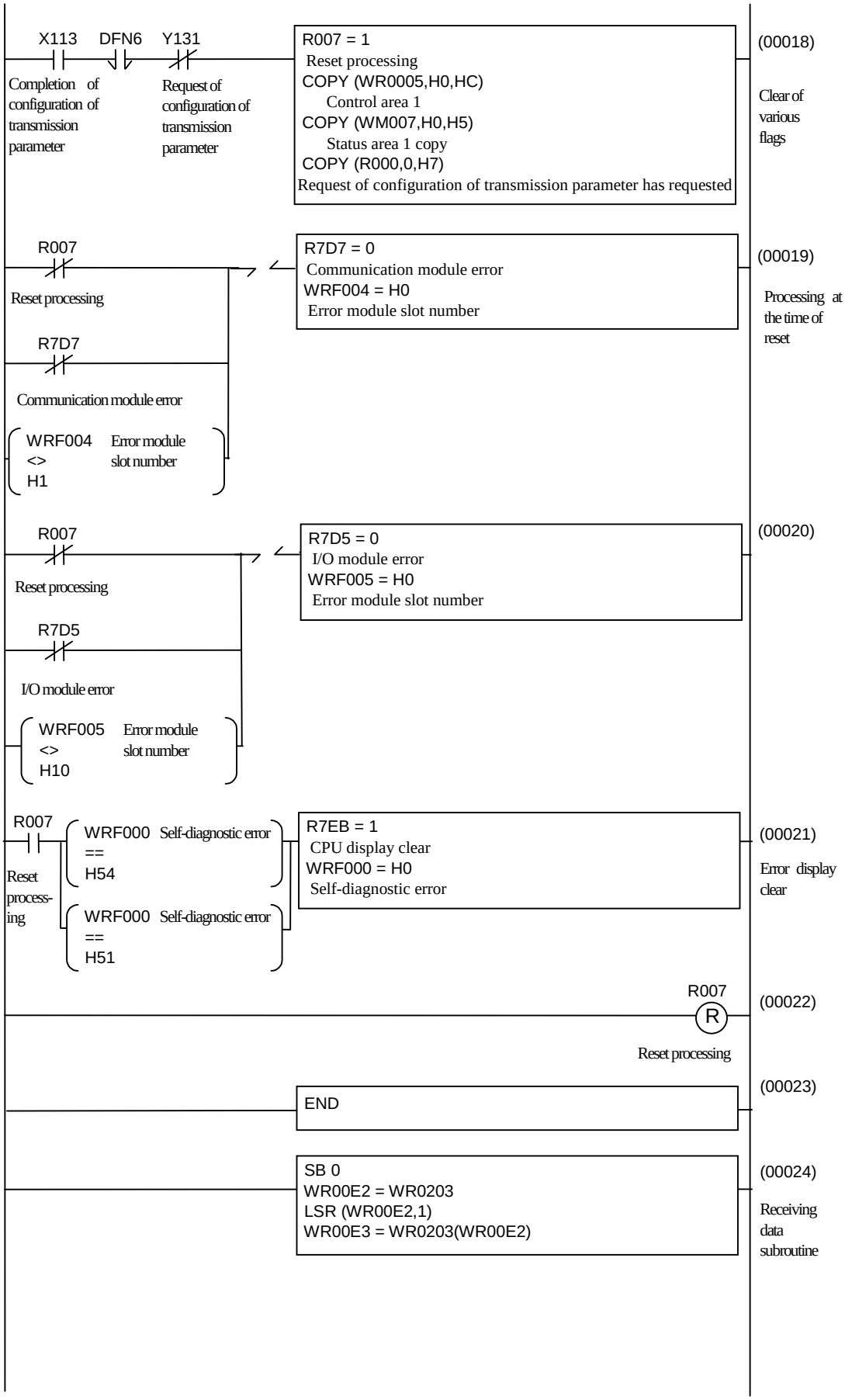

SB 1
(00037)
WR0203
<>
2
Number of receiving byte
M240
(00038)
Error of the number of receiving byte
Process of response distinguishment subroutine
WR0204
==
H1500
Receive data head
M241
Receiving of NAK
M240
M241
Number of receiving byte
Receiving of NAK
WR0204
<>
H600
Receive data head
M242
(00039)
Receiving of error answer
M240
Error of the number of receiving byte
M241
Receiving of NAK
M242
Receiving of error answer
M24F = 1
Ladder detection error representative flag
WM034 = WM034 OR WM024
Ladder detection error status Ladder detection error work
JMP 4
(00040)
Processing of error answer
WR00E1 = WR00E1 + 1
Send data number
WR00E1= WR00E1 AND H7
Send data number
WR00E0 = WR00E0 + 1
Communication counter
LBL4
RTS
(00041)
Process for a normal response

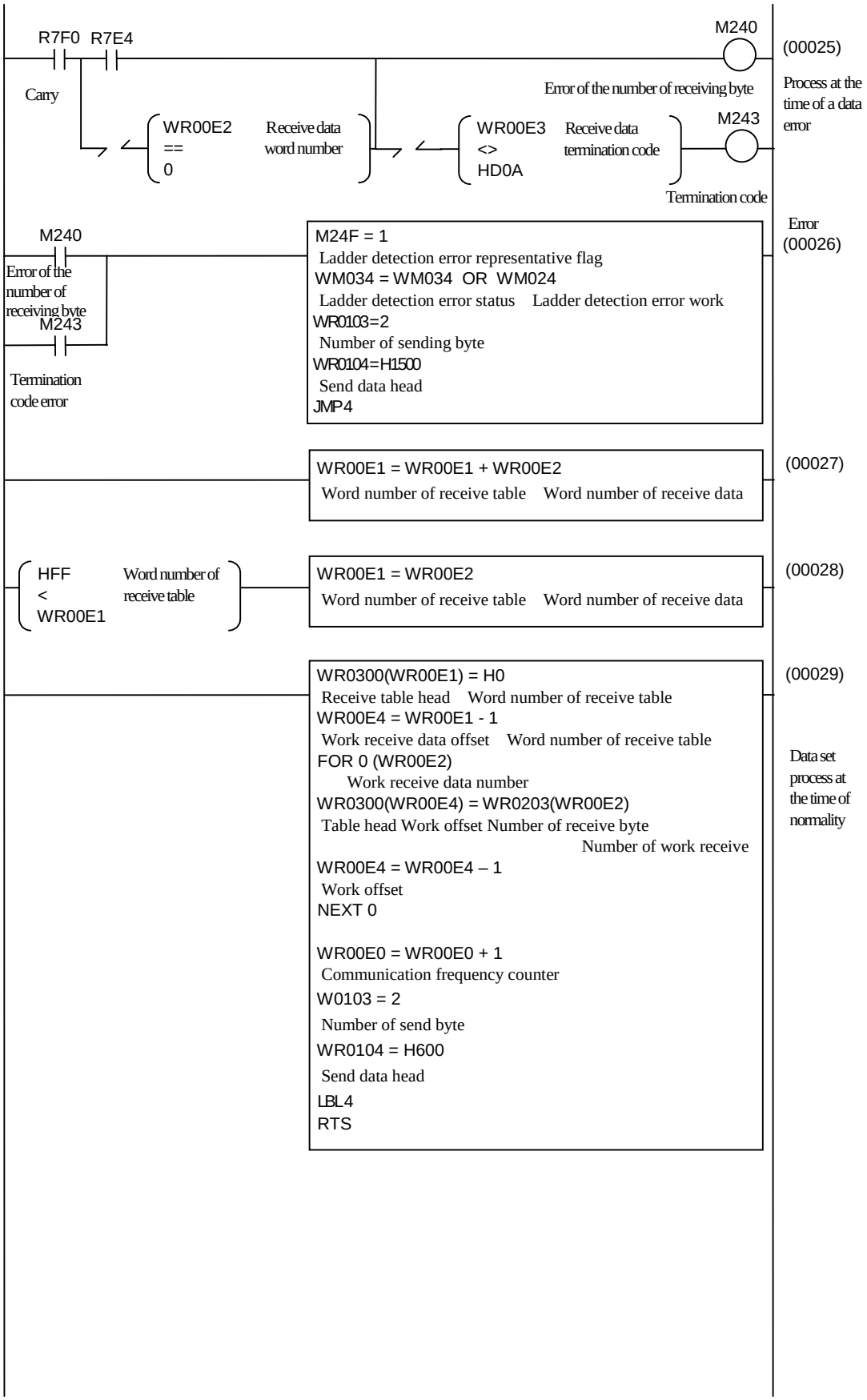
(Passive side) TEST R




X113
SS0
R006
DIF1
Completion of configuration of transmission parameter
Retry waiting timer
Close requesting
WR0005 = WR0005 OR H100
Control area 1
(00006)
Open request
M070
DIF2
Connection 1 open error
WM021 = WR000B
Open error status work Connection 1 status area
WM021 = WM021 AND H84
Open error status work
M021F = 1
Open error representative flag
WM031 = WM031 OR WM021
Open error status Open error status work
WR005 = WR0005 AND HFEFF
Control area 1
(00007)
Processing of open error
M070
Connection 1 open error
SS0
Retry waiting timer
(00008)
0.01s 300
Active side monitor
M078
R001
Connection 1 open completed
Send/receive processing
TD1
Active side monitor timer
(00009)
0.01s 3000
Active side monitor
TD1
Active side monitor timer
WM034 = WM034 OR H8020
Ladder detection error status
R0005 = 1
Fatal error occurs
(00010)
Process at the time of an active side stop
M078
R006
M098
DIF3
Connection 1 open completed
Close requesting
Receiving exist in connection 1
R001 = 1
Send/receive processing
CJMP 0 (M090
Connection1 receive error
CAL 0
R002 = 1
Complete of receive process
JMP 1
LBL 0
WM023 = WR000B
Send error status work Connection 1 status area
WM023= WM023 AND H81
Receive error status work
M023F = 1
Receive error representative flag
WM033 = WM033 OR WM023
Receive error status Error status work
R005 = 1
Fatal error occurs
LBL1
WR0006 = WR0006 OR H1
Control area 2
(00011)
Process of receive


R002
M088
R003
Receive has processed
Response for connection 1 send
Send processing
R003 = 1
Send processing
WR0006 = WR0006 OR H100
Control area 2
(00012)
Send process
R003
M088
DIF4
Send processing
Response from connection 1 exists
WR0006 = WR0006 AND HFEFF
Control area 2
R004 = 1
Distinguishing send result
(00013)
R004
M088
Distinguishing send result
Response from connection 1 exists
CJMP 2 (M080)
Connection 1 sends error
JMP 3
LBL 2
WM022 = WR000B
Send error status work Connection 1 status area
WM022= WM022 AND H86
Send error status work
M022F = 1
Send error representative flag
WM032 = WM032 OR WM022
Send error status Error status work
R005 = 1
Fatal error occurs
LBL3
R004 = 0
Distinguishing send result
R003 = 0
Send processing
R002 = 0
Complete of receiving process
(00014)
Distinguish send result
R001
R002
M098
Send/receive processing
Complete of receiving process
Receiving exists in connection 1
WR0006 = WR0006 AND HFFFE
Control area 2
R001 = 0
Send/receive processing
(00015)
Process of completion of send/receive
M078
R001
M0A8
DIF5
Connection 1 open completed
Send/receive processing
Other close requirement
R005
Fatal error occurs
WR0005 = WR0005 AND HFEFF
Control area 1
R005 = 0
Fatal error occurs
R006 = 1
Close requesting
(00016)
Close request
R006
M078
Close requesting
Connection 1 open completed
R006
Close requesting
(00017)
Closing


X113
DFN6
Y131
Completion of configuration of transmission parameter
Request of configuration of transmission parameter
R007 = 1
Reset processing
COPY (WR0005,H0,HC)
Control area 1
COPY (WM007,H0,H5)
Status area 1 copy
COPY (R000,0,H7)
Request of configuration of transmission parameter has requested
(00018)
Clear of various flags
R007
Reset processing
R7D7 = 0
Communication module error
WRF004 = H0
Error module slot number
(00019)
Processing at the time of reset
R7D7
Communication module error
WRF004 <> H1
Error module slot number
R007
Reset processing
R7D5 = 0
I/O module error
WRF005 = H0
Error module slot number
(00020)
R7D5
I/O module error
WRF005 <> H10
Error module slot number
R007
Reset processing
WRF000 == H54
Self-diagnostic error
WRF000 == H51
Self-diagnostic error
R7EB = 1
CPU display clear
WRF000 = H0
Self-diagnostic error
(00021)
Error display clear
R007
R
Reset processing
(00022)
END
(00023)
SB 0
WR00E2 = WR0203
LSR (WR00E2,1)
WR00E3 = WR0203(WR00E2)
(00024)
Receiving data subroutine


R7F0 R7E4
M240
(00025)
Carry
Error of the number of receiving byte
Process at the time of a data error
WR00E2
==
0
Receive data word number
WR00E3
<>
HD0A
Receive data termination code
M243
Termination code
M240
Error of the number of receiving byte
M243
Termination code error
Error
(00026)
M24F = 1
Ladder detection error representative flag
WM034 = WM034 OR WM024
Ladder detection error status Ladder detection error work
WR0103=2
Number of sending byte
WR0104=H1500
Send data head
JMP4
WR00E1 = WR00E1 + WR00E2
Word number of receive table Word number of receive data
(00027)
HFF
<
WR00E1
Word number of receive table
WR00E1 = WR00E2
Word number of receive table Word number of receive data
(00028)
WR0300(WR00E1) = H0
Receive table head Word number of receive table
WR00E4 = WR00E1 - 1
Work receive data offset Word number of receive table
FOR 0 (WR00E2)
Work receive data number
WR0300(WR00E4) = WR0203(WR00E2)
Table head Work offset Number of receive byte
Number of work receive
WR00E4 = WR00E4 – 1
Work offset
NEXT 0
WR00E0 = WR00E0 + 1
Communication frequency counter
W0103 = 2
Number of send byte
WR0104 = H600
Send data head
LBL4
RTS
(00029)
Data set process at the time of normality

MEMO