Panasonic®

PROGRAMMABLE CONTROLLER

FP2 ET-LAN Unit

Technical Manual

[Applicable Model]

- FP2-ET1 (Model No. AFP2790) (Discontinued product)
- FP2-ET2 (Model No. AFP27901)

ARCT1F322E-7

2013.12 | panasonic.net/id/pidsx/global

Safety Precautions

Observe the following notices to ensure personal safety or to prevent accidents.
To ensure that you use this product correctly, read this User's Manual thoroughly before use.
Make sure that you fully understand the product and information on safety.
This manual uses two safety flags to indicate different levels of danger.

WARNING

If critical situations that could lead to user's death or serious injury is assumed by mishandling of the product.

-Always take precautions to ensure the overall safety of your system, so that the whole system remains safe in the event of failure of this product or other external factor.
-Do not use this product in areas with inflammable gas. It could lead to an explosion.
-Exposing this product to excessive heat or open flames could cause damage to the lithium battery or other electronic parts.

CAUTION

If critical situations that could lead to user's injury or only property damage is assumed by mishandling of the product.

-To prevent excessive exothermic heat or smoke generation, use this product at the values less than the maximum of the characteristics and performance that are assured in these specifications.
-Do not dismantle or remodel the product. It could cause excessive exothermic heat or smoke generation.
-Do not touch the terminal while turning on electricity. It could lead to an electric shock.
-Use the external devices to function the emergency stop and interlock circuit.
-Connect the wires or connectors securely.
The loose connection could cause excessive exothermic heat or smoke generation.
-Do not allow foreign matters such as liquid, flammable materials, metals to go into the inside of the product. It could cause excessive exothermic heat or smoke generation.
-Do not undertake construction (such as connection and disconnection) while the power supply is on. It could lead to an electric shock.

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PLC_ORG_ET

Table of Contents

Compatibility with the FP3

Differences with the FP3 ET-LAN unit

The main differences between the specifications and operation of the FP2 ET-LAN unit and the FP3 ET-LAN unit are given in the table below. Refer to the reference page numbers given for each item for details regarding specifications and operation.

Item	FP2 ET-LAN unit	FP3 ET-LAN unit
Communication interface (See page 1-4.)	100BASE-TX, 10BASE-T, and 10BASE5	10BASE5
Mode setting switch (See page 2-3.)	1. 100BASE-TX/10BASE-T and 10BASE5 switch 2. Reserved 3. Normal mode/test mode switch 4. Test mode operation selection	1. Test mode operation selection 2. Handshake mode selection 3. ONLINE/OFFLINE switch 4. Normal mode/test mode switch
Mounting position/qty. limits (See page 1-11 and 1-12.)	The following quantities can be inserted in any of the master backplane slots (including Multi-wiring link unit MEWNET-W2 mode) With the FP2 CPU unit: 3 units With the FP2SH CPU unit: 8 units	The following quantities can be inserted in any of the master backplane slots (including MEWNET-H link unit) FP3/FP10SH CPU unit: 3 units
Handshaking (See page 4-8.)	I/O handshaking and shared-memory handshaking can be used simultaneously.	The mode setting switch is used to switch between I/O handshaking and shared memory handshaking.
Handshake signals (See pages 4-9 to 4-12.)	I/O handshaking signals Deleted: I/O handshake mode flag (XE) Shared memory handshake signal Deleted: I/O handshake mode flag (bank 0: 360H bit E) Added: Expansion complete signal area 2 (bank 0: 366H)	-
Shared memory (See page 15-5.)	Connection data notification block (bank 0: 2E0H to 35FH) Added: Receive processing complete code (offset address A) Receive unnotified data size (offset address B) Receive unnotified data size copy (offset address C)	-
Test mode (See page 3-6.)	Test items 1. Mode setting switch test 2. LED test 3. ROM test 4. RAM test 5. Shared memory test 6. Timer test 7. Internal loopback test 8. External loopback test Added: Mode setting switch test Deleted: EEPROM checksum test Modified: LED display during testing and error	Test items 1. LED test 2. ROM test 3. RAM test 4. Shared memory test 5. EEPROM checksum test 6. Timer test 7. Internal loopback test 8. External loopback test
Error log (See page 12-7.)	Error codes added 8036H: MEWTOCOL transmission error Error codes deleted 8006H: OFFLINE error 8009H: Mode change error 8019H: Forced close error B001H/B002H: ONLINE/OFFLINE switching error during operation	-
Ladder program	Ladder programs created using the FP3 can be used without modification.	-

Difference between AFP2790 and AFP27901

Available communication functions vary between AFP2790 and AFP27901.

	100BASE-TX	10BASE-T	10BASE5
AFP2790	Available	Available	Available
AFP27901	Available	Available	Not available

Note) AFP27901 has no 10BASE5 connector.

Other functions are common.

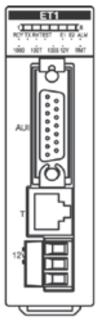
Chapter 1

Unit Functions and Restrictions

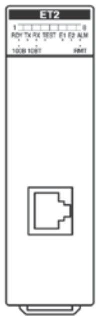
1.1 Features and Structure of ET-LAN Unit

1.1.1 Features

The FP2 ET-LAN unit is an Ethernet (100BASE-TX, 10BASE-T or 10BASE5) connection interface for TCP/IP and UDP/IP for the FP2 and FP2SH series programmable controllers.



FP2 ET-LAN unit
AFP2790
(Part No. FP2-ET1)



FP2 ET-LAN2 unit
AFP27901
(Part No. FP2-ET2)

Supports both TCP/IP and UDP/IP
The ET-LAN supports both the TCP/IP and UDP/IP protocols, enabling communication with a broad range of computers and other devices in a network.

Simultaneous communication possible among up to eight connected connections
Communication can be carried out among up to eight connections connected to the network using only a single unit. This enables connection to multiple partner nodes.

Three types of communication interfaces supported
Three types of Ethernet communication interfaces are supported (Usable interfaces vary according to the models): 100BASE-TX, 10BASE-T, and 10BASE5. Any one of these interfaces may be used. Automatic switching is possible between 100BASE-TX and 10BASE-T using an auto-negotiation function, while a switch can be used to switch between 100BASE-TX/10BASE-T and 10BASE5.

	100BASE-TX	10BASE-T	10BASE5
AFP2790	Available	Available	Available
AFP27901	Available	Available	Not available

Easy-to-use MEWTOCOL communication and general-purpose transparent communication supported
The MEWTOCOL communication function (computer linking and data transmission) that enables communication between personal computers, workstations, and FP series programmable controllers is supported, as well as the transparent communication function that enables communication between general-purpose devices such as computers.
Easy communication set-up
Communication settings can be easily performed using the setting tool (Configurator ET).
Changing the mode setting switches enables the communication setting to be performed by a ladder program.
Using the system connection enables easy connections with devices such as a programming tool (FPWIN GR).

E-mail send and receive functions (for a standard equipment)
Sending e-mails
- Errors occurred in the programmable controller can be notified via e-mail.
- E-mails can be sent at the specified time.
- The devices of programmable controller are monitored and e-mails can be sent when the designated conditions are satisfied.

Receiving e-mails
- Receiving an e-mail described in a specific format enables to notify the status of the programmable controller via e-mail.

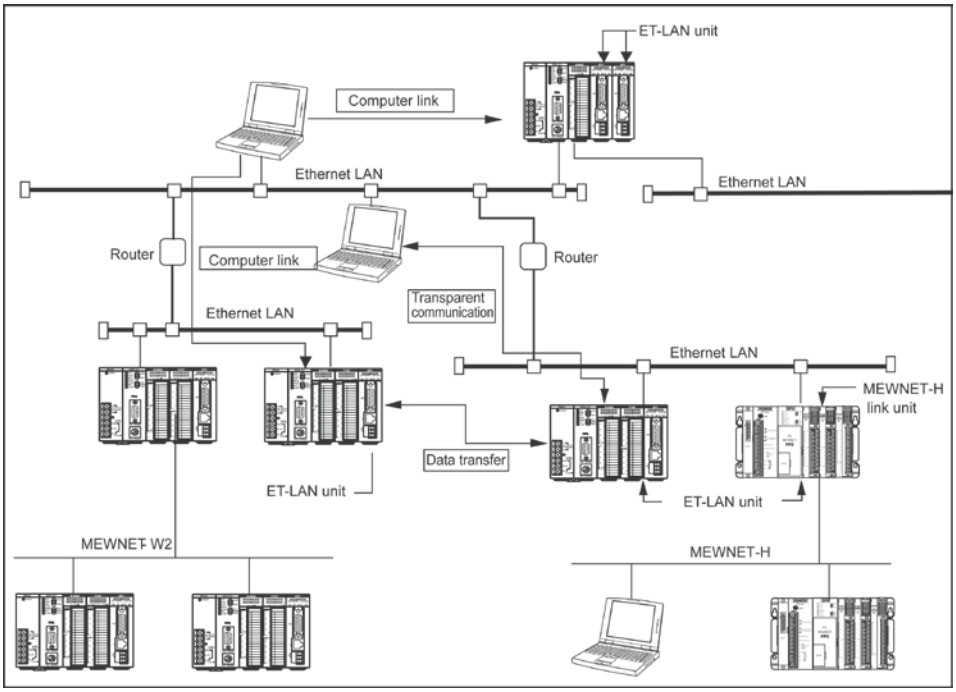
A broad range of self-diagnosis functions
- A function that checks the hardware and the communication status during operation.
- A function that checks the hardware and the communication status when the test mode is accessed.
- An error log function that records the results of various checks.

1.1.2 Unit Type

Name	Part No.	Model No.
FP2 ET-LAN unit	FP2-ET1	AFP2790
FP2 ET-LAN2 unit	FP2-ET2	AFP27901

Note) No accessories such as connectors or cables are included.

1.1.3 Structure of Network

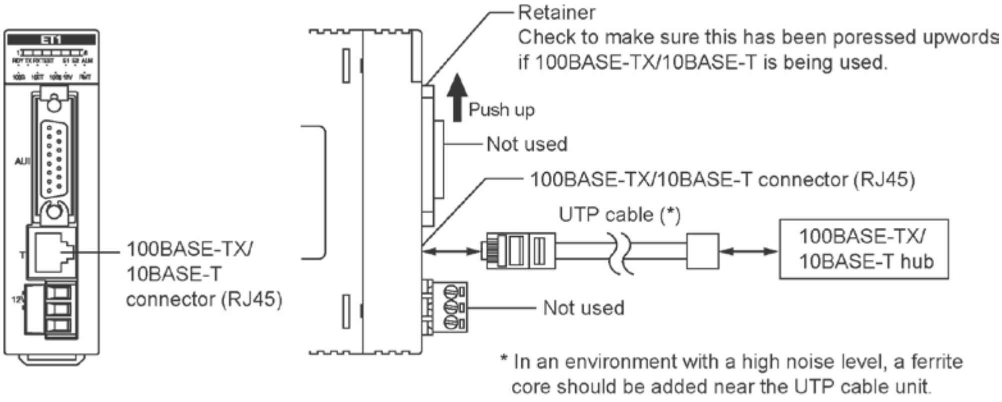


Communication functions of ET-LAN unit
Using the ET-LAN unit to connect to an Ethernet (100BASE-TX, 10BASE-T, or 10BASE5) enables (1) computer link function, (2) data transfer function, and (3) transparent communication function to be carried out with other programmable controllers and computers connected to the network.

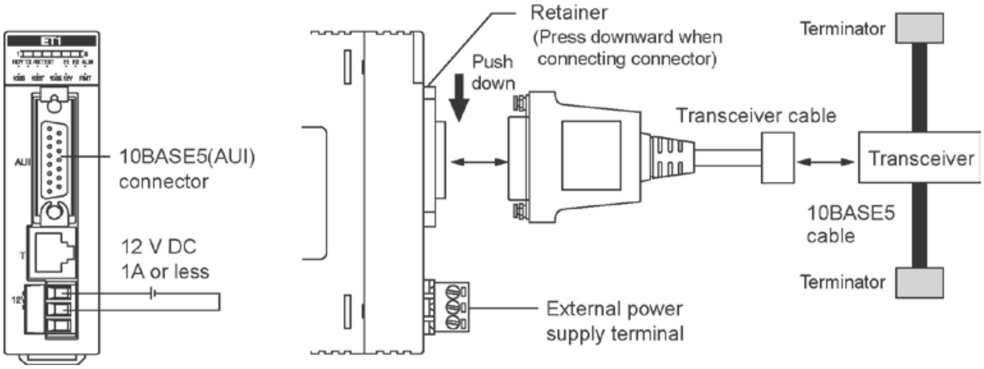
Combined use with a conventional MEWNET
The ET-LAN unit can be used in combination with another network unit such as the MEWNET-W/W2. This makes it possible to connect an existing FA network to an Ethernet LAN, using MEWNET.

1.1.4 Connecting to a Network

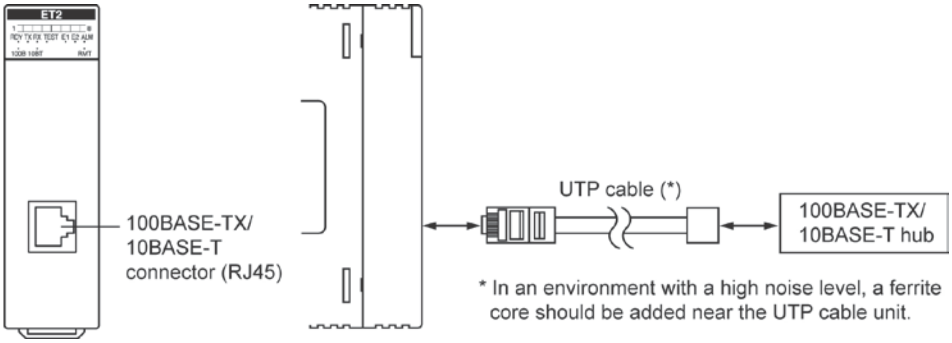
AFP2790
100BASE-TX/10BASE-T



10BASE5 (AUI)



AFP27901



Communication specifications

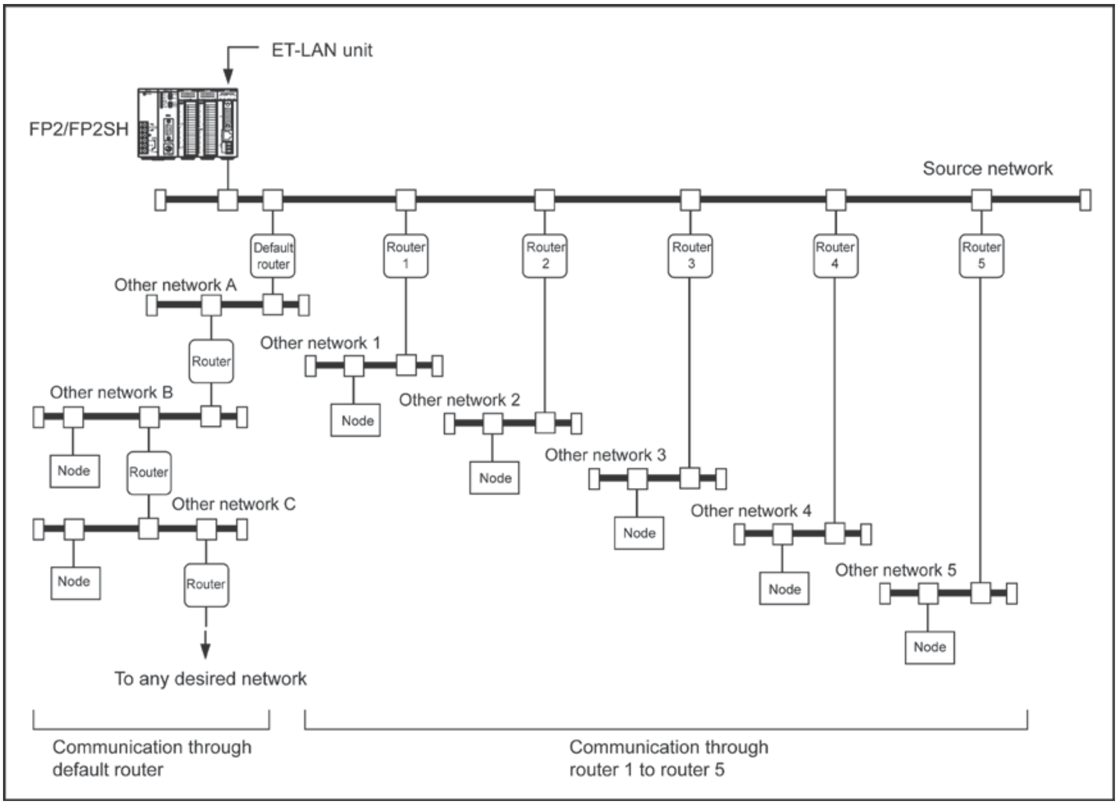
Item	100BASE-TX Note1)	10BASE-T Note1)	10BASE5
Target model	AFP2790 AFP27901	AFP2790 AFP27901	AFP2790
Data transfer	100M bits/s	10M bit/s	10M bit/s
Transfer method	Base band	Base band	Base band
Max. segment length	100 m Note2)	100 m Note2)	500 m
Max. distance between nodes	205 m (2 segments)	500 m (5 segments)	2500 m (5 segments)
Communication cable for connection	UTP (Category 5)	UTP (Category 3, 4 and 5)	Transceiver cable
Max. transceiver cable length	-	-	50 m Note3)
Max. number of nodes	-	-	100 nodes/segment
Node spacing	-	-	Integer multiples of 2.5 m

Note1) Switching between 100BASE-TX and 10BASE-T is done automatically by auto negotiation function.

Note2) The standards cite 10 m as the maximum, but noise resistance measures such as attaching a ferrite core may be necessary in some cases, depending on the usage environment. Also, if the hub is positioned close to a control board, we recommend using it at a distance of 10 m or less.

Note3) The standards cite 50 m as the maximum, but noise resistance measures such as attaching a ferrite core may be necessary in some cases, depending on the usage environment. Also, if the transceiver is positioned close to a control board, we recommend using it at a distance of 5 m or less.

1.1.5 Connections Between Networks



With an Ethernet, communication is possible not only between the home network and a node, but also between the nodes of other networks, using routers.
As shown in the illustration above, communication with nodes of other networks is classified as follows:

- The router is registered in advance, and communication is carried out between partner nodes of adjacent networks (other networks 1, 2, 3, etc. in the above illustration)
- Communication is carried out with the partner nodes of networks other than those shown above (other networks A, B, C, etc. in the above illustration)

Key Point:

When using the ET-LAN unit to carry out communication with partner nodes on another network, the router used by the ET-LAN unit should be registered.

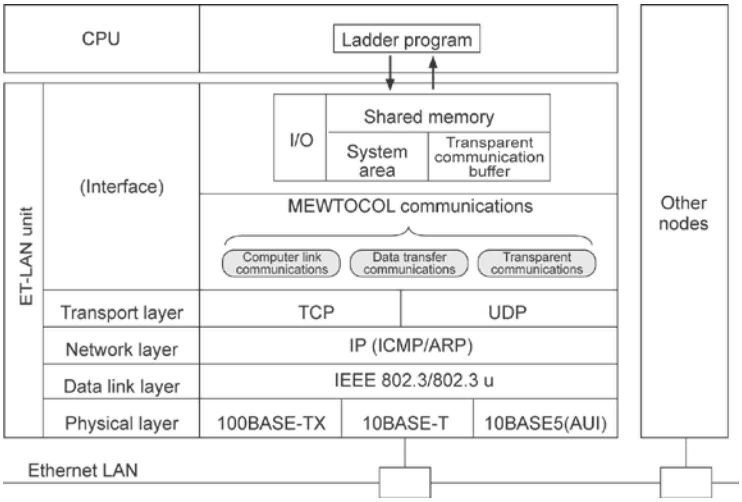
(1) Up to five routers can be registered for the source network, enabling communication with any of the nodes on another adjacent network.
(See other networks 1, 2, 3 etc. in the left illustration.)

(2) Only a single default router can be registered, and communication carried out with any desired node on any network other than those covered by (1), through the default router. (See other networks A, B, C, etc. in the left illustration.)
The router may be one of the five routers specified at (1), or may be a different router.

1.2 Overview of ET-LAN Unit Functions

1.2.1 Function Model

The functions of the ET-LAN unit are shown in the diagram below.
I/O and shared memory are used for the interface to the user program (CPU unit).
A maximum of eight simultaneous connections are possible for each of the computer link, data transfer, and transparent communication functions.



The layers beneath the transport layer of the ET-LAN unit provide the following communication services.

TCP (Transmission Control Protocol):
TCP is a connection-based communication method which provides the virtual circuit. In the TCP communication method, since communication services including re-transmission, sequence and flow control for the communication data are provided, high communication reliability is guaranteed at the protocol level.

UDP (User Datagram Protocol):
UDP is a connectionless communication method which provides only data communication in IP units. In the UDP communication method, since no re-transmission, sequence, or flow control for the communication data is provided, support at the application level is required to guarantee communication reliability.

IP (Internet Protocol):
IP is used to transmit data in units of datagrams to partner node specified by an IP address. It provides function such as the dividing and reassembling of communication data and communication services between networks via a router.

ICMP (Internet Control Message Protocol):
ICMP is used to transmit the error message in the IP. The ET-LAN unit supports the echo replay option only to the ping command.

ARP (Address Resolution Protocol):
ARP is used to transmit the Ethernet (physical) address, which is essential to Ethernet communications, by specifying the IP address. When an ET-LAN unit accesses a station with unknown Ethernet address, you only need to specify its IP address using the broadcast method.

AUI (Attachment Unit Interface
AUI is a transceiver cable that connects the ET-LAN unit with a transceiver.

1.2.2 Communication Functions

MEWTOCOL Communication Function

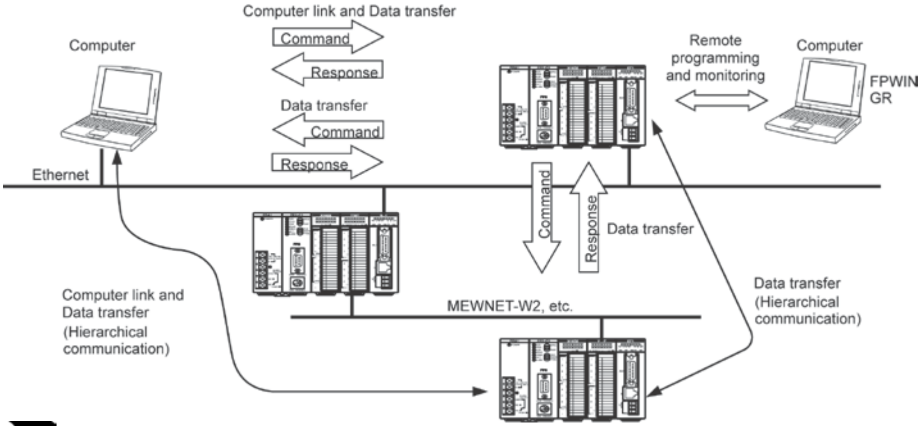
There are two MEWTOCOL communication functions: a computer link function and a data transfer function.

Computer link function: MEWTOCOL-COM (ASCII communication)

- Computer link communications can be realized by transmitting MEWTOCOL-COM data format from the computer to the programmable controller.
- The computer can read from and write to the programmable controller's I/O and registers.
- The maximum message length for one frame is 2k bytes.
- Using programming tools such as the FPWIN GR, remote programming and monitoring can be done through a LAN circuit.

Data transfer function: MEWTOCOL-DAT (binary communication)

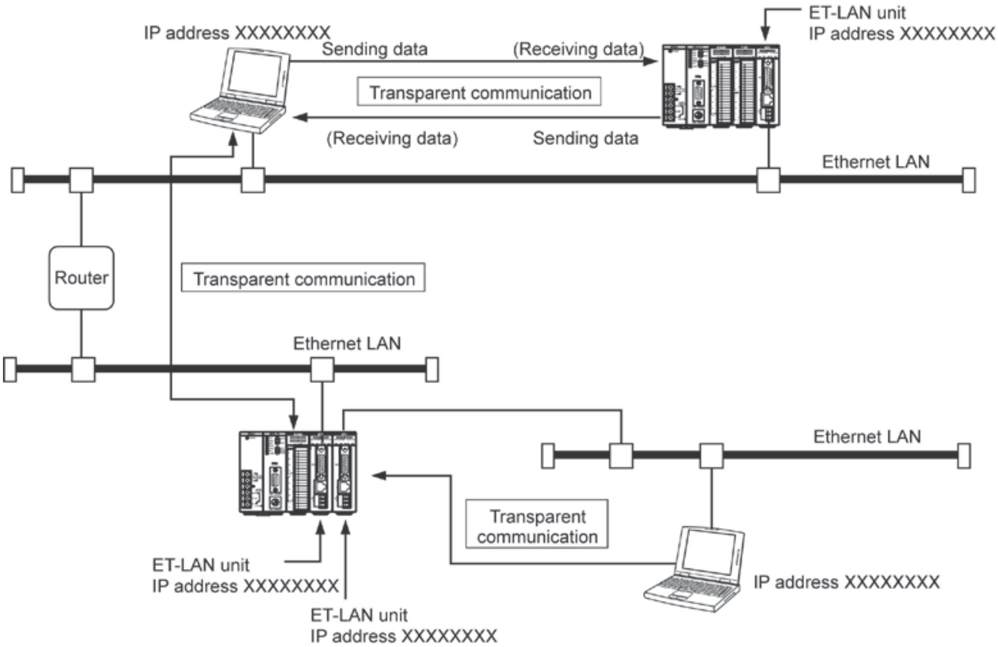
- Execution of the data transfer instruction "F145 (SEND)/P145 (PSEND) and F!46 (RECV)/P146 (PRECV)" by a programmable controller program allows data transfer communications between programmable controllers and between a programmable controller and a computer. Data communication whereby the computer transfers the MEWTOCOL-DAT data format to the programmable controller is also possible.
- The computer can read from and write to the programmable controller's I/O and registers. The programmable controller can read from and write to the computer's virtual I/O and virtual registers. A programmable controller can read from and write to the I/O and registers of another programmable controller partner node.
- The maximum amount of data that can be transferred by execution of one data transfer instruction is 1020 words.



Key Point:

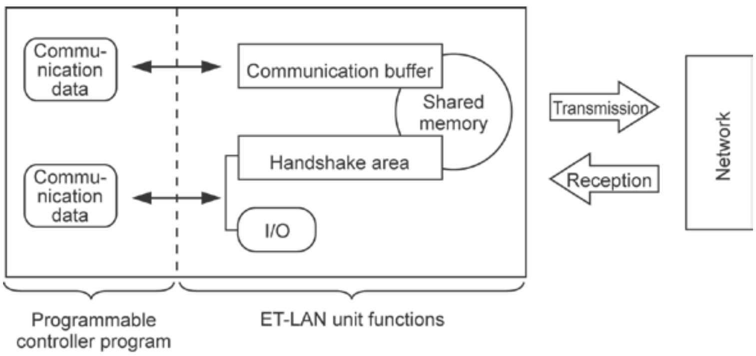
- The programmable controller specifies the IP address and MEWTOCOL station number (1 to 64), and opens a connection with its communication partner's node using MEWTOCOL communication mode.
- When the programmable controller receives the MEWTOCOL command message, it returns a response message automatically, so there is no need to describe a program to generate a response.
- With the MEWTOCOL communications function and the transparent communications function, you can simultaneously use a maximum of eight connections with one ET-LAN unit. The computer link function and data transfer function can be executed simultaneously using one connection.
- Hierarchical communication via other MEWNET networks is also possible.
- When using the data transfer function, we recommend that you use TCP/IP to guarantee communications reliability.
- When carrying out remote programming and monitoring, the ET-LAN unit settings should be set to the MEWTOCOL communication mode and to TCP/IP communication, and the processing of the various flags should be executed through a shared memory handshake.

Transparent Communication Function



With the transparent communication function, transparent data transmission and reception between computer and programmable controller and programmable controller and programmable controller is possible.

Storage and extraction of the communication data at the programmable controller is carried out by reading from and writing to the ET-LAN unit's shared memory communication buffer. The communication requests are performed by switching on and off bits in the I/O or shared memory handshake areas.



Key Point:

- With transparent communication, either the computer or programmable controller specifies the IP address, and they open a mutual connection with the communication partner. After opening a connection, communication processing on the programmable controller side is done by the ladder program reading from and writing to the communication buffer of shared memory, and executing the communication requests.
- With the transparent communication function and the MEWTOCOL communications function (computer link and data transfer), you can simultaneously use a maximum of eight connections with one ET-LAN unit.

1.2.3 Self Diagnosis Functions

Hardware and communication status check function

The ET-LAN unit is equipped with a self-diagnosis function that monitors the hardware (CPU unit and memory) and the communication status during operation. You can check the self diagnosis results using the LEDs on the unit, or by checking the contents of error log area in the shared memory.

Test mode operation function

The ET-LAN unit is reequipped with a test mode operation function for checking the hardware (memory check and communications check) and for performing internal and external loop back tests. You can check the results of the test mode operation function using the LEDs on the unit, or by checking the contents of error log area in the shared memory.

Error log function

The ET-LAN unit is equipped with an error log function that records hardware and communications faults in the order that they occur. You can read out the contents of error log from the error log area in the shared memory.

1.3 Restrictions on Units Combination

1.3.1 Restrictions on Current Consumption

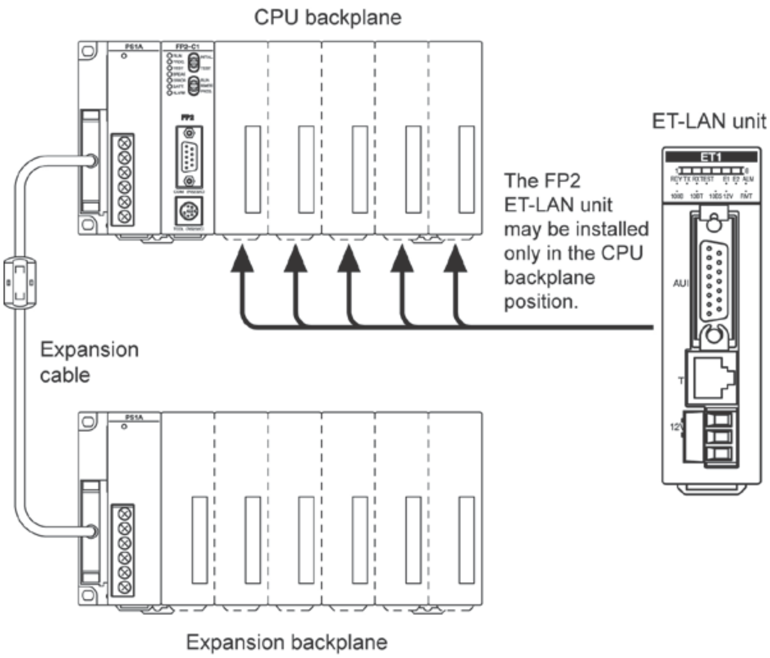
The internal current consumption (at 5 V DC power supply) for the FP2 ET-LAN unit is 670 mA. When the system is configured, the other units being used should be taken into consideration, and a power supply unit with a sufficient capacity should be used.

Name	Part number	Model number	Current consumption (at 5 V DC)
FP2 ET-LAN unit	FP2-ET1	AFP2790	670 mA
FP2 ET-LAN2 unit	FP2-ET2	AFP27901	670 mA

Reference: For information on the internal current consumption of other units, see the "FP2/FP2SH User's Manual" and the manuals provided with the other units.

1.3.2 Restrictions on Installation Position

The FP2 ET-LAN unit may be installed only in the CPU backplane position. However, the units should be installed to the right of the power supply unit and CPU unit. It cannot be installed in an expansion backplane.



1.3.3 Restrictions on Number of Units that can be Installed

The following restrictions apply when installing the ET-LAN unit in a programmable controller.

Unit name	Restrictions on number of units	
	For FP2 CPU unit	**For FP2SH CPU unit**
ET-LAN unit Multi-wire link unit (MEWNET-W2 mode)	Up to 3 units (up to 2 units for link between PLCs)	Up to 8 units (up to 2 units for link between PLCs)

Note:
If the hierarchical link function is being used through the MEWNET and the communication path includes an MEWNET-W, the maximum number of units that can be installed is two, for the units noted below.
- ET-LAN unit
- Multi-wire link unit
- Computer communication unit

1.4 Restrictions on Unit Version and Functions

The required versions of ET-LAN unit and CPU unit vary according to the used functions.

1.4.1 Functions of ET-LAN Unit and Applicable Versions

Functions of ET-LAN Unit	Version of ET-LAN Unit	Version of CPU unit
Self-diagnosis function	Available with all the versions of ET-LAN unit.	FP2 CPU unit Ver. 1.08 or later FP2SH CPU unit Ver. 1.02 or later
Data transfer function - MEWTOCOL-COM communication - MEWTOCOL-DAT communication		
Transparent communication function		
Error log function		
Auto connection function - Auto connection - System connection	Ver.2.00 or later of ET-LAN unit is required.	FP2 CPU unit Ver. 1.21 or later FP2SH CPU unit Ver. 1.10 or later
E-mail function		

1.4.2 Precautions when using the e-mail function

The calendar function is required for the CPU unit for using the e-mail function.

Add the following optional memory with the calendar function for using the FP2 CPU unit.
Expansion memory unit FP2-EM1 (AFP2201)
FP2-EM2(AFP2202)
FP2-EM3(AFP2203)

It is not necessary to add the optional memory when using the FP2SH CPU unit as the calendar function is built in the CPU unit.

Reference: <FP2/FP2SH User’s Manual (ARCT1F320)
2.3.1 Expansion Memory Unit/ROM <Option (FP2-EM)>

When there is no calendar function, the time to be recorded in e-mails is always the following time.
1 Jan. 2030 Tuesday 00:00:00 (Japan time)
- Indication: Date: Tue, 01 Jan 2030 00:00:00 +900

1.5 Unit Version and Communication Setting Method

Various communication settings such as IP address and communication method should be specified for using the ET-LAN unit.
The setting method varies depending on the version of the used ET-LAN unit.

Version of ET-LAN Unit	Communication setting method
ET-LAN Unit Ver.1.00 or later	Ladder program
ET-LAN Unit Ver.2.00 or later	Ladder program or Configurator ET (Can be switched by the mode setting switches.)

1.5.1 Configurator ET

Configurator ET is an exclusive tool for setting the communication settings or e-mail function of the ET-LAN unit.
Configuration ET can be used with Ver.2.00 or later of ET-LAN unit.

Name		Required OS	Hard disk capacity	Model No.
Control Configurtor ET	Japanese	Windows®95 (OSR2 or later) Windows®98 Windows®ME Windows®2000 Windows®XP Windows Vista®	20MB or later	AFPS32110
	English			AFPS32510

1.6 Restrictions Relating to Communication Conditions and Functions

1.6.1 Precautions When Using the FP2 CPU Unit

If the codes „MC, MD, MG“ for monitor commands are used among the commands sent from the host computer, commands being sent from multiple computers will prevent data from being read and written correctly.

Note:
If monitor commands are sent from multiple computers, registered data will overwrite previously registered data, starting from the latest item, so that different data will end up being monitored.

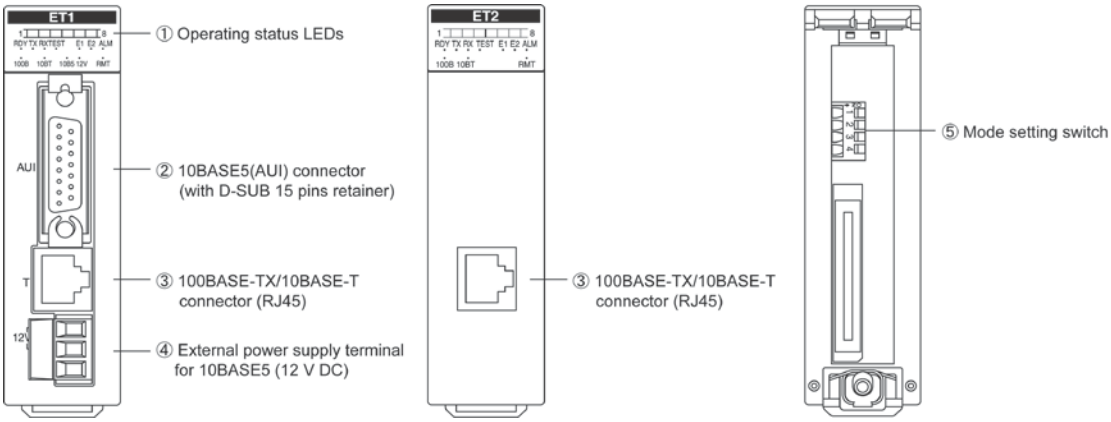
Key Point:
- Monitor commands are used to execute monitoring after the contacts and data to be monitored have been registered on the PLC side.
- If using the FP2SH CPU unit, the above restrictions apply for up to 10 connections.

Chapter 2

Names and Functions of Parts

2.1 Names and Functions of Parts

2.1.1 Names and Functions of Parts



① **Operating status LEDs**
These display the operating status of the unit, such as connection and communication conditions, and error statuses.

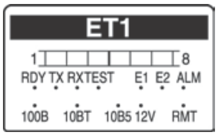
② **10BASE5(AUI) connector**
When an Ethernet (10BASE5) is being used, this connector is used to connect the ET-LAN unit and the transceiver, using a transceiver cable.

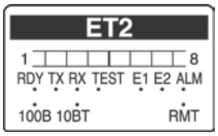
③ **100BASE-TX/10BASE-T connector (RJ45)**
When an Ethernet (100BASE-TX, 10BASE-T) is being used, this connector is used to connect the ET-LAN unit and the hub, using a UTP cable.

④ **External power supply terminal for 10BASE5 (12 V DC)**
When an Ethernet (10BASE5) is being used, this terminal supplies power to the transceiver.
When an Ethernet (100BASE-TX, 10BASE-T) is being used, this terminal is not used.

⑤ **Mode setting switch**
These are used to select the communication interface and the test mode for the Ethernet.

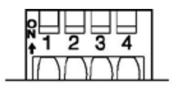
2.1.2 Operating Status LEDs





ET1 LED	ET2 LED	On	Flashing	Off
1	1	Connection 1 connected	Connection 1 fault	Connection 1 not connected
2	2	Connection 2 connected	Connection 2 fault	Connection 2 not connected
3	3	Connection 3 connected	Connection 3 fault	Connection 3 not connected
4	4	Connection 4 connected	Connection 4 fault	Connection 4 not connected
5	5	Connection 5 connected	Connection 5 fault	Connection 5 not connected
6	6	Connection 6 connected	Connection 6 fault	Connection 6 not connected
7	7	Connection 7 connected	Connection 7 fault	Connection 7 not connected
8	8	Connection 8 connected	Connection 8 fault	Connection 8 not connected
RDY	RDY	Initialization complete (communication ready status)	-	Initialization not complete
TX	TX	Transmitting	-	Not transmitting
RX	RX	Receiving	-	Not receiving
TEST	TEST	Test mode	-	Normal mode
E1	E1	Initialization processing error	Recovery possible error	Normal operation
E2	E2	System error Hardware error	Warning error Mail transmission error Mail reception error MEWTOCOL error Auto connection error	
ALM	ALM	CPU fault	-	Unit normal
100B	100B	100BASE-TX operation	-	Other mode in operation
10BT	10BT	10BASE-T operation	-	Other mode in operation
10B5	-	10BASE5 operation	-	Other mode in operation
12V	-	12 V power supply on	-	12 V power supply off
RMT	RMT	Reserved	Reserved	Reserved

2.1.3 Mode Setting Switch



Factory settings (All off position)

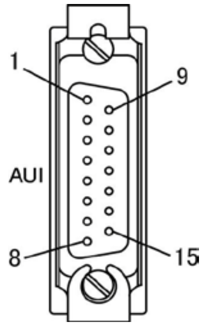
Switch No.	Off	On
1	100BASE-TX/10BASE-T Note1)	10BASE5
2	Auto connection function is not available	Auto connection function is available
3	Normal mode	Test mode
4	Test mode 1 Note2)	Test mode 2 Note2)

Note1) Switching between 100BASE-TX and 10BASE-T is done automatically by auto negotiation function. Always turn it off when using AFP27901.
Note2) Invalid when the switch 3 is off.

Key Point:
The settings of the mode setting switches become effective at the point when the power supply is turned on.

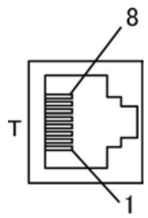
2.2 Connector Pin Layout

2.2.1 10BASE5(AUI) Connector (with D-SUB 15 pins retainer)



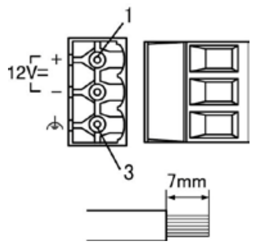
Pin No.	Signal name	Pin No.	Signal name
1	Signal shield	9	COL-
2	COL+	10	TX-
3	TX+	11	Signal shield
4	Signal shield	12	RX-
5	RX+	13	12 V DC
6	GND	14	Power supply shield
7	Not used	15	Not used
8	Signal shield	Shell	F.G.

2.2.2 100BASE-TX/10BASE-T Connector (RJ45)



Pin No.	Signal name
1	TX+
2	TX-
3	RX+
4	Not used
5	Not used
6	RX-
7	Not used
8	Not used

2.2.3 External Power Supply Terminal for 10BASE5 (12 V DC)



Pin No.	Signal name
1	12 V DC
2	GND
3	F.G.

Note:

- F.G. pin connects to the external metal shell of the 10BASE5 (AUI), 100BASE-TX/10BASE-T connectors and F.G. pin of the power supply unit.
- Pins should be tightened firmly, to a tightening torque of 0.5 to 0.6 N·m).
- The power supply cable should be 0.5 to 2.5 mm^2 (AWG20 to 12), and the length of the stripped wire should be 7mm.

Chapter 3

Connection for LAN Cable

3.1 Precautions Concerning Installation

Noise resistance

The Ethernet is a network used in offices and buildings, where there is comparatively little noise. It does not have a higher resistance to noise than ordinary FA application networks. Consequently, caution is required when installing the transceiver and hub, and when laying cables.

Guidelines to noise generation

If any of the following are occurring, there is a danger that external noise is affecting the communication circuit.

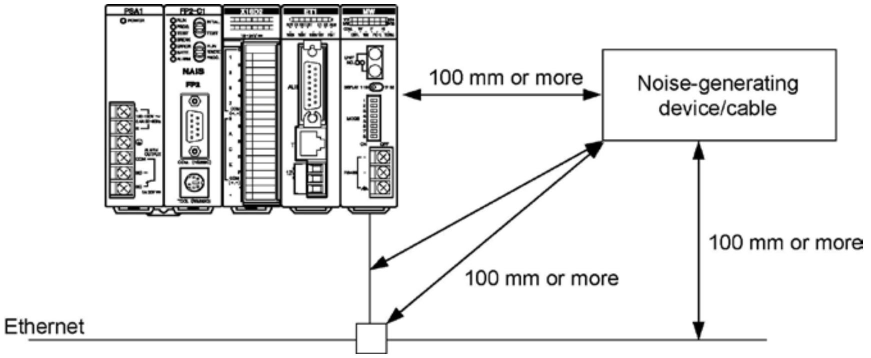
- The RX LED on the ET-LAN unit is lighted or flashing, whether or not communication is taking place at the moment.
  Cause: External noise from the communication circuit is penetrating the ET-LAN unit and is being interpreted as a reception signal.
- An error subsequent to error code 8020H has occurred.
  Cause: External noise from the communication circuit is penetrating the ET-LAN unit and is causing a communication error.
- An error subsequent to error code A001H has occurred.
  Cause: External noise from the communication circuit is penetrating the ET-LAN unit and is causing a communication error.

Confirm the following items and take any necessary corrective action.

- Check to see if the RXLED lights or flashes, or if a communication error is occurring, in synch with the operation of the device.
- If either of these is happening in synch with the operation of the device, take whatever measures are necessary to suppress the generation of noise from the device side.

Measures that can be taken in the installation environment

The ET-LAN unit, transceiver, hub, and communication cables should be installed as fast as possible from high-voltage wires, high-voltage equipment, power lines, power equipment, equipment that generates strong breaker surges, and the wiring for any of this equipment. At least 100 mm of clearance should be allowed when installing the equipment.



If it is impossible to avoid installing the equipment or cables near noise-generating equipment, the following measures should be taken.

- Place the programmable controller, transceiver, and hub inside metal panels.
- Place communication cables inside metal ducts.
- Attach a ferrite core near the ET-LAN unit of the communication cable.
- If using an external power supply terminal (12 V DC) for the ET-LAN unit, attach a ferrite core to the power supply cable.
- Attach a ferrite core to the power supply cable of the programmable controller (example of ferrite core: RFC-10 b Kitagawa Industrial Co., Ltd.).

An alternative measure is to use an optical transceiver close to the noise-generating section of the equipment and install an optical fiber to keep the noise from affecting nearby equipment. (This is also effective as a lightning shield for outdoor wiring.)

Caution: Metal panels and metal ducts should be grounded at a grounding resistance of 100 Ω or less. Also, metal panels and metal ducts should be insulated so that they do not come in contact with communication devices or cables.

Note:

Installation of LAN cables and devices

A specialist should be consulted concerning construction work such as the installation of 100BASE-TX and 10BASE-T hubs, the installation of the 10BASE5 (AUI) transceiver, and laying of cables. If this construction work is done incorrectly, it can adversely affect the entire network, and can cause accidents.

Taking corrective measures through the application

Communication errors occurring in the ET-LAN unit can be minimized by taking the steps outlined below. Corrective measures should also be taken on the computer side, such as increasing the number of times that data is sent.

1. Increasing the number of times data is sent
   Adjust the “TCP ULP (packet existence time)” and “TCP re-send timer value” parameters in the initial information setting area, to increase the number of times that data is sent. (See page 5-9.)
   When using UDP/IP, the above settings are invalid, so data should be re-sent through the application.

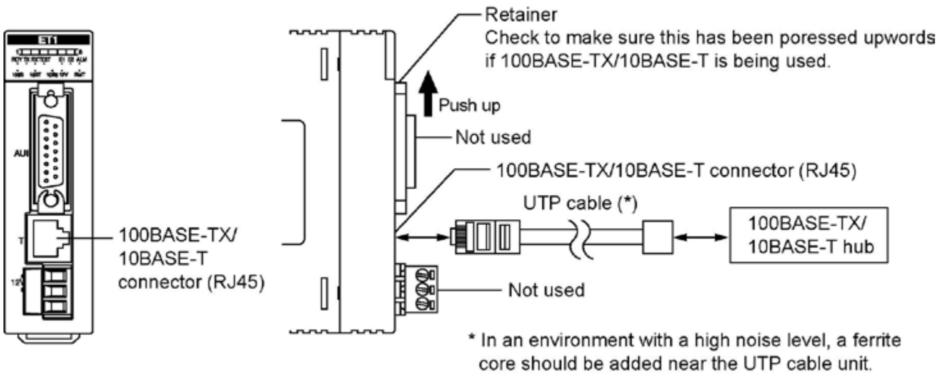
2. Increasing the timeout judgment time

When executing data transmission commands (SEND/RECV), increase the value set for the CPU unit system register No. 32. (See page 13-24.)

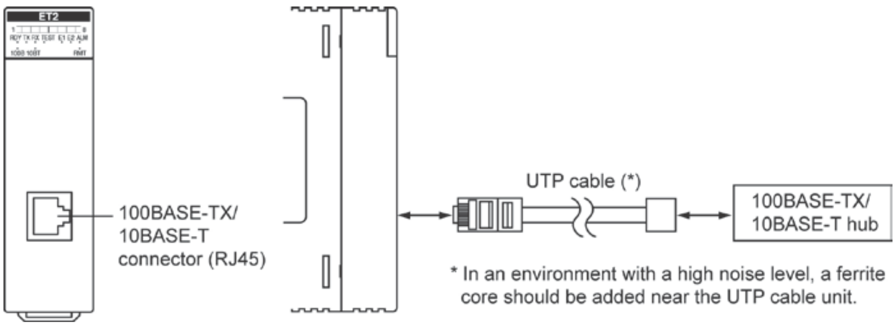
3.2 Connection for LAN Cable

3.2.1 100BASE-TX and 10BASE-T Connections

AFP2790



AFP27901



100BASE-T and 10BASE-T connections
Connect the UTP cable to the 100BASE-TX/10BASE-T connector (RJ45) on the front panel of the ET-LAN unit.

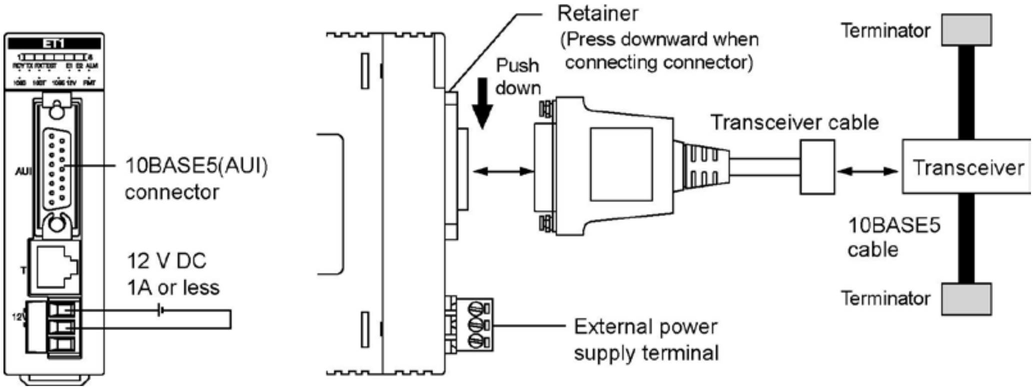
UTP cable
- Use Category 5 UTP cable. According to the ratings, Category 3 or better cable can be used with 10BASE-T, but we recommend that you use Category 5 UTP cable, which provides higher reliability.
- According to the ratings, UTP cable can be up to 100 m in length, but considering noise resistance, we recommend that you keep the cable under 10 m in length.
- We recommend that you use shielded cable in environments where electrical noise is likely to be generated.

External power supply terminal
The external power supply terminal is not used when 100BASE-TX and 10BASE-T are being used.

Earth
- The F.G. pin of the external power supply terminal on the front of the unit is connected to the outer metallic shell of the 100BASE-TX/10BASE-T connector (RJ45), or the outer metallic shell of the 10BASE5 (AUI) connector. These are also connected to the F.G. terminal of the power supply unit through the backplane.
- In an environment with a high noise level, the F.G. terminal should be grounded at a grounding resistance of 100 Ω or less.

3.2.2 10BASE5 (AUI) Connections

AFP2790



10BASE5(AUI) connections

Connect the transceiver cable to the 10BASE5 (AUI) connector (with D-SUB 15 pins retainer) on the front panel of the unit. After you connect it, push down the retainer to fasten the cable.

Transceiver and transceiver cable

- The transceiver that you use must comply with IEEE802.3.
- According to the ratings, transceiver cable can be up to 50 m in length but considering noise resistance, we recommend that you keep the cable under 5 m in length.
- We recommend that you use a high-reliability connector type for the transceiver.

External power supply terminal connections

- Connect the external power supply terminal on the front panel of the unit to 12 V DC power supply to power the transceiver cable.
- Note that the internal voltage drop is 1 V (max.).

Earth

- The F.G. pin of the external power supply terminal on the front of the unit is connected to the outer metallic shell of the 100BASE-TX/10BASE-T connector (RJ45), or the outer metallic shell of the 10BASE5 (AUI) connector. These are also connected to the F.G. terminal of the power supply unit through the backplane.
- In an environment with a high noise level, the F.G. terminal should be grounded at a grounding resistance of 100 Ω or less.

3.3 Test Mode

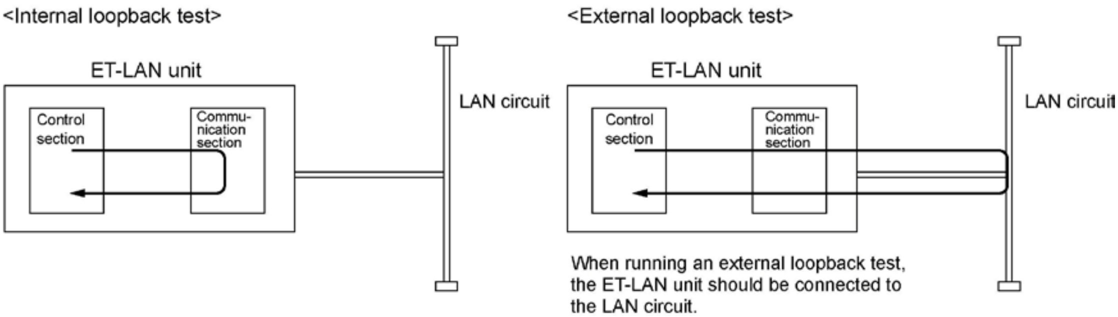
The ET-LAN unit has a test mode function that checks whether the unit is operating properly after it has been installed.

3.3.1 Types and Contents of Test Modes

Contents of test mode

Item	Test mode 1	Test mode 2
Mode setting switch test	Available	Available
LED test	Available	Available
ROM test	Available	Available
RAM test	Available	Available
Shared memory test	Available	Available
Timer test	Available	Available
Internal loopback test	Available	Available
External loopback test	Not available	Available

Loopback test
Running a loopback test checks the functions of the control section and communication section in the unit.

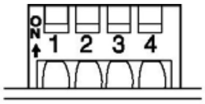


Note:
If you conduct an external loopback test when other nodes are communicating on the LAN, there is a chance that an error may occur. Either take steps to ensure that other nodes will not communicate or disconnect the other nodes before performing an external loopback test.

3.3.2 Running Test Modes

How the test modes are run

Set the mode setting switches on the rear of the ET-LAN unit to the settings indicated in the table below, and then turn on the power supply to the programmable controller. When this has been done, either test mode 1 or test mode 2 can be run. To exit a test mode, turn off the power supply to the programmable controller.



Factory settings (All off position)

Switch No.	Off	On
1	100BASE-TX/10BASE-T Note1)	10BASE5
2	Auto connection function is not available	Auto connection function is available
3	Normal mode	Test mode
4	Test mode 1 Note2)	Test mode 2 Note2)

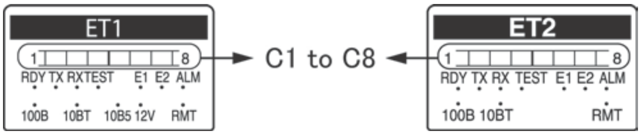
Note1) Switching between 100BASE-TX and 10BASE-T is done automatically by auto negotiation function. Always turn it off when using AFP27901.

Note2) Invalid when the switch 3 is off.

Key Point:

The settings of the mode setting switches become effective at the point when the power supply is turned on.

Description of test content



Item	Description	Confirmation method			
		LED display			Error code when error occurs *
		TEST LED	When testing	When error occurs	
Mode setting switch test	The current status of the mode setting switches (1 to 4) is displayed on LEDs C1 to C4. All the LEDs go off after about one second.	Lights	Visually check whether the LEDs light		-
LED test	All LEDs go off, then on for one second. After this, the LEDs go off, and each LED goes on for 0.5 seconds then off in the following order: C1, C2, C3, C4, C5, C6, C7, C8, RDY, TEST, E1, E2, ALM, 100B, 10BT, 10B5 and RMT	Visually check whether the LEDs light			
ROM test	Checks whether or not the result of 1-byte binary addition of the entire ROM area is 0. The checksum value is set so that the result of the last addition of the ROM is 0.	Lights	C1	C1 E1	9010H
RAM test	Writes AAH to every byte in RAM area, and reads every byte to check that the value matches AAH.		C1 to 2	C1 to 2 E1	9011H
Shared memory test	Checks in the same way as the RAM test, but does not check the top 2k bytes.		C1 to 3	C1 to 3 E1	9012H
Timer test	Check whether or not the time generates an interrupt.		C1 to 4	C1 to 4 E1	9016H
Internal loopback test	Performs an internal communication loopback test.		C1 to 5	C1 to 5 E1	9014H
External loopback test	Performs an external communication loopback test.		C1 to 5	C1 to 5 E1	9015H
Test complete		C1 to C8 LEDs and the TEST LED light at normal completion.			

* The error codes are stored in the error log area.

Action to take in response to errors

Item	Response action
External loopback test	Check the communication circuit connection and after confirming that there are no other nodes communicating, perform the test again.
Other tests	There may be a hardware problem. Switch the power off and on again, and run the test again. If the error persists, please contact your dealer.

Chapter 4

Confirming the Design Contents

4.1 Address Confirmation

4.1.1 IP Address Confirmation

IP address confirmation

- An individual IP address is necessary in order to connect the ET-LAN unit to an LAN environment.
- Confirm the IP address with the person running the network system.
- If two or more ET-LAN units have been installed on one backplane, individual IP addresses should be allocated to each one.

Ethernet address confirmation

- Individual Ethernet addresses for each unit are written to the internal EEPROM, and are also noted on the plate affixed to the side of the unit.
- This value can also be confirmed by checking the initial information notified area in the shared memory.

Router address confirmation

- If the ET-LAN is communicating with another node or nodes through a router, the router IP address and the sub-network address should be confirmed.
- This is not necessary if communication is not being carried out with nodes of other networks through a router.

Key Point:
If the network to which the ET-LAN unit is connected is completely independent, any IP address except for 0000 0000H and FFFF FFFFH may be allocated.

4.1.2 MEWTOCOL Station Number Confirmation

MEWTOCOL Station Number Confirmation

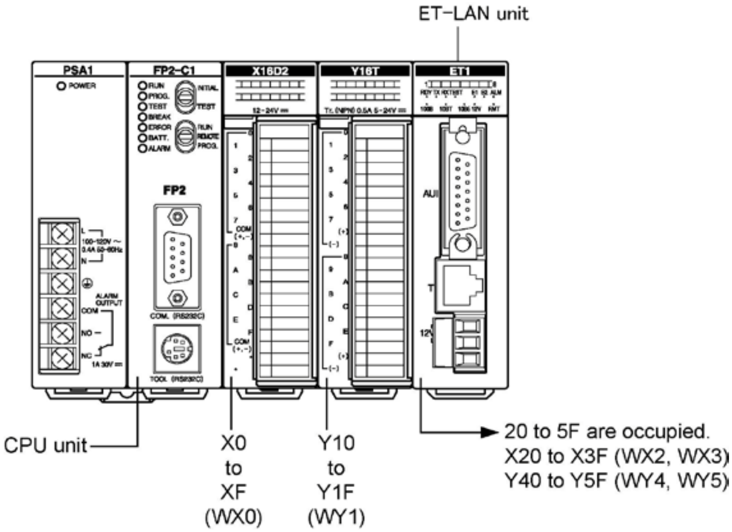
- This is used when communication destination nodes are specified with the computer link and data send functions.
- MEWTOCOL station numbers should be set in such a way that they do not overlap with the addresses of other communication destination nodes.
- Station numbers may be allocated within a range of 1 to 64. Allocating “0” will cause an error.

4.2 I/O Allocations

4.2.1 Confirmation of I/O Allocations

Allocating the ET-LAN unit

- A total of 32 inputs and 32 outputs can be allocated for the ET-LAN unit.
- If the I/O is not being used for the handshake, the programming tools can be used to specify [0SE], to set the number of occupied points to 0.



Note:

- If “I/O installation allocation” and “Auto allocation” are used, 16 points will be allocated automatically to each of the empty slots.
- If a dual-module type of CPU unit is being used, the I/O area occupied by the unit incorporated into the CPU unit should also be confirmed.

For information on I/O allocations, please refer to the “FP2 Hardware Manual”.

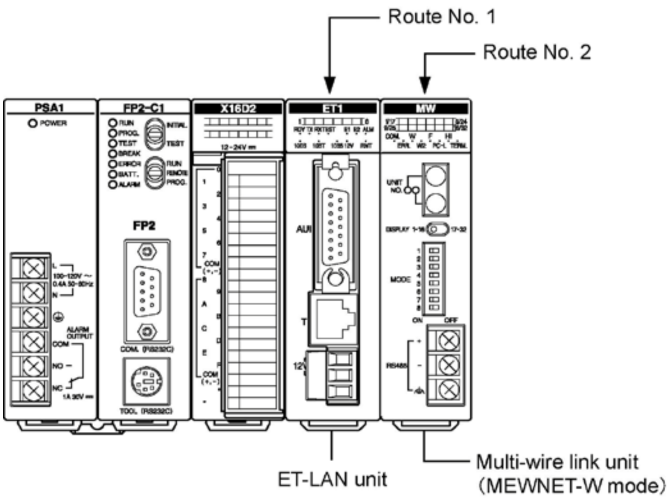
4.2.2 Confirmation of Route Numbers

When MEWTOCOL communication is being used, if communication is being carried out with a node on a different hierarchical level, the route number is used to specify that route. These numbers are not necessary if the hierarchy link function is not being used.

If multiple link-related units have been installed, they are numbered “route no. 1”, “route no. 2“, “route no. 3”, etc., in sequence, with route no.1 being the one closest to the CPU.

This “route” is not included for I/O units and advanced-function units other than link-related units.

Example: When one Multi-wire-link unit is being used at the same time



Key Point:

If any of the following units have also been installed, a “route no.” is specified that also includes these units.

- Computer communication unit (CCU)
- Multi-wire link unit (MEWNET-W mode)
- Multi-wire link unit (MEWNET-W2 mode)

4.3 Confirmation of the Contents of the Shared Memory

4.3.1 Configuration of the Shared Memory

Shared memory allocations

The shared memory in the ET-LAN unit consists of the following areas.

Bank No.	Address	Area
00H – 00H	0000H – 01FFH	Reserved
00H – 00H	0200H – 03FFH	User system area (512 words)
01H – 09H	0000H – 03FFH	Reserved (9k words)
0AH – 0FH	0000H – 03FFH	Transparent communication buffer area (6k words)
10H – 11H	0000H – 03FFH	User system area 2 (2k words)

Area	Bank No.	Address
Initialization information setting area (48 words)	00H	0200H – 022FH
Routing information setting area (32 words)	00H	0230H – 024FH
Connection information setting area (128 words)	00H	0250H – 02CFH
Initialization information notified area (16 words)	00H	02D0H – 02DFH
Conneciton information notified area (128 words)	00H	02E0H – 035FH
Handshake area (32 words)	00H	0360H – 037FH
Error log area (128 words)	00H	0380H – 03FFH
Receive buffer for Connection 1 (1k words)	0AH	0000H – 03FFH
Transmission buffer for Connection 1 (1k words)	0BH	0000H – 03FFH
Receive buffer for Connection 2 (1k words)	0CH	0000H – 03FFH
Transmission buffer for Connection 2 (1k words)	0DH	0000H – 03FFH
Receive buffer for Connection 3 (1k words)	0EH	0000H – 03FFH
Transmission buffer for Connection 3 (1k words)	0FH	0000H – 03FFH
Ladder e-mail send setting area (64 words)	10H	0000H – 003FH
Auto connection status confirmation area (16 words)	10H	0040H – 004FH
System connection information notified area (48 words)	10H	0050H – 007FH
E-mail status area (16 words)	10H	0080H – 008FH
Reserved (368 words)	10H	0090H – 01FFH
E-mail error log area (512 words)	10H	0200H – 03FFH
E-mail receive log area (512 words)	11H	0200H – 03FFH

Note:

- Addresses for the above shared memory are in word (16-bit) units.
- The allocations (connections 1 to 3) for the transparent communication buffer area shown above show the statuses in effect when the unit is shipped from the factory. The first addresses and sizes of the transmission and receiving buffers for connections 1 to 8 can be changed to any desired values in the transparent communication buffer area (6k words) by changing the contents of the initialization information settings.

4.3.2 The Roles Played by the Various Areas

Initialization information setting area <Addresses 200H to 22FH>

- These are used in the initialization processing of the ET-LAN unit.
- These specify basic information such as the addresses and node numbers of source stations, and the re-send setting time for the TCP.
- These are also used to specify the area settings for the communication buffer used for transparent communication.

Routing information setting area <Addresses 230H to 24FH>

- These are used in the initialization processing of the ET-LAN unit.
- These are specified when communication is being carried out from the ET-LAN unit with a node on an Ethernet, through a router.
- These are used to specify router IP addresses and sub-network masks.
- These do not need to be set if communication is being carried out only on the network to which the source station is connected.

Connection information setting area <Addresses 250H to 2CFH>

- These are used for open processing of the ET-LAN unit.
- These specify TCP and UDP settings, the method used for opening the ET-LAN unit, and the IP addresses and port numbers of the node at the other end.
- These can be specified separately for each connection, and are divided into eight blocks.

Initialization information notified area <Addresses 2D0H to 2DFH>

- When the initialization processing for the ET-LAN unit has been completed successfully, the specified conditions are stored at these addresses.
- The contents stored here include source node IP addresses, MEWTOCOL station numbers, and other information.
- If the initialization processing was not completed successfully, the error code is stored here.

Connection information notified area <Addresses 2E0H to 35FH>

- When the open processing for the ET-LAN unit has been completed successfully, the specified conditions are stored at these addresses.
- The contents stored here include IP addresses and port numbers for the destination nodes, and other information.
- If the open processing was not completed successfully, the error code is stored here.

Handshake area <Addresses 360H to 37FH>

- This is the area in which the handshake takes place between the CPU unit and the ET-LAN unit.
- The requests and completions for various types of processing such as initialization, opening, and communication are carried out here, as well as confirmation that processing has been completed.
- If the I/O is being used for the handshake, these addresses do not need to be used.

Error log area <Addresses 380H to 3FFH>

- Error-related information such as the contents of communication errors and unsuccessfully completed processing, as well as the contents of unit errors, are stored here as error codes.
- Up to 14 codes can be stored here at one time for each unit.
- The contents of these addresses can be confirmed using the shared memory readout menu in the programming tools.

Ladder send e-mail setting area <Bank 10H   Addresses 000H to 03FH>
- Used when e-mails are sent using the ladder program.
- Used to specify the e-mail destination address and message.

Auto connection status check area <Bank 10H   Addresses 040H to 04FH>
- Used to check whether the auto connection function is used or not.
- Used to check the open status of each connection (1 to 8).

System connection information notified area <Bank 10H   Addresses 050H to 07FH>
- Used to check the setting status of each system connection (1 to 3).

E-mail status area <Bank 10H   Addresses 080H to 08FH>
- E-mail send/receive status is stored.
- The contents stored here include the number of times e-mail is sent or received.

E-mail error log area <Bank 10H   Addresses 200H to 3FFH>
- Descriptions of the e-mail send and receive errors are stored when e-mail error log is requested.
- Up to the latest 32 e-mail error blocks (send and receive errors in total) can be stored.
- The contents of the area can be checked using the shared memory readout menu in the programming tool.

E-mail send log area <Bank 11H   Addresses 000H to 1FFH>
- E-mail send history is stored when e-mail error log is requested.
- Up to the latest 32 e-mail send blocks can be stored.
- The contents of the area can be checked using the shared memory readout menu in the programming tool.

E-mail receive log area <Bank 11H   Addresses 200H to 3FFH>
- E-mail receive history is stored when e-mail error log is requested.
- Up to the latest 32 e-mail receive blocks can be stored.
- The contents of the area can be checked using the shared memory readout menu in the programming tool.

Reference: Shared memory readout menu in the programming tool

1. On the "Tools" menu, select "Display PLC Shared memory". This reads the "PLC".
2. Specify the slot No. and the bank No.
3. The log information is read.

-

4.4 Handshake Method

4.4.1 Handshake Method

Handshake method

- The CPU unit and ET-LAN unit carry out initialization and termination processing, open and close processing, various types of communication processing requests, and confirmation of completion by means of a handshake.
- There are two types of handshake, one using the I/O and one using the shared memory.
- Both types can be used at the same time.

Handshakes using the I/O and using the shared memory

Item	I/O handshaking	Shared memory handshaking
Operation method	The various processes are executed by reading from and writing to the input contacts X and output contacts Y allocated to the ET-LAN unit from the ladder program.	The various processes are executed by reading from and writing to the handshaking area allocated to the shared memory in the ET-LAN unit from the ladder program.
Programming cautions	The input contacts X and output contacts Y can be used as it is.	The F150 (READ)/PREAD (P150), F151 (WRT)/P151 (PWRT) instructions are used to reflect the content of the shared memory handshake area to internal relays etc.
Operation in PROG. mode	The output contacts Y all go off. At this time, all connections (communication routes) are closed forcibly (communication not possible). Therefore, if the CPU unit switches from RUN to PROG. mode due to some error occurring, communication stops.	As the shared memory is not changed even in PROG. mode, the connection (communication route) is not closed. However, if the connection is closed from another node when in PROG. mode, the ET-LAN will not execute a process to reopen it. When you switch from PROG. mode to RUN mode, and the reinitialize and re-opening processes are not executed, we recommend that you construct a program after referring to the flow chart on page 4-16.
Limits on the communication functions that can be used	For MEWTOCOL communication, all processes can be realized using connections 1 to 8. For transparent communication, only the processes for connections 1 to 3 can be realized. I/O handshaking cannot be realized.	For both MEWTOCOL communication and transparent communication, all processes can be realized using connections 1 to 8.
	I/O handshaking and shared memory handshaking can be used simultaneously.	

Note:

If both the I/O and shared memory handshakes are used at the same time, operation is as follows.

- Input conditions such as complete signals and error signals are updated in both the input relay <I/O> and the complete signal area <shared memory>.
- Output conditions such as request signals operate under the logical OR of the output relay <I/O> and the request signal area <shared memory>. As a result, if both are on, the result is on, and an off result is produced only if both are off.

4.4.2 Using the I/O for the Handshake

The I/O signals in the table below are used when a handshake is carried out between the CPU unit and the ET-LAN unit using the I/O.

Input (Relay numbers indicate the numbers when installed in slot no. 0.)

No.	Description	No.	Description
X0	Receive notified signal (Connection 1)	X10	Open complete signal (Connection 1)
X1	Receive complete signal (Connection 1)	X11	Open error signal (Connection 1)
X2	Transmission complete signal (Connection 1)	X12	Open complete signal (Connection 2)
X3	Transmission error signal (Connection 1)	X13	Open error signal (Connection 2)
X4	Receive notified signal (Connection 2)	X14	Open complete signal (Connection 3)
X5	Receive complete signal (Connection 2)	X15	Open error signal (Connection 3)
X6	Transmission complete signal (Connection 2)	X16	Open complete signal (Connection 4)
X7	Transmission error signal (Connection 2)	X17	Open error signal (Connection 4)
X8	Receive notified signal (Connection 3)	X18	Open complete signal (Connection 5)
X9	Receive complete signal (Connection 3)	X19	Open error signal (Connection 5)
XA	Transmission complete signal (Connection 3)	X1A	Open complete signal (Connection 6)
XB	Transmission error signal (Connection 3)	X1B	Open error signal (Connection 6)
XC	Initialization complete signal	X1C	Open complete signal (Connection 7)
XD	Initialization error signal	X1D	Open error signal (Connection 7)
XE		X1E	Open complete signal (Connection 8)
XF	Error log notified complete signal	X1F	Open error signal (Connection 8)

Output (Relay numbers indicate the numbers when installed in slot no. 0.)

No.	Description	No.	Description
Y20	Receive request signal (Connection 1)	Y30	Open request signal (Connection 1)
Y21		Y31	
Y22	Transmission request signal (Connection 1)	Y32	Open request signal (Connection 2)
Y23		Y33	
Y24	Receive request signal (Connection 2)	Y34	Open request signal (Connection 3)
Y25		Y35	
Y26	Transmission request signal (Connection 2)	Y36	Open request signal (Connection 4)
Y27		Y37	
Y28	Receive request signal (Connection 3)	Y38	Open request signal (Connection 5)
Y29		Y39	
Y2A	Transmission request signal (Connection 3)	Y3A	Open request signal (Connection 6)
Y2B		Y3B	
Y2C	Initialization request signal	Y3C	Open request signal (Connection 7)
Y2D		Y3D	
Y2E	Error LED flash off signal (See note.)	Y3E	Open request signal (Connection 8)
Y2F	Error log notified request signal	Y3F	

Note:

If the Error LED flashing out request signal (Y2E) is turned on, the flashing LEDs for E1 and E2 go out. Also, while the Error LED flashing out request signal (Y2E) is on, the LEDs for E1 and E2 will not flash, even if a recoverable error or a warning error occurs. However, these functions are not affected by error log processing, so the error contents remain in the log.

4.4.3 Using the Shared Memory for the Handshake

Complete signal area (bank 0)

Address		Description
360H	bit 0	Receive notified signal (Connection 1)
	bit 1	Receive complete signal (Connection 1)
	bit 2	Transmission complete signal (Connection 1)
	bit 3	Transmission error signal (Connection 1)
	bit 4	Receive notified signal (Connection 2)
	bit 5	Receive complete signal (Connection 2)
	bit 6	Transmission complete signal (Connection 2)
	bit 7	Transmission error signal (Connection 2)
	bit 8	Receive notified signal (Connection 3)
	bit 9	Receive complete signal (Connection 3)
	bit A	Transmission complete signal (Connection 3)
	bit B	Transmission error signal (Connection 3)
	bit C	Initialization complete signal
	bit D	Initialization error signal
	bit E	-
	bit F	Error log notified complete signal
361H	bit 0	Open request signal (Connection 1)
	bit 1	
	bit 2	Open request signal (Connection 2)
	bit 3	
	bit 4	Open request signal (Connection 3)
	bit 5	
	bit 6	Open request signal (Connection 4)
	bit 7	
	bit 8	Open request signal (Connection 5)
	bit 9	
	bit A	Open request signal (Connection 6)
	bit B	
	bit C	Open request signal (Connection 7)
	bit D	
	bit E	Open request signal (Connection 8)
	bit F	
362H	bit 0	E-mail receive request signal
	bit 1	E-mail receive error signal
	bit 2	E-mail transmission complete signal
	bit 3	E-mail transmission error signal
	bit 4	E-mail log notified complete signal
	bit 5	E-mail error log notified complete signal
	bit 6 to bit F	Reserved

Expanded complete signal area (bank 0)

Address		Description
364H	bit 0	Receive notified signal (Connection 1)
	bit 1	Receive complete signal (Connection 1)
	bit 2	Transmission complete signal (Connection 1)
	bit 3	Transmission error signal (Connection 1)
	bit 4	Receive notified signal (Connection 2)
	bit 5	Receive complete signal (Connection 2)
	bit 6	Transmission complete signal (Connection 2)
	bit 7	Transmission error signal (Connection 2)
	bit 8	Receive notified signal (Connection 3)
	bit 9	Receive complete signal (Connection 3)
	bit A	Transmission complete signal (Connection 3)
	bit B	Transmission error signal (Connection 3)
	bit C	Receive notified signal (Connection 4)
	bit D	Receive complete signal (Connection 4)
	bit E	Transmission complete signal (Connection 4)
	bit F	Transmission error signal (Connection 4)
365H	bit 0	Receive notified signal (Connection 5)
	bit 1	Receive complete signal (Connection 5)
	bit 2	Transmission complete signal (Connection 5)
	bit 3	Transmission error signal (Connection 5)
	bit 4	Receive notified signal (Connection 6)
	bit 5	Receive complete signal (Connection 6)
	bit 6	Transmission complete signal (Connection 6)
	bit 7	Transmission error signal (Connection 6)
	bit 8	Receive notified signal (Connection 7)
	bit 9	Receive complete signal (Connection 7)
	bit A	Transmission complete signal (Connection 7)
	bit B	Transmission error signal (Connection 7)
	bit C	Receive notified signal (Connection 8)
	bit D	Receive complete signal (Connection 8)
	bit E	Transmission complete signal (Connection 8)
	bit F	Transmission error signal (Connection 8)
366H	bit 0	Receive error signal (Connection 1)
	bit 1	Receive error signal (Connection 2)
	bit 2	Receive error signal (Connection 3)
	bit 3	Receive error signal (Connection 4)
	bit 4	Receive error signal (Connection 5)
	bit 5	Receive error signal (Connection 6)
	bit 6	Receive error signal (Connection 7)
	bit 7	Receive error signal (Connection 8
	bit 8	No communication time-out signal (Connection 1)
	bit 9	No communication time-out signal (Connection 2)
	bit A	No communication time-out signal (Connection 3)
	bit B	No communication time-out signal (Connection 4)
	bit C	No communication time-out signal (Connection 5)
	bit D	No communication time-out signal (Connection 6)
	bit E	No communication time-out signal (Connection 7)
	bit F	No communication time-out signal (Connection 8)

Note:

The same signal (for example, the connection 1 Receive notified signal 360H bit 0 and 364H bit 0) can be used in both the signal complete area and the expanded complete signal area. It does not matter which signal is used in which area.

Complete signal area (bank 0)

Address		Description
368H	bit 0	Receive request signal (Connection 1)
	bit 1	-
	bit 2	Transmission request signal (Connection 1)
	bit 3	-
	bit 4	Receive request signal (Connection 2)
	bit 5	-
	bit 6	Transmission request signal (Connection 2)
	bit 7	-
	bit 8	Receive request signal (Connection 3)
	bit 9	-
	bit A	Transmission request signal (Connection 3)
	bit B	-
	bit C	Initialization request signal
	bit D	-
	bit E	Error LED flash off signal (See note.)
	bit F	Error log notified request signal
369H	bit 0	Open request signal (Connection 1)
	bit 1	-
	bit 2	Open request signal (Connection 2)
	bit 3	-
	bit 4	Open request signal (Connection 3)
	bit 5	-
	bit 6	Open request signal (Connection 4)
	bit 7	-
	bit 8	Open request signal (Connection 5)
	bit 9	-
	bit A	Open request signal (Connection 6)
	bit B	-
	bit C	Open request signal (Connection 7)
	bit D	-
	bit E	Open request signal (Connection 8)
	bit F	-
36AH	bit 0	E-mail receive complete signal
	bit 1	-
	bit 2	E-mail transmission request signal
	bit 3	-
	bit 4	E-mail log notified request signal
	bit 5	E-mail error log notified request signal
	bit 6 to bit F	Reserved

Expanded complete signal area (bank 0)

Address		Description
36CH	bit 0	Receive request signal (Connection 1)
	bit 1	-
	bit 2	Transmission request signal (Connection 1)
	bit 3	-
	bit 4	Receive request signal (Connection 2)
	bit 5	-
	bit 6	Transmission request signal (Connection 2)
	bit 7	-
	bit 8	Receive request signal (Connection 3)
	bit 9	-
	bit A	Transmission request signal (Connection 3)
	bit B	-
	bit C	Receive request signal (Connection 4)
	bit D	-
	bit E	Transmission request signal (Connection 4)
	bit F	-
36DH	bit 0	Receive request signal (Connection 5)
	bit 1	-
	bit 2	Transmission request signal (Connection 5)
	bit 3	-
	bit 4	Receive request signal (Connection 6)
	bit 5	-
	bit 6	Transmission request signal (Connection 6)
	bit 7	-
	bit 8	Receive request signal (Connection 7)
	bit 9	-
	bit A	Transmission request signal (Connection 7)
	bit B	-
	bit C	Receive request signal (Connection 8)
	bit D	-
	bit E	Transmission request signal (Connection 8)
	bit F	-

Note:

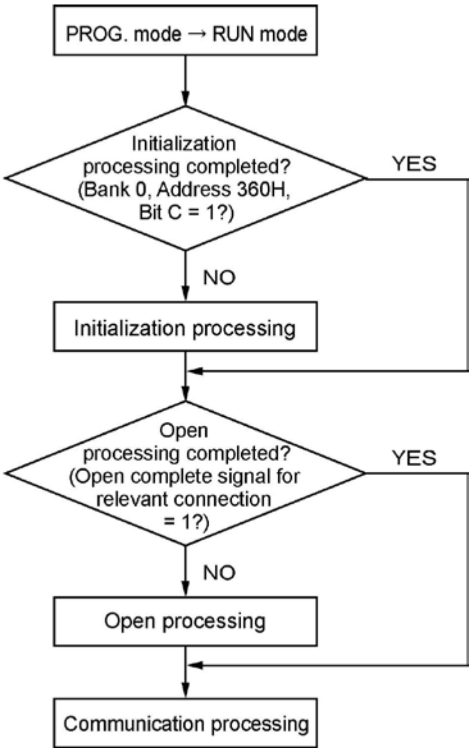
- The same signal (for example, the connection 1 Receive request signal 368H bit 0 and 36CH bit 0) can be used in both the signal complete area and the expanded complete signal area. It does not matter which signal is used in which area.
- If the Error LED flashing out signal (368H bit E) is turned on, the flashing LEDs for E1 and E2 go out. Also, while the Error LED flashing out signal (368H bit E) is on, the LEDs for E1 and E2 will not flash, even if a recoverable error or a warning error occurs. However, these functions are not affected by error log processing, so the error contents remain in the log.

Handshake using the shared memory
When using the shared memory to carry out the handshake, internal relays should be allocated to teach of the signal areas, as shown in the program below.

Program example

```
R9010
--| |----[ F150 READ, H0, H360, H2, WR10 ]   --- The complete signal area (Bank 0, Addresses
                                                 360H, 361H) is reflected in WR10 and WR11.
         [ F150 READ, H0, H364, H2, WR12 ]   --- The expanded complete signal area (Bank 0, Addresses
                                                 364H, 365H) is reflected in WR12 and WR13.
         [ F150 READ, H0, H366, H1, WR14 ]   --- The expanded complete signal area 2 (Bank 0,
                                                 Address 366H) is reflected in WR14.
         [ F151 WRT, H0, WR20, H2, H368 ]    --- WR20 and WR21 are reflected in the request
                                                 signal area (Bank 0, Addresses 368H, 369H).
         [ F151 WRT,   H0, WR22, H2, H36C ]  --- WR22 and WR23 are reflected in the expansion
                                                 request signal area (Bank 0, Addresses 36CH, 36DH).
```

Flow of processing when re-initialization and re-open processing are not carried out after a switch to RUN mode.



Chapter 5

Initialization Processing and Termination Processing

5.1 Initialization/Termination Processing

5.1.1 What is Initializaiton Processing?

Setting the various conditions for communication and booting the ET-LAN unit is called initialization processing.

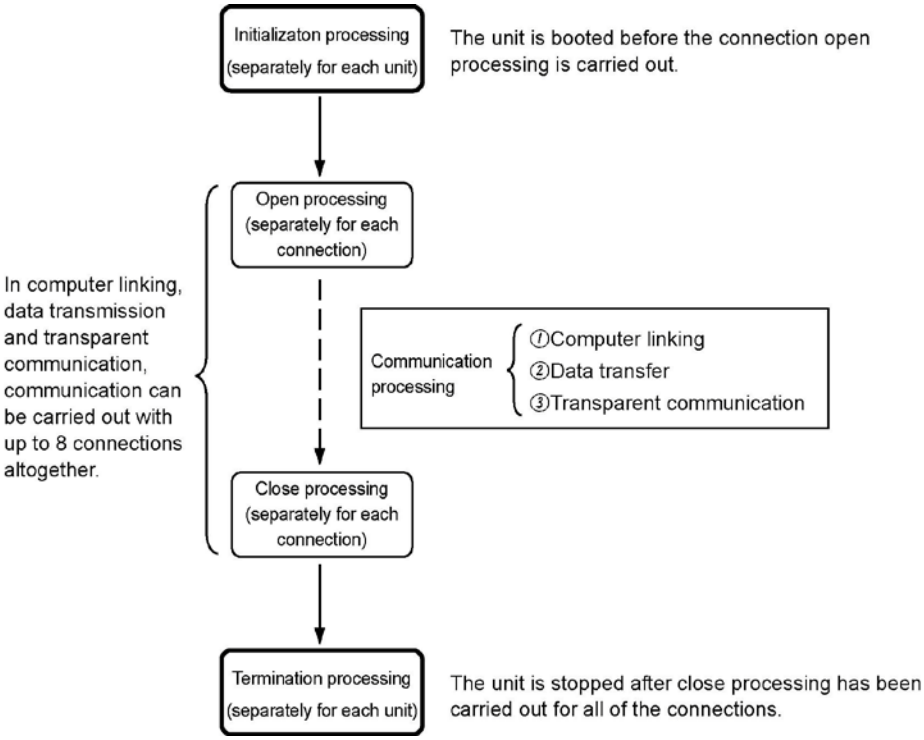
In initialization processing, the contents of the initialization information setting area and the routing information setting area in the shared memory of the ET-LAN unit are specified.

If close processing has been completed for all of the connections, termination processing can be carried out to stop the ET-LAN unit.

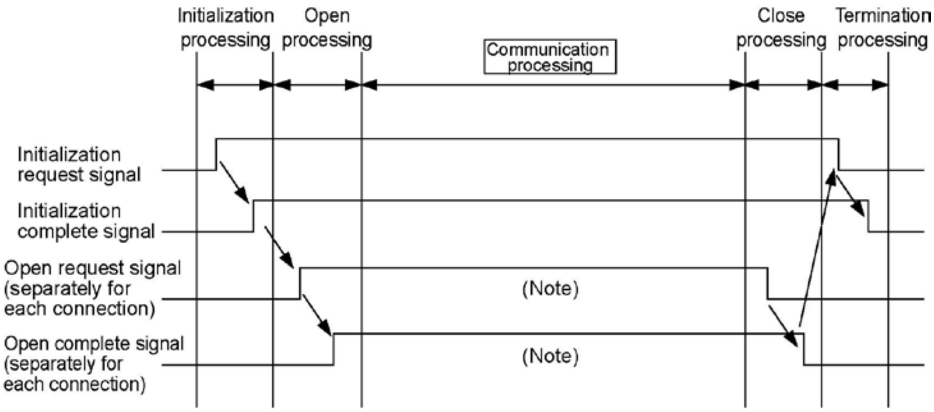
Items set during initialization processing

Setting area	Setting item
Initialization information setting area	Source node IP address
	Communication function setting between networks
	Source node MEWTOCOL station number
	TCP ULP (packet existence duration)
	TCP zero-window timer value
	TCP re-transmission timer value
	Receiving buffer starting address for transparent communication
	Receiving buffer size for transparent communication
	Transmission buffer starting address for transparent communication
	Transmission buffer size for transparent communication
Routing information setting area	Network (subnetwork) masking
	Default router IP address
	Number of registering router
	Router network (subnetwork) address
	Router IP address

Operation of the ET-LAN unit



The relationship between initialization processing and open processing



Note: When the initialization complete signal is on, any number of open processing and close processing operations can be performed.
By changing the setting and performing re-open processing, it is possible to communicate with a different partner.

5.2 Processing Procedures

5.2.1 An Overview of the Initialization Processing Procedure

The unit is initialized and booted using the following procedure.

(1) The necessary data is written to the initialization information setting area (Bank: 0, Addresses 200H to 22FH) in the shared memory.
(2) If communication is to be carried out between networks, the necessary data is written to the routing information setting area (Bank: 0, Addresses 230H to 24FH) in the shared memory.
(3) The initialization request signal is turned on.

Handshake method	Initialization request signal bit
When I/O is used for handshake	Y2C
When shared memory is used for handshake	Bank 0 Address 368H Bit C

The initialization request signal should be kept on unit termination processing is carried out.

(4) Check to make sure the initialization complete signal is on.

Handshake method	Initialization request signal bit
When I/O is used for handshake	XC
When shared memory is used for handshake	Bank 0 Address 360H Bit C

Note:
Data should be written to the initialization information setting area and the routing information setting area before initialization processing is carried out (before the request signal is turned on). (Data should not be written to these areas while the initialization complete signal is on.)

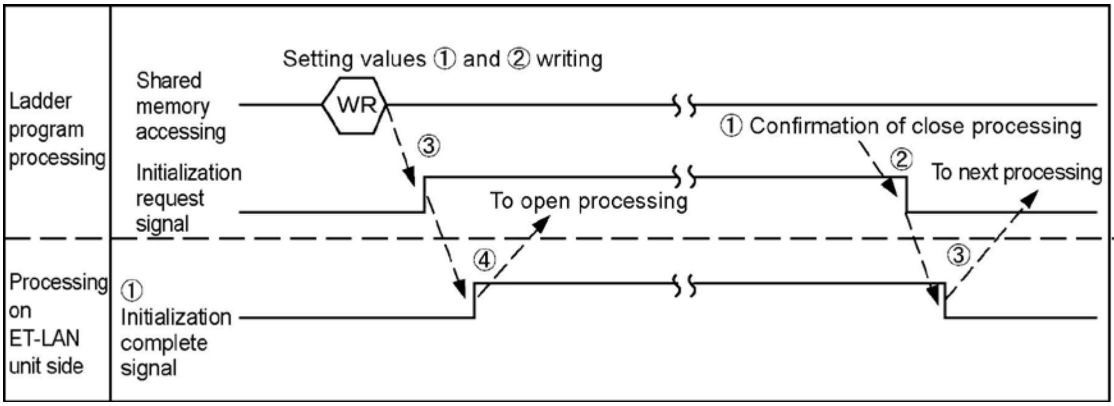
5.2.2 An Overview of the Termination Processing Procedure

The following procedure is used to stop operation of the unit.

(1) Check to make sure that close processing has been completed for all of the connections.
(2) Turn off the initialization request signal.
(3) Check to make sure the initialization complete signal has gone off.

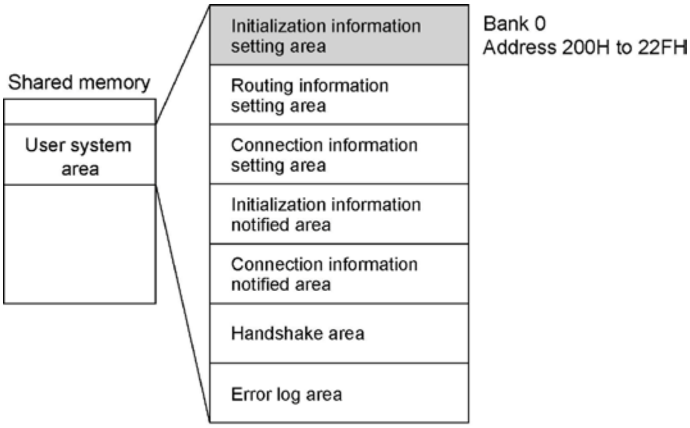
Note:
If the initialization request signal is turned off while a connection is open, all of the connections will be forcibly closed.

Timing chart for initialization and termination processing



5.2.3 Writing Data to the Initialization Information Setting Area

The necessary data is written to the initialization information setting area (Bank 0: 0, Addresses: 200H to 22FH) of the shared memory using the shared memory writing instructions F151 (WRT) and P151 (PWRT).



(Shared memory addresses are allocated in word units.)

Initialization information setting area (bank 0)

Address	Name	Default value	Setting value and explanation
200H	Source node IP address (L)	0000H	[Set value] Source node address - Address example: 192.168.1.1 (C0 A8 01 01H) IP address (L): 0101H IP address (H): C0A8H - Any address other than 00000000H and FFFFFFFFH is valid.
201H	Source node IP address (H)	0000H	
202H	Communication function setting between networks	0000H	[Set value] 0000H: Communication between networks not used. 0001H: Communication between networks used. - Specifies whether or not communication is carried out between networks using a router. - If communication between networks is used, the routing information setting area should also be specified.
203H	Source node MEWTOCOL station number	0000H	[Set value] 01H to 40H (01 to 64) - Specifies the MEWTOCOL station no. of the source node as a value between 01 and 64 when MEWTOCOL communication is used. - Specify a number that does not overlap that of any other station on the network. * A dummy value should be set even if MEWTOCOL communication is not being carried out.
204H 205H 206H 207H 208H 209H	Reserved (Used by the system.)	-	If any value is written, it should be 0000H.

Address	Name	Default value	Setting value and explanation
20AH	TCP ULP (packet existence duration)	000FH [30 seconds]	Setting time = [Setting value (1 to FFFFH)] x 2 seconds - With TCP, this specifies the time that a packet exists when data transmission, etc. is carried out.
20BH	TCP zero-window timer value	0005H [10 seconds]	Setting time = [Setting value (1 to FFFFH)] x 2 seconds - With TCP, this specifies the time until the receiver window size check packet is re-sent when the receive window size of the other node becomes 0.
20CH	TCT re-transmission timer value	0005H [10 seconds]	Setting time = [Setting value (1 to FFFFH)] x 2 seconds - With TCP, this specifies the time until data is re-sent if ACK is not sent by the other node, when data transmission, etc. is carried out.
20DH	TCP closed timer value	0001H [2 seconds]	Setting time = [Setting value (1 to FFFFH)] x 2 seconds - This specifies the time waited until open processing is carried out when the same port is being re-opened, when TCP close processing is done by the source node.
20EH	IP reassembling timer value	000FH [30 seconds]	Setting time = [Setting value (1 to FFFFH)] x 2 seconds - This specifies the time waited for the next portion of data when data split by the IP is being received.
20FH	Reserved (Used by the system.)	-	If any value is written, it should be 0000H.

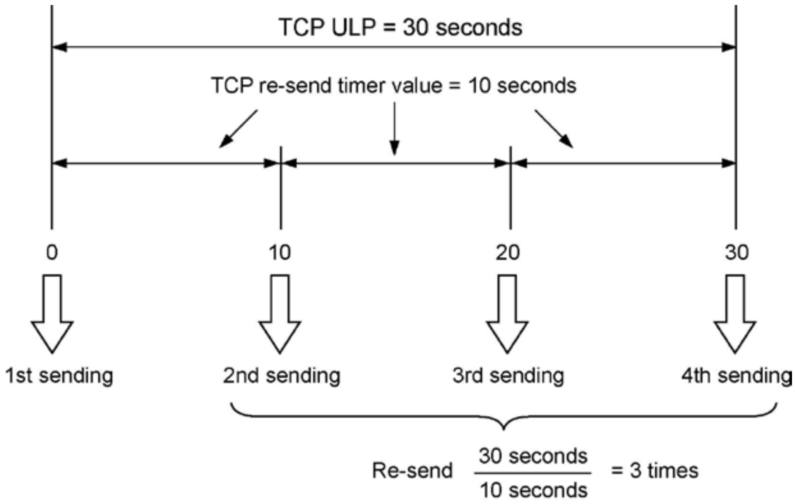
TCP ULP (packet existence duration) and TCP re-transmission timer value settings

When TCP/IP communication is being carried out, data is automatically re-sent the specified number of times, as shown in the illustration below.

$$\text{Number of re-sends} = \left[\frac{\text{TCP ULP (packet existence duration)}}{\text{TCP re-transmission timer value}} \right]$$

Values in the [ ] are rounded integer values.

Example: (when default settings are used)
20AH: TCP ULP = 000FH/30 seconds
20CH: TCP re-send timer value = 0005H/10 seconds



Note:
- If the value set for the TCP ULP is smaller than that set for the TCP re-send timer, the data will not be re-sent. Data will only be sent the first time.
- If UDP/IP is being used, re-sending is not carried out.

Key Point:
- Always specify the source node IP address and the source node MEWTOCOL station number. If these are not specified correctly, an error will occur processing will be terminated, and the “E1” Error LED will light.
- If the default values are to be used for other timer values, no values need to be written.

Initialization information setting area 2 (bank 0)

Address	Name		Default value	Setting value and explanation
210H	Receiving buffer starting address for transparent communication (Connection 1)		2800H	[Set value] First address in receive buffer. - The first address of the receive buffer is specified using the absolute address (word address) of the shared memory when transparent communication is being carried out among the various connections. - FFFFH is set if this is not being used.
211H	Receiving buffer size for transparent communication (Connection 1)		0400H	[Set value] Size of receive buffer. - The size of the receive buffer is specified in word units when transparent communication is being carried out among the various connections. - 0000H is set if this is not being used.
212H	Transmission buffer starting address for transparent communication (Connection 1)		2C00H	[Set value] First address in send buffer. - The first address of the send buffer is specified using the absolute address (word address) of the shared memory when transparent communication is being carried out among the various connections. - FFFFH is set if this is not being used.
213H	Transmission buffer size for transparent communication (Connection 1)		0400H	[Set value] Size of send buffer. - The size of the send buffer is specified in word units when transparent communication is being carried out among the various connections. - 0000H is set if this is not being used.
214H	Connection 2	Receiving buffer starting address for transparent communication	3000H	- The first address in each buffer should be specified using 2800H to 3FFFH (word address). - For the details of each setting, refer to the above “addresses 210H to 213H”.
215H		Receiving buffer size for transparent communication	0400H	
216H		Transmission buffer starting address for transparent communication	3400H	
217H		Transmission buffer size for transparent communication	0400H	
218H	Connection 3	Receiving buffer starting address for transparent communication	3800H	
219H		Receiving buffer size for transparent communication	0400H	
21AH		Transmission buffer starting address for transparent communication	3C00H	
21BH		Transmission buffer size for transparent communication	0400H	
21CH	Connection 4	Receiving buffer starting address for transparent communication	FFFFH	
21DH		Receiving buffer size for transparent communication	0000H	
21EH		Transmission buffer starting address for transparent communication	FFFFH	
21FH		Transmission buffer size for transparent communication	0000H	

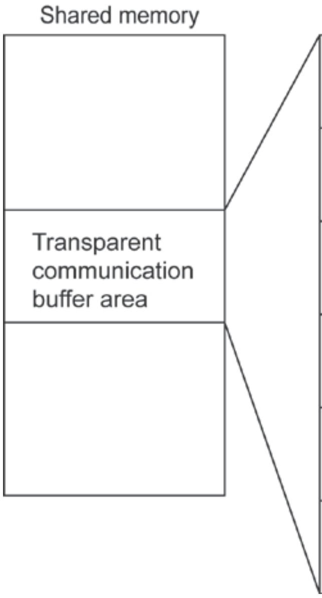
Address	Name		Default value	Setting value and explanation
220H	Connection 5	Receiving buffer starting address for transparent communication	FFFFH	- The first address in each buffer should be specified using 2800H to 3FFFH (word address). - For the details of each setting, refer to the above “addresses 210H to 213H”.
221H		Receiving buffer size for transparent communication	0000H	
222H		Transmission buffer starting address for transparent communication	FFFFH	
223H		Transmission buffer size for transparent communication	0000H	
224H	Connection 6	Receiving buffer starting address for transparent communication	FFFFH	
225H		Receiving buffer size for transparent communication	0000H	
226H		Transmission buffer starting address for transparent communication	FFFFH	
227H		Transmission buffer size for transparent communication	0000H	
228H	Connection 7	Receiving buffer starting address for transparent communication	FFFFH	
229H		Receiving buffer size for transparent communication	0000H	
22AH		Transmission buffer starting address for transparent communication	FFFFH	
22BH		Transmission buffer size for transparent communication	0000H	
22CH	Connection 8	Receiving buffer starting address for transparent communication	FFFFH	
22DH		Receiving buffer size for transparent communication	0000H	
22EH		Transmission buffer starting address for transparent communication	FFFFH	
22FH		Transmission buffer size for transparent communication	0000H	

Transparent communication buffer area allocations

The transparent communication buffer area allocations (connections 1 to 3) effective when the unit is shipped from the factory are as shown below.

The first addresses and sizes of the send and receive buffers of connections 1 to 8 can be sent to any desired values in the 6k words transparent communication buffer area by changing the contents of the initialization information settings.

The shared memory addresses indicated below are in word (16-bit) units.



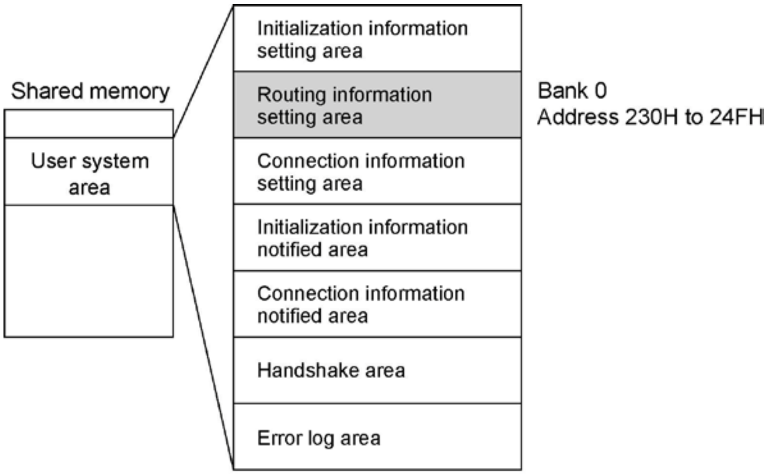
Bank No.	Address	
0AH to 0AH	0000H 03FFH	Receive buffer for connection 1 (1k words)
0BH to 0BH	0000H 03FFH	Transmission buffer for connection 1 (1k words)
0CH to 0CH	0000H 03FFH	Receive buffer for connection 2 (1k words)
0DH to 0DH	0000H 03FFH	Transmission buffer for connection 2 (1k words)
0EH to 0EH	0000H 03FFH	Receive buffer for connection 3 (1k words)
0FH to 0FH	0000H 03FFH	Transmission buffer for connection 3 (1k words)

Key Point:

- If the transparent communication function is not being used, it is not necessary to write anything to these areas.
- Please note that the various transparent communication buffer areas are not overlapped when changing them.

5.2.4 Writing Data to the Routing Information Setting Area

When communication is to be carried out between networks, the necessary data is written to the routing information setting area of the shared memory (Bank 0: Addresses 230H to 24FH), using the shared memory writing instructions F151 (WRT) and P151 (PWRT).



(Shared memory addresses are allocated in word units.)

Key Point:

- In order to make the routing information setting area valid, “0001H” should be set for the communication function setting between networks (Bank 0: Address 202H). If “0000H” is specified, the routing information will be invalid.
- If communication is not to be carried out between networks through a router, no settings are necessary for this area.

Routing information setting area 2 (bank 0)

Address	Name	Default value	Setting value and explanation
230H	Network (subnetwork) masking (L)	0000H	FF000000H to FFFFFFFCH: Field value that determines network address or subnetwork address. - The network (subnetwork) mask is value that sets the 32-bit network address used as the IP address and the bit used for the subnetwork address to “1”. Example: FF000000H: For a Class A network 1111 1111 0000 0000 0000 0000 0000 0000 FFC00000H: When 2 bits are used for a Class A subnetwork 1111 1111 1100 0000 0000 0000 0000 0000 FFFF0000H: For a Class B network 1111 1111 1111 1111 0000 0000 0000 0000 FFFFF000H: When 4 bits are used for a Class B subnetwork 1111 1111 1111 1111 1111 0000 0000 0000 FFFFFF00H: For a Class C network 1111 1111 1111 1111 1111 1111 0000 0000 FFFFFFE0H: When 3 bits are used for a Class C subnetwork 1111 1111 1111 1111 1111 1111 1110 0000 - An error occurs if FFFFFFDH or higher is specified. - The network (subnetwork) address is the address that results from the logical AND of the IP address for a source node and the network (subnetwork) mask, in the same class and with the same network address. Example: If the source node IP address is 59010201H: - If FF000000H is specified for the network mask, 59000000H will be the network address (Class A network). - If FFFF0000H is specified for the subnetwork mask, 59010000H will be the subnetwork address (Class B network).
231H	Network (subnetwork) masking (H)	0000H	
232H	Default router (Gateway) IP address (L)	0000H	[Se values] Default router (gateway) IP address - This is effective as long as the network (subnetwork) mask field is anything other than 0. - If the default router (gateway) IP address has been set, communication will be carried out through the default router (gateway) without an error occurring even if the class, network address, or subnetwork address is different from that of the destination node. - The network (subnetwork) address for the default router (gateway) IP address must be identical to the network (subnetwork) address for the source node IP address. If they are different, an error will occur. - 00000000H and FFFFFFFFH will cause errors to occur.
233H	Default router (Gateway) IP address (H)	0000H	
234H	Number of registering router	0000H	[Set value] 0 to 5 - This specifies the number of routers used on the source network. - The default router (gateway) is not included in the number of registered routers. - This is effective as long as the network (subnetwork) mask field is anything other than 0. - Any value higher than 5 will be treated as 5. - The number of network addresses and router IP addresses registered should not exceed the number specified here.

Address	Name		Default value	Setting value and explanation
235H	Router 1 network (subnetwork) address (L)		0000H	[Set value] Network (sub-network) address of destination node - This specifies the network (sub-network) address for an adjacent network connected through the router. - 00000000H and FFFFFFFFH will cause errors to occur.
236H	Router 1 network (subnetwork) address (H)		0000H	
237H	Router 1 Router IP address (L)		0000H	[Set value] Router IP address - The network (sub-network) address for the router address must be identical to the network (sub-network) address for the source node IP address. If they are different, an error will occur. - 00000000H and FFFFFFFFH will cause errors to occur.
238H	Router 1 Router IP address (H)		0000H	
239H	Router 2	Network (subnetwork) address (L)	0000H	Refer to the above “addresses 235H to 238H”.
23AH		Network (subnetwork) address (H)		
23BH		Router IP address (L)		
23CH		Router IP address (H)		
23DH	Router 3	Network (subnetwork) address (L)	0000H	
23EH		Network (subnetwork) address (H)		
23FH		Router IP address (L)		
240H		Router IP address (H)		
241H	Router 4	Network (subnetwork) address (L)	0000H	
242H		Network (subnetwork) address (H)		
243H		Router IP address (L)		
244H		Router IP address (H)		
245H	Router 5	Network (subnetwork) address (L)	0000H	
246H		Network (subnetwork) address (H)		
247H		Router IP address (L)		
248H		Router IP address (H)		
249H	Reserved (Used by the system.) If any value is written to these, it should be 0000H.			
24AH				
24BH				
24CH				
24DH				
24EH				
24FH				

Router 1 to 5 and default router (gateway) settings

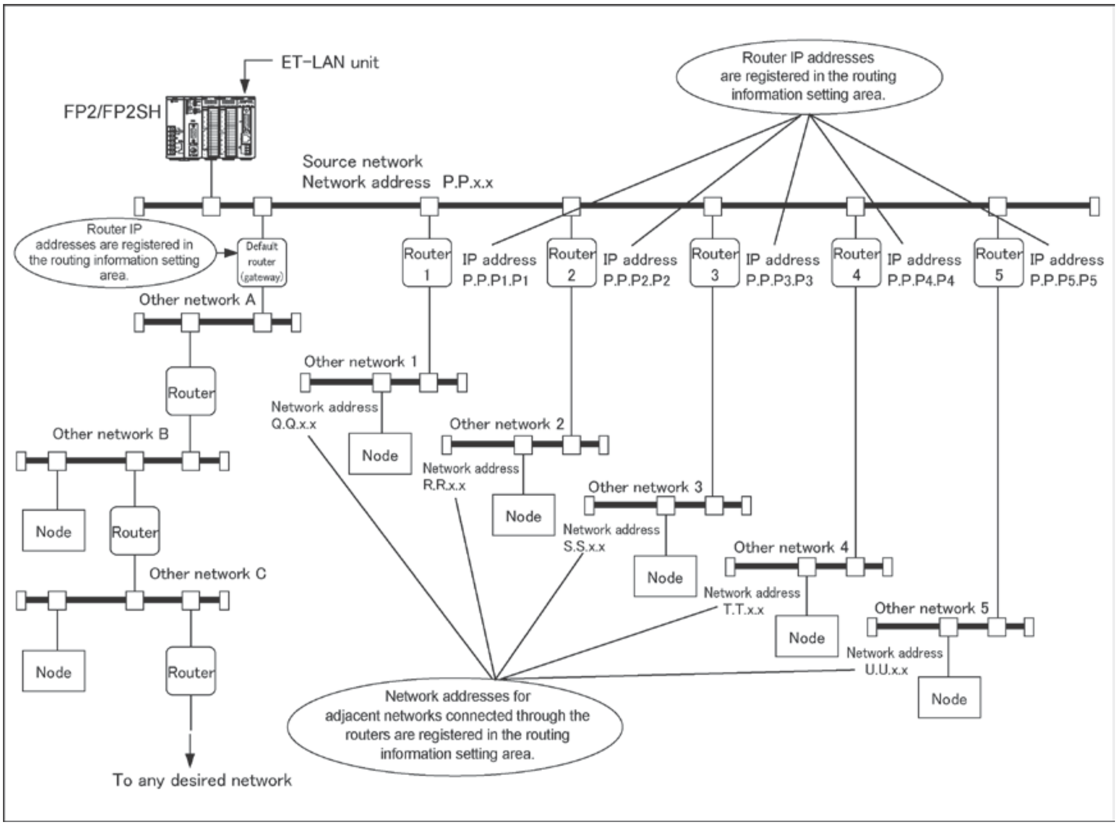
The ET-LAN unit can communicate not only with the destination nodes on the source network, but also with destination nodes on other networks, through the router.

There are two types of communication that can be carried out with destination nodes on other networks, as described below.

(1) Communication with destination nodes on adjacent networks registered in advance (Other networks 1, 2, 3, … in the diagram).

(2) Communication with destination nodes on any other desired network (Other networks A, B, C, … in the diagram)

With the ET-LAN unit, with regard to the routers on the source network through which the type of communication described in (1) is handled (there may be up to five of these routers), the IP address(es) of the router(s) and the network (sub-network) address(es) of the adjacent network(s) connected through the router(s) are registered in the routing information. The router on the source network through which the communication described in (2) is handled is called the default router (gateway), and the IP address for this default router is also registered in the routing information.



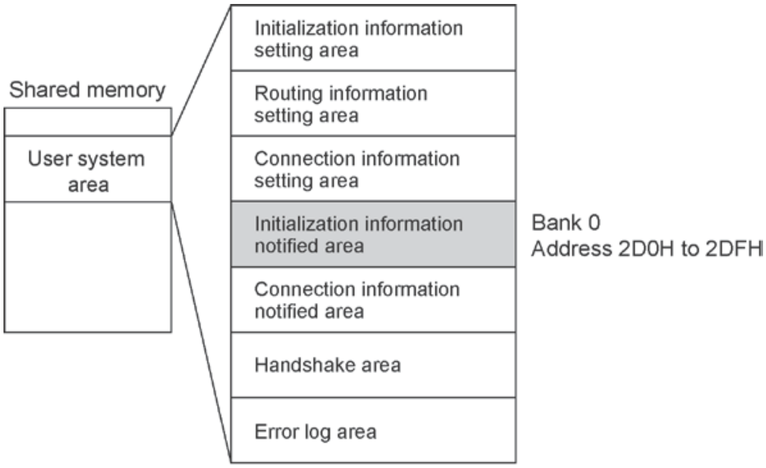
- If the destination node exists in any of the <Other networks 1 to 5> noted above, the ET-LAN unit communicates with the node through routers 1 to 5. In this case, the network (sub-network) address of the destination node will match the “Network (sub-network) address of the destination node will match the “Network (sub-network) address” of one of the five routers registered in the routing information setting area. (Refer to the IP addresses for the five routers “Router 1 to 5” in the illustration, and to the network addresses for the five networks “Network 1 to 5”.)
- In any other case, communication with the destination node is carried out through the default router (gateway) (if the destination node is located in networks A to C in the illustration).

Key Point:

1) The network (sub-network) addresses of the five routers (“Router 1 to 5” on the source network are registered, along with the IP addresses. The “network (sub-network) addresses” are the network (sub-network) addresses of the adjacent networks connected through the routers.
2) An IP address is registered for only one default router (gateway). The default router (gateway) may be the same as one of the five routers “Router 1 to 5” specified in step 1), or it may be different.

5.3 Reading Initialization Information

The initialization information subsequent to the initialization processing of the current unit can be read from the shared memory. The initialization information notified area (Bank: 0, Addresses: 2D0H to 2DFH) should be read using the shared memory read instruction F150 (READ) and P150 (PREAD).



(Shared memory addresses are allocated in word units.)

Initialization information notified area (bank 0)

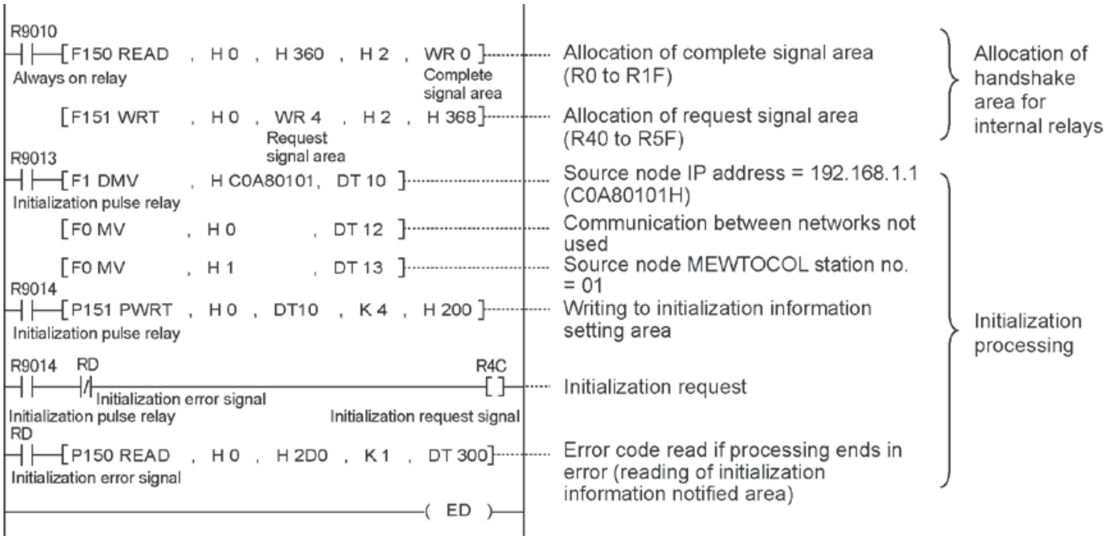
Address	Name	Setting value and explanation
2D0H	Initialization processing complete code	[Stored value] 0: Initialization processing was completed successfully. Any other value: Error code (initialization processing ended in an error)
2D1H	Source node IP address	[Stored value] Source node IP address when initialization processing was completed successfully. - The source node address in the initialization information setting area is written. - The value is not entered until initialization processing has been completed successfully.
2D2H	Source node IP address	
2D3H	Communication function setting between networks	[Stored value] 0: Communication function setting between networks is not used. 1: Communication function setting between networks is used. - The value is not entered until initialization processing has been completed successfully.
2D4H	Source node MEWTOCOL station number	[Stored value] Source node MEWTOCOL station number when initialization processing has been completed successfully. - The source node MEWTOCOL station number in the initialization information setting area is written. - The value is not entered until initialization processing has been completed successfully.
2D5H (lower word)	Source node Ethernet address (48 bits)	[Stored value] Source node Ethernet address in the EEPROM Example: If 1.2.3.4.5.6 has been set: 2D5H 0506H 2D6H 0304H 2D7H 0102H - The value is not entered until initialization processing has been completed successfully.
2D6H		
2D7H (higher word)		

Address	Name	Setting value and explanation
2D8H	Reserved (Used by the system.)	
2D9H		
2DAH		
2DBH		
2DCH		
2DDH		
2DEH		
2DFH		

5.4 Sample Program

This sample program assumes that the ET-LAN has been installed in slot no. 0.

Program example



Allocation of internal relays

Classification	Device number	Device used in program example
Complete signal area	R0 to R1F	RD: Initialization error signal
Request signal area	R40 to R5F	R4C: Initialization request signal

Allocation of data registers

Classification of processing	Device number	Setting item	Program example setting
Initialization processing	DT10 to DT11	Source node IP address	192.168.1.1
	DT12	Communication function setting between networks	Not used
	DT13	Source node MEWTOCOL station number	01

Chapter 6

Open Processing and Close Processing

6.1 Open/Close Processing

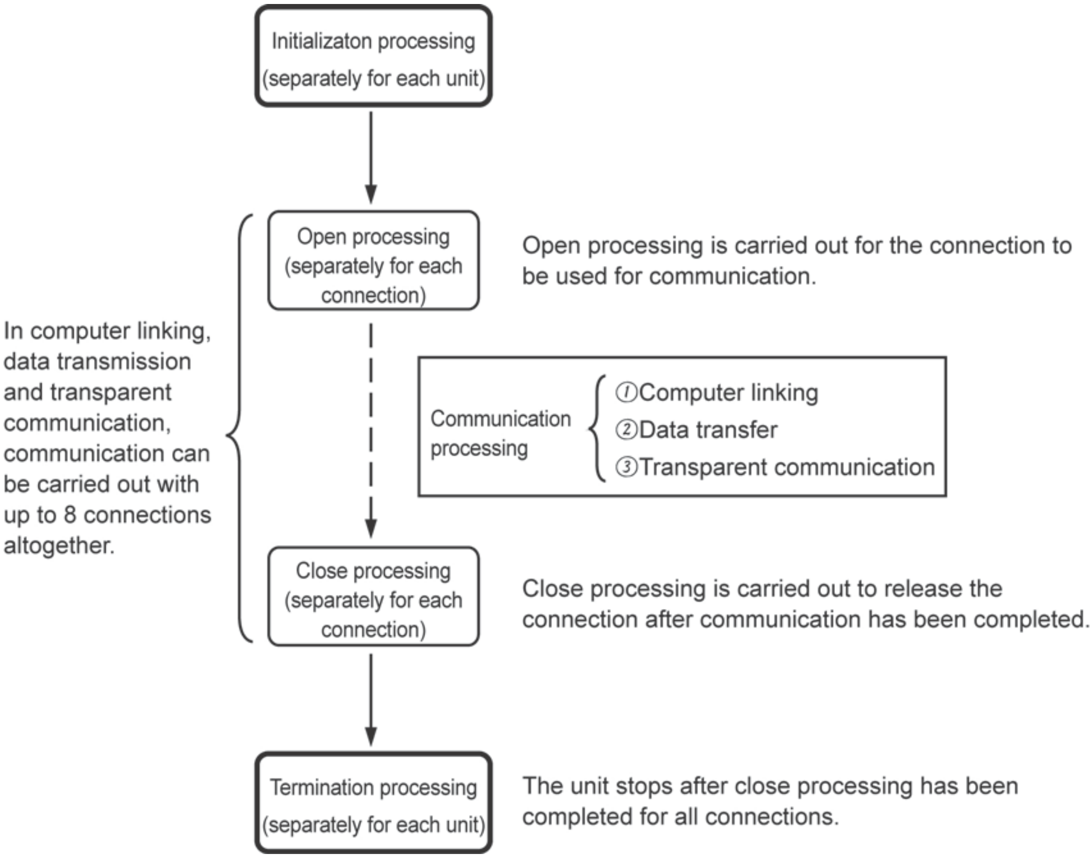
6.1.1 What is Open Processing?

Setting the connection information used to carry out communication with a partner node and enabling communication is called open processing.
Connectors for up to eight connections can be opened with a single ET-LAN unit. The contents noted in the table below are set in the open information setting area of the shared memory in the unit for each connection.
When communication has been completed, close processing can be used to release the connection.

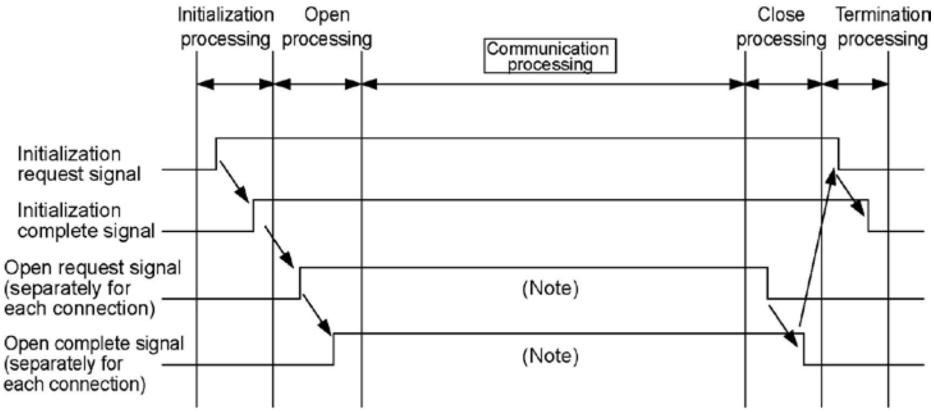
Items set for open processing

<table>
<tr><th>Setting area</th><th colspan="2">Setting item</th></tr>
<tr><td rowspan="8">Open information setting area</td><td rowspan="3">Application being used</td><td>Communication method (TCP/IP or UDP/IP)</td></tr>
<tr><td>Open method (Active, Fullpassive or Unpassive)</td></tr>
<tr><td>Application using the connection (MEWTOCOL communication or transparent communication)</td></tr>
<tr><td colspan="2">Source node port No.</td></tr>
<tr><td colspan="2">Partner node IP address</td></tr>
<tr><td colspan="2">Partner node port No.</td></tr>
<tr><td colspan="2">Partner node MEWTOCOL station number</td></tr>
<tr><td colspan="2">Partner node Ethernet address</td></tr>
</table>

Operation of the ET-LAN unit



The relationship between open processing and close processing



Note: When the initialization complete signal is on, any number of open processing and close processing operations can be performed.
By changing the setting and performing re-open processing, it is possible to communicate with a different partner.

6.1.2 Types of Open Processing

Open processing when using TCP/IP

- Transmission Control Protocol (TCP) is a type of connection protocol in which it is necessary to open mutual connections between the source and partner nodes before communication processing can be carried out.
- There are three ways to open a connection, as described on the following page.
- With the ET-LAN unit, the method of opening the connection is specified by writing a value to the shared memory.

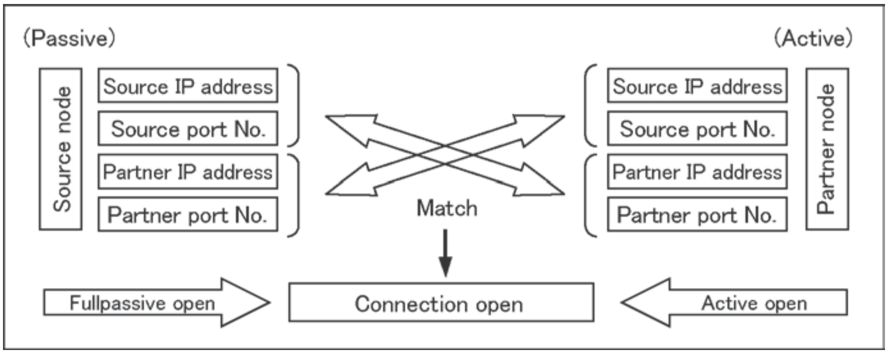
Open processing when using UDP/IP

- User Datagram Protocol (UDP) is a protocol in which connections are not used. Data can be transferred simply by specifying the IP address of the partner node and the number of the port being used, so no mutual connections need to be opened.
- With the ET-LAN unit, however, open processing is necessary in order to specify the application, the number of the port being used, and the IP address.

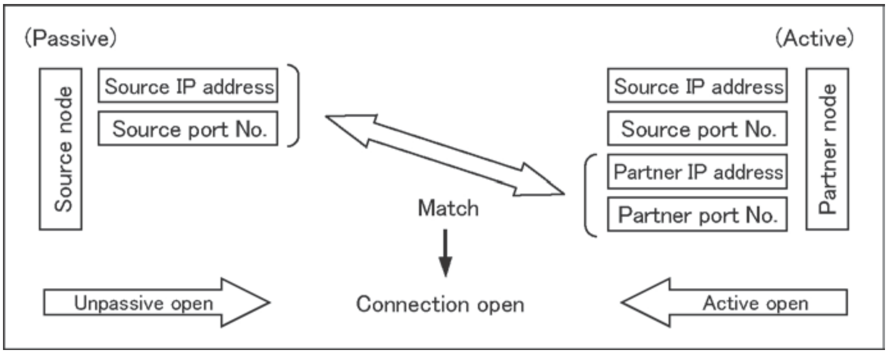
Note:

If connections have been functionally opened for both the source and partner nodes (active connections are open), or if the connections between the source and partner nodes are passively open (Fullpassive open or Unpassive open), no connection is opened between the nodes when open processing is carried out.

Fullpassive open (Passive connection open)
The system is waiting for data to be received from a given partner node, in order to establish a connection. In the Fullpassive open method, the IP address and port number of the partner node are specified, and then the system waits for reception.

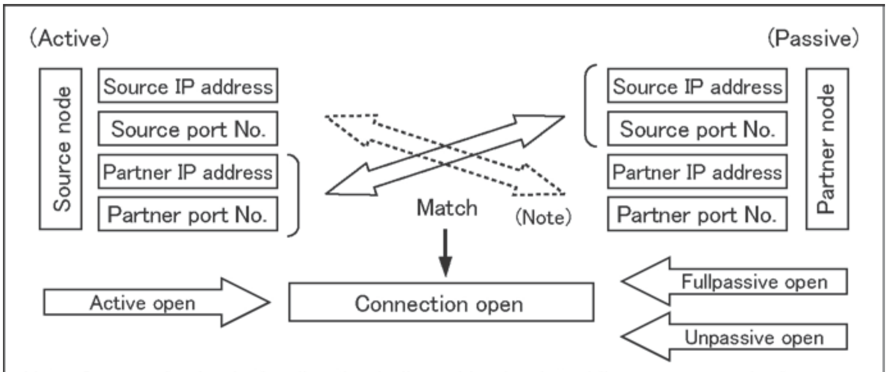


Unpassive open (Passive connection open)
The system is waiting for data to be received from an unspecified partner node, in order to establish a connection. In the Unpassive open method, the connection information concerning the partner node should be read and confirmed when a connection has been opened.



Active open (Active connection open)

The connection is actively established. When the Active open is specified, the source node should not begin Active open processing until the partner node has begun Fullpassive/Unpassive open processing.



Note: Communication in the direction indicated by the dotted-line arrow must be in agreement only if the partner node is in the Fullpassive open state.

6.2 Processing Procedures

6.2.1 An Overview of the Open Processing Procedure

(1) The data required for communication with the partner node is set in the connection information setting area (Bank: 0, Addresses 250H to 2CFH).

(2) The open request signal is turned on.

Hand-shake method	**Open request signal bit**							
	Conne-ction 1	**Conne-ction 2**	**Conne-ction 3**	**Conne-ction 4**	**Conne-ction 5**	**Conne-ction 6**	**Conne-ction 7**	**Conne-ction 8**
When I/O is used for handshake	Y30	Y32	Y34	Y36	Y38	Y3A	Y3C	Y3E
When shared memory is used for handshake	**Bank 0: Address 369H**							
	Bit 0	Bit 2	Bit 4	Bit 6	Bit 8	Bit A	Bit C	Bit E

(3) Check to make sure the pen complete signal is on.

Hand-shake method	**Open request signal bit**							
	Conne-ction 1	**Conne-ction 2**	**Conne-ction 3**	**Conne-ction 4**	**Conne-ction 5**	**Conne-ction 6**	**Conne-ction 7**	**Conne-ction 8**
When I/O is used for handshake	X10	X12	X14	X16	X18	X1A	X1C	X1E
When shared memory is used for handshake	**Bank 0: Address 361H**							
	Bit 0	Bit 2	Bit 4	Bit 6	Bit 8	Bit A	Bit C	Bit E

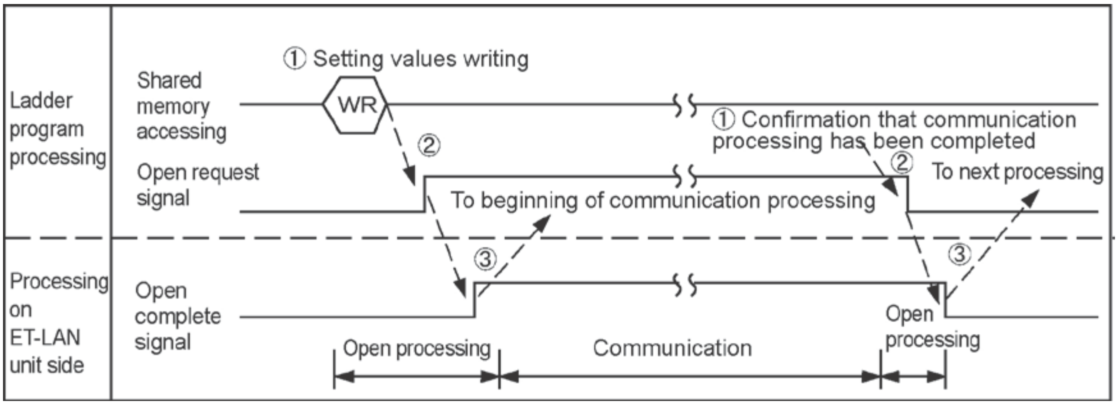
Note:

- The connection information setting area should be specified before open processing is carried out (the request signal goes on).
- Changes to the connection information setting area are invalid while the open complete signal is on. To change the contents of the area, first close the connection, and then carry out re-open processing after the changes have been made.
- The open request signal should be kept on until close processing is carried out.

6.2.2 An Overview of the Close Processing Procedure

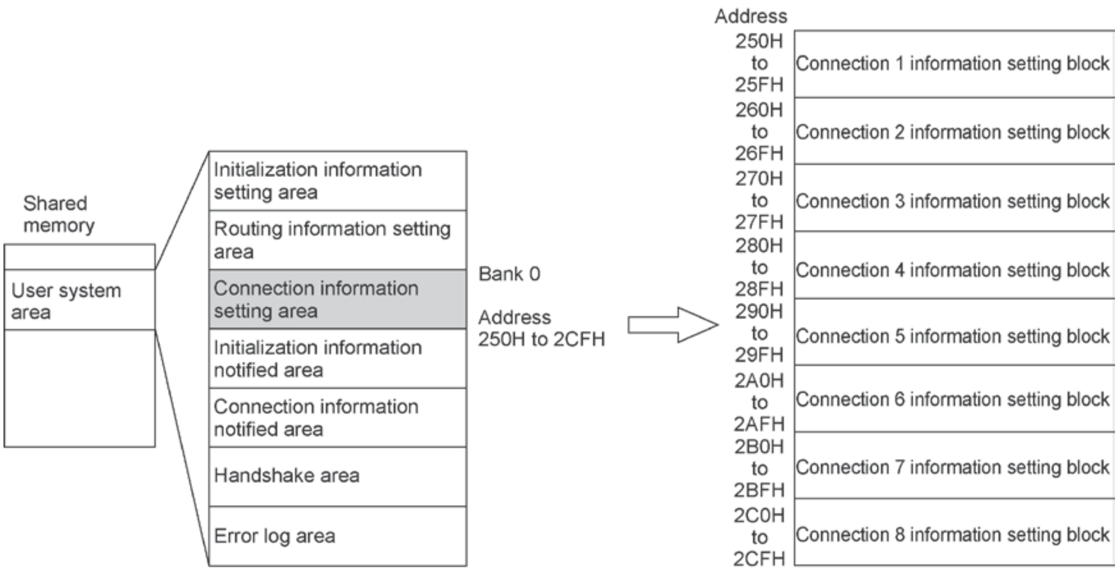
(1) Check to make sure the open complete signal is on.
(2) Turn off the open request signal.
(3) Check to make sure the open complete signal is off.

Timing chart for open and close processing



6.2.3 Writing Data to the Connection Information Setting Area

The necessary data is written to the connection information setting area (Bank 0: Addresses 250H to 2CFH) of the shared memory using the shared memory writing instructions F151 (WRT) and P151 (PWRT).



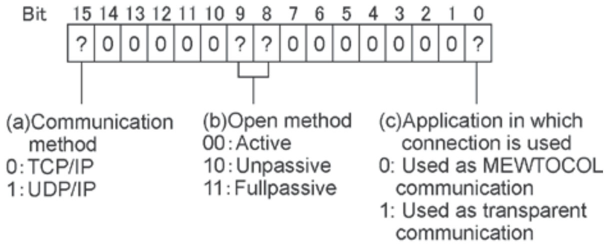
(Shared memory addresses are allocated in word units.)

- The connection information setting area consists of eight blocks, to match the number of connections.
- The offset address contents from the table in the next page are allocated for the various connections.

Key Point:

- Offset addresses 0 to 8 are written before open processing is carried out.
- Offset addresses D and F are used when communication processing is being carried out using the transparent communication function.

Offset address

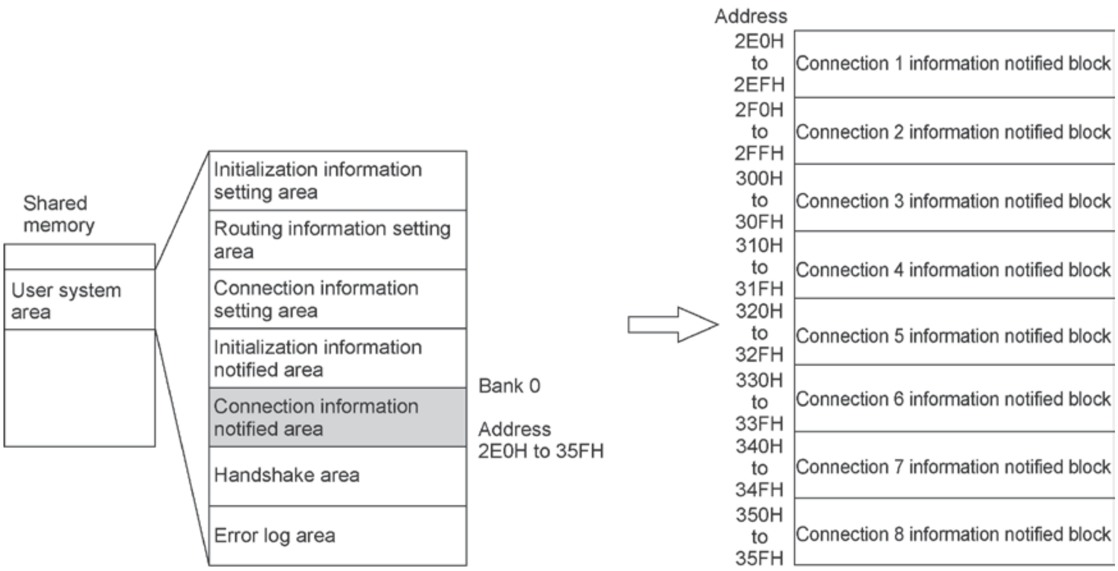
<table>
<tr><th>Offset address</th><th>Name</th><th>Default value</th><th>Set value and Explanation</th></tr>
<tr><td>0</td><td>Setting area for application being used (connections 1 to 8)</td><td>0000H</td><td>[Set value] 1-word data that sets the communication conditions for the various connections as bit information.


(a) Communication method
Specify whether the communication method for each connection is TCP/IP or UDP/IP. If using the data transfer function, always set TCP/IP.
(b) Opening method
This is valid only if TCP/IP was specified as the communication method.
Active open: Connection is actively established.
Fullpassive open: System waits for reception from a specified partner node in order to establish a connection.
Unpassive open: System waits for reception from an unspecified partner node in order to establish a connection.
(c) Application in which connection is used.
If using computer linking or data transfer, set “0: MEWTOCOL communication”.
If using transparent communication, set “1: Transparent communication”.</td></tr>
<tr><td>1</td><td>Source node port No. (connections 1 to 8)</td><td>0000H</td><td>[Set value] TCP or UDP communication process port number.
- Set any port number other than 0H (a value of 8000 (1F40) or higher is recommended).</td></tr>
<tr><td>2</td><td>Partner node IP address (L) (connections 1 to 8)</td><td>0000H</td><td rowspan="2">[Set value] Partner node IP address
When using TCP Fullpassive and Active open:
Specify an IP address for the partner node that is in the same class, and is other than 0H or FFFFFFFFH.
When using UDP:
Use an IP address for the partner node that is in the same class, and is other than 0H.
When using TCP Unpassive open:
No address needs to be specified.</td></tr>
<tr><td>3</td><td>Partner node IP address (H) (connections 1 to 8)</td><td>0000H</td></tr>
<tr><td>4</td><td>Partner node port No. (connections 1 to 8)</td><td>0000H</td><td>[Set value] Partner node port number
- Set any port number other than 0H (a value of 8000 (1F40) or higher is recommended).
- This is not necessary when using TCP Unpassive open.</td></tr>
</table>

<table>
<tr><th>Offset address</th><th>Name</th><th>Default value</th><th>Set value and Explanation</th></tr>
<tr><td>5</td><td>Partner node MEWTOCOL station number (connections 1 to 8)</td><td>0000H</td><td>[Set value] 1 to 40H (1 to 64)
- Set the station number of the partner node when MEWTOCOL communication is being carried out.
- Avoid duplicating the number of another station on the network.
- This is ignored if MEWTOCOL communication is not being used.</td></tr>
<tr><td>6</td><td rowspan="3">Partner node Ethernet address (connections 1 to 8)</td><td>0000H</td><td rowspan="3">[Set value] Ethernet address of partner node
- When using TCP Active open, if the partner node has no ARP function, specify this.
Example: If 1.2.3.4.5.6 is set, the offset addresses will be:
6 0506H
7 0304H
8 0102H
- If “0” or “FFFFFFFFFFFFH” is specified for this value, processing will be carried out as though the partner node has an ARP function.</td></tr>
<tr><td>7</td><td>0000H</td></tr>
<tr><td>8</td><td>0000H</td></tr>
<tr><td>9</td><td colspan="3" rowspan="4">Reserved (Used by the system.)
If any value is written to these, it should be 0000H.</td></tr>
<tr><td>A</td></tr>
<tr><td>B</td></tr>
<tr><td>C</td></tr>
<tr><td>D</td><td>Receive request data size (connections 1 to 8)</td><td>0000H</td><td>[Set value] Receive request data size (in byte units)
-This is specified if data is being received in transparent communication. No receive notification is made until data equal to the specified size has been received.
- If “FFFFH” is specified, direct reception is carried out (the receive complete signal goes on each time a packet is received).
- Specify a size such that the receive request data size is less than or equal to the size of the receive buffer x 2.</td></tr>
<tr><td>E</td><td colspan="3">Reserved (Used by the system.)
If any value is written to these, it should be 0000H.</td></tr>
<tr><td>F</td><td>Transmission request data size (connections 1 to 8)</td><td>0000H</td><td>[Set value] Transmission request data size (in byte units)
- If data is being sent using transparent communication, specify the size of the data being sent in byte units.
- Specify a size such that the transmission request data size is less than or equal to the size of the transmission buffer x 2.</td></tr>
</table>

6.3 Reading Connection Information

The current statuses of the settings for the various connections can be read from the shared memory. Settings are read from the connection information notified area (Bank 0: Address 2E0H to 35FH) using the shared memory reading instructions F150 (READ) and P150 (PREAD).

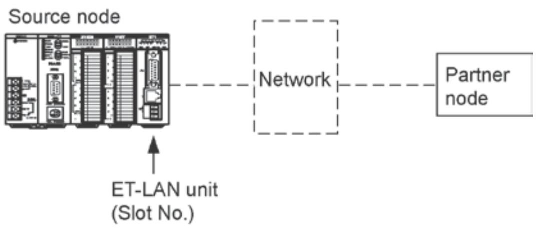


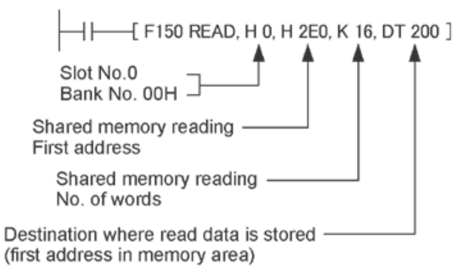
(Shared memory addresses are allocated in word units.)

- The connection information setting area consists of eight blocks, to match the number of connections.
- The offset address contents from the table in the next page are allocated for the various connections.

Program example

This program uses an ET-LAN installed in slot no. 0, as shown below, and reads the connection information for connection 1.





Key Point:

- Offset addresses 0 to 4 are stored after open processing has been completed.
- Offset addresses A to F are stored after communication processing has been completed, when using the transparent communication function.

Offset address

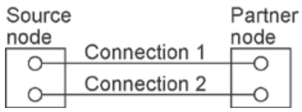
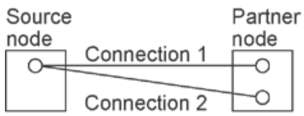
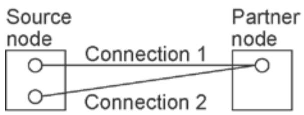
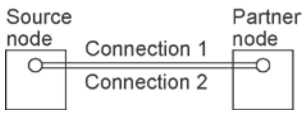
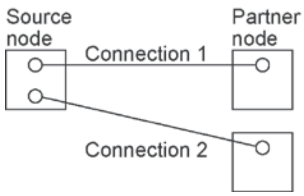
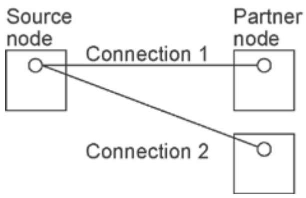
Offset address	Name	Stored value and Explanation
0	Open processing complete code (connections 1 to 8)	[Stored value] 0: Open processing has been completed successfully. Other than 0: Error code (when open processing ended in an error) - If re-open processing is carried out, the results are overwritten. - Error codes are also stored in the error log area.
1	Source node port No. (connections 1 to 8)	[Stored value] Source node port numbers for various connections after open processing has been completed. - The value is not entered until open processing has been successfully completed.
2	Partner node IP address (L) (connections 1 to 8)	[Stored value] Partner node IP addresses for various connections after open processing has been completed. -The value is not entered until open processing has been successfully completed.
3	Partner node IP address (H) (connections 1 to 8)	
4	Partner node port No. (connections 1 to 8)	[Stored value] Partner node IP port numbers for various connections after open processing has been completed. - The value is not entered until open processing has been successfully completed.
5	Partner node MEWTOCOL station number (connections 1 to 8)	[Stored value] Partner node MEWTOCOL station numbers for various connections after open processing has been completed. - The value is not entered until open processing has been successfully completed.
6	Connection closing time (connections 1 to 8)	[Stored value] Specified unused connection disconnect time - The value is not entered until initial processing has been successfully completed.
7	Re-opening information (connections 1 to 8)	They are stored only when the auto connection function is available. For the details, refer to 10.1.5 Auto Connection Information.
8	Communication method Opening method Application of connection (connections 1 to 8)	
9	Reserved (Used by the system)	
A	Transparent receive processing complete code (connections 1 to 8)	[Stored value] 0: Receive processing completed normally. Other than 0: Error code (stored when the receive processing error is completed) - Result is written when receive processing is done again. - The error code is stored in the error log area.
B	Transparent receive unnotified data size (connections 1 to 8)	[Stored value] Size of the transparent received data remaining in the ET-LAN unit (in bytes). - Receive processing for this amount of data will finish normally and receive requests accepted even if the connection is closed.

Offset address	Name	Stored value and Explanation
C	Transparent receive unnotified data size copy (connections 1 to 8)	[Stored value] Copy of the size of the transparent received data remaining in the ET-LAN unit (in bytes). - The same value as the transparent receive unnotified data size above is stored. - If the two values match, the size of the transparent receive data will be fixed, so after they match, send a receive request using this value.
D	Transparent receive notified data size (connections 1 to 8)	[Stored value] Size of the data actually received for the receive request in transparent communication (in byte units) - It is not possible for this value to be notified as exceeding the receive request data size. - If the connection has been closed, receive processing may end in some cases even if the receive request data size has not been satisfied. If this happens, this value is notified as being less than the receive request data size.
E	Transparent transmission processing complete code (connections 1 to 8)	[Stored value] 0: Transmission processing has been completed successfully. Other than 0: Error code (when transmission processing ended in an error) - If transmission processing is carried out again, the results are overwritten. - Error codes are also stored in the error log area.
F	Transparent transmission complete data size (connections 1 to 8)	[Stored value] Size of the data actually sent to the partner node for the transmission request in transparent communication (in byte units) - It is not possible for this value to be notified as exceeding the transmission request data size. - If the connection has been closed by the partner node during the transmission, the transmission may be aborted. If this happens this value is notified as being less than the transmission request data size. - If close processing is requested by the source node during the transmission, the transmission processing is carried out first, and then close processing is carried out. - Even if the transmission processing ends in an error for some reason, transmission processing of the size of data corresponding to this value is completed normally.

Port number settings

Port numbers are allocated in order for the various communication processes provided by the TCP/IP or UDP/IP to be differentiated by the programmable controller or the computer.

The restrictions that apply to available port numbers are different for TCP/IP and UDP/IP, as indicated in the table below.

	Setting status of port no. in open processing		Applicable communication protocol	
			TCP/IP	UDP/IP
Multiple connections with a single partner node		Multiple settings for both source node port number and partner node port number	Available	Available
Multiple connections with a single partner node		Single setting for source node port number, multiple settings for partner node port number	Not available	Not available
Multiple connections with a single partner node		Multiple settings for source node port number, single setting for partner node port number	Available	Not available
Multiple connections with a single partner node		Neither source node port number nor partner node port number can be set to single setting	Not available	Not available
Connections with multiple nodes		Multiple settings for source node port number	Available	Available
Connections with multiple nodes		Single setting for source node port number	Not available	Not available

- We recommend setting the port number to a value of 8000 (1F40) or higher.
- The same port number can be specified for the source node and the partner node.
- The same port number can be specified for TCP and UDP.

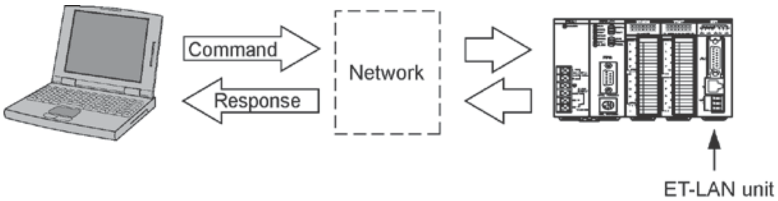
Chapter 7

Computer Link Function

7.1 An Overview of the Computer Link Function

7.1.1 What is the Computer Link Function?

A computer link is a function that enables a computer to read data from, and write data to, the I/O or register of a programmable controller, and to read from and write to the contents of the registers and programs in the controller.
An interactive communication procedure (protocol) called MEWTOCOL-COM is used for the computer link.
Communication is carried out by the computer sending command (instruction) messages to the programmable controller and receiving response messages from the programmable controller.



When the programmable controller receives a command message, it automatically returns a response message.
After a connection has been opened, there is no need to create a program on the programmable controller side to handle communication.

Key Point:

- With a computer link, the programmable controller specifies an IP address and a MEWTOCOL station number (1 to 64), and opens a connection with the computer (partner node) in the MEWTOCOL communication mode.
- A computer link enables up to eight simultaneous connections, in conjunction with other communication functions, using a single ET-LAN unit.
- The computer link function and data transmission function can be run on the same connection at the same time.

7.1.2 Commands and Functions Available for Use

MEWTOCOL-COM Commands

Command name	Code	Description
Read contact area	RC (RCS) (RCP) (RCC)	Reads the on/off status of relays. - Specifies only one point. - Specifies multiple points. - Specifies a range in word units.
Write contact area	WC (WCS) (WCP) (WCC)	Turns relays on and off. - Specifies only one point. - Specifies multiple points. - Specifies a range in word units.
Read data area	RD	Reads the contents of a data area.
Write data area	WD	Writes data to a data area.
Read timer/counter set value area	RS	Reads the set value for a timer/counter.
Write timer/counter set value area	WS	Writes the set value for a timer/counter.
Read timer/counter elapsed value area	RK	Reads the timer/counter elapsed value.
Write timer/counter elapsed value area	WK	Writes the timer/counter elapsed value.
Register or Reset contacts monitored	MC	Registers the relay to be monitored.
Register or Reset data monitored	MD	Registers the data to be monitored.
Monitoring start	MG	Monitors a registered relay or data.
Preset contact area (fill command)	SC	Embeds the area of a specified range in a 16-point on/off pattern.
Preset data area (fill command)	SD	Writes the same contents to the data area of a specified range.
Read system register	RR	Reads the contents of a system register.
Write system register	WR	Specifies the contents of a system register.
Read the status of PLC	RT	Reads the specifications of the programmable controller and error codes if an error occurs.
Remote control	RM	Switches the operation mode of the programmable controller.
Abort	AB	Aborts communication.

Key Point:

- Commands and responses used with the ET-LAN unit have a dedicated header added to the "MEWTOCOL-COM" communication procedure of the FP series PLC.
- The contents of the specified header vary depending on the communication conditions.
- With the ET-LAN unit, in addition to ordinary MEWTOCOL, an expansion header is also supported that enables single frames of up to 2048 characters to be sent.

Type of header	No. of characters that can be sent in 1 frame
%	Max. 118 characters
<	Max. 2048 characters

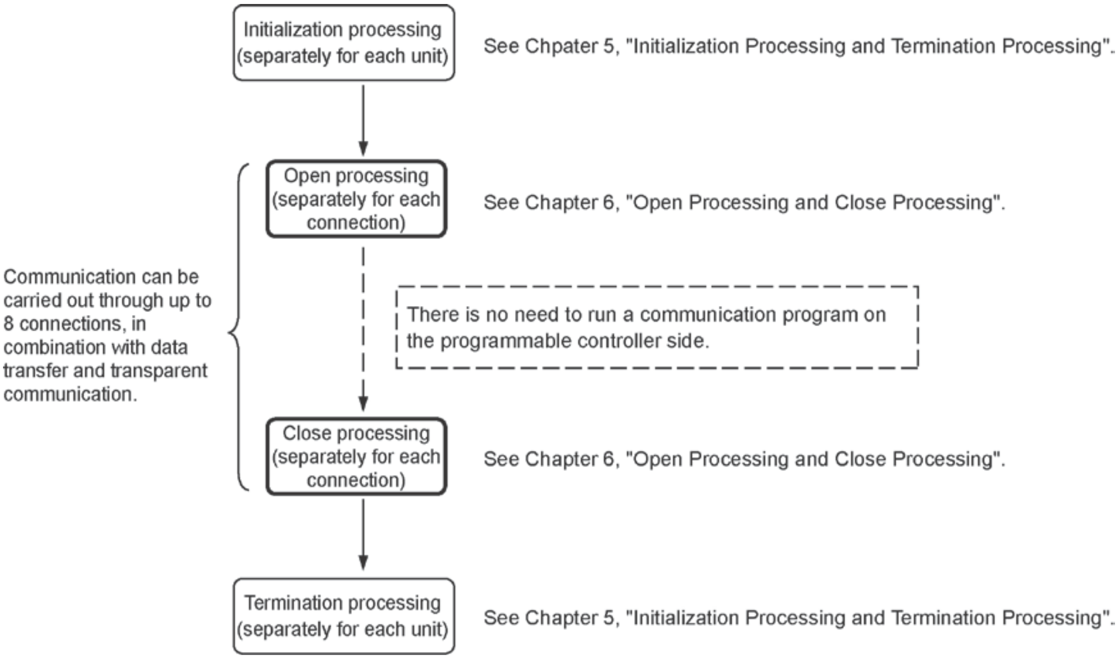
- The number of characters that can be sent is restricted by the type of header and the command.

Reference: For detailed information on MEWTOCOL-COM, please see Chapter 12.

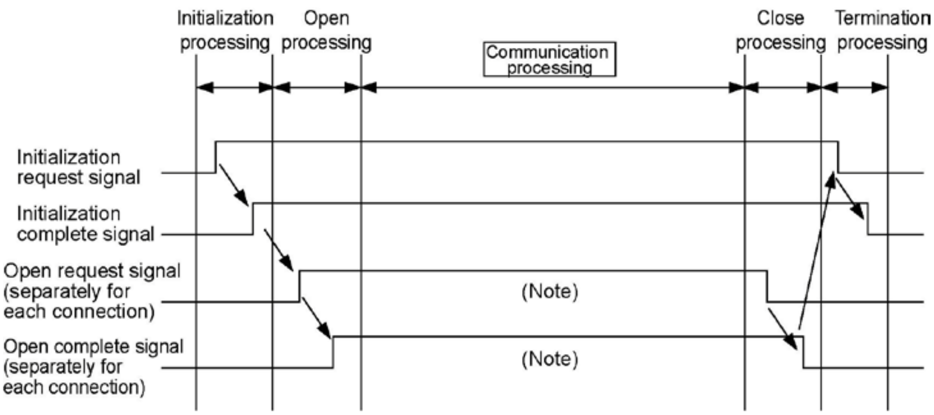
7.2 Computer Link Procedure

When computer link communication is being carried out on the programmable controller side, open processing is used to specify the MEWTOCOL communication mode and to open the connection with the partner node after initialization processing for the unit has been carried out. After a connection has been opened with the partner node computer, there is no need to run a communication program on the programmable controller side. Instead, the programmable controller receives command messages from the computer, and automatically sends response messages back.

Procedure for setting up an ET-LAN unit computer link



The relationship between open processing and close processing

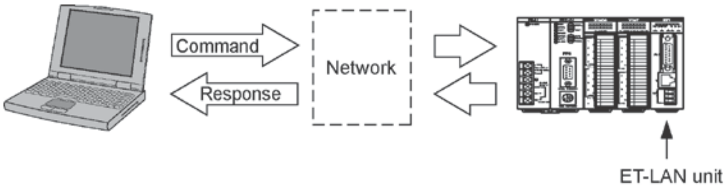


Note: When the initialization complete signal is on, any number of open processing and close processing operations can be performed.
By changing the setting and performing re-open processing, it is possible to communicate with a different partner.

7.3 Settings on the PLC Side

7.3.1 Connection Information Settings

A memory area such as the data registers of the programmable controller is set aside, and the data to be written to the connection information area of the shared memory is specified when the open processing is carried out.
When using a computer link, the contents of the specified data are as indicated below.



Contents of data settings

Offset address	Name	Set value and Explanation	
DTn	Setting area for application being used	Set value: 8000H When using UDP/IP	1000 0000 0000 0000
		Set value: 0000H When using TCP/IP Active open	0000 0000 0000 0000
		Set value: 0300H When using TCP/IP Fullpassive open	0000 0011 0000 0000
		Set value: 0200H When using TCP/IP Unpassive open	0000 0010 0000 0000
DTn+1	Source node port No.	Specify any port number other than 0H. (A value of 8000 (1F40) or higher is recommended.)	
DTn+2	Partner node IP address (L)	Specify the IP address of the partner node. Example: To specify 192.168.1.2 (C0 A8 01 02H): DTn+2: 0102H DTn+3: C0A8H This is not necessary when using the Unpassive open mode of TCP/IP.	
DTn+3	Partner node IP address (H)		
DTn+4	Partner node port No.	Specify any port number for the partner node other than 0H. (A value of 8000 (1F40) or higher is recommended.) This is not necessary when using the Unpassive open mode of TCP/IP.	
DTn+5	Partner node MEWTOCOL station number	Always specify a MEWTOCOL station number of between 1H and 40H (1 to 64) for the partner node computer.	
DTn+6	Partner node Ethernet address	When using the Active open mode of TCP/IP, if the partner node has no ARP function, specify the Ethernet address of the partner node. In any other case, specify 0H. Example: To specify 1.2.3.4.5.6: DTn+6 0506H DTn+7 0304H DTn+8 0102H	
DTn+7			
DTn+8			

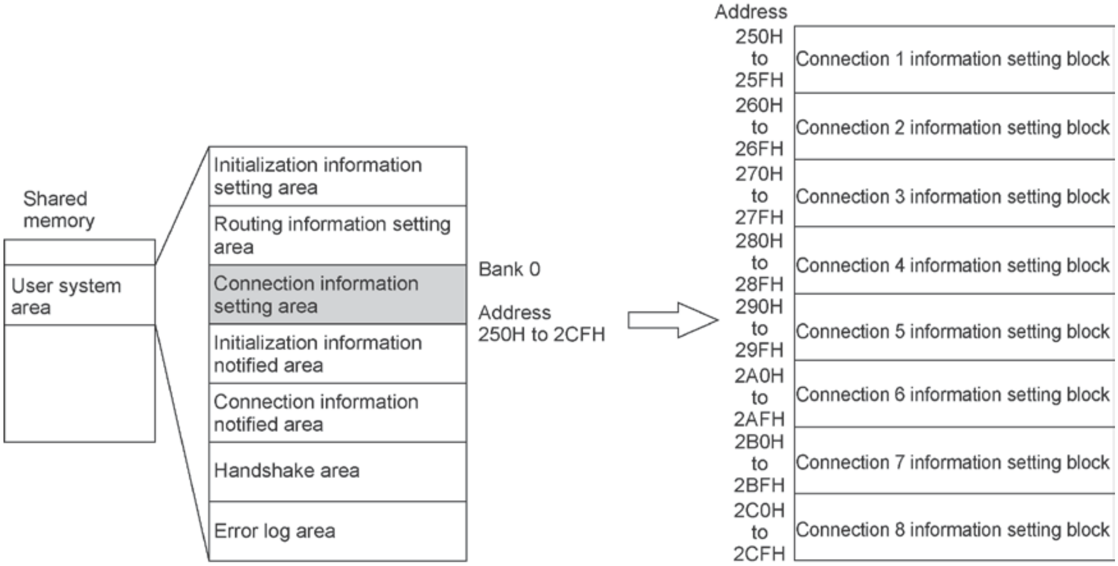
Note:

- We recommend specifying a port number of 8000 (1F40) or higher.
- Specify a MEWTOCOL station number within a range of 1 to 64, choosing a number that does not duplicate any other station number on the same network.
- When using the Active open mode, if the partner node has no ARP function, specify the Ethernet address of the partner node for "DTn+6 to DTn+8".

7.3.2 Writing to the Shared Memory

The specified data is written to the connection information setting area of the shared memory using the shared memory writing instructions F151 (WRT) and P151 (PWRT).

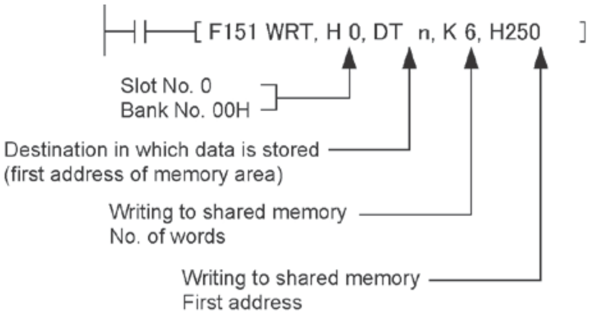
Shared memory address



(Shared memory addresses are allocated in word units.)

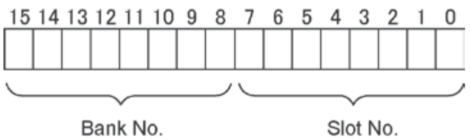
Program example

If using connection 1 of the ET-LAN unit installed in slot no. 0, the program for writing data to the shared memory would be as follows.



Key Point:

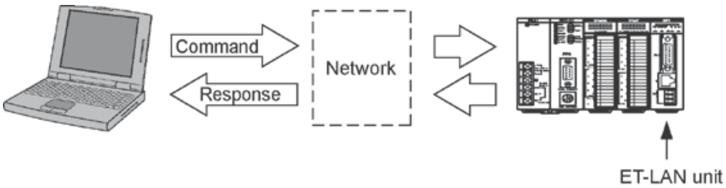
- The slot number and bank number to be used by the shared memory writing instructions F151 (WRT) and P151 (PWRT) are specified as follows.



7.3.3 Sample Program

Program contents

- The sample program is for an ET-LAN unit installed in slot no. 0, and covers communication settings up to where the connection is opened as a result of the contents noted below.
- After the connection has been opened, no communication program is necessary on the PLC side.



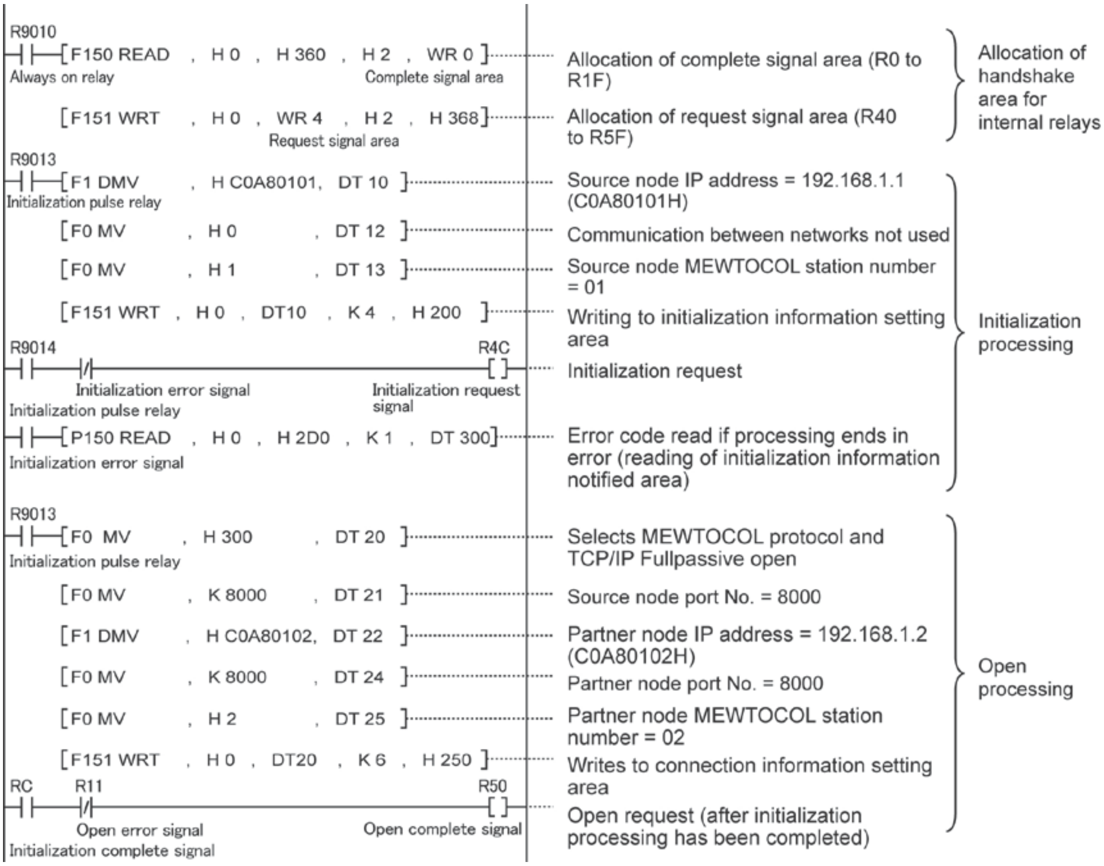
Internal relay allocation

Classification	Device number	Devices used in program example
Complete signal area	R0 to R1F	RC Initialization complete signal RD Initialization error signal R11 Open error signal (Connection 1)
Request signal area	R40 to R5F	R4C Initialization request signal R50 Open request signal (Connection 1)

Data register allocation

Classification of processing	Device number	Setting item	Setting for program example
Initialization processing	DT10 to DT11	Source node IP address	192.168.1.1 (C0A80101H)
	DT12	Communication function setting between networks	Not used
	DT13	Source node MEWTOCOL station number	01
Open processing	DT20	Open method	MEWTOCOL communication TCP/IP Fullpassive open
	DT21	Source node port No.	8000
	DT22 to DT23	Partner node IP address	192.168.1.2 (C0A80102H)
	DT24	Partner node port No.	8000
	DT25	Partner node MEWTOCOL station number	02

Program example

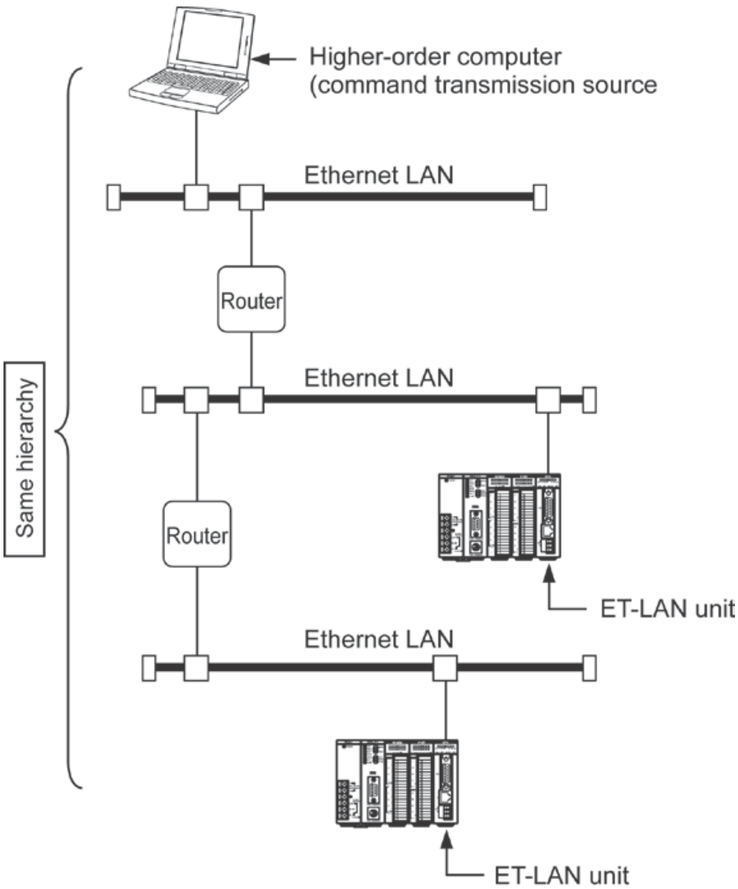


7.4 Command Communication on the Computer Side

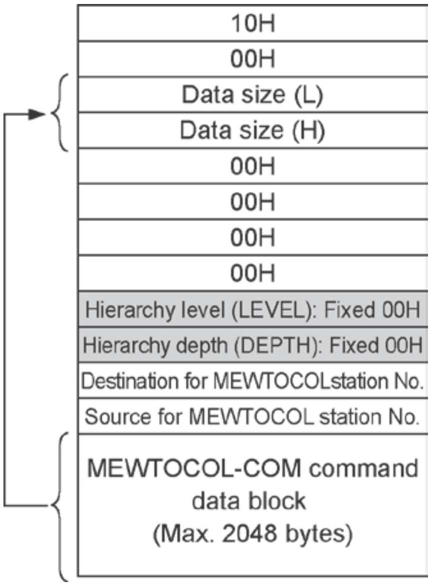
7.4.1 Communication Data Format (1)

Format when the partner node is on the same hierarchy level as the MEWTOCOL communication

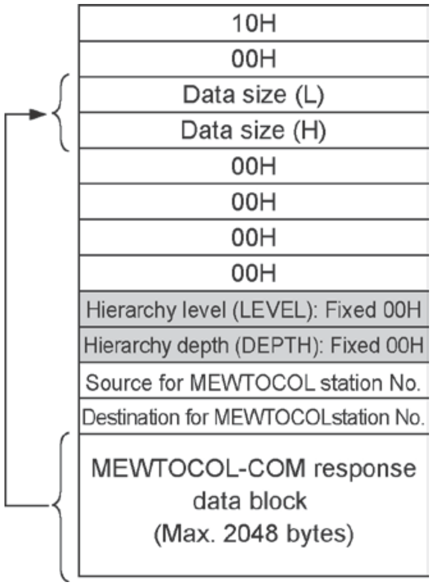
- If there is no other link unit between the computer and the partner node, acting as a relay station, the partner node is said to be on the same hierarchy level as the computer.
- With the ET-LAN unit, if the computer link function is being used with a unit on the same hierarchy level, commands and responses are sent and received using the format noted below.



Format of command transmission data



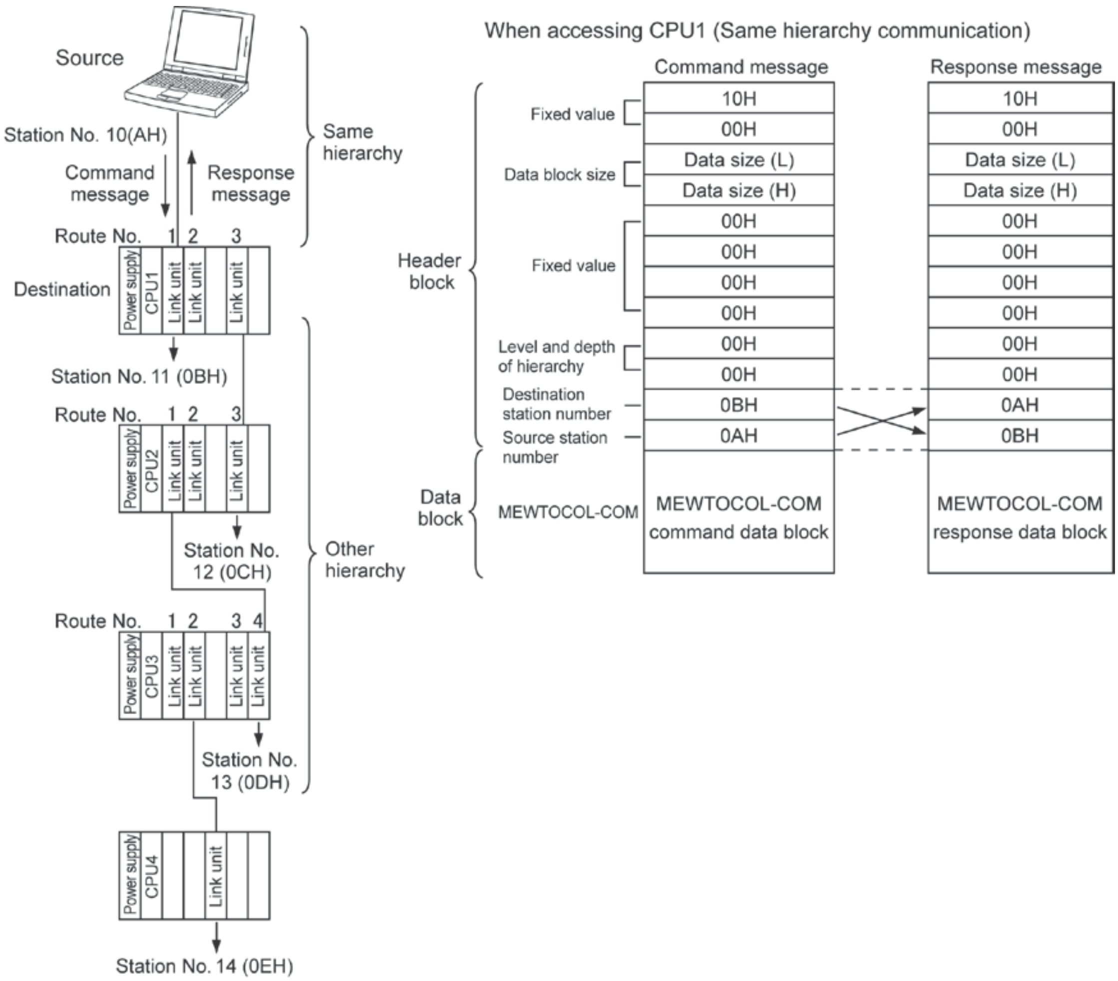
Format of response received data



Precautions concerning format

- The number of bytes comprising the MEWTOCOL-COM command or message is converted to hexadecimal data and specified for the “Data Size” parameter.
- The station number of the station sending the command is specified for “Source for MEWTOCOL station number”.
- The station number of the station receiving the command is specified for “Destination for MEWTOCOL station number”.
- “00H” should be specified for both “Hierarchy level (LEVEL)” and “Hierarchy depth (DEPTH)”.
- "Destination (Source) MEWTOCOL station No." is specified by converting to hexadecimal data.

Example of communication data (Same hierarchy communication)



7.4.2 Communication Data Format (2)

Format when the partner node is not on the same hierarchy level as the MEWTOCOL communication

- If there is another link unit between the computer and the partner node, acting as a relay station, the partner node is said to be on a different hierarchy level from the computer.
- With the ET-LAN unit, if the computer link function is being used with a unit on a different hierarchy level, commands and responses are sent and received using the format noted below.

Format of command transmission data

10H
00H
Data size (L)
Data size (H)
00H
00H
00H
00H
Hierarchy level (LEVEL)
Hierarchy depth (DEPTH)
MEWTOCOL station No. for relay station 1
MEWTOCOL station No. for relay station 2
MEWTOCOL station No. for relay station 3
Destination for MEWTOCOL station No.
Source for MEWTOCOL station No.
Route No. for relay station 1
Route No. for relay station 2
Route No. for relay station 3
MEWTOCOL-COM command data block (Max. 2048 bytes)

Format of response received data

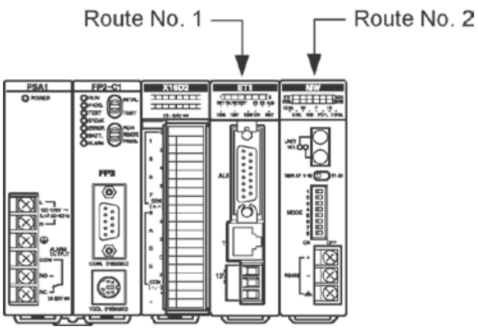
10H
00H
Data size (L)
Data size (H)
00H
00H
00H
00H
Hierarchy level (LEVEL): Fixed 00H
Hierarchy depth (DEPTH)
Source for MEWTOCOL station No.
MEWTOCOL station No. for relay station 1
MEWTOCOL station No. for relay station 2
MEWTOCOL station No. for relay station 3
Destination for MEWTOCOL station No.
Route No. for relay station 1
Route No. for relay station 2
Route No. for relay station 3
MEWTOCOL-COM response data block (Max. 2048 bytes)

Precautions concerning format

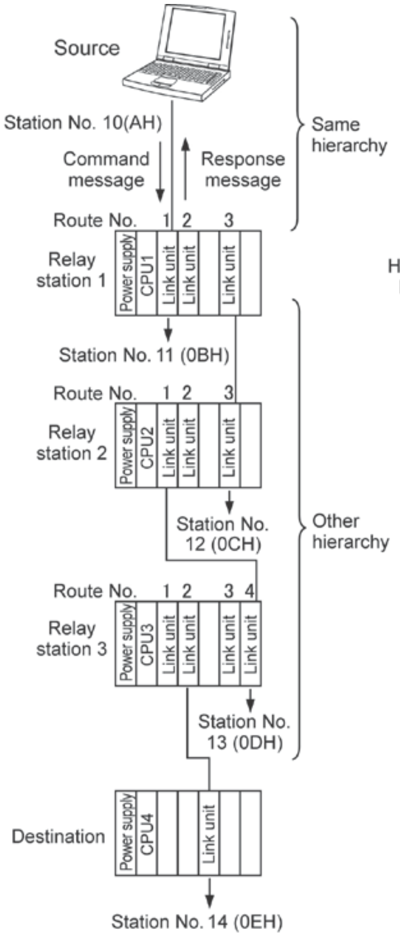
- The number of bytes comprising the MEWTOCOL-COM command or message is converted to hexadecimal data and specified for the “Data Size” parameter.
- The “Station Number for Relay Station” and “Route Number for Relay Station” parameters should be specified using the pertinent number. If there is only one relay station, the spaces for the second and third relay stations will be filled in, closing the gap.

- The station number of the station sending the command is specified for “Source for MEWTOCOL station number”.
- The station number of the station receiving the command is specified for “Destination for MEWTOCOL station number”.
- With commands, the same value should be specified for the “Hierarchy level (LEVEL)” and “Hierarchy depth (DEPTH)” parameters.
- With responses, “Hierarchy level (LEVEL)” is fixed at 00H.
- "Destination (Source) MEWTOCOL station No." is specified by converting to hexadecimal data.

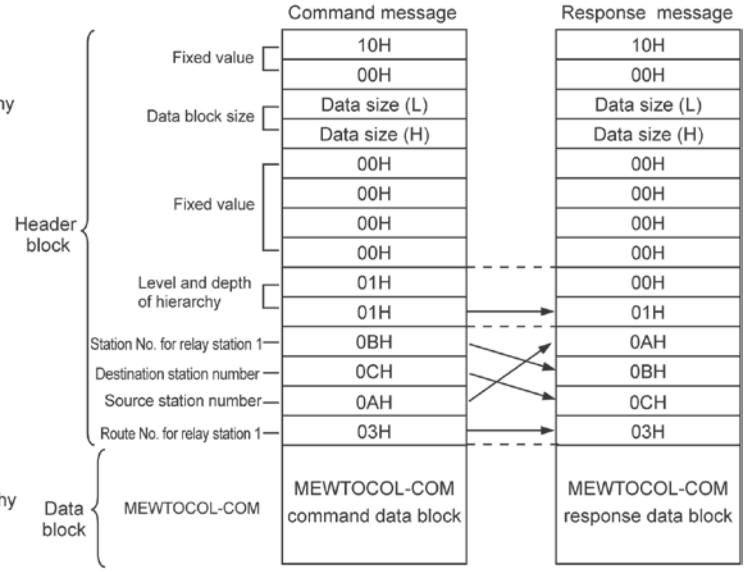
Key Point:
- The route number is a number that is automatically allocated to differentiate units if multiple link-related units are being used on the same backplane.
- With the FP2, this applies to ET-LAN units, multi-wire link units, and computer communication units.
- Route numbers proceed in sequential order (1, 2, 3 …), starting from the unit nearest the CPU unit.
- I/O units other than link-related units and advanced-function units are not included in these “routes”.



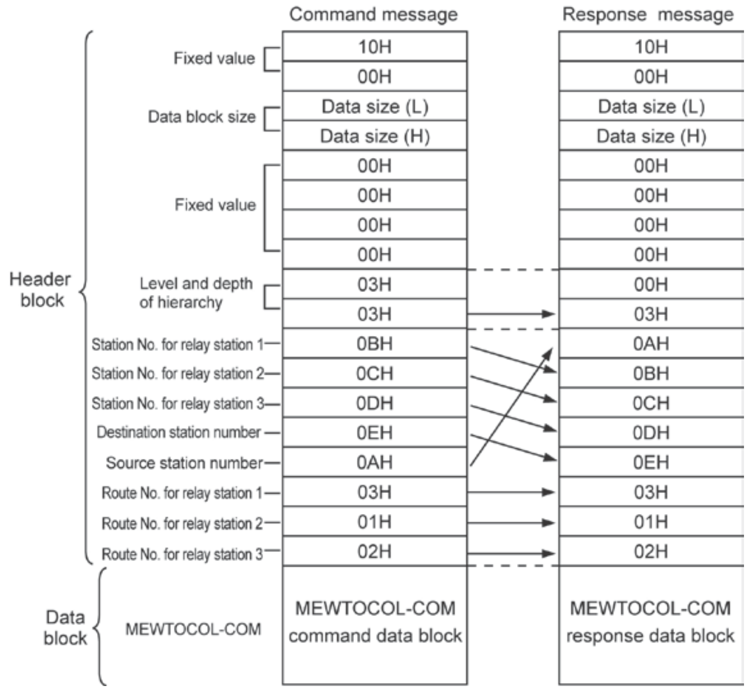
Example of communication data (Other hierarchy communication)



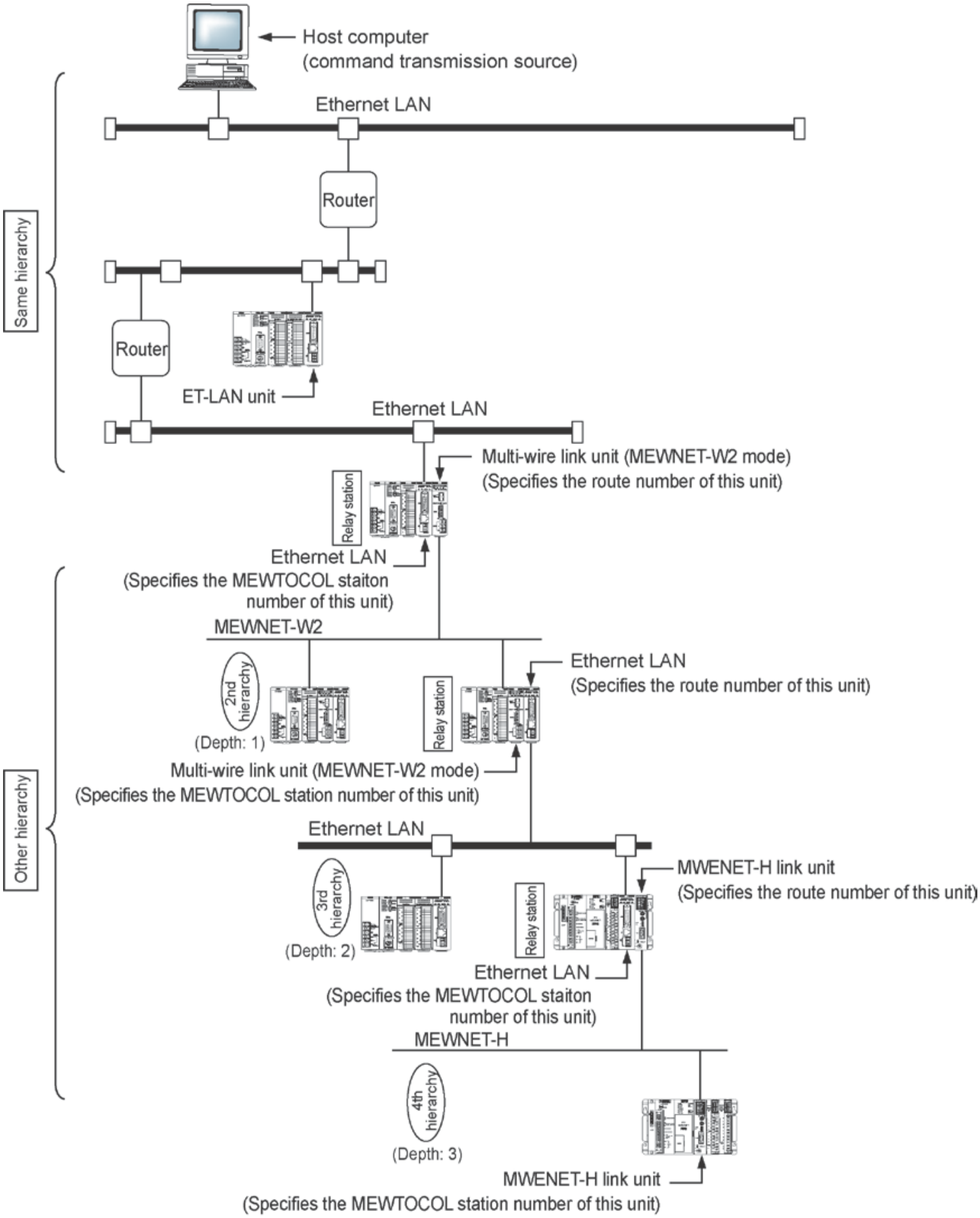
When accessing CPU2 (Other hierarchy communication)



When accessing CPU4 (Other hierarchy communication)



Other hierarchy communication for MEWTOCOL-COM



Chapter 8

Data Transfer Function

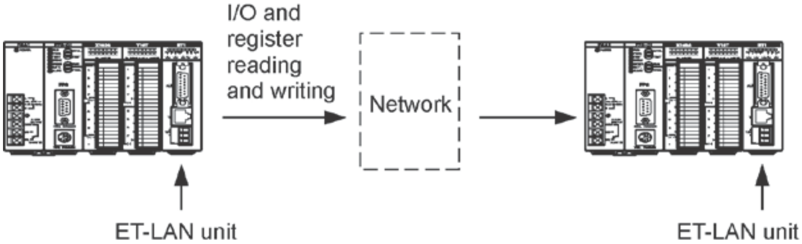
8.1 An Overview of the Data Transfer Function

8.1.1 What is the Data Transfer Function?

With the data transfer function in the ET-LAN unit, program instructions (the SEND and RECV instructions) in the programmable controller are used to transfer data. Data can be transferred between the units indicated below.

- Between open PLC and another
- Between a PLC and computer

The maximum amount of data that can be transferred with a single data transfer instructions is 1020 words.



SEND instruction	Writes data to the I/O or register of the partner node
RECV instruction	Reads data from the I/O or register of the partner node

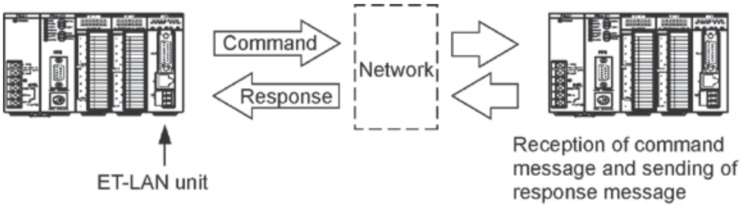
Note:
When using the data transfer function, TCP/IP should be used in order to assure the reliability of the communication.

Key Point:
- With data transfer, the programmable controller specifies an IP address and a MEWTOCOL station number (1 to 64), and opens a connection with the computer (partner node) in the MEWTOCOL communication mode.
- After the connection has been opened, the communication destination is specified only by the MEWTOCOL station number (1 to 64) in the ladder program on the programmable controller side.
- Data transfer enables up to eight simultaneous connections, in conjunction with other communication functions, using a single ET-LAN unit.
- There is no need to notate a program to handle communication, after the connection has been opened, for the programmable controller on the side that receives the data transfer command.
- The computer link function and data transmission function can be run on the same connection at the same time.

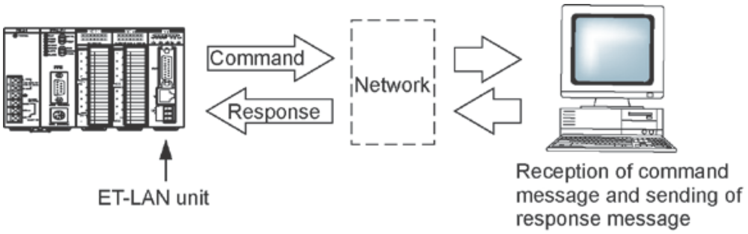
8.1.2 Commands and Functions that can be Used

Data transfer commands and MEWTOCOL-DAT command messages

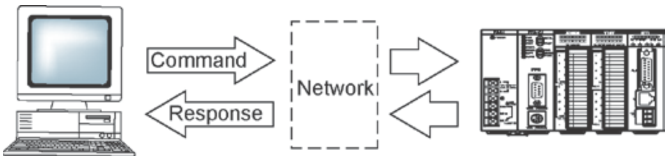
- Executing a data transfer command sends a MEWTOCOL-DAT command message to the partner node programmable controller, which then automatically returns a response message.



- When data is being sent from a programmable controller to a computer, the reception of the MEWTOCOL-DAT command message and the sending of the response message are handled on the computer side.



- When data is being sent from a computer to a PLC, the MEWTOCOL-DAT command message is sent to the partner node programmable controller, which automatically sends back a response message.



MEWTOCOL-DAT commands

Command code	Command name	Functions
50H	Write word data	The specified number of words of data are written, starting from the specified first word number in the data area.
51H	Read word area	The specified number of words of data are read, starting from the specified first word number in the data area.
52H	Write contact information	Data is written to the specified relay of the relay area.
53H	Read contact information	Data is read from the specified relay of the relay area.

Key Point:

- Commands and responses used with the ET-LAN unit have a dedicated header added to the "MEWTOCOL-DAT" communication procedure of the FP series PLC.

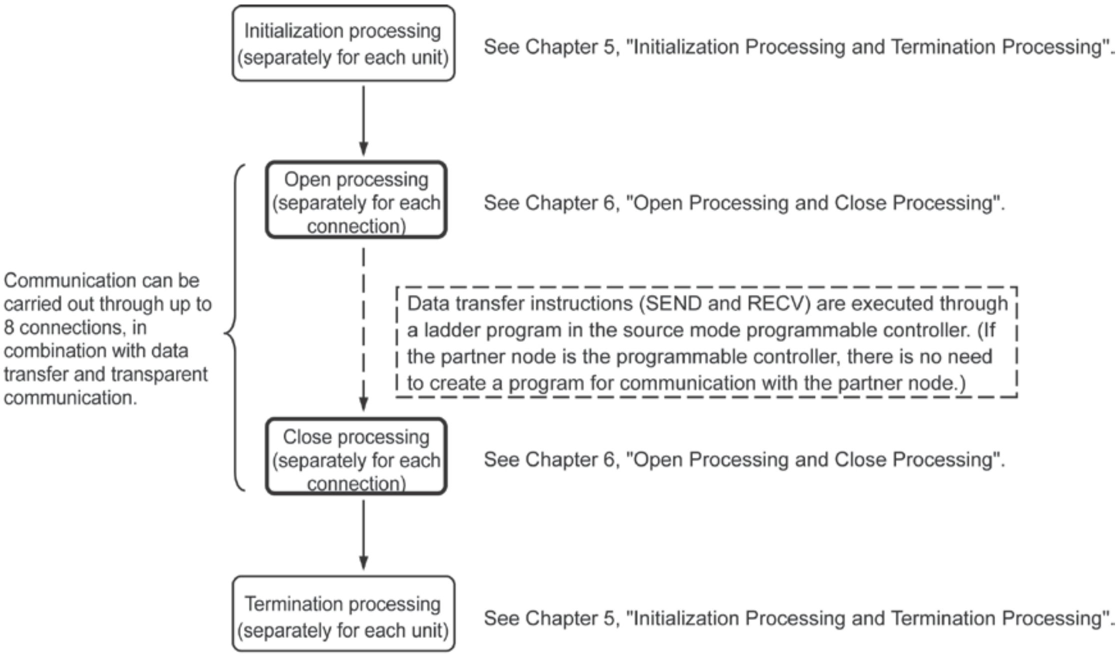
-

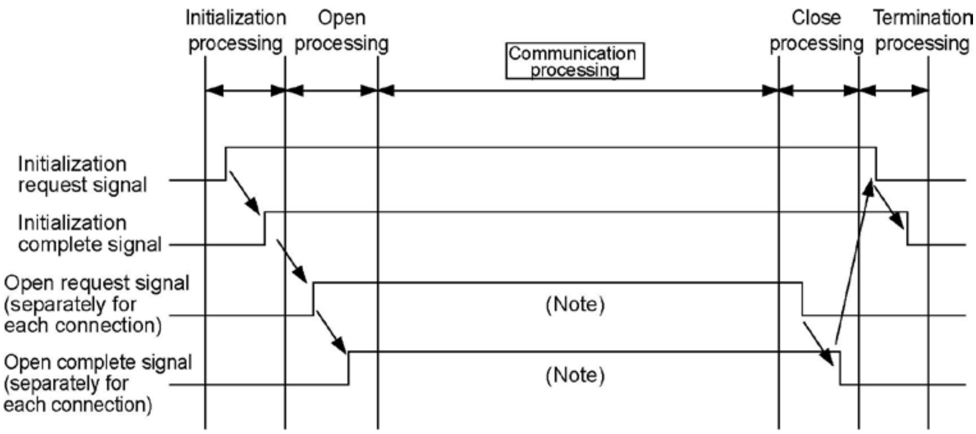
Reference: For detailed information on MEWTOCOL-DAT, please see Chapter 12.

8.2 Data Transfer Procedure

When data is being transferred with a programmable controller, open processing is used to specify the MEWTOCOL communication mode and to open the connection with the partner node after initialization processing for the ET-LAN unit has been carried out.

Procedure for transferring ET-LAN unit data



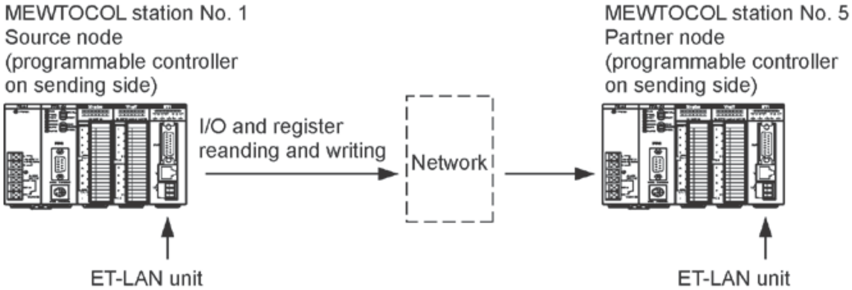


Note: When the initialization complete signal is on, any number of open processing and close processing operations can be performed.
By changing the setting and performing re-open processing, it is possible to communicate with a different partner.

8.3 Settings on the PLC Side

8.3.1 Connection Information Settings

A memory area such as the data registers of the programmable controller is set aside, and the data to be written to the connection information area of the shared memory is specified when the open processing is carried out.
When using data transfer, the contents of the specified data are as indicated below.



Contents of data settings

Address	Name	Set value and Explanation
DTn	Setting area for application being used	Set value: 0000H When using TCP/IP Active open 0 0 0 0 | 0 0 0 0 | 0 0 0 0 | 0 0 0 0
		Set value: 0300H When using TCP/IP Fullpassive open 0 0 0 0 | 0 0 1 1 | 0 0 0 0 | 0 0 0 0
		Set value: 0200H When using TCP/IP Unpassive open 0 0 0 0 | 0 0 1 0 | 0 0 0 0 | 0 0 0 0
DTn+1	Source node port No.	Specify any port number other than 0H. (A value of 8000 (1F40) or higher is recommended.)
DTn+2	Partner node IP address (L)	Specify the IP address of the partner node. Example: To specify 192.168.1.2 (C0 A8 01 02H): DTn+2: 0102H DTn+3: C0A8H This is not necessary when using the Unpassive open mode of TCP/IP.
DTn+3	Partner node IP address (H)	
DTn+4	Partner node port No.	Specify any port number for the partner node other than 0H. (A value of 8000 (1F40) or higher is recommended.) This is not necessary when using the Unpassive open mode of TCP/IP.
DTn+5	Partner node MEWTOCOL station number	Always specify a MEWTOCOL station number of between 1H and 40H (1 to 64) for the partner node computer.
DTn+6	Partner node Ethernet address	When using the Active open mode of TCP/IP, if the partner node has no ARP function, specify the Ethernet address of the partner node. In any other case, specify 0H. Example: To specify 1.2.3.4.5.6: DTn+6 0506H DTn+7 0304H DTn+8 0102H
DTn+7		
DTn+8		

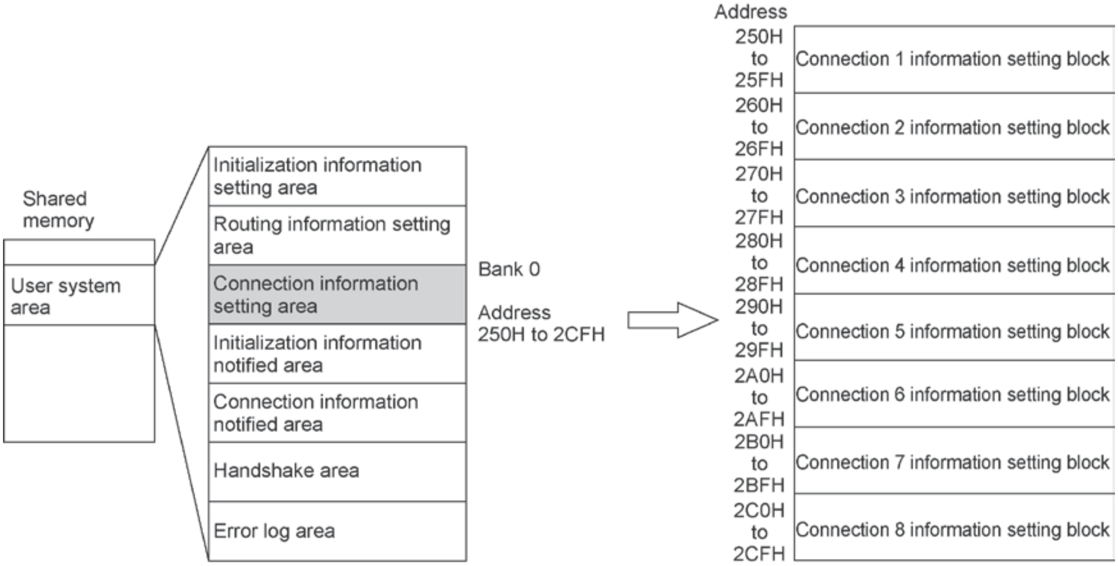
Note:

- Because the reliability of communication cannot be assured with UDP/IP, we recommend using TCP/IP.
- We recommend specifying a port number of 8000 (1F40) or higher.
- Specify a MEWTOCOL station number within a range of 1 to 64, choosing a number that does not duplicate any other station number on the same network (subnetwork).
- When using the Active open mode, if the partner node has no ARP function, specify the Ethernet address of the partner node for "DTn+6 to DTn+8".

8.3.2 Writing to the Shared Memory

The specified data is written to the connection information setting area of the shared memory using the shared memory writing instructions F151 (WRT) and P151 (PWRT).

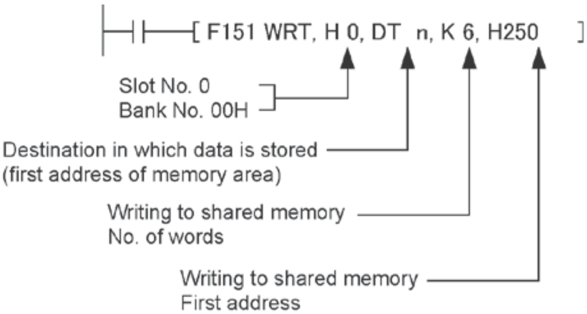
Shared memory address



(Shared memory addresses are allocated in word units.)

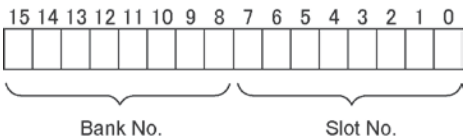
Program example

If using connection 1 of the ET-LAN unit installed in slot no. 0, the program for writing data to the shared memory would be as follows.



Key Point:

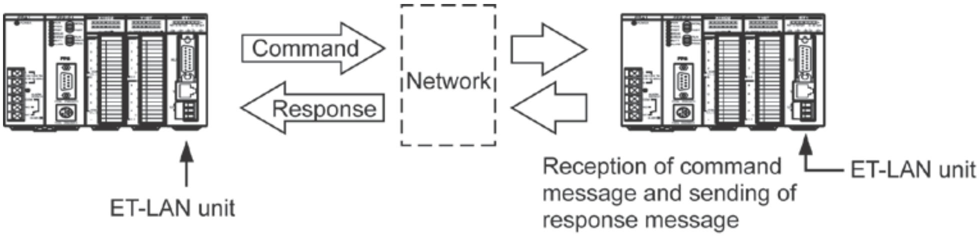
- The slot number and bank number to be used by the shared memory writing instructions F151 (WRT) and P151 (PWRT) are specified as follows.



8.3.3 Sample Program

Program contents

- The sample program is for an ET-LAN unit installed in slot no. 0, and covers communication settings up to where the SEND instruction is executed after the connection is opened as a result of the contents noted below.
- After the connection has been opened, no communication program is necessary on the PLC side receiving the MEWTOCOL-DAT commands..



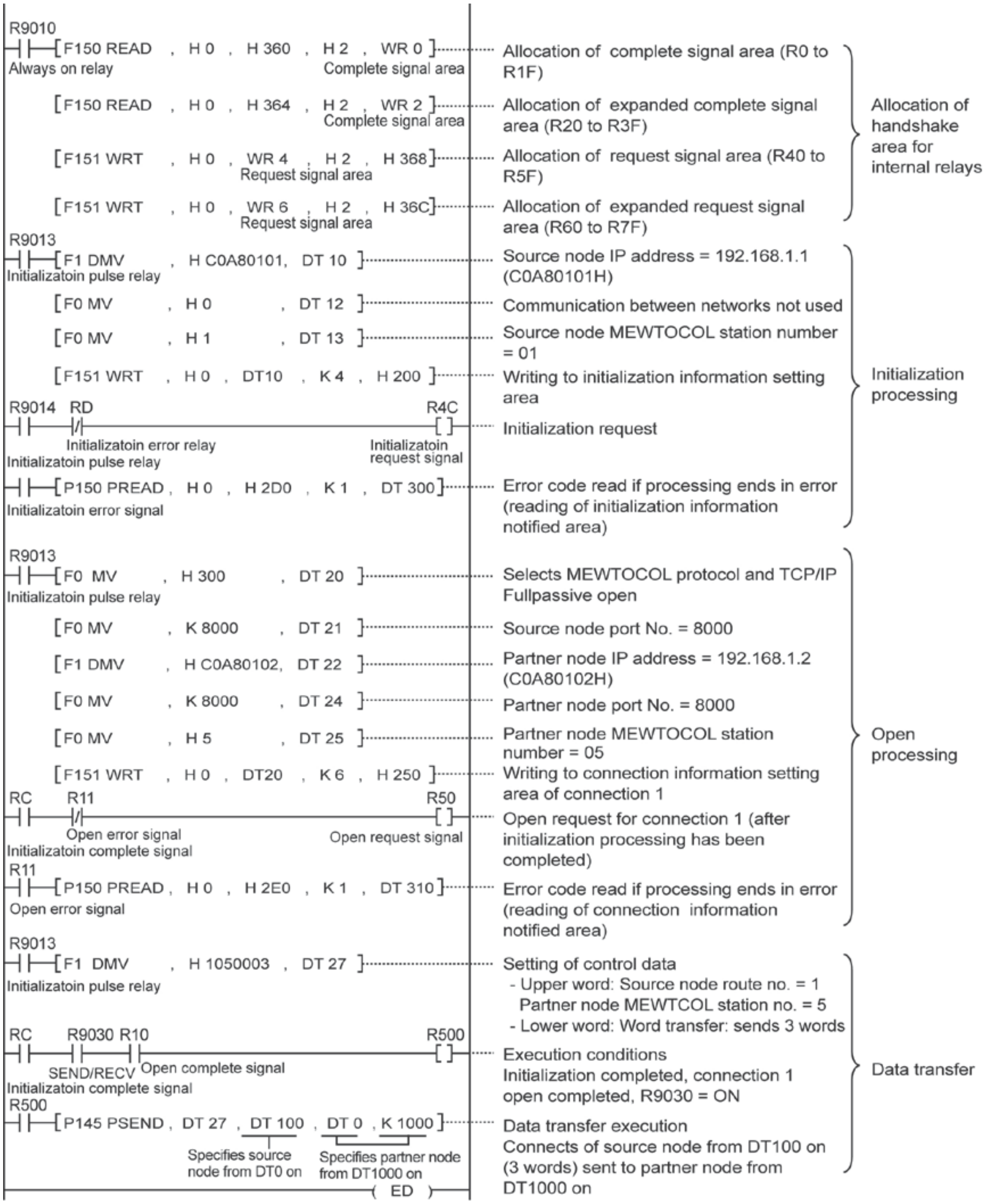
Internal relay allocation

Classification	Device number	Devices used in program example	
Complete signal area	R0 to R1F	RC RD R11	Initialization complete signal Initialization error signal Open error signal (Connection 1)
Request signal area	R40 to R5F	R4C R50	Initialization request signal Open request signal (Connection 1)

Data register allocation

Classification of processing	Device number	Setting item	Setting for program example
Initialization processing	DT10 to DT11	Source node IP address	192.168.1.1 (C0A80101H)
	DT12	Communication function setting between networks	Not used
	DT13	Source node MEWTOCOL station number	01
Open processing	DT20	Open method	MEWTOCOL communication TCP/IP Fullpassive open
	DT21	Source node port No.	8000
	DT22 to DT23	Partner node IP address	192.168.1.2 (C0A80102H)
	DT24	Partner node port No.	8000
	DT25	Partner node MEWTOCOL station number	05
Data transfer processing	DT27 to DT28	Source node route No.	1
		Partner node MEWTOCOL station number	05
		Number of words transferred	3
Transfer data area	DT100 to DT102	Transfer data writing area	

Program example

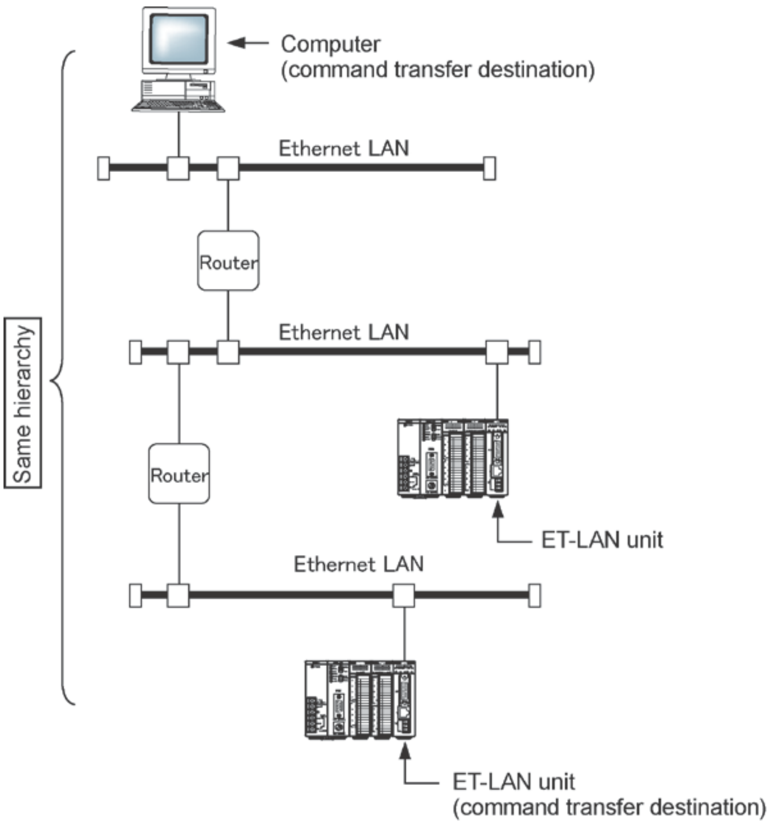


8.4 Command Communication on the Computer Side

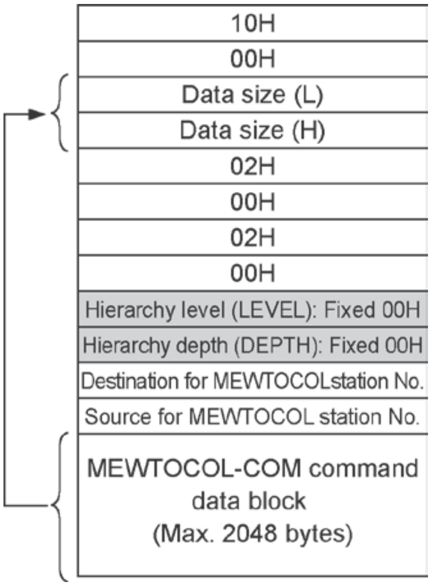
8.4.1 Communication Data Format (1)

Format when the partner node is on the same hierarchy level as the MEWTOCOL communication

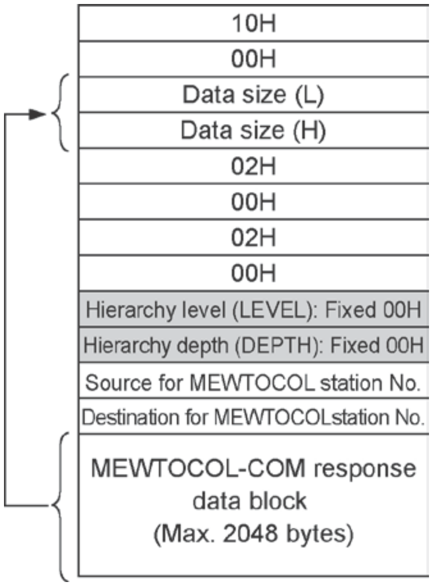
- If there is no other link unit between the computer and the partner node, acting as a relay station, the partner node is said to be on the same hierarchy level as the computer.
- When the data transfer function is being used between units on the same hierarchy, commands and responses are sent and received using the format indicated below.



Format of command transmission data



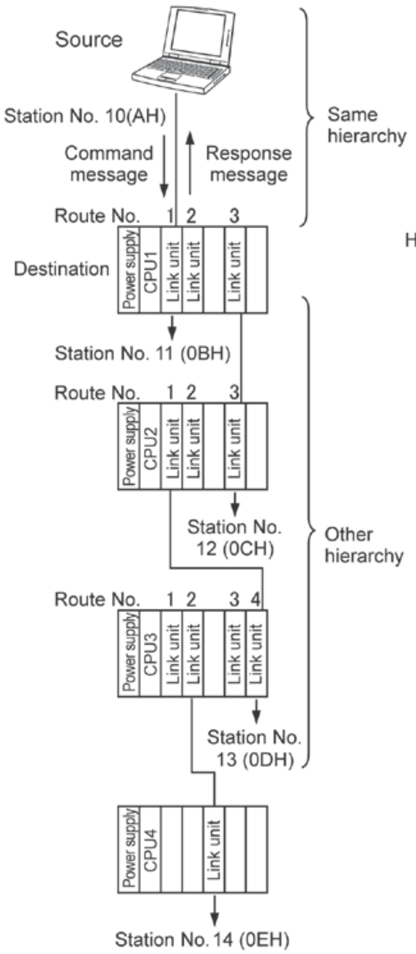
Format of response received data

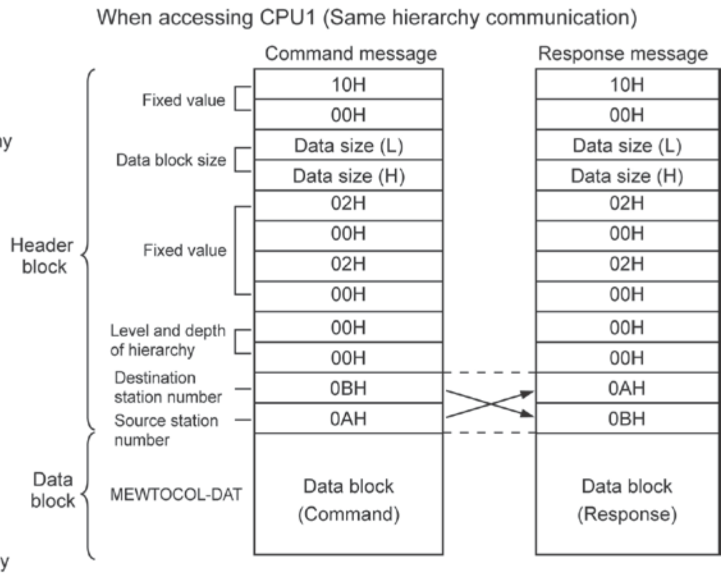


Precautions concerning format

- The number of bytes comprising the MEWTOCOL-COM command or message is converted to hexadecimal data and specified for the “Data Size” parameter.
- The station number of the station sending the command is specified for “Source for MEWTOCOL station number”.
- The station number of the station receiving the command is specified for “Destination for MEWTOCOL station number”.
- “00H” should be specified for both “Hierarchy level (LEVEL)” and “Hierarchy depth (DEPTH)”.
- "Destination (Source) MEWTOCOL station No." is specified by converting to hexadecimal data.

Example of communication data (Same hierarchy communication)





8.4.2 Communication Data Format (2)

Format when the partner node is not on the same hierarchy level as the MEWTOCOL communication

- If there is another link unit between the computer and the partner node, acting as a relay station, the partner node is said to be on a different hierarchy level from the computer.
- When the data transfer function is being used to send data to a unit on a different hierarchy, commands and responses are sent and received using the format indicated below.

Format of command transmission data

10H
00H
Data size (L)
Data size (H)
02H
00H
02H
00H
Hierarchy level (LEVEL)
Hierarchy depth (DEPTH)
MEWTOCOL station No. for relay station 1
MEWTOCOL station No. for relay station 2
MEWTOCOL station No. for relay station 3
Destination for MEWTOCOL station No.
Source for MEWTOCOL station No.
Route No. for relay station 1
Route No. for relay station 2
Route No. for relay station 3
Data block (Max. 2048 bytes)

Format of response received data

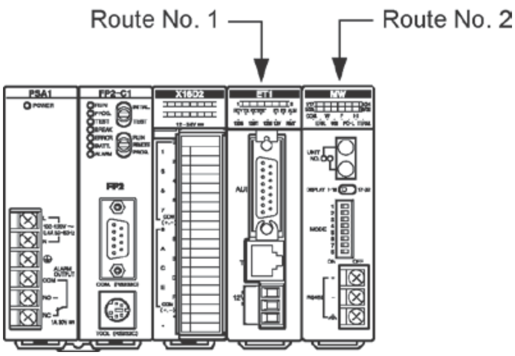
10H
00H
Data size (L)
Data size (H)
02H
00H
02H
00H
Hierarchy level (LEVEL): Fixed 00H
Hierarchy depth (DEPTH)
Source for MEWTOCOL station No.
MEWTOCOL station No. for relay station 1
MEWTOCOL station No. for relay station 2
MEWTOCOL station No. for relay station 3
Destination for MEWTOCOL station No.
Route No. for relay station 1
Route No. for relay station 2
Route No. for relay station 3
Data block (Max. 2048 bytes)

Precautions concerning format

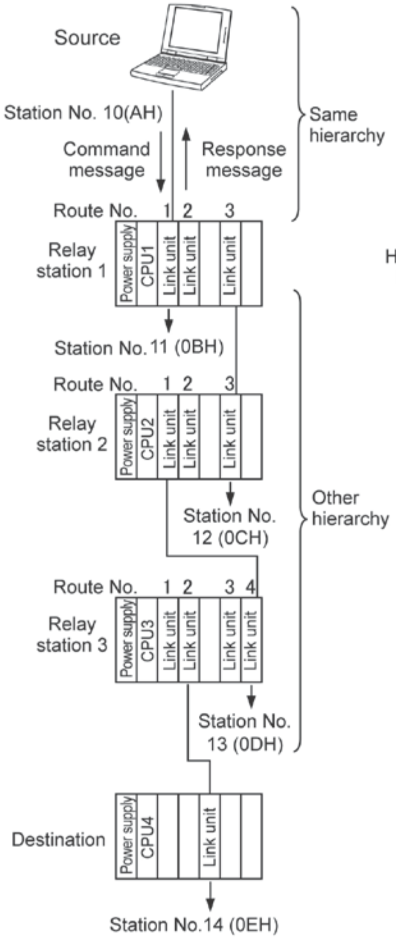
- The number of bytes comprising the MEWTOCOL-DAT command or message is converted to hexadecimal data and specified for the “Data Size” parameter.
- The “Station Number for Relay Station” and “Route Number for Relay Station” parameters should be specified using the pertinent number. If there is only one relay station, the spaces for the second and third relay stations will be filled in, closing the gap.
- The station number of the station sending the command is specified for “Source for MEWTOCOL station number”.
- The station number of the station receiving the command is specified for “Destination for MEWTOCOL station number”.
- For the command, the same value, within a range of “01H to 03H”, should be specified for both the “Hierarchy level (LEVEL)” and “Hierarchy depth (DEPTH)” parameters.
- With the responses, “Hierarchy level (LEVEL)” is fixed at 00H.
- "Destination (Source) MEWTOCOL station No." is specified by converting to hexadecimal data.

Key Point:

- The route number is a number that is automatically allocated to differentiate units if multiple link-related units are being used on the same backplane.
- With the FP2, this applies to ET-LAN units, multi-wire link units, and computer communication units.
- Route numbers proceed in sequential order (1, 2, 3 …), starting from the unit nearest the CPU unit.
- I/O units other than link-related units and advanced-function units are not included in these “routes”.



Example of communication data (Other hierarchy communication)



When accessing CPU2 (Other hierarchy communication)

Block	Field	Command message	Response message
Header block	Fixed value	10H	10H
		00H	00H
	Data block size	Data size (L)	Data size (L)
		Data size (H)	Data size (H)
	Fixed value	02H	02H
		00H	00H
		02H	02H
		00H	00H
	Level and depth of hierarchy	01H	00H
		01H	01H
	Station No. for relay station 1	0BH	0AH
	Destination station number	0CH	0BH
	Source station number	0AH	0CH
	Route No. for relay station 1	03H	03H
Data block	MEWTOCOL-DAT	MEWTOCOL-DAT command data block	MEWTOCOL-DAT response data block

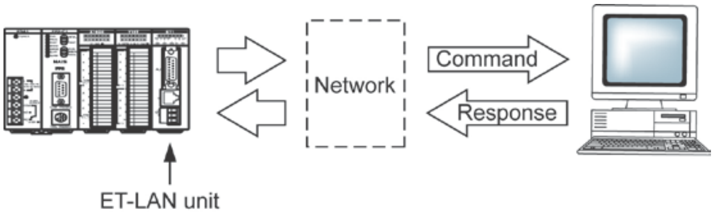
When accessing CPU4 (Other hierarchy communication)

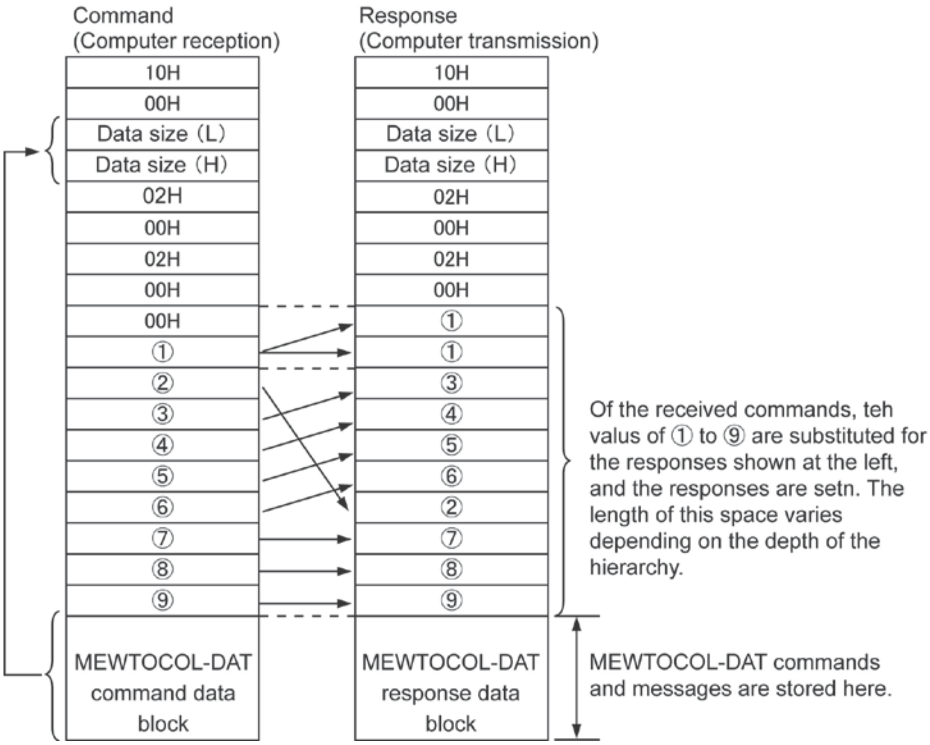
Block	Field	Command message	Response message
Header block	Fixed value	10H	10H
		00H	00H
	Data block size	Data size (L)	Data size (L)
		Data size (H)	Data size (H)
	Fixed value	02H	02H
		00H	00H
		02H	02H
		00H	00H
	Level and depth of hierarchy	03H	00H
		03H	03H
	Station No. for relay station 1	0BH	0AH
	Station No. for relay station 2	0CH	0BH
	Station No. for relay station 3	0DH	0CH
	Destination station number	0EH	0DH
	Source station number	0AH	0EH
	Route No. for relay station 1	03H	03H
	Route No. for relay station 2	01H	01H
	Route No. for relay station 3	02H	02H
Data block	MEWTOCOL-DAT	MEWTOCOL-DAT command data block	MEWTOCOL-DAT response data block

8.4.3 Communication Data Format (3)

Format when MEWTOCOL communication is being carried out from a PLC to a computer on the other hierarchy

- If there is another link unit between the PLC and the partner node, acting as a relay station, the PLC is said to be on a different hierarchy level from the computer.
- The format in which the computer receives data from a PLC on a different hierarchy and sends responses is generally s shown below.
- The format varies depending on the hierarchy position of the PLC on the sending side.

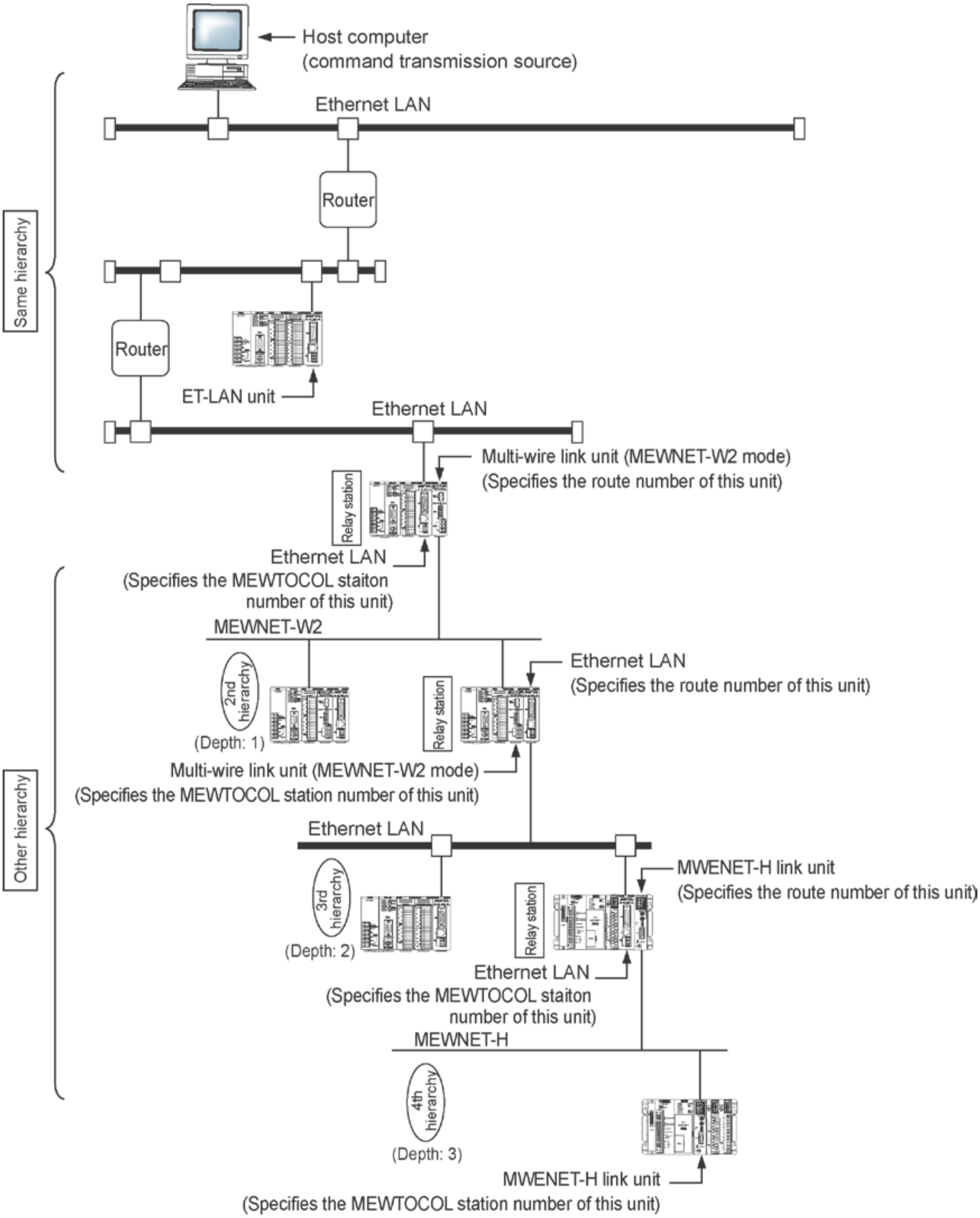




Precautions concerning format

The number of bytes comprising the MEWTOCOL-DAT command or message is converted to hexadecimal data and specified for the "Data Size" parameter.

Other hierarchy communication for MEWTOCOL-DAT



Chapter 9

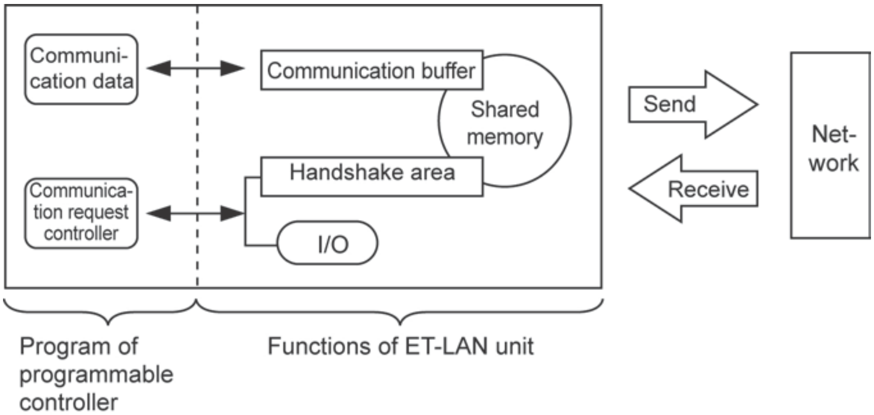
Transparent Communication Function

9.1 An Overview of the Transparent Communication Function

9.1.1 What is the Transparent Communication Function?

With the transparent communication function, data can be sent and received transparently between a computer and a programmable controller, and between two programmable controllers.

Communication data can be stored to and retrieved from the programmable controller by reading from and writing to the reception buffer of the shared memory in the ET-LAN unit. Communication requests and other commands are executed by the bits of the handshake area in the I/O or shared memory being turned on and off.



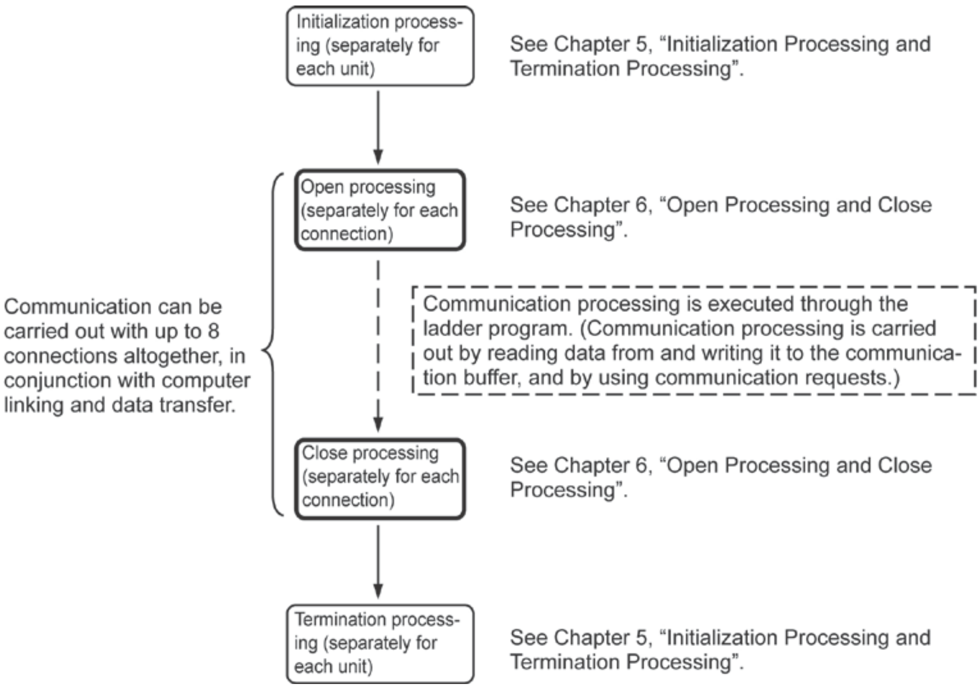
Key Point:

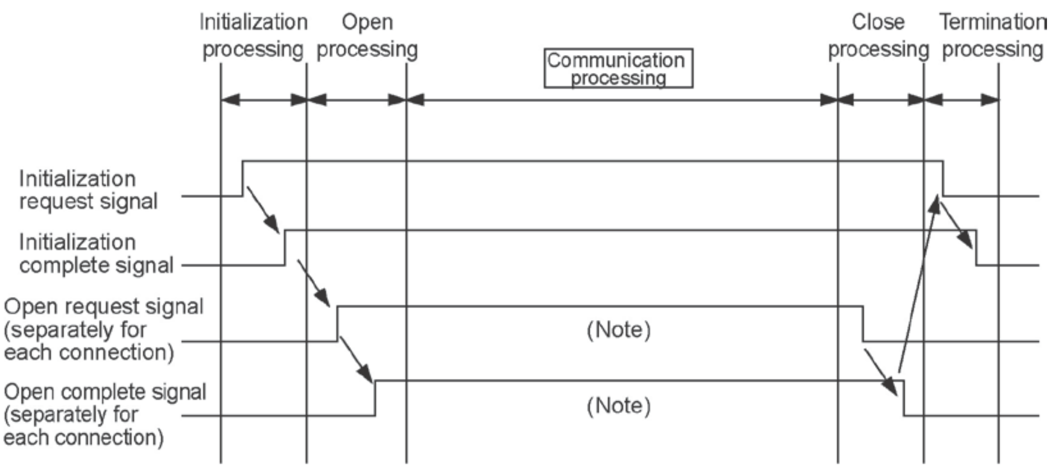
- With the transparent communication function, the programmable controller or computer specifies an IP address to open a connection with the communication destination.
- After the connection has been opened, communication processing on the programmable controller side is carried out by data being read from or written to the communication buffer of the shared memory through the ladder program, and by communication requests being executed.
- Up to eight connections can be used on a single ET-LAN unit by using the transparent communication function in conjunction with MEWTOCOL communication functions (computer linking and data transfer).

9.2 Transparent Communication Procedures

To carry out transparent communication using an ET-LAN unit, initialization processing is first carried out for the unit, and then a connection is opened between the source node and the partner node, through open processing. Once this connection has been opened, communication processing is executed through the ladder program.

Procedure for transparent communication with the ET-LAN unit





Note: When the initialization complete signal is on, any number of open processing and close processing operations can be performed.
By changing the setting and performing re-open processing, it is possible to communicate with a different partner.

9.3 Settings on the PLC Side

9.3.1 Connection Information Settings

A memory area such as the data registers of the programmable controller is set aside, and the data to be written to the connection information area of the shared memory is specified when the open processing is carried out.
When the transparent communication is being used, the contents of specified data are as indicated below.

Contents of data settings

Address	Name	Set value and Explanation	
DTn	Setting area for application being used	Set value: 8001H When using UDP/IP	1 0 0 0 | 0 0 0 0 | 0 0 0 0 | 0 0 0 1
		Set value: 0001H When using TCP/IP Active open	0 0 0 0 | 0 0 0 0 | 0 0 0 0 | 0 0 0 1
		Set value: 0301H When using TCP/IP Fullpassive open	0 0 0 0 | 0 0 1 1 | 0 0 0 0 | 0 0 0 1
		Set value: 0201H When using TCP/IP Unpassive open	0 0 0 0 | 0 0 1 0 | 0 0 0 0 | 0 0 0 1
DTn+1	Source node port No.	Specify any port number other than 0H. (A value of 8000 (1F40) or higher is recommended.)	
DTn+2	Partner node IP address (L)	Specify the IP address of the partner node. Example: To specify 192.168.1.2 (C0 A8 01 02H): DTn+2: 0102H DTn+3: C0A8H This is not necessary when using the Unpassive open mode of TCP/IP.	
DTn+3	Partner node IP address (H)		
DTn+4	Partner node port No.	Specify any port number for the partner node other than 0H. (A value of 8000 (1F40) or higher is recommended.) This is not necessary when using the Unpassive open mode of TCP/IP.	
DTn+5	Partner node MEWTOCOL station number	(Not used)	
DTn+6	Partner node Ethernet address	When using the Active open mode of TCP/IP, if the partner node has no ARP function, specify the Ethernet address of the partner node. In any other case, specify 0H. Example: To specify 1.2.3.4.5.6: DTn+6 0506H DTn+7 0304H DTn+8 0102H	
DTn+7			
DTn+8			

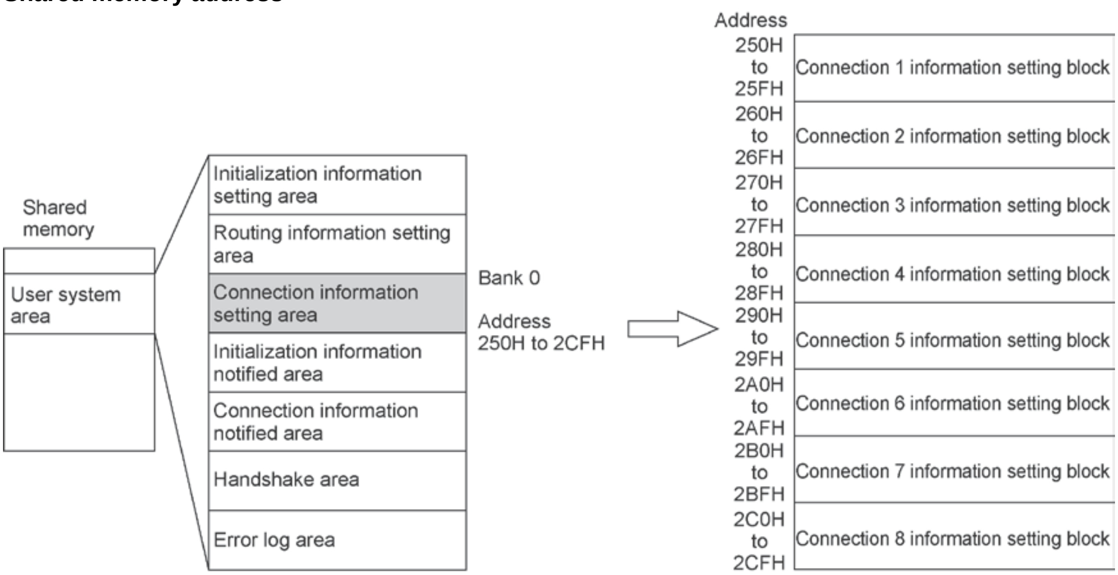
Note:

- We recommend specifying a port number of 8000 (1F40) or higher.
- When using the Active open mode, if the partner node has no ARP function, specify the Ethernet address of the partner node for "DTn+6 to DTn+8".

9.3.2 Writing to the Shared Memory

The specified data is written to the connection information setting area of the shared memory using the shared memory writing instructions F151 (WRT) and P151 (PWRT).

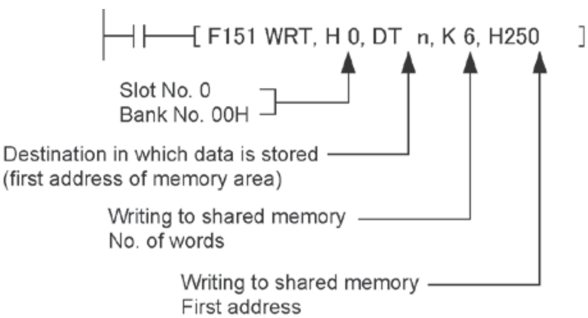
Shared memory address



(Shared memory addresses are allocated in word units.)

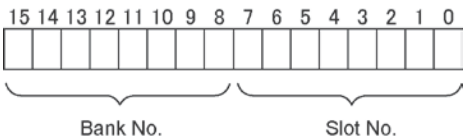
Program example

If using connection 1 of the ET-LAN unit installed in slot no. 0, the program for writing data to the shared memory would be as follows.



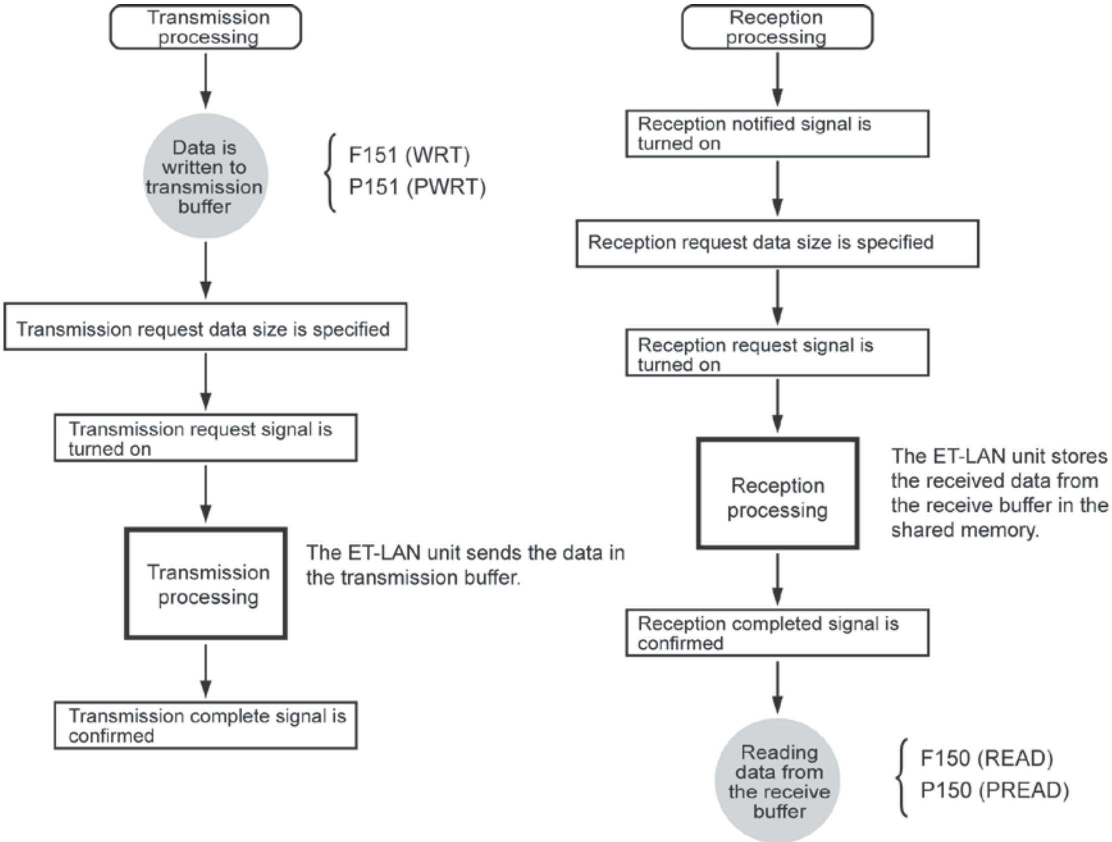
Key Point:

- The slot number and bank number to be used by the shared memory writing instructions F151 (WRT) and P151 (PWRT) are specified as follows.



9.4 Communication Processing for Transparent Communication

9.4.1 Connection Processing Procedure



Transmission processing

The ET-LAN unit sends data through the communication circuit by writing it to the transmission buffer of the shared memory and then executing the transmission request.

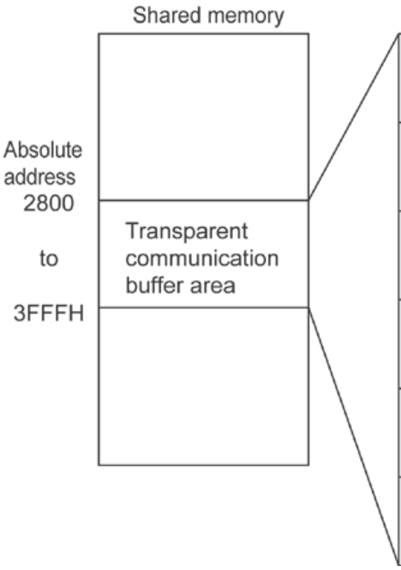
Reception processing

When the ET-LAN unit receives data from the communication circuit, the reception notified signal goes on. If a reception request is executed while this signal is on, the received data is stored in the receive buffer of the shared memory. Data is read from the receive buffer at the timing at which the reception complete signal goes on.

Transmission and receive buffers
The transparent communication buffer area allocations (connections 1 to 3) effective when the unit is shipped from the factory are as shown below. See page 5 – 10.

The first addresses and sizes of the transmission and receive buffers of connections 1 to 8 can be set to any desired values in the 6k words transparent communication buffer area, by changing the contents of the initialization information settings.

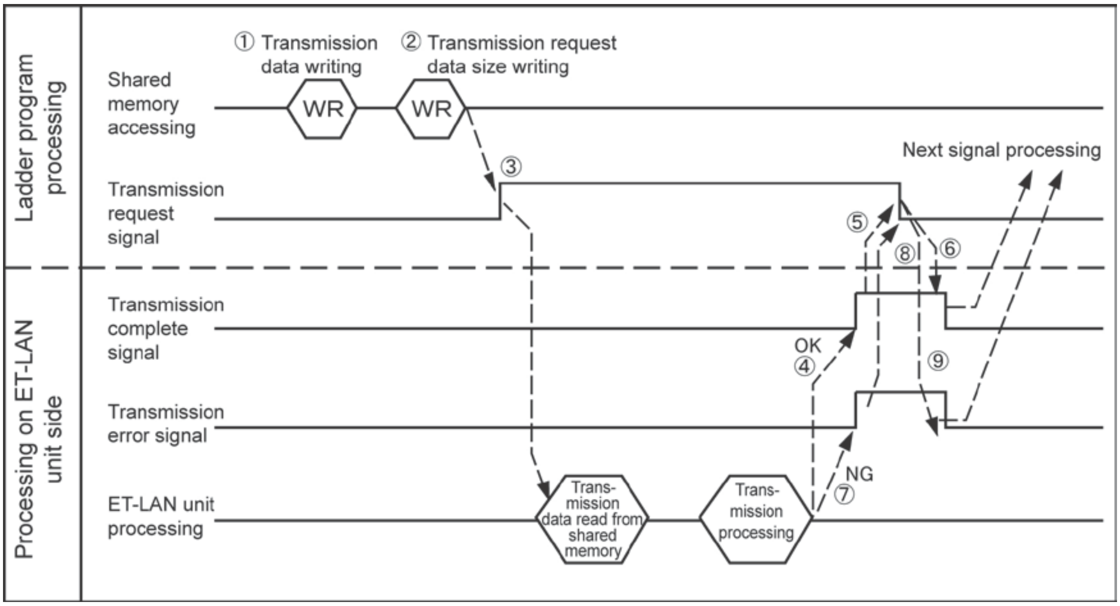
The shared memory addresses indicated below are in word (16-bit) units.



Absolute address	Bank No.	Address	
2800H	0AH to 0AH	0000H 03FFH	Receive buffer for connection 1 (1k words)
2C00H	0BH to 0BH	0000H 03FFH	Transmission buffer for connection 1 (1k words)
3000H	0CH to 0CH	0000H 03FFH	Receive buffer for connection 2 (1k words)
3400H	0DH to 0DH	0000H 03FFH	Transmission buffer for connection 2 (1k words)
3800H	0EH to 0EH	0000H 03FFH	Receive buffer for connection 3 (1k words)
3C00H	0FH to 0FH	0000H 03FFH	Transmission buffer for connection 3 (1k words)

9.4.2 Procedure for Transmission Processing

Transmission processing timing chart



Execution procedure when sending data

① The data to be sent in the transmission buffer.

② The size of the data to be sent is set in the transmission request data size parameter in the connection information setting area.

③ The transmission request signal is turned on.

④ When the transmission processing from the ET-LAN unit to the communication circuit has been successfully completed, the transmission complete signal goes on.

⑤ After confirmation has been made that the transmission complete signal is on, the transmission request signal should be turned off.

⑥ When the transmission request signal has been turned off, the transmission complete signal goes off.

⑦ If the transmission processing is not successfully completed for some reason, the transmission error signal goes on.

⑧ To re-try the processing, first turn the transmission request signal off.

⑨ When the transmission request signal goes off, the transmission error signal goes off. Always make sure that the transmission error signal has turned off before re-sending the data.

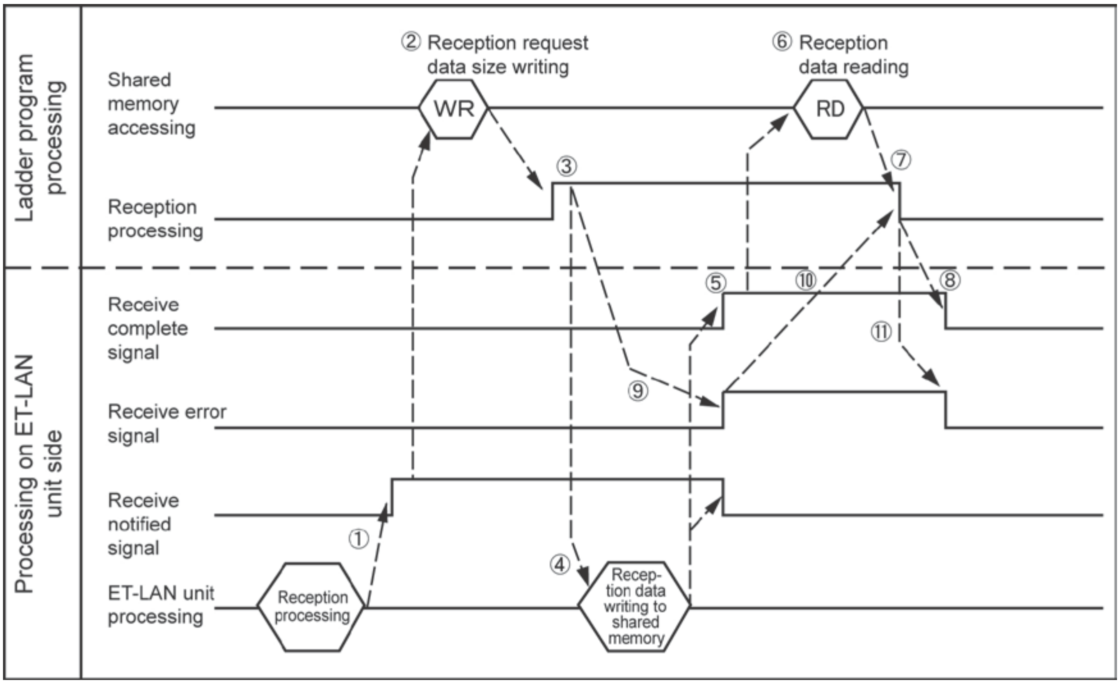
Note:

- The transmission request data size in the connection information setting area is specified in byte units, and should be set such that the transmission request data size is less than or equal to the transmission buffer size x 2.
- The next time data is to be sent, always check to make sure the transmission complete signal is off b before executing the transmission processing.
- The user is notified of the content of an error by means of a transmission processing end code and an error log.

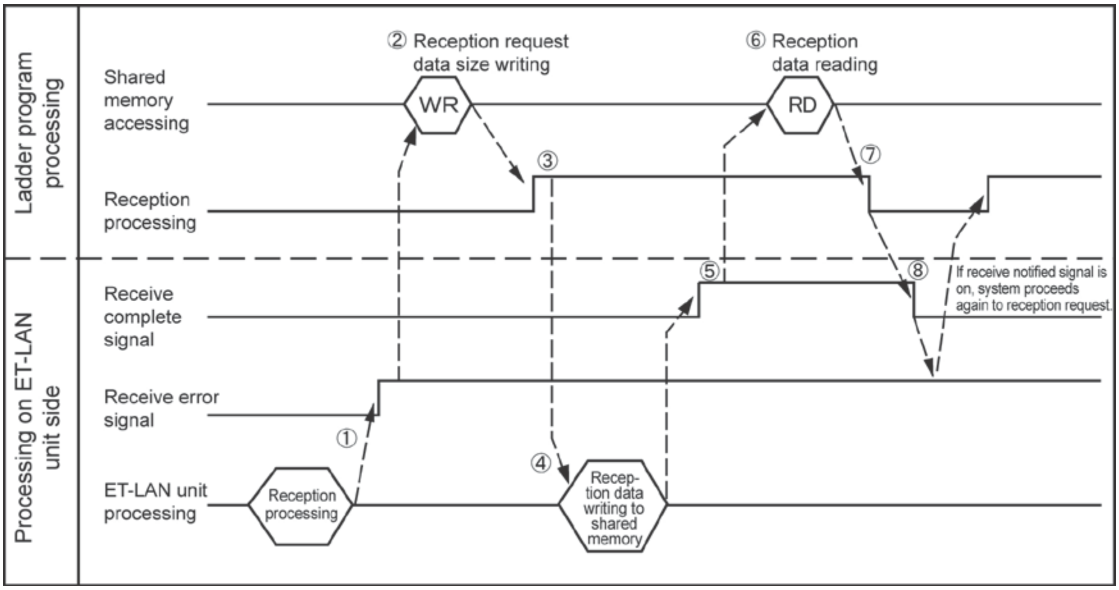
9.4.3 Procedure for Reception Processing

Reception processing timing chart

When the size of the data received is less than or equal to the reception request data size



When the size of the data received is greater than the reception request data size



Procedure when receiving data

When the size of the data received is less than or equal to the reception request data size, the following procedure is used to carry out communication processing.

① When data is received from the communication circuit, the receive notified signal goes on.
② The size of the data to be read is written to the reception request data size parameter in the connection information setting area.
③ The receive request signal is turned on.
④ The received data is sent to the receive buffer in the shared memory.
⑤ The receive complete signal goes on.
⑥ The received data is read from the receive buffer in the shared memory.
⑦ The receive request signal goes off.
⑧ When the receive request signal has been turned off, the receive complete signal goes off.
⑨ If the reception processing is not successfully completed for some reason, the receive error signal goes on.
⑩ If a reception error occurs, the receive request signal goes off.
⑪ When the receive request signal goes off, the receive error signal goes off. Always make sure this has been done before carrying out the reception processing again.

When the size of the data received is greater than the receive request data size, the following procedure is used to carry out communication processing.

⑧ Even if the receive request signal goes off, the receive notified signal remains on, so repeat the procedure from step ③, when the receive request signal goes on, to receive the remaining data. Operation when an error occurs is the same as that which occurs when the size of the data received is less than or equal to the receive request data size.

Key Point:

- The size of the transparent reception data remaining in the ET-LAN unit is stored in the receive unnotified data size area of the shared memory.
- If the receive unnotified data size matches the receive unnotifed data size copy, the size of the remaining data is entered. After the two have been matched, a request for reception of the remaining data should be issued based on this value.

Note:

- The size of the receive request data should be specified so that it is less than or equal to the size of the receive buffer x 2, and should be specified in byte units.
- The receive complete signal does not go on until the amount of data received is equal to the receive request data size in the connection information setting area.
- If “FFFFH” has been specified for the receive request data size, direct reception is carried out. With direct reception, the receive request signal goes on each time a packet is received.
- If the received data exceeds the receive request data size, the receive data notified signal remains on even after the receive complete signal has gone off. In this case, reception data can continue to be read by turning on the receive request signal again.
- The next time data is to be received, always check to make sure the receive complete signal is off before executing the reception processing.
- The user is notified of the content of an error by means of a receive processing end code and an error log.

9.4.4 Handshake Signal and Data Area

Handshake signals used in transparent communication

The handshake area of the I/O or the shared memory in the unit is used to execute communication processing.

Related to transmission processing

Signal name	Handshake method	Transmission request signal bit							
		Connec-tion 1	Connec-tion 2	Connec-tion 3	Connec-tion 4	Connec-tion 5	Connec-tion 6	Connec-tion 7	Connec-tion 8
Transmis-sion request signal	Handshake using I/O	Y22	Y26	Y2A	-	-	-	-	-
	Handshake using shared memory	Bank 0: Address 368H				-			
		Bit 2	Bit 6	Bit A	-	-	-	-	-
		Bank 0: Address 36CH				Bank 0: Address 36DH			
		Bit 2	Bit 6	Bit A	Bit E	Bit 2	Bit 6	Bit A	Bit E
Transmis-sion complete signal	Handshake using I/O	X2	X6	XA	-	-	-	-	-
	Handshake using shared memory	Bank 0: Address 360H				-			
		Bit 2	Bit 6	Bit A	-	-	-	-	-
		Bank 0: Address 364H				Bank 0: Address 365H			
		Bit 2	Bit 6	Bit A	Bit E	Bit 2	Bit 6	Bit A	Bit E
Transmis-sion error signal	Handshake using I/O	X3	X7	XB	-	-	-	-	-
	Handshake using shared memory	Bank 0: Address 360H				-			
		Bit 3	Bit 7	Bit B	-	-	-	-	
		Bank 0: Address 364H				Bank 0: Address 365H			
		Bit 3	Bit 7	Bit B	Bit F	Bit 3	Bit 7	Bit B	Bit F

Related to transmission processing

Signal name	Handshake method	Receive notified signal bit							
		Connec-tion 1	Connec-tion 2	Connec-tion 3	Connec-tion 4	Connec-tion 5	Connec-tion 6	Connec-tion 7	Connec-tion 8
Receive notified signal	Handshake using I/O	X0	X4	X8	-	-	-	-	-
	Handshake using shared memory	Bank 0: Address 360H				-			
		Bit 0	Bit 4	Bit 8	-	-	-	-	-
		Bank 0: Address 364H				Bank 0: Address 365H			
		Bit 0	Bit 4	Bit 8	Bit C	Bit 0	Bit 4	Bit 8	Bit C
Receive request signal	Handshake using I/O	Y20	Y24	Y28	-	-	-	-	-
	Handshake using shared memory	Bank 0: Address 368H				-			
		Bit 0	Bit 4	Bit 8	-	-	-	-	-
		Bank 0: Address 36CH				Bank 0: Address 36DH			
		Bit 0	Bit 4	Bit 8	Bit C	Bit 0	Bit 4	Bit 8	Bit C

Signal name	Handshake method	Receive notified signal bit							
		Connec-tion 1	**Connec-tion 2**	**Connec-tion 3**	**Connec-tion 4**	**Connec-tion 5**	**Connec-tion 6**	**Connec-tion 7**	**Connec-tion 8**
Receive complete signal	Handshake using I/O	X1	X5	X9	-	-	-	-	-
	Handshake using shared memory	Bank 0: Address 360H				-			
		Bit 1	Bit 5	Bit 9	-	-	-	-	-
		Bank 0: Address 364H				Bank 0: Address 365H			
		Bit 1	Bit 5	Bit 9	Bit D	Bit 1	Bit 5	Bit 9	Bit D
	Handshake using shared memory	Bank 0: Address 366H				-			
		Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7

Note:

- The I/O number applies when the ET-LAN unit has been installed in slot no. 0.
- Reception error signals are used only when the handshake is carried out using the shared memory.

Data areas used in transparent communication

Related to transmission processing

Name	Connec-tion 1	Connec-tion 2	Connec-tion 3	Connec-tion 4	Connec-tion 5	Connec-tion 6	Connec-tion 7	Connec-tion 8
Transmission request data size	Bank 0: Address 25FH	Bank 0: Address 26FH	Bank 0: Address 27FH	Bank 0: Address 28FH	Bank 0: Address 29FH	Bank 0: Address 2AFH	Bank 0: Address 2BFH	Bank 0: Address 2CFH
Transmission processing complete code	Bank 0: Address 2EEH	Bank 0: Address 2FEH	Bank 0: Address 30EH	Bank 0: Address 31EH	Bank 0: Address 32EH	Bank 0: Address 33EH	Bank 0: Address 34EH	Bank 0: Address 35EH
Transmission complete data size	Bank 0: Address 2EFH	Bank 0: Address 2FFH	Bank 0: Address 30FH	Bank 0: Address 31FH	Bank 0: Address 32FH	Bank 0: Address 33FH	Bank 0: Address 34FH	Bank 0: Address 35FH

Related to reception processing

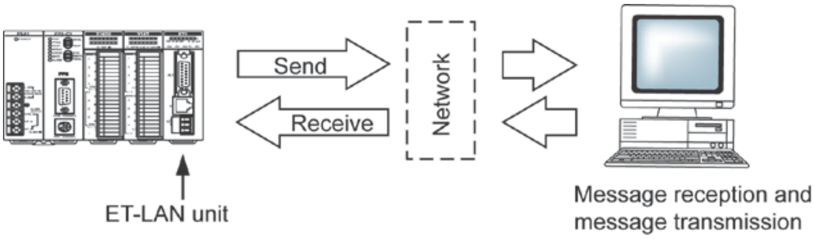
Name	Connec-tion 1	Connec-tion 2	Connec-tion 3	Connec-tion 4	Connec-tion 5	Connec-tion 6	Connec-tion 7	Connec-tion 8
Receive request data size	Bank 0: Address 25DH	Bank 0: Address 26DH	Bank 0: Address 27DH	Bank 0: Address 28DH	Bank 0: Address 29DH	Bank 0: Address 2ADH	Bank 0: Address 2BDH	Bank 0: Address 2CDH
Reception notified data size	Bank 0: Address 2EDH	Bank 0: Address 2FDH	Bank 0: Address 30DH	Bank 0: Address 31DH	Bank 0: Address 32DH	Bank 0: Address 33DH	Bank 0: Address 34DH	Bank 0: Address 35DH
Reception unnotified data size	Bank 0: Address 2EBH	Bank 0: Address 2FBH	Bank 0: Address 30BH	Bank 0: Address 31BH	Bank 0: Address 32BH	Bank 0: Address 33BH	Bank 0: Address 34BH	Bank 0: Address 35BH
Reception unnotified data size copy	Bank 0: Address 2ECH	Bank 0: Address 2FCH	Bank 0: Address 30CH	Bank 0: Address 31CH	Bank 0: Address 32CH	Bank 0: Address 33CH	Bank 0: Address 34CH	Bank 0: Address 35CH
Reception processing complete code	Bank 0: Address 2EAH	Bank 0: Address 2FAH	Bank 0: Address 30AH	Bank 0: Address 31AH	Bank 0: Address 32AH	Bank 0: Address 33AH	Bank 0: Address 34AH	Bank 0: Address 35AH

9.5 Sample Program

9.5.1 Sample Program <Initialization to Open>

Program contents

This sample program assumes that the ET-LAN has been installed in slot no. 0.



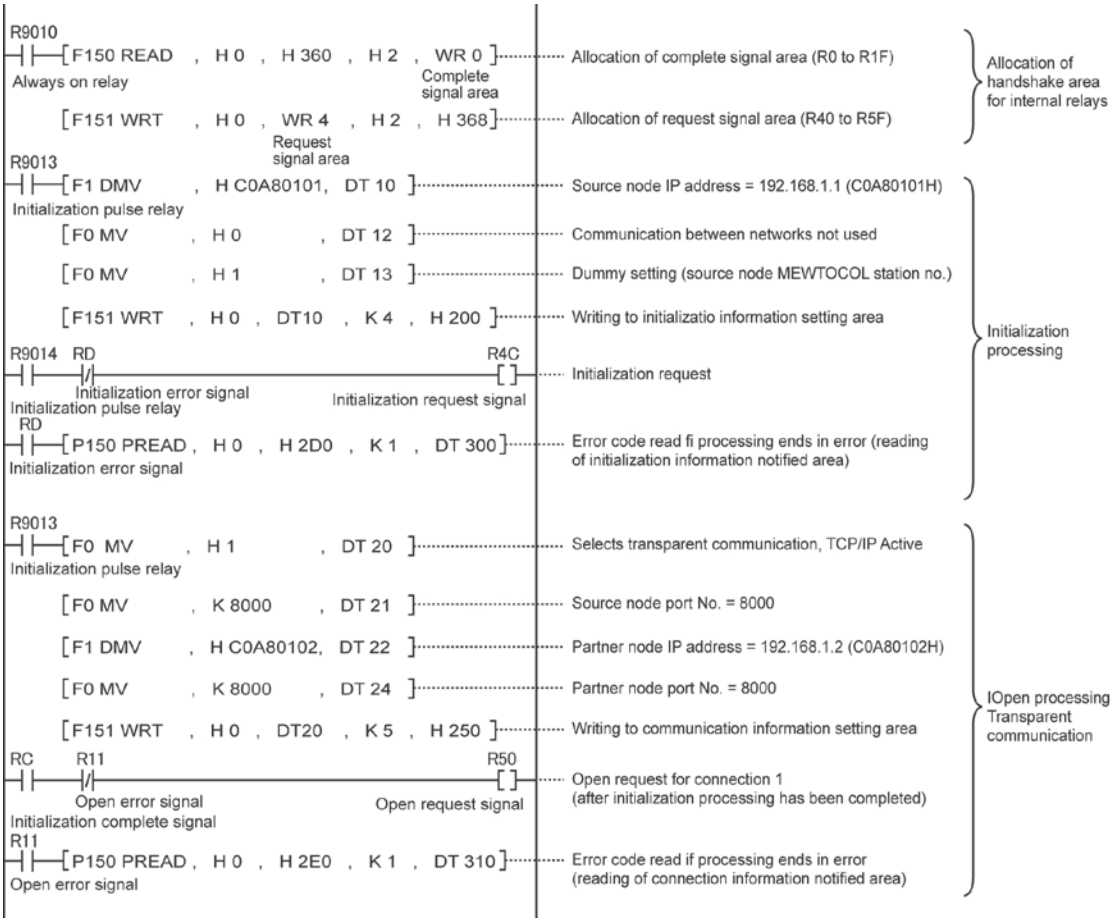
Internal relay allocation

Classification	Device number	Devices used in program example
Complete signal area	R0 to R1F	RC Initialization complete signal RD Initialization error signal R11 Open error signal (Connection 1)
Request signal area	R40 to R5F	R4C Initialization request signal R50 Open request signal (Connection 1)

Data register allocation

Classification of processing	Device number	Setting item	Setting for program example
Initialization processing	DT10 to DT11	Source node IP address	192.168.1.1 (C0A80101H)
	DT12	Communication function setting between networks	Not used
	DT13	Source node MEWTOCOL station number	01 <Dummy setting>
Open processing	DT20	Open method	MEWTOCOL communication TCP/IP Active open
	DT21	Source node port No.	8000
	DT22 to DT23	Partner node IP address	192.168.1.2 (C0A80102H)
	DT24	Partner node port No.	8000

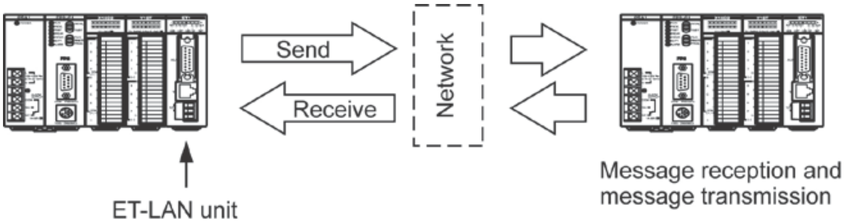
Program example



9.5.2 Sample Program <Transmission Processing and Reception Processing>

Program contents

In this sample program, the ET-LAN has been installed in slot no. 0, and transmission or reception of data is being carried out after initialization to open processing has been completed.



Internal relay allocation

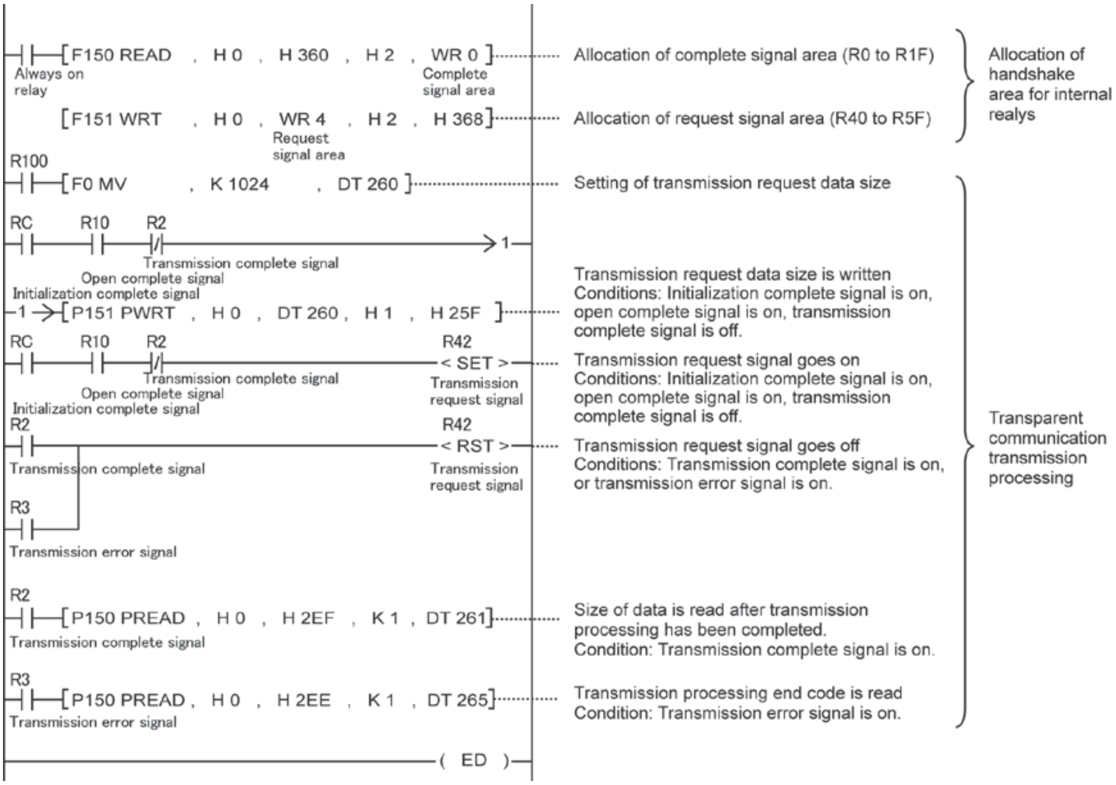
Classification	Device number	Devices used in program example	
Complete signal area	R0 to R1F	R1 R2 R3 RC R10	Receive complete signal Transmission complete signal Transmission error signal Initialization complete signal Open complete signal
Request signal area	R40 to R5F	R40 R42	Initialization request signal Transmission request signal

Data register allocation

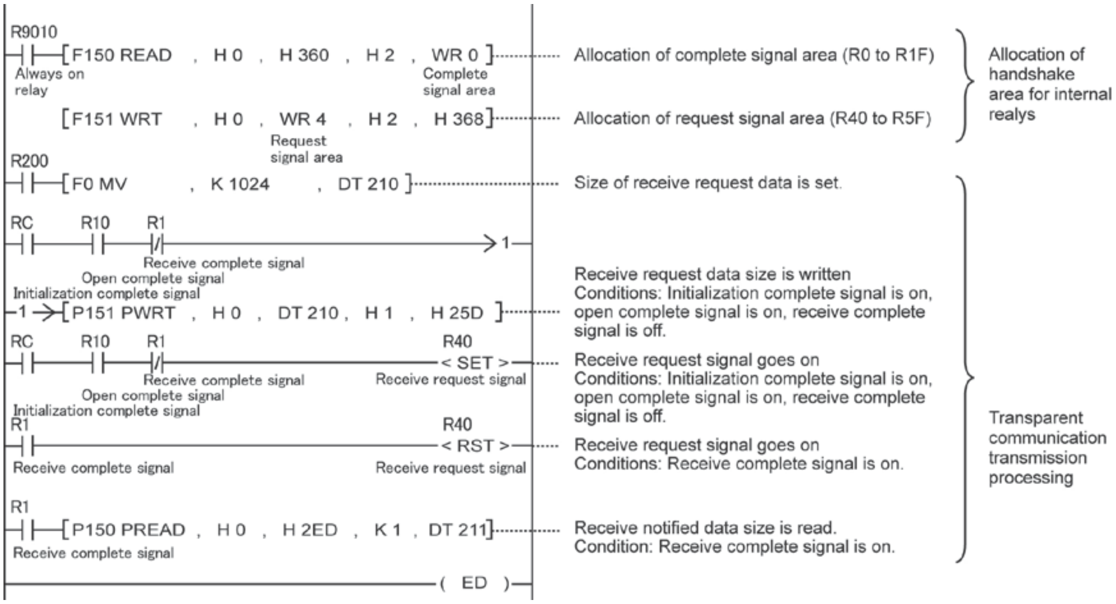
Classification of processing	Device number	Setting item	Setting for program example
Reception processing	DT210	Receive request data size	7024 words
Transmission processing	DT260	Transmission request data size	7024 words
	DT261	Transmission processing complete data size	-
	DT265	Transmission error code	-

Transmission processing

After the data being transmitted has been written to the transmission buffer of the shared memory, the following program is run.

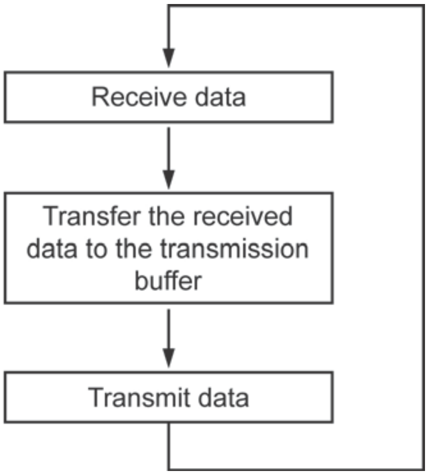


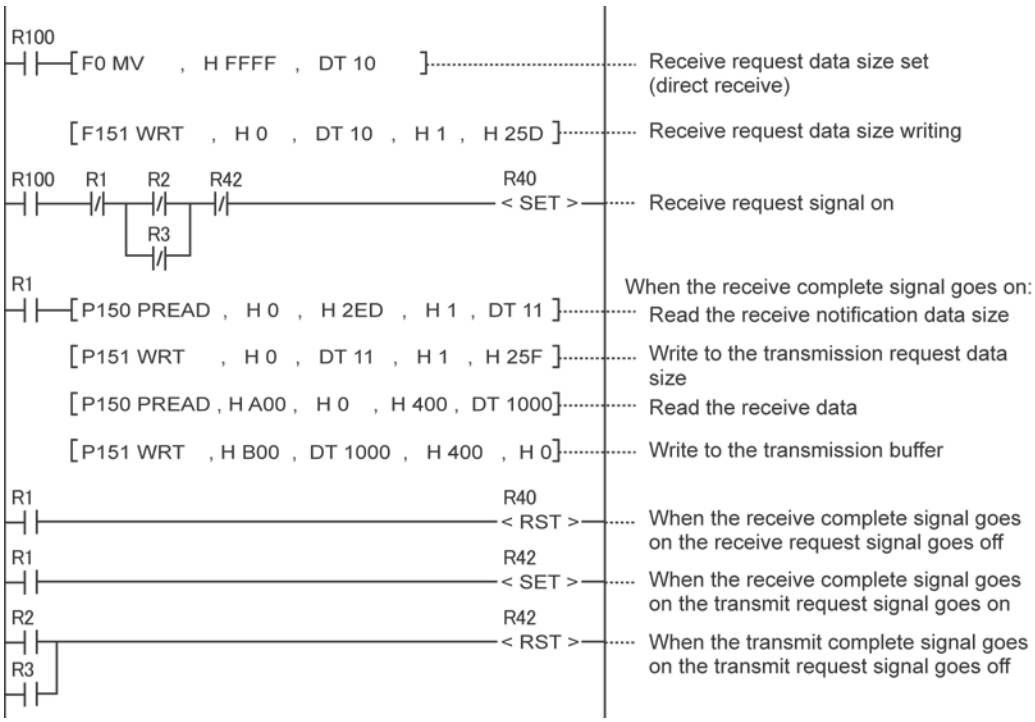
Reception processing
After the following program has been run, the received data is read from the receive buffer.



9.5.3 Sample Program <Reception to Transmission>

Program example for transmitting received data as it is





Note:

- This applies when the default allocations are used for the transmission buffers.
- For this example, the ET-LAN unit has been installed in slot 0.

Internal relay allocation

Classification	Device number	Devices used in program example	
Complete signal area	R0 to R1F	R1 R2 R3	Receive complete signal Transmission complete signal Transmission error signal
Request signal area	R40 to R5F	R40 R42	Receive request signal Transmission request signal

Chapter 10

Auto Connection

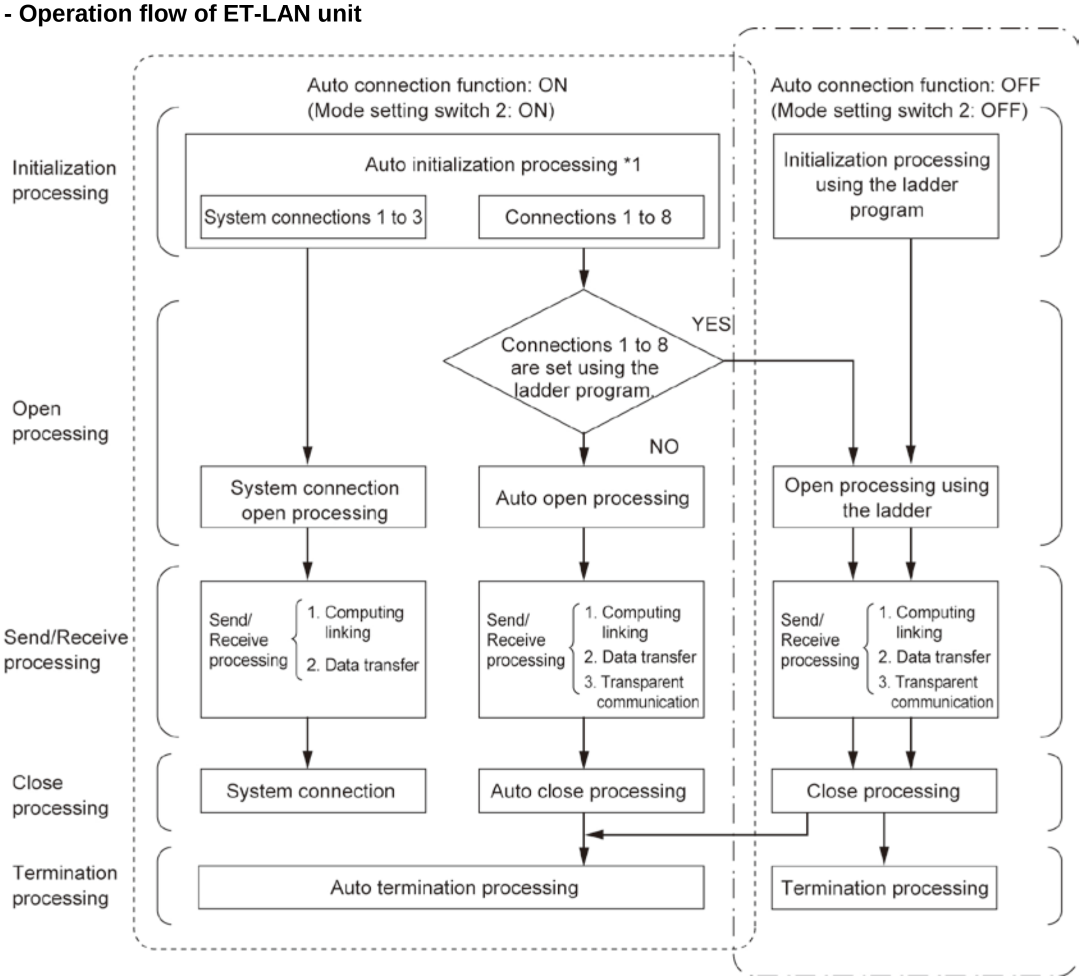
10.1 Auto Connection Function

What is Auto Connection Function?

Auto connection function facilitates initialization processing and open processing setup of the ET-LAN unit not with the ladder program but with the dedicated setup tool (Configurator ET).
Auto connection function is available when the mode setting switch 2 which is located on the back of the ET-LAN unit is turned ON. The operation flow of the ET-LAN unit is as shown below.

Reference: 2.1.3 “Mode setting switch”

- Operation flow of ET-LAN unit



Auto initialization processing:
When the auto connection function is ON (Setting mode switch 2 is ON), the initialization processing is performed automatically. At this time, the initialization processing by the ladder program is invalid.

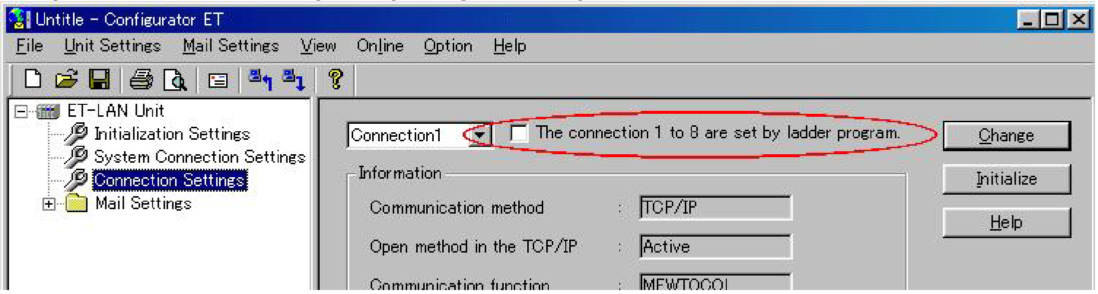
Reference: Chapter 10.1.2 “Auto Initialization Processing”

Note: The auto connection function is only available with Ver.2.00 or later of ET-LAN unit.

Auto open processing:
When the auto connection function is ON (Setting mode switch 2 is ON) and a check mark is not placed in “The connection 1 to 8 are set by ladder program” check box with the dedicated setup tool (Configurator ET), the auto open processing is valid. (See the window below.) At this time, open processing of the connection is automatically performed. The open processing by the ladder program is invalid.

Reference: Chapter 10.1.3 “Auto Open Processing”

Setup window with the setup tool (Configurator ET)



System connection open processing:
When the auto connection function is ON (Setting mode switch 2 is ON), the auto processing of the system connection is performed.

Reference: 10.2.2 “Open processing in the system connection”

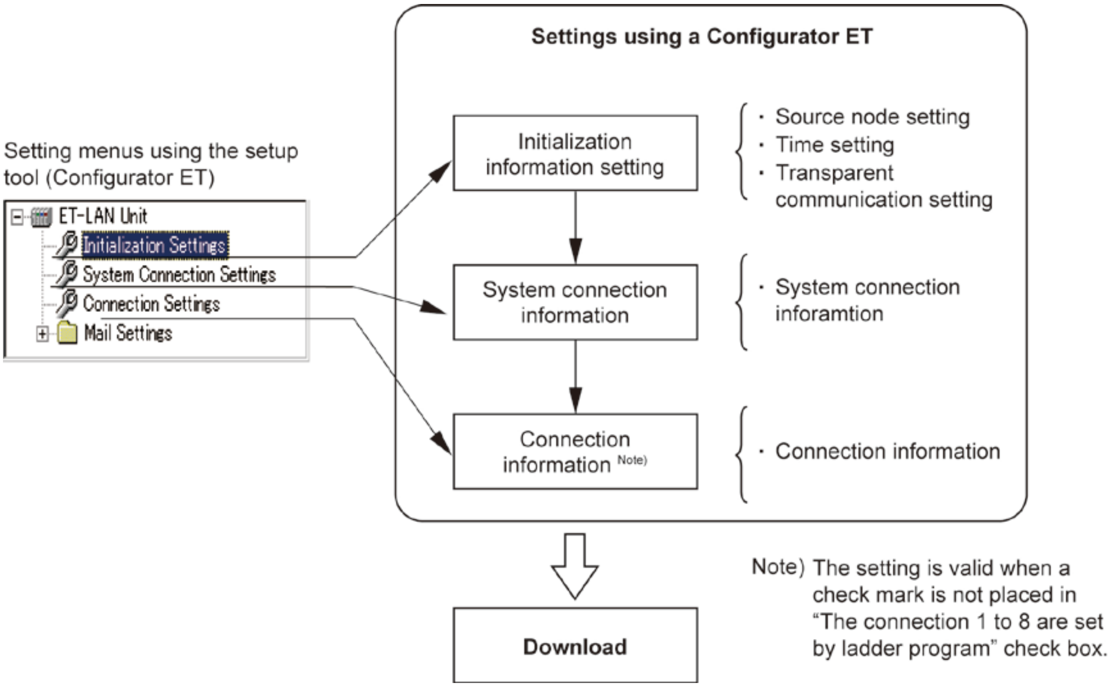
Initialization processing by the ladder program:
When the auto connection function is OFF (Setting mode switch 2 is OFF), the initialization processing is performed by the ladder program. At this time, the auto initialization processing is invalid.

Reference: Chapter 5 “Initialization Processing and Termination Processing”

Open processing by the ladder program:
When the auto connection function is ON (Setting mode switch 2 is ON) and the auto open processing is invalid (a check mark is placed in “The connection 1 to 8 are set by ladder program” check box) with the dedicated setup tool (Configurator ET), or when the auto connection function is OFF (Setting mode switch 2 is OFF), the open processing of the connection by the ladder program is performed. At this time, the auto open processing is invalid.

Reference: Chapter 6 “Open Processing and Close Processing”

- Setup procedure using the auto connection function and setup tool (Configurator ET)
For the auto connection function, it is necessary to set up each information (as shown in the diagram below) with the setup tool (Configurator ET).

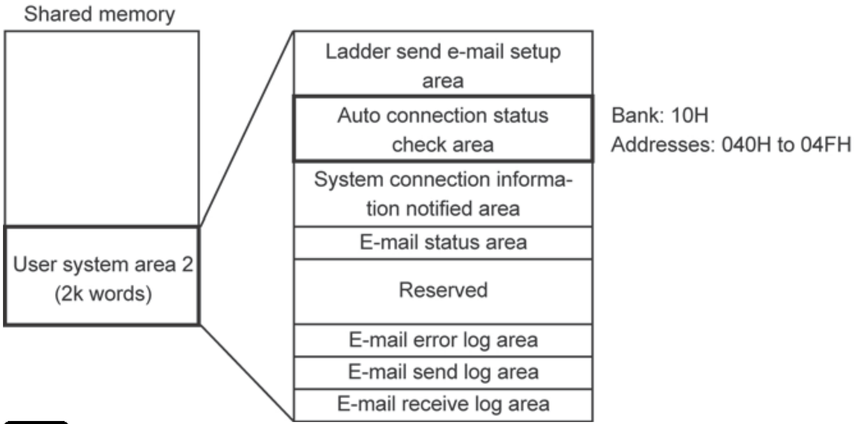


Configurator ET, the setup tool can be uploaded and downloaded irrespective of the auto connection function ON/OFF status.

Reference: Concerning the use of Configurator ET, refer to "Control Configurator ET Operational Guide Book." (ARCT1F341E).

10.1.1 Reading Auto Connection Status Information

The auto connection status check area (Bank: 10H, Addresses: 040H to 04FH) as shown in the diagram below can be read from the shared memory when the auto connection function is valid. In this process, connection status of System connections 1 to 3 and open processing method of Connections 1 to 8 set for the ET-LAN unit can be checked.



Note: Shared memory addresses are allocated in word (16-bit) units.

- Auto connection status check area (Bank: 10H)

Address	Name	Stored value and Explanation
040H	Auto connection function status	Auto connection function status (Mode setting switch 2 status) is stored. 00H: Auto connection function: invalid (Mode setting switch 2 is OFF.) 01H: Auto connection function: valid (Mode setting switch 2 is ON.)
041H	Normal connections 1 to 8 open processing setup procedure	Open processing setup status is stored. 00H: Tool setup: valid (Ladder setup: invalid) 01H: Ladder setup: valid (Tool setup: invalid)
042H	System connection 1 status	Connection status of System connection 1 is stored. 00H: Open processing (Waiting) 01H: Open processing (Completed) 02H: Connection (Connecting) FFH: Open processing (Ended in an error)
043H	System connection 2 status	Connection status of System connection 2 is stored. 00H: Open processing (Waiting) 01H: Open processing (Completed) 02H: Connection (Connecting) FFH: Open processing (Ended in an error)
044H	System connection 3 status	Connection status of System connection 3 is stored. 00H: Open processing (Waiting) 01H: Open processing (Completed) 02H: Connection (Connecting) FFH: Open processing (Ended in an error)
045H | 04FH	Reserved	Reserved (Used in the system.)

10.1.2 Auto Initialization Processing

What is Auto initialization processing?

- Based on the information set by the setup tool (Configurator ET), initialization processing is automatically conducted when the power is supplied. When this processing is performed, initialization processing using the ladder program is not required. Even if the initialization processing is set using the ladder program, the setting is ignored.
- In the auto initialization processing, initialization information and routing information as shown below are set using the setup tool (Configurator ET).
- Under the condition that the auto connection function is valid, the initialization processing is automatically conducted when the power is supplied to the programmable controller and the setting of the initialization processing has been changed. Therefore, the initialization request signal does not need to be ON.
- Whether the auto initialization processing is completed or not can be checked using the initialization complete signal and the initialization error signal in the conventional I/O handshake area or in the shared memory handshake complete signal area.

Items set with the Configurator ET during auto initialization processing

Setting information	Setting item	
Initialization information	Source node IP address	
	Communication setting between networks	
	Source node MEWTOCOL station number	
	TCP ULP (packet existence duration)	
	TCP zero-window timer value	
	TCP re-transmission timer value	
	IP reassembling timer value	
	Connections 1 to 8	Receiving buffer starting address for transparent communication
		Receiving buffer size for transparent communication
		Transmission buffer starting address for transparent communication
		Transmission buffer size for transparent communication
Routing information	Network (sub-network) masking	
	Default router IP address	
	Number of registering router	
	Routers 1 to 5	(Sub-network) address
		IP address

Note:

When the auto connection function is valid, the initialization processing can be set only with the Configurator ET. (The initialization processing cannot be set with the ladder program.) At this time, the termination processing cannot be conducted.

Reference:

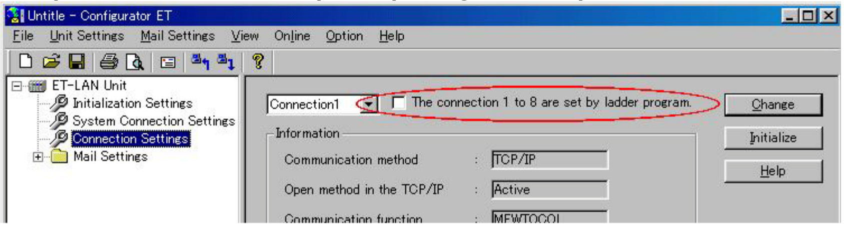
- Setup procedure: “Control Configurator ET Operational Guide Book” (ARCT1F341E)
- Setting items: “Initialization information notified area” in Chapter 5
- Reading the initialization information: “Initialization information notified area” in Chapter 5
- I/O handshake and shared memory handshake: Chapter 4.4 “Handshake Method”

10.1.3 Auto Open Processing

What is Auto open processing?

- Based on the information set by the setup tool (Configurator ET), the open processing is automatically conducted to each connection of the ET-LAN unit when the power is supplied. When using the auto open processing, open processing for each connection by the ladder program is not necessary.
- In the auto open processing, open information for each connection as shown below is set using the setup tool (Configurator ET).
- Before using the auto open processing, confirm that the auto connection function is ON and a check mark is not placed in “The connection 1 to 8 are set by ladder program” check box (Auto open processing is valid.).
  The check mark is not placed in this check box in the initial setting.

Setup window with the setup tool (Configurator ET)



- In the auto open processing, the open processing is automatically conducted when the auto initialization processing is completed. Therefore, the open request signal does not need to be ON for each connection.
- Whether the auto initialization processing is completed or not can be checked using the open complete signal and the open error signal in the conventional I/O handshake area or in the shared memory handshake complete signal area.

- Items set with the Configurator ET during auto open processing

<table>
<tr><th>Setting information</th><th colspan="2">Setting item</th></tr>
<tr><td>Common setting</td><td colspan="2">Open processing set with the ladder program (Valid or Invalid)</td></tr>
<tr><td rowspan="11">Open setting information connections
(1 to 8)</td><td colspan="2">Connection setting (Valid/Invalid)</td></tr>
<tr><td rowspan="3">Application being used</td><td>Communication method (TCP/IP or UDP/IP)</td></tr>
<tr><td>Open method (Active, Fullpassive, or Unpassive)</td></tr>
<tr><td>Application using the communication (MEWTOCOL communication or Transparent communication)</td></tr>
<tr><td colspan="2">Source node port No.</td></tr>
<tr><td colspan="2">Destination node IP address</td></tr>
<tr><td colspan="2">Destination node port No.</td></tr>
<tr><td colspan="2">Destination node MEW station number</td></tr>
<tr><td colspan="2">Destination node Ethernet address</td></tr>
<tr><td colspan="2">Connection closing time (min.)</td></tr>
<tr><td colspan="2">Number of re-open set times</td></tr>
</table>

Note:

- When the auto open processing is valid, the open processing using the ladder program is invalid. Only the settings set by the Configurator ET is valid. At this time, the close processing cannot be conducted.
- When the auto open processing is valid by not selecting the check box for “The connection 1 to 8 are set by ladder program” using the Configurator ET, the auto open processing is applied to all connections. Therefore, the open processing cannot be set to “Valid” or “Invalid” for each connection using the ladder program.

10.1.4 Auto Connection Information Settings

- Necessary data is set for the auto connection information setting items using the dedicated setup tool (Configurator ET).
- For the connection to be used, set the connection information settings as shown below. (Settings for up to 8 connections can be conducted.)

- Auto connection information setting item

Name	Setting value	Description	Default
Connection information settings 1 to 8	Connection valid/invalid selection	For the current connection settings, “Valid” or “Invalid” can be selected. When “Invalid” is selected, the open processing is not performed in the connection.	Invalid
	Application being used: Communica -tion method	Specify whether “TCP/IP” is used or “UDP/IP” is used for the currently-set communication method.	TCP/IP
	Application being used: Open method	This is valid only when “TCP/IP” is specified for the communication method. Select one method among the followings; “Active,” “Fullpassive,” or “Unpassive.”	Active
	Application being used: Application in which connection is used	When using computer link or data transfer, select “MEWTOCOL communication.” When using transparent communication, select “Transparent communication.”	MEWTOCOL communication
	Source node port No.	Specify any port number other than “0”. (A value of 8000 (1F40H) or higher is recommended.)	0
	Destination node IP address	<When using TCP Fullpassive and Active open> Specify an IP address for the destination node that is in the same class, and is other than 0.0.0.0 or 255.255.255.255. <When using UDP> Specify an IP address for the destination node that is in the same class, and is other than 0.0.0.0. <When using TCP Unpassive> No address needs to be specified.	0
	Destination node port No.	Specify any port number other than 0. (A value of 8000 (1F40H) or higher is recommended.) <When using TCP Unpassive> No address needs to be specified.	0
	Destination node MEWTOCOL station No.	Specify the station number of the destination node when MEWTOCOL communication is performed. ▪ Setting range: 1 to 64 ▪ Avoid duplicating the number of another station on the network. ▪ This is ignored when MEWTOCOL communication is not used.	0
	Destination node Ethernet address	Specify this address if the destination node has no ARP functions under the condition that TCP Active open is used.	00-00-00-00
	Connection closing time (min.)	When no communication is performed by the partner within the time specified here, the connection is closed. When the set value is “0,” the connection is not closed.	0
	Number of re-open times	Specify the number of times that re-open is to be conducted. After the specified times are satisfied, an error is issued. A connector in which the error is issued cannot be used. Users can select the number of re-open times from among 0 to 254 or infinite number of times. When the set value is “0,” re-open is not performed. When the set value is 255 or higher, re-open is performed infinitely.	0

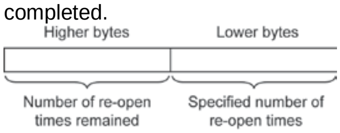
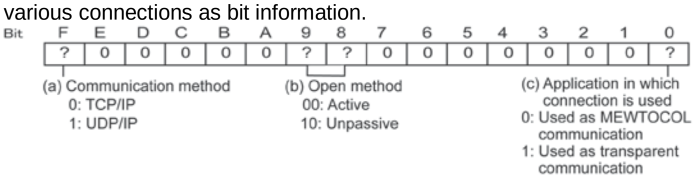
Note: 1. Open method: When “Active” is selected, re-open is performed every 5 to 10 seconds.
2. The number noted above is indicated in decimal number. For the hexadecimal numbers, “H” is added after the number.

Reference: For details on each setting, refer to Chapter 6 “Open Processing and Close Processing”

10.1.5 Reading Auto Connection Information

When the auto connection is valid, the auto connection information can be read in the same block as the connection information notified block of the conventional connection information notified area (Bank: 0, Addresses: 2E0H to 35FH). Additionally, other than the conventional information, the following information can be newly read.

- Auto connection information readout items

Offset address	Name	Stored value/Explanation
0	Open processing complete code (Connections 1 to 8)	[Stored value] 0: Open processing has been completed successfully. Other than 0: Error code (when open processing ended in an error) When re-open processing is conducted, the results are overwritten. Error codes are also stored in the error log area.
1	Source node port No. (Connections 1 to 8)	[Stored value] Source node port numbers for various connections after open processing has been completed. ▪ The value is not entered until open processing has been successfully completed.
2	Destination node IP address (L) (Connections 1 to 8)	[Stored value] Destination node IP addresses for various connections after open processing has been completed. ▪ The value is not entered until open processing has been successfully completed.
3	Destination node IP address (H) (Connections 1 to 8)	
4	Destination node port No. (Connections 1 to 8)	[Stored value] Destination node port No. for various connections after open processing has been completed. ▪ The value is not entered until open processing has been successfully completed.
5	Destination node MEWTOCOL station No. (Connections 1 to 8)	[Stored value] Destination node MEWTOCOL station numbers for various connections after open processing has been completed. ▪ The value is not entered until open processing has been successfully completed.
6	Connection closing time (Connections 1 to 8)	[Stored value] Connection is closed when no communication is performed during the time specified here. ▪ The value is not entered until initialization processing has been successfully completed.
7	Re-opening information (Connections 1 to 8)	[Stored value] Number of re-open times remained ▪ The value is not entered until initialization processing has been successfully completed.  Specified No. of re-open times: The specified number of re-open times is stored. No. of re-open times remained: The number of re-open times remained is stored.
8	Communication method Opening method Application in which connection is used (Connections 1 to 8)	[Stored value] 1-word data that sets the communication conditions for the various connections as bit information.  For details, refer to 6.2.3 “Writing Data to the Connection Information Setting Area” of the “ET-LAN Unit Technical Manual.” ▪ The value is not entered until initialization processing has been successfully completed.
9	Reserved	Reserved (Used in the system.)

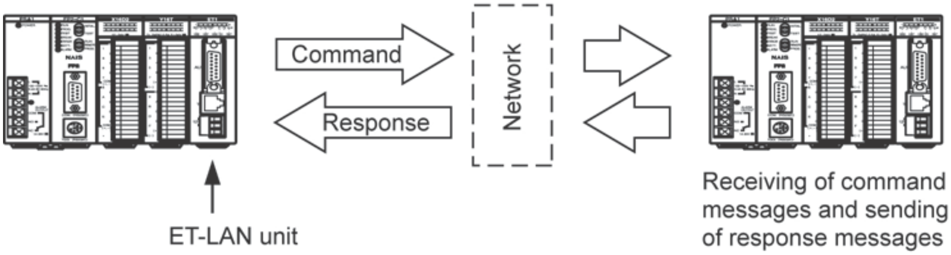
Offset address	Name	Stored value/Explanation
A	Transparent receive processing complete code (Connections 1 to 8)	[Stored value] 0: Receive processing has been completed successfully. Other than 0: Error code (stored when the receive processing ended in an error) ▪ Results are overwritten when receive processing is conducted again. ▪ Error codes are also stored in the error log area.
B	Transparent receive unnotified data size (Connections 1 to 8)	[Stored value] Size of the transparent receive data remaining in the ET-LAN unit (in byte units) ▪ Receive processing for this amount of data is finished successfully and receive requests will be accepted even if the connection is closed.
C	Transparent receive unnotified data size copy (Connections 1 to 8)	[Stored value] Copy of the size of the transparent receive data remaining in the ET-LAN unit (in byte units) ▪ The same value as the transparent receive unnotified data size above is stored. ▪ When the two values match, the size of the transparent receive data will be fixed, so after they match, send a receive request using this value.
D	Transparent receive notified data size (Connections 1 to 8)	[Stored value]: Size of the data actually received for the receive request in transparent communication (in byte units) ▪ It is not possible for this value to be notified as exceeding the receive request data size. ▪ When the connection has been closed, receive processing may end in some cases even if the receive request data size has not been satisfied. If this happens, the value is notified as being less than the receive request data size.
E	Transparent transmission processing complete code (Connections 1 to 8)	[Stored value] 0: Transmission processing has been completed successfully. Other than 0: Error code (when transmission processing ended in an error) ▪ Results are overwritten when transmission processing is conducted again. ▪ Error codes are also stored in the error log area.
F	Transparent transmission complete data size (Connections 1 to 8)	[Stored value] Size of the data actually sent to the destination node for the transmission request in transparent communication (in byte units) ▪ It is not possible for this value to be notified as exceeding the transmission request data size. ▪ When the connection has been closed by the destination node during the transmission, the transmission may be aborted. If this happens, this value is notified as being less than the transmission request data size. ▪ When close processing is requested by the source node during the transmission, the transmission processing is conducted first, and then close processing is conducted. ▪ Even if the transmission processing ends in an error for some reason, transmission processing of the data of the size corresponding to the value is completed successfully.

10.1.6 Sample Program

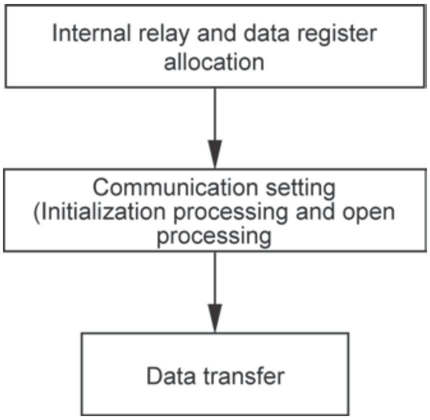
Data Transfer

- Program contents

- Data is transferred between two ET-LAN units.
- The sample program is for an ET-LAN unit installed in Slot No. 0, and covers communication settings up to where the SEND instruction is executed after the connection is opened as a result of the contents noted below.
- After the connection has been opened, no communication program is necessary on the PLC side which receives the MEWTOCOL-DAT command.



To transfer the data, the following procedures are required.



Communication setting can be performed as shown below.

When the auto connection function is not used: Setting is performed only using the ladder program.

→Case 1

When the auto connection function is used: When using the setup tool (Configurator ET)

▪ Connection setting using the ladder program

→Case 2-1

▪ Connection setting using the setup tool (Configurator ET)

→Case 2-2

The ladder programs required for the aforementioned cases are shown in the following pages.

Case 1

When the auto connection function is not used: Setting is performed only using the ladder program.

The following settings are required using the ladder program.

Setting item	Setting method
Internal relay allocation	Ladder program
Initialization processing	Ladder program
Open processing	Ladder program
Data transfer	Ladder program

- Setting using the ladder program

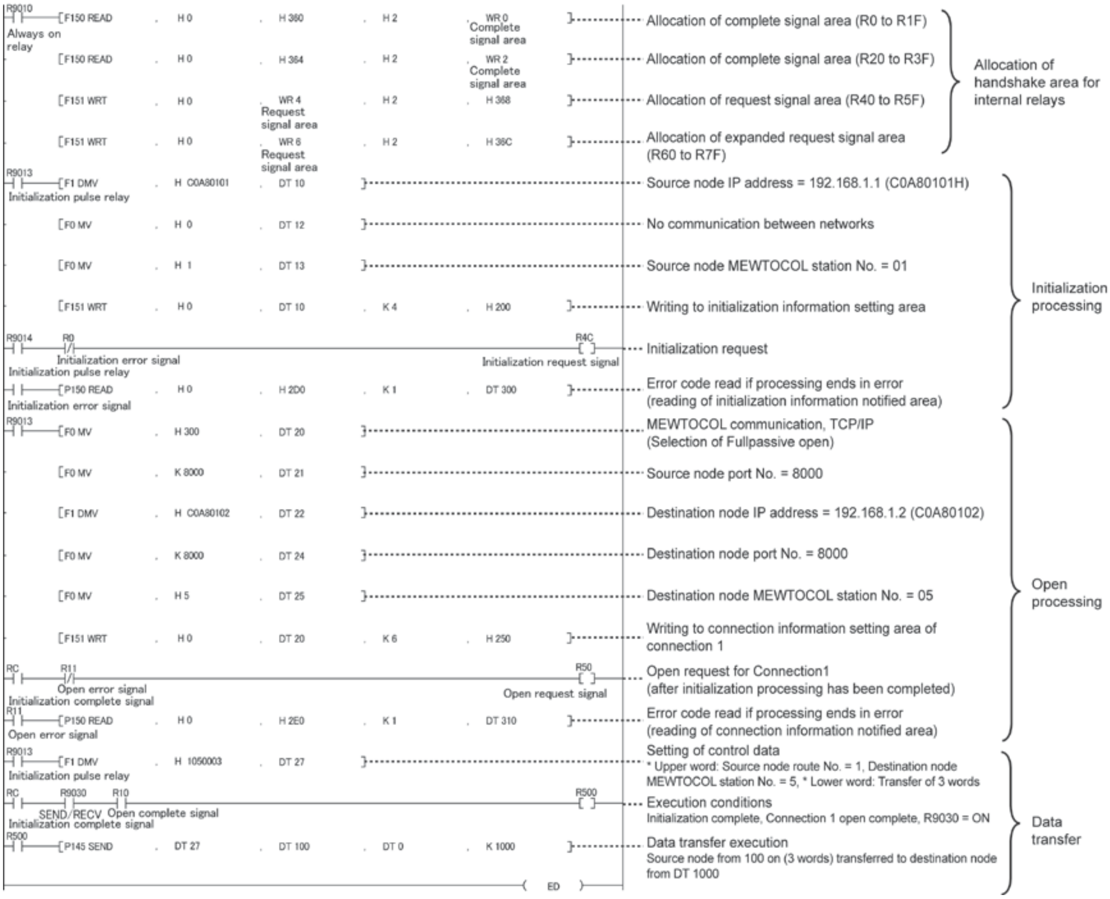
Internal relay allocation

Classification	Device number	Device used in program example
Completed signal area	R0 to R1F	RC: Initialization complete signal RD: Initialization error signal R11: Open error signal (Connection 1)
Request signal area	R40 to R5F	R4C: Initialization request signal R50: Open request signal (Connection 1)

Data register allocation

Classification of processing	Device number	Setting item	Settings used in the program
Initialization processing	DT10 to DT11	Source node IP address	192.168.1.1 (C0A80101H)
	DT12	Communication function setting between networks	Not used
	DT13	Source node MEWTOCOL station No.	01
Open processing	DT20	Open method	MEWTOCOL communication TCP/IP: Full Passive open
	DT21	Source node port No.	8000
	DT22 to DT23	Destination node IP address	192.168.1.2 (C0A80102H)
	DT24	Destination node port No.	8000
	DT25	Destination node MEWTOCOL station No.	05
Data transfer processing	DT22 to DT23	Source node route No.	1
		Destination node MEWTOCOL station No	05
		Number of transferred words	3
Data transfer area	DT100 to DT102	Transfer data writing area	

Case 1: Ladder program example



Case 2-1

When the auto connection function is used (Configurator ET is used) and connection setting is performed using the ladder program, the following settings are required.

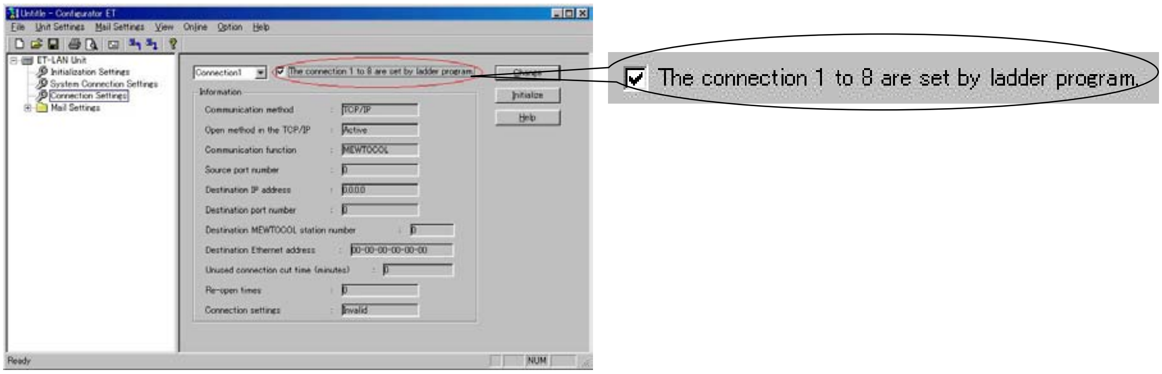
When the initialization processing is set using the Configurator ET, the initialization processing is automatically conducted without setting the initialization processing using the ladder program.

Setting item	Setting method
Internal relay allocation	Ladder program
Initialization processing	Configurator ET
Open processing	Ladder program
Data transfer	Ladder program

- Setting using the setup tool (Configurator ET)

Setting the connection using the ladder program

To set the open processing using the ladder program, confirm that a check mark is placed in “The connection 1 to 8 are set by ladder program” check box.



Setting the initialization processing using the Configurator ET

Classification	Setting item			Description
Initialization processing	Initialization information setting	Source node setting	Source node IP address	192.168.1.1
			Communication between networks	Not used
			Source node MEWTOCOL station No.	1
		Time setting		Default
		Transparent communication setting		Default

- Setting using the ladder program

Internal relay and data register allocation required for the ladder program are as shown below.

Internal relay allocation

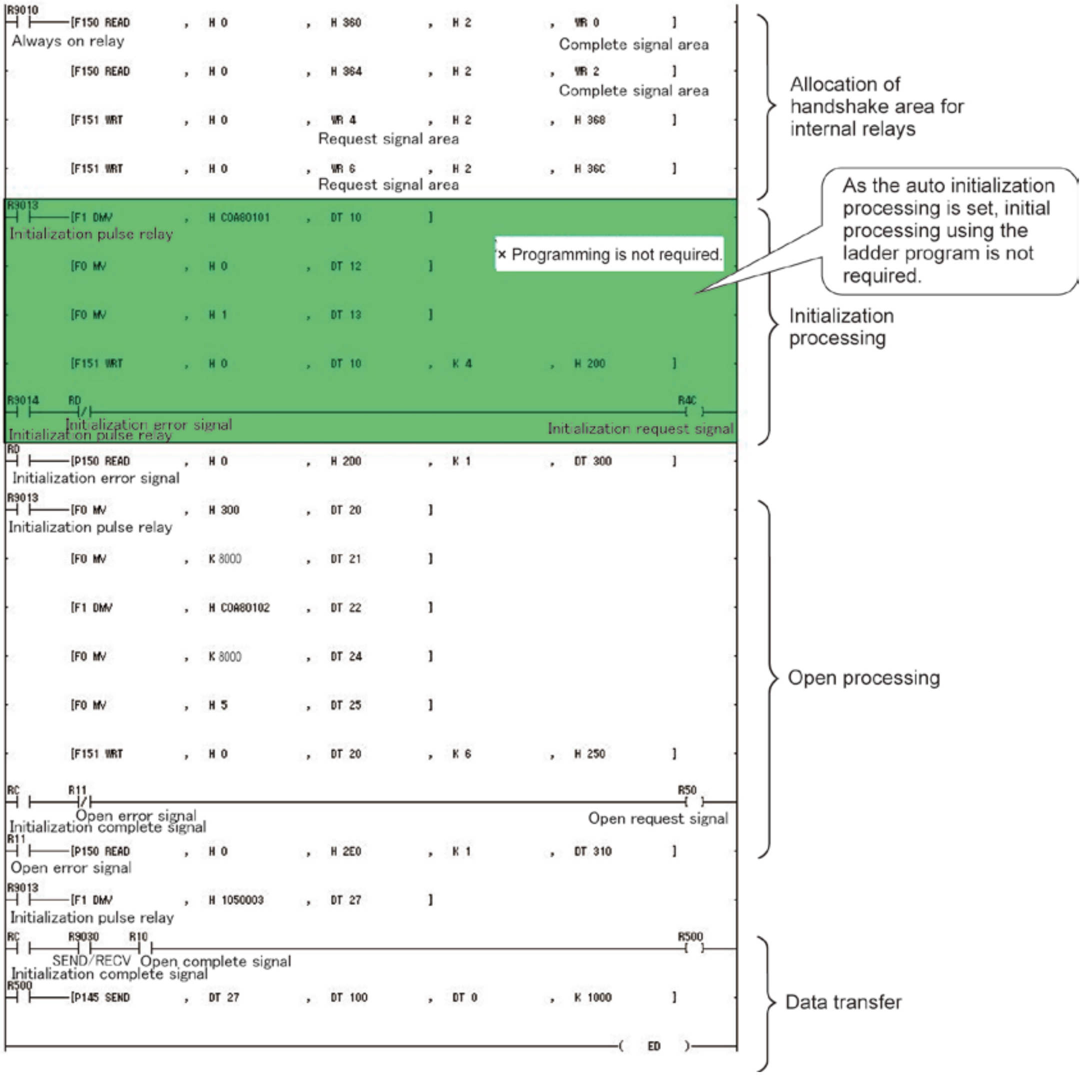
Classification of processing	Device number	Device used in program example
Complete signal area	R0 to R1F	RC: Initialization complete signal R0: Initialization error signal R11: Open error signal (Connection 1)
Request signal area	R40 to R5F	R4C: Initialization request signal

Data register allocation

Classification of processing	Device number	Setting item	Settings used in the program
Open processing	DT20	Open method	MEWTOCOL communication TCP/IP: Full Passive open
	DT21	Source node port No.	8000
	DT22 to DT23	Destination node IP address	192.168.1.2 (C0A80102H)
	DT24	Destination node port No.	8000
	DT25	Destination node MEWTOCOL station No.	05
Data transfer processing	DT22 to DT23	Source node route No.	1
		Destination node MEWTOCOL station No	05
		Number of transferred words	3
Data transfer area	DT100 to DT102	Transfer data writing area	

Case 2-1 Ladder program example

Same as the one which the “X Programming is not required” section as shown below is deleted from the ladder program in Case 1.



Case 2-2

When the auto connection function is used (Configurator ET is used) and connection setting is performed using the Configurator ET:

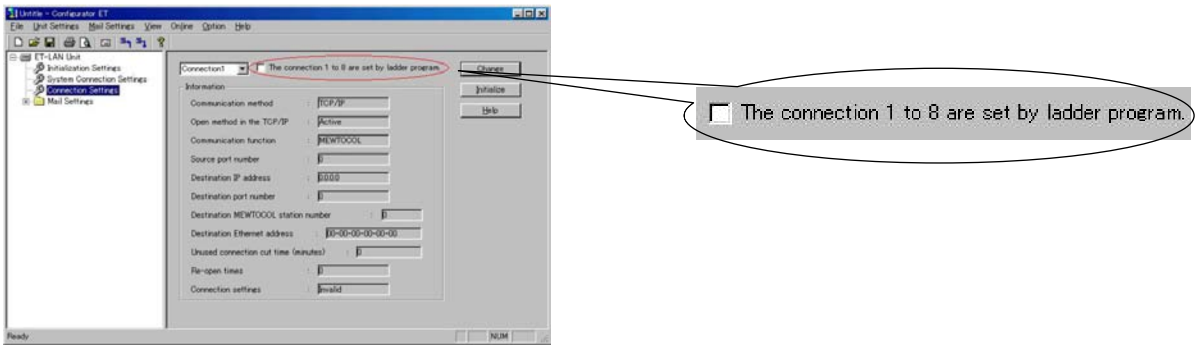
The following settings are required using the ladder program.

When the initialization processing is set using the Configurator ET, the auto initialization processing is automatically conducted without setting the initialization processing using the ladder program.
When setting the connection required for open processing is performed using the Configurator ET, the open processing (auto connection open processing) is automatically conducted without setting the open processing using the ladder program.

Setting item	Setting method
Internal relay allocation	Ladder program
Initialization processing	Configurator ET
Open processing	Configurator ET
Data transfer	Ladder program

- Setting using the setup tool (Configurator ET)

Setting the connection using the setup tool (Configurator ET)
To set the open processing using the setup tool (Configurator ET), confirm that a check mark is NOT placed in “The connection 1 to 8 are set by ladder program” check box.



Setting the initialization processing using the Configurator ET

<table>
<tr><th colspan="2">Classification</th><th colspan="2">Setting item</th><th>Description</th></tr>
<tr><td rowspan="5">Initialization processing</td><td rowspan="5">Initialization information setting</td><td rowspan="3">Source node setting</td><td>Source node IP address</td><td>192.168.1.1</td></tr>
<tr><td>Communication between networks</td><td>Not used</td></tr>
<tr><td>Source node MEWTOCOL station No.</td><td>1</td></tr>
<tr><td colspan="2">Time setting</td><td>Default</td></tr>
<tr><td colspan="2">Transparent communication setting</td><td>Default</td></tr>
<tr><td rowspan="7">Open processing</td><td rowspan="7">Connection setting</td><td rowspan="7">Connection information setting (Connection 1)</td><td>Open method</td><td>MEWTOCOL communication TCP/IP: Fullpassive open</td></tr>
<tr><td>Source node port No.</td><td>8000</td></tr>
<tr><td>Destination node IP address</td><td>192.168.1.2</td></tr>
<tr><td>Destination node port No.</td><td>8000</td></tr>
<tr><td>Destination node MEWTOCOL station No.</td><td>5</td></tr>
<tr><td>Connection closing time</td><td>1</td></tr>
<tr><td>Number of re-open times</td><td>255</td></tr>
</table>

- Setting using the ladder program

Internal relay and data register allocation required for the ladder program are as shown below.

Internal relay allocation

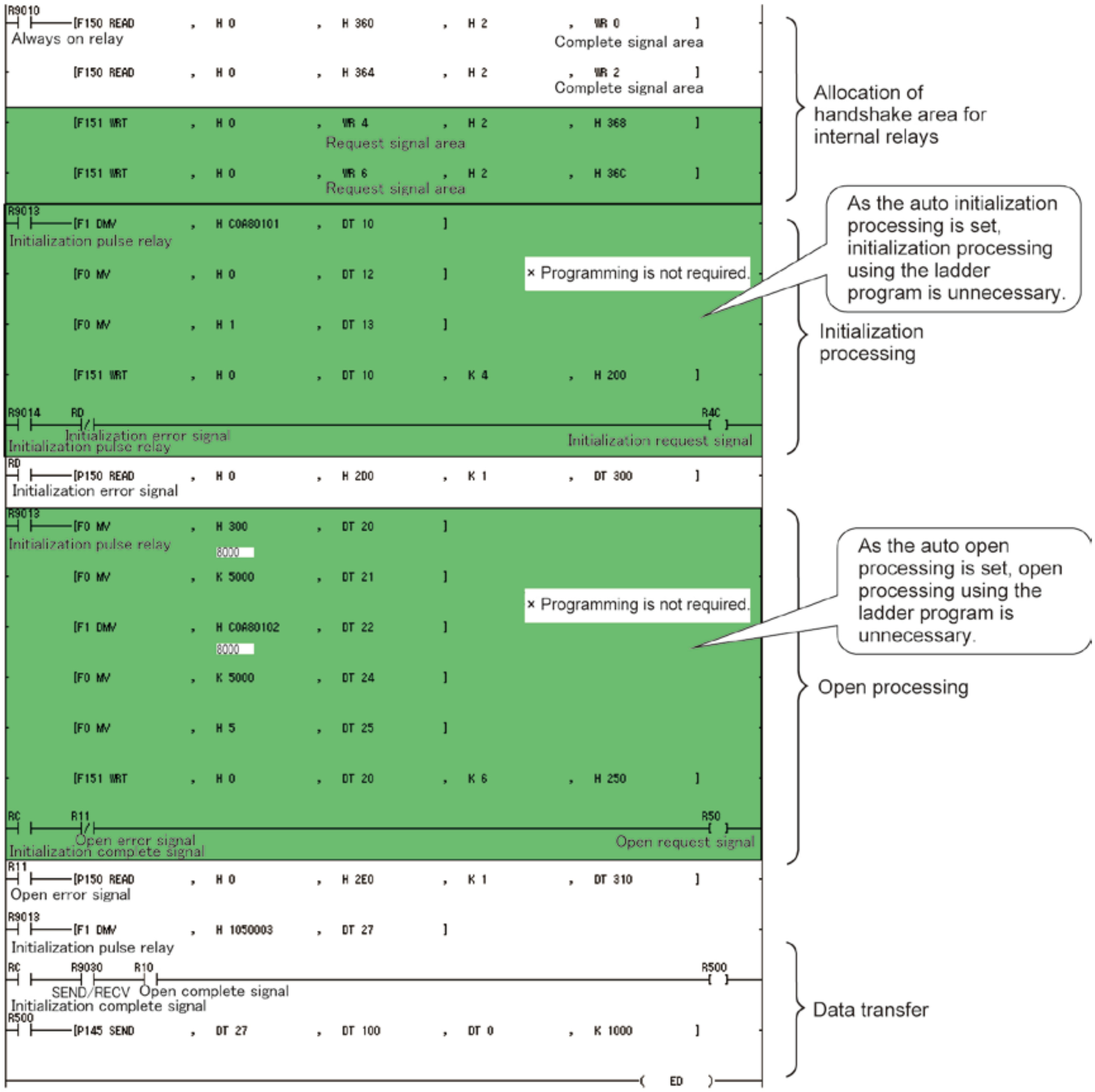
Classification	Device number	Device used in program example
Complete signal area	R0 to R1F	RC: initialization complete signal RD: Initialization error signal R11: Open error signal (Connection 1)
Request signal area	R40 to R5F	R4C: Initialization request signal

Data register allocation

Classification	Device number	Setting description	Setting for program example
Data transfer processing	DT22 to DT23	Source node route No.	1
		Destination node MEWTOCOL station No.	05
		Number of transferred words	3
Data transfer area	DT100 to DT102	Transfer data writing area	

Case 2-2 Ladder program example

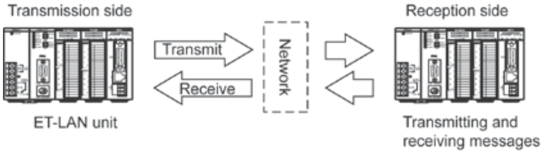
Same as the one which the “X Programming is not required” sections as shown below are deleted from the ladder program in Case 1.



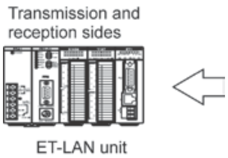
Transparent communication sample program

- Program contents

- In this sample program, the ET-LAN has been installed in Slot No. 0
- In this program, the contents of the transmission buffer (1K words) for Connection 1 are sent to the transmission side and received on the reception side using the transparent communication.



- When the auto connection function is available, use the setup tool (Configurator ET) to perform the initialization information settings and the connection information settings for both transmission and reception sides which are required for the open processing. The setting descriptions are as shown below.



Setting item	Setting method
Internal relay allocation	Ladder program
Initialization processing	Configurator ET
Open processing	Configurator ET
Data transfer	Ladder program

- Setting using the setup tool (Configurator ET)

(Transmission side)

Classification of processing	Setting item			Description
Initialization processing	Initialization information setting	Source node setting	Source node IP address	192.168.1.1
			Communication function setting between networks	Not used
			Source node MEWTOCOL station No.	1
		Time setting		Default
		Transparent communication setting		Default
Open processing	Connection setting	Connection information setting	Open method	Transparent communication TCP/IP: Active Open
			Source node port No.	8000
			Destination node IP address	192.168.1.2 (C0A80102H)
			Destination node port No.	8000
			Destination node MEWTOCOL station No.	5
			Connection closing time	1
			Number of re-open times	255

(Reception side)

Classification of processing	Setting item			Description
Initialization processing	Initialization information setting	Source node setting	Source node IP address	192.168.1.2
			Communication function setting between networks	Not used
			Source node MEWTOCOL station No.	5
		Time setting		Default
		Transparent communication setting		Default
Open processing	Connection setting	Connection information setting	Open method	Transparent communication TCP/IP: Unpassive Open
			Source node port No.	8000
			Destination node IP address	192.168.1.1 (C0A80102H)
			Destination node port No.	8000
			Destination node MEWTOCOL station No.	1
			Connection closing time	1
			Number of re-open times	255

- Setting using the ladder program

- Internal relay and data register allocation required for the ladder program are as shown below.
  (Common to transmission and reception sides.)

Internal relay allocation (Common to transmission and reception sides)

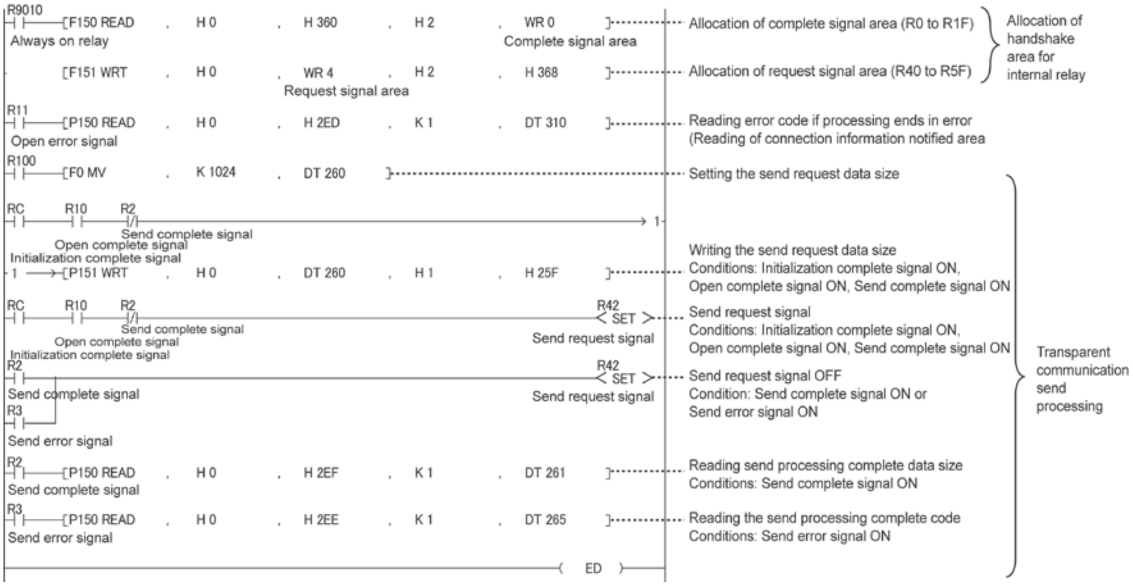
Classification	Device number	Device used in program example
Complete signal area	R0 to R1F	R1: Receive complete signal R2: Transmission complete signal R3: Transmission error signal RC: Initialization complete signal RD: Initialization error signal R10: Open complete signal R11: Open error signal
Request signal area	R40 to R5F	R40: Receive request signal R50: Transmission request signal

Data register allocation (Common to transmission and reception sides)

Classification	Device number	Setting item	Setting for program example
Reception processing	DT210	Receive request data size	1024 words
Transmission processing	DT260	Transmission request data size	1024 words
	DT261	Transmission processing complete data size	-
	DT265	Transmission error code	-

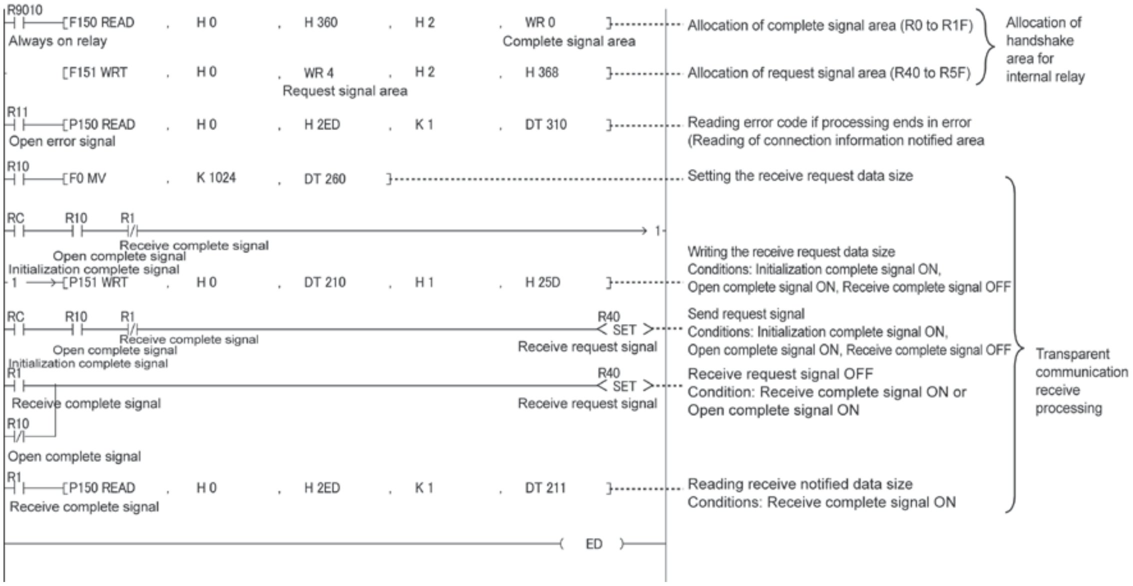
Example of transparent communication program (Transmission processing)

- After the data being transmitted has been written to the transmission buffer of the shared memory, the following program is executed.
- Initialization processing and open processing are automatically executed.



Example of transparent communication program (Reception processing)

- After the following program has been executed, the received data is read from the receive buffer of the shared memory.
- Initialization processing and open processing are automatically executed.



10.2 System Connection

What is System Connection?

System connection is the connection set without using the ladder program, and dedicated for the programmable controller during computer link communication. For the system connection, three connections can be used as well as the existing 8 connections (Connections 1 to 8).

Points:

- For the connection that the auto open processing is executed, the auto open processing setting may be ignored when the setup tool (Configurator ET) is used. On the other hand, the open processing setting for the system connection is not ignored when Configurator ET is used. For this reason, the system connection is suitable for communication with the PC tool "EPWIN-GR."

- System connection can also be used for the communication method (TCP/IP or UDP/IP), open method (Fullpassive or Unpassive), and the application using the connection (MEWTOCOL communication).

10.2.1 Initialization processing in the system connection

System connection can be used when the auto connection function is valid (Mode setting switch 2 is ON). To use the system connection function, therefore, auto initialization processing setting is required.

Reference: 2.1.3 "Auto Initialization Processing"

10.2.2 Open processing in the system connection

Open processing procedures in the system connection are the same as the auto open processing, except for the setting items and contents.

- Items set with the setup tool (Configurator ET) during system connection open processing

Setting information	Setting item	
Open setting information	Application being used	Communication method (TCP/IP or UDP/IP)
		Open method (Fullpassive or Unpassive)
		Application using the connection (MEWTOCOL communication)
	Source node port No.	
	Destination node IP address	
	Destination node port No.	
	Destination node MEWTOCOL station No.	
	Destination node Ethernet address	
	Connection closing time (min.)	

10.2.3 System Connection Information Setting

- Necessary data is set for the system connection information setting items using the dedicated setup tool (Configurator ET).
- For the connection to be used, set the connection information settings as shown below. (Settings for up to 3 connections can be conducted.)

System connection information setting item

Name	Setting value		Description	Default value
System connection information settings 1 to 3	Application being used	Communication method	Specify whether “TCP/IP” is used or “UDP/IP” is used for the currently-set communication method.	TCP/IP
		Open method	This is valid only when “TCP/IP” is specified for the communication method. Select “Fullpassive” or “Unpassive.”	Unpassive
		Application in which connection is used	Only “MEWTOCOL communication” can be used.	MEWTOCOL communication
	Source node port No.		Specify any port number other than “0”.. (A value of “8000” or higher is recommended.)	System connection 1 port 8500 System connection 2 port 8501 System connection 3 port 8502
	Destination node IP address		<When using TCP Fullpassive open> Specify an IP address for the destination node that is in the same class, and is other than “0” and “255.255.255.255”. <When using UDP> Specify the IP address for the destination node that is in the same class, and is other than “0H”. <When using TCP Unpassive> No address needs to be specified.	0.0.0.0
	Destination node port No.		Specify the port number other than “0”. (A value of “8000” or higher is recommended.) <When using TCP Unpassive> No address needs to be specified.	0
	Destination node MEWTOCOL station No.		▪ Specify the station number of the destination node when MEWTOCOL communication is used. Values 1 to 64 can be selected. ▪ Avoid duplicating the number of another station on the network.	0
	Destination node Ethernet address		Not used.	00-00-00-00
	Connection closing time (min.)		When no communication is performed by the partner within the time specified here, the connection is closed. When the set value is “0”. the connection is not closed.	0

Note:

- System connection can be set only with the setup tool (Configurator ET). Even if the ladder program is used, settings cannot be performed.
- System connection can be used when the auto connection function is available. (Mode setting switch 2 is ON).
- System connection automatically executes re-open processing when the connection is closed from the partner, and goes into the ready status to open the connection.
- The number noted above is indicated in decimal number. For the hexadecimal numbers, “H” is added after the number.

- **LED operation in the system connection**

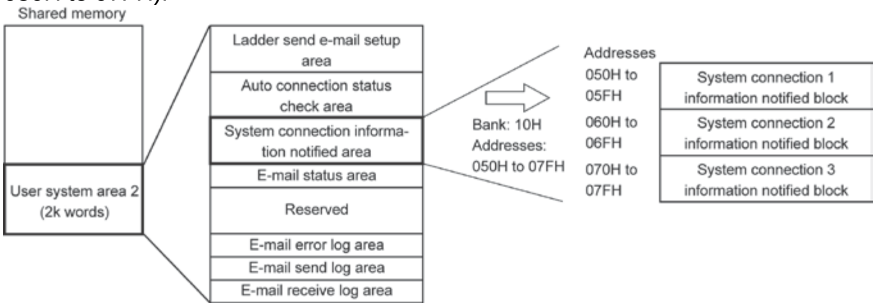
"RMT" LED display status is as shown below.

RMT LED	Description
ON	When any connection among System connections 1 to 3 is effective and no error occurs.
Flashing	When an error occurs in any System connection (System connection 1, 2 or 3).
OFF	When System connections 1 to 3 are not connected.

Reference: Chapter 2.1.2 "LED Operation Status"

10.2.4 Reading system connection information settings

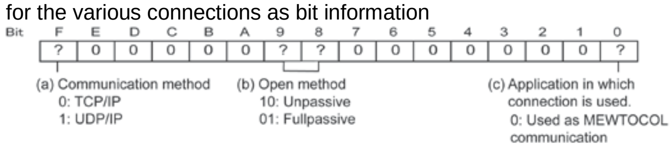
The current settings of the system connection can be read from the shared memory.
Read the necessary data from the system connection information setting area (Bank: 10H, Addresses: 050H to 07FH).



Shared memory addresses are allocated in word (16-bit) units.

- The system connection area consists of three blocks, to match the number of connections.
- The offset address contents as shown below are allocated for the various connections.

- **System connection information notified block (Bank: 10H, Addresses: 050H to 07FH)**

Offset address	Name	Stored value and Explanation
0	Open processing complete code (System connections 1 to 3)	[Stored value] 0: Auto open processing has been completed successfully. Other than 0: Error code (when open processing ended in an error.) When auto open processing is conducted once more, the results are overwritten. Error codes are also stored in the error log area.
1	Source node port No. (System connections 1 to 3))	[Stored value] Source node port number for various connections after auto open processing has been completed. ▪ The value is not entered until auto open processing has been successfully completed.
2	Destination node IP address (L) (System connections 1 to 3)	[Stored value] Destination node IP addresses for various connections after auto open processing has been completed. The value is not entered until auto open processing has been successfully completed.
3	Destination node IP address (H) (System connections 1 to 3)	
4	Destination node port No. (System connections 1 to 3)	[Stored value] Destination node port number for various connections after auto open processing has been completed. ▪ The value is not entered until auto open processing has been successfully completed.
5	Destination node MEWTOCOL station No. (System connections 1 to 3)	[Stored value] Destination node MEWTOCOL station number for various connections after auto open processing has been completed. ▪ The value is not entered until auto open processing has been successfully completed.
6	Connection closing time (min.)	[Stored value] When no communication is performed by the partner within the time specified here, the connection is closed. ▪ The value is not entered until auto initialization processing has been successfully completed.
7	Reserved (Used in the system.)	
8	Communication method Open method Application in which Connections 1 to 3 are used)	[Stored value] 1-word data that sets the communication conditions for the various connections as bit information  For details, refer to 6.2.3 “Writing Data to the Connection Information Setting Area” of “FP2 ET-LAN Unit Technical Manual.” (ARCT1F322E) ▪ The value is not entered until auto open processing has been successfully completed.
9 to F	Reserved (Used in the system.)	

Chapter 11

E-mail Function

11.1 Outline of E-mail Function

ET-LAN unit supports three types of e-mail functions: “Error Notice Mail,” “Report Mail,” and “Device Watch Mail.” The fixed interval function that the ET-LAN unit checks received e-mails in the mail server can also be specified. These e-mail functions can be set using setup tool (Configurator ET).

Reference: For details concerning setup procedures, refer to “Control Configurator ET Operational Guide Book” (ARCT1F341E) and the HELP window of Configurator ET.

E-mails can be sent and received using the ladder program. (Ladder e-mail send function and Ladder received e-mail check function.).
Data can be read via e-mail using the e-mail send/receive function (“Request Mail function”).
The e-mail function can be used regardless of the auto connection function status. That is, the e-mail function can be used either the mode setting switch 2 is ON or OFF.

11.1.1 E-mail Function Specification

<table>
<tr><th colspan="3">Item</th><th>Descriptions</th></tr>
<tr><td colspan="3">Buffer memory size for storing e-mail data Note1</td><td>96K bytes</td></tr>
<tr><td rowspan="4">Supported e-mail functions</td><td rowspan="4">Up to 64 e-mails can be registered.</td><td>Error Notice Mail</td><td>A fixed message, including error occurrence date, time and the error code, is sent to the entered destination when an error is detected in a CPU unit.</td></tr>
<tr><td>Report Mail</td><td>E-mail is sent to the entered destination at the specified intervals (1 to 120 min.) or at an appointed date (Date and time). Up to three appointed times can be registered.</td></tr>
<tr><td>Device Watch Mail</td><td>Bit device watch (X, Y, R, L T, and C)
Word device watch (WX, WY, WR, WL, DT, SV, EV, FL, and LD)</td></tr>
<tr><td>Message only</td><td>Message specified in the ladder send e-mail program</td></tr>
<tr><td colspan="3">E-mail size</td><td>A message can be edited within 2000 characters (including a line feed) every e-mail.</td></tr>
<tr><td colspan="3">Address Book</td><td>Up to 32 addresses can be registered.
“To:”, “Cc:”, and “Bcc:” can be specified.</td></tr>
<tr><td colspan="3">Signature</td><td>User signature: 4 (editable)
Fixed signature: 1</td></tr>
<tr><td colspan="3">Security for receiving e-mails</td><td>A filter can be set for the incoming e-mail using a keyword. (Sender’s e-mail address, domain name and Subject)</td></tr>
</table>

Note1) This size includes the e-mail main message, address book data, and signature data.
Note2) When sending and receiving e-mails, communication with the e-mail server is internally conducted. Therefore, connection setting for communication with the e-mail server is not necessary. (E-mail settings using the setup tool (Configurator ET) are required.)
Note3) E-mails that are sent and received do not support the encrypted data and compressed data. ET-LAN e-mail receive function is supported only by POP.

Note:
The e-mail function is only available with Ver.2.00 or later of ET-LAN unit.

11.2 Precautions When Using the E-mail Function

- **Check items before using the e-mail function**

Q1: Is ET-LAN unit installed in the network environment that can be connected with the e-mail server?
YES → Proceed to Q2.
NO → E-mails cannot be sent and received without using the e-mail server.
Not clear → Check with your network administrator.

Q2. Do you have the IP address used in the network that is connected with the ET-LAN?
YES → Proceed to Q3.
NO → E-mails cannot be sent and received without the IP address.
Not clear → Check with your network administrator.

Q3. Do you use the e-mail setup tool, Configurator ET?
YES
- I want to use it when sending e-mails. → Proceed to Q3.
- I want to use it when receiving e-mails. → Proceed to Q5.
- I want to use it when sending and receiving e-mails. → Proceed to Q4 and Q5.

NO → E-mail setting cannot be performed without the setup tool (Configurator ET).

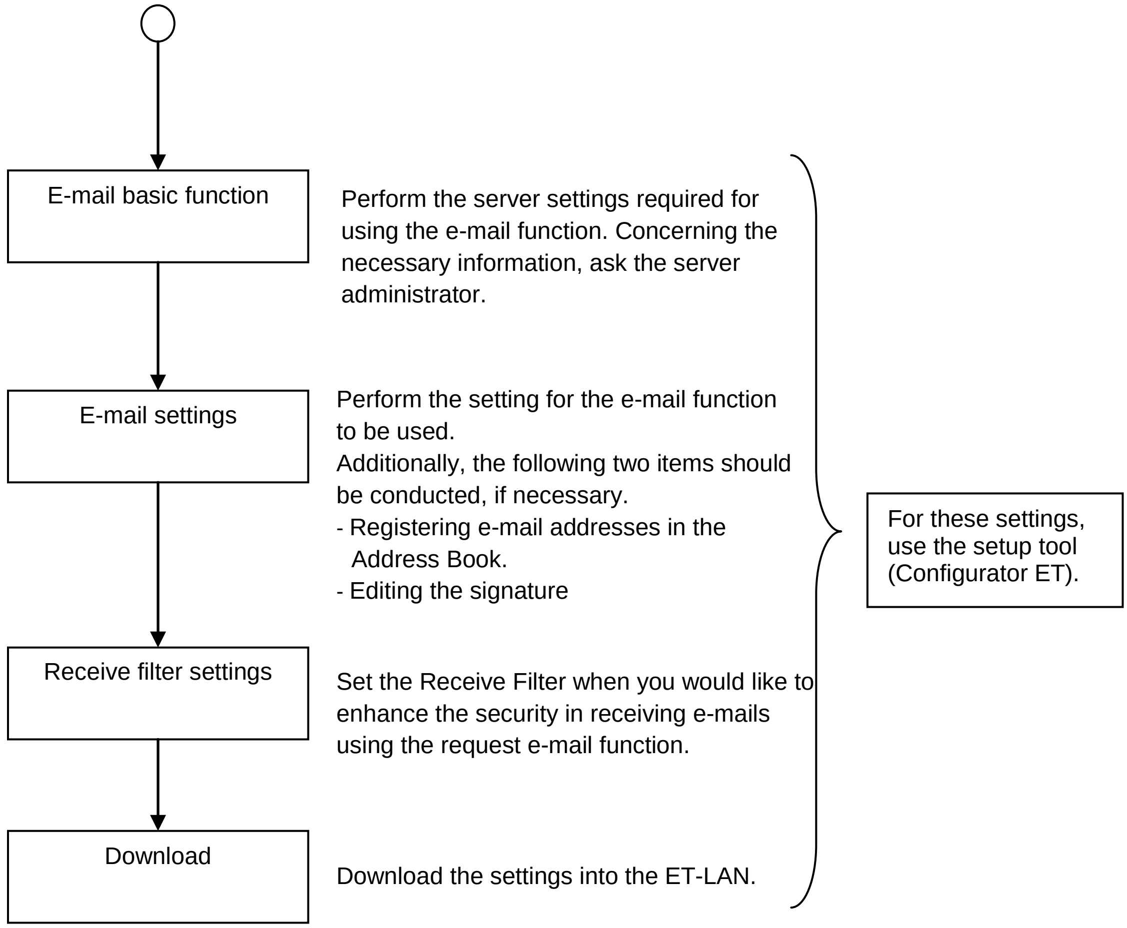
Q4. Do you have the IP address for ET-LAN unit?
YES → E-mail send function can be used. Set up the necessary items according to this manual.
NO → E-mails cannot be sent without the IP address.
Not clear → Check with your e-mail server administrator.

Q5. Does your e-mail server support POP?
YES → E-mail send function can be used. Set up the necessary items according to this manual.
NO → E-mails cannot be received, because ET-LAN e-mail receive function is supported only by POP.
Not clear → Check with your e-mail server administrator.

Q6. Do you have the POP account and POP password for the ET-LAN unit?
YES → E-mail receive function can be used. Set up the necessary items according to this manual.
NO → E-mails cannot be received without the POP account and POP password.
Not clear → Check with your e-mail server administrator.

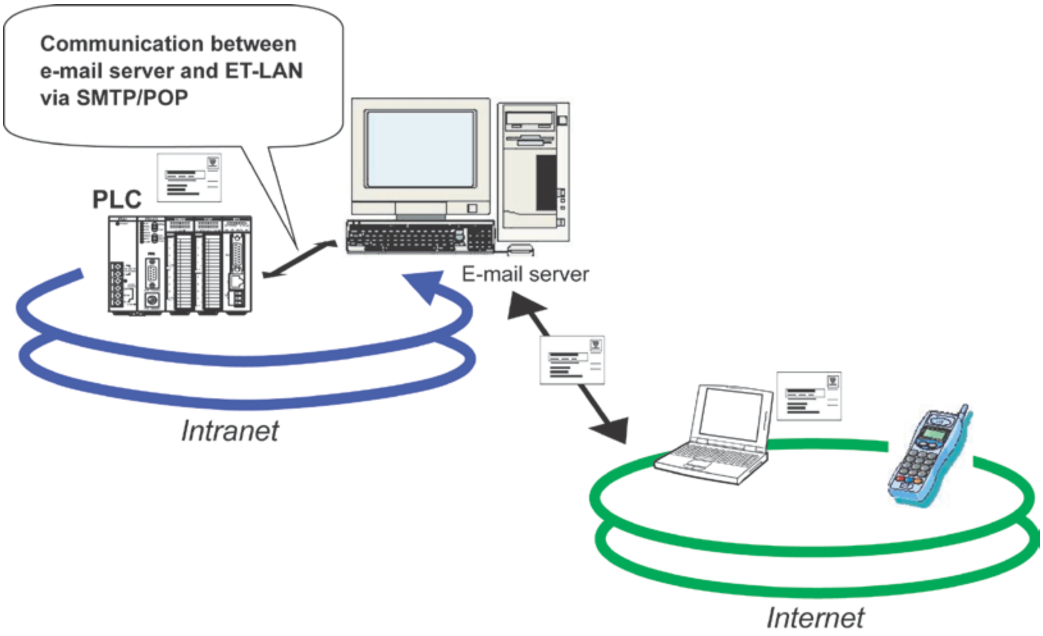
- **E-mail function setting procedure using the setup tool (Configurator ET)**

Flow of e-mail function setting



Reference: For details concerning the setting procedure and items, refer to "Control Configurator ET Operational Guide Book" (ARCT1F341E) or On-line HELP in the Configurator ET tool.

11.3 Operation Environment



- ET-LAN unit conducts the SMTP communication with the e-mail server (SMTP server) at Port No. 25 and the POP communication with the POP server at Port No. 110. E-mail communication cannot be conducted with the ports other than ones noted above.
- E-mails can be sent and received in the environment that Internet is available.
- Perform the settings required for the e-mail function according to the instructions by the Internet provider or network administrator.

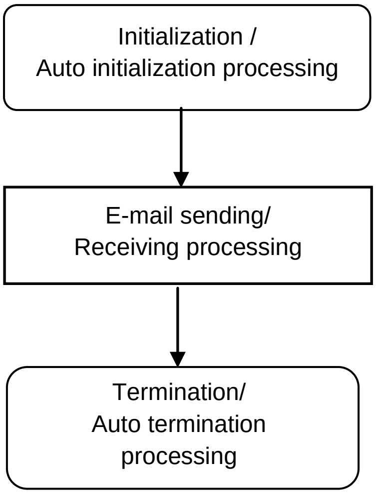
Note:

To avoid the malfunction affected by unauthorized incoming e-mails, perform the specified setting so that unauthorized e-mails cannot be received in the e-mail server on the ET-LAN unit.
Concerning the error that may occur when sending and receiving e-mails, he error code is stored in the error log area.
For the minimum intervals to access the e-mail server when sending/receiving e-mails, check with the system administrator.

11.4 Sending/Receiving E-mails Using E-mail Function

Before sending and receiving e-mails with the ET-LAN unit, initialization processing for the ET-LAN unit must be completed. The e-mail function can be used regardless of the auto connection function status. That is, the e-mail function can be used either the mode setting switch 2 is ON or OFF.

- **E-mail sending and receiving procedure using the ET-LAN unit**

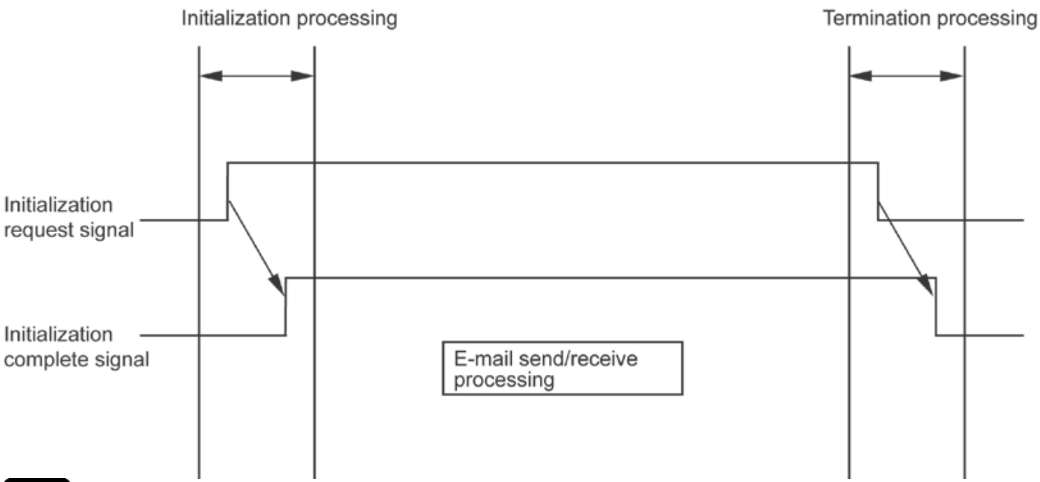


Reference:

When the auto connection function is OFF:
Refer to Chapter 5 “Initialization processing and Termination processing”.

When the auto connection function is ON:
Refer to 10.1.2 “Auto Initialization Processing” of this manual.

- **Relations between initialization processing and E-mail sending/receiving processing**
-



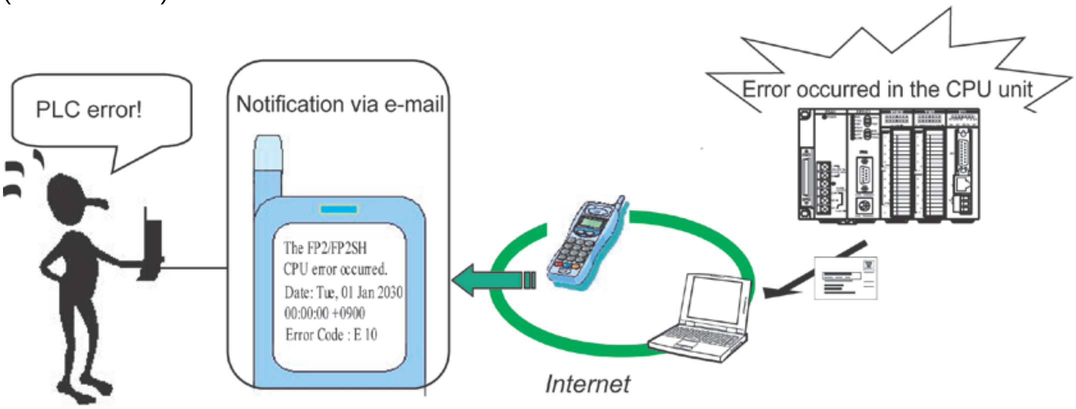
Note:
When the initialization complete signal is ON, e-mails can be sent/received.
When the e-mail setup tool (Configurator ET) is used, e-mail settings can be changed either the initialization complete signal is ON or OFF.

11.5 E-mail Function

- **E-mail sending function**

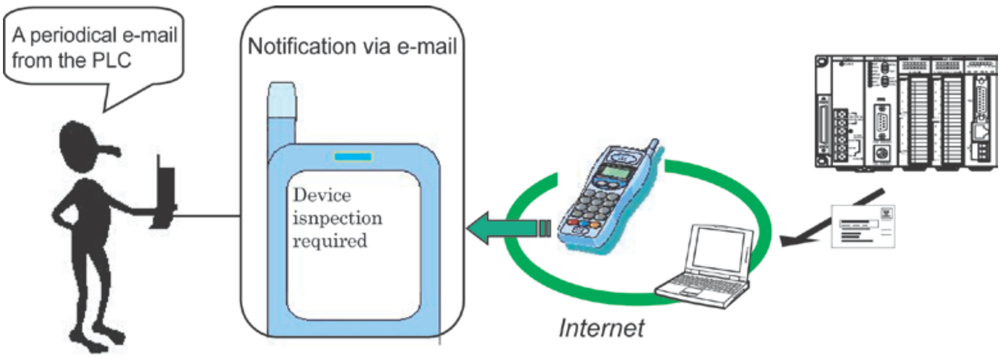
Error Notice E-mail:
When an error occurs in the CPU unit, a fixed message is sent to the specified destination. (The message of the e-mail cannot be edited.)

Reference:
For detailed setting procedure, refer to Chapter 4.3 of “Control Configurator ET Operational Guide Book.” (ARCT1F341E)
For the error codes to be sent, see Chapter 10.6 “Error Codes” of the “FP2/FP2SH Hardware” manual. (ARCT1F320E)



Note:
If an error that disables the unit from normal operation (e.g. ALARM LED of the CPU unit lights up) occurs, e-mails cannot be sent successfully.

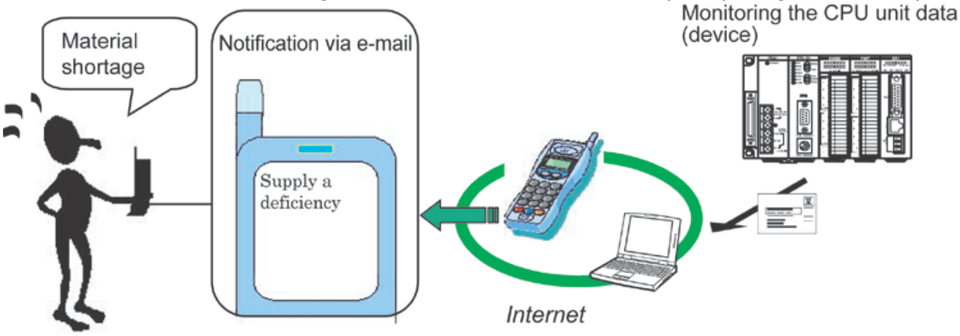
Report Mail:
E-mails are sent to the designated destination at the specified intervals or at the specified date.
- Time intervals can be specified within the range of 1 to 120 min.
- E-mails can be sent to the designated destination at an appointed date that can be specified with month, day, hour and minute. Up to 3 sending time can be specified per a Report Mail.



Device Watch Mail:
When a device of the programmable controller meets a certain condition (see Example below), an e-mail is sent to the designated destination.

Example:

Y0 turns ON or OFF,	(Turning ON/OFF the flag)
DT0 is 100,	(Monitoring the device)
DT0 is equal to the value of WR0, or	(Comparing the devices)
the value of DT1 becomes larger than the value of FL0	(Comparing the devices)



Note:
- When the status of the monitored device on the CPU unit changes in a short time, the ET-LAN unit may not be able to detect the change.
  As the number of monitored devices or the amount of connection communication increases, the interval for monitoring devices becomes longer. Refer to the following calculation method to enable to surely detect the change in the target device.
  [How to calculate the interval of monitoring time]
  When without the connection communication
  Interval of monitoring time = 50 x N (ms)
- If the conditions for device monitoring are satisfied when the power is supplied, a Device Watch Mail is sent to the specified destination.

Ladder send e-mail:
When the e-mail send request flag in the shared memory turns ON, an e-mail is sent to the specified destination.
The e-mail message, which is registered using the Configurator ET in advance, is determined by specifying using the ladder program.

Reference: Chapter 3.5 “Sending E-mail Using the Ladder Program”

- **E-mail receive function (Received e-mail check function)**
Checking received e-mails:
Received e-mails in the e-mail server can be checked at the specified intervals. The value for the intervals can be selected in the range of 0 to 255 (min.). When “0” is specified, received e-mails are not checked.

Reference: Control Configurator ET “Operational Guide Book” (ARCT1F341E)

Checking received e-mails using the ladder program:
When the e-mail receiving request flag in the shared memory turns ON, received e-mails in the e-mail server are checked.

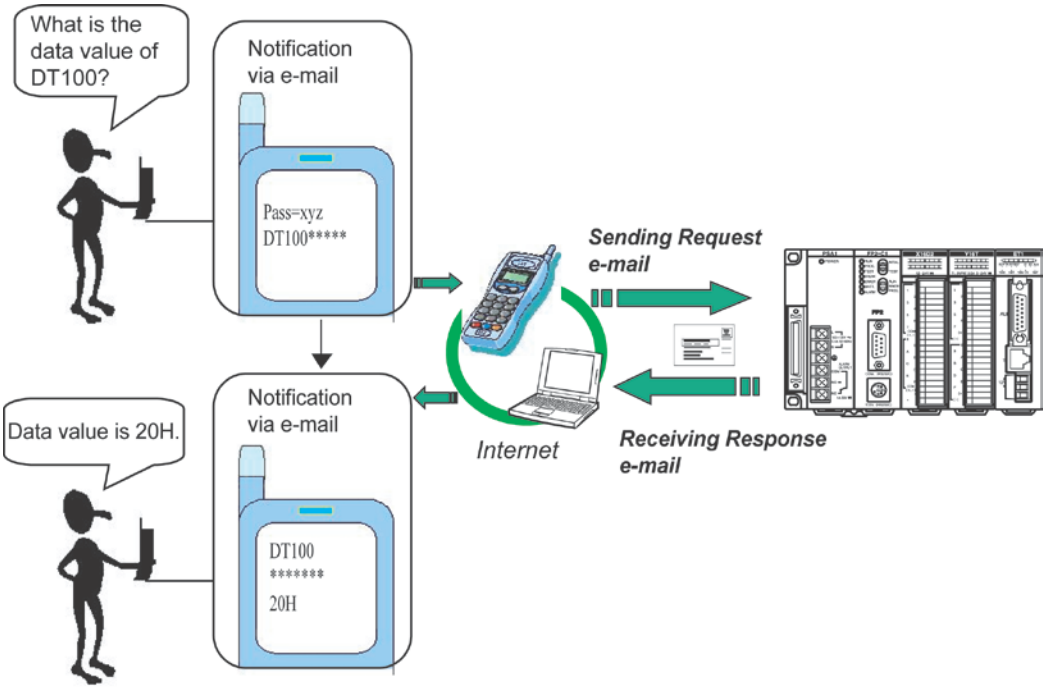
Reference: Chapter 2.7 “Receiving E-mails Using the Ladder Program”

- Request Mail function

Response Mail:

When the ET-LAN unit receives the request e-mail, it sends back a response e-mail to the e-mail source.

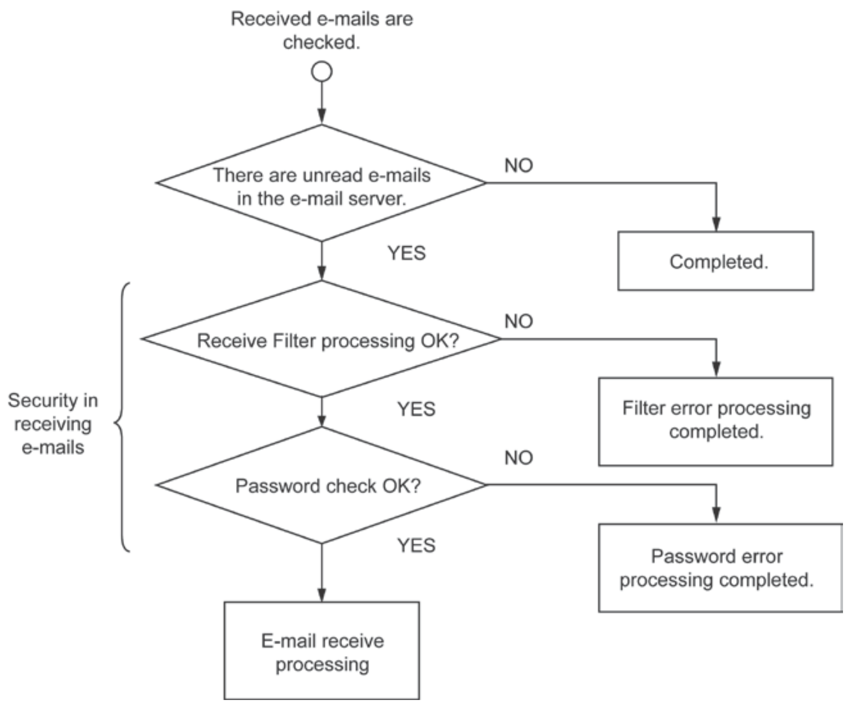
Reference: Chapter 3.6 “Request Mail Function”



11.6 Security in Receiving E-mails

To enhance the safety in receiving e-mails, use the Mail Filter fucntion and a security password.

- Flow of e-mail receiving steps



- Mail Filter function

Mail Filter function enables you to receive e-mails that satisfy the specified conditions when the ET-LAN unit receives e-mails.

Mail Filter function is avaialble for the following three items:
- E-mail address of the sender
- E-mail address domain (characters later than “@” mark) of the sender
- Contents of “Subject” in the e-mail

Example of Mail Filter function:
Targeted item to be set: E-mail address of the sender
Keyword: aaa@bbb.co.jp

When the conditions as shown in the example above are set, the ET-LAN unit receives only e-mails that are sent from the specified e-mail address.

For the Mail Filter function, up to 20 e-mail addresses can be registered.

Note:
- “Keyword” as shown above must be entered within 50 characters.
- Once even one filter item is registered for the Mail Filter function, the ET-LAN unit does not receive other e-mails than ones specified for the Mail Filter function.

- Security password in receiving e-mails

A security password is used for password authentication when receiving the request e-mail.
For an e-mail that the ET-LAN unit receives, the password is authenticated to check if the received e-mail is a request e-mail. This function prevents CPU data from being read and written by an unauthorized e-mail.

Reference: Chapter 3.6 “Outline of Request E-mail Function”

Note:

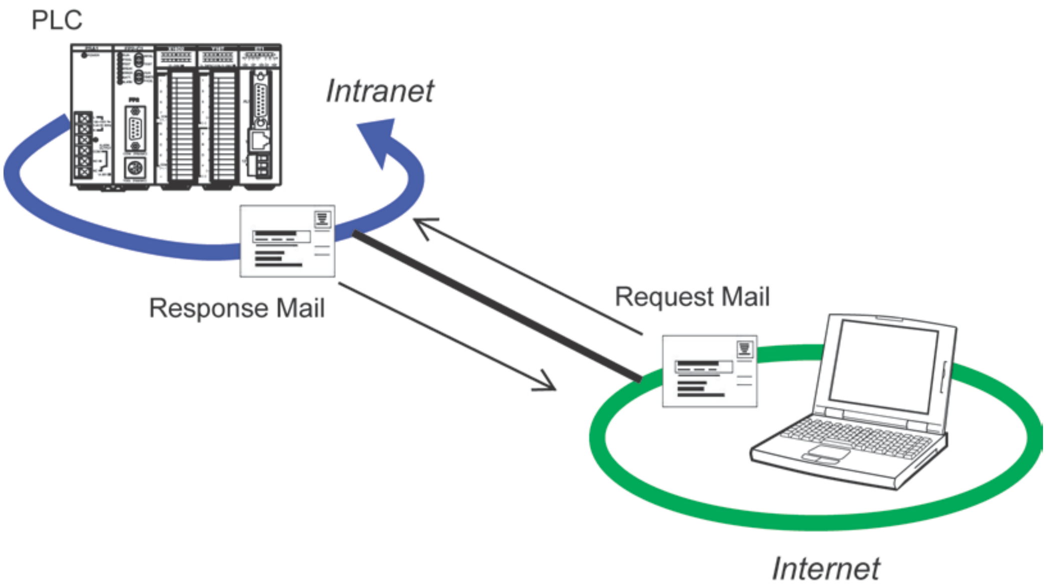
- A password must be entered within 16 chatacters.
- Case sensitivity is available for a password.
- E-mails that have been regarded as “incorrect” by the e-mail security function are not received. The description of the unreceived mail is stored in the receive e-mail error log area.

11.7 Outline of Request E-mail Function

Using the Request Mail function, data of the device that is monitored by the programmable controller can be read and written via e-mail.
A Request Mail created based on the specified format can be sent to the ET-LAN unit with this function. After the ET-LAN unit receives the Request Mail, it automatically creates the Response Mail in answer to the request e-mail and sends back the Response Mail to the computer.

- Request Mail and Response Mail

A computer sends a Request Mail to a programmable controller and receives the Response Mail from the controller. In this function, the computer receives various information from the programmable controller via communication.



11.7.1 Request Mail Format

- Format of Request Mail (Sent from a computer)

The format of the request mail to be sent to ET-LAN unit is as follows:

Example of a Request Mail

```
To: etlan@xxx.yyy.co.jp
From: pc@zzz.yyy.co.jp
Subject: Request                    ---------- ①


Pass=XYZ123 ↵                       ---------- ②
%EE#RDD0000100011**                 ---------- ③
```

Necessary settings for the e-mail to be sent

(1) Subject:
Enter “Request” here.

(2) Password:
Enter “Pass=∆ ∆ ∆” for the first line of the message body. In succession to “Pass=”, enter the security password (“XYZ123” in the example above), which is specified in Receive Option of the Configurator ET, and finally press the Enter key.
(When the security password is not set, press the Enter key just after entering “Pass=”.)

(3) MEWTOCOL command:
Enter the MEWTOCOL-COM command for the 2nd line of the message body.
For “BCC”, enter “**” (asterisks).

Reference: For details concerning MEWTOCOL command, refer to Chapter 12.

Note:

- When entering MEWTOCOL-COM command, the response must not be multiframe. If the response is multiframe, the error message as shown below is written in the Response Mail and sent back to the computer.

  No good: multi frame

- Upper/lower case characters and a space (indicated as “□” here) are discriminated when entering them in the “Subject” column and using them for a password.

  OK: “Request”
  NG: “request”, ”REQUEST”, ”Req□uest”, “ Request□”, and so on.

- **Format of Response Mail (Sent from a programmable controller)**

E-mail to be sent back from the ET-LAN unit is as follows:

Example of a Response Mail

```
Date: Thu, 24 Jan 2002 19:20:28 +0900
From: etlan@xxx.yyy.co.jp
To: pc@zzz.yyy.co.jp                          ------------------- ①
Subject: Response

%EE$RD0000000000000000000000000000000000000000**  --- ②

CPU Unit-Type    :  FP2SH
CPU version      :  1.07                       } ------- ③
ET-LAN version   :  02.00
IP address       :  192.168.1.1
```

(1) Subject:
“Response” is entered in the “Subject” column in the Response Mail**.**

(2) MEWTOCOL response:
MEWTOCOL-COM response is sent back from the programmable controller.

(3) Signature for Response Mail
A signature specified in Receive Option of Configurator ET is attached to the Response Mail.

Error messages
When a message as shown below is written in the Response Mail ((2) in the example above), check the Request Mail.

Error message	Description
No good: password	A security password is not correct.
No good: subject	A subject is not correct.
No good: command format	METOCOL-COM command format is not correct. Correct format: “<” and “%” are written in the header. ** (BCC) is written in the last of the command.
No good: multi frame	A multiframe command is sent.
CPU response timeout error	No response is returned from the CPU unit.

11.8 Sending E-mail Using the Ladder Program

In the ladder send e-mail function, e-mails can be sent by the instruction using the ladder program. Using the ladder program of the CPU unit, the e-mail send processing is executed by turning ON the e-mail send request signal in the handshake area which is allocated in the ET-LAN unit.
E-mail message to be sent can be specified by entering the necessary data in the ladder e-mail send setting area using the ladder program.

- Setting items for the ladder send e-mail

<table>
<tr><th colspan="3">Setting item</th><th>Description</th></tr>
<tr><td rowspan="5">Ladder send e-mail</td><td rowspan="3">Recipient e-mail address</td><td>To</td><td rowspan="3">The destination addresses based on the No. of the Address Book which is registered using the setup tool (Configurator ET) are specified. Up to 32 addresses can be specified each for “To”, “Cc”, and “Bcc”.</td></tr>
<tr><td>Cc</td></tr>
<tr><td>Bcc</td></tr>
<tr><td colspan="2">Selection of e-mail message to be sent</td><td>Using the ladder program, the No. of the message, which is registered with the setup tool (Configurator ET), is specified.</td></tr>
<tr><td colspan="2">Selection of a signature</td><td>Whether the signature is attached to a message or not is selected. A signature is registered using the setup tool (Configurator ET).</td></tr>
</table>

Reference: Control Configurator ET “Operational Guide Book” (ARCT1F341E)

11.8.1 E-mail Send Processing Using the Ladder Program

- **Handshake using the shared memory**

A CPU unit requests the ET-LAN unit for sending an e-mail and checks if the e-mail is successfully sent to the specified destination by means of a shared memory handshake.

Reference: <Chapter 4 Confirming the Design Contents>

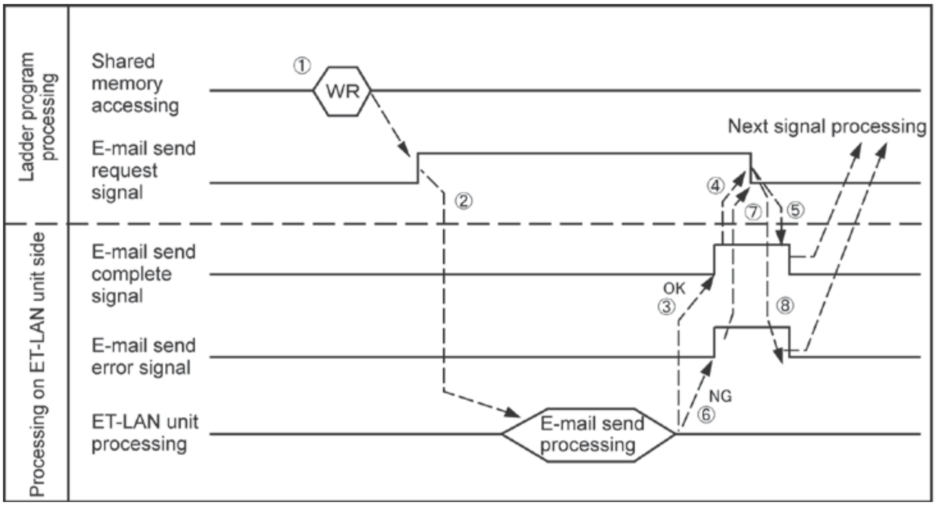
- **E-mail send complete signal area (Bank: 0)**

Address		Description
362H	bit 2	E-mail send complete signal
	bit 3	E-mail send error signal

- **E-mail send request signal area (Bank: 0)**

Address		Description
36AH	bit 2	E-mail send request signal

- **Time chart for e-mail send processing**



- **Procedure to send e-mails**

(1) Write the data that you wish to send via e-mail in the ladder send e-mail setting area.

Reference: Chapter 3.7.2 “Ladder Send E-mail Settings”

(2) The e-mail send request signal is turned ON.
(3) When the e-mail send processing from the ET-LAN unit to the e-mail server is completed successfully, the e-mail send complete signal is turned ON.
(4) After confirming that the e-mail send complete signal is ON, the e-mail send request signal should be turned OFF.
(5) When the e-mail send request signal has been turned OFF, the e-mail send complete signal is turned OFF.
(6) If the e-mail send processing is not successfully completed in some reason, the e-mail send error signal is turned ON.
(7) Before conducting the e-mail resend processing, be sure to turn OFF the e-mail send request signal at first.
(8) When the e-mail send request signal is turned OFF, the e-mail send error signal is turned OFF. To conduct the e-mail resend processing, be sure to confirm that the e-mail send error signal is OFF.

Note:

- To send e-mails using the ladder program, the following settings are required.
  (1) Source e-mail address (This should be specified in advance using Configurator ET.)
  (2) SMTP (E-mail) server IP (This should be specified in advance using Configurator ET.)
  (3) Ladder send e-mail settings

  When all required settings are not specified, an e-mail is not sent even if the e-mail send request signal is turned ON. The e-mail send error signal is turned ON instead.

- Users are notified of the description of the error by means of the error log.

Reference:

Presetting procedures for (1) “Source e-mail address” and (2) “SMTP (E-mail) server IP”: Control Configurator ET “Operational Guide Book” (ARCT1F341E)
For (3) Ladder send e-mail settings: Chapter 11.8.2 “Ladder Send E-mail Settings”.

11.8.2 Ladder Send E-mail Settings

Before sending e-mails using the ladder program, be sure to confirm that the settings as shown below are registered using the setup tool (Configurator ET).
- E-mail address(es) specified for the destination address(es) (“To”, “Cc”, and “Bcc”)
- A message specified in Message No.
  A signature specified in Signature No.

- Ladder send e-mail setting area (Bank: 10H)

<table>
<tr><th>Address</th><th>Name</th><th>Default</th><th>Setting value/Explanation</th></tr>
<tr><td>000H</td><td>Destination address 1
(For “To”)
(Address Nos. 1 to 16)</td><td>0000H</td><td rowspan="6">Default: 0 to FFFFH
Using the ladder program, Nos. of the destination addresses (for “To”, “Cc”, and “Bcc”) which are registered in the Address Book by means of Configurator ET can be specified. In this process, bit data is used.

Example:
<u>When sending e-mails to the address Nos. 1 and 6 registered in the Address Book</u>:

When Bit 0 and Bit 5 of Destination address 1 (For “To”, Address: 000H) in the ladder e-mail setting area (Bank: 10H) are set to “1”, e-mail address Nos. 1 and 6 registered in the Address Book are specified as the destination addresses.
Bit F E D C B A 9 8 7 6 5 4 3 2 1 0
0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 1
Registered No. 6 Registered No. 1

▪ To send e-mails using the ladder program, specify the value other than “0H” for either Destination address 1 (For “To”) or Destination address 2 (For “To”).
▪ This setting is not required for the destination addresses “Cc” and “Bcc”.</td></tr>
<tr><td>001H</td><td>Destination address 2
(For “To”)
(Address Nos. 17 to 32)</td><td>0000H</td></tr>
<tr><td>002H</td><td>Destination address 1
(For “Cc”)
(Address Nos. 1 to 16)</td><td>0000H</td></tr>
<tr><td>003H</td><td>Destination address 2
(For “Cc”)
(Address Nos. 17 to 32)</td><td>0000H</td></tr>
<tr><td>004H</td><td>Destination address 1
(For “Bcc”)
(Address Nos. 1 to 16)</td><td>0000H</td></tr>
<tr><td>005H</td><td>Destination address 2
(For “Bcc”)
(Address Nos. 17 to 32)</td><td>0000H</td></tr>
<tr><td>006H</td><td>Message No.</td><td>0000H</td><td>Default : 0H
Setting value: 1 H to the numbers that are registered as e-mail messages using Configurator ET
・ The e-mail message that you wish to send using the ladder program is specified.
・ The e-mail message No. registered using Configurator ET is specified. If the No. which is not registered is specified, e-mail message cannot be sent.</td></tr>
<tr><td>007H</td><td>Signature No.</td><td>0000H</td><td>Default: 0H
Setting value: 0 to 5H
・ The signature which is attached to the e-mail message using the ladder program is specified.
The fixed signature is determined as No. 5. Other signatures than the fixed one registered using Configurator ET are determined as Nos. 1, 2, 3, and 4 from the first one. When “0” is specified, a signature is not attached to the e-mail. If the value other than 0 to 5H is specified, e-mails cannot be sent.</td></tr>
<tr><td>008H</td><td colspan="3" rowspan="8">Reserved (Used in the system.)
If necessary, write “0000H”.</td></tr>
<tr><td>009H</td></tr>
<tr><td>00AH</td></tr>
<tr><td>00BH</td></tr>
<tr><td>00CH</td></tr>
<tr><td>00DH</td></tr>
<tr><td>00EH</td></tr>
<tr><td>00FH</td></tr>
</table>

11.8.3 Sample Program (for sending e-mails)

This sample program is created on the assumption that the following settings are completed in advance using the setup tool (Configurator ET).

- E-mail addresses are registered in the Nos. 1, 6, and 32.
- A message is registered in the Message No. 1.

- **Program contents**

The sample program is for the ET-LAN unit installed in Slot No. 0, and the following contents are sent using the ladder e-mail send program when the internal relay R300 turns ON.

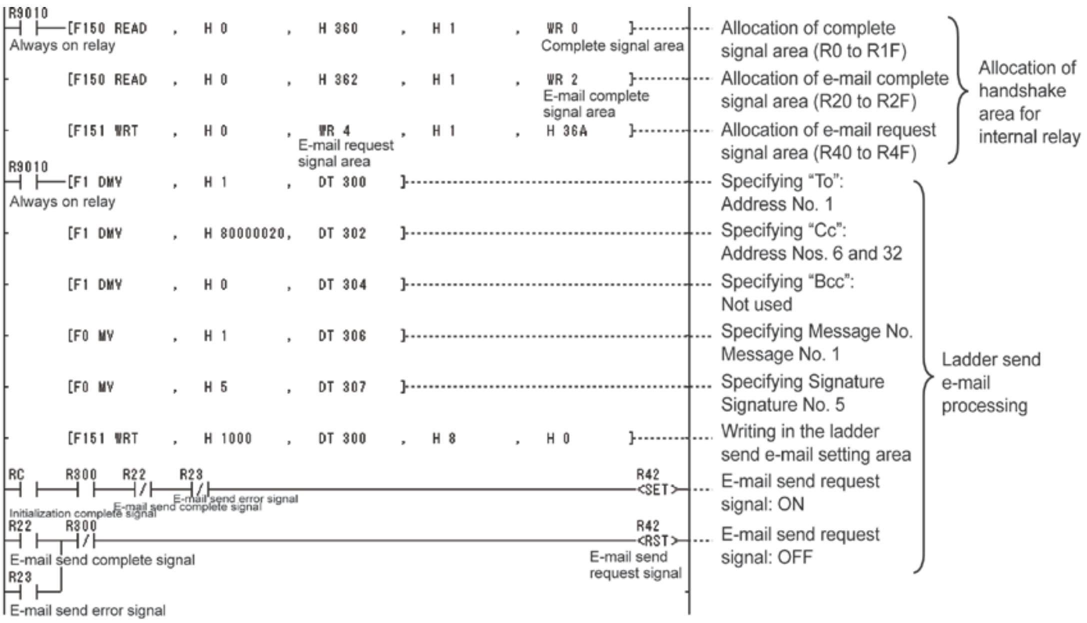
Internal relay allocation

Classification	Device No.	Device used in program example
Complete signal area	R0 to R1F	RC: Initialization complete signal
E-mail complete signal area	R20 to R2F	R22: E-mail send complete signal R23: E-mail send error signal
E-mail request signal area	R40 to R4F	R42: E-mail send request signal
Customized contact	R300	R300: User-defined contact

Data register allocation

Classification	Device No.	Settings	Settings for program example
E-mail sending processing	DT300 to DT301	Destination address (For specifying “To”)	Address No.1 (0000 0001H)
	DT302 to DT303	Destination address (For specifying “Cc”)	Address Nos. 6 and 32 (8000 0020H)
	DT304 to DT305	Destination address (For specifying “Bcc”)	Not used (0000 0001H)
	DT306	Specifying Message No.	Message No. 1 (0001H)
	DT307	Specifying Signature No.	Signature No. 5 (0005H)

- **Program example**



11.9 Receiving E-mails using the Ladder Program

Whether e-mails are received or not can be checked by the instruction using the ladder program.
E-mail receive processing is executed by turning ON the e-mail receive request signal in the handshake area which is allocated in the ET-LAN unit using the ladder program of the CPU unit.

Reference: <Chapter 4 Confirming the Design Contents>

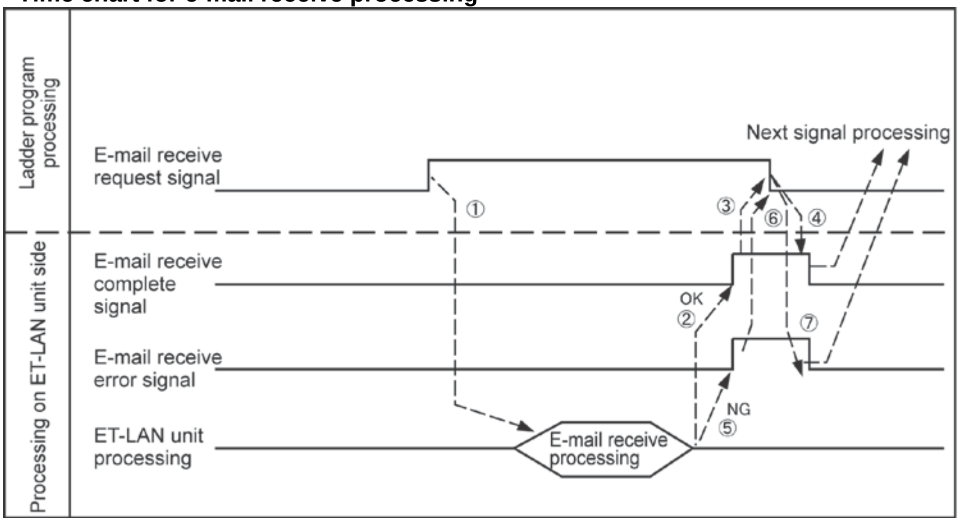
- **E-mail receive complete signal area (Bank: 0)**

Address		Description
362H	bit 0	E-mail receive complete signal
	bit 1	E-mail receive error signal

- E-mail receive request signal area (Bank: 0)

Address		Description
36AH	bit 0	E-mail receive request signal

- Time chart for e-mail receive processing



- Procedure to receive e-mails

(1) The e-mail receive request signal is turned ON.
(2) When the e-mail receive processing from the ET-LAN unit to the e-mail server is completed successfully, the e-mail receive complete signal is turned ON.
(3) After confirming that the e-mail receive complete signal is ON, the e-mail receive request signal should be turned OFF.
(4) When the e-mail receive request signal has been turned OFF, the e-mail receive complete signal is turned OFF.
(5) If the e-mail receive processing is not successfully completed in some reason, the e-mail receive error signal is turned ON.
(6) Before conducting the e-mail receive processing once again, be sure to turn OFF the e-mail receive request signal at first.
(7) When the e-mail receive request signal is tuned OFF, the e-mail receive error signal is turned OFF.

To conduct the e-mail receive processing once again, be sure to confirm that the e-mail receive error signal is OFF.

Note:

- To receive e-mails using the ladder program, the following settings are required in advance using the setup tool (Configurator ET).

  - Log-in name
  - Password
  - POP (e-mail) server IP address

  When all required settings are not specified, an e-mail is not received even if the e-mail receive request signal is turned ON. The e-mail receive error signal is turned ON instead.

- Users are notified of the description of the error by means of the error log.

Reference: Control Configurator ET “Operational Guide Book” (ARCT1F341E)

11.9.1 Sample Program (for receiving e-mails)

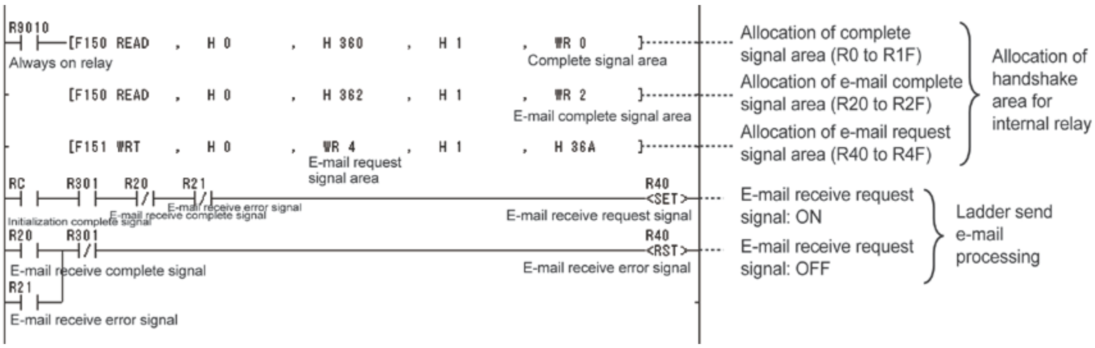
- Program contents

The sample program is for the ET-LAN unit installed in Slot No. 0, and the following contents are received when the internal relay R301 turns ON.

- Internal relay allocation

Classification	Device No.	Device used in the program example
Complete signal area	R0 to R1F	RC: Initialization complete signal
E-mail complete signal area	R20 to R2F	R20: E-mail receive complete signal R21: E-mail receive error signal
E-mail request signal area	R40 to R4F	R40: E-mail receive request signal
Customized contact	R301	R301: User-defined contact

- Program example



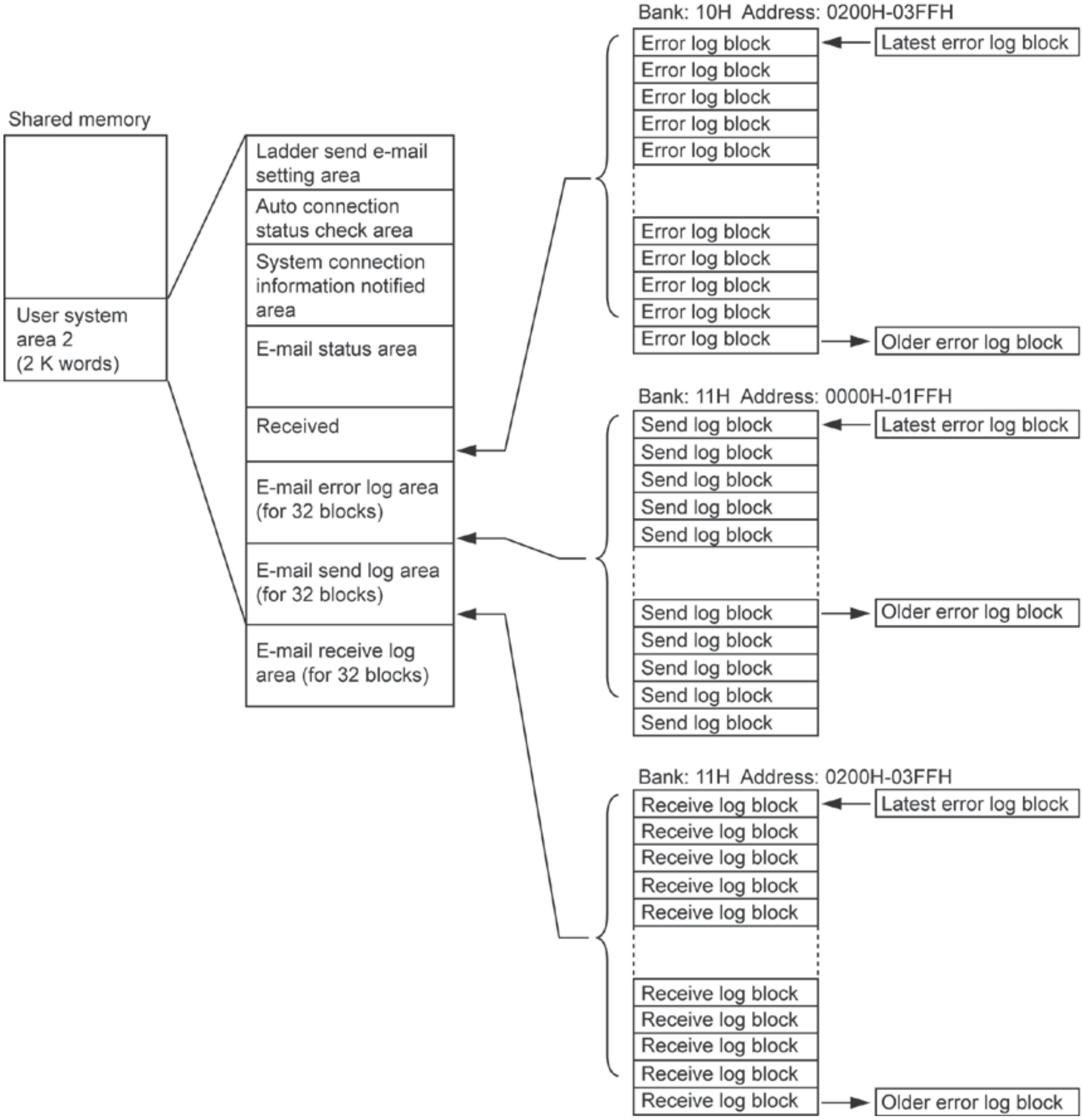
11.10 E-mail Error Log and E-mail Log Functions

11.10.1 What are the e-mail error logs and e-mail log functions

- The ET-LAN unit is equipped with a log buffer and an error log buffer;
  The log buffer records the communication information when sending/receiving e-mails.
  The error log buffer records the communication error information when sending/receiving e-mails.
  To read the contents of the log buffer, read the e-mail error log area, e-mail send log area, and e-mail receive log area in the shared memory using the shared memory access.

- The e-mail send/receive status (e.g. the number of times that e-mails are sent and received) can be checked by reading the e-mail status area of the ET-LAN unit. Whenever e-mail send/receive processing is completed, the e-mail status is updated.

- Configuration of the error log area



11.10.2 Reading E-mail Error Log

- Contents of the error log block

- Up to 32 error log blocks can be registered in the e-mail error log area. (Send and receive errors are mixed in the area.)
- When the number of the error log block exceeds 32, the older log in the e-mail error log area's last block is overwritten.

E-mail send errors (Bank:10H Address:0200H-03FFH)

Offset address	Name	Explanation
0 (L)	Date (Min.)	Date and time when e-mail is sent are stored.
0 (H)	Date (Time)	
1 (L)	Date (Day)	
1 (H)	Date(Month)	
2	Send e-mail identification No.	The sent e-mail message No.
3	Reserved	Reserved (Used in the system.)
4	Specifying "To" (Higher 16 bits) Nos. 1－16	E-mail address No. set for "To" is stored using the bit data.
5	Specifying "To" (Lower 16 bits) Nos. 17－32	
6	Specifying "Cc" (Higher 16 bits) Nos. 1－16	E-mail address No. set for "Cc" is stored using the bit data.
7	Specifying "Cc" (Lower 16 bits) Nos. 17－32	
8	Specifying "Bcc" (Higher 16 bits) Nos. 1－16	E-mail address No. set for "Bcc" is stored using the bit data.
9	Specifying "Bcc" (Lower 16 bits) Nos. 17－32	
A-E	Reserved	Reserved (Used in the system.)
F	Error code	

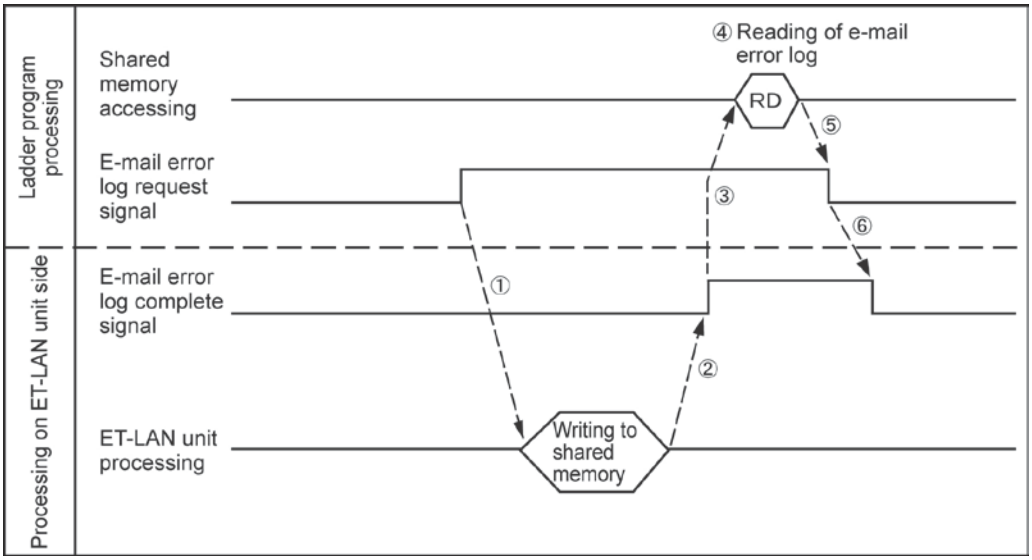
- E-mail receive errors (Bank:10H Address:0200H-03FFH)

Offset address	Name	Explanation
0 (H)	Date (Time)	Date and time when e-mail is received.
0 (L)	Date(Min.)	
1 (H)	Date(Month)	
1 (L)	Date(Day)	
2-E	From [Note1]	E-mail source address (ASCII 26 characters) of the received e-mail.
F	Error code	

Note:

1.When the e-mail source address is indicated in more than 27 characters, the characters later than the 27th character are omitted.

- Time chart for reading e-mail error log



- Procedure to read e-mail error logs

(1) The e-mail error log notified request signal is turned ON.
- The address 36AH (bit 5) in the e-mail request signal area (Bank: 0) is turned ON.

(2) The e-mail error log is transferred to the shared memory.

(3) Confirm that the e-mail error log complete signal (Bank: 0) is ON.
- Confirm that the address 362H (bit 5) in the e-mail complete signal area (Bank: 0) is ON.

(4) The e-mail error log area (Bank: 10H, Addresses: from 200H) in the e-mail error log area of the shared memory is read.

(5) The e-mail error log request signal is turned OFF.

(6) The e-mail error log complete signal is turned OFF. To read the next error log, be sure to confirm that this e-mail error log notified complete signal has been OFF.

Reference: <Chapter 4 Confirming the Design Contents>

11.10.3 Reading E-mail logs

- Contents of the send log block

- Send log blocks can be registered in the e-mail send log area.
- A newer e-mail send log is continuously registered in the starting send log block. When the number of the send log block exceeds 32, the older log that is stored in the e-mail send log area's last block is overwritten.

Send log blocks (Bank:11H Address:0000H-01FFH)

Offset address	Name	Description
0 (L)	Date (Min.)	Date and time when e-mail is sent.
0 (H)	Date (Time)	
1 (L)	Date (Day)	
1 (H)	Date (Month)	
2	Send e-mail identification No.	The send e-mail message No.
3	Reserved	Reserved (Used in the system.)
4	Specifying "To" (Higher 16 bits) Nos. 1－16	E-mail address No. set for "To" is stored using the bit data.
5	Specifying "To" (Lower 16 bits) Nos. 17－32	
6	Specifying "Cc" (Higher 16 bits) Nos. 1－16	E-mail address No. set for "Cc" is stored using the bit data.
7	Specifying "Cc" (Lower 16 bits) Nos. 17－32	
8	Specifying "Bcc" (Higher 16 bits) Nos. 1－16	E-mail address No. set for "Bcc" is stored using the bit data.
9	Specifying "Bcc" (Lower 16 bits) Nos. 17－32	
A-F	Reserved	Reserved (Used in the system.)

- Contents of the receive log block

- Receive log blocks can be registered in the e-mail receive log area.
- A newer e-mail receive log is continuously registered in the starting receive log block. When the number of the receive log block exceeds 32, the older log that is stored in the e-mail receive log area's last block is overwritten.

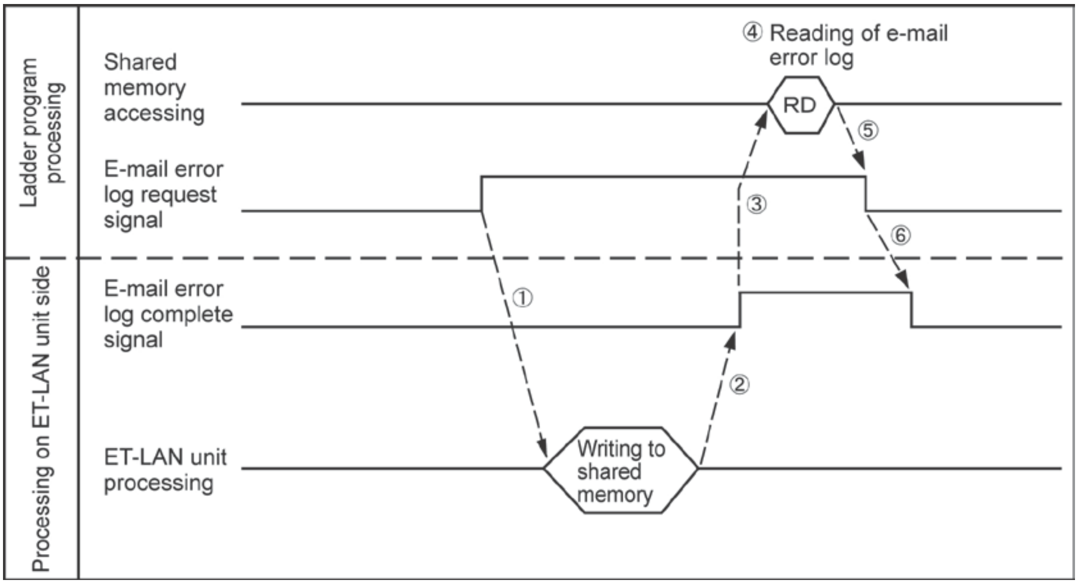
Receive log blocks (Bank:11H Address:0200H-03FFH)

Offset address	Name	Description
0 (L)	Date (Min.)	Date and time when e-mail is received.
0 (H)	Date(Time)	
1 (L)	Date (Day)	
1 (H)	Date (Month)	
2-E	From [Note1]	E-mail source address (ASCII 26 characters) of the received e-mail.
F	Error code	

Note:

1. When the e-mail source address is indicated in more than 27 characters, the characters later than the 27th character are omitted.

- Time chart for reading e-mail logs



- Procedure to read e-mail logs

(1) The e-mail log notified request signal is turned ON.
- The address 36AH (bit 4) in the e-mail request signal area (Bank: 0) is turned ON.

(2) The e-mail logs (e-mail send log and e-mail receive log) are transferred to the shared memory.

(3) Confirm that the e-mail log complete signal (Bank: 0, Address: 362H, Bit:4) is ON.
- Confirm that the address 362H (bit 4) in the e-mail complete signal area (Bank: 0) is ON.

(4) The e-mail send log area (Bank: 11H, Addresses: from 000H) and the e-mail receive log area (Bank: 11H, Addresses: from 200H) of the shared memory are read.

(5) The e-mail log request signal is turned OFF.

(6) The e-mail log complete signal is turned OFF. To read the next e-mail log, be sure to confirm that this e-mail log notified complete signal has been OFF.

Reference: <Chapter 4 Confirming the Design Contents>

11.10.4 E-mail Status Area

When the e-mail function is used, it can be checked that the ET-LAN unit normally sends/receives e-mails by means of the e-mail status area.

After checking the e-mail status area:

If the status is found to be as noted below, check the e-mail settings and re-set them if necessary.

- The e-mail send conditions set for the ET-LAN unit are met, but the number of e-mail send complete times and the number of e-mail send error are not counted.
- The e-mail receive conditions set for the ET-LAN unit are met, but the number of e-mail receive check times and the number of e-mail receive error are not counted.

If the status is found to be as noted below, contact the network administrator.

- The number of e-mail send complete times is counted, but the e-mail is not sent to the recipient.
- The number of e-mail receive check times is counted when an-email is sent to the ET-LAN unit, but the number of e-mail receive complete times and the number of e-mail receive error are not counted.

- E-mail status area (Bank: 10H)

Address	Name	Description
080H	Number of e-mail send complete times	Stored value: 0-FFFFH ▪ The number of times that e-mails have been sent normally is stored. ▪ The value is reset to “0” when the initialization processing is executed or the e-mail setting is changed.
081H	Number of e-mail send error	Stored value: 0-FFFFH ▪ The number of times that e-mails have not been sent normally is stored. ▪ The value is reset to “0” when the initialization processing is executed or the e-mail setting is changed.
082H	E-mail re-send status	Stored value: 0-FFFFH ▪ E-mail re-send status ▪ “1” is stored when the e-mail re-send processing is being executed. When the re-send processing is completed, “0” is stored.
083H | 087H	Reserved (Used in the system.)	
088H	Number of e-mail receive check times	Stored value: 0-FFFFH ▪ The number of times that e-mails in the e-mail server are checked is stored. ▪ The value is reset to “0” when the initialization processing is executed or the e-mail setting is changed.
089H	Number of e-mail receive check error	Stored value: 0-FFFFH ▪ The number of times that the e-mail check is not completed successfully is stored. ▪ The value is reset to “0” when the initialization processing is executed or the e-mail setting is changed.
08AH	Number of e-mail receive complete times	Stored value: 0-FFFFH ▪ The number of times that e-mails are received is stored. ▪ The value is reset to “0” when the initialization processing is executed or the e-mail setting is changed.
08BH	Number of e-mail receive error	Stored value: 0-FFFFH ▪ The number of errors occurred when e-mails are received is stored. (The errors include the ones occurred in Mail Filter and Request Mail Password check processing.) ▪ The value is reset to “0” when the initialization processing is executed or the e-mail setting is changed.
08CH | 08FH	Reserved (Used in the system.)	

11.10.5 Sample Program

- Program contents

The sample program is for an ET-LAN unit installed in Slot No. 0.

The program processing is as shown below.

- When the internal relay signal R303 is turned ON, e-mail send log information is transferred to the e-mail send log area and e-mail receive log information is transferred to the e-mail receive log area.
- When the internal relay signal R304 is turned ON and the e-mail receive error occurs, e-mail error log information is transferred to the e-mail error log area.

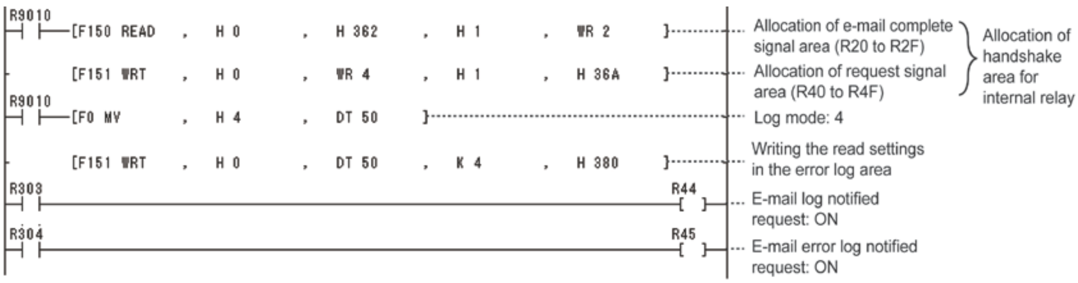
Note:

The e-mail request signal is effective only for handshake using the shared memory.

- Internal relay allocation

Classification	Device No.	Device used in the program example
E-mail complete signal area	R20 to R2F	R24: E-mail log notified complete signal R25: E-mail error log notified complete signal
E-mail request signal area	R40 to R4F	R44: E-mail log notified request signal R45: E-mail error log notified request signal

- Program example

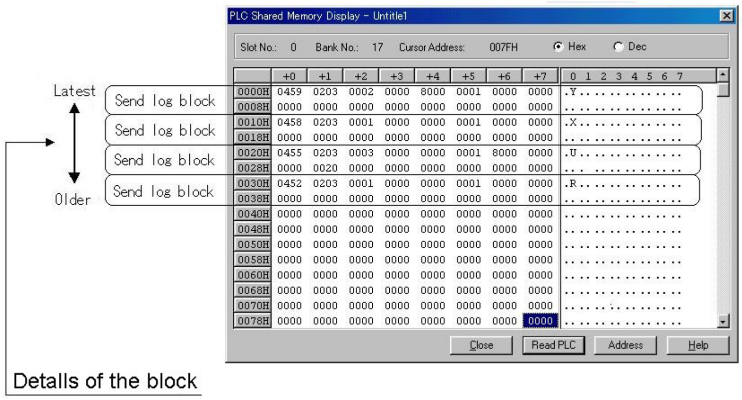


After transferring the e-mail error log information and e-mail log information using the ladder program, the transferred contents can be checked using the Shared Memory readout menu in the programming tool.

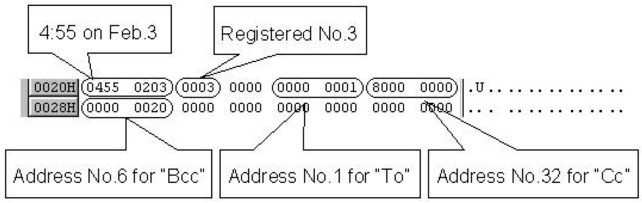
Reference: Shared memory readout menu in the programming tool

1. On the “Tools” menu, select “Display PLC Shared memory.” This reads the “PLC.”
2. Specify the slot No. and specify 3F8H as the address.
3. The log information is read.

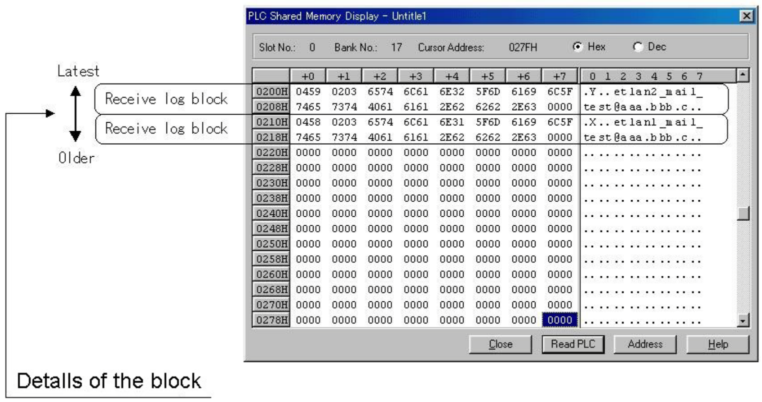
- Example of reading the e-mail send log area (Bank: 11H, Addresses: 000H to 1FFH)



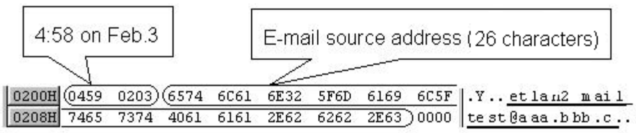
This send log block shows that the registered No. 3 e-mail message is sent at 4: 55 on Feb. 3 to the addresses specified as shown below:
Address No. 1 is specified for “To”, Address No.32 is specified for “Cc”, and Address No. 6 is specified for “Bcc”.



- Example of reading the e-mail receive log area (Bank: 11H, Addresses: 200H to 3FFH)



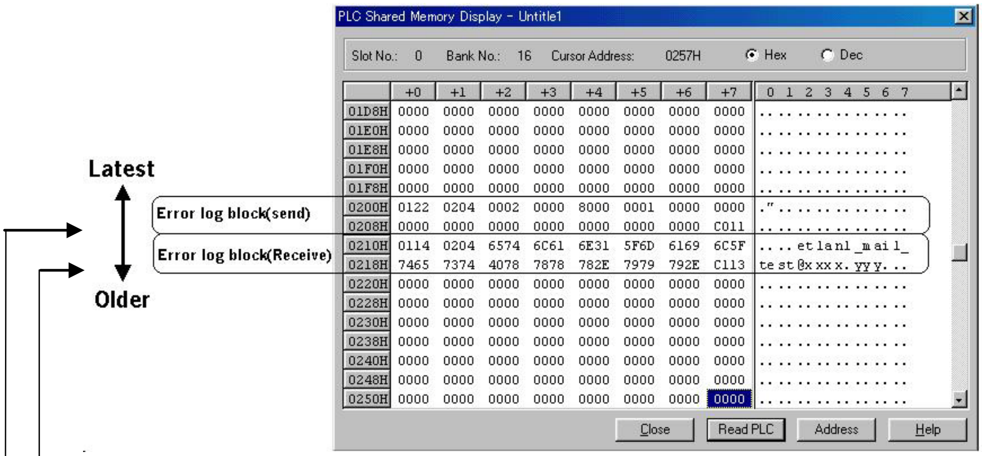
This receive log block shows that the e-mail is received from the source address (etlan1_mail_test@aaa.bbb.ccc) at 4: 58 on Feb. 3.



Note:

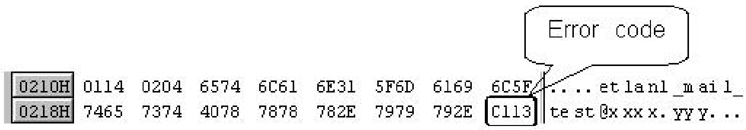
When the e-mail source address is indicated in more than 27 characters, the characters later than the 27th character are omitted.

- Example of reading the e-mail error log area (Bank: 10H, Addresses: 200H to 3FFH)



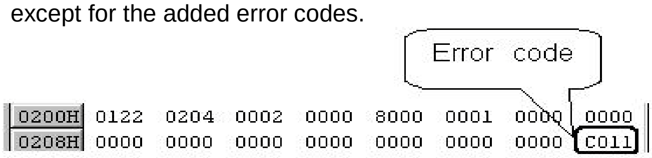
Send error log block

This error log block shows that the e-mail is received from the source address (etlan1_mail_test@xxx.yyy.zzz) at 1: 14 on Feb. 4. The contents of the block is the same as the one of the receive log block except for the added error codes.



Receive error log block

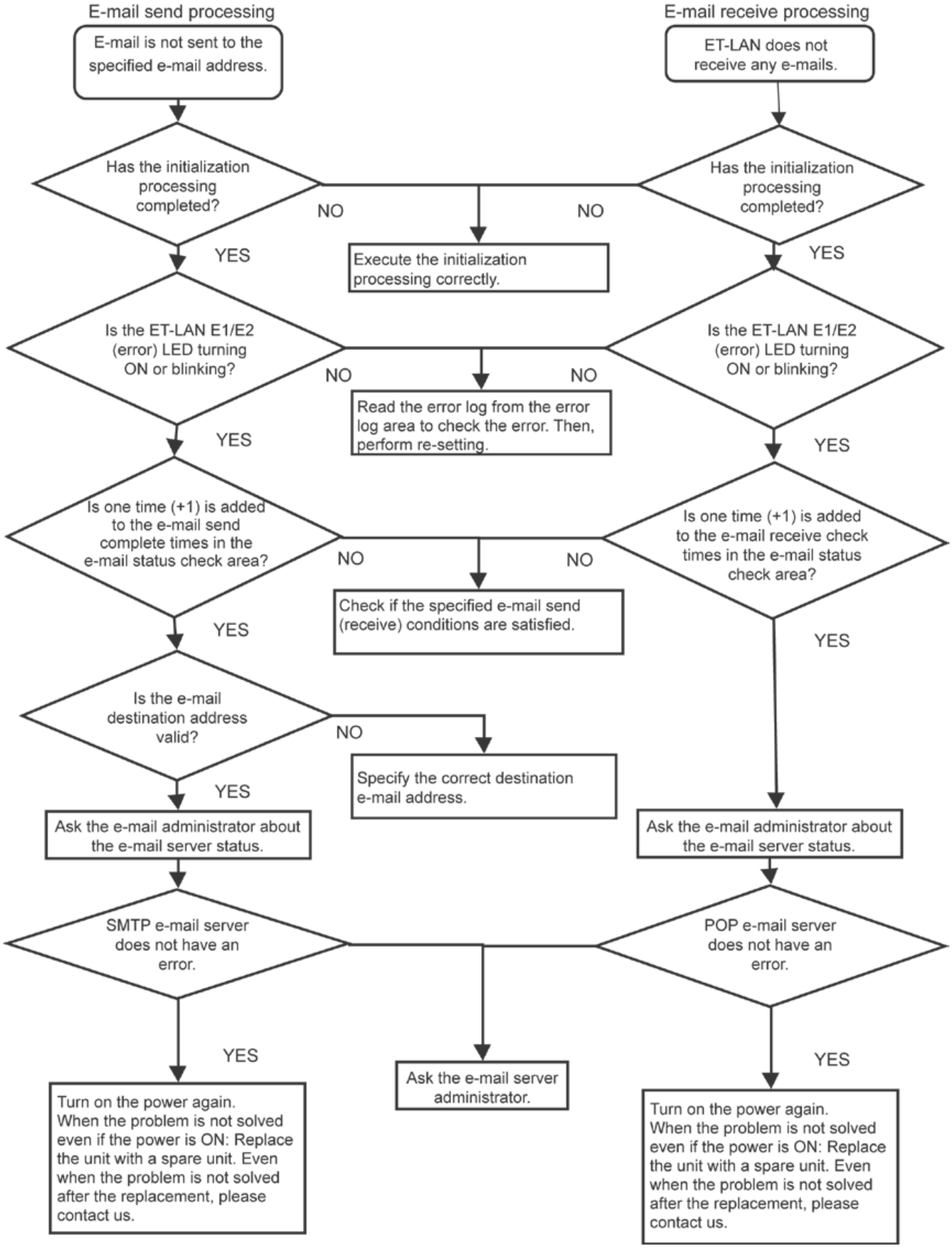
This error log block shows that the registered No. 2 e-mail message is sent to the addresses Nos. 1 and 32 for “To”. The contents of the block is the same as the one of the send log block except for the added error codes.



Reference: <12.3 Error Code Contents>

11.11 Troubleshooting Flowchart

The troubleshooting flowchart applicable for using the e-mail function is shown below.



Chapter 12

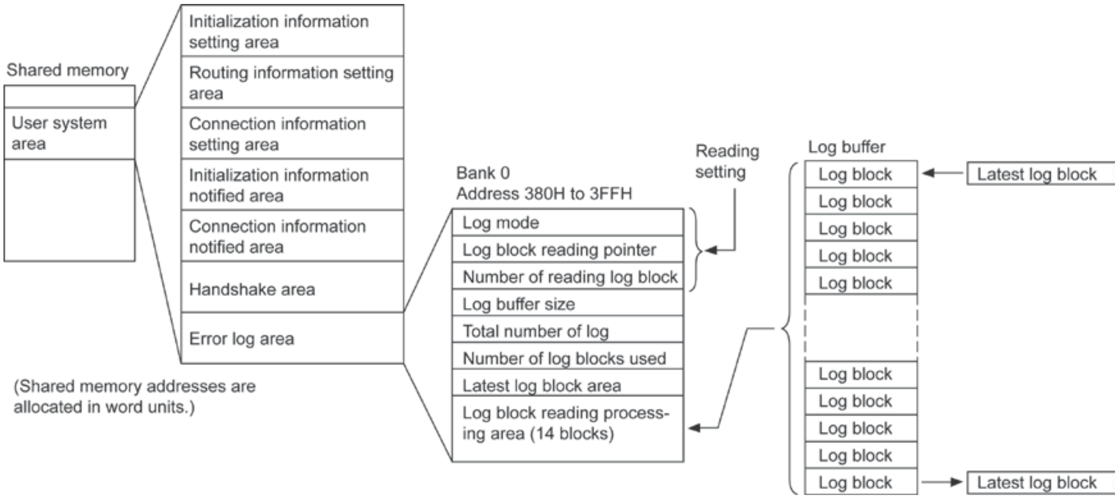
Error Log Function

12.1 Configuration of the Error Log Area

12.1.1 What is the Error Log Function?

- The ET-LAN unit is equipped with a log buffer where hardware and communication errors that occur in the unit are recorded.
- The contents of the log buffer are read by using the shared memory access instructions F150 (READ) and P150 (PREAD) and F151 (WRT) and P151 (PWRT) to read from and write to the error log area of the shared memory.

Configuration of the error log area



Latest log block area

Address	Description
388H	Connection No. (See note.)
389H	Error code
38AH to 38FH	Reserved (Used by the system.)

Note: If no connection number is specified, 0 will be set.

Log block reading processing area

Address	Description	
390H	Connection No. (See note.)	Pointer setting block (Latest log block)
391H	Error code	
392H to 397H	Reserved (Used by the system.)	
398H to 39FH	Same configuration as 390H to 397H	
3A0H to 3A7H	Same configuration as 390H to 397H	
3A8H to 3AFH	Same configuration as 390H to 397H	
3B0H to 3B7H	Same configuration as 390H to 397H	
3B8H to 3BFH	Same configuration as 390H to 397H	
3C0H to 3C7H	Same configuration as 390H to 397H	
3C8H to 3CFH	Same configuration as 390H to 397H	
3D0H to 3D7H	Same configuration as 390H to 397H	
3D8H to 3DFH	Same configuration as 390H to 397H	
3E0H to 3E7H	Same configuration as 390H to 397H	
3E8H to 3EFH	Same configuration as 390H to 397H	
3F0H to 3F7H	Same configuration as 390H to 397H	
3F8H to 3FFH	Same configuration as 390H to 397H	(Older log block)

Note: If no connection number is specified, 0 will be set.

12.1.2 Contents of Error Log Area

Error log area (bank 0)

<table>
<tr><th>Address</th><th>Name</th><th>Explanation</th></tr>
<tr><td>380H</td><td>Log mode</td><td>[Set value] (Default value: 0004H)
The recorded error differs depending on the set value.
<table>
<tr><td>Set value</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr>
<tr><td>System error</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>Recovery possible error</td><td>-</td><td>○</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>Warning error</td><td>-</td><td>-</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>Access error</td><td>-</td><td>-</td><td>-</td><td>○</td><td>○</td></tr>
<tr><td>E-mail error</td><td>-</td><td>-</td><td>-</td><td>-</td><td>○</td></tr>
</table></td></tr>
<tr><td>381H</td><td>Log block reading pointer</td><td>[Set value] Offset from latest log block of log buffer [Default value: 0000H]
- To read the latest log block, “0” is specified. To read the oldest log block used, “Number of log blocks used – 1” is specified (see 387H below). This value should be set such that the number of log blocks used is greater than or equal to the log block reading pointer + the number of log block being read. If anything else is specified, the results will be unclear.</td></tr>
<tr><td>382H</td><td>Number of reading log block</td><td>[Set value] No. of reading blocks [Default value: 0000H]
- This specifies the number of blocks up to the old block to be read from the log block reading point.
- A value of 14 or less should be set. If a value of 15 or higher is set, or if 0 is set, 14 blocks will be read.</td></tr>
<tr><td>383H
384H</td><td colspan="2">Reserved (Used by the system.)</td></tr>
<tr><td>385H</td><td>Log buffer size</td><td>[Stored value] Log buffer size available with the unit itself (number of log blocks)
[Set value: 0100H (256 blocks)]
- This is set by the unit itself when it boots.</td></tr>
<tr><td>386H</td><td>Total number of log</td><td>[Stored value] Cumulative total of log blocks recorded after initialization processing
- This is cleared to 0 when initialization processing is carried out.
- The number of logs is counted up to FFFFH (65535), but if an attempt is made to record more logs than will fit into the available buffer space, logs are overwritten, starting with the oldest.
- The number of logs will not be incremented past FFFFH (65535).</td></tr>
<tr><td>387H</td><td>Number of log blocks used</td><td>[Stored value] Current number of log blocks available for reading in log buffer
- This is cleared to 0 when initialization processing is carried out.
- The count of the number of logs used will not be incremented past the buffer size.</td></tr>
<tr><td>388H to 38FH</td><td>Latest log block area (8 words)</td><td>[Stored value] Latest log information
- The unit itself updates the contents constantly, so information can be read using the shared memory access instructions F150 (READ) and P150 (PREAD), without issuing a read request.
- This is cleared to 0 when initialization processing is carried out.</td></tr>
<tr><td>390H to 3FFH</td><td>Log block reading processing area (8 words x 14 blocks)</td><td>[Stored value] Data read during log block read processing
- Up to 14 blocks are stored in the log, in the order in which the errors occurred, when a read request is issued (the error log notified request bit of the handshake area in the I/O or shared memory goes on).
- This is cleared to 0 when initialization processing is carried out.</td></tr>
</table>

Note:

1) Addresses 380H to 382H should be set before the error log notified request is issued.
2) The ET-LAN unit writes the latest values to addresses 385H to 38FH.
3) The ET-LAN unit writes values to addresses 390H to 3FFH after the error log notified request has been issued.

12.2 Reading the Error Log

12.2.1 Procedure for Reading the Error Log

Reading the latest log block

The latest log block area in the error log area of the shared memory is read.
The unit itself updates the contents of the latest log block area constantly, so it is not necessary to turn on the error log notified request signal.

Contents of the latest log block

Address	Description
388H	Connection No. (See note.)
389H	Error code
38AH to 38FH	Reserved (Used by the system.)

Note) If no connection number is specified, 0 will be set.

Reading a particular log block

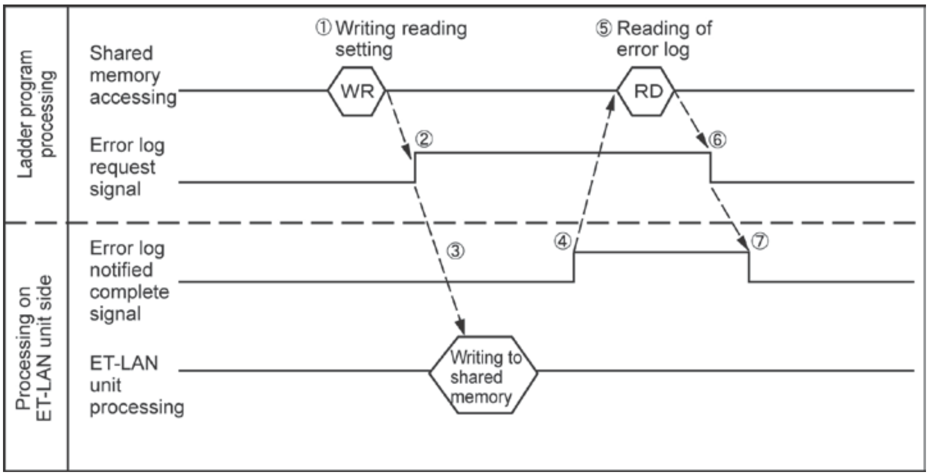
① The following area is set in the error log area of the shared memory.

Address	Item
380H	Log mode
381H	Log block reading pointer
382H	Number of reading log block

② The error log notified request signal is turned on.
- If the handshake is carried out through the I/O, Y2F is turned on.
- If the handshake is carried out through the shared memory, bit F of address 368H in the request signal area (bank 0) is turned on.

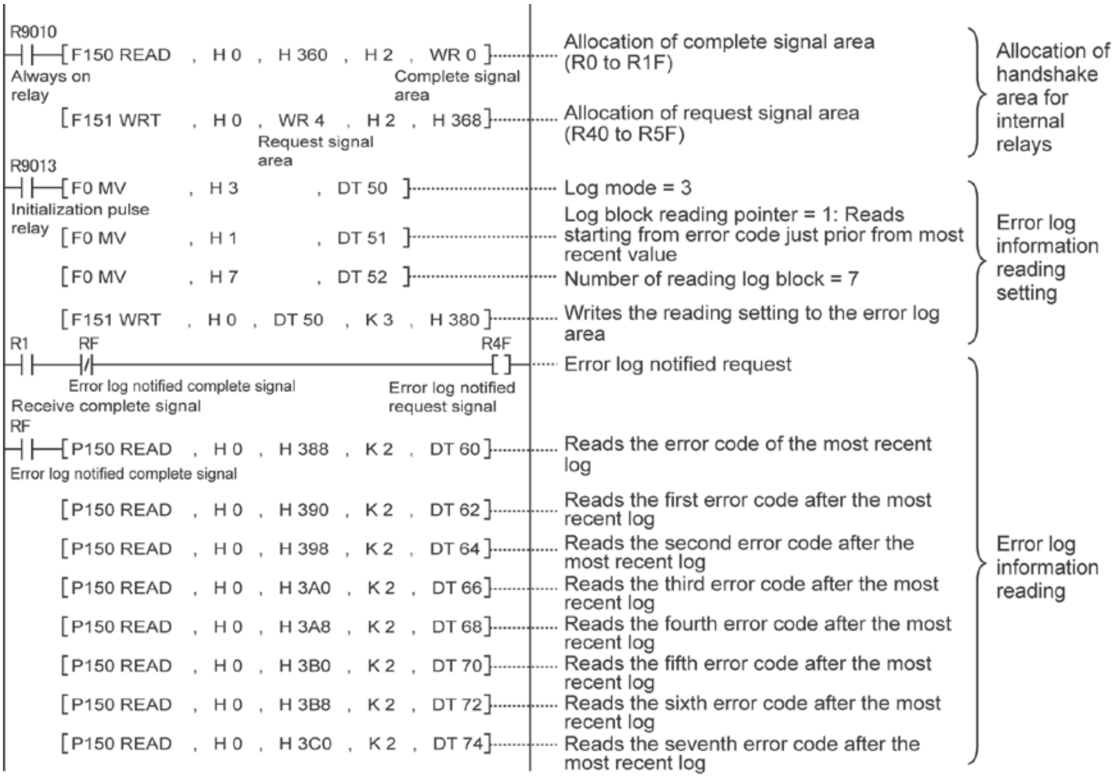
③ The error log is sent to the shared memory.
④ Check to make sure the error log notified complete signal is on.
- If the handshake was carried out through the I/O, make sure that XF is on.
- If the handshake was carried out through the shared memory, make sure that bit F of address 360H in the complete signal area (bank 0) is on.

⑤ Read the log block read processing area (from addresses 390H) in the error log area of the shared memory.
⑥ The error log notified request signal is turned off.
⑦The error log notified complete signal is turned off. If the next error log is to be read, always check to make sure that this error log notified complete signal has gone off.



12.2.2 Sample Program

The sample program applies when the ET-LAN unit has been installed in slot no. 0.
This program read the error log information to data registers DT60 to DT75.



Internal relay allocation

Classification	Device number	Devices used in sample program	
Complete signal area	R0 to R1F	R1	Receive complete signal
		RF	Error log notified complete signal
Request signal area	F40 to R5F	R4F	Error log notified request signal

12.3 Error Code Contents

12.3.1 Access Error

This error code notifies the user that processing ended abnormally.
(The addresses indicated in the Description column is the address of bank 0 unless refused.)

Code	Name	Description	Step to take	Remark
8000H	Source node IP address error	0H or FFFFFFFFH was set for the source node IP address during initialization processing.	Correct the source node IP address.	Initialization processing end code There are also stored in address 2D0H of the initialization processing end code of the initialization information notified area. The E1 LED on the front panel of the ET-LAN unit lights.
8001H	Subnetwork masking error	The uppermost 2 bits of the sub-network mask field have not been set, or a value of FFFFFFFD or higher was set.	Correct the sub-network mask value.	
8002H	Default router (Gateway) IP address error	0H or FFFFFFFFH was set for the default router (gateway) IP address, or an address was set that does not match the source node network IP address.	Correct the IP address of the default router (gateway).	
8003H	Router subnetwork address error	0H or FFFFFFFFH was set for the router sub-network address.	Correct the router sub-network address.	
8004H	Router IP address error	0H or FFFFFFFFH was set for the router IP address, or an address was set that does not match the source node network IP address.	Correct the router IP address.	
8005H	Transparent communication buffer error	An error in the first address or size setting for the transparent communication buffer caused a duplication in the buffer area, or caused the available area to be exceeded.	Correct the first address or size of the transparent communication buffer.	
8007H	Initialization processing error	An error occurred when the ET-LAN unit was carrying out initialization processing.	Run the initialization processing again.	
8008H	Termination processing error	An error occurred when the ET-LAN unit was carrying out termination processing.	Run the termination processing again.	
800AH	Source node MEWTOCOL station number error	A value other than 1 to 64 was set for the source node MEWTOCOL station number.	Correct the source node MEWTOCOL station number.	

Code	Name	Description	Step to take	Remark
8010H	Open error	An attempt was made to execute open processing although initialization processing was not completed successfully.	Run the open processing after the initialization processing has been completed.	Open processing end code There are also stored in offset address 0 of the open processing end code of the connection information notified area.
8011H	Application use error	A setting other than Active, Fullpassive or Unpassive was entered when using TCP/IP (not applicable if UDP/IP is being used).	Correct the setting area for the application being used.	
8012H	Source node port No. error	0 was set for the source node port number during open processing.	Correct the source node port number	
8013H	Partner node port No. error	0 was set for the partner node port number in a mode other than TCP/IP Unpassive, during open processing.	Correct the partner node port number.	
8014H	Partner node IP address error	During open processing: With UDP/IP, 0 was set for the partner node IP address. 0H or FFFFFFFFH was set for the partner node IP address in a mode other than TCP/IP Unpassive.	Correct the IP address of the partner node.	Open processing end code There are also stored in offset address 0 of the open processing end code of the connection information notified area.
8015H	UDP/IP source node port number duplication error	The same source node port number was set in UDP/IP as that of a source node port that is already open.	Specify a different source node port number.	
8016H	TCP/IP source node port number duplication error	The same source node port number was set in TCP/IP as that of a source node port that is already open.	Specify a different source node port number.	
8017H	Memory error	The connection cannot be opened because not enough memory is available.	Run the open processing again. If the error still occurs, run the initialization processing once again.	
8018H	No partner node error	The connection cannot be opened because the transmission destination of the specified partner node IP address and port number cannot be found, or a communication error occurred.	Check the transmission line connection, the IP address of the partner node, and the port number of the partner node.	
801AH	Forced close error	The connection was forcibly closed because the initialization request signal went off.	Turn the initialization request complete signal off after close processing has been completed.	
801BH	Destination MEWTOCOL station number setting error	A value other than 1 to 64 was set for the MEWTOCOL station number of the partner node.	Correct the MEWTOCOL station number of the partner node.	

Code	Name	Description	Step to take	Remark
8020H	Transparent communication transmission error	In transparent communication, an attempt was made to execute transmission processing although initialization processing was not completed successfully.	Carry out transmission processing after initialization and open processing have both been completed.	Transmission processing end code There are also stored in offset address E of the transmission processing end code of the connection information notified area.
8021H		In transparent communication, an attempt was made to send data to a partner node for which open processing has not been completed.		
8022H		n transparent communication, an attempt was made to send data for which the transmission request data size is 0.	Correct the transmission request data size.	
8023H		In transparent communication, the specified transmission request data size exceeded twice the size of the transmission buffer.	Correct the transmission request data size.	
8024H		In transparent communication, data could not be sent because the connection had been closed.	Send data to a partner node for which a connection is open.	
8025H	Transparent communication reception error	In transparent communication, an attempt was made to execute reception processing although initialization processing was not completed successfully.	Carry out reception processing after initialization and open processing have both been completed.	Reception processing end code There are also stored in offset address A of the reception processing end code of the connection information notified area.
8026H		An attempt was made to receive data from a partner node for which open processing has not been completed, using transparent communication.		
8027H		In transparent communication, an attempt was made to receive data although there was no reception buffer available.	When receiving data, the transparent communication reception buffer area must be specified for the pertinent connection (this setting becomes valid when the initialization processing is executed).	
8028H		In transparent communication, an attempt was made to receive data although the reception request data size was set to 0.	Correct the reception request data size.	

Code	Name	Description	Step to take	Remark	
8030H	MEWTOCOL transmission error	In MEWTOCOL communication, an attempt was made to send data although initialization processing had not been completed.	Carry out transmission processing after initialization and open processing have both been completed.	33	The value at the left has been set for the transmission completed code of the MEWTOCOL transmission control block.
8031H		An attempt was made to send a MEWTOCOL transmission to a partner node which had not been opened using MEWTOCOL.			
8032H		In MEWTOCOL communication, a transmission error occurred because the connection was closed.	Send data to a partner node for which a connection is already open.	39	
8033H		An error occurred when sending data because of a format error in the MEWTOCOL communication. A packet specified a hierarchy level (LEVEL) or 8 or more packets.	Run the MEWTOCOL transmission again.	24	
8034H		An error occurred when sending data because of a format error in the MEWTOCOL communication. A packet specified a hierarchy depth (DEPTH) or 8 or more packets.	Run the MEWTOCOL transmission again.	24	
8035H		An error occurred when sending data because of a format error in the MEWTOCOL communication. A packet specified a message data size of 2,049 or more.	Run the MEWTOCOL transmission again.	35	
8036H		An error occurred when sending data because of a format error in the MEWTOCOL communication. A packet was received that specified a value other than 10H, 11H, 20H or 21H as the first value.	Run the MEWTOCOL transmission again.	27	
8040H	Forced close error	The connection was forcibly closed by the partner node, or a transmission error occurred and the source node forcibly closed the connection.	Check the transmission line connection and the status of the partner node.	-	

Code	Name	Description	Step to take	Remark
8041H	MEWTOCOL reception error	A packet containing an error in the MEWTOCOL communication format was received. A packet with a hierarchy level (LEVEL) of 8 or higher was received.	Correct the setting for the node to which the MEWTOCOL communication was sent (format content, MEWTOCOL station number, etc.)	The connection will be forcibly closed.
8042H		A packet containing an error in the MEWTOCOL communication format was received. A packet with a hierarchy depth (DEPTH) of 8 or higher was received.		
8043H		A packet containing an error in the MEWTOCOL communication format was received. A packet with a message data size of 2,049 or more was received.		
8044H		A packet containing an error in the MEWTOCOL communication format was received. A packet was received that specified a value other than 10H, 11H, 20H or 21H as the first value.		
8045H		The received MEWTOCOL communication was not directed to the source node MEWTOCOL station number.		
8046H		The destination station number of the received MEWTOCOL communication was not a value of 1 to 64.		
8047H		A frame was received for a partner node MEWTOCOL station number for which no connection has been opened.		

12.3.2 System Error

This error code notifies the user if a critical system error has occurred.
If this error occurs, the E2 LED on the front panel of the ET-LAN unit lights.

Code	Name	Description	Step to take	Remark
9001H	System error during normal operation	A watchdog error occurred (the ALARM LED is lighted.)	The unit has run away. Turn the power supply off and then on again.	These are system errors that can occur during normal operation. If one of these errors occurs, the E2 LED on the front panel of the ET-LAN unit lights.
9002H		The unit transmission section sent notification of a memory access error.	Turn the power supply off and then on again.	
9003H		There is no longer enough buffer space available in the application processing.		
9004H		There is no longer enough buffer space available in the protocol processing.		
9005H		The EEPROM Ethernet address cannot be read successfully.		
9006H		The CPU unit has run away, or a version of the CPU unit is being used that is not supported by the ET-LAN unit, so the CPU unit cannot be recognized.	Problem with the CPU unit Check the contents of <ALARM LED>. Check the CPU unit version.	
9010H	Test mode execution results	An error was discovered during the ROM test.	Turn the power supply off and then on again.	These are errors that occur during test operation. If one of these errors occurs, the E2 LED on the front panel of the ET-LAN unit lights.
9011H		An error was discovered during the RAM test.		
9012H		An error was discovered during the shared memory test.		
9013H		An error was discovered during the EEPROM checksum test.		
9014H		An error was discovered during the internal loopback test.		
9015H		An error was discovered during the external loopback test.	Check the transmission line connections.	
9016H		An error was discovered during the timer test.	Turn the power supply off and then on again.	

12.3.3 Warning Error

This error code does not indicate a system error, but alerts the user to a certain condition or status.
If this error occurs, the E2 LED on the front panel of the ET-LAN unit flashes.

Code	Name	Description	Step to take	Remark
B003H	No reception buffer. Data has been destroyed at the connection destination.	In transparent communication, data was sent to a connection with a transparent communication reception buffer size of 0, so the data was destroyed.	To receive the data, specify a transparent communication reception buffer area for the pertinent connection (this setting becomes effective when initialization processing is carried out).	If this error occurs, the E2 LED on the front panel of the ET-LAN unit flashes.

12.3.4 Recovery Possible Error

These error codes are displayed if an error occurs in the communication control unit.
If one of these errors occurs, the E1 LED on the front panel of the ET-LAN unit flashes.

Code	Name	Description	Step to take	Remark
A001H	UDP check sum error	The checksum value of the UDP packet received from the partner node is erroneous.	Send the data once again from the partner node.	If any of these errors occur, the E1 LED on the front panel of the ET-LAN unit flashes.
A002H	UDP/IP level error	Communication processing was carried out with a different port number than the one registered for UDP.	Carry out the communication processing with the correct port number.	
A003H	Transmission error	This error indicates that a notification was received from the transmission section of the unit.	Carry out the transmission processing again.	
A004H	IP processing error	Error notification was received from the IP. Assembly timeout error: During assembly of the IP split data, the remaining data was not received within the allowed time limit. Specified IP address does not exist: There was no response to an ARP request for the specified IP address of the partner node. Checksum error: This notification is received if the IP header checksum value of an IP packet that has been received is not correct. Internal resource error: This notification is received if the IP resource is insufficient. Different IP address was specified for sub-network address from that of source node. This notification is received if the IP address specified for the partner node is different from that of the source node. This does not occur if a router address was specified, however.	Carry out the transmission processing again. If communication cannot be performed after the occurrence of error, use the reset function or turn the power off and on again.	

Code	Name	Description	Step to take	Remark
A005H	TCP/IP processing error	Error notification was received from the TCP. No connection established: This notification is received if an attempt was made to request transmission or reception without a TCP connection being established. Connection closed: This notification is received if an attempt was made to request transmission or reception while a close request was in process after the connection was established. Connection already established: This notification is received if a new open request is made with the same source node port number, partner node port number, and partner node IP address, after a connection has been established. Internal resource error: Successive TCP transmission requests are made without a response being returned. Checksum error: This notifies the user that, when a TCP packet was received, the checksum value was incorrect. ULP timeout error: This notifies the user that, when a TCP packet was re-sent, a normal response was not returned by the destination within a given period of time.	Carry out the transmission processing again. If communication cannot be performed after the occurrence of error, use the reset function or turn the power off and on again.	If any of these errors occur, the E1 LED on the front panel of the ET-LAN unit flashes.

12.3.5 E-mail Send Error

These error codes are displayed if an error occurs when sending e-mails.
If one of these errors occurs, the E2 LED on the front panel of the ET-LAN unit flashes.

Code	Name	Description	Step to take	Remark
C000H	SMTP server error	E-mail service of the SMTP server does not work. The server was shut down when e-mail was being transferred.	- Check the e-mail settings. - Check the SMTP server status through the server administrator.	If this error occurs, the E2 LED on the front panel of the ET-LAN unit flashes.
C001H	SMTP server error	The requested command was not executed.	- Check the SMTP server status through the server administrator. - Check if the network is not busy. - Check the e-mail settings.	
		The specified command was not executed due to the local error.		
		The requested command was not executed. Cause of the error: Memory shortage of the file system.		
		Syntax error of the command		
		Parameter error of the specified command		
		The specified command was not executed, because the destination address did not have the e-mail box.		
		The specified command was not executed due to the file system problem.		
		E-mail was not transferred successfully.		
C002H	SMTP server error	The SMTP server received an unsupported command.	- Check the SMTP server status through the server administrator.	
		Command execution order has a problem.		
		The parameter for the specified command is not supported.		
C003H	SMTP server error	The user specified for the destination does not exist.	- Check the e-mail settings.	
C004H	SMTP server error	The specified command was not executed due to a problem in the mail box.	- Check the e-mail settings.	
C010H	Registered condition setting error	Setting contents have a problem which are notified to the SMTP server.	- Check the e-mail settings.	
C011H	Server connection error	Access to the server was not conducted successfully.	- Check the SMTP server status through the server administrator. - Check if the network is not busy. - Check the e-mail settings.	
		Communication time out error occurred.		
C012H	Internal resource error	Internal memory to be used is insufficient. Excessive send buffer size. Access to the internal resource was not conducted successfully.	- Turn OFF the power and then turn it ON. - If the error occurs again, please contact us.	
C013H	E-mail basic setting error (for sending e-mail)	User tried to send an e-mail although the e-mail basic settings were inappropriate.	- Check the e-mail basic settings.	
C014H	E-mail send setting error	User tried to send an e-mail although the e-mail send setting using the ladder program was not correct. User tried to send a response mail whose destination is not specified.	- Check the e-mail settings.	
C020H	E-mail re-send error	User tried to re-send the e-mail for the specified number of times, but the e-mail was not sent successfully.	- Check the SMTP server status through the server administrator. - Check if the network is not busy.	

The contents of the e-mail when an error occurred are also stored in the mail error log area. For the details of the mail error log, refer to <11.10 Mail Error Log/Mail Log Function>.

12.3.6 E-mail Receive Error transmission

These error codes are displayed if an error occurs when receiving e-mails.
If one of these errors occurs, the E2 LED on the front panel of the ET-LAN unit flashes.

Code	Name	Description	Step to take	Remark
C100H	POP server error	User name is not authorized.	- Check the login name.	If this error occurs, the E2 LED on the front panel of the ET-LAN unit flashes.
C101H	POP server error	User name is not authorized. Password is not authorized.	- Check the login name. - Check the password.	
C102H	POP server error	Information on the number of e-mails in the POP server was not acquired successfully. Information on the e-mail data size was not acquired successfully. E-mail was not deleted successfully. UID was not acquired successfully. Response format error occurred. Response error occurred. POP server operation could not be checked.	- Check if the POP server works normally. - Check if the POP server or network is not busy.	
C103H	POP server error	E-mail information was not acquired successfully.	- Check if the e-mail is not compressed or encrypted. - Check if the encode/decode format and file format are the same as ones for ET-LAN. - Check if the e-mail is not divided.	
C104H	POP server error	APOP is not supported.	- Check if the POP server can be indentified using the password.	
C105H	POP server error	POP server receive time-out error occurred.	- Check if the POP server works normally. - Check if the POP server or network is not busy.	
C110H	Setting error	The values of e-mail settings are incorrect.	- Check if the e-mail settings are correct.	
C111H	POP internal error	Specified UID does not exist. Re-initialization error occurred. Initialization error occurred. Insufficient internal resource File was not created successfully.	- Turn OFF the power and then turn it ON. - If the error occurs again, please contact us.	
C112H	Receive e-mail filter error	E-mail with the unauthorized address and subject was received. (This error occurs when Mail Filter is set.)	- Check Mail Filter settings.	
C113H	Receive e-mail format error	ET-LAN received an e-mail in the format ET-LAN could not recognize.	- Check the e-mail contents of the e-mail source.	
C114H	Request e-mail execution error	Processing for the received e-mail was not conducted successfully.	- Check the request e-mail format.	
C115H	E-mail basic setting error (for receiving e-mail)	E-mail receive processing was conducted although e-mail basic settings were not set correctly.	- Check the e-mail basic settings.	

The contents of the e-mail when an error occurred are also stored in the mail error log area. For the details of the mail error log, refer to <11.10 Mail Error Log/Mail Log Function>.

12.3.7 MEWTOCOL Error

This error code is displayed when the information of the CPU unit cannot be obtained with the e-mail sending function.
If this error occurs, the E2 LED on the front panel of the ET-LAN unit flashes.

Code	Name	Description	Step to take	Remark
C200H	CPU information acquisition error	Communication processing with CPU unit was not conducted successfully.	- Turn OFF the power and then turn it ON. - If the error occurs again, please contact us.	If this error occurs, the E2 LED on the front panel of the ET-LAN unit flashes.

12.3.8 Hardware Error

These error codes are displayed if an error caused by the hardware occurs when using the auto connection function or e-mail function.
If one of these errors occurs, the E2 LED on the front panel of the ET-LAN unit flashes.

Code	Name	Description	Step to take	Remark
C220H	Setting value error	The values of the communication settings or e-mail settings stored in the ET-LAN unit are abnormal.	- Download the settings again. If the download is not conducted successfully, turn OFF the mode setting switch 2 and try to download once more.	If this error occurs, the E2 LED on the front panel of the ET-LAN unit flashes.
C221H	E-mail receive information error	The e-mail receive information stored in the ET-LAN unit is abnormal.	- Turn OFF the power and then turn it ON.	
C222H	Calendar time error	The calendar timer value for the CPU unit is not correct. Otherwise, the CPU unit does not have a calendar timer function.	- Check the calendar timer value set for the CPU unit. - When the FP2 is used for the CPU unit, install an additional memory unit, which has the calendar timer function, in the CPU unit.	

12.3.9 Auto Connection Error

These error codes are displayed if an error occurs when using the auto connection function (auto connection, system connection).

Code	Name	Description	Step to take	Remark
B100H	Auto disconnection error	Because the communication was not conducted for the specified time, connection was once closed and then re-opened.	- Check the communication application of the destination node.	Even if this error occurs, the error LEDs (E1, E2) on the ET-LAN unit are off.
B101H	System connection error	An error occurred in the system connection. Connection was automatically closed and could not be re-opened.	- Check the system connection settings. - Check if the network is not busy.	The RMT LED blinks. (When the error occurs to all the system connections 1 to 3: RMT and E2 LEDs blink.)

Note:

- The access errors (from 8000H) other than the above also occur in the system connection.
- When an error related to the system connection occurs, the followings are set as the connection number in the latest log block area.

  System connection 1: F1H
  System connection 2: F2H
  System connection 3: F3H

Chapter 13

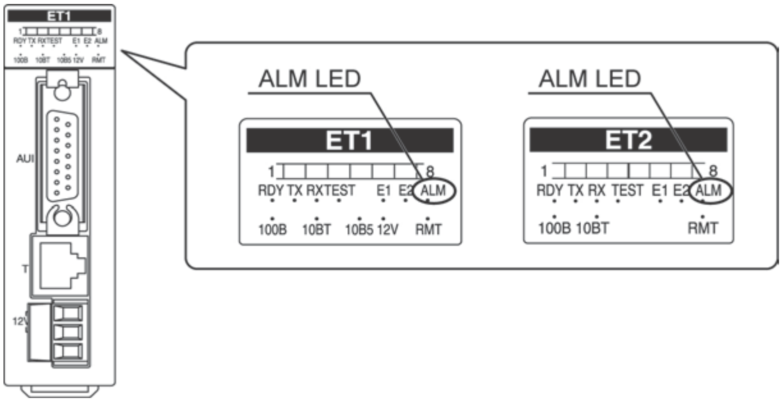
Troubleshooting

13.1 Operation If an Error Occurs

13.1.1 Operation If the ALARM LED on the ET-LAN Unit Lights

What the Alarm “ALM” LED does

The alarm “ALM” LED on the ET-LAN unit lights if the watchdog timer in the unit is activated, to warn of a problem.



CPU unit operation when the Alarm “ALM” LED lights

- The ERROR LED on the CPU unit lights, and operation stops.
- The error code to be occurred in the CPU unit is 41 (intelligent unit error).

If it is necessary to continue operation, change the setting of the CPU unit system register 22.

13.1.2 Operation If the “E1” or “E2” LED on the ET-LAN Unit Lights or Flashes

How the ERROR LEDs work

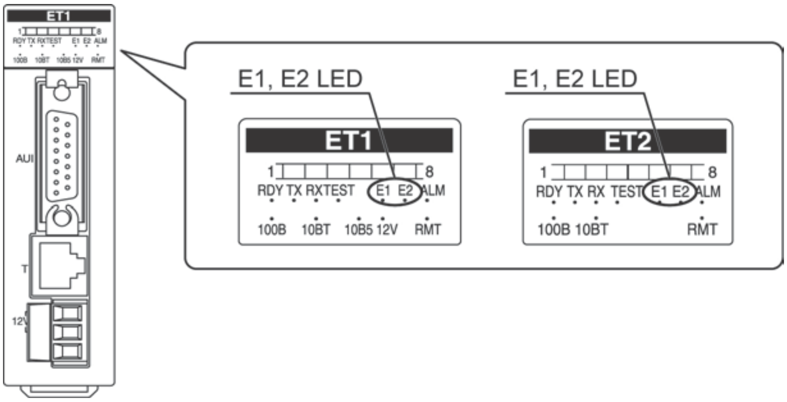
The ERROR LEDs on the ET-LAN unit light or flash when an error occurs in the unit itself, or when a communication error occurs.

“E1” flashing: Recovery possible error

“E1" lighted: Initialization processing error

“E2” flashing: Warning error

“E2” lighted: System error



Unit operation if an ERROR LED lights/flashes

ERROR LED status	ET-LAN unit operation	CPU unit operation
When “E1” is flashing	Operation is continued.	Operation is continued.
When “E1” is lighted	Operation is continued.	Operation is continued.
When “E2” is flashing	Operation is continued.	Operation is continued.
When “E2” is lighted	This notifies the user of a run away unit, or another problem involving the unit. Normal operation cannot be continued.	- If the “ALM” LED is lighted, operation is stopped. - In any other case, operation is continued.

Note:

The “E2” LED also lights if an error occurs in the transmission line during an external loopback test.

13.2 What to Do If an Error Occurs

13.2.1 If the Alarm "ALM" LED Lights on the ET-LAN Unit

Situation
The watchdog timer is activated to alert the user of a problem with ET-LAN unit.

Solution
- Turn the power supply off and then on again.
- If the "ALM“ LED lights again, there may be a problem with the unit.
- If the “ALM“ LED goes out after the power supply is turned off and then on again, the problem may have been caused by noise or another temporary phenomenon. Continue operation and watch for further signs of trouble.

13.2.2 If the "E1" LED on the ET-LAN Unit Lights or Flahses

Situation
Lighted: Initialization, open or communication processing was completed, but an error occurred.
Flashing: An error occurred in the communication control unit.

Solution (1)
Use the error log reading program to read the erro log. (See page 12-5.)

Solution (2)
Take the appropriate action, based on the contents of the error log. (See page 12-7.)

Key Point:
The following will cause aborted processing:
- An incorrect IP address setting or station number setting
- Processing was not carried out in the sequence of initialization → open → communication processing.
- The MEWTOCOL communication format was incorrect.

13.2.3 If the “E2” LED on the ET-LAN Unit Lights or Flashes

Situation
Lighted: A system error has occurred in the ET-LAN unit itself.
Flashing: Something has occurred to which the user should be alerted, because it may be a potential problem.

Solution (1)
Use the error log reading program to read the erro log. (See page 12-5.)

Solution (2)
Take the appropriate action, based on the contents of the error log. (See page 12-7.)
If a system error has occurred, turn the power supply off and then on again. If the error still occurs, please contact your dealer.

Key Point:
The “E2" LED will also light in the following cases:
- If the “ALM” LED is lighted.
- If an error occurred in a test mode.

Key Point:

The error log can be read using the programming tools and the following procedure.

(1) On the “Tools” menu, select “Force Input/Output Function”.

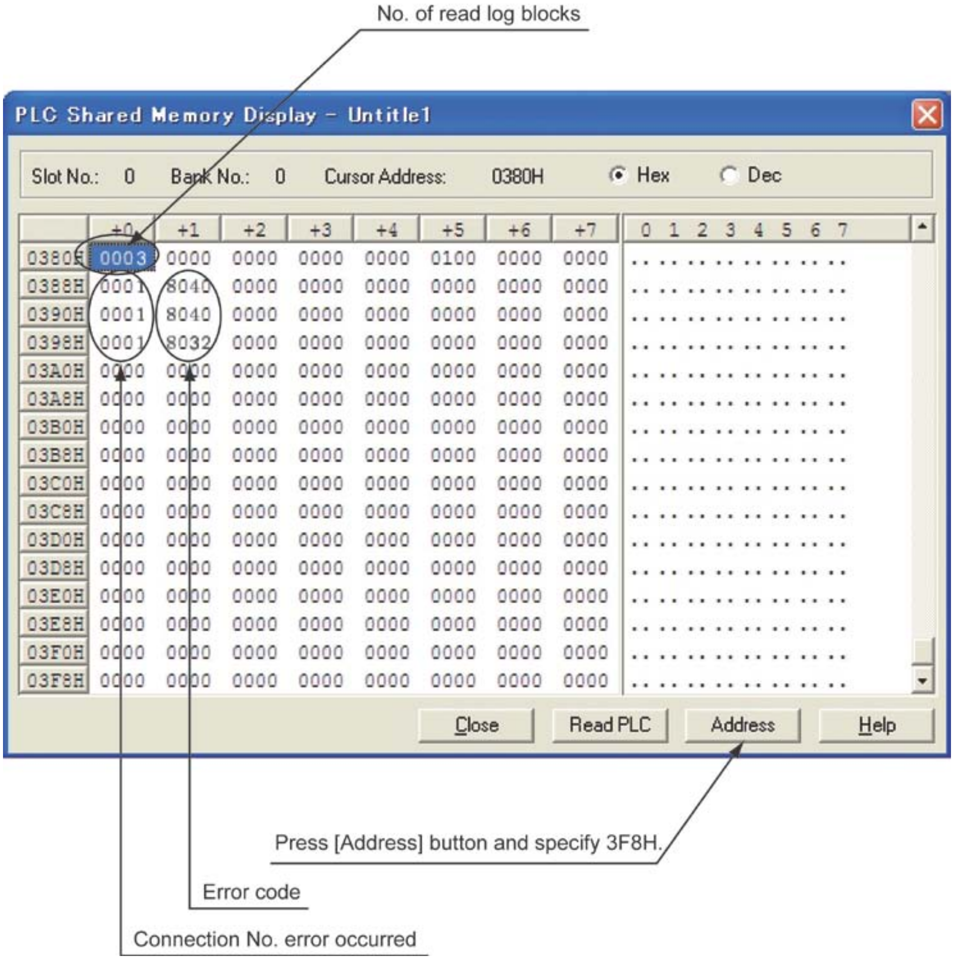
(2) Forcibly turn on the error log notified request signal (Y2F) and then turn it off again.
This reads the error log into 390H and subsequent addresses of the shared memory.
The I/O number for Y2F changes depending on the position at which the unit is installed.
When the shared memory is used for the handshake, the relay that reflects the error log notified request signal should be used.

(3) Cancel the force input/output status.

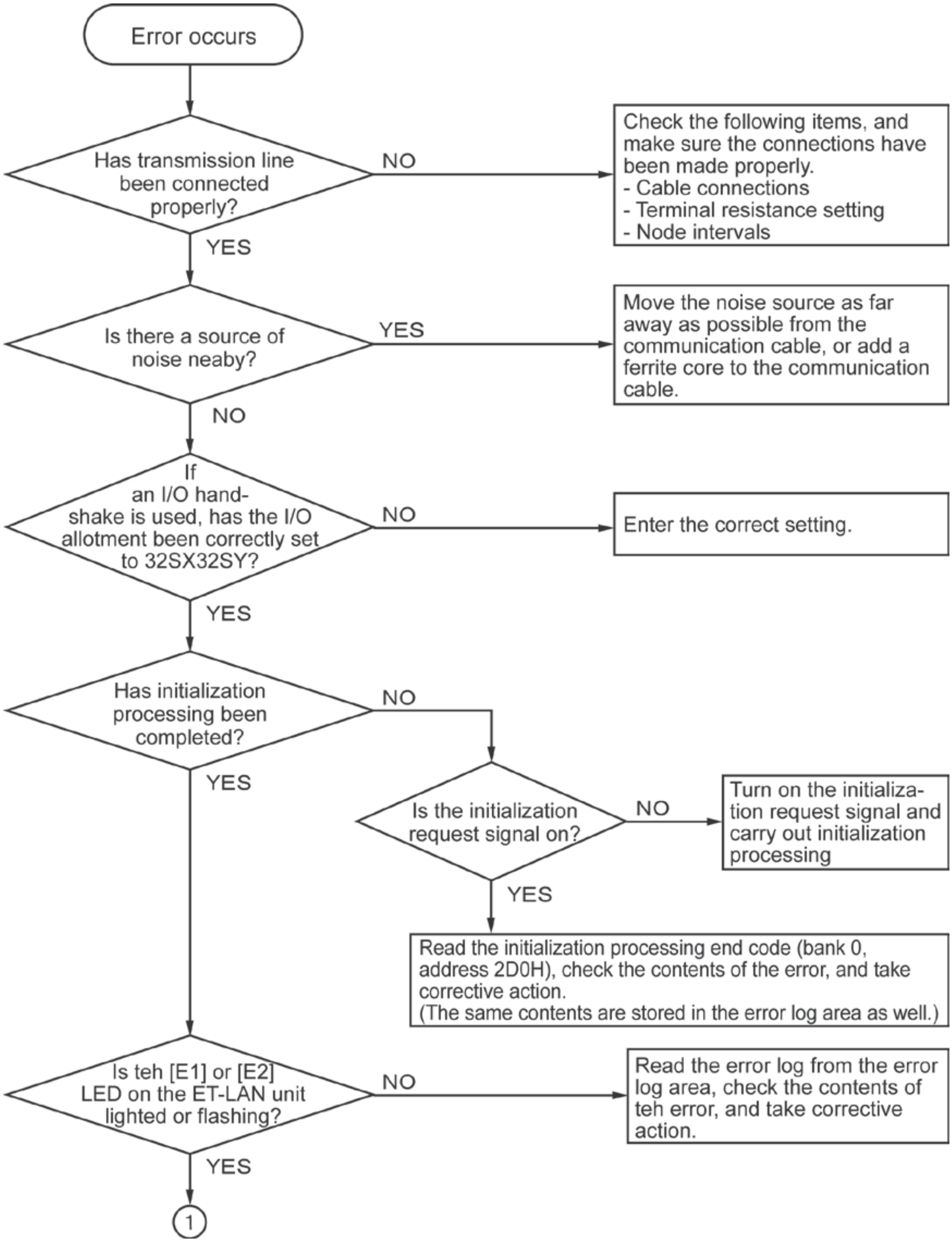
(4) On the “Tools” menu, select “Display PLC Shared Memory”.
This reads the “PLC”

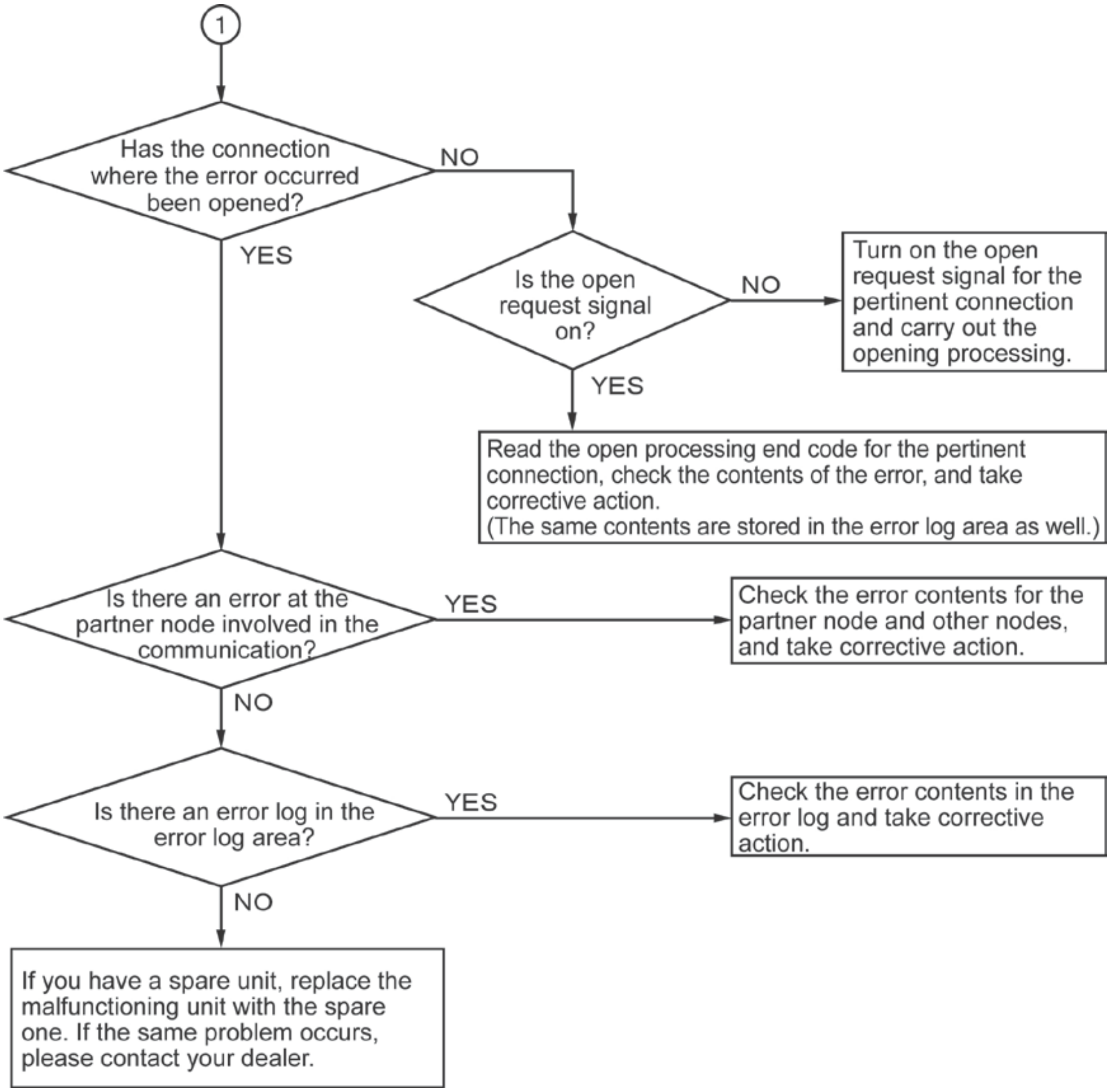
(5) Specify a slot number and specify 3F8H as the address.

(6) The log information is read.



13.2.4 Troubleshooting Flowchart




1
Has the connection where the error occurred been opened?
NO
YES
Is the open request signal on?
NO
Turn on the open request signal for the pertinent connection and carry out the opening processing.
YES
Read the open processing end code for the pertinent connection, check the contents of the error, and take corrective action.
(The same contents are stored in the error log area as well.)
Is there an error at the partner node involved in the communication?
YES
Check the error contents for the partner node and other nodes, and take corrective action.
NO
Is there an error log in the error log area?
YES
Check the error contents in the error log and take corrective action.
NO
If you have a spare unit, replace the malfunctioning unit with the spare one. If the same problem occurs, please contact your dealer.

13.3 Reset Function

13.3.1 What is the Reset Function?

The reset function is used to restart only the ET-LAN unit without cutting off the power supply for the system.
Using the reset function enables the ET-LAN unit to be the operable state when an unrecoverable error has occurred in the ET-LAN unit.
Also, using the reset function periodically when the ET-LAN unit is not communicating may help to prevent an accidental communication error.

The no communication notification function is available which is useful to detect the time to execute the reset function.

13.3.2 No Communication Notification Function

The no communication notification function is a function to notify that communication is not performed longer than a specified time for the connection opened by the open processing of the ET-LAN unit.
Using the no communication notification function enables to detect the state that the ET-LAN unit is not communicating.
Use this function when executing the reset function.

Procedure
1. Write a value in the following address of the initial information setting area (Shared memory Bank 0) to execute the initial processing.

Initial information setting area (Bank 0)

Address	Name	Default	Setting value/Explanation
208H	No communication connection time type	0000H	Set the base time for the no communication connection detection timer value. 0000H : × 2 minutes Other than 0000H : x 6 seconds
209H	No communication connection detection timer value	0000H	Setting time = [Setting value (1 - FFFFH)] × [Base time] - Set the time to detect a no-communication state after connection establishment. - The setting value of the above 208H is used as the base time. - When the setting value is larger than 0064H, in case of x 2 minutes : 200 minutes in case of x 6 seconds : 10 minutes

2. When communication is not performed for the period of the specified time-out value, the flags of the bits corresponding to each connection in the following handshake area (Shared memory Bank 0) turn on.

Handshake area
Expanded complete request area 2 (Bank 0)

Address	BIT	Description of signal
366H	bit8	No communication time-out signal (Connection 1)
	bit9	No communication time-out signal (Connection 2)
	bitA	No communication time-out signal (Connection 3)
	bitB	No communication time-out signal (Connection 4)
	bitC	No communication time-out signal (Connection 5)
	bitD	No communication time-out signal (Connection 6)
	bitE	No communication time-out signal (Connection 7)
	bitF	No communication time-out signal (Connection 8)

13.3.3 Procedure of Reset Function

Procedure

1. Write a value in the following address of the initial information setting area (Shared memory Bank 0) to execute the initial processing.

Initial information setting area (Bank 0)

Address	Name	Default	Setting value/Explanation
204H	Reset request flag 1	0000H	Reset the ET-LAN unit. Write 55AAH to reset the ET-LAN unit.
205H	Reset request flag 2	0000H	Reset the ET-LAN unit. Write 55AAH to reset the ET-LAN unit.

2. Writing 55AAH in the above address (2 words) starts the operation to reset the ET-LAN unit. (Unless either one of the above addresses is 55AAH, the unit will not be reset.)

3. After the reset function has been executed on the ET-LAN unit, the reset complete notified area (Shared memory 206H (Bank 0)) is set to "90FFH".
The reset complete notification is used to confirm that the ET-LAN has been reset. As this area is not automatically cleared, it is necessary to clear separately.

Initial information setting area (Bank 0)

Address	Name	Default	Setting value/Explanation
206H	Reset complete notification	0000H	When the ET-LAN unit has been reset, 90FFH is set in this area.

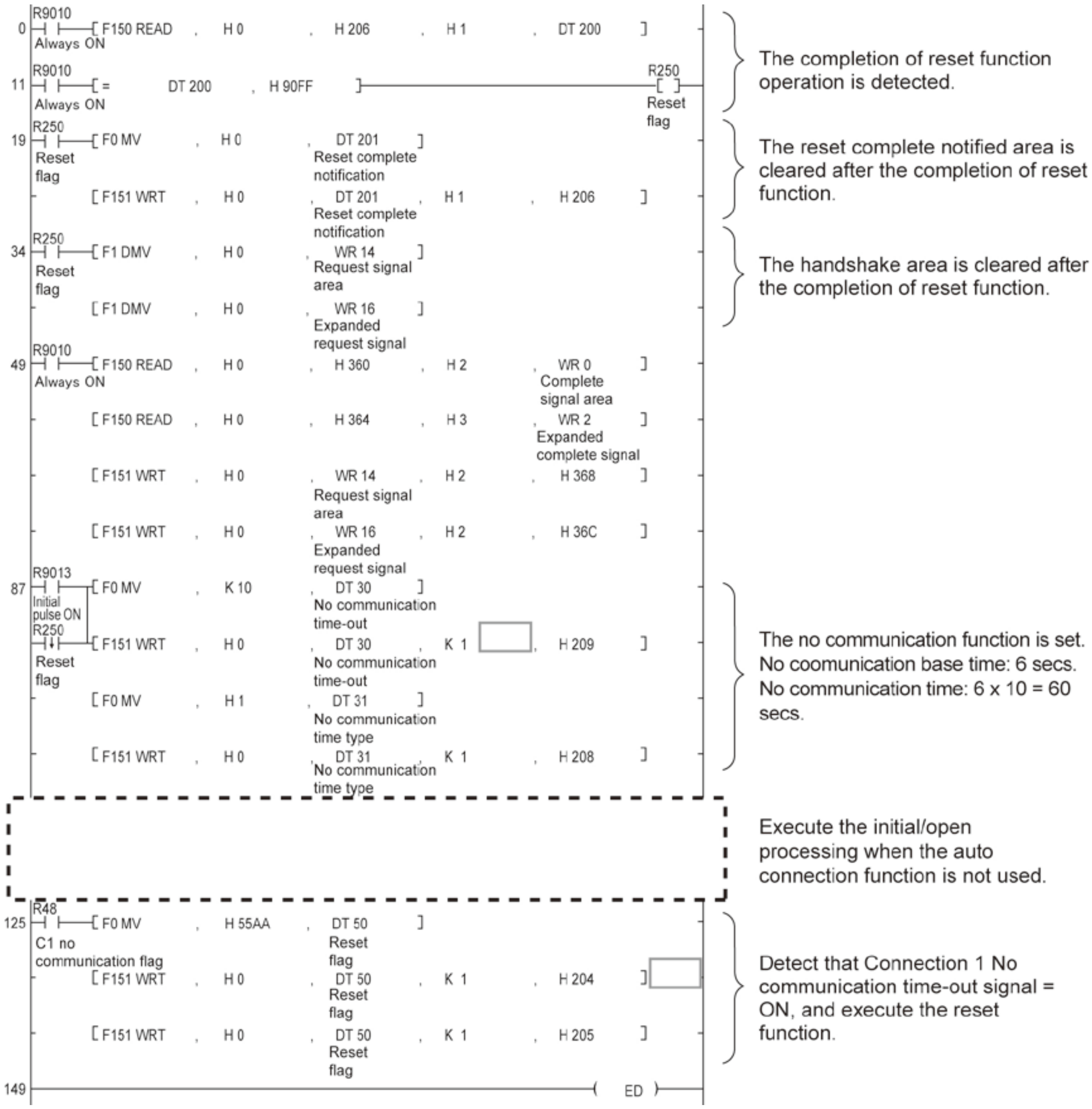
Note:

- Approx. 5 seconds as a maximum is needed to start the reset operation.
- The reset operation should be executed when communication is not performed.
- Turn off all the request signals in the handshake area after the completion of the reset.

13.3.4 Reset Function Sample Program

Program contents

- The sample program is for the ET-LAN unit installed in Slot No. 0, and the reset function is executed when the communication of connection 1 stops (the no communication time-out signal of connection 1 is on) longer than 60 seconds after the open of connection 1.
- The request signal area in the handshake area should be cleared after the execution of the reset function.
- The no communication time should be reset when starting the program operation and after executing the reset function.



Chapter 14

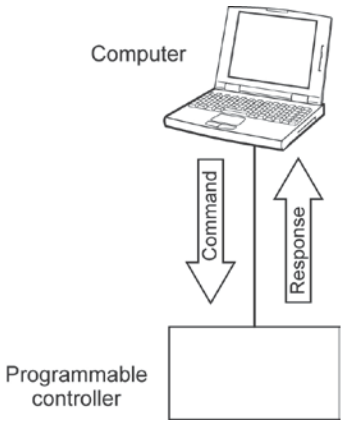
MEWTOCOL Communication Procedure

14.1 MEWTOCOL-COM (Computer Link)

14.1.1 Overview of MEWTOCOL-COM

Command and response functions

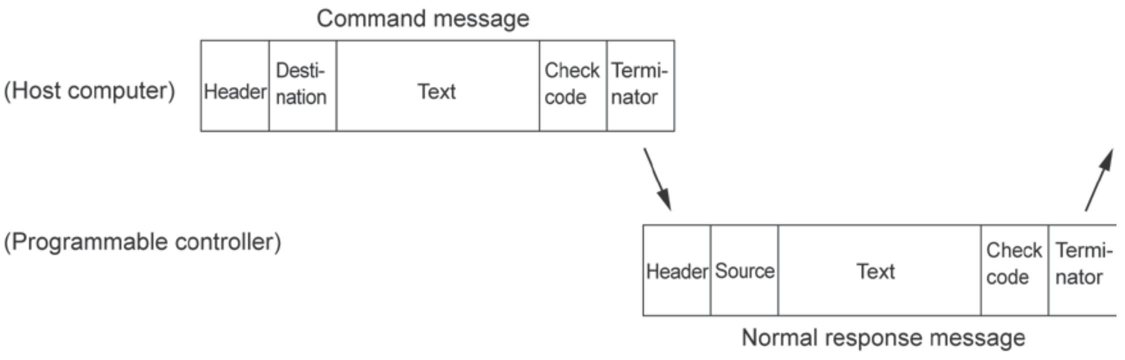
The computer sends commands (instructions) to the programmable controller, and receives responses in return. This enables the computer and programmable controller to converse with each other, so that various kinds of information can be obtained and provided.



Note:

A user program is required on the computer side in order to carry out a computer link. No program is necessary on the programmable controller side.

Command and response formats



Note:

Dedicated procedures and conversational formats are used. Transmissions are made by sending ASCII codes. The computer has the first right of transmission, and the right of transmission then shifts each time a message is sent.

Note:

- With MEWTOCOL communication through an ET-LAN unit, a format is used in which the special header shown below is added to MEWTOCOL-COM commands and responses.

Special header for ET-LAN unit	**MEWTOCOL command/response**

- The content of the special header changes depending on the communication conditions.

Control codes

Name	Character	ASCII code	Explanation
Header	% or <	25H or 3CH	Indicates the beginning of a message.
Command	#	23H	Indicates that the data comprises a command message.
Normal response	$	24H	Indicates that the data comprises a normal response message.
Error response	!	21H	Indicates that the data comprises a response message when an error occurs.
Terminator	CR	0DH	Indicates the end of a message.
Delimiter	&(+ CR)	26H	Indicates a delimiter that splits data into multiple frames.

Destination and source   AD (H), (L)

Two-digit decimal 01 to 64 (ASCII codes)
Command messages contain a unit number for the programmable controller that receives the message.
Response messages contain the unit number of the programmable controller that is sending the response.
(H) indicates the upper digit and (L) the lower digit. If there is no particular value to be specified, “01” should be set.
When FF (ASCII code table) is used, however, the transmission is a global transmission (sent to all units at once).
Note) When a global transmission is sent, no response to the command message is returned.

Block check code   BCC (H), (L)

Two-digit hexadecimal 00 to FF (ASCII codes)
These are codes (horizontal parity) that are used to detect errors in the transmitted data. If “**” is entered instead of “BCC”, however, messages can be transmitted without the BCC. In this case, the BCC is included with the response.

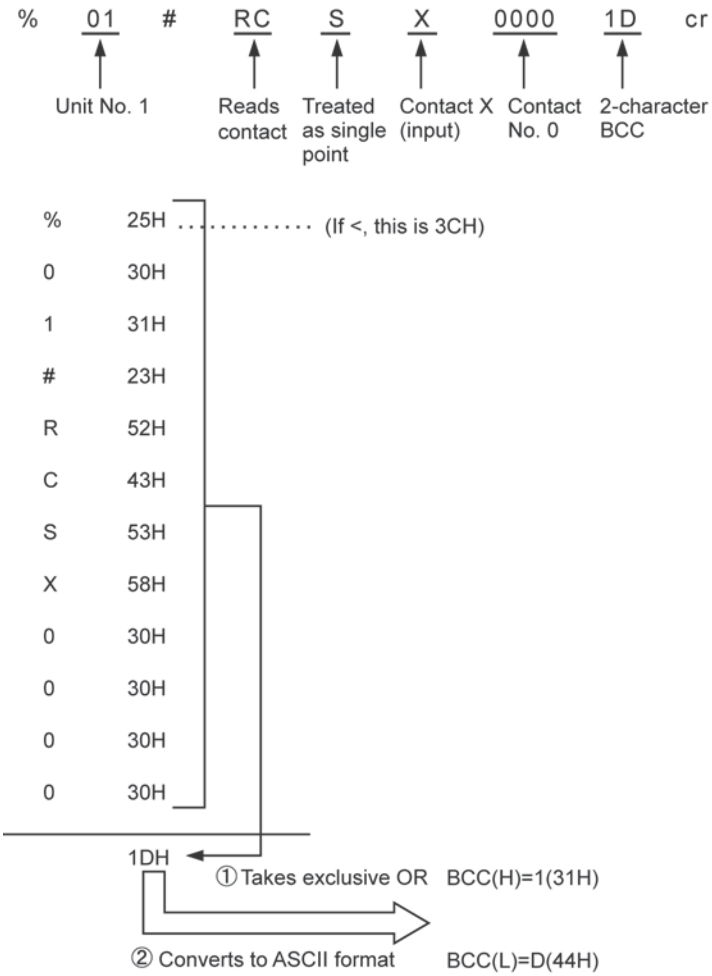
Error code   Err (H), (L)

Two-digit hexadecimal 00 to FF (ASCII codes)
These indicate the contents if an error occurs.

BCC (Block Check Code)

- The BCC is a code that carries out an error check using horizontal parity, to improve the reliability of the data being sent.
- The BCC uses an exclusive OR from the header (%) to the final character of the text, and converts the 8-bit data into a 2-character ASCII code.

Example



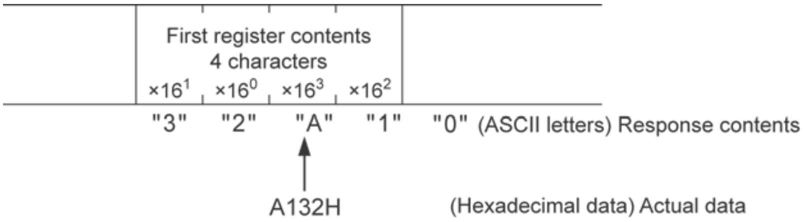
How data is notated in commands and responses

Data used in commands and responses can be notated in the three ways described below.

Hexadecimal data

$X16^0$ and 16^1 to indicate hexadecimal data.

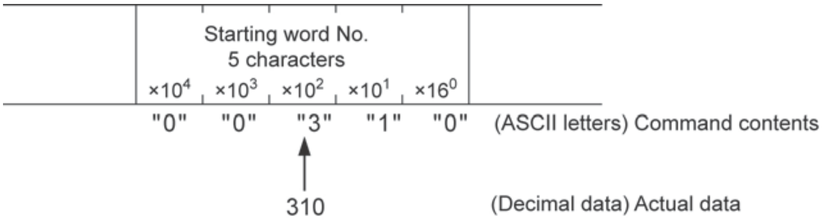
(Example) Register contents in a data area read (RD) response



Decimal data

$X10^0$ and $x10^1$ to indicate decimal data.

(Example) Initial word contents in a data area read (RD) command



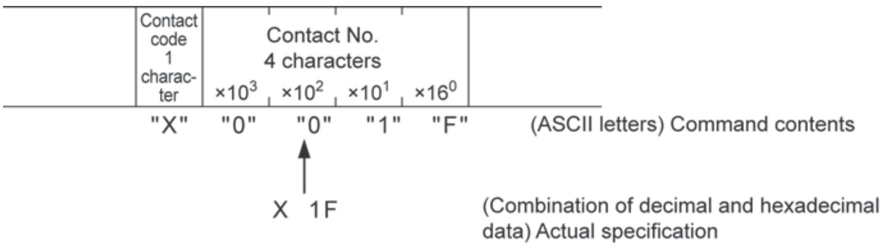
Decimal – hexadecimal data

In the relay numbers for external input (X), external output (Y), internal relays (R), and link relays (L), the last digit is in hexadecimal notation, while the preceding digits are in decimal notation. (In T/C contact numbers, all of the digits, including the last digit, are in decimal notation.)

In this case, the notation would read as follows:

$X16^0$, $x10^1$, $x10^2$ to

(Example) Specification of command contact of contact area lead (RCS)

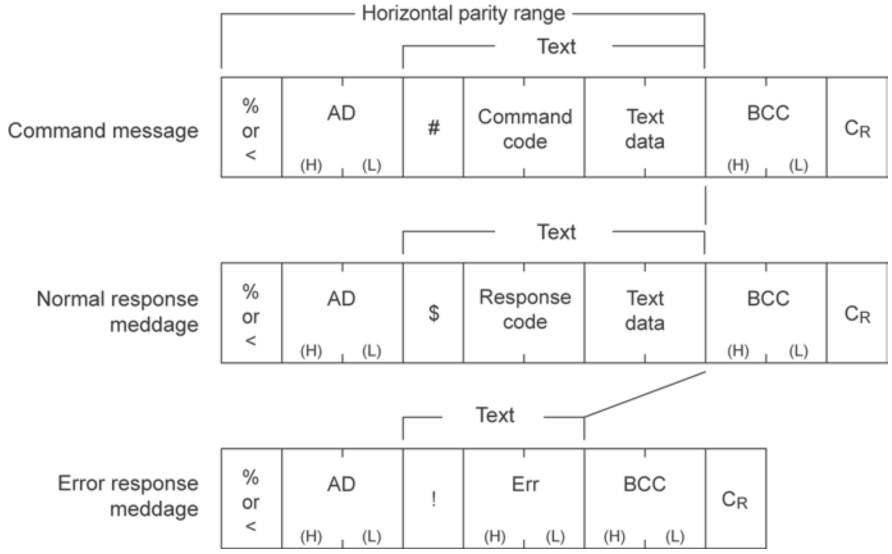


Note:

Data is limited to a certain number of characters. For example, the contact number above is specified using four characters, so when the X1F contact area is read, a 0 will be added at the beginning to fill out the number of characters and form a four-character string.

14.1.2 Single Frames and Multiple Frames

Single-frame commands and responses



Maximum message length

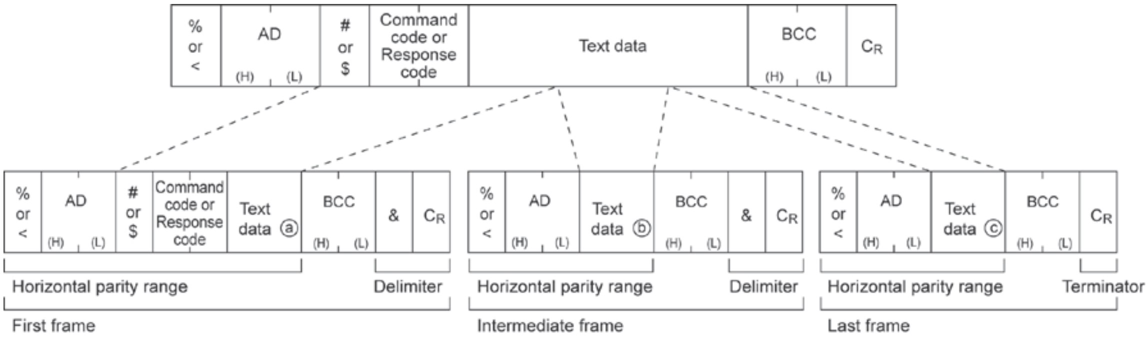
The maximum message length for a single frame of a command or response (the number of characters from the header to the terminator) is as indicated below. If the maximum message length is exceeded, the message should be split into multiple sections and sent (responses should be split into several frames and sent).

% (Header) 118 characters

< (Expanded header) 2048 characters

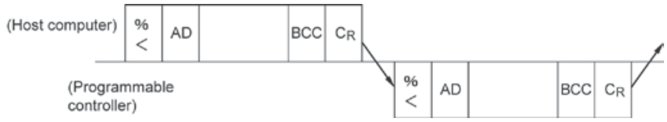
Some restrictions apply, however, based on the type and command.

Multiple-frame commands and responses

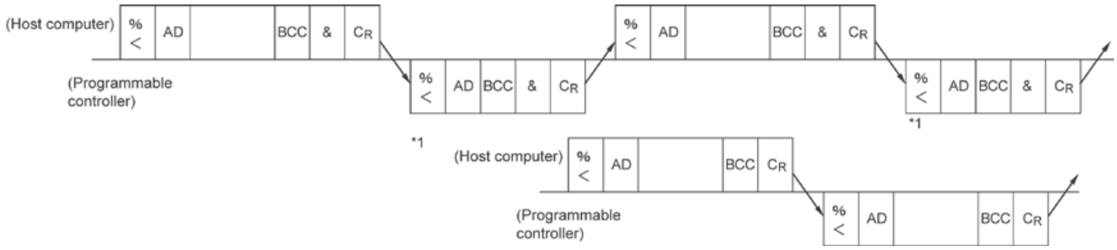


Sample communication timing chart

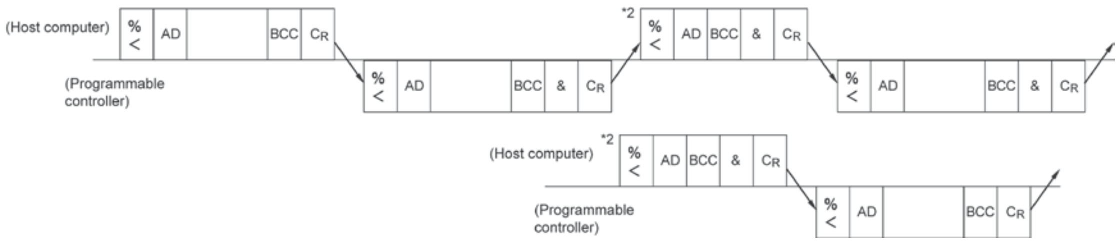
(1) Single-frame command and single-frame response



(2) Multiple-frame command and single-frame response



(3) Single-frame command and multiple-frame response



(4) When multiple-frame command is aborted before being completed

Note:

When a transmission is split into several frames and sent, after one frame has been sent, the next frame cannot be sent until a transmission request message (*1 in the sample communication timing chart) has been received from the partner side. If multiple frames are being received, a transmission request message (*2 in the sample communication timing chart) should be sent to the partner side so that the next frame can be received.

14.1.3 List of MEWTOCOL-COM Commands

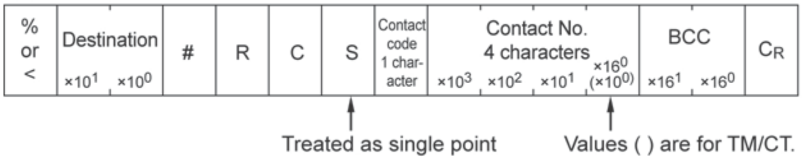
Table of command

Command name	Code	Description
Read contact area	RC (RCS) (RCP) (RCC)	Reads the on and off status of contacts. - Specifies only one point. - Specifies multiple contacts. - Specifies a range in word units.
Write contact area	WC (WCS) (WCP) (WCC)	Turns contacts on and off. - Specifies only one point. - Specifies multiple contacts. - Specifies a range in word units.
Read data area	RD	Reads the contents of a data area.
Write data area	WD	Writes data to a data area.
Read timer/counter set value area	RS	Reads the value set for a timer/counter.
Write timer/counter set value area	WS	Writes a timer/counter setting value.
Read timer/counter elapsed value area	RK	Reads the timer/counter elapsed value.
Write timer/counter elapsed value area	WK	Writes the timer/counter elapsed value.
Register or Reset contacts monitored	MC	Registers the contact to be monitored.
Register or Reset data monitored	MD	Registers the data to be monitored.
Monitoring start	MG	Monitors a registered contact or data.
Preset contact area (fill command)	SC	Embeds the area of a specified range in a 16-point on and off pattern.
Preset data area (fill command)	SD	Writes the same contents to the data area of a specified range.
Read system register	RR	Reads the contents of a system register.
Write system register	WR	Specifies the contents of a system register.
Read the status of PLC	RT	Reads the specifications of the programmable controller and error codes if an error occurs.
Remote control	RM	Switches the operation mode of the programmable controller.
Abort	AB	Aborts communication.

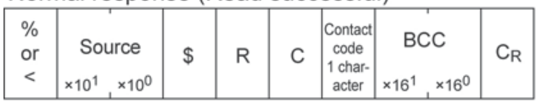
[RCS] Read contact area (single point)

This reads the on and off status for only one contact.

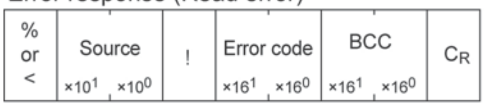
Command



Normal response (Read successful)



Error response (Read error)



Contact code

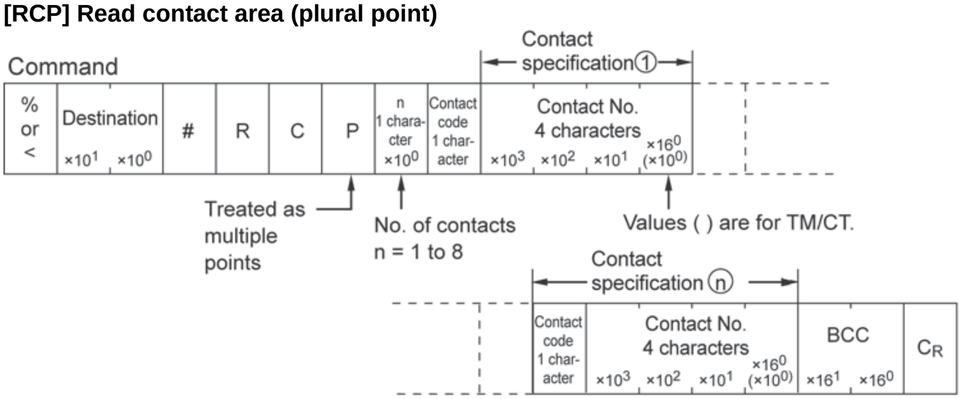
Contact	Notation
External input X	"X"
External output Y	"Y"
Internal relay R	"R"
Link relay L	"L"
Timer T	"T"
Counter C	"C"

Contact data

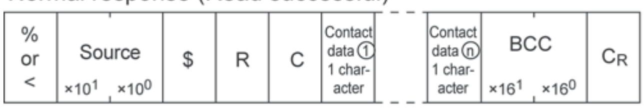
Contact	Notation
ON	"1"
OFF	"0"

[RCP] Read contact area (plural point)

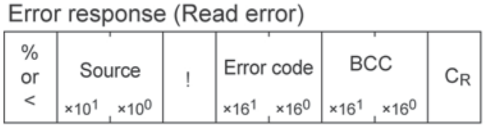
Command



Normal response (Read successful)



Error response (Read error)



Contact code

Contact	Notation
External input X	"X"
External output Y	"Y"
Internal relay R	"R"
Link relay L	"L"
Timer T	"T"
Counter C	"C"

Contact data

Contact	Notation
ON	"1"
OFF	"0"

[RCC] Read contact area (word units block)

This reads the on and off status of the contact in word units.

Command

% or <	Destination	#	R	C	C	Contact code 1 character	Starting word No. 4 characters	Ending word No. 4 characters	BCC	C_R
	$\times10^1$, $\times10^0$						$\times10^3$, $\times10^2$, $\times10^1$, $\times10^0$	$\times10^3$, $\times10^2$, $\times10^1$, $\times10^0$	$\times16^1$, $\times16^0$	

Treated as word (contact code)

Normal response (Read successful)

The contact information is read as hexadecimal data, in word units.

% or <	Source	$	R	C	First contact information 4 characters	...	Last contact information 4 characters	BCC	C_R
	$\times10^1$, $\times10^0$				$\times16^1$, $\times16^0$ (lower word), $\times16^3$, $\times16^2$ (higher word)		$\times16^1$, $\times16^0$ (lower word), $\times16^3$, $\times16^2$ (higher word)	$\times16^1$, $\times16^0$	

Error response (Read error)

% or <	Source	!	Error code	BCC	C_R
	$\times10^1$, $\times10^0$		$\times16^1$, $\times16^0$	$\times16^1$, $\times16^0$	

Contact code

Contact	Notation
External input X	"X"
External output Y	"Y"
Internal relay R	"R"
Link relay L	"L"
Timer T	"T"
Counter C	"C"

[WCS] Write contact area (single point)

This turns only one contact on or off.

Command

% or <	Destination	#	W	C	S	Contact code 1 character	Contact No. 4 characters	Contact data 1 character	BCC	C_R
	$\times10^1$, $\times10^0$						$\times10^3$, $\times10^2$, $\times10^1$, $\times16^0$ ($\times10^0$)		$\times16^1$, $\times16^0$	

Treated as single point (S)

Normal response (Write successful)

% or <	Source	$	W	C	BCC	C_R
	$\times10^1$, $\times10^0$				$\times16^1$, $\times16^0$	

Error response (Write error)

% or <	Source	!	Error code	BCC	C_R
	$\times10^1$, $\times10^0$		$\times16^1$, $\times16^0$	$\times16^1$, $\times16^0$	

Contact code

Contact	Notation
External output Y	"Y"
Internal relay R	"R"
Link relay L	"L"

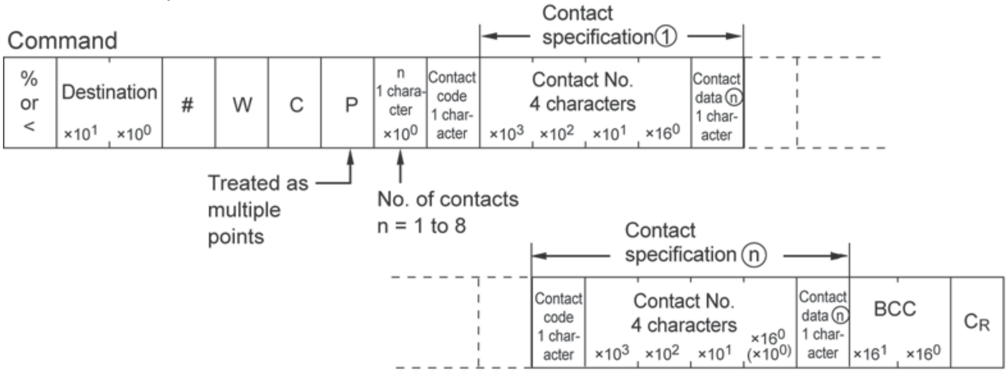
Contact data

Contact	Notation
ON	"1"
OFF	"0"

[WCP] Write contact area (plural points)

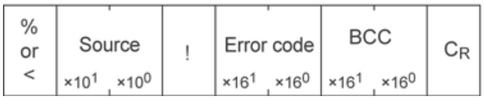
This turns multiple contacts on and off.

Command



Normal response (Write successful)

Error response (Write error)



Contact code

Contact	Notation
External output Y	"Y"
Internal relay R	"R"
Link relay L	"L"

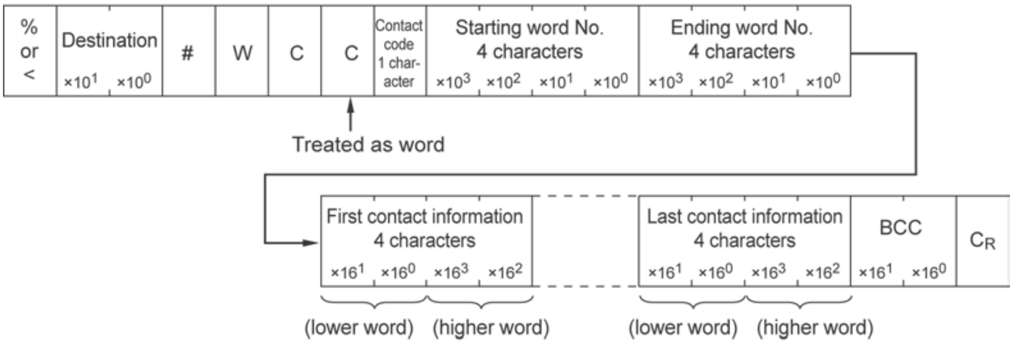
Contact data

Contact	Notation
ON	"1"
OFF	"0"

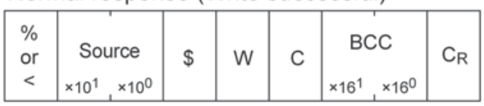
[WCC] Write contact area (word units block)

This turns a contact on or off in word units.

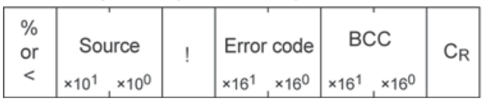
Command The contact information is read as hexadecimal data, in word units.



Normal response (Write successful)



Error response (Write error)



Contact code

Contact	Notation
External output Y	"Y"
Internal relay R	"R"
Link relay L	"L"

[RD] Read data area

This reads the contents of the data area.

To read the contents of DT, LD, and FL:

Command

% or <	Destination	#	R	D	Contact code 1 character	Starting word No. 5 characters	Ending word No. 5 characters	BCC	C_R
	$\times10^1$ $\times10^0$					$\times10^4$ $\times10^3$ $\times10^2$ $\times10^1$ $\times10^0$	$\times10^4$ $\times10^3$ $\times10^2$ $\times10^1$ $\times10^0$	$\times16^1$ $\times16^0$	

Normal response (Write successful)

% or <	Source	$	R	D	First register contents 4 characters	- - -	Last register contents 4 characters	BCC	C_R
	$\times10^1$ $\times10^0$				$\times16^1$ $\times16^0$ $\times16^3$ $\times16^2$		$\times16^1$ $\times16^0$ $\times16^3$ $\times16^2$	$\times16^1$ $\times16^0$	
					(lower word) (higher word)		(lower word) (higher word)		

Error response (Write error)

% or <	Source	!	Error code	BCC	C_R
	$\times10^1$ $\times10^0$		$\times16^1$ $\times16^0$	$\times16^1$ $\times16^0$	

Contact code

Data	Notation
Data register DT	"D"
Link data register LD	"L"
File register FL	"F"

To read the contents of an index register:

Command

% or <	Destination	#	R	D	Data code 2 characters	0 0 0 0 0 0 0 0 0 (9 characters)	BCC	C_R
	$\times10^1$ $\times10^0$						$\times16^1$ $\times16^0$	

Normal response (Read successful) (For I0 and I1)

% or <	Source	$	R	D	Register contents 4 characters	BCC	C_R
	$\times10^1$ $\times10^0$				$\times16^1$ $\times16^0$ $\times16^3$ $\times16^2$	$\times16^1$ $\times16^0$	
					(lower word) (higher word)		

Normal response (Read successful) (For I0 and I1)

% or <	Source	$	R	D	Register contents (I0) 4 characters	Register contents (I1) 4 characters	BCC	C_R
	$\times10^1$ $\times10^0$				$\times16^1$ $\times16^0$ $\times16^3$ $\times16^2$	$\times16^1$ $\times16^0$ $\times16^3$ $\times16^2$	$\times16^1$ $\times16^0$	
					(lower word) (higher word)	(lower word) (higher word)		

Error response (Read error)

% or <	Source	!	Error code	BCC	C_R
	$\times10^1$ $\times10^0$		$\times16^1$ $\times16^0$	$\times16^1$ $\times16^0$	

Contact code

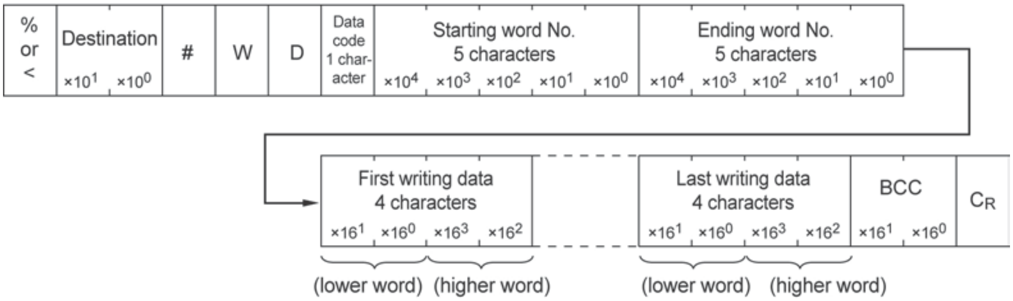
Data	Notation
I0	"I" "X"
I1	"I" "Y"
I0, I1	"I" "D"

[WD] Write data area

This writes the contents of the data area.

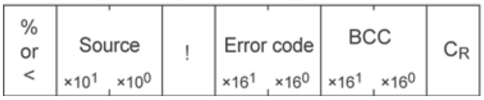
To write the contents of DT, LD, and FL:

Command The contact information is written as hexadecimal data, in word units.



Normal response (Write successful)

Error response (Write error)



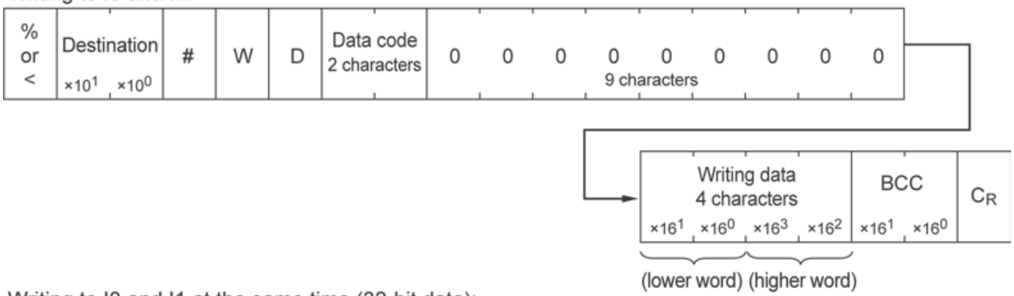
Contact code

Data	Notation
Data register DT	"D"
Link data register LD	"L"
File register FL	"F"

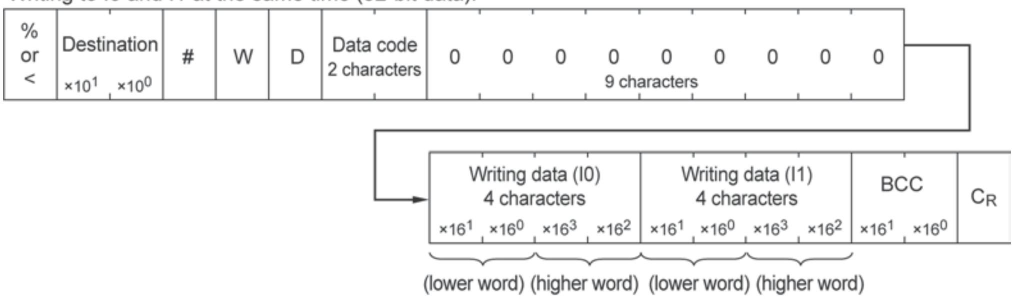
To write to an index register:

Command

Writing to I0 and I1:



Writing to I0 and I1 at the same time (32-bit data):



Normal response (Write successful)

% or <	Source $\times 10^1$ $\times 10^0$	$	W	D	BCC $\times 16^1$ $\times 16^0$	C_R

Error response (Write error)

% or <	Source $\times 10^1$ $\times 10^0$	!	Error code $\times 16^1$ $\times 16^0$	BCC $\times 16^1$ $\times 16^0$	C_R

Data code

Data	Notation
I0	"I" "X"
I1	"I" "Y"
I0, I1	"I" "D"

[RS] Read set value area

This reads the value set for a time/counter.

Command

% or <	Destination	#	R	S	Starting timer/counter No. 4 characters	Ending timer/counter No. 4 characters	BCC	C_R
	$\times10^1$ $\times10^0$				$\times10^3$ $\times10^2$ $\times10^1$ $\times10^0$	$\times10^3$ $\times10^2$ $\times10^1$ $\times10^0$	$\times16^1$ $\times16^0$	

Normal response (Read successful)

% or <	Source	$	R	S	First set value 4 characters	...	Last set value 4 characters	BCC	C_R
	$\times10^1$ $\times10^0$				$\times16^1$ $\times16^0$ $\times16^3$ $\times16^2$		$\times16^1$ $\times16^0$ $\times16^3$ $\times16^2$	$\times16^1$ $\times16^0$	
					(lower word) (higher word)		(lower word) (higher word)		

Error response (Read error)

% or <	Source	!	Error code	BCC	C_R
	$\times10^1$ $\times10^0$		$\times16^1$ $\times16^0$	$\times16^1$ $\times16^0$	

[WS] Write set value area

This writes the value to be set for a timer/counter.

Command

% or <	Destination	#	W	S	Starting timer/counter No. 4 characters	Ending timer/counter No. 4 characters
	$\times10^1$ $\times10^0$				$\times10^3$ $\times10^2$ $\times10^1$ $\times10^0$	$\times10^3$ $\times10^2$ $\times10^1$ $\times10^0$

First writing data 4 characters	...	Last writing data 4 characters	BCC	C_R
$\times16^1$ $\times16^0$ $\times16^3$ $\times16^2$		$\times16^1$ $\times16^0$ $\times16^3$ $\times16^2$	$\times16^1$ $\times16^0$	
(lower word) (higher word)		(lower word) (higher word)		

Normal response (Write successful)

% or <	Source	$	W	S	BCC	C_R
	$\times10^1$ $\times10^0$				$\times16^1$ $\times16^0$	

Error response (Write error)

% or <	Source	!	Error code	BCC	C_R
	$\times10^1$ $\times10^0$		$\times16^1$ $\times16^0$	$\times16^1$ $\times16^0$	

[RK] Read elapsed value area

This reads the elapsed value for a time/counter.

Command

% or <	Destination	#	R	K	Starting timer/counter No. 4 characters	Ending timer/counter No. 4 characters	BCC	C_R
	$\times10^1$ $\times10^0$				$\times10^3$ $\times10^2$ $\times10^1$ $\times10^0$	$\times10^3$ $\times10^2$ $\times10^1$ $\times10^0$	$\times16^1$ $\times16^0$	

Normal response (Read successful)

% or <	Source	$	R	K	First elapsed value 4 characters	- - -	Last elapsed value 4 characters	BCC	C_R
	$\times10^1$ $\times10^0$				$\times16^1$ $\times16^0$ $\times16^3$ $\times16^2$	- - -	$\times16^1$ $\times16^0$ $\times16^3$ $\times16^2$	$\times16^1$ $\times16^0$	
					(lower word) (higher word)		(lower word) (higher word)		

Error response (Read error)

% or <	Source	!	Error code	BCC	C_R
	$\times10^1$ $\times10^0$		$\times16^1$ $\times16^0$	$\times16^1$ $\times16^0$	

[WK] Write elapsed value area

This writes the elapsed value for a timer/counter.

Command

% or <	Destination	#	W	K	Starting timer/counter No. 4 characters	Ending timer/counter No. 4 characters
	$\times10^1$ $\times10^0$				$\times10^3$ $\times10^2$ $\times10^1$ $\times10^0$	$\times10^3$ $\times10^2$ $\times10^1$ $\times10^0$

First writing data 4 characters	- - -	Last writing data 4 characters	BCC	C_R
$\times16^1$ $\times16^0$ $\times16^3$ $\times16^2$	- - -	$\times16^1$ $\times16^0$ $\times16^3$ $\times16^2$	$\times16^1$ $\times16^0$	
(lower word) (higher word)		(lower word) (higher word)		

Normal response (Write successful)

% or <	Source	$	W	K	BCC	C_R
	$\times10^1$ $\times10^0$				$\times16^1$ $\times16^0$	

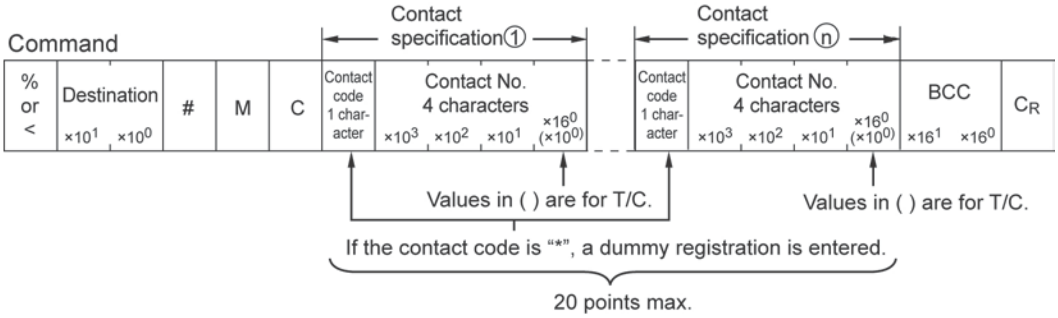
Error response (Write error)

% or <	Source	!	Error code	BCC	C_R
	$\times10^1$ $\times10^0$		$\times16^1$ $\times16^0$	$\times16^1$ $\times16^0$	

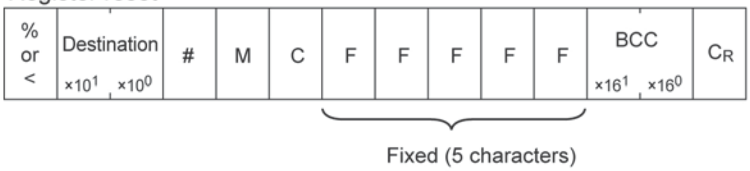
[MC] Register or Reset contacts monitored

This registers a contact to be monitored. Up to 80 points can be registered for one unit.

Command

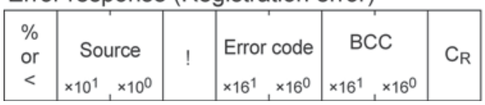


Register reset



Normal response (Registration successful)

Error response (Registration error)



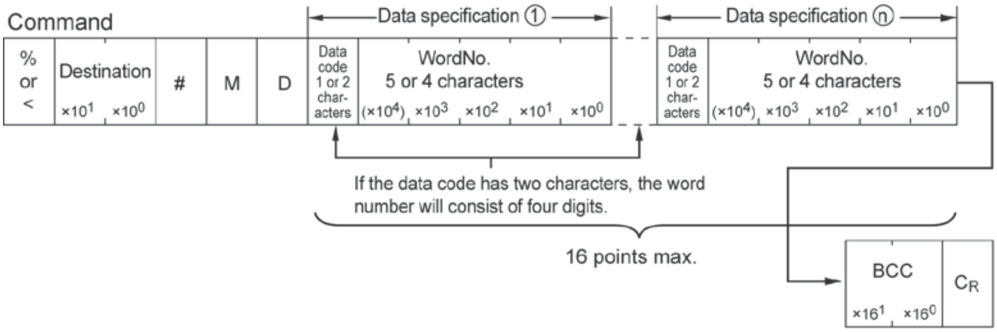
Contact code

Contact	Notation
External input X	"X"
External output Y	"Y"
Internal relay R	"R"
Link relay L	"L"
Timer T	"T"
Counter C	"C"

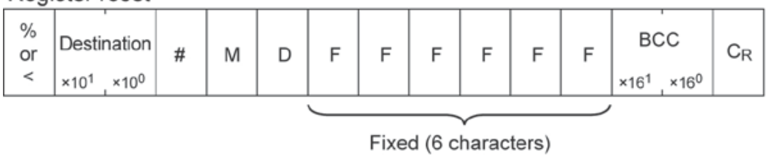
[MD] Register or Reset data monitored

This registers data to be monitored. Up to 16 points can be registered for one unit.

Command

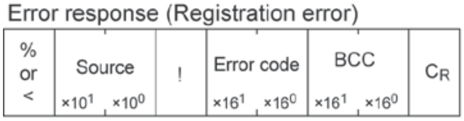


Register reset



Normal response (Registration successful)

Error response (Registration error)



Data code

Data	Data code	
Data register DT	D	
Lind data register LD	L	
File register FL	F	
Timer/counter set value area SV	S	
Timer/counter elapsed value area EV	K	
Index register I0	IX	2-character data code
Index register I1	IY	
External input WX	WX	
External output WY	WY	
Internal relay WR	WR	
Link relay WL	WL	

Note:

- If the data code is IX or IY, “0” should be specified for the four characters of the word number.
- Dummy registrations (“*”) are not possible when registering data to be monitored.

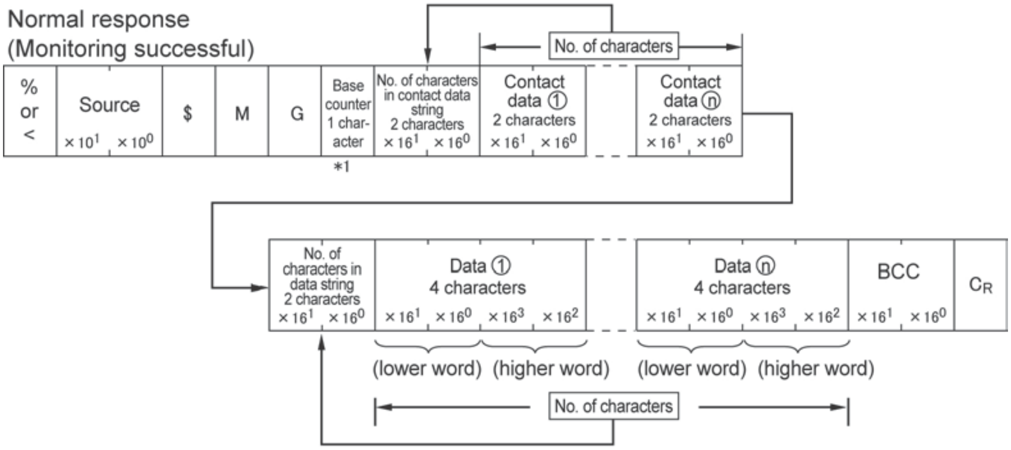
[MG] Monitoring start

This monitors a contact or data that has been registered.

Command

% or <	Destination		#	M	G	BCC		C_R
	$\times 10^1$	$\times 10^0$				$\times 16^1$	$\times 16^0$	

Normal response
(Monitoring successful)



*1 The base counter returns "A" if scanning took place ten times or more on the PLC side since the previous response.

Error response (Monitoring error)

% or <	Source		!	Error code		BCC		C_R
	$\times 10^1$	$\times 10^0$		$\times 16^1$	$\times 16^0$	$\times 16^1$	$\times 16^0$	

- Contact data is entered in the order registered, starting from bit 0 of the contact data ①.
- Data is entered in the order registered, starting from the data ①.

[SC] Preset contact area (fill command)
This embeds the areas of the specified range for 16 on and off points.

Command

% or <	Destination	#	S	C	Contact code 1 character	Starting word No. 4 characters	Ending word No. 4 characters	Word preset pattern 4 characters	BCC	C_R
	$\times10^1$ $\times10^0$					$\times10^3$ $\times10^2$ $\times10^1$ $\times10^0$	$\times10^3$ $\times10^2$ $\times10^1$ $\times10^0$	$\underbrace{\times16^1\ \times16^0}_{\text{(lower word)}}$ $\underbrace{\times16^3\ \times16^2}_{\text{(higher word)}}$	$\times16^1$ $\times16^0$	

Normal response (Preset successful)

% or <	Source	$	S	C	BCC	C_R
	$\times10^1$ $\times10^0$				$\times16^1$ $\times16^0$	

Error response (Preset error)

% or <	Source	!	Error code	BCC	C_R
	$\times10^1$ $\times10^0$		$\times16^1$ $\times16^0$	$\times16^1$ $\times16^0$	

Contact code

Contact	Notation
External output Y	"Y"
Internal relay R	"R"
Link relay L	"L"

[SD] Preset data area (fill command)
This writes the same contents to the data area of the specified range.

Command

% or <	Destination	#	S	D	Data code 1 character	Starting word No. 5 characters	Ending word No. 5 characters	Word preset pattern 4 characters	BCC	C_R
	$\times10^1$ $\times10^0$					$\times10^4$ $\times10^3$ $\times10^2$ $\times10^1$ $\times10^0$	$\times10^4$ $\times10^3$ $\times10^2$ $\times10^1$ $\times10^0$	$\underbrace{\times16^1\ \times16^0}_{\text{(lower word)}}$ $\underbrace{\times16^3\ \times16^2}_{\text{(higher word)}}$	$\times16^1$ $\times16^0$	

Normal response (Preset successful)

% or <	Source	$	S	D	BCC	C_R
	$\times10^1$ $\times10^0$				$\times16^1$ $\times16^0$	

Error response (Preset error)

% or <	Source	!	Error code	BCC	C_R
	$\times10^1$ $\times10^0$		$\times16^1$ $\times16^0$	$\times16^1$ $\times16^0$	

Data code

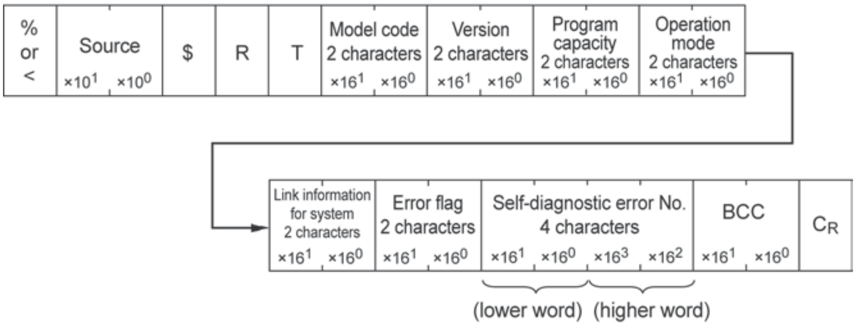
Data	Notation
Data register DT	"D"
Link data register LD	"L"
File register FL	"F"

[RT] Read the status of PLC

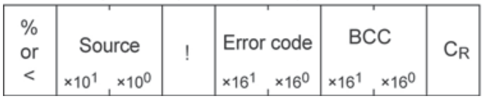
This reads information such as error codes if an error occurs in the programmable controller specifications.

Command

Normal response (Read successful)



Error response (Read error)



Model code

This expresses the CPU unit type as a 2-character decimal value.

Code	Model
20	FP2 and FP2SH

Version

This expresses the CPU unit version as a 2-character decimal value.
For example: 15 → Ver. 1.5

Program capacity

This expresses the program capacity by specified by system register no.0 as a 2-character decimal value. The value is expressed in k-step units.

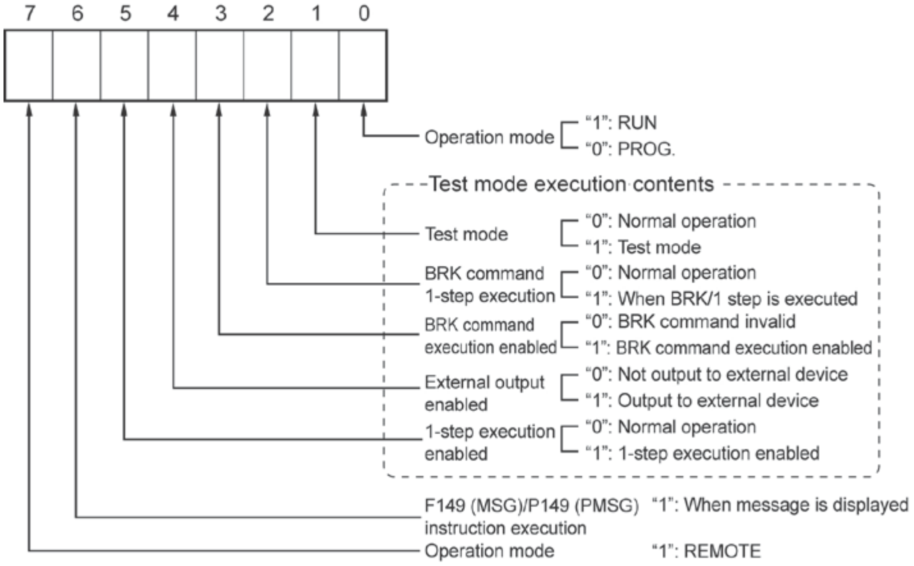
Code	Program capacity	Last step address
02	2k steps	1,534
n	n steps	1,024 x n - 152 – 2 For example: If n = 8, the value is 7,678.
16	16k steps	15,870
32	32k steps	32,254

Note) With the FP2SH, this will be “0”.

Operation mode

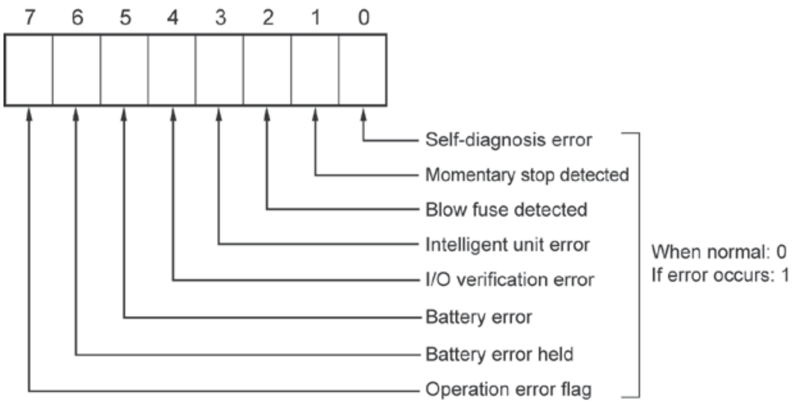
- The contents of special internal relays R9020 to R9027 are expressed as 2-character hexadecimal values.
- The user can check the settings of the mode selector switches on the CPU unit (RUN/PROG./REMOTE), whether normal operation or test operation is being used, and other elements.

Values are read in binary notation, as shown below.



Error flag

The statuses of the eight error flags (special internal relays) R9000 to R9007 are expressed as 2-character hexadecimal values. They are read using binary notation, as shown below.



Self-diagnostic error code

- If an error occurs, the self-diagnosis error code is expressed as a 4-digit hexadecimal value. Please be careful, since self-diagnosis error codes are normally treated as decimal values.
  For example, if the content is read as “2D00” in hexadecimal format, the self-diagnosis error code will be “2D”. In decimal notation it will be read as “45” (Operation error).
- If no error has occurred, the value will be “0000”.

[RR] Read system register
This reads the contents of the system registers.

Command

% or <	Destination	#	R	R	Dummy	Starting system register No. 3 characters	Ending system register No. 3 characters	BCC	C_R
	$\times 10^1$ $\times 10^0$					$\times 10^2$ $\times 10^1$ $\times 10^0$	$\times 10^2$ $\times 10^1$ $\times 10^0$	$\times 16^1$ $\times 16^0$	
					0				

Normal response (Read successful)

% or <	Source	$	R	R	First system register contents 4 characters		- - -	Last system register contents 4 characters		BCC	C_R
	$\times 10^1$ $\times 10^0$				$\times 16^1$ $\times 16^0$	$\times 16^3$ $\times 16^2$		$\times 16^1$ $\times 16^0$	$\times 16^3$ $\times 16^2$	$\times 16^1$ $\times 16^0$	
					(lower word)	(higher word)		(lower word)	(higher word)		

Error response (Read error)

% or <	Source	!	Error code	BCC	C_R
	$\times 10^1$ $\times 10^0$		$\times 16^1$ $\times 16^0$	$\times 16^1$ $\times 16^0$	

[WR] Write system register
This sets the system registers.

Command

% or <	Destination	#	W	R	Dummy	Starting system register No. 3 characters	Ending system register No. 3 characters
	$\times 10^1$ $\times 10^0$					$\times 10^2$ $\times 10^1$ $\times 10^0$	$\times 10^2$ $\times 10^1$ $\times 10^0$
					0		

First system register contents 4 characters		- - -	Last system register contents 4 characters		BCC	C_R
$\times 16^1$ $\times 16^0$	$\times 16^3$ $\times 16^2$		$\times 16^1$ $\times 16^0$	$\times 16^3$ $\times 16^2$	$\times 16^1$ $\times 16^0$	
(lower word)	(higher word)		(lower word)	(higher word)		

Normal response (Write successful)

% or <	Source	$	W	R	BCC	C_R
	$\times 10^1$ $\times 10^0$				$\times 16^1$ $\times 16^0$	

Error response (Write error)

% or <	Source	!	Error code	BCC	C_R
	$\times 10^1$ $\times 10^0$		$\times 16^1$ $\times 16^0$	$\times 16^1$ $\times 16^0$	

[RM] Remote control

This switches the operation mode of the programmable controller. It is effective only when the operation mode of the programmable controller is the REMOTE mode.

Command

% or <	Destination $\times10^1$ $\times10^0$	#	R	M	Operation code 1 character	BCC $\times16^1$ $\times16^0$	C_R

Normal response (Remote control successful)

% or <	Source $\times10^1$ $\times10^0$	$	R	M	BCC $\times16^1$ $\times16^0$	C_R

Operation code

Code	Operation
"R"	PROGRAM mode → RUN mode (booting)
"P"	RUN mode → PROGRAM mode (stopped)

Error response (Remote control error)

% or <	Source $\times10^1$ $\times10^0$	!	Error code $\times16^1$ $\times16^0$	BCC $\times16^1$ $\times16^0$	C_R

[AB] Abort

If a transmission is aborted while a multiple-frame response is being received from the programmable controller, this is issued from the side sending the command (the computer side).

Command

% or <	Destination $\times10^1$ $\times10^0$	#	A	B	BCC $\times16^1$ $\times16^0$	C_R

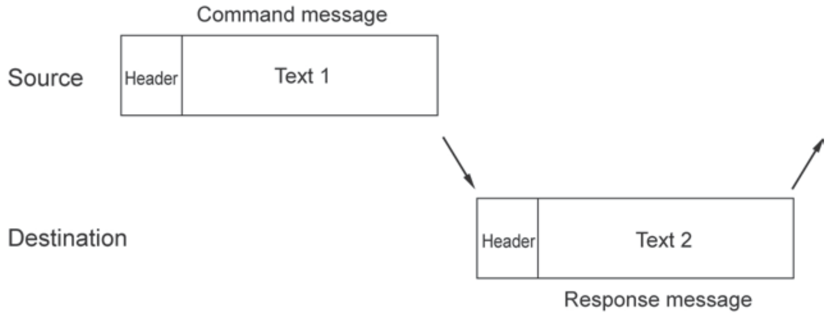
Response

No response

14.2 MEWTOCOL-DAT (Data Transfer)

14.2.1 Overview of MEWTOCOL-DAT

Overview of command and response



Notes:

- A dedicated procedure and conversational-style format are used.
- Data is sent as binary codes.
- Transmission rights are transferred each time a command message is sent.
- The maximum length for text data is 1,020 words.
- If the transmission source is a programmable controller, command messages are transmitted by executing the SEND and RECV commands.

Note:

- With MEWTOCOL communication carried out through an ET-LAN unit, format is used in which the special header shown below is added to MEWTOCOL-DAT commands and responses.

Special header for ET-LAN unit	MEWTOCOL command/response

- The content of the special header changes depending on the communication conditions.

Command code and Response code

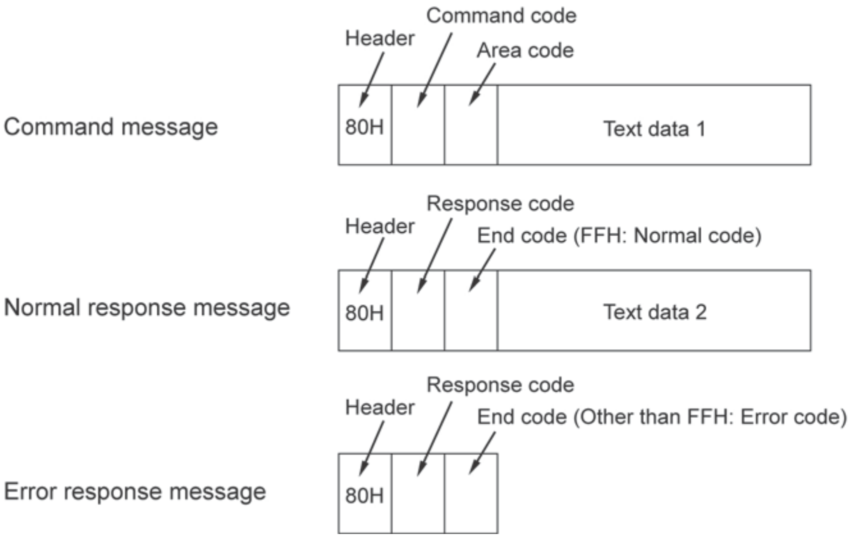


Table of command

Command code	Description	Corresponding response code
50H	Writing to a data area	D0H
51H	Reading from a data area	D1H
52H	Writing of contact information	D2H
53H	Reading of contact information	D3H

Note:

The corresponding response code is a value that is the reverse of the first bit (0 → 1) of the command code (1-byte binary code).

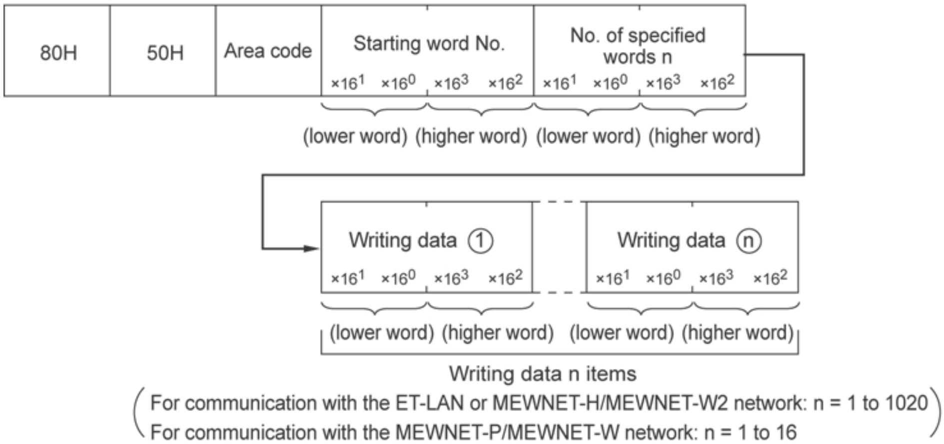
The end code for a normal response is FFH, while that when an error occurs is an error code. (See “MEWTOCOL Error Codes” on Chapter 14.3.)

14.2.2 List of MEWTOCOL-DAT Commands

[50H] Write data area

The specified number of words of data are written, starting from the specified first word number of the data area.

Command



Normal response (Write successful)

80H	D0H	FFH

Error response (Write error)

80H	D0H	Error code

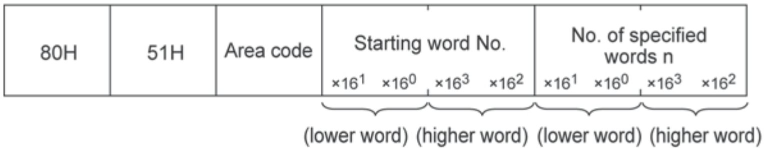
Area code

Area type	Area code
Link relay (WL)	00
Internal relay (WR)	01
External output relay (WY)	02
External input relay (WX)	03
Timer/counter set value area (SV)	04
Timer/counter elapsed value area (EV)	05
Link data register (LD)	06
Special internal relay (WR)	07
Special data register (DT)	08
Data register (DT)	09
File register (FL)	0A

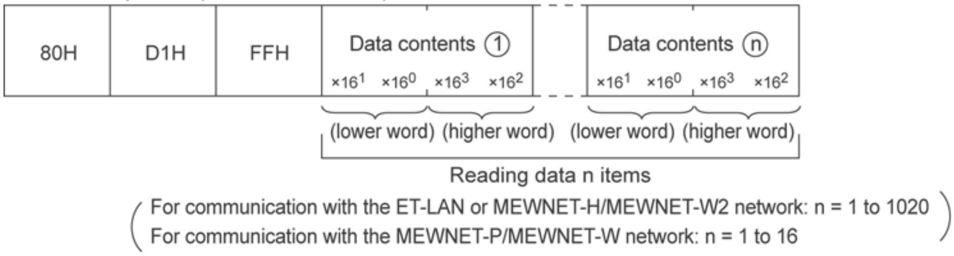
[51H] Read data area

The specified number of words of data are read, starting from the specified first word number of the data area.

Command



Normal response (Read successful)



Error response (Read error)

Area code

Area type	Area code
Link relay (WL)	00
Internal relay (WR)	01
External output relay (WY)	02
External input relay (WX)	03
Timer/counter set value area (SV)	04
Timer/counter elapsed value area (EV)	05
Link data register (LD)	06
Special internal relay (WR)	07
Special data register (DT)	08
Data register (DT)	09
File register (FL)	0A

[52H] Write contact information

Writing is carried out to the specified contact of the contact area.

Command

80H	52H	Area code	Word No.				Bit No.	Contact information
			×16^1	×16^0	×16^3	×16^2		
			(lower word)		(higher word)			

Contact information: 00 : OFF, 01 : ON

Bit No.: Bit 0 to 15: 01 to 0F

Normal response (Write successful)

80H	D2H	FFH

Error response (Write error)

80H	D2H	Error code

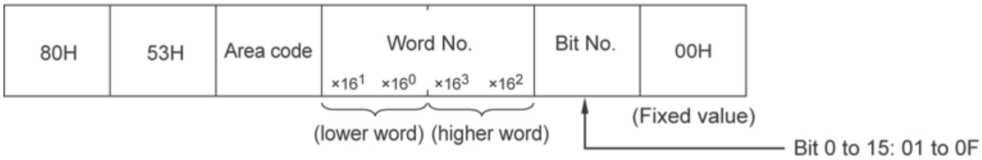
Area code

Area type	Area code
Link relay (WL)	00
Internal relay (WR)	01
External output relay (WY)	02
External input relay (WX)	03
Timer/counter set value area (SV)	04
Timer/counter elapsed value area (EV)	05
Link data register (LD)	06
Special internal relay (WR)	07
Special data register (DT)	08
Data register (DT)	09
File register (FL)	0A

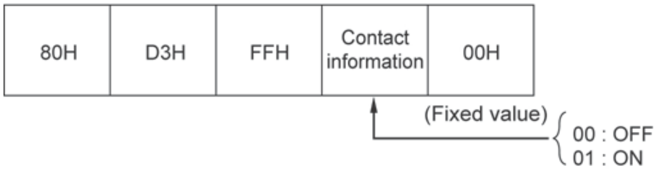
[53H] Read contact information

Reading is carried out from the specified contact of the contact area.

Command



Normal response (Read successful)



Error response (Read error)

Area code

Area type	Area code
Link relay (WL)	00
Internal relay (WR)	01
External output relay (WY)	02
External input relay (WX)	03
Timer/counter set value area (SV)	04
Timer/counter elapsed value area (EV)	05
Link data register (LD)	06
Special internal relay (WR)	07
Special data register (DT)	08
Data register (DT)	09
File register (FL)	0A

14.3 MEWTOCOL Error Codes

14.3.1 Table of Error Code

The same error codes are used for the computer link function and data link function.

Link system error

Error code	Error name	Steps to take
22H	WACK error	The receive buffer of the partner node has overflowed. Steps to take: Keep the data size within the maximum range.
23H	MEWTOCOL station No. overlap	The transmission has been interrupted because the MEWTOCOL station number of the source node duplicates that of another node. Steps to take: Change the setting for the MEWTOCOL station number and try again.
24H	ET-LAN unit hardware error	Hardware error in communication control unit Steps to take: Turn the power supply off and then on again. - If the error still occurs, replace the unit. - If the error does not occur, the malfunction may have been caused by noise. Check the installation and layout of the transmission line and the usage environment.
26H	MEWTOCOL station No. setting error	A value other than 01 to 64 has been specified for the MEWTOCOL station number of the source node. Steps to take: Specify a MEWTOCOL station number within a range of 01 to 64.
27H	No support error	An attempt was made to send a packet that is not supported by the system. Steps to take: Please contact your dealer.
28H	No response error	Timeout error while waiting for response from partner station. Steps to take: Use the application program to send the transmission again.
30H	Time-out error	Ongoing transmission disabled status Steps to take: Use the application program to send the transmission again.
32H	Transmission impossible error	The transmission was interrupted because the buffer of the source node overflowed. Steps to take: Keep the data size within the maximum range.
33H	Communication stop	The transmission was interrupted because the network access switch of the MEWNET-H link unit serving as a relay was off. Steps to take: Turn on the network access switch.
36H	No destination error	- No partner station exists on the network. - Network access was disengaged. Steps to take: - Check to see if a partner station exists on the network. - Use the application program to send the transmission again.
38H	Other communication errors	Transmission error other than the above Steps to take: Use the application program to send the transmission again.

Note1) When the error occurred on the second or a higher hierarchy level of a multiple-hierarchy link, no response will be returned.
Note2) For basic procedure errors, processing errors, and programmable controller application errors, if a link-related error (including hierarchical) occurred within the network, no response will be returned.

Basic procedure error

Error code	Error name	Steps to take
40H	BCC error	When using the computer link function: A BCC error occurred in the command data. Steps to take: Use the application program to send the transmission again.
41H	Format error	When using the computer link function: A command message was sent that does not fit the transmission format. - There is too much or too little command data. - “#” or “transmission destination” does not exist, or a similar problem For data transfer function - An attempt was made to send a greater volume of data than can be transmitted. Steps to take: Correct the format and command.
42H	No support error	When using the computer link function: A command was sent that is not supported. A command is being sent to a destination that is not supported, etc. Steps to take: Use a command that is supported.
43H	Procedure error	When using the computer link function: While the programmable controller was waiting for a transmission request message (there was still more data to be sent), a different command was sent. Steps to take: Send the transmission request message to the partner node.

Processing error

Error code	Error name	Steps to take
50H	Link setting error	When using the computer link function: A route number has been specified that does not exist. Steps to take: Specify the route number correctly.
51H	Simultaneous operation error	When using the computer link function: When sending a command to another node, the transmission buffer of the sending machine overflowed. Steps to take: Use the application program to send the transmission again.
52H	Transmit disable error	When using the computer link function: Data cannot be transmitted to another node. Steps to take: Turn the power supply off and then on again. - If the error still occurs, replace the unit. - If the error does not occur, the malfunction may have been caused by noise. Check the installation and layout of the transmission line and the usage environment.
53H	Busy error	When using the computer link function: A command was received while multiple frames were being processed. Steps to take: Use the application program to send the transmission again.

PLC application error

Error code	Error name	Steps to take
60H	Parameter error	When using the computer link function: The code used is for an area specification parameter that does not exist, or is a code that cannot be used with that command (X, Y, D, etc.). An inappropriate code is being used for the function specification parameter (0, 1, 2, etc.). Steps to take: Specify using the correct format code.
61H	Data error	When using the computer link function: An error occurred indicating that the specification for the contact number, area number, or the code format used to handle the data (BCD, HEX, etc.) is excessive, insufficient, or the wrong range has been specified. When using the data transfer function: The wrong field has been specified for the source node or another node. Steps to take: Specify using the correct format code.
62H	Registration error	When using the computer link function: Too many registrations have been entered, or a registration has not been entered (monitor registration, trace registration, etc.). When there are too many registrations, reset the registrations. Steps to take: Specify using the correct format code.
63H	Mode error	When using the computer link function: When a command was transmitted, the operation mode was one in which that command cannot be processed. Steps to take: Specify using the correct format code.
65H	Protect error	When using the computer link function: An attempt was made to write data to a program area or system register while the memory protect status was in effect. Steps to take: Data cannot be written while the memory protect status is in effect.
66H	Address error	When using the computer link function: An error occurred indicating that the code format (BCD, HEX, etc.) for the address (program address, absolute address, etc.) data is excessive, insufficient, or the wrong range has been specified. Steps to take: Specify using the correct format code.
67H	No data error	When using the computer link function: The data to be read does not exist. (An attempt was made to read a comment registration or other data that has not been written.) Steps to take: Specify using the correct format code.
72H	Time-out error	When using the data transfer function: Timeout error occurred while waiting for a transmission answer Steps to take: Use the application program to send the transmission again.
73H	Time-out error	When using the data transfer function: Timeout error occurred while waiting for the transmission buffer to become empty Steps to take: Use the application program to send the transmission again.
74H	Time-out error	When using the data transfer function: Timeout error occurred while waiting for a response Steps to take: Use the application program to send the transmission again.

Chapter 15

Specifications

15.1 Tables of Performance Specifications

15.1.1 General Specifications

Item	Description
Ambient temperature	0 to 55 °C
Storage temperature	-20 to 70 °C
Ambient humidity	30 to 85%RH (at 25°C, no-condensing)
Storage humidity	
Vibration resistance	10 to 55 Hz, 1 cycle/min.: double amplitude o f0.75 mm, 10 min. on 3 axes
Shock resistance	98 m/s2, 4 times on 3 axes
Noise resistance	1,500 Vp-p, pulse width 1μs for 50ns (based on in-house measurements)
Environment	Free from corrosive gases and excessive dust
Current consumption	670 mA or less (at 5 V DC)
External power supply for transceiver (when 10BASE5 (AUI) is used)	12 V DC/1 A max. (internal voltage drop 1 V max.)
Weight	Approx.130 g

15.1.2 Performance Specifications

Item			Description
I/O occupation			32SX/32SY [Note 1]
Limitations			Up to the following numbers can be installed in any basic mother board slot (including Multi-wiring link unit W2 mode). FP2 CPU unit: 3 units FP2SH CPU unit: 8 units
Communication function			- MEWTOCOL-COM: computer link function (Max. 2KB) [Note *2] - MEWTOCOL-DAT: data transfer (Max. 1,020 words) - Transparent communication
Number of connections per unit	System connection [Note3) 4)]		Max. 3 connections
	Connection		Max. 8 connections
Transparent communication buffer [Note5]	Transmit		Factory setting: (1 K words/connection) x 3
	Receive		Factory setting: (1 K words/connection) x 3
E-mail function [Note3)]	Buffer memory size for storing e-mail data [Note 6]		96K bytes
	Supported e-mail functions	Error Notice Mail	A fixed message, including the error occurrence date, time and error code, is sent to the entered destination when an error is detected in a CPU unit.
		Report Mail	(1) Fixed interval: 1 to 120 minutes (2) Appointed time: month, day, hour, minute. Up to 3 appointed times can be registered. Select either (1) or (2).
		Device Watch Mail	(1) Bit device watch: X, Y, R, L, T, and C (2) Word device watch: WX, WY, WR, WL, DT, SV, EV, FL, and LD Select either (1) or (2).
	Available memory size per 1 e-mail		2000 characters (including a line feed)
	Address Book		Max. 32 To:, Cc:, and/or Bcc: are available.
	Signature		User-defined signature: 4 (editable) Fixed signature: 1
	Mail Filter		A filter can be set for the incoming e-mail using a keyword. (The filter is available for the e-mail source address, domain name and Subject)

Note1) It is possible to set the unit type to “0SE” by using a programming tool such as FPWIN GR.
Note2) Remote programming and monitoring through the LAN are available using the programming tool such as FPWIN GR. (Configurator ET does not support the connection via LAN.)
Note3) The usable functions vary according to the version of the used ET-LAN unit.
For the details, refer to <1.4.1 Functions of ET-LAN Unit and Applicable Versions>.
Note4) System connection is used for communication to the programming tool (e.g. FPWIN GR) via LAN.
Note5) 6K words (transmit and receive combined) can be freely allocated to the 8 connections.
Note6) This size includes E-mail, Address Book, and signature data.

15.1.3 Communication Specifications

Item	100BASE-TX Note1)	10BASE-T Note1)	10BASE5
Target model	AFP2790 AFP27901	AFP2790 AFP27901	AFP2790
Data transfer speed	100M bits/s	10M bit/s	10M bit/s
Transmission system	Baseband	Baseband	Baseband
Max. segment length	100 m Note2)	100 m Note2)	500 m
Max. distance between nodes	205 m (2 segments)	500 m (5 segments)	2,500 m (5 segments)
Communication cable for connection	Category 5 UTP cable	Category 3, 4 and 5 UTP cable	Transceiver cable
Max. transceiver cable length	-	-	50 m Note3)
Max. number of nodes	-	-	100 nodes/segment
Node spacing	-	-	Integer multiples of 2.5 m

Note1) Switching between 100BASE-TX and 10BASE-T is done automatically by auto negotiation function.
Note2) The standards cite 100 m as the maximum, but noise resistance measures such as attaching a ferrite core may be necessary in some cases, depending on the usage environment. Also, if the hub is positioned close to a control board, we recommend using it at a distance of 10 m or less.
Note3) The standards cite 50 m as the maximum, but noise resistance measures such as attaching a ferrite core may be necessary in some cases, depending on the usage environment. Also, if the transceiver is positioned close to a control board, we recommend using it at a distance of 5 m or less.

15.2 I/O Allocation

The I/O signals in the table below are used when a handshake is carried out between the CPU unit and the ET-LAN unit using the I/O.

Input (Contact numbers indicate the numbers when installed in slot no. 0)

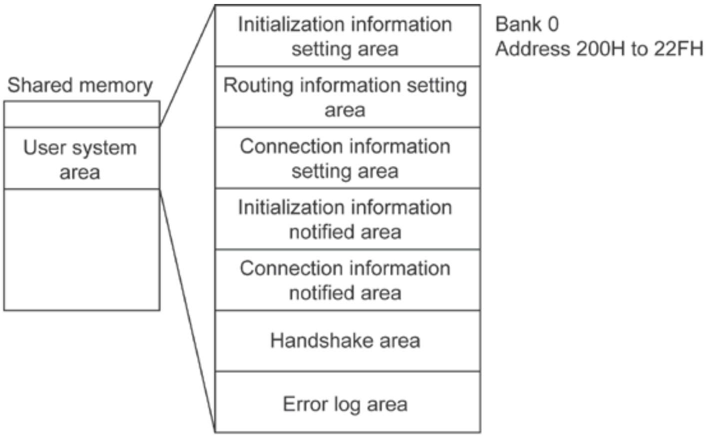
No.	Description	No.	Description
X0	Receive notified signal (Connection 1)	X10	Open complete signal (Connection 1)
X1	Receive complete signal (Connection 1)	X11	Open error signal (Connection 1)
X2	Transmission complete signal (Connection 1)	X12	Open complete signal (Connection 2)
X3	Transmission error signal (Connection 1)	X13	Open error signal (Connection 2)
X4	Receive notified signal (Connection 2)	X14	Open complete signal (Connection 3)
X5	Receive complete signal (Connection 2)	X15	Open error signal (Connection 3)
X6	Transmission complete signal (Connection 2)	X16	Open complete signal (Connection 4)
X7	Transmission error signal (Connection 2)	X17	Open error signal (Connection 4)
X8	Receive notified signal (Connection 3)	X18	Open complete signal (Connection 5)
X9	Receive complete signal (Connection 3)	X19	Open error signal (Connection 5)
XA	Transmission complete signal (Connection 3)	X1A	Open complete signal (Connection 6)
XB	Transmission error signal (Connection 3)	X1B	Open error signal (Connection 6)
XC	Initialization complete signal	X1C	Open complete signal (Connection 7)
XD	Initialization error signal	X1D	Open error signal (Connection 7)
XE		X1E	Open complete signal (Connection 8)
XF	Error log notified complete signal	X1F	Open error signal (Connection 8)

Output (Contact numbers indicate the numbers when installed in slot no. 0)

No.	Description	No.	Description
Y20	Receive request signal (Connection 1)	Y30	Open request signal (Connection 1)
Y21		Y31	
Y22	Transmission request signal (Connection 1)	Y32	Open request signal (Connection 2)
Y23		Y33	
Y24	Receive request signal (Connection 2)	Y34	Open request signal (Connection 3)
Y25		Y35	
Y26	Transmission request signal (Connection 2)	Y36	Open request signal (Connection 4)
Y27		Y37	
Y28	Receive request signal (Connection 3)	Y38	Open request signal (Connection 5)
Y29		Y39	
Y2A	Transmission request signal (Connection 3)	Y3A	Open request signal (Connection 6)
Y2B		Y3B	
Y2C	Initialization request signal	Y3C	Open request signal (Connection 7)
Y2D		Y3D	
Y2E	Error LED flash off signal (See note.)	Y3E	Open request signal (Connection 8)
Y2F	Error log notified request signal	Y3F	

Note) If the Error LED flash off signal (Y2E) is turned on, the flashing LEDs for E1 and E2 go out. Also, while the Error LED flash off signal (Y2E) is on, the LEDs for E1 and E2 will not flash, even if a recoverable error or a warning error occurs. However, these functions are not affected by error log processing, so the error contents remain in the log.

15.3 Table of Shared Memory



(Shared memory addresses are allocated in word units.)

Initialization information setting area (Bank 0)

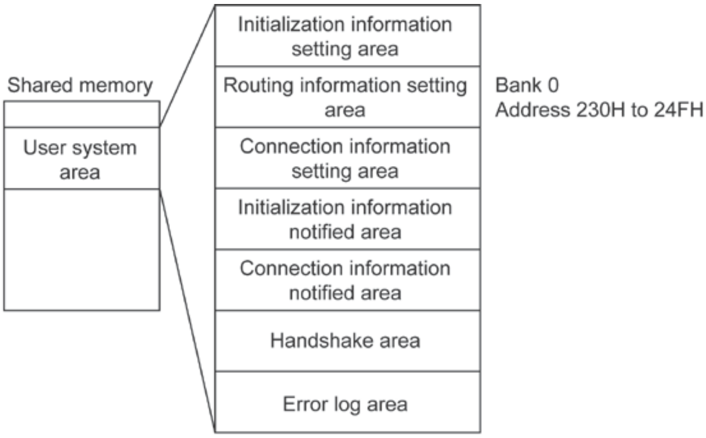
Address	Name	Default	Set value and explanation
200H	Source node IP address (L)	0000H	[Set value] Source node address - Address example: 192.168.1.1 (C0 A8 01 01H) IP address (L): 0101H IP address (H): C0A8H - Any address other than 00000000H and FFFFFFFFH is valid.
201H	Source node IP address (H)	0000H	
202H	Communication function setting between networks	0000H	[Set value] 0000H: Communication between networks not used. 0001H: Communication between networks used. - Specifies whether or not communication is carried out between networks using a router. - When communication between networks is used, the routing information setting area should also be specified.
203H	Source node MEWTOCOL station number	0000H	[Set value] 01H to 40H (01 to 64) - Specifies the MEWTOCOL station no. of the source node as a value between 01 and 64 when MEWTOCOL communication is used. - Specify a number that does not overlap that of any other station on the network. * A dummy value should be set even if MEWTOCOL communication is not being carried out.
204H	Reset request flag 1	0000H	Reset the ET-LAN unit. Write 55AAH to reset the ET-LAN unit.
205H	Reset request flag 2	0000H	Reset the ET-LAN unit. Write 55AAH to reset the ET-LAN unit.
206H	Reset complete notification	0000H	When the ET-LAN unit has been reset, 90FFH is set in this area.
207H	Reserved (Used by the system.)	-	When any value is written, it should be 0000H.

Address	Name	Default	Set value and explanation
208H	No communication connection time type	0000H	Set the base time for the no communication connection detection timer value. 0000H : x 2 minutes Other than 0000H : x 6 seconds
209H	No communication connection detection timer value	0000H	Setting time = [Setting value (1 - FFFFH)] x [Base time] - Set the time to detect a no-communication state after connection establishment. - The setting value of the above 208H is used as the base time. - When the setting value is larger than 0064H, in case of x 2 minutes : 200 minutes in case of x 6 seconds : 10 minutes
20AH	TCP ULP (packet existence duration)	000FH [30 seconds]	Setting time = [Set value (1 to FFFFH)] x 2 seconds - With TCP, this specifies the time that a packet exists when data transmission, etc. is carried out.
20BH	TCP zero-window timer value	0005H [10 seconds]	Setting time = [Set value (1 to FFFFH)] x 2 seconds - With TCP, this specifies the time until the receive window size check packet is re-sent when the receive window size of the other node becomes 0.
20CH	TCP re-transmission timer value	0005H [10 seconds]	Setting time = [Set value (1 to FFFFH)] x 2 seconds - With TCP, this specifies the time until data is re-sent if ACK is not sent by the other node, when data transmission, etc. is carried out.
20DH	TCP closed timer value	0001H [2 seconds]	Setting time = [Set value (1 to FFFFH)] x 2 seconds - This specifies the time waited until open processing is carried out when the same port is being re-opened, when TCP close processing is done by the source node.
20EH	IP assembling timer value	000FH [30 seconds]	Setting time = [Set value (1 to FFFFH)] x 2 seconds - This specifies the time waited for the next portion of data when data split by the IP is being received.
20FH	Reserved (Used by the system.)	-	When any value is written, it should be 0000H.

Address	Name		Default	Set value and explanation
210H	Receiving buffer starting address for transparent communication (Connection 1)		2800H	[Set value] First address in receive buffer. - The first address of the receive buffer is specified using the absolute address (word address) of the shared memory when transparent communication is being carried out among the various connections. - 0000H is set when this is not being used.
211H	Receiving buffer size for transparent communication (Connection 1)		0400H	[Set value] Size of receive buffer. - The size of the receive buffer is specified in word units when transparent communication is being carried out among the various connections. - FFFFH is set when this is not being used.
212H	Transmission buffer starting address for transparent communication (Connection 1)		2C00H	[Set value] First address in transmission buffer. - The first address of the transmission buffer is specified using the absolute address (word address) of the shared memory when transparent communication is being carried out among the various connections. - 0000H is set when this is not being used.
213H	Transmission buffer size for transparent communication (Connection 1)		0400H	[Set value] Size of transmission buffer. - The size of the transmission buffer is specified in word units when transparent communication is being carried out among the various connections. - FFFFH is set when this is not being used.
214H	Connection 2	Receiving buffer starting address for transparent communication	3000H	- The first address in each buffer should be specified using 2800H to 3FFFH (word address). - See address “210H to 213H”.
215H		Receiving buffer size for transparent communication	0400H	
216H		Transmission buffer starting address for transparent communication	3400H	
217H		Transmission buffer size for transparent communication	0400H	
218H	Connection 3	Receiving buffer starting address for transparent communication	3800H	
219H		Receiving buffer size for transparent communication	0400H	
21AH		Transmission buffer starting address for transparent communication	3C00H	
21BH		Transmission buffer size for transparent communication	0400H	

Address	Name		Default	Set value and explanation
21CH	Connection 4	Receiving buffer starting address for transparent communication	FFFFH	- The first address in each buffer should be specified using 2800H to 3FFFH (word address). - See address “210H to 213H”.
21DH		Receiving buffer size for transparent communication	0000H	
21EH		Transmission buffer starting address for transparent communication	FFFFH	
21FH		Transmission buffer size for transparent communication	0000H	
220H	Connection 5	Receiving buffer starting address for transparent communication	FFFFH	
221H		Receiving buffer size for transparent communication	0000H	
222H		Transmission buffer starting address for transparent communication	FFFFH	
223H		Transmission buffer size for transparent communication	0000H	
224H	Connection 6	Receiving buffer starting address for transparent communication	FFFFH	
225H		Receiving buffer size for transparent communication	0000H	
226H		Transmission buffer starting address for transparent communication	FFFFH	
227H		Transmission buffer size for transparent communication	0000H	
228H	Connection 7	Receiving buffer starting address for transparent communication	FFFFH	
229H		Receiving buffer size for transparent communication	0000H	
22AH		Transmission buffer starting address for transparent communication	FFFFH	
22BH		Transmission buffer size for transparent communication	0000H	
22CH	Connection 8	Receiving buffer starting address for transparent communication	FFFFH	
22DH		Receiving buffer size for transparent communication	0000H	
22EH		Transmission buffer starting address for transparent communication	FFFFH	
22FH		Transmission buffer size for transparent communication	0000H	

Routing information setting area (Bank 0)



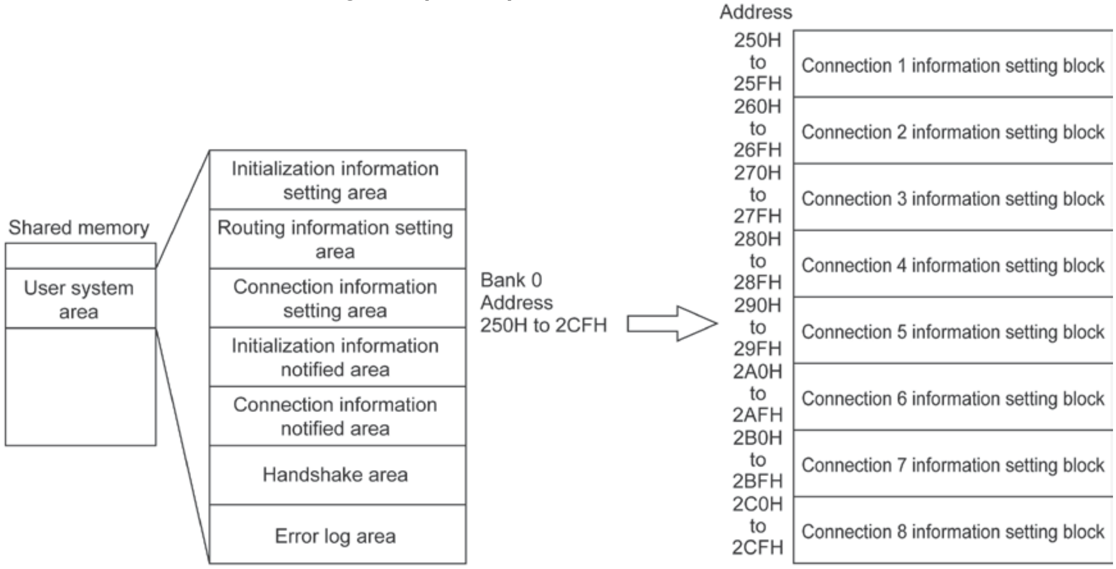
(Shared memory addresses are allocated in word units.)

Address	Name	Default	Set value and explanation
230H	Network (subnetwork) masking (L)	0000H	FF000000H to FFFFFFFCH: Field value that determines network address or subnetwork address. - The network (subnetwork) mask is a value that sets the 32-bit network address used as the IP address and the bit used for the subnetwork address to “1”. Example: FF000000H: For a Class A network 1111 1111 0000 0000 0000 0000 0000 0000 FFC00000H: When 2 bits are used for a Class A network 1111 1111 1100 0000 0000 0000 0000 0000 FFFF0000H: For a Class B network 1111 1111 1111 1111 0000 0000 0000 0000 FFFFF000H: When 4 bits are used for a Class B subnetwork 1111 1111 1111 1111 1111 0000 0000 0000 FFFFFF00H: For a Class C network 1111 1111 1111 1111 1111 1111 0000 0000 FFFFFFE0H: When 3 bits are used for a Class C subnetwork 1111 1111 1111 1111 1111 1111 1110 0000 - An error occurs if FFFFFFFDH or higher is specified. - The network (subnetwork) address is the address that results from the logical AND of the IP address for a source node and the network (subnetwork) mask, in the same class and with the same network address. Example: If the source node IP address is 59010201H: - When FF000000H is specified for the network mask, 59000000H will be the network address (Class A network). - When FFFF0000H is specified for the subnetwork mask, 59010000H will be the subnetwork address (Class B network).
231H	Network (subnetwork) masking (H)	0000H	

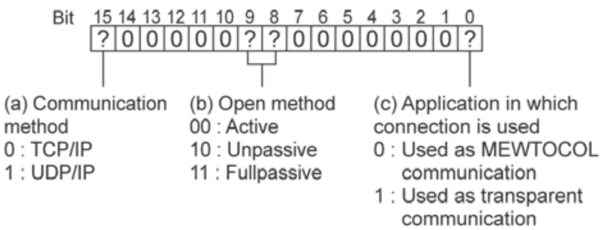
Address	Name	Default	Set value and explanation
232H	Default router (Gateway) IP address (L)	0000H	[Set value] Default router (gateway) IP address - This is effective as long as the network (subnetwork) mask field is anything other than 0. - If the default router (gateway) IP address has been set, communication will be carried out through the default router (gateway) without an error occurring even if the class, network address, or subnetwork address is different from that of the partner node. - The network (subnetwork) address for the default router (gateway) IP address must be identical to the network (subnetwork) address for the source node IP address. If they are different, an error will occur. - 00000000H and FFFFFFFFH will cause errors to occur.
233H	Default router (Gateway) IP address (H)	0000H	
234H	Number of registering router	0000H	[Set value] 0 to 5 - This specifies the number of routers used on the source network. - The default router (gateway) is not included in the number of registered routers. - This is effective as long as the network (subnetwork) mask field is anything other than 0. - Any value higher than 5 will be treated as 5. - The number of network addresses and router IP addresses registered should not exceed the number specified here.
235H	Router 1 network (subnetwork) address (L)	0000H	[Set value] Network (subnetwork) address of partner node - This specifies the network (subnetwork) address for an adjacent network connected through the router. - 00000000H and FFFFFFFFH will cause errors to occur.
236H	Router 1 network (subnetwork) address (H)	0000H	
237H	Router 1 Router IP address (L)	0000H	[Set value] Router IP address - The network (subnetwork) address for the router address must be identical to the network (subnetwork) address for the source node IP address. If they are different, an error will occur. - 00000000H and FFFFFFFFH will cause errors to occur.
238H	Router 1 Router IP address (H)	0000H	

Address	Name		Default	Set value and explanation
239H	Router 2	Network (subnetwork) address (L)	0000H	Refer to address “235H to 238H”
23AH		Network (subnetwork) address (H)		
23BH		Router IP address (L)		
23CH		Router IP address (H)		
23DH	Router 3	Network (subnetwork) address (L)	0000H	
23EH		Network (subnetwork) address (H)		
23FH		Router IP address (L)		
240H		Router IP address (H)		
241H	Router 4	Network (subnetwork) address (L)	0000H	
242H		Network (subnetwork) address (H)		
243H		Router IP address (L)		
244H		Router IP address (H)		
245H	Router 5	Network (subnetwork) address (L)	0000H	
246H		Network (subnetwork) address (H)		
247H		Router IP address (L)		
248H		Router IP address (H)		
249H	Reserved (Used by the system.) If any value is written to these, it should be 0000H.			
24AH				
24BH				
24CH				
24DH				
24EH				
24FH				

Connection information setting area (Bank 0)

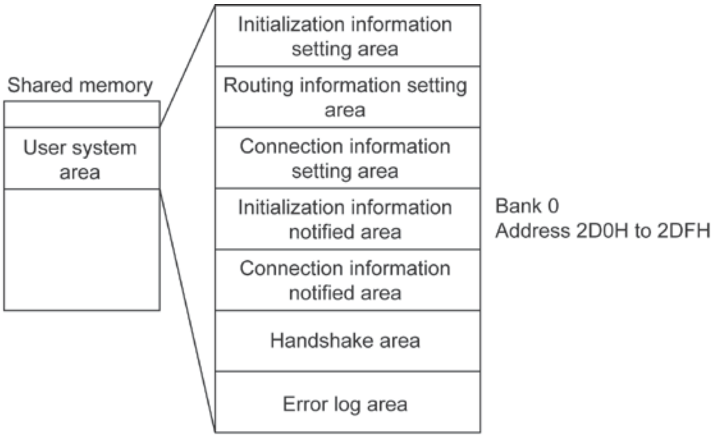


(Shared memory addresses are allocated in word units.)

Offset address	**Name**	**Default**	**Set value and explanation**
0	Setting area for application being used (connections 1 to 8)	0000H	[Set value] 1-word data that sets the communication conditions for the various connections as bit information.  (a) Communication method Specify whether the communication method for each connection is TCP/IP or UDP/IP. When using the data transfer function, always set TCP/IP. (b) Opening method This is valid only when TCP/IP was specified as the communication method. Active open: Connection is actively established. Fullpassive open: System waits for reception from a specified partner node in order to establish a connection. Unpassive open: System waits for reception from an unspecified partner node in order to establish a connection. (c) Application in which connection is used When using computer linking or data transfer, set “0: MEWTOCOL communication”. When using transparent communication, set “1: Transparent communication”.

Offset address	Name	Default	Set value and explanation
1	Source node port No. (connections 1 to 8)	0000H	[Set value] TCP or UDP communication process port number. - Set any port number other than 0H (a value of 1025 (401H) or higher is recommended).
2	Partner node IP address (L). (connections 1 to 8)	0000H	[Set value] Partner node IP address When using TCP Fullpassive and Active open: Specify an IP address for the partner node that is in the same class, and is other than 0H or FFFFFFFFH. When using UDP: Use an IP address for the partner node that is in the same class, and is other than 0H. When using TCP Unpassive open: No address needs to be specified.
3	Partner node IP address (H). (connections 1 to 8)	0000H	
4	Partner node port No. (connections 1 to 8)	0000H	[Set value] Partner node port number - Set any port number other than 0H (a value of 1025 (401H) or higher is recommended). - This is not necessary when using TCP Unpassive open.
5	Partner node MEWTOCOL station number (connections 1 to 8)	0000H	[Set value] 1 to 64 - Set the station number of the partner node when MEWTOCOL communication is being carried out. - Avoid duplicating the number of another station on the network. - This is ignored if MEWTOCOL communication is not being used.
6 (lower word)	Partner node Ethernet address (connections 1 to 8)	0000H	[Set value] Ethernet address of partner node - When using TCP Active open, if the partner node has no ARP function, specify this. Example: When 1.2.3.4.5.6 is set, the offset addresses will be: 6 0506H 7 0304H 8 0102H - When "0" or "FFFFFFFFFFFFH" is specified for this value, processing will be carried out as though the partner node has an ARP function.
7		0000H	
8 (higher word)		0000H	
9	Reserved (Used by the system.) When any value is written to these, it should be 0000H.		
A			
B			
C			
D	Receive request data size (connections 1 to 8)	0000H	[Set value] Receive request data size (in byte units) - This is specified when data is being received in transparent communication. No receive notification is made until data equal to the specified size has been received. - If "FFFFH" is specified, direct reception is carried out (the receive complete signal goes on each time a packet is received). - Specify a size such that the receive request data size is less than or equal to the size of the receive buffer x 2.
E	Reserved (Used by the system.) When any value is written to these, it should be 0000H.		
F	Transmission request data size (connections 1 to 8)	0000H	[Set value] Transmission request data size (in byte units) - When data is being sent using transparent communication, specify the size of the data being sent in byte units. - Specify a size such that the transmission request data size is less than or equal to the size of the transmission buffer x 2.

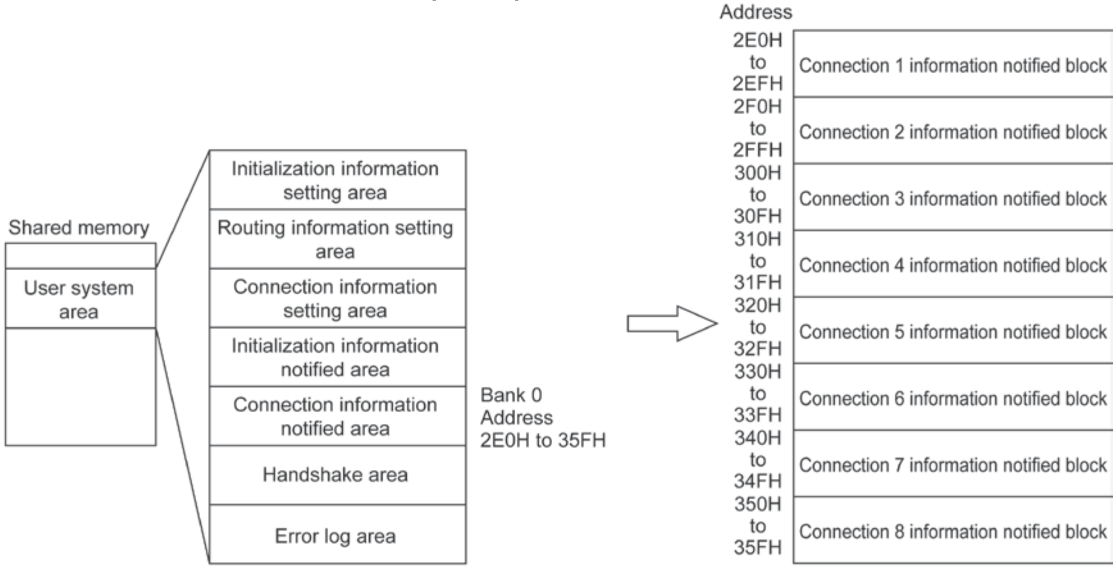
Initialization information notified area (Bank 0)



(Shared memory addresses are allocated in word units.)

Address	Name	Stored value and explanation
2D0H	Initialization processing complete code	[Stored value] 0: Initialization processing was completed successfully. Other than 0: Error code (Initialization processing ended in an error)
2D1H	Source node IP address (L)	[Stored value] Source node IP address when initialization processing was completed successfully. - The written value is the source node address in the initialization information setting area. - The value is not valid until initialization processing has been completed successfully.
2D2H	Source node IP address (H)	
2D3H	Communication function setting between networks	[Stored value] 0: Communication function setting between networks is not used. 1: Communication function setting between networks is used. - The value is not valid until initialization processing has been completed successfully.
2D4H	Source node MEWTOCOL station number	[Stored value] Source node MEWTOCOL station number when initialization processing was completed successfully. - The written value is the source node MEWTOCOL station number in the initialization information setting area. - The value is not valid until initialization processing has been completed successfully.
2D5H (lower word)	Source node Ethernet address (48 bits)	[Stored value] Source node Ethernet address in the EEPROM Example: When 1.2.3.4.5.6 has been set: 2D5H 0506H 2D6H 0304H 2D7H 0102H - The value is not valid until initialization processing has been completed successfully.
2D6H		
2D7H (higher word)		
2D8H	Reserved (Used by the system.)	
2D9H		
2DAH		
2DBH		
2DCH		
2DDH		
2DEH		
2DFH		

Connection information notified area (Bank 0)

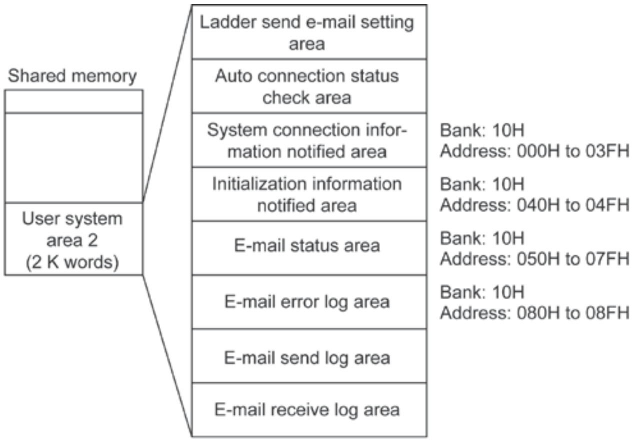


(Shared memory addresses are allocated in word units.)

Offset address

Offset address	Name	Stored value and explanation
0	Open processing complete code (connections 1 to 8)	[Stored value] 0: Open processing has been completed successfully. Other than 0: Error code (when open processing ended in an error) - If re-open processing is carried out, the results are overwritten. - Error codes are also stored in the error log area.
1	Source node port No. (connections 1 to 8)	[Stored value] Source node port numbers for various connections after open processing has been completed. - The value is not valid until open processing has been completed successfully.
2	Partner node IP address (L) (connections 1 to 8)	[Stored value] Partner node IP addresses for various connections after open processing has been completed. - The value is not valid until open processing has been completed successfully.
3	Partner node IP address (H) (connections 1 to 8)	
4	Partner node port No. (connections 1 to 8)	[Stored value]Partner node IP port numbers for various connections after open processing has been completed. - The value is not valid until open processing has been completed successfully.
5	Partner node MEWTOCOL station No. (connections 1 to 8)	[Stored value] Partner node MEWTOCOL station numbers for various connections after open processing has been completed. - The value is not valid until open processing has been completed successfully.
6 to 9	Reserved (Used by the system.)	

Offset address	Name	Stored value and explanation
A	Transparent receive processing complete code (connections 1 to 8)	[Stored value] 0: Receive processing completed normally. Other than 0: Error code (when the receive processing ended in an error) - Result is overwritten when receive processing is done again. - The error code is stored in the error log area.
B	Transparent receive unnotified data size (connections 1 to 8)	[Stored value] Size of the transparent received data remaining in the ET-LAN unit (in bytes). - Receive processing for this amount of data will finish normally and receive requests accepted even if the connection is closed.
C	Transparent receive unnotified data size copy (connections 1 to 8)	[Stored value] Copy of the size of the transparent received data remaining in the ET-LAN unit (in bytes). - The same value as the transparent receive unnotified data size above is stored. - If the two values match, the size of the transparent receive data will be fixed, so after they match, send a receive request using this value.
D	Transparent receive notified data size (connections 1 to 8)	[Stored value] Size of the data actually received for the receive request in transparent communication (in byte units) - It is not possible for this value to be notified as exceeding the receive request data size. - When the connection has been closed, receive processing may end in some cases even if the receive request data size has not been satisfied. If this happens, this value is notified as being less than the receive request data size.
E	Transparent transmission processing complete code (connections 1 to 8)	[Stored value] 0: Transmission processing has been completed successfully. Other than 0: Error code (when transmission processing ended in an error) - When transmission processing is carried out again, the results are overwritten. - Error codes are also stored in the error log area.
F	Transparent transmission complete data size (connections 1 to 8)	[Stored value] Size of the data actually sent to the partner node for the transmission request in transparent communication (in byte units) - It is not possible for this value to be notified as exceeding the transmission request data size. - If the connection has been closed by the partner node during the transmission, the transmission may be aborted. If this happens, this value is notified as being less than the transmission request data size. - If close processing is requested by the source node during the transmission, the transmission processing is carried out first, and then close processing is carried out. - Even if the transmission processing ends in an error for some reason, transmission processing of the size of data corresponding to this value is completed normally.



(Shared memory addresses are allocated in word units.)

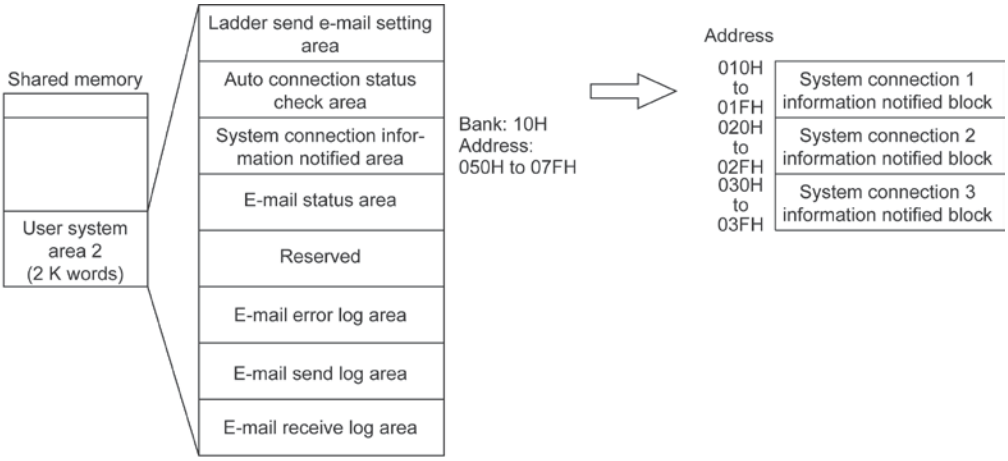
Ladder send e-mail setting area (Bank: 10H)

Address	Name	Default	Set value/Explanation
000H	Destination address 1 (For “To”) (Address Nos. 1 to 17)	0000H	[Default] 0 to FFFFH Nos. of the destination addresses (for “To”, “Cc”, and “Bcc”) which are registered in the Address Book by means of Configurator ET can be specified. In this process, bit data is used. Example: When sending e-mails to the Nos. 1 and 6 addresses registered in the Address Book: Destination address 1 (For “To”, Address: 000H) Bit F E D C B A 9 8 7 6 5 4 3 2 1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 1 Registered No. 6 Registered No. 1 - To send e-mails using the ladder program, set the default to the value other than “0H” for either Destination address 1 (For “To”) or Destination address 2 (For “To”). - This setting is not required for the destination addresses “Cc” and “Bcc”.
001H	Destination address 2 (For “To”) (Address Nos. 17 to 32)	0000H	
002H	Destination address1 (For “Cc”) (Address Nos. 1 to 16)	0000H	
003H	Destination address 2 (For “Cc”) (Address Nos. 17 to 32)	0000H	
004H	Destination address 1 (For “Bcc”) (Address Nos. 1 to 16)	0000H	
005H	Destination address 2 (For “Bcc”) (Address Nos. 17 to 32)	0000H	
006H	Message No.	0000H	[Default] 0H [Set value] 1H to the numbers that are registered as e-mail messages using Configurator ET - The e-mail message that you wish to send using the ladder program is specified. - The e-mail message No. registered using Configurator ET is specified.
007H	Signature No.	0000H	[Default] 0H [Set value] 0 to 5H - The signature which is attached to the e-mail message using the ladder program is specified. - The fixed signature is determined as No. 5. Other signatures than the fixed one registered using Configurator ET are determined as Nos.1, 2, 3, and 4 from the first one. When “0” is specified, a signature is not attached to the e-mail.
008H	Reserved (Used in the system.) If necessary, write “0000H”.		
009H			
00AH			
00BH			
00CH			
00DH			
00EH			
00FH			

- Auto connection status check area (Bank: 10H)

Address	Name	Explanation
040H	Auto connection function status	0: Auto connection function is invalid. 1: Auto connection function is valid.
041H	Normal connections 1 to 8 Open processing setting procedure	0: Setup tool setting is valid. (Ladder program setting is invalid.) 1: Ladder setting is valid. (Setup tool setting is invalid.)
042H	System connection 1 status (SC1)	0: Open processing wait status 1: Open processing has been completed. 2: Connection is ongoing. FF: Open processing has been ended in error.
043H	System connection 2 status (SC2)	0: Open processing wait status 1: Open processing has been completed. 2: Connection is ongoing. FF: Open processing has been ended in an error.
044H	System connection 3 status (SC3)	0: Open processing wait status 1: Open processing has been completed. 2: Connection is on going. FF: Open processing has been ended in an error.
045H to 04FH	Reserved	Reserved (Used in the system.)

System connection information notified area (Bank: 10H)



(Shared memory addresses are allocated in word units.)

System connection information notified block (Bank: 010H, Addresses 010H to 03FH)

Offset address	Name	Stored value/Explanation
0	Open processing complete code (System connections 1 to 3)	[Stored value] 0: Auto open processing has been completed successfully. Other than 0: Error code (when auto open processing ended in an error.) - Error logs are also stored in the error log area.
1	Source node port No. (System connections 1 to 3)	[Stored value] Source node port numbers for various connections
2	Destination node IP address (L) (System connections 1 to 3)	[Stored value] Destination node IP addresses for various connections after auto open processing has been completed. - The value is not entered until auto open processing has been successfully completed.
3	Destination node IP address (H) (System connections 1 to 3)	
4	Destination node port No. (System connections 1 to 3)	[Stored value] Destination node IP port numbers for various connections after auto open processing has been completed. - The value is not entered until auto open processing has been completed successfully.
5	Destination node MEWTOCOL station number (System connections 1 to 3)	[Stored value] Destination node MEWTOCOL station numbers for various connections after auto open processing has been completed. - The value is not entered until auto open processing has been completed successfully.
6	Connection closing time (min.)	[Stored value] Connection is closed when no communication is performed during the time specified here. - The set value is written.
7	Reserved	Reserved.
8	Communication method (System connections 1 to 3)	Refer to 10.2.4 “Reading system connection information settings” of this manual.
9 to F	Reserved	Reserved.

Note) Only when the auto connection function is valid, the information can be stored in the system connection information notified block.

E-mail status area (Bank: 10H)

Address	Name	Description
080H	Number of e-mail send complete times	− The number of times that e-mails have been sent normally is stored. − The value is reset to “0” when the initialization processing is executed or the e-mail setting is changed.
081H	Number of e-mail send error times	- The number of times that e-mails have not been sent normally is stored. - The value is reset to “0” when the initialization processing is executed or the e-mail setting is changed.
082H	E-mail re-send status	- E-mail re-send status - “1” is stored when the e-mail re-send processing is being executed. When the re-send processing is completed, “0” is stored.
083H to 087H	Reserved (Used in the system.)	
088H	Number of e-mail receive check times	- The number of times that the e-mail check is conducted to the e-mail server is stored. - The value is reset to “0” when the initialization processing is executed or the e-mail setting is changed.
089H	Number of e-mail receive check error times	- The number of errors issued when the e-mail check is conducted is stored. - The value is reset to “0” when the initialization processing is executed or the e-mail setting is changed.
08AH	Number of e-mail receive complete times	- The number of times that e-mails have been received successfully is stored. - The value is reset to “0” when the initialization processing is executed or the e-mail setting is changed.
08BH	Number of e-mail receive error times	- The number of errors occurred when e-mails are received is stored. (The errors include the ones occurred in Mail Filter and Request Mail Password check processing.) - The value is reset to “0” when the initialization processing is executed or the e-mail setting is changed.
08CH to 08FH	Reserved (Used in the system.)	

Handshake area

Complete signal area (Bank: 0)

Address		Description
360H	bit 0	Receive notified signal (Connection 1)
	bit 1	Receive complete signal (Connection 1)
	bit 2	Send complete signal (Connection 1)
	bit 3	Send error signal (Connection 1)
	bit 4	Receive notified signal (Connection 2)
	bit 5	Receive complete signal (Connection 2)
	bit 6	Receive complete signal (Connection 2)
	bit 7	Send error signal (Connection 2)
	bit 8	Receive notified signal (Connection 3)
	bit 9	Receive complete signal (Connection 3)
	bit A	Send complete signal (Connection 3)
	bit B	Send error signal (Connection 3)
	bit C	Initialization complete signal
	bit D	Initialization error signal
	bit E	
	bit F	Error log notified complete signal
361H	bit 0	Open complete signal (Connection 1)
	bit 1	Open error signal (Connection 1)
	bit 2	Open complete signal (Connection 2)
	bit 3	Open error signal (Connection 2)
	bit 4	Open complete signal (Connection 3)
	bit 5	Open error signal (Connection 3)
	bit 6	Open complete signal (Connection 4)
	bit 7	Open error signal (Connection 4)
	bit 8	Open complete signal (Connection 5)
	bit 9	Open error signal (Connection 5)
	bit A	Open complete signal (Connection 6)
	bit B	Open error signal (Connection 6)
	bit C	Open complete signal (Connection 7)
	bit D	Open error signal (Connection 7)
	bit E	Open complete signal (Connection 8)
	bit F	Open error signal (Connection 8)
362H	bit 0	E-mail receive complete signal
	bit 1	E-mail receive error signal
	bit 2	E-mail send complete signal
	bit 3	E-mail send error signal
	bit 4	E-mail log notified complete signal
	bit 5	E-mail error log notified complete signal
	bit 6 to bit F	Reserved

Expanded complete signal area (Bank: 0)

Address		Description
364H	bit 0	Receive notified signal (Connection 1)
	bit 1	Receive complete signal (Connection 1)
	bit 2	Send complete signal (Connection 1)
	bit 3	Send error signal (Connection 1)
	bit 4	Receive notified signal (Connection 2)
	bit 5	Receive complete signal (Connection 2)
	bit 6	Receive complete signal (Connection 2)
	bit 7	Send error signal (Connection 2)
	bit 8	Receive notified signal (Connection 3)
	bit 9	Receive complete signal (Connection 3)
	bit A	Send complete signal (Connection 3)
	bit B	Send error signal (Connection 3)
	bit C	Receive notified signal (Connection 4)
	bit D	Receive complete signal (Connection 4)
	bit E	Send complete signal (Connection 4)
	bit F	Send error signal (Connection 4)
365H	bit 0	Receive notified signal (Connection 5)
	bit 1	Receive complete signal (Connection 5)
	bit 2	Send complete signal (Connection 5)
	bit 3	Send error signal (Connection 5)
	bit 4	Receive notified signal (Connection 6)
	bit 5	Receive complete signal (Connection 6)
	bit 6	Receive complete signal (Connection 6)
	bit 7	Send error signal (Connection 6)
	bit 8	Receive notified signal (Connection 7)
	bit 9	Receive complete signal (Connection 7)
	bit A	Send complete signal (Connection 7)
	bit B	Send error signal (Connection 7)
	bit C	Receive notified signal (Connection 8)
	bit D	Receive complete signal (Connection 8)
	bit E	Send complete signal (Connection 8)
	bit F	Send error signal (Connection 8)
366H	bit 0	Receive error signal (Connection 1)
	bit 1	Receive error signal (Connection 2)
	bit 2	Receive error signal (Connection 3)
	bit 3	Receive error signal (Connection 4)
	bit 4	Receive error signal (Connection 5)
	bit 5	Receive error signal (Connection 6)
	bit 6	Receive error signal (Connection 7)
	bit 7	Receive error signal (Connection 8)
	bit 8	No communication time-out signal (Connection 1)
	bit 9	No communication time-out signal (Connection 2)
	bit A	No communication time-out signal (Connection 3)
	bit B	No communication time-out signal (Connection 4)
	bit C	No communication time-out signal (Connection 5)
	bit D	No communication time-out signal (Connection 6)
	bit E	No communication time-out signal (Connection 7)
	bit F	No communication time-out signal (Connection 8)

Note: The same signal (e.g. 360H bit 0 and 364H bit 0 Receive notified signal (Connection 1)) can be used in both the signal complete area and the expanded complete signal area. It does not matter which signal is used in which area.

Request signal area (Bank: 0)

Address		Description
368H	bit 0	Receive request signal (Connection 1)
	bit 1	
	bit 2	Send request signal (Connection 1)
	bit 3	
	bit 4	Receive request signal (Connection 2)
	bit 5	
	bit 6	Send request signal (Connection 2)
	bit 7	
	bit 8	Receive request signal (Connection 3)
	bit 9	
	bit A	Send request signal (Connection 3)
	bit B	
	bit C	Initialization request signal
	bit D	
	bit E	ERR. LED flash off signal Note)
	bit F	Error log notified request signal
369H	bit 0	Open request signal (Connection 1)
	bit 1	
	bit 2	Open request signal (Connection 2)
	bit 3	
	bit 4	Open request signal (Connection 3)
	bit 5	
	bit 6	Open request signal (Connection 4)
	bit 7	
	bit 8	Open request signal (Connection 5)
	bit 9	
	bit A	Open request signal (Connection 6)
	bit B	
	bit C	Open request signal (Connection 7)
	bit D	
	bit E	Open request signal (Connection 8)
	bit F	
36AH	bit 0	E-mail receive request signal
	bit 1	
	bit 2	E-mail send request signal
	bit 3	
	bit 4	E-mail log notified request signal
	bit 5	E-mail error log notified request signal
	bit 6 to bit F	Reserved

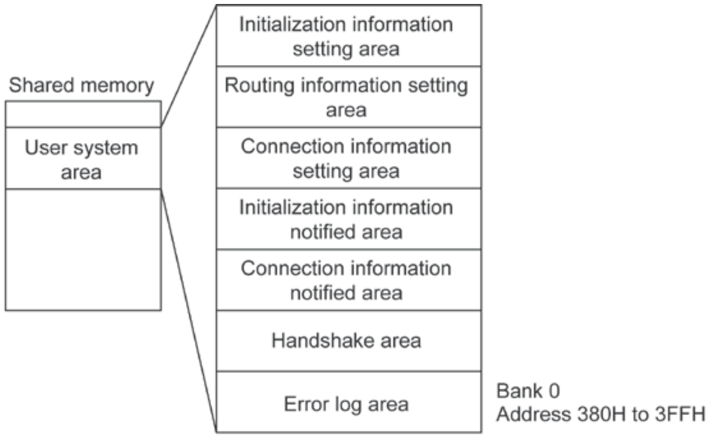
Expanded request signal area (Bank: 0)

Address		Description
36CH	bit 0	Receive request signal (Connection 1)
	bit 1	
	bit 2	Send request signal (Connection 1)
	bit 3	
	bit 4	Receive request signal (Connection 2)
	bit 5	
	bit 6	Send request signal (Connection 2)
	bit 7	
	bit 8	Receive request signal (Connection 3)
	bit 9	
	bit A	Send request signal (Connection 3)
	bit B	
	bit C	Receive request signal (Connection 4)
	bit D	
	bit E	Send request signal (Connection 4)
	bit F	
36DH	bit 0	Receive request signal (Connection 5)
	bit 1	
	bit 2	Send request signal (Connection 5)
	bit 3	
	bit 4	Receive request signal (Connection 6)
	bit 5	
	bit 6	Send request signal (Connection 6)
	bit 7	
	bit 8	Receive request signal (Connection 7)
	bit 9	
	bit A	Send request signal (Connection 7)
	bit B	
	bit C	Receive request signal (Connection 8)
	bit D	
	bit E	Send request signal (Connection 8)
	bit F	

Note:

- The same signal (e.g. 360H bit 0 and 364H bit 0 Receive notified signal (Connection 1)) can be used in both the signal complete area and the expanded complete signal area. It does not matter which signal is used in which area.
- If the ERR. LED flash off signal (368H bit E) is turned ON, flashing of the LEDs for E1 and E2 turns off. Also, while the ERR.LED flashing off signal (368H bit E) is ON, the LEDs for E1 and E2 will not flash even if a recoverable error or a warning error occurs. However, these functions are not affected by error log processing, so the error contents remain in the log.

Error log area (Bank 0)



(Shared memory addresses are allocated in word units.)

<table>
<tr><th>Address</th><th>Name</th><th>Explanation</th></tr>
<tr><td>380H</td><td>Log mode</td><td>[Set value] [Default: 0003H]
The recorded error differs depending on the set value.
A: Available N/A: Not available
<table>
<tr><th>Set value</th><th>0</th><th>1</th><th>2</th><th>3</th></tr>
<tr><td>System error</td><td>A</td><td>A</td><td>A</td><td>A</td></tr>
<tr><td>Recovery possible error</td><td>N/A</td><td>A</td><td>A</td><td>A</td></tr>
<tr><td>Warning error</td><td>N/A</td><td>N/A</td><td>A</td><td>A</td></tr>
<tr><td>Access error</td><td>N/A</td><td>N/A</td><td>N/A</td><td>A</td></tr>
</table></td></tr>
<tr><td>381H</td><td>Log block reading pointer</td><td>[Set value] Offset from latest log block of log buffer [Default: 0000H]
- To read the latest log block, “0” is specified. To read the oldest log block used, “Number of log blocks used – 1” is specified (see 387H below). This value should be set such that the number of log blocks used is greater than or equal to the log reading pointer + the number of log block being read. If anything else is specified, the results will be unclear.</td></tr>
<tr><td>382H</td><td>Number of reading log block</td><td>[Set value] No. of reading blocks [Default: 0000H]
- This specifies the number of blocks up to the old block to be read from the log block reading point.
- A value of 14 or less should be set. If a value of 15 or higher is set, or if 0 is set, 14 blocks will be read.</td></tr>
<tr><td>383H
384H</td><td colspan="2">Reserved (Used by the system.)</td></tr>
<tr><td>385H</td><td>Log buffer size</td><td>[Stored value] Log buffer size available with the unit itself (number of log blocks)
[Set value: 0100H (256 blocks)]
- This is set by the unit itself when it boots.</td></tr>
<tr><td>386H</td><td>Total number of log</td><td>[Stored value] Cumulative total of log blocks recorded after initialization processing
- This is cleared to 0 when initialization processing is carried out.
- The number of logs is counted up to FFFFH (65535), but if an attempt is made to record more logs than will fit into the available buffer space, logs are overwritten, starting with the oldest.
- The number of logs will not be incremented past FFFFH (65535).</td></tr>
<tr><td>387H</td><td>Number of log blocks used</td><td>[Stored value] Current number of log blocks available for reading in log buffer
- This is cleared to 0 when initialization processing is carried out.
- The count of the number of logs used will not be incremented past the buffer size.</td></tr>
</table>

Address	Name	Explanation
388H to 38FH	Latest log block area (8 words)	[Stored value] Latest log information - The unit itself updates the contents constantly, so information can be read using the shared memory access instructions F150 (READ) and P150 (PREAD), without issuing a read request. - This is cleared to 0 when initialization processing is carried out.
390H to 3FFH	Log block reading processing area (8 words x 14 blocks)	[Stored value] Data read during lob block read processing - Up to 14 blocks are stored in the log, in the order in which the errors occurred, when a read request is issued (the error log notified request bit of the handshake area in the I/O or shared memory goes on.) - This is cleared to 0 when initialization processing is carried out.

Note1) Addresses 380H to 382H should be set before the error log notified request is issued.
Note2) The ET-LAN unit writes the latest values to addresses 385H to 38FH.
Note3) The ET-LAN unit writes values to addresses 390H to 3FFH after the error log notified request has been issued.

15.4 Table of Related Relays, Registers and Instructions

15.4.1 System Register

Item	Address	Name	Default	Description (*)
Action on error for FP2 and FP2SH	22	Operation settings when an intelligent unit error occurs	Stop	Stop/continuation
	23	Operation settings when an I/O verification error occurs	Stop	Stop/continuation
Time setting for FP2SH	29	Operation time setting for communication processing	240 μs	0 to 52428 μs The setting for this system register is effective in the RUN mode only. In the PROG. mode and “0“ setting, the allowable duration of time used for communication processing is set at 52428 μs.
	31	Multi-frame communication time settings in the computer link and communication time setting for data sending buffer.	6500 ms	10.0 to 81917.5 ms Use of default setting (6500 ms) is recommended.
	32	Tome-out tome setting for the SEND/RECV and RMRD/RMWT instructions	10000 ms	10.0 to 81917.5 ms Use of default setting (10000 ms) is recommended.
Time setting for FP2SH	31	Multi-frame communication time settings in the computer link	6500 ms	10.0 to 81900.0 ms Use of default setting (6500 ms) is recommended.
	32	Tome-out tome setting for the SEND/RECV and RMRD/RMWT instructions	2000 ms	10.0 to 81900.0 ms Use of default setting (2000 ms) is recommended.

15.4.2 Special Internal Relay

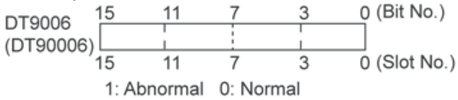
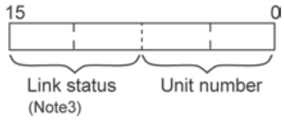
Address	Name	Description
R9003	Intelligent unit error flag	Turns on when an error occurs in an intelligent unit. The slot number where the erroneous intelligent unit is installed is stored in DT90006 or DT90007.
R9004	I/O verification error flag	Turns on when an I/O verification error occurs. The slot number of the I/O unit where the verification error was occurred is stored in DT90010 or DT90011.
R9030	SEND/RECV instruction executing flag	Monitors if CPU is in the SEND (F145) or RECV (F146) instruction executable condition as follows: OFF: None of the above mentioned instructions can be executed. ON: One of the above mentioned instructions can be executed.
R9031	SEND/RECV instruction end flag	Monitors if an abnormality has been detected during the execution of the SEND (F145)/RECV (F146) instructions as follows: OFF: No abnormality detected. ON: An abnormality detected. (Communication error) The error code is stored in DT90039.
R9055	Intelligent communication unit 1 transmission error flag (*1 and *2)	- Turns on when the Error LED lights on the intelligent communication unit. - Turns on when there is an error in the unit No. Settings.
R9056	Intelligent communication unit 2 transmission error flag (*1 and *2)	
R9057	Intelligent communication unit 3 transmission error flag (*1 and *2)	

Note1) The following units are included in the intelligent communication unit:

- ET-LAN unit
- Multi-wire link unit (MEWNET-W2 mode)

Note2) Numbered 1,2,3 starting from the slot nearest the CPU unit.

15.4.3 System Register

Register No.		Name	Description
FP3	FP10SH/ FP2/FP2SH		
DT9006	DT90006	Abnormal intelligent unit (Slot No. 0 to 15)	When an error condition is detected in an intelligent unit, the bit corresponding to the slot of the unit will be set to on. Monitor using binary display. <Example> 
DT9007	DT90007	Abnormal intelligent unit (Slot No. 16 to 31)	
DT9039	DT90039	SEND/RECV instructions end code	The error code is stored here if SEND/RECV instruction (F145, F146) was executed abnormally. When the instruction was successfully executed, „0“ is stored.
DT9195	DT90195	Intelligent communication unit 1 unit number (*1 and *2)	- The link status is stored in the higher bytes. - The unit number is stored in the lower bytes. 
DT9196	DT90196	Intelligent communication unit 2 unit number (*1 and *2)	
DT9197	DT90197	Intelligent communication unit 3 unit number (*1 and *2)	

Note1) The following units are included in the intelligent communication unit:

- ET-LAN unit
- Multi-wire link unit (MEWNET-W2 mode)

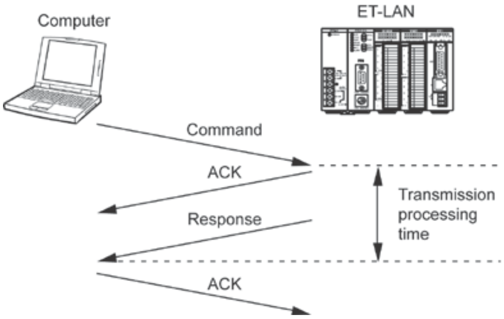
Note2) Numbered 1, 2,3 starting from the slot nearest the CPU unit.

Note3) Used by the system.

15.5 Minimum Transmission Delay Time

The minimum transmission processing time for MEWTOCOL communication and transparent communication is determined using the formulas below. This calculation serves as a general guide for the transmission time, assuming that there is one connection being used, no other nodes exist on the network, and 1:1 communication is being carried out. The actual transmission time may be longer, depending on the load ratio of the network, the transmission line environment, the number of connections being used, the system configuration, and the window size.
For the processing tome of the partner node, please refer to the instruction manual and other documentation for that particular device.

MEWTOCOL communication
This is a guide to the transmission processing time when the computer is issuing commands and the ET-LAN unit is returning responses. It indicates the time from the point that the ET-LAN unit receives the command, to when it sends the response.



Transmission processing time when using the computer link function

PLC being used	Communication processing method	Transmission processing time (calculation formula)
FP2 CPU	Read contact/data (RD/RCS command)	0.032 x no. of command and response data bytes + 4.8 + CPU scan time (ms)
	Write contact/data (WD/WCS command)	0.046 x no. of command and response data bytes + 4.3 + CPU scan time (ms)
FP2SH CPU	Read contact/data (RD/RCS command)	0.015 x no. of command and response data bytes + 8.7 + CPU scan time (ms)
	Write contact/data	0.022 x no. of command and response data bytes + 6.4 + CPU scan time (ms)

Transmission processing time when using the data transmission function

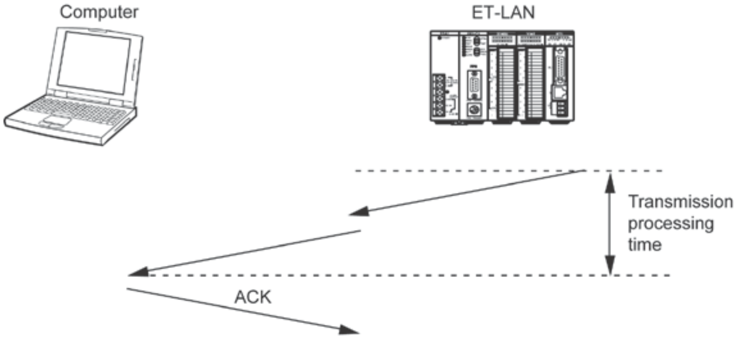
PLC being used	Communication processing method	Transmission processing time (calculation formula)
FP2 CPU	Read contact/data	0.009 x no. of command and response data bytes + 12.4 + CPU scan time (ms)
	Write contact/data	0.007 x no. of command and response data bytes + 8.5 + CPU scan time (ms)
FP2SH CPU	Read contact/data	0.013 x no. of command and response data bytes + 5.8 + CPU scan time (ms)
	Write contact/data	0.011 x no. of command and response data bytes + 4.2 + CPU scan time (ms)

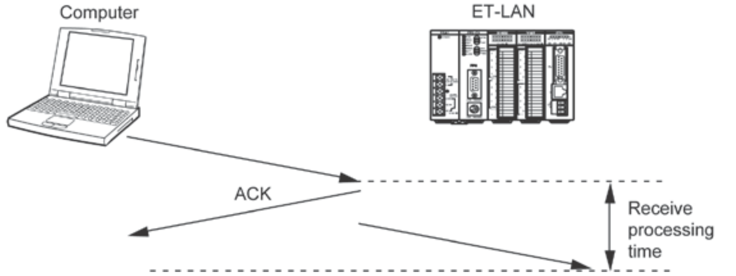
The above calculation formulas are used for both TCP/IP and UDP/IP.
The number of command data bytes and response data bytes are the total number of bytes, including the MEWTOCOL format header and all of the data.

[Example]
When using the FP2 CPU and reading 100 words of data with the computer link function (RD command), assuming a CPU scan time of 5 ms, the following would result:
Transmission processing time = 0.032 x (32 command bytes + 421 response bytes) + 4.8 + 5 (ms) = Approx. 24 (ms)

Transparent communication

The following is a guide to the transmission time when the ET-LAN unit is sending or receiving data.





When using TCP/IP:
Transmission processing time = 0.017 x no. of transmission data bytes + 8 (ms)
Receive processing time = 0.005 x no. of receive data bytes + 8 (ms)
When using UDP/IP:
Transmission processing time = 0.017 x no. of transmission data bytes + 6 (ms)
Receive processing time = 0.005 x no. of receive data bytes + 6 (ms)

The above calculation formula is used with both the FP2 CPU and the FP2SH CPU.

[Example]
When using transparent communication to send 1,000 bytes of data:
Transmission processing time = 0.017 x 1,000 bytes + 8 (ms) = 25 (ms)

Note:
The transmission processing time of MEWTOCOL communication and transparent communication gets longer with the e-mail function to perform communication processing by automatically generating MEWTOCOL in order to get the status of the CPU unit within the ET-LAN unit. Referring to the following, calculate the transmission processing time.

When using the FP2 CPU:
Transmission processing time = Minimum transmission delay time without using the e-mail function
+ 10 + 0.0025 x no. of automatically-generated MEWTOCOL bytes (ms)

When using the FP2SH CPU:
Transmission processing time = Minimum transmission delay time without using the e-mail function+ 6 + 0.0035 x no. of automatically-generated MEWTOCOL bytes (ms)

The automatically-generated MEWTOCOL is 18 bytes at minimum, and it increases according to the type or number of the obtained device.

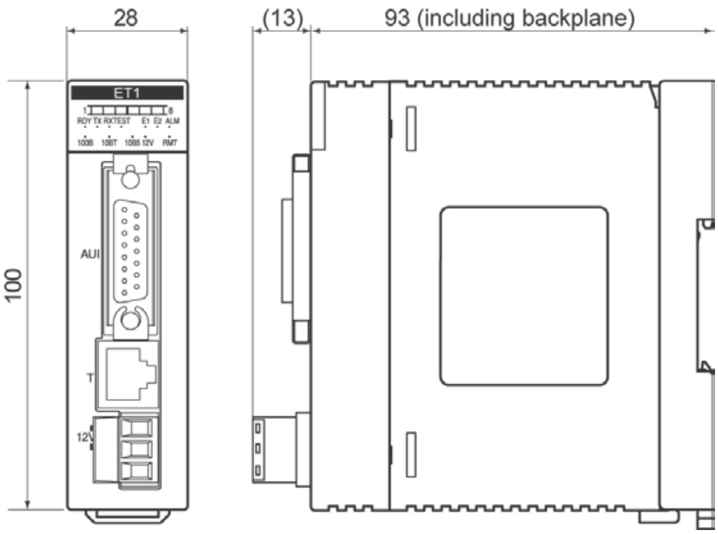
Reference: For the details of MEWTOCOL, see <14.1 MEWTOCOL-COM (Computer Link)>.

15.6 ASCII Codes

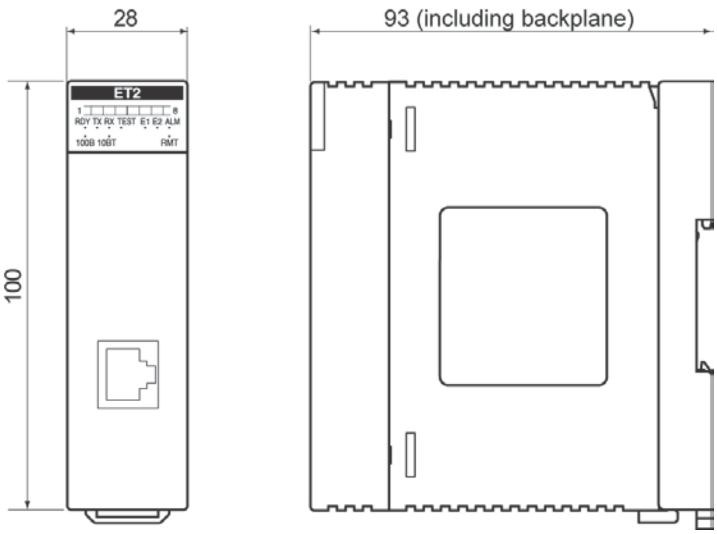
								b_7								
								b_6	0	0	0	0	1	1	1	1
								b_5	0	0	1	1	0	0	1	1
								b_4	0	1	0	1	0	1	0	1
b_7	b_6	b_5	b_4	b_3	b_2	b_1	b_0	R \ C	0	1	2	3	4	5	6	7
				0	0	0	0	0	NUL	DEL	SPACE	0	@	P	`	p
				0	0	0	1	1	SOH	DC$_1$	!	1	A	Q	a	q
				0	0	1	0	2	STX	DC$_2$	"	2	B	R	b	r
				0	0	1	1	3	ETX	DC$_3$	#	3	C	S	c	s
				0	1	0	0	4	EOT	DC$_4$	$	4	D	T	d	t
				0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u
				0	1	1	0	6	ACK	SYN	&	6	F	V	f	v
				0	1	1	1	7	BEL	ETB	'	7	G	W	g	w
				1	0	0	0	8	BS	CAN	(	8	H	X	h	x
				1	0	0	1	9	HT	EM	)	9	I	Y	i	y
				1	0	1	0	A	LF	SUB	*	:	J	Z	j	z
				1	0	1	1	B	VT	ESC	+	;	K	[	k	{
				1	1	0	0	C	FF	FS	,	<	L	¥	l	|
				1	1	0	1	D	CR	GS	-	=	M	]	m	}
				1	1	1	0	E	SO	RS	.	>	N	^	n	~
				1	1	1	1	F	SI	US	/	?	O	_	o	DEL

15.7 Dimensions

AFP2790 (FP2-ET1)



AFP27901 (FP2-ET2)



Chapter 16

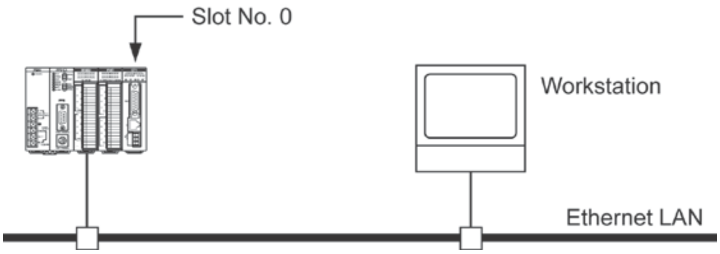
Sample Program

16.1 Sample Program

16.1.1 An Overview of the Sample Program

This is a sample program in which data is being sent and received between an ET-LAN unit and a workstation.

System configuration



Setting conditions

Items	ET-LAN unit	Workstation
IP address	192.9.210.130	If the network ID is the same as that of the ET-LAN unit, no host ID needs to be specified.
Port No.	4097	4098
MEWTOCOL station No.	01	02
Communication function	MEWTOCOL communication	
PROTOCOL	TCP/IP	
Open method	Unpassive	Active (bind → connect)

Operation overview

After a connection has been opened, the workstation uses MEWTOCOL-COM to send data to the ET-LAN unit, and writes it to the DT0 of the programmable controller.
On the programmable controller side, initialization processing and open processing of the ET-LAN unit are carried out, and „01“ is set as the MEWTOCOL station number.

Usage method

1. Compile the sample program and create the execution file.
2. Enter the RUN mode on the programmable controller side.
3. Run the sample program.
4. When the connection is successfully opened, the sample program displays the following menu and waits for input.

```
―――――― Sample Menu ――――――

   0 ... Clear DATA
   1 ... Set DATA
   E ... End Test
      Please, Push Key (0 or 1 or E)
```

5. Pressing “0” at this points writes “0H” to DT0 (check this on the programmable controller side).
6. Pressing “1” at this point writes “FFFFH” to DT0 (check this on the programmable controller side).
7. Pressing “E” at this point disconnects the line and exists the program.

16.1.2 Workstation Sample Program

The following shows an example of the “make file“ and “source file“ of the sample program run at the workstation.

make file

```
      cc  - c  - g  $<   - DBSD   - DDEVICE = "¥ie0¥"
                                           └── Specify the Ethernet device of the machine.

OBJS = fp3smp. o
fp3smp: $ (OBJS)
            cc   - 0 $ (OBJS)   - o $@
            chmod g+rwx   $@

$ (OBJS) :  $<
```

source file

```
#include          <studio. h>
#include          <errno. h>
#include          <ctype. h>
#include          <string. h>
#include          <sys/types.h>
#include          <sys/socket. h>
#include          <netdb. h>
#include          <netinet. h>


#define D_SRC_PORT      4098              /* Source node port No. */
#define D_DST_IP        "192.9.201.130"   /* Partner node IP address */
#define D_DST_PORT      4097              /* Partner node port No. */

#define MEW_DST_NO      1                 /* Partner node MEWTOCOL station number */
#define MEW_SRC_NO      2                 /* Source node MEWTOCOL station number */

#define OK              0
#define ERROR           1

struct  MEWTOCOL_stc{                           /* MEWTOCOL format */
                char FTI ;
                char padding ;                  /* Fixed 0 */
                unsigned char   datasize_L ;    /* Data size L */
                unsigned char   datasize_H ;    /* Data size H */
                unsigned char   COMorDAT ;      /* MEWTOCOL-COM or MEWTOCOL-DAT */
                unsigned char   reserved [5] ;  /* Fixed 0 */
                unsigned char   dst_rout ;      /* Destination for MEWTOCOL station number */
                unsigned char   src_rout ;      /* Source for MEWTOCOL station number */
                char          data [2048] ;     /* Data block size of MEWTOCOL format */
} ;

struct MEWTOCOL_stc     senddata, recvedate ;   /* Communication buffer */

int sno ;                                       /* Socket */
```

```
                    /* Function prototype declaration */

extern int main 0 ;
extern int MewtocolClientOpen 0 ;
extern int MewtocolSample 0 ;
extern int MewtocolSendAndReceive 0 ;
extern unsigned char BCC 0 ;

int main (argc, argv)
int argc ;
char *argv [ ] ;
{
        /* Connection is opened */
        if (MewtocolClientOpen 0  !=OK ) {
            puts ("Can't open connection!") ;
            return (ERROR) ;
        }

        /* Communication is carried out */
        MewtocolSample 0 ;

        /* Line is disconnected and processing is terminated*/
        close (sno) ;

        return (OK) ;
}
/* ================================================
   =  Connection is opened with partner node
   =  - - - - - - - - - - - - - - - - - - - - - - - - - -
   =
   = Return         OK: Opening successfully completed.
   =              ERROR: Connection could not be opened.
   =
   ================================================  */

int MewtocolClientOpen ()
{
        struct sockaddr_in SrcAddr ;          /* Information of source node */
        struct sockaddr_in DstAddr ;          /* Information of partner node */
        int err ;

        /* Socket is created */
        if ( ( sno = socket ( AF_INET , SOCK_STREAM , 0 ) ) < 0 ) {
             return ( ERROR ) ;                /* Socket cannot be created */
        }

        /* Source node address is allocated to the socket that was created */
        SrcAddr. sin_family       = AF_INET ;
        SrcAddr. sin_addr.s_addr = INADDR_ANY ;
        SrcAddr.sin_port          = htons (D_SRC_PORT) ;
        if ( ( err = bind ( sno, ( struct sockaddr * ) &SrcAddr, sizeof ( SrcAddr ) ) ) < 0 ) {
             /* Source node address cannot be allocated to the socket */
             close ( sno ) ;
             return ( ERROR )
        }
```

```
            /* Requests connection to partner node */
            DstAddr. sin_family        = AF_INET ;
            DstAddr. sin_addr.s_addr = inet_addr ( D_DST_IP ) ;
            DstAddr.sin_port           = htons (D_DST_PORT) ;
            if ( ( err = connect ( sno, ( struct sockaddr * ) &DstAddr, sizeof ( DstAddr ) ) ) < 0 ) {
                    /* Connection with partner node could not be established*/
                    close ( sno ) ;
                    return ( ERROR )
            }
            return ( OK ) ;
}

/* ==============================================
   =  After sample menu has been displayed, selection is made and processing carried out
   =  - - - - - - - - - - - - - - - - - - - - - - - - - - -
   =
   = Return         OK: Successfully completed
   =               ERROR: Error occurred, processing terminated
   =
   ==============================================  */

int MewtocolSample ()
{
LMenu:
          puts (" - - - - - - - - - - - - Sample Menu - - - - - - - - - - - - ") ;
          puts ("0 - - - - Clear Data") ;
          puts ("1 - - - - Set Data") ;
          puts ("E - - - - End Test") ;
          printf ("    Please, Push Key (0 or 1 or E) ") ;

          for (; ;) {
                 switch (getchar () {
                        case '0' :
                                      printf (" Clear Data ") ;
                                      if (MewtocolSendAndReceive ("<01#WDD00000000000000") ) {
                                            return ( ERROR )
                                      }
                                      break ;
                        case '1' :
                                      printf (" Set Data ") ;
                                      if (MewtocolSendAndReceive ("<01#WDD0000000000FFFF") ) {
                                            return ( ERROR )
                                      }
                                      break ;
                        case 'E' :
                        case 'e' :
                                      puts (" Bye Bye. ") ;}
                                      return ( OK ) ;
                        case '¥n' :
                                      break ;

                        default :
                                      puts ("Bad Command") ;
                                      goto LMenu ;
                 }
          }
}
```

```
/* ================================================
   =  Sends MEWTOCOL communication  data and waits for response
   =  - - - - - - - - - - - - - - - - - - - - - - - - - -
   =
   = Input unsigned char *cmd : MEWTOCOL command being sent
   =
   = Return        OK: Successfully completed
   =              ERROR: Error occurred, processing terminated
   =
   ================================================  */

int MewtocolSendAndReceive ( cmd )
unsigned char ;
{
        int len ;
        int sendsize, recvsize ;
        int senddatasize ;
        int err ;

        len = strlen ( cmd ) ;                          /* Size of actual data section (command) */
        senddatasize = len
                        +2                              /* BCC size */
                        +1 ;                            /* CR size */

        /* Creates MEWTOCOL header */
        senddata. FTI = 0x10 ;
        senddata. padding = 0 ;                                         /* Fixed 0 */
        senddata. datasize_L = (unsigned char ) senddatasize ;          /* Data size L */
        senddata. datasize_H = senddatasize/256 ;                       /* Data size H */

        senddata. COMorDAT = 0x00    /* 0x00 : MEWTOCOL-COM 0x02 : MEWTOCOL-DAT */

        senddata. reserved [0] = 0 ;                    /* Fixed 0 */
        senddata. reserved [1] = 0 ;                    /* Fixed 0 */
        senddata. reserved [2] = 0 ;                    /* Fixed 0 */
        senddata. reserved [3] = 0 ;                    /* Fixed 0 */
        senddata. reserved [4] = 0 ;                    /* Fixed 0 */

        senddata. dst_rout = MEW_DST_NO ;               /* Destination for MEWTOCOL station number */
        senddata. src_rout = MEW_SRC_NO ;               /* Source for MEWTOCOL station number */

        /* MEWTOCOL data section created */
        /* (1) Command copied to data section */
        /* (2) BCC is determined and added at end of actual data using 2-byte ASCII hexadecimal code */
        /* (3) CR (0x0D) added at end */

        sprintf (senddata. data, "%s%02X%c", cmd, BCD (cmd, len) , 0x0d) ;

        /* Determines overall transmission size */
        sendsize = 12                                   /* Size of expanstion header section */
                + senddatasize ;                        /* Size of data section */

        /* Sends to partner station */
        if ( ( crr = send ( sno, (char * ) &senddata, sendsize, 0 ) ) < 0 ) {
              return ( ERROR ) ;  /* Send error */
        }
```

```
        /* Receives response from partner node */

              /* Determines overall reception size */
        recvsize = 12                      /* Size of expansion header section */
                   +6                      /* Size of response command section */
                   +2                      /* BCC size */
                   +1 ;                    /* CR size */
        if ( ( err = recv ( sno, ( char * ) &recvdata, recvsize. 0 ) ) < 0 ) {
             return ( ERROR ) ;            /* Receive error */
        }

        /* Analyzes response data section */
        switch ( recvdata. data [3] ) {
              case '$' :    /* Normal response */
                   puts ("OK") ;
                   break ;

              case '!' :    /* Error response was received */
                   puts ("ERROR RESPONSE RECEIVED") ;
                   printf ("ERROR CODE %c%c%￥n", recvdata. data [4], recvdata. data [5] ) ;
                   break ;

              default :    /* System error (Unexpected response was returned) */
                   puts ("SYSTEM ERROR") ;
                   break ;
        }
        return ( OK ) ;
}

/* ==============================================
   =  Determines BCC
   =  - - - - - - - - - - - - - - - - - - - - - - - - - - -
   =
   = Input unsigned char *data : MEWTOCOL string of determined data
   =         int len : MEWTOCOL string data size
   =
   = Return   BCC value
   =
   ==============================================  */

unsigned char BCC (data, letn)
unsigned char *data ;
int len ;
{
        unsigned char ans ;
        for ( ans = *data+ + ; - - len ; ) {
              ans = *data+ + ;
        }
        return ( ans ) ;
}
```

16.1.3 Communication Setting Program on PLC Side

When the PLC is put in RUN mode, initialization and open processing are carried out for the ET-LAN unit, and “01“ is set for the MEWTOCOL station number.

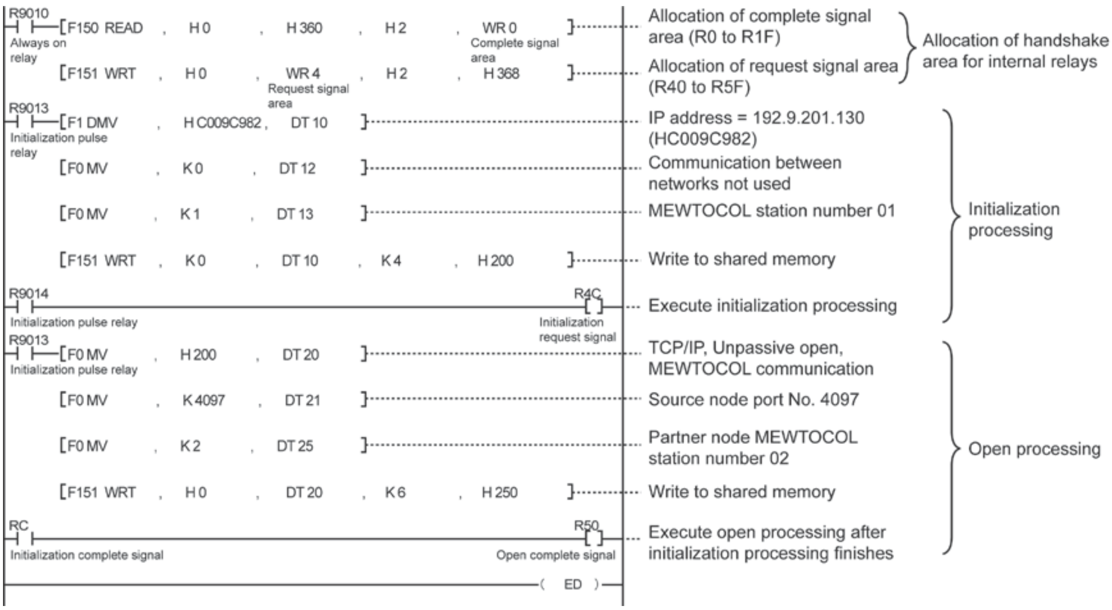
Internal relay allocation

Classification	Device number	Devices used in sample program
Complete signal area	R0 to R1F	RC Initialization complete signal
Request signal area	R40 to R5F	R4C Initialization request signal R50 Open request signal (Connection 1)

Data register allocation

Classification of processing	Device number	Setting item	Setting for program example
Initialization processing	DT10 to DT11	IP address	192.9.201.130 (C009C982H)
	DT12	Communication function setting between networks	Not used
	DT13	MEWTOCOL station number	01
Open processing	DT20	Open method	MEWTOCOL communication TCP/IP Unpassive open
	DT21	Source node port No.	4097
	DT25	Partner node MEWTOCOL station number	02

Program example



Record of changes

Manual No.	Date	Description of changes
ARCT1F322E/ ACG-M322E	APR.2001	First edition
ARCT1F322E-1/ ACG-M322E-1	NOV.2001	Second edition Chapter12 Page12-5,12-10,12-11to12-13:corrected Page12-25,12-28:corrected
ARCT1F322E-2/ ACG-M322E-2	NOV.2006	Third edition
ARCT1F322E-3/ ACG-M322E-3	NOV.2008	Fourth edition - Change in Corporate name
ARCT1F322E-4/ ACG-M322E-4	NOV.2009	Fifth edition - Addition of ET-LAN2 Unit AFP27901 - Addition of ARCT1F370E-2 (Additional vertion)
ARCT1F322E-5	AUG.2011	Sixth edition - Change in Corporate name
ARCT1F322E-6	MAY.2013	Seventh edition
ARCT1F322E-7	DEC.2013	Eighth edition

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