SHARP®

Version 1.0
Produced in June 2002

Sharp Programmable Controller

Module name

JW-20FL5
JW-20FLT
JW-50FL
Z-336J

FL-net

User's Manual

Thank you for purchasing the FL-net module (board) for use with the sharp programmable controller.

FL-net module	JW-20FL5	(Installed PC) JW20H/30H
	JW-20FLT	
	JW-50FL	JW50H/70H/100H
FL-net board	Z-336J	J-board

Please familiarize yourself with the module by reading this user's manual thoroughly.

Keep this manual handy. We are confident that this manual will be helpful whenever you face a problem.

In addition to this manual, the following manuals are available for your further study.

- JW-20FL5/20FLT ——— FL-net user's manual (this manual)
- JW-50FL ——— FL-net user's manual (this manual)
- Z-336J ——— FL-net user's manual (this manual)
- JW20H/30H Control module ——— User's manual - hardware version; Programming manual
- JW50H/70H/100H Control module ——— User's manual - hardware version; Programming manual
- J-board Z-300 series CPU board ——— Z-311J/312J user's manual - hardware version; Z-313J* user's manual - hardware version
- J-board Z-500 series CPU board ——— Z-511J*User's manual - hardware version

* Z-313J and Z-511J (CPU boards) are manufactured on request.

Note

- Should you have any questions or inquires, please feel free to contact one of our dealers, or our service department.
- Copying this manual in part of in total is prohibited.
- The contents of this manual may be revised without notice.

Safety Precautions

Read this manual and attached documents carefully before installation, operation, maintenance and checking in order to use the machine correctly. Understand all of the machine knowledge, safety information, and cautions before starting to use. In this instruction manual, safety precautions are ranked into "danger" and "caution" as follows.

⚠ Danger	: Wrong handling may possibly lead to death or heavy injury.
⚠ Caution	: Wrong handling may possibly lead to medium or light injury.

Even in the case of ⚠ Caution, a serious result may be experienced depending on the circumstances. Anyway, important points are mentioned. Be sure to observe them strictly.

The picture signs of prohibit and compel are explained below.

: It means don'ts. For example, prohibition of disassembly is indicated as ( ).

: It means a must. For example, obligation of grounding is indicated as ( ).

1) Installation

⚠ Caution

- Use in the environments specified in the user's manual.
  Electric shock, fire or malfunction may be caused when used in the environments of high temperature, high humidity, dusty or corrosive atmosphere, vibration or impact.
- Install according to the user's manual.
  Wrong installation may cause drop, breakdown, or malfunction.
- Never admit wire chips or foreign matters.
  Or fire, breakdown or malfunction may be caused.

2) Wiring

Compel

- Be sure to ground for programmable controller.
  Unless grounded, electric shock or malfunction may be caused.

⚠ Caution

- Connect the rated power source.
  Connection of a wrong power source may cause a fire.
- Wiring should be done by qualified electrician.
  Wrong wiring may lead to fire, breakdown or electric shock.

⚠ Caution

- Make sure to follow the descriptions in the instruction manual and user manual when wiring and installing a module/board.
  Make sure to supply the electricians with the wiring and installation requirements.
  If the wiring or installation do not meet the specifications, there may be a drop in the modules ability to reject noise, or the modules may malfunction.

3) Use

Danger

- Don't touch the terminal while the power is being supplied or you may have an electric shock.
- Assemble the emergency stop circuit and interlock circuit outside of the programmable controller. Otherwise breakdown or accident damage of the machine may be caused by the trouble of the programmable controller.

Caution

- Change of program during operation, or "Run" or "stop" during operation should be done with particular care by confirming safety. Misoperation may lead to damage or accident of the machine.
- Turn on the power source in the specified sequence. Turning ON with wrong sequence may lead to machine breakdown or accident.

4) Maintenance

Prohibit

- Don't disassemble or modify the modules.
  Or fire, breakdown or malfunction may be caused.

Caution

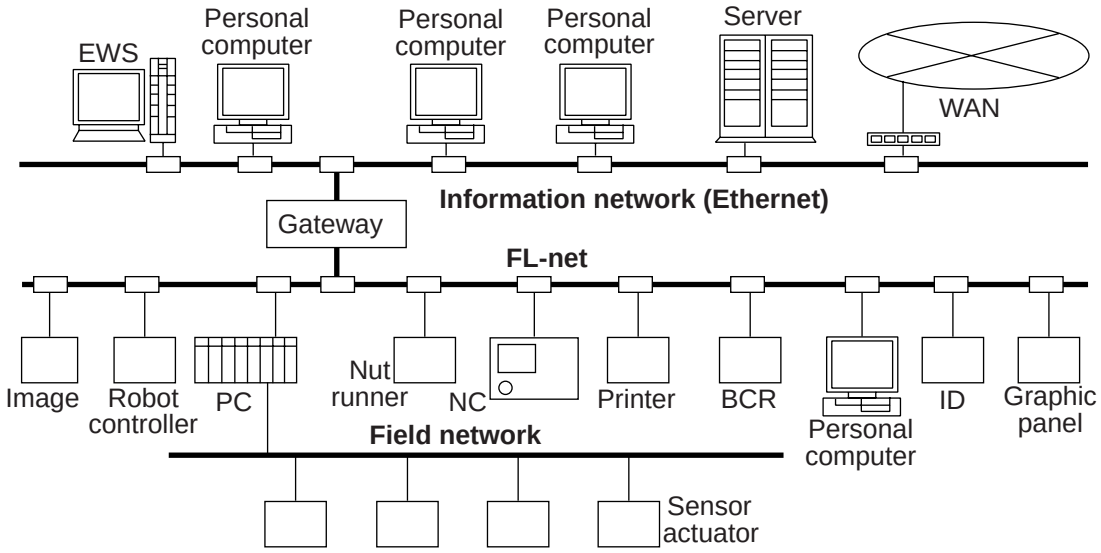
- Turn OFF the power source before detaching or attaching the module/board.
  Or electric shock, malfunction or breakdown may be caused.

User's Manual

Table of Contents

Chapter 1: Outline

An FL-net module (JW-20FL5/20FLT, JW-50FL, FL-net board (Z-336J)) is an interface module use to connect a programmable controller (JW20H/30H, JW50H/70H/100H), J-board to an FL-net. FL-net is an open network that connects production equipment and controllers from multiple FA (factory automation) venders, to create a unified production process. This network works as an intermediary between information networks and production networks, and makes it possible to connect control devices (such as personal computers or programmable controllers, hereafter referred to as PCs), to numeric control devices (CNCs), and robot controllers (RCs). The Ethernet is used as a world standard communication method to allow communication between pieces of OA (Office Automation) equipment.



FL-net employs an FA link protocol as an application layer.

■ **Features of the FA link protocol**

① Uses the Ethernet UDP/IP communication protocol.

② Using a Master-less, Token method, the system prevents data transmission conflicts and guarantees the transfer of data within a specified time.

③ Employs a shared memory system (shares information between each of the nodes).

④ Nodes can automatically enter and leave the network.

■ **Features of the JW-20FL5/20FLT, JW-50FL, Z-336J**

① FL-net compatible (uses the FA link protocol)

② Supports cyclic transfers and message transfers.

③ Supports exchange of data between SHARP PCs using the SEND/RECEIVE function. (A unique function of SHARP equipment)

④ Allows remote programming and remote monitor functions between SHARP PCs. (A unique function of SHARP equipment)

- FL-net is an open network that was standardized by the Japan FA Open Systems Promotion Group (JOP) in the Manufacturing Science Technology Center (MSTC).
- Ethernet is a registered trademark of XEROX CORPORATION, USA.

Chapter 2: Handling Precautions

Make sure to follow the precautions bellow who using the JW-20FL5/20FLT, JW-50FL (hereafter referred to as this module) and Z-336J (hereafter referred to as this board).

(1) Installation

- Do not install or store this unit in the following conditions.
  ① Locations close to a heating element
  ② Sudden temperature changes which may cause condensation
  ③ Corrosive or inflammable gas
  ④ Vibration or hard jolts
- The minimum distance between nodes is specified in the regulations. (2.5 m when the 10BASE5 is used.) When connecting devices, be sure to maintain these minimum distances.
  Cables used for 10BASE5 systems have marks every 2.5 m. Position each transceiver directly on one of these marks.
- Mount the transceivers on electrically insulated objects, such as a wooden mounting block.
- Prior to installing or detaching the JW20H/30H or JW50H/70H/100H, make sure to turn OFF the power supply to the PCs.
- Prior to connect the board, make sure to turn OFF the power to the J-board.
- Isolate the hub case electrically from the control panel chassis.

(2) Treatment

● **JW-20FL5/20FLT and JW-50FL**

- For ventilation, holes are provided in the cabinet to prevent a temperature rise. Do not block the ventilation holes. Good ventilation is necessary.
- Never allow a liquid such as water and chemical solution and a metallic object like a copper wire inside this module to avoid a possible hazard. Otherwise, it may be a cause of machine trouble.
- When a trouble or abnormal condition such as overheat, fume, or smoke is met, stop the operation immediately, and call your dealer or our service department.

● **Z-336J**

A J-board is a PC board which contains sensitive electronic parts. Therefore, be careful when handling it.

① Before touching the board with your hand, make sure to discharge all static electricity from your body.
② Do not touch the board if your hands are dirty or wet.
③ Do not put the board down on a conductive object (such as a metal plate).
(If a J-board with a CPU is placed on a conductive object, the battery terminals may be short circuited and the back up memory will be lost.)
④ Do not handle any switches, connectors, or terminal blocks on the J-board using excessive force.

(3) Grounding

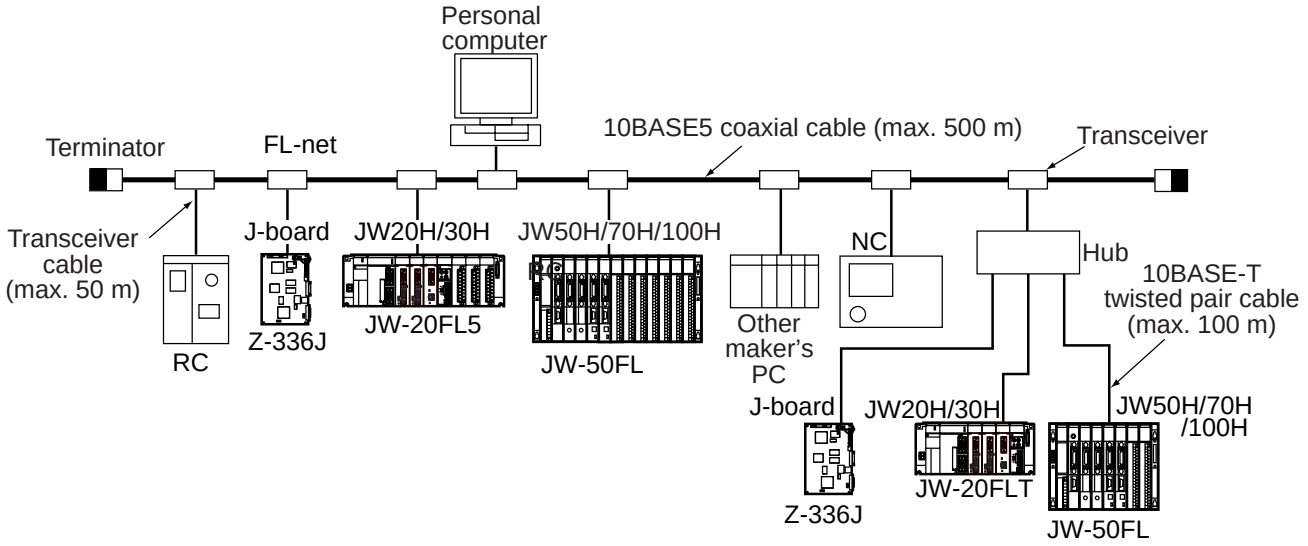
- Connect the J-board FG terminal (on the terminal block on the CPU board) to an independent class 3 ground. Do not share the ground with high voltage equipment.
- The hexagonal standoffs (supplied with each board) for assembling the J-board are used for connecting the ground (FG). Make sure to tighten them securely.

(4) Wiring precautions

- Install the communication lines at a distance of 60 cm or more away from motor power lines or high voltage lines.
- Do not route wires near equipment that generates electrical noise.
- Use category 5 10BASE-T shielded twisted pair cable.
- Use an isolated shield transformer to provide power to the hubs.
- We recommend using a transceiver cable that is 2 m or shorter.

Chapter 3: System Configuration

[Connection example]



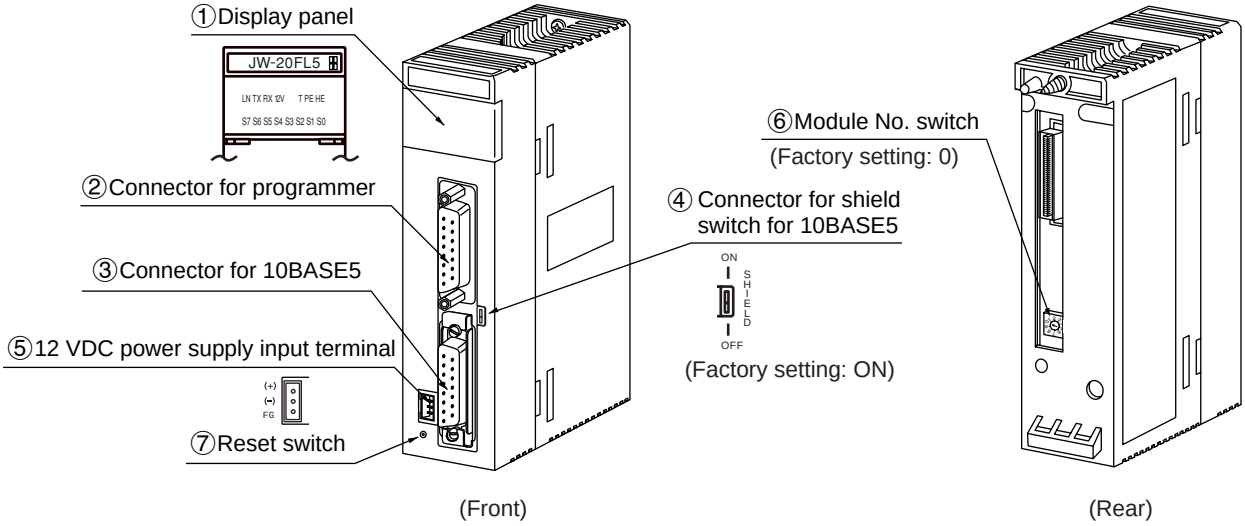
- A basic system (segment) configuration consists of a 10BASE5 coaxial cable between 10m and 500 m long with nodes connected to this cable. (A maximum of 100 nodes can be connected per segment)
- If the distance between nodes exceeds 500 m, use a repeater (maximum length 2,500 m).

⇨ See 7-1[1] 10BASE5 system.

Note: 10BASE5 coaxial cable, transceivers, transceiver cables, terminators, hubs, and 10BASE-T twisted pair cable is supplied and installed by the customer.

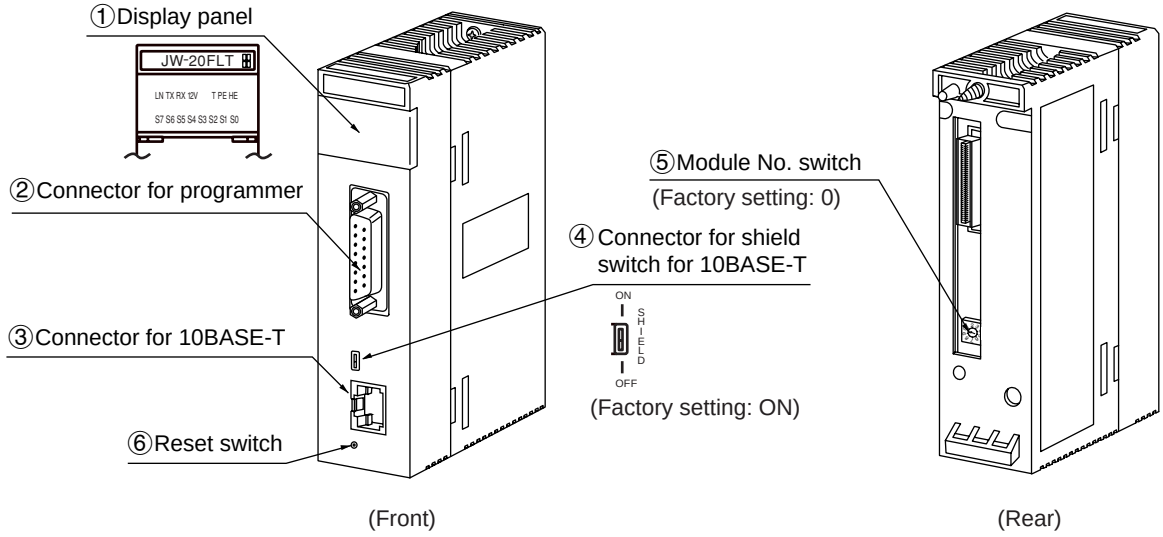
Chapter 4: Name and Function of Each Part

4-1 JW-20FL5



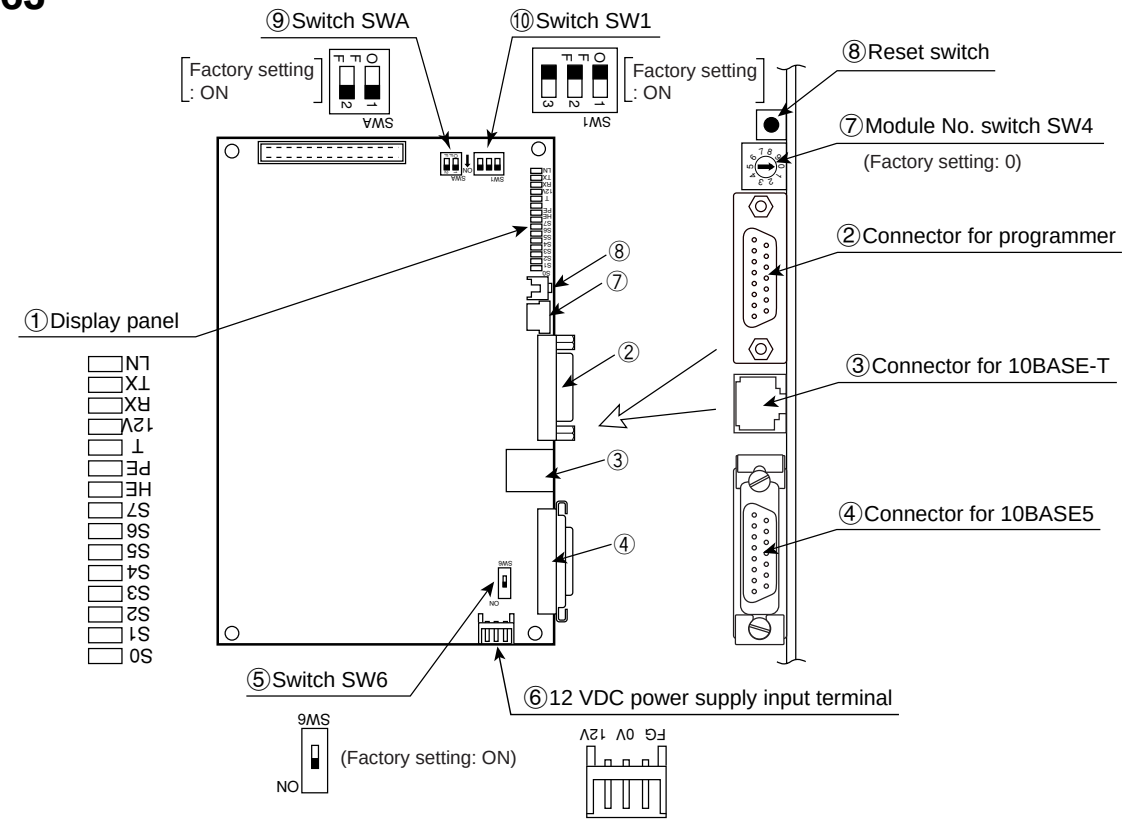
	Name		Function
①	Display panel		Displays the JW-20FL5 operating status using LEDs.
		LN	Lights when communicating normally.
		TX	Blink at transmitting data.
		RX	Blink at receiving data.
		12 V	Lights when 12 VDC is supplied. (Only when 10BASE5 is used.)
		T	Lights at test mode. (Normally, this is not used.)
		PE	Lights at parameter setting error.
		HE	Lights at this module error.
		S0 to S7	Displays the station number when operating normally. Displays an error code if an error occurs.
②	Connector for programmer		Connect a JW-14PG programmer or similar equipment to set the parameters on the JW-20FL5.
③	Connector for 10BASE5		Connect the 10BASE5 transceiver cable. Make sure to slide the lock securely to the "lock" position.
④	Connector for Shield switch for 10BASE5	ON	The shield on the coaxial cable and the FG (base) terminal on this module will be shorted together.
		OFF	The shield on the coaxial cable is not shorted to the base. - Ground the FG line on the 12 VDC connector separately.
⑤	12 VDC power supply input terminal		When 10BASE5 is used, connect a commercially available DC power supply that is designed to supply power to transceivers. The DC power supply must provide 12VDC ±5% and 0.5 A or more.
⑥	Module No. switch		Specify a module number from 0 to 6. - Be careful do not use the same number for another option module.
⑦	Reset switch		Only used by SHARP engineers. Users should not press this switch.

4-2 JW-20FLT



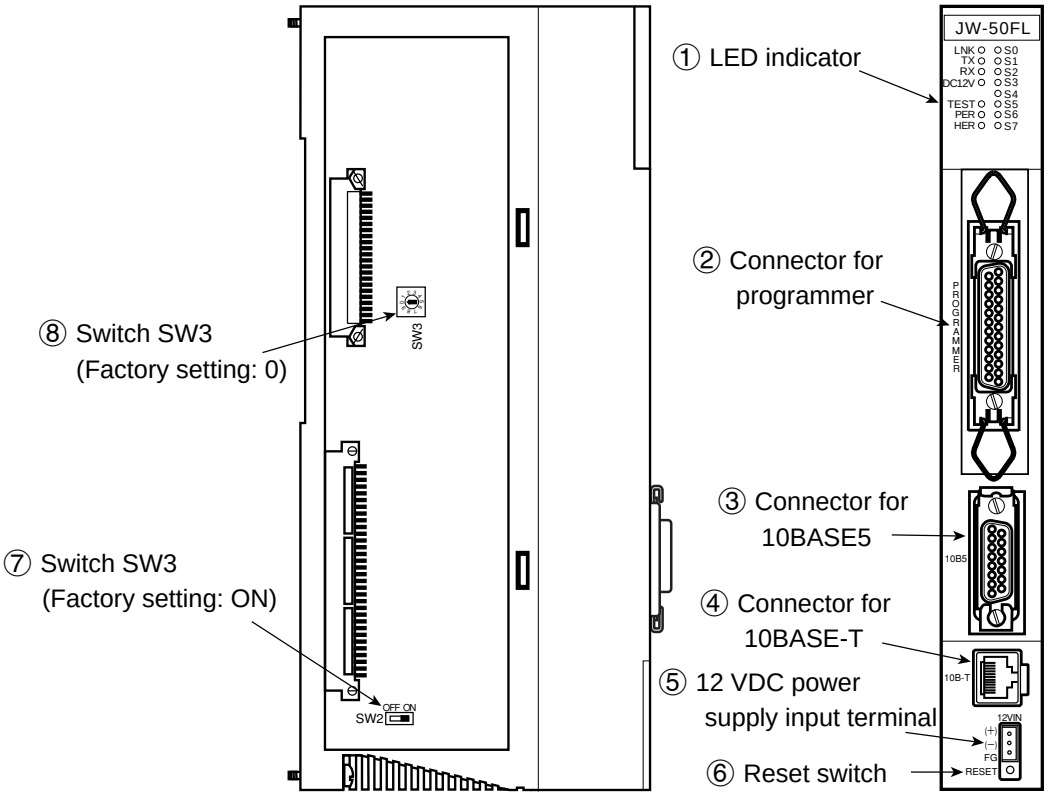
	Name		Function
①	Display panel		Displays the JW-20FLT operating status using LEDs.
		LN	Lights when communicating normally.
		TX	Blink at transmitting data.
		RX	Blink at receiving data.
		12 V	Cannot be used with the JW-20FLT.
		T	Lights at test mode. (Normally, this is not used.)
		PE	Lights at parameter setting error.
		HE	Lights at this module error.
		S0 to S7	Displays the station number when operating normally. Displays an error code if an error occurs.
②	Connector for programmer		Connect a JW-14PG programmer or similar equipment to set the parameters on the JW-20FLT.
③	Connector for 10BASE-T		Connect the 10BASE-T twisted pair.
④	Connector for Shield switch for 10BASE-T	ON	The shield on the twisted pair cable will be shorted to the FG (base) of this module.
		OFF	The shield on the twisted pair cable is not shorted to the base.
⑤	Module No. switch		Specify a module number from 0 to 6. - Be careful do not use the same number for another option module.
⑥	Reset switch		Only used by SHARP engineers. Users should not press this switch.

4-3 Z-336J



	Name		Function
①	Display panel		Displays this board operating status using LEDs.
		LN	Lights when communicating normally.
		TX	Blink at transmitting data.
		RX	Blink at receiving data.
		12 V	Lights when 12 VDC is supplied. (Only when 10BASE5 is used.)
		T	Lights at test mode. (Normally, this is not used.)
		PE	Lights at parameter setting error.
		HE	Lights at this board error.
		S0 to S7	Displays the station number when operating normally. Displays an error code if an error occurs.
②	Connector for programmer		Connect a JW-14PG programmer or similar equipment to set the parameters on this board.
③	Connector for 10BASE-T		Connect the 10BASE-T coaxial cable.
④	Connector for 10BASE5		Connect the 10BASE5 coaxial cable. Make sure to slide the lock securely to the "lock" position.
⑤	Switch SW6	ON	The shield on the cable between a 10BASE-T connector and a 10BASE5 connector and the FG (base) on this module will be shorted together.
		OFF	The shield on the cable between a 10BASE-T connector and a 10BASE5 connector is not shorted to the base. - Ground the FG line on the 12 VDC connector separately.
⑥	12 VDC power supply input terminal		When 10BASE5 is used, connect a commercially available DC power supply that is designed to supply power to transceivers. The DC power supply must provide 12VDC ±5% and 0.5 A or more.
⑦	Module No. switch		Specify a module number from 0 to 6. - Be careful do not use the same number for another option board.
⑧	Reset switch		Only used by SHARP engineers. Users should not press this switch.
⑨	Number of communication boards Switch SWA		Specify the number of communication boards actually installed (including the Z-336J). ⇨ See pages 5-3 to 5-7.
⑩	Switch SW1		No need to set this switch for the Z-336J. (Always set to OFF (default).)

4-4 JW-50FL



	Name		Function
①	Display panel		Displays the JW-50FL operating status using LEDs.
		LNK	Lights at operating. Lights OFF at stopping.
		TX	Blink at transmitting data.
		RX	Blink at receiving data.
		12 VDC	Lights when 12 VDC is supplied. (Only when 10BASE5 is used.)
		TEST	Lights at test mode.
		PER	Lights at parameter setting error.
		HER	Lights at this module error.
		S0 to S7	Indicates status of connection status monitor flag.
②	Connector for programmer		When using a remote monitor or remote programming function, connect a JW-14PG programmer.
③	Connector for 10BASE5		Connect the 10BASE5 transceiver cable. Make sure to slide the lock securely to the "lock" position.
④	Connector for 10BASE-T		Connect 10BASE-T twisted-pair cable.
⑤	12 VDC power supply input terminal		When 10BASE5 is used, connect a commercially available DC power supply that is designed to supply power to transceivers. The DC power supply must provide 12VDC 5% and 0.5 A or more.
⑥	Reset switch		Only used by SHARP engineers. Users should not press this switch.
⑦	Switch SW2	ON	Turn ON when the shields on the 10BASE-T connectors or 10BASE5 connectors are connected to the FG (base) of the JW-50FL.
		OFF	Turn OFF when the shields on the 10BASE-T connectors or 10BASE5 connectors are not connected to the FG. - Ground the FG line on the 12 VDC connector separately.
⑧	Switch SW3		Specify a parameter address (in system memory) from 0 to 4. ⇨ See page 12-4.

Note: Only 10BASE5 or 10BASE-T protocol is used. Mixed use of these two types is not permitted.

Chapter 5: Installation

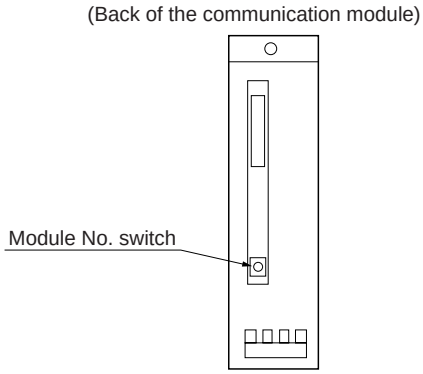
5-1 Installation of JW-20FL5/20FLT

This section describes the installation procedures for the JW-20FL5/20FLT (hereafter referred to as the module) on the JW20H/30H basic rack panel.

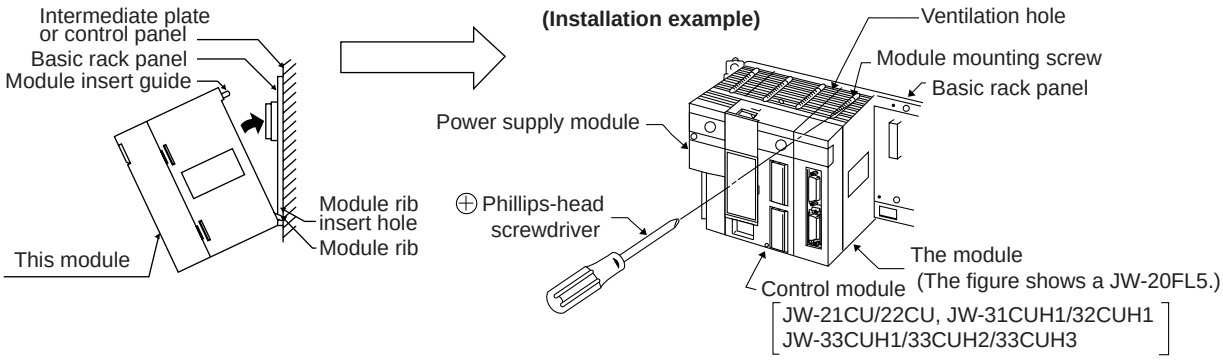
① Turn off the power to the JW20H/30H.

↓

② Set the module No. switch on the back of the module.



③ Insert the mounting rib on the module into the rib insert holes on the JW20H/30H basic rack panel and push in. Then, tighten module-mounting screws at the top of the module using a Phillips-head (+) screwdriver.



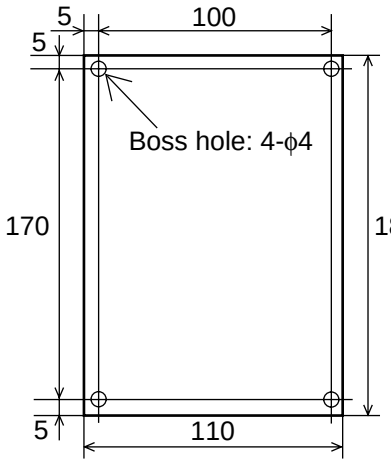
Notes

- The module cannot be installed into an expansion rack panel.
- More than two communication modules can be installed on the same control module (basic rack panel for the JW20H/30H). However, be careful not to use the same module No. switch setting for any other module (including JW-20FL5/20FLT).
- Make sure to tighten the module mounting screws securely. Loose screws may cause a malfunction.

5-2 Installation of Z-336J

Board dimensions and assembled dimensions of the Z-336J are shown below.

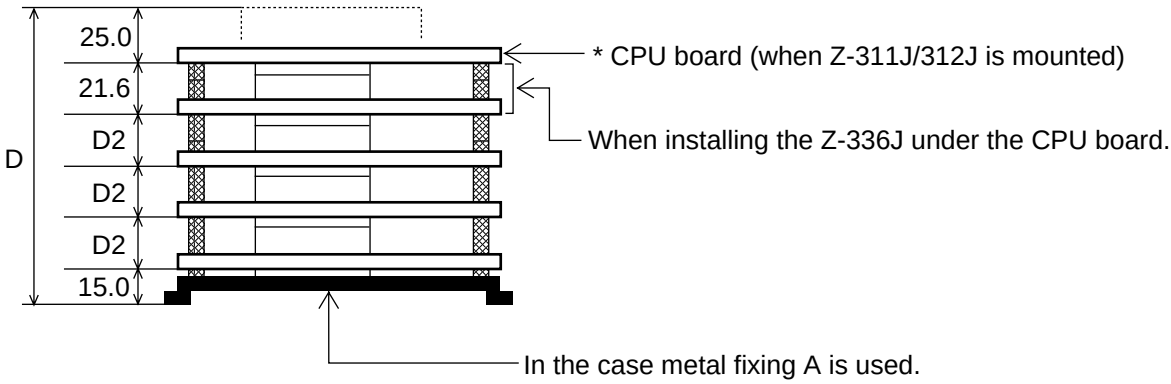
■ Board dimensions



The dimensions on the left do not include metal fittings.

■ Assembled dimensions

[Unit: mm]



* The CPU board can only be installed at the upper most position.

- For details about assembly/installation dimensions, see the manuals below.
  - J-board Z-311J/312J User's Manual: Hardware Version.
  - J-board Z-313J User's Manual: Hardware Version.
  - J-board Z-511J User's Manual: Hardware Version.

  Dimensions D and D2 correspond to D and D2 "board sizes" of the manuals above.
- Make sure to ensure there is conductivity between the installation metal and installation section.

This paragraph describes the maximum number of Z-336J boards to install on the J-board and allocation of I/O relays.

Allocation of I/O relays
- When mounted on the Z-311J/312J ⇨ See the next page.
- When mounted on the Z-313J ⇨ See page 5-5.
- When mounted on the Z-511J ⇨ See page 5-6.

[1] Maximum number of boards to mount

The Z-336J is a kind of communication board of the J-board. Maximum number of boards mounted on the J-board shall be the total number of communication boards mounted.

J-board	CPU board	Total number of boards able to be mounted including Z-336J and other communication boards
Z-300 series	Z-311J	Maximum 2 - When the total current flow at 5 V of each mounted board exceeds 800 mA, the number of boards shall be limited.
	Z-312J	
	Z-313J *	Maximum 1
Z-500 series	Z-511J *	Maximum 2

■ Types of communication boards

Module name	Specifications
Z-331J *	Data link or computer link, satellite I/O link master station
Z-332J	Data link or computer link
Z-333J	Satellite I/O link master station
Z-334J *	ME-NET board (with branch line extension function)
Z-335J	Satellite net board
Z-336J	FL-net board
Z-337J	DeviceNet board

* Manufactured on request.

[2] Address allocation of I/O relay

This section describes I/O relay addresses allocated to the Z-336J.

(1) When mounted on Z-311J/312J

The total number of Z-336J boards able to be mounted including other communication boards is two at maximum. Below the switch settings of the Z-336J and allocation of I/O relay are shown.

① When using one communication board (Z-336J)

Set switch SWA for number of communication boards on the Z-336J as follows.

Setting of switch SWA on the Z-336J		1 | 2 ON | ON	
Allocation of Z-336J I/O relay		I/O relay address	Address to set
	Z-336J (optional)*	ㅋ 0000	R = 0, S = 0
		ㅋ 0001	
	Dummy (vacant)	ㅋ 0002	R = 0, S = 1
		ㅋ 0003	
	Dummy (vacant)	ㅋ 0004	R = 0, S = 2
		ㅋ 0005	
	Dummy (vacant)	ㅋ 0006	R = 0, S = 3
		ㅋ 0007	

* Though it is allocated as optional, it will be a dummy area not functionally used.

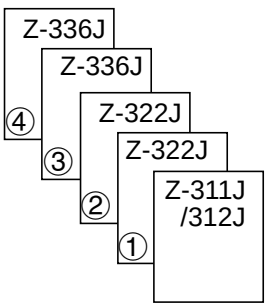
② When using two communication boards

Depending on at which position the Z-336J is used, the allocation of I/O relay varies.

		Use Z-336J as first unit		Use Z-336J as 2nd unit	
Setting of switch SWA on the Z-336J		1 | 2 ON | ON		1 | 2 OFF | ON	
Allocation of Z-336J I/O relay		I/O relay address	Address to set	I/O relay address	Address to set
	Z-336J (optional)*	ㅋ 0000	R = 0, S = 0	ㅋ 0010	R = 0, S = 4
		ㅋ 0001		ㅋ 0011	
	Dummy (vacant)	ㅋ 0002	R = 0, S = 1	ㅋ 0012	R = 0, S = 5
		ㅋ 0003		ㅋ 0013	
	Dummy (vacant)	ㅋ 0004	R = 0, S = 2	ㅋ 0014	R = 0, S = 6
		ㅋ 0005		ㅋ 0015	
	Dummy (vacant)	ㅋ 0006	R = 0, S = 3	ㅋ 0016	R = 0, S = 7
		ㅋ 0007		ㅋ 0017	

■ Examples of allocation

Below the switch setting and I/O allocation when using two Z-336J is shown.



Mounted position	SW1 (RACK NO)	SWA (SW2)	I/O relay address	Address to set
①	1 2 3 ■ □ □	SW2 1 2 ■ ■	ㅋ 0020, ㅋ 0021	R=1, S=0
			ㅋ 0022, ㅋ 0023	R=1, S=1
			ㅋ 0024, ㅋ 0025	R=1, S=2
			ㅋ 0026, ㅋ 0027	R=1, S=3
②	1 2 3 □ ■ □	SW2 1 2 ■ ■	ㅋ 0030, ㅋ 0031	R=2, S=0
			ㅋ 0032, ㅋ 0033	R=2, S=1
			ㅋ 0034, ㅋ 0035	R=2, S=2
			ㅋ 0036, ㅋ 0037	R=2, S=3
③	1 2 3 □ □ □	SWA 1 2 ■ ■	ㅋ 0000, ㅋ 0001	R=0, S=0
			ㅋ 0002, ㅋ 0003	R=0, S=1
			ㅋ 0004, ㅋ 0005	R=0, S=2
			ㅋ 0006, ㅋ 0007	R=0, S=3
④	1 2 3 □ □ □	SWA 1 2 □ ■	ㅋ 0010, ㅋ 0011	R=0, S=4
			ㅋ 0012, ㅋ 0013	R=0, S=5
			ㅋ 0014, ㅋ 0015	R=0, S=6
			ㅋ 0016, ㅋ 0017	R=0, S=7

(2) When mounted on Z-313J

The number of boards available mounted on the Z-336J including other communication boards is one at maximum.

Below shows the switch setting of the Z-313J and Z-336J as well as I/O relay allocation of the Z-336J.

■ Switch setting

The set switch SWA on the Z-313J and the number of communication boards setting switch SWA of the Z-336J are as shown below.

- Z-313J

Switch SWA	
1	2
ON	ON

- Z-336J

Switch SWA	
1	2
OFF	ON

■ Allocation of I/O relay

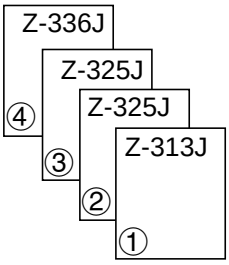
I/O relay address of the Z-336J shall be allocated as shown below.

Allocation details	I/O relay address	Address to set
Z-336J (optional)*	ㅋ0010	R = 0, S = 4
	ㅋ0011	
Dummy (vacant)	ㅋ0012	R = 0, S = 5
	ㅋ0013	
Dummy (vacant)	ㅋ0014	R = 0, S = 6
	ㅋ0015	
Dummy (vacant)	ㅋ0016	R = 0, S = 7
	ㅋ0017	

* Though it is allocated as optional, it will be a dummy area not functionally used.

■ Allocation examples

Below shows switch setting and I/O relay allocation when using one Z-336J.



■ ON
□ OFF

Mounted position	SW1 (RACK NO.)	SWA (SW2)	I/O relay address	Address to set
①	NO	SWA 1 2 ■ ■	ㅋ0000, ㅋ0001	R=0, S=0
			ㅋ0002, ㅋ0003	R=0, S=1
			ㅋ0004, ㅋ0005	R=0, S=2
			ㅋ0006, ㅋ0007	R=0, S=3
②	1 2 3 ■ □ □	SW2 1 2 ■ ■	ㅋ0020, ㅋ0021	R=1, S=0
			ㅋ0022, ㅋ0023	R=1, S=0
			ㅋ0024, ㅋ0025	R=1, S=1
			ㅋ0026, ㅋ0027	R=1, S=2
			ㅋ0030, ㅋ0031	R=1, S=3
③	1 2 3 □ ■ □	SW2 1 2 ■ ■	ㅋ0032, ㅋ0033	R=2, S=0
			ㅋ0034, ㅋ0035	R=2, S=0
			ㅋ0036, ㅋ0037	R=2, S=1
			ㅋ0040, ㅋ0041	R=2, S=2
			ㅋ0042, ㅋ0043	R=2, S=3
④	1 2 3 □ □ □	SWA 1 2 ■ □	ㅋ0010, ㅋ0011	R=0, S=4
			ㅋ0012, ㅋ0013	R=0, S=5
			ㅋ0014, ㅋ0015	R=0, S=6
			ㅋ0016, ㅋ0017	R=0, S=7

(3) When mounted on Z-511J

The number of boards available mounted on the Z-336J including other communication boards is two at maximum.

Below shows the switch setting of the Z-511J and Z-336J as well as I/O relay allocation of the Z-336J.

① **When using one communication board (Z-336J)**

■ **Switch setting**

The set switches SW1 and SWA on the Z-511J and the number of communication boards setting switch SWA on the Z-336J are as follows.

- Z-511J

Switch SW1			Switch SWA	
1	2	3	1	2
OFF	OFF	OFF	ON	ON

- Z-336J

Switch SWA	
1	2
OFF	ON

5

■ **Allocation of I/O relay**

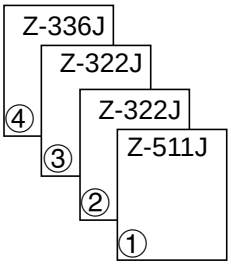
I/O relay address of the Z-336J shall be allocated as shown below.

Allocation details	I/O relay address	Address to set
Z-336J (optional)*	ㅋ 0010	R = 0, S = 4
	ㅋ 0011	
Dummy (vacant)	ㅋ 0012	R = 0, S = 5
	ㅋ 0013	
Dummy (vacant)	ㅋ 0014	R = 0, S = 6
	ㅋ 0015	
Dummy (vacant)	ㅋ 0016	R = 0, S = 7
	ㅋ 0017	

* Though it is allocated as optional, it will be a dummy area not functionally used.

■ **Allocation examples**

Below shows switch setting and I/O relay allocation when using one Z-336J.



■ ON
□ OFF

Mounted position	SW1 (RACK NO)	SWA (SW2)	I/O relay address	Address to set
①	1 2 3 □ □ □	SWA 1 2 ■ ■	ㅋ 0000, ㅋ 0001	R=0, S=0
			ㅋ 0002, ㅋ 0003	R=0, S=1
			ㅋ 0004, ㅋ 0005	R=0, S=2
			ㅋ 0006, ㅋ 0007	R=0, S=3
②	1 2 3 ■ □ □	SW2 1 2 ■ ■	ㅋ 0020, ㅋ 0021	R=1, S=0
			ㅋ 0022, ㅋ 0023	R=1, S=1
			ㅋ 0024, ㅋ 0025	R=1, S=2
			ㅋ 0026, ㅋ 0027	R=1, S=3
③	1 2 3 □ ■ □	SW2 1 2 ■ ■	ㅋ 0030, ㅋ 0031	R=2, S=0
			ㅋ 0032, ㅋ 0033	R=2, S=1
			ㅋ 0034, ㅋ 0035	R=2, S=2
			ㅋ 0036, ㅋ 0037	R=2, S=3
④	1 2 3 □ □ □	SW2 1 2 □ ■	ㅋ 0010, ㅋ 0011	R=0, S=4
			ㅋ 0012, ㅋ 0013	R=0, S=5
			ㅋ 0014, ㅋ 0015	R=0, S=6
			ㅋ 0016, ㅋ 0017	R=0, S=7

② When using two communication boards (Z-336J)

■ Switch setting

The set switches SW1 and SWA on the Z-551J and the number of communication boards setting switch SWA on the Z-336J are as follows.

- Z-511J

Switch SW1			Switch SWA	
1	2	3	1	2
OFF	OFF	OFF	ON	ON

- Z-336J

Use Z-336J as 1st unit		Use Z-336J as 2nd unit	
Switch SWA		Switch SWA	
1	2	1	2
ON	ON	OFF	ON

■ Allocation of I/O relay

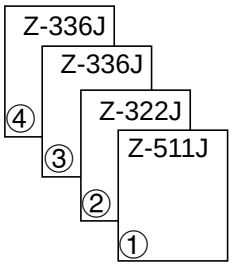
I/O relay address of the Z-336J shall be allocated as shown below.

Allocation details	Use Z-336J as 1st unit		Use Z-336J as 2nd unit	
	I/O relay address	Address to set	I/O relay address	Address to set
Z-336J (optional)*	⊐ 0000	R = 0, S = 0	⊐ 0010	R = 0, S = 4
	⊐ 0001		⊐ 0011	
Dummy (vacant)	⊐ 0002	R = 0, S = 1	⊐ 0012	R = 0, S = 5
	⊐ 0003		⊐ 0013	
Dummy (vacant)	⊐ 0004	R = 0, S = 2	⊐ 0014	R = 0, S = 6
	⊐ 0005		⊐ 0015	
Dummy (vacant)	⊐ 0006	R = 0, S = 3	⊐ 0016	R = 0, S = 7
	⊐ 0007		⊐ 0017	

* Though it is allocated as optional, it will be a dummy area not functionally used.

■ Allocation examples

Below shows switch setting and I/O relay allocation when using two Z-336Js.



■ ON
□ OFF

Mounted position	SW1 (RACK NO)	SWA (SW2)	I/O relay address	Address to set
①	1 2 3 ■ □ □	SWA 1 2 ■ ■	⊐ 0020, ⊐ 0021	R=1, S=0
			⊐ 0022, ⊐ 0023	R=1, S=1
			⊐ 0024, ⊐ 0025	R=1, S=2
			⊐ 0026, ⊐ 0027	R=1, S=3
②	1 2 3 □ ■ □	SWA 1 2 ■ ■	⊐ 0030, ⊐ 0031	R=2, S=0
			⊐ 0032, ⊐ 0033	R=2, S=1
			⊐ 0034, ⊐ 0035	R=2, S=2
			⊐ 0036, ⊐ 0037	R=2, S=3
③	1 2 3 □ □ □	SWA 1 2 ■ ■	⊐ 0000, ⊐ 0001	R=0, S=0
			⊐ 0002, ⊐ 0003	R=0, S=1
			⊐ 0004, ⊐ 0005	R=0, S=2
			⊐ 0006, ⊐ 0007	R=0, S=3
④	1 2 3 □ □ □	SWA 1 2 □ ■	⊐ 0010, ⊐ 0011	R=0, S=4
			⊐ 0012, ⊐ 0013	R=0, S=5
			⊐ 0014, ⊐ 0015	R=0, S=6
			⊐ 0016, ⊐ 0017	R=0, S=7

5-3 JW-50FL

(1) Installation of cable for option module

Install the optional cable on the basic rack panel that installed JW-50FL.

■ **Cable type for option module**

Cable for option module	Maximum number of JW-50FL that can be installed
ZW-2CC	2
ZW-4CC	4
ZW-6CC	5 Note *

* If the ZW-6CC is used, a maximum of 6 optional modules can be installed. However, a limit of 5 optional modules can be used with JW-50FL, due to a parameter (address area) setting limitation.

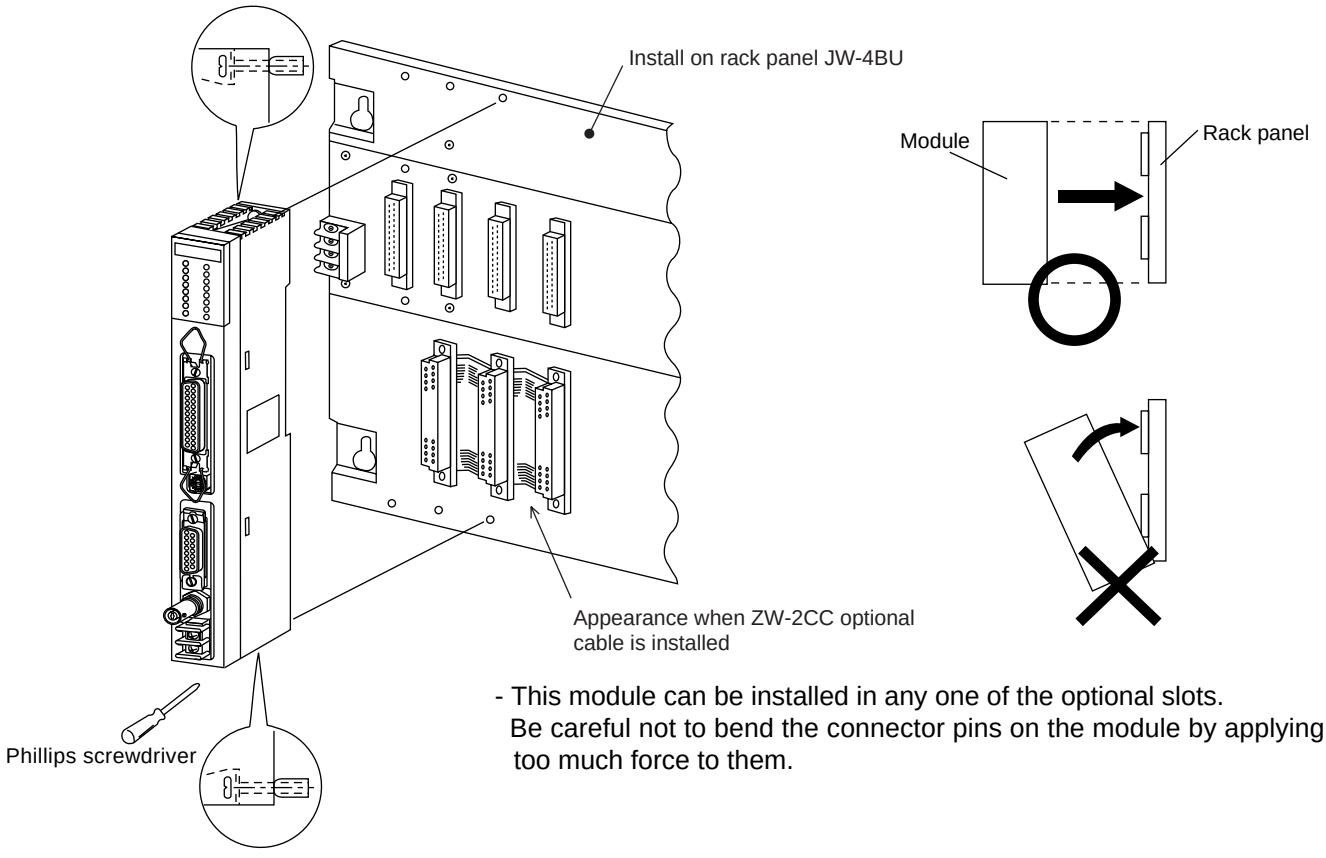
5

■ **Rack panel type**

Model name of the rack panel on which optional cable is installed	Cable for option module (○: Can be installed ×: Cannot be installed)		
	ZW-2CC	ZW-4CC	ZW-6CC
JW-4BU	○	×	×
JW-6BU	○	○	×
JW-8BU	○	○	○
JW-13BU	○	○	○

(2) Installation of JW-50FL

Attach the rack panel using the two attachment screws.
Before installation or removal, make sure to shut OFF the power supply to the PC.



- This module can be installed in any one of the optional slots. Be careful not to bend the connector pins on the module by applying too much force to them.

Chapter 6: Connection/Wiring

6-1 Installing an Ethernet cable

Workers who will install or hook up an Ethernet cable must have special training and knowledge, such as the safety procedures and standards required by this technology (JIS X5252).
We recommend that you contact a specialist for perform any installation or hook up. (Sharp Document Systems Co., Ltd. is providing the Ethernet installation work service, and supplying network products from Allied System Co., Ltd.)

[1] Equipment layout

- The minimum distance between nodes is specified in the regulations. (2.5 m when the 10BASE5 is used.) When connecting devices, be sure to maintain these minimum distances.
  Cables used for 10BASE5 systems have marks every 2.5 m. Position each transceiver directly on one of these marks.
- Mount the transceivers on electrically insulated objects, such as a wooden mounting block.

[2] Wiring

- Separate (60 cm or more) the data transmission cables from power cables.
- Do not run cables near any noise generating source.
- Both ends of the coaxial cable must be terminated with a termination resistance. Make sure to install termination resistance on each end.

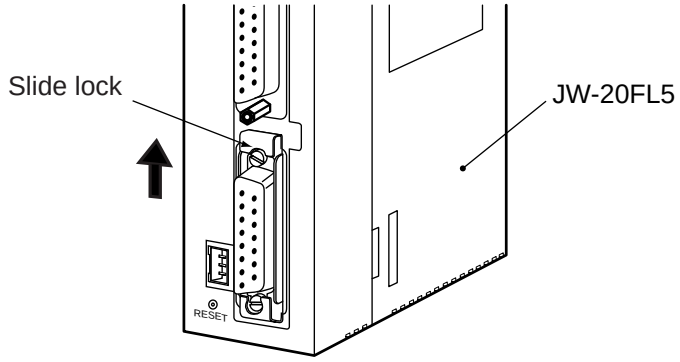
6-2 Connection

[1] Connection of JW-20FL5

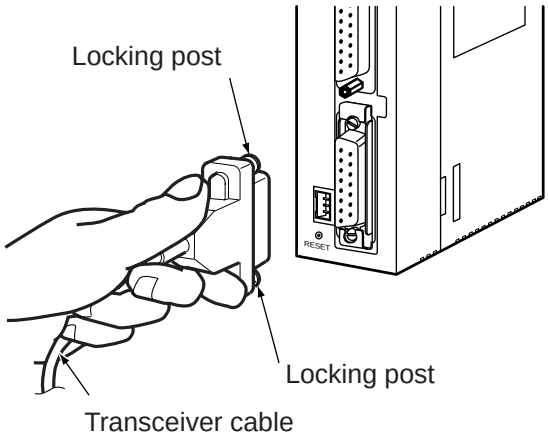
This paragraph describes how to connect 10BASE5 cable to the JW-20FL5.

(1) Connecting the transceiver cable

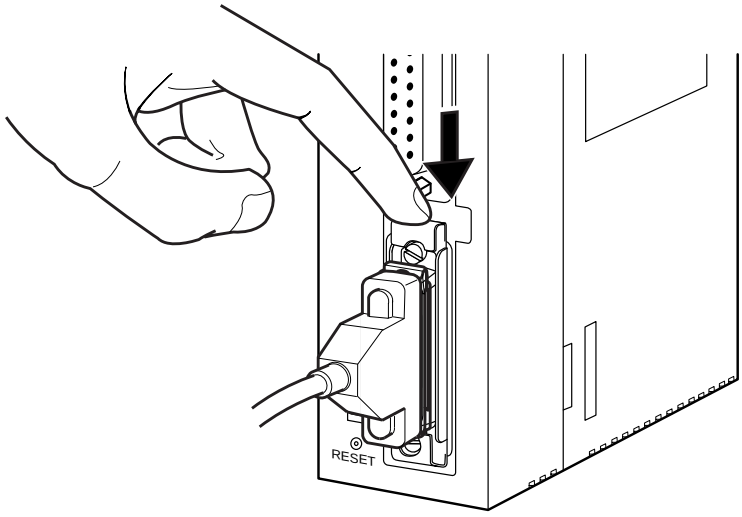
① Slide the lock on the 10BASE5 connector (on the JW-20FL5) up.



② Insert the connector so that the two locking posts on the cable connector match the holes on the slide lock.



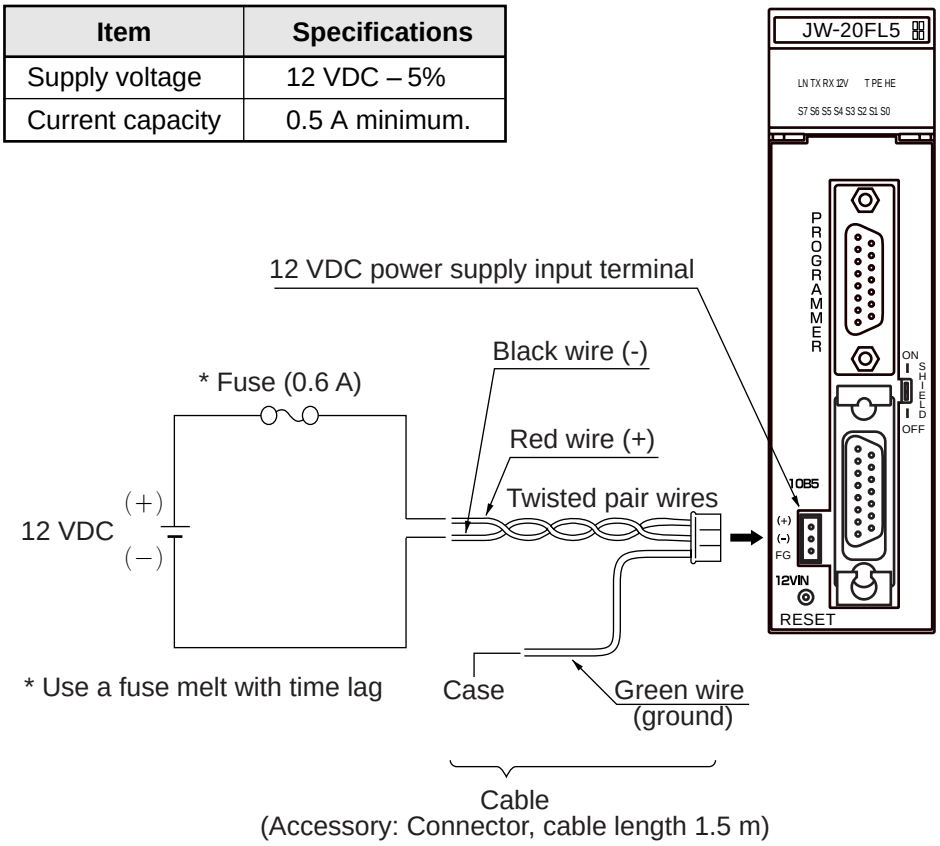
③ Slide the lock down to lock the cable connector.



(2) Wiring the power source

When a 10BASE5 is used, 12 VDC power should be supplied to the transceiver.
Supply power to the 12 VDC power supply input terminal using a commercial constant voltage power supply unit.

Item	Specifications
Supply voltage	12 VDC – 5%
Current capacity	0.5 A minimum.

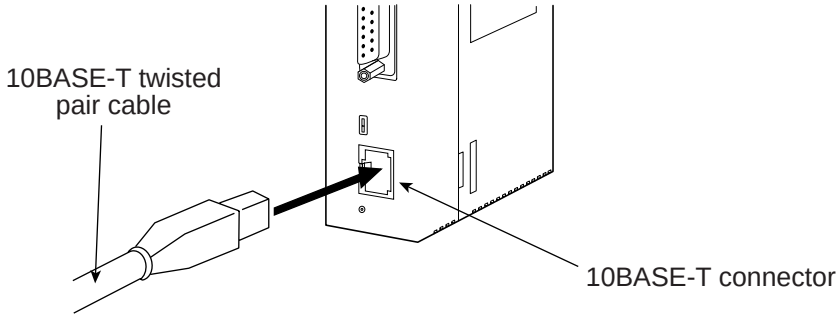


Remarks

- Use a power supply that is dedicated for use by the JW-20FL5.
- Do not reverse the positive and negative connections to the power terminals. Reversing the polarity may damage the JW-20FL5.

[2] When connecting to a JW-20FLT

Connect a 10BASE-T twisted pair cable to the 10BASE-T connector on the JW-20FLT.

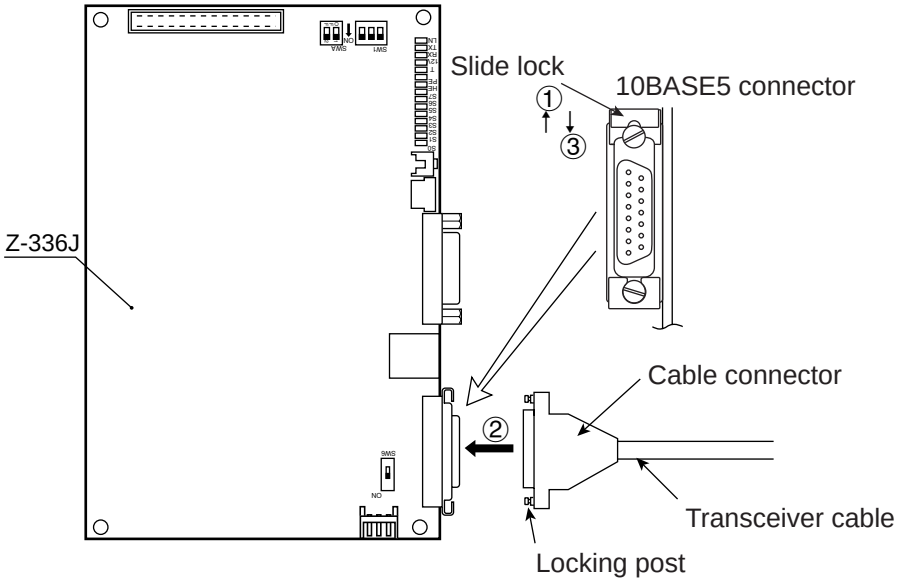


[3] Connection of Z-336J

(1) When connecting to a 10BASE5

This paragraph describes how to connect 10BASE5 cable to the Z-336J.

● **Connecting the transceiver cable**



① Slide the lock on the 10BASE5 connector (on the Z-336J) up.

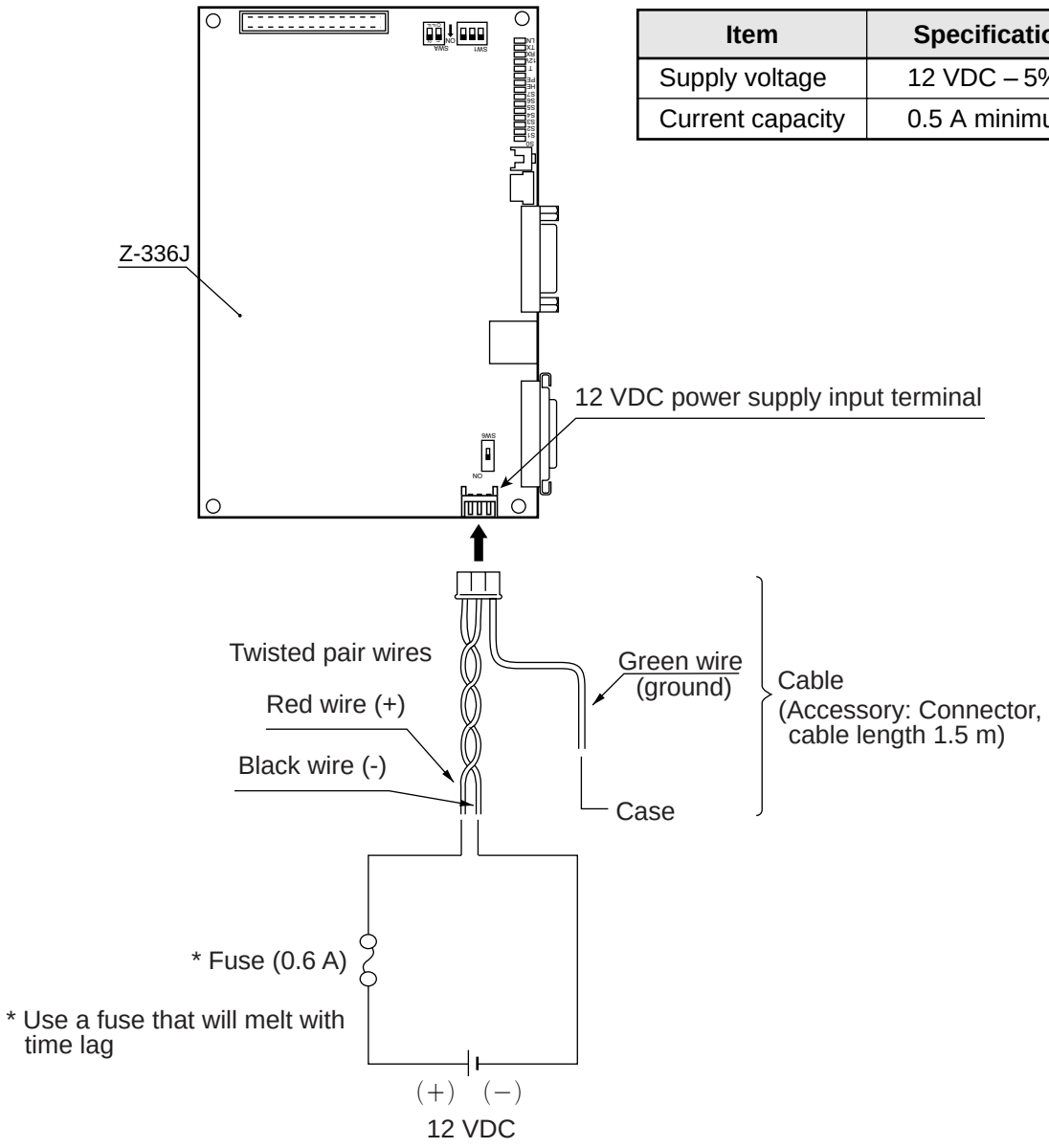
② Insert the connector so that the two locking posts on the cable connector match the holes on the slide lock.

③ Slide the lock down to lock the cable connector.

● **Wiring the power source**

When a 10BASE5 is used, 12 VDC power should be supplied to the transceiver.
Supply power to the 12 VDC power supply input terminal of the Z-336J using a commercial constant voltage power supply unit.

Item	Specifications
Supply voltage	12 VDC – 5%
Current capacity	0.5 A minimum.

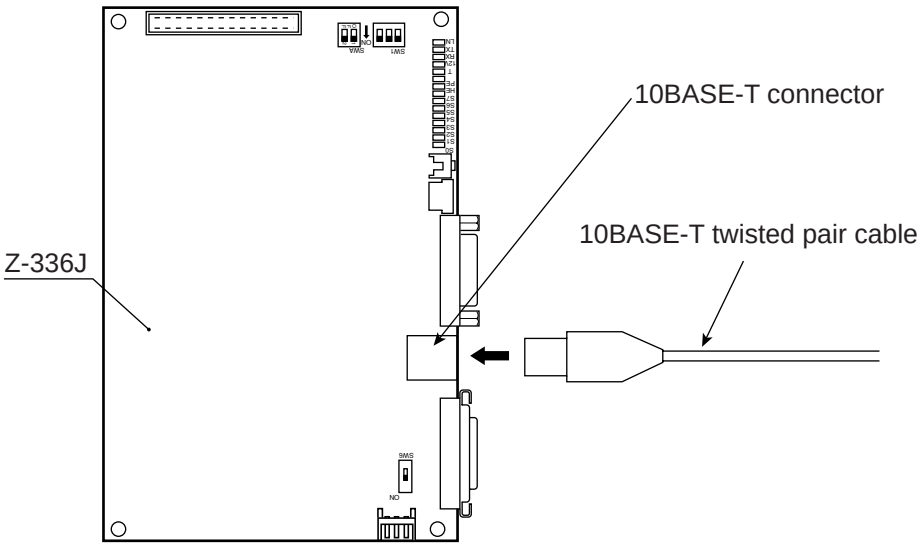


Remarks

- Use a power supply that is dedicated for use by the Z-336J.
- Do not reverse the positive and negative connections to the power terminals. Reversing the polarity may damage the Z-336J.

(2) When connecting to a 10BASE-T

Connect a 10BASE-T twisted pair cable to the 10BASE-T connector on the Z-336J.

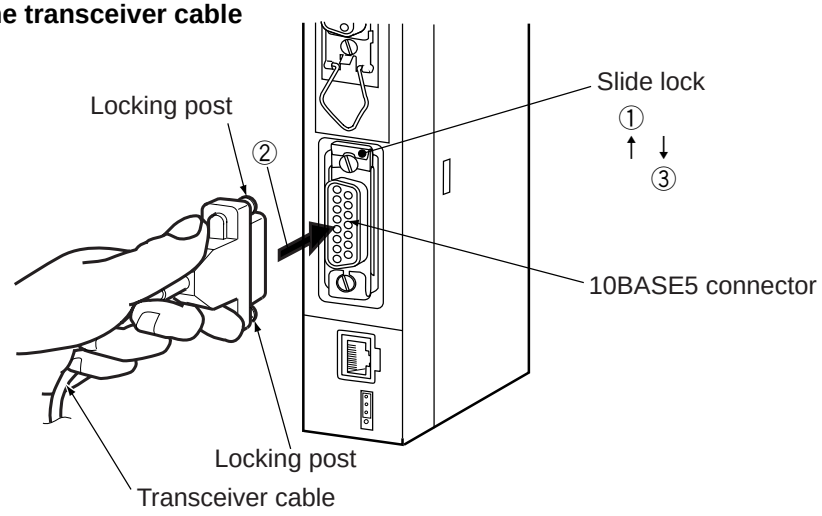


[4] Connection of JW-50FL

(1) Connection of 10BASE5

This paragraph describes how to connect 10BASE5 cable to the JW-50FL.

● **Connecting the transceiver cable**



① Slide the lock on the 10BASE5 connector (on the JW-50FL) up.

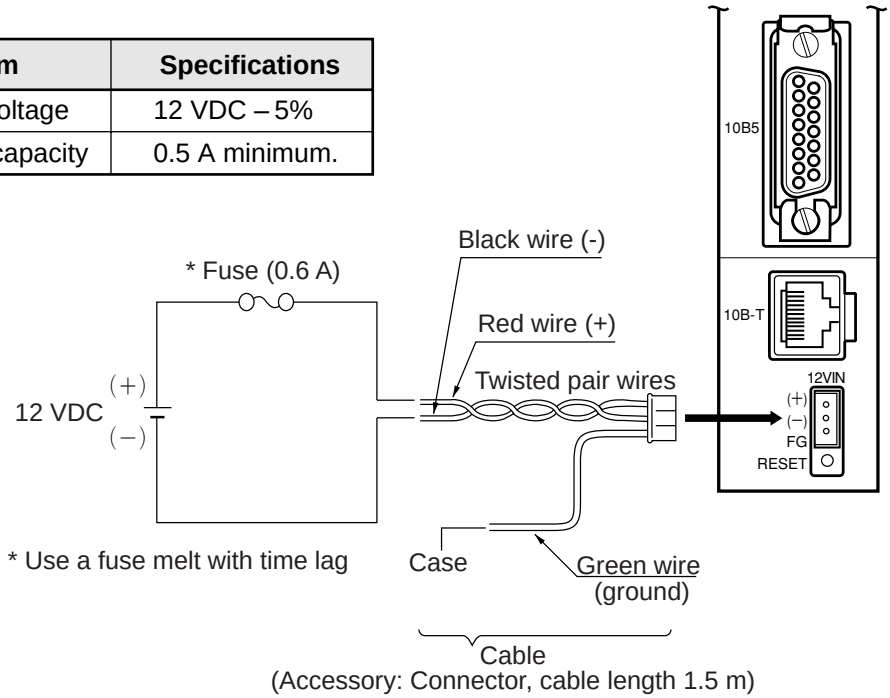
② Insert the connector so that the two locking posts on the cable connector match the holes on the slide lock.

③ Slide the lock down to lock the cable connector.

● **Wiring the power source**

When a 10BASE5 is used, 12 VDC power should be supplied to the transceiver.
Supply power to the 12 VDC power terminals using a commercial constant voltage power supply unit.

Item	Specifications
Supply voltage	12 VDC – 5%
Current capacity	0.5 A minimum.

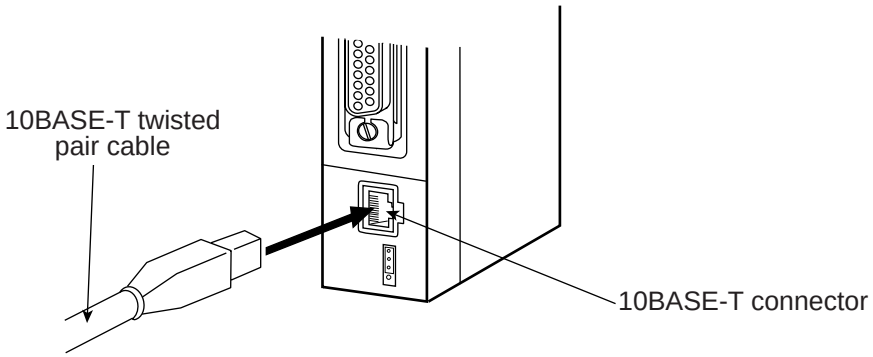


Remarks

- Use a power supply that is dedicated for use by the JW-50FL.
- Do not reverse the positive and negative connections to the power terminals. Reversing the polarity may damage the JW-50FL.

(2) When connecting to a 10BASE-T

Connect a 10BASE-T twisted pair cable to the 10BASE-T connector on the JW-50FL.



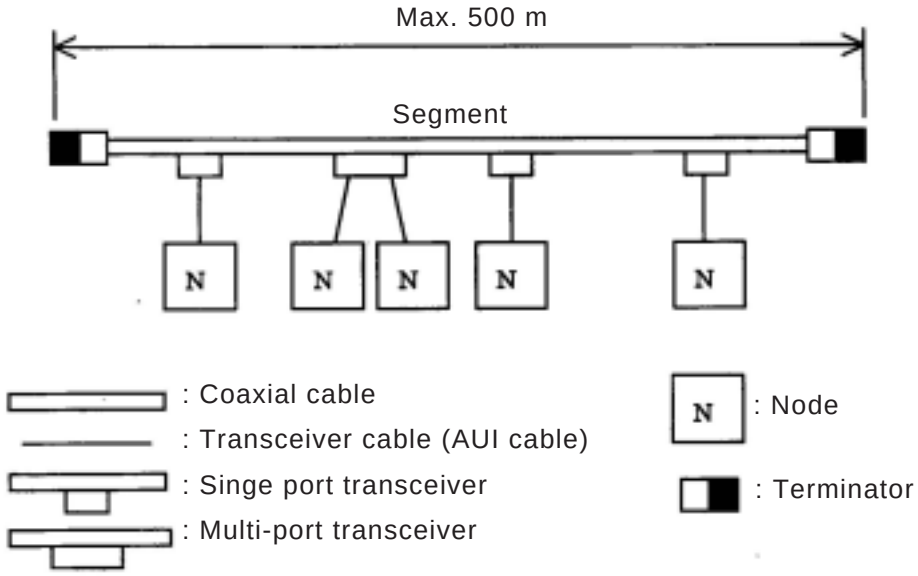
Chapter 7: Use Guide

7-1 Ethernet

[1] 10BASE5 system

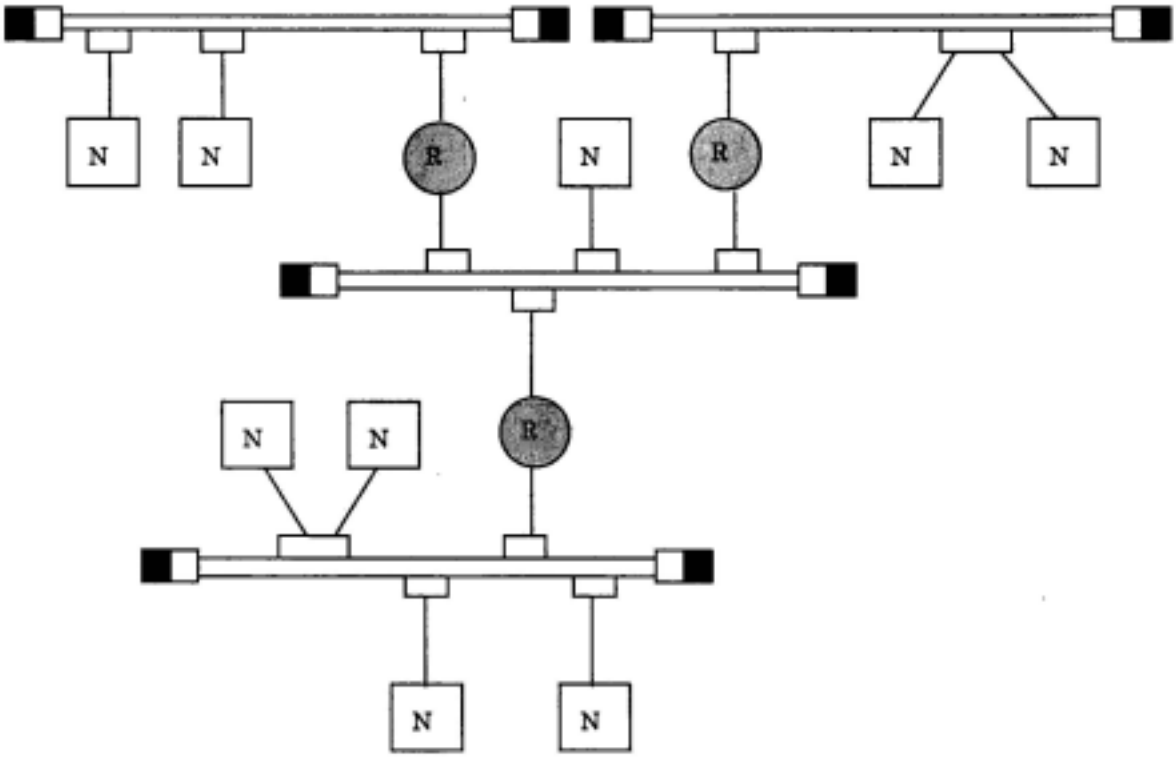
The basic configuration of a10BASE5 system consists of one coaxial cable, with a maximum length of 500 m, and nodes connected to this cable as shown below. Each node is connected to the coaxial cable using a transceiver and a transceiver cable (AUI cable). Two types of transceivers are available: Single port transceivers to connect a single transceiver cable (AUI cable), and multi-port transceivers to connect more than one cable.

This basic configuration unit is referred to as "segment." A maximum of 100 nodes can exist in one segment.



■ Basic connection method for a 10BASE5 system (maximum 500 m without a repeater)

If the distance between nodes is greater than 500 m, connect a repeater as shown below, or to increase the number of segments by branching. The figure below is an example of a system with a maximum of 1500 m of cable. Arrange the configuration so that there are never more than two repeaters between any two nodes along any path.

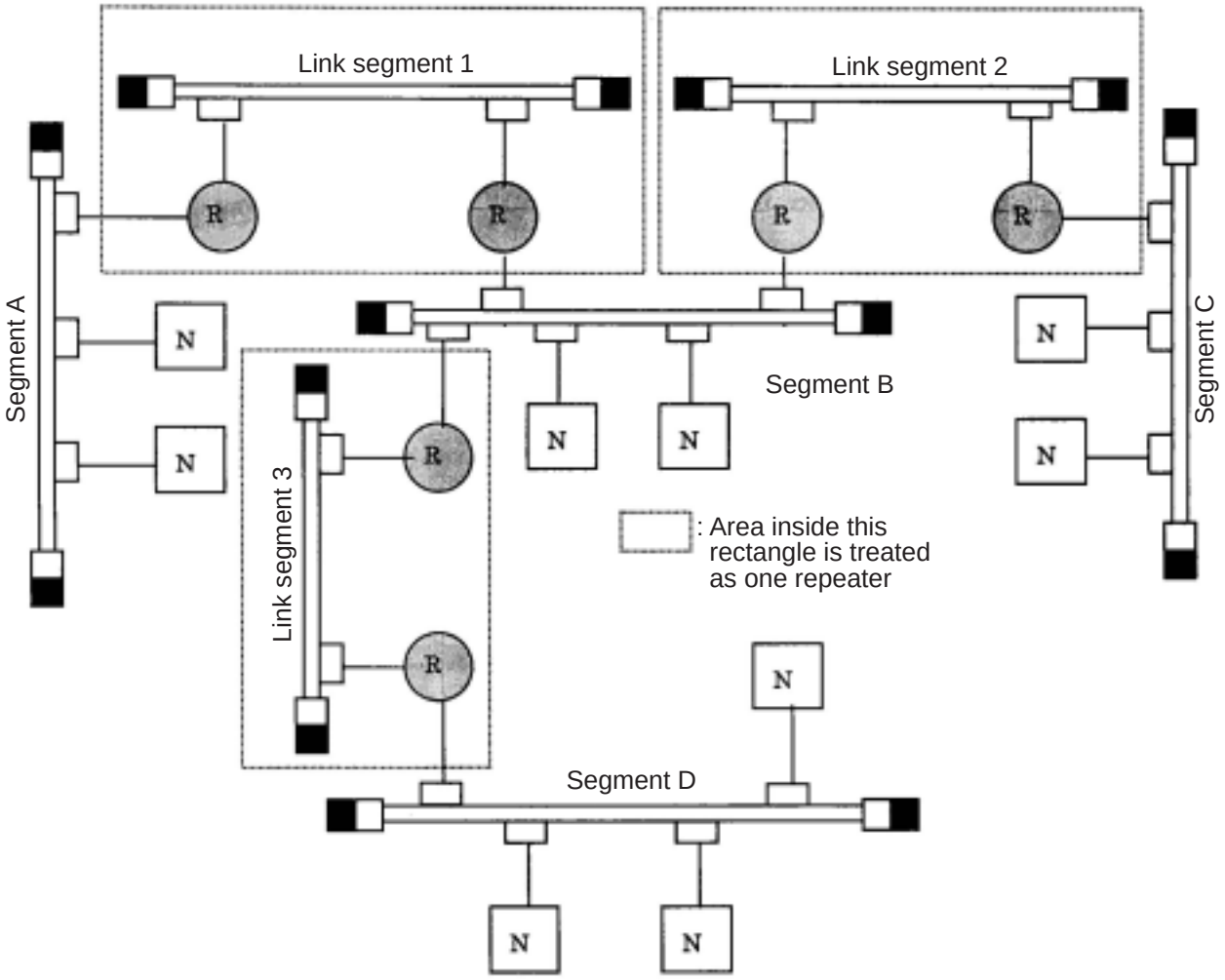


■ Basic connections in a 10BASE5 system (maximum 1500 m using repeaters)

⚠ CAUTION

Connect the repeater to the coaxial cable through a transceiver and transceiver cable. Repeaters can be connected to any transceiver in the same segment. The installation distance between transceivers is considered to be a multiple of "2.5m" lengths. That is, any cable length should be evenly divisible by 2.5 m and not have a remainder.

The example shown below allows up to 2,500m between nodes. In order to extend communication distance, link cables are used (with repeaters at both ends). The maximum length of one link is 500 m. These cables are referred to as "link segments."
The link segments must not connect nodes directly. However, the areas surrounded by dotted lines, including repeaters at both ends, are treated as a single repeater. This does away with the limitation on the total number of repeaters between nodes in a system.



■ Basic connections in a 10BASE5 system (maximum 2500 m using repeaters)

⚠ CAUTION

Each link segment must be 500 m or less.
Do not connect a node to the link segment.
A link segment is treated as one repeater, even though it includes a repeater at each end (enclosed with dotted lines).
No more than two repeaters shall exist along the path between any two nodes.
Only one segment in the network can be connected to more than two repeaters.

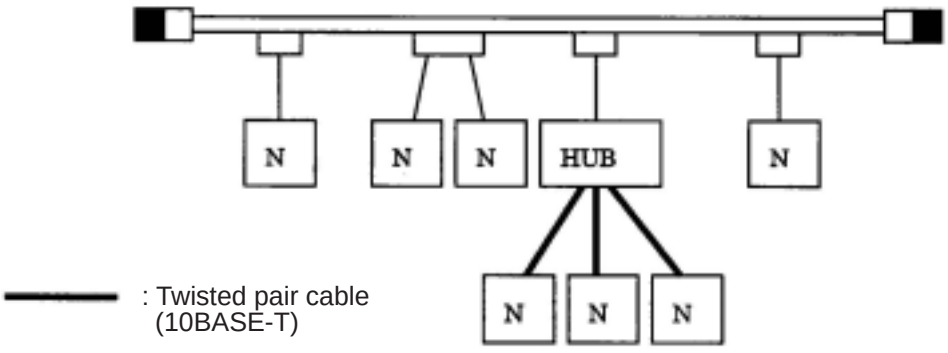
Parameters related to the system configuration are summed up below.

■ General specifications for configuring an Ethernet system

Item	Specifications
Maximum length of a segment	500 m
Maximum number of transceivers that can be installed within one segment	100
Maximum distance between nodes	2500 m or less (except for the transceiver cables)
Maximum number of nodes in a system	254
Maximum length of transceiver cable (AUI cable)	50 m
Cable length between transceiver and repeater	2 m or less (recommended)
Maximum number of repeaters between two nodes	2 (However, a link segment is treated as one repeater, even though it has a repeater at each end.)

[2] 10BASE-T system

Connect a hub to a transceiver using a transceiver cable, and the hub can be connected to multiple nodes. This system is shown below.
When you want to connect a node to a hub, use twisted pair cable (10BASE-T).

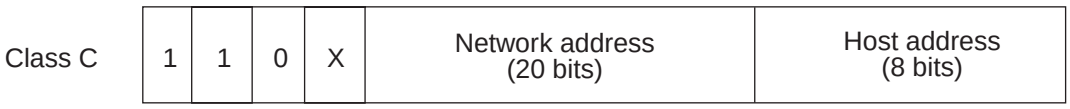


■ Basic connections in a 10BASE-T system

If distance between the nodes is not too great, you can connect a twisted pair cable to a hub directly, without using a coaxial cable or transceiver.

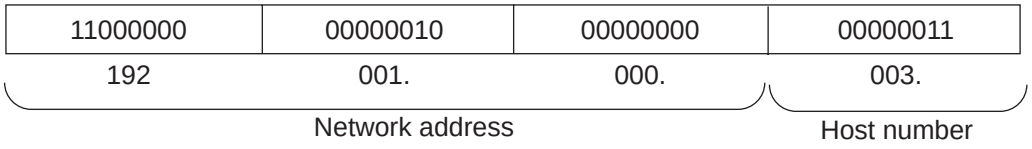
[3] IP addresses on an Ethernet

In general, the UDP/IP uses a 32-bit logical address called the "IP address."
The IP address consists of a network address and a host address. Normally, a class C configuration is used in the FA industry.



■ IP address classifications on an Ethernet

Each 8 bits of the address are separated by a period and can be expressed as a decimal number. For example, class C IP addresses are expressed as follows.



Note: The default address in the FL-net address scheme is 192.168.250.N (N: Node numbers 1 to 254).

■ An example of an IP address on a class C Ethernet

7-2 FL-net

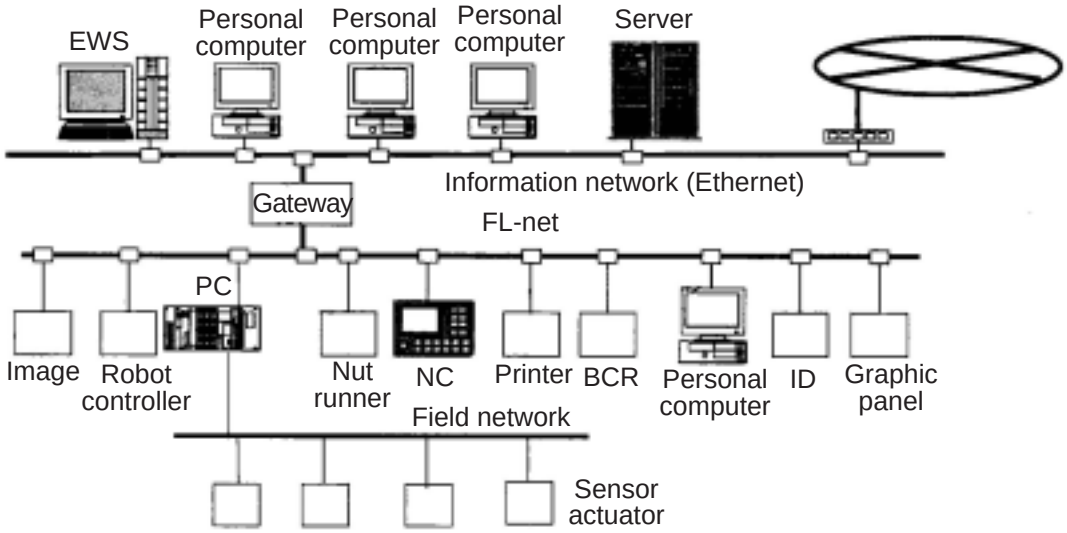
[1] Description of the FL-net

(1) The FL-net concept

FL-net is an FA control network that uses an Ethernet protocol.
FL-net has a cyclic transfer function and a message transfer function.
The basic concepts of the FL-net are as follows.

① Ethernet protocols are used for communication (physically and as conceptual data links) between FA controllers.
② A UDP/IP scheme compatible with the Ethernet is used. It establishes the basic data transfer procedures.
③ While using the basic data transfer methods above, FL-net guarantees data transfer within a specified time by managing and controlling (preventing conflicts) the access to communications by each node in the network.

The goal of the FL-net is to control devices such as programmable controllers (PC), robot controllers (RC), numeric control devices (CNC), and establish an FA control network that allows the exchange of data between personal computers.
The figure below shows the conceptual arrangement of the FL-net.

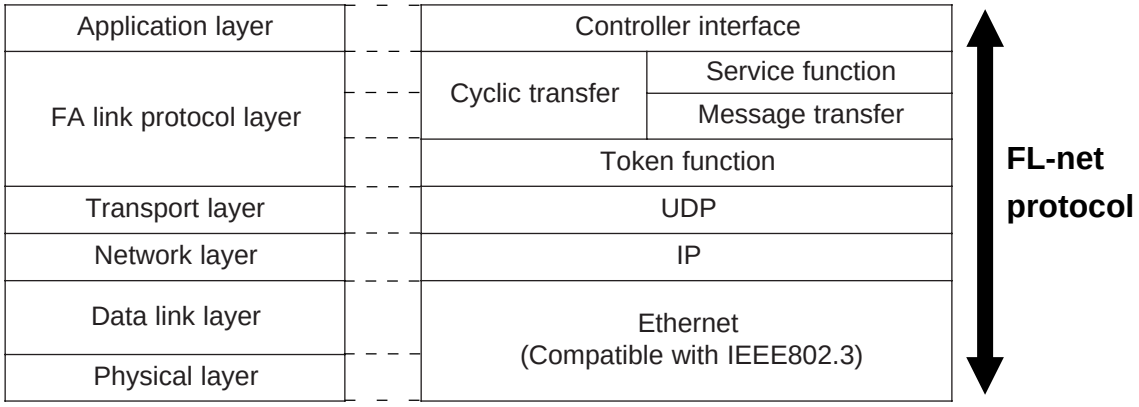


Note: BCR; Bar Code Reader, ID: ID controller

■ The FL-net concept

(2) FL-net protocol

The FL-net consists of the following 6 protocol layers.



■ FA link protocol

Note: The transport layer and network layer use the UDP/IP addressing scheme. The data link layer and physical layer use the Ethernet scheme.

(3) Features of the FL-net transfer system

The FL-net data transfer system has the following features.

① It manages the transmission of data using the Master-less Token method, and prevents communication conflicts.
② It is possible to specify a certain refresh cycle interval as the FL-net circulates a Token.
③ The specified Token is transmitted together with the cyclic data.
④ When starting up, the FL-net sends a token from the node with the lowest node number.
⑤ When a token is not received within a certain interval, the next node sends a token.
⑥ By using the Master-less Token method, even if some nodes are faulty the network will not stop operating.
⑦ The FL-net has an information management table for items such as the operation mode (RUN/STOP) / hardware error (ALARM), so that it can inform other nodes of the operation status.

(4) FL-net's IP address scheme

Each node in the FL-net should be set independently using class C addresses. An "IP address" is an address used to identify a specific node (station) when sending data and using an Internet Protocol (IP). Therefore a unique IP address should be assigned to each node or device. The FL-net uses class C IP addresses.

The default value of an FL-net IP address is "192.168.250.***", where "***" is the node number.

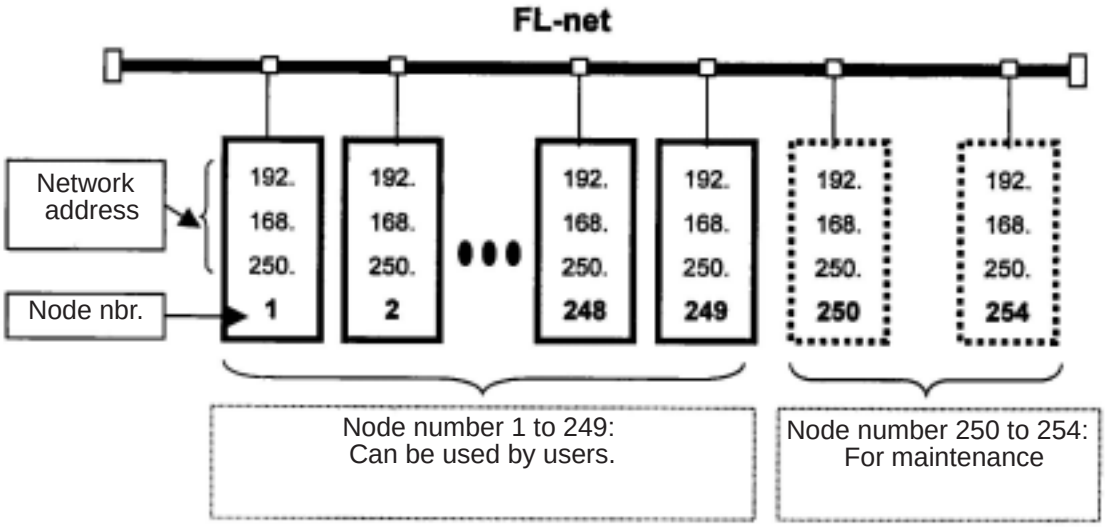
	Network address	Host number (node number)
FL-net IP address	192.168.250	n (n: 1 to 254)

■ FL-net IP address

[2] The number of modules and their node numbers

Up to 254 nodes can be connected. The FL-net uses node numbers from 1 to 254.

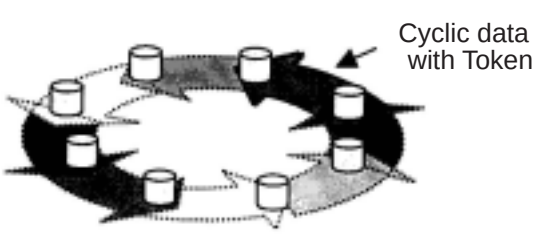
① Node Nos. 1 to 249: For normal equipment in the FL-net.
② Node Nos. 250 to 254: For maintenance of the FL-net.
③ Node No. 255: Used internally by the FL-net. The user cannot assign this number. (It is used to transfer broadcast of the global address.)
④ Node No. 0: Used internally by the FL-net. The user cannot assign this number.



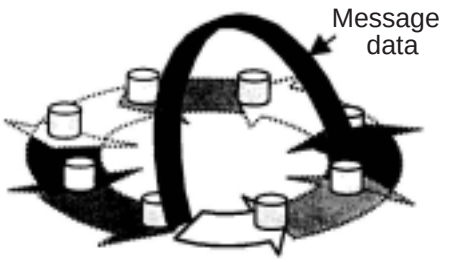
■ The number of nodes and node numbers on the FL-net.

[3] Data communication type

FL-net data communication supports both "cyclic transfer" and "message transfer."



Cyclic transfer

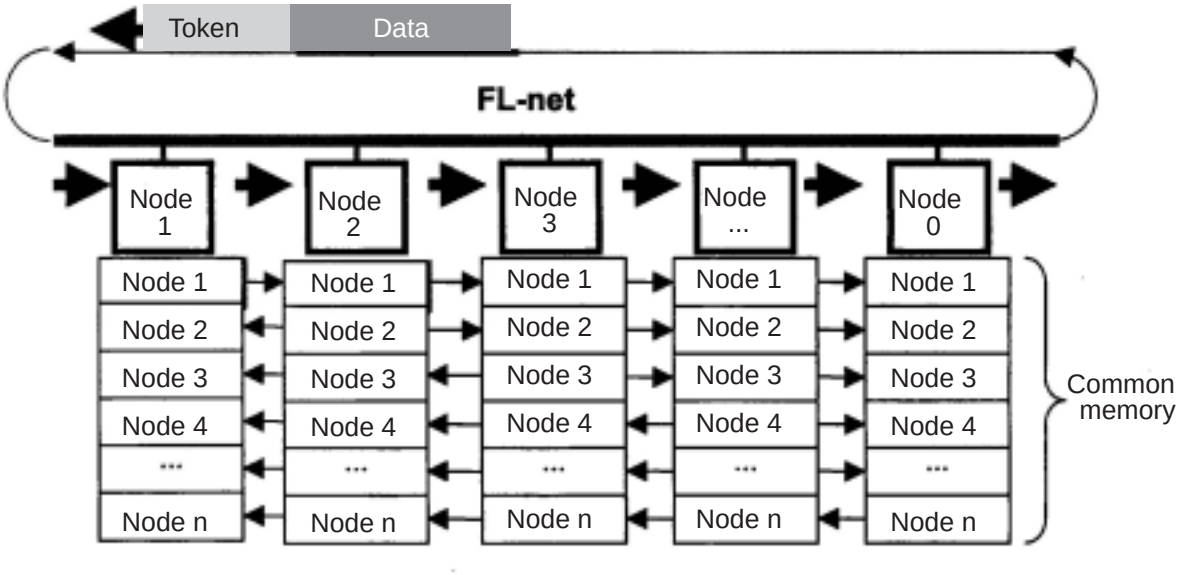


Cyclic transfer + Message transfer

■ **Type of data communication on the FL-net**

(1) Cyclic transfer

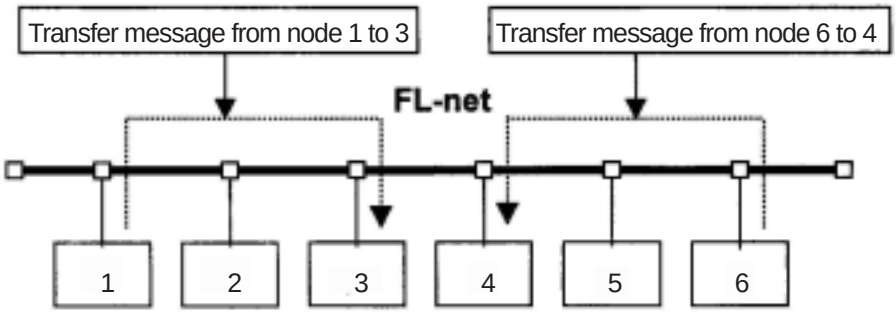
With cyclic transfer, the JW-50FL sends data at certain intervals. Each node can share data through a common (shared) memory.



■ **Example of a common memory and cyclic transfer**

(2) Message transfer

In the message transfer operation, the JW-50FL sends data non-cyclically.
Normally, when a request to send occurs, the FL-net will communicate with a certain node.

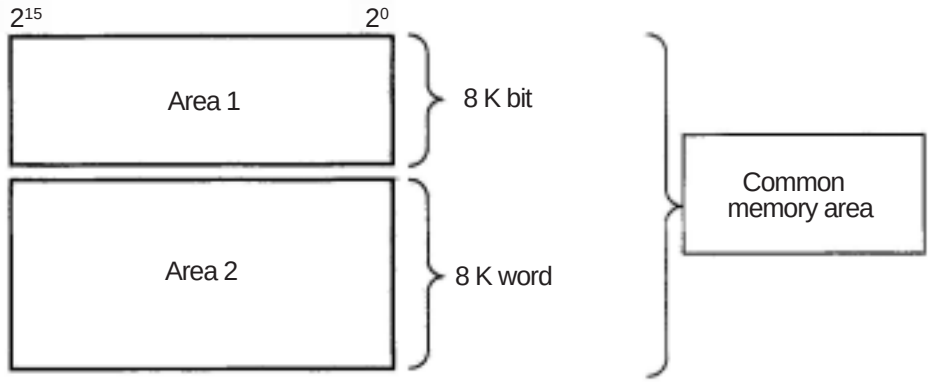


■ **Example of a message transfer**

[4] Transfer data volume

(1) Cyclic transfer

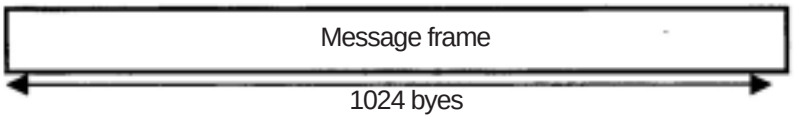
In a cyclic transfer, the FL-net has an 8 K bits + 8 K words = 8.5 K word transfer area.
The maximum amount of data that can be transferred cyclically at one time by one node is 8.5 K words.
One word = 2 bytes.



■ **Cyclic transfer data limit**

(2) Message transfer

The maximum amount of data that can be transferred in one message frame is 1024 bytes (excluding the header section).



■ Message transfer data limit

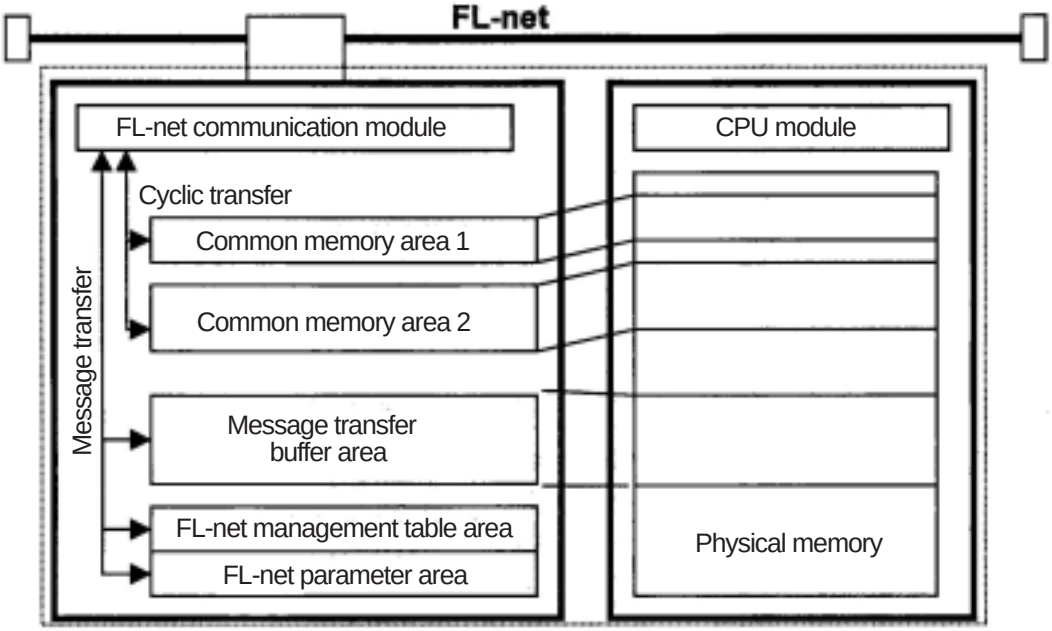
[5] Transfer cycle

In the cyclic transfer operation, the JW-50FL refreshes the common memory almost constantly. The JW-50FL controls the transfer of messages so that the refresh interval of the common memory does not exceed the allowable refresh cycle interval for a single message transfer.

Each node always monitors the messages being transferred throughout the network, waiting to receive a token addressed to itself. If no message transferred by the network within this cycle, the refresh cycle interval is increased to 120 % of its current value.

Due to the monitoring process above, the refresh cycle interval is automatically determined by the number of nodes active on the network.

[6] Data area and memory



Data area and memory

[7] Communication management table

The status of each node is controlled using an individual node management table (maintained by the node itself), a participating node management table, and a network management table.

(1) Local node management table

The settings in each local node management table are controlled by the node itself.

■ **Local node management table**

Item	Number of bytes	Description
Node number	1 byte	1 to 254
Area 1 of common memory: Data top address	2 bytes	Word address (0 to 0x1ff)
Area 1 of common memory: Data size	2 bytes	Size (0 to 0x1ff)
Area 2 of common memory: Data top address	2 bytes	Word address (0 to 0x1fff)
Area 2 of common memory: Data size	2 bytes	Size (0 to 0x1fff)
Upper layer status	2 bytes	RUN/STOP/ALARM/WARNING/NORMAL
Token monitor time	1 byte	In units of 1 msec.
Minimum separation of frames	1 byte	In units of 100 µsec.
Vendor name	10 bytes	Vender name
Manufacturer name	10 bytes	Manufacture model name, device name
Node name (facility name)	10 bytes	Node name by user entry
Protocol version	1 byte	Fixed to 0x80
FA link status	1 byte	Participate/leave
Local node's status	1 byte	Doubled node number detection, etc.

- "0x1ff" is the hexadecimal notation for $1FF_{(HEX)}$.

⇨ For details about the local node management table maintained by the JW-50FL, see page 10-5.

(2) Participating node management table

The participating node management table contains data related to the nodes currently participating in the network.

■ **Participating node management table**

Item	Number of bytes	Description
Node number	1 byte	1 to 254
Upper layer status	2 bytes	RUN/STOP/ALARM/WARNING/NORMAL
Area 1 of common memory: Data top address	2 bytes	Word address (0 to 0x1ff)
Area 1 of common memory: Data size	2 bytes	Size (0 to 0x1ff)
Area 2 of common memory: Data top address	2 bytes	Word address (0 to 0x1fff)
Area 2 of common memory: Data size	2 bytes	Size (0 to 0x1fff)
Allowable refresh cycle time	2 bytes	In units of 1 msec.
Token monitor time	1 byte	In units of 1 msec.
Minimum separation of frames	1 byte	In units of 100 µsec.
Link status	1 byte	Participate/leave

- "0x1ff" is the hexadecimal notation for $1FF_{(HEX)}$.
- For details about the participation node management table maintained by the JW-50FL, see page 10-6.

(3) Network management table

The network management table contains information common to the network.

■ **Network management table**

Item	Number of bytes	Description
Token latch node number	1 byte	Currently token staying node.
Minimum separation of frames	1 byte	In units of 100 µsec.
Allowable refresh cycle time	2 bytes	In units of 1 msec.
Measured refresh cycle time (current value)	2 bytes	In units of 1 msec.
Measured refresh cycle time (maximum value)	2 bytes	In units of 1 msec.
Measured refresh cycle time (minimum value)	2 bytes	In units of 1 msec.

- For details about the network management table maintained by the JW-50FL, see page 10-6.

[8] Cyclic transfer and data area

(1) Outline of the cyclic transfer process

The cyclic transfer process is a function that supports cyclic data exchanges that occur between nodes.

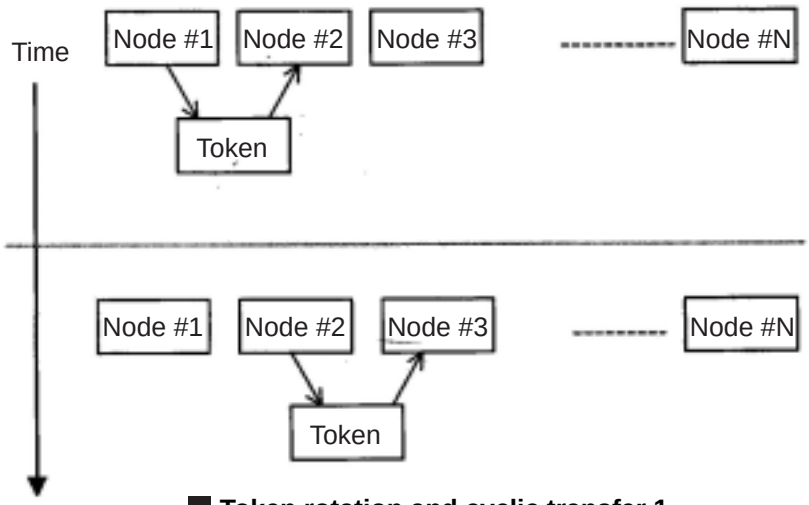
① Establishes the common memory function.

② Transmits when a node receives the token.

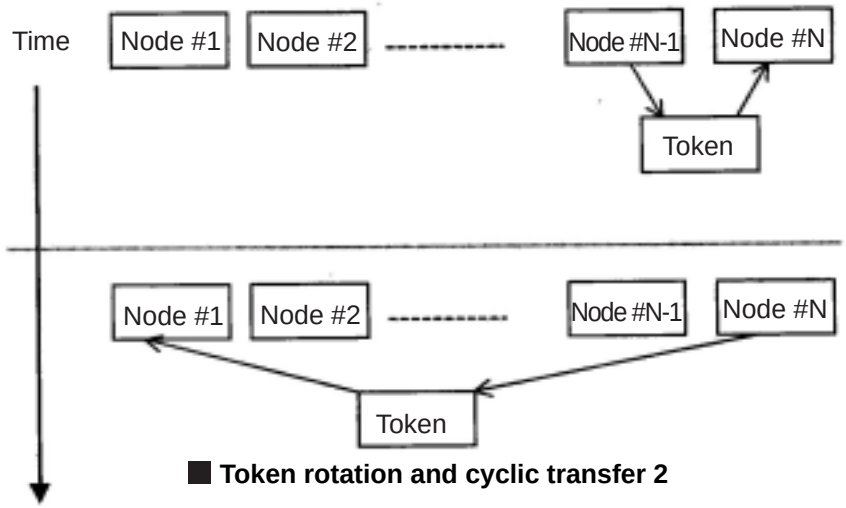
③ Nodes which do not execute cyclic transfers within the network are allowed to participate.

④ When received the token, the node sends all the cyclic data that it needs to send.

- Token: Generally, only one token exists in a network. If more than one token exists in a network, the token with the lowest destination node number has priority and any other token is discarded.
- Token frame: A frame with a token has a destination node number and a transmitting node number. The node whose number matches the destination node number holding the token.
- Token order: The token rotation order is determined by the node numbers. The token is passed to the nodes in order that the nodes were registered in the participating node management table. The node with the highest node number hands the token over to the node with the lowest node number.



■ **Token rotation and cyclic transfer 1**

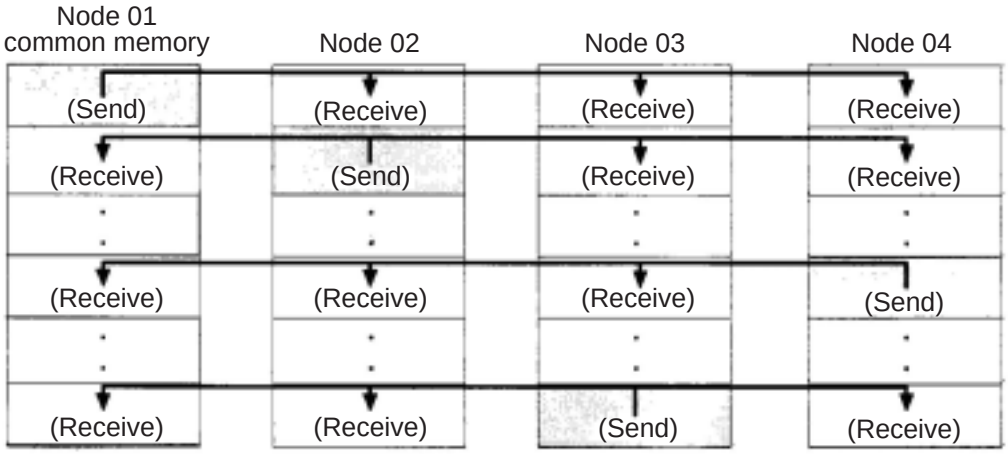


■ **Token rotation and cyclic transfer 2**

(2) Common memory

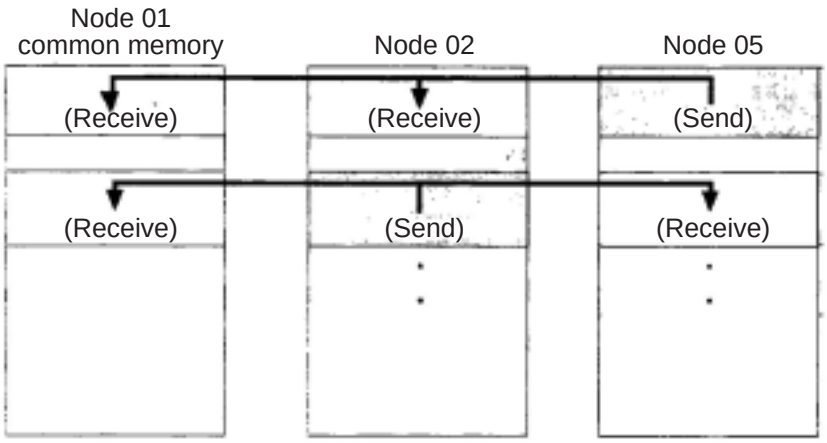
The description of the common memory is as follows.

① The common memory allows the memory to be shared between nodes performing a cyclic transfer.
② Two types of areas (area 1 and area 2) are allocated for each node.
③ If an area needed by a node to send its data exceeds the transfer size allowed for one frame, namely, more than 1024 bytes, the node should use multiple frames to send the data.
④ When receiving multiple frames of related data, as described in point 3) above, the common memory does not renew the common memory details until it has received all of the frames being sent by one node. In other words, it guarantees simultaneity of each node.
(However, if the data in area 2 exceeds 3084 bytes, the JW-50FL cannot guarantee simultaneity for hardware reasons.)
⑤ 8 K bits + 8 K words = 8.5 K words (fixed) of common memory must be reserved in the node communication section.
⑥ The size of areas 1 and 2, used as the sending area for one node in the common memory, can be specified as any size within the maximum size allowed for the area.
⑦ Since each node broadcasts data with a certain interval, it provides a function for sharing the same data throughout the system. Each node in an FL-net is assigned a sending area that does not overlap with the others for exchanging data. In common memory operations, the sending area for one node will be the receiving area for another node.



■ Example 1: Common memory during a cyclic transfer

The common memory can also be used exclusively as a receiving area.

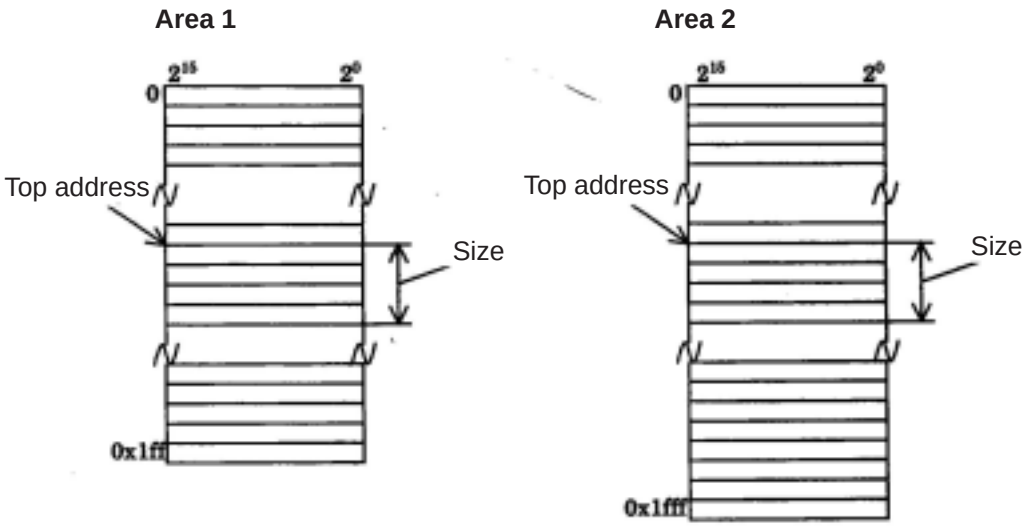


■ Example 2: Common memory during a cyclic transfer

(3) Area 1 and area 2

One node can be allocated two data areas (area 1 and area 2) for common memory. To determine the sending area, specify a top address and the size of the area.

To access the area, use word addresses. Area 1 consists of 0.5 K word. Area 2 consists of 8 K words.



■ Common memory areas 1 and 2

(4) Guarantee of simultaneity

The cyclic transfer divides data into frames, depending on the amount of data being sent.
The FL-net guarantees the simultaneity on common memory of each node using the following procedures.

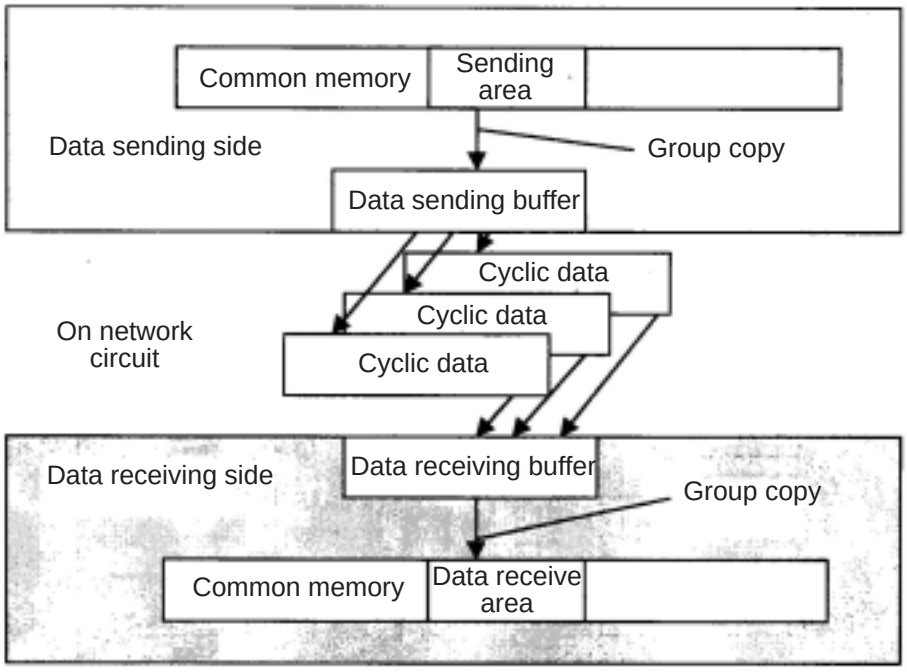
Note: When area 2 exceeds 3084 bytes, the JW-50FL cannot guarantee the simultaneity of the data for hardware reasons.

① Data transmission timing

When a node receives a request to send data from the upper layer, it copies its own cyclic data into a buffer and sends the data, one word after another. When the amount of data being sent is more than will fit in one frame, it divides the data in the buffer into multiple frames before sending.

② Refresh timing when receiving

After a node has received all the cyclic data from some other node, it will refresh the corresponding area while synchronizing with the upper layer.
When a cyclic data is sent as multiple frames, the receiving node will refresh the area after receiving all the frames from the other node. If any of the frames is missing, it will delete all the data from that node.



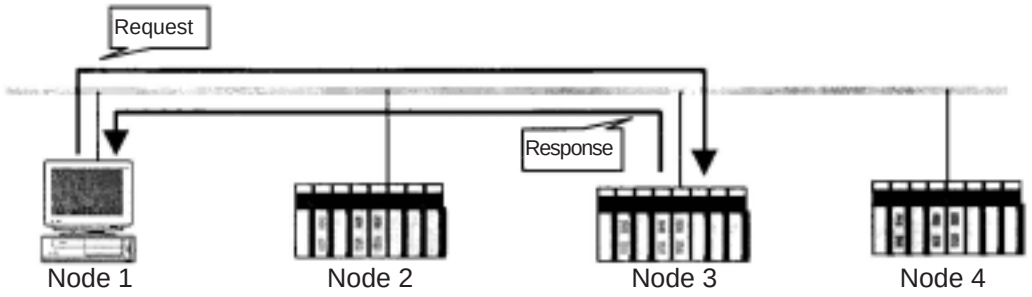
■ Guarantee of simultaneity of data

[9] Message transfers

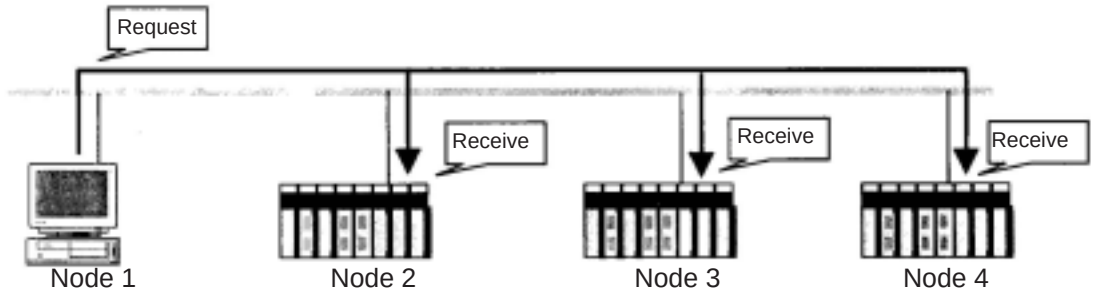
(1) Outline of the message transfer process

The message transfer process is a function that allows asynchronous data to be exchanged between nodes.
The basic operation of the message transfer process is shown below.

① When a node receives a token, it will send a maximum of one frame of message data before the cyclic frame data sending.
② A maximum of 1024 bytes can be sent at one time.
③ The JW-50FL uses an algorithm to prevent nodes from exceeding the allowable refresh cycle interval for message transfers.
④ The JW-50FL has a "1:1" message transfer mode for sending to a specified node, and "1:N" message transfer mode to send to all nodes.
⑤ It has a data send confirmation function used to check whether a target node has correctly received the data in a "1:1" message transfer.



"1:1" data transfer



"1:N" data transfer

■ Outline of the message transfer process

(2) Table of support messages

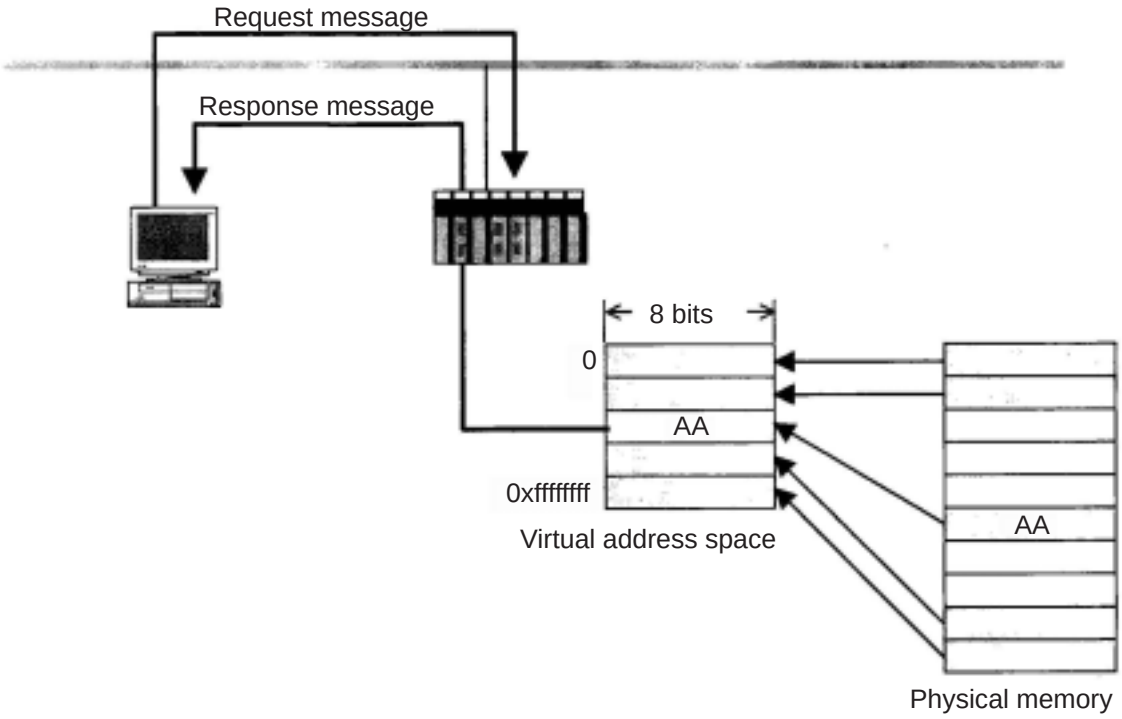
■ **Table of support messages**

No.	Message	Request	Response	Pages to refer
①	Read byte-block data	O	O	7-21
②	Write byte-block data	O	O	7-22
③	Read word-block data	O	O	7-23
④	Write word-block data	O	O	7-24
⑤	Read network parameters	O	O	7-25
⑥	Write network parameters	O	O	7-26
⑦	Start, stop commands	O	O	7-27
⑧	Read profile	O	O	7-28
⑨	Read log data	O	O	7-29
⑩	Clear log data	O	O	7-29
⑪	Return message	O	O	7-30
⑫	Transfer transmission message	O	O	7-30

(3) Details of the support messages

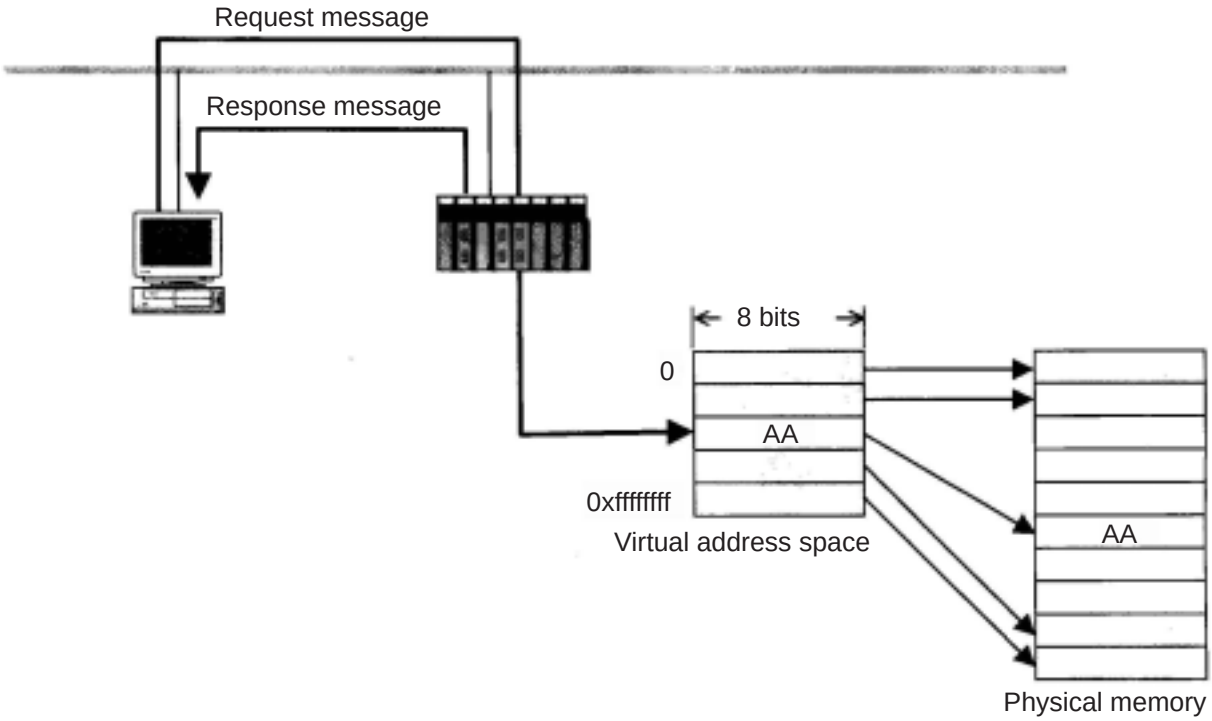
① Read byte-block data

This is a message function used to read a virtual address space (32-bit address space) in a target node on the network, in units of one byte at a time (each address = 8-bits). Be careful because the internal address map varies with the FL-net module you are using.



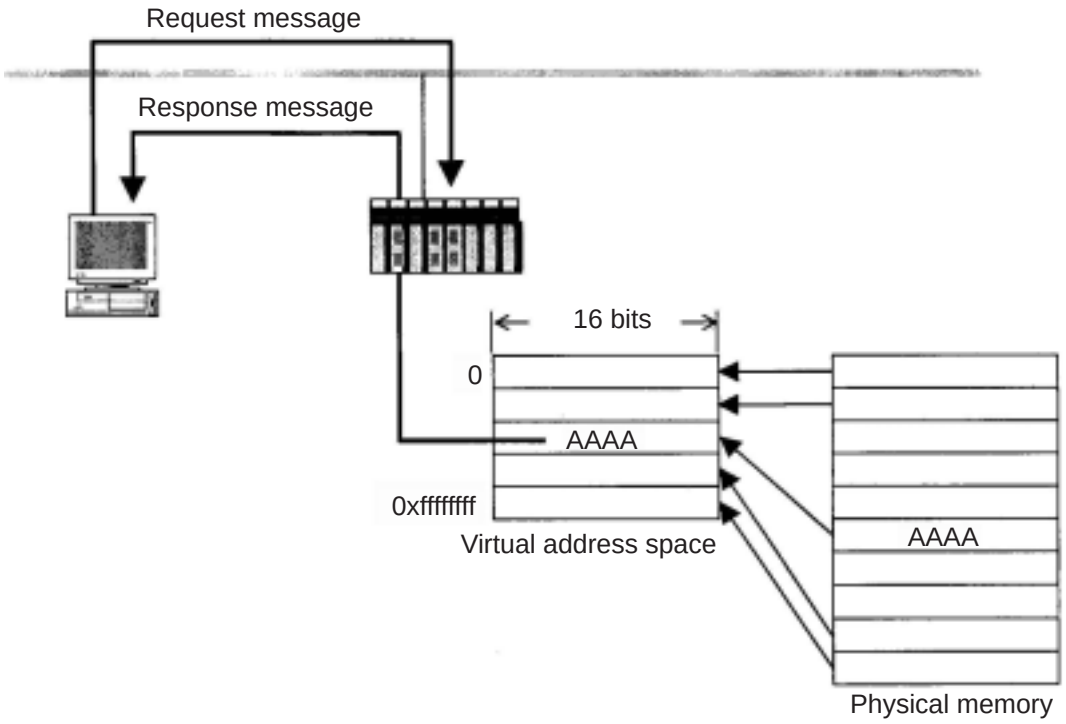
② Write byte-block data

This is a message function used to write to a virtual address space (32-bit address space) in a target node on the network, in units of one byte at a time (each address = 8-bits). Be careful because the internal address map varies with the FL-net module you are using.



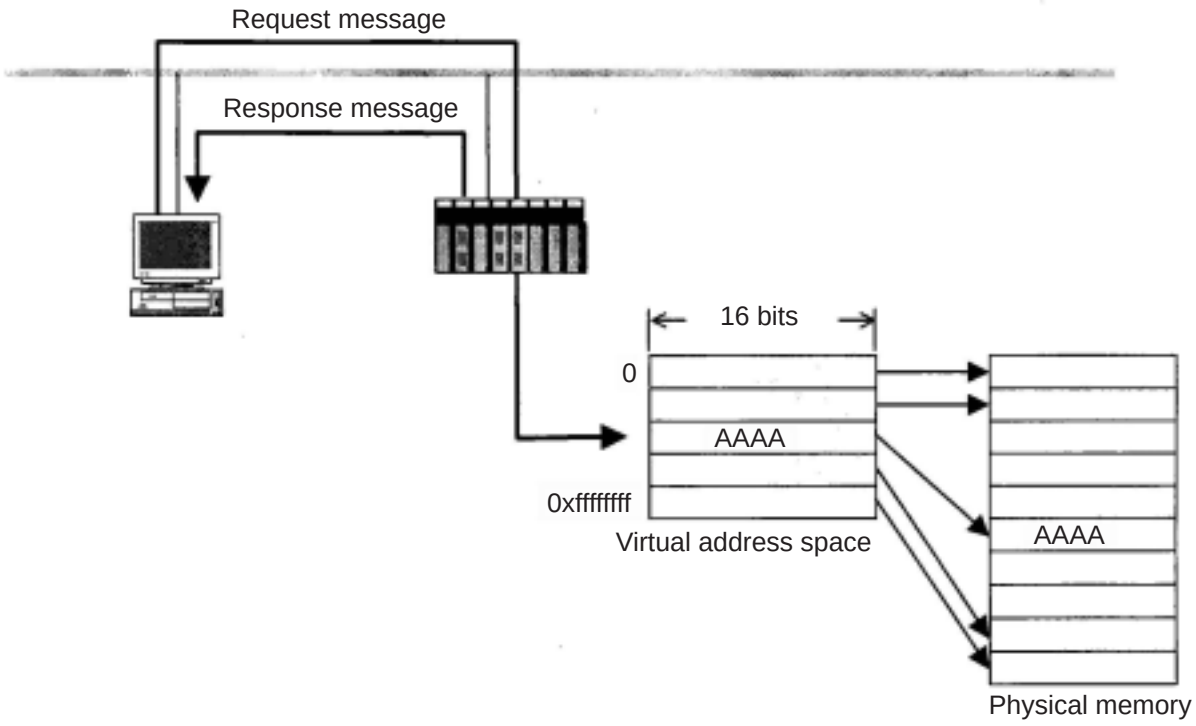
③ Read word-block data

This is a message function used to read a virtual address space (32-bit address space) in a target node on the network in units of one word at a time (one address = 16-bits). Be careful because the internal address map varies with the FL-net module you are using.



④ Write word-block data

This is a message function used to write to a virtual address space (32-bit address space) in a target node on the network in units of one word at a time (one address = 16-bits). Be careful because the internal address map varies with the FL-net module you are using.

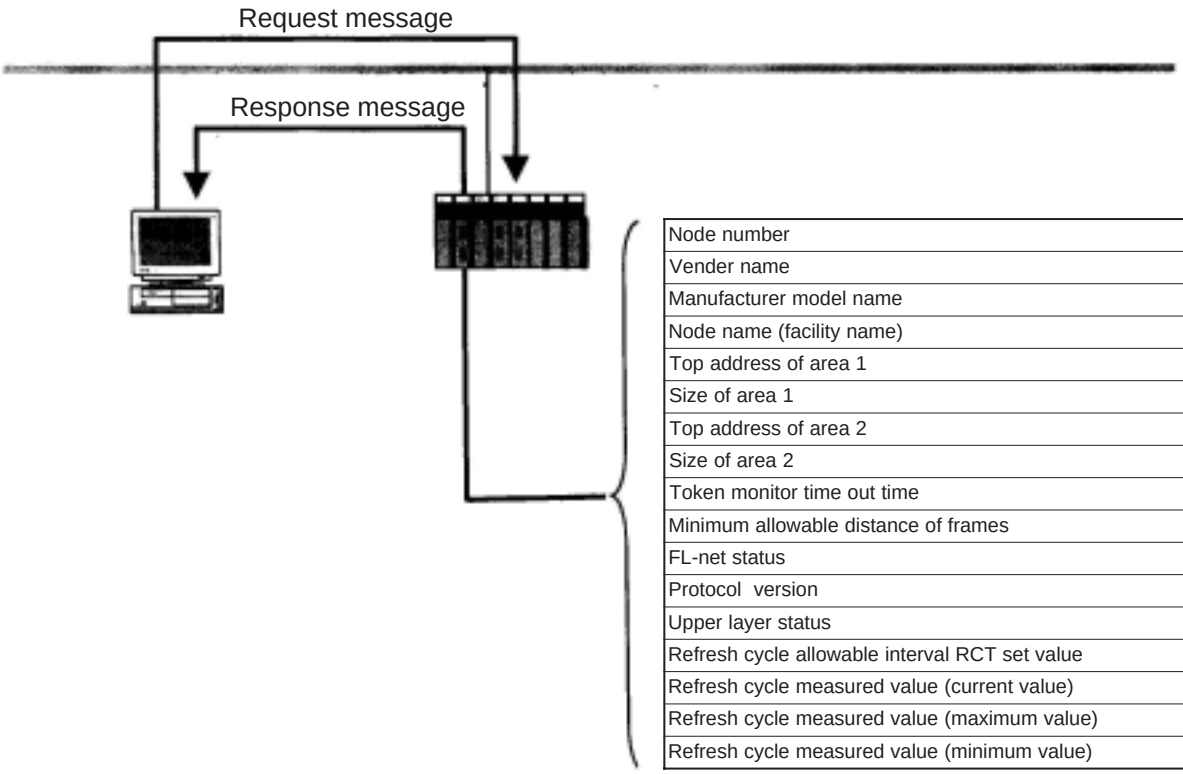


⑤ Read network parameters

This is a function used to read the network parameter data for a target node through the network. It reads the following data.

■ **Network parameter data**

- Node number
- Vender name
- Manufacturer model name
- Node name (facility name)
- Address and size of common memory
- Token monitor interval
- Refresh cycle allowable interval
- Refresh cycle measuring interval (actually measured value)
- Minimum allowable distance between frames
- Upper layer status
- FL-net status
- Protocol version



Node number
Vender name
Manufacturer model name
Node name (facility name)
Top address of area 1
Size of area 1
Top address of area 2
Size of area 2
Token monitor time out time
Minimum allowable distance of frames
FL-net status
Protocol version
Upper layer status
Refresh cycle allowable interval RCT set value
Refresh cycle measured value (current value)
Refresh cycle measured value (maximum value)
Refresh cycle measured value (minimum value)

Network parameter

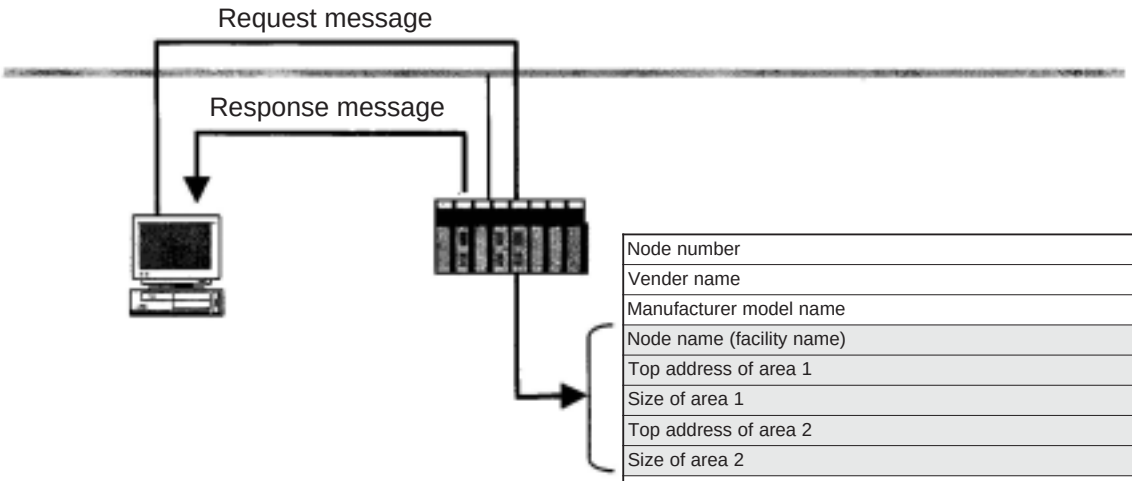
⑥ Write network parameters

This is a function used to change the network parameter data of a receiving node through the network.

The following data can be changed.

- Node name (facility name)
- Address and size of common memory

When the address and size of the common memory is changed, the receiving node leaves the network and re-enters it again. If only the node name is changed, the receiving node will not leave the network.

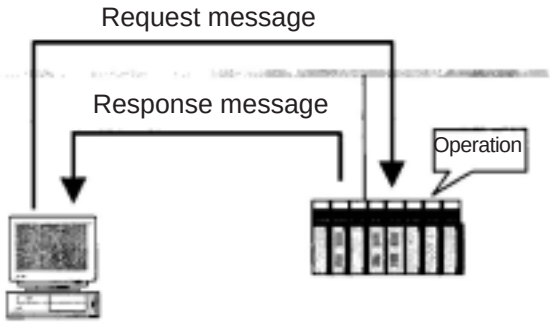


Node number
Vender name
Manufacturer model name
Node name (facility name)
Top address of area 1
Size of area 1
Top address of area 2
Size of area 2
Token monitor time out time
Minimum allowable distance of frames
FL-net status
Protocol version
Upper layer status
Refresh cycle allowable interval RTC set value
Refresh cycle measured value (current value)
Refresh cycle measured value (maximum value)
Refresh cycle measured value (minimum value)

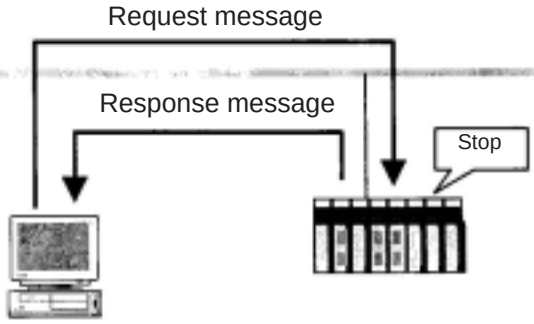
Network parameter

⑦ Start, stop commands

This is a function used to remotely start and stop the operation of equipment that is connected to the FL-net.



Operation instruction

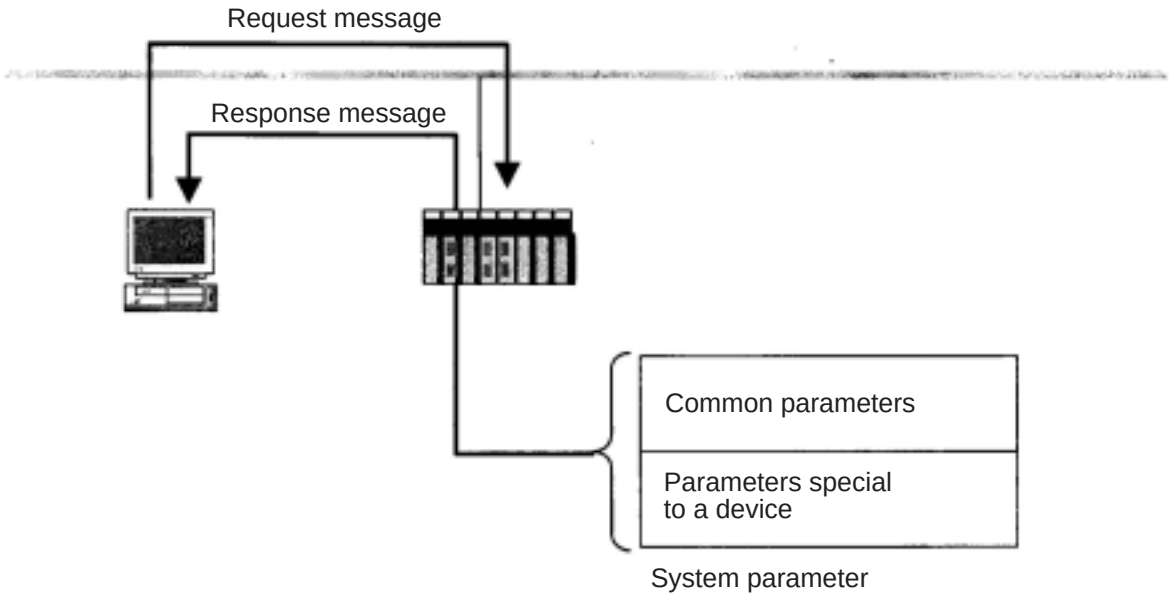


Stop instruction

⑧ Read profile

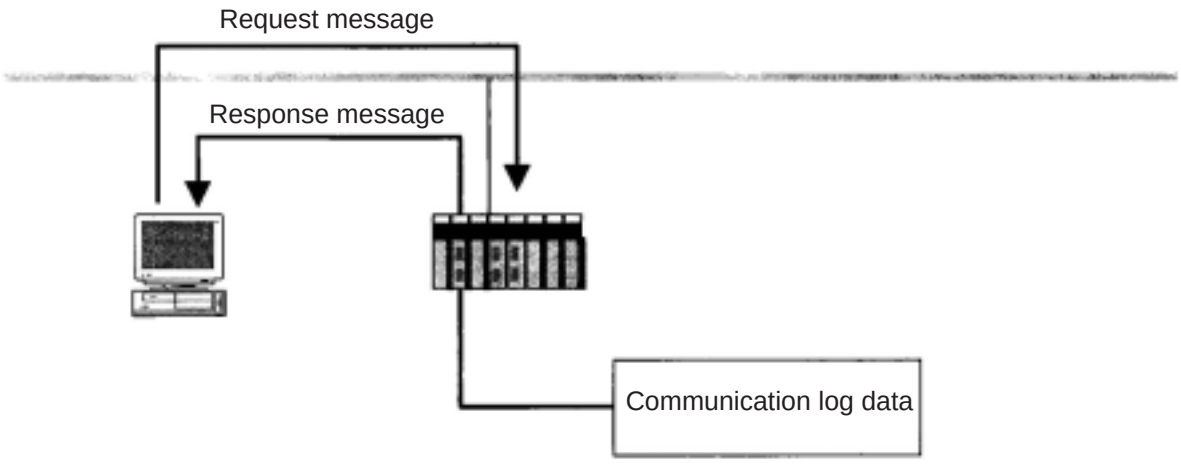
This is a function used to remotely set the system parameters of a device profile that is the data for the receiving node. The following parameters are included in the system parameters.

- Common parameters (essential)
- Parameters peculiar to each device (optional)



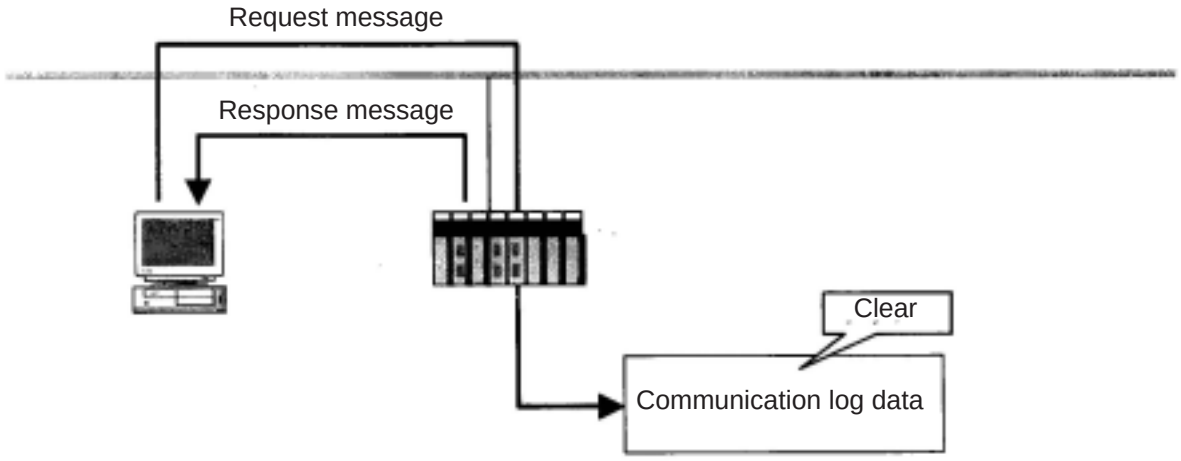
⑨ Read log data

This is a function used to read the log data of the receiving node.



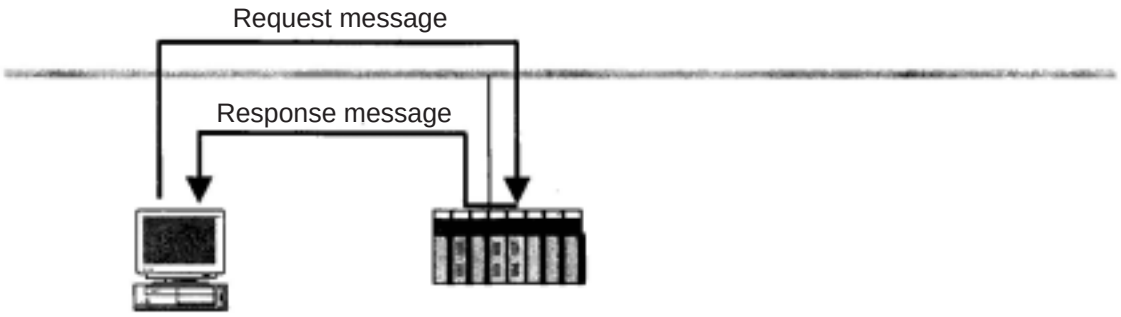
⑩ Clear log data

This is a function used to clear log data of the receiving node.



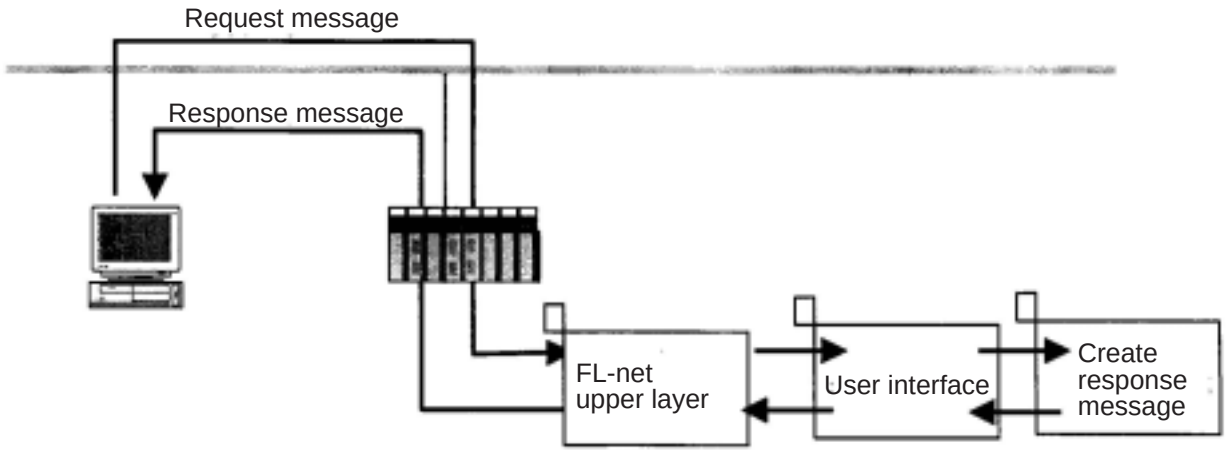
⑪ Return message

This is a function used to send back a message that has been received.
The FL-net automatically returns messages.



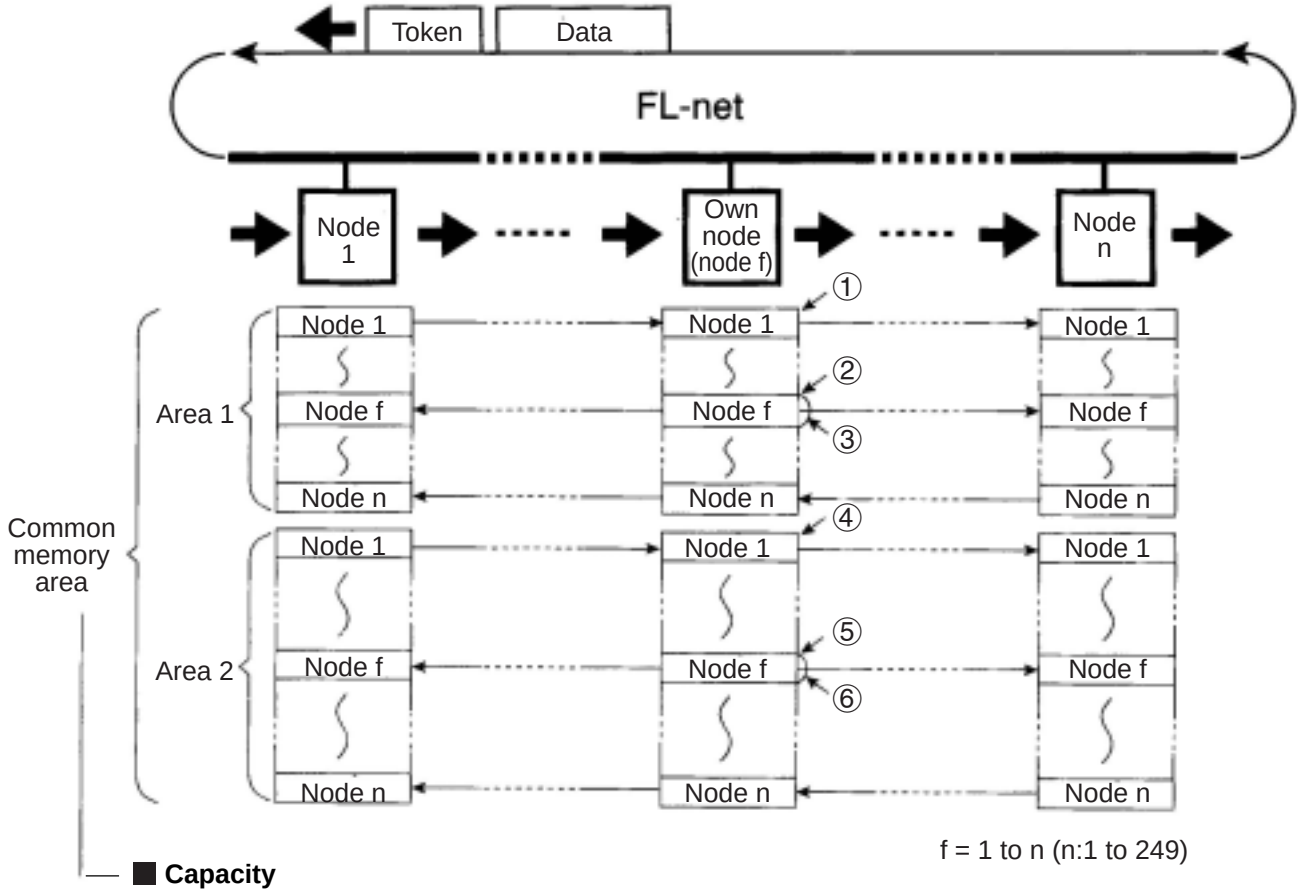
⑫ Transfer transmission message

This is a function used to provide a transmission service to the FL-net upper layer.
This function informs received message to the FL-net upper layer.
The FL-net upper layer supplies this message to the user interface without modification. The user interface has to create a response and returns against this notice.
Some equipment provides a special service for the transmission message. For details, check the services on each device.



Chapter 8: Cyclic Transfer

To execute a cyclic transfer using the FL-net module (JW-20FL5/20FLT and JW-50FL) and FL-net board (Z-336J), the parameters in the common memory areas (area 1 and 2) must be set.



■ Capacity

Common memory area	Area 1	8K bits (8192 bits = 1024 bytes)	8.5K words
	Area 2	8K words (8192 words = 16384 bytes)	

- Nodes used to execute a cyclic transfer must have 8.5 K words of memory available for the common memory area.
- Areas that can be allocated as the common memory area ⇨ Page 8-4 to 8-6.
- Notes on the common memory areas ⇨ Next page.

■ Parameter items to set

Set item		Reference number of the figure above	Parameter address(8)
Area 1	Top address and file number on a PC	①	20 to 22
	Top address of sending area (this node)	②	10 to 11
	Sending data length (this node)	③	12 to 13
Area 2	Top address and file number on a PC	④	24 to 26
	Top address of sending area (this node)	⑤	14 to 15
	Sending data length (this node)	⑥	16 to 17

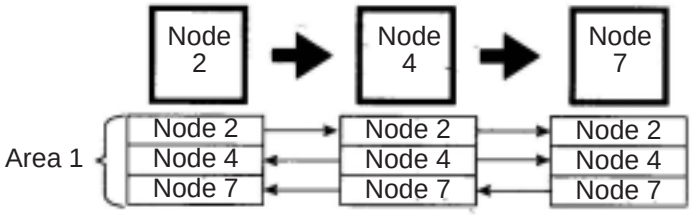
- Set the parameters for use by the module in controlling any module (CPU board) installed in this module. ⇨ See "Chapter 12: Parameters."

Notes on the common memory areas

The common memory areas (area 1 and 2) can also be set using the following procedures.

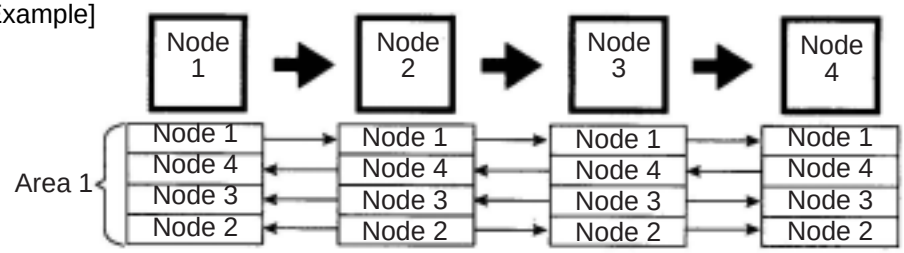
1. There is no need to allocate sequential node numbers.

[Example]



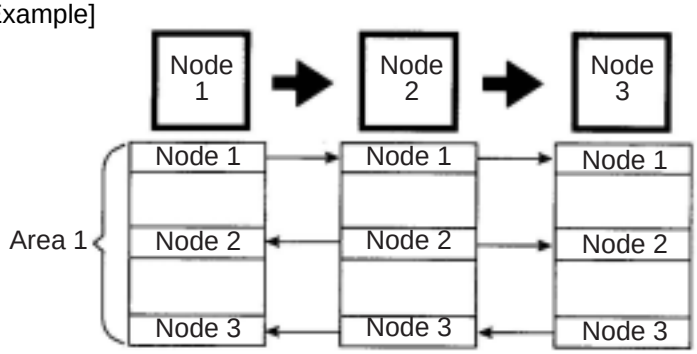
2. There is no need to assign data memory areas in node number order.

[Example]



3. There is no need for continuous data memory areas.

[Example]



8

8-1 Setting procedures

This section describes all of the FL-net module setting procedures. For details about message transfers, the communication management area, and the SEND/RECEIVE function, see the respective chapters.

① Specify a parameter area ⇨ See Chapter 12.

A parameter area is allocated within the control module.

- When the JW20H, JW30H, or J-board is used for a PC, set the parameter area in accordance with the set value of the module No. switch.
- When the JW50H/70H/100H is used for host PC, set switch SW3 on the JW-50FL.

② Enter basic data

Enter basic data (node number, token monitor interval, and minimum separation of frames) in the parameter area (addresses 00 to $05_{(8)}$).

③ Settings related to cyclic transfers

1) Enter the top address for the common memory areas (area 1 and 2)

- The data memory area (see pages 8-4 to 8-6) in which a common memory area can be assigned in the PC varies with the model of the module installed in the PC.
- Enter the top addresses for area 1 and area 2 at parameter addresses 20 to $26_{(8)}$ as word addresses (see pages 8-7 to 8-12).

2) Enter the send area address for this node

- Enter the send area parameters for this node (top address and data length) for areas 1 and 2 at addresses 10 to $17_{(8)}$. Enter a word address (page 8-7 to 8-12) for the top address.

④ Settings related to message transfers ⇨ See Chapter 9 (page 9-2).

When you will not be using the client function in the messages that are sent, this setting is not required.

1) Set the buffer area for transmitted messages

Enter the top address of the transmission buffer, and this area (address +0000 to $4055_{(8)}$: 2094 bytes) will also be set. Enter the top address at parameter addresses 34 to $36_{(8)}$.

2) Enable use of the transmission buffer

Enable/disable the use of this buffer for each message. Use parameter address $37_{(8)}$.

⑤ Assign the communication management area ⇨ See Chapter 10 (page 10-1).

Enter the top address of the communication management area, and the areas (address +000 to $301_{(8)}$: 194 bytes) will also be set. Enter the top address at parameter addresses 20 to $26_{(8)}$.

⑥ Enter the node name

Enter the node name at parameter addresses 40 to $51_{(8)}$, if required.

⑦ Enter a SEND/RECEIVE instruction time-out time ⇨ See Chapter 11.

When using the SEND/RECEIVE function, enter a time-out time (0.1 to 25.5 seconds) at param eter address $60_{(8)}$. If you will not be using the SEND/RECEIVE function, this setting is not required.

⑧ Set the start switch

Change the value at parameter address $77_{(8)}$ from $00_{(H)}$ to $01_{(H)}$, and transfer the parameter setting details from the control module (CPU board) to the FL-net module, to start communication.

8-2 Areas that can be allocated as the common memory area

The data memory area that can be allocated as the common memory areas (area 1 and 2) vary with the model of the module used.

FL-net module	Host PC	Control module	Details
JW-20FL5 JW-20FLT	JW20H	JW-21CU/22CU	See below
	JW30H	JW-31CUH1	Next page
		JW-32CUH1	
		JW-33CUH1/2/3	

FL-net board	Host J-board	CPU board	Details
Z-336J	Z-300 series	Z-311J/312J/313J	See below
	Z-500 series	Z-511J	Next page

FL-net module	Host PC	Memory module	Details
JW-50FL	JW50H	---	Page 8-6
	JW70H JW100H	JW-1MAH	
		JW-2MAH	
		JW-3MAH	
		JW-4MAH	

8

(1) For the JW20H or J-board (Z-300 series)

	Address of the data memory that can be allocated to common memory		
	Bit address(8)	**Byte address(8)**	**File address(8)**
Relay	00000 to 15777	ㅋ0000 to ㅋ1577	000000 to 001577
TMR/CNT contact point	T-C000 to T-0777	ㅋ1600 to ㅋ1777	001600 to 001777
TMR/CNT/MD current value	---	b0000 to b1777	002000 to 003777
Register	---	09000 to 09777	004000 to 004777
		19000 to 19777	005000 to 005777
		29000 to 29777	006000 to 006777
		39000 to 39777	007000 to 007777
		49000 to 49777	010000 to 010777
		59000 to 59777	011000 to 011777
		69000 to 69777	012000 to 012777
		79000 to 79777	013000 to 013777
		89000 to 89777	014000 to 014777
		99000 to 99777	015000 to 015777
Self diagnosis result storage register	---	E0000 to E1777	016000 to 017777

- The top address parameter is a word based address. ⇨ See page 8-8.

(2) For the JW30H or J-board (Z-500 series)

		Address of the data memory that can be allocated to common memory		
		Bit address(8)	**Byte address(8)**	**File address(8)**
File 0	Relay	00000 to 15777	ㅋ0000 to ㅋ1577	000000 to 001577
	TMR/CNT contact point	T-C0000 to T-C0777	ㅋ1600 to ㅋ1777	001600 to 001777
	TMR/CNT/MD current value	---	b0000 to b1777	002000 to 003777
	Register	---	09000 to 09777	004000 to 004777
			19000 to 19777	005000 to 005777
			29000 to 29777	006000 to 006777
			39000 to 39777	007000 to 007777
			49000 to 49777	010000 to 010777
			59000 to 59777	011000 to 011777
			69000 to 69777	012000 to 012777
			79000 to 79777	013000 to 013777
			89000 to 89777	014000 to 014777
			99000 to 99777	015000 to 015777
			E0000 to E5777	016000 to 023777
	Register (Possible to register error history)	---	E6000 to E7777	024000 to 025777
	TMR/CNT current value	---	b2000 to b3777	026000 to 027777
	Expansion relay	20000 to 75777	ㅋ2000 to ㅋ7577	030000 to 035577
	TMR/CNT contact point	T-C1000 to T-C1777	ㅋ7600 to ㅋ7777	035600 to 035777
File 1		---	---	000000 to 037777
File 2		---	---	000000 to 177777
File 3		---	---	000000 to 177777
File $10_{(H)}$		---	---	000000 to 177777
to		to	to	to
File $14_{(H)}$		---	---	000000 to 177777
to		to	to	to
File $2C_{(H)}$		---	---	000000 to 177777

- The relationship between the control module (on which the memory module is installed) and the file memory is as follows.

Control module	File memory
JW-31CUH1	File 0
JW-32CUH1 *	File 0, 1, and 2 (File 2 can be allocated to 000000 to 177777 or 000000 to 077777)
JW-33CUH1	File 0, 1 to 3
JW-33CUH2	File 0, 1 to 3 and 10 to $14_{(H)}$
JW-33CUH3	File 0, 1 to 3 and 10 to $2C_{(H)}$

* File memory of J-board (Z-500 series) is the same as that of JW-32CUH1.

- The top address parameter is a word based address. ⇨ See page 8-9.

(3) For the JW50H/70H/100H

		Address of the data memory that can be allocated to common memory		
		Bit address(8)	**Byte address(8)**	**File address(8)**
File 0	Relay	00000 to 15777	ㅋ0000 to ㅋ1577	000000 to 001577
	TMR/CNT contact point	T-C0000 to 0777	ㅋ1600 to ㅋ1777	001600 to 001777
		T-C1000 to 1777	ㅋ 1300 to ㅋ1477*	001300 to 001477 *
	TMR/CNT/MD current value	---	b0000 to b1777	002000 to 003777
	Register	---	09000 to 09777	004000 to 004777
			19000 to 19777	005000 to 005777
			29000 to 29777	006000 to 006777
			39000 to 39777	007000 to 007777
			49000 to 49777	010000 to 010777
			59000 to 59777	011000 to 011777
			69000 to 69777	012000 to 012777
			79000 to 79777	013000 to 013777
			89000 to 89777	014000 to 014777
			99000 to 99777	015000 to 015777
			E0000 to E0777	016000 to 016777
			E1000 to E1777	017000 to 017777
File 1		---	---	000000 to 177777
File 2		---	---	000000 to 177777
File 3		---	---	000000 to 177777
to		to	to	to
File 7		---	---	000000 to 177777

* ㅋ1300 to ㅋ1477 (file addresses 001300 to 001477) are for shared use with the general-purpose relays. Therefore, if a timer/counter is set up with 1024 points, these file addresses cannot be used for the general-purpose relays.

- The relationship between the PC model (on which the memory module is installed) and the file memory is as follows.

PC model	Integrated memory module	File memory
JW50H	---	File 0, 1 (000000 to 037777)
JW70H JW100H	JW-1MAH	File 0, 1 (000000 to 037777)
	JW-2MAH	File 0, 1 (000000 to 177777)
	JW-3MAH	File 0, 1, 2
	JW-4MAH	File 1 to 7

- The top address parameter is a word based address. ⇨ See page 8-11.

8-3 Parameter settings for cyclic transfers

The parameters related to cyclic transfers are as follows.

	Parameter address(8)	Description
②	10	Top address (word address) of the data sending areas of own node area 1 * - Address 10 is for the lower digit and 11 is for the upper digit.
	11	
③	12	Sending data length (word) of own node area 1 - Address 12 is for the lower digit and 13 is for the upper digit.
	13	
⑤	14	Top address (word address) of the data sending areas of own node area 1 * - Address 14 is for the lower digit and 15 is for the upper digit.
	15	
⑥	16	Sending data length (word) of own node area 1 - Address 16 is for the lower digit and 17 is for the upper digit.
	17	
①	20	Top address (word address) of area 1 on a PC * - Address 20 is for the lower digit and 21 is for the upper digit.
	21	
	22	File number of area 1 on the PC.
④	24	Top address (word address) of area 2 on a PC * - Address 24 is for the lower digit and 25 is for the upper digit.
	25	
	26	File number of area 2 on the PC.

Corresponds to ① to ⑥ on page 8-1. (For parameter details ⇨ See Chapter 12.)

- Enter the top address in word units (* above). ⇨ Pages 8-8 to 8-12.

Ex.: Enter ⊐1600 to ⊐1601 (word address 01C0(H)) as the top address at parameter addresses 10 and 11(8).

Parameter address	(Upper digit) 11	(Lower digit) 10
Set value (HEX)	01	C0

[1] Word addresses used for the top address

The top address entered in the parameters for cyclic transfers on the FL-net are word addresses. Variations among the PLC models that can be installed are shown below.

(1) For the JW20H or J-board (Z-300 series)

	JW20H/J-board (Z-300series) address		Top address set in FL-net cyclic transfer	
	Byte address(8)	File address(8)	Word unit: Octal	Word unit: Hex.
Relay	ㅋ0000, ㅋ0001	000000, 000001	000000	0000
	ㅋ0002, ㅋ0003	000002, 000003	000001	0001
	to	to	to	to
	ㅋ1576, ㅋ1577	001576, 001577	000677	01BF
TMR/CNT contact point	ㅋ1600, ㅋ1601	001600, 001601	000700	01C0
	ㅋ1602, ㅋ1603	001602, 001603	000701	01C1
	to	to	to	to
	ㅋ1776, ㅋ1777	001776, 001777	000777	01FF
TMR/CNT/MD current value	b0000, b0001	002000, 002001	001000	0200
	b0002, b0003	002002, 002003	001001	0201
	to	to	to	to
	b1776, b1777	003776, 003777	001777	03FF
Register	09000, 09001	004000, 004001	002000	0400
	09002, 09003	004002, 004003	002001	0401
	to	to	to	to
	09776, 09777	004776, 004777	002377	04FF
	19000, 19001	005000, 005001	002400	0500
	to	to	to	to
	19776, 19777	005776, 005777	002777	05FF
	29000, 29001	006000, 006001	003000	0600
	to	to	to	to
	29776, 29777	006776, 006777	003377	06FF
	39000, 39001	007000, 007001	003400	0700
	to	to	to	to
	39776, 39777	007776, 007777	003777	07FF
	49000, 49001	010000, 010001	004000	0800
	to	to	to	to
	49776, 49777	010776, 010777	004377	08FF
	59000, 59001	011000, 011001	004400	0900
	to	to	to	to
	59776, 59777	011776, 011777	004777	09FF
	69000, 69001	012000, 012001	005000	0A00
	to	to	to	to
	69776, 69777	012776, 012777	005377	0AFF
	79000, 79001	013000, 013001	005400	0B00
	to	to	to	to
	79776, 79777	013776, 013777	005777	0BFF
	89000, 89001	014000, 014001	006000	0C00
	to	to	to	to
	89776, 89777	014776, 014777	006377	0CFF
	99000, 99001	015000, 015001	006400	0D00
	to	to	to	to
	99776, 99777	015776, 015777	006777	0DFF
Self diagnosis result storage register	E0000, E0001	016000, 016001	007000	0E00
	to	to	to	to
	E1776, E1777	017776, 017777	007777	0FFF

(2) For the JW30H or J-board (Z-500 series)

		JW30H/J-board (Z-500 series) address		Top address set in FL-net cyclic transfer	
		Byte address(8)	File address(8)	Word unit: Octal	Word unit: Hex.
File 0	Relay	ㅋ0000, ㅋ0001	000000, 000001	000000	0000
		ㅋ0002, ㅋ0003	000002, 000003	000001	0001
		to	to	to	to
		ㅋ1576, ㅋ1577	001576, 001577	000677	01BF
	TMR/CNT contact point	ㅋ1600, ㅋ1601	001600, 001601	000700	01C0
		ㅋ1602, ㅋ1603	001602, 001603	000701	01C1
		to	to	to	to
		ㅋ1776, ㅋ1777	001776, 001777	000777	01FF
	TMR/CNT/MD current value	b0000, b0001	002000, 002001	001000	0200
		b0002, b0003	002002, 002003	001001	0201
		to	to	to	to
		b1776, b1777	003776, 003777	001777	03FF
	Register	09000, 09001	004000, 004001	002000	0400
		09002, 09003	004002, 004003	002001	0401
		to	to	to	to
		09776, 09777	004776, 004777	002377	04FF
		19000, 19001	005000, 005001	002400	0500
		to	to	to	to
		19776, 19777	005776, 005777	002777	05FF
		29000, 29001	006000, 006001	003000	0600
		to	to	to	to
		29776, 29777	006776, 006777	003377	06FF
		39000, 39001	007000, 007001	003400	0700
		to	to	to	to
		39776, 39777	007776, 007777	003777	07FF
		49000, 49001	010000, 010001	004000	0800
		to	to	to	to
		49776, 49777	010776, 010777	004377	08FF
		59000, 59001	011000, 011001	004400	0900
		to	to	to	to
		59776, 59777	011776, 011777	004777	09FF
		69000, 69001	012000, 012001	005000	0A00
		to	to	to	to
		69776, 69777	012776, 012777	005377	0AFF
		79000, 79001	013000, 013001	005400	0B00
		to	to	to	to
		79776, 79777	013776, 013777	005777	0BFF
		89000, 89001	014000, 014001	006000	0C00
		to	to	to	to
		89776, 89777	014776, 014777	006377	0CFF
		99000, 99001	015000, 015001	006400	0D00
		to	to	to	to
		99776, 99777	015776, 015777	006777	0DFF
		E0000, E0001	016000, 016001	007000	0E00
		to	to	to	to
		E5776, E5777	023776, 023777	011777	13FF

Continued on the next page

From the previous page

		JW30H/J-board (Z-500 series) address		Top address set in FL-net cyclic transfer	
		Byte address(8)	File address(8)	Word unit: Octal	Word unit: Hex.
File 0	Register (Possible to register error history)	E6000, E6001	024000, 024001	012000	1400
		to	to	to	to
		E7776, E7777	025776, 025777	012777	15FF
	TMR/CNT/MD current value	b2000, b2001	026000, 026001	013000	1600
		to	to	to	to
		b3776, b3777	027776, 027777	013777	17FF
	Expansion relay	ㅋ2000, ㅋ2001	030000, 030001	014000	1800
		to	to	to	to
		ㅋ7576, ㅋ7577	035576, 035577	016677	1DBF
	TMR/CNT contact point	ㅋ7600, ㅋ7601	035600, 035601	016700	1DC0
		to	to	to	to
		ㅋ7776, ㅋ7777	035776, 035777	016777	1DFF
File 1		---	000000, 000001	000000	0000
			to	to	to
			037776, 037777	017777	1FFF
File 2		---	000000, 000001	000000	0000
			to	to	to
			177776, 177777	077777	7FFF
File 3		---	000000, 000001	000000	0000
			to	to	to
			177776, 177777	077777	7FFF
File 10(H)		---	000000, 000001	000000	0000
			to	to	to
			177776, 177777	077777	7FFF
to		to	to	to	to
File 14(H)		---	000000, 000001	000000	0000
			to	to	to
			177776, 177777	077777	7FFF
to		to	to	to	to
File 2C(H)		---	000000, 000001	000000	0000
			to	to	to
			177776, 177777	077777	7FFF

- The relationship between the control module (on which the memory module is installed) and file memory is as follows.

Control module	File memory
JW-31CUH1	File 0
JW-32CUH1 *	File 0, 1, and 2 (File 2 can be allocated to 000000 to 177777 or 000000 to 077777)
JW-33CUH1	File 0, 1 to 3
JW-33CUH2	File 0, 1 to 3 and 10 to 14(H)
JW-33CUH3	File 0, 1 to 3 and 10 to 2C(H)

* File memory of J-board (Z-500 series) is the same as that of JW-32CUH1.

(3) For the JW50H/70H/100H

	JW30H/J-board (Z-500 series) address		Top address set in FL-net cyclic transfer	
	Byte address(8)	File address(8)	Word unit: Octal	Word unit: Hex.
Relay	ㅋ0000, ㅋ0001	000000, 000001	000000	0000
	ㅋ0002, ㅋ0003	000002, 000003	000001	0001
	to	to	to	to
	ㅋ1576, ㅋ1577	001576, 001577	000677	01BF
TMR/CNT contact point *	ㅋ1600, ㅋ1601	001600, 001601	000700	01C0
	ㅋ1602, ㅋ1603	001602, 001603	000701	01C1
	to	to	to	to
	ㅋ1776, ㅋ1777	001776, 001777	000777	01FF
TMR/CNT/MD current value	b0000, b0001	002000, 002001	001000	0200
	b0002, b0003	002002, 002003	001001	0201
	to	to	to	to
	b1776, b1777	003776, 003777	001777	03FF
Register	09000, 09001	004000, 004001	002000	0400
	09002, 09003	004002, 004003	002001	0401
	to	to	to	to
	09776, 09777	004776, 004777	002377	04FF
	19000, 19001	005000, 005001	002400	0500
	to	to	to	to
	19776, 19777	005776, 005777	002777	05FF
	29000, 29001	006000, 006001	003000	0600
	to	to	to	to
	29776, 29777	006776, 006777	003377	06FF
	39000, 39001	007000, 007001	003400	0700
	to	to	to	to
	39776, 39777	007776, 007777	003777	07FF
	49000, 49001	010000, 010001	004000	0800
	to	to	to	to
	49776, 49777	010776, 010777	004377	08FF
	59000, 59001	011000, 011001	004400	0900
	to	to	to	to
	59776, 59777	011776, 011777	004777	09FF
	69000, 69001	012000, 012001	005000	0A00
	to	to	to	to
	69776, 69777	012776, 012777	005377	0AFF
	79000, 79001	013000, 013001	005400	0B00
	to	to	to	to
	79776, 79777	013776, 013777	005777	0BFF
	89000, 89001	014000, 014001	006000	0C00
	to	to	to	to
	89776, 89777	014776, 014777	006377	0CFF
	99000, 99001	015000, 015001	006400	0D00
	to	to	to	to
	99776, 99777	015776, 015777	006777	0DFF
	E0000, E0001	016000, 016001	007000	0E00
	to	to	to	to
	E1776, E1777	017776, 017777	007777	0FFF

Continued on the next page

* To address T-C1000 to 1777, which are TMR/CNT contact points, use ㅋ1300 to ㅋ1477 (file addresses 001300 to 001477) in the general-purpose relays.

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	JW50H/70H/100H address		Top address set in FL-net cyclic transfer	
	Byte address(8)	File address(8)	Word unit: Octal	Word unit: Hex.
File 1		000000, 000001	000000	0000
		to	to	to
		037776, 037777	017777	1FFF
		to	to	to
		177776, 177777	077777	7FFF
File 2		000000, 000001	000000	0000
		to	to	to
		177776, 177777	077777	7FFF
File 3		000000, 000001	000000	0000
		to	to	to
		177776, 177777	077777	7FFF
to	to	to	to	to
File 7		000000, 000001	000000	0000
		to	to	to
		177776, 177777	077777	7FFF

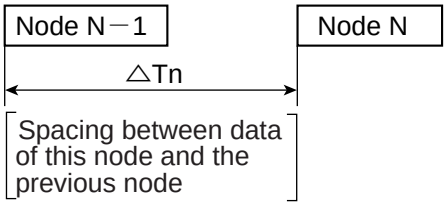
- The relationship between the PC model, the memory module that is installed, and file memory is as follows.

PC model	Integrated memory module	File memory
JW50H	---	File 0, 1 (000000 to 037777)
JW70H JW100H	JW-1MAH	File 0, 1 (000000 to 037777)
	JW-2MAH	File 0, 1 (000000 to 177777)
	JW-3MAH	File 0, 1, 2
	JW-4MAH	File 1 to 7

8-4 Communication time

[1] Token round time

The token round time can be obtained as follows.



Token round time = $\sum_{n=1}^{m} \triangle Tn$

(Total of the space (time) between data from this node and all previous nodes.)

"Tn" varies with the amount of data sent by the previous station. It also varies with the processing timing of the JW-50FL. To get the token round time, perform a calculation based on the rough numbers shown below.

Cyclic transfer capacity per station (word)		Communication time per station (ms)
Area 1	Area 2	
1	1	1.2 to 1.7
2	2	1.3 to 1.7
4	64	1.5 to 1.9
8	128	1.7 to 2.3
16	256	2.2 to 3.0
32	464	3.0 to 4.2
32	512	3.6 to 4.3
64	960	4.2 to 6.1
64	1024	5.0 to 6.7
96	1440	5.1 to 8.1
96	1536	6.5 to 9.0
128	1920	6.8 to 10.1
128	2048	8.0 to 10.6
160	2560	8.6 to 13.3
256	4096	13.9 to 18.4

- The values above are for the JW-50FL. For other nodes, see each manual.

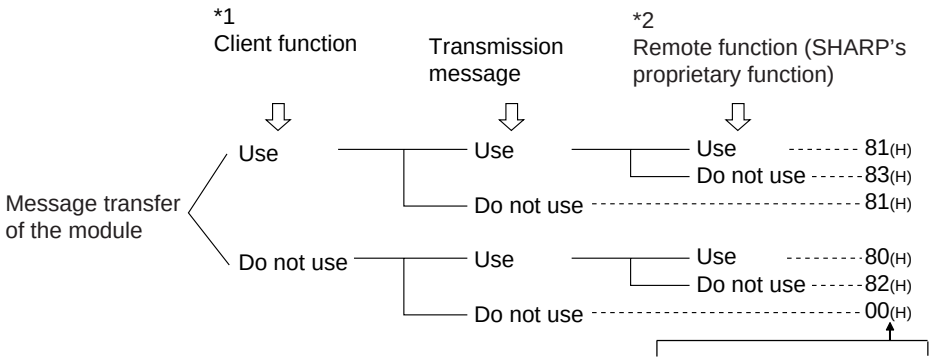
When message transfers are used, the communication time will be longer. However, the FL-net restricts the token round time when using message transfers to 1.2 times that of a message transfer.

[2] Round time when a communication error occurs

If a station goes down, the node immediately after the dead node will issue a token. This time depends on the token monitor time of the dead node. Therefore, if one station goes down, its cycle will result in a longer token monitor time than the dead node would have used. If two consecutive nodes go down simultaneously, the next node will issue a token. In this case the time required to issue a new token will be the total of the token monitor time of both dead nodes. If more than two consecutive nodes go down, a similar calculation will apply.

Chapter 9: Message Transfers

The message transfer method used with the module classifies messages as "client function," "transmission type message," or "remote function" (SHARP's proprietary function). These classifications can be assigned by setting each type to "Used" or "Not used," as shown below.



Message			Selection of transmission buffer				
			80(H)	81(H)	82(H)	83(H)	*3
Message other than transmission			×	○	×	○	
Transmission message	Messages other than SHARP's proprietary message format		○	○	○	○	
	SHARP's proprietary format	Computer link function	○	○	○	○	
		Remote function	○	○	×	×	

O: Usable X: Not usable

*1: The client function is used to send a message to a target node and receive a response from that node. When not sending a transmission message, set the client function to "Not used."

*2: The remote function includes the remote programming and remote monitoring functions.

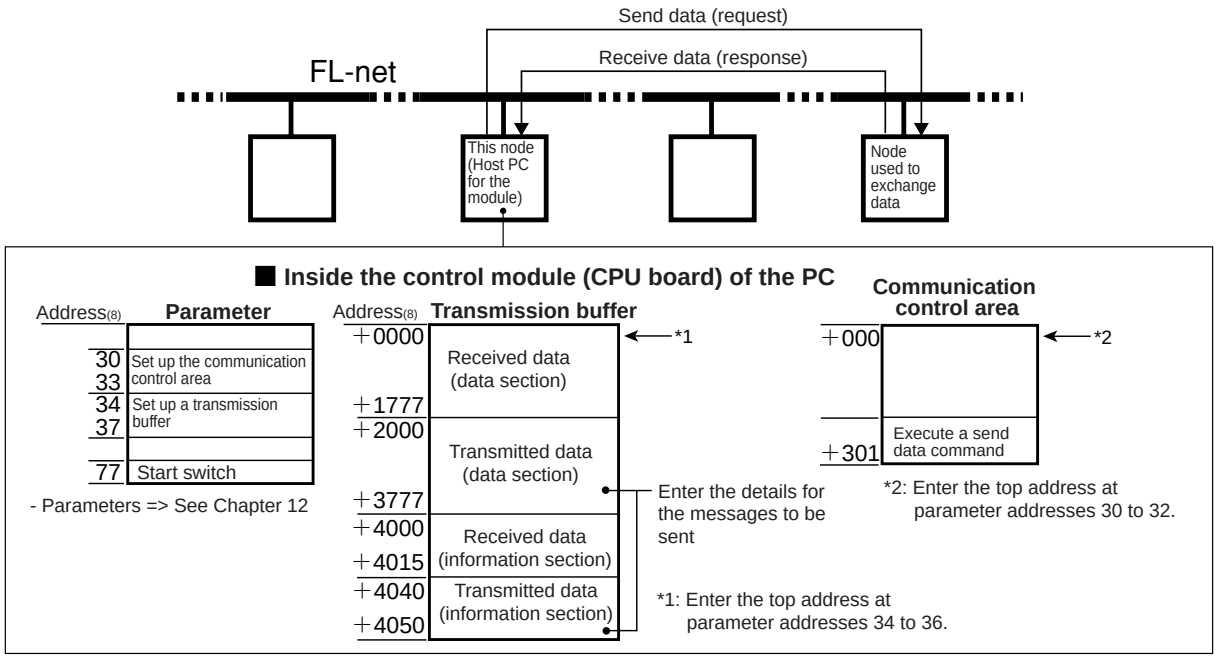
*3: 00, and 80 to 83(H) are values used for the parameter address 37(8). ⇨ See Chapter 12.

To execute a message transfer using the FL-net, the following settings are required on the control module (CPU board) of the PC on which the FL-net is installed.

① Create a transmission buffer area for the parameters and select it for use.

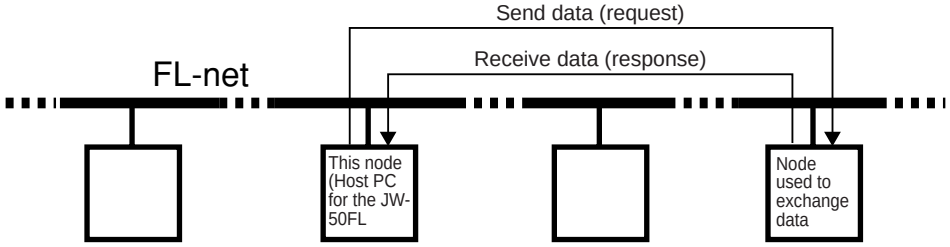
② Place the message to send in the transmission buffer.

③ Execute a send command in the communication control area.



9-1 Message sending procedures and data reception details

This section describes procedures used for the settings needed to send (or request) messages using the message transfer function, as well as the details for receiving data from a node. (JW-50FL general setting procedures ⇨ See page 8-3.)



① Setting the parameters

Specify the transmission buffer area that will be used to send (request) and receive (response) messages.

1) Specify the area for the transmission buffer

When the top address of the transmission buffer has been entered, the area (address + 0000 to 4055$_{(8)}$: 2094 bytes) will be allocated. Enter the top address at parameter address (34 to 36$_{(8)}$).

Parameter address$_{(8)}$	Details
34	Top address (word address) of transmission buffer - Address 34 is for the lower digit. Address 35 is for the upper digit.
35	
36	File number of the transmission buffer

(Parameter details ⇨ See Chapter 12.)

2) Set the transmission buffer to "Used"

Select whether or not to enable each message classification. Enter your choices at parameter address 37$_{(8)}$.

Parameter address$_{(8)}$	Details
37	Enable/disable use of a transmission type buffer

Message			Setting value			
			80$_{(H)}$	81$_{(H)}$	82$_{(H)}$	83$_{(H)}$
Message other than transmission			×	○	×	○
Transmission message	Messages other than SHARP's proprietary message format		○	○	○	○
	SHARP's proprietary format	Computer link function	○	○	○	○
		Remote function	○	○	×	×

O: Used X: Not used

3) Set the start switch

Change the parameter setting at address 77$_{(8)}$ from 00$_{(H)}$ to 01$_{(H)}$, and transfer the setting details for the control module to the JW-50FL.

Parameter address$_{(8)}$	Detail
77	Start switch

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② Setting transmission buffer (set the sending details)

Specify the [information section] and [data section] to be used for sending messages to the transmission buffer (addresses +2000 to 3777(8), +4040 to 4055(8)).

Transmission buffer address(8)	Details	
+2000	**Sending [data section]**	
to		
+3777		
+4040	Node number of destination node.	**Sending [information section]**
+4041	Response message type (fixed to 00(H))	
+4042 to 4043	Message (request) transaction code.	
+4044 to 4047	Top address of the virtual address space.	
+4050 to 4051	Data length requesting to the virtual address space (word/byte).	
+4052	Current fragment block number (fixed to 01(H))	
+4053	Total fragment block number (fixed to 01(H))	
+4054 to 4055	Current block length (byte)	

(Transmission buffer ⇨ Next page.)

③ Execute a transmission

Write an 01(H) at address +301 in the communication control area and the JW-50FL will send the contents of the transmission buffer [information section] and [data section] to the destination node. After sending the message, the details in the [data section] will be cleared.

Communication control address(8)	Detail
+301	Execute sending data

(Communication control area ⇨ See page 10-1.)

■ **Settings in the communication control area**

Enter the top address for the communication control area. The area (address +000 to 301(8)) will then be allocated. Use the parameter addresses 30 to 32(8) to enter the top address.

When receive data

④ Receive (received to transmission buffer)

The received data from a node are stored in the transmission buffer (address +0000 to 1777(8), +4000 to 40015(8)).

Transmission buffer address(8)	Details	
+0000	**Receiving [data section]**	
to		
+1777		
+4000	Node number of data sending node.	**Sending [information section]**
+4001	Response message type (fixed to 00(H))	
+4002 to 4003	Message (response) transaction code.	
+4004 to 4007	Top address of the virtual address space.	
+4010 to 4011	Data length requesting to the virtual address space (word/byte).	
+4012	Current fragment block number (fixed to 01(H))	
+4013	Total fragment block number (fixed to 01(H))	
+4014 to 4015	Current block length (byte)	

9-2 Transmission buffer

This section describes the transmission buffer that is used for sending and receiving data for the message transfer.
The transmission buffer area (+0000 to $4055_{(8)}$) is determined by entering top address to parameter (address 34 to $36_{(8)}$). (Parameter ⇨ See Chapter 12.)

Transmission buffer address(8)	Details	
+0000	**Receiving [data section]** - When writing $00_{(H)}$ to address +4000, the received data will be transferred to the control module (CPU board)	
to		
+1777		
+2000	**Sending [data section] *1**	
to		
+3777		
+4000	Node number of the node sending data.	**Receiving [information section]**
+4001	Response message type (always $00_{(H)}$)	
+4002 to 4003	Transaction code (response).	
+4004 to 4007	Top address of the virtual address space.	
+4010 to 4011	Data length of response from the virtual address space (word/byte).	
+4012	Current fragment block number (always $01_{(H)}$)	
+4013	Total fragment block number (always $01_{(H)}$)	
+4014 to 4015	Current block length (byte)	
+4016 to 4037	Reserved area	
+4040	Node number of destination node. *2	***1 Sending [information section]**
+4041	Response message type (always $00_{(H)}$)	
+4042 to 4043	Transaction code (request).	
+4044 to 4047	Top address of the virtual address space.	
+4050 to 4051	Data length requesting to the virtual address space (word/byte).	
+4052	Current fragment block number (always $01_{(H)}$)	
+4053	Total fragment block number (always $01_{(H)}$)	
+4054 to 4055	Current block length (byte)	

*1: The data in the transmission area [information section] and [data section] are transferred when $01_{(H)}$ is written at the base address +301 in the communication control area. After sending data, JW-50FL clears the setting data of the sending data section.
*2: Enter $255_{(D)}$ at the base address +4040. Then the data will be transferred to all the nodes currently connected.

[1] Allocation of available areas for the transmission buffer

The allocation of available areas for the transmission buffer varies with the module on which the FL-net is installed.

FL-net module	Host PC	Control module	Details
JW-20FL5 JW-20FLT	JW20H	JW-21CU/22CU	See below
	JW30H	JW-31CUH1	Next page
		JW-32CUH1	
		JW-33CUH1/2/3	

FL-net board	Host J-board	CPU board	Details
Z-336J	Z-300 series	Z-311J/312J/313J	See below
	Z-500 series	Z-511J	Next page

FL-net module	Host PC	Memory module	Details
JW-50FL	JW50H	---	Page 9-7
	JW70H JW100H	JW-1MAH	
		JW-2MAH	
		JW-3MAH	
		JW-4MAH	

(1) For the JW20H or J-board (Z-300 series)

	Allocation available data memory address for the transmission buffer		
	Bit address(8)	Byte address(8)	File address(8)
Relay	00000 to 15777	ㅋ0000 to ㅋ1577	000000 to 001577
TMR/CNT contact point	T-C000 to T-C777	ㅋ1600 to ㅋ1777	001600 to 001777
TMR/CNT current value	---	b0000 to b1777	002000 to 003777
Register	---	09000 to 09777	004000 to 004777
		19000 to 19777	005000 to 005777
		29000 to 29777	006000 to 006777
		39000 to 39777	007000 to 007777
		49000 to 49777	010000 to 010777
		59000 to 59777	011000 to 011777
		69000 to 69777	012000 to 012777
		79000 to 79777	013000 to 013777
		89000 to 89777	014000 to 014777
		99000 to 99777	015000 to 015777
Self diagnosis result storage register	---	E0000 to E1777	016000 to 017777

Note: Be careful not to allow the transmission buffer area to overlap with the common memory area.

(2) For the JW30H or J-board (Z-500 series)

		Allocation available data memory address for the transmission buffer		
		Bit address(8)	**Byte address(8)**	**File address(8)**
File 0	Relay	00000 to 15777	ㅋ0000 to ㅋ1577	000000 to 001577
	TMR/CNT contact point	T-C0000 to T-C0777	ㅋ1600 to ㅋ1777	001600 to 001777
	TMR/CNT/MD current value	---	b0000 to b1777	002000 to 003777
	Register	---	09000 to 09777	004000 to 004777
			19000 to 19777	005000 to 005777
			29000 to 29777	006000 to 006777
			39000 to 39777	007000 to 007777
			49000 to 49777	010000 to 010777
			59000 to 59777	011000 to 011777
			69000 to 69777	012000 to 012777
			79000 to 79777	013000 to 013777
			89000 to 89777	014000 to 014777
			99000 to 99777	015000 to 015777
			E0000 to E5777	016000 to 023777
	Register (Possible to register error history)	---	E6000 to E7777	024000 to 025777
	TMR/CNT current value	---	b2000 to b3777	026000 to 027777
	Expansion relay	20000 to 75777	ㅋ2000 to ㅋ7577	030000 to 035577
	TMR/CNT contact point	T-C1000 to T-C1777	ㅋ7600 to ㅋ7777	035600 to 035777
File 1		---	---	000000 to 037777
File 2		---	---	000000 to 177777
File 3		---	---	000000 to 177777
File $10_{(H)}$		---	---	000000 to 177777
to		to	to	to
File $14_{(H)}$		---	---	000000 to 177777
to		to	to	to
File $2C_{(H)}$		---	---	000000 to 177777

- The relationship between the control module (on which the memory module is installed) and the file memory is as follows.

Control module	File memory
JW-31CUH1	File 0
JW-32CUH1 *	File 0, 1, and 2 (File 2 can be allocated to 000000 to 177777 or 000000 to 077777)
JW-33CUH1	File 0, 1 to 3
JW-33CUH2	File 0, 1 to 3 and 10 to $14_{(H)}$
JW-33CUH3	File 0, 1 to 3 and 10 to $2C_{(H)}$

* File memory of J-board (Z-500 series) is the same as that of JW-32CUH1.

Note: Be careful not to allow the transmission buffer area to overlap with the common memory area.

(3) For the JW50H/70H/100H

		Allocation available data memory address for common memory area		
		Bit address(8)	**Byte address(8)**	**File address(8)**
File 0	Relay	00000 to 15777	ㅋ0000 to ㅋ1577	000000 to 001577
	TMR/CNT contact point	T-C0000 to 0777	ㅋ1600 to ㅋ1777	001600 to 001777
		T-C1000 to 1777	ㅋ1300 to ㅋ1477 *	001300 to 001477 *
	TMR/CNT-/MD current value	---	b0000 to b1777	002000 to 003777
	Register	---	09000 to 09777	004000 to 004777
			19000 to 19777	005000 to 005777
			29000 to 29777	006000 to 006777
			39000 to 39777	007000 to 007777
			49000 to 49777	010000 to 010777
			59000 to 59777	011000 to 011777
			69000 to 69777	012000 to 012777
			79000 to 79777	013000 to 013777
			89000 to 89777	014000 to 014777
			99000 to 99777	015000 to 015777
			E0000 to E0777	016000 to 016777
			E1000 to E1777	017000 to 017777
File 1		---	---	000000 to 177777
File 2		---	---	000000 to 177777
File 3		---	---	000000 to 177777
to		to	to	to
File 7		---	---	000000 to 177777

* ㅋ1300 to ㅋ1477 (file addresses 001300 to 001477) are for shared use with the general-purpose relays. Therefore, if a timer/counter is set up with 1024 points, these file addresses cannot be used as general-purpose relays.

- The relationship between the PC model (on which the memory module is installed) and the file memory is as follows.

PC model	Integrated memory module	File memory
JW50H	---	File 0, 1 (000000 to 037777)
JW70H JW100H	JW-1MAH	File 0, 1 (000000 to 037777)
	JW-2MAH	File 0, 1 (000000 to 177777)
	JW-3MAH	File 0, 1, 2
	JW-4MAH	File 1 to 7

Note: Be careful not to allow the transmission buffer area to overlap with the common memory area.

9-3 Message transaction codes and execution conditions

The transaction codes (TCD) and execution conditions for the messages supported by the JW-50FL are as follows.

TCD: Transaction code

Messages supported by the JW-50FL		Request TCD	Response TCD	Message execution conditions
Messages other than transmission messages	Read byte-block data	65003	65203	Always possible
	Write byte-block data	65004	65204	*
	Read word-block data	65005	65205	Always possible
	Write word-block data	65006	65206	*
	Read network parameter	65007	65207	Always possible
	Write network parameter	65008	65208	Possible only when the host PC has stopped
	Stop instruction	65009	65209	Always possible
	Operation instruction	65010	65210	
	Read profile	65011	65211	
	Read log data	65013	65213	
	Clear log data	65014	65214	
	Return message	65015	65215	
Transmission messages		0 to 999 1002 to 1199 1202 to 59999		
SHARP's proprietary message	Computer link function	1000	1200	
	Remote monitor, remote programming function	1001	1201	

* When the high word (pages 9-10 to 15) is "0x0000 to 0x002C," execution is possible regardless of the host PC status (operation/stop).
When the high word is not "0x0000 to 0x002C," execution is only possible when the host PC is stopped.

■ Relationship of the selected transmission buffer and various messages

Message	Transaction code (TCD)	Use selection of transmission type buffer *			
		80(H)	81(H)	82(H)	83(H)
Messages not transmission	60000 to 65202 (request)	X	X	X	X
	65203 to 65215 (response)	X	O	X	O
Transmission messages	0 to 999	O	O	O	O
	1000 (request computer link function: SHARP's proprietary function)	X	X	O	O
	1001 (request remote function: SHARP's proprietary function)	X	X	O	O
	1002 to 1199	O	O	O	O
	1200 (response of computer link function: SHARP's proprietary function)	O	O	O	O
	1201 (response of remote function: SHARP's proprietary function)	X	X	O	O
	1202 to 59999	O	O	O	O

(Transmission buffer --- O: Used, X: Not used)

* When using the transmission buffer, set to parameter (address 37(8)).

9-4 Use of virtual address space and PC memory space

This section describes the addresses used in the host PC by the FL-net.

FL-net module	Host PC	Control module	Details
JW-20FL5 JW-20FLT	JW20H	JW-21CU/22CU	Next page
	JW30H	JW-31CUH1	Page 9-11 to 9-13
		JW-32CUH1	
		JW-33CUH1/2/3	

FL-net board	Host J-board	CPU board	Details
Z-336J	Z-300 series	Z-311J/312J/313J	See below
	Z-500 series	Z-511J	Page 9-11 to 13

FL-net module	Host PC	Memory module	Details
JW-50FL	JW50H	---	Page 9-14 to 15
	JW70H JW100H	JW-1MAH	
		JW-2MAH	
		JW-3MAH	
		JW-4MAH	

(1) For the JW20H or J-board (Z-300 series)

PC memory space		Virtual address space		
		High word	Low word	
			Byte block	Word block
Relay area	ↄ0000 to ↄ0077	0x0000	0x0000 to 0x003F	0x0000 to 0x001F
	ↄ0100 to ↄ0177		0x0040 to 0x007F	0x0020 to 0x003F
	ↄ0200 to ↄ0377		0x0080 to 0x00FF	0x0040 to 0x007F
	ↄ0400 to ↄ0677		0x0100 to 0x01BF	0x0080 to 0x00DF
	ↄ0700 to ↄ0777		0x01C0 to 0x01FF	0x00E0 to 0x00FF
	ↄ1000 to ↄ1077		0x0200 to 0x023F	0x0100 to 0x011F
	ↄ1100 to ↄ1177		0x0240 to 0x027F	0x0120 to 0x013F
	ↄ1200 to ↄ1277		0x0280 to 0x02BF	0x0140 to 0x015F
	ↄ1300 to ↄ1377		0x02C0 to 0x02FF	0x0160 to 0x017F
	ↄ1400 to ↄ1477		0x0300 to 0x033F	0x0180 to 0x019F
	ↄ1500 to ↄ1577		0x0340 to 0x037F	0x01A0 to 0x01BF
TMR/CNT contact points	ↄ1600 to ↄ1777	0x0000	0x0380 to 0x03FF	0x01C0 to 0x01FF
TMR/CNT/MD current value	b0000 to b1777	0x0000	0x0400 to 0x07FF	0x0200 to 0x03FF
Register	09000 to 09777	0x0000	0x0800 to 0x09FF	0x0400 to 0x04FF
	19000 to 19777		0x0A00 to 0x0BFF	0x0500 to 0x05FF
	29000 to 29777		0x0C00 to 0x0DFF	0x0600 to 0x06FF
	39000 to 39777		0x0E00 to 0x0FFF	0x0700 to 0x07FF
	49000 to 49777		0x1000 to 0x11FF	0x0800 to 0x08FF
	59000 to 59777		0x1200 to 0x13FF	0x0900 to 0x09FF
	69000 to 69777		0x1400 to 0x15FF	0x0A00 to 0x0AFF
	79000 to 79777		0x1600 to 0x17FF	0x0B00 to 0x0BFF
	89000 to 89777		0x1800 to 0x19FF	0x0C00 to 0x0CFF
	99000 to 99777		0x1A00 to 0x1BFF	0x0D00 to 0x0DFF
	E0000 to E0777		0x1C00 to 0x1DFF	0x0E00 to 0x0EFF
	E1000 to E1777		0x1E00 to 0x1FFF	0x0F00 to 0x0FFF
Program	000000 to 016777	0x0100		0x0000 to 0x1DFF
System memory	0000 to 0177	0x0110	0x0000 to 0x007F	0x0000 to 0x003F
	0200 to 0377		0x0080 to 0x00FF	0x0040 to 0x007F
	0400 to 2177		0x0100 to 0x047F	0x0080 to 0x023F
Special I/O parameter	A0-000 to 177	0x00F0	0x0000 to 0x007F	0x0000 to 0x003F
	A1-000 to 177		0x0080 to 0x00FF	0x0040 to 0x007F
	A2-000 to 177		0x0100 to 0x017F	0x0080 to 0x00BF
	A3-000 to 177		0x0180 to 0x01FF	0x00C0 to 0x00FF
	A4-000 to 177		0x0200 to 0x027F	0x0100 to 0x013F
	A5-000 to 177		0x0280 to 0x02FF	0x0140 to 0x017F
	A6-000 to 177		0x0300 to 0x037F	0x0180 to 0x01BF
	A7-000 to 177		0x0380 to 0x03FF	0x01C0 to 0x01FF
Option parameter	B0-000 to 077	0x00F1	0x0000 to 0x003F	0x0000 to 0x001F
	B1-000 to 077		0x0040 to 0x007F	0x0020 to 0x003F
	B2-000 to 077		0x0080 to 0x00BF	0x0040 to 0x005F
	B3-000 to 077		0x00C0 to 0x00FF	0x0060 to 0x007F
	B4-000 to 077		0x0100 to 0x013F	0x0080 to 0x009F
	B5-000 to 077		0x0140 to 0x017F	0x00A0 to 0x00BF
	B6-000 to 077		0x0180 to 0x01BF	0x00C0 to 0x00DF

(2) For the JW30H or J-board (Z-500 series)

■ **Files 0**

PC memory space		Virtual address space		
		High word	Low word	
			Byte block	Word block
Relay area	ↄ0000 to ↄ0077	0x0000	0x0000 to 0x003F	0x0000 to 0x001F
	ↄ0100 to ↄ0177		0x0040 to 0x007F	0x0020 to 0x003F
	ↄ0200 to ↄ0377		0x0080 to 0x00FF	0x0040 to 0x007F
	ↄ0400 to ↄ0677		0x0100 to 0x01BF	0x0080 to 0x00DF
	ↄ0700 to ↄ0777		0x01C0 to 0x01FF	0x00E0 to 0x00FF
	ↄ1000 to ↄ1077		0x0200 to 0x023F	0x0100 to 0x011F
	ↄ1100 to ↄ1177		0x0240 to 0x027F	0x0120 to 0x013F
	ↄ1200 to ↄ1277		0x0280 to 0x02BF	0x0140 to 0x015F
	ↄ1300 to ↄ1377		0x02C0 to 0x02FF	0x0160 to 0x017F
	ↄ1400 to ↄ1477		0x0300 to 0x033F	0x0180 to 0x019F
	ↄ1500 to ↄ1577		0x0340 to 0x037F	0x01A0 to 0x01BF
TMR/CNT contact points	ↄ1600 to ↄ1777	0x0000	0x0380 to 0x03FF	0x01C0 to 0x01FF
TMR/CNT/MD current value	b0000 to b1777	0x0000	0x0400 to 0x07FF	0x0200 to 0x03FF
Register	09000 to 09777	0x0000	0x0800 to 0x09FF	0x0400 to 0x04FF
	19000 to 19777		0x0A00 to 0x0BFF	0x0500 to 0x05FF
	29000 to 29777		0x0C00 to 0x0DFF	0x0600 to 0x06FF
	39000 to 39777		0x0E00 to 0x0FFF	0x0700 to 0x07FF
	49000 to 49777		0x1000 to 0x11FF	0x0800 to 0x08FF
	59000 to 59777		0x1200 to 0x13FF	0x0900 to 0x09FF
	69000 to 69777		0x1400 to 0x15FF	0x0A00 to 0x0AFF
	79000 to 79777		0x1600 to 0x17FF	0x0B00 to 0x0BFF
	89000 to 89777		0x1800 to 0x19FF	0x0C00 to 0x0CFF
	99000 to 99777		0x1A00 to 0x1BFF	0x0D00 to 0x0DFF
	E0000 to E0777		0x1C00 to 0x1DFF	0x0E00 to 0x0EFF
	E1000 to E1777		0x1E00 to 0x1FFF	0x0F00 to 0x0FFF
	E2000 to E2777		0x2000 to 0x21FF	0x1000 to 0x10FF
	E3000 to E3777		0x2200 to 0x23FF	0x1100 to 0x11FF
	E4000 to E4777		0x2400 to 0x25FF	0x1200 to 0x12FF
	E5000 to E5777		0x2600 to 0x27FF	0x1300 to 0x13FF
	E6000 to E6777		0x2800 to 0x29FF	0x1400 to 0x14FF
	E7000 to E7777		0x2A00 to 0x2B7F	0x1500 to 0x15FF
TMR/CNT/MD current value	b2000 to b3777	0x0000	0x2C00 to 0x2FFF	0x1600 to 0x17FF
Relay	ↄ2000 to ↄ2377	0x0000	0x3000 to 0x30FF	0x1800 to 0x187F
	ↄ2400 to ↄ2777		0x3100 to 0x31FF	0x1880 to 0x18FF
	ↄ3000 to ↄ3777		0x3200 to 0x33FF	0x1900 to 0x19FF
	ↄ4000 to ↄ4177		0x3400 to 0x347F	0x1A00 to 0x1A3F
	ↄ4200 to ↄ7577		0x3480 to 0x3B7F	0x1A40 to 0x1DBF
TMR/CNT contact points	ↄ7600 to ↄ7777	0x0000	0x3B80 to 0x3BFF	0x1DC0 to 0x1DFF
Program	000000 to 076777	0x0100		0x0000 to 0x7DFF
	100000 to 176777	0x0100		0x8000 to 0xFDFF
System memory	0000 to 0177	0x0110	0x0000 to 0x007F	0x0000 to 0x003F
	0200 to 0377		0x0080 to 0x00FF	0x0040 to 0x007F
	0400 to 2177		0x0010 to 0x047F	0x0080 to 0x023F

↓
Continued on the next page

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PC memory space		Virtual address space		
		High word	Low word	
			Byte block	Word block
Special I/O parameter	T00-000 to 177	0x00F0	0x0000 to 0x007F	0x0000 to 0x003F
	T01-000 to 177		0x0080 to 0x00FF	0x0040 to 0x007F
	T02-000 to 177		0x0100 to 0x017F	0x0080 to 0x00BF
	T03-000 to 177		0x0180 to 0x01FF	0x00C0 to 0x00FF
	T04-000 to 177		0x0200 to 0x027F	0x0100 to 0x013F
	T05-000 to 177		0x0280 to 0x02FF	0x0140 to 0x017F
	T06-000 to 177		0x0300 to 0x037F	0x0180 to 0x01BF
	T07-000 to 177		0x0380 to 0x03FF	0x01C0 to 0x01FF
	T10-000 to 177		0x0400 to 0x047F	0x0200 to 0x023F
	T11-000 to 177		0x0480 to 0x04FF	0x0240 to 0x027F
	T12-000 to 177		0x0500 to 0x057F	0x0280 to 0x02BF
	T13-000 to 177		0x0580 to 0x05FF	0x02C0 to 0x02FF
	T14-000 to 177		0x0600 to 0x067F	0x0300 to 0x033F
	T15-000 to 177		0x0680 to 0x06FF	0x0340 to 0x037F
	T16-000 to 177		0x0700 to 0x077F	0x0380 to 0x03BF
	T17-000 to 177		0x0780 to 0x07FF	0x03C0 to 0x03FF
	T20-000 to 177		0x0800 to 0x087F	0x0400 to 0x043F
	T21-000 to 177		0x0880 to 0x08FF	0x0440 to 0x047F
	T22-000 to 177		0x0900 to 0x097F	0x0480 to 0x04BF
	T23-000 to 177		0x0980 to 0x09FF	0x04C0 to 0x04FF
	T24-000 to 177		0x0A00 to 0x0A7F	0x0500 to 0x053F
	T25-000 to 177		0x0A80 to 0x0AFF	0x0540 to 0x057F
	T26-000 to 177		0x0B00 to 0x0B7F	0x0580 to 0x05BF
	T27-000 to 177		0x0B80 to 0x0BFF	0x05C0 to 0x05FF
	T30-000 to 177		0x0C00 to 0x0C7F	0x0600 to 0x063F
	T31-000 to 177		0x0C80 to 0x0CFF	0x0640 to 0x067F
	T32-000 to 177		0x0D00 to 0x0D7F	0x0680 to 0x06BF
	T33-000 to 177		0x0D80 to 0x0DFF	0x06C0 to 0x06FF
	T34-000 to 177		0x0E00 to 0x0E7F	0x0700 to 0x073F
	T35-000 to 177		0x0E80 to 0x0EFF	0x0740 to 0x077F
	T36-000 to 177		0x0F00 to 0x0F7F	0x0780 to 0x07BF
	T37-000 to 177		0x0F80 to 0x0FFF	0x07C0 to 0x07FF
Option parameter	B0-000 to 077	0x00F1	0x0000 to 0x003F	0x0000 to 0x001F
	B1-000 to 077		0x0040 to 0x007F	0x0020 to 0x003F
	B2-000 to 077		0x0080 to 0x00BF	0x0040 to 0x005F
	B3-000 to 077		0x00C0 to 0x00FF	0x0060 to 0x007F
	B4-000 to 077		0x0100 to 0x013F	0x0080 to 0x009F
	B5-000 to 077		0x0140 to 0x017F	0x00A0 to 0x00BF
	B6-000 to 077		0x0180 to 0x01BF	0x00C0 to 0x00DF

■ **Files 1 to 3 and 10 to 2C(H)**

PC memory space		Virtual address space		
		High word	Low word	
File number(H)	File address		Byte block	Word block
1	000000 to 037777	0x0001	0x0000 to 0x3FFF	0x0000 to 0x1FFF
2	000000 to 177777	0x0002	0x0000 to 0xFFFF	0x0000 to 0x7FFF
3	000000 to 177777	0x0003	0x0000 to 0xFFFF	0x0000 to 0x7FFF
10	000000 to 177777	0x0010	0x0000 to 0xFFFF	0x0000 to 0x7FFF
11	000000 to 177777	0x0011	0x0000 to 0xFFFF	0x0000 to 0x7FFF
12	000000 to 177777	0x0012	0x0000 to 0xFFFF	0x0000 to 0x7FFF
13	000000 to 177777	0x0013	0x0000 to 0xFFFF	0x0000 to 0x7FFF
14	000000 to 177777	0x0014	0x0000 to 0xFFFF	0x0000 to 0x7FFF
15	000000 to 177777	0x0015	0x0000 to 0xFFFF	0x0000 to 0x7FFF
16	000000 to 177777	0x0016	0x0000 to 0xFFFF	0x0000 to 0x7FFF
17	000000 to 177777	0x0017	0x0000 to 0xFFFF	0x0000 to 0x7FFF
18	000000 to 177777	0x0018	0x0000 to 0xFFFF	0x0000 to 0x7FFF
19	000000 to 177777	0x0019	0x0000 to 0xFFFF	0x0000 to 0x7FFF
1A	000000 to 177777	0x001A	0x0000 to 0xFFFF	0x0000 to 0x7FFF
1B	000000 to 177777	0x001B	0x0000 to 0xFFFF	0x0000 to 0x7FFF
1C	000000 to 177777	0x001C	0x0000 to 0xFFFF	0x0000 to 0x7FFF
1D	000000 to 177777	0x001D	0x0000 to 0xFFFF	0x0000 to 0x7FFF
1E	000000 to 177777	0x001E	0x0000 to 0xFFFF	0x0000 to 0x7FFF
1F	000000 to 177777	0x001F	0x0000 to 0xFFFF	0x0000 to 0x7FFF
20	000000 to 177777	0x0020	0x0000 to 0xFFFF	0x0000 to 0x7FFF
21	000000 to 177777	0x0021	0x0000 to 0xFFFF	0x0000 to 0x7FFF
22	000000 to 177777	0x0022	0x0000 to 0xFFFF	0x0000 to 0x7FFF
23	000000 to 177777	0x0023	0x0000 to 0xFFFF	0x0000 to 0x7FFF
24	000000 to 177777	0x0024	0x0000 to 0xFFFF	0x0000 to 0x7FFF
25	000000 to 177777	0x0025	0x0000 to 0xFFFF	0x0000 to 0x7FFF
26	000000 to 177777	0x0026	0x0000 to 0xFFFF	0x0000 to 0x7FFF
27	000000 to 177777	0x0027	0x0000 to 0xFFFF	0x0000 to 0x7FFF
28	000000 to 177777	0x0028	0x0000 to 0xFFFF	0x0000 to 0x7FFF
29	000000 to 177777	0x0029	0x0000 to 0xFFFF	0x0000 to 0x7FFF
2A	000000 to 177777	0x002A	0x0000 to 0xFFFF	0x0000 to 0x7FFF
2B	000000 to 177777	0x002B	0x0000 to 0xFFFF	0x0000 to 0x7FFF
2C	000000 to 177777	0x002C	0x0000 to 0xFFFF	0x0000 to 0x7FFF

- The relationship between the control module (on which the memory module is installed) and the file memory is as follows.

Control module	File memory
JW-31CUH1	File 0
JW-32CUH1 *	File 0, 1, and 2 (File 2 can be allocated to 000000 to 177777 or 000000 to 077777)
JW-33CUH1	File 0, 1 to 3
JW-33CUH2	File 0, 1 to 3 and 10 to 14(H)
JW-33CUH3	File 0, 1 to 3 and 10 to 2C(H)

* File memory of J-board (Z-500 series) is the same as that of JW-32CUH1.

(3) For the JW50H/70H/100H

■ **Files 0**

PC memory address		Virtual address space		
		High word	Low word	
			Byte block	Word block
Relay area	⊐0000 to ⊐0077	0x0000	0x0000 to 0x003F	00x0000 to 00x001F
	⊐0100 to ⊐0177		0x0040 to 0x007F	00x0020 to 00x003F
	⊐0200 to ⊐0377		0x0080 to 0x00FF	00x0040 to 00x007F
	⊐0400 to ⊐0677		0x0100 to 0x01BF	00x0080 to 00x00DF
	⊐0700 to ⊐0777		0x01C0 to 0x01FF	00x00E0 to 00x00FF
	⊐1000 to ⊐1077		0x0200 to 0x023F	00x0100 to 00x011F
	⊐1100 to ⊐1177		0x0240 to 0x027F	00x0120 to 00x013F
	⊐1200 to ⊐1277		0x0280 to 0x02BF	00x0140 to 00x015F
	⊐1300 to ⊐1377		0x02C0 to 0x02FF	00x0160 to 00x017F
	⊐1400 to ⊐1477		0x0300 to 0x033F	00x0180 to 00x019F
	⊐1500 to ⊐1577		0x0340 to 0x037F	00x01A0 to 0x01BF
TMR/CNT contact points	⊐1600 to ⊐1777	0x0000 *	0x0380 to 0x03FF	00x01C0 to 0x01FF
	⊐1300 to ⊐1477		0x02C0 to 0x033F	00x0160 to 0x019F
TMR/CNT/MD current value	b0000 to b1777	0x0000	0x0400 to 0x07FF	0x0200 to 0x03FF
Register	09000 to 09777	0x0000	0x0800 to 0x09FF	0x0400 to 0x04FF
	19000 to 19777		0x0A00 to 0x0BFF	0x0500 to 0x05FF
	29000 to 29777		0x0C00 to 0x0DFF	0x0600 to 0x06FF
	39000 to 39777		0x0E00 to 0x0FFF	0x0700 to 0x07FF
	49000 to 49777		0x1000 to 0x11FF	0x0800 to 0x08FF
	59000 to 59777		0x1200 to 0x13FF	0x0900 to 0x09FF
	69000 to 69777		0x1400 to 0x15FF	0x0A00 to 0x0AFF
	79000 to 79777		0x1600 to 0x17FF	0x0B00 to 0x0BFF
	89000 to 89777		0x1800 to 0x19FF	0x0C00 to 0x0CFF
	99000 to 99777		0x1A00 to 0x1BFF	0x0D00 to 0x0DFF
	E0000 to E0777		0x1C00 to 0x1DFF	0x0E00 to 0x0EFF
	E1000 to E1777		0x1E00 to 0x1FFF	0x0F00 to 0x0FFF
Program	000000 to 076777	0x0100		0x0000 to 0x7DFF
	100000 to 176777	0x0100		0x8000 to 0xFDFF
System memory	0000 to 0177	0x0110	0x0000 to 0x007F	0x0000 to 0x003F
	0200 to 0377		0x0080 to 0x00FF	0x0040 to 0x007F
	0400 to 2177		0x0100 to 0x047F	0x0080 to 0x023F

* When the timer/counter is set to use 1024 points, ⊐1300 to ⊐1400 cannot be used as general-purpose relays.

■ **Files 1 to 7**

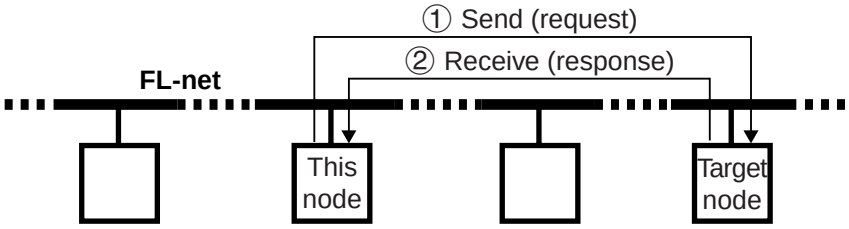
PC memory address		Virtual address space		
		High word	Low word	
File No.	File address(8)		Byte block	Word block
1	000000 to 177777	0x0001	0x0000 to 0xFFFF	00x0000 to 0x7FFF
2	000000 to 177777	0x0002	0x0000 to 0xFFFF	00x0000 to 0x7FFF
3	000000 to 177777	0x0003	0x0000 to 0xFFFF	00x0000 to 0x7FFF
4	000000 to 177777	0x0004	0x0000 to 0xFFFF	00x0000 to 0x7FFF
5	000000 to 177777	0x0005	0x0000 to 0xFFFF	00x0000 to 0x7FFF
6	000000 to 177777	0x0006	0x0000 to 0xFFFF	00x0000 to 0x7FFF
7	000000 to 177777	0x0007	0x0000 to 0xFFFF	00x0000 to 0x7FFF

- Relationship between the host PC (memory module) and the file memory is as follows.

Host PC	Memory module	Details
JW50H	---	File 0, 1 (000000 to 037777)
JW70H JW100H	JW-1MAH	File 0, 1 (000000 to 037777)
	JW-2MAH	File 0, 1 (000000 to 177777)
	JW-3MAH	File 0, 1, 2
	JW-4MAH	File 1 to 7

9-5 Computer link function

(Compatible with Satellite net: SHARP's proprietary message format)
The computer link function is SHARP's proprietary transmission message format (request TCD1000, response TCD12000, and can be used between PCs equipped with a SHARP FL-net module (board).



① Specify the node number, command details, and transaction code to communicate from this node.
② The message (command) is received, the messages are processed and a response is returned.

The command contains three types: read, write, and control commands.

Type	Function
Read command	Monitor relay Monitor timer/counter current value Monitor the register Read program memory Read system memory Read date Read time
Write command	Set/reset relay Set/reset timer or counter Write to register Write same data to register Write program Write to system memory Set date Set time
Control command	Monitor PC operation status PC stop/release stop operation Set write enable mode Monitor write enable mode

[1] Setting the computer link to send and receive data

When a computer link message format is used, the sending and receiving details of the transmission buffer are set as follows.

① Setting the sending details (command)

Put the address of the [information section] and [data section] containing the data to be sent in the transmission buffer (base address +2000 to 3777(8), and base address +4040 to 4055(8)).

Transmission buffer address(8)	Details	
+2000	Header (40 bytes) - Normally, all 40 bytes to 00(H). When you want to communicate crossover two layers including Ethernet, enter expansion header. ⇨ [5] Two layer communication with Ethernet.	**Sending [data section]**
to		
+2047		
+2050	c-ID: 47(H)	
+2051	ATTR: 00(H)	
+2052	COM: Command code ⇨ Page 9-14.	
+2053	Command Text: Command detail ⇨ [3] Description of each command	
to		
+3777		
+4040	Node number of destination node.	**Sending [information section]**
+4041	00(H) (Response message type)	
+4042 to 4043	1000(H) (Transaction code: request)	
+4044 to 4047	00(H) (Top address of the virtual address space)	
+4050 to 4051	00(H) (Data length requesting to the virtual address space)	
+4052	01(H) (Current fragment block number)	
+4053	01(H) (Total fragment block number)	
+4054 to 4055	00(H) (Current block length)	

Command ⇨ page 9-14.

(Transmission buffer table ⇨ Page 9-4.)

② Transmit the data

Write 01(H) at the base address +301 in communication control area and the details in the transmission buffer will be sent to the destination node.

Communication control area address(8)	Details
+301	Transfer the data

(Communication control area table ⇨ See page 10-1.)

■ Communication control area settings

Enter the top address of the communication control area and the area (base address +000 to 301(8)) will be allocated. Enter the top address at parameter addresses 30 to 32(8). ⇨ Page 12-1.

Continued on the next page.

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③ Receive (response details)

The details of the data received (response) from the node to communicate is stored in the transmission buffer (base address +0000 to $1777_{(8)}$, and base address +4000 to $4015_{(8)}$).

Transmission buffer address(8)	Details	
+0000	Header (40 bytes) - Normally, set $00_{(H)}$ all 40 bytes. When to communicate crossover two layers including Ethernet, enter expansion header. ⇨ [5] Two layer communication with Ethernet.	**Receiving data [information section]**
to		
+0047		
+0050	r-ID: $45_{(H)}$	
+0051	ATTR: $00_{(H)}$	
+0052	COM: Command code ⇨ See page 9-14.	
+0053	RSLT: Command execution result Normal end with $00_{(H)}$ A result that is not $00_{(H)}$ is an error code. ⇨ [4] Computer link, Error code table - When used as error code, there is no response text.	
+0054	Response Text: Response detail ⇨ [3] Description of each command	
to		
+1777		
+4000	Node number of destination node.	**Sending data [information section]**
+4001	$00_{(H)}$ (Response message type)	
+4002 to 4003	$1200_{(H)}$ (Transaction code: response)	
+4004 to 4007	$00_{(H)}$ (Top address of the virtual address space)	
+4010 to 4011	$00_{(H)}$ (Data length requesting to the virtual address space)	
+4012	$01_{(H)}$ (Current fragment block number)	
+4013	$01_{(H)}$ (Total fragment block number)	
+4014 to 4015	$00_{(H)}$ (Current block length)	

Response ⇨ the next page.

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[2] Basic format of computer link commands

(1) Communication format

When a computer link is used, data sent from this node to a target node is referred to as a [command], and data received from the target node by this node is referred to as a [response]. The communication format for commands and responses is as follows.

■ **Command**

+2000 Header (40 bytes) +2047	+2050 c-ID	+2051 ATTR	+2052 COM	+2053 Command Text

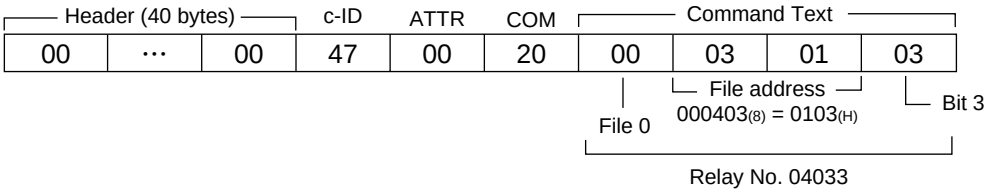
■ **Response**

+0000 Header (40 bytes) +0047	+0050 r-ID	+0051 ATTR	+0052 COM	+0053 RSLT	+0054 Response Text

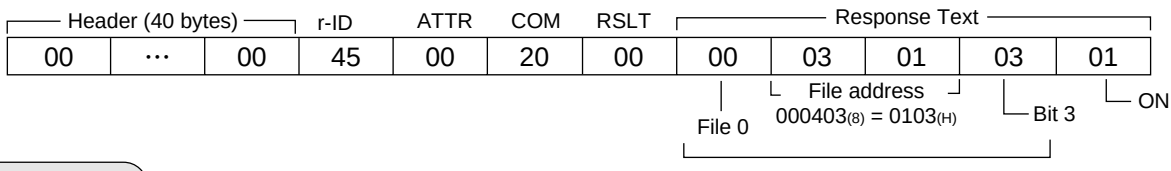
Header : Normally, all 40 bytes are $00_{(H)}$.
If you want to communicate with Ethernet over two layers, you have to use an extension header.
(See "[5] Two-layer communication with Ethernet")
c-ID : $47_{(H)}$
r-ID : $45_{(H)}$
ATTR : $00_{(H)}$
COM : Command code (See page 9-14)
RSLT : Command execution result
Normally terminated with $00_{(H)}$
If any byte other than $00_{(H)}$ is found, an error code will be output (See "[4] Computer link error code table").
If an error code is output, there is no response text.
Command Text : Command details (See "[3] Descriptions of each command")
Response Text : Response details (See "[3] Descriptions of each command")

[Example] When you want to monitor the ON/OFF status of relay 04033 ⇨ See page 9-17.

■ **Command**



■ **Response**



Remarks

The maximum data length for read/write operations is 1024 bytes. In case of two-layer communication with the Ethernet, however, the maximum length is 256 bytes. For the UDP, the total number of bytes from the header to the command text must be less than 1024 bytes.

(2) Memory address expression format

The format expressing memory address contained in the command (command text/response text) is as shown below. (For more details, refer to "[3] Descriptions of each command.")

PSEG : Program segment (corresponds to the file number.)

	JW20H J-board (Z-300 series)	JW30H J-board (Z-500 series)	JW50H/70H/100H
PSEG	$08_{(H)}$	$08_{(H)}$, $09_{(H)}$	$08_{(H)}$, $09_{(H)}$

- Memory capacity varies with type of control module and memory module used. The values above are the maximum values.

PADR : Program address

	JW20H J-board (Z-300 series)	JW30H J-board (Z-500 series)	JW50H/70H/100H
PADR	0000 to $1DFF_{(H)}$	0000 to $7DFF_{(H)}$	0000 to $7DFF_{(H)}$

- Memory capacity varies with type of control module and memory module used. The values above are the maximum values.

The program address is to be designated using PSEG and PADR.

Address 000000 to $076777_{(8)}$: PSEG = 8, PADR is the address expressed in hexadecimal notation.

Address 100000 to $176777_{(8)}$: PSEG = 9, PADR is the value in hexadecimal notation obtained by subtracting $100000_{(8)}$ from the address.

[Example] Address $043256_{(8)}$: PSEG = $08_{(H)}$, PADR= $46AE_{(H)}$

Address $153762_{(8)}$: PSEG= $09_{(H)}$, PADR = $57F2_{(H)}$

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DSEG : Data memory segment (corresponds to the file number.)

	JW20H J-board (Z-300 series)	JW30H J-board (Z-500 series)	JW50H/70H/100H
DSEG	$00_{(H)}$	$00_{(H)}$ to $03_{(H)}$, 10 to $2C_{(H)}$	$00_{(H)}$ to $07_{(H)}$

- Memory capacity varies with type of control module and memory module used. The values above are the maximum values.

DADR : Data memory address (corresponds to the file number.)

	JW20H J-board (Z-300 series)	JW30H J-board (Z-500 series)		JW50H/70H/100H	
DADR	0000 to $1FFF_{(H)}$	(Setting value of the DSEG) $00_{(H)}$	0000 to $3BFF_{(H)}$	(Setting value of the DSEG) $00_{(H)}$	0000 to $1FFF_{(H)}$
		$01_{(H)}$	0000 to $3FFF_{(H)}$	01 to $07_{(H)}$	0000 to $FFFF_{(H)}$
		02 to $03_{(H)}$	0000 to $FFFF_{(H)}$		
		10 to $2C_{(H)}$	0000 to $FFFF_{(H)}$		

- Memory capacity varies with type of control module and memory module used. The values above are the maximum values.

BLOC : Bit location on the data memory
The register (file register) is to be designated using DSEG and DADR.
[Example] Register 09000 : DSEG = $00_{(H)}$, DADR = $0800_{(H)}$
030000 of the file 1 : DSEG = $01_{(H)}$, DADR = $3000_{(H)}$

The relay address is to be designated using DSEG, DADR, and BLOC.
The destination is made by the combination of the file address and the bit location.
[Example] Relay 07252: DSEG = $00_{(H)}$, DADR = $01D5_{(H)}$, BLOC = $02_{(H)}$
(bit 2 of the file address 000725 (]0725))

TADR : Timer/counter number
To assign a timer/counter number, use TADR. (Hexadecimal notation)

	JW20H J-board (Z-300 series)	JW30H J-board (Z-500 series)	JW50H/70H/100H
TADR	0000 to 01FF$_{(H)}$	0000 to 03FF$_{(H)}$	0000 to 03FF$_{(H)}$

SADR : System memory address
To assign a system memory address, use SADR. (Hexadecimal notation)
SEG should be assigned in the command. Always specify $08_{(H)}$.

	JW20H J-board (Z-300 series)	JW30H J-board (Z-500 series)	JW50H/70H/100H
SADR	0000 to 00FF$_{(H)}$	0000 to 047F$_{(H)}$	0000 to 047F$_{(H)}$

(3) Execution condition

① Write enable mode

Each command will be executed or depending on the current status of the write enable mode.

Write enable mode	Details
Mode 0	Writing to all of memory is prohibited
Mode 1	Writing is only enabled to data memory
Mode 2	Writing is enabled to all of memory

When the power is first applied, the module is in "mode 0." Therefore, if you want to write data from the host computer, change to "mode 1 or "mode 2" using the setting command (command code F9$_{(H)}$). The current status can be read using the reading command (command code E9$_{(H)}$) for the write enable command.

② PC operation status

Some commands can be executed when the PC halts operation (writing programs: Command code 14$_{(H)}$ etc.). Other commands can be executed whether the PC is halted or is running (reading programs: Command code 04$_{(H)}$ etc.)

(4) Table of commands

Command code	Contents	See page
04(H)	Reading program	9-34
14(H)	Write program	9-35
20(H)	Monitoring relay	9-25
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F9(H)	Selecting the write enable mode	9-24

[3] Descriptions of each command

This section describes the "COM" settings and the items thereafter of the communication formats (page 9-19).

Read out write enable mode (COM=E9(H))

[Format]

■ **Command**

COM

■ **Response**

COM	RSLT	WMOD

COM = $E9_{(H)}$
WMOD = $00_{(H)}$: Mode 0 (All memory write-disabled)
$01_{(H)}$: Mode 1 (Only the data memory write-enabled)
$02_{(H)}$: Mode 2 (All memory write-enabled)

[Function]

- Reads the status of the write-enable mode.

[Execution condition]

- Write enable mode : Mode 0, mode 1 and mode 2
- PC operation status : Stopping, operating

[Example]

- Reads the status of the write-enable mode.

■ **Command**

E9

■ **Response**

E9	00	02

└— Mode 2 (All memory write-enabled)

Selecting the write enable mode COM = F9(H)

[Format]

■ **Command**

COM	WMOD

■ **Response**

COM	RSLT

COM = F9(H)
WMOD = 00(H) : Mode 0 (All memory write-disabled)
01(H) : Mode 1 (Only the data memory write-enabled)
02(H) : Mode 2 (All memory write-enabled)

[Function]

- Selecting the write enable mode.

[Execution condition]

- Write enable mode : Mode 0, mode 1 and mode 2
- PC operation status : Stopping, operating

[Example]

- Set the write enable mode to mode 2 (Writing is enable to all of memory).

■ **Command**

F9	02

└ Mode 2 (All memory write-enabled)

■ **Response**

F9	00

Monitoring relay (COM = $20_{(H)}$)

[Format]

■ **Command**

COM	DSEG	$DADR_L$	$DADR_H$	BLOC

■ **Response**

COM	RSLT	DSEG	$DADR_L$	$DADR_H$	BLOC	DATA

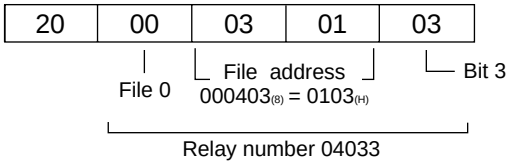
COM = $20_{(H)}$
DSED = Segment (00 to 07, 10 to $2C_{(H)}$) ⇨ See page 9-20.
$DADR_{L, H}$ = Byte address ($0000_{(H)}$ to $FFFF_{(H)}$) ⇨ See page 9-20.
BLOC = Bit position ($00_{(H)}$ to $07_{(H)}$)
DATA = Read data ($00_{(H)}$: OFF, $01_{(H)}$: ON)

[Function]
- Read the bit data (relay) shown in DSEG, DADR, and BLOC.

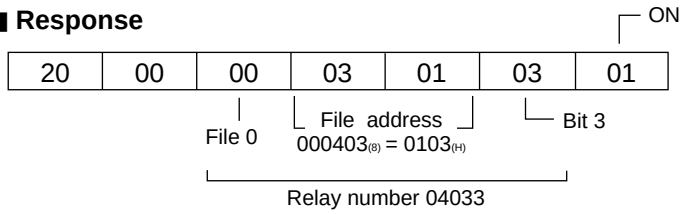
[Execution condition]
- Write enable mode : Mode 0, mode 1 and mode 2
- PC operation status : Stopping, operating

[Example]
- Monitor the ON/OFF status of relay number 04033.

■ **Command**



■ **Response**



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Set/reset relay (COM = $30_{(H)}$)

[Format]

■ **Command**

COM	DSEG	$DADR_L$	$DADR_H$	BLOC	DATA

■ **Response**

COM	RSLT	DSEG	$DADR_L$	$DADR_H$	BLOC

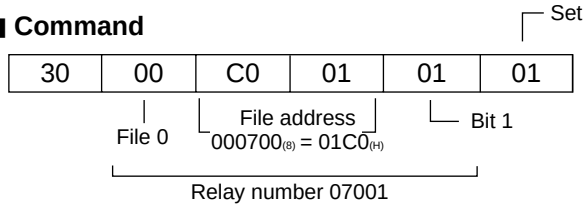
COM = $30_{(H)}$
DSED = Segment (00 to 07, 10 to $2C_{(H)}$) ⇨ See page 9-20.
$DADR_{L, H}$ = Byte address ($0000_{(H)}$ to $FFFF_{(H)}$) ⇨ See page 9-20.
BLOC = Bit position ($00_{(H)}$ to $07_{(H)}$)
DATA = Set/reset data ($00_{(H)}$: reset, $01_{(H)}$: set)

[Function]
- Set/reset the relays shown in DSEG, DADR, and BLOC.

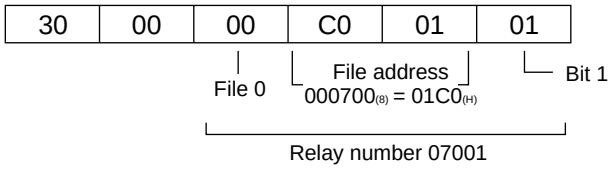
[Execution condition]
- Write enable mode : Mode 1 and mode 2
- PC operation status : Stopping, operating

[Example]
- Set relay number 07001.

■ **Command**



■ **Response**



Set/reset timer/counter (COM = $32_{(H)}$)

[Format]

■ **Command**

COM	$TADR_L$	$TADR_H$	DATA

■ **Response**

COM	RSLT	$TADR_L$	$TADR_H$

COM = $32_{(H)}$
$TADR_{L, H}$ = Timer-counter number ($0000_{(H)}$ to $03FF_{(H)}$) ⇨ See page 9-21.
DATA = Set/reset data ($00_{(H)}$: reset, $01_{(H)}$: set)

[Function]
- Set/reset the timer/counter displayed on TADR.

[Execution condition]
- Write enable mode : Mode 1 and mode 2
- PC operation status : Stopping, operating

[Example]
- Set TMR0002.

■ **Command**

32	02	00	01

02: Timer and counter number 0002
01: Set

■ **Response**

32	00	02	00

02: Timer and counter number 0002

The current value monitor of the timers/counters (COM = $23_{(H)}$)

[Format]

■ **Command**

COM	$TADR_L$	$TADR_H$	L_L	L_H

■ **Response**

COM	RSLT	$TADR_L$	$TADR_H$	L_L	L_H	$DATA_1$	.....

	$DATA_N$	$ATTR_1$	.....	$ATTR_N$

COM = $23_{(H)}$
$TADR_{L, H}$ = Timer and counter number ($0000_{(H)}$ to $03FF_{(H)}$) ⇨ See page 9-21.
$L_{L, H}$ = Number of data to read
$DATA_{1 \text{ to } N}$ = The current value data (read current value field of the timer and the counter)
$ATTR_{1 \text{ to } N}$ = The attribute data of the timer and the counter

[Function]

- Reads the current values and the attributes of the timers/counters identified by the starting number TADR and the number of data L.
- Up to 256 timers/counters can be read at a time.
- The current value data is read from the timer/counter's current range (b0000 to xxxxx).
- The attributes are as shown below :

$00_{(H)}$	Not in use	$0A_{(H)}$	UTMR(BCD)
$01_{(H)}$	MD	$0B_{(H)}$	UTMR(BIN)
$02_{(H)}$	CNT	$0C_{(H)}$	DCNT(BCD)
$04_{(H)}$	TMR	$0D_{(H)}$	DCNT(BIN)
$08_{(H)}$	DTMR(BCD)	$0E_{(H)}$	UCNT(BCD)
$09_{(H)}$	DTMR(BIN)	$0F_{(H)}$	UCNT(BIN)

[Execution condition]

- Write enable mode : Mode 0, mode 1 and mode 2
- PC operation status : Stopping, operating

[Example]

- Reads the current values of TMR0000 and TMR0001.

■ **Command**

23	00	00	02	00

Top number of the timer and the counter

Number of data

■ **Response**

23	00	00	00	02	00	34	92	78	D6	08	0A

Top number of the timer and the counter

Number of data

The current value of TMR0000 1234

The current value of TMR0001 5678

DTMR (BCD)

UTMR (BCD)

Monitoring register COM = $24_{(H)}$

[Format]

■ **Command**

COM	DSEG	$DADR_L$	$DADR_H$	L_L	L_H

■ **Response**

COM	RSLT	DSEG	$DADR_L$	$DADR_H$	L_L	L_H	$DATA_1$	·····	$DATA_N$

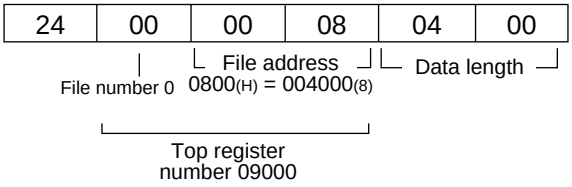
COM = $24_{(H)}$
DSEG = Segment (00 to 07, 10 to $2C_{(H)}$) ⇨ See page 9-20.
$DADR_{L, H}$ = Byte address ($0000_{(H)}$ to $FFFF_{(H)}$) ⇨ See page 9-20.
$L_{L, H}$ = Data length (Number of bytes)
$DATA_{1 \text{ to } N}$ = Read data

[Function]
- Read the register data with the length shown by L, starting from DSEG, DADR.
- Up to 1024 bytes can be read at a time.

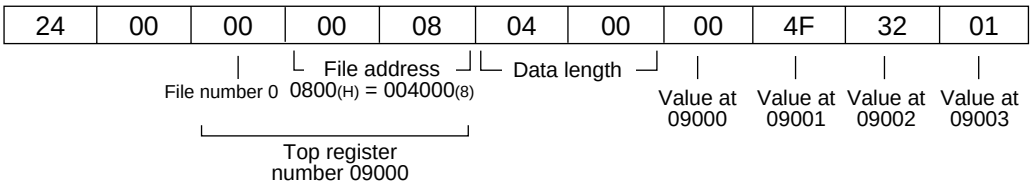
[Execution condition]
- Write enable mode : Mode 0, mode 1 and mode 2
- PC operation status : Stopping, operating

[Example]
- Read 4 bytes data from register 09000 to 09003.

■ **Command**



■ **Response**



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Write in register (COM = $34_{(H)}$)

[Format]

■ **Command**

COM	DSEG	$DADR_L$	$DADR_H$	L_L	L_H	$DATA_1$	·····	$DATA_N$

■ **Response**

COM	RSLT	DSEG	$DADR_L$	$DADR_H$	L_L	L_H

COM = $34_{(H)}$
DSEG = Segment (00 to 07, 10 to $2C_{(H)}$) ⇨ See page 9-20.
$DADR_{L, H}$ = Byte address ($0000_{(H)}$ to $FFFF_{(H)}$) ⇨ See page 9-20.
$L_{L, H}$ = Data length (number of bytes)
$DATA_{1 \text{ to } N}$ = Write data

[Function]

- Write the register data with the length shown by L, starting from DSEG, DADR.
- Up to 1024 bytes can be write at a time.

[Execution condition]

- Write enable mode : Mode 1 and mode 2
- PC operation status : Stopping, operating

[Example]

- Write $00_{(H)}$, $4F_{(H)}$, $32_{(H)}$, and $01_{(H)}$ to registers 09000 to 09003.

■ **Command**

34	00	00	08	04	00	00	4F	32	01

File number 0
File address 0800(H) = 004000(8)
Data length
Value at 09000
Value at 09001
Value at 09002
Value at 09003
Top register number 09000

■ **Response**

34	00	00	00	08	04	00

File number 0
File address 0800(H) = 004000(8)
Data length
Top register number 09000

Write same data to register (COM = $35_{(H)}$)

[Format]

■ **Command**

COM	DSEG	$DADR_L$	$DADR_H$	L_L	L_H	DATA

■ **Response**

COM	RSLT	DSEG	$DADR_L$	$DADR_H$	L_L	L_H

COM = $35_{(H)}$
DSEG = Segment (00 to 07, 10 to $2C_{(H)}$) ⇨ See page 9-20.
$DADR_{L, H}$ = Byte address ($0000_{(H)}$ to $FFFF_{(H)}$) ⇨ See page 9-20.
$L_{L,H}$ = Data length (number of bytes)
DATA = Write data

[Function]

- Write the same data with the length shown by L, starting from DSEG, DADR.

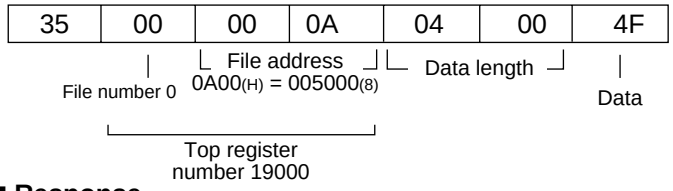
[Execution condition]

- Write enable mode : Mode 1 and mode 2
- PC operation status : Stopping, operating

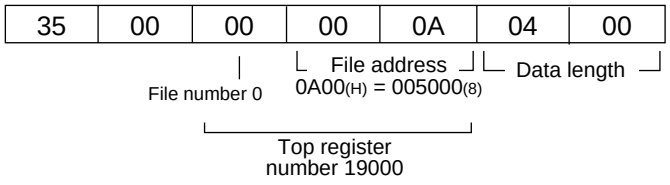
[Example]

- Write $4F_{(H)}$ to register 19000 to 19003 (4 bytes).

■ **Command**



■ **Response**



Read out the system memory (COM = $44_{(H)}$)

[Format]

■ **Command**

COM	SEG	$SADR_L$	$SADR_H$	L_L	L_H

■ **Response**

COM	RSLT	SEG	$SADR_L$	$SADR_H$	L_L	L_H	$DATA_1$	·····	$DATA_N$

COM = $44_{(H)}$
SEG = Segment ($08_{(H)}$)
SADRL,H = System memory address ($0000_{(H)}$ to $047F_{(H)}$) ⇨ See page 9-21.
$L_{L,H}$ = Data length (number of bytes)
$DATA_{1\ to\ N}$ = Read data

[Function]

- Read the system memory data with the length shown by L, starting from SEG, SADR.

[Execution condition]

- Write enable mode : Mode 0, mode 1 and mode 2
- PC operation status : Stopping, operating

[Example]

- Read data of system memory #204 to 207.

■ **Command**

44	08	84	00	04	00

84 00: System memory address $0084_{(H)} = 000204_{(8)}$
04 00: Data length

■ **Response**

44	00	08	84	00	04	00	80	01	08	00

84 00: System memory address $0084_{(H)} = 000204_{(8)}$
04 00: Data length
80: Value at #204
01: Value at #205
08: Value at #206
00: Value at #207

Write to the system memory (COM = $54_{(H)}$)

[Format]

■ **Command**

COM	SEG	$SADR_L$	$SADR_H$	L_L	L_H	$DATA_1$	·····	$DATA_N$

■ **Response**

COM	RSLT	SEG	$SADR_L$	$SADR_H$	L_L	L_H

COM = $54_{(H)}$
SEG = Segment ($08_{(H)}$)
$SADR_{L, H}$ = System memory address ($0000_{(H)}$ to $047F_{(H)}$) ⇨ See page 9-21.
$L_{L, H}$ = Data length (number of bytes)
$DATA_{L\ to\ N}$ = Write data

[Function]
- Write the system memory data with the length shown by L, starting from SEG, SADR.

[Execution condition]
- Write enable mode : Mode 2
- PC operation status : Stopping

[Example]
- Set $81_{(H)}$, $00_{(H)}$, $00_{(H)}$, and $04_{(H)}$ to system memory #204 to #207.

■ **Command**

54	08	84	00	04	00	81	00	00	04

84 00: System memory address $0084_{(H)} = 000204_{(8)}$
04 00: Data length
81: Value at #204
00: Value at #205
00: Value at #206
04: Value at #207

■ **Response**

54	00	08	84	00	04	00

84 00: System memory address $0084_{(H)} = 000204_{(8)}$
04 00: Data length

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Reading program (COM = $04_{(H)}$)

[Format]

■ **Command**

COM	PSEG	$PADR_L$	$PADR_H$	L_L	L_H

■ **Response**

COM	RSLT	PSEG	$PADR_L$	$PADR_H$	L_L	L_H	$DATA_1$	·····	$DATA_N$

COM = $04_{(H)}$
PSEG = Program segment ($08_{(H)}$, $09_{(H)}$) ⇨ See page 9-20.
$PADR_{L,H}$ = Program address ($0000_{(H)}$ to $7DFF_{(H)}$) ⇨ See page 9-20.
$L_{L,H}$ = Data length (number of words)
$DATA_{1\ to\ N}$ = Read data (2 bytes = one step)

[Function]

- Read a program with a length (number of words) shown by L, from address PSEG, PADR.
- Up to 512 words can be read at a time.

[Execution condition]

- Write enable mode : Mode 0, mode 1 and mode 2
- PC operation status : Stopping, operating

[Example]

- Read the contents of the program address 000000 to 000002 (file number 8).

■ **Command**

04	08	00	00	03	00

Top program address | Data length

■ **Response**

04	00	08	00	00	03	00	00	80	00	91

Top program address | Data length | Address 000000 contents | Address 000001 contents

08	B8

Address 000002 contents

Note: Inquiries concerning the bit configuration of programs cannot be accepted.

Write program (COM = $14_{(H)}$)

[Format]

■ **Command**

COM	PSEG	$PADR_L$	$PADR_H$	L_L	L_H	$DATA_1$	·····	$DATA_N$

■ **Response**

COM	RSLT	PSEG	$PADR_L$	$PADR_H$	L_L	L_H

COM = $14_{(H)}$
PSEG = Program segment ($08_{(H)}$, $09_{(H)}$) ⇨ See page 9-20.
$PADR_{L, H}$ = Program address ($0000_{(H)}$ to $7DFF_{(H)}$) ⇨ See page 9-20.
$L_{L, H}$ = Data length (number of words)
$DATA_{1 \text{ to } N}$ = Write data (2 bytes = one step)

[Function]
- Write a program with a length (number of words) shown by L, from address PSEG, PADR.
- Up to 512 words can be write at a time.

[Execution condition]
- Write enable mode : Mode 2
- PC operation status : Stopping

[Example]
- Write the contents below in program address 000000 to 000002 (file number 8).

■ **Command**

14	08	00	00	03	00	00	80	00	91	08	B8
		Top program address		Data length		Address 000000 contents		Address 000001 contents		Address 000002 contents	

■ **Response**

14	00	08	00	00	03	00
			Top program address		Data length	

Note: Inquiries concerning the bit configuration of programs cannot be accepted.

Read date (COM = A2(H))

[Format]

■ **Command**

COM

■ **Response**

COM	RSLT	Y	M	D	DW

COM = A2(H)
Y = Year (express lower two digits of Western year, 00(H) to 99(H))
M = Month (01(H) to 12(H))
D = Date (01(H) to 31(H))
DW = Day of week (00(H): Sunday, 01(H): Monday, 02(H): Tuesday, 03(H): Wednesday, 04(H): Thursday, 05(H): Friday, 06(H): Saturday)

[Function]
- Read date data.

[Execution condition]
- Write enable mode : Mode 0, mode 1 and mode 2
- PC operation status : Stopping, operating

[Example]
- Read date data.

■ **Command**

A2

■ **Response**

A2	00	99	12	17	05
		'99	December	17	Friday

9

Set date (COM = $B2_{(H)}$)

[Format]

■ **Command**

COM	Y	M	D	DW

■ **Response**

COM	RSLT

COM = $B2_{(H)}$
Y = Year (express lower two digits of Western year in BCD. $00_{(H)}$ to $99_{(H)}$)
M = Month ($01_{(H)}$ to $12_{(H)}$)
D = Date ($01_{(H)}$ to $31_{(H)}$)
DW = Day of week ($00_{(H)}$: Sunday, $01_{(H)}$: Monday, $02_{(H)}$: Tuesday, $03_{(H)}$: Wednesday, $04_{(H)}$: Thurs day, $05_{(H)}$: Friday, $06_{(H)}$: Saturday)

[Function]
- Set date data.

[Execution condition]
- Write enable mode : Mode 1 and mode 2
- PC operation status : Stopping, operating

[Example]
- Set data to Friday, January 23, 1999.

■ **Command**

B2	99	01	23	06
	'99	January	23	Saturday

■ **Response**

B2	00

Read time (COM = $A3_{(H)}$)

[Format]

■ **Command**

COM

■ **Response**

COM	RSLT	H	M	S

COM = $A3_{(H)}$
H = Hour ($00_{(H)}$ to $23_{(H)}$: BCD)
M = Minute ($00_{(H)}$ to $59_{(H)}$: BCD)
S = Second ($00_{(H)}$ to $59_{(H)}$: BCD)

[Function]
- Read time data.

[Execution condition]
- Write enable mode : Mode 0, mode 1 and mode 2
- PC operation status : Stopping, operating

[Example]
- Read time data.

■ **Command**

A3

■ **Response**

A3	00	21	12	37

21 o'clock 12 minutes 37 seconds

Set time (COM = B3(H))

[Format]

■ **Command**

COM	H	M	S	CTRL

■ **Response**

COM	ACK

COM =B3(H)
H = Hour (00(H) to 23(H): BCD)
M = Minute (00(H) to 59(H): BCD)
S = Second (00(H) to 59(H): BCD)
CTRL = Control data 00(H): Run clock
01(H): Stop clock

[Function]
- Write time data

[Execution condition]
- Write enable mode : Mode 1 and mode 2
- PC operation status : Stopping, operating

[Example]
- Set time data to 18 o'clock, 10 minutes, and 20 seconds.

■ **Command**

B3	18	10	20	00

18 o'clock 10 minutes 20 seconds Run clock

■ **Response**

B3	00

Monitor PC operation status (COM = $E8_{(H)}$)

[Format]

■ **Command**

COM	MODE

■ **Response**

COM	RSLT	MODE

COM = $E8_{(H)}$
MODE = $00_{(H)}$: Operating
$01_{(H)}$: Stopped operation by an instruction from other module.
$02_{(H)}$: Stopped operation by an instruction from this module.

[Function]
- Monitor PC run/stop status.

[Execution condition]
- Write enable mode : Mode 0, mode 1 and mode 2
- PC operation status : Stopping, operating

[Example]
- Monitor PC operation status.

■ **Command**

E8

■ **Response**

E8	00	00

└ Operating

9

Halt and release halting of PC(COM = $F8_{(H)}$)

[Format]

■ **Command**

COM	MODE

■ **Response**

COM	RSLT	MODE

COM = $F8_{(H)}$
MODE = $00_{(H)}$: Release halt
$01_{(H)}$: Halt

[Function]
- Halt/release halting of PC operation.

[Execution condition]
- Write enable mode : Mode 0, mode 1 and mode 2
- PC operation status : Stopping, operating

[Example]
- Halt PC operation

■ **Command**

F8	01

└── Stopping

■ **Response**

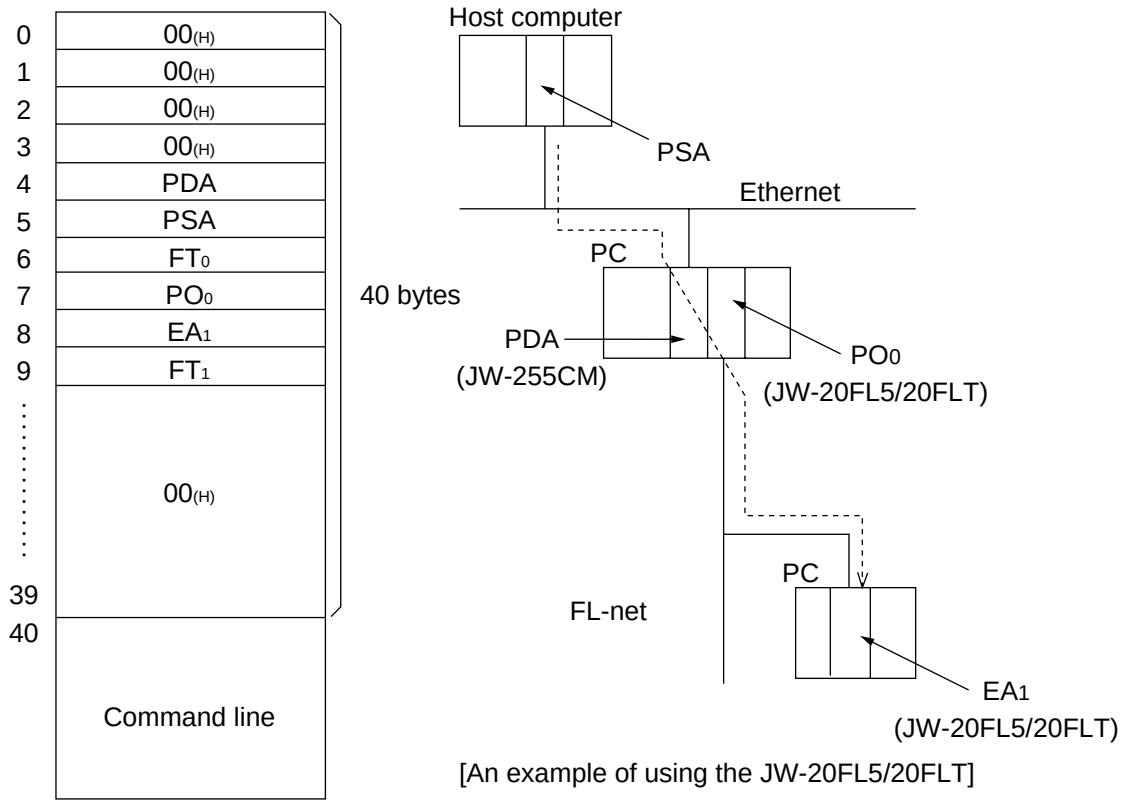
F8	00	01

[4] Computer link error code table

RSLT (Hexadecimal)	Details
00	Normally end
01	Format error
06	PC does not stop operation
07	Verify error of write command.
0F	Time out while accessing memory.
13	Tried to set/reset TMR/CNT while PC stops operation.
10	Miss match write enable mode.

[5] Two-layer communication with the Ethernet

In order to communicate with the Ethernet on a different layer, use the following information in the communication format header (see page 9-19) as an extension header.



[An example of using the JW-20FL5/20FLT]

- When making a two-layer communication with the FL-net, the frame needs to contain the information including the source, transit stations, and destination, and slot number (i.e. designating the communication path). The FL-net uses eight bits to represent a station number. For that reason, when designating a module on the Ethernet, a station number for the FL-net needs to be designated. The address is referred to as a pseudo station number.

(a) PDA : Pseudo destination address
Designate the station number of JW-255CM that connects with the Ethernet. This may be any value within the range of 1 to 254 that can be discriminated from other equipment on the Ethernet.

(b) PSA : Pseudo source address
Designate the station number for the equipment sending the command. This may be any value within the range of 1 to 254 that can be discriminated from other equipment on the Ethernet.
With respect to the response, the pseudo target station number that is given by the command will be set.

(c) FT_0 : Frame type 0
Designate $60_{(H)}$.

(d) PO_0 : Transit slot number
Designate the slot number on the transit station PC that the FL-net module JW-20FL5/20FLT is installed on. This number is 2, 3 ... up to 7 from the next position of the control module (in case ZW-6CC is used.)

(e) EA_1 : End target station address
Designate the end target station address 1 to 254 on the FL-net.

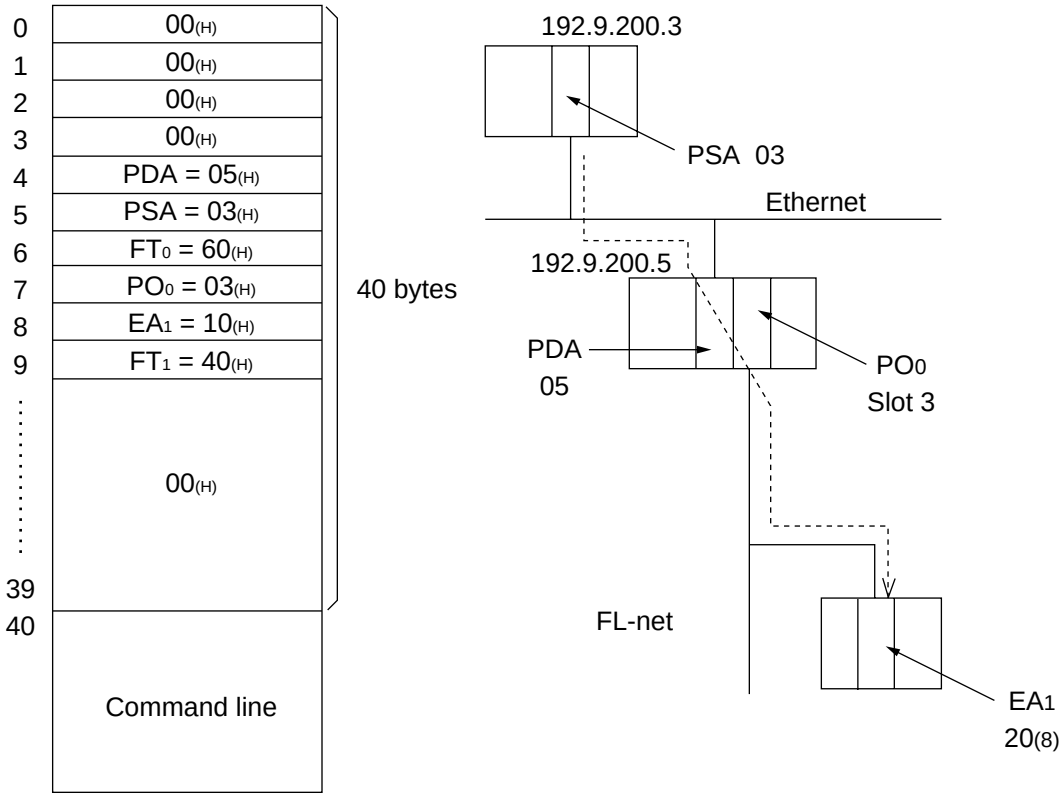
(f) FT1 : Frame type 1
Set the $40_{(H)}$.

(g) Command line : Command/response line
c-ID/r-ID and after of communication format (page 9-19)

Note

The two-layer communication is possible only with the computer link to the module on the FL-net from the host computer on the Ethernet via transit stations. Communication in the reverse direction, or the computer link from the host computer on the FL-net to this module, is not possible.

Example: In the following example as shown in the diagram, the expansion header needs to be as follows.



9-6 Remote programming and remote monitor functions

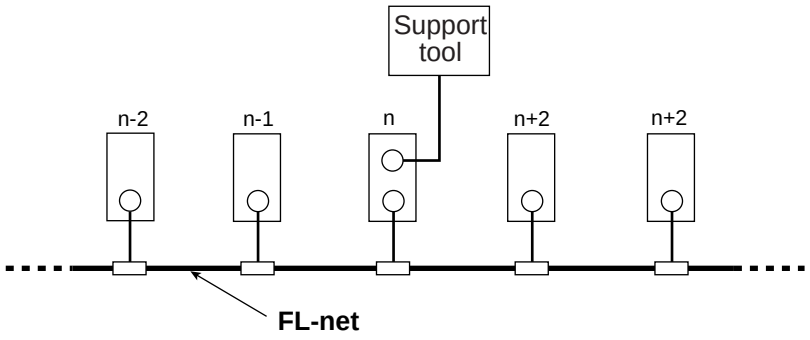
The remote programming and remote monitor functions are methods for operating a PC on another node connected to the FL-net. These are proprietary SHARP functions. These functions can be used only between PCs that are quipped with SHARP FL-net modules (boards). You can access these functions using the following support devices.

- Hand held programmer: JW-14PG
- Ladder software: JW-100SP, JW-92SP, and JW-52SP

Although these functions use request TCD (1001) and response TCD (1201) in transmission type messages, users are not required to make any settings.

[1] Function

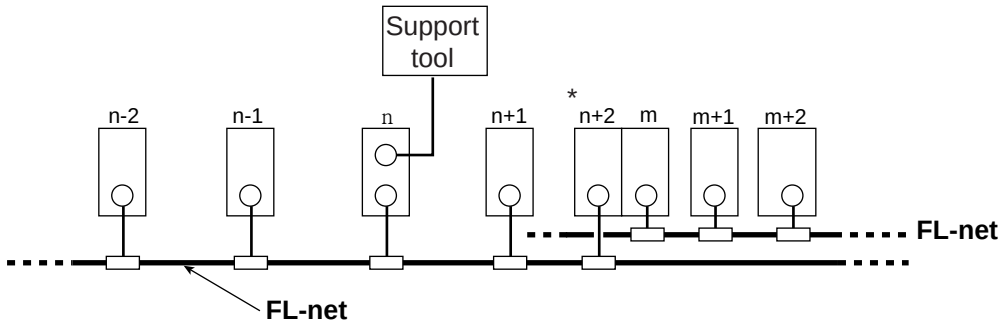
- When connecting to a standard network.



You can do the following using a support device connected to node "n."

- Change the program (Writing to the program while the PC is operating is not allowed, for safety reasons. Change the program only after stopping the PC operation.)
- Monitor remotely
- Change the parameter memory (only possible using the JW-14PG).

- When connected to an expansion network



* The JW20H (JW-20FL5/20FLT) cannot be used as a junction station ("n+2" station or "m "station). Use a JW30H (JW-20FL5/20FLT) or a JW50H/70H/100H (JW-50FL).

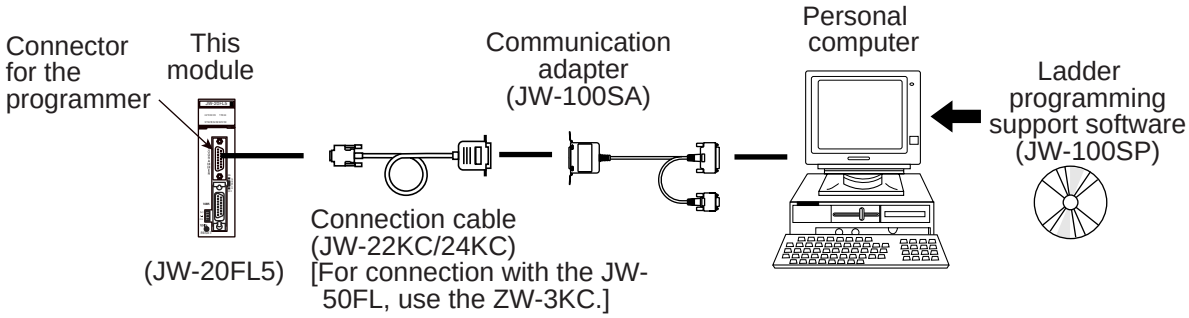
Using a support tool that is connected to node "n," you can do the following.

- Change the program (Writing to the program while the PC is operating is not allowed, for safety reasons. Change the program only after stopping the PC operation.)
- Monitor remotely
- Change the parameter memory (only possible using the JW-14PG).

[2] Example operation

The example below shows the procedure for using the JW-100SP ladder logic programming software. For details about the operation of other support tools, see their respective manuals.

① Connect a personal computer to the module on the FL-net.



② Communication settings

Set the JW-100SP communication settings to "network" and enable remote programming and remote monitoring.

Start the JW-100SP

↓

Click [Setting] on the menu bar.
⇨ The "Set" menu will appear.

↓

Click [Communication setting] on the "Set" menu.
⇨ The [Communication setting] dialog box will appear.

↓

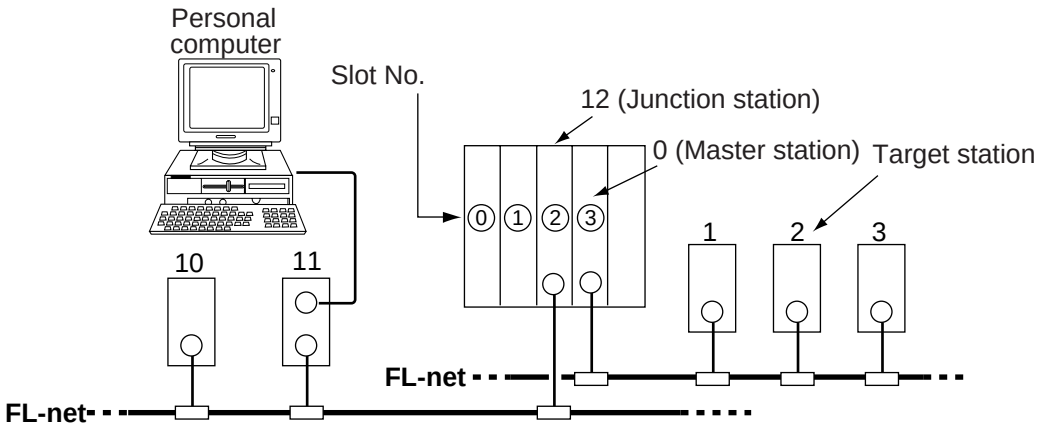
Click on "Network" and then click on "Detail settings."
⇨ The [Detail setting] dialog box will appear.

9

③ Network settings

Select whether a node (target station) that will be used to execute remote programming and remote monitoring is on a standard network connection or an extended connection.

In the figure below, nodes numbered 10 to 12 are standard connections. Nodes numbered 1 to 3 are extended network connections.



● **When connecting to a standard network**

In the "Detail setting" dialog box, select "Standard" for the network configuration.

↓

Set the module type for the target station to "ME-NET."

↓

Enter the station number (1 to 249) of the target station.

● **When connecting to an extended network**

In the "Detail setting" dialog box, select "Extended" for the network configuration.

↓

Set the module type for the junction station to "ME-NET."

↓

Set the module type for the target station to "ME-NET."

↓

Enter the station number (1 to 249) of the target station.

(In the case of the example above, enter 2)

↓

Enter the station number (1 to 249) of the junction station.

(In the case of the example above, enter 12)

↓

Enter the rack number of the junction station.

(In the case of the example above, leave it at 0)

↓

Enter the slot number of the junction station.

(Enter the target station's insertion slot number in the host station. In the example above, enter 3.)

Chapter 10: Communication Control

A participating node list flag, an operation status flag, error status flag, local node management table, participating nodes management table, and network management table are set up in the communication control area of the JW-50FL.
(Complete setting procedure for the JW-50FL => See page 8-3.)

Communication control area	Address(8) *	Control details	Reference section
Participating nodes list flag	+000 to +037	Participating status of each node in the network	[1]
Operation status flag	+040 to +077	Operation information for each node	[2]
Error status flag	+100 to +137	Error information of each node	[3]
Local node management table	+140 to +233	Information concerning own node	[4]
Participating node management table	+234 to +253	Node number information written to the base address +300	[5]
Network management table	+254 to +267	Information common to the network	[6]
Node number to read information	+300	Node number to read information to the participating node management table (address +234 to 253)	---
Transmit the data	+301	Write 01(H) is written to this address, the data in the transmission area [information and data sections] of the transmission buffer is sent to the target node.	---

* Addresses +000 to 301(8) are offset addresses calculated from the top address of the communication control area. Enter the top address for the communication control area as a parameter at addresses 30 to 32(8)).

Parameter address(8)	Details
30	Top address (word address) of the communication control area in the PC. - Address 30 is for the lower digit. Address 31 is for the upper digit.
31	
32	File number of the communication control area in a PC.

(Parameter => See Chapter 12)

[1] Participating nodes list flag

Shows the participation status of each node in the network

*1 Address(8)	Node number (correspond to bit number of each address) *2							
	D7	D6	D5	D4	D3	D2	D1	D0
+000	7	6	5	4	3	2	1	
+001	15	14	13	12	11	10	9	8
+002	23	22	21	20	19	18	17	16
+003	31	30	29	28	27	26	25	24
+004	39	38	37	36	35	34	33	32
+005	47	46	45	44	43	42	41	40
+006	55	54	53	52	51	50	49	48
+007	63	62	61	60	59	58	57	56
+010	71	70	69	68	67	66	65	64
+011	79	78	77	76	75	74	73	72
+012	87	86	85	84	83	82	81	80
+013	95	94	93	92	91	90	89	88
+014	103	102	101	100	99	98	97	96
+015	111	110	109	108	107	106	105	104
+016	119	118	117	116	115	114	113	112
+017	127	126	125	124	123	122	121	120
+020	135	134	133	132	131	130	129	128
+021	143	142	141	140	139	138	137	136
+022	151	150	149	148	147	146	145	144
+023	159	158	157	156	155	154	153	152
+024	167	166	165	164	163	162	161	160
+025	175	174	173	172	171	170	169	168
+026	183	182	181	180	179	178	177	176
+027	191	190	189	188	187	186	185	184
+030	199	198	197	196	195	194	193	192
+031	207	206	205	204	203	202	201	200
+032	215	214	213	212	211	210	209	208
+033	223	222	221	220	219	218	217	216
+034	231	230	229	228	227	226	225	224
+035	239	238	237	236	235	234	233	232
+036	247	246	245	244	243	242	241	240
+037		254	253	252	251	250	249	248

*1: Addresses +000 to $037_{(8)}$ are offset addresses calculated from the top address that is stored in the parameter at addresses 30 to $32_{(8)}$.

*2: 1 to 254 express each node number. By turning the bits in these addresses on and off, the participating status of each node can be represented.

1 to 254 (node No.)	ON	OFF
Bit showing this node's status	This node is participating in the network	This node is not participating in the network.
Bit showing other node's status	Node associated with this node number is participating in the network.	Node associated with this node number is not participating in the network.

[2] Operation status flag

Shows the operation information for each node

*1 Address(8)	Node number (correspond to bit number of each address) *2							
	D7	D6	D5	D4	D3	D2	D1	D0
+040	7	6	5	4	3	2	1	
+041	15	14	13	12	11	10	9	8
+042	23	22	21	20	19	18	17	16
+043	31	30	29	28	27	26	25	24
+044	39	38	37	36	35	34	33	32
+045	47	46	45	44	43	42	41	40
+046	55	54	53	52	51	50	49	48
+047	63	62	61	60	59	58	57	56
+050	71	70	69	68	67	66	65	64
+051	79	78	77	76	75	74	73	72
+052	87	86	85	84	83	82	81	80
+053	95	94	93	92	91	90	89	88
+054	103	102	101	100	99	98	97	96
+055	111	110	109	108	107	106	105	104
+056	119	118	117	116	115	114	113	112
+057	127	126	125	124	123	122	121	120
+060	135	134	133	132	131	130	129	128
+061	143	142	141	140	139	138	137	136
+062	151	150	149	148	147	146	145	144
+063	159	158	157	156	155	154	153	152
+064	167	166	165	164	163	162	161	160
+065	175	174	173	172	171	170	169	168
+066	183	182	181	180	179	178	177	176
+067	191	190	189	188	187	186	185	184
+070	199	198	197	196	195	194	193	192
+071	207	206	205	204	203	202	201	200
+072	215	214	213	212	211	210	209	208
+073	223	222	221	220	219	218	217	216
+074	231	230	229	228	227	226	225	224
+075	239	238	237	236	235	234	233	232
+076	247	246	245	244	243	242	241	240
+077		254	253	252	251	250	249	248

*1: Addresses +040 to $077_{(8)}$ are offset address calculated from the top address that is stored in the parameter at addresses 30 to $32_{(8)}$).

*2: 1 to 254 express each node number. By turning the bits in these addresses on and off, the participating status of each node can be represented.

1 to 254 (node nbr.)	ON	OFF
Bit to express own node	This node is participating in the network	This node is not participating in the network.
Bit to express other nodes	Node associated with this number is operating. (RUN = 1: Not in program mode)*	Node associated with this number is not operating. (RUN = 0: Program mode)*

* When other nodes are allocated by controllers from other manufacturers, follow the specifications of their PCs.

[3] Error status flag

Shows the error information for each node

*1 Address(8)	Node number (correspond to bit number of each address) *2							
	D7	D6	D5	D4	D3	D2	D1	D0
+100	7	6	5	4	3	2	1	
+101	15	14	13	12	11	10	9	8
+102	23	22	21	20	19	18	17	16
+103	31	30	29	28	27	26	25	24
+104	39	38	37	36	35	34	33	32
+105	47	46	45	44	43	42	41	40
+106	55	54	53	52	51	50	49	48
+107	63	62	61	60	59	58	57	56
+110	71	70	69	68	67	66	65	64
+111	79	78	77	76	75	74	73	72
+112	87	86	85	84	83	82	81	80
+113	95	94	93	92	91	90	89	88
+114	103	102	101	100	99	98	97	96
+115	111	110	109	108	107	106	105	104
+116	119	118	117	116	115	114	113	112
+117	127	126	125	124	123	122	121	120
+120	135	134	133	132	131	130	129	128
+121	143	142	141	140	139	138	137	136
+122	151	150	149	148	147	146	145	144
+123	159	158	157	156	155	154	153	152
+124	167	166	165	164	163	162	161	160
+125	175	174	173	172	171	170	169	168
+126	183	182	181	180	179	178	177	176
+127	191	190	189	188	187	186	185	184
+130	199	198	197	196	195	194	193	192
+131	207	206	205	204	203	202	201	200
+132	215	214	213	212	211	210	209	208
+133	223	222	221	220	219	218	217	216
+134	231	230	229	228	227	226	225	224
+135	239	238	237	236	235	234	233	232
+136	247	246	245	244	243	242	241	240
+137		254	253	252	251	250	249	248

*1: Addresses +100 to $137_{(8)}$ are offset addresses calculated from the top address that is stored in the parameter at addresses 30 to $32_{(8)}$).

*2: 1 to 254 are express node number. By turning the bits in these addresses on and off, the participating status of each node can be represented.

1 to 254 (node nbr.)	ON	OFF
Bit showing this node's status	This node is participating in the network	This node is not participating in the network.
Bit showing other node's status	The status of the node associated with this number is NORMAL or WARNING. (NORMAL: No problem WARNING: Battery error)*	The status of the node associated with this number is ALARM . (Has a non battery error or is not functioning.)*

* When other nodes are allocated by controllers from other manufacturers, follow the specifications for their PCs.

[4] Local node management table

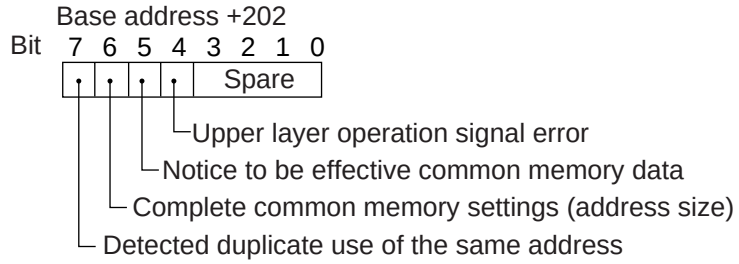
This section shows the information about the local node as part of the network control information.

Address(8)	Details	Corresponding header information
+140	Node number	
+141	Reserved area	
+142 to 153	Node name (facility name)	
+154 to 165	Vendor name	
+166 to 177	Manufacturer's model name	
+200	This node's status	
+201	Reserved area	
+202	FA link layer status => See below	LKS
+203	Reserved area	
+204 to 205	Status of the upper layer => See below	ULS
+206 to 207	Common memory (area 1) storage address	C_AD1
+210 to 211	Common memory (area 1) storage size	C_SZ1
+212 to 213	Common memory (area 2) storage address	C_AD2
+214 to 215	Common memory (area 2) storage size	C_SZ2
+216	Token monitor time-out time	TW
+217	Reserved area	
+220	Minimum allowable time between frames	MFT
+221	Reserved area	
+222	Protocol version	PVER
+223	Reserved area	

*1: Addresses +140 to 223(8) are offset addresses calculated from the top address that is stored in the parameter at addresses 30 to 32(8).

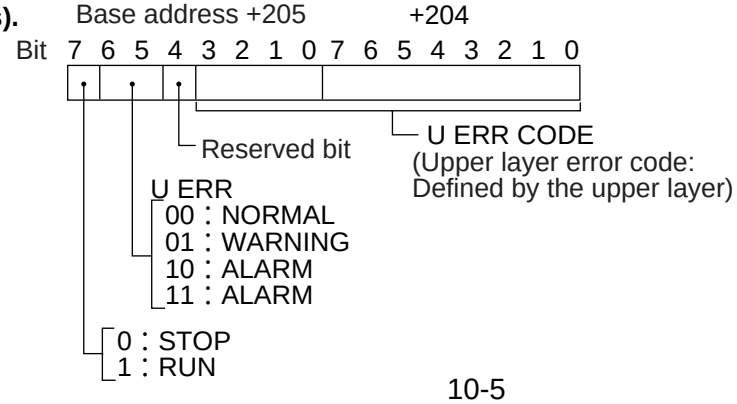
■ FA link layer status (LKS)

Shows the FA link status of the network.



■ Upper layer status (ULS)

Show the upper layer status using RUN/STOP (1 bit), UERR (2 bits), and UERR CODE (12 bits).



10

[5] Participating node management table

Shows the information for the node numbers at address offset +300 for each table.

Address(8)	Details	Corresponding header information
+224 to 225	Common memory (area 1) storage address	C_AD1
+226 to 227	Common memory (area 1) storage size	C_SZ1
+230 to 231	Common memory (area 2) storage address	C_AD2
+232 to 233	Common memory (area 2) storage size	C_SZ2
+234	FA link layer status	LKS
+235	Reserved area	
+236 to 237	Upper layer status	ULS
+240	Token monitor timeout time	TW
+241	Reserved area	
+242	Minimum allowable time between frames	MTF
+243	Reserved area	
+244 to 245	Time allowed for the refresh cycle	RCT
+246 to 253	Reserved	

- Addresses +224 to $253_{(8)}$ are offset addresses calculated from the top address that is stored in the parameter at addresses 30 to $32_{(8)}$.
- The details of the offset addresses at +234 (FA link layer status) and at +236 to 237 (upper layer status) are the same as for offset addresses +202 and +204 to 205 in the Local Node Control Table.

[6] Network management table

Shows the information shared by the network.

Address(8)	Details	Corresponding header information
+254	Token holding the node number	
+255	Reserved area	
+256	Minimum allowable time between frames	MFT
+257	Reserved area	
+260 to 261	Refresh cycle measured time (calculated value)	
+262 to 263	Refresh cycle measured time (current value)	
+264 to 265	Refresh cycle measured time (max. value)	
+266 to 267	Refresh cycle measured time (min. value)	

- Addresses +254 to $267_{(8)}$ are offset addresses calculated from the top address that is stored in the parameter at addresses 30 to $32_{(8)}$.

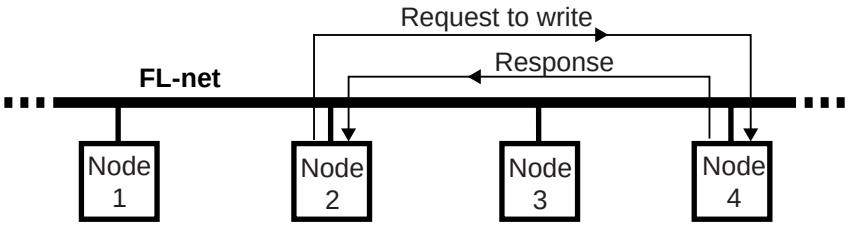
Chapter 11: SEND/RECEIVE function

The SEND/RECEIVE functions are exclusive SHARP functions. These can only be used between PCs equipped with FL-net modules (board).

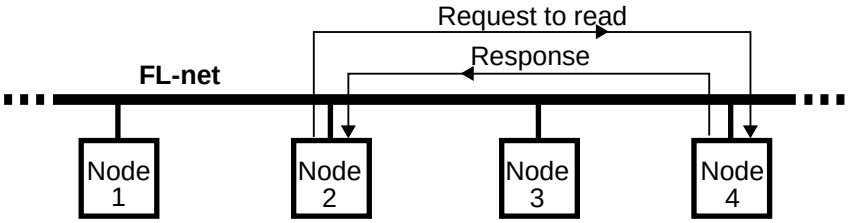
Note: The SEND/RECEIVE functions can be used only when a JW30H, JW50H/70H/100H, or a J-board (Z-500 series) is used as the host PC. This function cannot be used with the JW20H or J-board (Z-300 series).

The SEND/RECEIVE functions allow the exchange of data between certain nodes within a specified maximum time. The SEND function is used to declare a target node and write data from that node. The RECEIVE function is used to declare which node will return data to the node issuing the call and then it receives the data.

[An example of the SEND function]



[An example of the RECEIVE function]



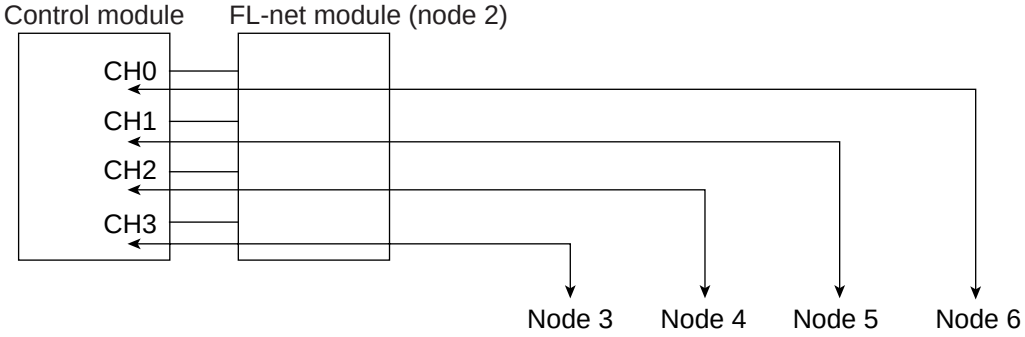
- Dedicated instructions are used to execute the SEND/RECEIVE functions.

Dedicated instruction	Detail
F-203 (OPCH)	Declare a station to communicate with (single layer)
F-204 (SEND)	Write data to the target station
F-205 (RCV)	Read data from the target station

Enter the module No. (port No.)/channel of the host module (board) by using the F-203 (OPCH) instruction. This instruction includes the target node number, and the data memory address in the target node. Enter the data memory address for number of bytes to be transferred using the F-204 (SEND) / F-205 (RCV) instructions. Using these instructions, when the JW-50FL receives a response from the target node, it completes this function automatically. There is no need for special program for the target node PC.

- When using the SEND/RECEIVE functions, the data route between the control module (CPU board) and FL-net module (board) is referred to as a "channel." There are four channels (CH0 to CH3) for each module (board). Each channel can transfer 256 bytes of data. Therefore, in a ladder program, up to four SEND/RECEIVE functions can be executed at once.

[Ex.]

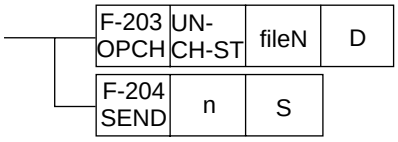


11-1 Operation of SEND/RECEIVE instruction

[1] SEND

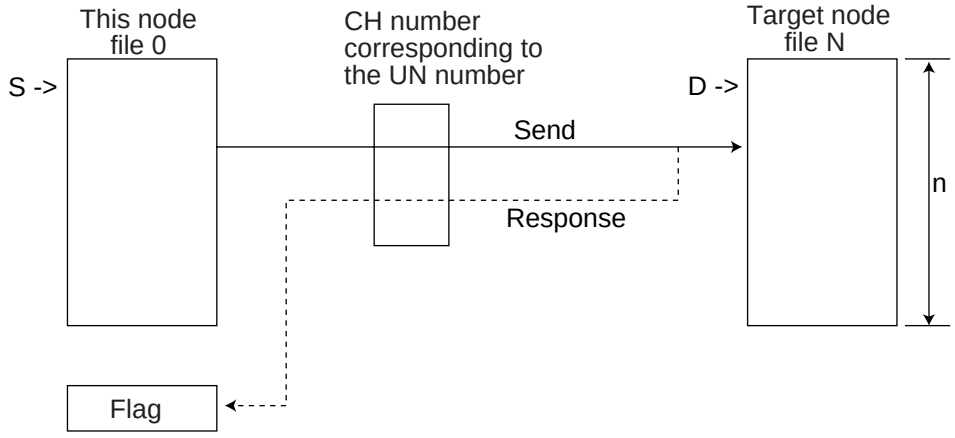
This function operates by the combination of F-203 (OPCH) and F-204 (SEND).

(1) When the module is used (host PC: JW30H, J-board (Z-500 series))



UN : Module No. switch set value of the module (0 to 6).
CH : Channel number within the specified module (board) (0 to 3). In the PC program, the same port number can be called 4 times, once for each channel (CH0, CH1, CH2, and CH3).
ST : Target node number (01 to $FE_{(H)}$)
fileN : Data area in the target node PC (file number)
D : Top file address of the data area in the target node PC
n : Number of data bytes transmitted (000 to $377_{(8)}$, 256 bytes at 000)
S : Data area top register of source station data

- Setting range of S
  - ㅋ0000 to ㅋ1577
  - ㅋ2000 to ㅋ7577
  - b0000 to b1777
  - b2000 to b3777
  - 09000 to 99777
  - E0000 to E7777
  - File1 000000 to 037777
  - @ㅋ0000 to @ㅋ1574
  - @ㅋ2000 to @ㅋ7574
  - @b0000 to @b1774
  - @b2000 to @b3774
  - @09000 to @99774
  - @E0000 to @E7774
  - File1 @000000 to @037774



11

Flag status during and after the operation

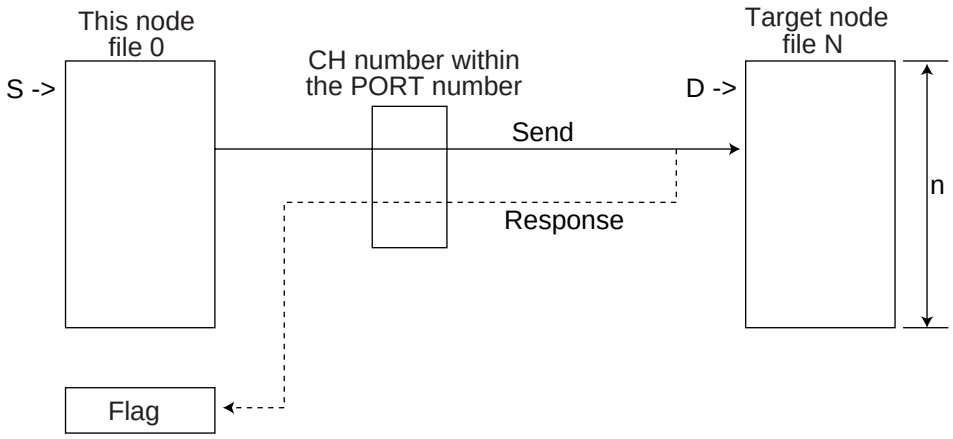
	Zero 07357	Carry 07356	Error 07355	Non-carry 07354	Description
No response from the module (board)	0	0	1	0	Set value on the UN and module No. switch set value of the communication module are different.
Communi-cation jam	0	0	0	1	This condition may instantaneously occur while other send instruction is being executed. However, as soon as the condition becomes clear for the execution of an instruction, the status will turn to "Communicating."
Communi-cating	1	0	0	1	The communicating is being run. Once the communication completes, the status will change to either "normal end" or "abnormal end."
Normal end	0	1	0	0	When the send instruction has successfully completed.
Abnormal end (timeout)	0	1	1	0	When there is no response from target node.
Abnormal end (error)	1	1	1	0	The target node cannot be written to.

(2) When the module is used (host PC: JW50H/70H/100H)

F-203 OPCH	PORT-CH-ST	fileN	D
F-204 SEND	n	S	

PORT : Port number on which the JW-50FL is installed (0 to 7)
CH : Channel number within the specified port number (0 to 3)
In the PC program, the same port number can be called 4 times, once for each channel (CH0, CH1, CH2, and CH3).
ST : Target node number (01 to $FE_{(H)}$)
fileN : Data area in the target node PC (file number)
D : Top file address of the data area in the target node PC
n : Number of data bytes transmitted (000 to $377_{(8)}$, 256 bytes at 000)
S : Data area top register of source station data

- Setting range of S
  - Ↄ0000 to Ↄ1577
  - b0000 to b1777
  - 09000 to 99777
  - E0000 to E1777
  - @Ↄ0000 to @Ↄ1574
  - @b0000 to @b1774
  - @09000 to @99774
  - @E0000 to @E1774



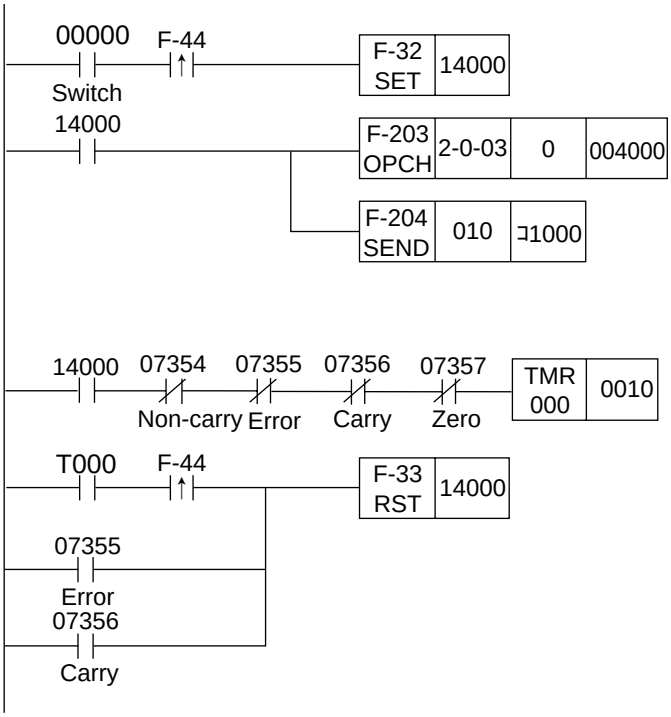
Flag status during and after the operation

	Zero 07357	Carry 07356	Error 07355	Non-carry 07354	Description
No response from port	0	0	1	0	The value entered for the PORT and the actual installed port number may be different.
Communi-cation jam	0	0	0	1	This condition may instantaneously occur while other send instruction is being executed. However, as soon as the condition becomes clear for the execution of an instruction, the status will turn to "Communicating."
Communi-cating	1	0	0	1	The communicating is being run. Once the communication completes, the status will change to either "normal end" or "abnormal end."
Normal end	0	1	0	0	When the send instruction has successfully completed.
Abnormal end (error)	0	1	1	0	The target node cannot be written to.

■ **Sample of program (for the JW30H)**

When transferring 8 bytes of data from source station register ⊐1000 to the register 09000 of the target station number 3 :

Local node JW-20FL [Module No. Switch : 2, Channel used : 0]



Set the sending relay 14000.

UN 2, CH0, target node number 3,
File number 0
File address 001000

Transfers 8 bytes of the range
⊐1000 to ⊐1007.

Detects non-execution at power ON.
(Flags do not change for one second.)

Resets 14000 when the execution completes.

Note

- The entry condition of F-203/204 instruction needs to be kept ON until the execution of the instruction completes (or until any error occurs or the carry flags turns ON). If the entry condition turns OFF while the instruction is being run, the instruction will end in an incomplete condition. Once this condition occurs, a "communication jam" occurs when an instruction execution is attempted the next time, and the instruction will not run properly. To restore the condition, power OFF the PC, and turn it ON again.
- If the entry condition turns OFF, due to an instantaneous power failure, turn the entry condition to "latched relay" as a remedy. If, however, any power loss occurs while an instruction is being run using "latched relay," turning the power ON again will cause F-203/204 instructions process being run to disappear, and the entry condition will stay ON. Therefore, the start of the entry may not be detected. Since, in this case, all flags will be turned OFF, detect the continuation of the OFF condition of all flags using the timer, and then reset the entry condition before running the next instruction.

[2] RECEIVE

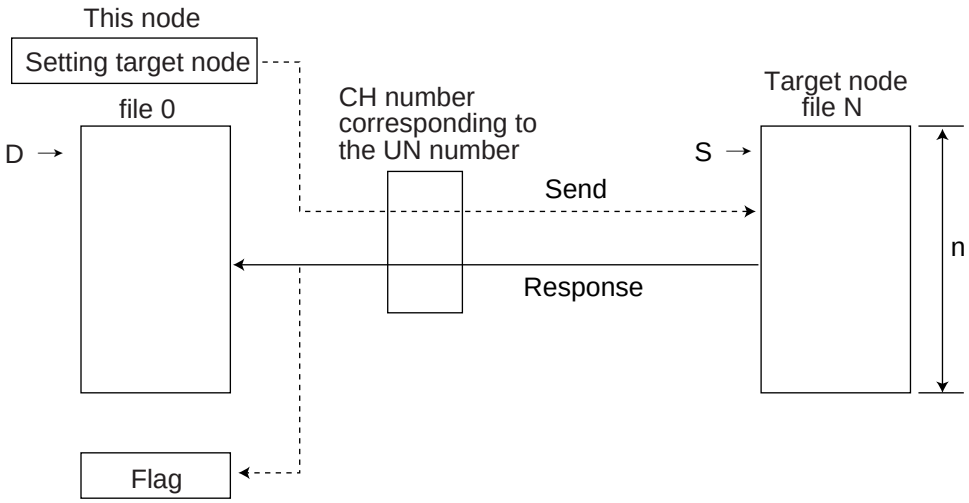
This function operates by the combination of F-203 (OPCH) and F-205 (RCV).

(1) When the module is used (host PC: JW30H, J-board (Z-500 series))

F-203 OPCH	UN-CH-ST	fileN	S
F-204 SEND	n	D	

UN : Module No. switch set value (0 to 6) of the communication module
CH : Channel number within the specified module (board) (0 to 3). In the PC program, the same port number can be called 4 times, once for each channel (CH0, CH1, CH2, and CH3).
ST : Target node number (01 to $FE_{(H)}$)
fileN : Data area in the target node PC (file number)
S : Top file address of the data area in the target node PC
n : Number of data bytes transmitted (000 to $377_{(8)}$, 256 bytes at 000)
D : Data area top register of source station data

- Setting range of D
  - J0000 to J1577
  - J2000 to J7577
  - b0000 to b1777
  - b2000 to b3777
  - 09000 to 99777
  - E0000 to E7777
  - File1 000000 to 037777
  - @J0000 to @J1574
  - @J2000 to @J7574
  - @b0000 to @b1774
  - @b2000 to @b3774
  - @09000 to @99774
  - @E0000 to @E7774
  - File1 @000000 to @037774



Flag status during and after the operation

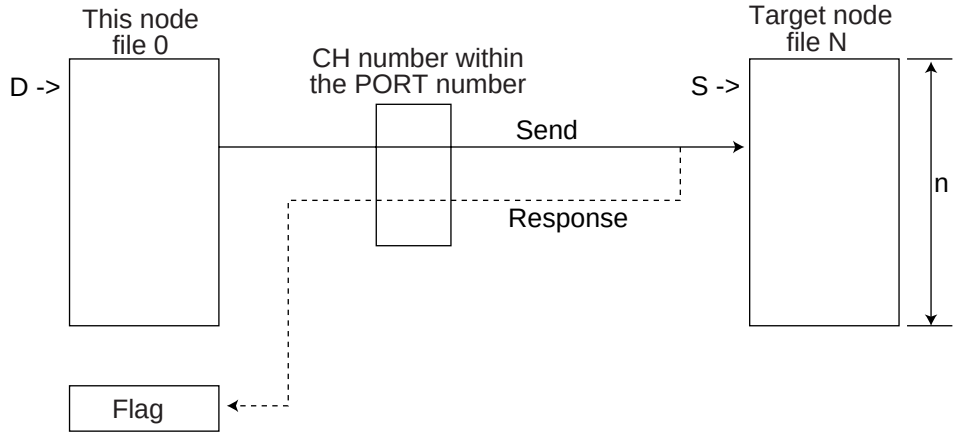
	Zero 07357	Carry 07356	Error 07355	Non-carry 07354	Description
No response from the module (board)	0	0	1	0	Set value on the UN and module No. switch set value of the communication module are different.
Communi-cation jam	0	0	0	1	This condition may instantaneously occur while other receive instruction is being executed. However, as soon as the condition becomes clear for the execution of an instruction, the status will turn to "Communicating."
Communi-cating	1	0	0	1	The communicating is being run. Once the communication completes, the status will change to either "normal end" or "abnormal end."
Normal end	0	1	0	0	When the receive instruction has successfully completed.
Abnormal end (timeout)	0	1	1	0	When there is no response from target node.

(2) When the module is used (host PC: JW50H/70H/100H)

F-203 OPCH	PORT-CH-ST	fileN	S
F-204 SEND	n	D	

PORT : Port number on which the JW-50FL is installed (0 to 7)
CH : Channel number within the specified port number (0 to 3)
In the PC program, the same port number can be called 4 times, once for each channel (CH0, CH1, CH2, and CH3).
ST : Target node number (01 to $FE_{(H)}$)
fileN : Data area in the target node PC (file number)
D : Top file address of the data area in the target node PC
S : Data area top register of source station data
n : Number of data bytes transmitted (000 to $377_{(8)}$, 256 bytes at 000)
D : Top file address of the data area in the target node PC

- Setting range of D
  - ㅋ0000 to ㅋ1577
  - b0000 to b1777
  - 09000 to 99777
  - E0000 to E1777
  - @ㅋ0000 to @ㅋ1574
  - @b0000 to @b1774
  - @09000 to @99774
  - @E0000 to @E1774



11

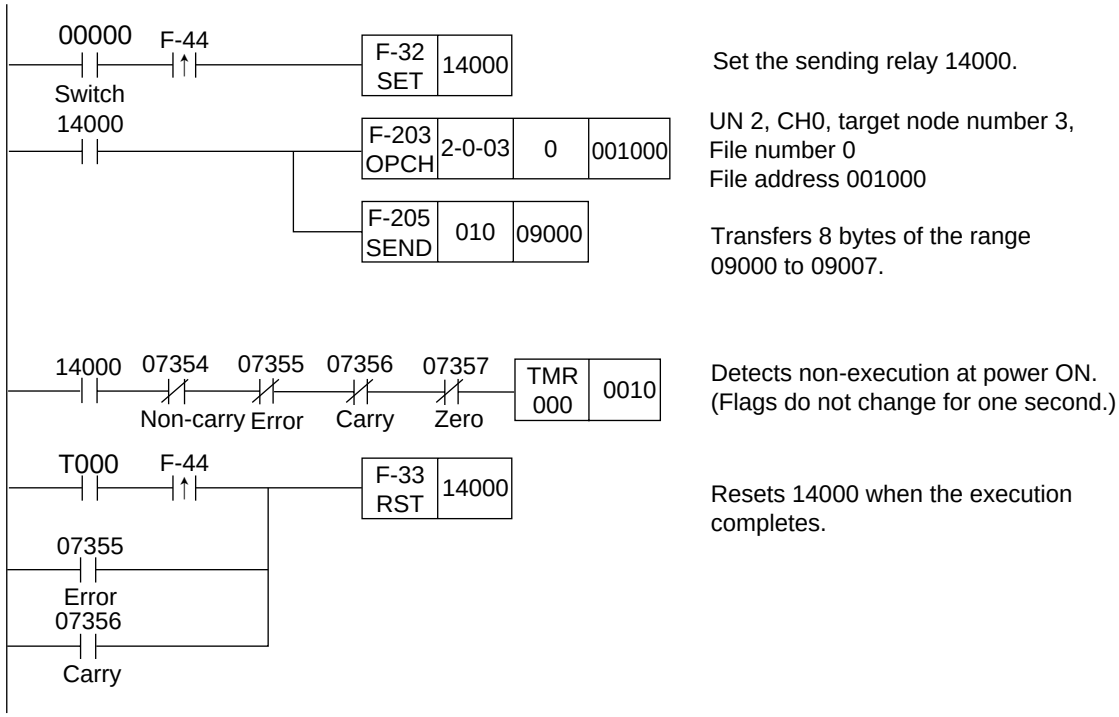
Flag status during and after the operation

	Zero 07357	Carry 07356	Error 07355	Non-carry 07354	Description
No response from port	0	0	1	0	The value entered for the PORT and the actual installed port number may be different.
Communi-cation jam	0	0	0	1	This condition may instantaneously occur while other send instruction is being executed. However, as soon as the condition becomes clear for the execution of an instruction, the status will turn to "Communicating."
Communi-cating	1	0	0	1	The communicating is being run. Once the communication completes, the status will change to either "normal end" or "abnormal end."
Normal end	0	1	0	0	When the send instruction has successfully completed.
Abnormal end (error)	0	1	1	0	The target node cannot be written to.

■ Sample of program (for the JW30H)

When transferring 8 bytes of data from source station register ∃1000 to the register 09000 of the target station number 3 :

Local node JW-20FL [Module No. Switch : 2 / Channel used : 0]



Note

- The entry condition of F-203/205 instruction needs to be kept ON until the execution of the instruction completes (or until any error occurs or the carry flags turns ON). If the entry condition turns OFF while the instruction is being run, the instruction will end in an incomplete condition. Once this condition occurs, a "communication jam" occurs when an instruction execution is attempted the next time, and the instruction will not run properly. To restore the condition, power OFF the PC, and turn it ON again.
- If the entry condition turns OFF, due to an instantaneous power failure, turn the entry condition to "latched relay" as a remedy. If, however, any power loss occurs while an instruction is being run using "latched relay," turning the power ON again will cause F-203/205 instructions process being run to disappear, and the entry condition will stay ON. Therefore, the start of the entry may not be detected. Since, in this case, all flags will be turned OFF, detect the continuation of the OFF condition of all flags using the timer, and then reset the entry condition before running the next instruction.

11-2 Timeout time for SEND/RECEIVE instructions

Enter a timeout time for the SEND/RECEIVE functions in the parameter at address $60_{(8)}$.

■ Timeout time parameter

Address(8)	Detail
60	Timeout time for SEND/RECEIVE instructions (0.1 to 25.5 sec.)

- The specified timeout time will be effective for all target nodes.
- The allowable range is 0.01 (0.1 sec.) to 255 (25.5 sec.), in decimal notation. (In units of 0.1 sec.)
- The default value of $00_{(H)}$ is 1 sec.

Chapter 12: Parameters

This chapter describes the parameters that can be set in the module. The parameter area is set in the control module (CPU board). ⇨ "12-3 How to set parameters."

12-1 Table of parameters

Address(8)	Details		Reference page
00	IP address	When $FF_{(H)}$ is written to address 03, the module will enter the data memory setting mode. - Enter the parameter file address at addresses 00 and 01. Enter the file number at address 02.	7-5 7-8 12-3 15-13
01	IP address		
02	IP address		
03	IP address, node number		
04	Token monitor timing => See next page		8-13
05	Interval between frames (normally set to 0)		15-22
06 to 07	Reserved area		-
10	Data transmission Area 1 top address (word address) for this node. - Address 10 is for the lower digit. Address 11 is for the upper digit.	Related to cyclic transfers	Chapter 8
11			
12	Data length (word) of Area 1 for this node. - Address 12 is for the lower digit. Address 13 is for the upper digit.		
13			
14	Data transmission Area 2 top address (word address) for this node. - Address 14 is for the lower digit. Address 15 is for the upper digit.		
15			
16	Data length (word) of Area 2 for this node. - Address 16 is for the lower digit. Address 17 is for the upper digit.		
17			
20	Top address of Area 1 on the PC (word address) - Address 20 is for the lower digit. Address 21 is for the upper digit.		
21			
22	Area 1 file number on the PC		
23	Reserved area		
24	Top address of Area 2 on the PC (word address) - Address 24 is for the lower digit. Address 25 is for the upper digit.		
25			
26	Area 2 file number on the PC		
27	Reserved area		-
30	Top address of the communication control area on the PC (word address) - Address 30 is for the lower digit. Address 31 is for the upper digit.	Related to communi-cation control	Chapter 10
31			
32	Communication control area's file number on the PC		
33	Communication control area transfer type - Specify the address to transfer from the module to the control module (CPU board) $00_{(H)}$: Transfer all of the area $80_{(H)}$: Does not transfer data from the communication transfer area. $81_{(H)}$: Transfer only the participating node list flag, operation status flag, and error status flag. $83_{(H)}$: Transfer all of the area.		
34	Transmission buffer top address (word address) - Address 34 is for the lower digit. Address 35 is for the upper digit.	Related to message transfer	Chapter 9
35			
36	Transmission buffer file number		
37	Enable/disable use of the transmission buffer => See next page		
40 to 51	Node name (10 ASCII characters)		-
52 to 57	Reserved area		-
60	Timeout time for the SEND/RECEIVE instruction (0.1 to 25.5 sec.).		11-8
61 to 76	Reserved area		-
77	Start switch - When the value of this switch changes from 00 to $01_{(H)}$, the parameters settings are transferred to the module.		8-3 9-2

- Do not write data in the reserved areas (5 locations).

When the JW-50FL is used, set the parameters in system memory. ⇨ See pages 12-4 to 12-5.

12-2 Details of each of the parameters

(1) Enable/disable the use of the transmission buffer (Setting parameter address 37(8))

Select whether to enable/disable the buffer for each message by entering the appropriate value at parameter address 37(8).

Message			Selection of transmission buffer				
			80(H)	81(H)	82(H)	83(H)	*
Message other than transmission			×	○	×	○	
Transmission message	Messages other than SHARP's proprietary message format		○	○	○	○	
	SHARP's proprietary format	Computer link function	○	○	○	○	
		Remote function	○	○	×	×	

(Transmission buffer... ○ : Used, × : Not used)

* 80 to 83(H) are the valid values for parameter address 37(8).

■ **Relationship between messages and transaction codes.**

Message	Transaction code (TCD)	Use selection of transmission type buffer				
		80(H)	81(H)	82(H)	83(H)	*
Messages other than transmission	60000 to 65202 (request)	X	X	X	X	
	65203 to 65215 (response)	X	O	X	O	
Transmission messages	0 to 999	O	O	O	O	
	1000 (request computer link function: SHARP's proprietary function)	X	X	O	O	
	1001 (request remote function: SHARP's proprietary function)	X	X	O	O	
	1002 to 1199	O	O	O	O	
	1200 (response of computer link function: SHARP's proprietary function)	O	O	O	O	
	1201 (response of remote function: SHARP's proprietary function)	X	X	O	O	
	1202 to 59999	O	O	O	O	

(Transmission buffer... ○ : Used, × : Not used)

(2) Token monitor time (parameter address 04(8))

Set the token monitor time as follows, based on the number of bytes being sent by this station.

- 0 to 5K bytes: 10 ms
- 5K to 10K bytes: 30 ms
- 10K bytes or more: 40 ms

12

12-3 How to set parameters

[1] When the JW-20FL5/20FLT or Z-366J is used

Set parameters of JW-20FL5/20FLT and Z-336J as optional parameters of the control module (CPU board). Determine the area of the optional parameters using the module No. switch set value of JW-20FL5/20FLT and Z-336J. The parameters occupy 64 bytes per module.

Module No. switch setting value	Parameter address(H)
0	00 to 77
1	00 to 77
2	00 to 77
3	00 to 77
4	00 to 77
5	00 to 77
6	00 to 77

Note: Do not set switch SW3 outside the range of 0 to 6.

- Relationship between the host PC and the control module

FL-net module	Host PC	Control module
JW-20FL5 JW-20FLT	JW20H	JW-21CU/22CU
	JW30H	JW-31CUH1
		JW-32CUH1
		JW-33CUH1/2/3

FL-net board	Host J-board	CPU board
Z-336J	Z-300 series	Z-311J/312J/313J
	Z-500 series	Z-511J

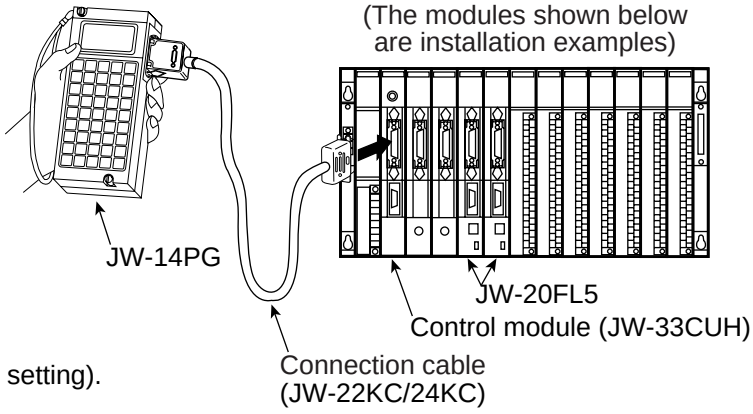
■ How to set the parameters using the JW-14PG

This paragraph describes parameter setting procedures (in system memory) using the hand-held programmer JW-14PG.

① Connect the JW-14PG to the PG port on the control module (CPU board.)

② Set the PC to program mode.

[クリア CLR] [＊] [＊] [PROG MODE] [SET 8]



③ Set to the initial mode (parameter setting).

[クリア CLR] [＊] [＊] [シフト SHIFT] [INTL DISP] [SET 8] [C 2]

④ Select the option parameter and enter "2" for the module No. switch number.

[B 1] [C 2] [,]

JW-14PG screen

```
I Parameter
 0) I/O
 1) Option
```

⑤ Rewrite start switch to 00(H).
Reading parameter address 77(8).

[7] [7] [モニタ MNTR]
[A 0] [書込 ENT]
← Reading a prameter address(H)

```
I Parameter  0 - SW: 2
```

```
 75      HEX     00
 76      HEX     00
I Parameter  0 - SW: 2
>77      HEX     00
```

⑥ Enter IP address (192.168.250.3) for the parameter address 00 to 03(8).
Decimal notation of parameter 00.

[クリア CLR] [モニタ MNTR] [変換 CONV] [変換 CONV] ← Decimal display of the setting of parameter 00

[B 1] [RESET 9] [C 2] [書込 ENT] [STEP (+)]

[B 1] [6] [SET 8] [書込 ENT] [STEP (+)]

[C 2] [F 5] [A 0] [書込 ENT] [STEP (+)]

[D 3] [書込 ENT]

```
 01      DCM     168
 02      DCM     250
I Parameter
>03      DCM     003
```

Same as the above, enter the other parameter addresses.

[2] When **the JW-50FL is used**

Set the parameters for the JW-50FL in the system memory of the control module. Select the parameter (system memory) area using the SW3 switch on the JW-50FL.

(Details ⇨ See the next page. Switch SW3 ⇨ See page 4-4.)

Switch SW3 setting	0	1	2	3	4
Parameter address(8) (system memory)	#0300 to #0377	#1400 to #1477	#1500 to #1577	#1600 to #1677	#1700 to #1777

Note: Do not set switch SW3 outside the range of 0 to 4.

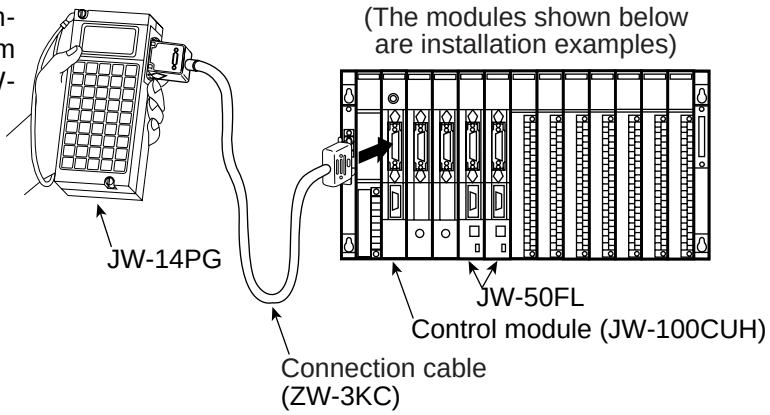
- Relationship between the host PC and the control module

FL-net module	Host PC	Control module
JW-50FL	JW50H	JW-50CUH
	JW70H	JW-70CUH
	JW100H	JW-100CUH

- How to set the parameters using the JW-14PG

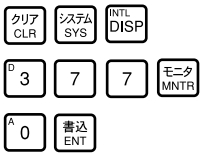
This paragraph describes parameter setting procedures (in system memory) using the handheld JW-14PG programmer.

① Connect the JW-14PG to the support tool connector on the control module.



② Set the PC to program mode.

③ Set a start switch to $00_{(H)}$.

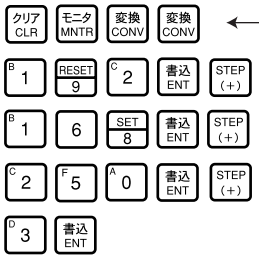


← Read parameter address $77_{(8)}$ (system memory #0377 *).
* When switch SW3 is set to 0.

JW-14PG screen

```
  #0375   HEX    00
  #0376   HEX    00
P  System
>#0377   HEX    00
```

④ Enter the IP address (192.168.250.3) at parameter addresses 00 to $03_{(8)}$.



← Decimal display of the setting

```
  #0301   DCM    168
  #0302   DCM    250
P  System
>#0303   DCM    003
```

Same as the above, enter the other parameter addresses.

- Parameter addresses on the JW-50FL

Depending on the setting of switch SW3 on the JW-50FL, the addresses of the parameters (in system memory) will vary, as shown below. In this manual, the parameter addresses in the left column of the tables are expressed in their common form.

	Parameter address(8)	Set value for switch SW3					Details of parameter (Details ⇨ See page 12-1)
		0	1	2	3	4	
Parameter address (System memory address)	00	#0300	#1400	#1500	#1600	#1700	IP address
	01	#0301	#1401	#1501	#1601	#1701	IP address
	02	#0302	#1402	#1502	#1602	#1702	IP address
	03	#0303	#1403	#1503	#1603	#1703	IP address, node number
	04	#0304	#1404	#1504	#1604	#1704	Token monitor time (normally set to 10 ms)
	05	#0305	#1405	#1505	#1605	#1705	Minimum frame interval (normally set to 0)
	06 to 07	#0306 to #0307	#1406 to #1407	#1506 to #1507	#1606 to #1607	#1706 to #1707	Reserved area
	10	#0310	#1410	#1510	#1610	#1710	Sending area top address of area 1 for local node (Word address)
	11	#0311	#1411	#1511	#1611	#1711	
	12	#0312	#1412	#1512	#1612	#1712	Sending data length (word) of area 1 for local node area 1
	13	#0313	#1413	#1513	#1613	#1713	
	14	#0314	#1414	#1514	#1614	#1714	Sending area top address of area 2 for the local node (Word address)
	15	#0315	#1415	#1515	#1615	#1715	
	16	#0316	#1416	#1516	#1616	#1716	Sending data length (word) of area 2 for local node
	17	#0317	#1417	#1517	#1617	#1717	
	20	#0320	#1420	#1520	#1620	#1720	Top address (word address) of area 1 on PC
	21	#0321	#1421	#1521	#1621	#1721	
	22	#0322	#1422	#1522	#1622	#1722	File number of area 1 on PC
	23	#0323	#1423	#1523	#1623	#1723	Reserved area
	24	#0324	#1424	#1524	#1624	#1724	Top address (word address) of area 2 on PC
	25	#0325	#1425	#1525	#1625	#1725	
	26	#0326	#1426	#1526	#1626	#1726	File number of area 2 on PC
	27	#0327	#1427	#1527	#1627	#1727	Reserved area
	30	#0330	#1430	#1530	#1630	#1730	Top address of communication control area (word address) on PC
	31	#0331	#1431	#1531	#1631	#1731	
	32	#0332	#1432	#1532	#1632	#1732	File number of communication control area on PC
	33	#0333	#1433	#1533	#1633	#1733	Transmission type of communication control area
	33	#0334	#1434	#1534	#1634	#1734	Top address of transmission buffer (word address)
	35	#0335	#1435	#1535	#1635	#1735	
	36	#0336	#1436	#1536	#1636	#1736	File number of transmission buffer
	37	#0337	#1437	#1537	#1637	#1737	Use selection of transmission buffer
	40 to 51	#0340 to #0351	#1440 to #1451	#1540 to #1551	#1640 to #1651	#1740 to #1751	Node name (ASCII 10 characters)
	52 to 57	#0352 to #0357	#1452 to #1457	#1552 to #1557	#1652 to #1657	#1752 to #1757	Reserved area
	60	#0360	#1460	#1560	#1660	#1760	SEND/RECEIVE instruction timeout time
	61 to 76	#0361 to #0376	#1461 to #1476	#1561 to #1576	#1661 to #1676	#1761 to #1776	Reserved area
	77	#0377	#1477	#1577	#1677	#1777	Start switch

Chapter 13: Troubleshooting

13-1 Before you conclude that the machine is faulty

■ Check item

	Description
1	Check whether the modules and boards are installed properly.
2	Are the switches on the module and boards set properly?
3	Check whether the network IP addresses are set properly.
4	Are the common memory areas set properly?
5	Check for loose connections on modules and boards.
6	Make sure the cables are connected properly.
7	Are termination resistors installed on the 10BASE5 cables?
8	Are the ground terminals on the 10BASE5 cables connected?
9	Was a cross cable used instead of a 10BASE-T cable?
10	Was a category 5 cable used instead of 10BASE-T cable?
11	Is power supplied to the Ethernet hubs and repeaters?

13-2 General network problems and countermeasures

[1] Problems concerning the network and appropriate countermeasures (when unable to communicate)

Symptom	Check points	Check details	Countermeasure
Unable to communicate	Power source	Is the indicator on the power supply lit?	Check and reconnect the power cable. Check the voltage.
		Whether main power lamps of communication modules are lit?	
		Is the main power lamp on the AUI power supply modules lit?	
		Is the power output by AUI power supply module within the specified range (12 V)?	
		Are the power lamps on the hubs lit?	
		Are power cables from the AUI properly connected to the equipment?	
	Connection between the communicati-on cable and the transceiver	Are there loose parts in the transceiver installation area?	Reinstall according to section 15-6.
		Check for abnormalities using transceiver installation checking devices.	Adjust until they are normal. If errors occur continuously, install the unit in another location.
		Are the transceivers properly insulated?	Reinstall according to section 15-6
		Were the transceivers properly installed to the communication cable at its marker section?	Reinstall according to section 15-6
	Connection between the transceiver cable and transceiver	Are there loose parts in the transceiver installation area?	Reinstall according to section 15-6
		Check for abnormalities using transceiver installation checking devices.	See the installation manual of the checker(s)
		Are the transceivers locked properly?	Lock them properly according to section 15-6
		Are the transceiver LEDs lit normally?	Check and reconnect the power cable and check the voltage
	Connection between the transceiver cable and equipment	Are there loose parts in the transceiver installation area?	Reinstall according to section 15-6
		Are the SD (sending) and RD (receive) LEDs lit normally?	Check the error detail according to Chapter 13
		Make sure the media select switches (SQE etc.) are set properly.	Reset according to section 15-6

[2] Problems concerning the network and appropriate countermeasures (when communications are unstable)

Symptom	Check points	Check details	Countermeasures
Unable to communicate, or unstable communication	Communication route	Make sure the external conductive shields of all the coaxial cables are connected to ground at one point	Ground properly, according to section 15-6.
		Are the shield wires of the AUI cables properly connected to ground?	Ground according to the manufacturer's instruction manuals
		Does each station respond properly to a Ping command?	Check the power and cables of any station that doesn't respond properly.
		Is the collision lamp lit frequently?	Check the contacts in cables and connectors. Check for abnormalities using an analyzer.
		Are repeaters used in less than 4 layers	Review the configuration according to section 15-6.
		Is each segment within the maximum length?	
		Are termination resistors installed at both ends?	
		Is the number of devices connected in each segment within the specified range?	
		Are 3 or fewer segments used to connect the equipment?	
		Is power to the repeaters turned on?	Check the power supply and power cable, as well as the voltage.
	Participating stations equipment settings	Are the IP addresses for the network set properly?	Check the IP addresses and support tools using an analyzer.
		Are the station numbers of the equipment set properly?	Check the IP addresses and support tools using an analyzer.
		Are the equipment parameters set properly?	Check the equipment parameters using support tools.
		Are the CD (carrier detection) indicators lit consecutively or intermittently?	Check the communication cables, and the AUI power supply.
		Are the SD (send) indicators lit consecutively or intermittently?	Re-check the equipment settings.
		Are the LK (link) indicators lit consecutively?	Re-check the equipment parameter settings

[3] How to check an IP address using the Ping function on a personal computer

Even without specialized tools, such as the FL-net network analyzer, you can check the connections and IP addresses of FL-net equipment using an ordinary personal computer running Windows95 etc. The method for using the Ping function is described below.

Check the IP connection using the Ping function	When an IP connection is made, check the connection using the Ping command.
	(1) Bring up an [MS-DOS] prompt by selecting [Start] -> [Program] on Windows95, and then select [MS-DOS prompt] to display an [MS-DOS window].
	Microsoft(R)Windows95 (C)Copyright Microsoft Corp 1981-1996. C: ¥WINDOWS>
	(2) Enter a Ping command, and execute a basic communication test between the link module and the personal computer. To send a Ping command, type Ping [IP address] or Ping [host name]. <Ex.: using an IP address> Ping 192.168.250.13 If the equipment on the FL-net is set properly, the following messages will appear.
	Pinging 192.168.250.13 with 32bytes of data Reply from 192.168.250. 13:byte=32 times=2ms TTL=32 Reply from 192.168.250. 13:byte=32 times=1ms TTL=32 Reply from 192.168.250. 13:byte=32 times=1ms TTL=32 C: WINDOWS>
	(3) If the connection is faulty (no connection), the following display (time out) will appear.
	Pinging 192.168.250.13 with 32bytes of data: Request timed out. Request timed out. Request timed out. Request timed out. C: ¥WINDOWS>

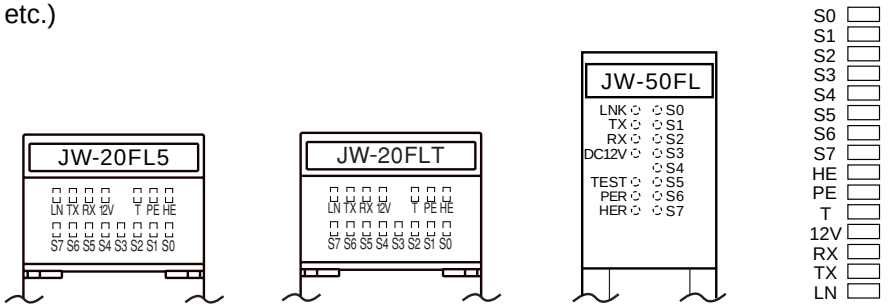
13-3 General precautions related to the FL-net

For details about the FL-net transfer route standards, see the previous section and IEEE802.3. In addition, the following limitations and precautions should be noted.

<table>
<tr><th></th><th>Description</th></tr>
<tr><td>1</td><td>Do not place communication data from other Ethernet devices on the FL-net communication cables.</td></tr>
<tr><td>2</td><td>Do not connect the FL-net to a router.</td></tr>
<tr><td>3</td><td>Switching hubs cannot be used on the FL-net.</td></tr>
<tr><td>4</td><td>Using IR communications or other wireless media may reduce the communication speed.</td></tr>
<tr><td>5</td><td>When a personal computer is used, the communication speed may be affected by the amount of memory, the OS used, and other applications running on the personal computer.</td></tr>
<tr><td>6</td><td rowspan="2">Use the specified IP addresses.
Network addresses should be used (the standard network address is 192.168.250.) The IP address node numbers (station numbers) should be within the allowable input range.
Be careful not to use the same node number twice because the node numbers are not checked during the initialization check. They will be checked when communication starts.
<table><tr><th>Network address</th><th>Node number</th></tr><tr><td>192.168.250</td><td>1 to 249</td></tr></table></td></tr>
<tr><td>7</td></tr>
<tr><td>8</td><td>Connect the ground securely. Use ground lines that are large enough.</td></tr>
<tr><td>9</td><td>Separate the communication lines from any noise generating sources. Do not lay communication lines parallel to power lines.</td></tr>
<tr><td>10</td><td>When executing both cyclic data communications and message data communications at the same time, the communication speed may drop due to the volume of data.</td></tr>
<tr><td>11</td><td>Areas (common memory areas) for cyclic data communications are not required to be adjacent to each other.</td></tr>
<tr><td>12</td><td>When an SQE switch is installed on a transceiver, make sure it is properly installed according to the instruction manual.</td></tr>
<tr><td>13</td><td>Depending on the processing capacity of the connected devices, the minimum time for communication throughout the system may be affected. Set the communication processing speed for the device with the slowest communication capacity (calculated from the minimum allowable time between frames). Note that adding a single device may drop the communication speed of the whole system significantly.</td></tr>
<tr><td>14</td><td>The header section of message data communications is big endian, and the data section is little endian. However, the system parameters, that is data section at reading profile, is big endian. (Big endian is a method in which the MSB is sent first.)</td></tr>
</table>

13-4 Error indicators on the display panel

If an error occurs while communicating with the module, the error details can be checked by reading the error code on the display panel (LED display) of the module. Find the cause of the error by looking up the error code that is displayed. Then take the appropriate countermeasures (resetting the parameters, etc.)



(JW-20FL5) (JW-20FLT) (JW-50FL) (Z-336J)

LED symbol		Details
JW-20FL5/T Z-336J	JW-50FL	
LN	LNK	Lit when communicating normally.
TX	TX	Lit when sending data.
RX	RX	Lit when receiving data.
12 V	12 VDC	Lit when 12 VDC power is present. (This indicator cannot be used with JW-20FLT.)
T	TEST	Lights while in the test mode. (Is normally OFF.)
PE	PER	Lights when the parameter settings are abnormal.
HE	HER	Lights when the module has an error.
S0 to S7	S0 to S7	Displays the node number when it is normal, and an error code when an error occurs.

■ Error code of LED (S0 to S7)

LED name								Error code(H)	Error item	Cause (parameter setting status)	
S7	S6	S5	S4	S3	S2	S1	S0				
O	O	O	O	O	O	O	●	01	Node number	Node number is outside the range of 1 to 254.	
O	O	O	O	O	O	●	O	02	Token monitor time	The token monitor time is 0.	
O	O	O	O	O	●	O	O	04	Not available CU (Only the JW-50FL.)	The host PC is a W70H/100H.	
O	O	O	O	●	O	O	O	08	Area 1 address	Area 1 is outside the allowed range.	
O	O	O	O	●	O	O	●	09	Area 1 size	Area 1 is larger than 8K bits.	
O	O	O	O	●	O	●	O	0A	Area 2 address	Area 2 is outside the allowed range.	
O	O	O	O	●	O	●	●	0B	Area 2 size	Area 2 is larger than 8K words.	*
O	O	O	O	●	●	●	O	0E	Area 1 PC address	The top address of area 1 is outside the allowed range.	
O	O	O	O	●	●	●	●	0F	Area 2 PC address	The top address of area 2 is outside the allowed range.	
O	O	O	●	O	O	O	O	10	Doubled node number	The same node number was assigned to more than one node.	
O	O	O	●	O	O	O	●	11	Doubled common memory address	This node's transmission area 1 (or 2) is used by another node.	*
O	O	●	O	O	O	O	O	20	Range of area 1 *	When the JW20H and J-board (Z-300 series) is used for a PC, any area is set for file 1 though there is no file 1.	
O	O	●	O	O	O	O	●	21	Range of area 2 *		
O	O	●	O	O	O	●	O	22	Range of each table		
O	O	●	O	O	O	●	●	23	Rang e of the transmission buffer.		

●: Light, ○: Light off

* Related to the cyclic transfer

Chapter 14: Specifications

14-1 JW-20FL5/20FLT

[1] General specifications

Item	Specifications	
	JW-20FL5	JW-20FLT
PC models to use	JW20H/30H	
Storage temperature	-20 to +70˚ C	
Ambient operating temperature	0 to +55˚ C	
Ambient humidity	35 to 90% RH (without condensing)	
Vibration resistance	Equivalent to JIS C 0911: Vibration test: width 0.15 mm (10 to 58 Hz), 9.8 m/s^2 (58 to 150 Hz), (2 hours each on the X, Y, Z axes)	
Impact resistance	Equivalent to JIS C 0912: 98 m/s^2 (3 each on the X, Y, Z axes)	
Internal current consumption (5 VDC)	350 mA	
External supply power	12 VDC ±5%, 0.5 A	No
Ethernet interface	AUI for 10BASE5 (D-sub 15-pin)	10BASE-T (RJ-45 connector)
Programmer interface	D-sub 15-pin	D-sub 15-pin
Weight	Approx. 215 g	Approx. 185 g
Accessory	One cable, one instruction manual	One instruction manual

[2] Communication specifications

(1) Communication section specifications

Item	Specifications	
	JW-20FL5	JW-20FLT
Network compatibility	10BASE5	10BASE-T
Physical topology	Bus	Star
Transfer media	50 ohm yellow cable	10BASE-T twisted pair cable
Maximum data transmission length between stations	500 m/segment, 2.5 km/network *1	100 m/segment, 500 m/network *2
Transfer speed	10M bps	
Transfer system	Base band	
Protocol configuration Application Transport Network Data link	FA link protocol UDP IP Ethernet V2	

*1: Maximum transfer distance between stations when connecting more than one segment using repeaters.

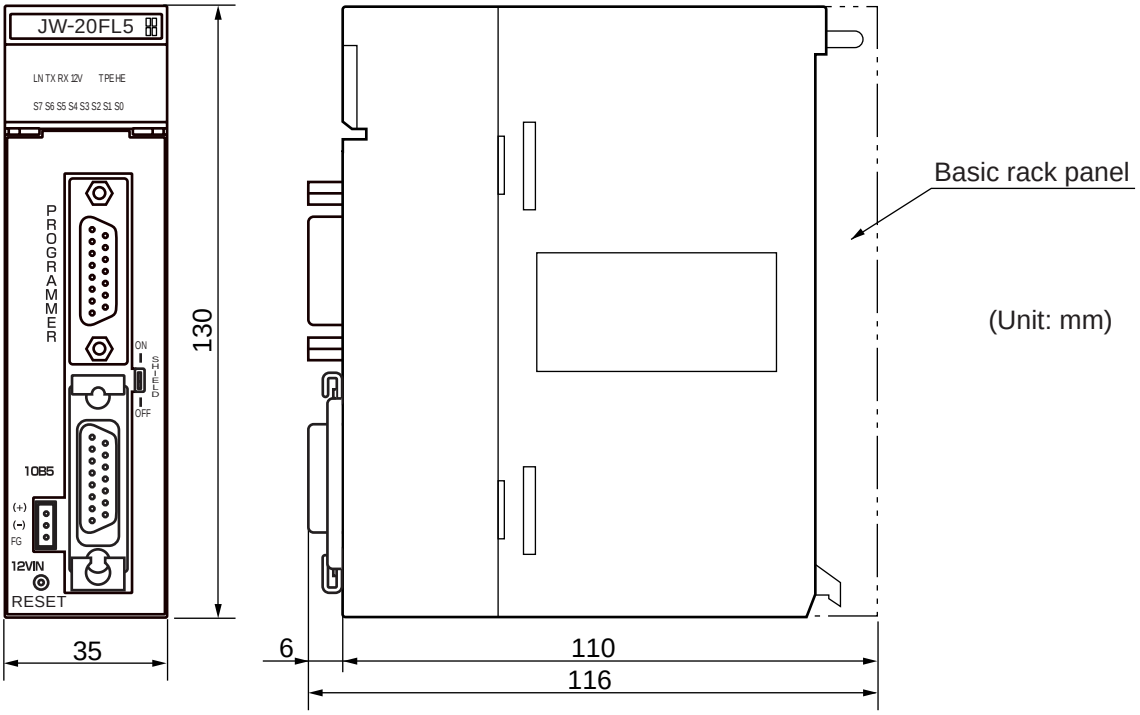
*2: Maximum transfer distance between stations when connecting more than one 10BASE-T segment using hubs.

(2) FL-net specifications

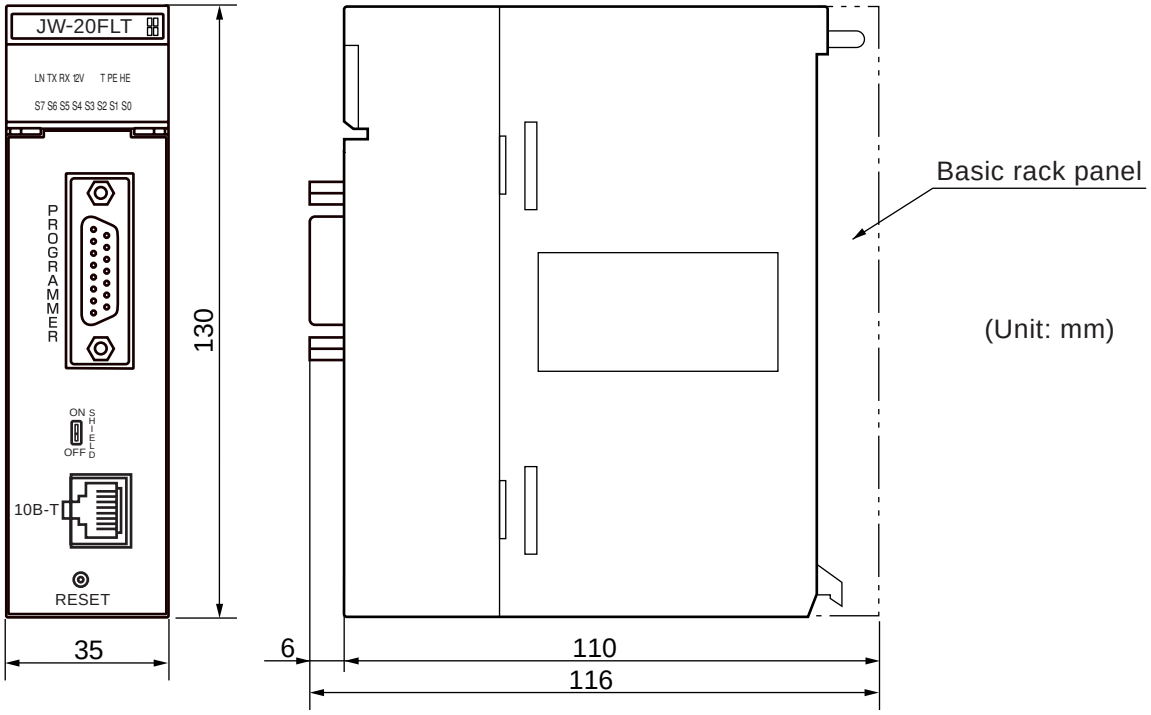
Item	Specifications
Communication control method	Master-less token method
Number of stations supported	Maximum 254
Communication function	Cyclic transfer (n: n, 8K bits + 8K words) Message transfer (1: 1, 1: n) Maximum data length of one frame is 1K bytes

[3] External dimension drawings

■ JW-20FL5



■ JW-20FLT



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14-2 Z-336J

[1] General specifications

Item	Specifications
PC models to use	J-board
Storage temperature	-20 to +70˚ C
Ambient operating temperature	0 to +55˚ C
Ambient humidity	35 to 90% RH (without condensing)
Vibration resistance	Equivalent to JIS C 0911: Vibration test: width 0.15 mm (10 to 58 Hz), 9.8 m/s^2 (58 to 150 Hz), (2 hours each on the X, Y, Z axes)
Impact resistance	Equivalent to JIS C 0912: 98 m/s^2 (3 each on the X, Y, Z axes)
Internal current consumption (5 VDC)	380 mA
External supply power	12 VDC ±5%, 0.5 A
Ethernet interface	AUI for 10BASE5 (D-sub 15-pin) 10BASE-T (RJ-45 connector)
Programmer interface	D-sub 15-pin
Maximum number of modules available to mount	Z-300 series: Max. two (Z-311J/312J), max. one set (Z-313J) Z-500 series: Max. 2 sets
Weight	Approx. 180 g
Accessory	Cable 1 Boss for securing between boards (20 mm + 6 mm protrusion) 4 Screws (Semuth type M3 x 6 mm) 4 Instruction manual 1

[2] Communication specifications

(1) Communication section specifications

Item	Specifications
Network compatibility	Either one of 10BASE5 or 10BASE-T
Transfer speed	10M bps
Physical topology	Bus (10BASE5) / Star (10BASE-T)
Transfer media	50 ohm yellow cable (10BASE5) / twisted pair cable (10BASE-T)
Transfer system	Base band
Maximum station	10BASE5: 500 m/segment, 2.5 km/network *1 10BASE-T: 100 m/segment, 500 m/network *2
Protocol configuration Application Transport Network Data link	 FA link protocol UDP IP Ethernet V2

*1: Maximum transfer distance between stations when connecting more than one segment using repeaters.

*2: Maximum transfer distance between stations when connecting more than one 10BASE-T segment using hubs.

(2) FL-net specifications

Item	Specifications
Communication control method	Master-less token method
Number of stations supported	Maximum 254
Communication function	Cyclic transfer (n: n, 8K bits + 8K words) Message transfer (1: 1, 1: n) Maximum data length of one frame is 1K bytes

[3] External dimension drawings

⇨ See page 5-2.

14-3 JW-50FL

[1] General specifications

Item	Specifications
Host PC	Install in optional slots on the JW50/70H/100H (max. 5 units) *1
Storage temperature	-20 to +70˚ C
Ambient operating temperature	0 to +55˚ C
Ambient humidity	35 to 90% RH (without condensing)
Vibration resistance	Equivalent to JIS C 0911: Vibration test: width 0.15 mm (10 to 58 Hz), 9.8 m/s^2 (58 to 150 Hz), (2 hours each on the X, Y, Z axes)
Impact resistance	Equivalent to JIS C 0912: 98 m/s^2 (3 each on the X, Y, Z axes)
Internal current consumption (5 VDC)	400 mA
External supply power	12 VDC ±5%, 0.5 A (only needed for 10BASE5 systems)
Ethernet interface	AUI for 10BASE5 (D-sub 15-pin) 10BASE-T (RJ-45 connector)
Programmer interface	D-sub 25-pin
Weight	Approx. 380 g
Accessory	One cable, one instruction manual

*1: The JW-50FL cannot be installed on a W70H/100H.

[2] Communication specifications

(1) Communication section specifications

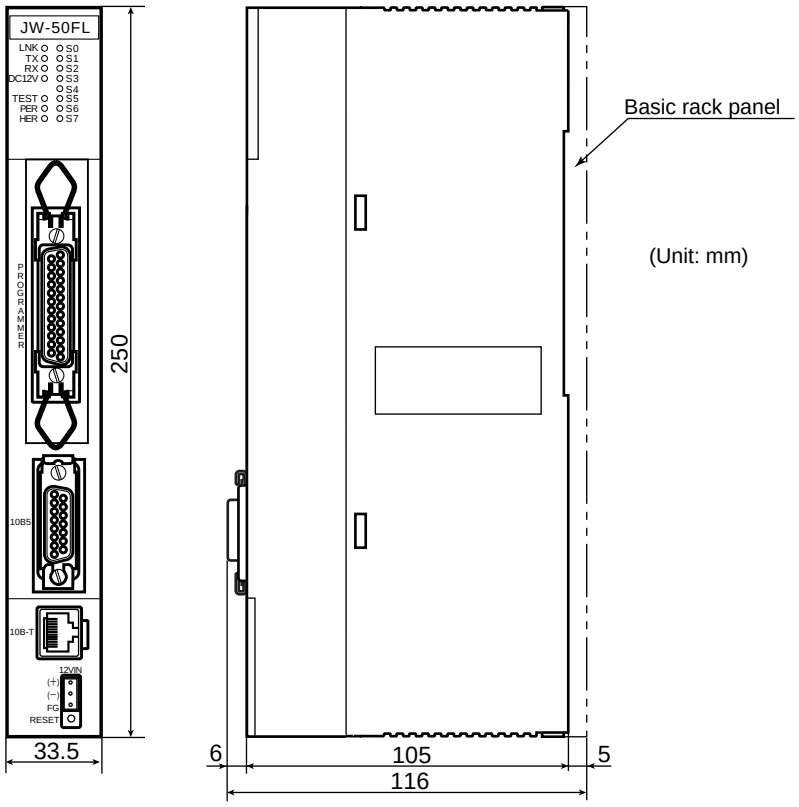
Item	Specifications
Network compatibility	10BASE5 or 10BASE-T
Transfer speed	10M bps
Physical topology	Bus (10BASE5) / Star (10BASE-T)
Transfer media	50 ohm yellow cable (10BASE5), twisted pair cable (10BASE-T)
Transfer system	Base band
Maximum transfer distance	10BASE5: 500 m/segment, 2.5 km/network *2 10BASE-T: 100 m/segment, 500 m/network *3
Protocol configuration Application Transport Network Data link	 FA link protocol UDP IP Ethernet V2

*2: Maximum transfer distance between stations when connecting more than one segment using repeaters.
*3: Maximum transfer distance between stations when connecting more than one 10BASE-T segment using hubs.

(2) FL-net specifications

Item	Specifications
Communication control method	Master-less token method
Number of stations supported	Maximum 254
Communication function	Cyclic transfer (n: n, 8K bits + 8K words) Message transfer (1: 1, 1: n) Maximum data length of one frame is 1K bytes

[3] External dimension drawings

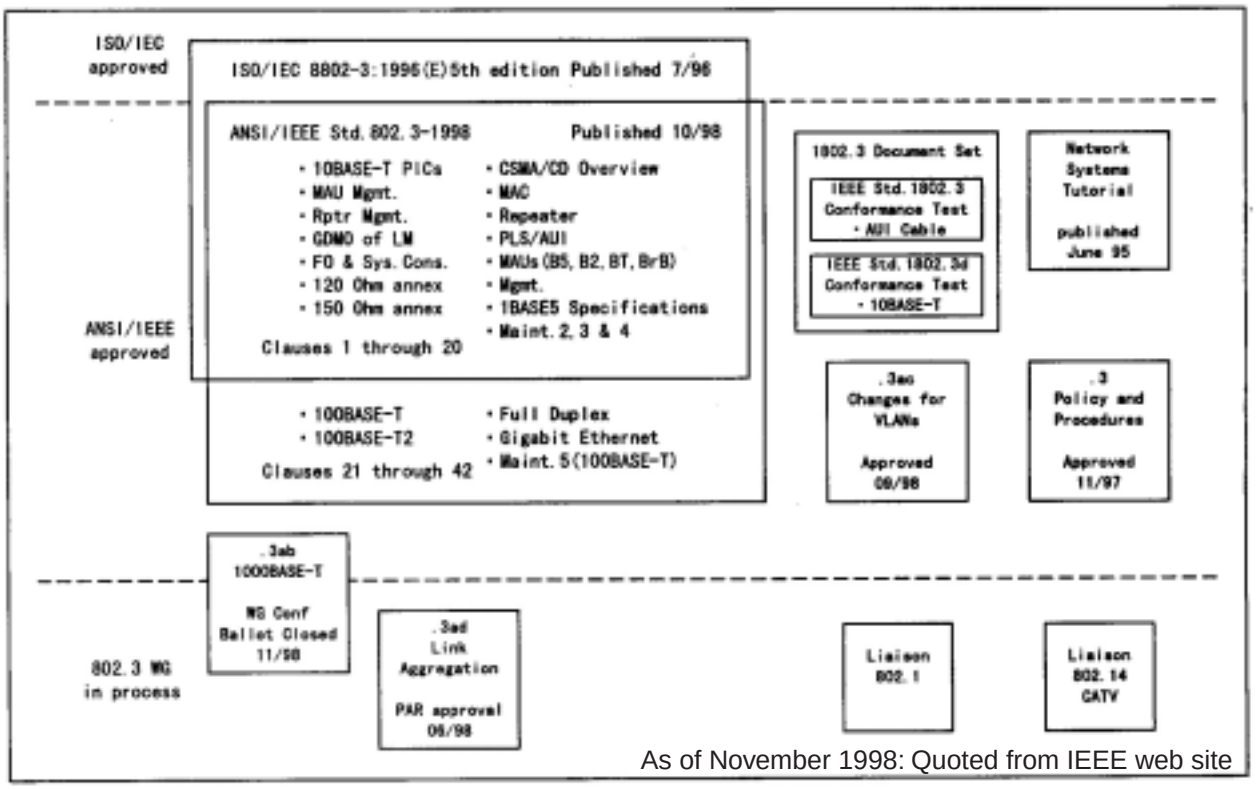


Chapter 15: Appendix

15-1 System configuration guide

[1] Brief description of the Ethernet

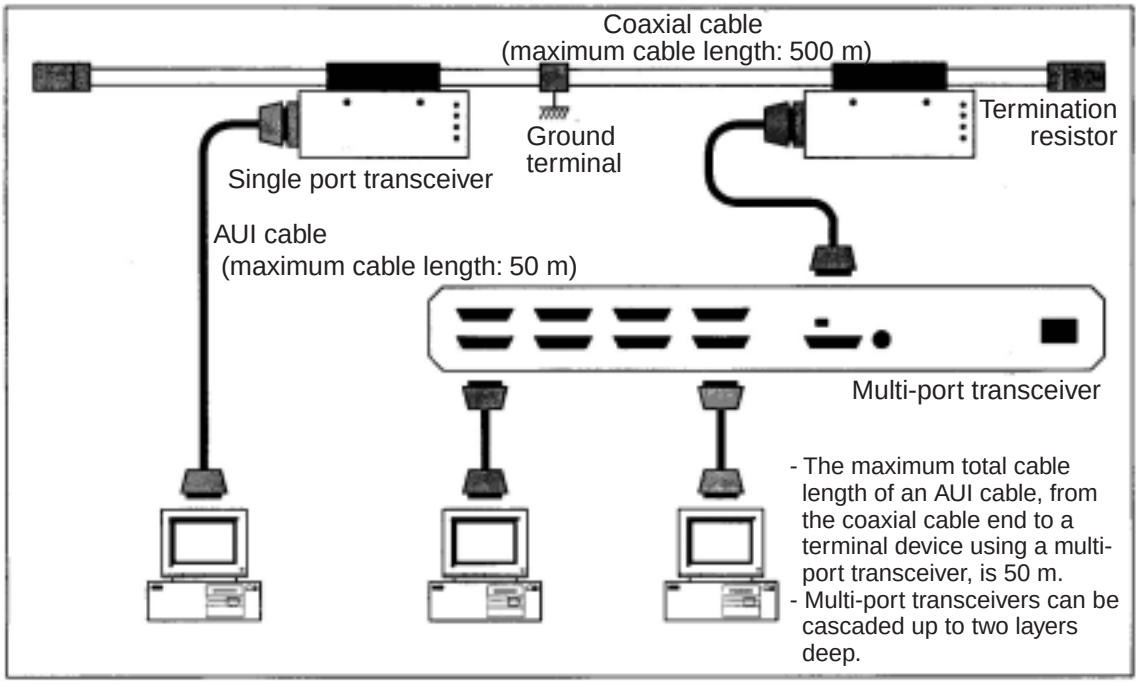
Ethernet is a standardized LAN (Local Area Network) arrangement used to communicate between personal computers and printers. It prescribes the communication data format, cables and connectors to use. The Ethernet standards are established by the Ethernet working group: IEEE802.3 of the IEEE. Currently standards such as 10BASE5, 10BASE2, and 10BASE-T have been clearly defined. The working group is continually examining new standards, such as 1000BASE-T, and others. The trend in standards from the IEEE802.3 working group is shown below.



■ Trends in standardization by the IEEE802.3 working group

[2] 10BASE5 Specifications

10BASE5 is a connection method for creating an Ethernet network using a coaxial cable approximately 10 mm thick (The thick cable is also called the "yellow cable"). The "10" in "10BASE5" refers to a data transfer speed of 10Mbps. The word "BASE" means that the data transfer system is a "base band system." Finally, the "5" means that the data transfer distance of a trunk is limited to 500 m. In order to connect devices such as a personal computer, a transceiver is connected by coaxial cable. The transceiver is connected to devices using a transceiver cable (AUI cable). Since the 10BASE5 cable is thick and it is not very easy to lay the cables, this system is rarely used for office networks. However, since it can transfer data over long distances, this system is well suited for trunk networks.
The figure below shows a configuration example of a 10BASE5 Ethernet system.

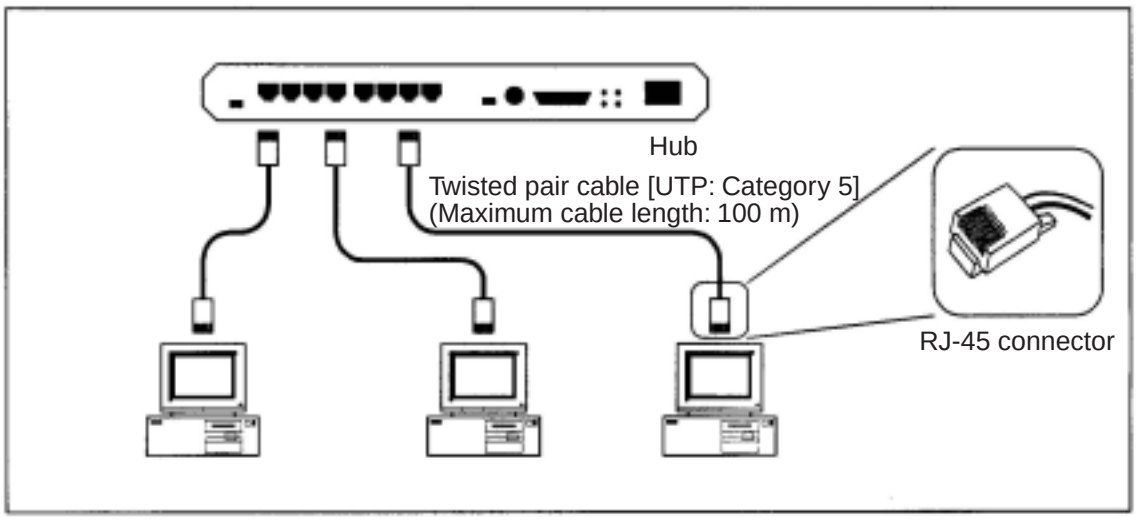


■ Configuration example of a 10BASE5 Ethernet system

[3] 10BASE-T Specifications

10BASE-T is a connection method for creating an Ethernet network using twisted pair cables. The "10" in "10BASE-T" refers to the data transfer speed of 10Mbps. The word "BASE" means that the data transfer system is a "base band system." The "-T" refers to the twisted pair cable that is used to carry the data. On a 10BASE-T network, devices such as personal computers are connected using hubs. Between devices, hubs must be routed and cannot be connected to each other. (However, a cross cable (special cable) can be used to make a direct connection, but this is not common.) The maximum length from a hub to any device is 100 m.

A 10BASE-T system can be constructed easily, since its cables are thin. Each device can be connected or disconnected without affecting the network. Therefore, 10BASE-T is well suited for use in office networks. The figure below shows a configuration example of a 10BASE-T Ethernet system.

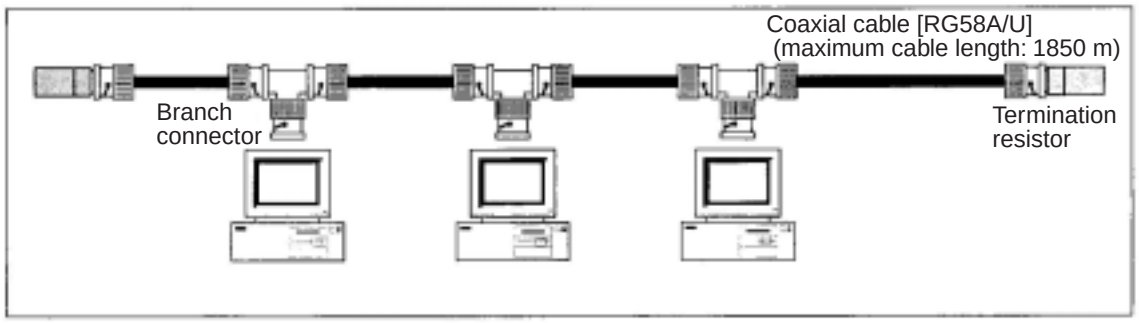


■ Configuration example of a 10BASE-T Ethernet system

[4] Other Ethernet Specifications

(1) 10BASE2

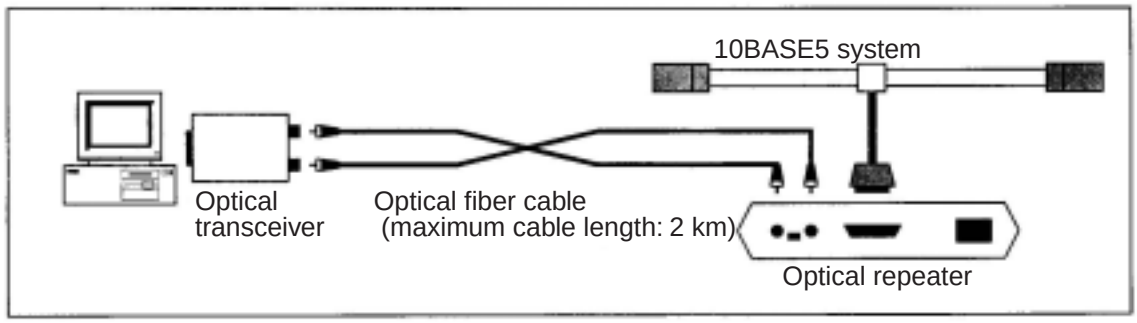
10BASE2 is a connection method for creating an Ethernet network using a coaxial cable approximately 5 mm thick (This cable is also called a "Thin cable"). The "10" in "10BASE2" refers to a data transfer speed of 10Mbps. The word "BASE" means that the data transfer system is a "base band system." Finally, the "2" means that the data transfer distance of a trunk is limited to 185 m (approx. 200 m). In order to connect devices such as a personal computer, a T-branch BNC connector is connected to each device, and a coaxial cable comes in on each side of the T. The figure below shows a configuration example of a 10BASE2 Ethernet system.



■ A configuration example of a 10BASE2 Ethernet system

(2) Optical Ethernet Specifications

Optical Ethernet is a connection method for creating an Ethernet network using an optical fiber cable to transfer data. It can be used for distances over 500 m and in systems that must be immune to noise. The following standard (IEEE802.3) connection methods are available: 10BASE-FP, 10BASE-FB, 10BASE-FL, 10BASE-FX,1000BASE-LX, and 1000BASE-SX. The figure below shows a configuration example of an optical Ethernet system.



■ An example of an optical Ethernet configuration

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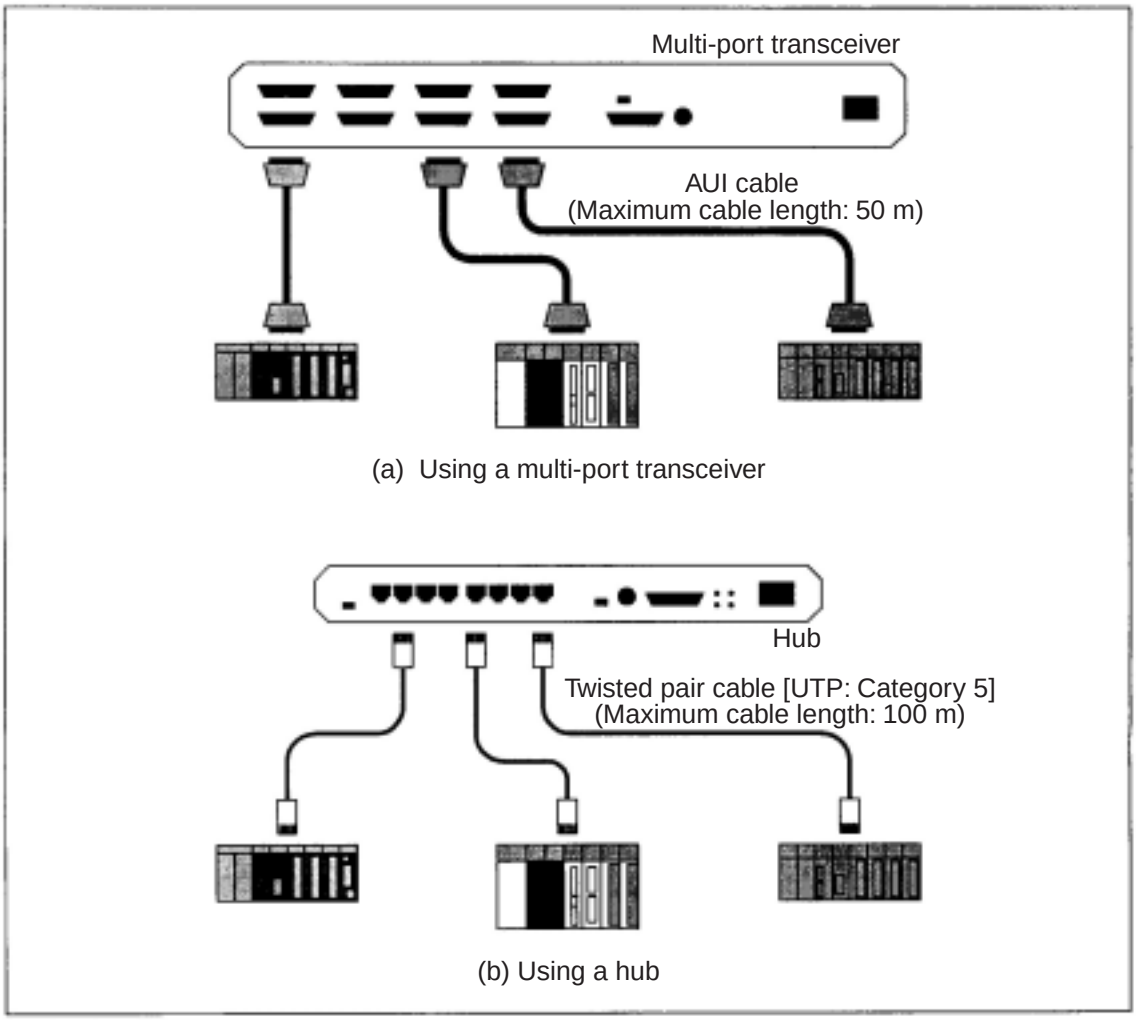
15-2 Examples of system configurations

[1] Small scale configuration

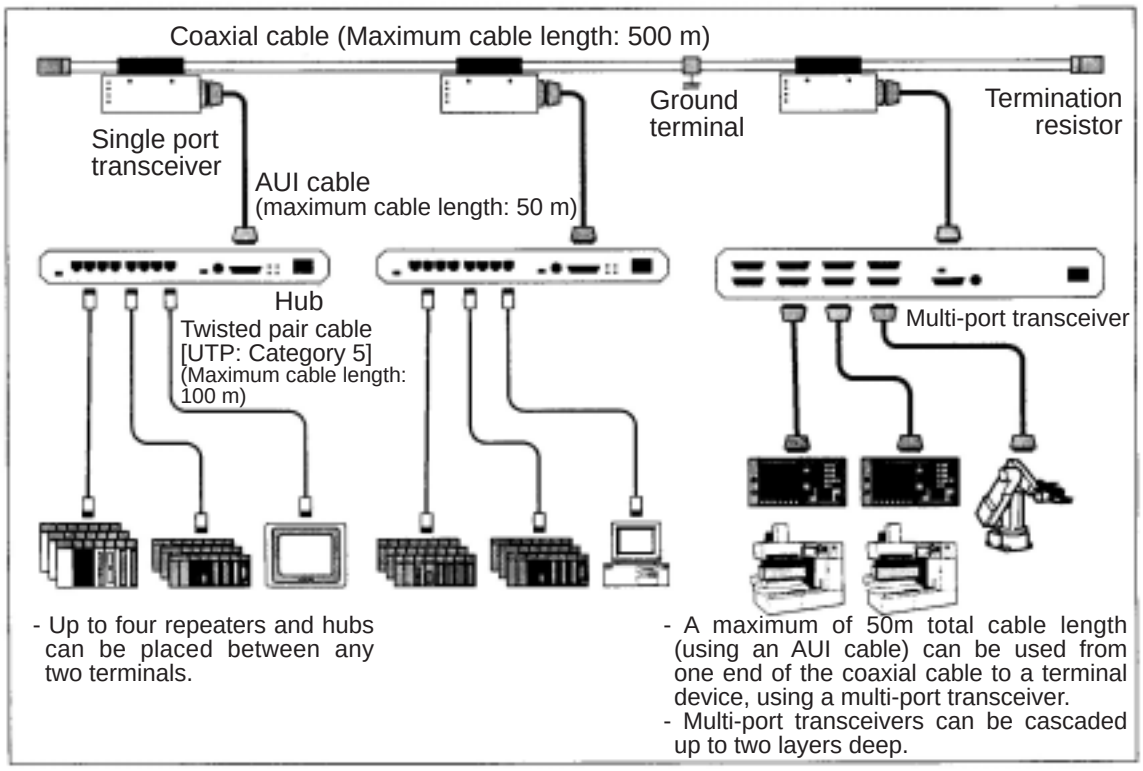
Using a single, multi-port transceiver or hub, you can construct a network system connecting a few devices.



■ Examples of small scale configurations

[2] Basic configuration

Connect several multi-port transceivers and hubs to a single coaxial cable, and construct a network of dozens of devices.

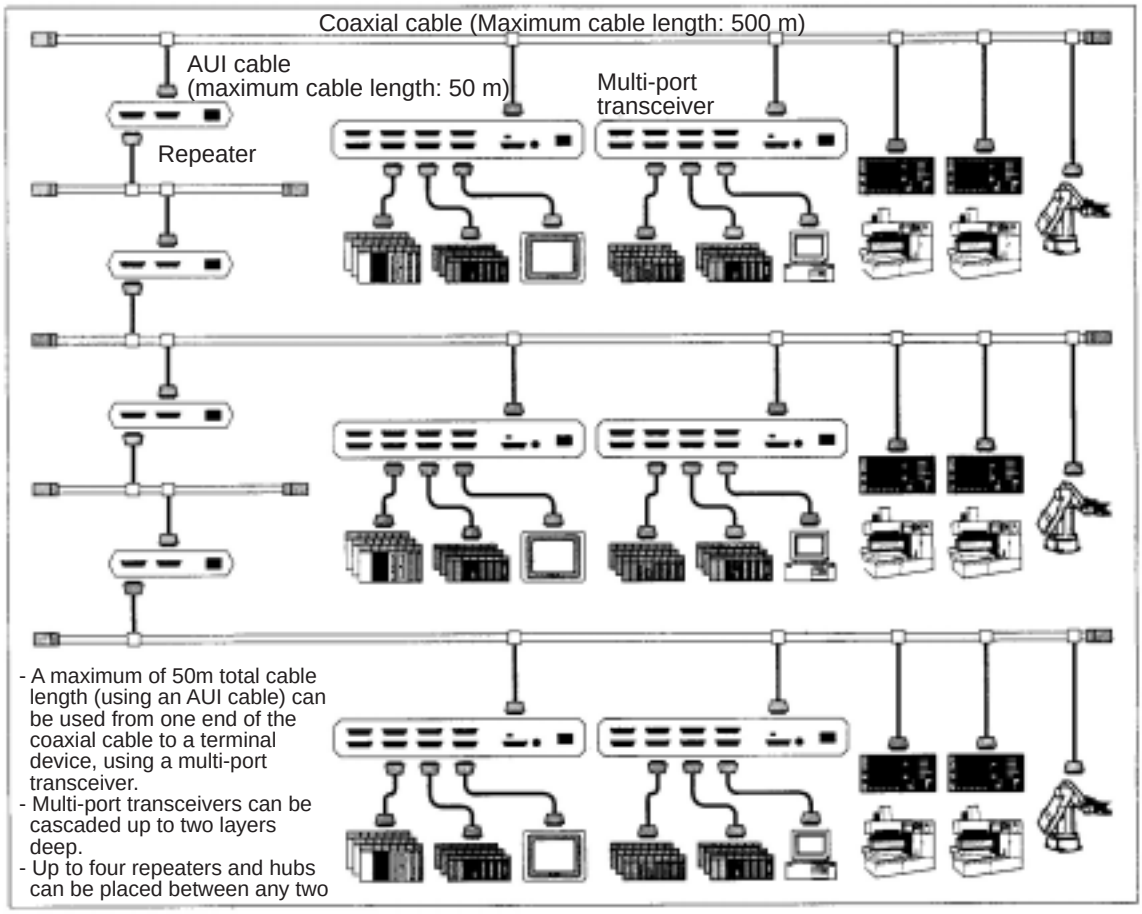


An example of a basic configuration

15

[3] Configuration of a large-scale network

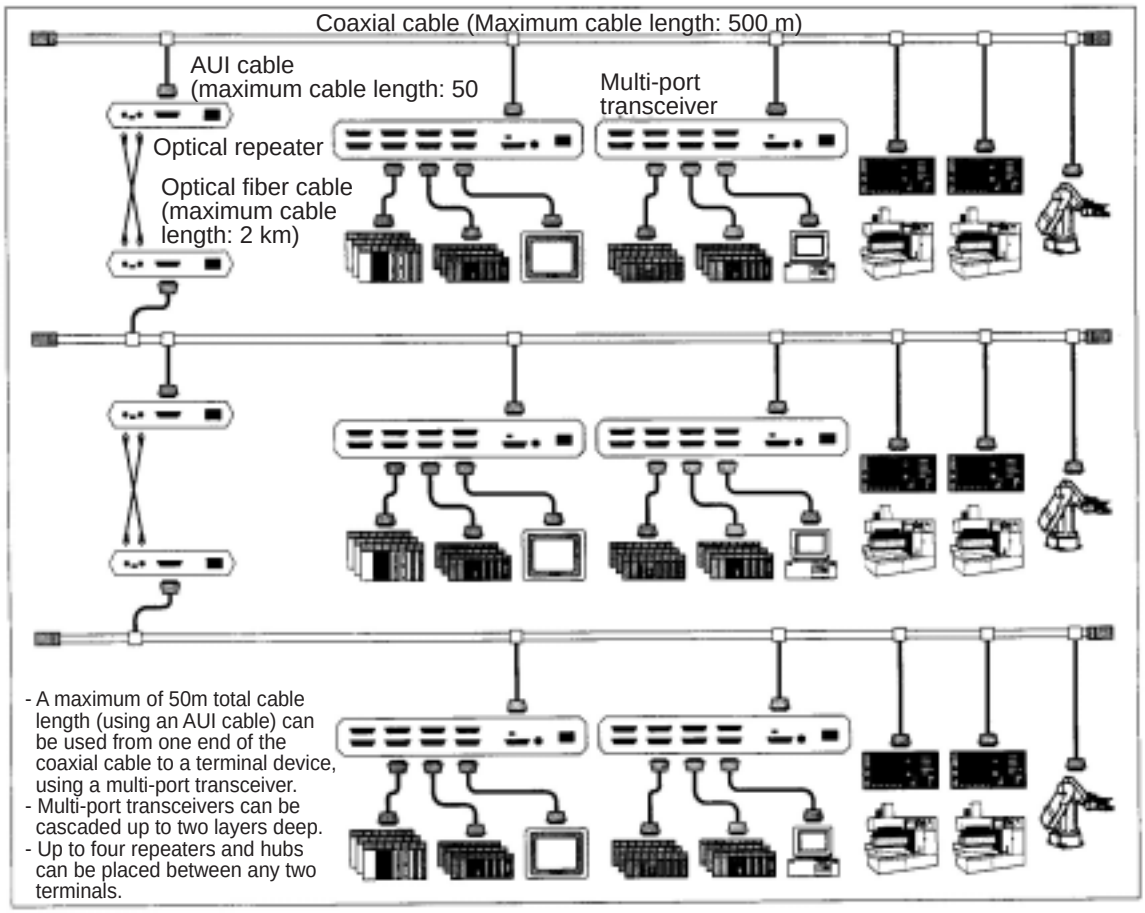
By connecting several 10BASE5 network segments using repeaters, you can construct a network consisting of several hundred devices.



An example of a large-scale configuration

[4] Configuration of a long distance distribution system

When constructing a large-scale network, if the distance between network segments exceeds the limit of the 10BASE5 cable (500 m), you can construct a network up to 2 km long by connecting optical repeaters between network segments.

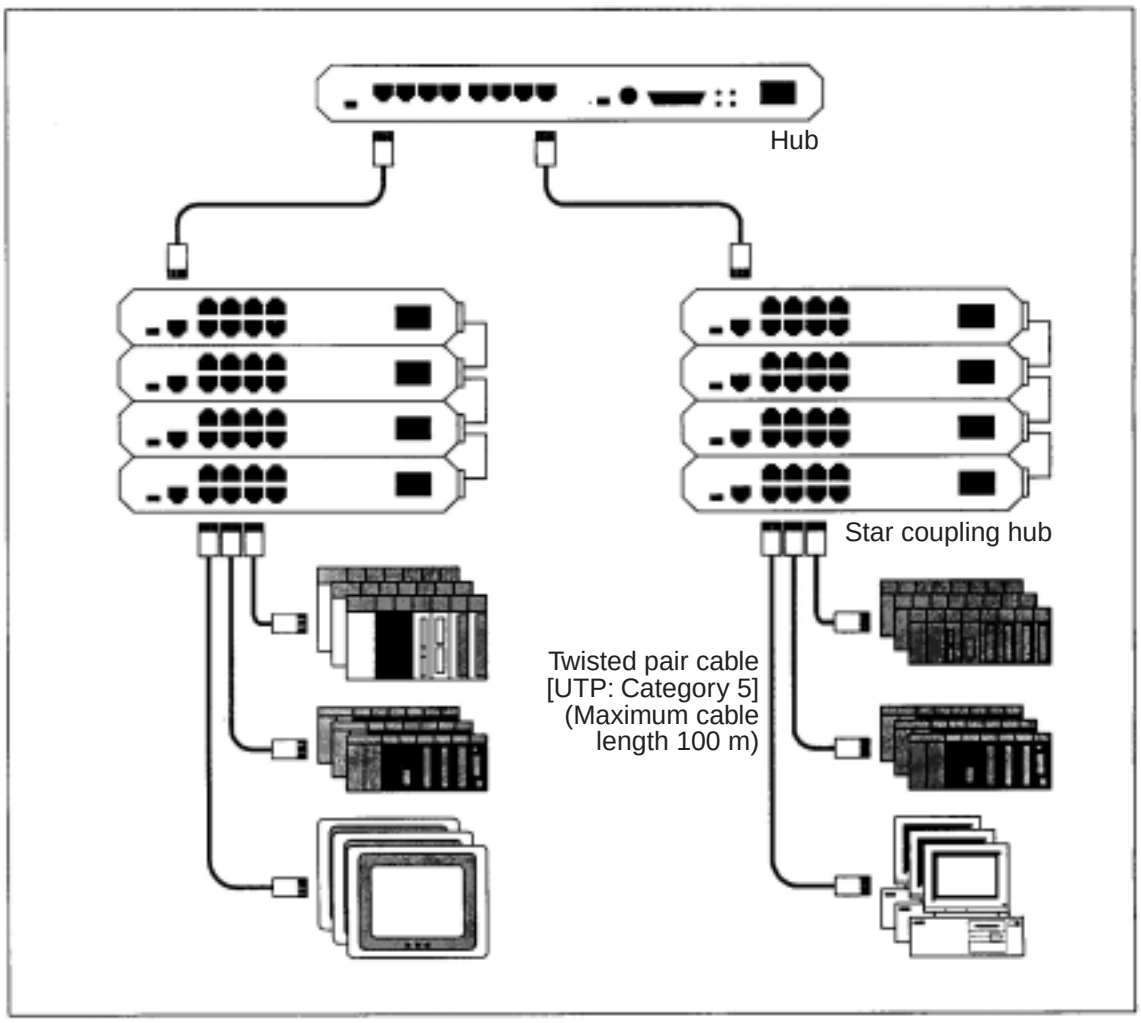


An example of a large-scale, long distance distribution

15

[5] Configuration of local concentrations

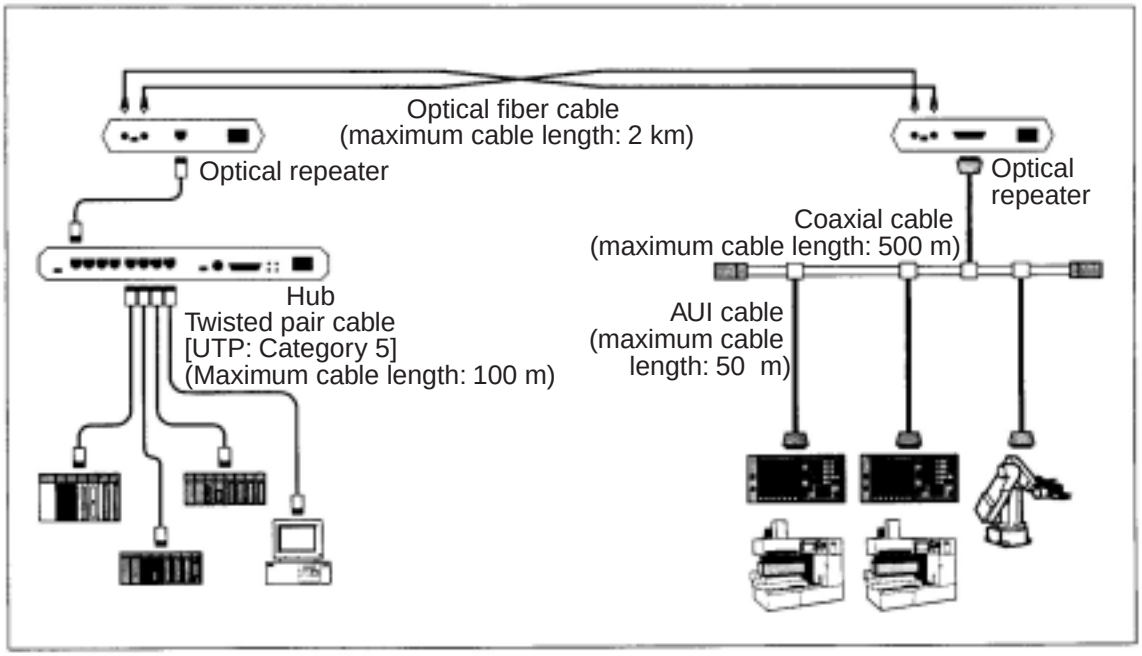
In a location where several dozen devices are concentrated in close proximity, a network system can be constructed using a star coupling hub.



An example of a configuration for a local concentration of devices

[6] Configuration combining local and long distance distribution

In the basic configuration, if a specific controller is located a long distance away, or if there is a high voltage power source or noise generating source near the network, divide the network into two segments and connect an optical cable between the two segments. This will allow you to construct a combined local and long distance network with good noise immunity.



An example of a configuration combining local devices and long distance distribution

15

[7] Principles of the FL-net system

The goal of an FL-net is real-time communication between controllers, such as programmable controllers, robot controllers, and numeric control devices, in production systems.
The FL-net constructs a token passing mechanism using an instantaneous information transfer based on Ethernet UDP/IP protocols to execute cyclic and message communications.

[8] Differences between a general-purpose Ethernet and FL-net

① FL-net is a network developed specifically for the FA (Factory Automation) field. Therefore, not all general purpose Ethernet equipment can be used on the FL-net. Some items may not have suitable noise immunity in an electrically noisy environment.

② FL-net is must respond immediately, to maintain real-time communication for control, and therefore only controllers and control equipment compatible with the FL-net can be connected.

③ FL-net employs a cyclic communication method, using the instantaneous information transfer function of UDP/IP communication on 10BASE5/10BASE-T systems. Therefore, it has the following limitations.

1. The devices currently available are only compatible with a 10Mbps Ethernet LAN.
2. Cannot have other general-purpose Ethernet devices connected to the network.
3. Does not support the TCP/IP communication function.
4. The use of a switching hub is not supported.
5. When a router is used, some router functions cannot be used.

15-3 Definition of network systems

[1] Communication protocol standards

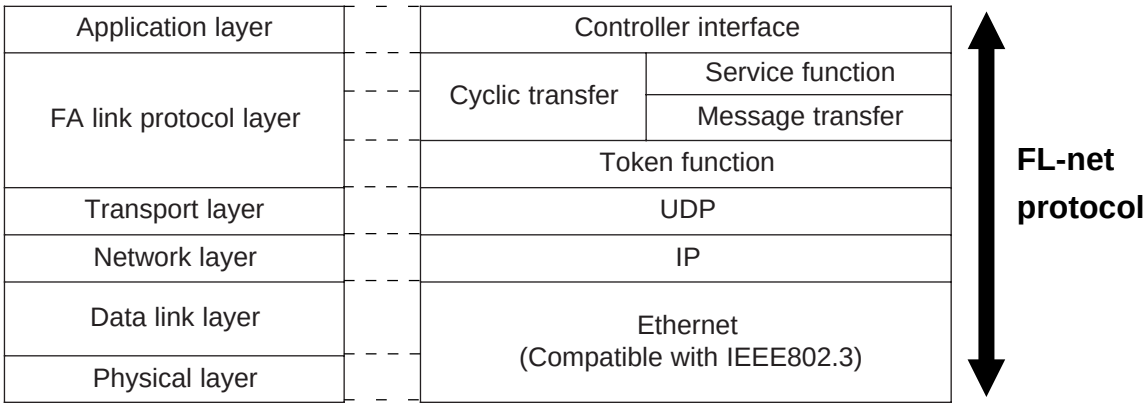
The term "Communication protocol" refers to the rules for exchanging information between systems on a particular communication circuit. The communication protocols used by FL-net conform to the following standards.

■ FL-net communication protocols

FL-net supported communication protocol	Compatible specifications
FL-net	FA link protocol specification sheets (MSTC FA open promotion committee, issued by the FA control network promotion committee)
UDP	RFC768
IP, ICMP etc.	RFC791, 792, 919, 922, 950
APR etc.	RFC826, 894
Ethernet	IEEE802.3

[2] Hierarchical structure of the communication protocols

The communication protocols are configured as a layered structure. Communication processes are expressed and standardized by classification and they are arranged in various levels. The FL-net consists of the following six protocol layers.



■ Hierarchical structure of the FA link protocol

15

[3] Physical implementations of an FL-net

There are five physical implementations of an Ethernet network that support a 10M bps data transfer speed. They are 10BASE5, 10BASE2, 10BASE-T, 10BASE-F, and 10BROAD36 (this is not common/). In addition to these implementations, a 100M bps Ethernet transmission speed is also available.
The FL-net supports 10BASE5 (recommended), 10BASE2, and 10BASE-T hardware.

[4] IP addresses on the FL-net

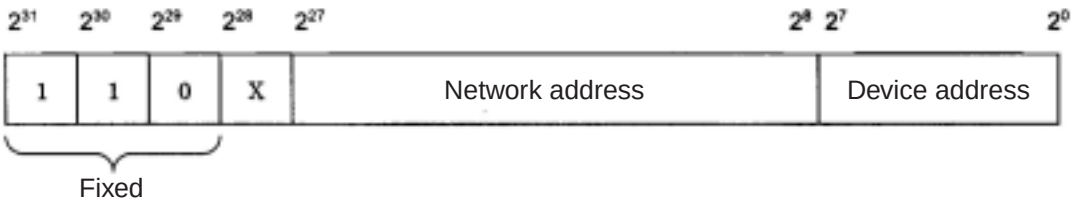
In order to identify one communication device among lots of devices connected to an Ethernet network, the FL-net uses IP addresses (INET address). Therefore, each device that is connected to the network mist have its own IP address.
An IP address consists of one part that identifies the network to which the device is connected, and a unique device address. Depending on the size of the network, a network can be classified as one of three classes: A, B, and C. (For special use, class D and E are also available.)

■ Classes of IP address

	Top octet value	Network address section	Device address section
Class A	0 to 127	xxx.xxx.xxx.xxx	Xxx.xxx.xxx.xxx
Class B	128 to 191	xxx.xxx.xxx.xxx	Xxx.xxx.xxx.xxx
Class C	192 to 223	xxx.xxx.xxx.xxx	Xxx.xxx.xxx.xxx

(Note: The gray digits are respective addresses.)

In a network, the IP address of all the communicating devices connected to this network will have the same network address. They should each have a unique device address.
The default value for the FL-net IP address is "192.168.250.N" (N is the node number: 1 to 254). The FL-net standard recommends using a class C IP address and the lower three digits of the address can be used to assign node numbers according to the FL-net protocol.



■ FL-net IP address

[5] FL-net sub net mask

The sub net mask on an FL-net is always "255.255.255.0." The user does not need to set this sub net value.
This value is identical to the original network address section and the device address section of the class C.

[6] TCP/IP, UDP/IP protocols

TCP, UDP, and IP are major protocols used on Ethernet networks.
The IP is located in the network layer of communication protocols and controls the flow of communication data.
The TCP and UDP are located in the transport layer. Both use the IP as a network layer. However, there is not much difference between these protocols in their details.
The TCP provides reliable service that does not care about the partition of data in the upper layer. On the other hand, the UDP transfers groups of data (data diagram) from the IP to the upper layer without any modification. It pays no attention to whether or not the data arrives nor does it care what the destination is. Confirmation of the data being received and re-sending the data is the job of the upper layer.
Although the UDP is not reliable, compared with the TCP, its advantage is that it has a small communication overhead.
The FL-net uses the UDP. This is because the TCP's data confirmation and re-sending procedures make it difficult to meet the FL-net goals. By omitting this procedure, the FL-net protocol layer controls data transmission correctly using tokens. And it divides and recombines multiple frames, so that it can provide high speed data exchange.

[7] FL-net port number

In order to offer service from the FL-net protocol layer, that is the upper position of the transport layer, the following port numbers are already specified. However, the user does not need to set the parameters for these port numbers.

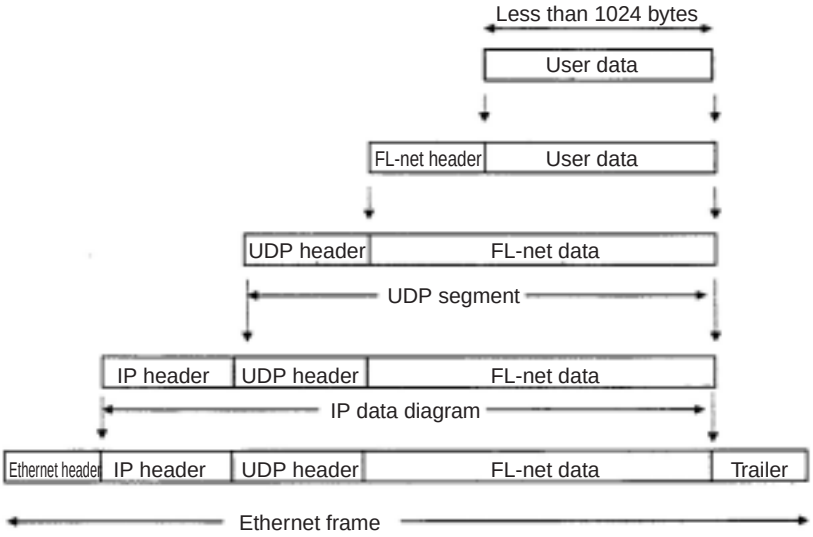
■ **FL-net port number**

	Name	Port number
1	Port number for cyclic transfer	55000 (fixed)
2	Port number for message communication	55001 (fixed)
3	Port number for a participation request frame	55002 (fixed)
4	Port number for sending data	55003 (fixed)

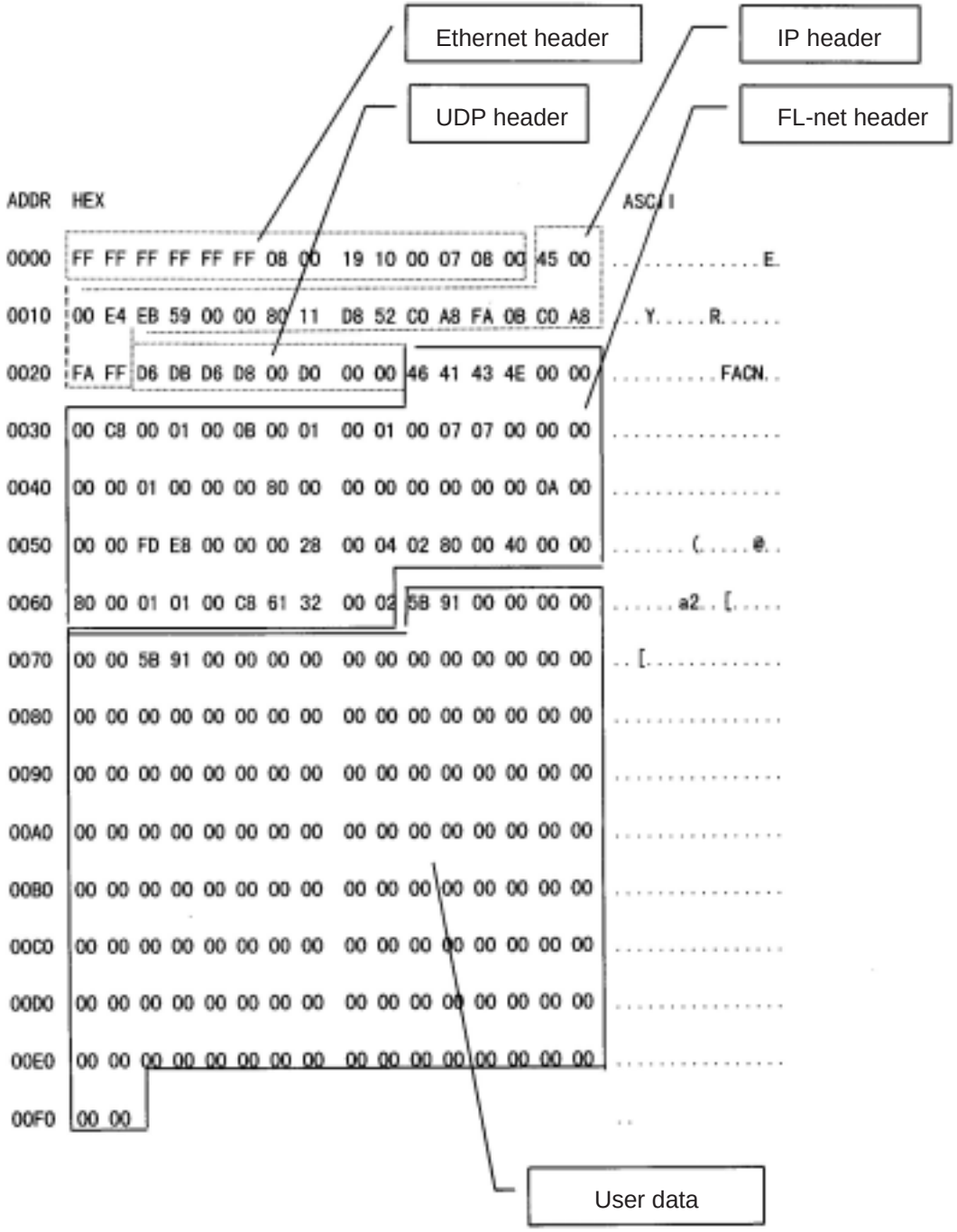
[8] FL-net data format

(1) Outline of the FL-net data format

Data that are sent and received over the FL-net are packed in each layer of the communication protocol as follows.



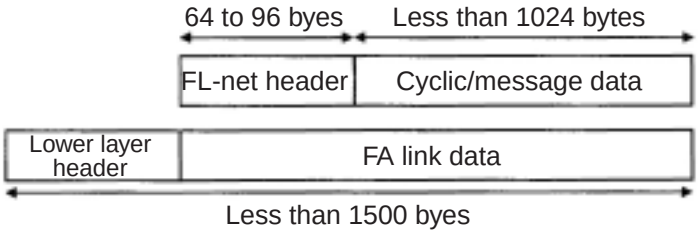
One frame of FL-net data that can be monitored in a communication circuit is shown below. In the example below, 128 bytes of cyclic data is being transferred.



■ Sample frame of FL-net data

(2) FL-net header format

The FL-net header is 64 to 96 bytes long.



■ **FL-net header**

An FL-net header is added to every frame, to comply with the FL-net protocol.

[9] FL-net transaction code

The FL-net provides the following services with the message transmission service.

■ **Message transmission service**

No.	Message transmission service of the FL-net
1	Read byte-block data
2	Write byte-block data
3	Read word-block data
4	Write word-block data
5	Read network parameters
6	Write network parameters
7	Stop commands
8	Run commands
9	Read profile
10	Read log data
11	Clear log data
13	Return message
14	Transfer transmission message

Each message has a transaction code for requesting or responding in its header. It is used to identify the message frame.

■ **Table of transaction codes**

Transaction code	Application
0 to 5999	Transmission message
60000 to 64999	Reserved
65000	Cyclic header (with token)
65001	Cyclic header (without token)
65002	Participation request frame header
65003	Read byte block data (request)
65004	Write byte block data (request)
65005	Read word block data (request)
65006	Write word block data (request)
65007	Read network parameter (request)
65008	Write network parameter (request)
65009	Stop instruction (request)
65010	Run instruction (request)
65011	Read profile (request)
65012	Trigger header
65013	Read log (request)
65014	Clear log (request)
65015	To test for a message return (request)
65016 to 65202	Reserved (for future extension)
65203	Read byte block data (response)
65204	Write byte block data (response)
65205	Read word block data (response)
65206	Write word block data (response)
65207	Read network parameter (response)
65208	Write network parameter (response)
65209	Stop instruction (response)
65210	Run instruction (response)
65211	Read profile (response)
65212	Reserved
65213	Read log (response)
65214	Clear log (response)
65215	To test for a message return (response)
65216 to 65399	Reserved (for future extension)
65400 to 65535	Reserved

15-4 Network control of the FL-net

[1] Token control of the FL-net

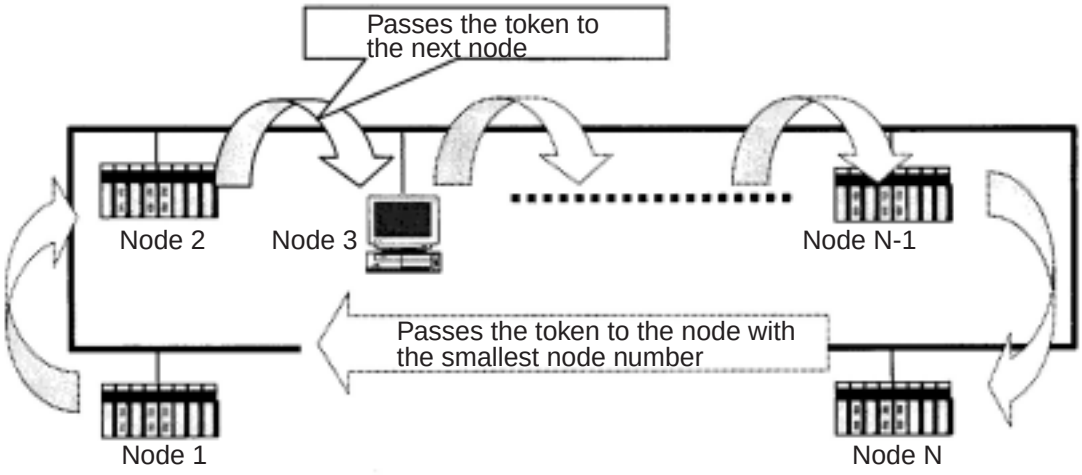
(1) Token

Basically, a node can send data whenever it holds a token. A node can send data without holding a token when it reissues a token due to a time out of the token monitor time, or when it issues a participation request frame so that it can begin participating in the network.

① The FA net routes one token between the nodes.
② Each node keeps the right to send data over the network from the time it receives the token until it passes the token to another node.
③ The token flows through all the nodes participating in an FL-net.
④ A token can be sent together with cyclic data.
⑤ A token can be routed without data.
⑥ Tokens are monitored by the timer. If the token is not passed along through the network for a certain interval, the network will automatically reissue a token.
⑦ If there are two tokens on the same network, the JW-50FL will unify them into one token.

(2) Flow of the token

Basically, only one token exists on the same network.
If there are two or more tokens on the same network, the token from the node with the smaller node number takes priority, and the other tokens are discarded.
A frame with a token (a token frame) consists of a destination node number and the node number of the node sending the token.
A node will become the node holding the token when the destination node number in a token frame matches its own node number.
The routing order of a token is determined by the node numbers.
Each node passes the token in the order of the nodes listed in the participating node management table.
The node with the largest node number will pass the token to a node with the smallest node number.

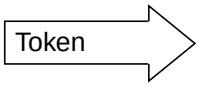
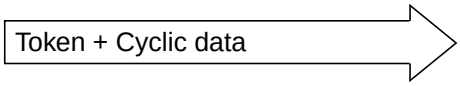
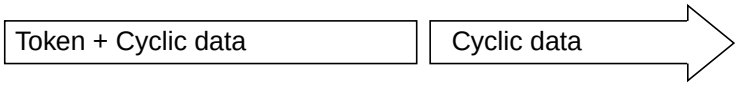
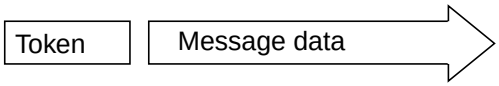
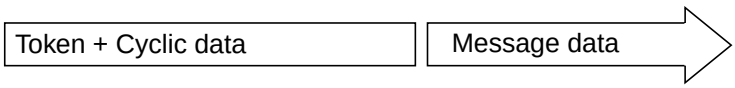
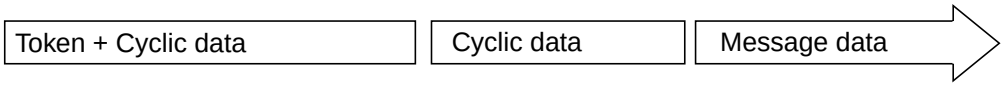


■ Flow route taken by the token.

(3) Token and data

There are six data patterns that can be attached to and sent with a token, as follows.

■ **Token and data**

No.	Item	Details
1	No data to attach	Only sends the token
		
2	Cyclic data only	Only attaches cyclic data to the token
		
3	Cyclic data sent in frames.	Sends only cyclic data. The token is attached to the last frame.
		
4	Message data only	After sending the message data, passes the token along.
		
5	Cyclic data and message data	After sending the message data, sends the cyclic data together with the token.
		
6	Cyclic data sent in frames and message data.	After sending the message data, the cyclic data is sent by itself. Then the token is sent by attaching it to the last frame.
		

(4) Interval between frames (minimum allowable interval between frames)

The time interval after a node receives a token until it sends a frame is referred to as the "frame interval."

The minimum interval that each node must wait for, before sending a frame, is referred to as the "minimum allowable frame interval."

The FL-net shares this minimum allowable frame interval throughout the network.

Each node calculates the maximum value of the minimum frame interval each time a node joins or leaves the participating node list.

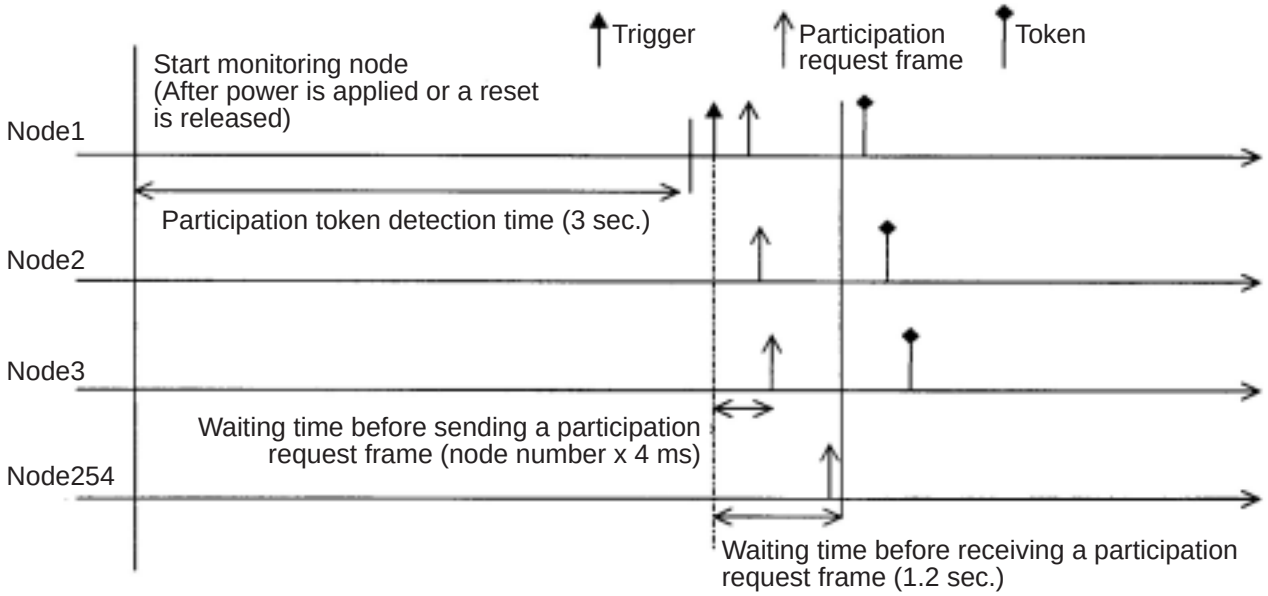
[2] Joining and leaving an FL-net network

(1) Participation in the FL-net

Each node monitors the circuit while the FL-net starts up, to determine the interval of a participating token detection time. When that time has elapsed, if it does not receive a token, the node concludes that the network is just starting and tries to join the network as it starts. If it receives a token, it concludes that it is monitoring a network that is in-ring startup state, and it tries to join the network.

① New entry

If the JW-50FL does not receive a token after the participating token detection time has elapsed, it will prepare to send a trigger, which it sends after 4 ms x its node number. If it receives a trigger before sending a trigger, it will not send a trigger. After receiving a trigger it will wait 1200 ms to receive a participation request frame. During that period, it will wait for all of the nodes to send participation request frames while checking for duplicate use of its node number and address. It also updates participation node management table. After the time it must wait before sending a participation request frame (node number x 4 ms) has elapsed, it will send a participation request frame. At this time, if a node has identified a duplicate use of its address by examining the participation request frames from other nodes, it sets the common memory top address and common memory size of area 1 and 2 to zero, and does not send any cyclic data. A node that identifies duplicate use of its address will set a duplicate address flag and reset the common memory data to enable, so that the flag will be seen. After the time it must wait before sending a participation request frame has elapsed, and after referring to the participating node table, the node with the smallest node number will issue the first token. A node that has identified duplicate use of its node number will not send or receive data.



■ Time chart when starting: 1

② **Participation in an existing network**

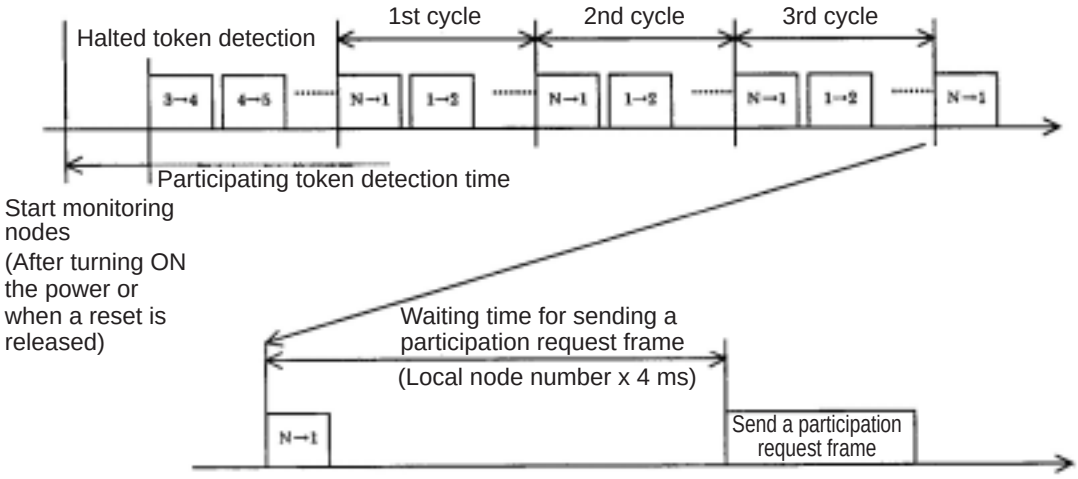
When the JW-50FL receives a token within the participating token detection time, it concludes that it is linked to a network that is already established, and waits for a participation request frame up to three token cycles. During this interval, it checks for duplicate use of its node number and address, as well as updates the participation node operation table. At this time, if a node has identified a duplicate use of its address by examining the participation request frames from other nodes, it sets the common memory top address and common memory size of area 1 and 2 to zero, and does not send any cyclic data. A node that identifies duplicate use of its address will set a duplicate address flag and reset the common memory data to enable, so that the flag will be seen. If there are no problems with the node numbers, a node will send a participation request frame after the waiting time for sending a participating request frame has elapsed. The participating request frame will be sent, regardless whether it has a token or not. A node that has identified duplicate use of its node number will not send a participating request frame and will not send or receive data.

Remarks:

Participation token detection time: the time allowed to check whether the network is in operation or not.

Cycling: This refers to the point when the smallest node number receives a token that has been passed around the network.

Waiting time for sending a participation request frame: In order not to create a duplicate node number with some other node trying to enter, the participation request frame is sent after the node number x 4ms has elapsed.



■ Time charge setting when starting: 2

(2) Leaving an FL-net network

Each node checks the node numbers each time it receives a token frame. If the JW-50FL does not receive a token frame from a certain node three times in a row, the node is regarded as having left the network.

(This is also true when the node holding the token does not send the token after token monitor time has elapsed.)

If the JW-50FL determines that a node has left the network, it deletes that node's number from the management table.

[3] Node status control

The status control of nodes consists of a local node management table, a participating nodes management table, and a network management table. An outline of each is shown below.

■ **Outline of each table used for node status control**

Name	Details
Local node management table	Control its own node settings.
Participating nodes management table	Control information about nodes participating the network.
Network management table	Control information shared throughout the network.

[4] FL-net Local node management table

(1) Basic function

Control data relating to this node. An outline is shown below.

① Used for reading participating request frames and network parameters.
② The control data are set by the FL-net upper layer when this node starts.
③ The node name, top address and size of the data send area in the common memory can be set through the network.

(2) Control data

■ **Individual node management table**

Item	Number of bytes	Description
Node number	1 byte	1 to 254
Area 1 of common memory: Data top address	2 bytes	Word address (0 to 0x1ff)
Area 1 of common memory: Data size	2 bytes	Size (0 to 0x1ff)
Area 2 of common memory: Data top address	2 bytes	Word address (0 to 0x1fff)
Area 2 of common memory: Data size	2 bytes	Size (0 to 0x1fff)
Upper layer status	2 bytes	RUN/STOP/ALARM/WARNING/NORMAL
Token monitor time	1 byte	In units of 1 msec.
Minimum separation of frames	1 byte	In units of 100 µsec.
Vendor name	10 bytes	Vender name
Manufacturer name	10 bytes	Manufacture model name, device name
Node name (facility name)	10 bytes	Node name by user entry
Protocol version	1 byte	Fixed to 0x80
FA link status	1 byte	Participate/leave
Local node's status	1 byte	Doubled node number detection, etc.

[5] FL-net Participating node management table

(1) Basic functions

The status of each node is monitored by the management table which each node keeps for itself. This table handles the data used to control each node participating in the network. The operation is outlined below.

① When starting, it receives a token frame and refreshes the participating node management table and network management table.
② Each node refreshes its own participating node management table when it receives a token frame.
③ Renews the participating node management table when receiving a participation request frame of a new entry.
④ Delete any node that does not send a token frame or which times out three times in a row.

(2) Control data

The participating node management table contains data related to the nodes currently participating in the network.

■ **Participating node management table**

Item	Number of bytes	Description
Node number	1 byte	1 to 254
Upper layer status	2 bytes	RUN/STOP/ALARM/WARNING/NORMAL
Area 1 of common memory: Data top address	2 bytes	Word address (0 to 0x1ff)
Area 1 of common memory: Data size	2 bytes	Size (0 to 0x1ff)
Area 2 of common memory: Data top address	2 bytes	Word address (0 to 0x1fff)
Area 2 of common memory: Data size	2 bytes	Size (0 to 0x1fff)
Allowable refresh cycle time	2 bytes	In units of 1 msec.
Token monitor time	1 byte	In units of 1 msec.
Minimum separation of frames	1 byte	In units of 100 µsec.
Link status	1 byte	Participate/leave

- "0x1ff" is the hexadecimal notation for $1FF_{(HEX)}$.

Note: This information is contained in the token frame received.

[6] Status management of the FL-net

(1) Basic functions

Control parameters related to the network.

(2) Management data

■ **Network management table**

Item	Number of bytes	Description
Token latch node number	1 byte	Currently token staying node.
Minimum frame interval	1 byte	In units of 100 µsec.
Allowable refresh cycle time	2 bytes	In units of 1 msec.
Measured refresh cycle time (current value)	2 bytes	In units of 1 msec.
Measured refresh cycle time (maximum value)	2 bytes	In units of 1 msec.
Measured refresh cycle time (minimum value)	2 bytes	In units of 1 msec.

[7] Control message sequence number of the FL-net

(1) Basic function

The control sequence number and version of sequence number for a message transmission.

(2) Sending control data

■ **Sending control data for message sequence number control**

Item number	Number of bytes	Details
Version of sequence number	4 bytes	Version of sequence number for the send message transmission.
Sequence number (1: N transfer)	4 bytes	0x1 to 0xffffffff
Sequence number (1: 1 transfer)	4 bytes x 256	0x1 to 0xffffffff

- "0xffffffff" is the hexadecimal notation for $FFFFFFFF_{(HEX)}$.

(3) Received control data

■ **Received control data for message serial control**

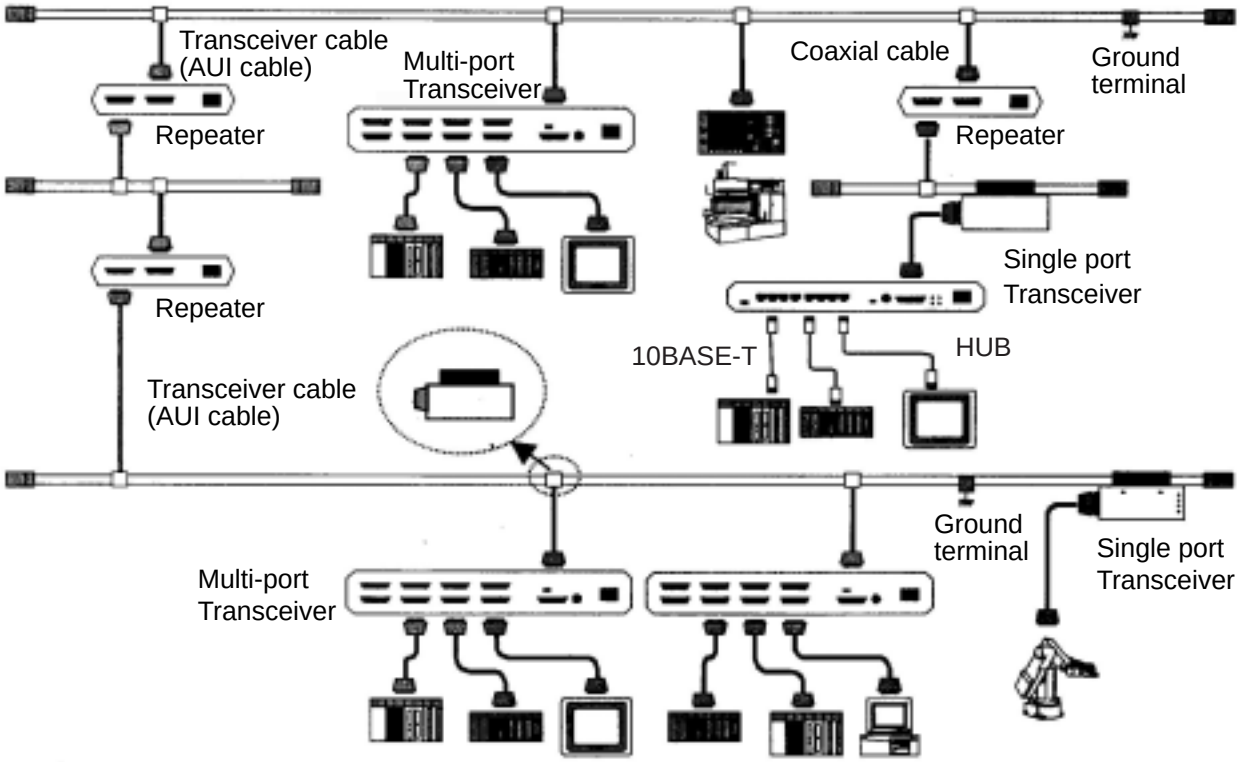
Item number	Number of bytes	Details
Version of sequence number	4 bytes	0x1 to 0xffffffff
Sequence number (1: 1 transfer)	4 bytes	: 0x1 to 0xffffffff
Sequence number (1: N transfer)	4 bytes	: 0x1 to 0xffffffff

- "0xffffffff" is the hexadecimal notation for $FFFFFFFF_{(HEX)}$.

15-5 Parts needed to build a network

[1] Parts needed to configure an Ethernet

The parts needed to configure an Ethernet are shown below.
For details about these parts, see section [2] and [3].

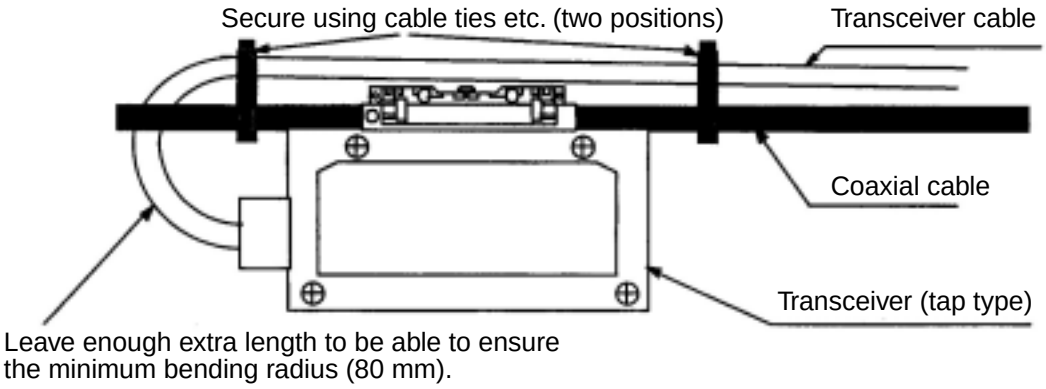


■ Parts needed to construct an Ethernet

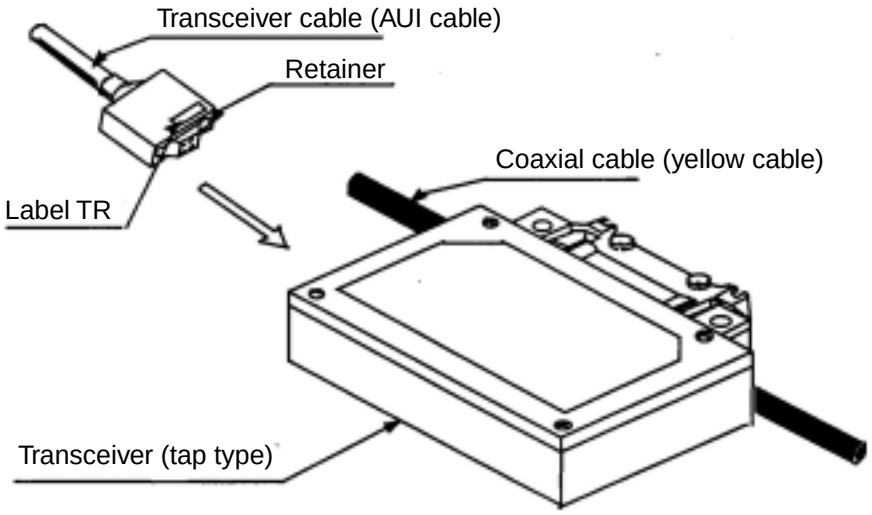
[2] Parts related to 10BASE5

(1) Transceiver

A transceiver converts signals flowing through coaxial cables (yellow cables) into signals that the nodes can use, and vise-versa.
When you want to connect a transceiver, it should be installed at a distance of 2.5 m (or a multiple of 2.5 m) from any other transceiver. Coaxial cables are marked at 2.5 m intervals. That makes it easy to install the transceiver over one of these marks on the cable.
Before connecting a transceiver to a coaxial cable, shut OFF the power supplies for the nodes and transceivers. If you make a connection while the power is still on, you may cause a short circuit.
Use transceivers that conform to the IEEE802.3 standard.

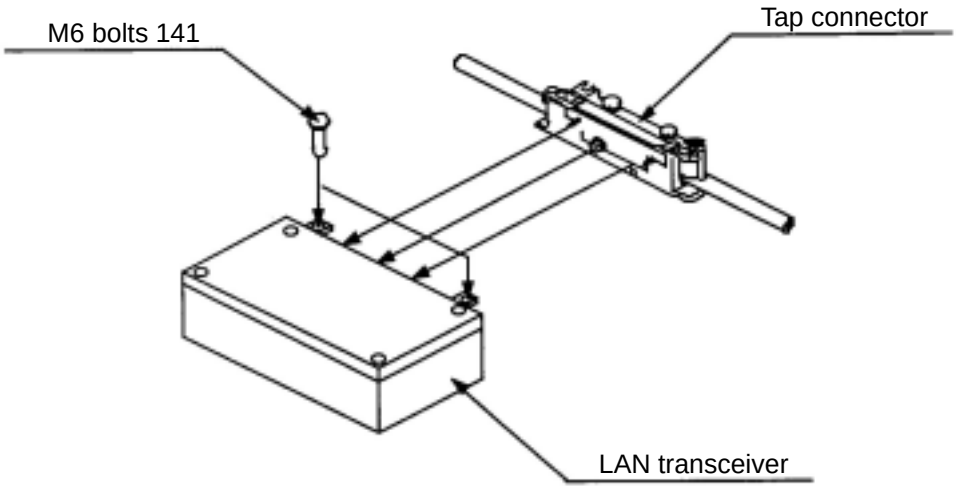


■ Conceptual drawing of a transceiver



■ Transceiver and transceiver cable (AUI cable)

15



■ Installation of a tap in the main case of a transceiver

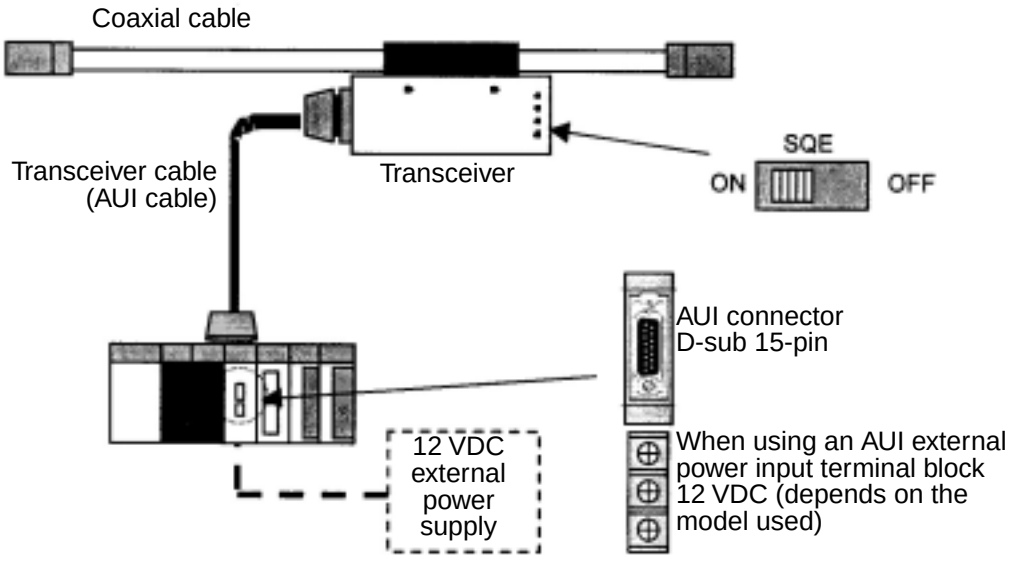
① **Transceiver (tap type)**

To connect a tap type transceiver to a coaxial cable, make a hole in the coaxial cable insulation and insert a probe that will make contact with center conductor in the coaxial cable. Remove the insulation around the coaxial cable using a special tool.

Supply power from a node to the transceiver (12 VDC) using a transceiver cable. Some nodes may require a separate 12 VDC power supply in order to use the transceiver cable. For details, see the hardware manual for your node.

The "SQE" switch setting on a transceiver is made as follows.

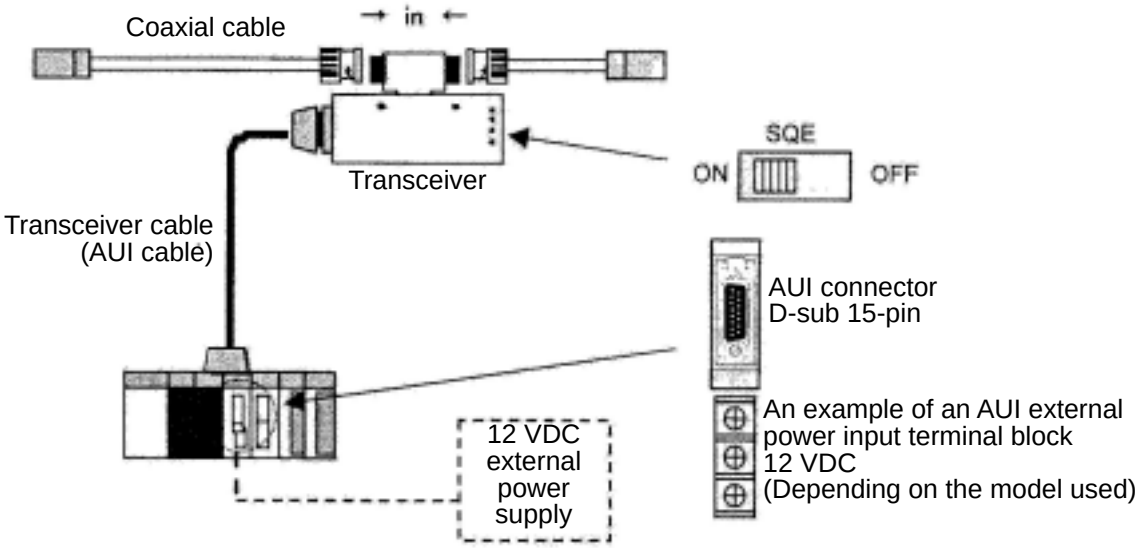
1. ON when connected to a node.
2. OFF when connected to a repeater.



■ Transceiver (tap type) for Ethernet cable

② **Transceiver (connector type)**

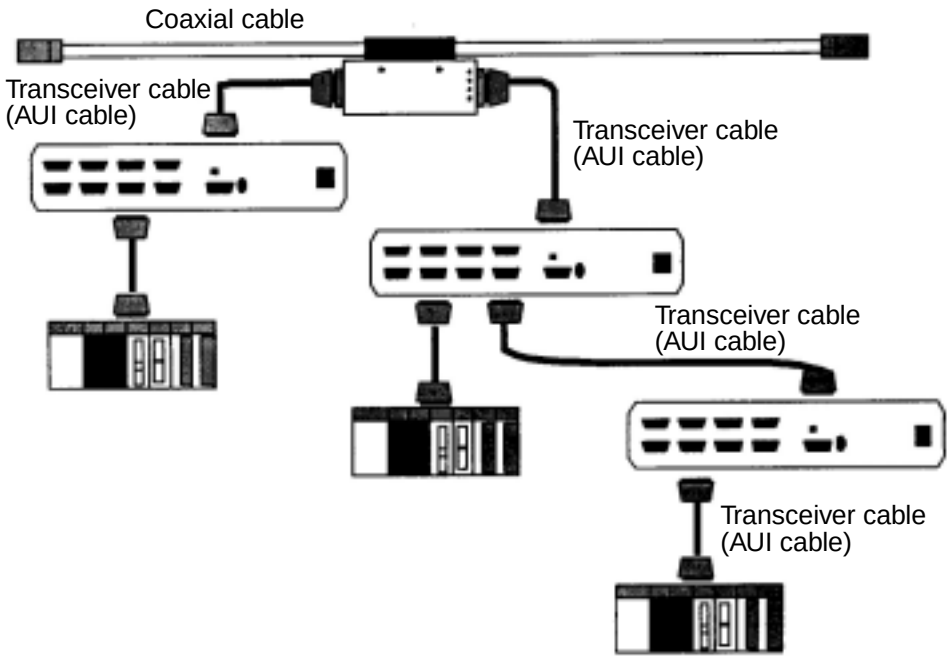
Install the transceiver connector on a coaxial cable. Then, connect the transceiver to the connector.
No special tools are needed for this connection, and it is easy to install and remove.
The transceiver must be supplied with power from a node through a transceiver cable.



■ **Transceiver (connector type) for Ethernet cable**

③ **Multi-port transceiver**

The tap type transceiver and connector type transceiver can only be used to connect one terminal. A multi-port transceiver can connect a number of nodes. In practice, 4- and 8-port type transceivers are available.



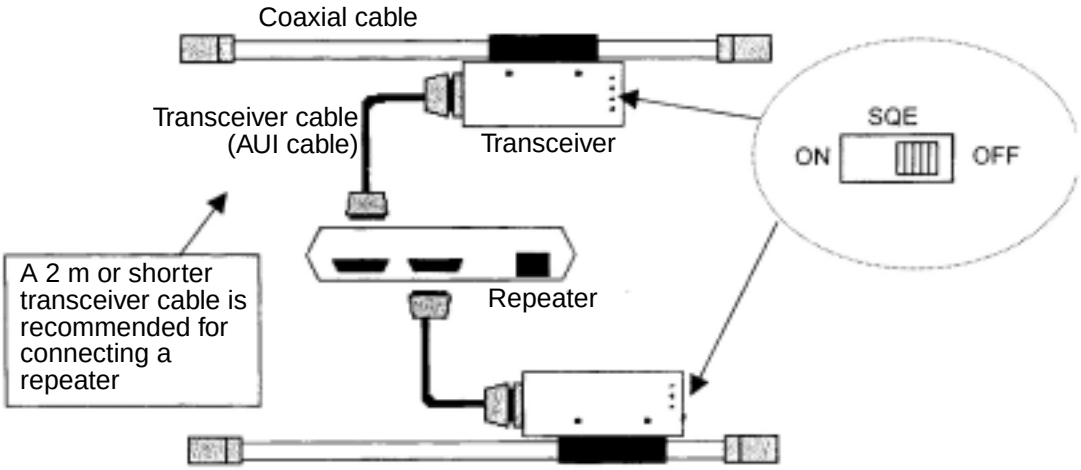
Note: Use a power supply cable to supply power to the transceiver.

■ Multi-port transceiver for Ethernet cables

④ **Repeater**

A repeater is used to relay or transfer signals. It is used for communication between segments using different media, to extend the length of a segment, to increase the number terminals that can be connected, or to convert from one cable type to another. A repeater reads the electronic signals from one segment, amplifies the signal as required, and sends it to all the segments connected to the repeater.

The maximum transceiver cable length that can be connected to the repeater is 50 m. However, we recommend using transceiver cable lengths of 2 m or less to prevent problems caused by noise. Pay attention to the SQE switch settings.



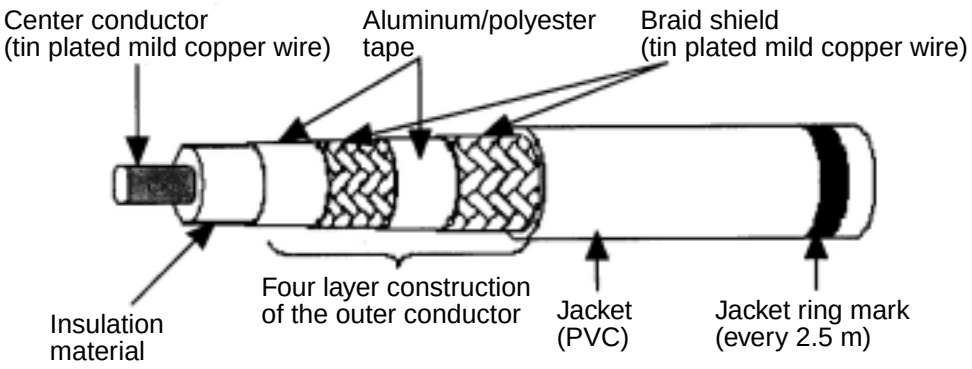
■ **Ethernet Repeater**

(2) Coaxial cable

Coaxial cable consists of a center conductor and an external conductive layer that functions as a shield. Coaxial cables used for Ethernet connections must have 50 ohms of impedance. An RG58A/U cable can be used with 10BASE2 and a yellow cable can be used with 10BASE5.

The maximum length of a single 10BASE2 cable is 185 m and the maximum length of a 10BASE5 cable is 500 m.

Make sure to connect the shield (external conductive) to the ground to prevent problems from noise (class D single point ground).



■ Coaxial cable for Ethernet networks

(3) Coaxial connectors

A coaxial connector is usually an "N" type connector. It is used to connect the coaxial cable to a termination device, another coaxial cable or to a connector type transceiver.

■ Coaxial connector for Ethernet use

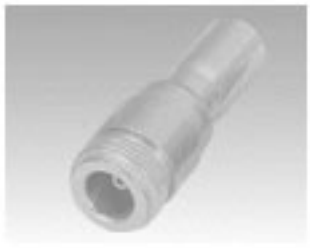
(4) Relay connector

This connector is used to make a connection between coaxial cables. Although the repeater is used to extend a segment, a relay connector is used to extend a cable in the same segment. Be careful because the use of multiple relay connectors on the same line may change the electrical resistance of the coaxial cable. (We recommend not using more than one relay connector in the same line.)

■ **Relay connector for Ethernet use**

(5) Terminator (terminating resistor)

This is a device attached to the two ends of a cable, in order to prevent reflection of the signals in a bus type arrangement. Terminators should always be connected to the ends of the cable. Without termination device, signal reflection (collisions) may occur and the network may go down. Both "J" type (used with a tap type transceiver) and "P" type (used for a connector type transceiver) terminators are available. Install the terminators at one of the marks on the outer insulation of the coaxial cable.



■ **Terminator (terminating resistor) for Ethernet use**

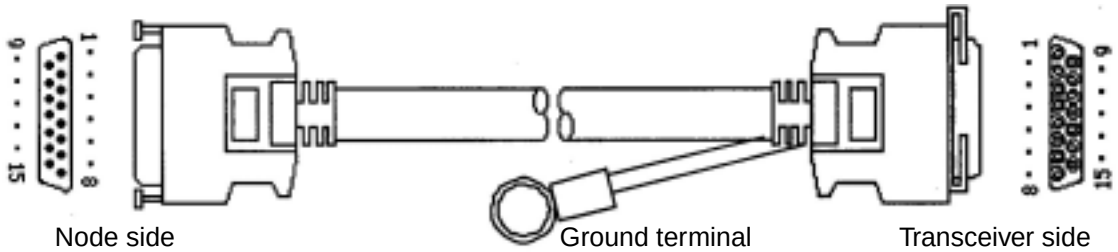
(6) Ground terminal of a coaxial cable

This device is used to prevent communication data errors that may be caused by electrical noise on a coaxial cable. There should only be one ground point on any single piece of coaxial cable. Provide class D grounding to connect this device.

■ Coaxial cable ground terminal for Ethernet use

(7) Transceiver cable

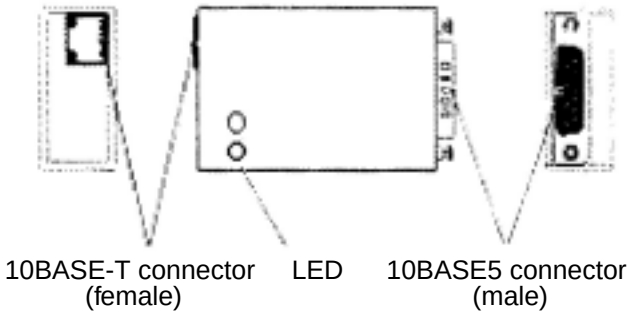
This cable is used to connect a transceiver to a node. The transceiver cable has a D-sub 15-pin AUI connector on both ends. The maximum length allowed is 50 m. However, we recommend keeping the cable length to 15 m or less to prevent problems from noise. Cables with a ground terminal must be grounded.



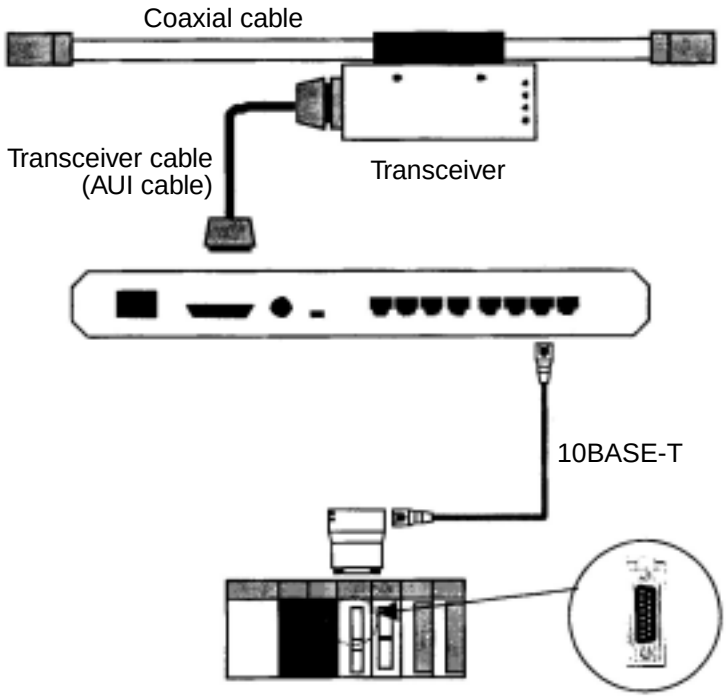
■ Transceiver cable for Ethernet use.

(8) 10BASE5/10BASE-T converter

This converter is used to connect a 10BASE5 cable to a 10BASE-T cable.



■ 10BASE5/10BASE-T converter for Ethernet use

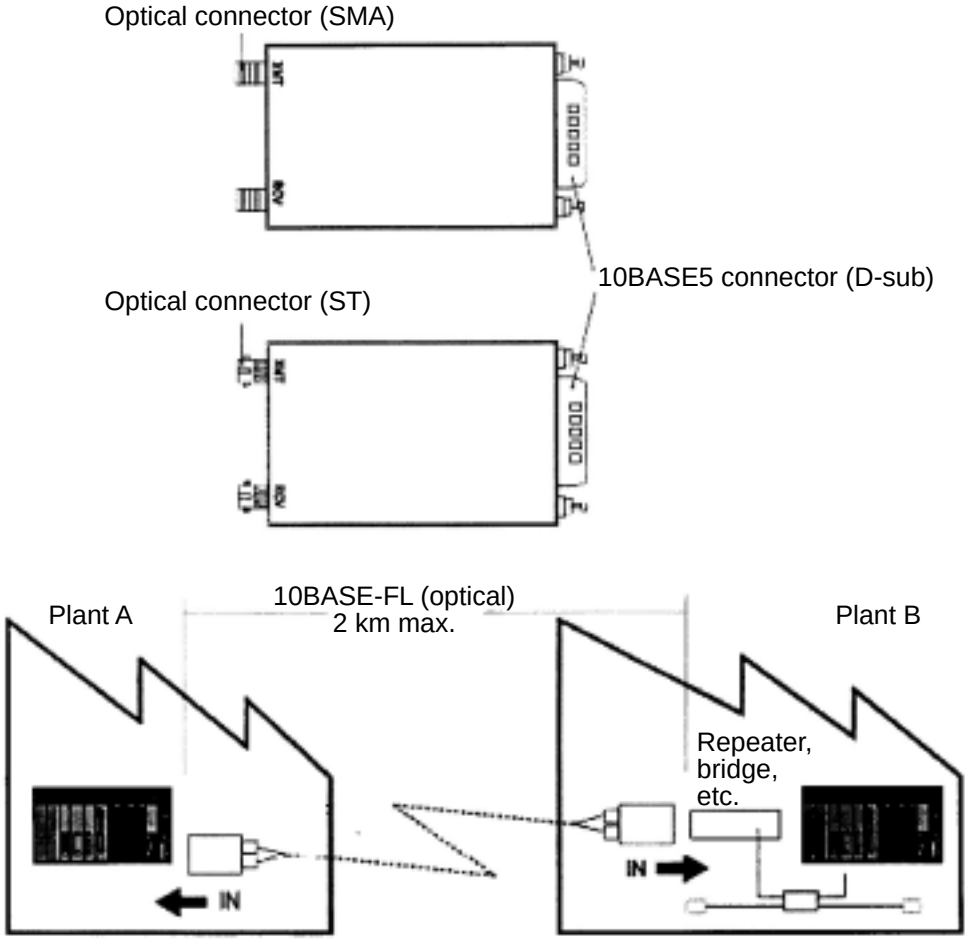


■ Installation of a 10BASE5/10BASE-T converter for Ethernet use.

15

(9) Coaxial/optical converter, repeater

This device converts electrical signals on a coaxial cable (10BASE5/10BASE2) into optical signals, and from optical signals to electrical signals. A FOIRL (Fiber Optic Inter Repeater Link) is used to connect repeaters in a 10BASE-FL network. The device is used to prevent noise and extend the length of a cable.



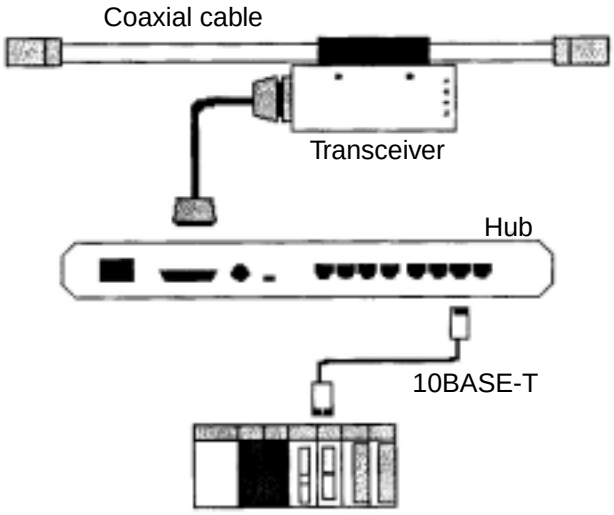
■ **Coaxial /optical converter, repeater for Ethernet use**

[3] 10BASE-T related items

(1) Hub

A hub connects a number of twisted pair cables in a10BASE-T installation and it has a repeater function.

Some types of hubs have a 10BASE2 interface or a cascade interface. When you need to cascade hubs, you can use up to 4 layers. A star coupling hub allows the use of one hub with several hub functions.



■ **Ethernet Hub**

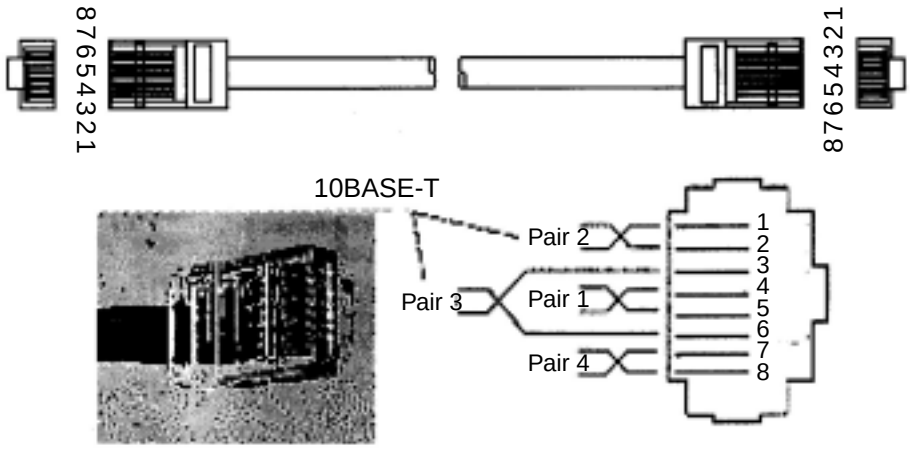
(2) 10BASE-T cable

This cable is also called "twisted pair cable" or "twisted couple cable." Two copper wires are twisted around each other as a pair. These pairs are bundled together in sets and covered with external insulating cover. The following types are available.

① STP cable with a shield, and UTP cable without a shield.

② A cross cable can be directly connected between nodes and straight cable can connect nodes through a hub.

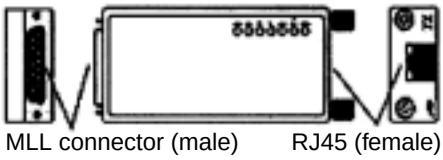
The maximum transfer speed of 10BASE-T cable is 10M bps and the maximum length is 100 m. The connectors at both ends of the cable are 8-pole modular connectors specified in ISO8877.
Use category 5 compatible 10BASE-T cable for an FL-net.



■ 10BASE-T cable for Ethernet use

(3) 10BASE-T/optical converter, repeater

This device is used to convert electrical signals on a 10BASE-T cable into optical signals.
A FOIRL (Fiber Optic Inter Repeater Link) is used to connect between repeaters and a 10BASE-FL with terminals. This is used to prevent problems caused by electrical noise and to extend a cable's length.



■ 10BASE-T/optical converter, repeater for Ethernet use

15-6 Installation of an FL-net network

[1] Wiring 10BASE5 coaxial cable

(1) Laying and connecting cables

Various installation methods can be used, depending on local conditions. The major wiring methods are shown below.

① Exposed wiring on a wall.
② Free access, wiring beneath the floor.
③ Wring inside cable racks
④ Laying cable in the ceiling.

(2) Precautions for laying and hooking up

Please observe the following precautions when laying cable and hooking up a network.

① In principle, conduct all work indoors.
② Cables may be stressed when secured on a wall. Except in special cases, provide support for the cable at approximately 1 m intervals. Be careful not to deform the cables when securing them.
③ When laying cables inside cable racks or in the ceiling, secure them at appropriate intervals so that the cables will not sag.
④ When laying cables below the floor or next to a wall, provide protective covers for the cables to avoid damage from foot traffic or carts.
⑤ It is best to ground the external shield on the cables.
⑥ When grounding, ground only one point of each segment using class 3 grounding techniques.
⑦ In order to prevent contact between the conductor and exposed metal on any other device , apply boots or insulation tape to "N" and "L" type connectors, linear sleeves, and terminators.
⑧ Make sure the cable is always at least 60 cm away from AC power cables (more than 100 VAC).

(3) Major coaxial cable installation specifications

The primary coaxial cable installation requirements are as follows:

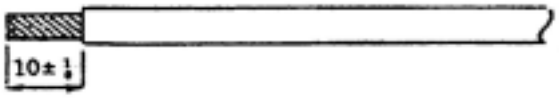
■ **Coaxial cable installation information**

Item	Specifications and details
When routing a cable	Minimum 100 mm radius in corners
When securing a cable	Minimum 100 mm radius in corners
Cable tension	Max. 25 kg
Cable weight	188 kg/km

(4) Installation of coaxial connectors

Install coaxial connectors (N-PC) as follows.

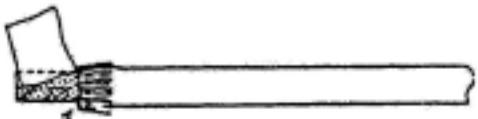
① **Strip the PVC sheath**



■ **Stripping the sheath (PVC sheath) on a coaxial cable**

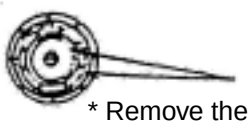
② **Remove the aluminum braided screen around the cable**

1. Remove aluminum screen around the cable



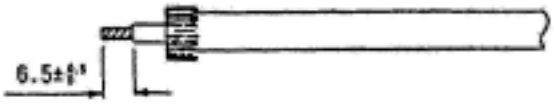
* Remove all the aluminum tape on this part.

2. Remove the aluminum tape on the cable

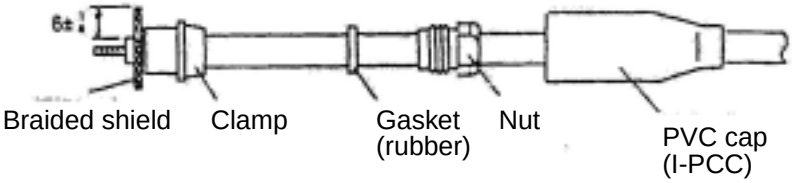


* Remove the aluminum tape at the two positions shown above.

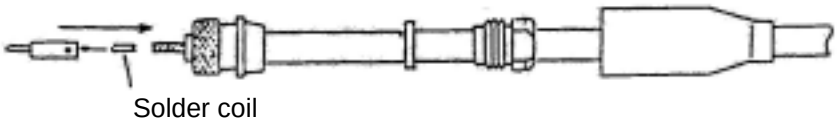
③ **Strip the insulation material around the conductor.**



④ **Assemble the connector and shield parts**

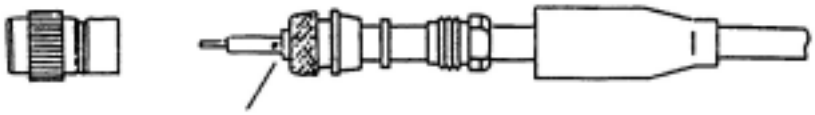


⑤ **Shielding coaxial cables and soldering the pin.**



15

⑥ **Assemble the coaxial cable connector**



Note: The gap between the center pin and the insulator should not be larger than 1 mm. The insulation material must be intact.

(5) Transceiver

① **Installing and securing a tap type transceiver**

The method and location for installing a transceiver depends on the local conditions. However, common installation locations are as follows.

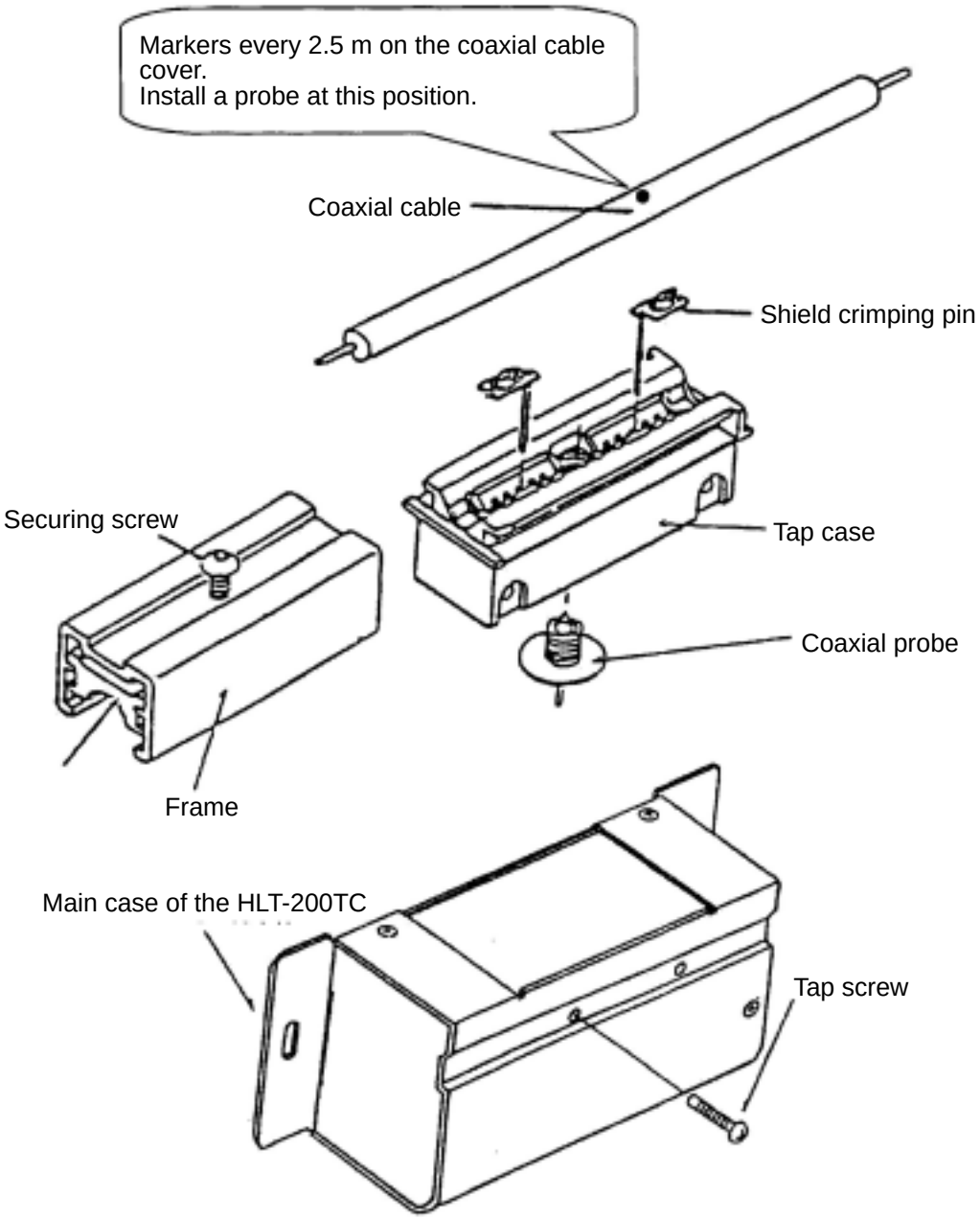
- Install on a wall
- Install in the free access space under the floor
- Install in the ceiling or in a cable rack
- Install near a station

The precautions when installing a transceiver are as follows:

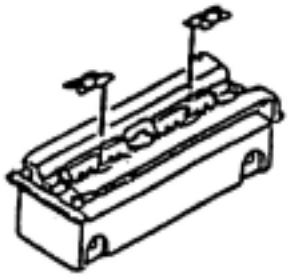
- Secure the transceiver on the floor or a flat surface using foot, or secure it using self-tapping screws.
- When installing a transceiver in the ceiling or below the floor, select a location that is easy to access for maintenance and checking.
- The installation distance between transceivers is 2.5 m. (Use the markers on the cable that are spaced every 2.5 m)

② **Handling and installation procedures**

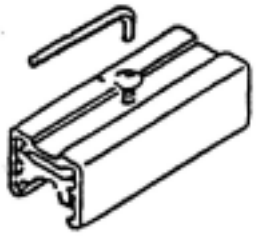
1. Names of the parts in the transceiver



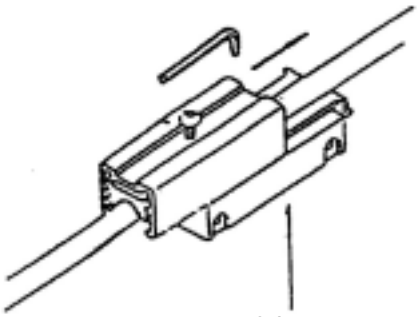
2. Insert a shield crimping pin into the tap case.



3. Tighten the case screw so that it will not loosen.

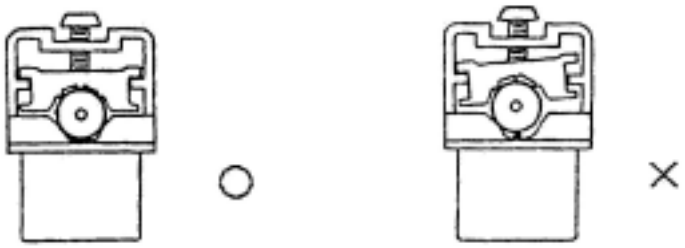


4. Place the tap case at one of the markers located every 2.5 m on the coaxial cable. Insert a frame into the slide and secure the case using the screw. (Tighten the screw so that distance between top of the tap case and holding metal is approximately 1 mm.)



Center of the 2.5 m mark

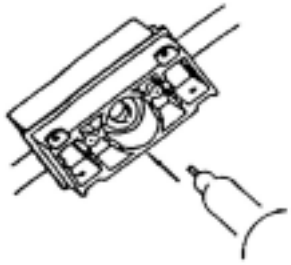
■ Transceiver tap frame and tap installation device.



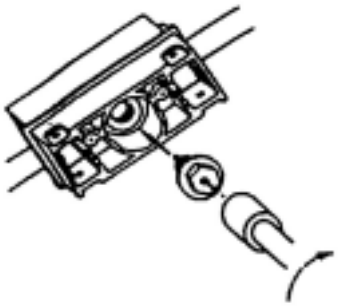
■ **Insert into the transceiver tap frame and coaxial cable**

Note: When inserting a frame, make sure that the cable is at the center of the crimping pin. Tighten the screw a little and see if the clamping part is tilted very much. If so, loosen the screw and reposition the cable so that frame is at the center of the tap.

5. Drill a hole for the core probe until white insulation material can be seen. (Please note that when the securing screw is loosened, some aluminum tape may remain. Remove the plastic chips from the hole.)



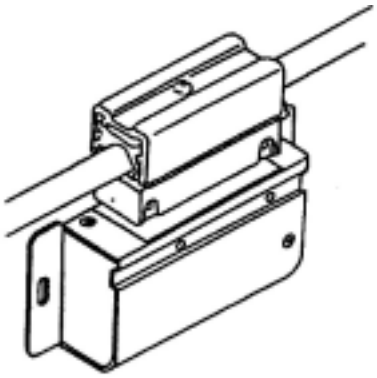
6. Tighten the core probe using a special spanner.



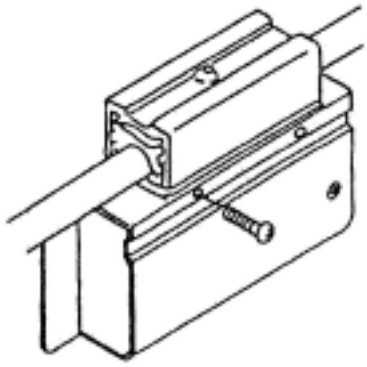
Note: That completes the installation of a tap connector. The test method for a proper installation is shown below.
- The shield-crimping pin shall be shorted.
- When a terminator is installed at both ends of a coaxial cable, the resistance between the core probe and the shield crimping pin] should be 25 ohms.

However, if a system is already operating, do not perform the test procedures above since it may cause the system to malfunction.

7. Insert the transceiver main housing to the tap connector. Align the shield crimping pin and core probe so that they are vertical.



8. If you think the shield-crimping pin or the core probe may be bent, pull them out. If they are inserted improperly, you may be able to see that they are bent. In this case, realign them. Insert the tap screw in the hole in the top of the case, and tighten it.



■ Securing the transceiver's main case and tap

③ **Setting the SQE switch**

In general, set the SQE switch as follows:

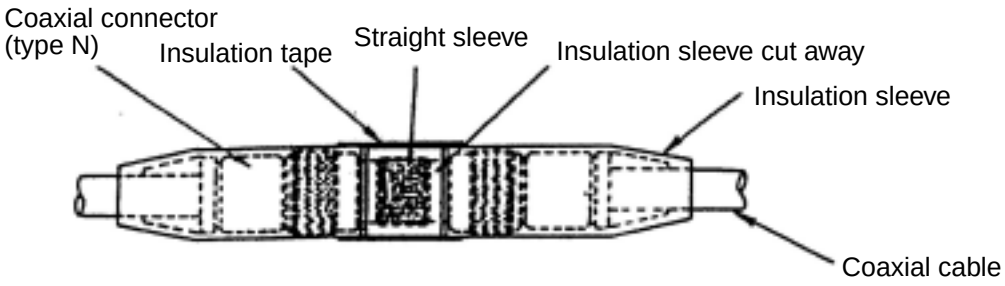
■ SQE switch settings

Item	Setting
When connected to a node	ON
When connected to a repeater	OFF

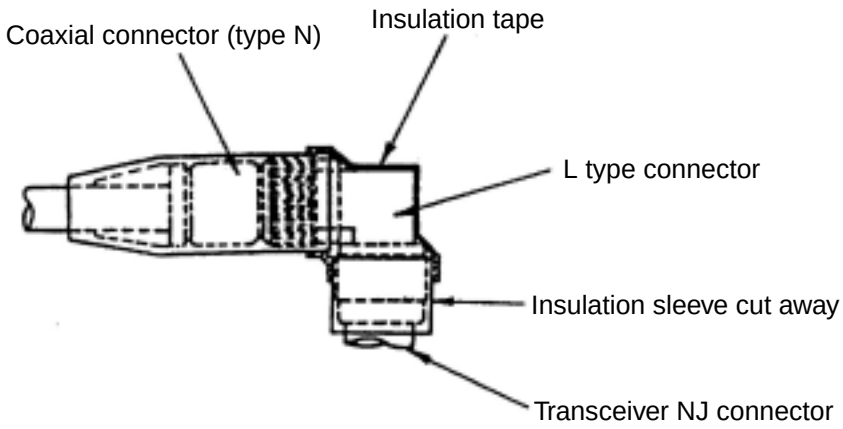
(6) Installation of terminators (terminating resistors)

Insulation on connectors and terminators

Shown below is a method for insulating a relay connector and an "L" type connector.



■ Insulating a relay connector



■ Insulating an L type connector

The method for insulating a terminator (T-NP male and T-NJ female) is as follows.

- Cover the insulation sleeve (black) (I-NPC) to the male T-NP.
- Cover an insulation sleeve (black) (I-NJP) to the female T-NJ.

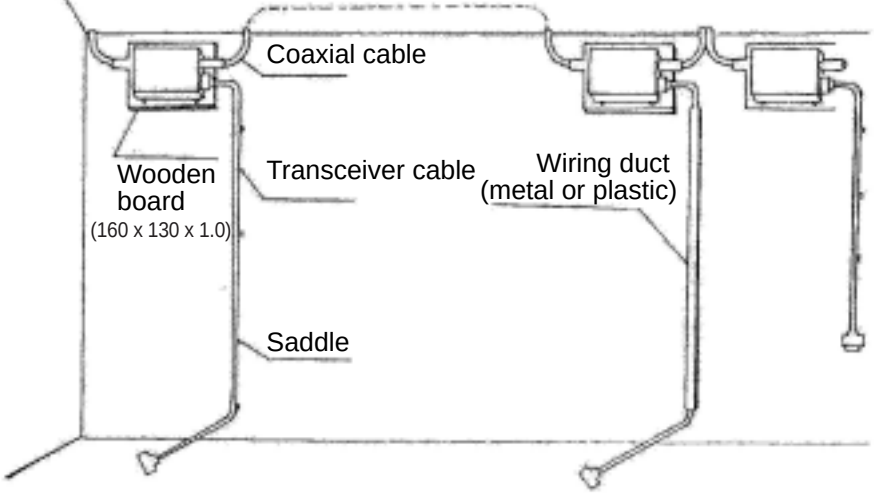
(7) Installation of a transceiver cable

An example of how to install a transceiver and transceiver cable is shown below.

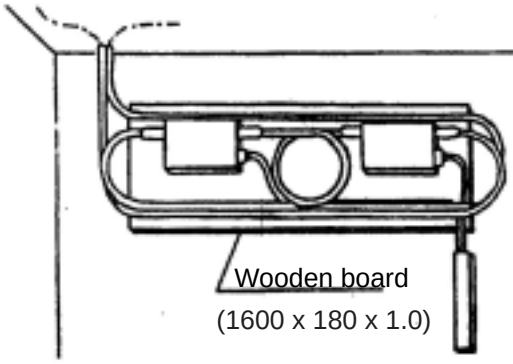
- An example of how to install parts on a wall
- An example of how to install parts in the ceiling and below the floor

An example of how to install a transceiver and transceiver cable

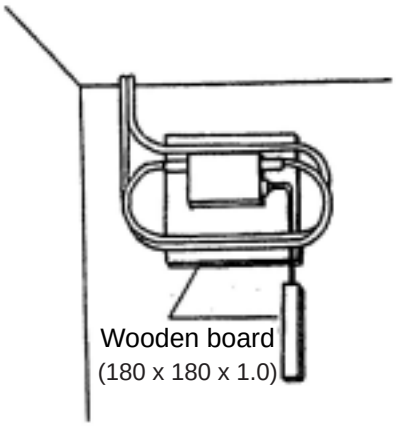
Example of an installation on a wall (1)



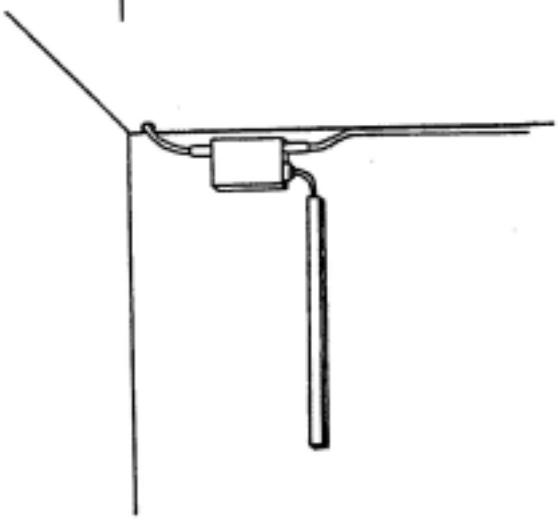
■ An example of how to install a transceiver and transceiver cable on a wall



An example of an installation on a wall (2)

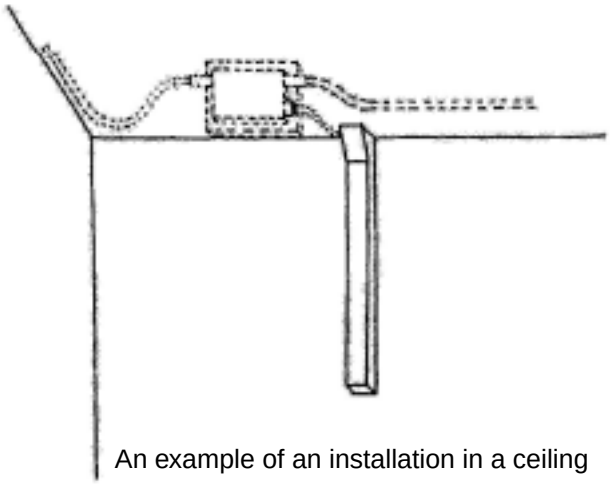


An example of an installation on a wall (3)

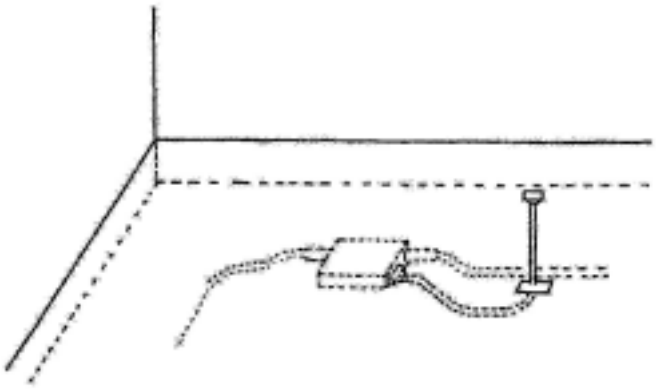


An example of an installation on a wall (4)

■ Installation example of a transceiver and transceiver cable: 1



An example of an installation in a ceiling

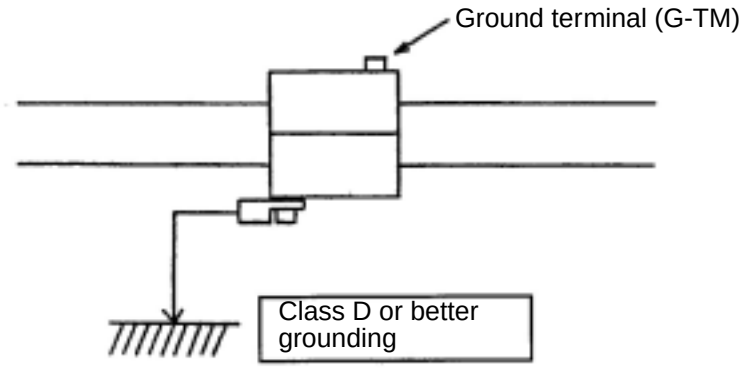


An example of an installation below a floor

■ Installation example of a transceiver and transceiver cable: 2

(8) Installation of a ground terminal for a coaxial cable

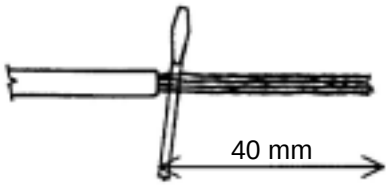
A method for installing a grounding terminal for a coaxial cable is shown below. Set up a single ground point (class 3 or better grounding) using a ground terminal (G-TM).
Ground a coaxial cable at any one point.



[2] 10BASE-T (UTP)

(1) How to create a 10BASE-T (UTP) cable

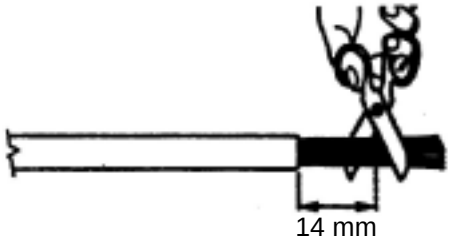
① **Strip the sheath on a 10BASE-T (UTP) cable**
Cut the sheath 40 mm away from the end and untwist the cables. Lay them out in the same order as the terminals.
Normally, you use a straight cable.



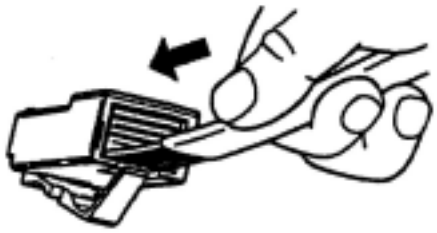
■ **Terminal arrangement**

	T568B	T568A
	Normal (straight)	**Cross cable**
8	Brown	Brown
7	White/brown	White/brown
6	Green	Orange
5	White/blue	White/blue
4	Blue	Blue
3	White/green	White/green
2	Orange	Green
1	White/orange	White/orange

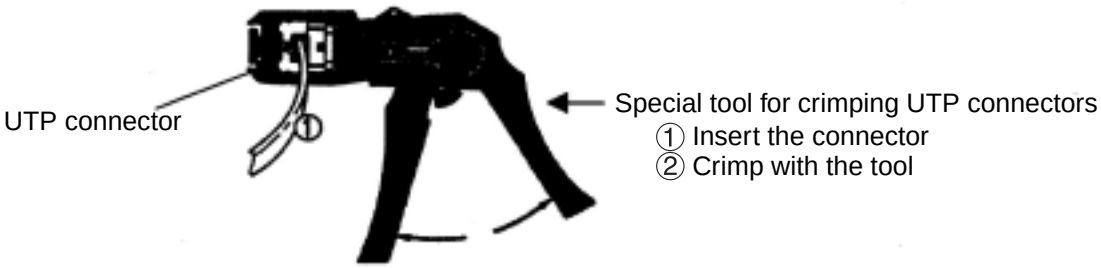
② **Cut the signal lines in a 10BASE-T (UTP) cable**
Cut the signal lines 14 mm away from the sheath using a nipper.



③ **Insert the UTP cable signal lines into the connector**
Install the signal lines in the correct order, and check to make sure the wires reach all the way into the connector. Look at the connector from the front, top and bottom.



④ **Assembling a UTP cable connector**
After making sure the signal lines are fully inserted, crimp the connector using a special tool. After crimping, check the connector using a dedicated tester.



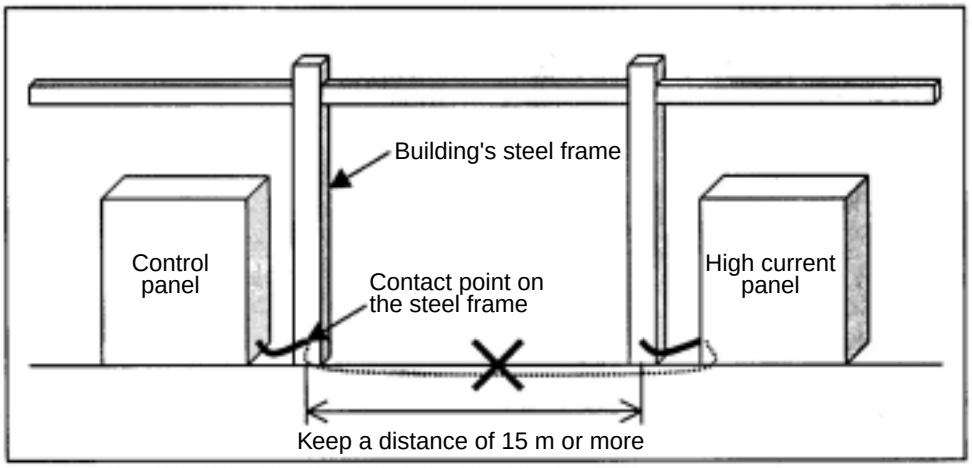
15-7 Grounding the FL-net system

[1] Outline of the grounding procedures for the FL-net system

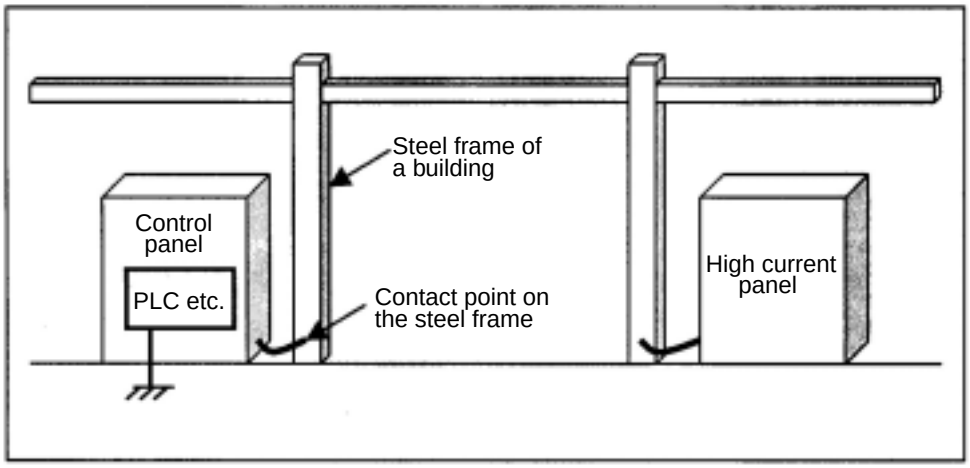
This section uses an example of how to ground an FL-net controller control panel when attaching the control panel to the steel frame of a building.

In order to ground the control panel to a building frame, the following conditions need to be satisfied. If the ground cannot meet the conditions below, provide an exclusive class D ground for the controller.

1. All of the steel frames must be welded to each other.
2. Class D grounding standards must be met between the controller ground and the steel frame.
3. No strong electrical current should flow through the ground terminal on the controller.
4. Keep a distance of 15 m or more between the controller ground point and any ground for a high current electrical power panel.



■ An example of how to ground a control panel: 1 (grounded to the steel frame of a building)



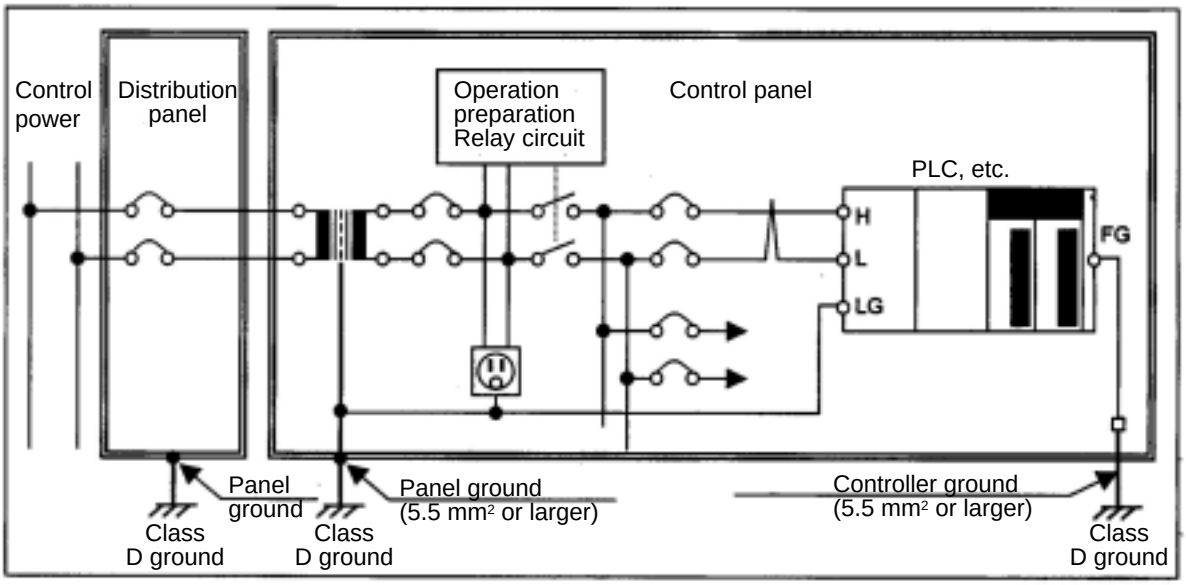
■ An example of how to ground a control panel: 2 (exclusive class D ground)

[2] Wiring power lines and grounding equipment

This section describes how to wire power lines and ground lines in a distribution panel, or controller panel for the FL-net system.

When wiring power lines and making grounds, observe the precautions below.

1. Isolate the control power circuit from the controller power circuit using an isolation transformer with a static electricity protective function.
2. Ground the frames of the distribution panel and the control panel using class D grounding.
3. Provide an exclusive class D or better ground to the controller FG (frame ground) terminal. Do not connect this terminal to the controller frame.
4. The wiring for the power line to the controller should be as short as possible, using twisted power cables.
5. Connect the LG (line ground) terminal on the controller to the shield terminal on the isolation transformer, and then to the frame ground on the panel.



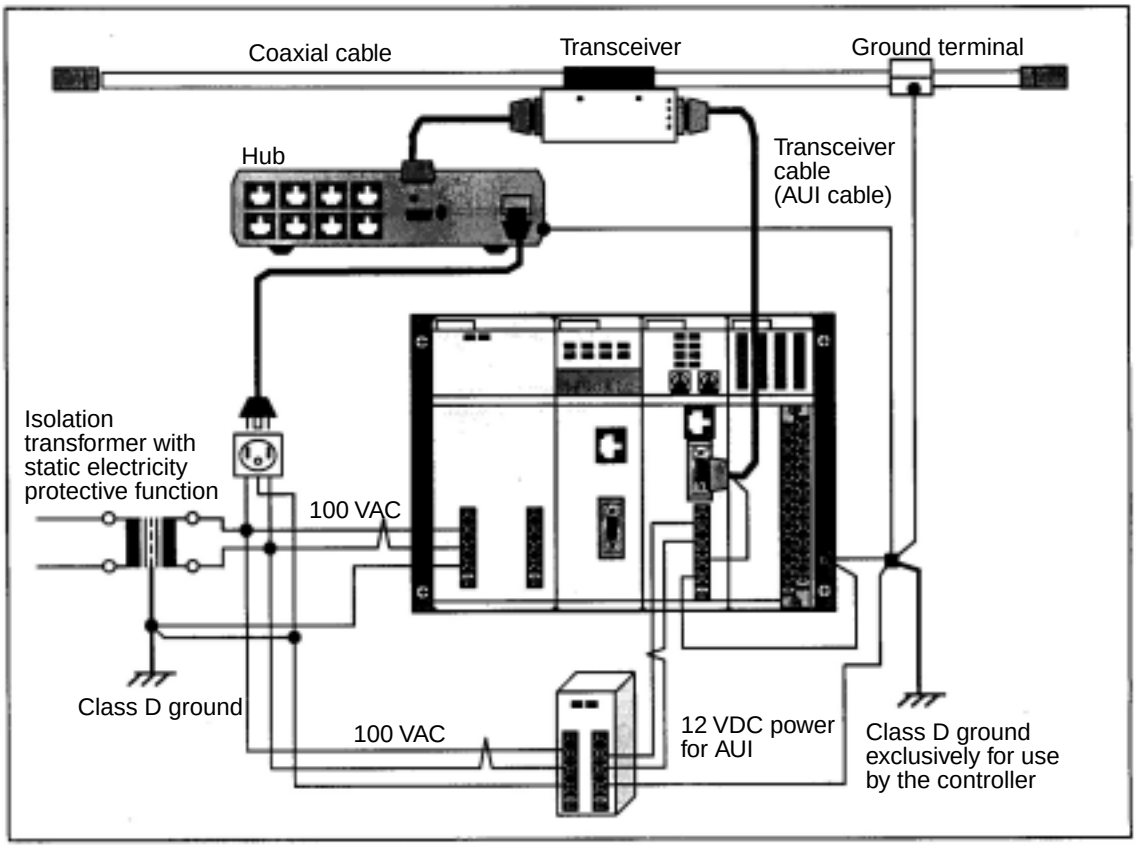
■ An example of how to ground the FL-net system

[3] Wiring the power lines and grounding the network equipment in an FL-net

This section describes how to wire the power lines and ground lines for the network equipment in an FL-net system.

When wiring power lines and making ground connections, observe the precautions below.

1. Connect the coaxial cable ground terminal to the class D ground that is specially created for the controller.
2. Connect the frame ground of the hubs for a 10BASE-T system to the class D ground that is specially created for the controller. Supply power to the hub from an isolation transformer with a static electricity protective function (used to power the controller).
3. Provide an exclusive class D or better ground for the controller FG (frame ground) terminal. Do not connect this terminal to the controller frame.
4. Connect the FG (frame ground) terminal of FL-net modules to the FG (frame ground) of the controller.
5. Connect the shield ground on the transceiver (AUI) cable to the FG (frame ground) terminal on the FL-net module.
6. When a transceiver (AUI) needs DC power (12 VDC etc.), provide a stable power supply for exclusive use by the network, and connect the DC output terminals to the FL-net module. 100 VAC input power needs to be supplied from the isolation transformer, the same as for the controller.



■ Example of how to wire power lines and ground lines for network equipment in the FL-net system

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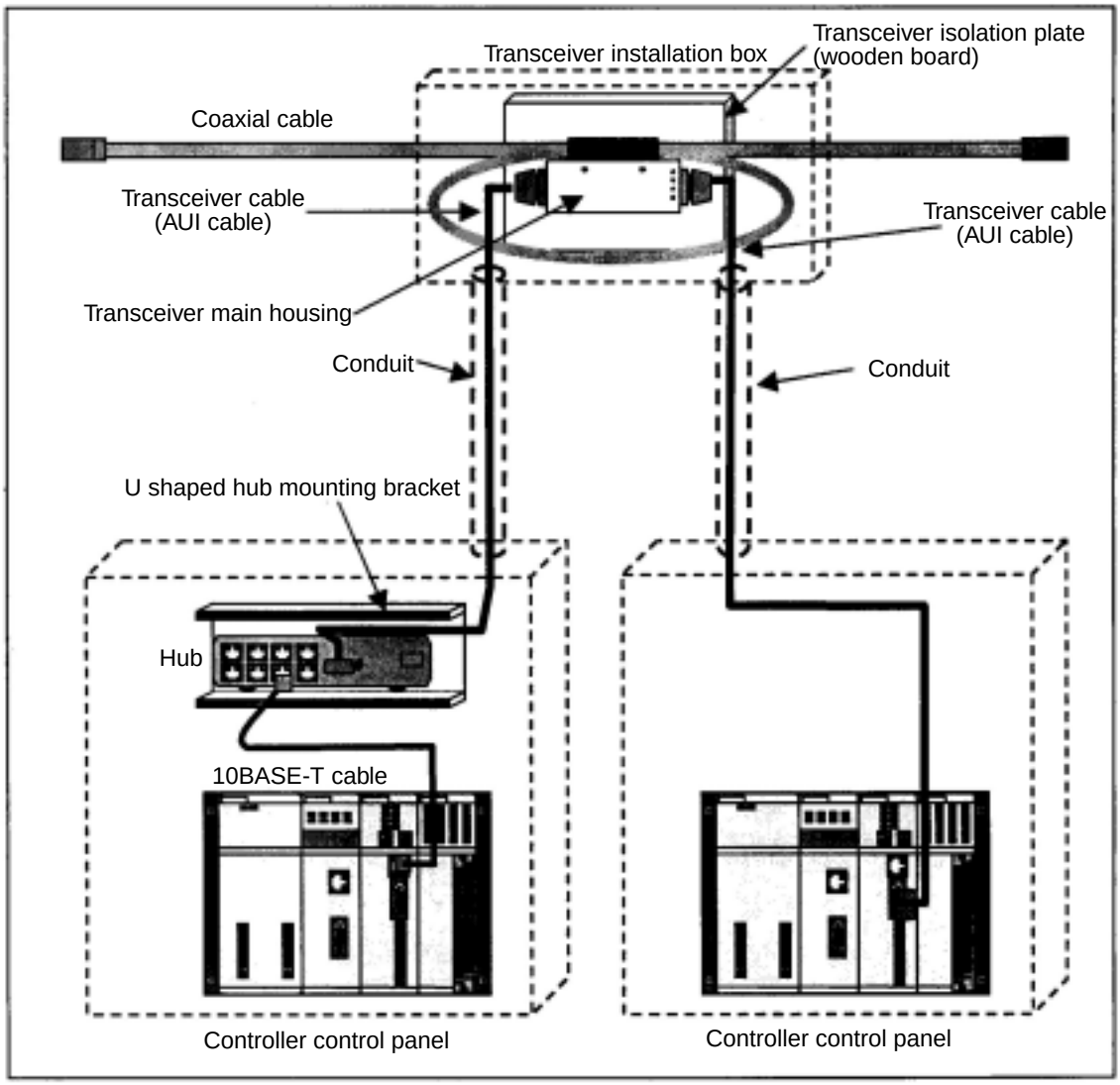
[4] Installation of network equipment in an FL-net

Shown below is an example installation of network equipment in an FL-net system.

1. Install a transceiver in a metal box using a wooden board for insulation. The box must have a class D ground.
2. Run the transceiver cable to the controller control panel through metal conduit. Provide a class D ground for the conduit.
3. Install a hub inside the controller control panel using a metal, U shaped bracket. Use a hub that is electrically isolated from the metal mounts, such as by using rubber feet. Ground the hub mounts to the control panel. The control panel must be provided with a class D ground.



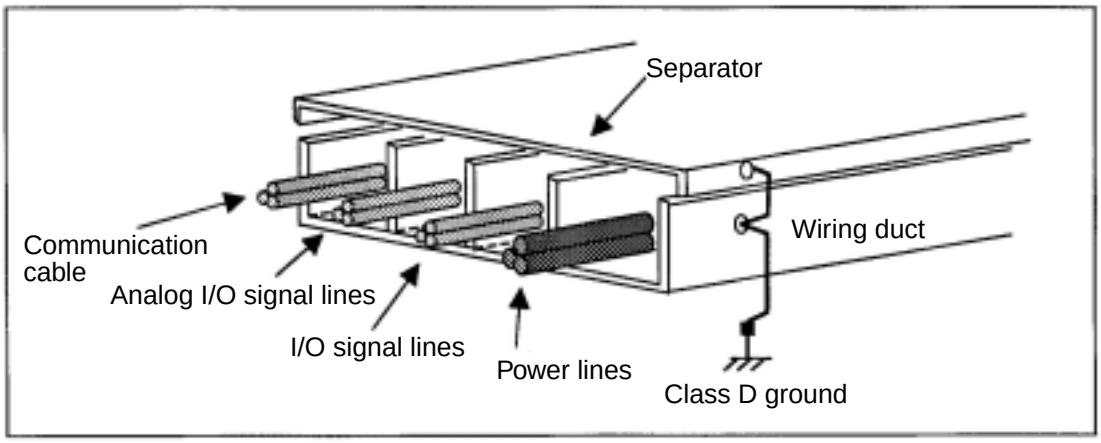
■ Installation example of network equipment in an FL-net

[5] Wiring and grounding through wiring ducts and conduits

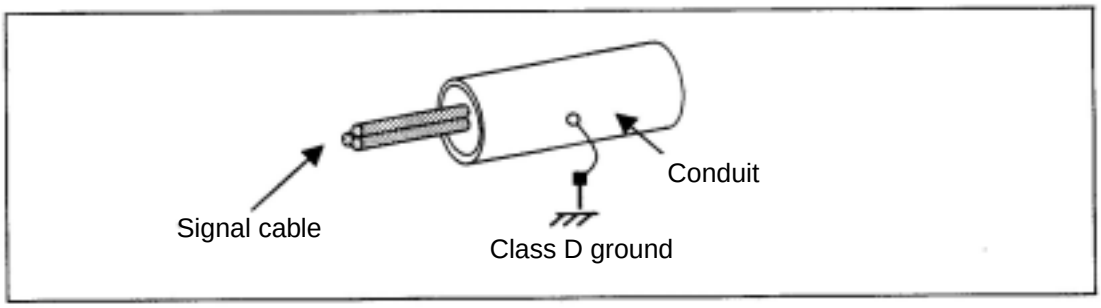
Shown below are methods for wiring and grounding through wiring ducts and conduits used on an FL-net.

Observe the precautions below when wiring

1. When wiring using wiring ducts, separate the power lines and signal lines using a physical separator. The wiring duct itself (including the lid and separator) must be grounded with a class D ground.
2. When using conduits, provide one conduit for the power lines and one for the signal lines. Use conduit that complies with JIS-C-8305 and create a class D ground.



■ Wiring example when using a wiring duct



■ Wiring example using a conduit

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15-8 FL-net installation check sheet

FL-net installation check sheet

Communication line name: Station number:

		Date checked:	
	Item to check	Checked by:	
Cable	Are all the connectors securely locked?		
	Are the cable curve radiuses within the specified value?		
	Are the connectors protected by jackets, etc.?		
	Are the wiring DI numbers (line numbers) attached to the lines? Are they correct?		
	Is any communication cable lying under a heavy object?		
	Is any communication cable bundled with a power line?		
	Is the AUI cable length for repeaters always 2 m or less? Is the transceiver cable length less than 50 m?		
	Is the coaxial cable (10BASE-5) length less than 500 m?		
	Is the coaxial cable properly grounded using a ground terminal?		
	Is the shield on the coaxial cable isolated from the transceiver?		
	Are the terminating resistors properly installed on the coaxial cable?		
	Are the number of layers of hubs and repeaters within the specified values?		
	Is a straight cable (not a cross cable) used for the twisted pair cable?		
	Is a category 5 cable used for the twisted pair cable and is it less than 100 m long?		
Module (device)	Are the GND terminals on the equipment properly connected?		
	Is each device securely attached to its base?		
	Is the rack panel securely attached to a control panel?		
	Is the AUI cable securely locked?		
	Is excessive force being placed on the AUI cable installation section by a door?		
Hub ect.	Are the RJ45 connectors securely installed?		
	Are the connectors for the AUI cables securely locked?		
	Are the line numbers attached?		
	Are the transceivers properly installed at marked positions on the cable?		
	Are the SQE switches on the transceivers properly set as per the specifications?		
	Are the hubs properly secured?		
	Are there any incorrect settings on the HB/MAU select switches on the hubs?		
	Does the power supplied to hubs comply with the specifications for voltage?		

- Make sure to check these items and fill in the sheet when modifying or changing the system.
- Put an O (OK) or an X (NG) in the result column and enter the rotary switch number and ON/OFF status of dip switches inside the parenthesis ( ) for the setting switches.

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