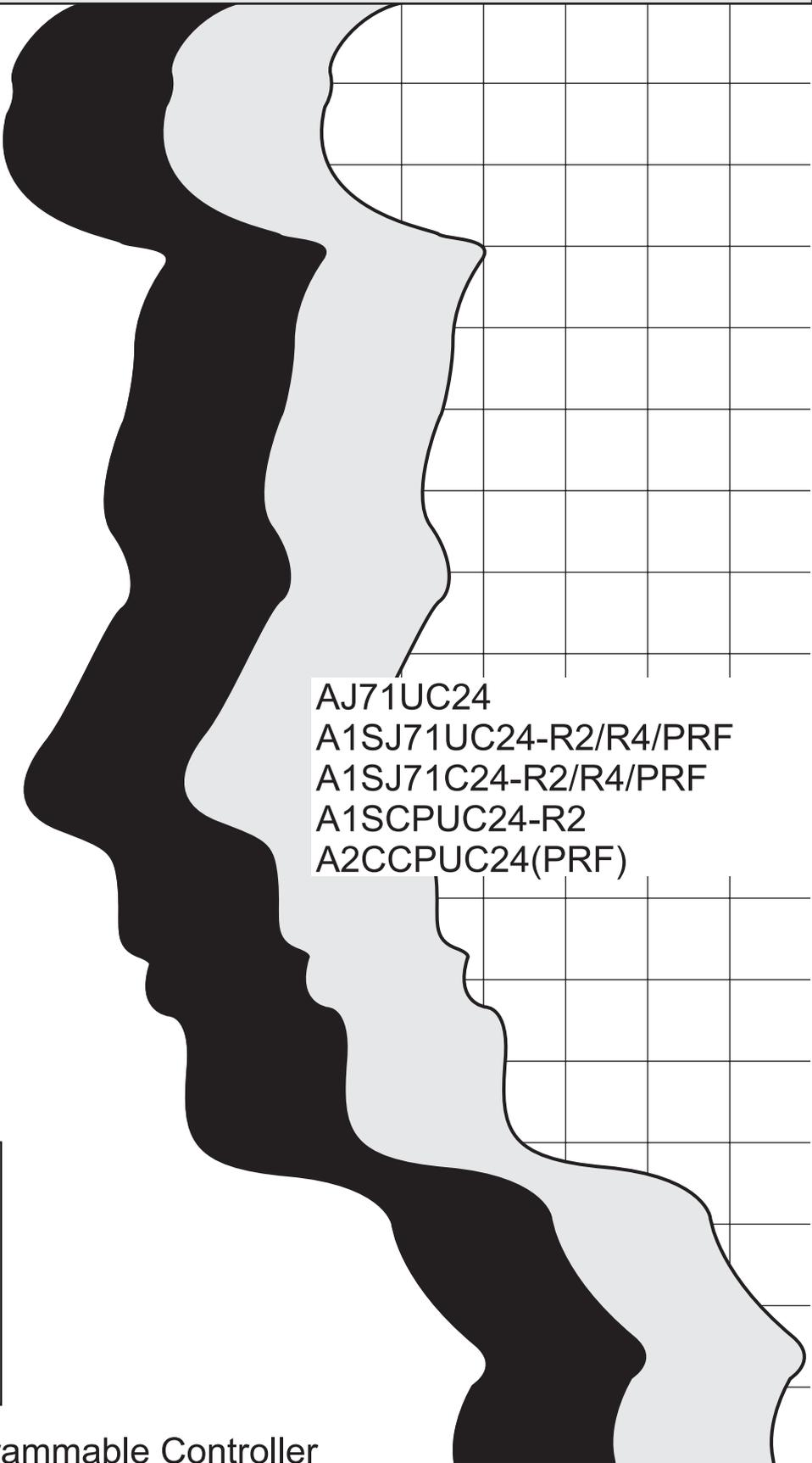


MITSUBISHI

Computer Link Module (Com. link func./Print. func.)

User's Manual



AJ71UC24
A1SJ71UC24-R2/R4/PRF
A1SJ71C24-R2/R4/PRF
A1SCPUC24-R2
A2CCPUC24(PRF)



Mitsubishi Programmable Controller

• SAFETY PRECAUTIONS •

(Read these precautions before using this product.)

Before using this product, please read this manual and the relevant manuals carefully and pay full attention to safety to handle the product correctly.

The precautions given in this manual are concerned with this product only.

For the safety precautions of the programmable controller system, refer to the user's manual for the CPU module used.

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

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

Under some circumstances, failure to observe the precautions given under "⚠ CAUTION" may lead to serious consequences.

Observe the precautions of both levels because they are important for personal and system safety.

Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

[Design Precautions]

WARNING

- When controlling a programmable controller by connecting a personal computer or other similar control device to a special function module for the purpose of changing the data, changing the program, or changing the operation status (Remote RUN/STOP), an interlock circuit must be configured in the sequence program so that the entire system will always operate safely. Especially, when a remote programmable controller is controlled by an external device, immediate action cannot be taken if a problem occurs in the programmable controller due to a communication failure.
To prevent this, configure an interlock circuit in the sequence program, and determine corrective actions to be taken between the external device and CPU module in case of a communication failure.

[Design Precautions]

CAUTION

- Do not install the control lines or communication cables together with the main circuit lines or power cables. Keep a distance of 100mm (3.94 inches) or more between them.
Failure to do so may result in malfunction due to noise.
- After the CPU module is powered on or is reset, the time taken to enter the RUN status varies depending on the system configuration, parameter settings, and/or program size.
Design circuits so that the entire system will always operate safely, regardless of the time.

[Installation Precautions]

CAUTION

- Use the programmable controller in an environment that meets the general specifications in the user's manual for the CPU module used.
Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.
- Shut off the external power supply for the system in all phases before wiring or mounting the module.
Failure to do so may result in electric shock or damage to the product.
- Make sure that the module fixing projection located in the lower part of the module is properly engaged in the module fixing hole in the base unit before mounting the module. (To fix an AnS series module to the base unit, tighten the screws within the specified torque range).
Incorrect mounting may cause malfunction, failure or drop of the module.
- Tighten the screw within the specified torque range.
Undertightening can cause drop of the screw, short circuit or malfunction.
Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- Do not directly touch any conductive parts and electronic components of the module.
Doing so can cause malfunction or failure of the module.

[Wiring Precautions]

CAUTION

- Use applicable solderless terminals and tighten them within the specified torque range.
If any spade solderless terminal is used, it may be disconnected when the terminal screw comes loose, resulting in failure.
- Place the cables in a duct or clamp them.
If not, dangling cable may swing or inadvertently be pulled, resulting in damage to the module or cables or malfunction due to poor contact.
- When connecting wire to a connector, use the specified tool to connect it by crimping, pressure welding, or soldering correctly. Plug the connector into the module securely.
- Check the interface type and correctly connect the cable.
Incorrect wiring (connecting the cable to an incorrect interface) may cause failure of the module and external device.
- Do not connect an external device that requires power supply from the computer link module to the RS-422 interface of the computer link module.
This could cause failure of the module or the external device.
- Tighten the terminal screw within the specified torque range.
Undertightening the terminal screws can cause short circuit or malfunction.
Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- When disconnecting the cable from the module, do not pull the cable by the cable part.
For the cable with connector, hold the connector part of the cable.
For a cable without a connector, loosen the screws that hold the cable onto the module then remove the cable.
Failure to do so may result in damage to the module or cable or malfunction due to poor contact.
- Prevent foreign matter such as dust or wire chips from entering the module.
Such foreign matter can cause a fire, failure, or malfunction.

[Startup and Maintenance Precautions]

WARNING

- Do not touch any terminal while power is on.
Failure to do so may cause malfunction.
- Shut off the external power supply (all phases) used in the system before cleaning the module or retightening the screws.
Failure to do so may cause the module to fail or malfunction.
Undertightening can cause drop of the screw, short circuit or malfunction.
Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.

[Startup and Maintenance Precautions]

CAUTION

- Do not disassemble or modify the modules.
Doing so may cause failure, malfunction, injury, or a fire.
- Shut off the external power supply (all phases) used in the system before mounting or removing the module.
Failure to do so may cause the module to fail or malfunction.
- Before handling the module, touch a grounded metal object to discharge the static electricity from the human body.
Failure to do so may cause the module to fail or malfunction.

[Operating Precautions]

WARNING

- Do not write data in the "system area" in the buffer memory of a special function module.
Among the signals output from the programmable controller CPU to a special function module, do not output the "use prohibited" signals.
Doing so may cause malfunction of the programmable controller system.

CAUTION

- When controlling a programmable controller by connecting a personal computer or other similar control device to a special function module for the purpose of changing the data, changing a program, or changing the operation status (Remote RUN/STOP), read this manual carefully and start the intended control only after ensuring that it can be performed safely.
Errors in changing the data, changing the program, or controlling the status will cause system malfunction, and machine damage or accidents.
- When using the contents of buffer memory by registering them to the EEPROM in a module, do not switch off the power of the station where the module is mounted, or reset the programmable controller CPU.
If the power is switched off at the station where the module is mounted or the programmable controller CPU is reset, the contents of the data in the EEPROM will become indefinite, requiring the data to be registered to the EEPROM again. The module may also fail or malfunction.

[Disposal Precautions]

CAUTION

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

• CONDITIONS OF USE FOR THE PRODUCT •

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

MITSUBISHI SHALL HAVE NO RESPONSIBILITY OR LIABILITY (INCLUDING, BUT NOT LIMITED TO ANY AND ALL RESPONSIBILITY OR LIABILITY BASED ON CONTRACT, WARRANTY, TORT, PRODUCT LIABILITY) FOR ANY INJURY OR DEATH TO PERSONS OR LOSS OR DAMAGE TO PROPERTY CAUSED BY the PRODUCT THAT ARE OPERATED OR USED IN APPLICATION NOT INTENDED OR EXCLUDED BY INSTRUCTIONS, PRECAUTIONS, OR WARNING CONTAINED IN MITSUBISHI'S USER, INSTRUCTION AND/OR SAFETY MANUALS, TECHNICAL BULLETINS AND GUIDELINES FOR the PRODUCT.

("Prohibited Application")

Prohibited Applications include, but not limited to, the use of the PRODUCT in;

- Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.
- Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.
- Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.

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

REVISIONS

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

Print Date	*Manual Number	Revision
Sep., 1994	SH (NA)-3511-A	First edition
Feb., 1995	SH (NA)-3511-B	<p>Correction</p> <p>Front cover(applicable module model names added), Sections 3.2.1(Page 3-7, 3-9 position of *3 changed), 3.10(Table 3.13), 6.2.1(4) (How to clear received data), 7.2.6 (2) (k)</p> <p>Addition</p> <p>Sections 6.2.1 (4) REMARK, 6.2.5 (7)</p>
Feb., 1995	SH (NA)-3511-C	<p>Correction</p> <p>Sections 5.5 (4) (b), APPENDIX 4.2 (1)</p>
Feb., 1995	SH (NA)-3511-D	<p>Correction</p> <p>Front cover(applicable module model names added), Section 1.4.1, Chapter 2, Sections 3.9, 5.12.3, 6.4.2, 15.4</p> <p>Addition</p> <p>Related Manuals, Sections 1.3.1, 1.4.2, 3.7.1, 3.10, 4.1.2, 4.2.1, 4.2.2, 4.3, 4.7, 6.2.1, 6.2.4, Chapter 14, Sections 15.2, 16.2, 16.3, 16.6, 16.7.2, 17.8, 18.3.2, 18.3.3, 18.3.4</p>
Mar., 1996	SH (NA)-3511-E	<p>Correction</p> <p>Sections 2.7 (2), 4.6.2 (1)</p>
Jan., 1998	SH (NA)-3511-F	<p>Correction</p> <p>SAFETY PRECAUTIONS, CONTENTS (APPENDIX), Sections 1.4.2 (2), 2.7, 3.1 (Table 3.1), 3.2.1 (Table 3.2, *1), (2) POINT, 5.7.1 (1)-(a), (2)-(b) POINT, 6.4.2 (2) POINT, 7.2.7 (5), 7.4.2, APPENDIX 6 (Section numbers changed due to addition of APPENDIX 5)</p> <p>Addition</p> <p>Sections 2.7 (3), 5.2.4 (9), APPENDIX 5</p>
May., 1998	SH (NA)-3511-G	<p>Correction</p> <p>SAFETY PRECAUTIONS, Sections 1.4.2, 2.7, 3.2.1, 3.7.1 (3), 3.9, 3.10, 4.6.1, 4.7, 5.7.1, 5.10 (3), 6.2.1 (4), 6.2.4, 7.6.2, 8.3.1, 8.3.2, 12.4.2, 12.5.2, 17.8 (5), APPENDIX 3, 6.1.1 (1)</p> <p>Addition</p> <p>SAFETY PRECAUTIONS, Sections 1.3.1, 4.6.2, 4.6.3, 5.11.3, 5.12.5 (1) 17.2.4, APPENDIX 3, 5, 6.1.3, 7</p> <p>Deletion</p> <p>Sections 4.6.3, APPENDIX 3</p>

Print Date	*Manual Number	Revision
Jan., 1999	SH (NA)-3511-I	<p>Correction</p> <p>CONTENTS (APPENDIX 7 changed to APPENDIX 8), Sections 2.7 (3), 3.1, 3.8.1 (2) (Figure), 3.8.3 (Figure), 4.2.1 (Table), 4.2.2 (d), 4.6.3 (2) (Wiring Diagram), APPENDIX 5 (3), APPENDIX 8 (Section)</p> <p>Addition</p> <p>CONTENTS (APPENDIX 7), Sections 1.1.1 (2) POINT, 3.2.1 (1) *5°, 3.10 (2) POINT, 13.4.1 (Remark), APPENDIX 7</p>
Jan., 2000	SH (NA)-3511-J	<p>Correction</p> <p>SAFETY PRECAUTIONS, Sections 2.6.2, 2.7 (1), 3.2.1, 3.8.3 (1) 2) (4), 4.6.3 (1) (e), 5.2.4 (2), 5.14.3 (3), 7.2.7 (3), APPENDIX 3, 5</p> <p>Addition</p> <p>Sections 4.6.3 (1) (g), 5.2.4 (10)</p>
Jan., 2001	SH (NA)-3511-K	<p>Correction</p> <p>Sections 1.1.1 (2) POINT, 2.7 (1) (3), 3.2.1 (2), 3.6, 4.2.1, 4.5.1 (Step 3), 5.2.3 (2) *1, 5.5, 12.1, 12.2.1 (2), APPENDIX 3 (2), APPENDIX 7</p> <p>Addition</p> <p>Sections 5.5 (4) (b) 2), APPENDIX 3 (2) *3</p>
Dec., 2003	SH (NA)-3511-L	<p>Correction</p> <p>SAFETY PRECAUTIONS, Sections 1.1.1, 1.1.2, 3.1, 5.7.1, 5.11.3, 6.2.1, 12.3, 12.4.1, 16.7.2, 18.1, APPENDIX 7, 7.1, 7.2</p> <p>Addition</p> <p>Conformation to the EMC Directive and Low Voltage Instruction</p>
Feb., 2009	SH (NA)-3511-M	<p>Correction</p> <p>SAFETY PRECAUTIONS, Chapter 1, Sections 3.8.2, 3.8.3 (4), 4.2.2 (2) (3), 8.3.2, 9.2.1, APPENDIX 7.1 (3) to (5), 8 (3)</p> <p>Addition</p> <p>Sections 4.2.2 (5) 8)</p>
Mar., 2012	SH (NA)-3511-N	<p>Correction</p> <p>SAFETY PRECAUTIONS, COMPLIANCE WITH EMC AND LOW VOLTAGE DIRECTIVES, Chapter 3, Section 3.2.1 (1), 3.7.1, 3.7.2, 3.8.2, 3.9 (1), 4.6.1, 4.8.1, 5.14.3 "PLC" was changed to "programmable controller".</p> <p>Addition</p> <p>APPENDIX 9</p>

INTRODUCTION

Thank you for choosing the Mitsubishi MELSEC-A Series of General Purpose Programmable Controllers.

Please read this manual carefully so that the equipment is used to its optimum.

A copy of this manual should be forwarded to the end User.

CONTENTS

COMMON

1. GENERAL DESCRIPTION

This section gives the general description of each link function of computer link module.

COMPUTER LINK FUNCTION

2. SYSTEM CONFIGURATION AND AVAILABLE FUNCTIONS

This section gives available computer link functions of every system configuration composed of external devices and PC CPU.

3. SPECIFICATIONS

This section gives the functions of computer link module, specifications of interface, a list of input signal for PC CPU, and a list of buffer memory.

4. SETTINGS AND PROCEDURES BEFORE OPERATION

This section gives the procedures of starting up the computer link module through starting the computer link.

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

This section gives the communications with a computer in the dedicated protocol.

6. COMMUNICATIONS WITH EXTERNAL DEVICES IN THE NO-PROTOCOL MODE

This section gives the communications with external devices in the no-protocol mode.

7. COMMUNICATIONS WITH A COMPUTER IN THE BIDIRECTIONAL MODE

This section gives the communications with a computer in the bidirectional mode.

8. WHEN READING SIGNAL/SETTING INFORMATION IN THE COMPUTER LINK

This section gives how to read RS-232C signal status and the switch setting status of the module and how to turn off ERROR LEDs during operation of computer link.

9. WHEN COMMUNICATING DATA AFTER CHANGING TO DC1 TO DC4 CONTROL METHOD

This section gives the transmission control with external devices using the control signal (DTR/DSR) or DC code.

10. WHEN COMMUNICATING DATA AFTER CHANGING TO HALF-DUPLEX TRANSMISSIONS

This section gives the half-duplex transmissions with external devices via RS-232C interface.

11. WHEN COMMUNICATING DATA WITH M:N RATIO OF COMPUTER TO PC CPU FOR CONNECTION

This section gives the computer link that connects multiple computers and computer link module.

12. WHEN CHANGING OVER MODE DURING OPERATION OF COMPUTER LINK

This section gives how to change over the mode of computer link module and restart the computer link during operation of computer link.

13. TROUBLESHOOTING OF COMPUTER LINK FUNCTIONS

This section gives how to take corrective actions against problems occurred concerning the computer link function.

PRINTER FUNCTION

14. SYSTEM CONFIGURATION AND AVAILABLE DEVICES

This section gives available printer functions for every system configuration.

15. SPECIFICATIONS

This section gives the functions of printer, specifications of interface, a list of input/output signal for PC CPU, and a list of buffer memory.

16. SETTING AND PROCEDURES BEFORE OPERATION

This section gives the procedures of starting up the computer link module through starting message output (printing).

17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

This section gives how to print messages using the printer functions.

18. TROUBLESHOOTING OF PRINTER FUNCTIONS

This section gives how to take corrective actions against problems occurred using the printer functions.

APPENDICES

These appendices describe the Table of ASCII code, intervention time into PC CPU in the dedicated protocol, and program examples for computer link.

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About Manuals

There are the following manuals related to the computer link/multidrop link modules.

Related Manuals

Name of Manual	Manual No. (Model Code)
Computer Link Module Guide Book This guide book describes basically how to communicate data with external devices (computer, etc.) for each mode of computer link. This guide book is common to all computer link module (optional).	SH-3510
Computer Link/Multidrop Link Module Type AJ71UC24 User's Manual (Hardware) This manual describes the system configuration, module specifications, nomenclature and setting, and module external dimensions diagram (contained in the module package).	IB-66559
Computer Link/Multidrop Link Module Type A1SJ71C24-R4 User's Manual (Hardware) This manual describes the system configuration, module specifications, nomenclature and setting, and module external dimensions diagram (contained in the module package).	IB-66364
Computer Link Module Type A1SJ71C24-R2, Computer Link/Printer Function Module Type A1SJ71C24-PRF User's Manual (Hardware) This manual describes the system configuration, module specifications, nomenclature and setting, and module external dimensions diagram (contained in the module package).	IB-66340
A2CCPU(P21/R21), A2CCPU-DC24V, A2CCPUC24(-PRF), A2CJCPU User's Manual This manual describes the system configuration, specifications and connection of module, PC CPU, power supply module, and troubleshooting.	IB-66545
A2CCPU(P21/R21), A2CCPU-DC24V, A2CCPUC24(-PRF), A2CJCPU User's Manual (Hardware) This manual describes the handling, nomenclature and setting, specifications and connection of I/O module for use with A2CCPU, error code (contained in the module package).	IB-66475
A1SCPU, A1SCPUC24-R2, A2SCPU User's Manual (Detailed Information) This manual describes the system configuration, specifications and connection of module, PC CPU, power supply module, and error code (optional).	IB-66320
A1S/A1SC24-R2/A2S/A2ASCPU(S1) User's Manual (Hardware) This manual describes the handling, nomenclature and setting, specifications and connection of I/O modules for use with AnSCPU, error code (contained in the module package).	IB-66468

COMPLIANCE WITH EMC AND LOW VOLTAGE DIRECTIVES

(1) Method of ensuring compliance

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

- User's manual for the CPU module used
- User's manual (hardware) for the CPU module or base unit used

(2) Additional measures

- For the AJ71UC24, A1SJ71UC24-R2/R4/PRF, and A1SJ71C24-R2/R4/PRF
No additional measures are necessary for the compliance of this product with EMC and Low Voltage Directives.
- For the A1SCPUC24-R2 and A2CCPUC24(PRF)
To ensure that this product maintains EMC and Low Voltage Directives, please refer to one of the manuals listed under (1).

COMMON

This part describes the general description of computer link and printer function, abbreviation and general name of modules used for configuration and description of this manual.

1. GENERAL DESCRIPTION

This User's Manual describes the functions of computer link and printer at an appropriate section, among the functions of computer link, printer, and multidrop link of each module as indicated in Section 1.3.

When applying program examples introduced in this manual into the actual system, fully examine the applicability and confirm that it will not cause system control problems.

1.1 General Description of Computer Link Functions

The computer link functions have roughly classified three functions that can be used for the following operations:

- 1) Monitoring operation of PC CPU
- 2) Data collection handled by PC CPU
- 3) Upload/download of sequence program

General description of each function is explained below.

When the computer link module has two interfaces of RS-422/485 and RS-232C, it is possible to use two functions among the functions indicated below (by setting and using either function for each interface):

- (1) Dedicated protocol + no-protocol mode
- (2) Dedicated protocol + bidirectional mode
- (3) Dedicated protocol + printer function (RS-232C only)

POINT

<p>When the computer link function is used for the first time, read the guide book (optional) below to understand a basic computer link function. Computer Link Module Guide Book SH-3510</p>

1.1.1 General description and features of computer link in the dedicated protocol

(1) General description

Sending the command statements for computer link from the computer to the computer link module in the prescribed communicating procedure allows PC CPU devices and sequence program to be read/written.

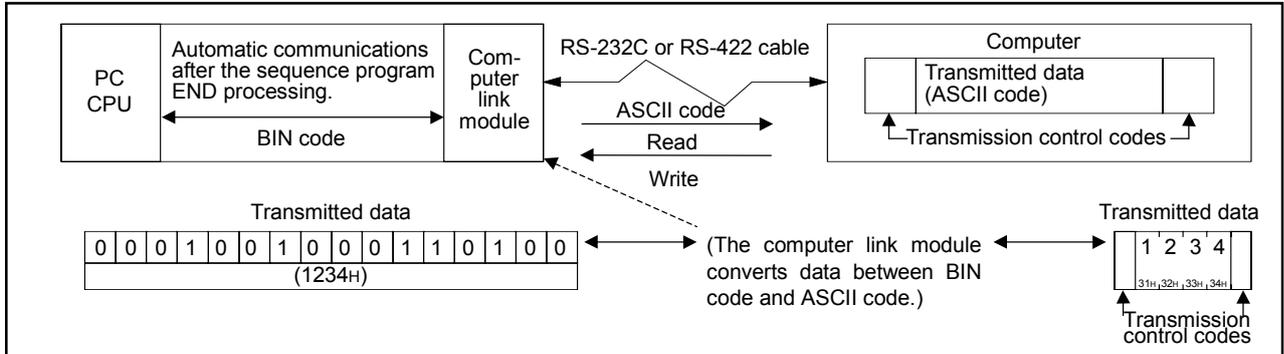


Fig. 1.1 Data Transmission with the Dedicated Protocol

(2) Features

(a) Communications at the request of the computer

Data communications is always initiated by the computer.

Designated data is transmitted according to the request command transmitted from a computer to a computer link module.

It is not necessary to create and change special sequence programs in order to use a computer link module.

1) Read and write possible to and from all PC CPU devices

Data can be read from all PC CPU devices. This permits observation and monitoring of all operations, as well as the collection and analysis of data. Data can be written to all PC CPU devices. This permits production control and production directives to be carried out.

2) A computer link module can upload and download programs from a PC CPU.

PC CPU programs (main sequence and subsequence control programs and microcomputer programs), parameter data and comment data are read by the computer and stored. When required they can be written to the PC CPU to change the program.

3) Remote RUN and STOP control of the PC CPU

The PC CPU can be remote-controlled by means of RUN and STOP instructions from the computer.

4) When multiple computers and PC CPU modules are connected to a link with a computer link module, the input (X) signals of the CPUs in the link can be turned ON/OFF using any computer in the link. This function can immediately stop or simultaneously start all CPUs in the link.

(This function is called the global function of the computer link module.)

(b) Communications at the request of the PC CPU

The PC CPU transmits the data send request.

When the emergency data needs to be transmitted from a PC CPU to a computer, the PC CPU transmits a send request to the computer link module to make the computer execute an interrupt processing.

(This is the on-demand function of the computer link module.)

* : The dedicated protocols consist of four different protocols.

By selecting either format according to the specifications of computer to be connected, data communication can be performed.

The term “dedicated protocols” used in this manual is the collective term for these protocols.

POINT

By using the Mitsubishi communication support tool for supporting communication between the MELSEC-A Series and QnA Series Programmable Logic Controller (hereinafter PC) and personal computer, the communication program on the personal computer side connected with Ethernet or a computer link, etc., can be simplified.

- MX Component (Basic Communication Support ActiveX Controls, SW0D5C-ACT-E or later usable)

The outline of the basic communication support tool and an example of its use are described in Appendix 7.

Refer to it as necessary.

1.1.2 General description and features of computer link in the no-protocol mode

(1) General description

Arbitrary data can be communicated between external devices and PC CPU via computer link module in the user own communicating procedure.

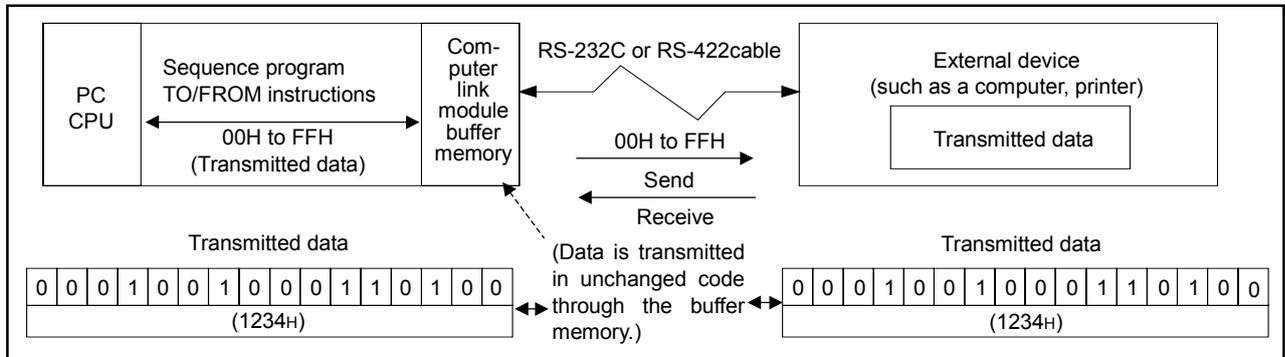


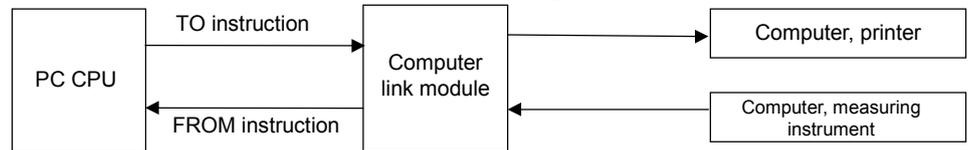
Fig. 1.2. Data Transmission in the No-Protocol Mode

(2) Features

(a) Data communications can be initiated by a PC CPU

Data communications can be initiated by an external device or any PC CPU. Data can be transmitted from a PC CPU to an external device by using the TO instruction in the sequence program to write data to the buffer memory.

Data transmitted from an external device can be read by a PC CPU using the FROM instruction in the sequence program.



(b) Receiving data length can be set to variable or fixed:

The length of the data transmitted from an external device and received by the PC CPU can be set to variable or fixed.

1) Receiving variable-length data:

Data receive stops when the receive completed code set by the user is received.

2) Receiving fixed-length data:

Data receive stops when the fixed length of data set by the user is received.

Both the receive completed code and the receive-completion data length can be freely set by the user.

(c) Variable communications memory area

The user memory area can be allocated to suit the purpose and application of the data transmission.

(c) Variable communications memory area

The user memory area can be allocated to suit the purpose and application of the data transmission.

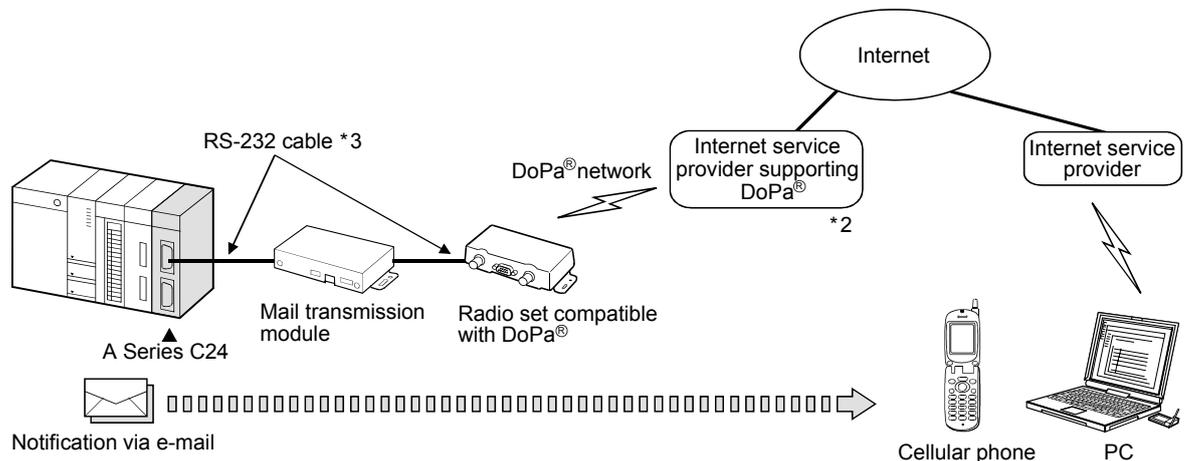
(d) Monitoring the programmable controller CPU

Using the mail transmission module, e-mail notification can be made via the DoPa[®] network through communication according to the TTY protocol. Refer to the manual of the FX-232DOPA mail transmission module for details.

[Device to be used]

Mail transmission module : MELSEC-F Series FX-232DOPA mail transmission module

Radio set compatible with DoPa[®] : Dopa Mobile Ark 9601D *1 (Introduced product)



*1: Purchase DoPa Mobile Ark 9601D from NTT DoCoMo, Inc.

Contact NTT DoCoMo group for the purchasing method.

*2: E-mail service contract is necessary with an Internet service provider supporting the DoPa[®] network, to transmit e-mail.

You can use the service at a provider such as Mopera[®] of NTT DoCoMo, Inc.

*3: To use FX-232DOPA-CAB2 for the connection between 3A Series C24 and FX-232DOPA, a male/female (9-pin female to 9-pin male) converter is necessary.

1.1.3 General description and features of computer link in the bidirectional mode

(1) General description

Arbitrary data can be communicated between the computer and the PC CPU via computer link module in the prescribed communicating procedure.

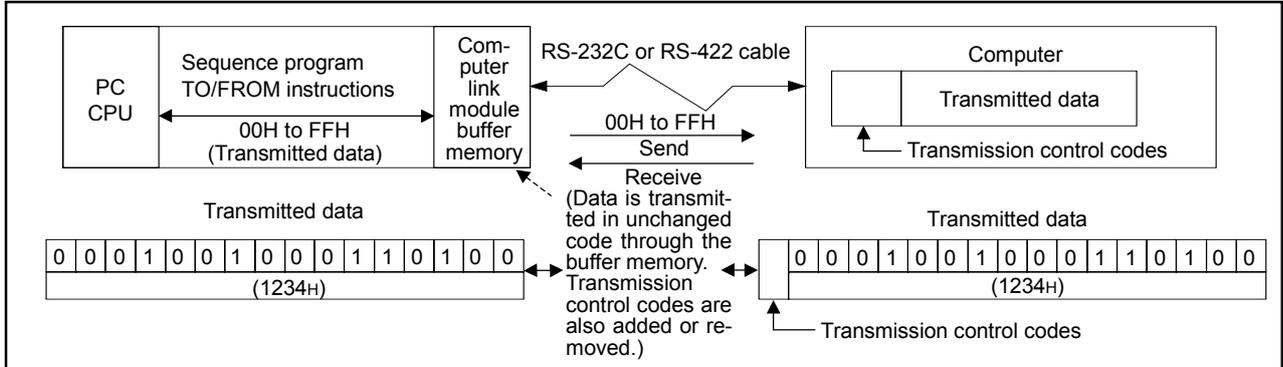


Fig. 1.3 Data Transmission in the Bidirectional Mode

(2) Features

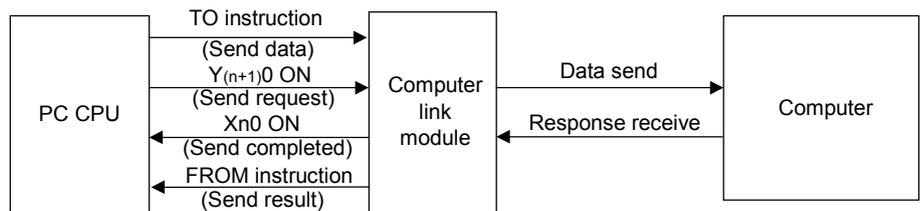
(a) Data communications can be initiated by a PC CPU

Data communications can be initiated by a computer or any PC CPU. Data can be transmitted from a PC CPU to an external device by using the TO instruction in the sequence program to write data to the buffer memory.

The data send operation is completed when the response message to the sent (received) data is received from the computer. The result of the send (normal end/error) is stored in the buffer memory and can be read out.

The data received from the computer can be read with the FROM instruction of the sequence program.

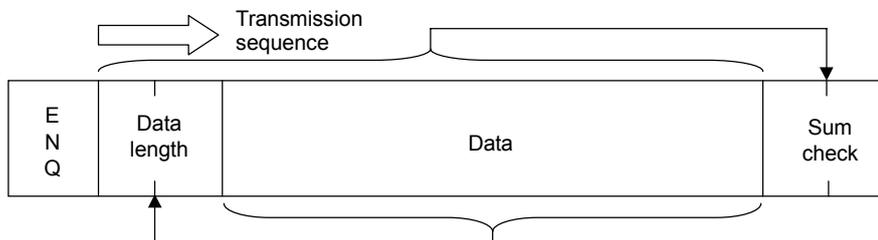
(When data is transmitted by a computer link module)



(b) Data length is set within the send message

Data length is set within the send message when the data is transmitted to a device.

The receiving side recognizes the data length by the send message.



The send data of the computer link module is processed as follows.

- ENQ.....Added to the head.
- Data length...The send data length set in the buffer memory is transmitted.
- Data.....The send data stored in the buffer memory is transmitted.
- Sum check....Computed with the sum checking range in a message.

The data transmitted by a computer and received by a computer link module is processed as follows.

- ENQ.....Checked and removed from the received data.
- Data length...Stored in the buffer memory as the received data length.
- Data.....Stored in the buffer memory as the received data.
- Sum check...Checked and removed from the received data.

(c) Variable communications memory area

The user memory area can be allocated to suit the purposes and applications of the data transmission.

1. GENERAL DESCRIPTION

Function	Computer link function						
	A1SJ71UC24		A1SJ71C24		A1SCPU G24+R2	A2CCPU G24	A2CCPU G24+PRF
Applicable module	AJ71UC24	-R2	-R4	-PRF	-R2	-R4	-PRF
Remarks			0	0			0

1.2 General Description of Printer Function

(1) General description

By connecting the printer to the RS-232C interface of the computer link module, it is possible to print the messages (fixed messages) previously registered to the computer link module and any messages (free messages) registered when necessary.

General description of printer function is explained below.

When the computer link module has two interfaces of RS-422/485 and RS-232C, it is possible to use it together with the dedicated protocol for the computer link function as shown in Section 1.1.1.

- RS-422/485 interface.....Dedicated protocol
- RS-232C interface.....Printer function

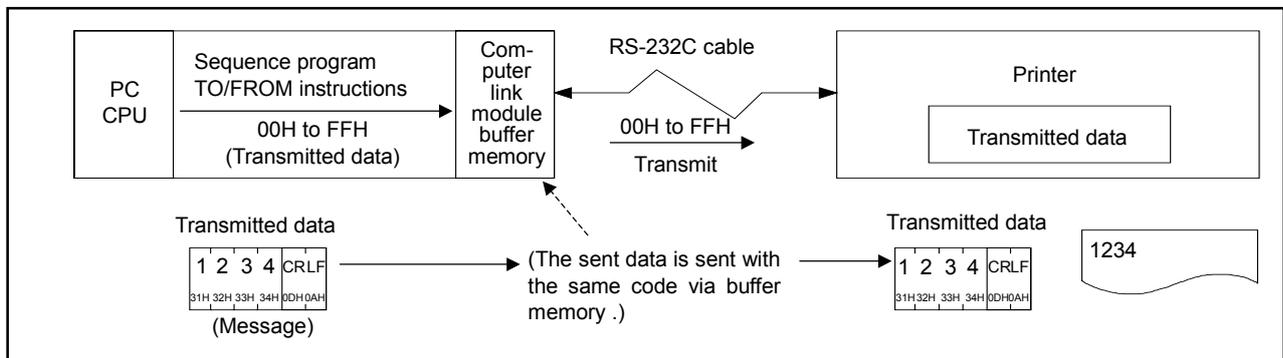


Fig. 1.4 Transmitted Data of Printer Function

(2) Features

(a) Registering and reading a message

- 1) When the computer is connected via RS-422 interface, fixed messages up to 80 characters per message can be registered and read by using a computer with a CI (for registering) command (dedicated protocol) and a CJ (for reading) command.
- 2) Fixed/free messages up to 80 characters per message can be registered and read by using the PC CPU with a TO (for registering) instruction and a FROM (for reading) instruction.

(b) Number of messages

Free messages can be registered up to 31 messages, and fixed messages, up to 400 messages.

(c) Printer output

Free and fixed messages for requested quantity of data can be output to a printer by making an output request from the PC CPU.

(d) Test output

Registered fixed messages or ASCII codes (21H to 7EH) can be output to a printer.

1.3 General Description and Functions of Computer Link Module

1.3.1 General description and functions

This section describes appropriate computer link module type and description and function of each module.

Model	Description	Function		
		Computer Link Function	Printer Function	Multidrop Link Function
AJ71UC24	(1) Building block type module (2) Equipped with one channel of RS-232C and RS-422/485 interface, respectively	O	X	O
A1SJ71UC24-R2 A1SJ71C24-R2	(1) Small building block type module (2) Equipped with one channel of RS-232C interface	O	X	X
A1SJ71UC24-PRF A1SJ71C24-PRF	(1) Small building block type module (2) Equipped with one channel of RS-232C interface	O	O	X
A1SJ71UC24-R4 A1SJ71C24-R4	(1) Small building block type module (2) Equipped with one channel of RS-422/485 interface	O	X	O
A1SCPUC24-R2	(1) Small PC CPU module (2) Equipped with one channel of RS-232C interface	O	X	X
A2CCPUC24	(1) Small PC CPU module (2) Equipped with one channel of RS-232C, RS-422/485 interface, respectively	O	X	X
A2CCPUC24-PRF	(1) Small PC CPU module (2) Equipped with one channel of RS-232C, RS-422/485 interface, respectively	O	O	X

O: With function X: Without function

REMARK

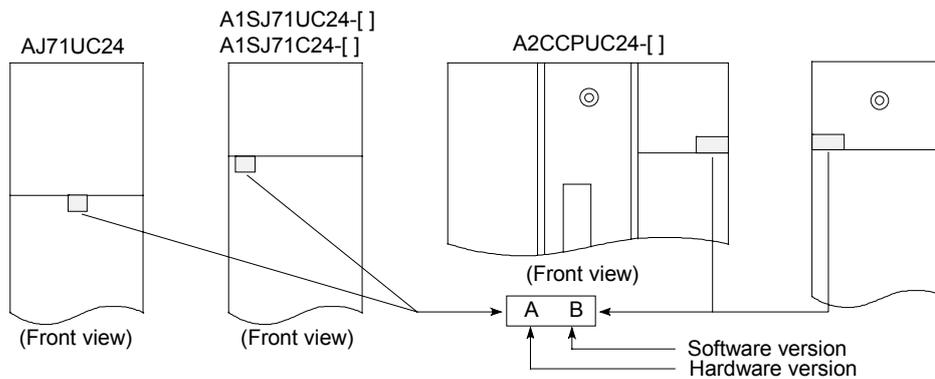
After unpacking the container, check to ensure that the following items are delivered with the product.

Items not indicated below should be arranged by the user separately.

Product Name	Items	Q'ty
AJ71UC24	Module	1
	Terminal resistor 330 Ω, 1/4W (orange/orange/brown/[])	2
	Terminal resistor 110 Ω, 1/2W (brown/brown/brown/[])	2
A1SJ71UC24-R2, A1SJ71C24-R2, A1SJ71UC24-PRF, A1SJ71C24-PRF, A1SCPUC24-R2,	Module	1
	9-pin D-sub connector (male), screw tightening type	1
A1SJ71UC24-R4, A1SJ71C24-R4	Module	1
	Terminal resistor 330 Ω, 1/4W (orange/orange/brown/[])	2
	Terminal resistor 110 Ω, 1/2W (brown/brown/brown/[])	2
A2CCPUC24, A2CCPUC24-PRF	Module	1
	9-pin D-sub connector (male), screw tightening type	1
	Battery (A6BAT)	1

1.3.2 How to confirm the version of computer link module

In this manual, a software version in question is shown at the upper right of an appropriate page to indicate the computer link module that has the restriction of contents and functions (For description of way of looking at, refer to Section 1.4.) If it is necessary to confirm the software version of appropriate computer link module, make sure of it by a seal at the following position.



1.4 Configuration of This Manual and Abbreviation

1.4.1 Configuration of this manual

In this manual, the functions of computer link and printer are described for the computer link module as shown in Section 1.3.

(1) Computer link function (Sections 2 to 13)

Data communication with external devices in the dedicated protocol, no-protocol mode, and bidirectional mode, is explained for all computer link module that have these functions.

(2) Printer function (Sections 14 to 18)

Message output (printing) onto the printer using the printer function is explained for all computer link module with printer function.

IMPORTANT	<p>(1) If restrictions apply to the contents or functions described on any page of this manual depending on the computer link module used, these restrictions are indicated in a table at the top right of the page.</p> <p>(a) Functions.....Denote to those functions (computer link function, printer function) that correspond to the contents described.</p> <p>(b) Applicable module.....Markings “O” and “Δ” are indicated to the computer link module that has the corresponding contents or can use those functions described.</p> <p style="margin-left: 40px;">O: Module that has the corresponding contents and/or can use those functions described.</p> <p style="margin-left: 40px;">Δ: Module for which restrictions apply to the contents and/or functions described.</p> <p>(Meaning of the Table located at the upper right in a page as shown on the following page)</p> <p>PC command denotes that the software version of the computer link module can be used from version-A, and PU command denotes that the software version of the computer link module can be used from Version-M or later, or -K or later.</p> <p>(2) In this manual, the drawing of computer link module is shown by a building block type.</p>
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(Example of Table as shown at the upper right in a page)

Function	Computer link function									
	AJ71UC24	A1SJ71UC24			A1SJ71C24			A1SFCPU	A2CCPU	A2CCPU
Applicable module	-R2	-R4	-PRF	-R2	-R4	-PRF	C24-R2	C24	C24-PRF	
Remarks	O	O	O	Δ	Δ	Δ	O	Δ	Δ	
	PC : (Ver A) PU : (Ver M)						PC : (Ver A) PU : (Ver M)			

(2) PC model code/model name reading

When model code and model name of PC in question that is linked with the computer is read using the PC and PU commands, its control procedure is explained using an example.

1.4.2 Abbreviation and general name used in this manual

(1) Abbreviation and general name of computer link module

This manual describes the computer link module using the abbreviation and general name as shown below.

Abbreviation/General Name	Contents of Abbreviation and General Term/Module
Computer link module	General term of all modules shown below
AJ71UC24	Abbreviation of computer link/multidrop link module type AJ71UC24
A1SJ71UC24-R2	Abbreviation of computer link module type A1SJ71UC24-R2
A1SJ71UC24-PRF	Abbreviation of computer link/printer function module type A1SJ71UC24-PRF
A1SJ71UC24-R4	Abbreviation of computer link/multidrop link module type A1SJ71UC24-R4
A1SJ71UC24-R2/R4/PRF	General term of A1SJ71UC24-R2, A1SJ71UC24-R4, and A1SJ71UC24-PRF
A1SJ71C24-R2	Abbreviation of computer link module type A1SJ71C24-R2
A1SJ71C24-PRF	Abbreviation of computer link/printer function module type A1SJ71C24-PRF
A1SJ71C24-R4	Abbreviation of computer link/multidrop link module type A1SJ71C24-R4
A1SJ71C24-R2/R4/PRF	General term of A1SJ71C24-R2, A1SJ71C24-R4, and A1SJ71C24-PRF
A1SJ71(U)C24-R2	General term of A1SJ71C24-R2, A1SJ71UC24-R2
A1SJ71(U)C24-R4	General term of A1SJ71C24-R4, A1SJ71UC24-R4
A1SJ71(U)C24-PRF	General term of A1SJ71C24-PRF, A1SJ71UC24-PRF
A1SCPUC24-R2	Abbreviation of PC CPU with computer link function type A1SCPUC24-R2
A2CCPUC24	Abbreviation of PC CPU with computer link function type A2CCPUC24
A2CCPUC24-PRF	Abbreviation of PC CPU with computer link/printer function type A2CCPUC24-PRF
A2CCPUC24(PRF)	General term of A2CCPUC24, A2CCPUC24-PRF
Other than A2CCPUC24(PRF)	General term of AJ71UC24, A1SJ71UC24-R2/R4/PRF, A1SJ71C24-R2/R4-PRF, A1SCPU24-R2

(2) General name of PC CPU

This manual describes the PC CPU of the computer link module using the abbreviation and general name shown below.

When it is necessary to clarify the model name of the PC CPU, a model name of PC CPU is described.

Abbreviation/General Name	Contents of Abbreviation and General Name/Module
ACPU	Generic term for the applicable CPU modules indicated in Section 2.7 (including PC CPU modules with MELSECNET data link function).
AnACPU	General name of A2ACPU, A2ACPU-S1, A3ACPU, A2ACPUP21/R21, A2ACPUP21/R21-S1, A3ACPUP21/R21 out of ACPUs.
AnUCPU	General name of A2UCPU, A2UCPU-S1, A3UCPU, A4UCPU, A2ASCPU, A2ASCPU-S1 out of ACPUs.
AnA/AnUCPU	General name of AnACPU and AnUCPU.
QnACPU	General name of Q2ACPU, Q2ACPU-S1, Q3ACPU, Q4ACPU, Q4ARCPU, Q2ASCPU, Q2ASCPU-S1, Q2ASHCPU, Q2ASHCPU-S1 out of ACPUs.
QLP21/QBR11	AJ71QLP21(S/G), AJ71QBR11, A1SJ71QLP21, A1SJ71QBR11
LP21/BR11	AJ71LP21(G), AJ71BR11, A1SJ71LP21, A1SJ71BR11
QLP25/QBR15	AJ72QLP25(G), AJ72QBR15, A1SJ72QLP25, A1SJ72QBR15
LP25/BR15	AJ72LP25(G), AJ72BR15
P25/R25	AJ72P25, AJ72R25, AJ72T25B, A1SJ72T25B

(3) Other abbreviation and general name

This manual describes the computer link and printer functions using the abbreviation and general name shown below.

Abbreviation/General Name	Contents of Abbreviation and General Name
Multidrop link module	General name of all computer links with multidrop functions described in (1)/multidrop link module. (Note that this name has a different meaning from the following multidrop connection.)
Multidrop connection (1:n, m:n connection)	Mnemonic-name of connection when connecting multiple external devices using the computer link module RS-422 interface to carry out data communication with external devices using the computer link function.
Computer link, computer link function	General name of dedicated protocol, no-protocol, bidirectional mode functions that the computer link module has.
Dedicated protocol	Dedicated protocol function of computer link function. General name of formats 1 to 4 of dedicated protocol.
Printer function	Printer function that the computer link module has.
External devices	General name of devices such as computer, printer, other computer link module that connect to the computer link module to carry out data communication with computer link function.
RS-422 (Interface)	General name of RS-422 and RS-485 interface. (Especially, RS-422/485 is shown if name of RS-485 interface must also be indicated, and RS-485 is shown if name of RS-485 interface only must be indicated.)
Network system	Abbreviation of MELSECNET/10 network system
Data link system	Abbreviation of MELSECNET(II), MELSECNET/B data link system
ACPU common command	Command of dedicated protocol that can be used for all PC CPUs out of applicable CPU of the computer link module used.
AnA/AnUCPU common command	Command of dedicated protocol that can be used for AnACPU and AnUCPU out of applicable CPU of the computer link module used.
AnUCPU dedicated command	Command of dedicated protocol that can be used for AnUCPU out of applicable CPU of the computer link module used.

COMPUTER LINK FUNCTION

This part describes the system configuration, specifications, procedure, data communicating method and so forth related to data communication with external devices in the dedicated protocol, no-protocol and bidirectional mode.

2. SYSTEM CONFIGURATION AND AVAILABLE FUNCTIONS

Among the system configuration using the computer link module, there are a variety of ratio of external devices to computer link module (PC CPU) such as 1:1 to 1:32 stations and 2:1 to 2:32 stations.

This section gives the type of this system configuration and computer link function available for each system configuration separately by the system configuration.

Since those settings of mode setting switch (refer to Section 4.2.1) and main channel setting switch (refer to Section 4.2.2) of the computer link module have an influence on system configuration, the relation of these switch settings and computer link is described first.

(1) When either AJ71UC24, A2CCPUC24, or A2CCPUC24-PRF is used:

(a) When the mode setting switch is set to [1] to [8];

- Two interfaces become a different mode.
- The computer can be linked to the external devices connected with each interface in the dedicated protocol, no-protocol or bidirectional mode.

Mode Setting		Dedicated Protocol	No-Protocol/ Bidirectional Mode	Remarks
1 to 4	RS-232C side	O	X	Computer link can be carried out by either mode setting. Main channel setting switch is ignored.
	RS-422 side	X	O	
5 to 8	RS-232C side	X	O	
	RS-422 side	O	X	

(b) When the mode setting switch is set to [9] to [D];

- Two interfaces become the same mode.
- In this case, the computer can be linked to the external devices connected with the interface that is set to the main channel of the computer link module in the dedicated protocol or no-protocol mode.

Mode Setting		Dedicated Protocol/ No-Protocol Mode	Bidirectional Mode	Remarks
9 to D	RS-232C side (Main channel)	O	X	The computer can be linked at the main channel.
	RS-422 side	X	X	
	RS-232C side	X	X	
	RS-422 side (Main channel)	O	X	

- The computer cannot be linked to the external devices connected with the interface that is not set to the main channel.

2. SYSTEM CONFIGURATION AND AVAILABLE FUNCTIONS

MELSEC-A

- (2) When either A1SJ71UC24-R2/R4/PRF, A1SJ71C24-R2/R4/PRF, or A1SCPU-C24-R2 is used:
- The mode setting switch can be set to [1] to [5] or [4] to [8].
 - The computer can be linked to the external devices connected with the computer link module in the dedicated protocol, no-protocol or bidirectional mode.

Mode Setting		Dedicated Protocol	No-Protocol/ Bidirectional Mode	Remarks
1 to 4	RS-232C side	○	×	Computer link can be carried out by either mode setting. There is no main channel setting switch.
5 to 8	RS-422 side			
5 to 8	RS-232C side	×	○	
1 to 4	RS-422 side			

POINT

For applicable system to use an appropriate computer link module described in this manual, refer to the User's Manual (Hardware) of the computer link module used.

2. SYSTEM CONFIGURATION AND AVAILABLE FUNCTIONS

2.1 1 : 1 Ratio of an External Device to a PC CPU

- (1) The system configuration for a 1 : 1 ratio of an external device (such as a computer) to a PC CPU is shown in Fig. 2.1 below.

(Mode: [] to []) in the figure indicates the range of setting set with the mode setting switch of a computer link module (refer to Section 4.2.1).

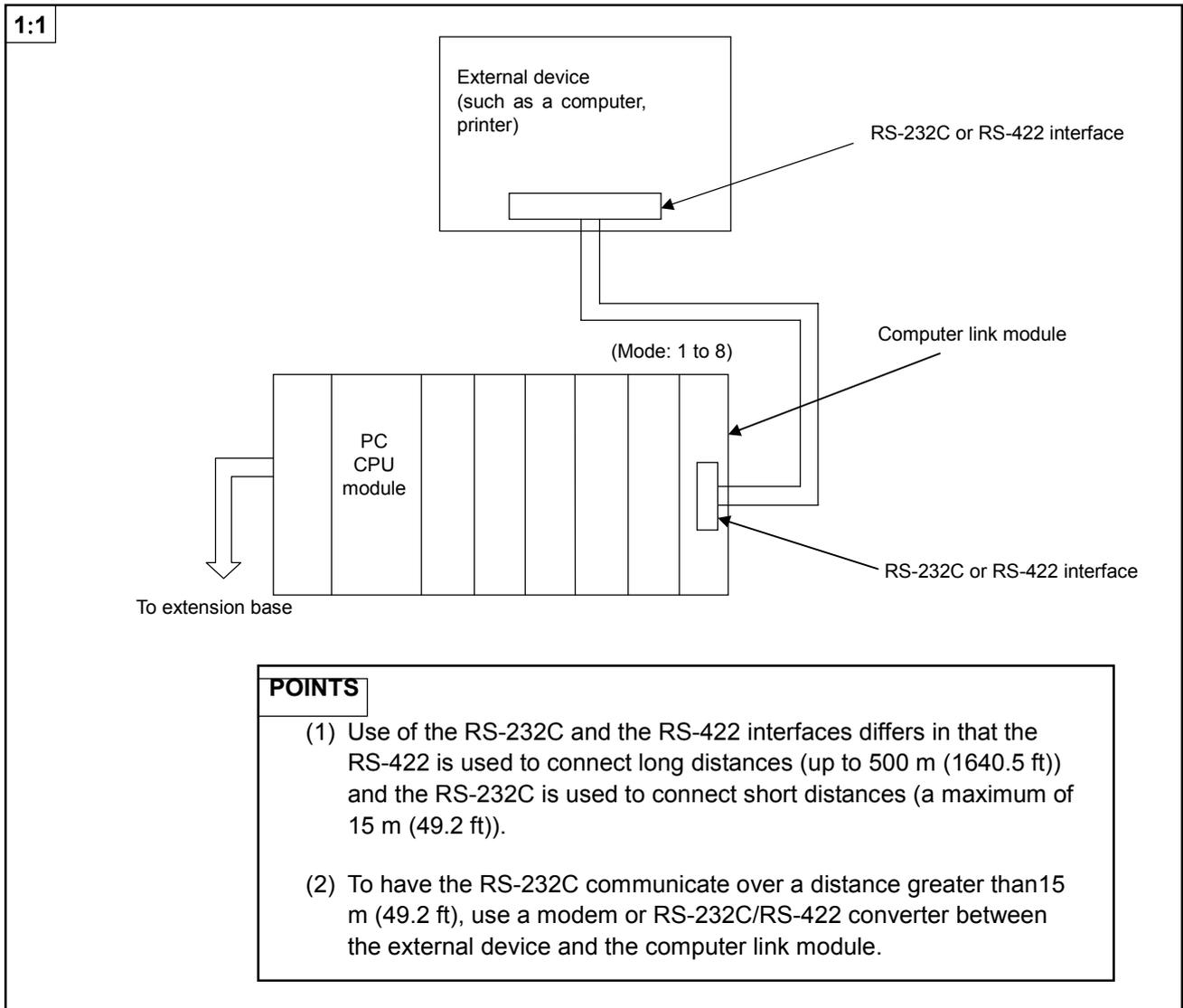


Fig. 2.1 System Configurations (I)

2. SYSTEM CONFIGURATION AND AVAILABLE FUNCTIONS

MELSEC-A

(2) The following tables list the functions available when an external device is linked with a PC CPU module to make a 1 : 1 configuration.

(a) The interface used to set dedicated protocols 1 to 4:

1) Functions available when using a computer

Available Functions		Interfaces for Dedicated Protocol		Remarks	
		RS-422	RS-232C		
Device memory	Read/write	○	○	Including extension devices	
	Test				
	Monitor				
Extension file register	Read/write	○	○	—	
	Test				
	Monitor				
Buffer memory computer link module of the self	Read/write	○	○		
Special function module's buffer memory	Read/write	○	○		
Sequence/microcomputer program	Read/write	○	○		
Comment	Read/write	○	○		Including extension comments
Parameter	Read/write	○	○		—
PC CPU	Remote RUN/STOP	○	○		
	CPU type read	○	○		
Global	Input signal (X) ON/OFF	○	○		
Loopback test	Transmission of received data	○	○		

2) Functions available when using a PC CPU

Available Functions		Interfaces for Dedicated Protocol		Remarks
		RS-422	RS-232C	
On-demand	Data transmission to computers	○	○	—

2. SYSTEM CONFIGURATION AND AVAILABLE FUNCTIONS

MELSEC-A

(b) Interfaces used to set the no-protocol mode

Functions available when using an external device and a PC CPU

Available Functions		Interfaces for No-protocol Mode		Remarks
		RS-422	RS-232C	
Send	PC CPU to external device	○	○	To computers and printers
Receive	External device to PC CPU	○	○	From computers

(c) Interfaces used to set the bidirectional mode

Functions available when using a computer and a PC CPU

Available Functions		Interfaces for Bidirectional Mode		Remarks
		RS-422	RS-232C	
Send	PC CPU to computer	○	○	To computers
Receive	Computer to PC CPU	○	○	From computers

2. SYSTEM CONFIGURATION AND AVAILABLE FUNCTIONS

Function	Computer link function							
	AJ71UC24	A1S71UC24		A1S71C24		A1SCPU G24-R2	A2CCPU C24	A2CCPU G24-PRF
Applicable module		-R2	-R4	-PRF	-R2	-R4	-PRF	
Remarks	○		○		○		○	○

MELSEC-A

2.2 1 : n Ratio of an External Device to PC CPUs

- (1) The system configurations for a 1 : n (up to 32 stations) ratio of an external device to PC CPUs are shown in Fig. 2.2 below.

(Mode: [] to []) in the figure indicates the range of setting set with the mode setting switch of a computer link module (refer to Section 4.2.1).

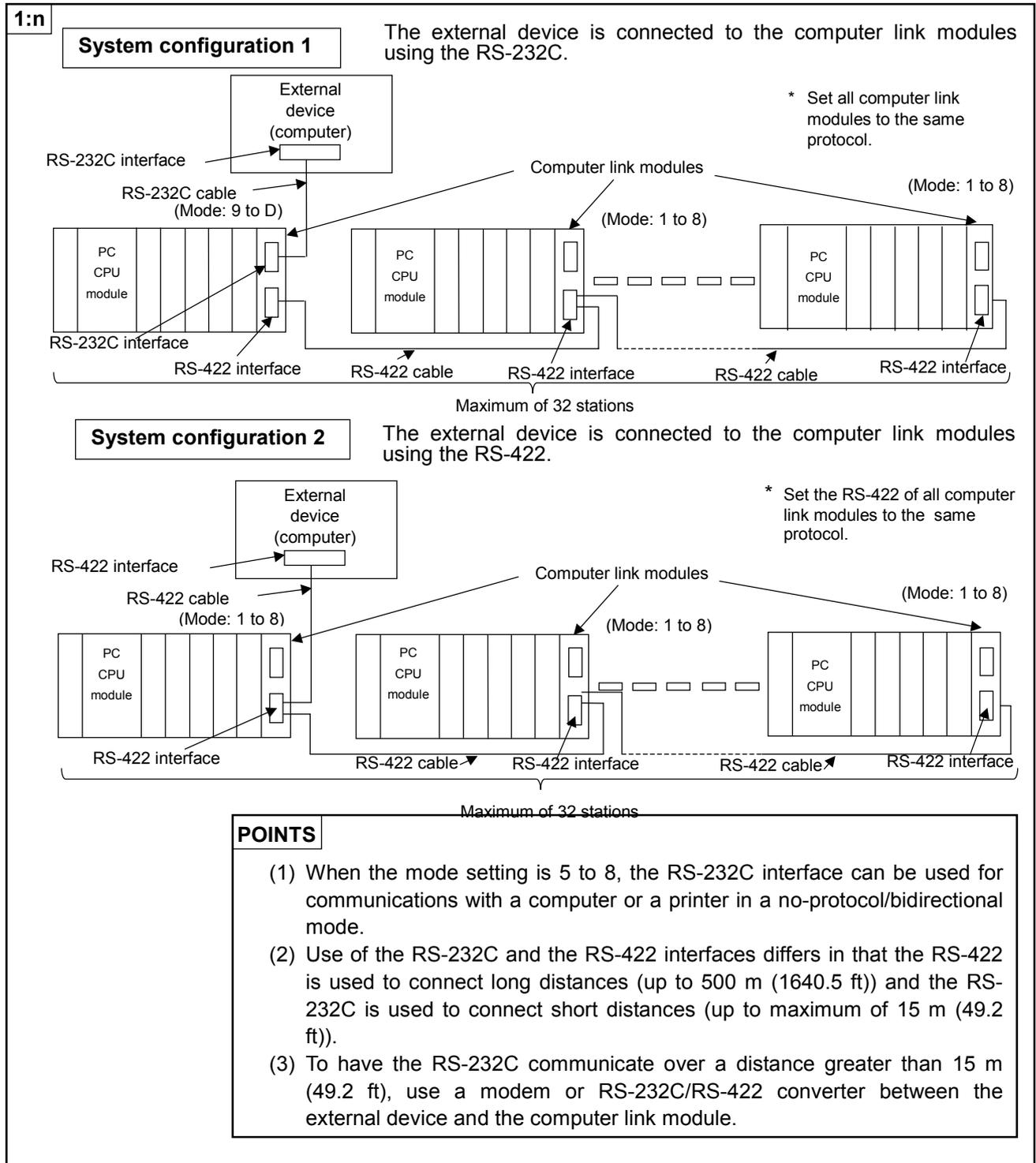


Fig. 2.2 System Configurations (II)

2. SYSTEM CONFIGURATION AND AVAILABLE FUNCTIONS

MELSEC-A

(2) The following tables list the functions available when an external device is linked with the PC CPU modules to make a 1 : n configuration.

(a) The interface used to set dedicated protocols 1 to 4:

1) Functions available when using a computer

Available Functions		Interfaces for Dedicated Protocol		Remarks	
		RS-422	RS-232C		
Device memory	Read/write	○	○	Including extension devices	
	Test				
	Monitor				
Extension file register	Read/write	○	○	—	
	Test				
	Monitor				
Buffer memory computer link module of the self	Read/write	○	○		
Special function module's buffer memory	Read/write	○	○		
Sequence/microcomputer program	Read/write	○	○		
Comment	Read/write	○	○		Including extension comments
Parameter	Read/write	○	○		—
PC CPU	Remote RUN/STOP	○	○		
	CPU type read	○	○		
Global	Input signal (X) ON/OFF	○	○		
Loopback test	Transmission of received data	○	○		

2) Functions available when using a PC CPU

Available Functions		Interfaces for Dedicated Protocol		Remarks
		RS-422	RS-232C	
On-demand	Data transmission to computers	X	X	—

2. SYSTEM CONFIGURATION AND AVAILABLE FUNCTIONS

MELSEC-A

(b) Interfaces used to set the no-protocol mode

Functions available when using an external device and a PC CPU

Available Functions		Interfaces for No-protocol Mode		Remarks
		RS-422	RS-232C	
Send	PC CPU to external device	O	O*1	To computers and printers
Receive	External device to PC CPU	O	O*1	From computers

* 1 : If the external device is capable of performing full-duplex transmission, data communications in the no-protocol mode can be performed.

(c) Interfaces used to set the bidirectional mode

Functions available when using a computer and a PC CPU.

Available Functions		Interfaces for Bidirectional Mode		Remarks
		RS-422	RS-232C	
Send	PC CPU to computer	X	X	To computers
Receive	Computer to PC CPU	X	X	From computers

2. SYSTEM CONFIGURATION AND AVAILABLE FUNCTIONS

Function	Computer link function										
	AJ71UC24	A1SJ71UC24			A1SJ71C24			A1SCPU C24-R2	A2CCPU C24	A2CCPU C24-PRF	
Applicable module	○								○	○	
Remarks											

MELSEC-A

2.3 2 : 1 Ratio of External Devices to a PC CPU

- (1) The system configuration for a 2 : 1 ratio of external devices to a PC CPU is shown in Fig. 2.3 below.

(Mode: [] to []) in the figure indicates the range of setting set with the mode setting switch of a computer link module (refer to Section 4.2.1).

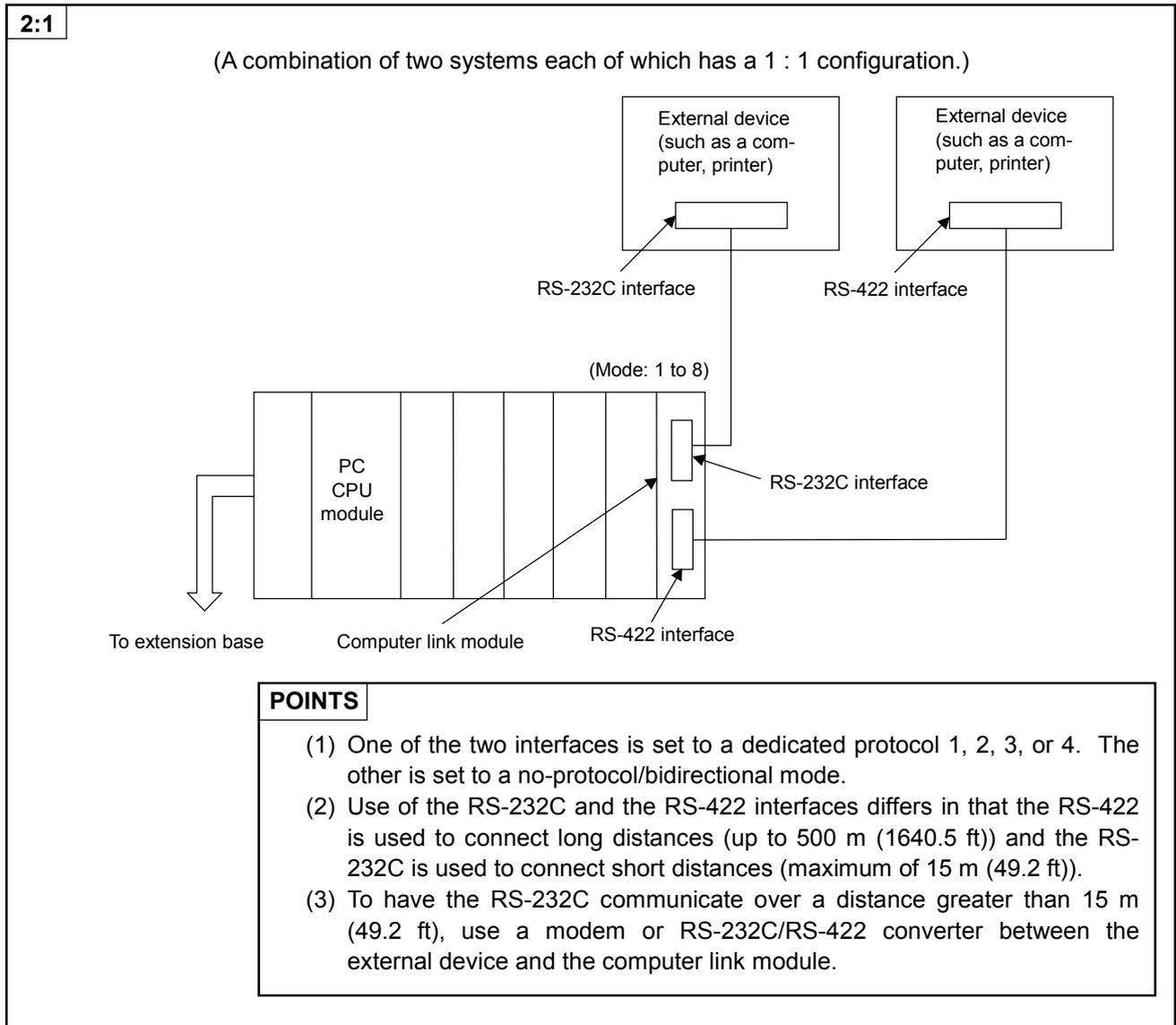


Fig. 2.3 System Configurations (III)

2. SYSTEM CONFIGURATION AND AVAILABLE FUNCTIONS

MELSEC-A

(2) The following tables list the functions available when the external devices are linked with the PC CPU modules to make a 2 : 1 configuration.

(a) The interface used to set dedicated protocols 1 to 4:

1) Functions available when using computers

Available Functions		Interfaces for Dedicated Protocol		Remarks	
		RS-422	RS-232C		
Device memory	Read/write	○	○	Including extension devices	
	Test				
	Monitor				
Extension file register	Read/write	○	○	—	
	Test				
	Monitor				
Buffer memory computer link module of the self	Read/write	○	○		
Special function module's buffer memory	Read/write	○	○		
Sequence/microcomputer program	Read/write	○	○		
Comment	Read/write	○	○		Including extension comments
Parameter	Read/write	○	○		—
PC CPU	Remote RUN/STOP	○	○		
	CPU type read	○	○		
Global	Input signal (X) ON/OFF	○	○		
Loopback test	Transmission of received data	○	○		

2) Functions available when using a PC CPU

Available Functions		Interfaces for Dedicated Protocol		Remarks
		RS-422	RS-232C	
On-demand	Data transmission to computers	○	○	—

2. SYSTEM CONFIGURATION AND AVAILABLE FUNCTIONS

MELSEC-A

(b) Interfaces used to set the no-protocol mode

Functions available when using external devices and a PC CPU

Available Functions		Interfaces for No-protocol Mode		Remarks
		RS-422	RS-232C	
Send	PC CPU to external device	○	○	To computers and printers
Receive	External device to PC CPU	○	○	From computers

(c) Interfaces used to set the bidirectional mode

Functions available when using computers and a PC CPU

Available Functions		Interfaces for Bidirectional Mode		Remarks
		RS-422	RS-232C	
Send	PC CPU to computer	○	○	To computers
Receive	Computer to PC CPU	○	○	From computers

2. SYSTEM CONFIGURATION AND AVAILABLE FUNCTIONS

Function	Computer link function									
	AJ71UC24		A1S71UC24			A1S71C24			A1SCPU C24-R2	A2CCPU C24	A2CCPU C24-PRF
Applicable module	○	○	○	○	○	○	○	○	○	○
Remarks										

MELSEC-A

2.4 2 : n Ratio of External Devices to PC CPUs

- (1) The system configuration for a 2 : n (up to 32 stations) ratio of external devices (such as a computer and a printer) to PC CPUs is shown in Fig. 2.4 below.

(Mode: [] to []) in the figure indicates the range of setting set with the mode setting switch of a computer link module (refer to Section 4.2.1).

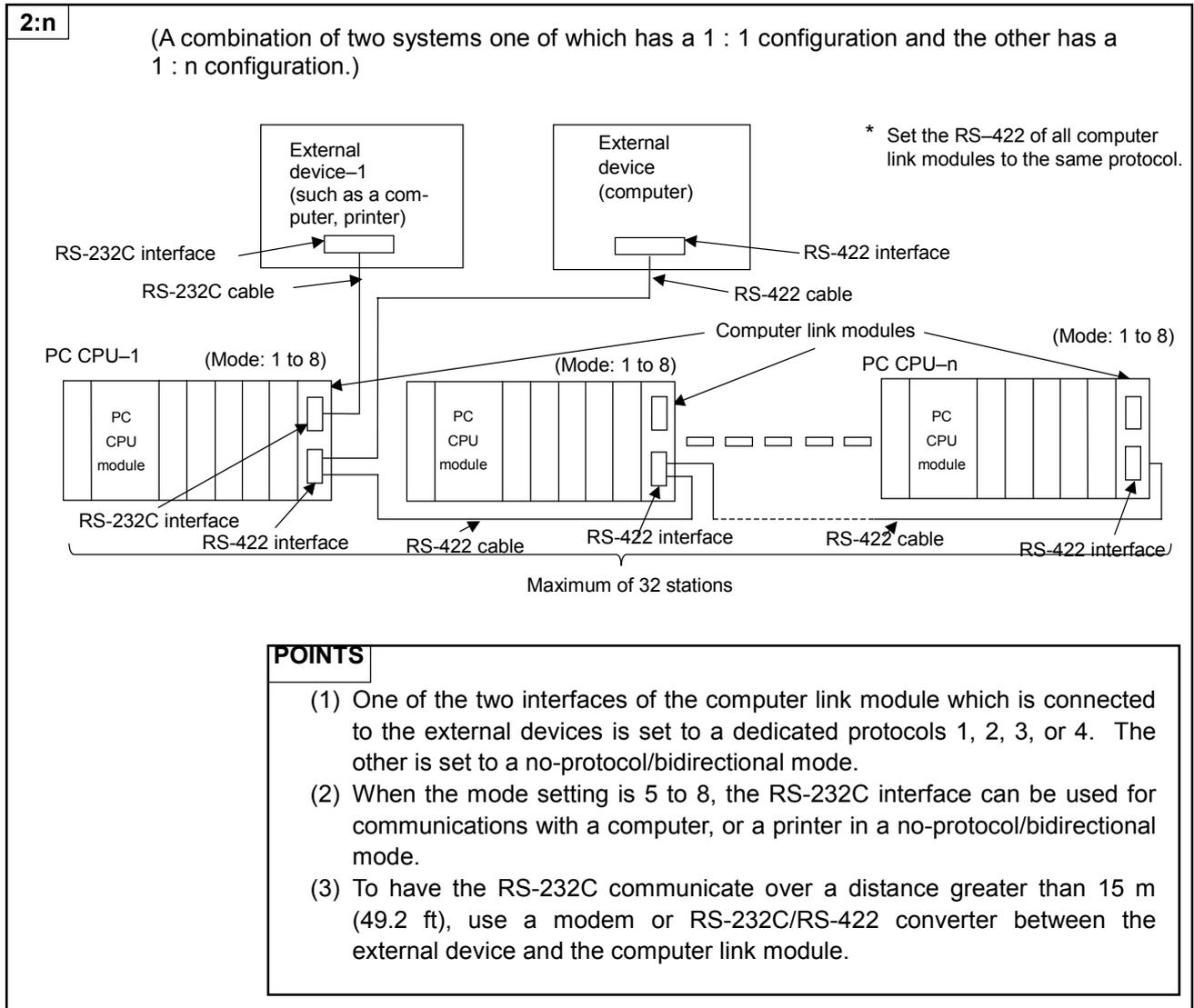


Fig. 2.4 System Configurations (IV)

2. SYSTEM CONFIGURATION AND AVAILABLE FUNCTIONS

MELSEC-A

(2) The following tables list the functions available when the external devices are linked with the PC CPU modules making a 2 : n configuration.

(a) The interface used to set dedicated protocols 1 to 4:

1) Functions available when using computers

Available Functions		Interfaces for Dedicated Protocol		Remarks	
		RS-422	RS-232C		
Device memory	Read/write	○	○	Including extension devices	
	Test	○	○		
	Monitor	○	○		
Extension file register	Read/write	○	○	—	
	Test	○	○		
	Monitor	○	○		
Buffer memory computer link module of the self	Read/write	○	○		
Special function module's buffer memory	Read/write	○	○		
Sequence/microcomputer program	Read/write	○	○		
Comment	Read/write	○	○		Including extension comments
Parameter	Read/write	○	○		—
PC CPU	Remote RUN/STOP	○	○		
	CPU type read	○	○		
Global	Input signal (X) ON/OFF	○	○		
Loopback test	Transmission of received data	○	○		

2) Functions available when using PC CPUs

Available Functions		Interfaces for Dedicated Protocol		Remarks
		RS-422	RS-232C	
On-demand	Data transmission to computers	○*1	○*1	—

* 1 : Data communications are possible only with the system which has a 1 : 1 configuration (external device-1 to PC CPU-1, as shown in Fig. 2.4).

2. SYSTEM CONFIGURATION AND AVAILABLE FUNCTIONS

MELSEC-A

(b) Interfaces used to set the no-protocol mode

Functions available when using external devices and PC CPUs

Available Functions		Interfaces for No-protocol Mode		Remarks
		RS-422	RS-232C	
Send	PC CPU to external device	O	O*1	To computers and printers
Receive	External device to PC CPU	O	O*1	From computers

* 1 : If full-duplex transmission is possible with the external device, data communications in the no-protocol mode are possible with the system which has the 1 : n configuration (external device-2 to PC CPUs, as shown in Fig. 2.4).

(c) Interface used to set the bidirectional mode

Functions available when using computers and PC CPUs

Available Functions		Interfaces for Bidirectional Mode		Remarks
		RS-422	RS-232C	
Send	PC CPU to computer	O*1	O*1	To computers
Receive	Computer to PC CPU	O*1	O*1	From computers

* 1 : Data communications are possible only with the system which has a 1 : 1 configuration (external device-1 to PC CPU-1, as shown in Fig. 2.4).

2. SYSTEM CONFIGURATION AND AVAILABLE FUNCTIONS

Function	Computer link function								
	AJ71UC24		A1SJ71UC24		A1SJ71C24		A1SCPU G24+R2	A2CCPU C24	A2CCPU G24+PRF
Applicable module	○	-R2	-R4	-PRF	-R2	-R4	○	○	○
Remarks			○			○			

MELSEC-A

2.5 m : n Ratio of External Devices to PC CPUs

- (1) The system configuration for a m : n (up to 32 stations) ratio of external devices (such as a computer) to PC CPUs is shown in Fig. 2.5 below.

(Mode: [] to []) in the figure indicates the range of setting set with the mode setting switch of a computer link module (refer to Section 4.2.1).

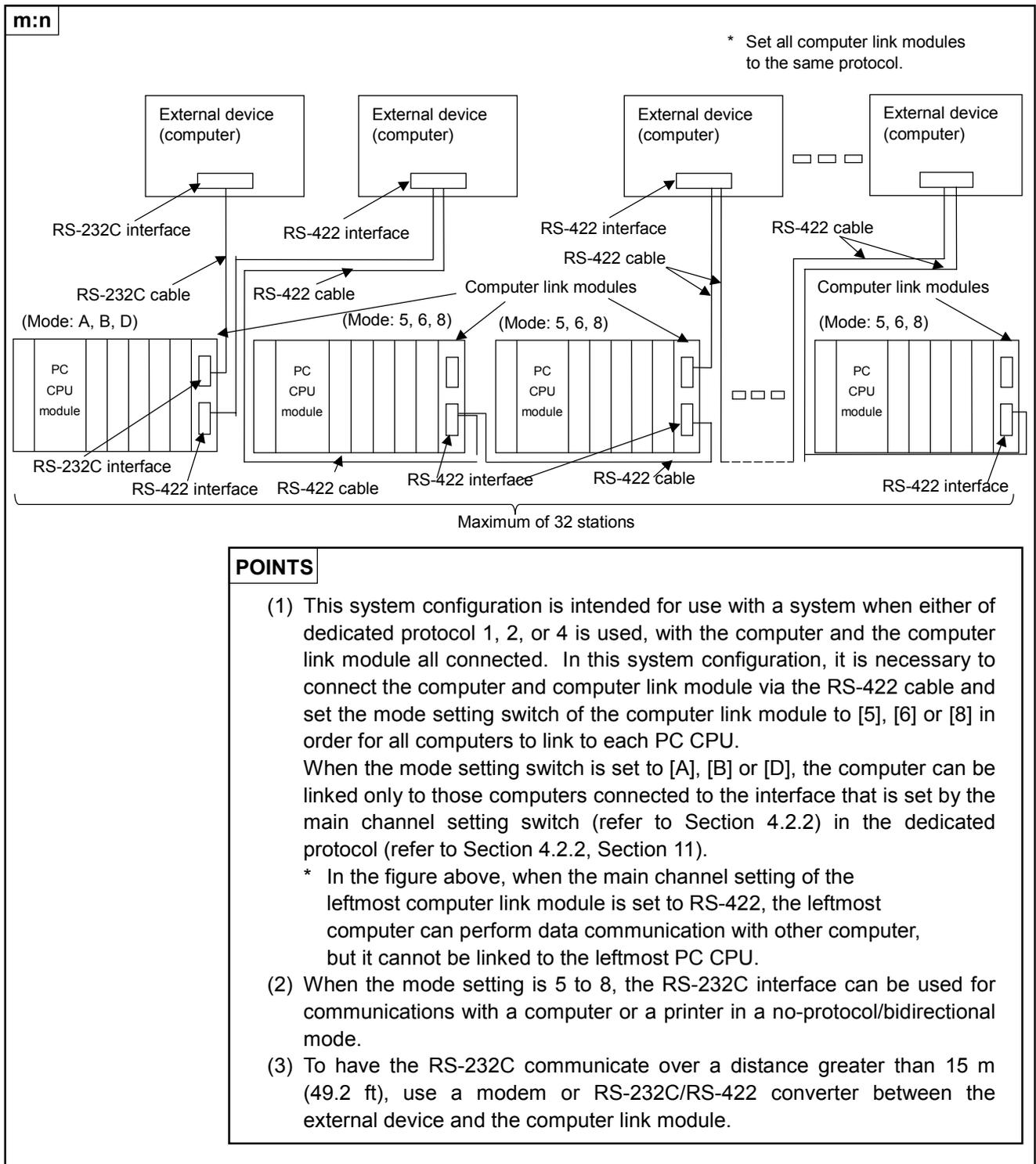


Fig. 2.5 System Configurations (V)

2. SYSTEM CONFIGURATION AND AVAILABLE FUNCTIONS

MELSEC-A

(2) The following tables list the functions available when the external devices (computers) are linked with the PC CPU modules making an m : n configuration.

(a) The interface used to set dedicated protocols 1, 2, 4:

1) Functions available when using computers

Available Functions		Interfaces for Dedicated Protocol		Remarks	
		RS-422	RS-232C		
Device memory	Read/write	○	○	Including extension devices	
	Test	○	○		
	Monitor	○	○		
Extension file register	Read/write	○	○	—	
	Test	○	○		
	Monitor	○	○		
Buffer memory computer link module of the self	Read/write	○	○		
Special function module's buffer memory	Read/write	○	○		
Sequence/microcomputer program	Read/write	○	○		
Comment	Read/write	○	○		Including extension comments
Parameter	Read/write	○	○		—
PC CPU	Remote RUN/STOP	○	○		
	CPU type read	○	○		
Global	Input signal (X) ON/OFF	○	○		
Loopback test	Transmission of received data	○	○		

* If full-duplex transmission is possible with the computer, data communications in the dedicated protocol mode are possible with the RS-232C interface.

2) Functions available when using a PC CPU

Available Functions		Interfaces for Dedicated Protocol		Remarks
		RS-422	RS-232C	
On-demand	Data transmission to computers	X	X	—

2. SYSTEM CONFIGURATION AND AVAILABLE FUNCTIONS

MELSEC-A

- (b) Interfaces used to set the no-protocol mode (Mode: for stations set to 5, 6, or 8)

Functions available when using external devices and the PC CPU

Available Functions		Interfaces for No-protocol Mode		Remarks
		RS-422	RS-232C	
Send	PC CPU to external device	—	O*1	To computers and printers
Receive	External device to PC CPU	—	O*1	From computers

* 1 : Data communications are possible only with the 1:1 ratio connection of external devices to PC CPUs.

- (c) Interfaces used to set the bidirectional mode (Mode: for stations set to 5, 6, or 8)

Functions available when using computers and the PC CPU

Available Functions		Interfaces for Bidirectional Mode		Remarks
		RS-422	RS-232C	
Send	PC CPU to computer	—	O*1	To computers
Receive	Computer to PC CPU	—	O*1	From computers

* 1 : Data communications are possible only with the 1 : 1 ratio connection of computers to PC CPUs.

2. SYSTEM CONFIGURATION AND AVAILABLE FUNCTIONS

Function	Computer link function							
	AJ71UC24	A1SJ71UC24		A1SJ71C24		A1SCPU C24-R2	A2CCPU C24	A2CCPU C24-PRF
Applicable module	-R2	-R4	-PRF	-R2	-R4	-PRF	△	○
Remarks	○	○	○	○	○	○	No allowed X/Y link	Multidrop connection

MELSEC-A

2.6 System Configuration for Data Link System and Network System

2.6.1 In the case of MELSECNET(II) and MELSECNET/B

By installing the computer link module onto the PC CPU that is connected by the data link system, it is possible to access a PC CPU of other station on the MELSECNET(II) and MELSECNET/B from the computer in the dedicated protocol (on-demand function cannot be used from other station's PC CPU). However, A0J2CPUP23/R23 and A0J2P25/R25 cannot be accessed.

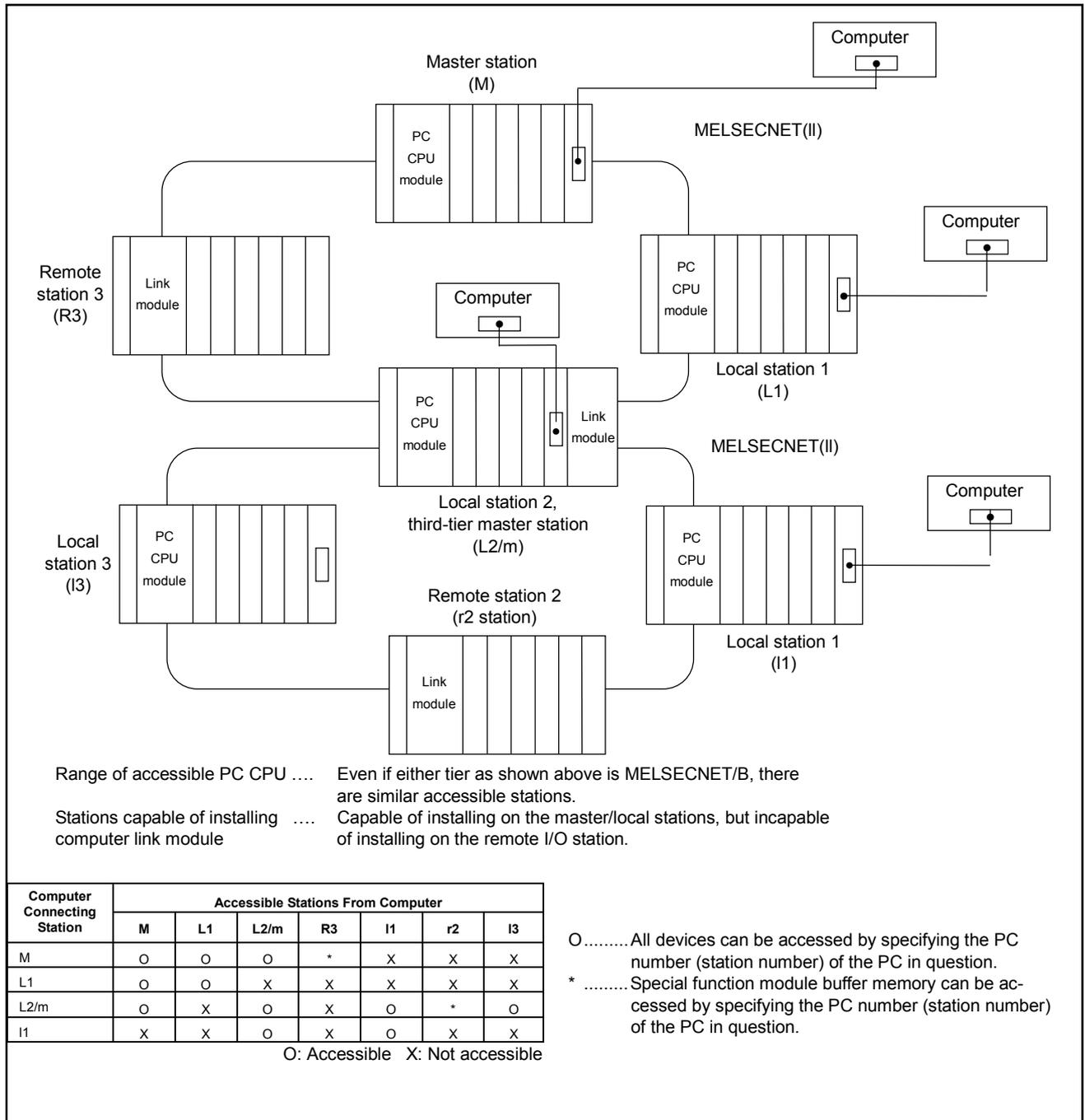


Fig. 2.6 System Configurations (VI)

2. SYSTEM CONFIGURATION AND AVAILABLE FUNCTIONS

Function	Computer link function								
	AJ71UC24	A1S71UC24			A1S71C24		A1SCPUC24-R2	A2CCPUC24	A2CCPUC24-PRF
Applicable module	-R2	-R4	-PRF	-R2	-R4	-PRF	1	0	0
Remarks	0	0	0	0	0	0	No allowed X/Y link	Multidrop connection	

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2.6.2 In the case of MELSECNET/10

By installing the computer link module onto the PC CPU that is connected by the network system, it is also possible to access a PC CPU of other station on the MELSECNET/10 from the computer in the dedicated protocol (on-demand function cannot be used from other station's PC CPU).

- To access other station, it is necessary to have various parameter settings and network registered * (refer to Section 5.15).

* When a station is AnUCPU on the MELSECNET/10

(In case of PC-to-PC network)

O: Accessible X: Not accessible

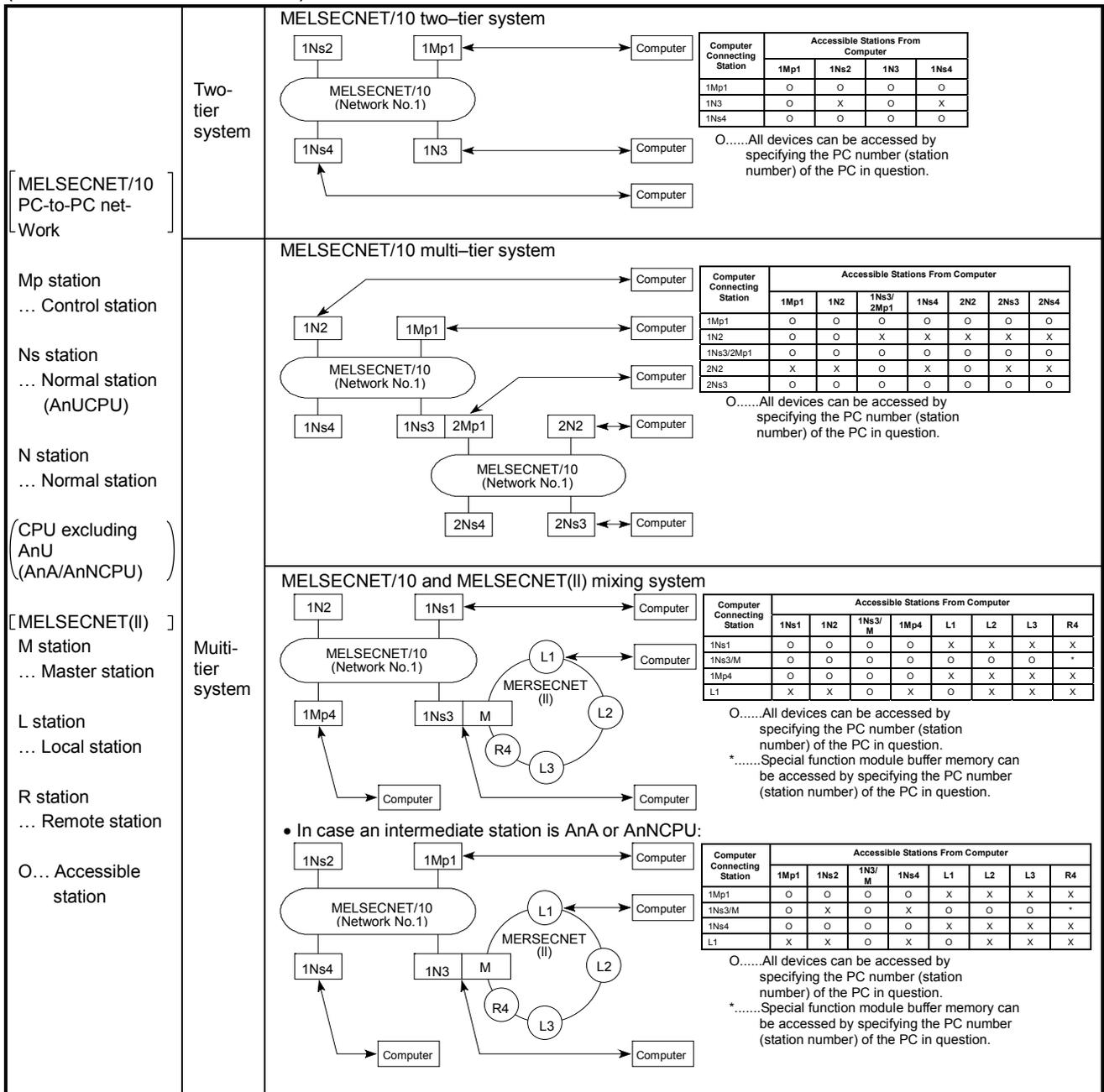


Fig. 2.7 System Configurations (VII)

2. SYSTEM CONFIGURATION AND AVAILABLE FUNCTIONS

Function	Computer link function											
	AJ71UC24		ATSJ71UC24		ATSJ71C24		A1SCPU C24-R2		A2CCPU C24		A2CCPU C24-PRF	
Applicable module	-R2	-R4	-PRF	-R2	-R4	-PRF						
Remarks							No allowed X/Y link				Multidrop connection	

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(In case of remote I/O network)

O: Accessible X: Not accessible

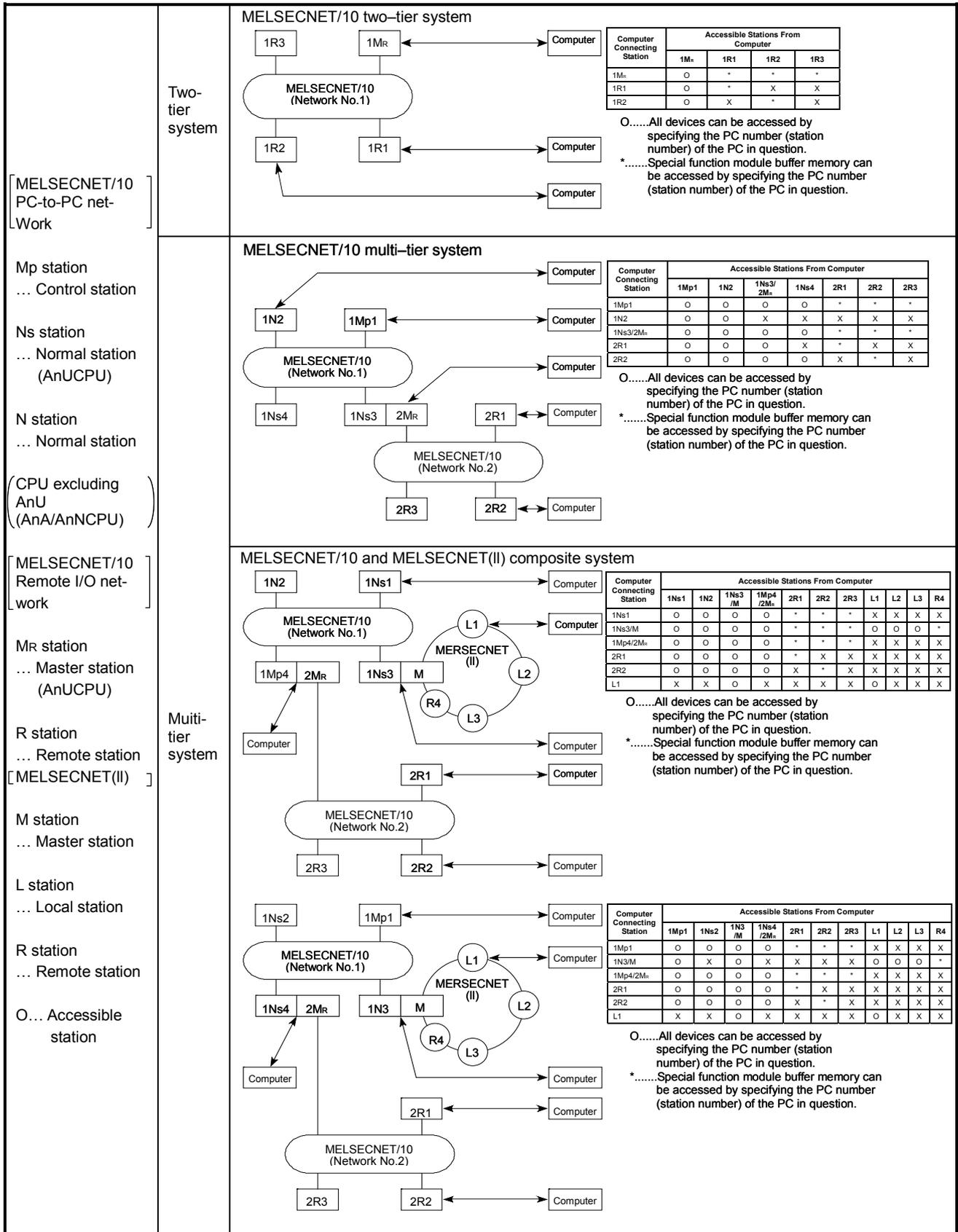


Fig. 2.7 System Configurations (VIII)

2. SYSTEM CONFIGURATION AND AVAILABLE FUNCTIONS

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2.7 Applicable PC CPU Modules and Number of Computer Link Modules

- (1) The installable PC module and the number of installable PC modules are shown when the computer link function and printer function of the computer link module are used.

Station where Module(s) Mounted	Applicable Module	Number of Modules Mountable	Remarks
CPU Module	A0J2H A1, A1N A1S(-S1), A1SJ A1SH, A1SJH A2(-S1) A2N(-S1) A2S(-S1) A2SH(-S1) A3, A3N A3H, A3M A73	2	<p>When using the A1S series, the A series special function module, or the GOT series, the mountable number of modules is the total including the number of these special function modules and the number of connected modules.</p> <ul style="list-style-type: none"> • A1SJ71UC24-R2 • A1SJ71UC24-R4 • A1SJ71UC24-PRF • A1SD51S • A1SJ71E71-B2/B5(-S3) • AD51(-S3) • AD51FD(-S3) • AD57G(-S3) • AJ71C21(-S1) (BASIC program mode only) • AJ71C23(-S3) • AJ71UC24 • AJ71P41 • AJ71E71(-S3) • A0J2C214-S1 • GOT series (only in bus connection)
	A2A(-S1) A3A A2U(-S1) A3U A4U A2AS(-S1) A2USH-S1	6	
	A1SCPUC24-R2 A52G	1	
	Q2AS(-S1) QSASH(-S1) Q2A(-S1) Q3A Q4A, Q4AR Q (A mode)	6	
MELSECNET/10 (Remote Station)	AJ72LP25 (G) AJ72BR15 AJ72LR25 AJ72QLP25 (G) AJ72QBR15 AJ72QLR25 A1SJ72QLP25 A1SJ72QBR15 A1SJ72QLR25	2	

* The computer link module cannot be installed for use on the remote stations of the MELSECNET(II) and MELSECNET/B.

- (2) When the following modules are used as multidrop link modules, they are not included in the restrictions on the mountable number of modules indicated above. Two or more can be mounted, provided the number of I/O points of the PC CPU module is not exceeded.

- AJ71UC24
- A1SJ71UC24-R4, A1SJ71C24-R4
- A0J2C214-S1

2. SYSTEM CONFIGURATION AND AVAILABLE FUNCTIONS

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(3) Accessible Programmable Controllers

The programmable controllers at other stations that can be accessed via a station where a computer link module is mounted are indicated here.

In each case, in addition to the PC CPU modules indicated, modules that also have a MELSECNET link function can also be accessed.

Example: In the case of A3ACPU, access to A3ACPU21 and A3ACPUR21 is also possible.

1) PC CPU

The PC CPUs that can be accessed from an external device are indicated here, including access via a data link system or network system.

Execute access as described in Section 2 and Section 5.

PC CPU Module	A0J2H	A1	A1N	A1S(S1)	A1SJ	A1SH	A1SJH
	A2(S1)	A2N(S1)	A2A(S1)	A2U(S1)	A2S(S1)	A2SH(S1)	A2AS(S1)
	A2USH-S1	A2C	A2CJ	A3	A3N	A3A	A3U
	A4U	Q2A(S1)	Q3A	Q4A	Q4AR	Q2AS(S1)	Q2ASH(S1)
	Q(A mode)						

2) Remote stations

The remote stations that can be accessed from an external device via a data link system or network system are indicated below.

Access is possible to the buffer memories of special function modules at remote stations connected to the following models of link module.

MELSECNET/10	AJ72QLP25(G)	AJ72QBR15	AJ72QLR25	A1SJ72QLP25	A1SJ72QBR15
	A1SJ72QLR25	AJ72LP25(GE)	AJ72BR15	AJ72LR25	
MELSECNET(II)	AJ72P25	AJ72R25			
MELSECNET/B	AJ72T25B	A1SJ72T25B			

3. SPECIFICATIONS

This section gives the transmission specifications of computer link function, data communicating function of each mode, interface specifications of computer link module. For the specification of each computer link module, refer to the User's Manual (Hardware) of the computer link module used.

For general specifications, refer to the user's manual for the CPU module used.

3.1 Transmission Specifications

This section describes the transmission specifications of computer link module.

Table 3.1 Transmission Specifications

Item		Specifications			
Interface		Conform to RS-232C.			
		Conform to RS-422 or RS-485.			
Communication method		RS-232C	Dedicated protocol	Half-duplex communication method *1	
			No-protocol/bidirectional	Full-/half-duplex (buffer memory setting)	
		RS-422/485	Dedicated protocol	Half-duplex communication method *1	
			No-protocol/bidirectional	1:1 connection	Full-duplex communication method
	1:n, m:n connection	Half-duplex communication method			
Synchronous system		Asynchronous system			
Transmission speed		300, 600, 1200, 2400, 4800, 9600, 19200 BPS (switch selected)			
Data format	Start bit	1			
	Data bit	7 or 8	To be sent from bit 0	Selectable	
	Parity bit	1 or none	Vertical		
	Stop bit	1 or 2	—		
Access cycle		Each request is processed in the END processing of the sequence program. Therefore, access cycle is 1 scan time.			
Error detection		Parity check present (odd/even)/absent			
		Sum check present/absent			
DTR/DSR (ER/DR) control		Present /Absent (RS-232C only)	Capable of either control		
DC1/DC3, DC2/DC4 control		Present /Absent			
System configuration (External device: PC CPU)		Dedicated protocol		1 : 1, 1 : n, m : n *2	
		No-protocol		1 : 1, 1 : n *2	
		Bidirectional		1 : 1	

3. SPECIFICATIONS

Item	Specifications
Transmission distance	Up to 15 m (49.2 ft) for RS-232C
	Up to 500 m (1640.5 ft) for RS-422/485
Current consumption	AJ71UC24 : 0.3A A1SJ71UC24-R2/R4/PRF : 0.1/0.1/0.1A A1SJ71C24-R2/R4/PRF : 0.1/0.1/0.1A A1SCPUC24-R2 : 0.56A A2CCPUC24(PRF) : — (—)
EEPROM writing frequency	Max. 100,000 cycles to a single area (EEPROM can be used with the printer function.)
Number of occupying I/Os	32 *3
Weight	AJ71UC24 : 0.63 [1.39] kg [lb] A1SJ71UC24-R2/R4/PRF : 0.22 [0.48]/0.25 [0.55]/0.22 [0.48] kg [lb] A1SJ71C24-R2/R4/PRF : 0.22 [0.48]/0.25 [0.55]/0.22 [0.48] kg [lb] A1SCPUC24-R2 : 0.41 [0.9] kg [lb] A2CCPUC24(PRF) : 1.4 [3.08] (1.4) [3.08] kg [lb]
Recommended RS-232C to RS-422 converter (For 1:1 connection)	EL-LINE-II *4

*1 : If the on-demand function is used, only full-duplex communications is available when full-duplex communications is enabled.

*2 : "n" for 1:n ratio is up to 32. Total of "m" and "n" for m:n ratio is up to 32.

*3 : Set the special function modules to have 32 inputs/outputs when the I/O allocation is set. When using AnA/AnUCPU dedicated commands for computer link module, set the module model name indicated at the POINT in Section 6.4.2 (2).

*4 : EL-LINE-II cannot be used for 1:n or m:n of line configuration.

3. SPECIFICATIONS

Function	Computer link function									
	AJ71UC24	A1SJ71UC24			A1SJ71C24			A1SCPU C24-R2	A2CCPU C24	A2CCPU C24-PRF
Applicable module	O	R2	R4	PRF	R2	R4	PRF	O	Δ	Δ
Remarks		O	O	O	Δ	Δ	Δ		Δ	Δ

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3.2 Data Communications Functions

The tables below list the data communications functions available when an external device and a PC CPU are connected by a computer link module.

3.2.1 List of functions and commands with dedicated protocols

The functions available using dedicated protocols 1 to 4 are listed in Tables 3.2, 3.3 and 3.4.

Usage of commands indicated in each Table differ depending on a combination of PC CPU and computer link module.

- Table 3.2 ... ACPU common command capable of being used for a combination with ACPU.
- Table 3.3 ... AnA/AnUCPU common command capable of being used for a combination with AnACPU or AnUCPU.
- Table 3.4 ... AnUCPU dedicated command capable of being used for a combination of AnUCPU.

3. SPECIFICATIONS

(1) Functions available with the ACPU common commands

Table 3.2 Functions List When Using a Dedicated Protocol (corresponding to ACPU)

Function			Command		Description	Number of Points Processed per Communication
			Sym-bol	ASCII Code		
Device memory *5	Batch read	Bit units	BR	42H, 52H	Reads bit devices (such as X, Y, M) in units of 1 device.	256 points
		Word units	WR	57H, 52H	Reads bit devices (such as X, Y, M) in units of 16 devices.	32 words (512 points)
	Reads word devices (such as D, R, T, C) in units of 1 device.				64 points	
	Batch write	Bit units	BW	42H, 57H	Writes bit devices (such as X, Y, M) in units of 1 device.	160 points
		Word units	WW	57H, 57H	Writes bit devices (such as X, Y, M) in units of 16 devices.	10 words (160 points)
	Writes word devices (such as D, R, T, C) in units of 1 device.				64 points	
	Test (random write)	Bit units	BT	42H, 54H	Specifies bit devices (such as X, Y, M) and device number in units of 1 device at random and sets/resets the device.	20 points
		Word units	WT	57H, 54H	Specifies bit devices (such as X, Y, M) and device number in units of 16 devices at random and sets/resets the device.	10 words (160 points)
	Specifies word devices (such as D, R, T, C) and device number in units of 1 device at random and sets/resets the device.				10 points	
	Monitor data registration	Bit units	BM	42H, 4DH	Sets bit devices to be monitored (such as X, Y, M) in units of 1 device.	40 points *1
		Word units	WM	57H, 4DH	Sets bit devices to be monitored (such as X, Y, M) in units of 16 devices.	20 words *1 (320 points)
	Sets word devices to be monitored (such as D, R, T, C) in units of 1 device.				20 points	
	Monitor	Bit units	MB	4DH, 42H	Reads data from devices for which device data registration has been made.	—
		Word units	MN	4DH, 4EH		
Extension file register	Batch read		ER	45H, 52H	Reads extension file registers (R) in units of 1 register.	64 points
	Batch write		EW	45H, 57H	Writes extension file registers (R) in units of 1 register.	64 points
	Test (random write)		ET	45H, 54H	Specifies the extension file registers (R) in units of 1 register using block or device number and makes a random write.	10 points
	Monitor data registration		EM	45H, 4DH	Sets the extension file registers (R) device numbers to be monitored in units of 1 register.	20 points
	Monitor		ME	4DH, 45H	Monitors the extension file register after monitor data registration.	—

3. SPECIFICATIONS

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	PC CPUs with Which the Command Can be Executed											PC CPU State			Reference Section		
	A1S(S1) A1SJ	A0J2H	A1 A1N	A2(S1) A2N(S1) A2S(S1)	A2A(S1) A2U(S1) A2AS(S1)	A2C A52G	A3 A3N A1SH A1SJH A2SH (S1)	A3A A3U A4U	A3H A3M A73	QnA *5	P25 / R25	QLP25 LP25 / QBR15 BR15	During STOP	During RUN			
														Write Enabled		Write Disabled	
																	5.7.2
					O					O	X	O	O	O	O		5.7.3
																	5.7.4
					O					O	X	O	O	O	X		5.7.5
																	5.7.6
					O					O	X	O	O	O	X		5.7.7
																	5.7.8
					O					O	X	O	O	O	O		
	O	O	X			O				X	X	X	O	O	O		5.8.4
	O	O	X			O				X	X	X	O	O	X		5.8.5
	O	O	X			O				X	X	X	O	O	X		5.8.8
	O	O	X			O				X	X	X	O	O	O		5.8.9
	O	O	X			O				X	X	X	O	O	O		

3. SPECIFICATIONS

Table 3.2 Functions List When Using a Dedicated Protocol (Continued)

Function			Command		Description	Number of Points Processed per Communication				
			Sym-bol	ASCII Code						
Buffer memory	Batch read		CR	43H, 52H	Reads data from the computer link module buffer memory.	64 words (128 bytes)				
	Batch write		CW	43H, 57H	Writes data to the computer link module buffer memory.					
Special function module	Batch read		TR	54H, 52H	Reads the contents of the special function module buffer memory.	64 words (128 bytes)				
	Batch write		TW	54H, 57H	Writes data to the special function module buffer memory.					
Sequence Program	Batch read	Main	Other than T/C set value	MR	4DH, 52H	Reads main sequence programs.	64 steps			
			T/C set value			Reads T/C set values used in main sequence programs.	64 points			
		Sub	Other than T/C set value	SR	53H, 52H	Reads subsequence programs.	64 steps			
			T/C set value			Reads T/C set values used in subsequence programs.	64 points			
	Batch read	Main	Other than T/C set value	XR	58H, 52H	Reads main sequence programs.	64 steps			
			T/C set value			Reads T/C set values used in main sequence programs.	64 points			
		Sub 1	Other than T/C set value			Reads subsequence program 1.	64 steps			
			T/C set value			Reads T/C set values used in subsequence program 1.	64 points			
		Sub 2	Other than T/C set value			Reads subsequence program 2.	64 steps			
			T/C set value			Reads T/C set values used in subsequence program 2.	64 points			
		Sub 3	Other than T/C set value			Reads subsequence program 3.	64 steps			
			T/C set value			Reads T/C set values used in subsequence program 3.	64 points			
		Batch write	Main			Other than T/C set value	MW	4DH, 57H	Writes main sequence programs.	64 steps
						T/C set value			Writes T/C set values used in main sequence programs.	64 points
			Sub			Other than T/C set value	SW	53H, 57H	Writes subsequence programs.	64 steps
						T/C set value			Writes T/C set values used in subsequence programs.	64 points
	Batch write	Main	Other than T/C set value	XW	58H, 57H	Writes main sequence programs.	64 steps			
			T/C set value			Writes T/C set values used in main sequence programs.	64 points			
		Sub1	Other than T/C set value			Writes subsequence program 1.	64 steps			
			T/C set value			Writes T/C set values used in subsequence program 1.	64 points			

3. SPECIFICATIONS

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	PC CPUs with Which the Command Can be Executed											PC CPU State			Reference Section	
	A1S(S1) A1SJ	A0J2H	A1 A1N	A2(S1) A2N(S1) A2S(S1)	A2A(S1) A2U(S1) A2AS(S1)	A2C A52G	A3 A3N A1SH A1SJH A2SH (S1)	A3A A3U A4U	A3H A3M A73	QnA	P25 / R25	QLP25 LP25 / QBR15 BR15	During STOP	During RUN		
														Write Enabled		Write Disabled
					O								O	O	O	5.9.2
																5.9.3
					O					X	O	O	O	O	O	5.10.3
					O					X	O	O	O	O	X	5.10.4
					O					X	X	X	O	O	O	5.12.4
			X				O			X	X	X	O	O	O	
					O					X	X	X	O	O	O	
			X				O			X	X	X	O	O	O	
			X				O			X	X	X	O	O	O	
					O					X	X	X	O	O	O	
					O					X	X	X	O	O	X	
					O					X	X	X	O	O	X	
			X				O			X	X	X	O	O	X	
			X				O			X	X	X	O	O	X	

3. SPECIFICATIONS

Table 3.2 Functions List When Using a Dedicated Protocol (Continued)

Function				Command		Description	Number of Points Processed per Communication
				Sym- bol	ASCII Code		
Sequence Program	Batch write	Sub 2	Other than T/C set value	XW	58H, 57H	Writes subsequence program 2.	64 steps
			T/C set value			Writes T/C set values used in subsequence program 2.	64 points
		Sub 3	Other than T/C set value			Writes subsequence program 3.	64 steps
			T/C set value			Writes T/C set values used in subsequence program 3.	64 points
Micro computer program	Batch read	Main	UR	55H, 52H	Reads main microcomputer programs.	128 bytes	
		Sub	VR	56H, 52H	Reads submicrocomputer programs.		
	Batch write	Main	UW	55H, 57H	Writes main microcomputer programs.		
		Sun	VW	56H, 57H	Writes submicrocomputer programs.		
Comment	Batch read		KR	4BH, 52H	Reads comment data.	128 bytes	
	Batch write		KW	4BH, 57H	Writes comment data.		
Parameter *4	Batch read		PR	50H, 52H	Reads parameters from PC CPU.	128 bytes	
	Batch write		PW	50H, 57H	Writes parameters to PC CPU.		
	Analysis request		PS	50H, 53H	Causes PC CPU to acknowledge and check rewritten parameters.	—	
PC CPU	Remote RUN		RR	52H, 52H	Request remote run of PC CPU.	—	
	Remote STOP		RS	52H, 53H	Request remote stop of PC CPU.		
	CPU type read		PC	50H, 43H	Reads the type of PC CPU: A1N, A2N, A3N, A3H		
	Model code/model name reading		PU	50H, 55H	Model name of PC CPU is read by model name and model code.		
Global			GW	47H, 57H	Turns ON and OFF the global signal of the computer link module loaded in each PC CPU system.	1 point	
On-demand			—		Send request is initiated by a PC CPU. (Available in a 1:1 ratio system.)	Data length specified in the sequence program. (Max. 3296 words)	
Loopback test			TT	54H, 54H	Echoes unchanged characters back to the computer.	254 characters	

3. SPECIFICATIONS

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	PC CPUs with Which the Command Can be Executed											PC CPU State			Reference Section	
	A1S(S1) A1SJ	A0J2H	A1 A1N	A2(S1) A2N(S1) A2S(S1)	A2A(S1) A2U(S1) A2AS(S1)	A2C A52G	A3 A3N A1SH A1SJH A2SH (S1)	A3A A3U A4U	A3H A3M A73	QnA	P25 / R25	QLP25 LP25 / QBR15 BR15	During STOP	During RUN		
														Write Enabled		Write Disabled
				X				O*2	X	X	X	X	O	O*3	X	5.12.4
				X				O*2	X	X	X	X	O	O	X	
				X				O*2	X	X	X	X	O	O*3	X	
				X				O*2	X	X	X	X	O	O	X	
		O			X	O		X	O	X	X	X	O	O	O	5.12.5
		X														
		O			X	O		X	O	X	X	X	O	O*3	X	
		X														
					O					X	X	X	O	O	O	5.12.6
					O					X	X	X	O	O	X	
					O					X	X	X	O	O	O	
					O					X	X	X	O	X	X	5.12.3
					O					O	X	X	O	O	O	
					O					O	X	X	O	O	O	5.11.2
					O					O	X	X	O	O	O	
					O					O	O	O	O	O	O	5.11.3
					O					X	X	X	O	O	O	
					O					X	X	X	O	O	O	5.13
					O					X	X	X	—	O	O	5.14
					—					—	—	—	O	O	O	5.16

- *1: When the CPU modules other than A3H, AnA, and AnU are used, devices X (input) are allocated with 2 inputs per device.
To include devices X in designated devices, set as follows:
 $((\text{number of designated X devices} \times 2) + \text{number of other designated devices}) \leq \text{number of devices able to be processed in one communication}$
If only devices X are designated, the number of inputs usable for one communications time is half the value mentioned in the table.
- *2: Reading/writing subprogram 2 or 3 is effective only for A4UCPU.
- *3: Writing during a program RUN may be carried out if all the following conditions are met:
(This is different from the write during PC RUN with a MELSEC-A series peripheral device (e.g., A6GPP).)
 - (a) The PC CPU is type A3, A3N, A3H, A3M, A73, A3A, A3U, A4U, or A7LMS-F.
(In case of subprogram 2 or 3, A4UCPU is used.)
 - (b) The program is not the currently running program.
(includes subprograms called by the currently running main program)
 - (c) The PC CPU special relay is in the following states:
 - 1) M9050 (signal flow exchange contact)..... OFF (A3CPU only)
 - 2) M9051 (CHG instruction disable)..... ON
- *4: Parameter capacity of AnUCPU is 3k bytes plus parameter for MELSECNET/10 (max. 24k bytes).

*5: QnACPU can be accessed within the device range of AnACPU and to the devices of which names exist in AnACPU. (Excluding those specified below)

To those devices shown below, access cannot be made from the mating devices.

- Devices increased additionally by QnACPU
- Latch relay (L) and step relay (S)

* For QnACPU, latch relay (L) and step relay (S) are different from internal relays (M). Even when either of them is specified, access is made to the internal relays.

- File register (R)

Accessible Devices in QnACPU ... when the Parameter Setting is Set to Default								
Category	Device	Device No. (Specified Range)	Decimal/Hexadecimal Representation	Category	Device	Device No. (Specified Range)	Decimal/Hexadecimal Representation	
Internal user devices	Input relay	X0 to X7FF	Hexadecimal representation	Internal user devices	Timer	Contact	TS0 to TS2047	Decimal representation
	Output relay	Y0 to Y7FF	Decimal representation			Coil	TC0 to TC2047	
	Internal relay	M0 to M8191				Present value	TN0 to TN2047	
	Link relay	B0 to BFFF	Hexadecimal representation		Counter	Contact	CS0 to CS1023	
	Annunciator	F0 to F2047	Decimal representation			Coil	CC0 to CC1023	
	Data register	D0 to 6143				Present value	CN0 to CN1023	
	Link register	W0 to WFFF	Hexadecimal representation	Internal system devices	Special relay **1	M9000 to M9255		
				Special register **2	D9000 to D9255			

**1 If M9000 to M9255 are specified, SM1000 to SM1255 are accessed.

**2 If D9000 to D9255 are specified, SD1000 to SD1255 are accessed.

POINT

When the following functions are used to access AnACPU or AnUCPU, use those commands indicated in Table 3.3.

(When the computer link module other than AJ71UC24 is used, AnACPU or AnUCPU can be accessed via data link system/network system or multidrop connection.)

- Batch read/write, test, monitor data registration, and monitor of device memory
- Batch read/write of extension file registers by designating device numbers (continuous numbers)
- Batch read/write of extension comments

When ACPU common commands are used, available functions and devices to be specified are restricted to the same range as A3HCPU.

Therefore, the extended devices of AnACPU or AnUCPU cannot be accessed.

3. SPECIFICATIONS

(2) Functions available with the AnA/AnUCPU common commands

Table 3.3 Functions List When Using a Dedicated Protocol (corresponding to AnA/AnUCPU)

Function			Command		Description	Number of Points Processed per Communication	PC CPU State			Reference Section
			Symbol	ASCII Code			During STOP	During RUN		
								Write Enabled	Write Disabled	
Device memory	Batch read	Bit units	JR	4AH, 52H	Reads bit devices (such as X, Y, M) in units of 1 device.	256 points	○	○	○	5.7.2
		Word units	QR	51H, 52H	Reads bit devices (such as X, Y, M) in units of 16 devices.	32 words (512 points)				5.7.3
					Reads word devices (such as D, R, T, C) in units of 1 device.	64 points				
	Batch write	Bit units	JW	4AH, 57H	Writes bit devices (such as X, Y, M) in units of 1 device.	160 points	○	○	X	5.7.4
		Word units	QW	51H, 57H	Writes bit devices (such as X, Y, M) in units of 16 devices.	10 words (160 points)				5.7.5
					Writes word devices (such as D, R, T, C) in units of 1 device.	64 points				
	Test (random write)	Bit units	JT	4AH, 54H	Specifies bit devices (such as X, Y, M) and device number in units of 1 device at random and sets/ resets the device.	20 points	○	○	X	5.7.6
		Word units	QT	51H, 54H	Specifies bit devices (such as X, Y, M) and device number in units of 16 devices at random and sets/resets the device.	10 words (160 points)				5.7.7
					Specifies word devices (such as D, R, T, C) and device number in units of 1 device at random and sets/resets the device.	10 points				
	Monitor data registration	Bit units	JM	4AH, 4DH	Sets bit devices to be monitored (such as X, Y, M) in units of 1 device.	40 points	○	○	○	5.7.8
		Word units	QM	51H, 4DH	Sets bit devices to be monitored (such as X, Y, M) in units of 16 devices.	20 words (320 points)				
					Sets word devices to be monitored (such as D, R, T, C) in units of 1 device.	20 points				
Monitor	Bit units	MJ	4DH, 4AH	Reads data from devices for which device data has been registered.	—	○	○	○		
	Word units	MQ	4DH, 51H							
Extension file register	Direct read	Word units	NR	4EH, 52H	Reads data in units of 1 device by designating the device numbers continuously regardless of the extension file register block numbers.	64 points	○	○	○	5.8.6
	Direct write	Word units	NW	4EH, 57H	Writes data in units of 1 device by designating the device numbers continuously regardless of the extension file register block numbers.	64 points	○	○	X	5.8.7
Extension comment	Batch read	DR	44H, 52H	Reads the extension comment data.	128 bytes	○	○	○	5.12.7	
	Batch write	DW	44H, 57H	Writes the extension comment data.		○	○	X		

POINT

AnA/AnUCPU common commands can be used when accessing AnACPU, AnUCPU or QnACPU, and the entire device range (for QnACPU, refer to (I) *5) of each device memory can be accessed.

(If using a computer link module other than AJ71UC24, it is possible to access AnACPU and AnUCPU via a data link system or network system, or through a multidrop connection.)

To use functions other than those indicated in Table 3.3, execute the commands shown in Table 3.2.

3. SPECIFICATIONS

Function	Computer link function									
	AJ71UC24	A1S/J1UC24			A1S/J1C24			A1SCPU C24/R2	A2CCPU C24	A2CCPU C24-PRF
Applicable module	○	○	○	○	○	○	○	○	○	○
Remarks	For applicability, refer to the description on each command in Section 5.									

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(3) A list of functions using AnUCPU dedicated command

Table 3.4 A List of Functions Using Dedicated Protocol (corresponding to AnUCPU)

Function		Command		Description	Number of Points Processed per Communication	PC CPU State			Reference Section
		Symbol	ASCII Code			During STOP	During RUN		
							Write Enabled	Write Disabled	
Network	Network registration	ZE	5AH, 45H	Registers the name of system, in which a station to be accessed resides, or a network No.	—	○	○	○	5.15.3
	Network registration readout	ZR	5AH, 52H	Reads the network registration data, MELSECNET/10 or AnUCPU error code, system name/network No. just accessed.					5.15.4
	Routing parameter readout	ZT	5AH, 54H	Reads the network registration data, routing parameter being set to that accessed.					5.15.5

POINT

AnUCPU dedicated command can be used to access to A2UCPU(S1) or A3UCPU or A4UCPU.
 (When the computer link module other than AJ71UC24 is used, AnUCPU can be accessed via data link system/network system or multidrop connection.)
 For functions other than those listed in Table 3.4, use the commands as given in Tables 3.2 and 3.3.

3.2.2 List of functions in the no-protocol mode

Those functions capable of being carried out in the no-protocol mode are given in Table 3.5.

Table 3.5 List of Functions in the No-protocol Mode

Function	Command	Description	Number of Points Processed per Communication	PC CPU State			Reference Section
				During STOP	During RUN		
					Write Enabled	Write Disabled	
Send (PC CPU → external device)	—	A PC CPU uses the TO instruction to output data written to a computer link module buffer memory area in unchanged code to an external device.	127 words (default value). Can be changed with buffer size setting (refer to Sections 6.2.4(2)(c)(d)).	X	O	O	Section 6
Receive (External device → PC CPU)	—	A PC CPU uses the FROM instruction to read from a computer link module buffer memory which was transmitted from an external device. *1					

*1 : Either the end code (for receiving with variable data length) or the completion data length (for receiving with fixed data length) can be selected as the timing signal for reading received data to the sequence program. Section 6.2.1 gives details.

3. SPECIFICATIONS

3.2.3 List of functions in the bidirectional mode

Those functions capable of being carried out in the bidirectional mode are given in Table 3.6.

Table 3.6 List of Functions in the Bidirectional Mode

Function	Command	Description	Number of Points Processed per Communication	PC CPU State			Reference Section
				During STOP	During RUN		
					Write Enabled	Write Disabled	
Send (PC CPU → computer)	—	A PC CPU uses the TO instruction to output data written to a computer link module buffer memory area in unchanged code to a computer. When the computer link module receives the response message from a computer after data send the computer link module transmits a send completed signal to the sequence program.	127 words (default value). Can be changed with the buffer size setting (refer to Sections 7.2.6(2)(b)(c))	X	O	O	Section 7
Receive (Computer → PC CPU)	—	A PC CPU uses the FROM instruction to read data from a computer link module buffer memory which was transmitted from a computer. When the computer link module receives the data read completed signal from the sequence program, the computer link module transmits a response message for the data receive to a computer.					

POINT

The no-protocol mode cannot be used together with the bidirectional mode. Select and use either mode (by specifying the mode with the buffer memory address 112H)

3.3 Transmission Control Function

This function serves to control data communication by the computer link module using the DC code (DC1/DC3, DC2//DC4) or DTR/DSR signal for data communication between computer link module and external devices.

- (1) Appropriate interface subject to transmission control and mode capable of performing transmission control

Transmission control function, appropriate interface, and modes of computer link module capable of performing transmission control are as follows:

Transmission Control Function	Type of Control	Appropriate Interface	Modes Capable of Performing Transmission Control			Remarks	
			No-protocol	Bidirectional	Dedicated Protocol		
DTR/DSR control	DTR control	RS-232C	○	—	—	RS-422 side is ignored.	Either DTR/DSR control or DC code control is selected and used (refer to Section 9).
	DSR control		○	○	○		
DC code control	DC1/DC3 send control	RS-232C RS-422	○	—	—	When there are two interfaces for the computer link module, both are controlled.	
	DC1/DC3 receive control		○	○	○		
	DC2/DC4 send control		○	○	○		
	DC2/DC4 receive control		○	○	○		

○ : Can be used (Transmission control is performed)
 — : Not used

- (2) Transmission control

- (a) DTR/DSR control

When data communication is performed with external devices using RS-232C of the computer link module, DTR/DSR control serves to inform the opponent device of possibility of data reception with the DTR(ER)/DSR(DR) signal.

For communication via RS-422, DTR/DSR control is not performed.

When the computer link module is started up, DTR/DSR control is performed.

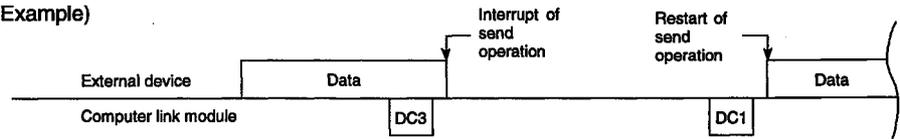
(b) DC1/DC3 send control, DC1/DC3 receive control

When data communication is performed with external devices, DC1/DC3 send/receive control serves to notify the opponent device of possibility of data reception by sending/receiving DC1 and/or DC3.

DC1 ... Control data to notify the opponent device that data reception is allowed.

DC3 ... Control data to notify the opponent device that data reception is not allowed.

(Example)



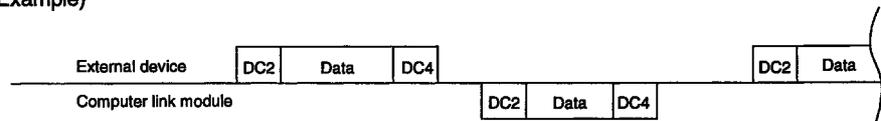
(c) DC2/DC4 send control, DC2/DC4 receive control

When data communication is performed with external devices, DC2/DC4 send/receive control serves to notify the opponent device of range of effective data, with "DC2" added prior to data to be sent/received and "DC4" after the data.

DC2 ... Control data to notify the opponent device of beginning of effective data.

DC4 ... Control data to notify the opponent device of end of effective data.

(Example)



POINT

Transmission control method and DC code can be changed by a user according to Section 9.

3. SPECIFICATIONS

Function	Computer link function								
	AJ71UC24	A1SJ71UC24			A1SJ71C24			A1SCPU	A2CCPU
Applicable module	-R2	-R4	-PRF	-R2	-R4	-PRF	C24-R2	C24	C24-PRF
Remarks	○	○	○	○	○	○	○	○	○

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3.4 Half-Duplex Communication Function

This function allows the computer link module to control the data communication by using the RS and CD signals so that the computer link module and the external device do not send data simultaneously to each other through the RS-232C connection.

(1) System configurations and functions

The following figure shows (a) the system configurations of the external device and the PC CPU that can do half-duplex communications, and (b) the functions of the computer link module.

System Configurations (External Device : PC CPU)	Dedicated Protocol		No-protocol Mode/ Bidirectional Mode
	Data Communications by a Command Transmitted from the Computer	Data Send from the PC CPU by the On-demand Function	Data Send and Data Receive
1 : 1	○	○	○
1 : n	X	X	X

○ : Usable x : Unusable

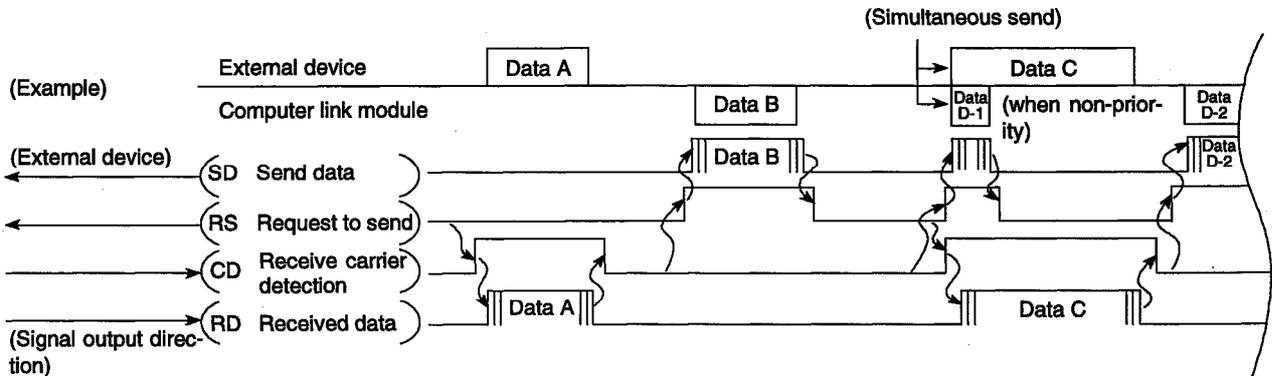
(2) Contents of the half-duplex communication control

The half-duplex communication is executed according to the setting of "priority/non-priority at simultaneous send" and the status of RS and CD signals of the computer link module.

Priority/non-priority at Setting to continue (priority) or suspend simultaneous send (non-priority) the send from the computer link module when the computer link module and an external device start sending simultaneously to each other.

RS signal This signal remains ON only when data is being sent.

CD signal While this is ON, data send does not start.



POINT

The computer link module is in the full-duplex communication mode when it is started up. This can be switched to the half-duplex communication mode if necessary.

Follow Section 10 to switch to the half-duplex communication mode.

3.5 m : n Communication Function

This function enables the data communications by connecting up to 32 stations consisting of m computers and n computer link modules between the computer link modules and the external devices through the RS-422 only or the RS-232C and RS-422.

- (1) System configuration and functions which can be used with the m:n communication

The system configuration of the computers and the PC CPUs which enables the m:n communication and the computer link module functions available for respective systems are given below.

Functions System Configurations (External Device : PC CPU)	Dedicated Protocol		No-protocol Mode/ Bidirectional Mode
	Data Communications by a Command Transmitted from the Computer	Data Send from the PC CPU by the On-demand Function	Data Send and Data Receive
m : n	o *1	X	X

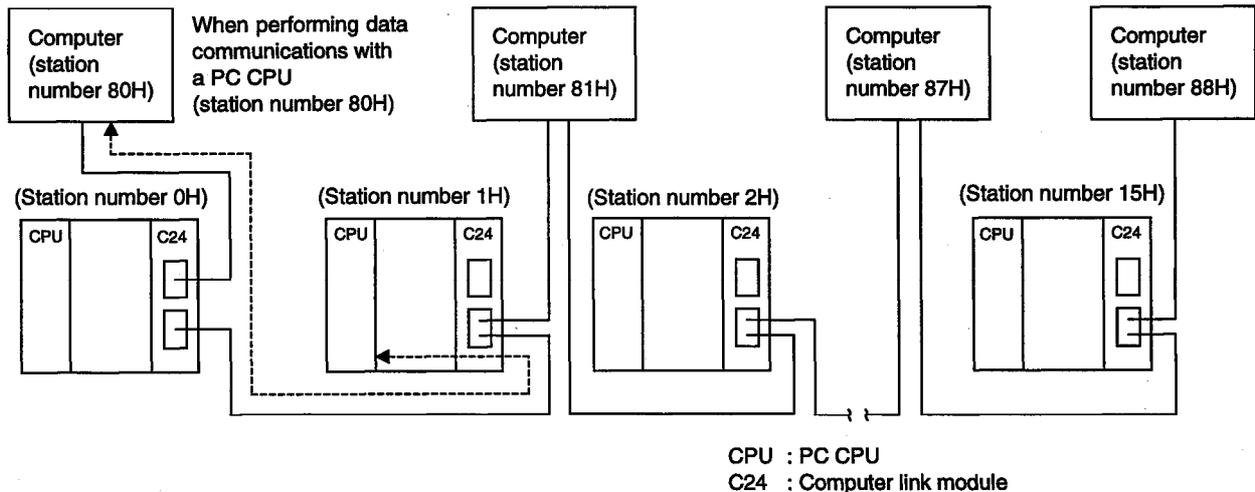
o : Usable
x : Unusable

*1 : Data communication by sending commands from a computer only is possible.

- (2) Contents of the m:n communication

The computer to perform data communication with a PC CPU is decided among the computers, so that data communication is performed between the computer and the PC CPU.

After the data communication is completed, the next computer to perform data communication with a PC CPU is decided. This process is repeated to perform data communication between the computer and PC CPU.



POINTS

- (1) To enable a computer link between all computers and all PC CPUs in the system configuration shown on the previous page, it is necessary to connect the computers and the computer link modules with the RS-422 cables and to set the mode setting switch of the computer link module at "5", "6", or "8".

If the mode setting switch has been set at "A", "B", or "D", it is possible to establish a computer link with dedicated protocol only with a computer connected to the interface which has been set for the main channel (by using the main channel setting switch (Section 4.2.2)).

- (2) The wiring for the m:n communication is different from that for the 1:1 or 1:n communication.

And, the m:n communication requires settings and rules which are explained in Section 11.

3. SPECIFICATIONS

Function	Computer link function										
	Applicable module				A1S71UC24		A1S71TC24		A1SCPU C24-R2		A2CCPU C24	A2CCPU C24-PRF
Remarks	○	○	○	○	○	○	○	○	○	○	○
	Normal switching: Ver. A Forced switching: Ver. M										
	Normal switching: Ver. A Forced switching: Ver. K										

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3.6 Mode Switching Function

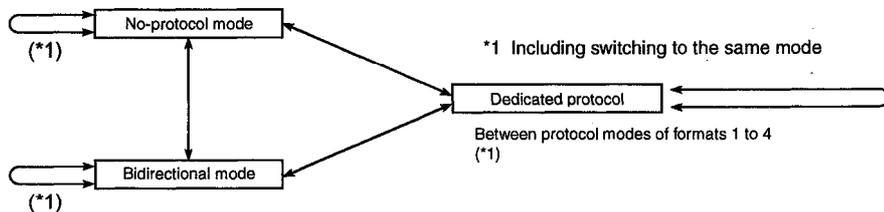
This function is used to switch mode of RS-232C/RS-422 interface of the computer link module and continue the computer link with different function while operating the computer link.

There are two kinds of mode switching: One is “Normal Mode Switching” that is used to switch a mode after current data communication has been completed, and the other is “Forced Mode Switching” that is used to switch a mode after current data communication has been forced to complete.

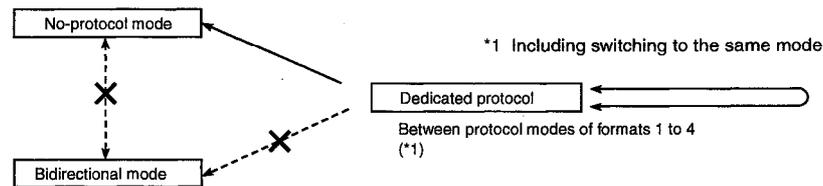
(1) Device capable of requesting the mode switching and switchable mode

From the PC CPU and computer that are used for computer link, the following mode switching can be performed:

(a) When mode is switched from the PC CPU;



(b) When mode is switched from the computer;



(2) Processing description of mode switching

The computer link module performs the following processing when switching the modes:

Mode Switching Function	Conditions When Mode Switching is Requested	Processing Description
Normal mode switching	While data communication is in progress	After data communication is completed, mode switching is performed.
	When data communication is not performed	Mode switching is performed when mode switching is requested.
Forced mode switching	While data communication is in progress	When mode switching is requested, data communication is forced to complete and mode switching is performed.
	When data communication is not performed	Mode switching is performed when mode switching is requested.

POINTS
(1) When mode is switched to continue data communication, perform mode switching according to Section 12.
(2) Normal mode switching can be done on all computer link modules.
(3) Forced mode switching serves to perform mode switching irrespective of communicating conditions. Therefore, the forced mode switching can be used to perform communication again while avoiding problems related to communication.

3. SPECIFICATIONS

Function	Computer link function									
	A1J1UC24	A1S1J1UC24			A1S1J1C24			A1SCPU C24-R2	A2CCPU C24	A2CCPU C24-PRF
Applicable module	○	○	○	○	○	○	○	○	○	○
Remarks										

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3.7 RS-232C Interface Specifications

3.7.1 RS-232C connector specifications

RS-232C connector specifications for connecting with external devices are shown in Figs. 3.1 and 3.2.

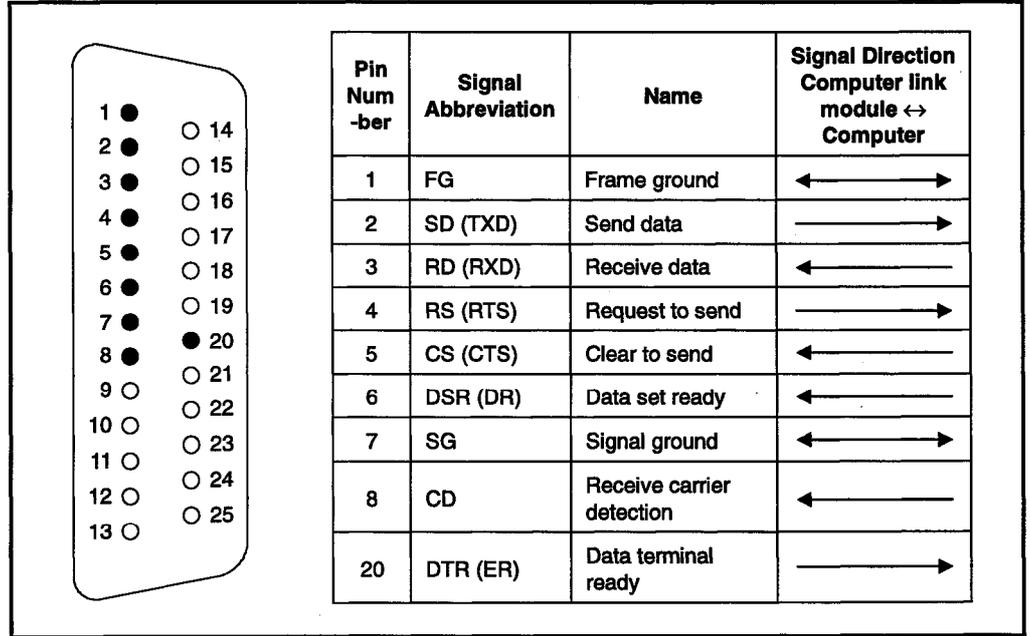


Fig. 3.1 RS-232C Connector Specifications (25-pin)

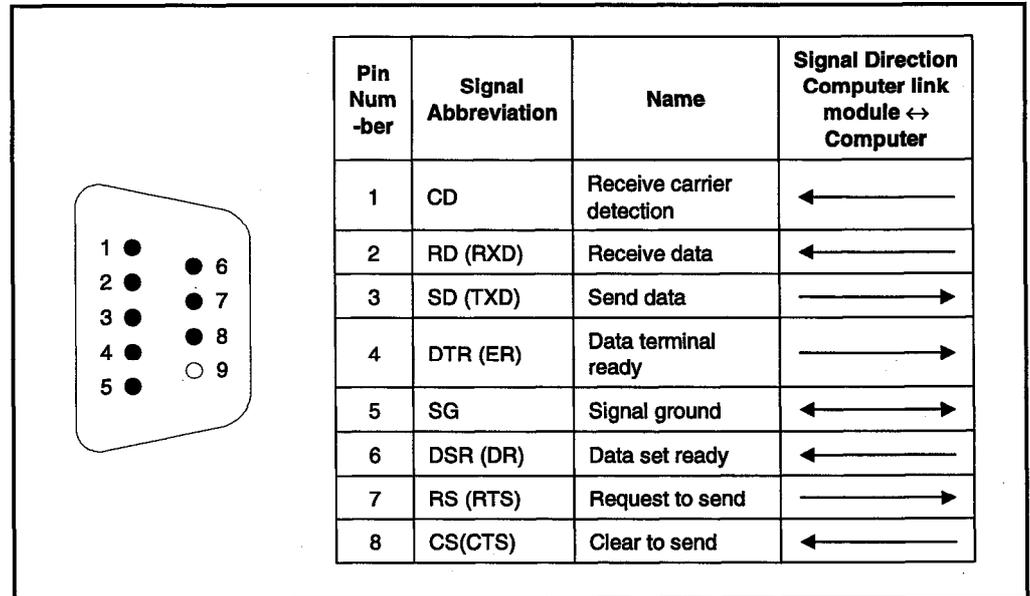


Fig. 3.2 RS-232C Connector Specifications (9-pin)

(1) Signals are described below. Those signals in the parentheses denote the pin number of 25-/9-pin connector.

(a) CD signal (8/1)

- The computer link module operates according to the setting of the CD terminal check.

	CD Terminal Check Enabled	CD Terminal Check Disabled
Full-duplex	The computer link module performs transmission processing when the CD signal (receive carrier detection) is ON. The transmission sequence of the computer link module is initialized when the CD signal is turned OFF during data communications in the dedicated protocol.	The computer link module performs transmission processing regardless of the ON/OFF state of the CD signal. (This enables data communications with those external devices which cannot control (ON/OFF) the CD signal.)
Half-duplex	Refer to Section 10.	Setting impossible

(b) RD signal (3/2)

- This is a signal to receive data.
- RD LED is flashed while receiving data.

(c) SD signal (2/3)

- This is a signal to send data.
- SD LED is flashed while sending data.

(d) DTR signal (20/4)

- Under the control of DTR/DSR, the computer link module system is turned ON/OFF as follows:

The copmputer link module system turns ON the DTR signal when communications is enabled if the dedicated protocol or bidirectional mode is currently used.

When DTR/DSR control is executed, the computer link module system turns ON/OFF the DTR signal according to the size of available area of the receive data storage OS area during communications in the no-protocol mode. (The DTR signal turns ON when the data communications of the computer link module is enabled.)

Section 9.2.1 gives for the ON/OFF timing of the DTR signal.

Since the received data is stored in the OS area when the DTR signal is OFF, read the received data using the sequence program (Refer to Section 9).

- This signal is normally ON unless DTR/DSR control is executed.

(e) SG signal (7/5)

- In case of 9-pin connector, the connecting cable shield should be connected to the SG terminal on the computer link module.

(f) DSR signal (6/6)

- During DTR/DSR control, when this signal is OFF, data is not transmitted from the computer link module to an external device.
- If DTR/DSR control is not executed, the DSR signal status will be ignored.
- When the external device can receive data, make sure that this signal is ON.

(g) RS signal (4/7)

The computer link module system is turned ON/OFF as shown below according to the communicating method (Communicating method can be changed by user (refer to Section 10)).

Even if the receiving data cannot be stored in the computer link module, RS signal is not turned OFF.

- For full-duplex communication, when the Ready signal (Xn7) of the computer link module is ON, the RS signal is turned ON.
- For half-duplex communication, when the data is sent from the computer link module to the external device, the RS signal is turned ON. For details, refer to Section 10.

(h) CS signal (5/8)

When this signal is OFF, data will not be sent from the computer link module to the external device. This signal should always be ON when external device is ready for reception.

(i) FG signal (1/-)

- In case of 25-pin connector, the connecting cable shield should be connected to the FG terminal on the computer link module. When there are FG terminals on both external device and computer link module, the shield should be connected to only either side of the FG terminal.
- If it is connected to both terminals, normal data transmission may not be carried out due to noise and so forth.

(2) ON and OFF definitions are as follows:

	(Output)	(Input)
ON	: 5V to 15 VDC,	3V to 15VDC
OFF	: -5 V to -15 VDC,	-3 V to -15 VDC

(3) Interface connector

A 25-pin D-sub connector (female) of screw-fixing type and a 9-pin D-sub connector (female) of screw-fixing type are used as RS-232C interface connectors.

For connector models, refer to APPENDIX 9.

3. SPECIFICATIONS

3.7.2 RS-232C cable

Use the RS-232C cable of within 15 m (49.2ft) that conforms to RS-232C standards.

Diameter	Type	Material	Temperature rating
28 to 24 AWG	Stranded	Copper	60°C or more

3. SPECIFICATIONS

Function	Computer link function								
	AJ71UC24	A1S/J1UC24			A1S/J1C24		A1SCPU C24+R2	A2CCPU C24	A2CCPU C24+PRF
Applicable module		-R2	-R3	-PRF	-R2	-R3	-PRF		
Remarks	0	0	0	0	0	0	0	0	0

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3.8 RS-422/485 Interface Specifications

3.8.1 RS-422/485 terminal block specification

The RS-422/485 terminal block specification for connecting to the external devices is given in Fig. 3.3.

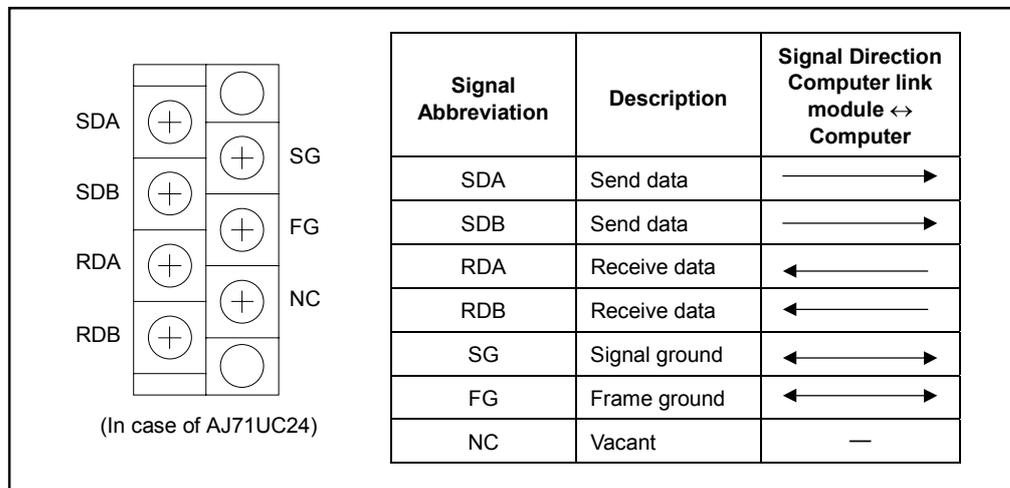


Fig. 3.3 RS-422 Terminal Block Specifications

* The signal assignment to the terminal block differs according to the type of the computer link module.

Check the signal assignment by referring to the User's Manual (Hardware) supplied with the computer link module.

(1) Contents of the signals

(a) SDA and SDB signals

- The signals used to send data.
- While data is sent, the SD LED flashes.
- A terminal resistor must be connected (or set) between SDA and SDB at the terminal stations on the line.

(b) RDA and RDB signals

- The signals used to receive data.
- While data is received, the RD LED flashes.
- A terminal resistor must be connected (or set) between RDA and RDB at the terminal stations on the line.

(c) SG signal

- This is the signal ground and must be connected to the SG terminal of a communicating station.

(d) FG signal

- The shield of the connecting cable must be connected to the device mentioned in Section 4.6.

(2) The function block diagrams are shown in Figs. 3.4 and 3.5.
 (AJ71UC24 and A1SJ71C24-R4)

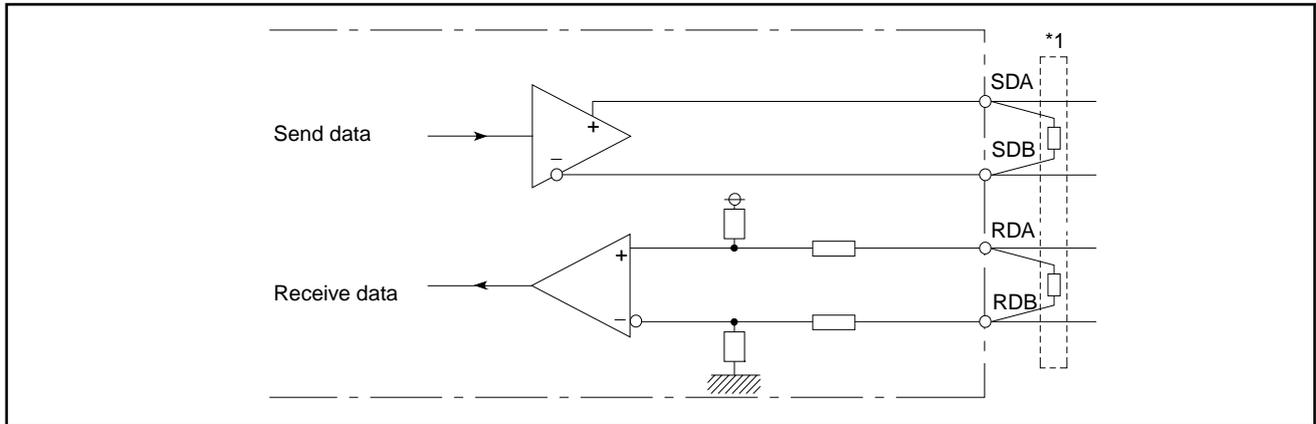


Fig. 3.4 Interface Function Block Diagram

*1 This shows the connection of the terminal resistors.
 Make the connection by referring to the User's Manual (Hardware) supplied with the computer link module and Section 4.7.

(A2CCPUC24 and A2CCPUC24-PRF)

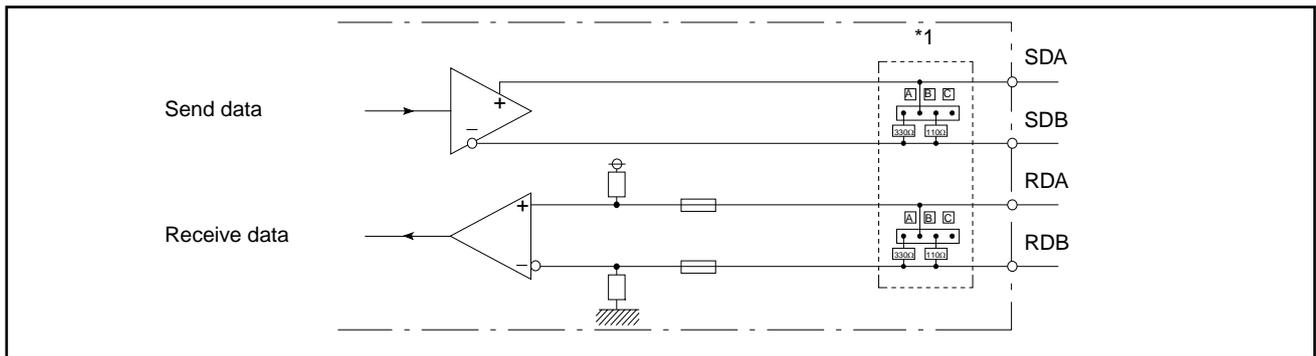


Fig. 3.5 Interface Function Block Diagram

*1 This section indicates the setting of terminating resistor.
 Set a terminating resistor according to Section 4.7 and User's Manual (Hardware) of the computer link module used.

3.8.2 RS-422 cable specifications

It is possible to use the RS-422 cables that satisfy the following specifications.

Table 3.8 RS-422 Cable Specifications

Item	Description
Cable type	Shielded cable
Number of pairs	3 Pairs
Conductor resistance (20 °C)	88.0 Ω/km or less
Insulation resistance	10,000 MΩ/km or more
Dielectric strength	500 VDC, 1 minute
Electrostatic capacity (1 kHz)	60 nF/km or less on average
Characteristic impedance (100 kHz)	110 ± 10 Ω
Recommended conductor size	0.2mm ² to 0.75mm ²
Diameter	22 to 16 AWG
Type	Stranded
Material	Copper
Temperature rating	60°C or more

3.8.3 Precautions during data communication via RS-422 line

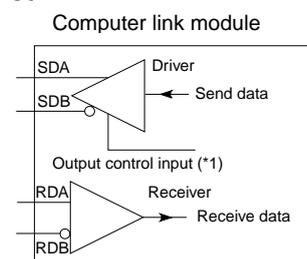
Care should be exercised to the following points when communicating data between computer link module and external devices via RS-422 line.

On the external devices, data should be sent/received with the following points taken into account.

(1) Operation of RS-422/485 interface

(a) Configuration of RS-422/485 interface

In case of RS-422/485 interface, driver (send) and receiver (reception) section of the computer link module has the following configuration.



*1 "Output control input" (also referred to as send gate) of the driver (send) section as shown in the figure to the left is used to determine whether or not data is outputted from SDA/SDB to the external device.

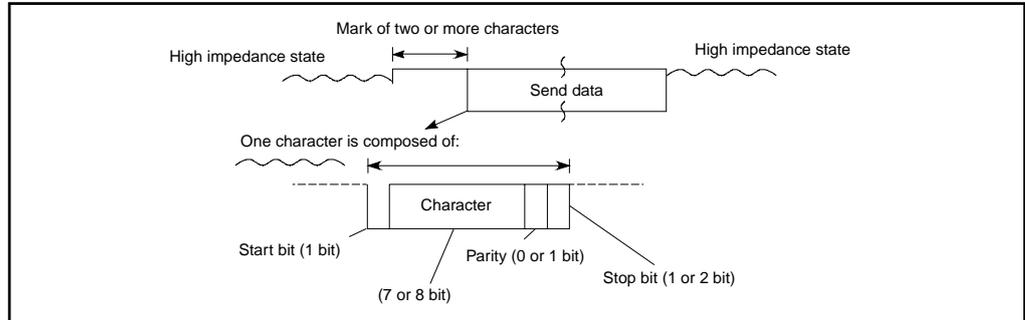
(b) Operation of RS-422/485 interface

In the above figure, the status of the impedance becomes low (status where data can be transmitted) when the "output control input" is turned ON.

It becomes high (status where data is not being transmitted) when the "output control input" is turned OFF.

(2) Data transmission method

The computer link module outputs a mark of two or more characters and then actual data after releasing high impedance state due to the operation described above during data transmission.



(3) Countermeasures against erroneously received data at the external devices

Since the transmission line is in a high impedance state and becomes unsteady due to noise and so forth when neither station performs transmission, there is a possibility that erroneous data may be received by the external device. At this time, it seems that there occur a parity error or framing error, so erroneous data should be skipped.

Either of ACK, NAK, STX is sent first when communicating data in the dedicated protocol. Therefore, data, until either of ACK, NAK, STX is received, should concurrently be skipped.

POINT

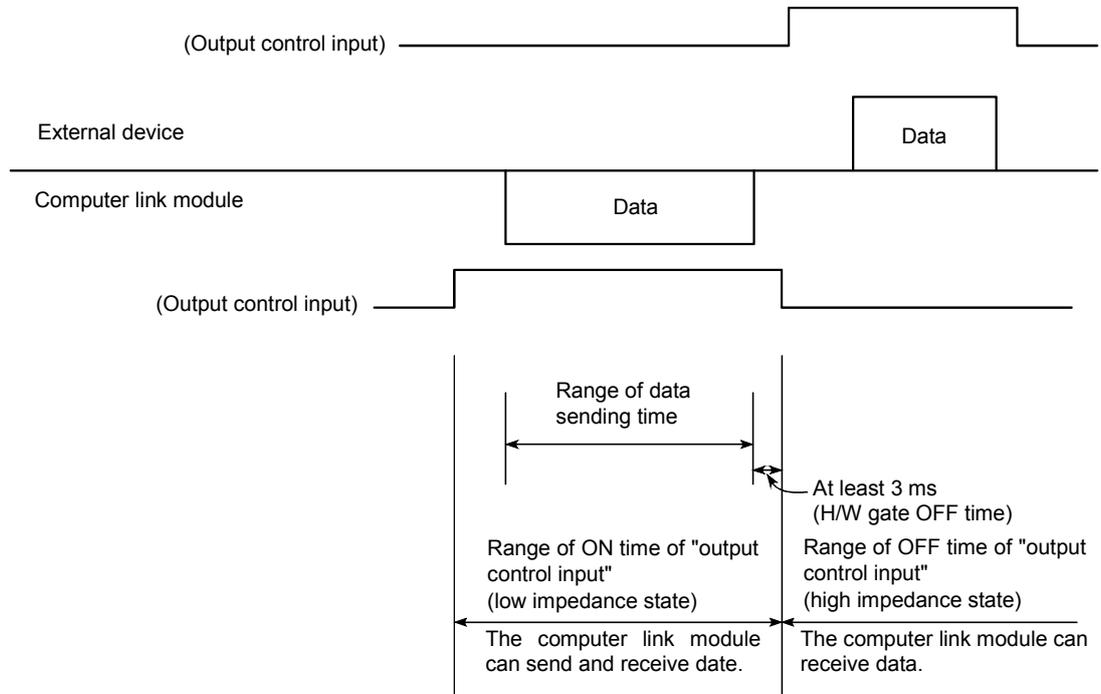
When there are pull-up and pull-down resistors at the external devices, erroneous data may not be received.

When there is not any pull-up or pull-down resistor at the external devices, erroneous reception of data can be prevented by attaching a resistor (standard resistor is about 4.7 kΩ, 1/4W).

The diagram shows an external device connected to a receiver. The external device has two lines, RDA and RDB. RDA is connected to the non-inverting input (+) of a receiver through a pull-up resistor. RDB is connected to the inverting input (-) of the receiver through a pull-down resistor connected to ground. The receiver's output is labeled 'Receive data'.

- (4) When data is communicated with the external devices connected to the computer link module by a ratio of 1:n or m:n

The computer link module requires 3 ms or more from when it has finished sending data until transmission processing is completed (high impedance state is established).

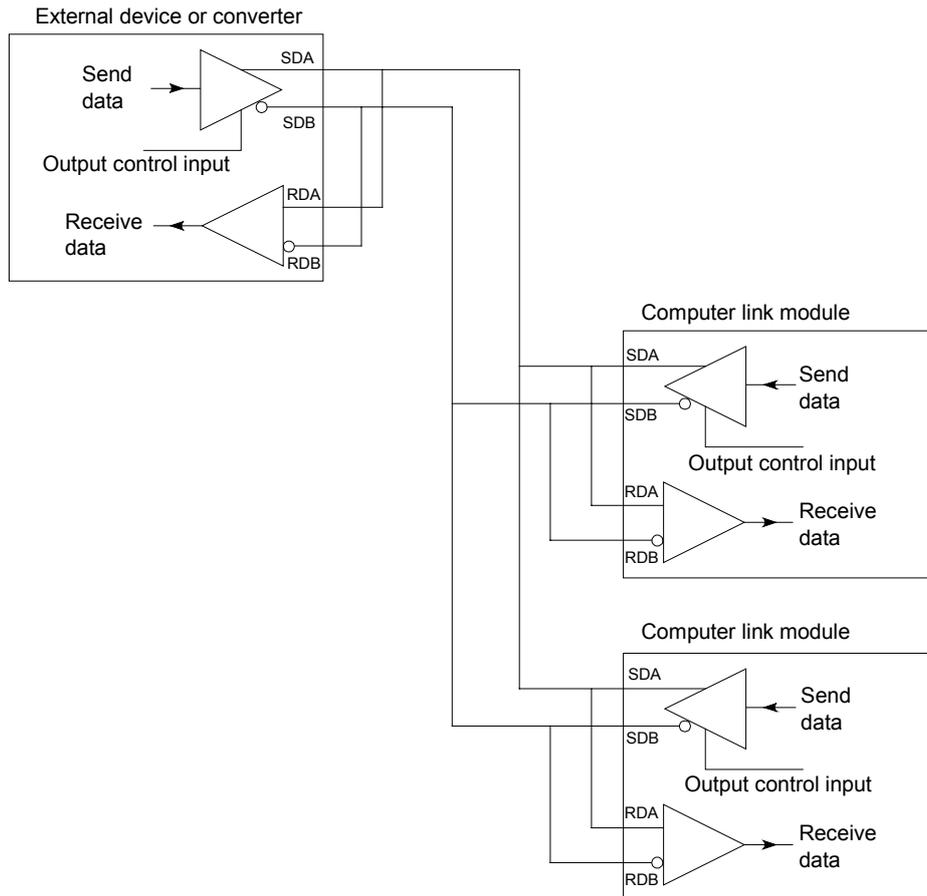


3. SPECIFICATIONS

When the send signal of each device is connected as shown below, data will be outputted (sent) simultaneously from a given device when "output control input" is in a state of ON at two or more locations.

In order to communicate data normally, external devices must

- Turn the "output control input" to ON state only when data is sent.
 - Turn the "output control input" to OFF state when data is not sent.
- The computer link module side automatically controls the output control input.



3.9 I/O Signals List for PC CPU

Input/output signals of the computer link module for PC CPU are as follows (I/O signals handled at the printer function are not described in this section): "n" added to the number of X and Y is determined by the I/O number of the slot in which the computer link is installed (for example, when computer link module is installed into the slot 0 of the main base unit; Xn0 to X0). I/O signals for A1SCPUC24-R2 computer link module are fixed at X/YE0 to FF (m = E). I/O signals for A2CCPUC24 (PRF) computer link module are fixed at X/Y1E0 to 1FF (m = 1E).

(1) Input signals (Computer link module → PC CPU)

Input signals are turned ON/OFF by the computer link module.

Table 3.5 Input Signals List

Input Signal	Signal Name	Mode		Description	Reference Sections																																													
		Dedicated protocol	No-protocol/Bidirectional																																															
Xn0	Send completed	—	O	Turns ON when the send from the computer link module to the external device is completed when Y(n+1)0 is turned ON. Turns OFF when Y(n+1)0 is turned OFF.	6.5, 7.6																																													
Xn1	Received data read request	—	O	Turns ON when the completed code, fixed length data, or designated data length is received from the external device. Turns OFF when Y(n+1)1 is turned ON.	6.4, 7.5																																													
Xn2	Global signal	O	—	Turns ON/OFF according to the message (factor number) when a global command is received from a computer.	5.13																																													
Xn3	On-demand function operating	O	—	Turns ON when the on-demand transmission is executed according to the request from the sequence program. Turns OFF when the on-demand transmission is completed.	5.14																																													
Xn4 to Xn6	Computer link module transmission sequence state	O	—	<p>(1) Set values "1" to "8" of the mode setting switches (refer to Section 4.2.1) indicating the state of communications between the computer connected to the interface on the dedicated protocol side and the computer link module. Set values "A" to "D" of the mode setting switches indicating the state of communications between the computer connected to the interface on the main channel side (set with SW11, a transmission specification setting switch, refer to Section 4.2.2) and the computer link module.</p> <p>(2) Used by a sequence program to check communications status, etc.</p> <table border="1"> <thead> <tr> <th>Value indicated by 3 bits</th> <th>Xn6</th> <th>Xn5</th> <th>Xn4</th> <th>Message Sequence State</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>When the computer link module is initialized or is not in the dedicated protocol when the power is turned ON.</td> </tr> <tr> <td>1</td> <td>OFF</td> <td>OFF</td> <td>ON</td> <td>Waiting for ENQ</td> </tr> <tr> <td>2</td> <td>OFF</td> <td>ON</td> <td>OFF</td> <td>Received ENQ</td> </tr> <tr> <td>3</td> <td>OFF</td> <td>ON</td> <td>ON</td> <td>Received station number (self)</td> </tr> <tr> <td>4</td> <td>ON</td> <td>OFF</td> <td>OFF</td> <td>Waiting for response from programmable controller after receiving all data</td> </tr> <tr> <td>5</td> <td>ON</td> <td>OFF</td> <td>ON</td> <td>Waiting for message (waiting for the sending of the response message)</td> </tr> <tr> <td>6</td> <td>ON</td> <td>ON</td> <td>OFF</td> <td>Unused</td> </tr> <tr> <td>7</td> <td>ON</td> <td>ON</td> <td>ON</td> <td>Unused</td> </tr> </tbody> </table>	Value indicated by 3 bits	Xn6	Xn5	Xn4	Message Sequence State	0	OFF	OFF	OFF	When the computer link module is initialized or is not in the dedicated protocol when the power is turned ON.	1	OFF	OFF	ON	Waiting for ENQ	2	OFF	ON	OFF	Received ENQ	3	OFF	ON	ON	Received station number (self)	4	ON	OFF	OFF	Waiting for response from programmable controller after receiving all data	5	ON	OFF	ON	Waiting for message (waiting for the sending of the response message)	6	ON	ON	OFF	Unused	7	ON	ON	ON	Unused	—
Value indicated by 3 bits	Xn6	Xn5	Xn4	Message Sequence State																																														
0	OFF	OFF	OFF	When the computer link module is initialized or is not in the dedicated protocol when the power is turned ON.																																														
1	OFF	OFF	ON	Waiting for ENQ																																														
2	OFF	ON	OFF	Received ENQ																																														
3	OFF	ON	ON	Received station number (self)																																														
4	ON	OFF	OFF	Waiting for response from programmable controller after receiving all data																																														
5	ON	OFF	ON	Waiting for message (waiting for the sending of the response message)																																														
6	ON	ON	OFF	Unused																																														
7	ON	ON	ON	Unused																																														

3. SPECIFICATIONS

Input Signal	Signal Name	Mode		Description	Reference Sections
		Dedicated protocol	No-protocol/Bidirectional		
Xn7	Computer link module READY signal	O	O	(1) Turns ON when the computer link module becomes READY after the power is turned ON, the PC CPU is resetted, or mode is changed. Turns OFF when an error (which discontinues the computer link module's operation) occurs. (2) Used for the READY communications signal when the no-protocol mode, bidirectional mode, or the on-demand function of the dedicated protocol is used.	—
Xn8	—	—	—	Unavailable	—
Xn9	Mode switching complete	O	O	Turns ON when the mode switching of the computer link module is completed by means of ON of Y(n+1)9. Turns OFF when Y(n+1)9 is OFF.	12
XnA to XnC	—	—	—	Unavailable	—
XnD	Watch dog timer error	O	O	Turns ON when the computer link module watch dog timer error occurs or when the mode setting switch is set improperly. Remains OFF during normal operation.	—
XnE to Y(n+1)F	—	—	—	Unavailable	—

(2) Output signals (PC CPU → computer link module)

Output signals are turned ON/OFF by the sequence program.

Table 3.6 Output Signals List

Output Signal	Signal Name	Mode		Description	Reference Sections
		Dedicated protocol	No-protocol/Bidirectional		
—	—	—	—	Usage prohibited	—
Y _(n+1) 0	Send request	—	O	When this signal is turned ON by the sequence program in the no-protocol mode/bidirectional mode, data written to the buffer memory is transmitted from the computer link module to an external device. (After X _n 0 is turned ON, Y _(n+1) 0 is turned OFF.)	6.5, 7.6
Y _(n+1) 1	Received data read completed	—	O	This signal turns ON in the no-protocol mode/bidirectional mode, when the PC CPU has completed reading the data received from an external device. This data is stored in the computer link module buffer memory. (After X _n 1 is turned OFF, Y _(n+1) 1 is turned OFF.)	6.4, 7.5
Y _(n+1) 2 to Y _(n+1) 8	—	—	—	Usage prohibited	—
Y _(n+1) 9	Mode switching request	O	O	Changes a mode of the computer link module and performs an initializing process when this signal is turned ON by the sequence program (Turns OFF Y _(n+1) 9 after ON of X _n 9).	12
Y _(n+1) A to Y _(n+1) F	—	—	—	Usage prohibited	—

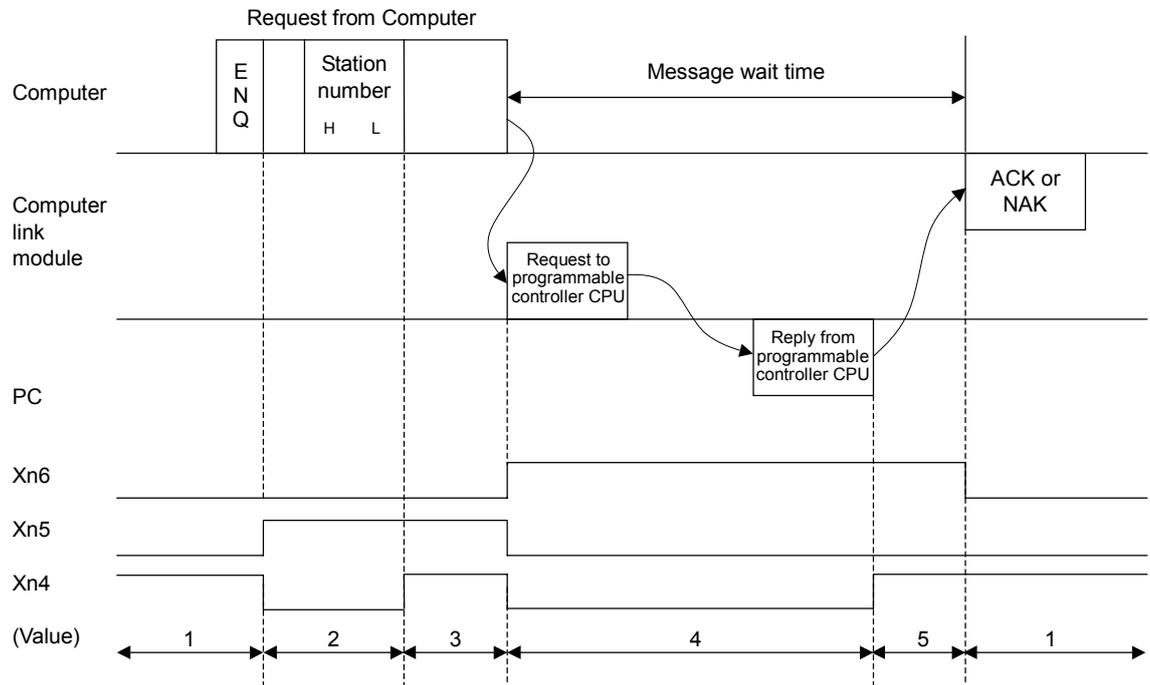
IMPORTANT

- (1) Among the signals output from the PC CPU to a special function module, do not output the "usage prohibited" signals. If a "usage prohibited" signal is output, it will cause malfunction of the PC system.
- (2) Unless otherwise specified, common number of input signals of computer link is X_n0 to X_(n+1)F, and common number of output signals of computer link is Y_n0 to Y_(n+1)F. When the A2CCPUC24(PRF) and A1SCPUC24-R2 is used, number of signals should be changed and considered as follows:

	Input Signal	Output Signal
A1SCPUC24-R2	XE0 to XFF	YE0 to YFF
A2CCPUC24(PRF)	X1E0 to X1FF	Y1E0 to Y1FF

REMARK

Example: Use of input signals Xn4 to Xn6.



3.10 Buffer Memory Applications and Allocation

The term "buffer memory" used in this manual refers to a memory area of a computer link module used to store the control and communications data which is transmitted between an external device (e.g., a computer) and a PC CPU.

The buffer memory can be accessed from the sequence program by using the FROM/TO instruction.

The buffer memory can be accessed from an external device by using the buffer memory read/write command (CR, CW) with dedicated protocols 1 to 4.

(1) Buffer memory applications

There are two types of buffer memory area. One area may be used freely by the user, the other area has a special application.

(a) User area (Address 0H to FFH, area of 120H to DFFH)

There are four applications of the user area, which can be categorized as follows.

1) Data receive area in no-protocol mode/bidirectional mode

This area stores data transmitted from an external device in the no-protocol mode or bidirectional mode.

2) No-protocol mode/bidirectional mode data send area

This area stores data from the PC CPU to be transmitted to an external device.

3) On-demand data storage area

This area stores send data to be transmitted from the sequence program to an external device using the on-demand function.

4) Area when using buffer memory read/write commands

This area stores data when communication is made using protocols 1 to 4 for buffer memory read/write commands (CR,CW).

(b) Specific use area (Area of address 100H to 11FH)

The applications of this memory area are fixed. They are used to determine the data communications format and to change the allocation of the memory area for section (a) above.

When the power is turned ON, the PC CPU is reset or switching the mode, default values are written to this specific use area.

Default values can be changed to suit the purposes and applications of data transmission and the specifications of the external device.

(2) Buffer memory allocation

The buffer memory consists of 16-bit addresses. The buffer memory has no back-up battery.

The buffer memory address names and values for each address are listed in the following table.

IMPORTANT

Do not write data in the "system area" in the buffer memory of a special function module.

If data is written in the "system area", the PC system may malfunction.

POINT

Access from the PC CPU has priority over other processing in a special function module.

Therefore, if the buffer memory of a special function module is frequently accessed from the PC CPU, it will not only extend the scanning time of the PC CPU, but also cause a delay in the various processing in a special function module.

Access from the PC CPU to the buffer memory with FROM/TO instruction should be executed only when necessary.

3. SPECIFICATIONS

Function	Computer link function								
	AJ71UC24		ATSJ71UC24		ATSJ71C24		A1SCPU C24-R2	A2CCPU C24	A2CCPU C24-PRF
Applicable module	○	○	○	○	△	△	○	△	△
Remarks	Refer to Section 3.10 (3)						Refer to Section 3.10 (3)		

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The following table shows the contents of the buffer memory allocation. The memory areas which are used with the no-protocol mode or the bidirectional mode are listed as those to be used with the no-protocol mode. The memory areas function the same way in either mode. When the bidirectional mode is required, see the following table, changing "no-protocol" to "bidirectional".

Table 3.13 Buffer Memory

Addresses	Buffer Memory Address Names		Default Values	Related Mode			(Reference Sections)
				Dedicated Protocol	No-Protocol	Bidirectional	
0H	User area (256 words)	No-protocol send data length storage area	0	○	○	○	5.9 5.14 6.2.1(1) 6.2.2(1) 7.2.2(1) 7.2.3(1)
1H to 7FH		No-protocol send buffer memory area (Send data storage area)			○	○	
80H		No-protocol received data length storage area.			○	○	
81H to FFH		No-protocol receive buffer memory area (Received data storage area)			○	○	
100H•	Area to specify receive completed code in no-protocol mode		0D0AH (CR, LF)	—	●	—	6.2.4(2)(a)
101H	Error LED display state storage area		0	△	△	△	8.1
102H	Error LED turn OFF request area		0	●	●	●	
103H•	Area to specify word or byte units in no-protocol mode		0 (words)	●	●	●	5.2.1(2)(a) 6.2.4(2)(b) 7.2.6(2)(a)
104H•	Area to specify head address of send buffer memory for no-protocol mode		0	—	●	●	6.2.4(2)(c) 7.2.6(2)(b)
105H•	Area to specify send buffer size for no-protocol mode		80H	—	●	●	
106H•	Area to specify head address of receive buffer memory for no-protocol mode		80H	—	●	●	6.2.4(d) 7.2.6(c)
107H•	Area to specify receive buffer size for no-protocol mode		80H	—	●	●	
108H•	Area to specify receive completed data length in no-protocol mode		127 (words)	—	●	—	6.2.4(2)(e)
109H	Area to specify head address of on-demand buffer memory		0	●	—	—	5.14
10AH	Area to specify on-demand data length		0	●	—	—	
10BH•	Area to specify RS-232C CD terminal check		0 (check)	●	●	●	5.2.1(2)(b) 6.2.4(2)(f) 7.2.6(2)(d)
10CH	Storage area for on-demand errors		0	△	—	—	5.14
10DH	Receive data clear request area for no-protocol mode		0	—	●	—	6.2.1(4)
10EH	System area (unavailable)		—	—	—	—	
10FH•	RS-232C communications mode setting area		0 (Full-duplex transmission)	●	●	●	10.4
110H•	Simultaneous send priority/non-priority setting area		0 (Priority)	●	●	●	
111H•	Send method setting area when transmission is resumed		0 (No retransmission)	●	●	●	
112H•	Bidirectional mode setting area		0 (No-protocol mode)	—	—	●	7.2.6(2)(f) to 7.2.6(2)(k)
113H•	Time-out check time setting area		0 (Infinite)	—	—	●	
114H•	Simultaneous transmission data valid/invalid setting area		0 (Data valid)	—	—	●	
115H•	Check sum enable/disable setting area		0 (Check sum enabled)	—	—	●	
116H	Data send error storage area		0	—	—	●	
117H	Data receive error storage area		0	—	—	●	

3. SPECIFICATIONS

Addresses	Buffer Memory Address Names	Default Values	Related Mode			(Reference Sections)
			Dedicated Protocol	No-Protocol	Bidirectional	
118H	Operation mode setting state storage area	Set number of switch	Δ	Δ	Δ	8.3.3
119H	Mode switching specification area	0 (No switching)	○	○	○	12.4 12.5
11AH•	Transmission control specification area (DTR/DSR control and DC code control)	0 (DTR/DSR control)	●	●	●	9.3
11BH•	DC1/DC3 control code specification area	1311H	●	●	●	
11CH•	DC2/DC4 control code specification area	1412H	●	●	●	
11DH	RS-232C signal status storage area	———	Δ	Δ	Δ	8.2
11EH	Mode setting switch/station number setting switch condition storage area	———	Δ	Δ	Δ	8.3.1
11FH	Transmission specification setting switch condition storage area	———	Δ	Δ	Δ	8.3.2
120H to DFFH	User free area (3296 words)	0	○	○	○	Sections for address 0H to FFH

- The ●, ○, Δ, and — symbols in the table indicate the following:
- : PC CPUs can read/write from/to this area and computers can read from this area.
 - : PC CPUs and computers can read/write from/to this area.
 - Δ : PC CPUs and computers can only read from this area.
 - : PC CPUs and computers do not need to read/write from/to this area.

IMPORTANT

If the default value of an item with a symbol "●" marked to the right of an address is changed, do it when the READY signal (Xn7) of the computer link module is started.

3. SPECIFICATIONS

(3) Accessible area of each computer link module

Accessible area to buffer memory and accessible software version are shown for each computer link module.

Since those areas that cannot be accessed by the computer link module used are "System Area" (unavailable), user must not write data in those areas. If any data is written in those areas, the computer link module cannot run properly.

Addresses			Buffer Memory Address Names			Accessible Software Version							
						AJ71 UC24	A1SJ71 UC24-R2/ PRF	A1SJ71 UC24-R4	A1SJ71 C24-R2/ PRF	A1SJ71 C24-R4	A1S CPU C24-R2	A2C CPU C24	A2C CPUC 24-PRF
0H	User area (256 words)	Area for default	No-protocol send data length storage area			Version A or later	Version R or later	Version R or later	Version A or later				
1H to 7FH			No-protocol send buffer memory area (Send data storage area)										
80H			No-protocol received data length storage area.										
81H to FFH			No-protocol receive buffer memory area (Received data storage area)										
100H	Area to specify receive completed code in no-protocol mode												
101H	Error LED display state storage area												
102H	Error LED turn OFF request area												
103H	Area to specify word or byte units in no-protocol mode												
104H	Area to specify head address of send buffer memory for no-protocol mode												
105H	Area to specify send buffer size for no-protocol mode												
106H	Area to specify head address of receive buffer memory for no-protocol mode												
107H	Area to specify receive buffer size for no-protocol mode												
108H	Area to specify receive completed data length in no-protocol mode												
109H	Area to specify head address of on-demand buffer memory												
10AH	Area to specify on-demand data length												
10BH	Area to specify RS-232C CD terminal check												
10CH	Storage area for on-demand errors												
10DH	Receive data clear request area for no-protocol mode												
10EH	System area (unavailable)												
10FH	RS-232C communications mode setting area												
110H	Simultaneous send priority/non-priority setting area												
111H	Send method setting area when transmission is resumed												
112H	Bidirectional mode setting area												
113H	Time-out check time setting area												
114H	Simultaneous transmission data valid/invalid setting area												
115H	Check sum enable/disable setting area												

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Addresses		Accessible Software Version										
		AJ71 UC24	A1SJ71 UC24-R2/ PRF	A1SJ71 UC24-R4	A1SJ71 C24-R2/ PRF	A1SJ71 C24-R4	A1S CPU C24-R2	A2C CPU C24	A2C CPUC 24-PRF			
116H	Data send error storage area	Version A or later	Version R or later	Version R or later	Version A or later							
117H	Data receive error storage area											
118H	Operation mode setting state storage area											
119H	Mode switching specification area				Version M or later	Version M or later		Version A or later	Version A or later	Version A or later	Version K or later	Version K or later
11AH	Transmission control specification area (DTR/DSR control and DC code control)											
11BH	DC1/DC3 control code specification area											
11CH	DC2/DC4 control code specification area				Version A or later	Version A or later		Version A or later				
11DH	RS-232C signal status storage area											
11EH	Mode setting switch/station number setting switch condition storage area											
11FH	Transmission specification setting switch condition storage area				Version A or later	Version A or later		Version A or later				
120H to DFFH	User free area (3296 words)											

 Indicates a system area (unavailable).

REMARK

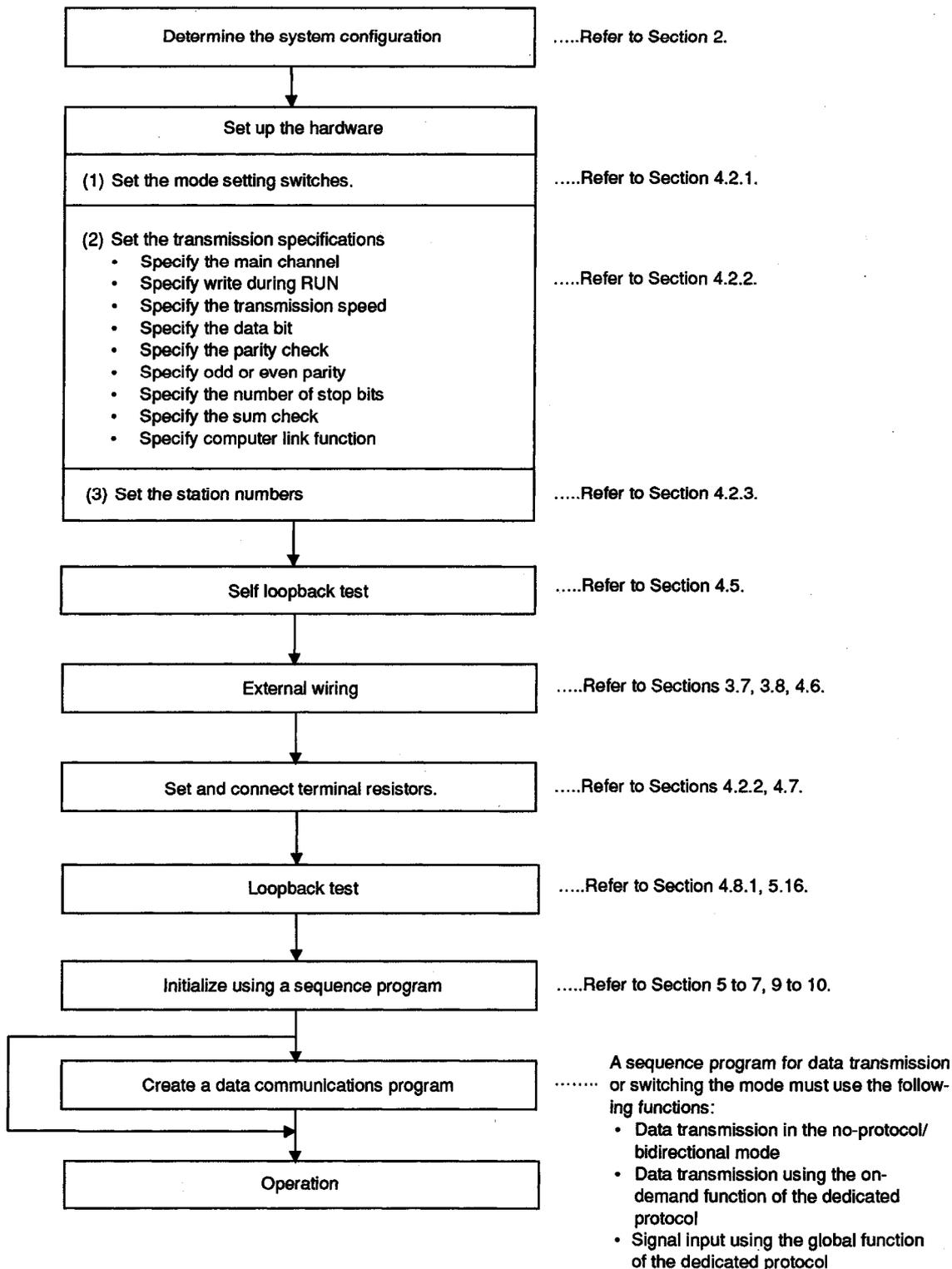
Software version of computer link module can be made sure by a seal in front of the module. Make sure of it according to Section 1.3.2.

4. SETTINGS AND PROCEDURES BEFORE OPERATION

4.1 Settings and Procedures before Operation

4.1.1 Flow of procedures before operation

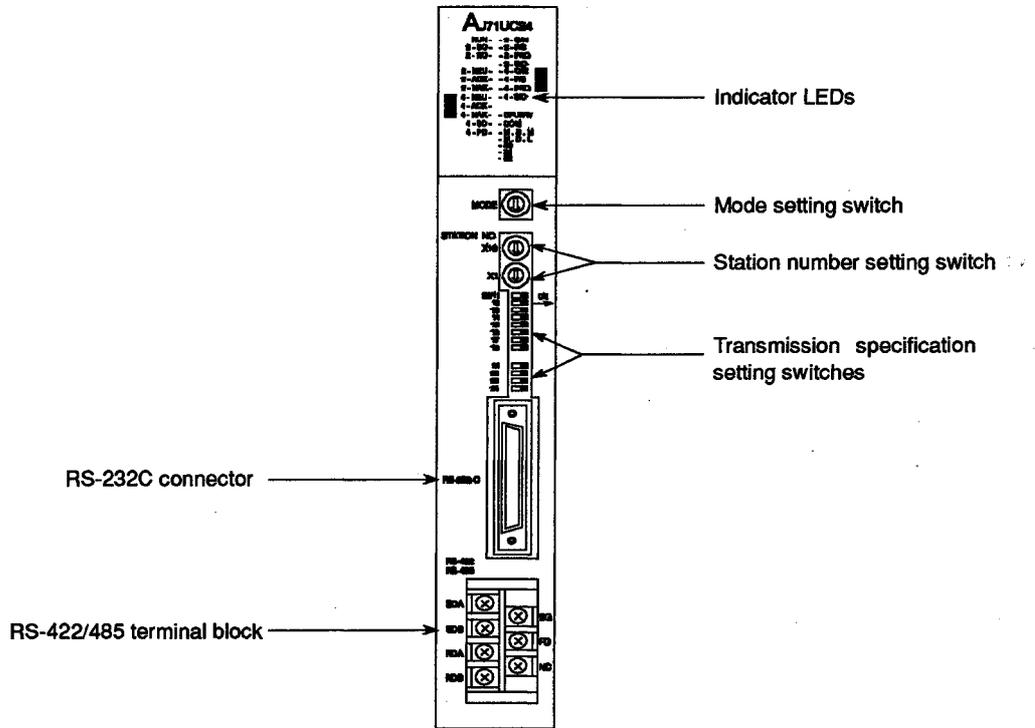
Below is the flow of procedures to start up the system equipped with a computer link module:



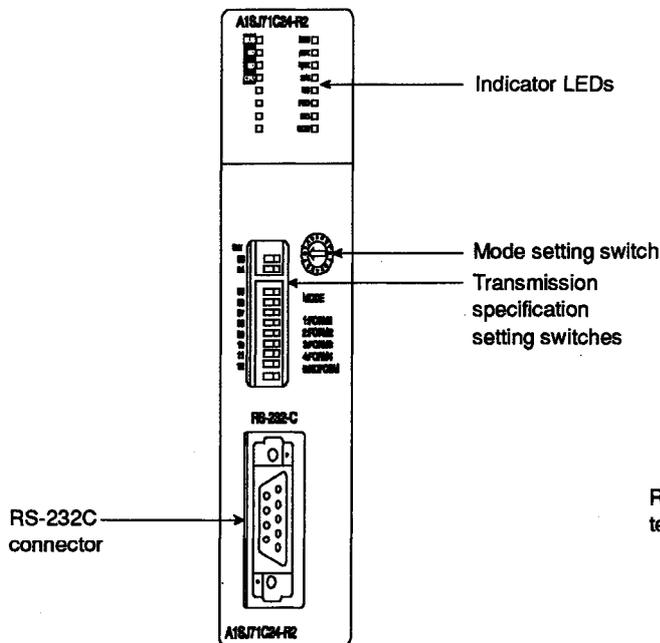
4. SETTINGS AND PROCEDURES BEFORE OPERATION

4.1.2 Nomenclature

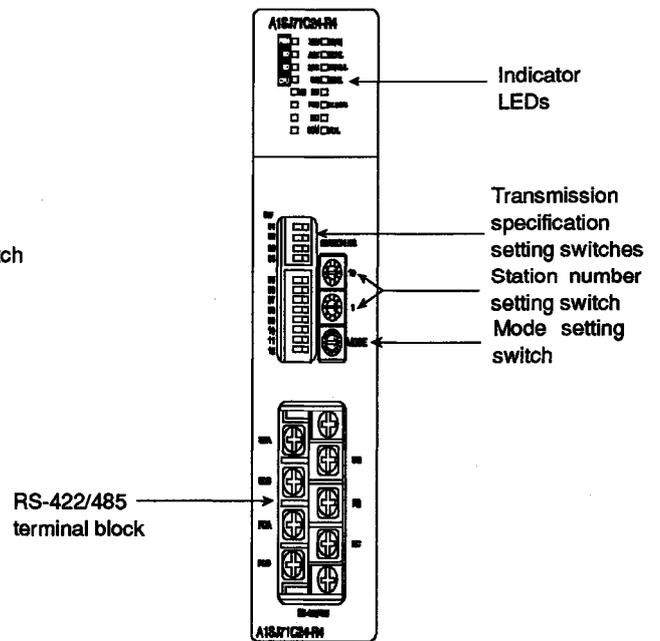
(1) AJ71UC24



(2) A1SJ71UC24-R2, A1SJ71UC24-PRF, A1SJ71C24-R2, A1SJ71C24-PRF



(3) A1SJ71C24-R4

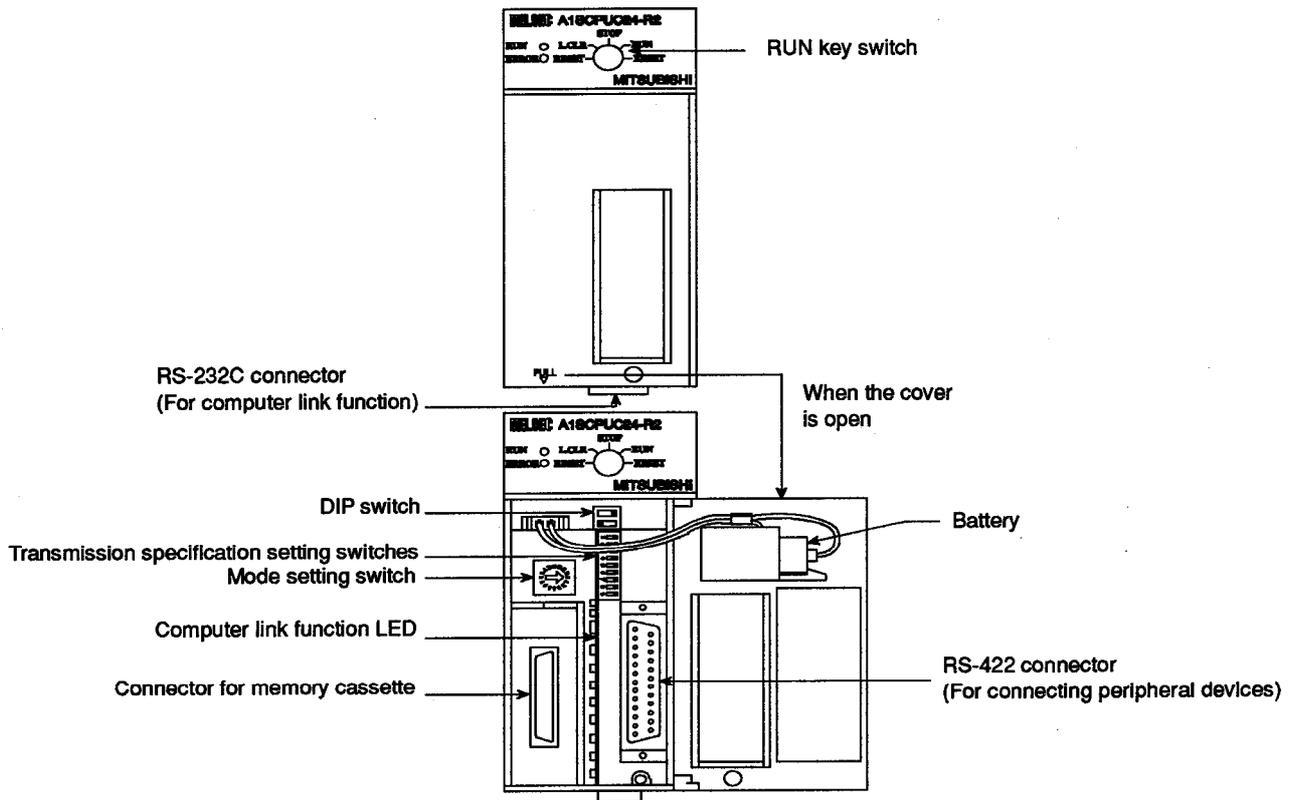


* The figure shows the A1SJ71C24-R2

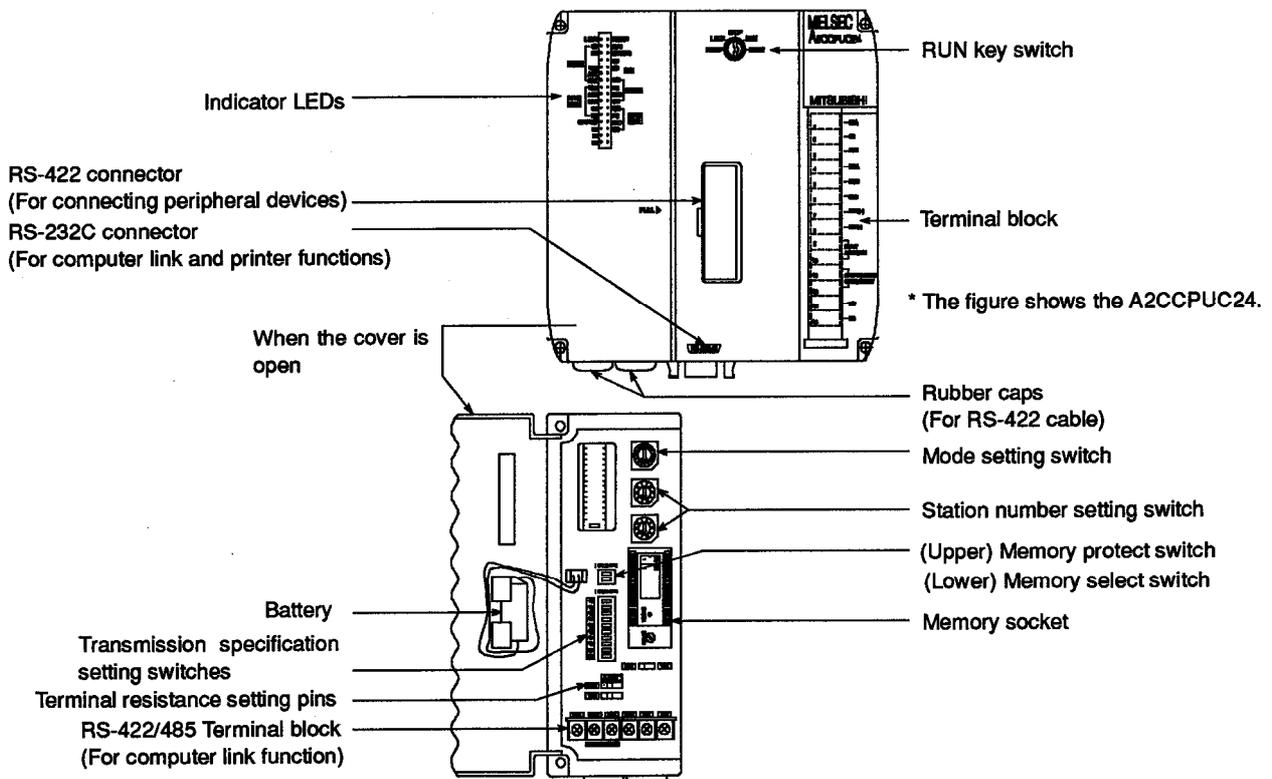
4. SETTINGS AND PROCEDURES BEFORE OPERATION

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(4) A1SCPUC24-R2



(5) A2CCPUC24, A2CCPUC24-PRF



4. SETTINGS AND PROCEDURES BEFORE OPERATION

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4.2 Switch Setting

This section describes the switch settings required for performing the computer link operation.

Make proper setting according to the type and the number of interfaces of the computer link module to be used.

POINTS

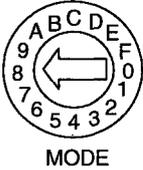
1. If any of the switch settings described in this section have been changed, either turn OFF and ON the PC CPU power supply or reset the PC CPU.
2. The positions and shapes of the switches described in this section may vary depending on the computer link module to be used. Confirm the position and shape of the switches by referring to Section 4.1.2 and make settings.

4.2.1 Mode setting switch

Set the operation mode of each interface according to the system configuration and functions to be used for performing the computer link operation.

If the mode setting switch is set at "1" to "8" and the bidirectional mode designation area (buffer address 112H) is set at "1", the "no-protocol mode" indicated in the table below switches to "bidirectional mode".

All modes are indicated as "no-protocol mode" in the table below.

Mode Setting Switch	Mode Setting Switch Number	Mode Settings		Remarks
		RS-232C	RS-422	
	0	Unusable		
	1	Protocol 1	No-protocol	For connection of computers to RS-232C and RS-422 individually, or for connection of a printer to the no-protocol interface. Both interfaces work independently.
	2	Protocol 2	No-protocol	
	3	Protocol 3	No-protocol	
	4	Protocol 4	No-protocol	
	5	No-protocol	Protocol 1	
	6	No-protocol	Protocol 2	
	7	No-protocol	Protocol 3	
	8	No-protocol	Protocol 4	
	9	No-protocol ← → No-protocol	This mode is used to enable a no-protocol computer link with all devices connected to the RS-232C and RS-422 interfaces.	
	A	Protocol 1 ← → Protocol 1	This mode is used to enable a dedicated protocol computer link with all devices connected to the RS-232C and RS-422 interfaces.	
	B	Protocol 2 ← → Protocol 2		
	C	Protocol 3 ← → Protocol 3		
	D	Protocol 4 ← → Protocol 4		
E	Unusable		—	
F	For self-loopback test		For checking computer link module operations.	

(1) Description of settings

(a) When the switch is set to a number between "1" and "4"

- The devices connected to the RS-232C and RS-422 interfaces respectively operate independently in the set modes.
- A dedicated-protocol computer link can be established with the device connected to the RS-232C interface. Set the switch to the number proper for the message format to be sent or received.
- A no-protocol or bidirectional computer link can be established with the device connected to the RS-422 interface.

(b) When the switch is set to a number between "5" and "8"

- The devices connected to the RS-232C and RS-422 interfaces respectively operate independently in the set modes.
- A no-protocol or bidirectional computer link can be established with the device connected to the RS-232C interface.
- A dedicated-protocol computer link can be established with the device connected to the RS-422 interface.
Set the switch to the number proper for the message format to be sent or received.
When two or more computer link modules are loaded, the one specified in the message sent from the computer receives and processes it.

(c) When the switch is set to "9"

- The devices connected to the RS-232C and RS-422 interfaces synchronize with each other, thereby allowing a no-protocol computer link between all the devices connected to the same interface.
- Data communications can be executed only between the PC CPU of the self station and the external device or the PC CPU of another station connected to the interface set by the main channel setting switch (refer to Section 4.2.2).

(d) When the switch is set to a number between "A" and "D"

- The devices connected to the RS-232C and RS-422 interfaces synchronize with each other, thereby allowing a dedicated-protocol computer link between all the devices connected to the same interface.
- Data communications can be executed only between the PC CPU of the self station and the external device or the PC CPU of another station connected to the interface set by the main channel setting switch (refer to Section 4.2.2).
When two or more computer link modules are connected to the main channel, the one specified in the message sent from the computer receives and processes it.

4. SETTINGS AND PROCEDURES BEFORE OPERATION

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- (e) When the switch is set to "F"
- A self-loopback test can be performed on the computer link module.
 - Set the switch to this position to check the computer link module PC CPU communications function, and the data send and receive function of the RS-232C interface and of the RS-422 interface.
Checking the data send and receive function of the RS-232C and RS-422 interfaces requires a loopback cable (refer to Section 4.5).

POINT

Refer to Section 2 for setting examples of respective system configurations.

(2) Precautions for setting

- (a) When the system configuration to be computer-linked is m:n (the number of external devices and that of PC CPUs), data communications in dedicated protocol 3 is impossible. For this reason, do not set the switch to "7" or "C".
- (b) When the system configuration to be computer-linked is 1:1 (the number of external devices and that of PC CPU), data cannot be communicated properly because of a noise coming in from the interface to which no external device is connected. For this reason, do not set the switch to between "9" and "D".
- (c) The settings of the following functions or modes made by the user will be the same on the devices connected to the RS-232C interface and the RS-422 interface respectively:
- Settings of transmission specifications : Refer to Section 4.2.2.
 - Settings of transmission control functions: Refer to Sections 3.3 and 9.
- (d) The table below shows which mode setting switch setting is applicable to each type of computer link module:

Mode Setting Switch No.	Setting for RS-232C	Setting for RS-422	Applicable Computer Link Module						
			AJ71 UC24	A1SJ71 UC24-R2	A1SJ71 UC24-PRF	A1SJ71 UC24-R4	A1SCPU C24-R2	A2CCPU C24	A2CCPU C24PRF
				A1SJ71 C24-R2	A1SJ71 C24PRF	A1SJ71 C24-R4			
0	Unusable		—	—	—	—	—	—	—
1 to 3	Protocol mode n	No-protocol mode	O	O	O	—	O	O	O
4	Protocol mode 4	No-protocol mode	O	O	O	O	O	O	O
5	No-protocol mode	Protocol mode 1	O	O	O	O	O	O	O
6 to 8	No-protocol mode	Protocol mode n	O	—	—	O	—	O	O
9	No-protocol mode		O	—	—	—	—	O	O
A to D	Protocol mode n		O	—	—	—	—	O	O
E	Unusable		—	—	—	—	—	—	—
F	Self-loopback test		O	O	O	O	O	O	O

O: Applicable —: Inapplicable

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4.2.2 Setting transmission specifications, main channel, etc.

Set the switches of the computer link module used as shown below:

(1) AJ71UC24

Setting of Switches	Switches	Setting Items	Position of Setting Switch								Remarks
			OFF				ON				
	SW11	Main channel settings	RS-232C				RS-422/485				Valid for modes 9 to D
	SW12	Data bit setting	7 bits				8 bits				Parity bit is not included
		Baud rate (BPS)	300	600	1200	2400	4800	9600	19200	Unusable	—
	SW13	Transmission speed setting	OFF	ON	OFF	ON	OFF	ON	OFF	ON	
	SW14		OFF	OFF	ON	ON	OFF	OFF	ON	ON	
	SW15		OFF	OFF	OFF	OFF	ON	ON	ON	ON	
	SW16	Parity bit setting	Disabled				Enabled				—
	SW17	Even/odd parity setting	Odd				Even				Valid only when parity check "enabled" is selected
	SW18	Stop bit setting	1 bit				2 bits				—
	SW21	Sum check setting	Not set				Set				For dedicated protocol
	SW22	Write during RUN enabled/disabled setting	Disabled				Enabled				
	SW23	Computer link/Multidrop	Multidrop link				Computer link				Must be set the switch to ON (computer link)
SW24	Master station/Local station setting	Multidrop link local station				Multidrop link master station				Setting is ignored in computer link	

* The functions of the SW23 and SW24 are different from those of the AJ71C24-S8

4. SETTINGS AND PROCEDURES BEFORE OPERATION

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(2) A1SJ71UC24-R2, A1SJ71C24-R2, A1SJ71UC24-PRF, A1SJ71C24-PRF

Setting of Switches	Switches	Setting Items	Position of Setting Switch								Remarks	
			ON				OFF					
SW 03 <input type="checkbox"/> ON ← 04 <input type="checkbox"/> 05 <input type="checkbox"/> ON ← 06 <input type="checkbox"/> 07 <input type="checkbox"/> 08 <input type="checkbox"/> 09 <input type="checkbox"/> 10 <input type="checkbox"/> 11 <input type="checkbox"/> 12 <input type="checkbox"/>	SW03	A1ADP-SP setting	A1ADP-SP used				A1ADP-SP not used				A1SJ71UC24-R2, A1SJ71UC24-PRF only	
	SW04	Write during RUN setting	Enabled				Disabled				For dedicated protocol	
		Transmission speed setting	Baud rate (BPS)	300	600	1200	2400	4800	9600	19200	Unusable	—
	SW05		OFF	ON	OFF	ON	OFF	ON	OFF	ON		
	SW06		OFF	OFF	ON	ON	OFF	OFF	ON	ON		
	SW07		OFF	OFF	OFF	OFF	ON	ON	ON	ON		
	SW08	Data bit setting	8 bits				7 bits				Parity bit is not included.	
	SW09	Parity bit setting	Set				Not set				—	
	SW10	Even/odd parity setting	Even				Odd				Valid when parity bit is set.	
	SW11	Stop bit setting	2 bits				1 bit				—	
	SW12	Sum check setting	Set				Not set				For dedicated protocol	

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(3) A1SJ71UC24-R4, A1SJ71C24-R4

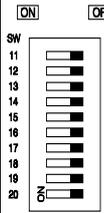
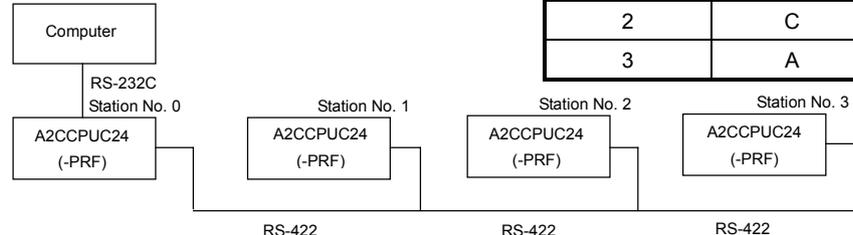
Setting of Switches	Switches	Setting Items	Position of Setting Switch								Remarks	
			ON				OFF					
	SW01	Master station /Local station setting	Multidrop link master station				Multidrop link local station				Setting is ignored in computer link.	
	SW02	Computer link/multidrop link selection	Computer link				Multidrop link				Must be set to ON (computer link).	
	SW03	A1ADP-SP setting	A1ADP-SP used				A1ADP-SP not used				A1SJ71UC24-R4 only	
	SW04	Write during RUN enabled/disabled setting	Enabled				Disabled				For dedicated protocol	
			Baud rate (BPS)	300	600	1200	2400	4800	9600	19200	Unusable	—
	SW05	Transmission speed setting	OFF	ON	OFF	ON	OFF	ON	OFF	ON		
	SW06		OFF	OFF	ON	ON	OFF	OFF	ON	ON		
	SW07		OFF	OFF	OFF	OFF	ON	ON	ON	ON		
	SW08	Data bit setting	8 bits				7 bits				Parity bit is not included.	
	SW09	Parity bit setting	Set				Not set				—	
	SW10	Even/odd parity setting	Even				Odd				Valid when parity bit is set.	
	SW11	Stop bit setting	2 bits				1 bit				—	
SW12	Sum check setting	Set				Not set				For dedicated protocol		

(4) A1SCPUC24-R2

Setting of Switches	Switches	Setting Items	Position of Setting Switch								Remarks	
			ON				OFF					
	1	Write during RUN enabled /disabled setting	Enabled				Disabled				For dedicated protocol	
			Baud rate (BPS)	300	600	1200	2400	4800	9600	19200	Unusable	—
	2	Transmission speed setting	OFF	ON	OFF	ON	OFF	ON	OFF	ON		
	3		OFF	OFF	ON	ON	OFF	OFF	ON	ON		
	4		OFF	OFF	OFF	OFF	ON	ON	ON	ON		
	5	Data bit setting	8 bits				7 bits				Parity bit is not included.	
	6	Parity bit setting	Set				Not set				—	
	7	Even/odd parity setting	Even				Odd				Valid when parity bit is set.	
	8	Stop bit setting	2 bits				1 bit				—	
9	Sum check setting	Set				Not set				For dedicated protocol		

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(5) Settings for the A2CCPUC24 and A2CCPUC24-PRF

Setting of Switches	Switches	Setting Items	Position of Setting Switch								Remarks																
			ON				OFF																				
		Baud rate (BPS)	300	600	1200	2400	4800	9600	19200	Unusable	—																
	SW11	Transmission speed setting	OFF	ON	OFF	ON	OFF	ON	OFF	ON																	
	SW12		OFF	OFF	ON	ON	OFF	OFF	ON	ON																	
	SW13		OFF	OFF	OFF	OFF	ON	ON	ON	ON																	
	SW14	Data bit setting	8 bits				7 bits				Parity bit is not included																
	SW15	Parity setting	Set				Not set				—																
	SW16	Even/odd parity setting	Even				Odd				Valid only when parity bit set is set																
	SW17	Stop bit setting	2 bits				1 bit				—																
	SW18	Sum check setting	Set				Not set				For dedicated protocol																
	SW19	Main channel setting	RS-422/RS-485				RS-232C				Valid for modes 9 to D																
	SW20	Write during RUN enabled/disabled setting	Enabled				Disabled				For dedicated protocol																
Settings of Terminal Resistor Setting Pins	Connect a terminal resistor to both end stations when wiring cables.																										
	<p>TXD : For transmission RXD : For reception A : When the RS-422 is the main channel B : When the RS-485 is the main channel C : Open (no terminal resistor)</p> <p>Setting example of terminal resistor setting pins</p>  <table border="1"> <thead> <tr> <th rowspan="2">Station No.</th> <th colspan="2">Setting Pin</th> </tr> <tr> <th>TXD</th> <th>RXD</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>A</td> <td>A</td> </tr> <tr> <td>1</td> <td>C</td> <td>C</td> </tr> <tr> <td>2</td> <td>C</td> <td>C</td> </tr> <tr> <td>3</td> <td>A</td> <td>A</td> </tr> </tbody> </table>											Station No.	Setting Pin		TXD	RXD	0	A	A	1	C	C	2	C	C	3	A
Station No.	Setting Pin																										
	TXD	RXD																									
0	A	A																									
1	C	C																									
2	C	C																									
3	A	A																									
<p>REMARKS</p> <p>(1) When more than one external device is connected to the RS-422 interface and the computer link module is the first or last station on the line, a terminal resistor must be set or connected to it. When the computer link module is not an end station on the line, there is not need to set or connect a terminal resistor to it. Below is a setting example of the pins of the A2CCPUC24 and the A2CCPUC24-PRF (For details, refer to Section 4.7):</p> <p>(a) When a terminal resistor is to be set Set the pins to A or B (terminal resistor set).</p> <p>(b) When no terminal resistor is to be set Set the pins to C (not terminal resistor).</p> <p>(2) Refer to Section 4.7 for terminal resistor connections of computer link modules other than the A2CCPUC24 and the A2CCPUC24-PRF.</p> <p>(3) Incorrect terminal resistor setting or connection results in abnormal computer linking.</p>																											

4. SETTINGS AND PROCEDURES BEFORE OPERATION

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(a) Main channel setting

- When the external devices and/or other computer link modules are connected to the RS-232C and RS-422 interfaces, set the interface to which a communicating device to make a computer link is connected (for positioning "9" to "D" of the mode setting switch).

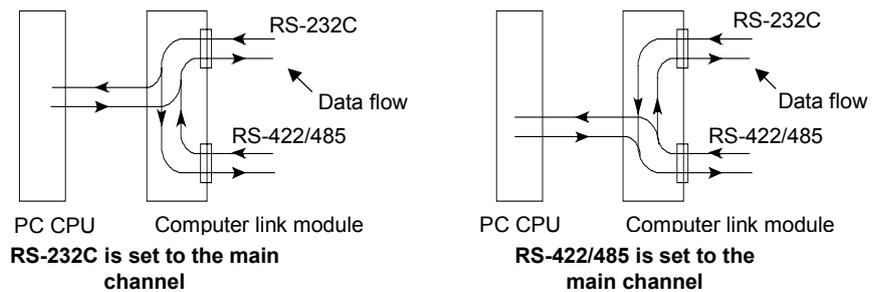
If the communicating device is connected to one of the interfaces, either ON or OFF setting is allowable. (The mode setting switch is set at "1" to "8".)

- Section 4.7 gives example settings.
- Setting the main channel defines data flow as shown below:
Data received through the main channel is automatically transmitted through the sub channel.

Data received through the sub channel is automatically transmitted through the main channel.

When the mode switch is set to "9" to "D", only the processing request commands, transmitted from other stations and received through the main channel of the self, are valid with the set mode.

The computer link module executes the requested processing and transmits the result through the main channel.



(b) Data bit setting

- Set the bit length for one byte of data to be sent or received according to the specifications of the device to be computer-linked.
- The parity bit mentioned in (4) is not included.
- The specifications of the RS-232C interface and those of the RS-422 match with each other.

(c) Transmission speed setting

- Set the transmission speed for data communication with a communicating device in a computer link.
- The specifications of the RS-232C interface and those of the RS-422 match with each other.
- If an unusable position is set, the RUN LED goes OFF and the computer link module does not operate.

(d) Parity bit setting

- Set whether or not a parity bit (horizontal parity) is appended to the data for the communications with a communicating device in a computer link.
- The specifications of the RS-232C interface and those of the RS-422 match with each other.

- (e) Odd/even parity setting
- If a parity bit is appended as set in (d) in the previous page, set whether an even or odd parity is used.
 - The specifications of the RS-232C interface and those of the RS-422 match with each other.

- (F) Stop bit setting
- Set the bit length for one byte of data to be sent or received according to the specifications of the device to be computer-linked.
 - The specifications of the RS-232C interface and those of the RS-422 match with each other.

- (G) Sum check setting
- Set whether to add a sum check code to the end of each message during dedicated-protocol computer linking.
 - Refer to Section 5.4 for message structures when the sum check setting is “Enabled”.

- (H) A1ADP-SP setting

Set this to ON when the following two conditions are met.

- With the A1ADP-SP (the A-A1S Module Conversion Adapter), the A1SJ71UC24-R2/R4/ PRF is connected to an AnACPU.
- The computer link function is used.

This setting is available for software version X or later of the A1SJ71UC24-R2/R4/PRF. (Refer to Section 1.3.2.)

- (I) Write during RUN setting
- Set whether or not to write data to the running programmable controller CPU during dedicated protocol computer linking.
 - For available functions when “Enabled” is selected for this setting, refer to the “write enabled setting” and “write disabled setting” columns of the table shown in Section 3.2.

- (J) Computer link/Multidrop link selection

- For computer linking with a computer link module having a multidrop function, set the switch to “Computer link”.
To use the multidrop link function, set the switch to “Multidrop link”.

- (K) Master station/Local station setting

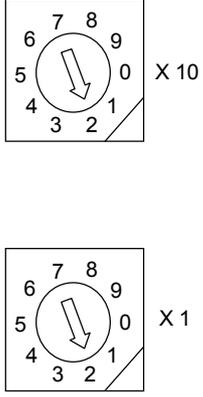
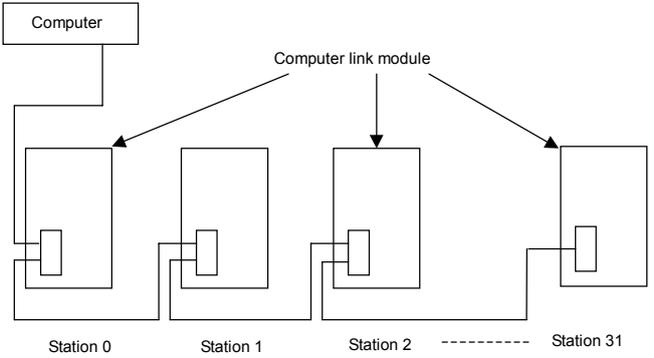
- When the computer link/multidrop link selection switch described in (i) above is set to “Computer link”, this setting will be ignored.
Set whether the computer link module should be used as the master station or as a local station when “Multidrop link” is selected.

4. SETTINGS AND PROCEDURES BEFORE OPERATION

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4.2.3 Setting the station number setting switches

A station number defines which computer link module the computer must access during dedicated-protocol computer linking.

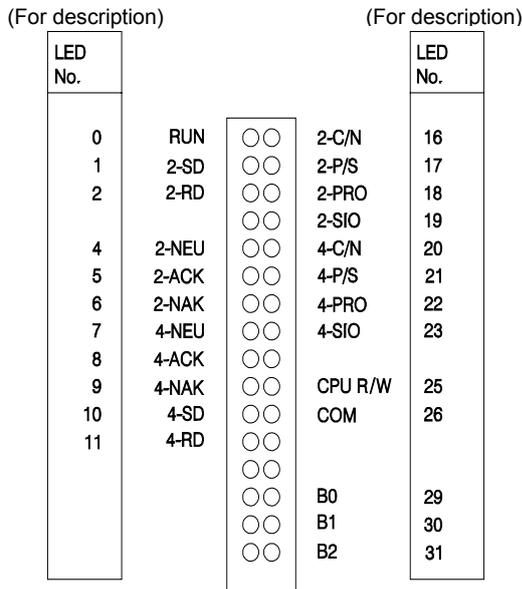
Station Number Setting Switches	Contents
 <p>The above figure shows the switch of the A1SJ71C24-R4.</p>	<ol style="list-style-type: none"> (1) Set the station number in the range of 0 to 31. (Do not set a station number above 31.) (2) Use X10 to set the station number ten's place. (3) Use X1 to set the station number unit's place. (4) Do not duplicate a station number already set in the range of 0 to 31. Therefore, it is not necessary to set station numbers in the order connected to a computer. Also, station numbers can be skipped when set. (5) Station number setting example: 

POINTS
<ol style="list-style-type: none"> (1) The A1SJ71(U)C24-R2 and the A1SJ71(U)C24-PRF are not equipped with station number setting switches. For dedicated-protocol computer linking, set 00H as station number. (2) A station number must not be duplicated. If so, link data may be destroyed, and an error may occur.

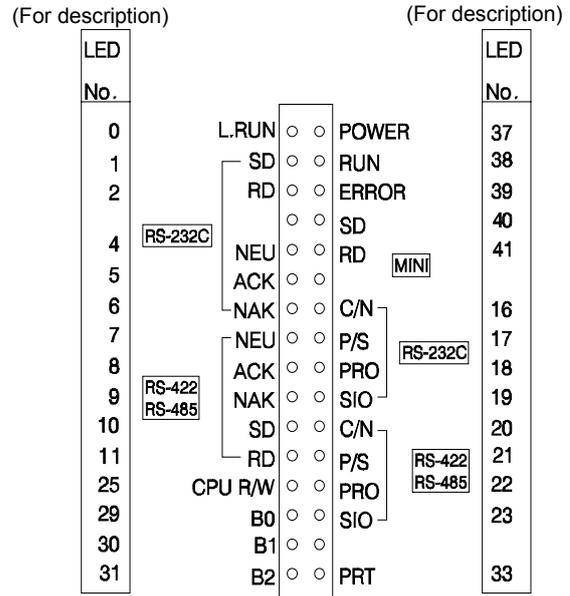
4. SETTINGS AND PROCEDURES BEFORE OPERATION

4.3 Description of the Indicator LEDs

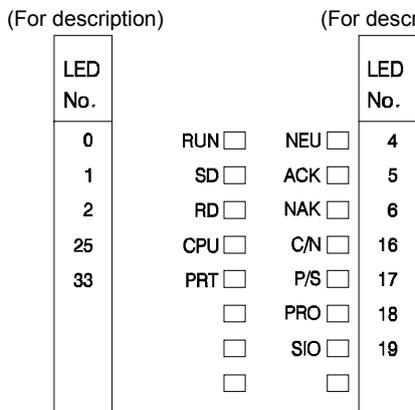
(Indicator LEDs on the AJ71UC24)



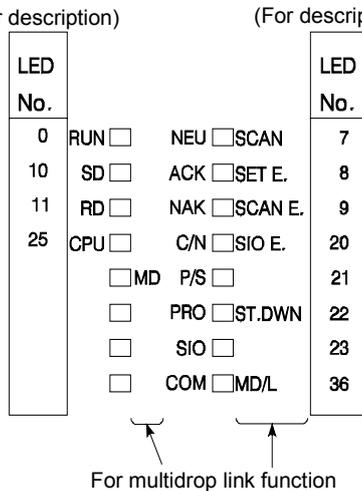
(Indicator LEDs on the A2CCPUC24 and the A2CCPU-PRF)



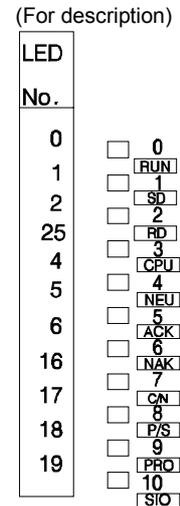
(Indicator LEDs on the A1SJ71UC24-R2, A1SJ71UC24-PRF, A1SJ71C24-R2 and the A1SJ71C24-PRF)



(Indicator LEDs on the A1SJ71UC24-R4 and the A1SJ71C24-R4)



(Indicator LEDs on the A1SCPUC24-R2)



REMARK

- The LED numbers shown in the above figures are given for description. The actual modules do not bear such LED numbers.
- The indicator LEDs without a number are not used for computer linking.

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LED No.	LED Name		Indication of LED	LED ON (Comes on/Flickers)					LED OFF (Goes off)	Initial Status of LED	
0	RUN	L.RUN	Normal run	Normal run					Error	ON	
1	2-SD	SD	Data transmission status at RS-232C side	Flickers during transmission of data.						OFF	
2	2-RD	RD	Data receive status at RS-232C side	Flickers during receipt of data.						OFF	
4	2-NEU	NEU	Neutral status at RS-232C side	Transmission sequence initial status (waiting for ENQ)			Receipt of ENQ completed			*1	
5	2-ACK	ACK	Transmission of ACK through RS-232C side	After ACK is sent					After NAK is sent	OFF	
6	2-NAK	NAK	Transmission of NAK through RS-232C side	After NAK is sent					After ACK is sent	OFF	
7	4-NEU	NEU	Neutral status at RS-422/485 side	Transmission sequence initial status (waiting for ENQ)			Receipt of ENQ completed			*1	
8	4-ACK	ACK	Transmission of ACK through RS-422/485 side	After ACK is sent					After NAK is sent	OFF	
9	4-NAK	NAK	Transmission of NAK through RS-422/485 side	After NAK is sent					After ACK is sent	OFF	
10	4-SD	SD	Data transmission status at RS-422/485 side	Flickers during transmission of data.						OFF	
11	4-RD	RD	Data receive status at RS-422/485 side	Flickers during receipt of data.						OFF	
16	2-C/N	C/N	Result of communications between RS-232C side and PC CPU	Refer to (4).					Normal	OFF	
17	2-P/S	P/S	Parity/Sum check error at RS-232C side	Parity/Sum check error					Normal	OFF	
18	2-PRO	PRO	Protocol error at RS-232C side	Communications protocol error					Normal	OFF	
19	2-SIO	SIO	SIO error at RS-232C side	When received data is abandoned because of an overrun or framing error or full OS area.					Normal	OFF	
20	4-C/N	C/N	Result of communications between RS-422/485 side and PC CPU	Refer to (4).					Normal	OFF	
21	4-P/S	P/S	Parity/Sum check error at RS-422/485 side	Parity/Sum check error					Normal	OFF	
22	4-PRO	PRO	Protocol error at RS-422/485 side	Communications protocol error					Normal	OFF	
23	4-SIO	SIO	SIO error at RS-422/485 side	When received data is abandoned because of an overrun or framing error or full OS area.					Normal	OFF	
25	CPURW	CPU	Status of communications with programmable controller CPU	Flickers during communications with the programmable controller CPU (or comes on when no communications is established).						ON	
26	COM		Selected function	Computer link					Multidrop link	*2	
			Transmission speed setting	Transmission speed (BPS)						*3	
29	B0			300	600	1200	2400	4800	9600		19200
30	B1			OFF	ON	OFF	ON	OFF	ON		OFF
31	B2			OFF	OFF	ON	ON	OFF	OFF		ON
33	PRT		Printer message output equipped only with A1SJ71UC24-PRF, A1SJ71C24-PRF and A2CCPUC24-PRF, and message related to them	Comes on at printer message output.						OFF	
37	POWER		Normal power supply	Normal					Error	ON	
38	RUN		PC CPU run	ON : The sequence program is executed with the RUN key switch set in the RUN position. (The LED remains on in case of error that the sequence program continues to be executed.) OFF : (1)The power is not turned on. (2)The RUN key switch is in the STOP position. (3)A remote stop is set. (4)A remote pause is set. Flicker : (1)An error of suspending the execution of the sequence program was detected in a self-diagnosis. (2)A latch is cleared.						OFF	
39	ERROR		PC CPU error	Error detection status in a self-diagnosis ON : An error was detected in a self-diagnosis. (When OFF is selected for an error in LED indication priority setting, the LED remains off even if such the error is detected.) OFF : Normal Flicker : The annunciator (F) was turned on by the sequence program.						OFF	
40	SD		MINI transmission status	Flickers during transmission of MINI.						OFF	
41	RD		MINI receive status	Flickers during receipt of MINI.						OFF	

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REMARK

Regarding the LEDs which are given two names in the LED Name column of the table on the previous page and have the same function, this manual uses the names shown in the left block for description. (LED No. 0 with the names "RUN" and "L.RUN", for example, is called "RUN" herein.)

*1 The 4-NEU indicator LED comes on or goes off depending on the settings of the mode setting switch (refer to Section 4.2.1) and the main channel setting switch (refer to Section 4.2.2) for transmission specifications.

Mode Setting		1 to 4	5 to 8	9	A to D		F
Main Channel Setting		RS-232C RS-422/485	RS-232C RS-422/485	RS-232C RS-422/485	RS-232C	RS-422/485	RS-232C RS-422/485
LED No.	LED						
4	2-NEU/NEU	ON	OFF	OFF	ON	OFF	OFF
7	4-NEU/NEU	OFF	ON	OFF	OFF	ON	OFF

*2 The COM indicator LED comes on or goes off depending on whether the computer link/multidrop link selection switch for transmission specifications is set to "Computer link" or to "Multidrop link".

*3 The B0, B1, and B2 indicator LEDs come on or go off depending on the transmission speed setting switches for transmission specifications.

- (1) LEDs 2-C/N to 4-SIO (LED Nos.16 to 23) above light when an error occurs.

LED's 2-SIO and 4-SIO light when receive data cannot be stored in OS area during data receive with no-protocol mode (refer to Section 6.2.1 (2), 9.2.1 and 9.2.2).

If this happens, respond in one of the following two ways:

- (a) Lower the transmission speed.
- (b) Use one of the following transmission control functions:
DTR/DSR control or DC1/DC3 receive control.

The ON/OFF status of the LED Nos. 16 to 23 are stored in the buffer memory at address 101H. The status can be read using the PC CPU instruction which permits checking by a sequence program.

(Section 13 gives details about processing when an error is indicated.)

- (2) After any LED 2-C/N to 4-SIO (LED Nos. 16 to 23) is ON, they remain ON even when the cause of the error is eliminated.

It is necessary to send a turn-off request to address 102H of the buffer memory using the sequence program TO instruction to turn OFF the LED (refer to Section 8.1).

- (3) LEDs RUN to 4-RD (LED Nos. 0 to 11), CPU R/W (LED No.25) PRT (LED No. 33) above light corresponding to the relevant status.
- (4) LEDs 2-C/N and 4-C/N (LED Nos. 16 and 20) above light in the following circumstances:
- (a) When the computer link module attempts to make an illegal access while the PC CPU is running (a write during program execution, for example).
 - (b) During abnormal PC CPU access.
- (5) The "initial state" column indicates the status when the power is turned ON, the PC CPU is reset or the computer link module READY signal (Xn7) is ON after switching mode.

4.4 Loading and Installation

This section describes precautions for the handling of computer link modules, from unpacking to installation, and the proper installation environment.

For details of loading and installing each type of computer link module, refer to the User's Manual attached to it.

4.4.1 Handling instructions

Follow the precautions below to handle the computer link module:

- (1) The computer link module case is made of resin. Do not drop or impose a shock on it.
- (2) Do not remove the printed circuit board from the module case. It may cause malfunctioning.
- (3) In wiring, use caution not to drop wire scraps into the module. Remove scraps and foreign matters completely, if found.
- (4) Tighten the computer link module clamping screws to the torques specified in the User's Manual (Hardware) for the module used.

4.4.2 Installation environment

Never install the system in the following environments:

- (1) Locations where ambient temperature is outside the range 0 to 55°C (32 to 131°F).
- (2) Locations where ambient humidity is outside the range of 10 to 90%RH.
- (3) Locations where dew condensation takes place due to sudden temperature changes.
- (4) Locations where there are corrosive gasses and combustible gasses.
- (5) Locations where there is a high level of conductive powder, such as dust and iron filings, oil mist, salt, and organic solvent.
- (6) Locations exposed to the direct rays of the sun.
- (7) Locations where strong power and magnetic fields are generated.
- (8) Locations where vibration and shock are directly transmitted to the main unit.

4. SETTINGS AND PROCEDURES BEFORE OPERATION

4.5 Self-Loopback Test

The self-loopback test function is to check the computer link module, when no external device is connected to it, to see if it can send or receive data to or from the external device and the PC CPU properly. This function is selected by setting the mode setting switch to "F".

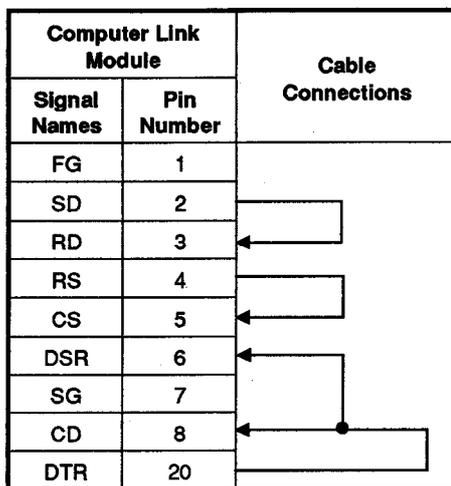
4.5.1 Procedure to carry out the self-loopback test

The procedure to carry out the self-loopback test is as follows:

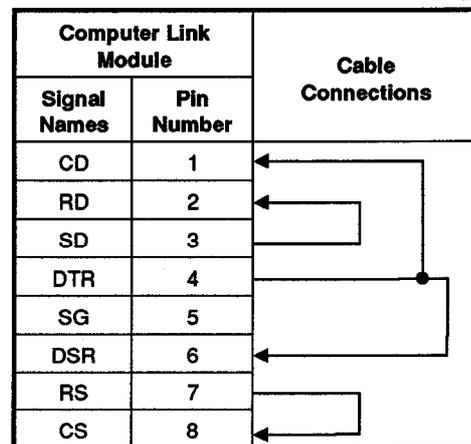
Step 1 Connect the cables

- 1) Cable connections of the RS-232C interface
 Connect cables to the RS-232C connector, as shown below.
 A computer link module without an RS-232C interface does not require such cable connections.

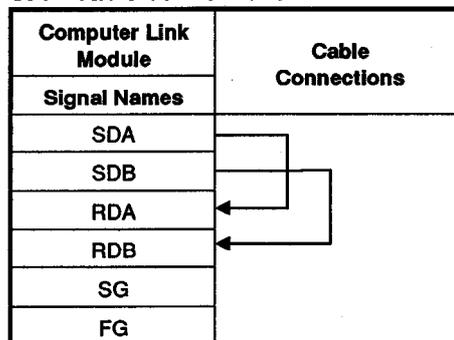
(25-pin connector)



(9-pin connector)



- 2) Cable connections of the RS-422 interface
 Connect cables to the RS-422 terminal block, as shown below.
 A computer link module without an RS-422 interface does not require such cable connections.



Step 2 Set the mode setting switch

Set the mode setting switch to "F" to select the self-loopback test.
 (Section 4.2.1 tells details of how to set this switch.)

4. SETTINGS AND PROCEDURES BEFORE OPERATION

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Step 3 Execute the self-loopback test

- 1) Stop the PC CPU.
- 2) Powering on or resetting the PC CPU starts the test automatically.
(The test starts several seconds after the PC CPU is powered on or reset.)
 - * During operation in the self-loopback test mode, the READY signal (Xn7) of the computer link module does not turned on.

3) Check sequence

Checks are executed out in the following order:

- a) PC CPU communications check
- b) RS-232C communications check
- c) RS-422 communications check

The checks are then repeated. (The checks are executed automatically by the computer link module.)

The checks per cycle are completed within one second.

4) Check the LED display status, as described in Section 4.5.2.

Normal : Follow procedure (5) to end the test.

Error : Correct the error and repeat the self-loopback test

5) When checks are completed:

- a) Turn the power supply OFF.
- b) Disconnect the cables. Connect the cables to link with the computers (refer to Section 4.6).
- c) Change the setting of the mode setting switch. ("1" to "D")

POINTS

- (1) If an error (error code: 11H) occurs during data communications (reading/writing) between the PC CPU and the computer link module using a dedicated protocol, perform a self-loopback test to check the module to see if it operates properly.
- (2) When two or more computer link modules are loaded in the main base unit, carry out a self-loopback test on the modules one by one. Carrying out a self-loopback test on the modules together causes an error in a PC CPU communications check.
- (3) To allocate I/O points by the GPP function of the MELSEC-A series, set the slot for the computer link module to F32.

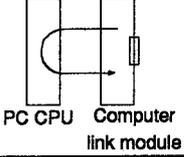
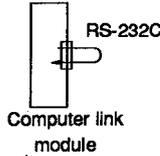
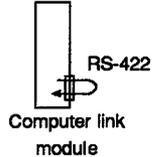
4. SETTINGS AND PROCEDURES BEFORE OPERATION

MELSEC-A

4.5.2 Self-loopback test operations

This section describes what is checked in the self-loopback test and how the indicator LEDs function according to the check results.

The LED numbers in the following table are for description, and correspond to the numbers shown in Section 4.3.

Check Items	Check Descriptions	Normal Indicator LED		Error Indicator LED		Information Flow
PC CPU communication check	After writing data to special data register D9072, the computer link module reads and verifies it. If the data matches, it is changed and the procedure is repeated. If data does not match, an error is indicated.	2-C/N (LED No. 16)	OFF	2-C/N (LED No. 16)	ON	
		CPU R/W (LED No. 25)	Flashing			
RS-232C communications check	Checks the RS-232C interface of the computer link module to see if it normally receives the data it sends. If normal, computer link module changes data and the procedure is repeated. If not normal, an error is indicated. An error is indicated if no cable is connected.	2-SIO (LED No. 19)	OFF	2-SIO (LED No. 19)	ON	
		2-SD (LED No. 1)	Flashing			
		2-RD (LED No. 2)				
RS-422 communications check	Checks the RS-422 interface of the computer link module to see if it normally receives the data it sends. If normal, computer link module changes data and the procedure is repeated. If not normal, an error is indicated. An error is indicated if no cable is connected.	4-SIO (LED No. 23)	OFF	4-SIO (LED No. 23)	ON	
		4-SD (LED No. 10)	Flashing			
		4-RD (LED No. 11)				

POINTS

- (1) Even if an error occurs during a check in the self-loopback test, the test proceeds.
- (2) Ignore the description and normal and error indications of a check which is applicable to an interface that the computer link module does not have.

4. SETTINGS AND PROCEDURES BEFORE OPERATION

Function	Computer link function									
	AJ71UC24	A1SJ7UC24			A1SJ7IC24			A1SCPU C24R2	A2CCPU C24	A2CCPU C24-PRF
Applicable module		-R2	-R4	-PRF	-R2	-R4	-PRF			
Remarks	○	○		○	○		○	○	○	

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4.6 External Wiring

This section describes wiring with an external device for computer linking.

4.6.1 Precautions during wiring

External wiring which is resistant to external noise effects is a prerequisite for reliable computer link module operations (full use of all available functions).

When external wiring of the computer link module is conducted, the following precautions must be taken:

- (1) Keep main circuit wiring, high-voltage wiring, and other load-carrying wiring outside the PC CPU separate from computer link module wiring. Never bundle them together. This prevents noise and surge-induction effects.
These wirings above must be at least 100 mm (3.94 in.) away from the computer link module.
- (2) Ground the shield of shielded wires and cables at only one point.
- (3) M3.5 screws are used for the terminal screw at the RS-422/485 interface terminal block. The applicable solderless terminal is the 1.25-3.5 model. A solderless terminal with insulation sleeve cannot be used for the terminal block. The wire-connected-part of the solderless terminal should be covered with mark tube or insulation tube.
- (4) This section covers wiring with an external device for computer linking.
For connecting a power supply wire or MELSECNET/MINI to an A2CCPUC24, refer to the User's Manual (Hardware) for the PC CPU.

4.6.2 Connecting the RS-232C connectors

Precautions and examples of connections to an RS-232C connector is shown in the diagram below.

- (1) Precautions during connections
 - (a) Given in this section are some examples of typical connections for full-duplex transmission. Determine and adopt one of the connections methods shown in (2) depending on whether the external device can turn on and off the CD signal (pin No. 8/pin No. 1) to the computer link module.
The operation of the computer link module to the CD signal is described in (3).
 - (b) For half-duplex transmission, connect the connectors according to Section 10.
 - (c) Connect the FG signal and shield of the connector cable as indicated below.

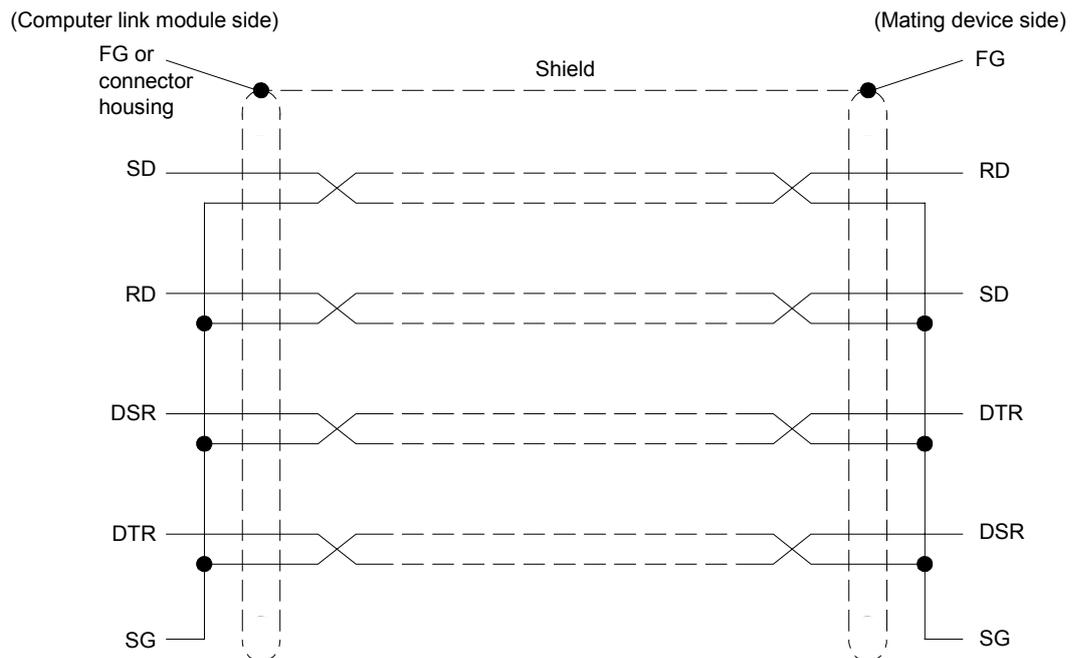
	When Connector at Computer Link Module Side is 25 Pin	When Connector at Computer Link Module Side is 9 Pin	Remarks
FG signal of connector cable	Connect to FG signal terminal at computer link module side	Connect to the connector body at the computer link module side	<ul style="list-style-type: none"> • Do not short the FG signal and SG signal lines of the connector cable. • If the FG signal and SG signal lines are connected inside the external device, do not connect the FG signal at the computer link module side to the external device.
Connector cable shield	Connect to the FG signal terminal at the computer link module side (do not connect to the external device).	Connect to the FG terminal at the external device side or the connector body at the computer link module side.	

* If the shield of the connector cable is connected to both the computer link module side and the external device side, data transmission may not be possible due to noise.

4. SETTINGS AND PROCEDURES BEFORE OPERATION

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- (d) If external noises disable correct data communications even if the cable is connected in the manner indicated above, follow the instructions below for connecting the cable.
- If there is an FG pin at the computer link module side, connect the FG pins by the shield of the cable.
If there is no FG pin at the computer link module side, connect the FG terminal of the mating device to the connector housing of the computer link module by the shield of the cable.
For the connection at the external device, follow the instructions given in its manual.
 - Connect the signals with the exception of SG in a pair with the SG.



* The FG of the computer link module is connected to the screw tightening section of the connector and it functions as the FG of the module itself.

- (e) Do not connect an RS-422 device to the RS-232C interface.
If an RS-422 device is connected to the RS-232C interface, the interface hardware of the connected RS-422 device will be damaged, disabling communications.

POINT

If an RS-232C - RS-422 converter is used when connecting an external device to the computer link module, use a converter which is compatible with the system configuration (1-to-1) of the PC CPU and external device.

4. SETTINGS AND PROCEDURES BEFORE OPERATION

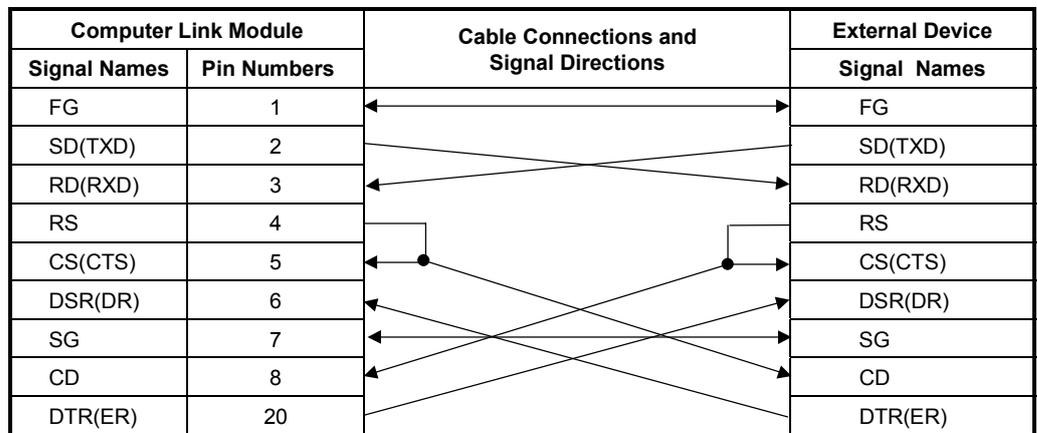
(2) Examples

(a) When connecting an external device which can turn on and off the CD signal (pin No. 8/pin No. 1) to the computer link module.

- Connect cables so that the external device can turn on and off the CD signal to the computer link module.
(To send or receive data in full-duplex transmission, keep the CD signal to the computer link module on.)
- For the RS-232C CD terminal check setting (set at address 10BH in the buffer memory, refer to Section 3.10), do not change the default value (CD terminal check enabled), as described in (3).

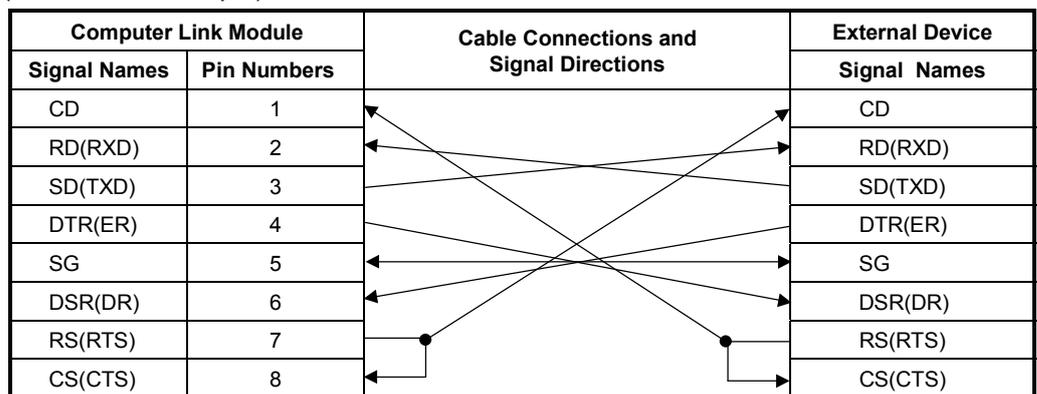
1) When the computer link module is equipped with a 25-pin connector

(Connection example)



2) When the computer link module is equipped with a 9-pin connector

(Connection example)



POINT

As shown in the figures above, connecting the DTR signal and DSR signal pins of the computer link module as well as the CD signal pin to the external device enables CD code control or DTR/DSR control described in Section 9.

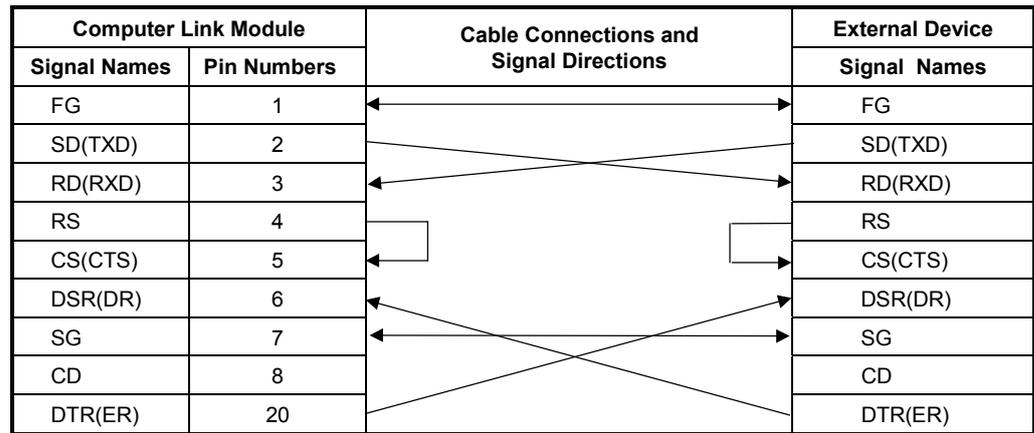
4. SETTINGS AND PROCEDURES BEFORE OPERATION

(b) When connecting an external device which cannot turn on and off the CD signal (pin No. 8/pin No. 1) to the computer link module.

- It is not necessary to connect the CD pins (pin No. 8/pin No. 1) of the external device and the computer link module to each other.
(The connection shown in (a) can also establish a computer link.)
- For the RS-232C CD terminal check setting (set at address 10BH in the buffer memory, refer to Section 3.10), set CD terminal check disabled (write 1), as described in (3).

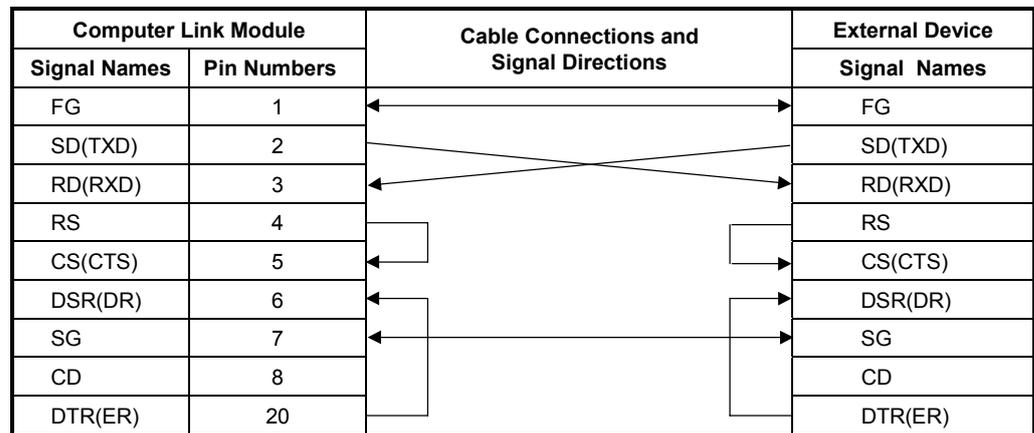
1) When the computer link module is equipped with a 25-pin connector

(Connection example 1)



* As shown in the figure above, connecting the DTR signal and DSR signal pins of the computer link module enables DC code control or DTR/DSR control described in Section 9.

(Connection example 2)

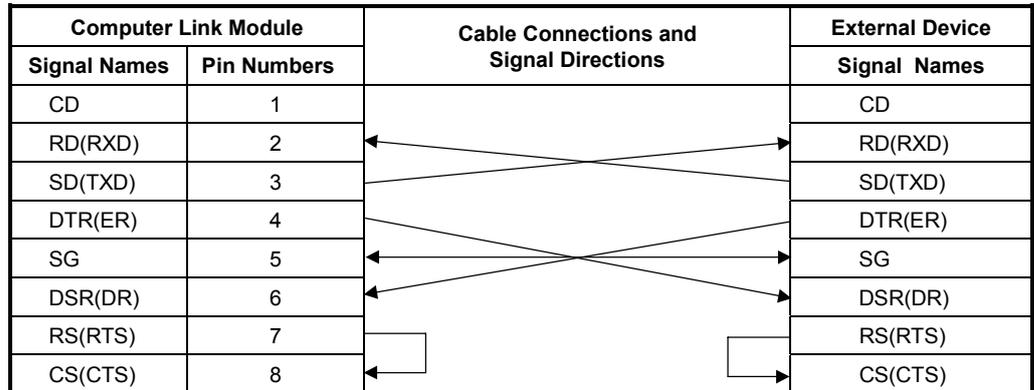


* As shown in the figure above, keeping the DTR signal and DSR signal pins of the computer link module free from the external device enables DC code control described in Section 9, but DTR/DSR control cannot be executed.

4. SETTINGS AND PROCEDURES BEFORE OPERATION

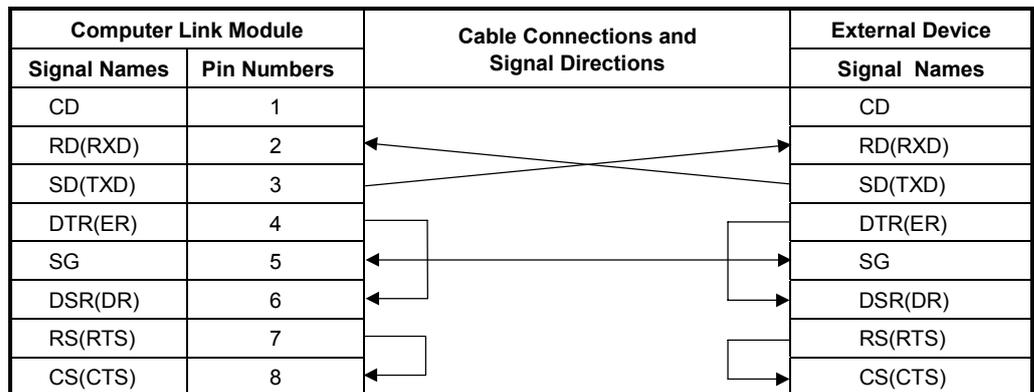
2) When the computer link module is equipped with a 9-pin connector

(Connection example 1)



* As shown in the figure above, connecting the DTR signal and DSR signal pins of the computer link module enables DC code control or DTR/DSR control described in Section 9.

(Connection example 2)



* As shown in the figure above, keeping the DTR signal and DSR signal pins of the computer link module free from the external device enables DC code control described in Section 9, but DTR/DSR control cannot be executed.

4. SETTINGS AND PROCEDURES BEFORE OPERATION

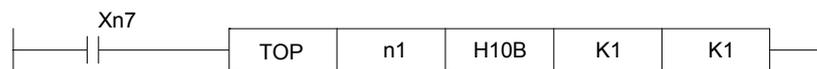
(3) RS-232C CD terminal check setting

The operations of the computer link module to the CD signal according to the RS-232C CD terminal check setting (set with address 10BH of buffer memory, mentioned in Section 3.10) are given below.

	CD Terminal Check Enabled	CD Terminal Check Disabled
Full-duplex	The computer link module performs transmission processing when the CD signal (receive carrier detection) is ON. The transmission sequence of the computer link module is initialized when the CD signal is turned OFF during data communications.	<p>The computer link module sends or receives data in full-duplex transmission whether or not the CD signal is ON or OFF.</p> <p>The computer link module performs transmission processing regardless of the ON/OFF state of the CD signal.</p> <p>This enables data communications with those external devices which cannot control (ON/OFF) the CD signal.</p>

Insert a sequence program given below to set "CD terminal check disabled".

To set "CD terminal check enabled", the sequence program shown below is not necessary since the default setting when the computer link module is started up is "0" (CD terminal check enabled.)



* Also refer to Sections 5.2.1 (2) (b), 6.2.4 (2) (f), and 7.2.6 (2) (d) explaining the computer link functions for the RS-232C CD terminal check setting.

REMARK

The computer link module does not turn OFF the RS signal even when the received data storage OS area of the computer link module has become full and the data received from the external device cannot be stored while the data is received in no-protocol mode.

To notify the external device that the received data storage OS area is full, use a DTR/DSR control function or DC code control function. Refer to Section 9.

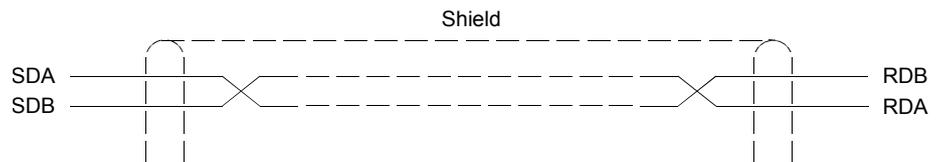
4. SETTINGS AND PROCEDURES BEFORE OPERATION

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- (f) Connect the signals correctly, paying attention to the order of the signals at the terminal block of the computer link module.
- (g) If a data communication with external devices is disabled, check the specifications of the mating device, and then connect the cable between them with the connectors □A and □B for each signal reversed to each other on either of the devices.
Data communication function may be recovered.

(For SDA and SDB)

Connect SDA to RDB of the mating device, and SDB to RDA of the mating device.



POINTS

- (1) In the description of setting/connection of a terminal resistor, given in this item, if an RS-232C - RS-422 converter or other device functions as the end station, a terminal resistor must be set or connected at the converter.
- (2) If an RS-232C - RS-422 converter is used when connecting an external device to the computer link module, use a converter which is compatible with the system configuration (1-to-1, 1-to-n, m-to-n) of the PC CPU and external device.
- (3) All devices that are connected to the RS-422/485 interface of the computer link module must be either RS-422 or RS-485 devices including the configuration of "1-to-n" and "1-to-m".

4. SETTINGS AND PROCEDURES BEFORE OPERATION

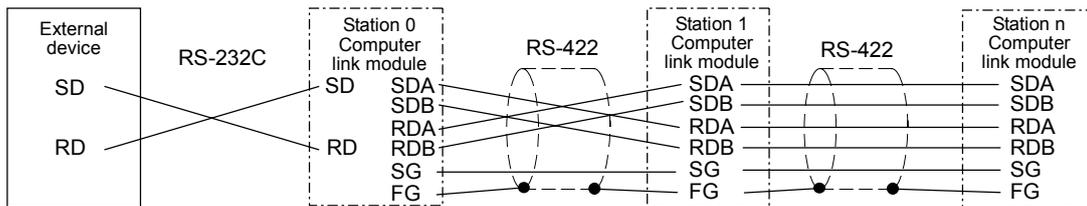
(2) Example

(a) 1:1 connection ratio

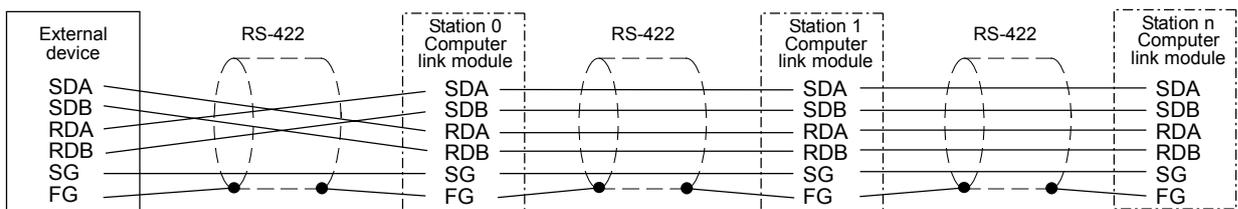
Computer Link Module	Cable Connections and Signal Directions	External Device	Description	
Signal Names		Signal Names		
SDA		RDA	Received data	
SDB		RDB	Received data	
RDA		SDA	Send data	
RDB		SDB	Send data	
		RSA	Request to send	
		RSB	Request to send	
		CSA	Clear to send	
		CSB	Clear to send	
NC				
SG		SG	Signal ground	
FG		FG	Frame ground	

(b) 1:n connection ratio (Multidrop connection)

1) An external and station 0 computer link module are connected through the RS-232C port:



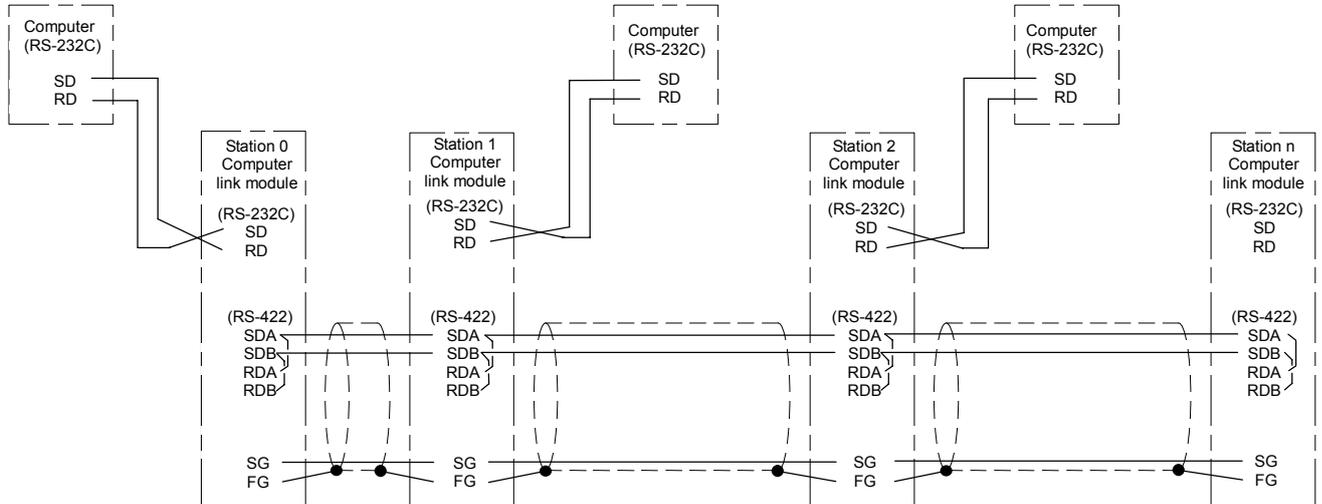
2) An external device and station 0 computer link module are connected through the RS-422 port:



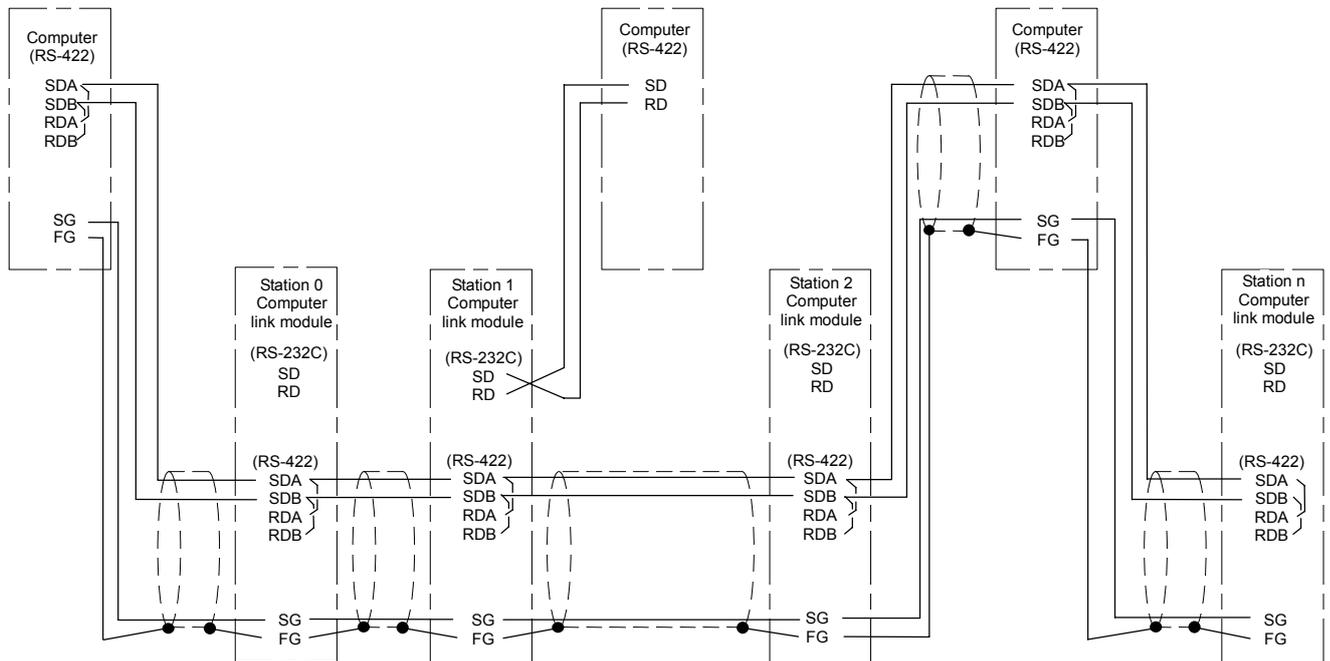
4. SETTINGS AND PROCEDURES BEFORE OPERATION

(c) m:n connection ratio (Multidrop connection)

- 1) The computer and the computer link module are connected through the RS-232C, and the computer link modules are connected through the RS-422.

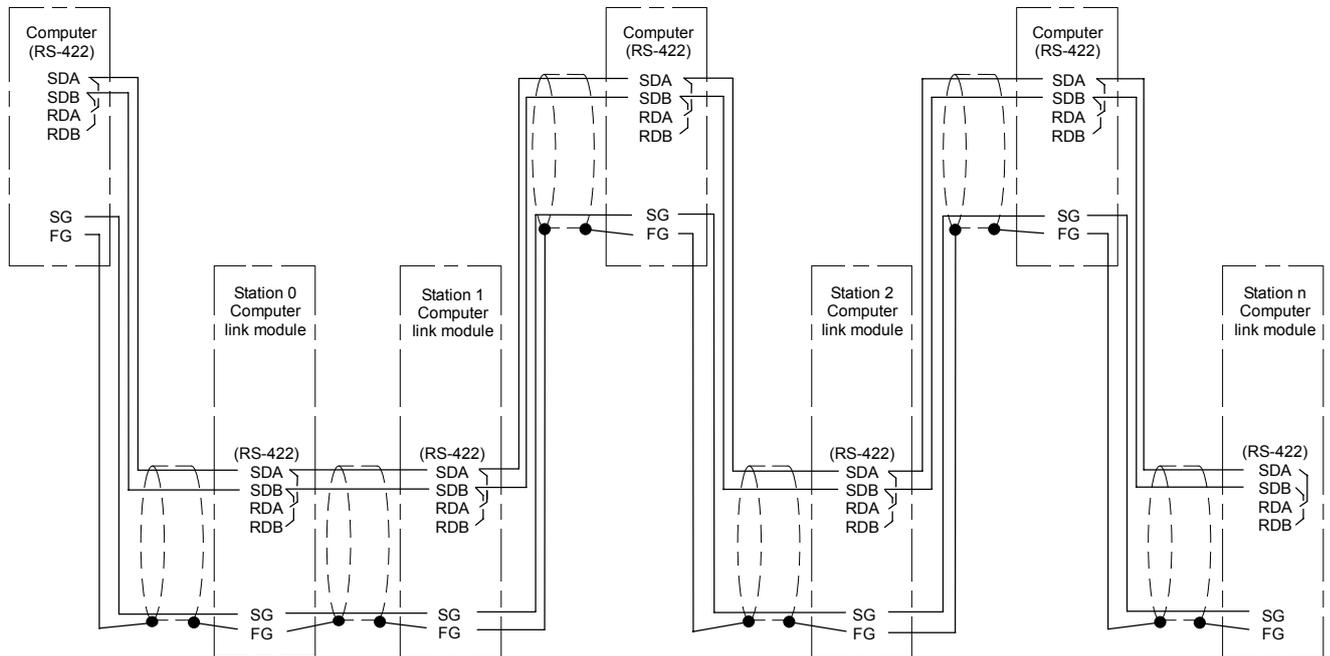


- 2) The computer and the computer link module are connected through the RS-232C and RS-422, and the computer link modules are connected through the RS-422.



4. SETTINGS AND PROCEDURES BEFORE OPERATION

- 3) The computer and the computer link module are connected through the RS-422.



4. SETTINGS AND PROCEDURES BEFORE OPERATION

Function	Computer link function									
	AJ71UC24	A1SJ71UC24			A1SJ71C24			A1SCPU C24-RZ	A2CCPU C24	A2CCPU C24-PRF
Applicable module		-RZ	-R4	-PRF	-RZ	-R4	-PRF			
Remarks	○		○			○			○	○

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4.7 Setting/Connecting Terminal Resistors

Set (Connect) a terminal resistor to the end stations (the first and the last stations (□ stations on the following page)) to be connected through the RS-422 interface.

Other stations do not require a terminal resistor.

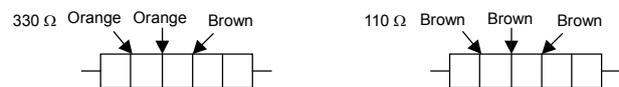
This section describes how to set or connect a terminal resistor to the computer link module.

When setting or connecting a terminal resistor to an external device, refer to the instruction manual for the external device.

POINTS

Pay attention to the following points in setting or connecting a terminal resistor according to this section:

- (1) To use an RS-232C/RS-422 converter with the end stations connected through the RS-422 interface, set or connect a terminal resistor to the RS-422 interface of the converter.
 - (2) Connect the following attached terminal resistors to computer link modules other than the A2CCPUC24(-PRF):
 - For communications through the RS-422 interface: “330 Ω, 1/4 W” resistor
 - For communications through the RS-485 interface: “110 Ω, 1/2 W” resistor
- * Discrimination between above terminal resistors



- (3) On the A2CCPUC24(-PRF), set the terminal resistor setting pin to the proper position.
 - For communications through the RS-422 interface: “A”
 - For communications through the RS-485 interface: “B”
- * Set the pin to “C” when the module is not an end station.

4. SETTINGS AND PROCEDURES BEFORE OPERATION

(1) When the system configuration is 1 (external device):1 (computer link module)

System configuration						
Station No.	Necessity of setting/connecting terminal resistor to external device	Method of setting/connecting terminal resistor to computer link module concerned				Remarks
		AJ71UC24	A1SJ71UC24-R4 A1SJ71C24-R4	A2CCPUC24	A2CCPUC24-PRF	
(1)	Necessary	Connect attached terminal resistor (330 Ω/110 Ω).		Set using terminal resistor setting pin (Section 4.2.2).		Allowable setting mode Main channel setting
(2)	—	Connect terminal resistor between SDA and SDB and between RDA and RDB.		TXD : Set to A or B. RXD : Set to A or B.		1 to 8

(2) When the system configuration is 1 (external device):n (computer link modules) (multidrop connection)

System configuration	When connecting computer link modules to external device through RS-232C					
	When connecting computer link modules to external device through RS-422					
Station No.	Necessity of setting/connecting terminal resistor to external device	Method of setting/connecting terminal resistor to computer link module concerned				Remarks
		AJ71UC24	A1SJ71UC24-R4 A1SJ71C24-R4	A2CCPUC24	A2CCPUC24-PRF	
(1)	Unnecessary	Connect attached terminal resistor (330 Ω/110 Ω).		Set using terminal resistor setting pin (Section 4.2.2).		Allowable Setting mode Main channel setting
(2)	—	Connect terminal resistor between SDA and SDB and between RDA and RDB.		TXD : Set to A or B. RXD : Set to A or B.		9 to D RS-232C
(3), (6), (7)	—	Connection is unnecessary.		Set pins of all modules to C.		1 to 8
(4), (8)	—	Connect terminal resistor between SDA and SDB and between RDA and RDB.		TXD : Set to A or B. RXD : Set to A or B.		1 to 8
(5)	Necessary					

4. SETTINGS AND PROCEDURES BEFORE OPERATION

(3) When the system configuration is m (computers):n (computer link modules) (multidrop connection)

System configuration	When connecting computer link modules to computers through RS-232C					
	When connecting computer link modules to computers through RS-232C and RS-422					
	When connecting computer link modules to computers through RS-422					
		<p>*1 Connection example</p>				
Station No.	Necessity of setting/connecting terminal resistor to external device	Method of setting/connecting terminal resistor to computer link module concerned				Remarks
		AJ71UC24	A1SJ71UC24-R4 A1SJ71C24-R4	A2CCPUC24	A2CCPUC24-PRF	
		Connect attached terminal resistor (330 Ω/110 Ω).		Set using terminal resistor setting pin (Section 4.2.2).		Allowable setting mode Main channel setting
(1), (4), (6), (11), (13), (18), (20)	Unnecessary	—	—	—	—	—
(2)	—	Connect terminal resistor between RDA and RDB.	—	TXD : Set to C RXD : Set to A or B.	—	A, B, D RS-422
(3), (5), (10)	—	Connection is unnecessary.	—	Set pins of all modules to C.	—	A, B, D RS-422
(7), (14), (21)	—	Connect terminal resistor between RDA and RDB.	Connect terminal resistor between RDA and RDB.	TXD : Set to C RXD : Set to A or B.	—	5, 6, 8 —
(8), (15)	Necessary	—	—	—	—	—
(9), (12), (16), (17), (19)	—	Connection is unnecessary.		Set pins of all modules to C.		5, 6, 8 —

4.8 Setting the Operation Mode and Starting Operation

After making sure that the computer link module operates properly and that the cable connections between the module and the external device are made properly, the module is ready to start computer linking with the device.

This section describes the procedure from the completion of the operation described in Section 4.2 through Section 4.7 and the start of computer linking.

4.8.1 Loopback test

The loopback test function is to check the cable connections between the computer and the computer link module, and the communications function using a dedicated command (TT) in dedicated protocol modes 1 to 4.

If the external device can establish a computer link using a dedicated protocol, follow the steps below:

(Step 1) Connecting cables between the computer and the computer link module

Connect cables between the computer and the computer link module according to the system configuration specified in Section 4.6.

(Step 2) Setting the mode setting switch

Set the mode setting switch to a number between "1" and "4" or between "5" and "8" according to the interface to be loopback-tested so that the interface will go into a dedicated protocol mode.

(For the setting of the switch, refer to Section 4.2.1.)

(Step 3) Starting up the PC CPU

Turning on the power supply or resetting the PC CPU with the PC CPU stopped enables a loopback test to start by turning on the computer link module READY signal (Xn7).

(Step 4) Executing the command for loopback test

1) Create a program for loopback test on the computer, and send the loopback test command (TT) and data to the computer link module.

Refer to Section 5.4 for the message structures in control formats 1 to 4, and Section 5.16 for details of the loopback test command (TT).

2) The computer link module sends the received data directly to the computer.

(Step 5) Checking data on the computer

1) Check on the computer if the data sent from the computer and the data returned from the computer link module match with each other.

Exactly matching data indicates that the computer and the computer link module normally communicate with each other.

If a mismatch is found between them, the settings of the transmission specifications are incorrect, or the CD signal is turned on and off repeatedly.

Identify the cause of the mismatch by following the troubleshooting procedure in Section 13, and perform another loopback test.

- 2) When communications is not executed
The hardware settings are incorrect, or the cables are not connected properly.
Identify the cause of the problem following the troubleshooting procedure in Section 13, and perform another loopback test.
- 3) The completion of the loopback test permits dedicated-protocol computer linking.
To start computer linking in the no-protocol or bidirectional mode, carry out the procedures described in Sections 4.8.2 and 4.8.3.

4.8.2 Setting the mode

After performing the loopback test to confirm that the cable connections between the external device and the computer link module are connected correctly and that the communications function works properly, set the mode so that the interface to which the external device is connected can establish a computer link (mode switching).

The relationship between the mode and the mode setting switch number is as shown in Section 4.2.1. The mode can be set by the use of the mode setting switch or the mode switching function.

For details of the mode setting switch, refer to Section 4.2.1. After setting the mode, reset the power to the PC CPU or the PC CPU itself, then start up the computer link module again.

When setting the mode by the mode switching function, refer to Section 12, and start up the computer link module again.

4.8.3 Writing values to buffer memory specific use areas and starting operation

After setting the mode of the computer link module and starting it up again, computer linking specified can be executed.

According to the following related section which describes computer linking in the specified mode, execute computer linking.

- Computer linking using dedicated protocols.....Section 5
- Computer linking in the no-protocol mode.....Section 6
- Computer linking in the bidirectional mode.....Section 7

If it is necessary to modify (write) the set values in a specific use area in the buffer memory (area indicated by • in Section 3.10) when the computer link module READY signal (Xn7) is turned on, follow the procedure in the corresponding section above.

POINT

Among the processing by special function modules, access by the PC CPU is given priority.

Therefore, frequent access to the special function module buffer memory by the PC CPU not only lengthens the scan time of the PC CPU, but also delays processing by the special function module.

Access to the the buffer memory area from the PC CPU by the instruction such as FROM/TO instruction is allowed only when the access is necessary,

4.9 Maintenance and Inspection

The computer link module itself requires no particular inspection procedures. However, carry out the inspections listed in the PC CPU User's Manual to ensure optimum system performance.

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

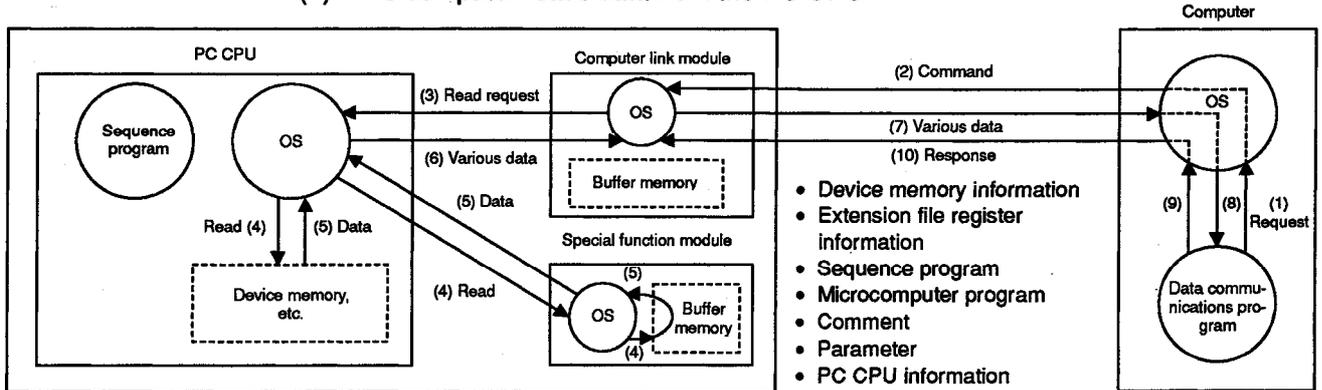
5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

This section explains the details and methods of specifying control protocols 1 to 4 along with examples.

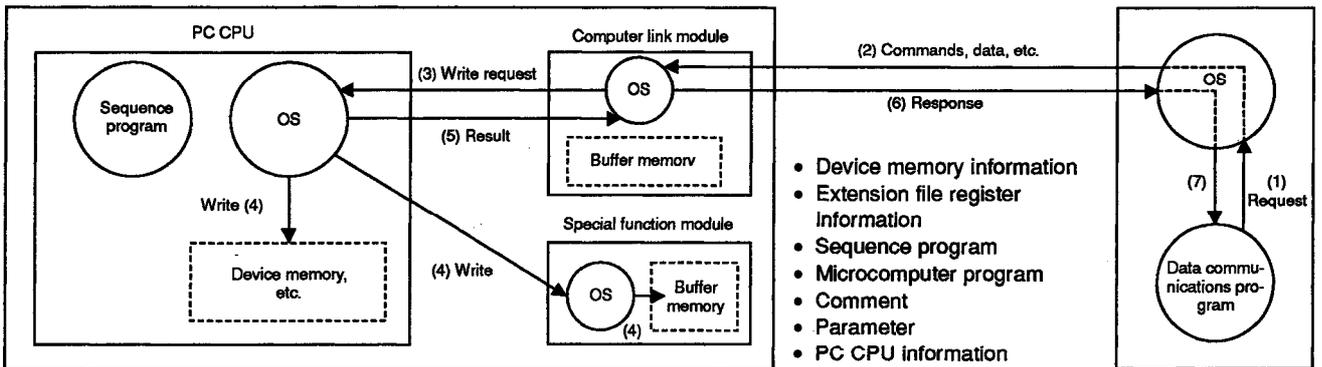
5.1 Data Flow in Communications with Dedicated Protocols

Data to be read from or written to the PC CPU

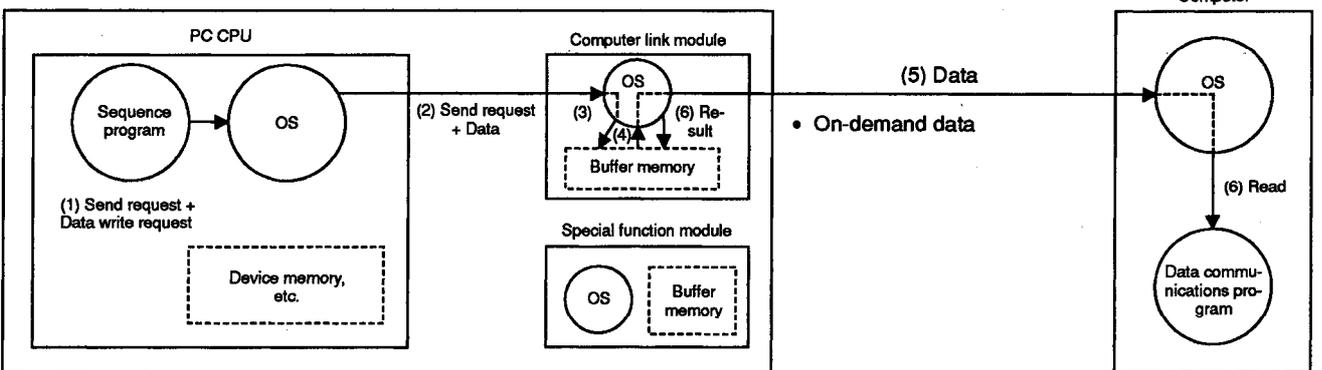
(1) The computer reads data from the PC CPU



(2) The computer writes data to the PC CPU



(3) The PC CPU sends data to the computer



REMARK

The OS (operating system) shown in the above illustrations is the software that uses resources such as the PC CPU, memory, terminals, files, and network efficiently. In this manual, this software is described as the system program or system.

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5.2 Programming Hints

Described below are precautions for preparing a program for dedicated protocol computer linking.

5.2.1 Reading/Writing data from/to the buffer memory

Dedicated-protocol computer linking does not require a sequence program for reading or writing data from or to the buffer memory, except in the cases below.

To do the following operations, read or write data from or to the buffer memory, if necessary.

(The areas in the buffer memory are shown in Section 3.10.)

When the computer link module is turned on, a default value is written to a specific use area in the buffer memory.

	Reading/Writing Needing Sequence Program Prepared	Reference Section
(1)	Changing the default value for a specific use area in the computer link module buffer memory to communicate data	Section 5.2.1 (2) and (3)
(2)	Using the on-demand function to send data from the PC CPU to the computer	Section 5.14
(3)	Using the buffer memory reading/writing function by the computer	Section 5.9
(4)	Reading the start-up state of computer link module LEDs and writing their turn-off state during computer linking	Section 8
(5)	Reading the states of the module and signals during computer linking	Section 8
(6)	Executing transmission control with the external device using the DC code	Section 9
(7)	Executing half-duplex transmission through the RS-232C interface of the computer link module	Section 10

(1) Precautions for reading or writing data from or to a specific use area in the buffer memory

(a) Buffer memory is not backed up by a battery.

When the power is turned ON, the PC CPU is reset, or the mode is switched, all data in the buffer is set to default values. Therefore, whenever the power is turned ON, the CPU is reset, or the mode is switched, any data which has been changed from a default value must be written to the buffer.

(b) Except for the mode-switching area, data can only be written to the specific use area (100H to 11FH) using the TO instruction in a sequence program. If data is written to the buffer memory using the command in a computer program, the computer link module will not operate correctly. Never try to write data using a computer program.

(c) If the following functions are used in combination with the dedicated protocol, make sure to allocate the user area in buffer memory so that the same area will not be used by different functions.

If the same area is allocated to different functions, the data in this area is rewritten and communications will not be correctly executed.

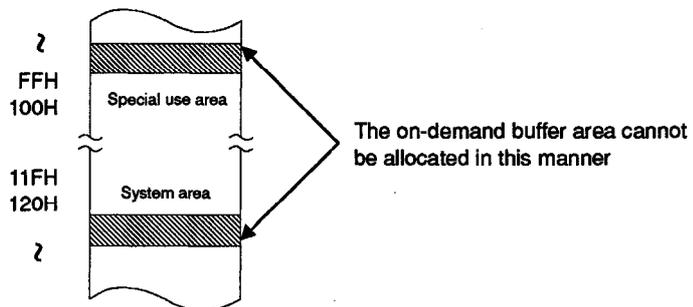
- No-protocol mode transmission or bidirectional mode transmission
- No-protocol mode receive or bidirectional mode receive
- Buffer memory read/write (CR/CW command) function
- On-demand function

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The memory areas preceding and following the specific use area cannot be allocated as a single area. The areas 0H to FFH and 120H to DFFH must be recognized as independent areas.

Example:



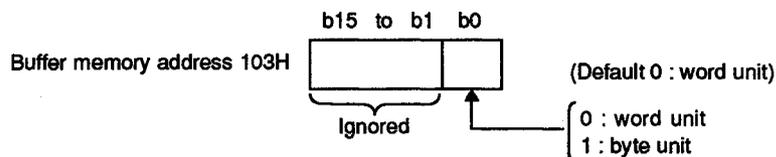
(2) Changing the default value for a specific use area in the buffer memory

When the default value for a specific use area in the computer link module buffer memory must be changed for data communications, it is necessary to write a proper sequence program according to the following:

(a) Area to specify word or byte units in no-protocol mode (address: 103H)

- When the on-demand function for data transmission from the PC CPU to the computer is used and the computer link module is turned on, the on-demand data length is set for the word unit.
- To set the on-demand data length for the byte unit, write "1" to the area with the computer link module on.
- The byte unit can be used as the unit of the quantity of data to be sent or received in the no-protocol or bidirectional mode.

Setting Method

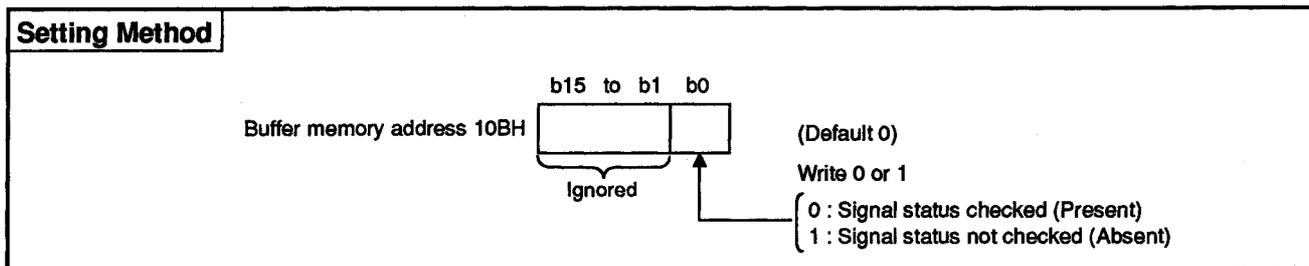


(b) Area to specify RS-232C CD terminal check (address: 10BH)

- When an external device is connected to the RS-232C interface of the computer link module, "CD terminal check enabled" must be set according to Section 4.6.2.
- When the computer link module is turned on, "CD terminal check enabled" is set.
- To select "CD terminal check disabled", write "1" to the area with the computer link module on.
- This setting is available for dedicated protocols and the no-protocol and bidirectional modes.

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REMARK

For the operation of the computer link module to the CD signal in an RS-232C CD terminal check, refer to Section 4.6.2.

(c) Areas for changing the communications mode of the RS-232C interface

RS-232C communications mode setting area (address: 10FH)
Simultaneous send priority/non-priority setting area (address: 110H)
Send method setting area when transmission is resumed (address: 111H)

- When an external device is connected to the RS-232C interface of the computer link module and the module is turned on, full-duplex transmission is possible between the module and the external device.
- To select half-duplex transmission, change the default value for the area concerned with the computer link module on, as described in Section 10.

(d) Areas for changing the method of transmission control with the external device

Transmission control specification area (address: 11AH)
DC1/DC3 control code specification area (address: 11BH)
DC2/DC4 control code specification area (address: 11CH)

- When the computer link module is turned on, data transmission to the external device is DTR/DSR-controlled at the RS-232C interface.
- To execute DC code control at the RS-232C and RS-422/485 interfaces, change the default value for the area concerned with the computer link module on, as described in Section 9.
- This setting is available for dedicated protocols and the no-protocol and bidirectional modes.

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

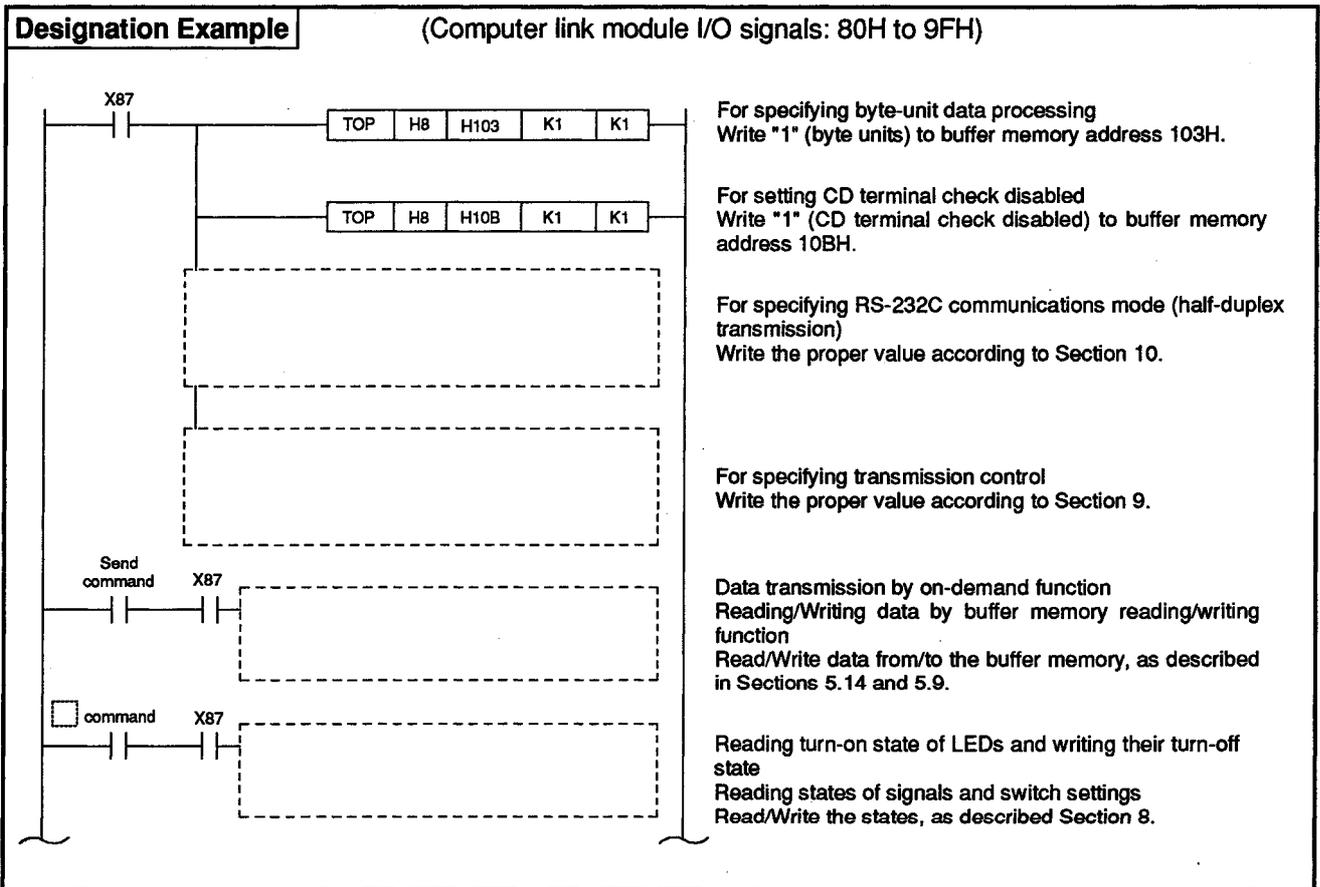
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- (3) Program example when the default values for specific use areas in the buffer memory are to be changed

Below is a program example when the default values for specific use areas in the computer link module buffer memory are to be changed.

Make only necessary changes in the program.

The example is a program when the computer link module I/O signals to be processed by the PC CPU are 80H to 9FH.



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5.2.2 Procedure for sending commands from the computer

This section describes how to send commands from the computer when it accesses PC CPUs using a dedicated protocol.

- (1) When the computer accesses only PC CPUs loaded with a computer link module which is connected to the computer

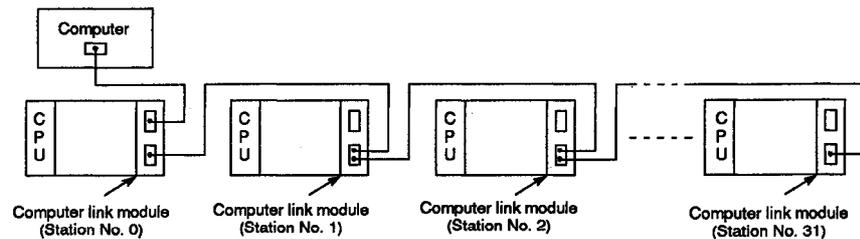
This procedure is applicable to systems of which the computer-to-PC-CPU ratio is 1:1, 1:n or m:n and of which the PC CPUs the computer will access are all loaded with a computer link module connected to the computer.

- (a) When the computer accesses the PC CPU specified, send a command shown in Section 5.7 or the following sections in one of control formats 1 to 4 described in Section 5.4, and receive the result.

Assign the following numbers to the station and the PC CPU in the message:

- Station number Station number of the computer link module which sends a command (the number set by the user using a switch)
- PC number FFH

(Example: 1:n multidrop connection)



- (2) When the computer also accesses PC CPUs of other stations without a computer link module

This procedure is applicable to systems composed of PC CPUs to be accessed by the computer, which are linked through the MELSECNET (II), MELSECNET/B or MELSECNET/10, and one of which is connected to the computer.

- (a) When the PC CPU loaded with the computer link module connected to the computer is not an AnUCPU

When the computer accesses the PC CPU specified, send a command shown in Section 5.7 or the following sections in one of control formats 1 to 4 described in Section 5.4, and receive the result.

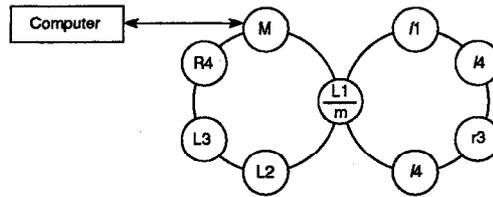
Assign the following numbers to the station and the PC CPU in the message:

- Station number Station number of the computer link module which sends a command (the number set by the user using a switch)
- PC number FFH when the computer accesses the PC CPU loaded with the computer link module connected to it, or 00H or the station number of the PC CPU specified when the computer accesses the PC CPU of another station on the MELSECNET (II), MELSECNET/B or MELSECNET/10.

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(Example: MELSECNET (II))



- (b) When the PC CPU loaded with the computer link module connected to the computer is an AnUCPU

Before having the computer access a PC CPU without a computer link module, it is necessary to switch the system to the network or data link system which includes the PC CPU specified.

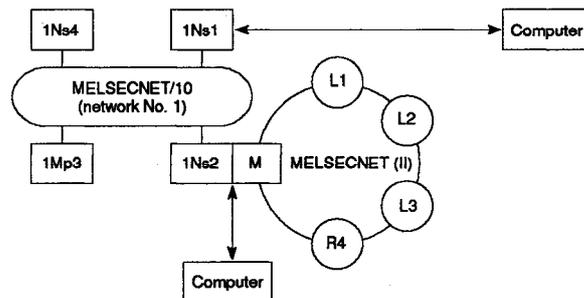
(To have the computer access a PC CPU loaded with a computer link module, it is not necessary to switch the network or data link system.)

When the computer accesses the PC CPU specified, send a command shown in Section 5.7 or the following sections in one of control formats 1 to 4 described in Section 5.4, and receive the result.

Assign the following numbers to the station and the PC CPU in the message:

- Station number Station number of the computer link module which sends a command (the number set by the user using a switch)
- PC number FFH when the computer accesses the PC CPU loaded with the computer link module connected to it, or 00H or the station number of the PC CPU specified when the computer accesses the PC CPU of another station on the MELSECNET (II), MELSECNET/B or MELSECNET/10.

(Example: Combination of MELSECNET (II) and MELSECNET/10)



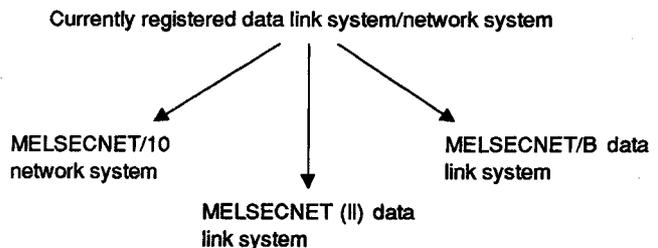
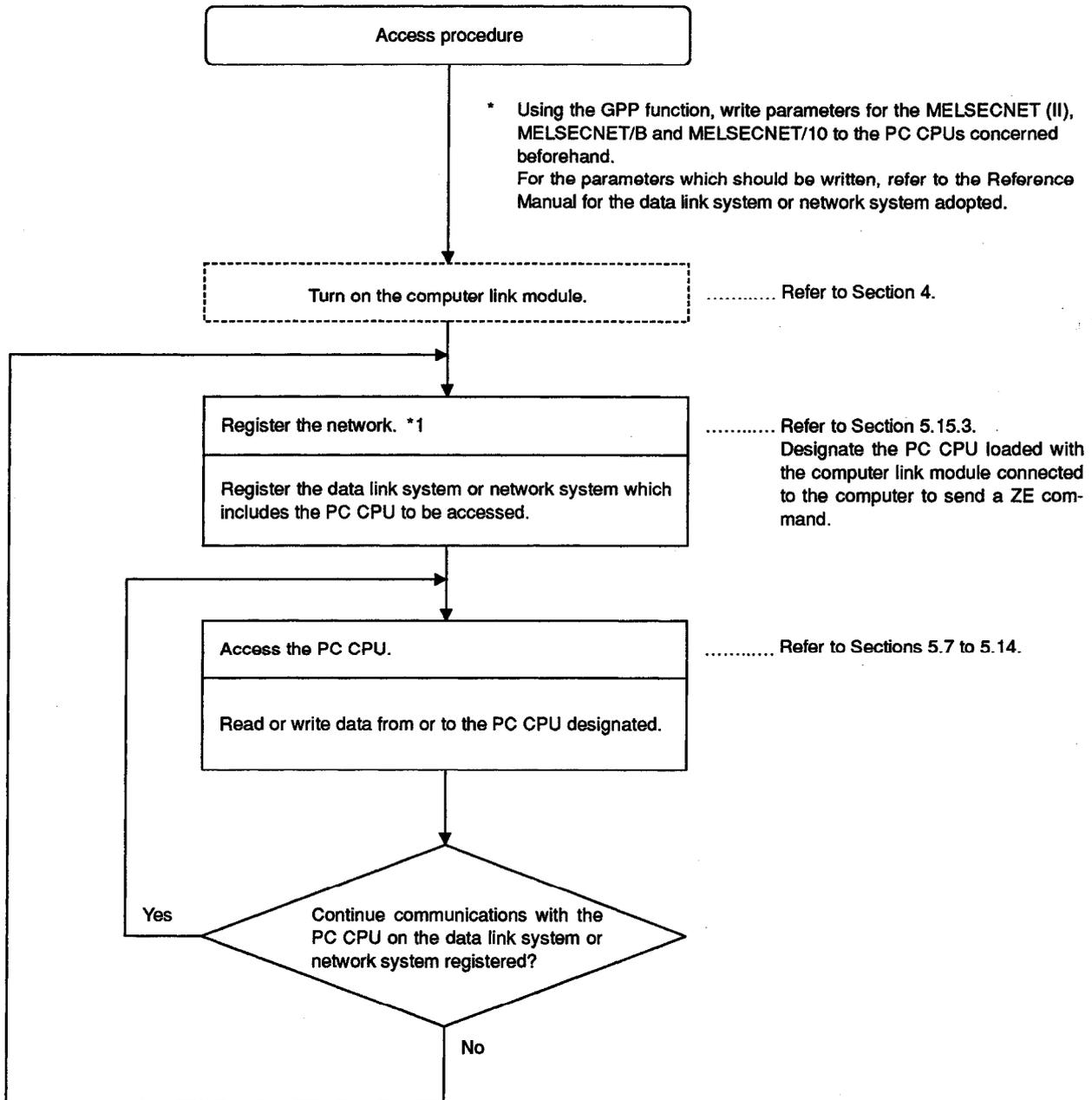
REMARK

Section 5.4.6 describes details of how to specify the station number and the PC number.

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The following flowchart shows how the computer accesses a PC CPU which, loaded with the computer link module connected to the computer, is an AnUCPU and is on the MELSECNET/10, MELSECNET (II) or MELSECNET/B.



*1 Only one network system or data link system can be registered.

5.2.3 Operation of the PC CPU during data communications

This section describes the operation of the PC CPU during data communications using a dedicated protocol.

(1) Scan time of the PC CPU

During access from the computer link module to the PC CPU, the latter, while running, processes information in response to a request from the computer link module every time END processing takes place. (*1)

The scan time is, therefore, increased by the processing time.

For the intervention time required for data communications between the computer link module and the PC CPU, refer to APPENDIX 2.

Even if the computer does not issue a command, loading a computer link module increases the scan time by approximately 0.1 ms to 0.2 ms.

(2) Simultaneous access to the PC CPU

The PC CPU processes information in response to a request in END processing. (*1)

When several computer link modules simultaneously access the PC CPU specified, the PC CPU executes processing requested by a module while the requests from the rest of the modules are waiting to be processed, which results in an increase in the number of scan operations necessary for processing.

*1. The following is the way to process multiple requests in one scan of the PC CPU.

1) For An(N)CPU, AnACPU, AnUCPU, QnACPU

Providing a COM instruction in a sequence program enables multiple access requests to be processed within one scan.

However, the scan time increases by the COM instruction execution time.

2) For AnUCPU

By turning on the special relay M9029 (data exchange request batch-processing), all the data exchange requests received from any modules during one scan are processed by the AnUCPU at the END processing of that scan.

3) For QnACPU

When set to the "PLC System Setting" of the QnACPU parameter of the station installed in the computer link module.

If the "PLC system settings" general data processing setting has been made, the QnACPU will process the requests for general data processing settings using END processing.

(Example)

If the "PLC system settings" general data processing setting is "4", a maximum of 4 access requests given by the modules and GPP functions during one scan are all processed by the QnACPU at the END processing of that scan.

5.2.4 Precautions for data communications

Described below are precautions for data communications using a dedicated protocol:

- (1) Conditions under which the transmission sequence of the computer link module enters the initial state
 - When the power supply is turned on, when the reset switch on the PC CPU is operated, or when the mode is switched.
 - When normal data send or receive is completed.
 - When a control code EOT or CL is received in each control format (refer to Section 5.4.6 (1) (c)).
 - When a control code NAK is sent.
 - When data is communicated with the setting of "CD terminal check enabled" in full-duplex transmission at the RS-232C interface (refer to Sections 4.6.2 and 5.2.1), or when the CD signal is turned off.

- (2) Transmission of commands from the computer

Send a command from the computer to the computer link module using a dedicated protocol after data communications in response to the preceding command is completed.

If a failure to receive data occurs after the commands have been transmitted, carry out the time check on the computer side. When a timeout error occurs, transmit the clear commands (EOT, CL codes. See Item 5.4.6 (1)(C).) to initialize the transmission sequence before the next commands are transmitted.

- (3) Multidrop connection in the 1:n system configuration

A communications error occurs when the sending device (computer) resends data before the receiving device (computer link module) completely receives the data previously sent. Send the next data after the receiving device (computer link module) receives all data.

- (4) NAK message from the computer link module

The computer link module sends an NAK message to the computer using a dedicated protocol when an error is found in the request to the self station.

In full-duplex transmission, the module can issue the signal even when the computer is sending data.

- (5) Action when a data link error occurs

When a data link error occurs during communications with the PC CPU of another station (the PC number is other than FFH) on the MELSECNET (II), MELSECNET/B or MELSECNET/10, the computer link module goes into the standby state (Xn4=OFF, Xn5=OFF, Xn6=ON) (refer to the list of I/O signals to PC CPU in Section 3.9).

In this case, check the time on the computer. If a time-out error is detected, send a clear command (EOT or CL code, refer to Section 5.4.6 (1) (c)) to initialize the transmission sequence.

(6) Replacing the PC CPU of another station for data communications

After turned on, the computer link module receives and keeps information on the PC CPUs of other stations.

When the type of the PC CPU of another station for data communications, which is replaced after the computer link module was turned on, is changed, reset the computer link module (resetting the power supply to the PC CPU of the self station/resetting the PC CPU/switching the computer link module mode).

(7) Framing error in the computer

A framing error may occur in the computer when nothing is sent from the computer link module to the computer through the RS-422 interface. (Refer to Section 3.8.3.)

In this case, skip the data on the computer until an STX, ACK or NAK message is sent from the computer link module.

Before starting data communications through the RS-422 interface, check the interface specifications of the computer link module shown in Section 3.8.3.

(8) Loading more than one computer link module

When computers connected to computer link modules simultaneously request access to the PC CPU, the PC CPU determines the sequence of access to it.

The user cannot fix this access priority.

(9) Read the manual carefully and confirm safety before attempting operations such as data changes, program changes, remote RUN/STOP, etc., during operation. Incorrect procedure could cause system malfunction, mechanical damage, and accidents.

(10) Cancelling read/write requests

When cancelling the read/write request in command message transmitted from the external device, transmit the message for initializing the transmission sequence from the external device to the computer link module following Item 5.4.6 (1)(C).

5.3 Check Points before Starting Operation

The procedure for starting computer linking by the use of dedicated protocols is shown in Section 4.

Check the following points before starting an operation to ensure proper computer linking with the computer link module used:

	Check Point	Reference Section for Check Point
(1)	Settings of switches	Section 4.2
(2)	Operation of computer link module	Sections 4.5 and 4.8.1
(3)	Connection with computer	Section 4.6
(4)	Connection or setting of terminal resistor	Section 4.7

POINT

Normal dedicated-protocol computer linking may not be achieved if one of the above points is found improper.

Recheck them prior to a computer link module operation.

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5.4 Basic Formats of Dedicated Protocol

There are 4 formats of control protocol. Any of these formats can be designated by selecting the mode setting switch (Section 4.2.1) or mode number during mode switching (Section 12).

The differences between the control formats (based on format 1) are as follows:

Format 2 : Format 1 with block number added.

Format 3 : Format 1 with each block preceded and followed by STX and ETX.

Format 4 : Format 1 with CR and LF added.

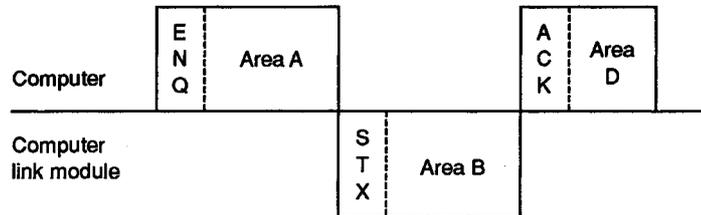
The following sections describe details of the four control protocols and the meanings of individual items.

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5.4.1 Basics of dedicated protocol control procedures

This section shows the send data structures cited to describe the control formats in and after Section 5.4.2.

(1) Reading data by the computer from the PC CPU



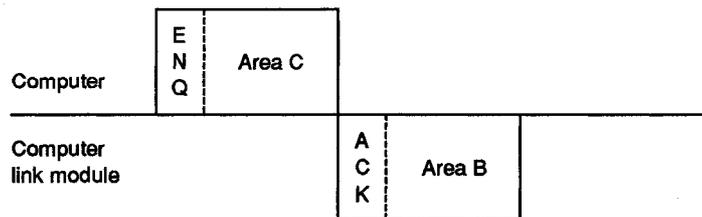
- (a) Areas A and D indicate transmission from the computer to the PC CPU.
- (b) Area B indicates transmission from the computer link module to the computer.
- (c) Computer programs are created so that all data is transmitted from left to right.

(Example: In area A, data is transmitted to the right after the ENQ signal.)

POINT

When the computer reads data from the PC CPU, it does not need to send "area D" shown in the first figure. (It can be omitted.) The computer link module, after sending "area B" shown in the first figure to the computer, completes processing on the readout request "area A", then waits for the writing request "area C" to come (neutral status). Thus, the computer link module does not execute any processing even if it receives "area D" from the computer at the end of data communications.

(2) Writing data by the computer to the PC CPU



- (a) Area C indicates transmission from the computer to the computer link module.
- (b) Area B indicates transmission from the computer link module to the computer.
- (c) Computer programs are created so that all data is transmitted from left to right.

(Example: In Area C, data is transmitted to the right after the ENQ signal.)

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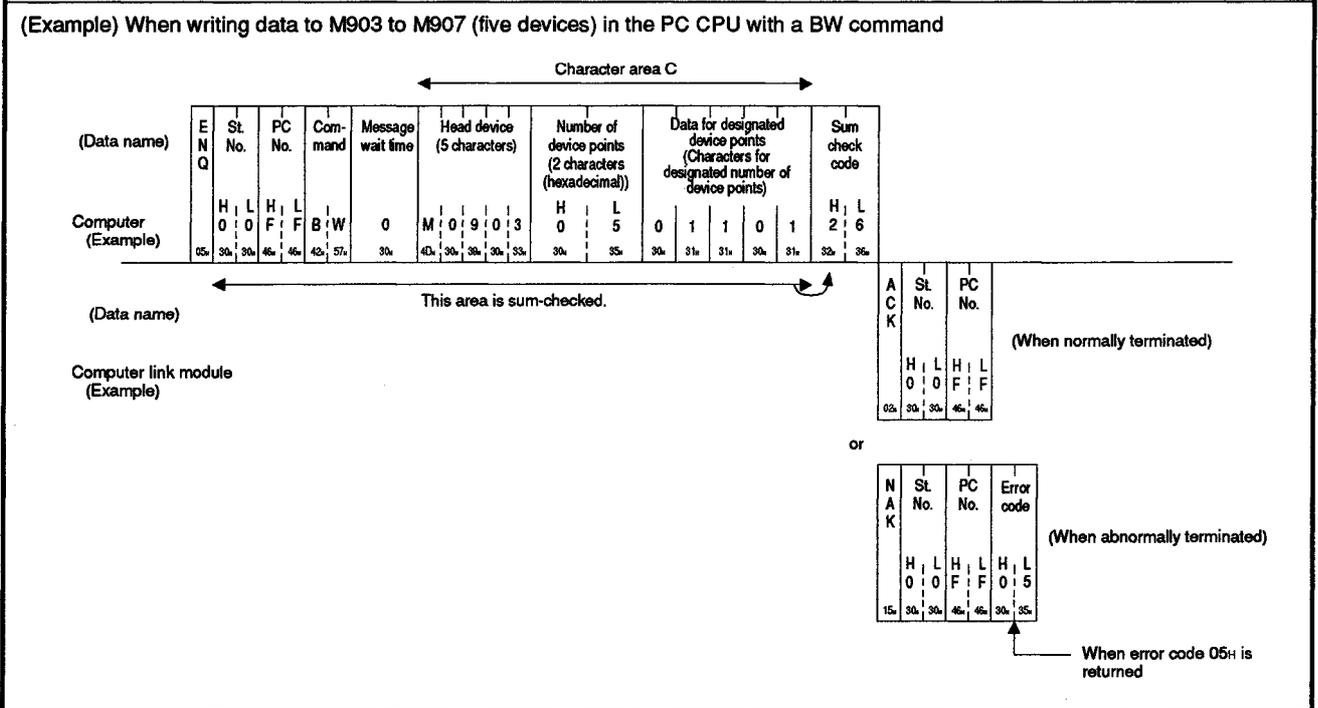
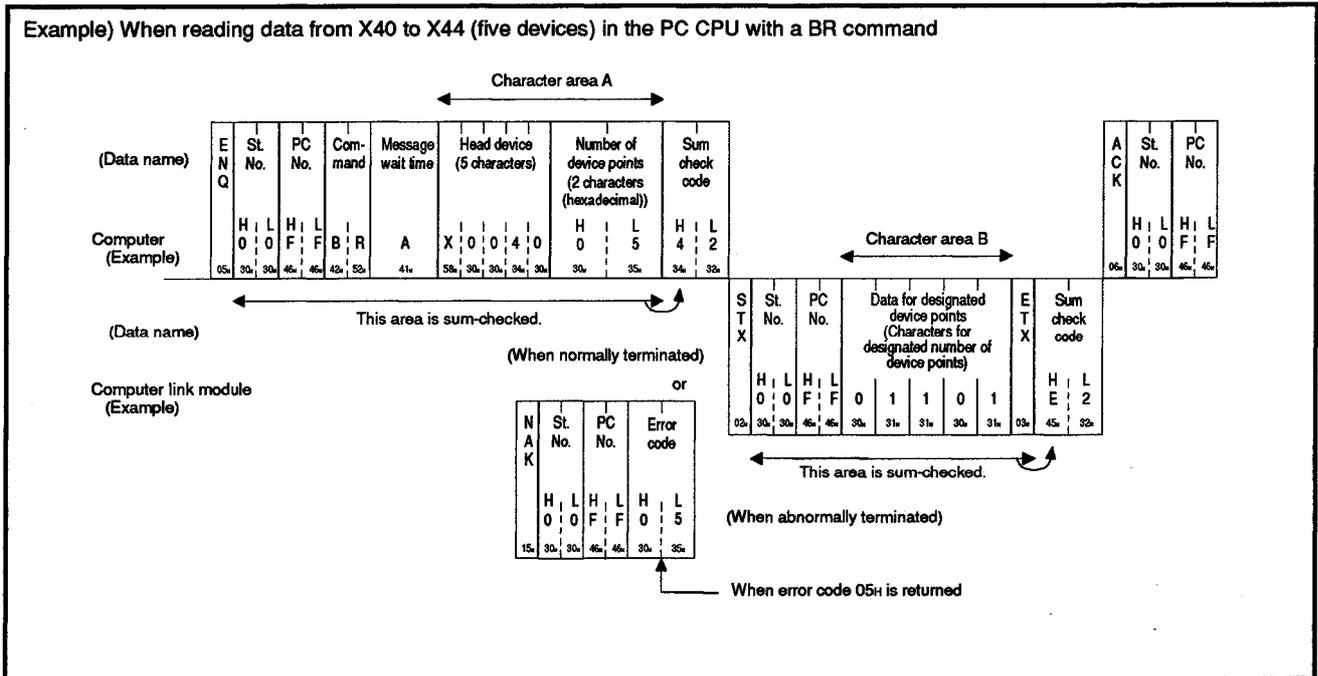
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5.4.2 Control format 1

Description	Control Protocol
<p>To read data from the PC CPU to the computer</p>	<p style="text-align: right;">St.No.: Station number</p> <p style="text-align: center;">Transmission sequence →</p> <p>The diagram illustrates the transmission sequence for reading data from the PC CPU to the computer. It shows two paths: one through the Computer link module and one direct path. The direct path includes fields for ENQ, St. No., PC No., Command, Message wait time, Character area A, and Sum check code. The path through the Computer link module includes fields for STX, St. No., PC No., Character area B, ETX, and Sum check code. Alternative fields for NAK and ACK are shown with asterisks (**).</p>
<p>To write data from the computer to the PC CPU</p>	<p>The diagram illustrates the transmission sequence for writing data from the computer to the PC CPU. It shows two paths: one through the Computer link module and one direct path. The direct path includes fields for ENQ, St. No., PC No., Command, Message wait time, Character area C, and Sum check code. The path through the Computer link module includes fields for ACK, St. No., PC No., and Error code.</p>
<p>Remarks</p>	<ol style="list-style-type: none"> (1) The sum check code is added only when sum check "enabled" is set (refer to Section 4.2.2). It will not be added when sum check "disabled" is selected. (2) The sum check is made for characters marked "*" in these diagrams. (3) In these diagrams, the contents of "character area A", "character area B", and "character area C" depend on the individual system. For details, see the relevant sections. The contents of all character areas are the same for all 4 formats. (4) When reading data sent from the PC CPU on the computer, the transmission of the ACK or NAK message indicated by ** in the upper figure can be omitted.

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5.4.3 Control format 2

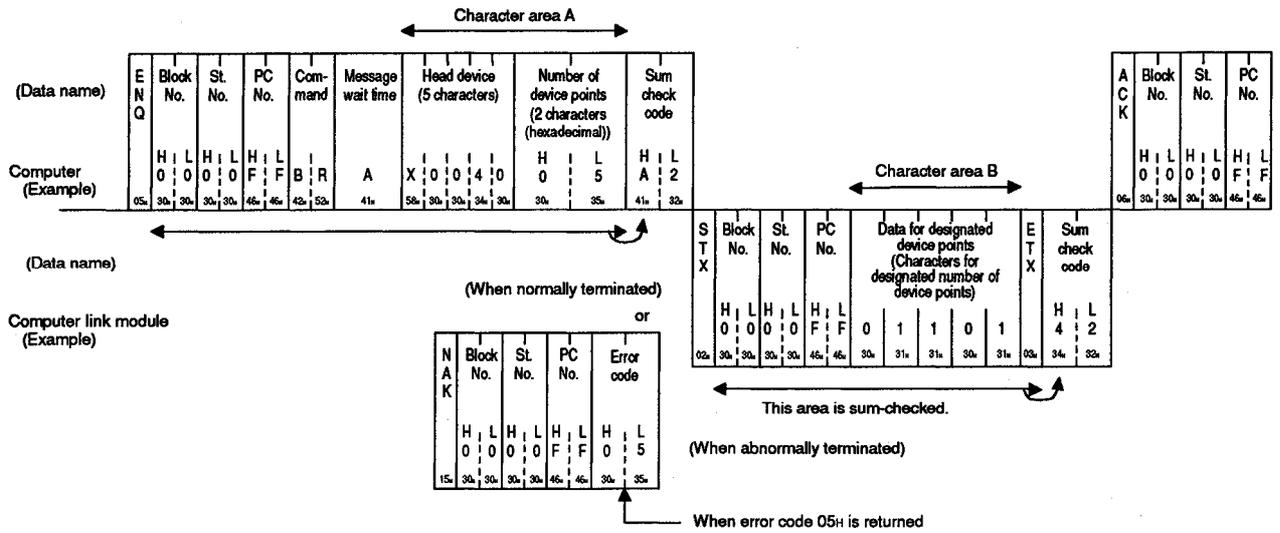
Description	Control Protocol																																																
<p>To read data from the PC CPU to the computer</p>	<p style="text-align: right;">St. No.: Station number</p> <p style="text-align: center;">Transmission sequence →</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>Computer</p> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td>E N Q</td><td>Block No.</td><td>St. No.</td><td>PC No.</td><td>Com- mand</td><td>Message wait time</td><td>Character area A</td><td>Sum check code</td></tr> <tr><td>H₁ L</td><td>H₁ L</td><td>H₁ L</td><td>H₁ L</td><td> </td><td></td><td></td><td>H₁ L</td></tr> </table> <p>Computer link module</p> </div> <div style="text-align: center;"> <p>or</p> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td>N A K</td><td>Block No.</td><td>St. No.</td><td>PC No.</td></tr> <tr><td>H₁ L</td><td>H₁ L</td><td>H₁ L</td><td>H₁ L</td></tr> </table> </div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;"> <div style="text-align: center;"> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td>S T X</td><td>Block No.</td><td>St. No.</td><td>PC No.</td><td>Character area B</td><td>E T X</td><td>Sum check code</td></tr> <tr><td>H₁ L</td><td>H₁ L</td><td>H₁ L</td><td>H₁ L</td><td></td><td></td><td>H₁ L</td></tr> </table> </div> <div style="text-align: center;"> <p>or</p> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td>N A K</td><td>Block No.</td><td>St. No.</td><td>PC No.</td><td>Error code</td></tr> <tr><td>H₁ L</td><td>H₁ L</td><td>H₁ L</td><td>H₁ L</td><td>H₁ L</td></tr> </table> </div> </div>	E N Q	Block No.	St. No.	PC No.	Com- mand	Message wait time	Character area A	Sum check code	H ₁ L	H ₁ L	H ₁ L	H ₁ L				H ₁ L	N A K	Block No.	St. No.	PC No.	H ₁ L	H ₁ L	H ₁ L	H ₁ L	S T X	Block No.	St. No.	PC No.	Character area B	E T X	Sum check code	H ₁ L	H ₁ L	H ₁ L	H ₁ L			H ₁ L	N A K	Block No.	St. No.	PC No.	Error code	H ₁ L				
E N Q	Block No.	St. No.	PC No.	Com- mand	Message wait time	Character area A	Sum check code																																										
H ₁ L	H ₁ L	H ₁ L	H ₁ L				H ₁ L																																										
N A K	Block No.	St. No.	PC No.																																														
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H ₁ L	H ₁ L	H ₁ L	H ₁ L			H ₁ L																																											
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H ₁ L	H ₁ L	H ₁ L	H ₁ L	H ₁ L																																													
<p>To write data from the computer to the PC CPU</p>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>Computer</p> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td>E N Q</td><td>Block No.</td><td>St. No.</td><td>PC No.</td><td>Com- mand</td><td>Message wait time</td><td>Character area C</td><td>Sum check code</td></tr> <tr><td>H₁ L</td><td>H₁ L</td><td>H₁ L</td><td>H₁ L</td><td> </td><td></td><td></td><td>H₁ L</td></tr> </table> <p>Computer link module</p> </div> <div style="text-align: center;"> <p>Transmission sequence →</p> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td>A C K</td><td>Block No.</td><td>St. No.</td><td>PC No.</td></tr> <tr><td>H₁ L</td><td>H₁ L</td><td>H₁ L</td><td>H₁ L</td></tr> </table> </div> </div> <div style="display: flex; justify-content: center; align-items: center; margin-top: 10px;"> <p>or</p> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td>N A K</td><td>Block No.</td><td>St. No.</td><td>PC No.</td><td>Error code</td></tr> <tr><td>H₁ L</td><td>H₁ L</td><td>H₁ L</td><td>H₁ L</td><td>H₁ L</td></tr> </table> </div>	E N Q	Block No.	St. No.	PC No.	Com- mand	Message wait time	Character area C	Sum check code	H ₁ L	H ₁ L	H ₁ L	H ₁ L				H ₁ L	A C K	Block No.	St. No.	PC No.	H ₁ L	H ₁ L	H ₁ L	H ₁ L	N A K	Block No.	St. No.	PC No.	Error code	H ₁ L	H ₁ L	H ₁ L	H ₁ L	H ₁ L														
E N Q	Block No.	St. No.	PC No.	Com- mand	Message wait time	Character area C	Sum check code																																										
H ₁ L	H ₁ L	H ₁ L	H ₁ L				H ₁ L																																										
A C K	Block No.	St. No.	PC No.																																														
H ₁ L	H ₁ L	H ₁ L	H ₁ L																																														
N A K	Block No.	St. No.	PC No.	Error code																																													
H ₁ L	H ₁ L	H ₁ L	H ₁ L	H ₁ L																																													
<p>Remarks</p>	<ol style="list-style-type: none"> (1) The sum check code is added only when sum check "enabled" is set (refer to Section 4.2.2). It will not be added when sum check "disabled" is selected. (2) The sum check is made for characters marked "*" in these diagrams. (3) In these diagrams, the contents of "character area A", "character area B", and "character area C" depend on the individual system. For details, see the relevant sections. The contents of all character areas are the same for all 4 formats. (4) When reading data sent from the PC CPU on the computer, the transmission of the ACK or NAK message indicated by "*" in the upper figure can be omitted. 																																																

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

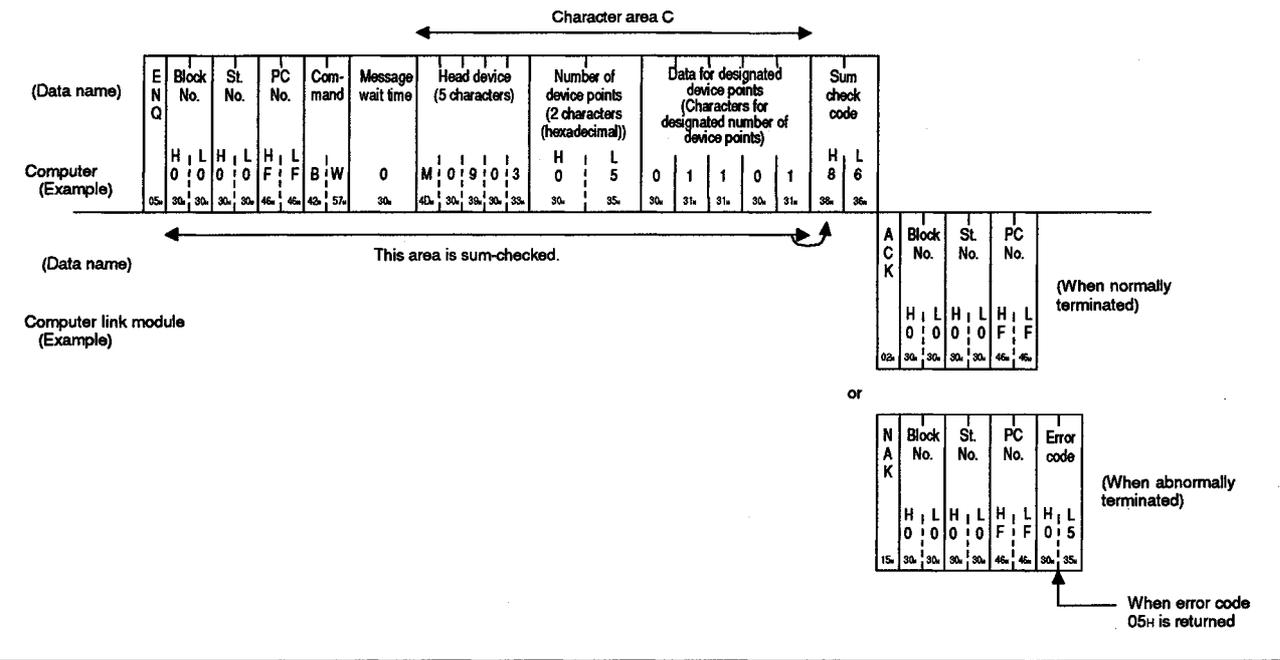
MELSEC-A

St. No.: Station number

(Example) When reading data from X40 to X44 (five devices) in the PC CPU with a BR command



(Example) When writing data to M903 to M907 (five devices) in the PC CPU with a BW command



5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

MELSEC-A

5.4.4 Control format 3

St. No. : Station number

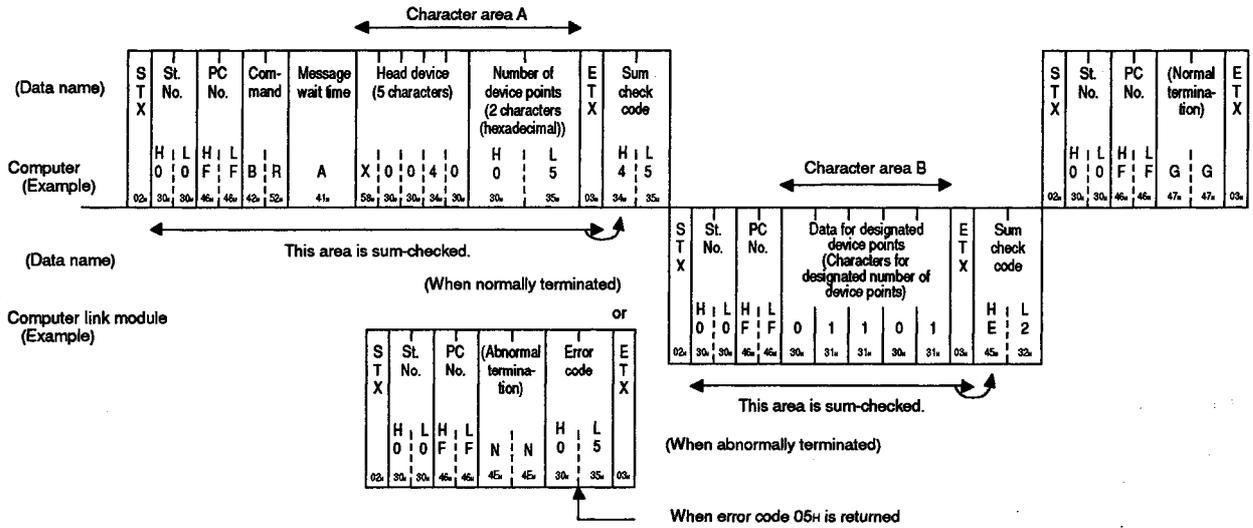
Description	Control Protocol
<p>To read data from the PC CPU to the computer</p>	<p>The diagram illustrates the transmission sequence for reading data from the PC CPU to the computer. It shows two paths: one through the Computer link module and one direct path. The direct path includes fields for STX, St. No., PC No., NN, NN, Error code, and ETX. The path through the Computer link module includes fields for STX, St. No., PC No., Command, Message wait time, Character area A, ETX, and Sum check code. Alternative fields for the direct path include GG and Error code. A transmission sequence arrow points from the Computer link module towards the Computer. A bracket labeled with an asterisk (*) spans the Command, Message wait time, and Character area A fields. A double asterisk (**) is placed above the NN, NN, Error code, and ETX fields.</p>
<p>To write data from the computer to the PC CPU</p>	<p>The diagram illustrates the transmission sequence for writing data from the computer to the PC CPU. It shows two paths: one through the Computer link module and one direct path. The direct path includes fields for STX, St. No., PC No., NN, NN, Error code, and ETX. The path through the Computer link module includes fields for STX, St. No., PC No., Command, Message wait time, Character area C, ETX, and Sum check code. A transmission sequence arrow points from the Computer towards the Computer link module. A bracket labeled with an asterisk (*) spans the Command, Message wait time, and Character area C fields.</p>
<p>Remarks</p>	<ol style="list-style-type: none"> (1) The sum check code is added only when sum check "enabled" is set (refer to Section 4.2.2). It will not be added when sum check "disabled" is selected. (2) The sum check is made for characters marked "*" in these diagrams. (3) In these diagrams, the contents of "character area A", "character area B", and "character area C" depend on the individual system. For details, see the relevant sections. The contents of all character areas are the same for all 4 formats. (4) When reading data sent from the PC CPU on the computer, the transmission of the ACK or NAK message indicated by ** in the upper figure can be omitted. (5) When data communication is executed in a system configuration in which computers and PC CPUs are connected in an m:n ratio, control format 3 cannot be used.

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

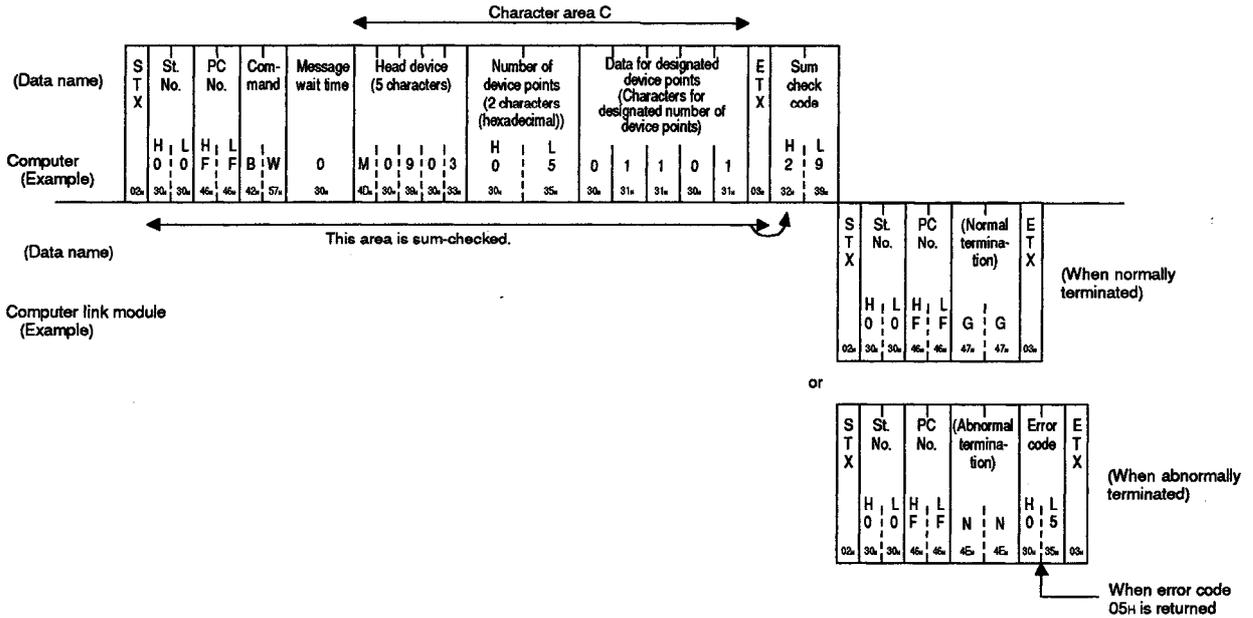
MELSEC-A

St. No.: Station number

(Example) When reading data from X40 to X44 (five devices) in the PC CPU with a BR command



(Example) When writing data to M903 to M907 (five devices) in the PC CPU with a BW command



5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

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5.4.5 Control format 4

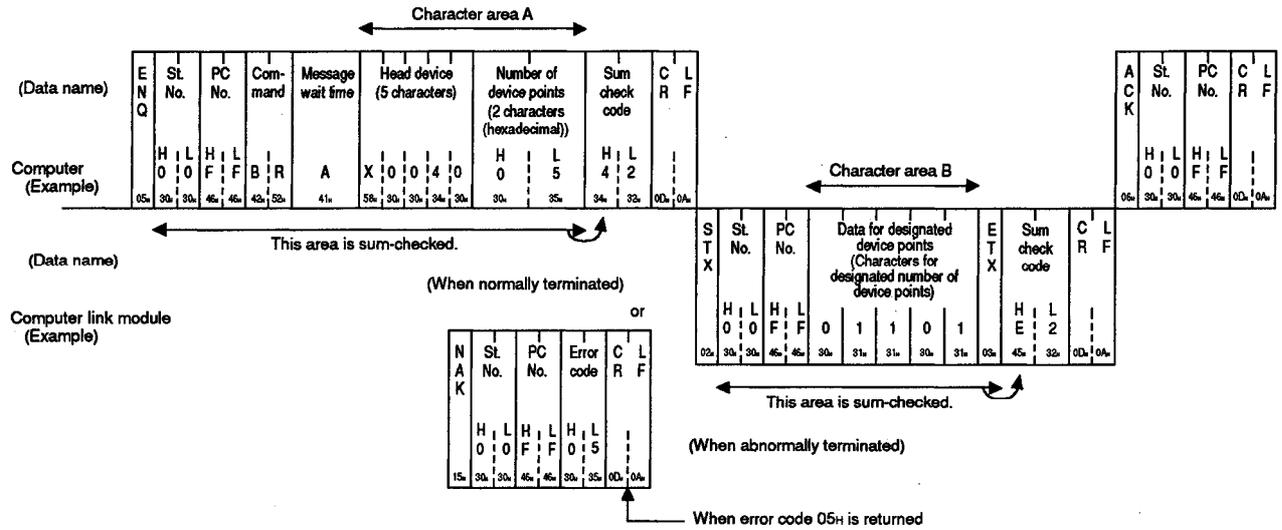
St. No.: Station number

Description	Control Protocol
<p>To read data from the PC CPU to the computer</p>	<p>The diagram illustrates the transmission sequence for reading data from the PC CPU to the computer. It shows the following fields in a sequence:</p> <ul style="list-style-type: none"> ENQ (High/Low) St. No. (High/Low) PC No. (High/Low) Command Message wait time Character area A (marked with asterisks) Sum check code (High/Low) CRLF <p>Alternative fields shown include:</p> <ul style="list-style-type: none"> ACK (High/Low) St. No. (High/Low) PC No. (High/Low) CRLF <p>A NAK message is also shown with the following fields:</p> <ul style="list-style-type: none"> St. No. (High/Low) PC No. (High/Low) Error code (High/Low) CRLF
<p>To write data from the computer to the PC CPU</p>	<p>The diagram illustrates the transmission sequence for writing data from the computer to the PC CPU. It shows the following fields in a sequence:</p> <ul style="list-style-type: none"> ENQ (High/Low) St. No. (High/Low) PC No. (High/Low) Command Message wait time Character area C (marked with asterisks) Sum check code (High/Low) CRLF <p>Alternative fields shown include:</p> <ul style="list-style-type: none"> ACK (High/Low) St. No. (High/Low) PC No. (High/Low) CRLF <p>A NAK message is also shown with the following fields:</p> <ul style="list-style-type: none"> St. No. (High/Low) PC No. (High/Low) Error code (High/Low) CRLF
<p>Remarks</p>	<ol style="list-style-type: none"> (1) The sum check code is added only when sum check "enabled" is set (refer to Section 4.2.2). It will not be added when sum check "disabled" is selected. (2) The sum check is made for characters marked "*" in these diagrams. (3) In these diagrams, the contents of "character area A", "character area B", and "character area C" depend on the individual system. For details, see the relevant sections. The contents of all character areas are the same for all 4 formats. (4) When reading data sent from the PC CPU on the computer, the transmission of the ACK or NAK message indicated by "*" in the upper figure can be omitted.

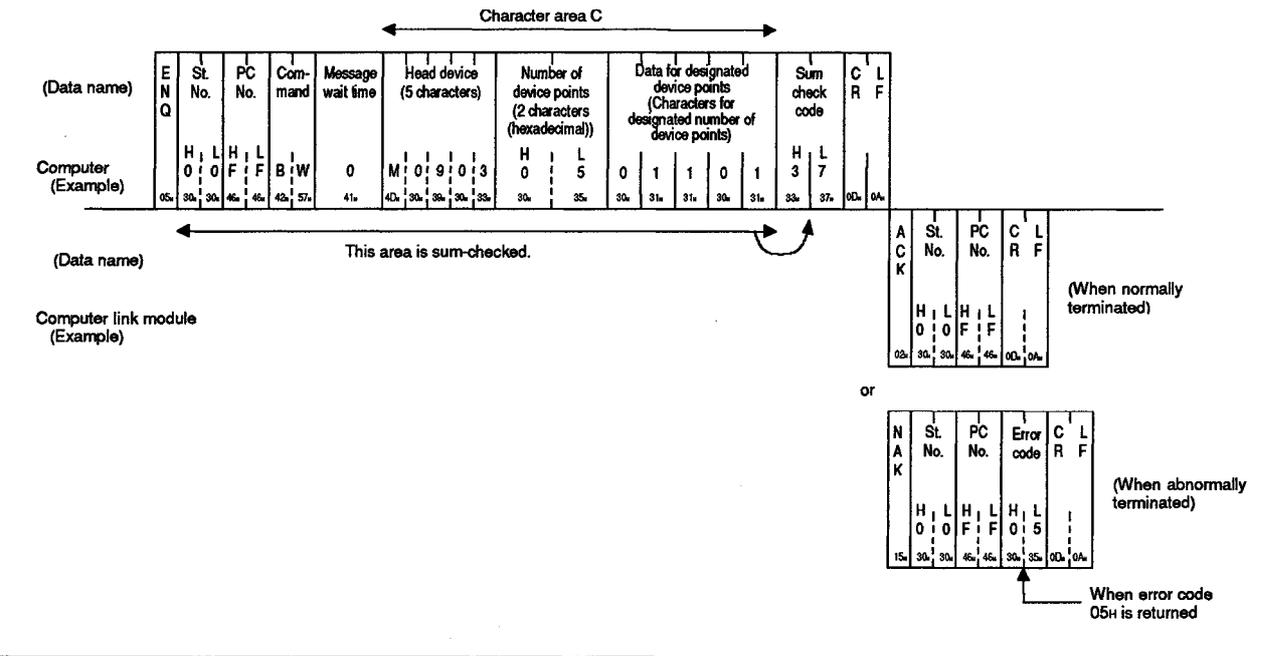
5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

St. No.: Station number

(Example) When reading data from X40 to X44 (five devices) in the PC CPU with a BR command



(Example) When writing data to M903 to M907 (five devices) in the PC CPU with a BW command



5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

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5.4.6 Names of data to be specified in control formats

This section describes the name of each data to be specified in one of the four control formats.

(1) Control code

All control codes are sent and received in hexadecimal. They are shown in the following table.

Signal	Code (Hexadecimal)	Description	Signal	Code (Hexadecimal)	Description
NUL	00H	Null	LF	0AH	Line Feed
STX	02H	Start of Text	CL	0CH	Clear
ETX	03H	End of Text	CR	0DH	Carriage Return
EOT	04H	End of Transmission	NAK	15H	Negative Acknowledge
ENQ	05H	Enquiry	G	47H	Good
ACK	06H	Acknowledge	N	4EH	No Good

- (a) The NUL code (00H) is ignored in all messages. If a NUL code is included in a message, it is processed as if it did not exist.
- (b) In format 3, control code "GG" is equivalent to ACK and "NN" is equivalent to NAK.
- (c) The control codes EOT and CL initialize the transmission sequence for data communications using a dedicated protocol to put the computer link module on standby for a command from the computer.

As soon as it receives an EOT or CL code, the computer link module:

- Suspends the on-going data reading or writing from or to the PC CPU on a request from the computer.
In this case, it does not issue a response message (area B shown in Section 5.4.1) to the command it received right before the request;
- Initializes the transmission sequence for data communications using a dedicated protocol to put the computer link module on standby for a command from the computer;
- Does not issue any response message to the incoming EOT or CL code (nothing is sent to the computer)
- Continues sending data to the computer by the on-demand function (for data transmission from the PC CPU to the computer, refer to Section 5.14) when it receives an EOT or CL code during the execution of the function.

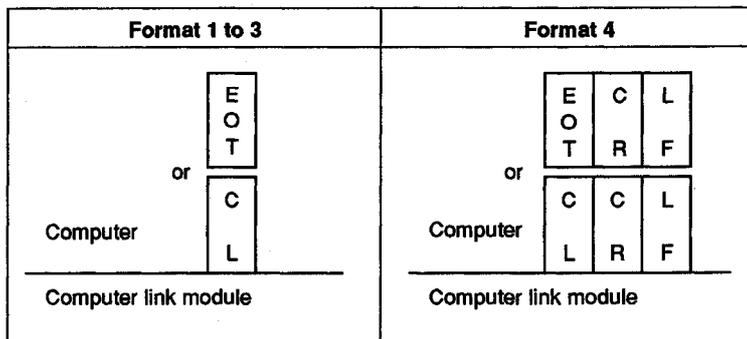
To carry out the following operations on the computer, send an EOT or CL code from the computer to the computer link module in one of the formats shown below:

- 1) Cancel the request for reading or writing in response to the last sent command. (When data has already been written to the PC CPU on a request for writing, the request cannot be cancelled.)

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

MELSEC-A

- 2) Keep the computer link module waiting for a command before it is sent.
- 3) In case of abnormal data communications, reset the computer link module to the start-up state.



* When an EOT or CL code is issued, only the data shown on the left is sent. The station number or PC number need not be sent.

(2) Block number

The block number is an optional number assigned as a data reference number for the computer. Block numbers are used to arrange data, etc. Block numbers may be from 00H to FFH in 2-digit ASCII (hexadecimal).

The computer link module only checks whether the block numbers are set within the above number range.

It does not check whether the block numbers included in a command message are sent in sequence.

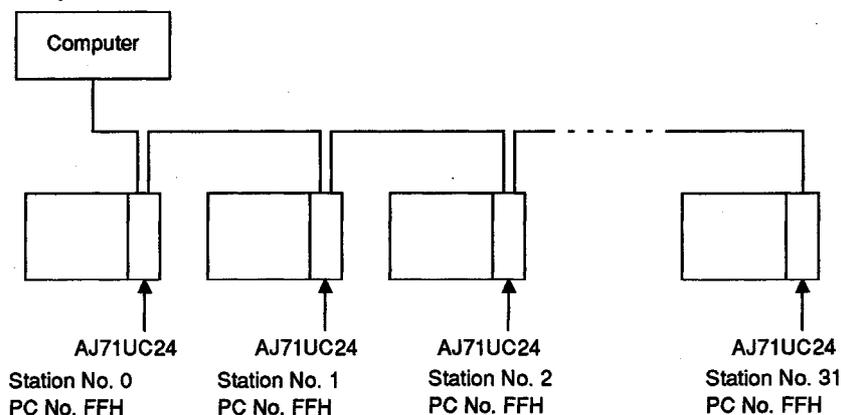
(3) Station number

The station number is set by the station number setting switch on the front of the computer link module. It identifies file which computer link module in a station to access.

Station numbers must be in the range of 00H to 1FH (0 to 31) in 2-digit ASCII (hexadecimal).

The A1SJ71C24-R2 and the A1SJ71C24-PRF are not equipped with station number setting switches. Set 00H as the station number.

Example:



REMARK

Station numbers do not need to be sequential. Normal data communications can be established even if station No. 31 is set first.

POINTS

- (1) The station number setting switch is set to a decimal value, but the station number is specified in hexadecimal.
Example: Switch setting "10" corresponds to station number "0AH" specified in the protocol.
- (2) The station number for using the global function described in Section 5.13 is set to "FF" in the protocol.
If 0 to 31 (00H to 1FH) is specified, "Xn2" turns ON at that station number only. For details, refer to Section 5.13.
- (3) To execute data communications between the computer and computer link modules in the m:n multidrop connection, set the station number at the computer side in the range of 128 to 159 (80H to 9FH).
In this setting, the station numbers are determined according to the rule set by the computers.
For details, refer to Section 11.

(4) PC number

The PC number is used to identify which of the PC CPUs on the MELSEC-NET(II), MELSECNET/B or MELSECNET/10 the computer will access.

The PC number is FFH or converted into a 2-digit ASCII number (hexadecimal) within the range from 00H to 40H (or from 00H to 1FH in the MELSECNET/B) which are set in the data link module or network module.

- (a) When the computer link accesses a PC CPU loaded with a computer link module

The user should set "FF" when sending a command from the computer to the computer link module by a function other than the on-demand function.

When sending data from the computer link module to the computer by the on-demand function, the computer link module adds "FE".

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

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- (b) When the computer accesses the PC CPU of another station through the PC CPU loaded with a computer link module, set one of the following PC numbers:

System Name	PC CPU Loaded with Computer Link Module Connected to Computer	PC CPU (of Another Station) Accessed by Computer	PC No. to be Set
MELSECNET(II)	Master station	Local station, remote I/O station	Set a station number (1 to 64) in hexadecimal (01H to 40H).
	Local station	Master station	Set 00H.
MELSECNET/B	Master station	Local station, remote I/O station	Set a station number (1 to 31) in hexadecimal (01H to 1FH).
	Local station	Master station	Set 00H.
MELSECNET/10 (PC-to-PC network)	Control station (AnUCPU)	Normal station (AnUCPU) (AnACPU/AnNCPU) *1	Set a station number (1 to 64/32) in hexadecimal (01H to 40H/20H).
	Normal station (AnUCPU)	Control station (AnUCPU) *1	Set a station number (1 to 64/32) in hexadecimal (01H to 40H/20H). Possible to set in 00H.
	Normal station (AnACPU/AnNCPU)		Set 00H.
	Normal station (AnUCPU)	Normal station (AnUCPU) (AnACPU/AnNCPU) *1	Set a station number (1 to 64/32) in hexadecimal (01H to 40H/20H).
	Normal station (AnACPU/AnNCPU)	Normal station (AnUCPU) (AnACPU/AnNCPU)	Inaccessible
MELSECNET/10 (remote I/O network)	Master station (AnUCPU)	Remote station (AJ72LP25/BR15) *1	Set a station number (1 to 64/32) in hexadecimal (01H to 40H/20H).
	Remote station (AJ72LP25/BR15)	Master station (AnUCPU) *1	Set 00H.
		Remote station (AJ72LP25/BR15)	Inaccessible

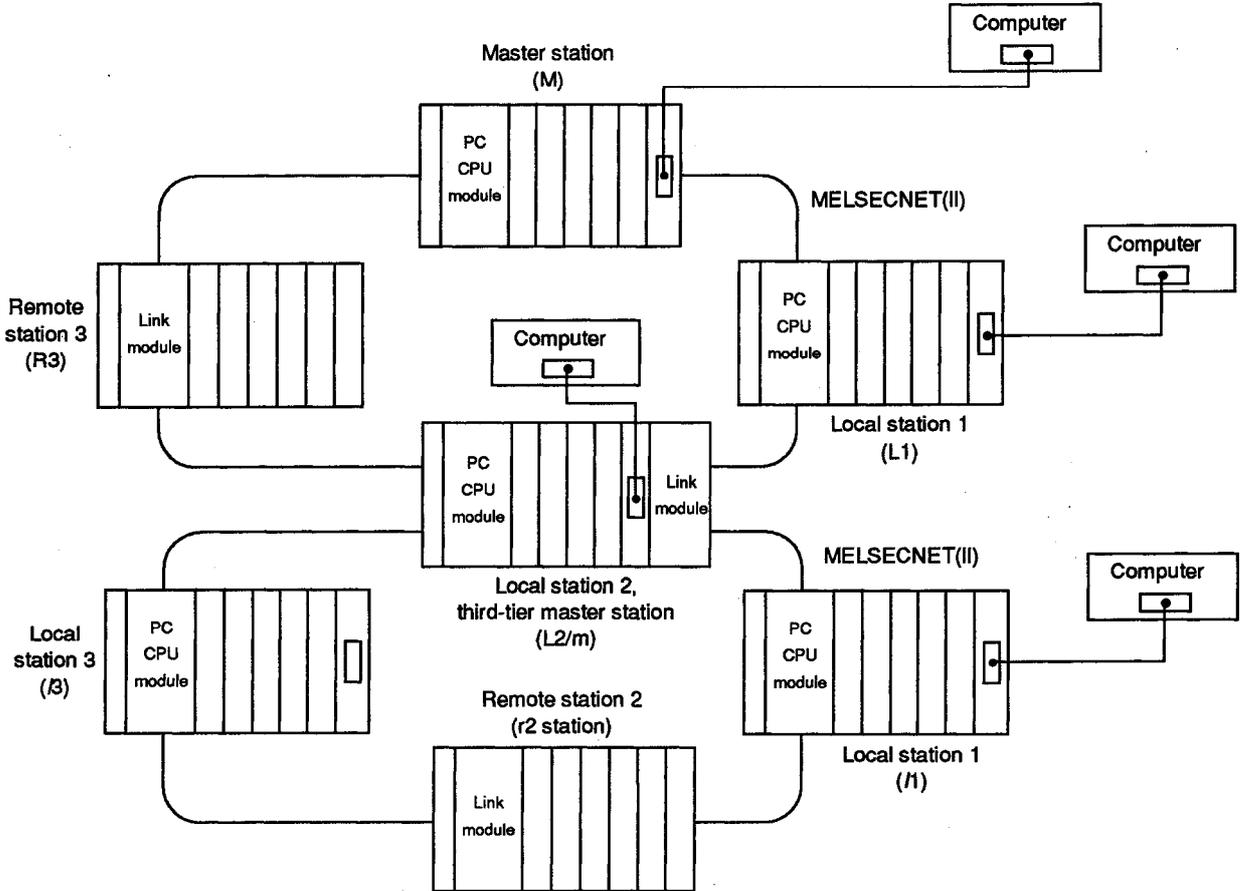
*1 : Only stations on the network of which the number is registered with the station (self station) connected to the computer are accessible.
(Refer to Sections 5.2.2 (2) (b) and 5.15.3.)

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

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[PC number setting example]

In the case of the MELSECNET (II) and MELSECNET/B



PC Numbers to be Set

Station Connected to Computer	PC CPU Accessed by Computer						
	M	L1	L2/m	R3	l1	r2	B
M	FF	01	02	03 *1	X	X	X
L1	00	FF	X	X	X	X	X
L2/m	00	X	FF	X	01	02 *1	03
l1	X	X	00	X	FF	X	X

X: Inaccessible

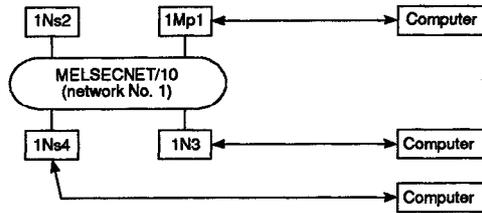
POINTS

- (1) The PC number to be set is the same even if the MELSECNET/B is used for one of the tiers in the above figure.
- (2) The A0J2CPUP23/R23 and the A0J2P25/R25 are inaccessible.
- (3) With regard to *1 (M → R3, L2/m → r2), it is possible to access the buffer memory in a special function unit.

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

In the case of the MELSECNET/10 PC-to-PC network

- 2-tier MELSECNET/10 system

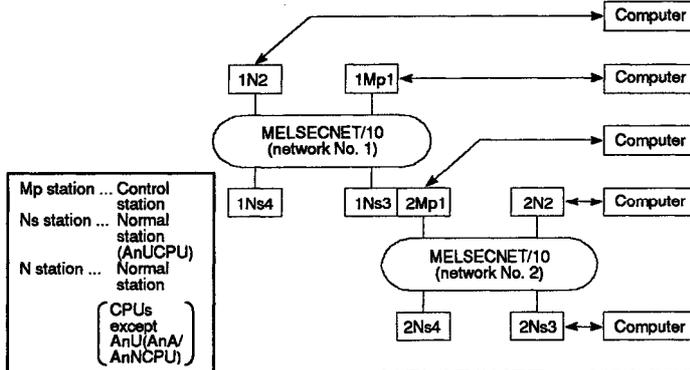


PC Number to be Set

Station Connected to Computer	PC CPU Accessed by Computer			
	1Mp1	1Ns2	1N3	1Ns4
1Mp1	FF	02	03	04
1N3	00	X	FF	X
1Ns4	01	02	03	FF

X: Inaccessible

- Multi-tier MELSECNET/10 system



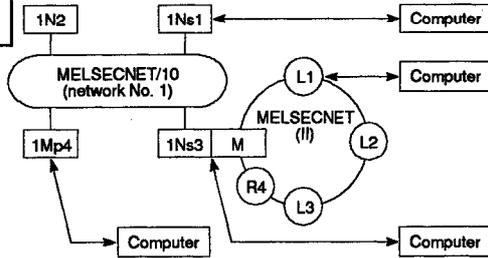
PC Number to be Set

Station Connected to Computer	PC CPU Accessed by Computer						
	1Mp1	1N2	1Ns3/2Mp1	1Ns4	2N2	2Ns3	2Ns4
1Mp1	FF	02	03	04	02	03	04
1N2	00	FF	X	X	X	X	X
1Ns3/2Mp1	01	02	FF	04	02	03	04
2N2	X	X	00	X	FF	X	X
2Ns3	01	02	01	04	02	FF	04

X: Inaccessible

Mp station ... Control station
 Ns station ... Normal station (AnUCPU)
 N station ... Normal station
 (CPUs except AnU/AnA/AnNCPU)
 The first number and the last number of each station in the right figure represent the network number and the station number respectively.

- MELSECNET/10-MELSECNET (II) composite system (Intermediate station: AnUCPU)

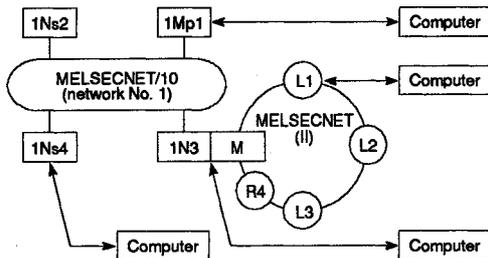


PC Number to be Set

Station Connected to Computer	PC CPU Accessed by Computer							
	1Ns1	1N2	1Ns3/M	1Mp4	L1	L2	L3	R4
1Ns1	FF	02	03	04	X	X	X	X
1Ns3/M	01	02	FF	04	01	02	03	04
1Mp4	01	02	03	FF	X	X	X	X
L1	X	X	00	X	FF	X	X	X

X: Inaccessible

(Intermediate station: AnACPU or AnNCPU)



PC Number to be Set

Station Connected to Computer	PC CPU Accessed by Computer							
	1Mp1	1Ns2	1Ns3/M	1Ns4	L1	L2	L3	R4
1Mp1	FF	02	03	04	X	X	X	X
1Ns3/M	00	X	FF	X	01	02	03	04
1Ns4	01	02	03	FF	X	X	X	X
L1	X	X	00	X	FF	X	X	X

X: Inaccessible

POINT

To access the PC CPU of another station, it is necessary to set the network parameters by the GPP function and register the network in the computer link module (when the station connected to the computer is an AnUCPU on the MELSECNET/10).

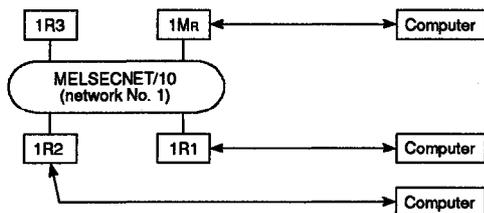
For network parameter settings, refer to the MELSECNET/10 Network System Reference Manual.

Register the network according to the procedure described in Section 5.15.3 herein.

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

In the case of the MELSECNET/10 remote I/O network

• 2-tier MELSECNET/10 system

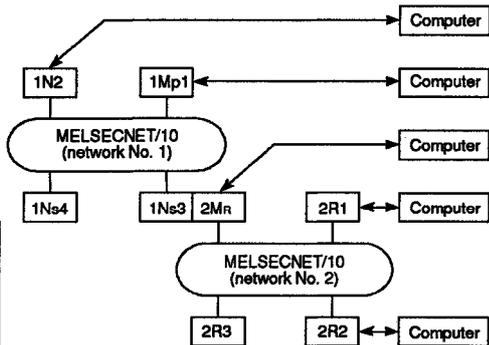


PC Number to be Set

Station Connected to Computer	PC CPU Accessed by Computer			
	1Mn	1R1	1R2	1R3
1Mr	FF	01	02	03
1R1	00	FF	X	X
1R2	01	X	FF	X

X: Inaccessible

• Multi-tier MELSECNET/10 system



PC Number to be Set

Station Connected to Computer	PC CPU Accessed by Computer						
	1Mp1	1N2	1Ns3/2Mn	1Ns4	2R1	2R2	2R3
1Mp1	FF	02	03	04	01	02	03
1N2	00	FF	X	X	X	X	X
1Ns3/2Mn	01	02	FF	04	01	02	03
2R1	01	02	00	04	FF	X	X
2R2	01	02	00	04	X	FF	X

X: Inaccessible

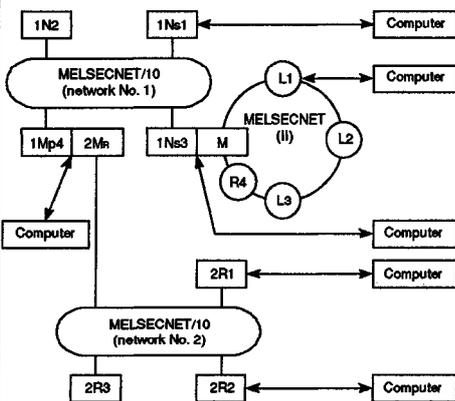
• MELSECNET/10-MELSECNET (II) combination system

[MELSECNET/10]
PC-to-PC network
Mp station ... Control station
Ns station ... Normal station (AnUCPU)
N station ... Normal station
CPUs except AnU(An/AnNCPU)

[MELSECNET/10]
remote I/O network
Mn station ... Master station (AnUCPU)
R station ... Remote station

[MELSECNET (II)]
M station ... Master station
L station ... Local station
R station ... Remote station

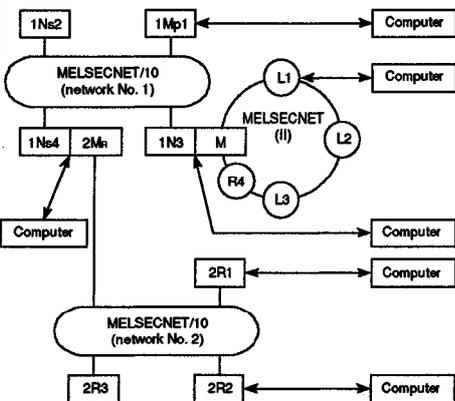
The first number and the last number of each station on the network in the right figure represent the network number and the station number respectively.
The station number is not attached to any Mr (master station) because the number is 0.



PC Number to be Set

Station Connected to Computer	PC CPU Accessed by Computer											
	1Ns1	1N2	1Ns3/M	1Mp4/2Mn	2R1	2R2	2R3	L1	L2	L3	R4	
1Ns1	FF	02	03	04	01	02	03	X	X	X	X	
1Ns3/M	01	02	FF	04	01	02	03	01	02	03	04	
1Mp4/2Mn	01	02	03	FF	01	02	03	X	X	X	X	
2R1	01	02	03	00	FF	X	X	X	X	X	X	
2R2	01	02	03	00	X	FF	X	X	X	X	X	
L1	X	X	00	X	X	X	X	FF	X	X	X	

X: Inaccessible



PC Number to be Set

Station Connected to Computer	PC CPU Accessed by Computer											
	1Mp 1	1Ns 2	1Ns3/ M	1Ns4/ 2Mn	2R1	2R2	2R3	L1	L2	L3	R4	
1Mp1	FF	02	03	04	01	02	03	X	X	X	X	
1Ns3/M	00	X	FF	X	X	X	X	01	02	03	04	
1Ns4/2Mn	01	02	03	FF	01	02	03	X	X	X	X	
2R1	01	02	03	00	FF	X	X	X	X	X	X	
2R2	01	02	03	00	X	FF	X	X	X	X	X	
L1	X	X	00	X	X	X	X	FF	X	X	X	

X: Inaccessible

POINT

Refer to POINT on the previous page.

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

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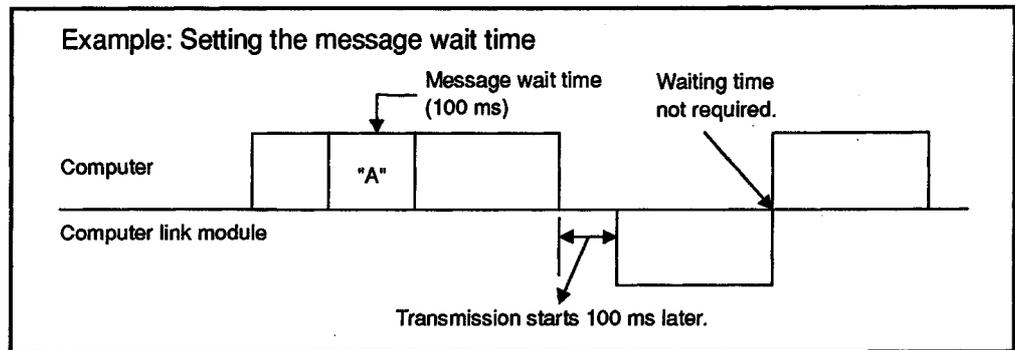
(5) Command

Used to specify the operation required, e.g. read, write, etc. Commands described in Section 5.7 to 5.16 must be in 2-digit ASCII (hexadecimal).

(6) Message wait time

This is a time delay required for some computers to switch from send to receive states. The message wait time determines the minimum waiting time before the computer link module sends data after receiving it from the computer. Set this time in accordance with the computer specifications.

The message wait time may be set between 0 and 150 ms in units of 10 ms. The time is set from 0H to FH (0 to 15) in 1-digit ASCII (hexadecimal), where 1 corresponds to 10 ms.



(7) Character area A

Character area A is the data to read out data from the computer link module to the PC CPU in response to the request for reading specified by a command. It is sent in ASCII codes.

The contents of character area A are different depending on the command sent from the computer. For details, refer to Sections 5.7 through 5.16.

(8) Character area B

Character area B is the data the computer link module sends back to the computer in response to the request specified by a command. It is sent in ASCII codes.

The contents of character area B are different depending on the command sent from the computer just before the above operation starts. For details, refer to Sections 5.7 through 5.16.

(9) Character area C

Character area C is the data to write data from the computer link module to the PC CPU in response to the request for writing specified by a command. It is sent in ASCII codes.

The contents of character area C are different depending on the command sent from the computer. For details, refer to Sections 5.7 through 5.15.

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

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(10) Sum check code

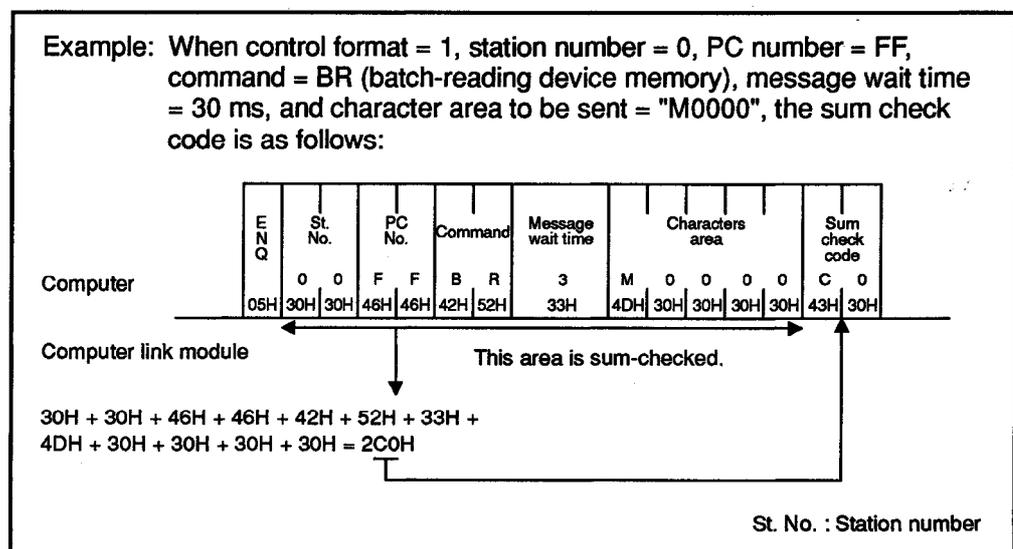
The sum check code is a 2-digit ASCII code (hexadecimal) representing the last 1 byte (8 bits) of the result (sum) obtained by adding the sum-checked data as BIN data.

The "sum check enabled/disabled setting" DIP switch (refer to Section 4.2.2) placed in the OFF position indicates that sum check disabled is selected, and thus the computer link module does not add a sum check code to the message sent. The data received is also processed as if it contained no sum check code.

When the "sum check enabled/disabled setting" DIP switch is in the ON position, the computer link module attaches a sum check code to the message sent.

The data received is also processed as if it contained a sum check error.

The following example shows the details of the sum check code.



(11) Error code

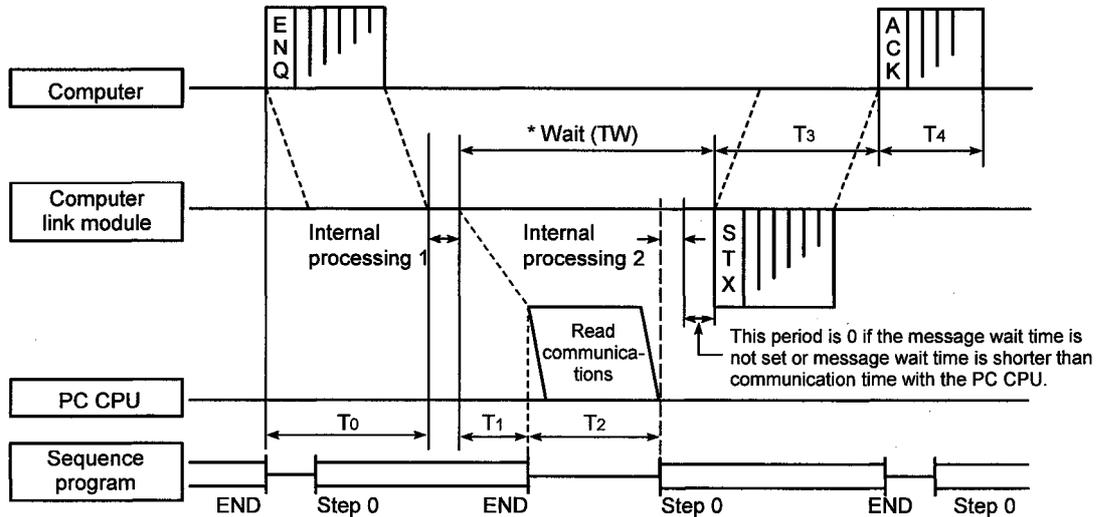
- Indicates an error following a NAK transmission.
- Error codes are transmitted as 2-digit ASCII (hexadecimal) in the range of 00H to FFH.
- If two or more errors occur simultaneously. The computer link module sends the first detected error code.
- For error code details, refer to Section 13.1.

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

5.5 Transmission Sequence Timing Charts and Communication Time

This section describes the time charts of communications between the computer and the PC CPU.

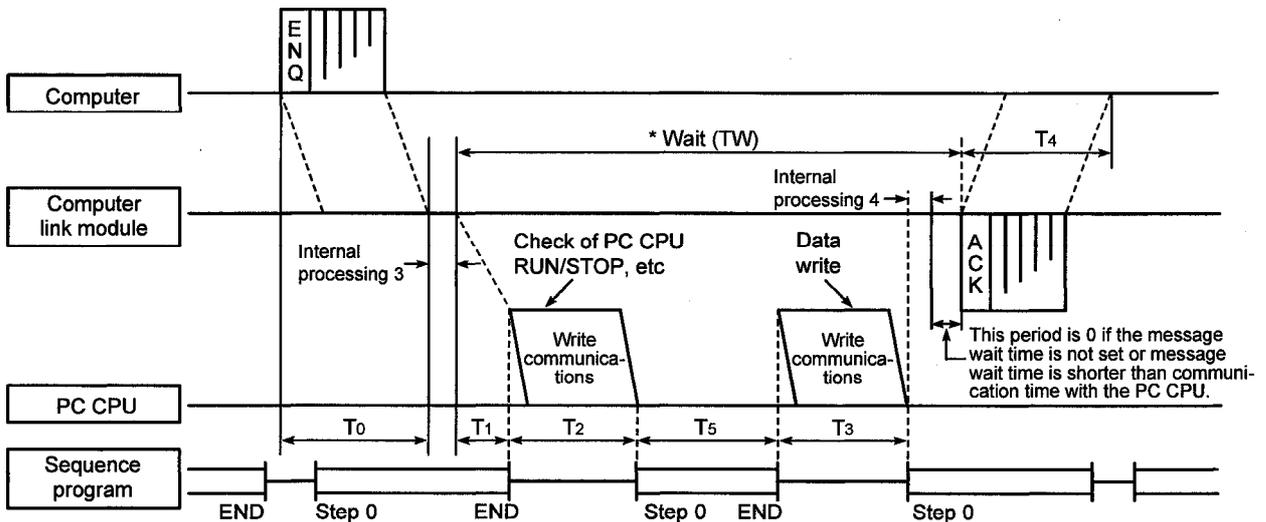
- (1) To read data from the PC CPU to the computer
 ("**" indicates that the message wait time has been set.)



REMARK

For file register and parameter, an extra 1 scan plus T2 is required.

- (2) To write data from the computer to the PC CPU
 ("**" indicates that message wait time has been set.)



REMARK

As shown above, exchange between the computer link module and PLC CPU is always made after END. Therefore, the scan time increases by that exchange time (time for intervening the PLC CPU).

Refer to Appendix 2 for the exchange time.

Also refer to Section 3.2.1 for the number of points that can be processed during exchange made once after END.

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

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(3) Communication time

This section describes how to calculate approximate communication time from the start of data transmission from the computer to the completion of all communications after a reply is sent from the computer link module.

For T0 to T4, refer to (1) and (2) on the previous page.

(a) To read data from the PC CPU to the computer

$$\text{Communication time} = T0 + (\text{longer time of } T1 + T2 \text{ or } TW) + T3 + T4 \\ + \text{sum of internal processing times}$$

where,

$$\left. \begin{aligned} T0, T3, T4 &= \frac{1}{\text{baud rate}} \times \text{the number of bits per character} \\ &= (1 + \frac{7}{8} + \frac{0}{1} + \frac{1}{2}) \times \text{the character length} \\ &\quad \begin{array}{l} \uparrow \quad \uparrow \quad \uparrow \quad \uparrow \\ \text{Start bit} \quad \text{Data length (7 or 8)} \\ \text{Parity bit (0 or 1)} \\ \text{Stop bit (1 or 2)} \end{array} \\ T1 &= \text{maximum 1 scan time (since data entry to the PC CPU is made} \\ &\quad \text{after END processing. If the PC CPU is not running, } T1 \text{ is 0.)} \\ T2 &= \text{value in APPENDIX 2} \\ TW &= \text{message wait time} \\ \text{Internal processing 1} &= \text{receive data analysis/conversion or other processing time (guideline)} \\ &\quad \text{Processing time} = 0.1 \text{ to } 4\text{ms (approx. 4ms at transmission} \\ &\quad \text{speed of 19200bps)} \\ &\quad * \text{Higher transmission speed leads to longer internal processing time.} \\ \text{Internal processing 2} &= \text{send data conversion or other processing time (guideline)} \\ &\quad \text{Processing time} = 4 + 1.5 \times \text{number of read points (unit: ms)} \end{aligned} \right\}$$

(b) To write data from the computer to the PC CPU

$$\text{Communication time} = T0 + (\text{longer time of } T1 + T2 + T3 + T5 \text{ or } TW) + T4 \\ + \text{sum of internal processing times}$$

where,

$$\left. \begin{aligned} T0, T4 &= \frac{1}{\text{baud rate}} \times \text{the number of bits per character} \\ &= (1 + \frac{7}{8} + \frac{0}{1} + \frac{1}{2}) \times \text{the character length} \\ &\quad \begin{array}{l} \uparrow \quad \uparrow \quad \uparrow \quad \uparrow \\ \text{Start bit} \quad \text{Data length (7 or 8)} \\ \text{Parity bit (0 or 1)} \\ \text{Stop bit (1 or 2)} \end{array} \\ T1 &= \text{maximum 1 scan time (since data entry to the PC CPU is made} \\ &\quad \text{after END processing. If the PC CPU is not running, } T1 \text{ is 0.)} \\ T2, T3 &= \text{value in APPENDIX 2} \\ &\quad \text{(For functions processed in 1 scan, } T3 \text{ is 0.)} \\ TW &= \text{message wait time} \\ T5 &= \text{1 scan time} \\ &\quad \text{(For functions processed in one scan, } T5 \text{ is 0.)} \\ \text{Internal processing 3} &= \text{receive data analysis/conversion or other processing time (guideline)} \\ &\quad \text{Processing time} = 4 + 1.5 \times \text{number of write points (unit: ms)} \\ \text{Internal processing 4} &= \text{processing result send preparation time (guideline)} \\ &\quad \text{Processing time} = 1\text{ms} \end{aligned} \right\}$$

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

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(4) Transmission time through Data link systems/Network systems

- (a) The transmission time (T1) for data transmission by specifying the PC CPU number to a PC CPU on MELSECNET(II), MELSECNET/B not equipped with a computer link module is calculated as follows:

- Local station
Transmission time (T1) = (Transmission delay time A *1 + 1 scan time for local station loaded with computer link module) x (n *2 + 1 *3)
 - Remote station
Transmission time (T1) = (Transmission delay time B *1 + MELSECNET master station scan time) x (n *2 + 1 *3)
- *1 Refer to the sections of the Data Link Reference Manual that explain corresponding data link system transmission delay times.
Transmission delay time A
Refer to the table which describes LRDP instruction processing time.
Transmission delay time B
Refer to the table which describes RFRP instruction processing time.
- *2
- When the power supply is turned on, or when the first communication with a specified station takes place after resetting the CPU
 - When communications with stations except the ten stations communicated last takes place
 - When the number of stations to communicate with is ten or less and the second communications takes place
 - When the second communications with the ten stations communicated last takes place
- } n=3
} n=1
- *3 If "Write during RUN enabled/disabled setting" of the transmission specification setting switches on the computer link module is disable, addition is performed only when data is written from the computer.

Example:

The transmission time for MELSECNET master station equipped with computer link module to read a local station device memory (when the number of stations to communicate with is ten or less and the second communications takes place):

(Conditions: L < LS < M, M : 80 ms α1 : 10 ms)

$$\text{Transmission time } T1 = (M \times 4 + \alpha 1 \times 4 + M) \times 1 = (80 \times 4 + 10 \times 4 + 80) \times 1 = 440$$

The transmission time is 440 ms. Where:

- M : MELSECNET master station scan time
- α1 : MELSECNET master station link refresh time
- LS : Link scan time
- L : MELSECNET local station scan time

• Causes of delayed transmission time (T1)

Instructions requiring 2 scans for transmission (e.g. write to device performed when "Write during RUN enabled/disabled setting" of the transmission specification setting switches is disable) need double the time derived from the equations above.

Refer to Section 5.2.3 (2) for the necessary number of scans when other computer link modules, GPP functions and/or like give access requests to the same PC CPU simultaneously.

*The Data Link Reference Manual gives details of the data link.

POINT

Under some conditions, data transmission to a PC CPU on MELSECNET(II), MELSECNET/B not equipped with a computer link module can cause a considerable time delay.

This time delay can be reduced by carrying out all communications from the computer to PC CPUs to stations equipped with an computer link module (PC CPU station number FFH) and all other data communications using the data link (B, W).

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

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(b) Transmission time through the MELSECNET/10

The transmission time (T1) for data transmission to a PC CPU without a computer link module in the MELSECNET/10 by specifying the PC number is calculated as follows:

1) For inter-PLC network

- Transmission time (T1) = (Transmission delay time *1 + 1 scan time for station loaded with computer link module) × (n *2 + 1 *3)
- *1 Refer to the sections of the Network Reference Manual that explain corresponding network system transmission delay times.
- *2
 - When the power supply is turned on, or when the first communication with a specified station takes place after resetting the CPU
 - When communication with stations except the ten stations communicated last takes place
 - When the number of stations to communicate with is ten or less and the second communication takes place
 - When the second communication with the ten stations communicated last takes place
- *3 If "Write during RUN enabled/disabled setting" of the transmission specification setting switches on the computer link module is disable, addition is performed only when data is written from the computer.

Example:

When a station on the MELSECNET/10 is loaded with a computer link module and data is read from the device memory in another station on the MELSECNET/10 (When the number of stations to communicate with is ten or less and the second communication takes place)

- ST: Sending side scan time 30 ms
- SR: Receiving side scan time 20 ms
- αT: Sending side link fresh time 20 ms
- αR: Receiving side link fresh time 10 ms
- LS: Link scan time 30 ms
- Number of simultaneous transient times 3

$$\text{Transmission time (T1)} = \{30 (\text{ST}) \times 2 + 20 (\alpha\text{T}) \times 2 + 30 (\text{LS}) \times 6 + 20 (\text{SR}) \times 2 + 10 (\alpha\text{R}) \times 2 + \left(\frac{3 (\text{number of simultaneous transient times})}{2} - 1 \right) \times 30 (\text{LS}) \times 2 + 30 (\text{ST}) \} \times 1 = 430 \text{ ms}$$

• Causes of delayed transmission time (T1)

Instructions requiring 2 scans for transmission (e.g. write to device performed when "Write during RUN enabled/disabled setting" of the transmission specification setting switches is disable) need double the time derived from the equations above.

Refer to Section 5.2.3 (2) for the necessary number of scans when other computer link modules, GPP functions and/or like give access requests to the same PC CPU simultaneously.

*The Network Reference Manual gives details of the data link.

POINT

Under some conditions, data transmission to a PC CPU on MELSECNET/10 not equipped with a computer link module can cause a considerable time delay. This time delay can be reduced by carrying out all communications from the computer to PC CPUs to stations equipped with an computer link module (PC CPU station number FFH) and all other data communications using the data link (LB, LW) and by increasing maximum number of transient times per scan.

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

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2) For remote I/O network

- Transmission time (T1) = (transmission delay time *1 + 1 link scan time) × (n *2 + 1 *3)

*1 Refer to the explanation of transmission delay time in the network system reference manual.

- *2
- When conducting the first exchange to the corresponding station after link has begun
 - When conducting exchange to a station except the latest 10 stations to which exchange was conducted
 - When conducting the second exchange when the number of exchange stations is 10 or less
 - When conducting the second exchange to the latest 10 stations to which exchange was conducted
- } n=6
} n=1

*3 If "Write during RUN enabled/disabled setting" of the transmission specification setting switches on the computer link module is disable, addition is performed only when data is written from the computer.

Example:

When a computer link module is installed in a station on an MELSECNET/10 (remote I/O network) and read from the other station device memory is conducted on the same MELSECNET/10. (At the second exchange when the number of exchange stations is 10 or less)

- Sm : Master station sequence scan time 120ms
- αm : Master station link refresh time 10ms
- αr : Remote I/O station link refresh time 2ms
- Ls : Link scan time 30ms

Since (Sm) > (Ls) in the above, the transmission time is as follows. (When there is one master station)

$$\text{Transmission time (T1)} = \left\{ \left(\underset{\text{(Sm)}}{120} + \underset{\text{(αm)}}{10} \right) \times 3 + \underset{\text{(Ls)}}{30} \right\} \times 1 = 420\text{ms}$$

- Reason for transmission time (T1) delay

When commands that require two scans (e.g. write to device performed when "Write during RUN enabled/disabled setting" of the transmission specification setting switches is disable) are executed, the value is twice greater than that calculated using the above formula.

Refer to Section 5.2.3 (2) for the necessary number of scans when access requests are given to the same PC CPU simultaneously by the other computer link modules, GPP functions, etc.

* Refer to the network system reference manual for details of the network system.

POINT

Depending on conditions, there will be a delay in data transmission to the PC other than the host station (PC No. FF) on MELSECNET/10.

The transmission delay time can be reduced by making exchange between the computer and PC using only the computer link module-installed station (PC No. FFH) and making exchange with the other station PC using the MELSECNET/10 data link (LB, LW).

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5.6 Character Area Data Transmission

The concept of transmission data handled as character areas when using commands to carry out data communications between the computer and the PC CPU is explained in this section. The data shown in the examples is contained in character area B in the case of read and monitor, and in character area C in the case of write, test, and monitor data register.

(1) Bit device memory read and write

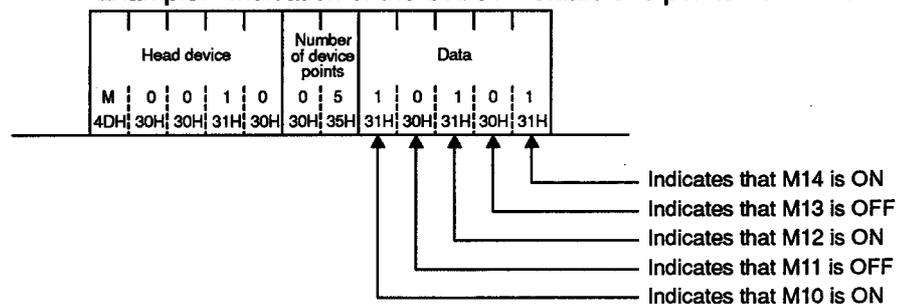
The bit device memory can be handled in bit units (1 device point) or word units (16 device points).

These units are described below.

(a) Bit units (1 point)

When the bit device memory is handled as bit units, the specified number of device points from the specified head device in sequence from the left are represented as 1 (31H) if the device is ON, or 0 (30H) if the device is OFF.

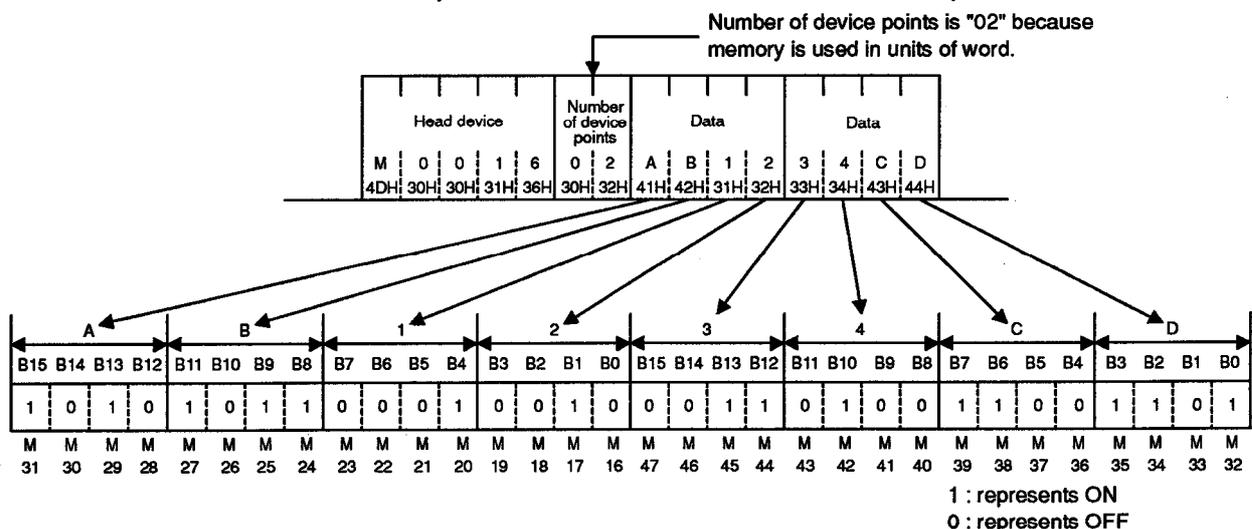
Example: Indication of the ON/OFF status of 5 points from M10



(b) Word units (16 points)

When the bit device memory is handled as word units, each word is expressed sequentially in hexadecimal values in 4-bit units from the higher bit.

Example: Indication of the ON/OFF status of 32 points from M16



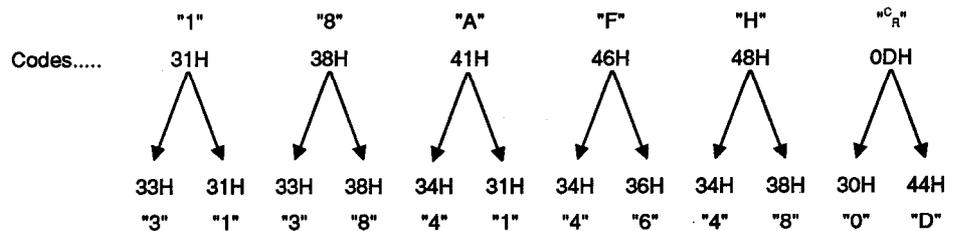
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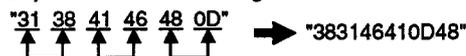
- (1) Extension file memory read and write, buffer memory read and write, and on-demand data when word units are specified are handled according to the same principle as the word device memory.
- (2) To output a character-string with the PR instruction externally after transmitting it from the computer to the PC CPU, the processing should be as shown below:
 - 1) The character-string to be transmitted is developed into 2-byte codes in units of characters.

Example: To transmit "18AFH^cr" to a sequence program.



- 2) The character-string developed into 2-byte codes is arranged in units of 2 characters and sent to the computer link module.

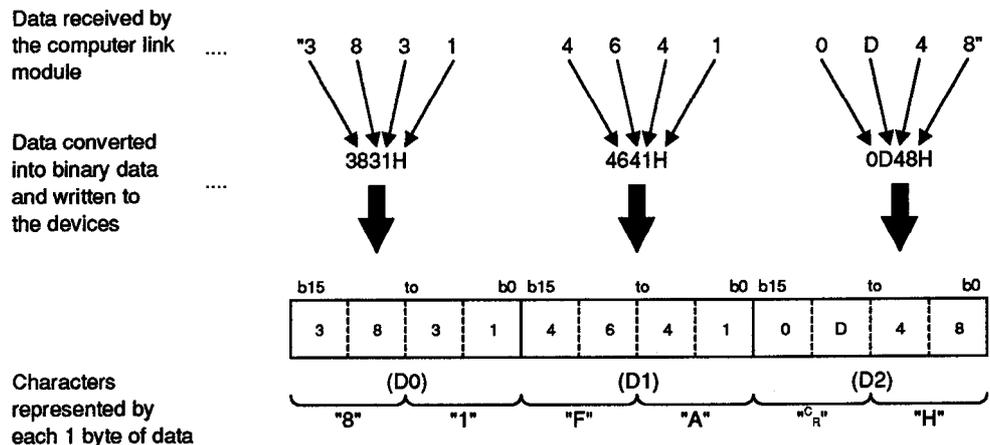
Example: The character-string used in the above example in 1)



"383146410D48" is sent from the computer to the computer link module.

The computer link module converts the data sent from the computer into binary data and writes it to the designated device.

Example: To write the data composed in the example in 2) on the previous page to D0 to D2 in the PC CPU.



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5.7 Device Memory Read/Write

This section describes how to designate the control procedure to read or write data from or to device memory, and designation examples.

5.7.1 Commands and device ranges

(1) The ACPU common commands and device ranges used for device memory read/write are described below.

(a) ACPU common commands

Item		Command		Description	Number of Points Processed per Communication	PC CPU State			Reference Section
		Symbol	ASCII Code			During STOP	During RUN		
							Write Enabled	Write Disabled	
Batch read	Bit units	BR	42H, 52H	Reads bit devices (X, Y, M, etc.) in units of 1 point.	256 points	○	○	○	5.7.2
	Word units	WR	57H, 52H	Reads bit devices (X, Y, M, etc.) in units of 16 points.	32 words (512 points)				5.7.3
				Reads word devices (D, R, T, C, etc.) in units of 1 point.	64 points				
Batch write	Bit units	BW	42H, 57H	Writes data to bit devices (X, Y, M, etc.) in units of 1 point.	160 points	○	○	X	5.7.4
	Word units	WW	57H, 57H	Writes data to bit devices (X, Y, M, etc.) in units of 16 points.	10 words (160 points)				5.7.5
				Writes data to word devices (D, R, T, C, etc.) in units of 1 point.	64 points				
Test (Random write)	Bit units	BT	42H, 54H	Sets/resets bit devices (X, Y, M, etc.) in units of 1 point by designating the devices and device numbers at random.	20 points	○	○	X	5.7.6
	Word units	WT	57H, 54H	Sets/resets bit devices (X, Y, M, etc.) in units of 16 points by designating the devices and device numbers at random.	10 words (160 points)				5.7.7
				Writes data to word devices (D, R, T, C, etc.) in units of 1 point by designating the devices and device numbers at random.	10 points				
Monitor data registration	Bit units	BM	42H, 4DH	Sets the bit devices (X, Y, M, etc.) to be monitored in units of 1 point.	40 points*	○	○	○	5.7.8 (2)
	Word units	WM	57H, 4DH	Sets the bit devices (X, Y, M, etc.) to be monitored in units of 16 points.	20 words* (320 points)				
				Sets the word devices (D, R, T, C, etc.) to be monitored in units of 1 point.	20 points				
Monitor	Bit units	MB	4DH, 42H	Monitors the devices registered for monitoring.	—	○	○	○	5.7.8 (3)
	Word units	MN	4DH, 4EH						

Note : ○ Executable
X Not executable

For the numbers of processing points indicated by an asterisk (*), the number is one half of the values indicated in the table for input devices (X) when PC CPUs other than A3HCPU, AnACPU, AnUCPU or QnACPU are used. (Refer to *1 in Section 3.2.1 (1)).

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POINT

When ACPU common commands are used to access the devices in an AnACPU, AnUCPU or QnACPU, the device number ranges described in (b) can be accessed.

Use the AnA/AnUCPU common commands described in (2) to access the extension devices.

(b) Device ranges when ACPU common commands are used

The devices and device number ranges that can be used for the device memory access operation are described below.

1) The device designation code consists of 5 characters.

Leading zeros in the device number (underlined zeros in X0070, for example) can be expressed with a blank code (20H).

$$\begin{array}{ccccccc}
 \text{Device} & & + & & \text{Device number} & & = 5 \text{ characters} \\
 \left\{ \begin{array}{c} 1 \text{ character} \\ (2 \text{ characters for T/C}) \end{array} \right\} & & & & \left\{ \begin{array}{c} 4 \text{ characters} \\ (3 \text{ characters for T/C}) \end{array} \right\} & &
 \end{array}$$

Bit Device			Word Device		
Device	Device Number Ranges (Characters)	Decimal/Hexadecimal Expression	Device	Device Number Range (Characters)	Decimal/Hexadecimal Expression
Input X	X0000 to X07FF	Hexadecimal	Timer (present value) T	TN000 to TN255	Decimal
Output Y	Y0000 to Y07FF		Counter (present value) C	CN000 to CN255	
Internal relay M	M0000 to M2047	Decimal	Data register D	D0000 to D1023	
Latch relay L	L0000 to L2047		Link register W	W0000 to W03FF	Hexadecimal
Step relay S	S0000 to S2047	Hexadecimal	File register R	R0000 to R8191	Decimal
Link relay B	B0000 to B03FF		Special register D	D9000 to D9255	
Annunciator F	F0000 to F0255	Decimal			
Special relay M	M9000 to M9255				
Timer (contact) T	TS000 to TS255				
Timer (coil) T	TC000 to TC255				
Counter (contact) C	CS000 to CS255				
Counter (coil) C	CC000 to CC255				

2) Designate the number of device points by converting the number of points for reading/writing to be executed by command (the number should be within the processing points executable in one cycle of communications shown in the table in (a)) into 2-digit ASCII codes (hexadecimal).

Set "00" for 256 points.

(Example: Numbers in parentheses are ASCII codes.)

5 points 05 (30H, 35H) 20 points 16 (31H, 36H)
 10 points 0A (30H, 41H) 256 points 00 (30H, 30H)

POINTS

- (1) Access the device number range which can be used with common ACPU commands and common AnA/AnU commands and that can be used with the PLC CPU to be accessed.
- (2) To designate the bit device ranges in units of words, the bit device number must be a multiple of 16.
- (3) Although the ranges are designated for M, L, and S, if the range for M is designated by L or S, the same processing occurs. This is also true for the ranges for L and S.
- (4) The ranges of special relays (M9000 to M9255) and special registers (D9000 to D9255) are divided into the areas for read only, write only, and system use.
Trying to write data to the ranges outside the write-only area might cause the PC CPU to malfunction.
The ACPU programming manual gives details concerning special relays and special registers.
- (5) When utilizing dedicated instructions for AnACPU and AnUCPU extension file registers with the following software packages, use the commands shown in Section 5.8 to read or write data from or to a file register (R):
 - SW0GHP-UTLPC-FN1
 - SW0SRX-FNUP

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(2) The AnA/AnUCPU common commands and device ranges used for device memory read/write are described below.

(a) AnA/AnUCPU common commands

Item	Command		Description	Number of Points Processed per Communication	PC CPU State			Reference Section	
	Symbol	ASCII Code			During STOP	During RUN			
						Write Enabled	Write Disabled		
Batch read	Bit units	JR	4AH, 52H	Reads bit devices (X, Y, M, etc.) in units of 1 point.	256 points				5.7.2
	Word units	QR	51H, 52H	Reads bit devices (X, Y, M, etc.) in units of 16 points.	32 words (512 points)	○	○	○	5.7.3
				Reads word devices (D, R, T, C, etc.) in units of 1 point.	64 points				
Batch write	Bit units	JW	4AH, 57H	Writes data to bit devices (X, Y, M, etc.) in units of 1 point.	160 points				5.7.4
	Word units	QW	51H, 57H	Writes data to bit devices (X, Y, M, etc.) in units of 16 points.	10 words (160 points)	○	○	X	5.7.5
				Writes data to word devices (D, R, T, C, etc.) in units of 1 point.	64 points				
Test (Random write)	Bit units	JT	4AH, 54H	Sets/resets bit devices (X, Y, M, etc.) in units of 1 point by designating the devices and device numbers at random.	20 points				5.7.6
	Word units	QT	51H, 54H	Sets/resets bit devices (X, Y, M, etc.) in units of 16 points by designating the devices and device numbers at random.	10 words (160 points)	○	○	X	5.7.7
				Writes data to word devices (D, R, T, C, etc.) in units of 1 point by designating the devices and device numbers at random.	10 points				
Monitor data registration	Bit units	JM	4AH, 4DH	Sets the bit devices (X, Y, M, etc.) to be monitored in units of 1 point.	40 points				5.7.8 (2)
	Word units	QM	51H, 4DH	Sets the bit devices (X, Y, M, etc.) to be monitored in units of 16 points.	20 words (320 points)	○	○	○	
				Sets the word devices (D, R, T, C, etc.) to be monitored in units of 1 point.	20 points				
Monitor	Bit units	MJ	4DH, 4AH	Monitors the devices registered for monitoring.	—	○	○	○	5.7.8 (3)
	Word units	MQ	4DH, 51H						

Note : ○.....Executable
X.....Not executable

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Function	Computer link function											
	AJ71UC24			A1SJ71UC24			A1SJ71UC24			A1SCPU	A2CCPU	A2CCPU
Applicable module	-R2	-R4	-PRF	-R2	-R4	-PRF	-R2	-R4	-PRF	C24-R2	C24	C24-PRF
Remarks	○	○	○	○	○	○	○	○	○	○	○	○

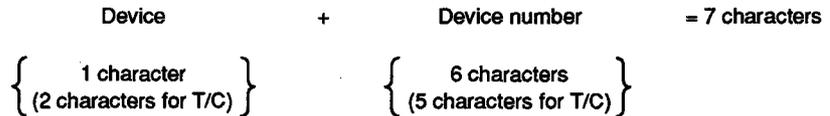
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(b) Device ranges when AnA/AnUCPU common commands are used

The devices and device number ranges that can be used for device memory access operation are described below.

1) The device designation code consists of 7 characters.

Leading zeros in the device number (underlined zeros in X000070, for example) can be expressed with a blank code (20H).



Bit Device			Word Device		
Device	Device Number Ranges (Characters)	Decimal/Hexadecimal Expression	Device	Device Number Range (Characters)	Decimal/Hexadecimal Expression
Input X	X000000 to X001FFF (X0007FF)	Hexadecimal	Timer (present value) T	TN00000 to TN02047	Decimal
Output Y	Y000000 to Y001FFF (Y0007FF)		Counter (present value) C	CN00000 to CN01023	
Internal relay M	M000000 to M008191	Decimal	Data register D	D000000 to D008191 (D006143)	Hexadecimal
Latch relay L	L000000 to L008191		Link register W	W000000 to W001FFF (W000FFF)	
Step relay S	S000000 to S008191		File register R	R000000 to R008191	
Link relay B	B000000 to B001FFF (B000FFF)	Hexadecimal	Special register D	D009000 to D009255	Decimal
Annunciator F	F000000 to F002047	Decimal			
Special relay M	M009000 to M009255				
Timer (contact) T	TS00000 to TS02047				
Timer (coil) T	TC00000 to TC02047				
Counter (contact) C	CS00000 to CS01023				
Counter (coil) C	CC00000 to CC01023				

* The device number in parentheses represents the maximum device number that can be designated with a computer link module other than the AJ71UC24, A1SJ71UC24-R2/R4/PRF.

2) Designate the number of device points by converting the number of points for reading/writing to be executed by command (the number should be within the processing points executable in one cycle of communications shown in the table in (a)) into 2-digit ASCII codes (hexadecimal).

Set "00" for 256 points.

(Example: Numbers in parentheses are ASCII codes.)

5 points	05 (30H, 35H)	10 points	0A (30H, 41H)
20 points	14 (31H, 34H)	256 points	00 (30H, 30H)

POINTS

- (1) Access the device number range which can be used with common ACPU commands and common AnA/AnU commands and that can be used with the PLC CPU to be accessed. (For QnACPU this is the AnACPU range).
- (2) To designate the bit device ranges in units of words, the bit device number must be a multiple of 16.
For special relays M, whose device number is M9000 or greater, designation is possible by using "9000 + multiples of 16".
- (3) Although the ranges are designated for M, L, and S, if the range for M is designated by L or S, the same processing occurs. This is also true for the ranges for L and S.
- (4) The ranges of special relays (M9000 to M9255) and special registers (D9000 to D9255) are divided into the areas for read only, write only, and system use.
Trying to write data to the ranges outside the write-only area might cause the PC CPU to malfunction.
The ACPU programming manual gives details concerning special relays and special registers.
- (5) When utilizing dedicated instructions for AnACPU and AnUCPU extension file registers, use the commands shown in Section 5.8 to read or write data from or to a file register (R).

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5.7.2 Batch read in units of bits

In this section, an example is quoted to describe the control protocol for batch-reading data from devices in bit device memory using a BR or JR command.

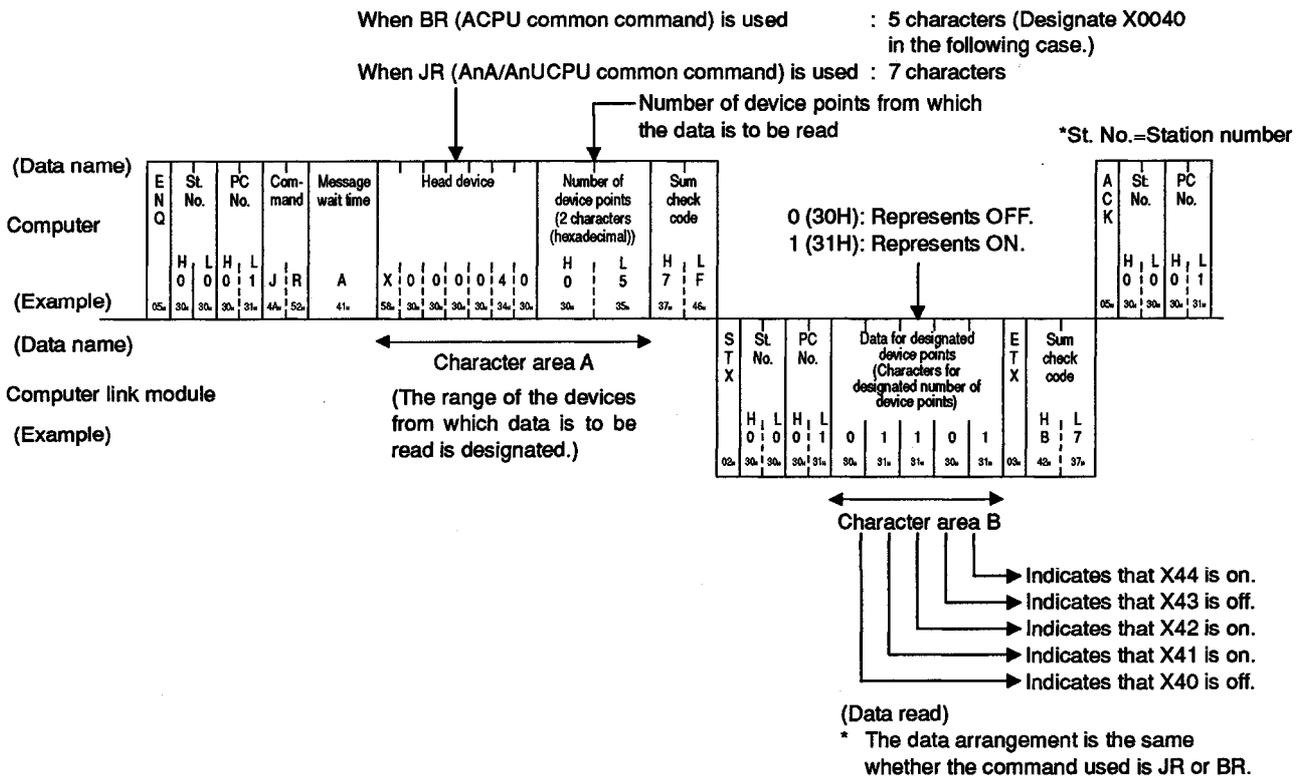
[Control protocol]

The protocol shown below is in control format 1.

To access device memory in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

(Reading conditions)

- 1) Message wait time is 100 ms
- 2) Data is to be read from five devices, X040 to X044.



POINTS

- (1) To designate the device range, the following conditions must be met:
 - $1 \leq \text{number of device points} \leq 256$ (setting for 256 points is 00H)
 - $(\text{Head device number}) + [(\text{number of device points}) - 1] \leq \text{maximum device number}$
- (2) The message wait time is designated in the range of 0 to 150 ms in units of 10 ms, using hexadecimal notation of 0 through FH. Therefore, 100 ms corresponds to "A".

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5.7.3 Batch read in units of words

In this section, examples are quoted to describe the control protocols for batch-reading data on devices from bit device memory (by 16 devices) and from word device memory using a WR or QR command.

[Control protocol]

The protocol shown below is in control format 1.

To access device memory in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

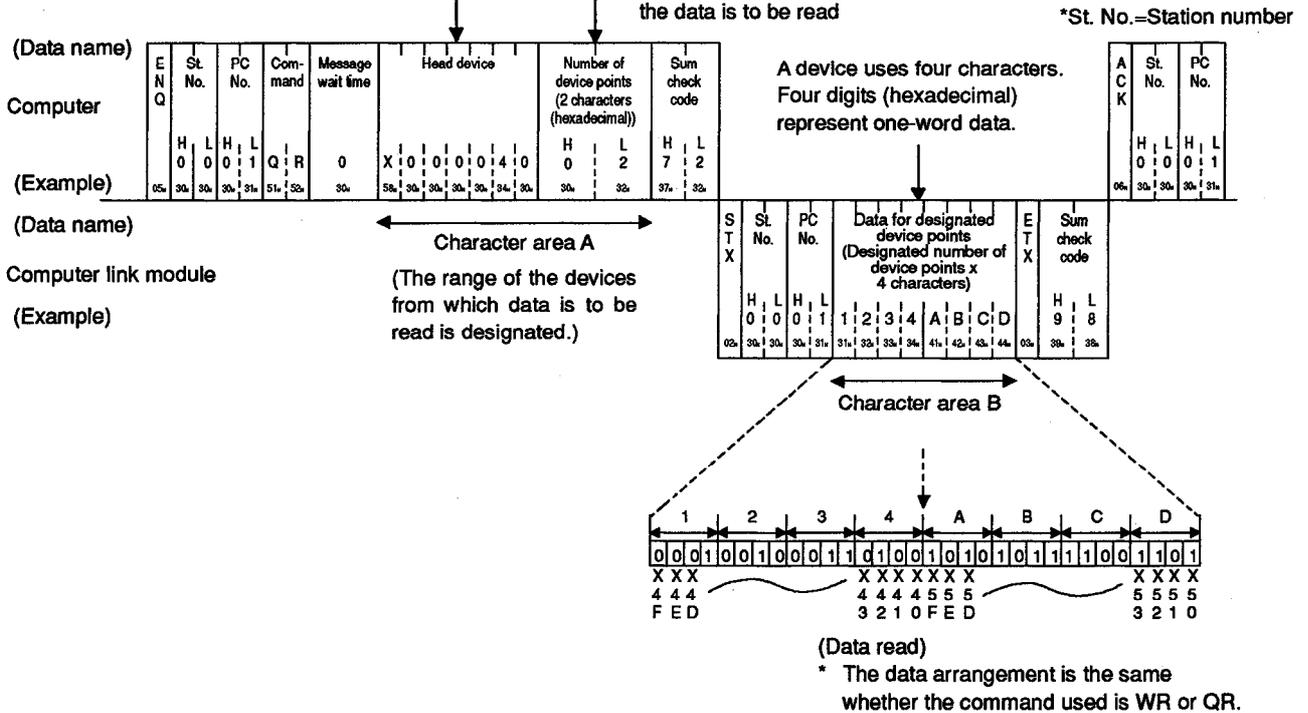
(Reading conditions)

- 1) The message wait time is 0 ms.
- 2) Data is to be read from 32 devices, X040 to X05F, and the present values from two devices (both of them are two words), T123 and T124.

(1) Batch-reading data on devices from bit device memory

When WR (ACPU common command) is used : 5 characters (Designate X0040 in the following case.)

When QR (AnA/AnUCPU common command) is used : 7 characters
Number of device points from which the data is to be read



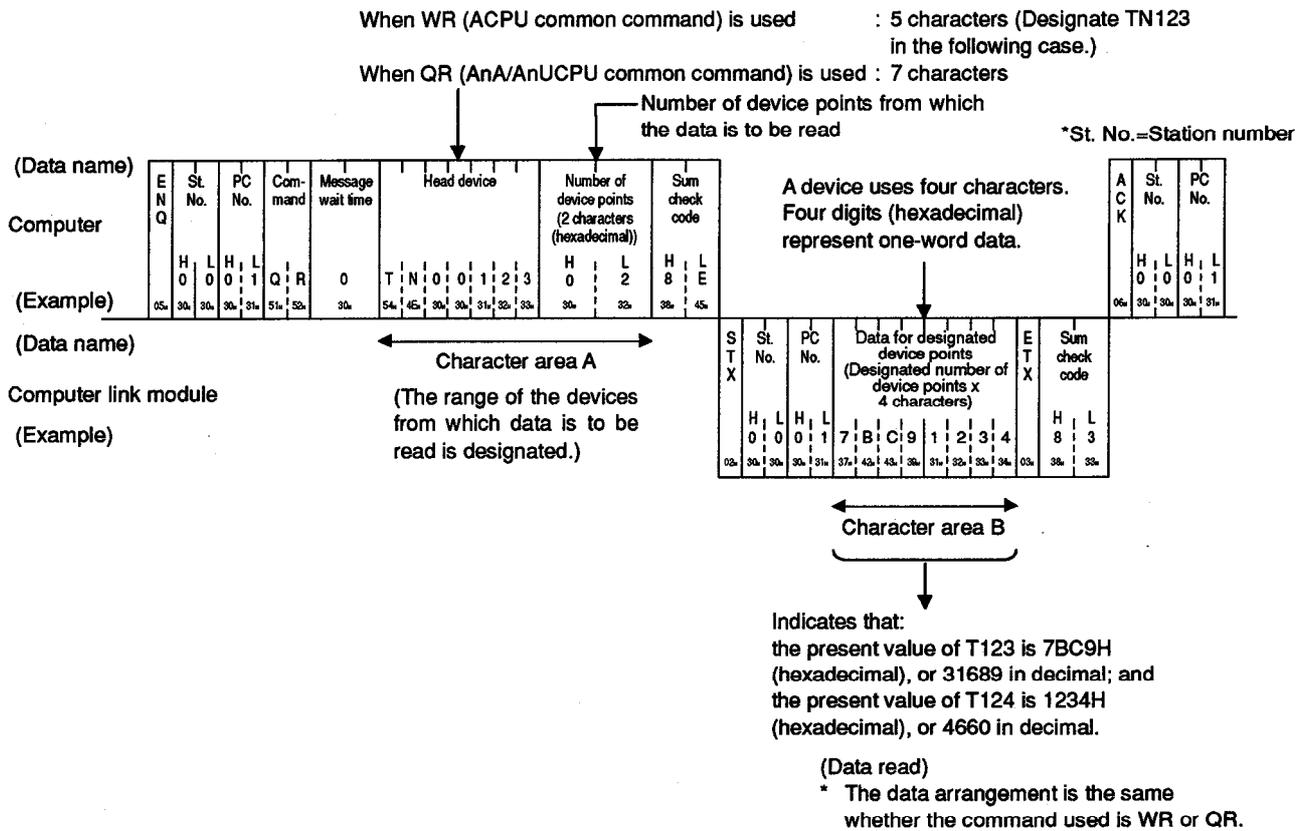
POINTS

- (1) When batch-reading data from devices in bit device memory, the following conditions must be met to designate the device range:
 - $1 \leq \text{number of device points} \leq 32$
 - $(\text{Head device number}) + [(\text{number of device points}) \times 16 - 1] \leq \text{maximum device number}$
- (2) The WR and QR commands are used for word unit designation. Designate "02" (16 points are designated as 1) for the number of device points in reading 32 points of devices from X40 to X5F.

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(2) Batch-reading data from devices in word device memory



POINTS

- (1) When batch-reading data from devices in word device memory, the following conditions must be met to designate the device range:
 - $1 \leq \text{Number of device points} \leq 64$
 - $(\text{Head device number}) + [(\text{number of device points}) - 1] \leq \text{maximum device number}$
- (2) The WR and QR commands are used for word unit designation. Designate "02" (a point is designated as 1) for the number of device points in reading the present values of T123 and T124.

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

5.7.4 Batch write in units of bits

In this section, an example is quoted to describe the control protocol for batch-writing data to devices in bit device memory using a BW or JW command.

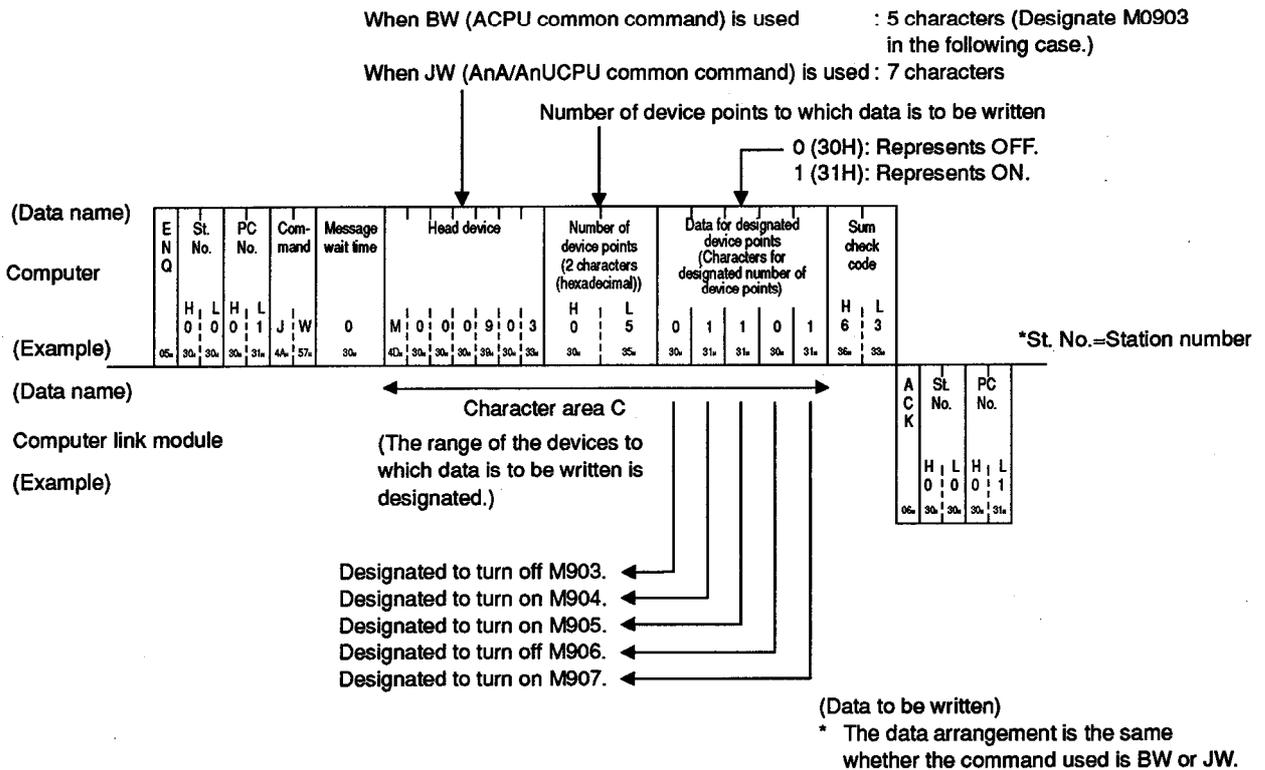
[Control protocol]

The protocol shown below is in control format 1.

To access device memory in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

(Writing conditions)

- 1) The message wait time is 0 ms.
- 2) Data is to be written to five devices, M903 to M907.



POINT

To designate the device range, the following conditions must be met:

- $1 \leq \text{number of device points} \leq 160$
- $(\text{Head device number}) + [(\text{number of device points}) - 1] \leq \text{maximum device number}$

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5.7.5 Batch write in units of words

In this section, examples are quoted to describe the control protocols for batch-writing data to devices in bit device memory (by 16 devices) and in word device memory using a WW or QW command.

[Control protocol]

The protocol shown below is in control format 1.

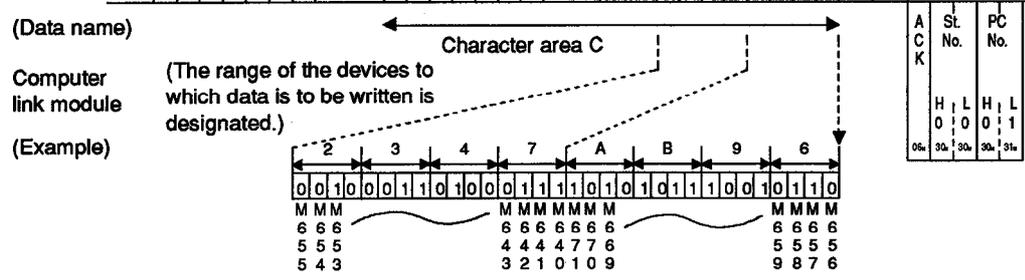
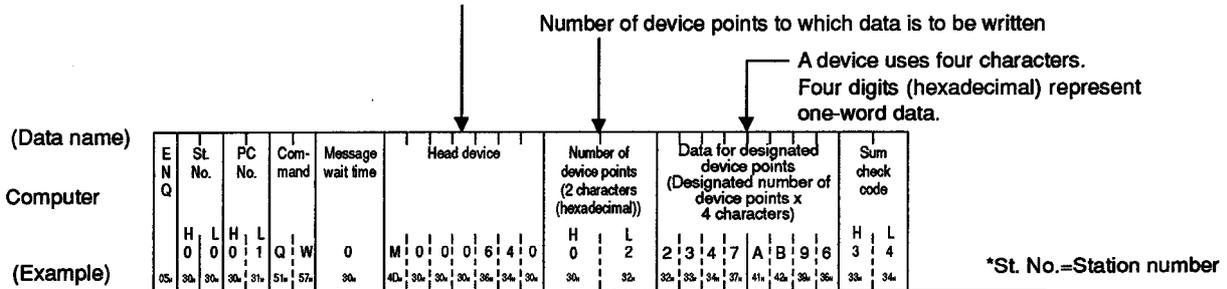
To access device memory in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

(Writing conditions)

- 1) The message wait time is 0 ms.
- 2) Data is to be written to 32 devices, M640 to M671, and to two devices (two words), D0 and D1.

(1) Batch-writing data to devices in bit device memory

When WW (ACPU common command) is used : 5 characters (Designate M0640 in the following case.)
 When QW (AnA/AnUCPU common command) is used : 7 characters



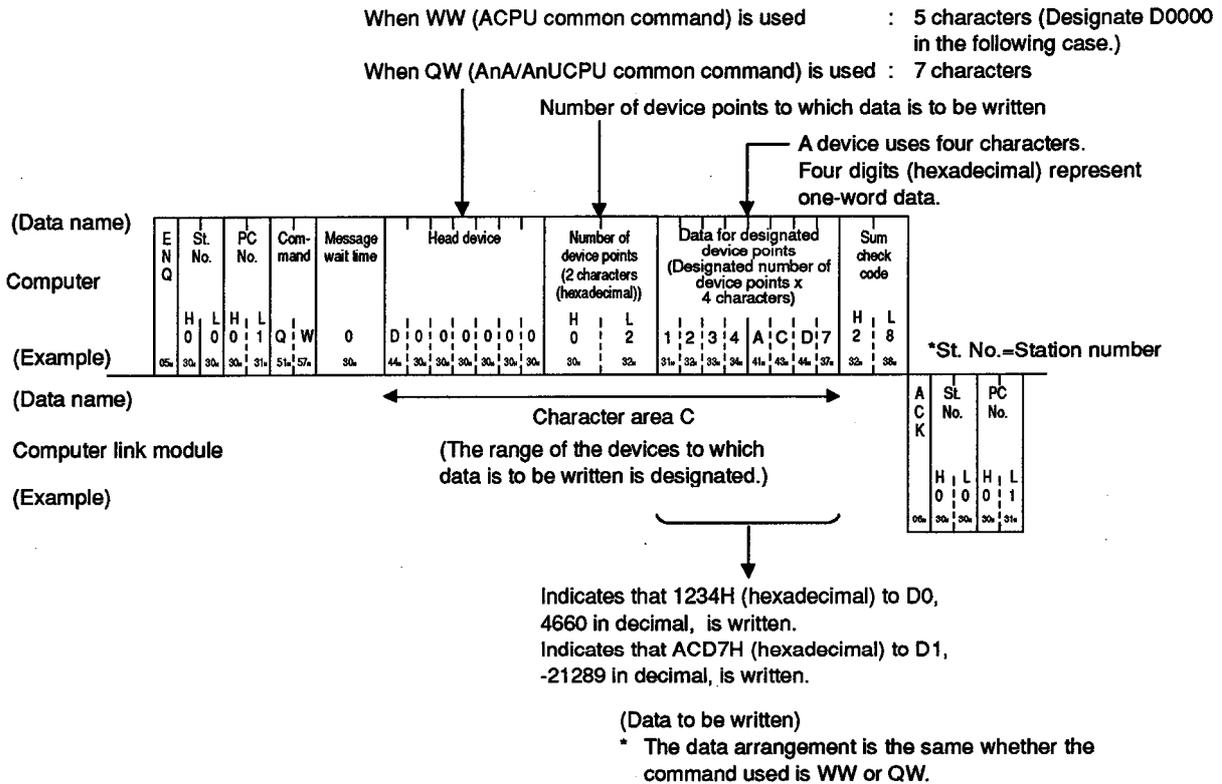
(Data to be written)
 * The data arrangement is the same whether the command used is WW or QW.

POINTS
(1) When batch-writing data to devices in bit device memory, the following conditions must be met to designate the device range:
• $1 \leq \text{number of device points} \leq 10$
• $(\text{Head device number}) + [(\text{number of device points}) \times 16 - 1] \leq \text{maximum device number}$
(2) The WW and QW commands are used for word unit designation.
Designate "02" (16 points are designated as 1) for the number of device points in writing 32 points of devices from M640 to M671.

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(2) Batch-writing data to devices in word device memory



POINTS

- When batch-writing data to devices in word device memory, the following conditions must be met to designate the device range:
 - 1 ≤ Number of device points ≤ 64
 - (Head device number) + [(number of device points) - 1] ≤ maximum device number
- The WW and QW commands are used for word unit designation. Designate "02" (a point is designated as 1) for the number of device points in writing to two devices, D0 and D1.

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5.7.6 Testing device memory in units of bits (random write)

In this section, an example is quoted to describe the control protocol for writing data to randomly designated devices in bit device memory using a BT or JT command.

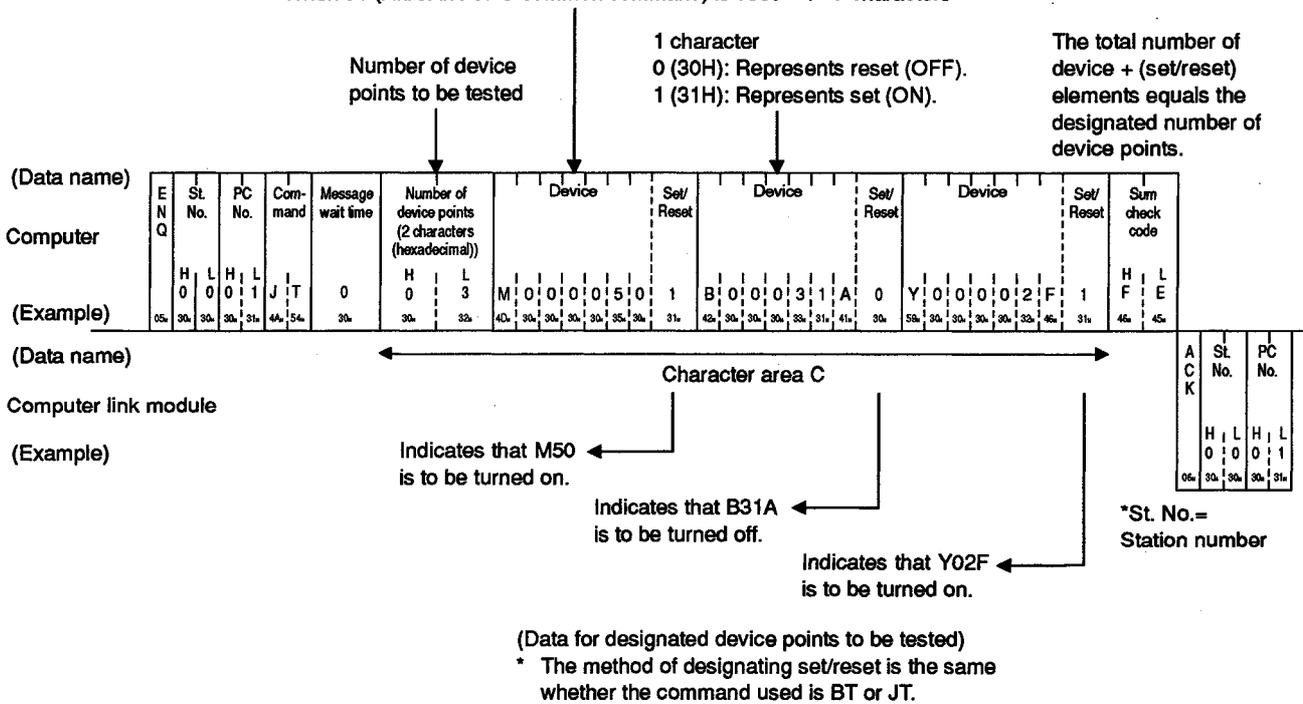
[Control protocol]

The protocol shown below is in control format 1.
To access device memory in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

(Writing conditions)

- 1) The message wait time is 0 ms.
- 2) This test is conducted on three devices (three bits), M50, B31A, and Y02F, to turn on M50 and Y02F and to turn off B31A.

When BT (ACPU common command) is used : 5 characters (Designate M0050, B031A, and Y002F in the following case.)
When JT (AnA/AnUCPU common command) is used : 7 characters



POINT

To designate the device range, the following condition must be met:

- 1 ≤ number of device points ≤ 20

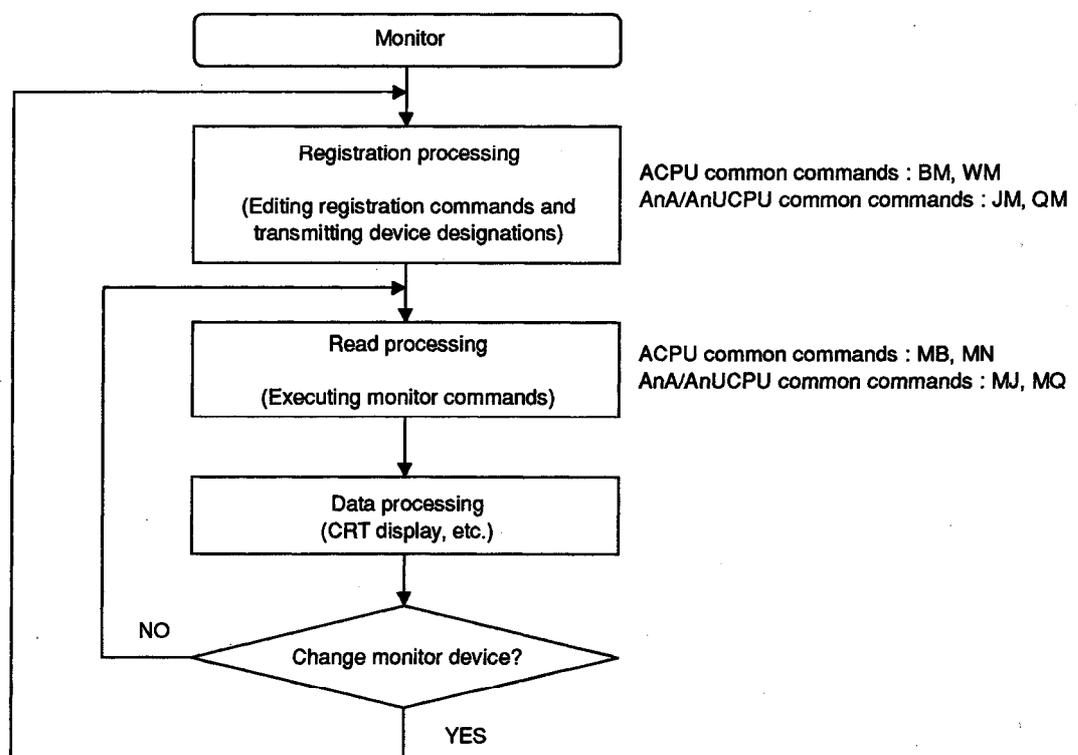
5.7.8 Monitoring device memory

Monitor data registration is the function that registers the name and the number of the device to be monitored by the computer to the computer link module. The monitor is the function that (a) reads the data content of the device registered at the time the monitor read command is executed by the computer, and (b) executes the corresponding processing such as monitoring.

The device numbers must be consecutive when the device is read using the batch read (BR, WR/JR, QR) command. However, when this function is used, it is possible to read and monitor the devices by designating the device numbers at random.

In this section, examples are quoted to describe the control protocols for monitoring and registering devices to be monitored and their numbers in the computer link module.

(1) Control procedure for monitoring



POINTS

- (1) As the flowchart shows, monitor data registration must be executed before monitoring. Attempting to execute monitoring without registering the monitor data will cause a protocol error.
- (2) The contents of the monitor data registration area are cleared when the computer link module is reset.
- (3) For monitor registration, five types of registration are possible. They are device memory in bit units (BM or JM), device memory in word units (WM or QM), and the extension file register (EM).
- (4) For monitoring extension file registers, refer to Section 5.8.9.

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(2) Registering devices for data monitoring in device memory

In this section, examples are quoted to describe the control protocols for registering devices to be monitored and their numbers in the computer link module using a BM, JM, WM or QM command.

(a) Registering devices for data monitoring in bit device memory in units of bits

[Control protocol]

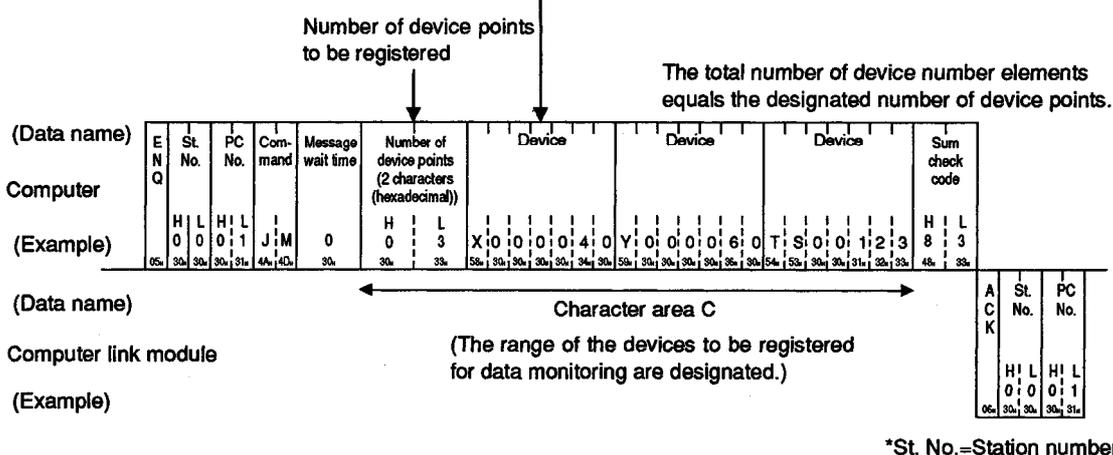
The protocol shown below is in control format 1.

To access device memory in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

(Monitor data registration conditions)

- 1) The message wait time is 0 ms.
- 2) Three devices (three bits), X040, Y060, and T123 (contact), are to be registered for data monitoring.

When BM (ACPU common command) is used : 5 characters (Designate X0040, Y0060, and TS123 in the following case.)
 When JM (AnA/AnUCPU common command) is used : 7 characters



POINTS

- (1) To designate the device range, the following conditions must be met.
 - When the BM command is used and the PC CPU to be accessed is other than the A3HCPU, AnACPU or AnUCPU, a device X (input) is treated as two points.
 - $1 \leq \text{number of device points} \leq 40$
- (2) To monitor devices registered in device memory in units of bits, follow the procedure described in (3)(a) of this section.

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(3) Monitoring devices registered in device memory for data monitoring

In this section, examples are quoted to describe the control protocols for monitoring devices registered with the computer link module, which are shown in (2), using an MB, MJ, MN or MQ command.

(a) Monitoring devices registered for data monitoring in bit device memory in units of bits

[Control protocol]

The protocol shown below is in control format 1.

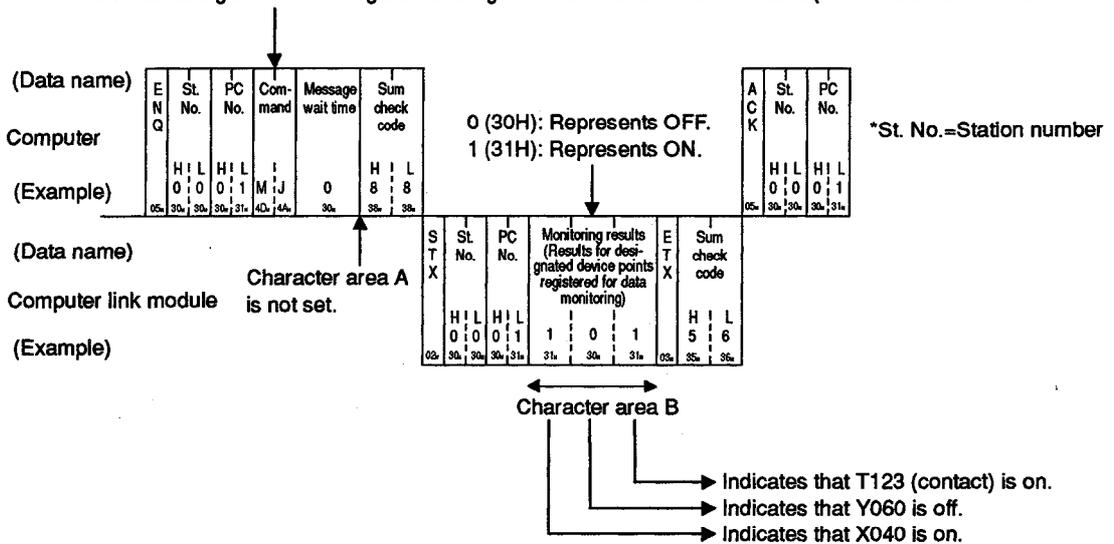
To access device memory in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

Devices registered in bit device memory using a BM command can be monitored with an MB command, while those registered using a JM command can be monitored with an MJ command.

(Monitoring conditions)

- 1) The message wait time is 0 ms.
- 2) Three devices (three bits) registered for data monitoring, X040, Y060, and T123 (contact), are to be monitored.

When monitoring a bit device registered using a BM command : MB command (ACPU common command)
 When monitoring a bit device registered using a JM command : MJ command (AnA/AnUCPU common command)



(Monitored data)

* The data arrangement is the same whether the command used is MB or MJ.

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- (b) Monitoring devices registered for data monitoring in bit device memory and word device memory in units of words

[Control protocol]

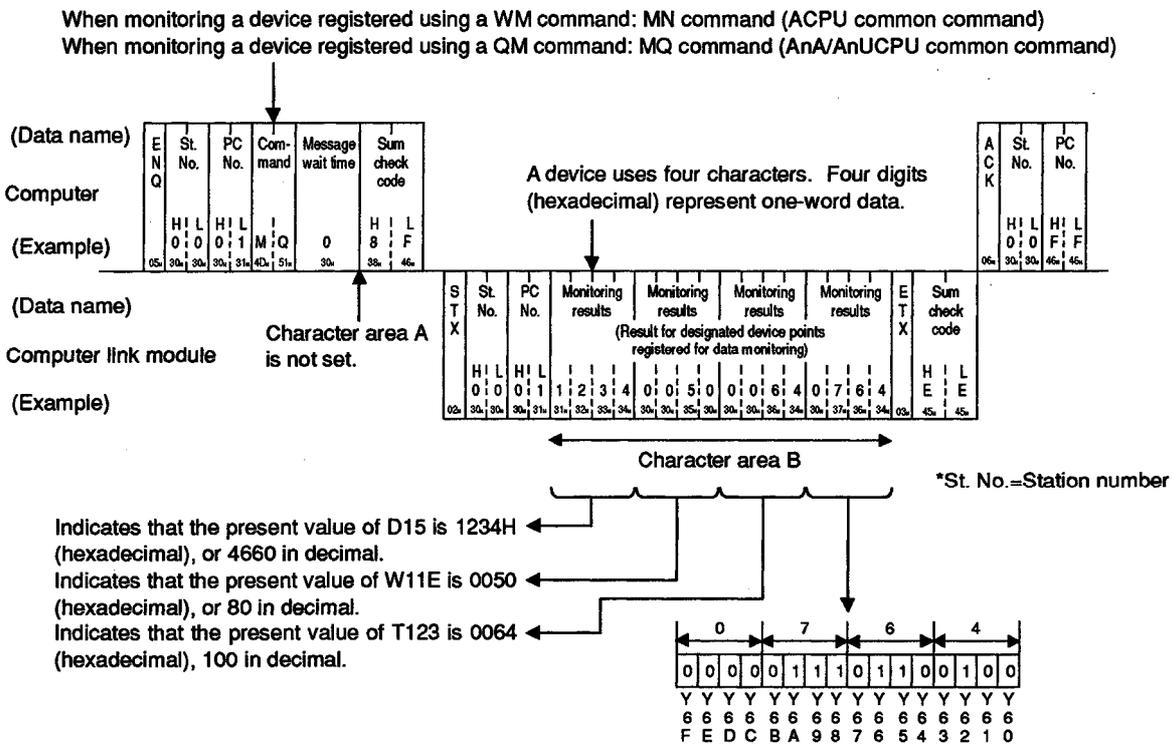
The protocol shown below is in control format 1.

To access device memory in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

Devices registered in device memory using a WM command can be monitored with a MN command, while those registered using a QM command can be monitored with a MQ command.

(Monitoring conditions)

- 1) The message wait time is 0 ms.
- 2) The present values of D15, W11E, and T123 registered for data monitoring, and data on devices Y060 to Y06F (four words) are to be monitored.



(Monitored data)

- * The data arrangement is the same whether the command used is MN or MQ.

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5.8 Extension File Register Read and Write

A free area in the user memory area in the PC CPU and used as a file register is called extension file register. This memory area can store necessary data and the results of data processing and other operations executed by the "SW0GHP-UTLPC-FN1" (hereinafter referred to as the UTLPC-FN1) or "SW0SRX-FNUP" (hereinafter referred to as the FNUP), both of which are software packages for extension file registers, or by dedicated instructions for extension file registers in the AnACPU and the AnUCPU.

In this section, examples are quoted to describe the control protocols for reading or writing data from or to extension file registers.

5.8.1 ACPU common commands and addresses

(1) ACPU common commands used for read/write of extension file registers

Item	Command		Description	Number of Points Processed per Communication	PC CPU State			Reference Section
	Symbol	ASCII Code			During STOP	During RUN		
						Write Enabled	Write Disabled	
Batch read	ER	45H, 52H	Reads from extension file registers (R) in units of 1 point.	64 points	○	○	○	5.8.4
Batch write	EW	45H, 57H	Writes to extension file registers (R) in units of 1 point.	64 points	○	○	X	5.8.5
Test (random write)	ET	45H, 54H	Specifies the extension file registers (R) in units of 1 point using block or device number and makes a random write.	10 points	○	○	X	5.8.8
Monitor data registration	EM	45H, 4DH	Sets the device numbers to be monitored in units of 1 point.	20 points	○	○	○	5.8.9 (2)
Monitor	ME	4DH, 45H	Monitors the extension file registers after monitor data registration.	—	○	○	○	5.8.9 (3)

Note : O Executable
X Not executable

(2) Extension file register addresses

- (a) The extension file register comprises blocks number 0 to "n", with "n" varying according to the memory cassette. Block number "0" contains the number of points designated by the PC CPU parameters and each block with numbers "1" to "n" has 8192 points of registers.

Read/write is possible in the range of parameters designated in block number 0.

- (b) The range of block numbers which can be designated varies according to the type of memory cassette and the PC CPU parameter setting.

The UTLPC-FN1 or FNUP Operating Manual, or AnACPU or AnUCPU User's Manual give details.

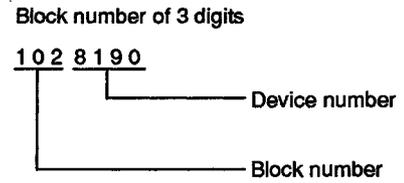
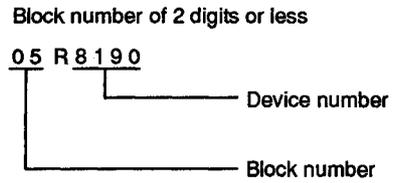
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(c) Each address is designated in 7 characters consisting of the block and device numbers.

- Block number of 2 digits or less:
"Block number (2 digits)" + "R" + "Device number (4 digits)"
- Block number of 3 digits:
"Block number (3 digits)" + "Device number (4 digits)"

Example:



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5.8.2 AnA/AnUCPU common commands and device numbers

(1) The AnA/AnUCPU common commands used for direct read and direct write of extension file registers are described below.

These dedicated commands are used to access the extension file register of block numbers 1 to 256 by directly designating the address, which begins with address 0 in block number 1, as the device number.

(The address numbers used to access the extension file register go from 0 to "the usable number of blocks x 8192 points".)

Item	Command		Description	Number of Points Processed per Communication	PC CPU State			Reference Section
	Symbol	ASCII Code			During STOP	During RUN		
						Write Enabled	Write Disabled	
Direct read	NR	4EH, 52H	Reads data from the extension file register in units of 1 point (words) by designating the extension file register in successive numbers.	64 points	O	O	O	5.8.6
Direct write	NW	4EH, 57H	Writes data to the extension file register in units of 1 point (words) by designating the extension file register in successive numbers.	64 points	O	O	X	5.8.7

Note : OExecutable
X.....Not executable

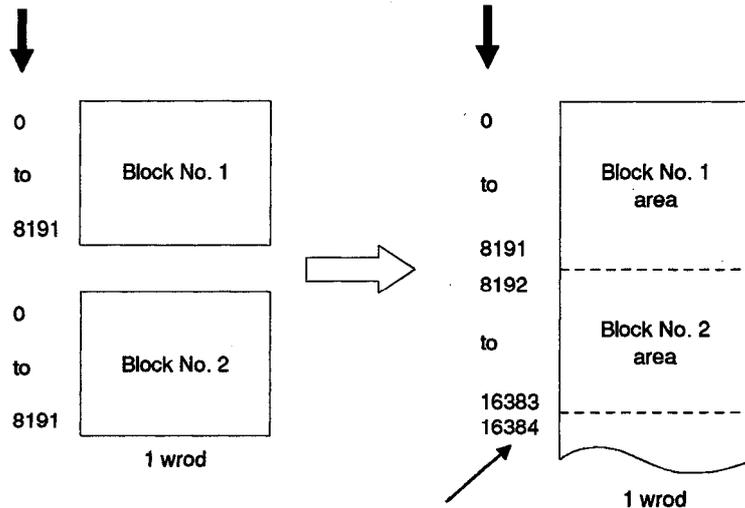
(2) Device numbers of extension file registers

(a) Device number range

Range: 0 through [(the number of usable blocks x 8192) - 1]

Device numbers used with ACPU common commands mentioned in Section 5.8.1.

Device numbers used with AnA/AnUCPU common commands mentioned in Section 5.8.2.



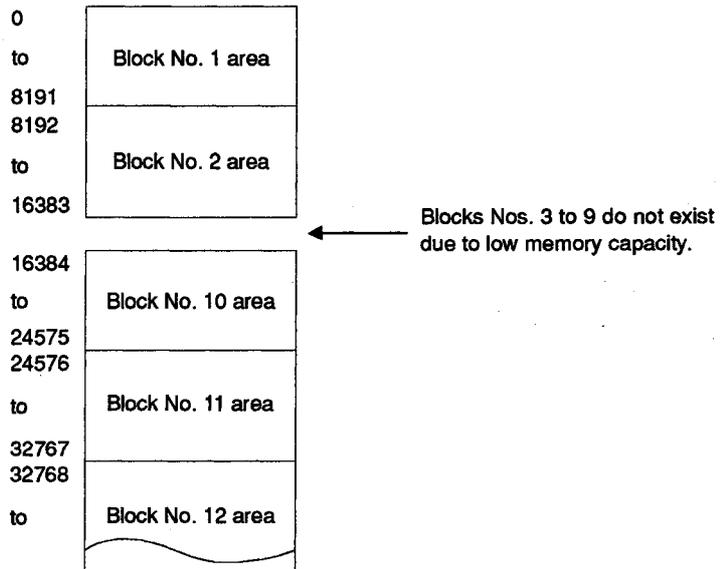
Device numbers are allocated in ascending order from the blocks assigned a smaller block number.

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The device numbers that can be designated vary according to the type of memory cassette and the PC CPU parameter setting. (The UTLP-FN1 or FNUP Operating Manual or the AnACPU or AnUCPU User's Manual give details.)

For block numbers that do not exist in the memory cassette, device numbers are not allocated. In this case, the device numbers are allocated as indicated below, skipping non-existent block numbers.

Device numbers



(b) A device number is designated in 7 characters.

Designation example 1:

To designate R10 in block number 1:

0000010

Designation example 2:

To designate R8 in block number 2:

0008200

$$(2 - 1) \times \underline{8192} + 8$$

↑ ↑
 Block number Block points

A blank code (20H) can be used to express leading zeros (the underlined 0s in 0008200).

POINTS

- (1) The AnA/AnUCPU common commands NR and NW can only be used for read/write operations at the extension file registers of block numbers 1 to 256. They can be used regardless of the parameter's file register setting.
- (2) Use the commands described in Section 5.8.1 to access the parameter set file registers (R) or to access a file register by designating a block number.
- (3) The following equation is used to calculate the head device number to be designated with the AnA/AnUCPU common commands NR and NW. (To designate device number "m" (0 to 8191) in the "n"th block (n ≥ 1))
 Head device number = (n-1) x 8192 + m

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REMARK

The range of device numbers (up to the 28th block) that can be designated with the NR or NW commands is shown below.

Device No.	Objective Block	Device No.	Objective Block
0 to 8191	1st block	R0 to R8191	114688 to 122879
8192 to 16383	2nd block	R0 to R8191	122880 to 131071
16384 to 24575	3rd block	R0 to R8191	131072 to 139263
24576 to 32767	4th block	R0 to R8191	139264 to 147455
32768 to 40959	5th block	R0 to R8191	147456 to 155647
40960 to 49151	6th block	R0 to R8191	155648 to 163839
49152 to 57343	7th block	R0 to R8191	163840 to 172031
57344 to 65535	8th block	R0 to R8191	172032 to 180223
65536 to 73727	9th block	R0 to R8191	180224 to 188415
73728 to 81919	10th block	R0 to R8191	188416 to 196607
81920 to 90111	11th block	R0 to R8191	196608 to 204799
90112 to 98303	12th block	R0 to R8191	204800 to 212991
98304 to 106495	13th block	R0 to R8191	212992 to 221183
106496 to 114687	14th block	R0 to R8191	221184 to 229375
			15th block
			16th block
			17th block
			18th block
			19th block
			20th block
			21st block
			22nd block
			23rd block
			24th block
			25th block
			26th block
			27th block
			28th block

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5.8.3 Precautions during extension file register read/write

Described below are precautions for reading or writing data from or to extension file registers using the commands shown in Section 5.8.4 through Section 5.8.9.

- (1) The extension file register is not used by A1 and A1NCPU.

This function is not available during communications with A1 or A1NCPU.

- (2) Some types of memory cassette loaded to the PC CPU are unable to detect an error (character area error 06H) if an attempt is made to read or write after specifying a block number which does not exist. In this case, data which is read may not be correct and writing such incorrect data may destroy the PC CPU user memory.

Always check the type of memory cassette and the parameter settings before using this function.

Type of Memory Cassette	Block Numbers Which do not Cause a Character Area Error (06H)		
	A0J2H, A2, A3CPU	A2N, A3NCPU	A3H, AnA, AnUCPU
A3NMCA-12	No. 10, No. 11		
A3NMCA-18	—	No. 10 to No. 28	
A3NMCA-24	—	No. 13 to No. 20	No. 13 to No. 28
A3NMCA-40	—		No. 21 to No. 28
A3AMCA-96	—		No. 21 to No. 48 (*1)

*1 The A3AMCA-96 can be used for the A3A, the A3U, and the A4UCPU.

(The UTLF-FN1 or FNUP Operating Manual or the AnACPU or AnUCPU User's Manual give details.)

- (3) The A2USCPU(-S1) can deal with the following extension file register block numbers:

- A2USCPU No. 1 to No. 3
- A2USCPU-S1 No. 1 to No. 8, No. 10 to No. 16

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5.8.4 Batch read of the extension file register

In this section, an example is quoted to describe the control protocol for batch-reading data from extension file registers using an ER command.

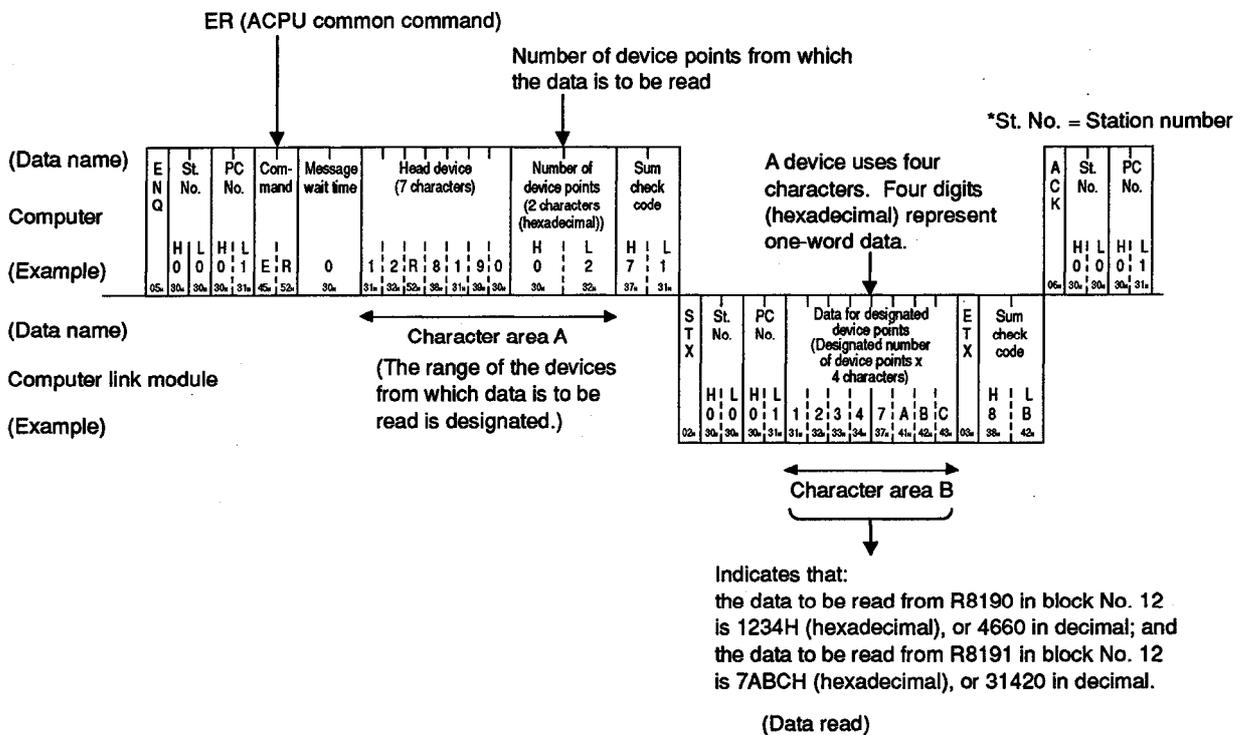
[Control protocol]

The protocol shown below is in control format 1.

To access an extension file register in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

(Reading conditions)

- 1) The message wait time is 0 ms.
- 2) Data is to be read from two registers, R8190 and R8191, in block No. 12.



POINT

To designate the device range, the following conditions must be met:

- $1 \leq \text{number of device points} \leq 64$
- $(\text{Head device number}) + [(\text{number of device points}) - 1] \leq \text{maximum device number}$

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5.8.5 Batch write of the extension file register

In this section, an example is quoted to describe the control protocol for batch-writing data to extension file registers using an EW command.

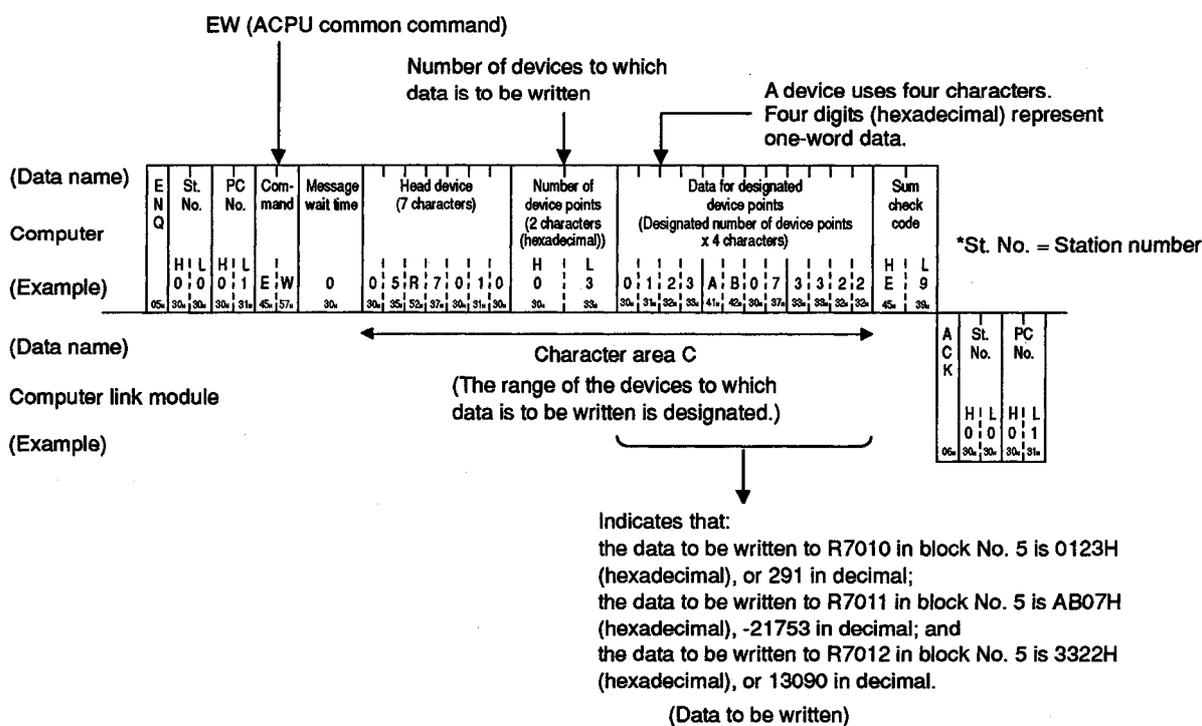
[Control protocol]

The protocol shown below is in control format 1.

To access an extension file register in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

(Writing conditions)

- 1) The message wait time is 0 ms.
- 2) Data is to be written to three extension file registers, R7010 to R7012, in block No. 5.



POINT

To designate the device range, the following conditions must be met:

- $1 \leq \text{number of device points} \leq 64$
- $(\text{Head device number}) + [(\text{number of device points}) - 1] \leq \text{maximum device number}$

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5.8.6 Direct read of the extension file register

In this section, an example is quoted to describe the control protocol for reading data directly from extension file registers using an NR command.

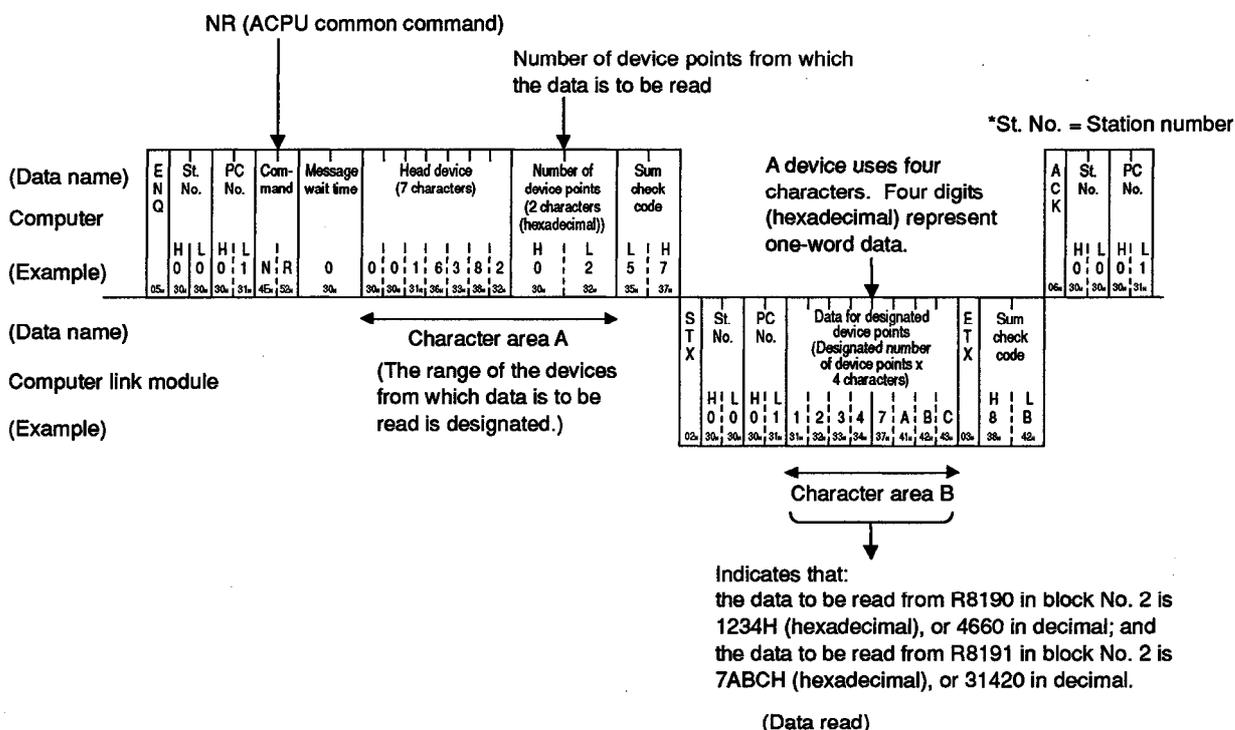
[Control protocol]

The protocol shown below is in control format 1.

To access an extension file register in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

(Reading conditions)

- 1) The message wait time is 0 ms.
- 2) Data is to be read from two extension file registers, R8190 and R8191, in block No. 2.



POINT

- To designate the device range, the following conditions must be met:
- $1 \leq \text{number of device points} \leq 64$
 - $(\text{Head device number}) + [(\text{number of device points}) - 1] \leq \text{maximum device number}$

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5.8.7 Direct write of the extension file register

In this section, an example is quoted to describe the control protocol for writing data directly to extension file registers using an NW command.

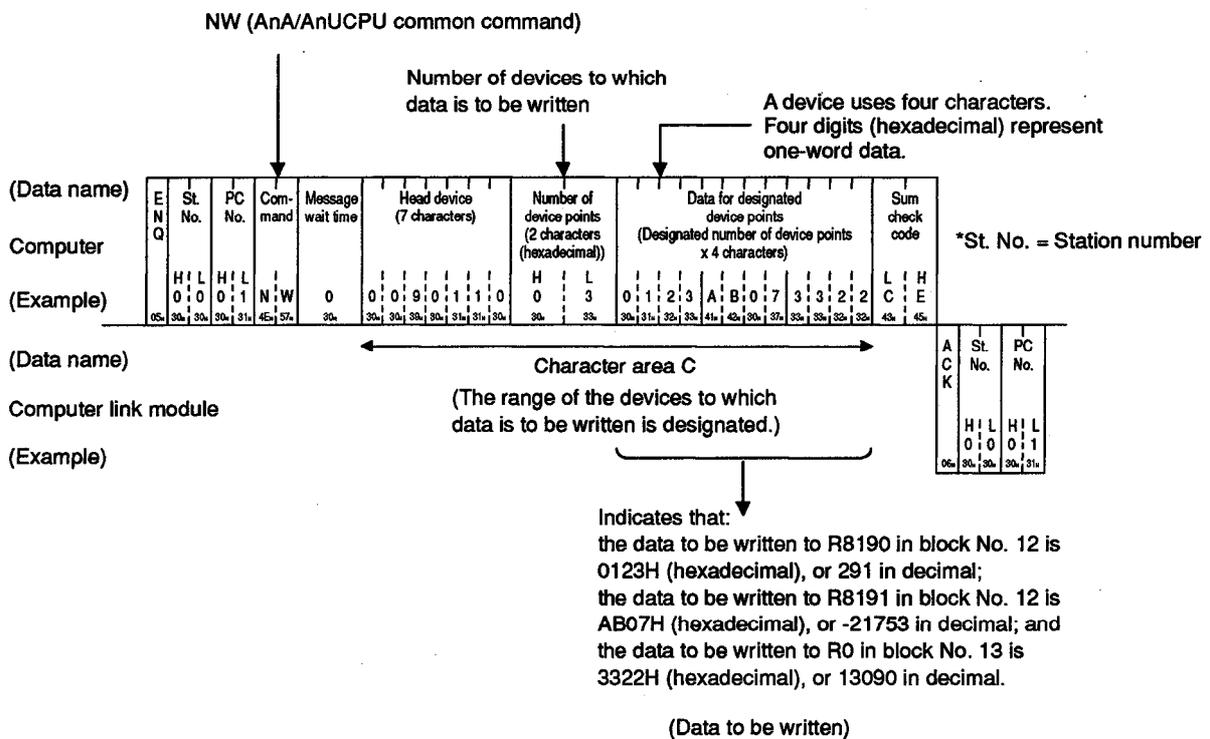
[Control protocol]

The protocol shown below is in control format 1.

To access extension file registers in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

(Writing conditions)

- 1) The message wait time is 0 ms.
- 2) Data is to be written to two extension file registers in block No. 12, R8190 and R8191, and to R0 in block No. 13 (when extension file registers are reserved for blocks No. 1 to No. 8 and for blocks No. 10 to No. 13).



POINT

To designate the device range, the following conditions must be met:

- $1 \leq \text{number of device points} \leq 64$
- $(\text{Head device number}) + [(\text{number of device points}) - 1] \leq \text{maximum device number}$

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5.8.8 Testing (random write) the extension file register

In this section, an example is quoted to describe the control protocol for writing data to randomly designated device numbers in extension file registers using an ET command.

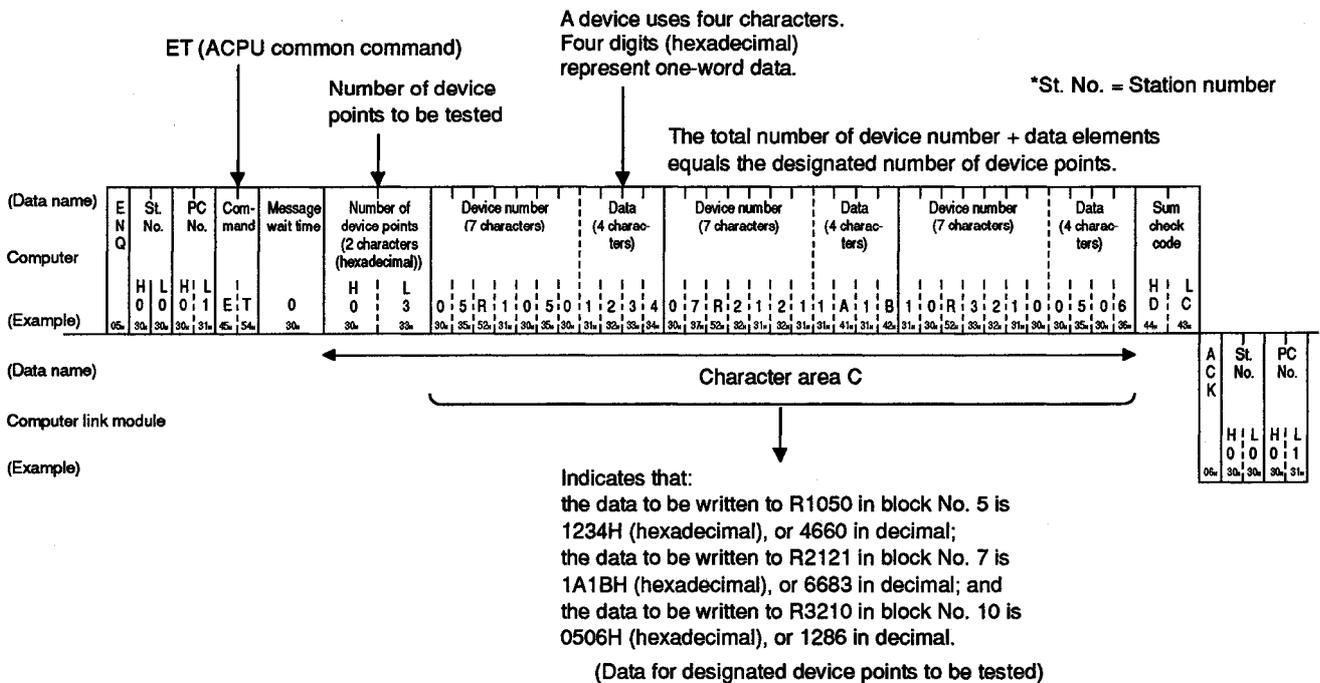
[Control protocol]

The protocol shown below is in control format 1.

To access an extension file register in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

(Writing conditions)

- 1) The message wait time is 0 ms.
- 2) This test is conducted on three extension file registers (three words), R1050 in block No. 5, R2121 in block No. 7, and R3210 in block No. 10, to write 1234H to R1050, 1A1BH to R2121, and 506H to R3210 (when extension file registers are reserved for blocks No. 1 to No. 8 and for block No 10).



POINT

To designate the device range, the following condition must be met:

- $1 \leq \text{number of device points} \leq 10$

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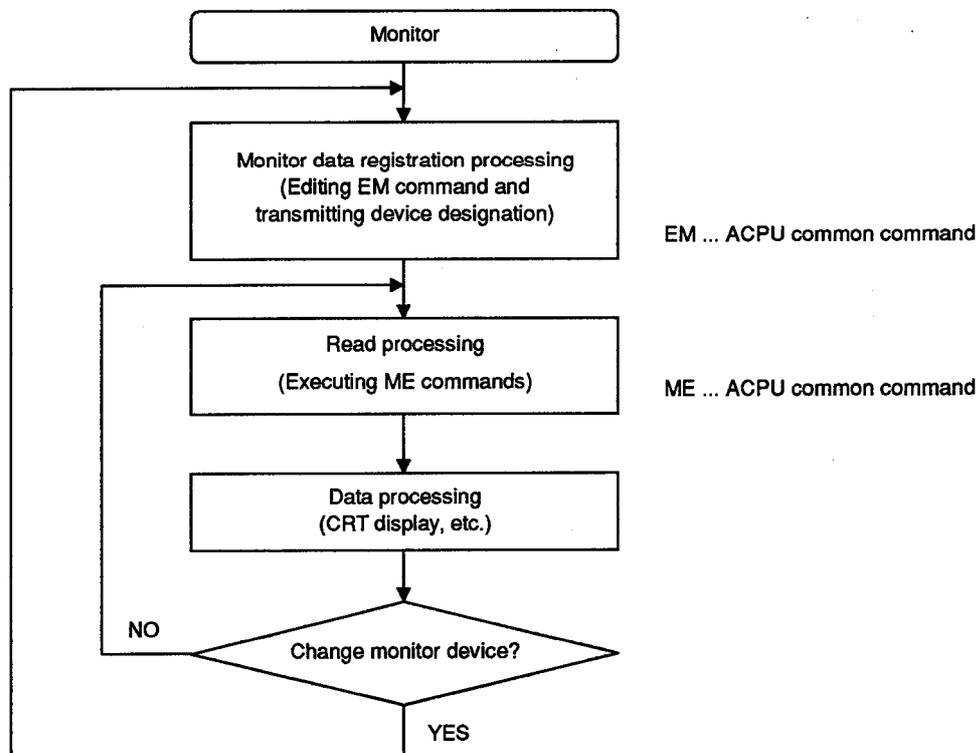
5.8.9 Monitoring the extension file register

Monitor data registration is the function that registers the name and the number of the device to be monitored by the computer to the computer link module. The monitor is the function that (a) reads the data content of the device registered at the time the monitor read command is executed by the computer, and (b) executes the corresponding processing such as monitoring.

The device numbers must be consecutive when the device is read using the batch read (ER) or direct read (NR) command. However, when this function is used, it is possible to read and monitor the devices by designating the device numbers at random.

In this section, examples are quoted to describe the control protocols for monitoring and registering devices to be monitored and their numbers in the computer link module.

(1) Control procedure for monitoring



POINTS

- (1) As the flowchart shows, monitor data registration must be executed before monitoring. Attempting to execute monitoring without registering the monitor data will cause a protocol error.
- (2) The contents of the monitor data registration area are cleared when the computer link module is reset.
- (3) For monitor registration, five types of registration are possible. They are device memory in bit units (BM or JM), device memory in word units (WM or QM) and the extension file register (EM).
- (4) For monitoring of device memory, refer to Section 5.7.8.

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(3) Monitoring extension file registers

In this section, an example is quoted to describe the control protocol for monitoring extension file registers, which are registered with the computer link module using an EM command as shown in the preceding section (2), using an ME command.

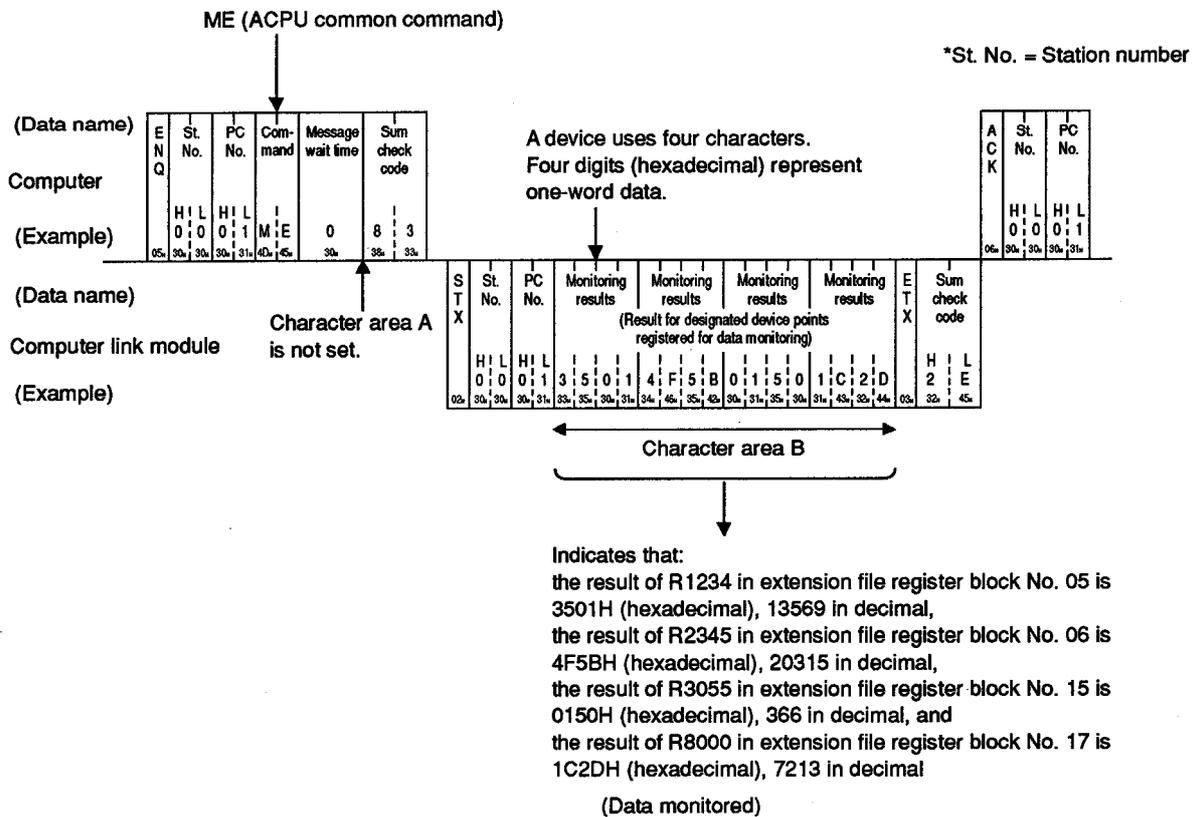
[Control protocol]

The protocol shown below is in control format 1.

To access an extension file register in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

(Monitoring conditions)

- 1) The message wait time is 0 ms.
- 2) Four extension file registers (four words) registered for data monitoring, R1234 in block No. 5, R2345 in block No. 6, R3055 in block No. 15, and R8000 in block No. 17, are to be monitored (when extension file registers are reserved for blocks No. 1 to No. 8 and for No. 10 to No. 17).



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5.9 Buffer Memory Read and Write

This function is used to read from and write to the computer link module buffer memory. When this function is used, communications between the computer and computer link module commences immediately when the computer sends a read or write request, without waiting for the PC CPU END processing. Therefore, the time T1, described in Section 5.5, is always equal to zero.

The PC CPU carries out buffer memory read and write using TO and FROM instructions.

The method for specifying the control protocol, meanings, and examples for carrying out this function are shown below.

5.9.1 Commands and buffer memory

This section describes commands to be used to read or write data from or to the buffer memory in the computer link module, and buffer memory addresses to be designated for the control protocol.

(1) Commands

Item	Command		Description	Number of Points Processed per Communication	PC CPU State			Reference Section
	Symbol	ASCII Code			During STOP	During RUN		
						Write Enabled	Write Disabled	
Batch read	CR	43H, 52H	Reads from buffer memory.	64 words (128 bytes)	○	○	○	5.9.2
Batch write	CW	43H, 57H	Writes to buffer memory.		○	○	○	5.9.3

Note : ○ Executable

(2) Buffer memory and access unit

Buffer memory addresses are 0H to 7FFH (see Section 3.10).

One address consists of 1 word (16 bits).

Read and write are both executed in word units, regardless of the word/byte unit setting (set at buffer memory address 103H).

POINTS

- (1) Buffer addresses 100H to 11FH comprise the area. The computer link module will not operate correctly if any operations other than those described in the following sections are executed.
- (2) When this function and the on-demand function in Section 5.14, the no-protocol mode in Section 6 or the bidirectional protocol in Section 7 are used together to access the user free area in the buffer memory simultaneously, do not designate the following areas in the buffer memory with the commands shown in Section 5.9.1 (1):
 - No-protocol mode send area (or bidirectional mode send area)
 - No-protocol mode receive area (or bidirectional mode receive area)
 - On-demand area

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5.9.2 Reading data from buffer memory

In this section, an example is quoted to describe the control protocol for reading data from the buffer memory in computer link module connected to the computer using a CR command.

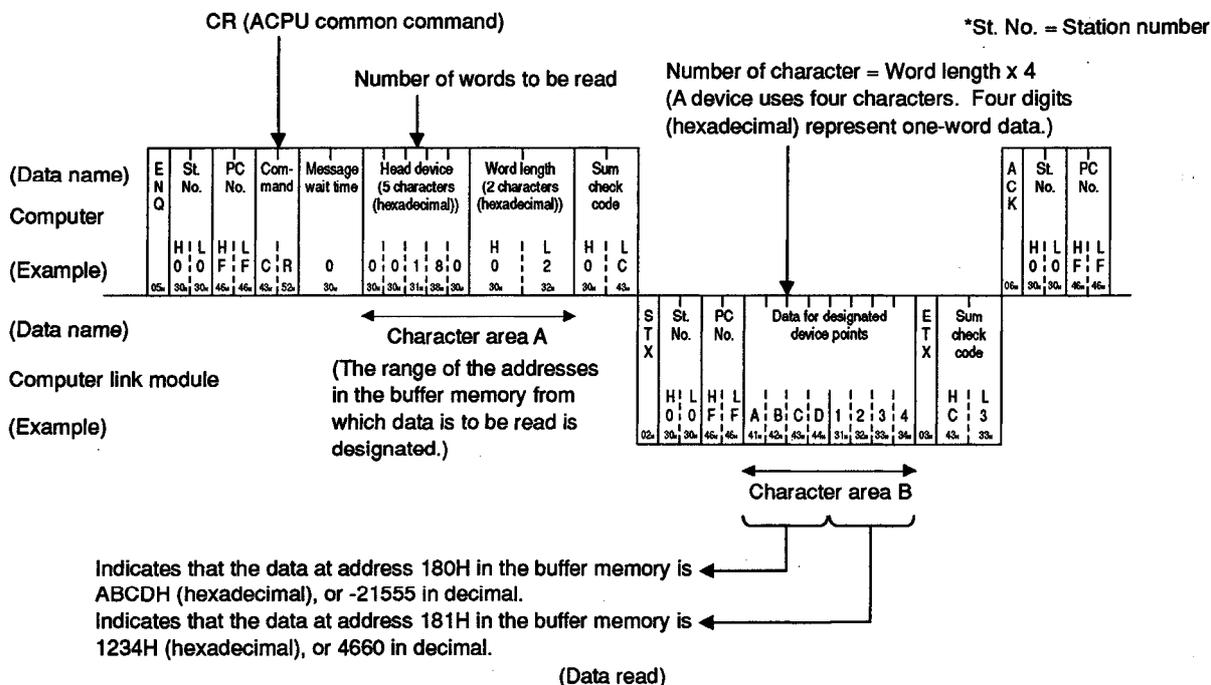
[Control protocol]

The protocol shown below is in control format 1.

To access the buffer memory in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

(Reading conditions)

- 1) The message wait time is 0 ms.
- 2) Data at two buffer memory addresses (two words), 180H and 181H, is to be read.



POINT

To designate the word length, the following conditions must be met:

- $1 \leq \text{word length} \leq 64$
- $(\text{Head address}) + (\text{word length}) - 1 \leq \text{maximum address number (DFFH)}$

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5.9.3 Writing data to buffer memory

In this section, an example is quoted to describe the control protocol for writing data to the buffer memory in the computer link module connected to the computer using a CW command.

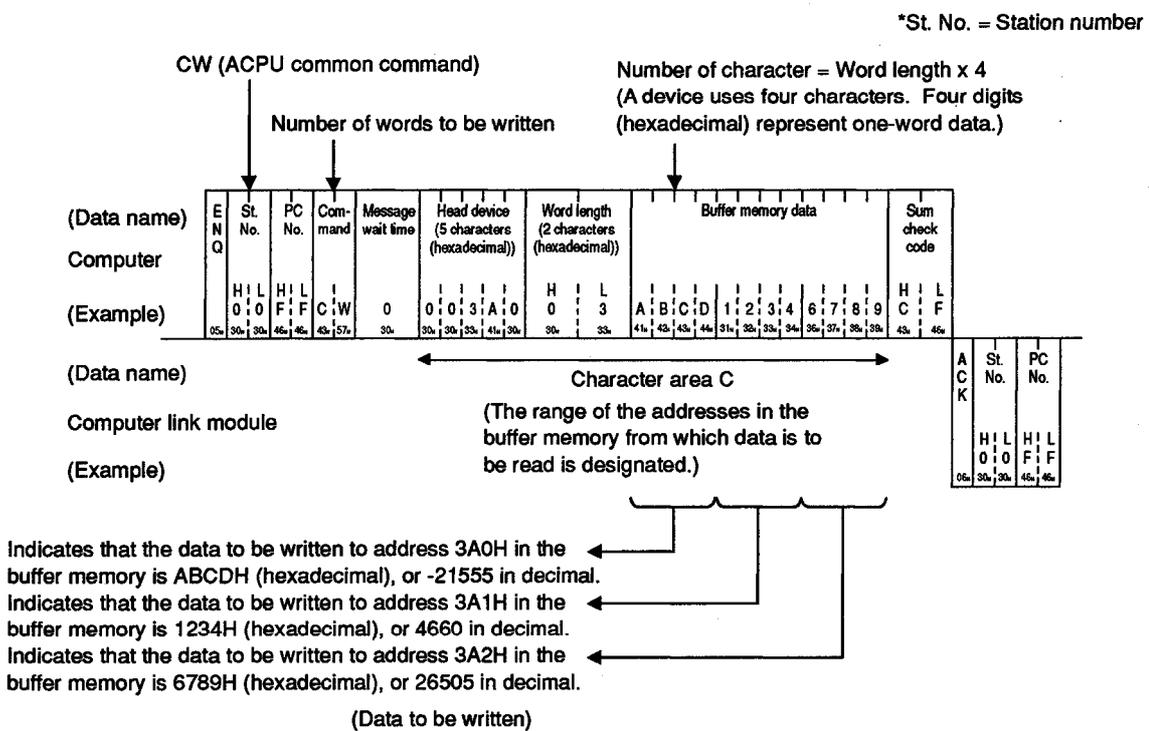
[Control protocol]

The protocol shown below is in control format 1.

To access the buffer memory in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

(Writing conditions)

- 1) The message wait time is 0 ms.
- 2) Data (three words) is to be written to three buffer memory addresses, 3A0H to 3A2H.



POINT

To designate the word length, the following conditions must be met:

- $1 \leq \text{word length} \leq 64$
- $(\text{Head address}) + (\text{word length}) - 1 \leq \text{maximum address number (DFFH)}$

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5.10 Special Function Module Buffer Memory Read and Write

In this section, examples are quoted to describe the control protocols for reading or writing data from or to the buffer memory in a special function module.

When a command described in this section is used, access to the buffer memory in a special function module is made in units of bytes.

5.10.1 Commands and designation

(1) ACPU common commands

Item	Command		Description	umber of Points Processed per Communication	PC CPU State			Reference Section
	Sym- bol	ASCII Code			During STOP	During RUN		
						Write Enabled	Write Disabled	
Batch read	TR	54H, 52H	Reads from special function module buffer memory.	128 bytes (64 words)	O	O	O	5.10.3
Batch write	TW	54H, 57H	Writes to special function module buffer memory.		O	O	X	5.10.4

Note : OExecutable
X.....Not executable

(2) Accessible module types and buffer memory addresses

Refer to APPENDIX 3 for special function modules accessible with this function and the head address in the buffer memory to be designated.

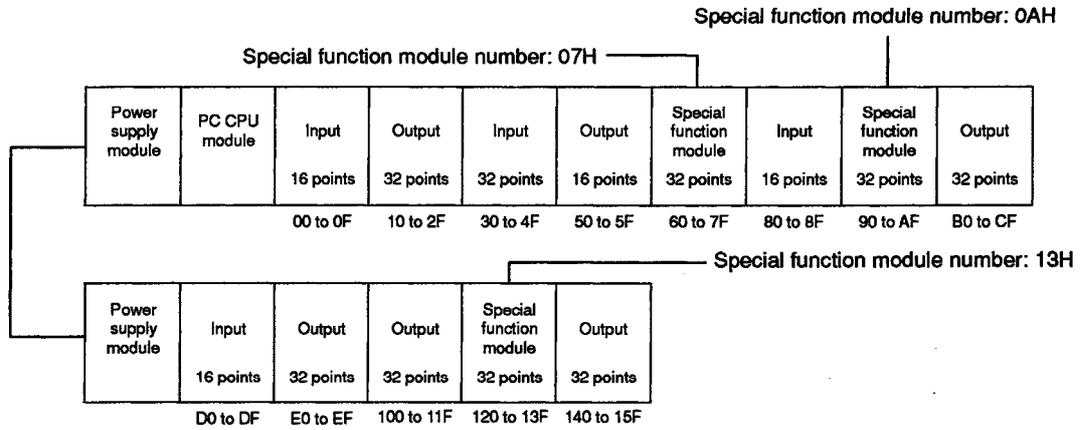
When this function is used, data is read or written in units of bytes, irrespective of the word/byte units setting (specified at address 103H in the computer link module buffer memory).

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5.10.2 Special function module numbers using control protocols

(1) Module numbers of special function modules occupying one slot

The special function module numbers designated by using control protocols are the upper 2 digits of the last special function module I/O address expressed in 3 digits.

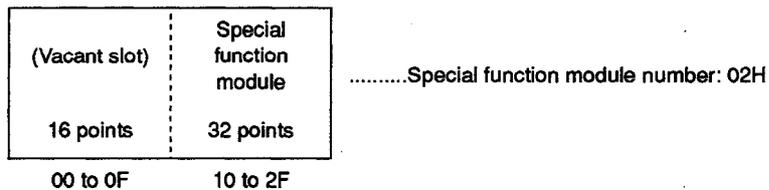


(2) Module number of special function modules occupying two slots

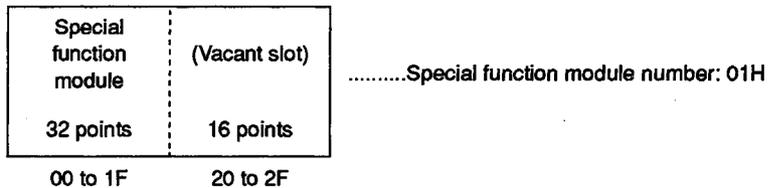
For special function modules occupying two slots, the number of points occupied by each slot is fixed for each module. The special function module number is the upper two digits of the three-digit number representing the last address of the slot allocated to the module.

The User's Manual for each special function module gives details about the allocation of slots to each module.

(a) Modules with the front slot allocated as the vacant slot (AD72, A84AD, etc.)



(b) Modules with the rear slot allocated as the empty slot (A61LS, etc.)



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(c) Modules with the special function module allocation and I/O allocation mixed (A81CPU, etc.)

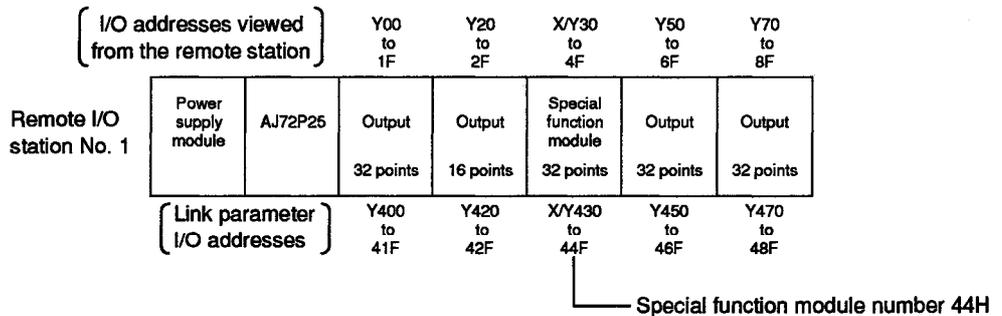
Special function module	Input module
64 points	64 points
00 to 3F	40 to 7F

.....Special function module number: 03H

(3) Module numbers of special-function modules at MELSECNET remote I/O stations

The module numbers of special function modules at MELSECNET remote I/O stations are determined by link parameters setting at the MELSECNET master station.

L/R NO.	M ← L		M → R	M ← R	M → L/R		M ← L/R	
	B	W	W	W	Y	X/Y	X	Y/X
R1	----	----	29C-309	0F9-15E	400-48F	000-08F	430-44F	030-04F
R2	----	----	215-24F	080-0A3	510-67F	010-17F	500-65F	000-15F
R3	----	----	1B6-214	15F-1B5	270-32F	050-10F	220-28F	000-06F
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-



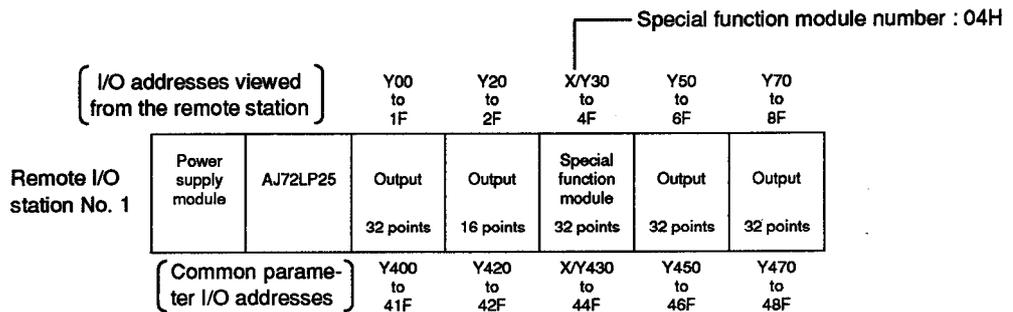
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- (4) Module numbers of special function modules at MELSECNET/10 remote I/O stations

The module numbers of special function modules at MELSECNET/10 remote I/O stations are expressed by the upper two digits of the three-digit numbers which represent the last addresses of the "I/O addresses viewed from the remote I/O station."

Designate special function module numbers according to the above rule, irrespective of the link parameters set on the master station on the MELSECNET/10 remote I/O network.



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5.10.3 Reading data from the special function module buffer memory

In this section, an example is quoted to describe the control protocol for reading data from the buffer memory in a special function module using a TR command.

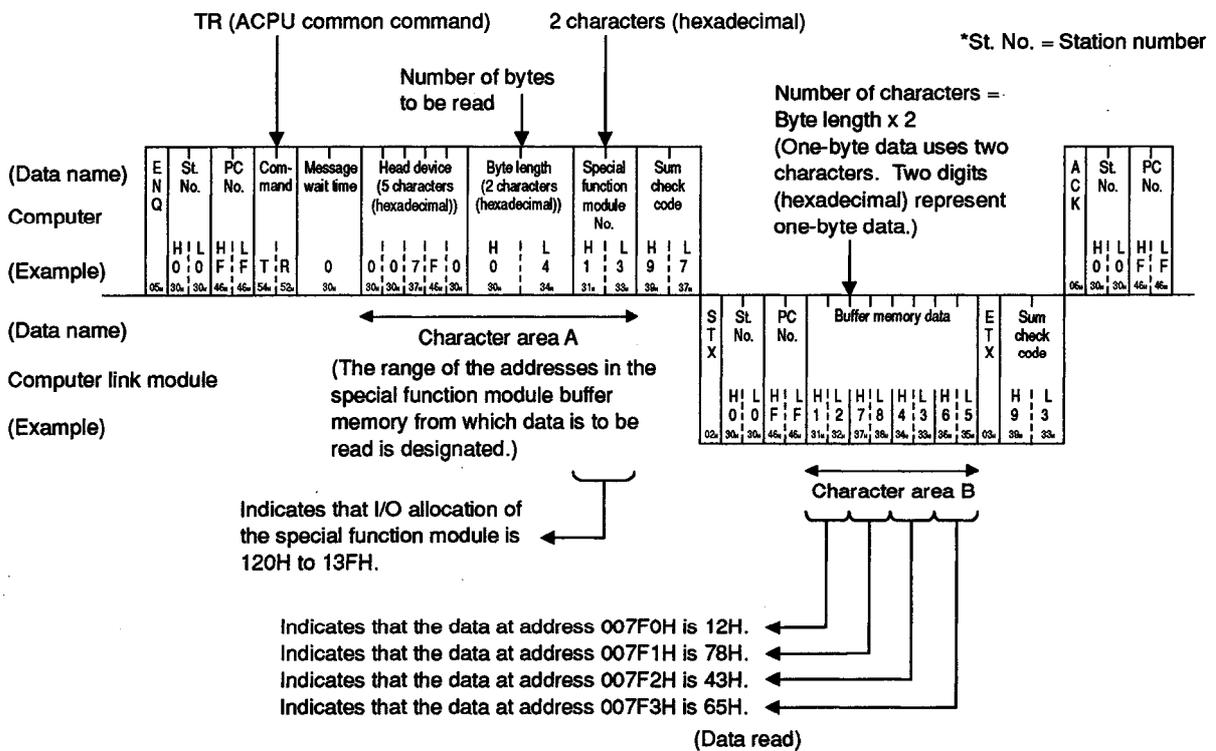
[Control protocol]

The protocol shown below is in control format 1.

To access the buffer memory in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

(Reading conditions)

- 1) The message wait time is 0 ms.
- 2) Data (four bytes) is to be read from four addresses, 7F0H to 7F3H, in the buffer memory in the special function module with I/O addresses 120H to 13FH (module No. 13H).



POINTS

- (1) To designate the byte length, the following condition must be met:
 $1 \leq \text{byte length} \leq 128$
- (2) With some special function modules, 2 or 3 bytes are used to express the data. Therefore, designate the byte length by referring to the manuals for each individual module.

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5.10.4 Writing data to the special function module buffer memory

In this section, an example is quoted to describe the control protocol for writing data to the buffer memory in a special function module using a TW command.

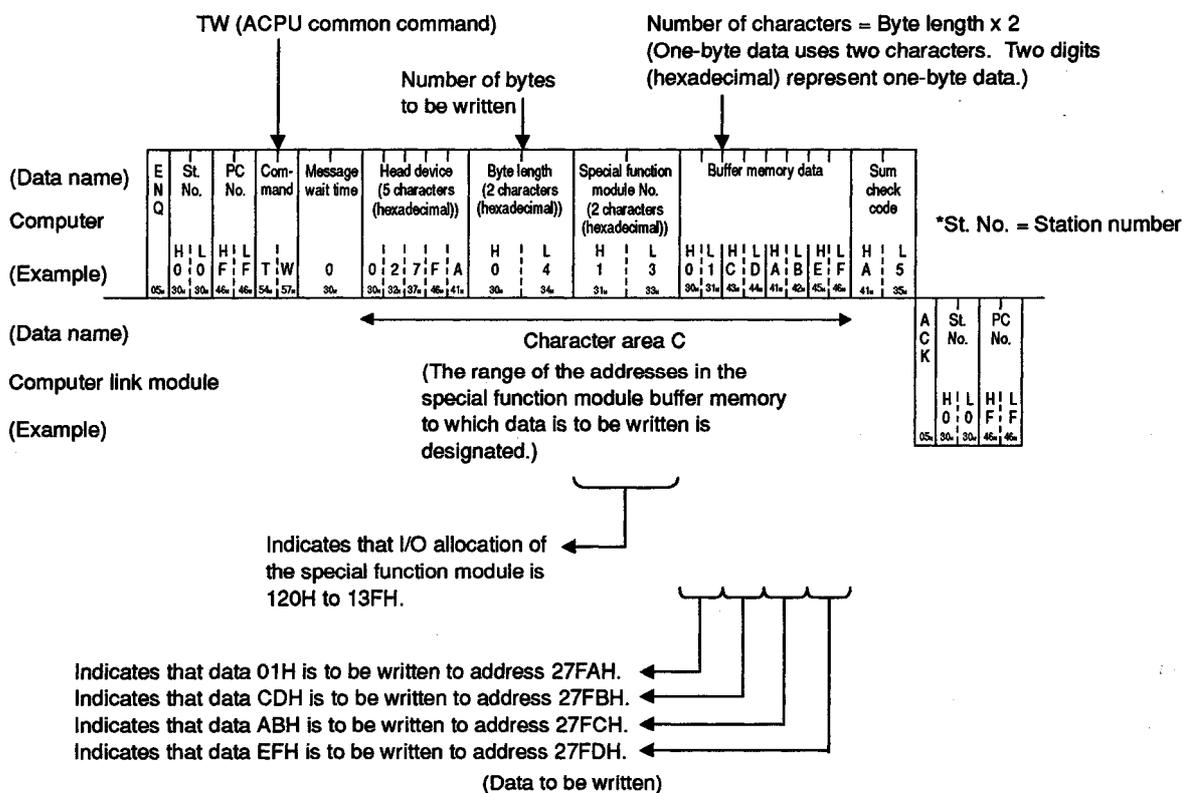
[Control protocol]

The protocol shown below is in control format 1.

To access the buffer memory in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

(Reading conditions)

- 1) The message wait time is 0 ms.
- 2) Data (four bytes) is to be written to four addresses, 27FAH to 27FDH, in the buffer memory in the computer link module with I/O addresses 120H to 13FH (module No. 13H).



POINTS

- (1) To designate the byte length, the following condition must be met:
 $1 \leq \text{byte length} \leq 128$
- (2) With some special function modules, 2 or 3 bytes are used to express the data. Therefore, designate the byte length by referring to the manuals for each individual module.

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5.11 PC CPU Remote RUN/STOP and PC CPU Model Code/Name Read

These functions are used to remote-run or remote-stop the PC CPU from the computer, and to read what model of PC CPU is linked with the computer.

In this section, examples are quoted to describe the control protocols for these functions.

5.11.1 Commands and their functions

(1) The following table shows the ACPU common commands to be used to remote-run or remote-stop the PC CPU and to read the PC CPU model, Remote Run/Stop of PC CPU and Reading PC CPU Model Name

Item	Command		Description	PC CPU State			Reference Section
	Symbol	ASCII Code		During STOP	During RUN		
					Write Enabled	Write Disabled	
Remote RUN	RR	52H, 52H	Requests remote RUN of PC CPU.	O	O	O	5.11.2
Remote STOP	RS	52H, 53H	Requests remote STOP of PC CPU.	O	O	O	
CPU model code read	PC	50H, 43H	Reads the model code of the PC CPU.	O	O	O	5.11.3
CPU model code/name read	PU	50H, 55H	Reads the model code and name of the PC CPU.	O	O	O	

Note : O.....Executable

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5.11.2 Remote RUN/STOP

(1) Remote RUN/STOP control

(a) RUN, STOP, PAUSE and STEP-RUN states are produced by the following combinations of PC CPU key switch positions and computer commands.

		PC CPU Key Switch Position			
		RUN	STOP	PAUSE	STEP-RUN
Command from computer	Remote RUN	RUN	STOP	PAUSE	STEP-RUN
	Remote STOP	STOP	STOP	STOP	STOP

REMARK

When a PC CPU is stopped by the remote STOP command given by an external computer, that PC CPU cannot be put into the RUN state by the computer connected to the PC CPU.

(b) The clearing of data memories on receiving a remote RUN instruction depends on the states of special relays M9016 and M9017 as shown below.

Special Relay		Data Memory State
M9016	M9017	
OFF	OFF	PC CPU enters the RUN state without clearing remote STOP data.
OFF	ON	Remote STOP data is cleared outside the latch range set in parameters. (In this case, Link X image is not cleared.)
ON	ON/OFF	PC CPU enters the RUN state after data memory is cleared.

REMARK

Always reset special relays M9016 and M9017 when data memory clearing is not required.

POINT

After operations remote RUN/STOP control from the computer are completed, the remote data will be lost if the power supply is turned ON or the PC CPU is reset.

POINTS

- (1) Only AnUCPUs can be remote-run or remote-stopped by designating a dedicated PC CPU number.
- (2) Regarding the following systems, a dedicated PC CPU number can be designated in the message requesting remote run or remote stop sent from the computer:
 - (a) The PC CPU loaded in the computer link module connected to the computer is an AnUCPU.
 - (b) The PC CPU requested by the computer to be remote-run or remote-stopped is an AnUCPU which is connected on the MELSECNET/10.
- (3) Remote run or remote stop is unavailable for systems and PC CPUs other than those described in (2) above even if a dedicated PC CPU number is designated.

In the following cases, the computer link module sends a NAK message:

 - (a) The PC CPU loaded in the computer link module connected to the computer is not an AnUCPU.
 - (b) The PC CPU loaded in the computer link module connected to the computer is an AnUCPU, but the MELSECNET/10 is not registered as a network (refer to Section 5.15.3).
- (4) After making a remote run or remote stop request from the computer with a dedicated PC CPU number designated, check the PC CPU status after the processing with the special register for MELSECNET/10 linking even if the computer link module sends an ACK signal.

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(3) Control protocols for remote RUN/STOP

In this section, examples are quoted to describe the control protocols for remote-running or remote-stopping the PC CPU using an RR or RS command.

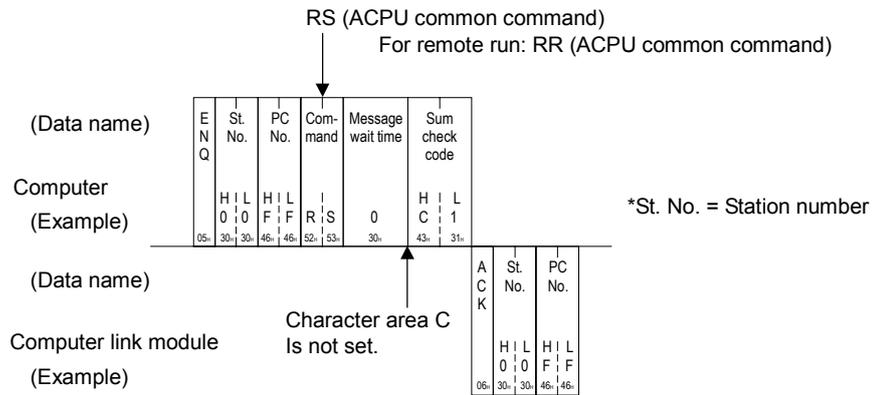
[Control protocol]

The protocol shown below is in control format 1.

To access the PC CPU in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

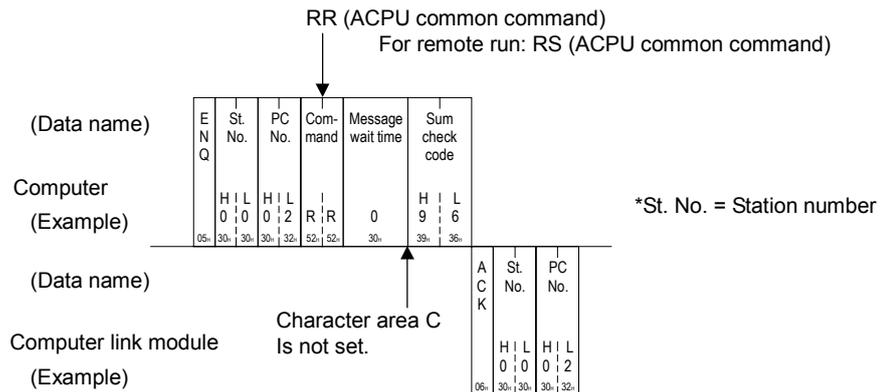
(Example 1: Remote control conditions)

- 1) The message wait time is 0 ms.
- 2) The PC CPU (self station) loaded with a computer link module (station No. 00) connected to the computer is to be remote-stopped.



(Example 2: Remote control conditions)

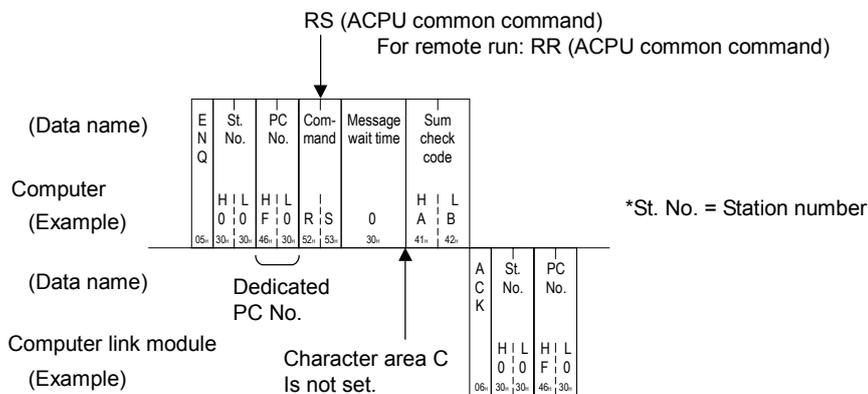
- 1) The message wait time is 0 ms.
- 2) The PC CPU (station No. 02) on the data link system or network system is to be remote-run through the PC CPU loaded with a computer link module (station No. 00) connected to the computer.



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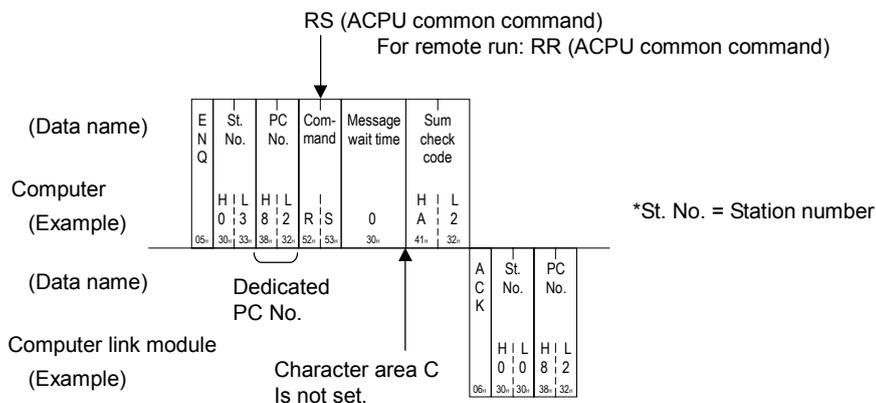
(Example 3: Remote control conditions)

- 1) The message wait time is 0 ms.
- 2) All AnUCPUs on the MELSECNET/10, which is registered with the AnUCPU (self station) loaded with a computer link module (station No. 00) connected to the computer, are to be remote-stopped.



(Example 4: Remote control conditions)

- 1) The message wait time is 0 ms.
- 2) All AnUCPUs in group No. 2 on the MELSECNET/10, which is registered with the AnUCPU (self station) loaded with a computer link module (station No. 03) connected to the computer, are to be remote-stopped.



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5.11.3 PC CPU model code and name read

This function is used to read the model code and name of the PC CPU being linked with the computer.

(1) Readable PC CPU model codes and names

PC CPU Model	Data to be Read		PC CPU Model	Data to be Read	
	Model Code (Hexadecimal)	Model Name		Model Code (Hexadecimal)	Model Name
A0J2HCPU	98H	A0J2H			
A1CPU, A1NCP	A1H	*1	A4UCPU	85H	A4U
A1SCPU(-S1), A1SJCPU	98H	A1S	A52GCPU	9AH	A52G
A1SHCPU	A3H	A1SH	A73CPU	A3H	*1
A1SJHCPU		A2SH	A7LMS-F	A3H	*1
A2CPU(-S1)	A2H	A2			
A2NCP(-S1)		*1	AJ72P25/R25	ABH	*1
A2SCPU(-S1)		*1	AJ72LP25/BR15	8BH	L/B25
A2ACPU	92H	A2A			
A2ACPU-S1	93H	A2AS1	Q2ACPU(-S1)	93H	_____
A2CCPU	9AH	A2C	Q3ACPU	94H	_____
A2UCPU, A2ASCPU	82H	A2U	Q4ACPU		
A2UCPU-S1, A2ASCPU-S1	83H	A2US1	Q4ARCPU		
A2SHCPU(-S1)	A3H	A2SH1	AJ72QLP25	84H	_____
A2USHCPU-S1	84H	A2USH	AJ72QBR15		
A3CPU	A3H	A3			
A3NCP		*1	Q2ASCPU(-S1)		
A3ACPU	94H	A3A	Q2ASHCPU(-S1)	93H	_____
A3HCP	A4H	A3H			
A3MCP		A3M			
A3UCPU	84H	A3U			

*1 represents blank (20H).

POINTS

- (1) The model commands are all readable with either PC or PU command described in this section, however, only the PU command can help read the model names.
- (2) The model codes are expressed in two characters, and the model names in five characters.
If a model name read is represented by less than five characters, the computer link module makes up the lacking character(s) with the equal number of blanks (20H), thereby returning a five-character name.

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Function	Computer link function									
	A1S71UC24			A1S71C24			A1SCPU C24-R2		A2CCPU C24	A2CCPU C24-PRF
Applicable module	-R2	-R4	-PRF	-R2	-R4	-PRF	G		Δ	Δ
Remarks	○	○	○	Δ	Δ	Δ	G		Δ	Δ

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(2) Reading the PC CPU model code and name

In this section, examples are quoted to describe the control protocols for reading the model code and name of the PC CPU linked with the computer using a PC or PU command.

(a) Reading the model code using a PC command

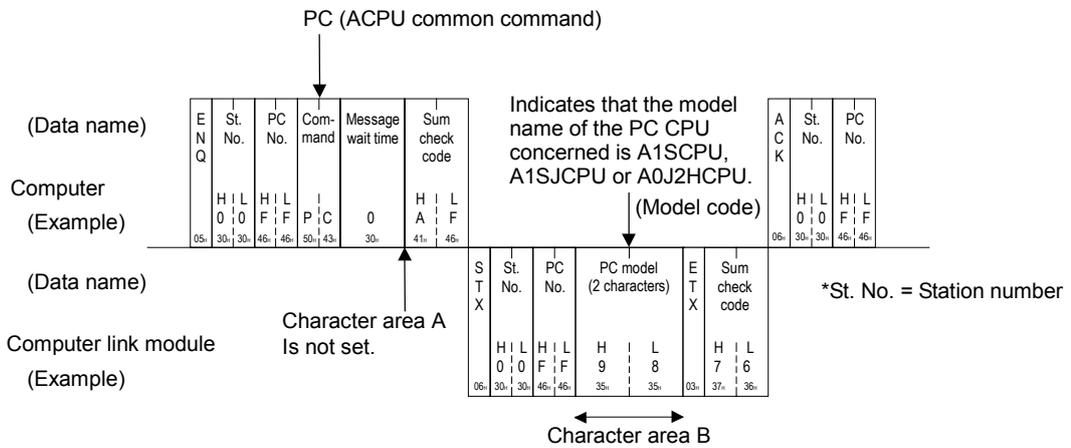
[Control protocol]

The protocol shown below is in control format 1.

To access the PC CPU in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

(Reading conditions)

- 1) The message wait time is 0 ms.
- 2) The model code of the PC CPU (self station) loaded with a computer link module is to be read.



(b) Reading the model code and name using a PU command

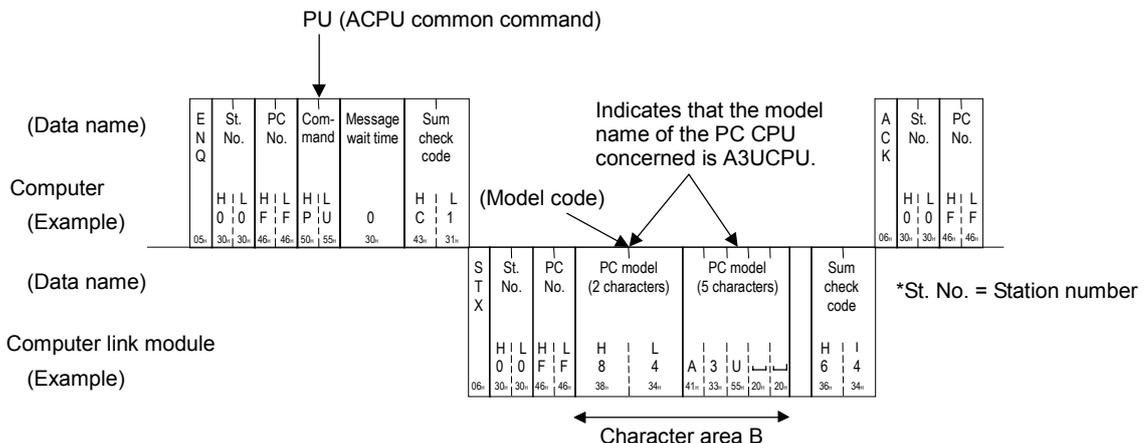
[Control protocol]

The protocol shown below is in control format 1.

To access the PC CPU in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

(Reading conditions)

- 1) The message wait time is 0 ms.
- 2) The model code and name of the PC CPU (self station) loaded with a computer link module are to be read.



5.12 Program Read/Write

This function is used to transfer all types of programs (main and subsequence programs, microcomputer main and sub programs), parameters and comment data from the PC CPU and store them in the computer. The computer then carries out the appropriate controls by writing programs, parameters, and comment data to the PC CPU.

5.12.1 Precautions during program read/write

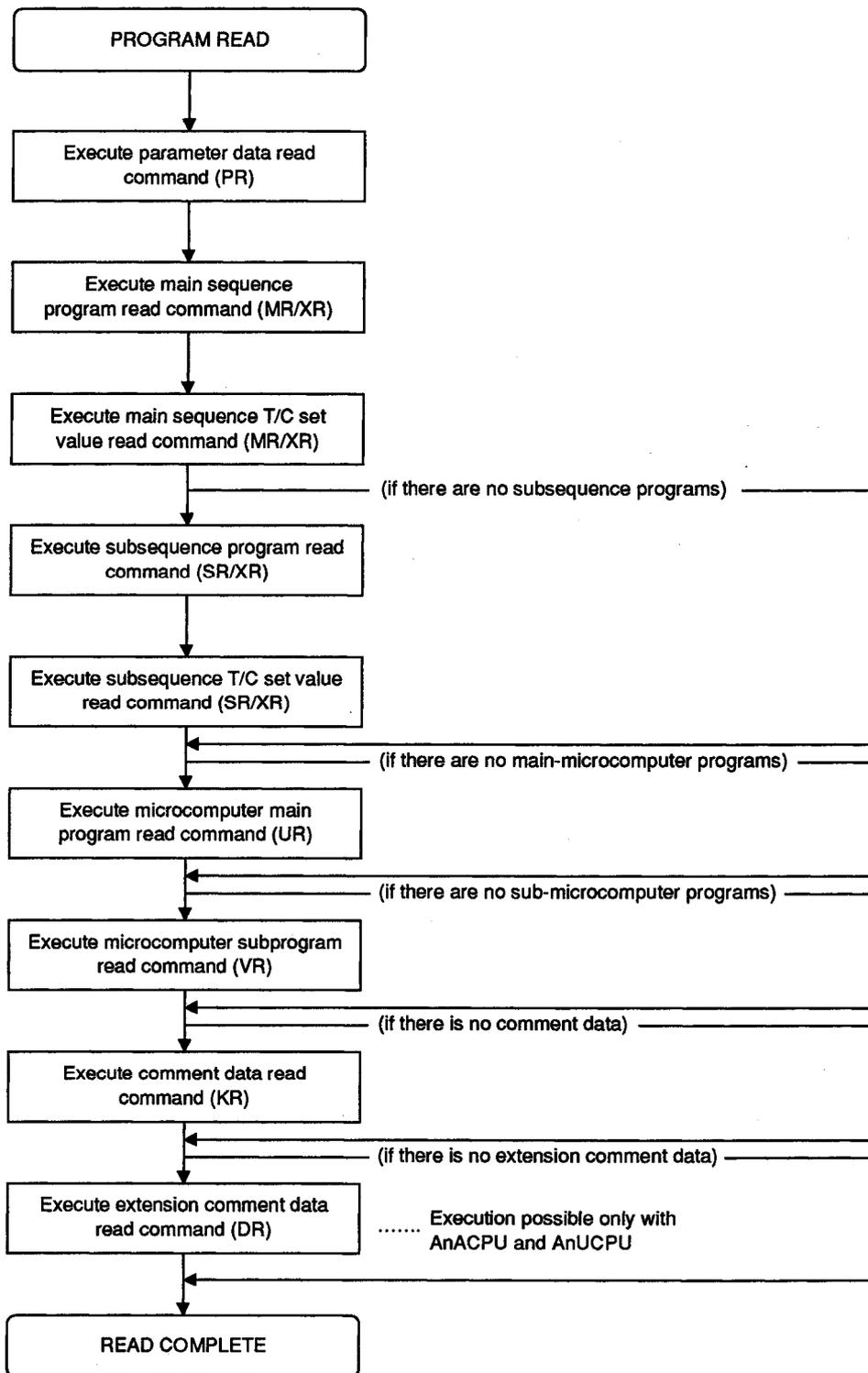
- (1) When reading programs that have been written to the PC CPU, read all sequence programs, microcomputer programs, parameter data, and comment data from all areas.
When writing programs, write all stored data to the PC CPU. If all areas have not been written to, the PC CPU will not work correctly.
- (2) Before writing programs, write parameter data and execute a parameter analysis request. Otherwise, the parameters in the PC CPU user memory will be changed but the parameters stored in the work area by the ACPU for operation will remain unchanged. Therefore, if a peripheral device is loaded and operated after the parameters are changed, processing will be carried out with the previous parameters, which are still stored in the work area.
- (3) The number of points which can be processed per communications is fixed. When reading or writing data, divide the data into several groups to read or write the entire area. Parameter data should be divided into 3k bytes. Other data should be divided into units of data determined by parameter setting.
- (4) When the PC CPU, which reads or writes the sequence program, is an AnUCPU, network parameters are read or written together with other parameters.
To read or write the network parameters, use the parameter memory read/write function described in Section 5.12.3.
- (5) A program read by this function into the computer cannot be modified on the computer. Keep it as a backup copy.
- (6) When the PC CPU is an AnA or AnUCPU, the SFC program is read or written by the main microcomputer program read/write function.
To read or write the SFC program, use the microcomputer program read/write function described in Section 5.12.5.

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5.12.2 Program read/write control procedures

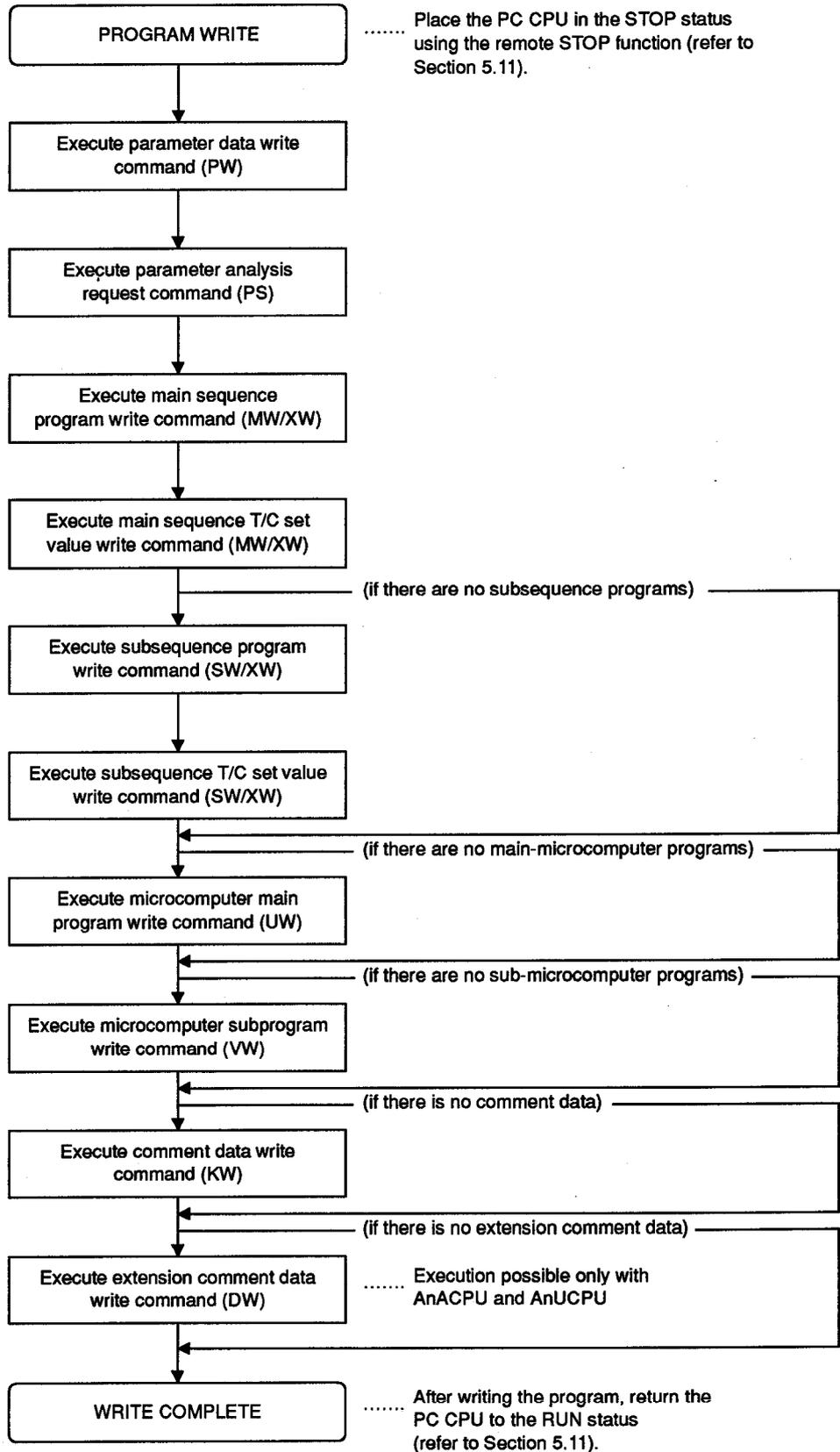
(1) Reading



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(2) Writing



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5.12.3 Parameter memory read/write

(1) Commands and addresses

(a) ACPU common commands

Item	Command		Description	Number of Points Processed per Communication	PC CPU State			Reference Section
	Symbol	ASCII code			During STOP	During RUN		
						Write Enabled	Write Disabled	
Batch read	PR	50H, 52H	Reads parameters.	128 bytes	○	○	○	5.12.3 (2)
Batch write	PW	50H, 57H	Writes parameters.		○	X	X	5.12.3 (3)
Analysis request	PS	50H, 53H	Causes the PC CPU to acknowledge and check rewritten parameters.		○	X	X	5.12.3 (4)

Note : ○..... Executable
x..... Not executable

(b) Parameter addresses

There are 3k bytes of parameter memory, addresses 00000H to 00BFFH.
For addresses, use 5-digit ASCII (hexadecimal).

POINTS

- (1) This function is applicable to the parameters set in making the memory capacity and other settings for the GPP function, and to the network parameters for the MELSECNET/10.

When the PC CPU, which reads or writes the parameters, is an AnUCPU, the network parameters are read or written together with the parameters.

When reading or writing the network parameters, read or write all bytes of parameters, including the parameter memory (3 kbytes) and the network parameter memory.

The network parameter memory capacity is displayed on the network parameter setting screen for the GPP function.

The network parameters can be read or written with one of the following versions of computer link module software:

Applicable module	AJ71UC24	A1SJ71 UC24-R2/R4	A1SJ71 C24-R2/R4/PRF	A1SCPU C24-R2	A2CCPU C24	A2CCPU C24-PRF
Version	A	R	M	A	K	K

- (2) After changing parameters, always call the parameter analysis request command (PS).

If this is not done, the parameters in PC CPU user memory will be changed but the parameters stored in the work area by the ACPU for operation will remain unchanged. Therefore, if a peripheral device is loaded and operated after the parameters are changed, processing will be executed with the previous parameters, which are still stored in the work area.

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Function	Computer link function								
	A1S71UC24		A1S71C24		A1SCPU	A2CCPU	A2CCPU		
Applicable module	-R2	-R4	-PRF	-R2	-R4	-PRF	C24-R2	C24	C24-PRF
Remarks	O	O	O	O	A	A	A	A	A

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(2) Parameter memory batch read

In this section, an example is quoted to describe the control protocol for batch-reading data from the PC CPU parameter memory using a PR command.

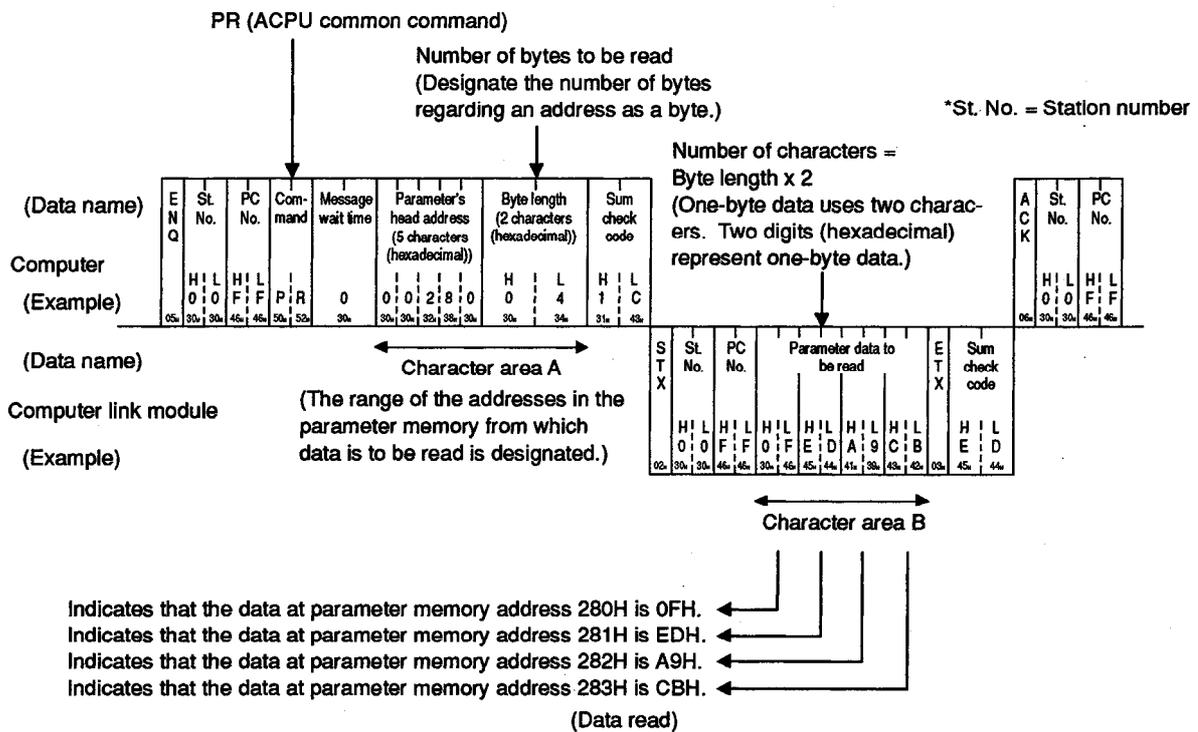
[Control protocol]

The protocol shown below is in control format 1.

To access the parameter memory in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

(Reading conditions)

- 1) The message wait time is 0 ms.
- 2) Data (four bytes) is to be read from four parameter memory addresses, 280H to 283H, in the PC CPU (self station) loaded with a computer link module.



POINT

- To designate the byte length, the following condition must be met:
- $1 \leq \text{byte length} \leq 128$

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Function	Computer link function									
	A1S71UC24			A1S71UC24			A1SCPU	A2CCPU	A2CCPU	
Applicable module	-B2	-B4	-PRF	-B2	-B4	-PRF	0	A	A	A
Remarks	0	0	0	0	0	0	0	0	0	0

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(3) Parameter memory batch write

In this section, an example is quoted to describe the control protocol for batch-writing data to the parameter memory in the PC CPU using a PW command.

[Control protocol]

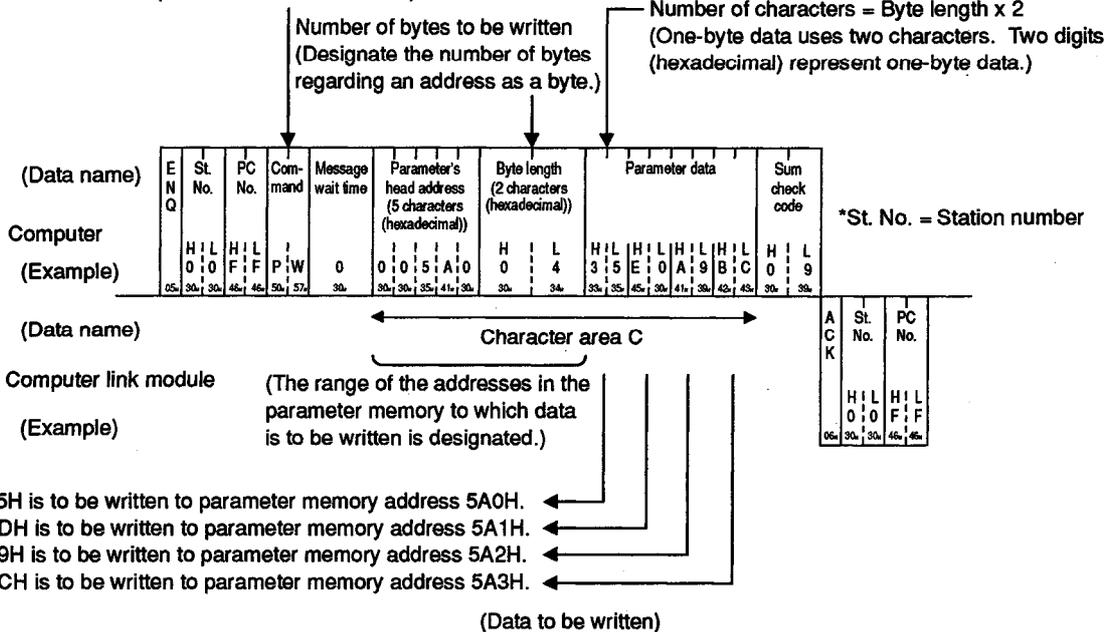
The protocol shown below is in control format 1.

To access the parameter memory in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

(Writing conditions)

- 1) The message wait time is 0 ms.
- 2) Parameter data (four bytes) is to be written to four parameter memory addresses, 5A0H to 5A3H, in the PC CPU (self station) loaded with a computer module.

PW (ACPU common command)



POINT

To designate the byte length, the following condition must be met:

- $1 \leq \text{byte length} \leq 128$

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Function	Computer link function								
	A1S71UC24			A1S71UC24			A1SCPU	A2CCPU	A2CCPU
Applicable module	-R2	-R4	-PRF	-R2	-R4	-PRF	C24-R2	C24	C24-PRF
Remarks	0	0	0	0	0	0	0	0	0

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(4) Parameter memory analysis request

When data in the parameter memory in the PC CPU is changed, this function allows the PC CPU to identify the changed parameter and change the parameters in the work area in the PC CPU accordingly.

In this section, an example is quoted to describe the control protocol for executing an analysis request using a PS command.

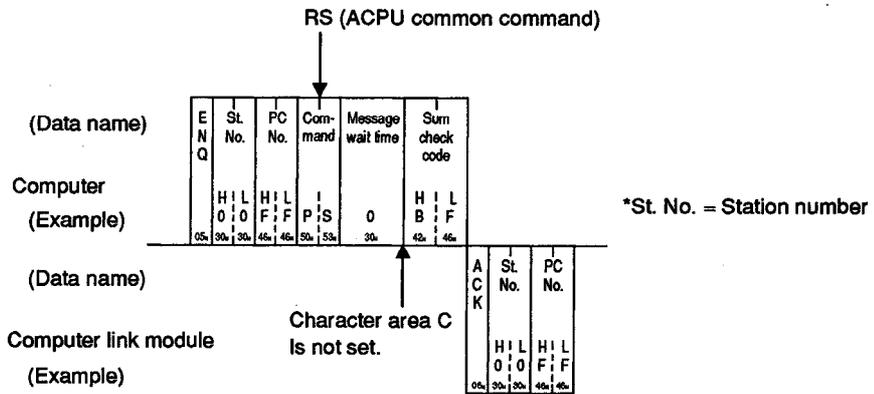
[Control protocol]

The protocol shown below is in control format 1.

To access the parameter memory in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

(Analysis request conditions)

- 1) The message wait time is 0 ms.
- 2) An analysis of the parameters written to the parameter memory in the PC CPU (self station) loaded with a computer link module is to be requested.



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5.12.4 Sequence program read/write

In this sections, examples are quoted to describe the control protocols for reading or writing the PC CPU sequence programs.

(1) Commands and step allocation

(a) ACPU common commands

Item			Command		Description	Number of Points Processed per Communication	PC CPU State			Reference Section				
			Symbol	ASCII Code			During STOP	During RUN						
								Writing Enabled	Writing Disabled					
Batch read	Main	Except T/C set value	XR/MR	58H, 52H/4DH, 52H	Reads main sequence program.	64 steps	○	○	○	5.12.4 (2)				
		T/C set value			Reads the T/C set value used in main sequence program.	64 points								
	Sub 1	Except T/C set value	XR/SR	58H, 52H/53H, 52H	Reads subsequence program 1.	64 steps	○	○	○					
		T/C set value			Reads the T/C set value used in subsequence program 1.	64 points								
	Sub 2 (A4U only)	Except T/C set value	XR	58H, 52H	Reads subsequence program 2.	64 steps	○	○	○					
		T/C set value			Reads the T/C set value used in subsequence program 2.	64 points								
	Sub 3 (A4U only)	Except T/C set value			Reads subsequence program 3.	64 steps	○	○	○					
		T/C set value			Reads the T/C set value used in subsequence program 3.	64 points								
	Batch write	Main			Except T/C set value	XW/MW	58H, 57H/4DH, 57H	Writes main sequence program.	64 steps		○	○*	X	5.12.4 (3)
					T/C set value			Writes the T/C set value used in main sequence program.	64 points					
Sub 1		Except T/C set value	XW/SW	58H, 57H/53H, 57H	Writes subsequence program 1.	64 steps	○	○*	X					
		T/C set value			Writes the T/C set value used in subsequence program 1.	64 points								
Sub 2 (A4U only)		Except T/C set value	XW	58H, 57H	Writes subsequence program 2.	64 steps	○	○*	X					
		T/C set value			Writes the T/C set value used in subsequence program 2.	64 points								
Sub 3 (A4U only)		Except T/C set value			Writes subsequence program 3.	64 steps	○	○*	X					
		T/C set value			Writes the T/C set value used in subsequence program 3.	64 points								

Note : ○Executable
X.....Not executable

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* Writing during a program run may be executed out if all the following conditions are met:

- 1) The PC CPU is A3, A3N, A3H, A3M, A73, A3A, A3U, or A4U.
- 2) The program is not the currently running program (indicates a sub-program called by the main program, if the main program is being run).
- 3) The PC CPU special relay is in the following state:
 - a) M9050 (signal flow conversion contact).....OFF (A3CPU only)
 - b) M9051 (CHG instruction disable).....ON

POINTS
(1) When reading or writing the timer/counter setting values using the sequence program read/write command, range designations of T0 to T255 or C0 to C255 are possible.
(2) Extended ranges of T256 to T2047 and C256 to C1023 for AnA CPU should be used for storing the setting values; read or write the set values using the batch read/write command for devices (D, W, R) allocated by parameter setting.

(b) Designating the head address

The division between sequence programs and T/C set values, and their addresses in 4-digit ASCII are shown in the table below.

Example:

To read the set values T0 to T63

Head address = FE00H Command = XR or MR

Sequence Program	Designated Step for Protocol
T0 set value T1 set value to T255 set value	FE00H FE01H to FEFFH
C0 set value C1 set value to C255 set value	FF00H FF01H to FFFFH
Step 0 Step 1 to Step 30718 (30K)	0000H 0001H to 77FEH

Calculation of designated step

Head step number in designating FE00H + timer device No.
the timer set value (expressed in hexadecimal)

Head step number in designating FF00H + counter device No.
the counter set value (expressed in hexadecimal)

Head step number in designating 0000H + step No.
a sequence program (expressed in hexadecimal)

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(c) Meaning of T/C set values

T/C set values are stored as hexadecimal values as shown in the table below.

When rewriting the PC CPU set values from the computer via the computer link module, designate the set value in 4-digit ASCII.

Example:

Data designated to change T10 setting value K10 to K20.....0014H

Data designated to change T11 setting value D30 to D10.....8014H

Ladder Example in Program	Setting in Program	Setting in Protocol
	K0 K1 to K9 K10 to K32767	0000H 0001H to 0009H 000AH to 7FFFH
	D0 D1 D2 to D1023	8000H 8002H 8004H to 87FEH

Calculation of protocol setting value

When the value is set in a 0000H + constant
constant (Kxxxx) (expressed in hexadecimal)

When the value is set in a data 8000H + data register device
register (Dyyyy) No. x 2 (expressed in hexadecimal)

(2) Designating a program when an XR or XW command is used

To read or write a sequence program or T/C set values using an XR or XW command, designate the program with the corresponding selection number shown in the table below:

Program	Selection No.	PC CPU Concerned		
		PC CPU Incapable of Creating Subsequence Program *1	PC CPU Capable of Creating Subsequence Program (Except A4UCPU) *1	A4UCPU
Main sequence program	00H	○	○	○
Subsequence program (1)	01H	—	○	○
Subsequence program (2)	02H	—	X	○
Subsequence program (3)	03H	—	X	○

*1 For each PC CPU, refer to the PC CPU concerned shown in the "Functions available with the ACPU common commands" in Section 3.2.1 (1).

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(3) Sequence program batch read

In this section, examples are quoted to describe the control protocols for batch-reading the data (machine language) or T/C set values from a sequence program using an XR, MR or SR command.

[Control protocol]

The control protocols for reading a sequence program (machine language) or T/C set values are all shown in control format 1.

To access a sequence program in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocols in this section.

POINTS

- (1) The main program and its T/C set values can be read by the use of an XR or MR command.
- (2) Subsequence program 1 and its T/C set values can be read by the use of an XR or SR command.
- (3) The subprograms for the A4UCPU (sub 2, sub 3, sub 4) and their T/C set values can be read by the use of an XR command.
- (4) An XR command can be used to read all sequence programs and their T/C set values.
- (5) The number of steps must meet the following requirement:
 - $1 \leq \text{number of steps} \leq 64$
- (6) It is impossible to designate a T/C set value and the main sequence program together. Only either of them can be designated.

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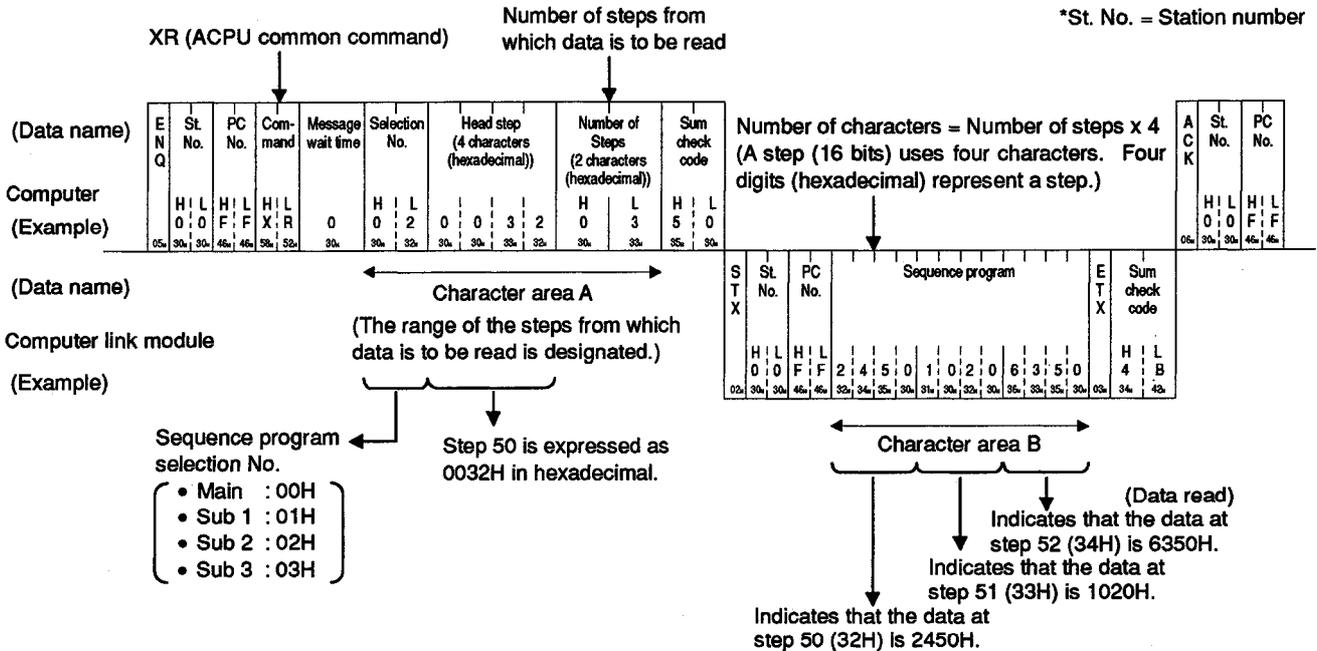
Function	Computer link function									
	AJ71UC24		A1S/J1UC24		A1S/J1C24		A1SCPU C24-R2		A2CCPU C24-PHF	
Applicable module	O	O	O	O	O	O	O	O	O	O
Remarks									MR, SR (Ver. A), XR (Ver. B)	

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(a) Reading data from a sequence program using an XR command

(Reading conditions)

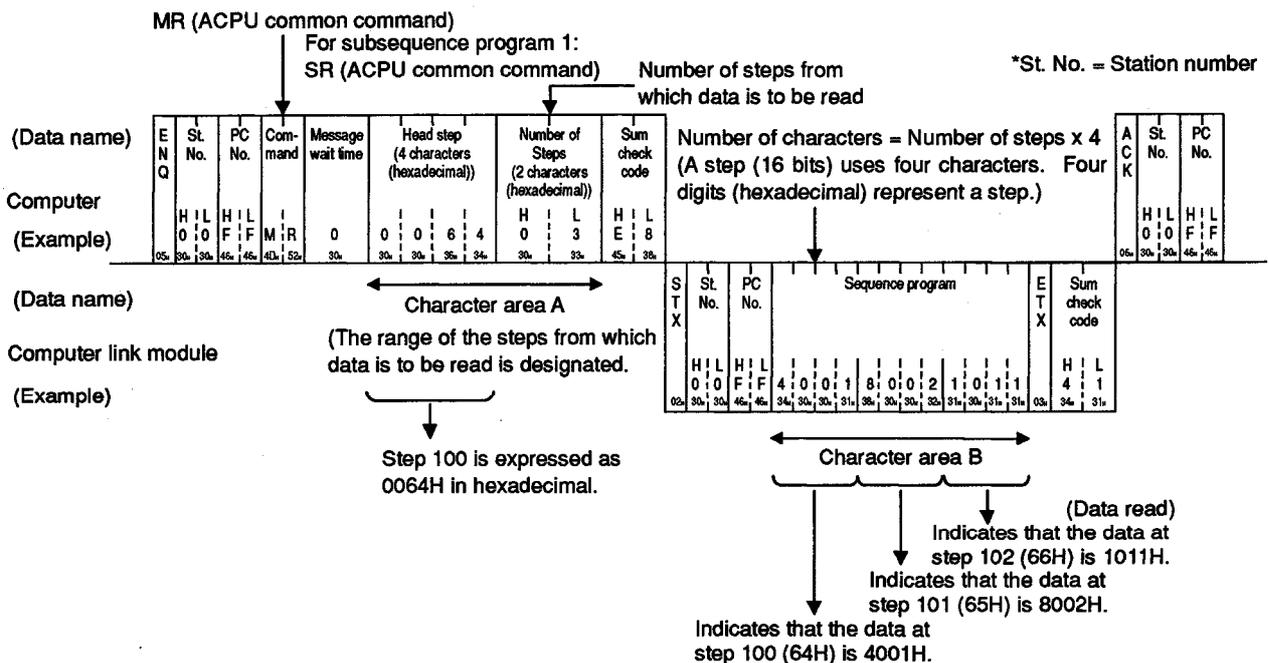
- 1) The message wait time is 0 ms.
- 2) Data at three steps, step 50 to step 52, in subsequence program 2 is to be read from the PC CPU (self station) loaded with a computer link module.



(b) Reading data from a sequence program using an MR or SR command

(Reading conditions)

- 1) The message wait time is 0 ms.
- 2) Data at three steps, step 100 to step 102, in the main sequence program is to be read from the PC CPU (self station) loaded with a computer link module.



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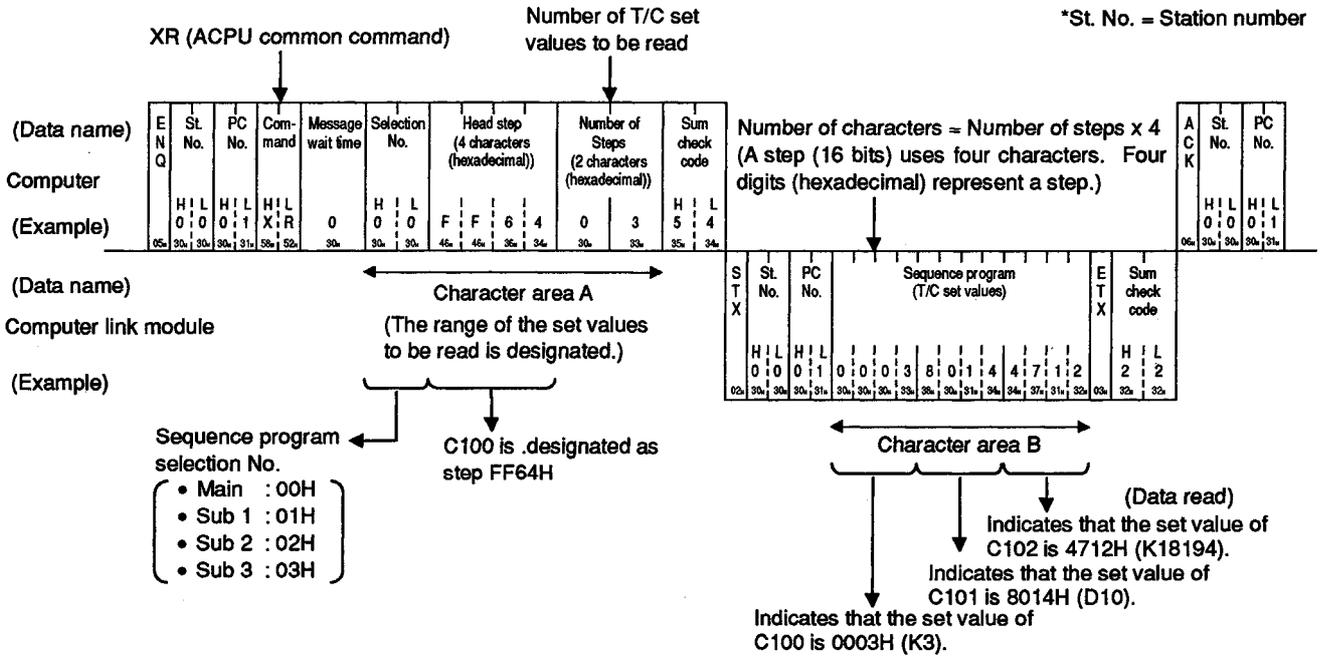
Function	Computer link function					
	A1S71UC24	A1S71UC24	A1S71UC24	A1S71UC24	A2CCPU C24	A2CCPU C24-PRF
Applicable module	AJ71UC24	-R2	-R4	-PRF	A	A
Remarks					MR, SR: (Ver. A), XR: (Ver. K)	MR, SR: (Ver. A), XR: (Ver. K)

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(c) Reading T/C set values using an XR command

(Reading conditions)

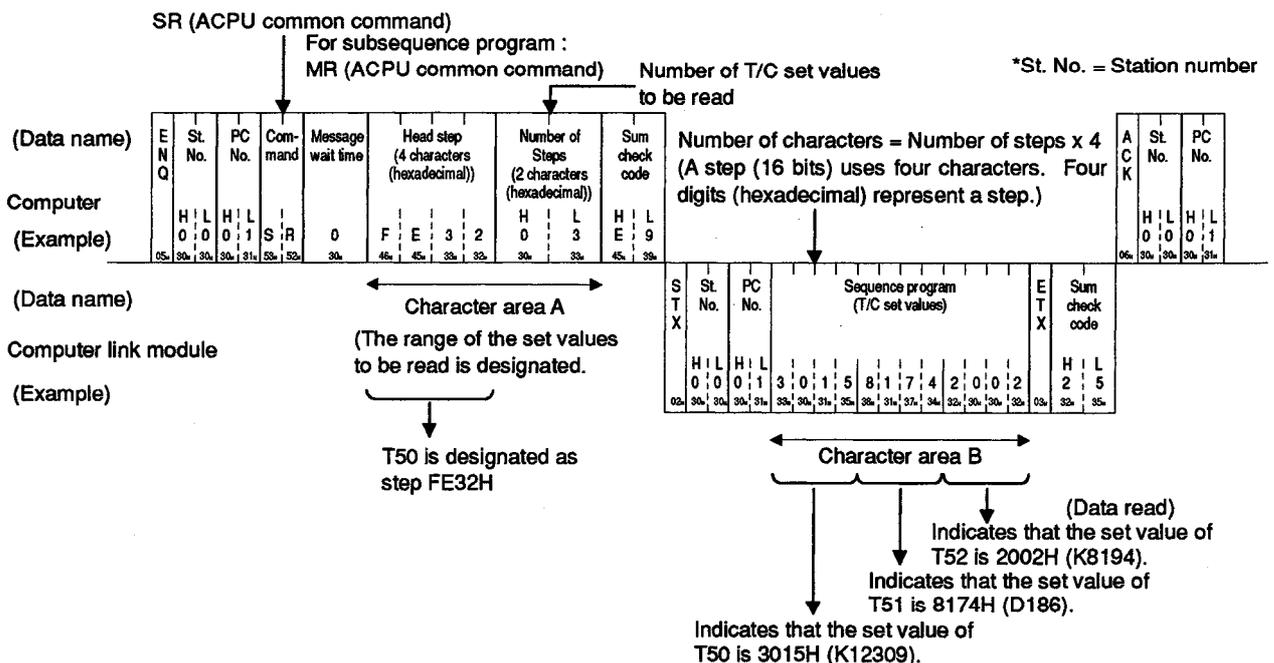
- 1) The message wait time is 0 ms.
- 2) The T/C set values of three counters, C100 to C102, for the main program are to be read from PC CPU No. 01 on the MELSECNET system.



(d) Reading T/C set values using an MR or SR command

(Reading conditions)

- 1) The message wait time is 0 ms.
- 2) The T/C set values of three timers, T50 to T52, for subsequence program 1 are to be read from PC CPU No. 01 on the MELSECNET system.



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(4) Sequence program batch write

In this section, examples are quoted to describe the control protocols for batch-writing a sequence program or T/C set values using an XW, MW or SW command.

[Control protocol]

The control protocols for writing a sequence program (machine language) or T/C set values are all shown in control format 1.

To access a sequence program in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

POINTS

- (1) The main program and its T/C set values can be written by the use of an XW or MW command.
- (2) Subsequence program 1 and its T/C set values can be written by the use of an XW or SW command.
- (3) The subsequence programs for the A4UCPU (sub 2, sub 3, sub 4) and their T/C set values can be written by the use of an XW command.
- (4) An XW command can be used to write all sequence programs and T/C set values.
- (5) The number of steps must meet the following requirement:
 - $1 \leq \text{number of steps} \leq 64$
- (6) It is impossible to designate a T/C set value and the main sequence program together. Only either of them can be designated.

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

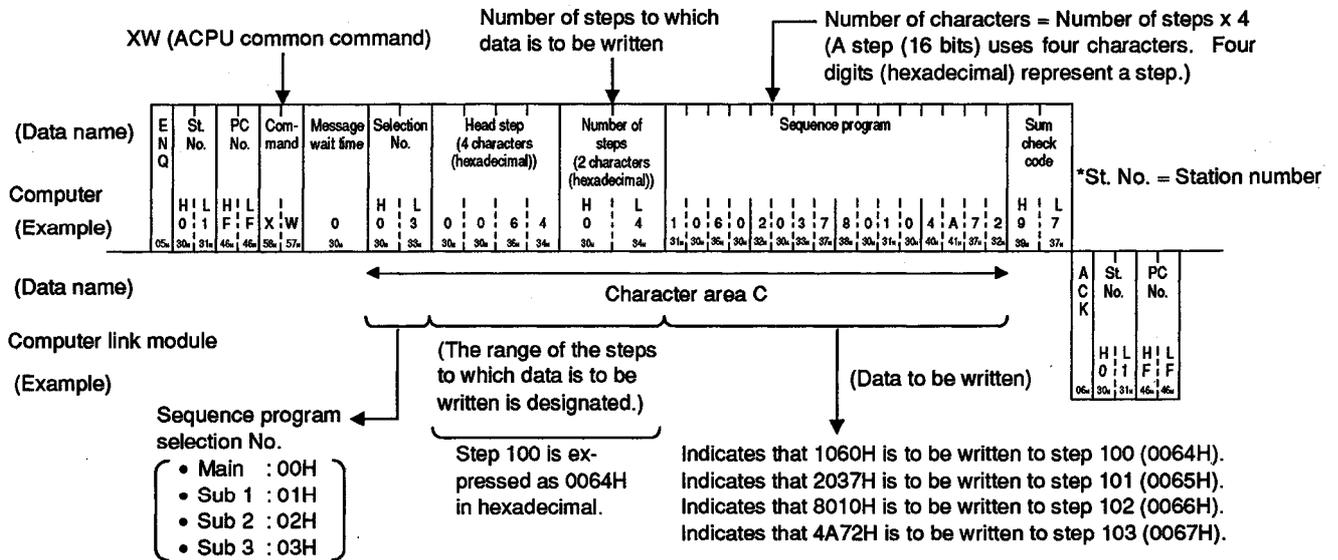
Function	Computer link function					
	A1S1UC24		A1S17UC24		A1S17IC24	
Applicable module	A17UC24	-R2	-R4	-PRF	-R2	-R4
Remarks	MW, SW: (Ver. A), XW: (Ver. K)			MW, SW: (Ver. A), XW: (Ver. K)		

MELSEC-A

(a) Writing data to a sequence program using an XW command

(Writing conditions)

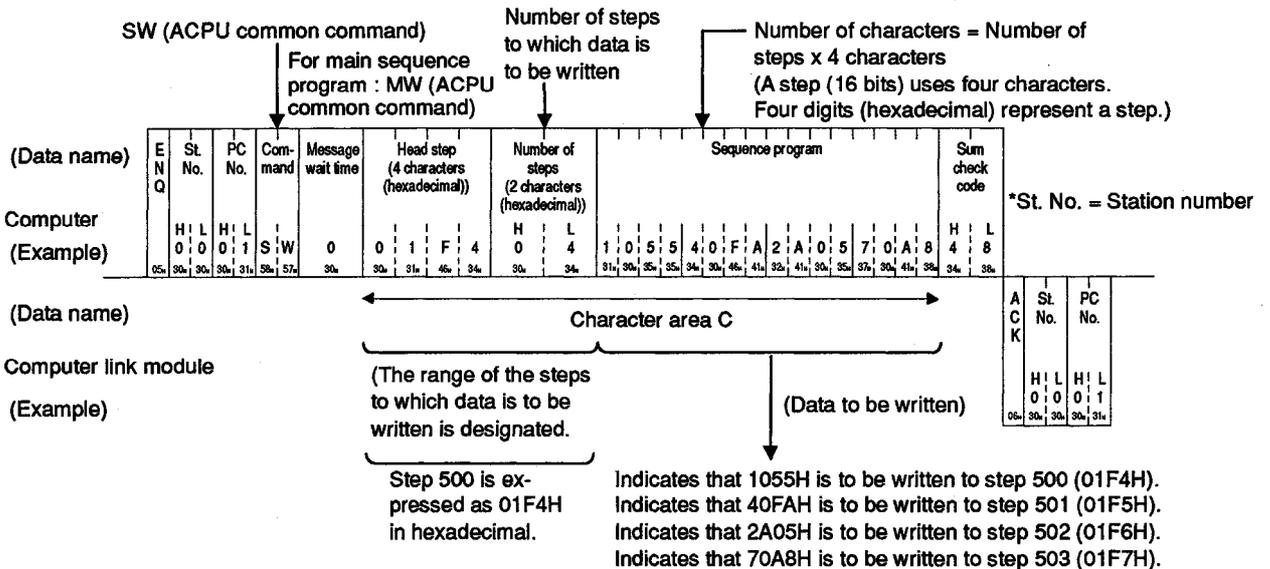
- 1) The message wait time is 0 ms.
- 2) Data is to be written to four steps, step 100 to step 103, in subsequence program 3 of PC CPU No. 01 on the MELSECNET system.



(b) Writing data to a sequence program using an MW or SW command

(Writing conditions)

- 1) The message wait time is 0 ms.
- 2) Data is to be written to four steps, step 500 to step 503, in subsequence program 1 of PC CPU No. 01 on the MELSECNET system.



5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

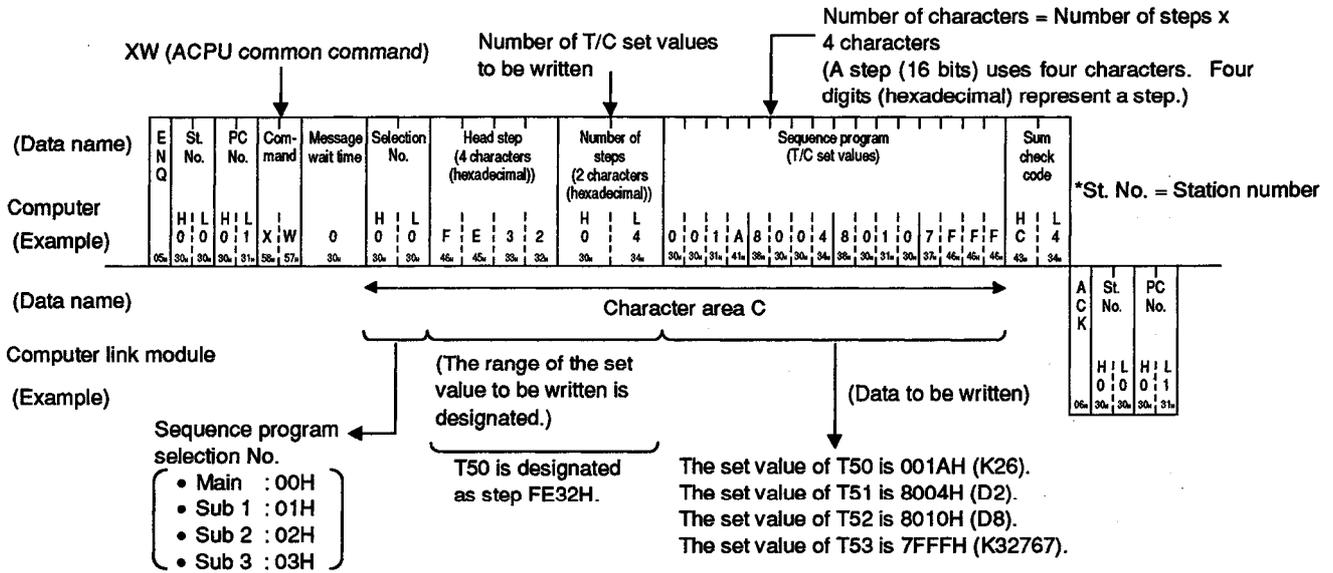
Function	Computer link function								
	A1S/71UC24		A1S/71UC24		A1S/71UC24		A1SCPU C24-R2	A2CCPU C24	A2CCPU C24-PRF
Applicable module	○	○	○	○	○	○	○	○	○
Remarks					MW, SW (Ver. A), RW (Ver. B)		MW, SW (Ver. A), RW (Ver. B)		

MELSEC-A

(c) Writing T/C set values using an XW command

(Writing conditions)

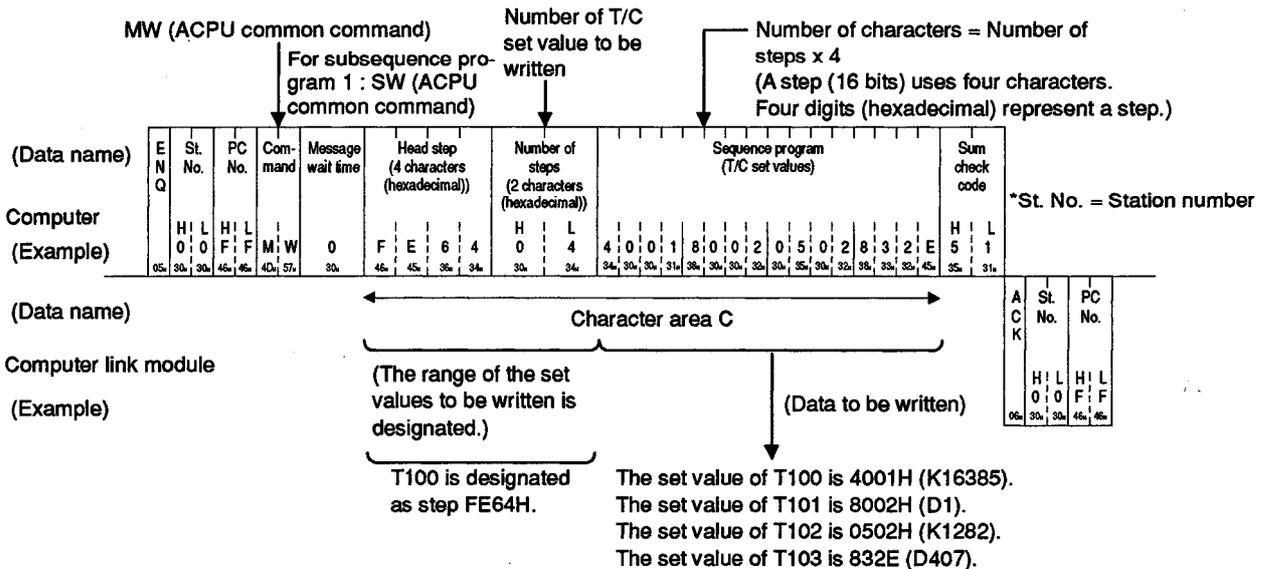
- 1) The message wait time is 0 ms.
- 2) The T/C set values of four timers, T50 to T53, for the main sequence program are to be written to PC CPU No. 01 on the MELSECNET system.



(d) Writing T/C set values using an MW or SW command

(Writing conditions)

- 1) The message wait time is 0 ms.
- 2) The T/C set values of four timers, T100 to T103, for the main sequence program are to be written to the PC CPU (self station) loaded with a computer link module.



5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

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5.12.5 Microcomputer program read/write

In this section, an example is quoted to describe the control protocol for reading or writing microcomputer programs for the PC CPU.

(1) Commands and addresses

Commands and program addresses to read and write microcomputer programs are explained below:

(a) ACPU common commands

Item	Command		Description	Number of Points Processed per Communication	PC CPU State			Reference Section	
	Symbol	ASCII Code			During STOP	During RUN			
						Write Enabled	Write Disabled		
Batch read	Main	UR	55H, 52H	Reads microcomputer main programs.	128 bytes	O	O	O	5.12.5 (2)
	Sub	VR	56H, 52H	Reads microcomputer subprograms.					
Batch write	Main	UW	55H, 57H	Writes microcomputer main programs.	128 bytes	O	O*	X	5.12.5 (3)
	Sub	VW	56H, 57H	Writes microcomputer subprograms.					

Note : O..... Executable
X..... Not executable

* Writing during a program run may be executed if all the following conditions are met:

- 1) The PC CPU is A3, A3N, A3H, A3M or A73.
- 2) The program is not currently running program (indicates a subprogram called by the main program, if the main program is being run).
- 3) The PC CPU special relay is in the following state:
 - a) M9050 (signal flow conversion contact) OFF (A3CPU only)
 - b) M9051 (CHG instruction disable) ON

POINT

When the PC CPU is an AnA or AnUCPU, the SFC program is read or written by the main microcomputer read/write function. (It cannot be written while the PC CPU is running.)

The SFC program must be read or written within the microcomputer program capacity and address ranges specified in (1) (b).

The microcomputer program capacity is the one set in making the memory capacity setting for the GPP function or on the SFC area capacity setting screen, an MELSAP-II function.

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

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(b) Microcomputer program address

Microcomputer addresses are designated in the protocol as follows:

- 1) The range of addresses that can be set for each PC CPU is shown in the table on the next page.

CPU Model	Microcomputer Program Capacity	Microcomputer Program Addresses
A1SCPU(S1) A1SJCPU A1SHCPU A1SJHCPU A0J2HCPU A2CCPU A2CJCPU	Max. 14k bytes	0000H to 37FEH
A1CPU A1NCPU	Max. 10k bytes	0000H to 27FEH
A2SCPU(S1) A2ASCPU(S1) A2SHCPU(S1) A2CPU(S1) A2NCPU(S1) A2ACPU(S1) A2UCPU(S1)	Max. 26k bytes	0000H to 67FEH
A3CPU A3NCPU A3HCPU A3MCPU A3ACPU A3UCPU A4UCPU A73CPU	Main and sub Max. 58k bytes	0000H to E7FEH

- 2) Addresses are set by converting 4-digit hexadecimal into ASCII.
- 3) A character area error 06H occurs if the following condition is not met:
Head address + (number of bytes) - 1 ≤ microcomputer program capacity.

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

(2) Microcomputer program batch read

In this section, an example is quoted to describe the control protocol for batch-reading data from a microcomputer program using a UR or VR command.

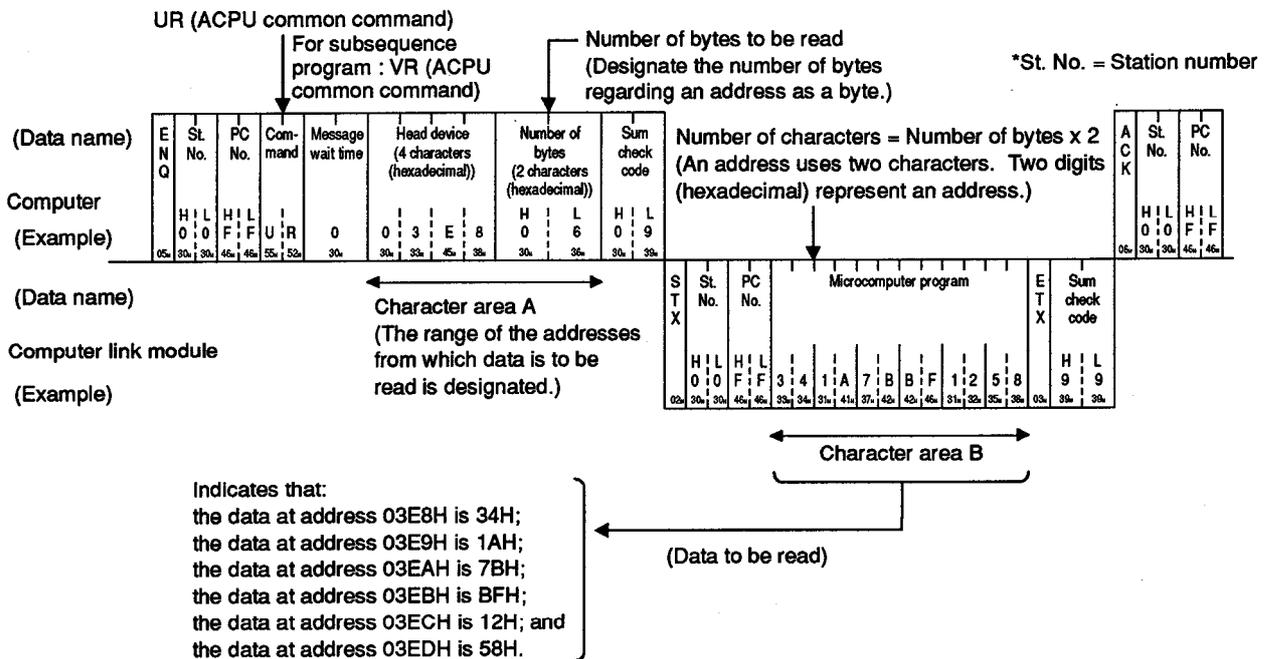
[Control protocol]

The protocol shown below is in control format 1.

To access a microcomputer program in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

(Reading conditions)

- 1) The message wait time is 0 ms.
- 2) Data (six bytes) is to be read from six addresses, 03E8H to 03EDH, in the microcomputer program for the main sequence program of the PC CPU (selfs tation) loaded with a computer link module.



POINT

To designate the number of bytes, the following conditions must be met:

- 1 ≤ number of bytes ≤ 128
- Head address + number of bytes - 1 ≤ microcomputer program capacity

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

(3) Microcomputer program batch write

In this section, an example is quoted to describe the control protocol for batch-reading data from a microcomputer program using a UW or VW command.

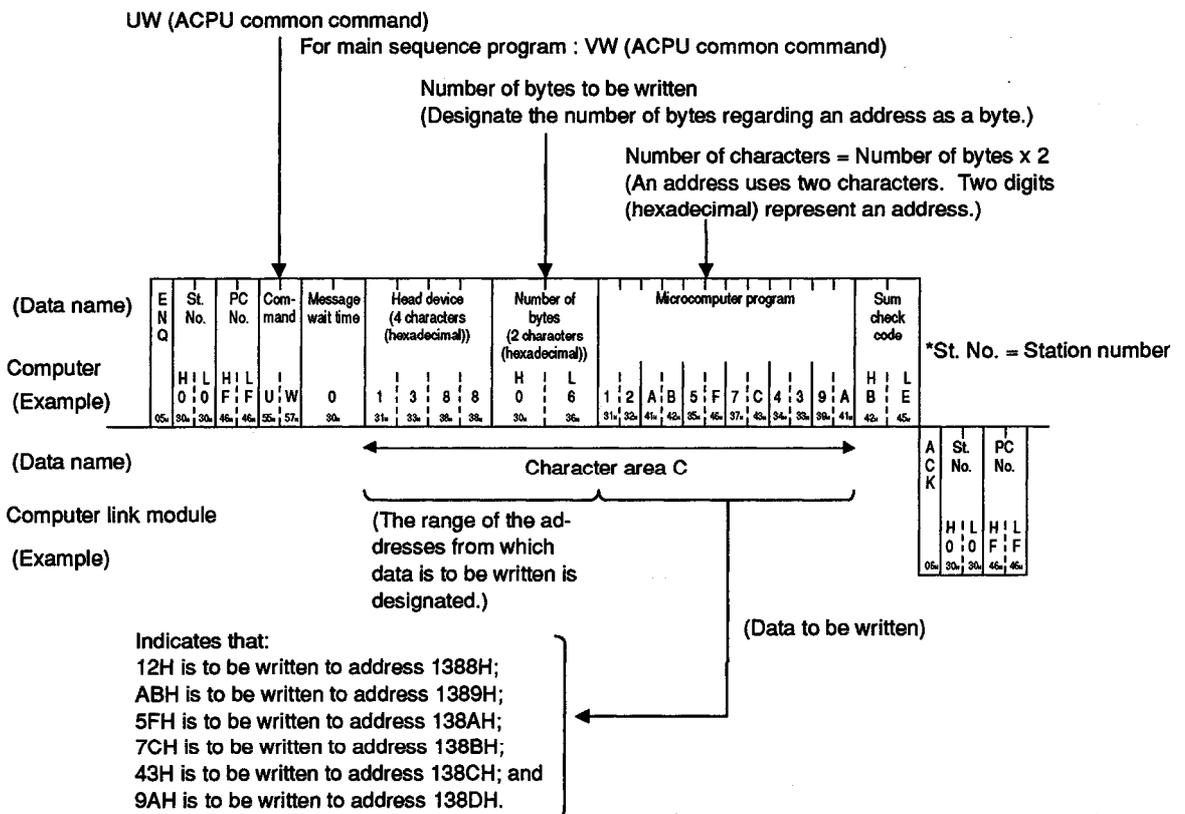
[Control protocol]

The protocol shown below is in control format 1.

To access a microcomputer program in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

(Writing conditions)

- 1) The message wait time is 0 ms.
- 2) Data (six bytes) is to be read from six addresses, 1388H to 138DH, in the microcomputer program for the main sequence program of the PC CPU (self station) loaded with a computer link module.1. (The range of the addresses to which data is to be written is designated.)



POINT

To designate the number of bytes, the following conditions must be met:

- $1 \leq \text{number of bytes} \leq 128$
- $\text{Head address} + \text{number of bytes} - 1 \leq \text{microcomputer program capacity}$

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

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5.12.6 Comment memory read/write

In this section, examples are quoted to describe the control protocols for reading and writing comment data from or to the PC CPU.

(1) Commands and addresses

Commands and comment data addresses to read and write comment data are explained below.

(a) ACPU common commands

Item	Command		Description	Number of Points Processed per Communication	PC CPU State			Reference Section
	Symbol	ASCII Code			During STOP	During RUN		
						Write Enabled	Write Disabled	
Batch read	KR	4BH, 52H	Reads from comment memory.	128 bytes	O	O	O	5.12.6(2)
Batch write	KW	4BH, 57H	Writes to comment memory.	128 bytes	O	O	X	5.12.6(3)

Note : O Executable
X Not executable

(b) Comment memory addresses

The area to store comment data is managed using relative addresses from the head address 00H.

For example, for 2k bytes of parameter comments, the range in which the addresses may be specified for the head address is 00H to 7FFH.

1) Comment memory capacity is 64k bytes

The comment data address range is determined by the parameter setting.

2) Comment memory addresses are set by converting 4-digit hexadecimal into ASCII. (0000 to FFFF)

3) A character area error 06H occurs if the following condition is not met:

Head address + designated number of bytes \leq comment memory capacity.

POINT

It is not possible to designate a particular device or device number when reading or writing comment data.

Always read or write all data from address 0H.

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

(2) Comment memory batch read

In this section, an example is quoted to describe the control protocol for batch-reading comment data from comment memory using a KR command.

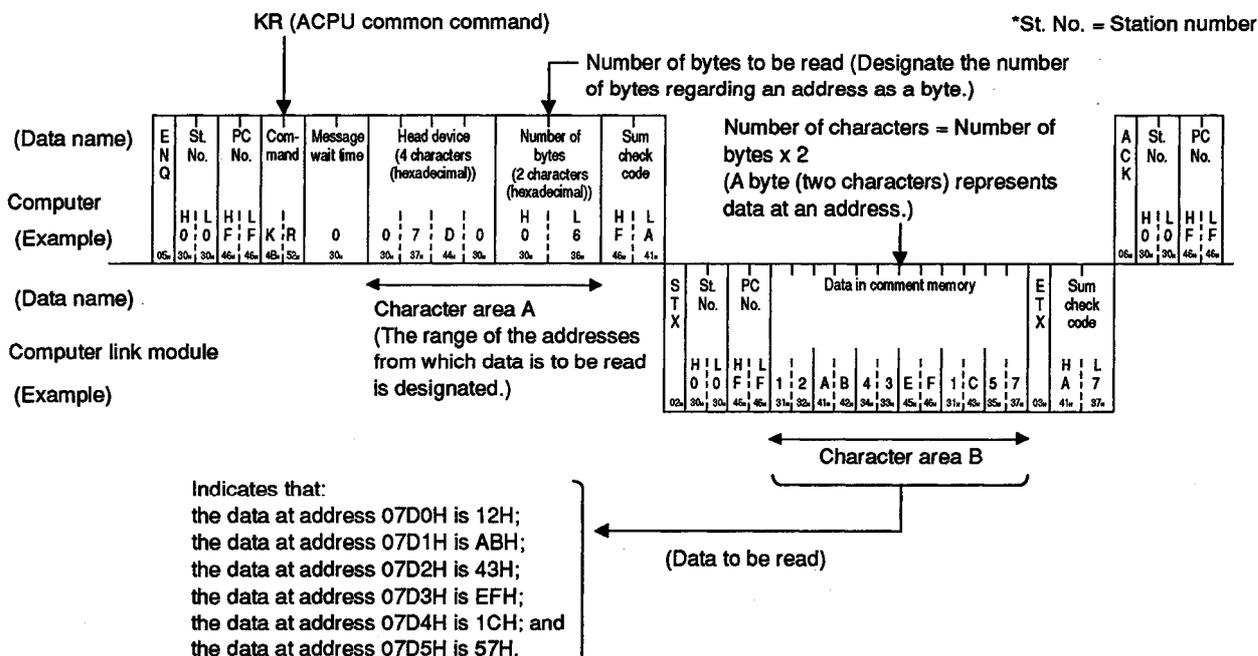
[Control protocol]

The protocol shown below is in control format 1.

To access device memory in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

(Reading conditions)

- 1) The message wait time is 0 ms.
- 2) Comment data (six bytes) is to be read from six addresses, 07D0H to 07D5H, in the comment memory in the PC CPU (self station) loaded with a computer link module.



POINT

To designate the number of bytes, the following conditions must be met:

- 1 ≤ number of bytes ≤ 128
- (Head address) + [(number of bytes) - 1] ≤ comment memory capacity

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

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(3) Comment memory batch write

In this section, an example is used to describe the control protocol for batch-writing data to comment memory using a KW command.

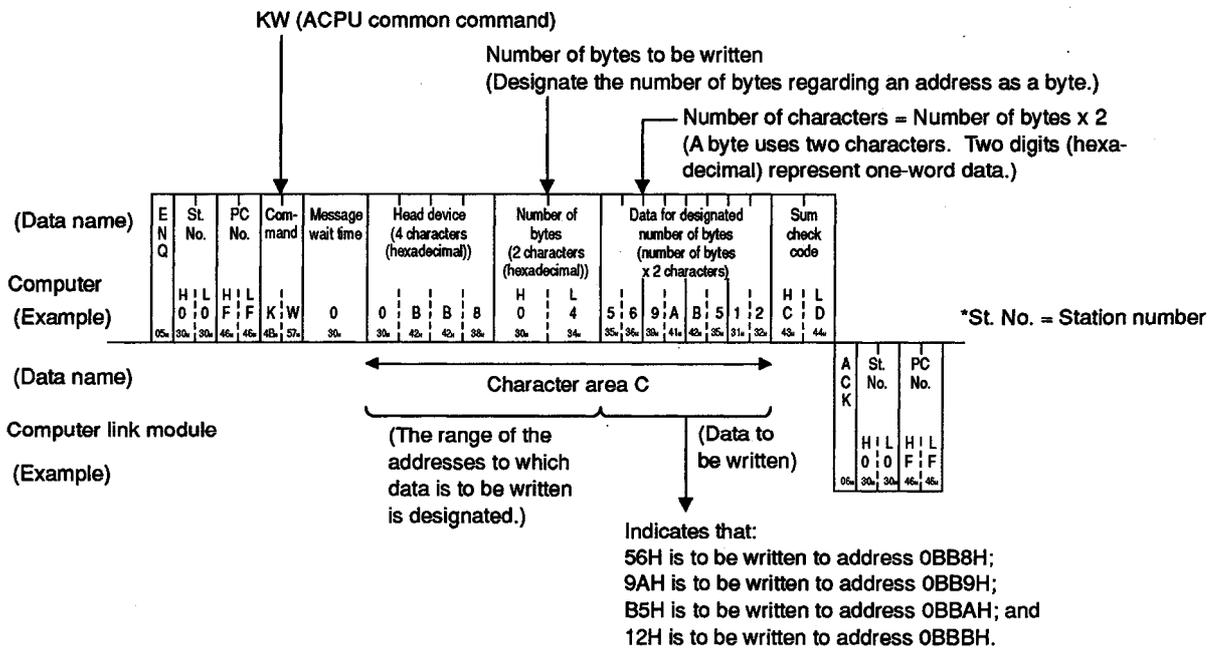
[Control protocol]

The protocol shown below is in control format 1.

To access comment memory in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

(Writing conditions)

- 1) The message wait time is 0 ms.
- 2) Data (four bytes) is to be written to four addresses, 0BB8H to 0BBBH, in the comment memory in the PC CPU (self station) loaded with a computer link module.



POINT

To designate the number of bytes, the following conditions must be met:

- $1 \leq \text{number of bytes} \leq 128$
- $(\text{Head address}) + [(\text{number of bytes}) - 1] \leq \text{comment memory capacity}$

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

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5.12.7 Extension comment memory read/write

In this section, examples are quoted to describe the control protocols for reading and writing data (extension comment 1) to and from the extension comment memory in the PC CPU.

(1) Commands and addresses

The following are the comments to be used to read and write extension comment data, and the extension comment data addresses.

(a) AnA/AnUCPU common commands

Item	Command		Description	Number of Points Processed per Communication	PC CPU State			Reference Section
	Symbol	ASCII Code			During STOP	During RUN		
						Write Enabled	Write Disabled	
Batch read	DR	44H, 52H	Reads from the extension comment memory.	128 bytes	○	○	○	5.12.7(2)
Batch write	DW	44H, 57H	Writes to the extension comment memory.	128 bytes	○	○	X	5.12.7(3)

Note : ○Executable
X.....Not executable

(b) Extension comment memory addresses

The extension comment data storage area is managed in relative addresses with the head address 00H.

For example, the range that can be set to the head address for an extension comment memory of 3k bytes is 00H to BFFH.

- 1) The maximum extension comment memory area is 63k bytes.

The address range for the extension comment data is determined in accordance with the parameter set capacity.

- 2) Designation of the extension comment memory address is made by converting 5-digit hexadecimal into ASCII code (00000 to 0FBFF).
- 3) A character error "06H" occurs if the extension comment memory capacity is not equal to or greater than [head address + (set number of bytes - 1)].

POINT

Reading or writing extension comment data by designating specific devices or device numbers is not possible.

Always read or write extension comment data beginning with address 0H.

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

(2) Extension comment memory batch read

In this section, an example is quoted to describe the control protocol for batch-reading extension comment data from extension comment memory using a DR command.

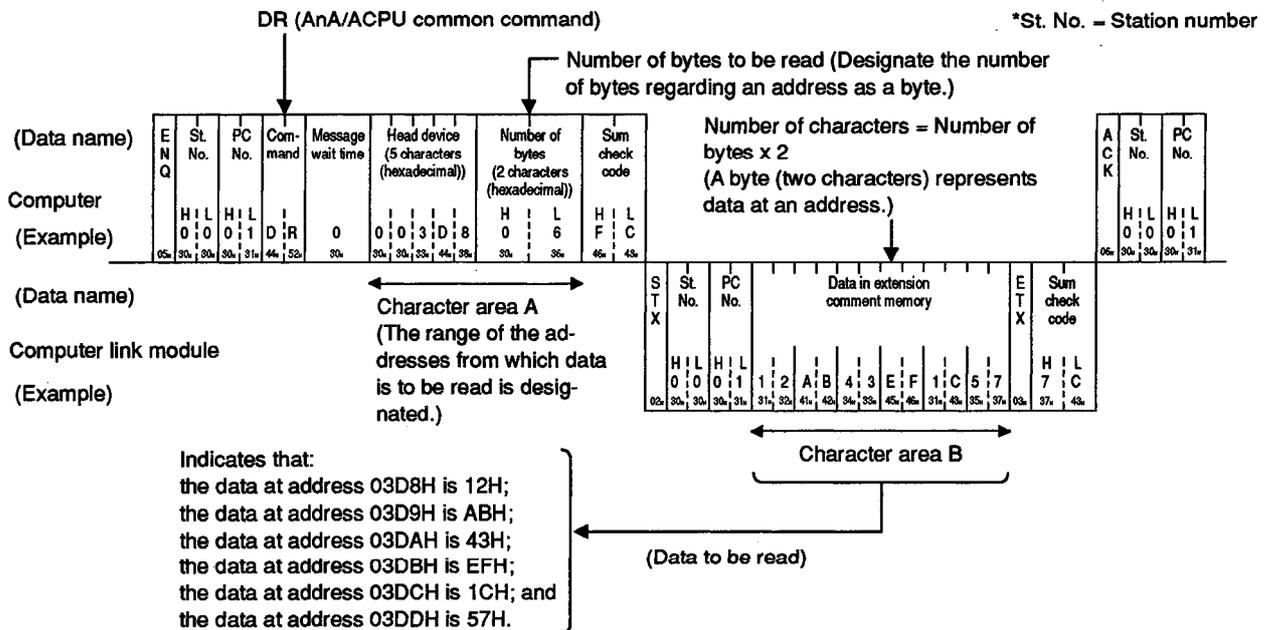
[Control protocol]

The protocol shown below is in control format 1.

To access device memory in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

(Reading conditions)

- 1) The message wait time is 0 ms.
- 2) Extension comment data (six bytes) is to be read from six addresses, 03D8H to 03DDH, in the extension comment memory in PC CPU No. 1 on the MELSECNET system.



POINT

- To designate the number of bytes, the following conditions must be met:
- $1 \leq \text{number of bytes} \leq 128$
 - $(\text{Head address}) + [(\text{number of bytes}) - 1] \leq \text{extension comment memory capacity}$

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

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(3) Extension comment memory batch write

In this section, an example is quoted to describe the control protocol for batch-writing extension comment data to extension comment memory using a DW command.

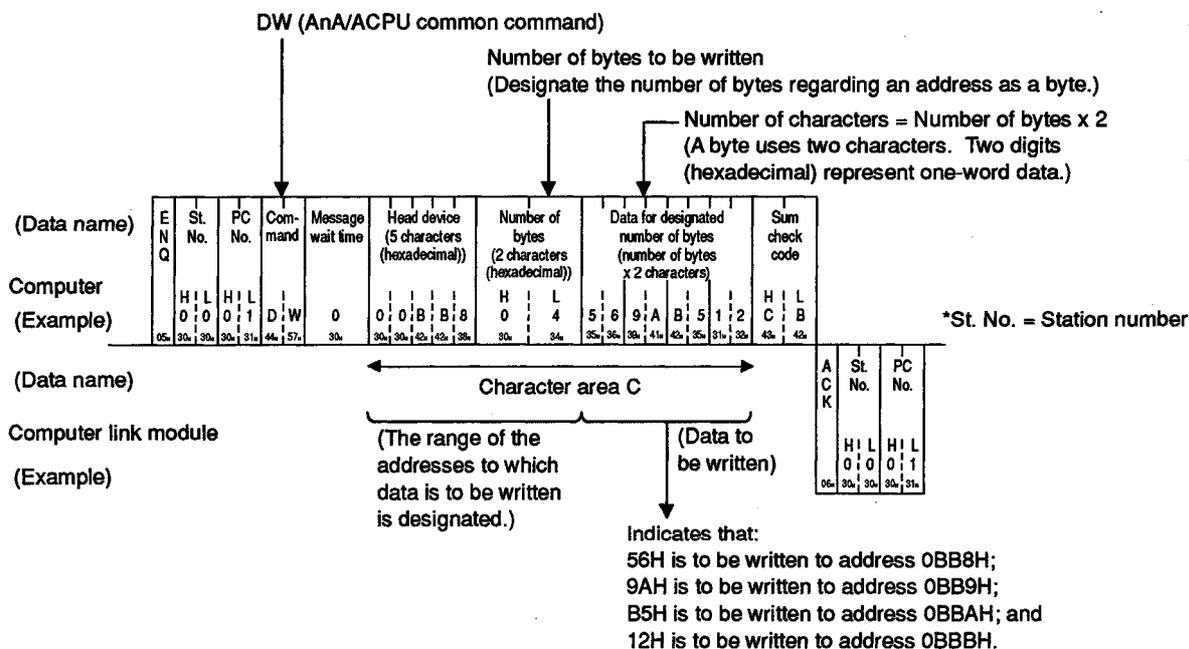
[Control protocol]

The protocol shown below is in control format 1.

To access extension comment memory in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

(Writing conditions)

- 1) The message wait time is 0 ms.
- 2) Extension comment data (four bytes) is to be written to four addresses, 0BB8H to 0BBBH, in the extension comment memory in PC CPU No. 1 on the MELSECNET system.



POINT

To set the number of bytes, the following conditions must be met:

- $1 \leq \text{number of bytes} \leq 128$
- $(\text{Head address}) + [(\text{number of bytes}) - 1] \leq \text{extension comment memory capacity}$

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

5.13 Global Function

The global function is used to switch the Xn2 input signal at each computer link module in all stations connected to the computer by the multidrop link (refer to Section 3.9).

This function is used for emergency instructions simultaneous start, etc., to the PC CPU.

In this section, examples are quoted to describe the control protocols when the global function is used.

5.13.1 Commands and control

(1) ACPU common commands

Item	Command		Description	PC CPU State			Reference Section
	Symbol	ASCII Code		During STOP	During RUN		
					Write Enabled	Write Disabled	
Global	GW	47H, 57H	Turns ON/OFF Xn2 of the computer link module loaded in each PC CPU system.	○	○	○	5.13.2

Note : ○ Executable

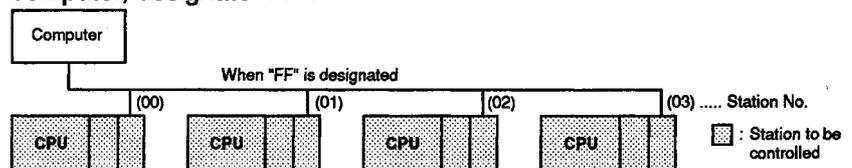
(2) Control

This function switches the Xn2 input signal at each computer link module in all stations linked to the computer.

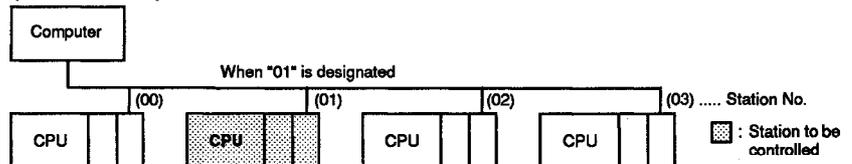
- (a) The "n" in Xn2 is the number determined by the I/O signal at the computer link module loaded in the PC CPU.
(Example: When the I/O signal at the computer link module is between 90H and AFH, Xn2 is X92.)

- (b) Designate "FF" or a number between "00" and "1F" for the station number for the control protocol.

- 1) To turn on the Xn2 at all computer link modules connected to the computer, designate "FF".



- 2) To turn on the Xn2 at a computer link module connected to the computer, designate the station number of the computer link module ("00" to "1F").



- (c) The computer link modules do not respond to any instruction sent by this function from the computer.
- (d) When the power supply to the PC CPU is turned off or when resetting or mode switching is made, the Xn2 will be turned off.

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

5.13.2 Control protocols for the global function

In this section, examples are quoted to describe the control protocols for turning on or off the Xn2 at the computer link module from the computer using a GW command.

[Control protocol]

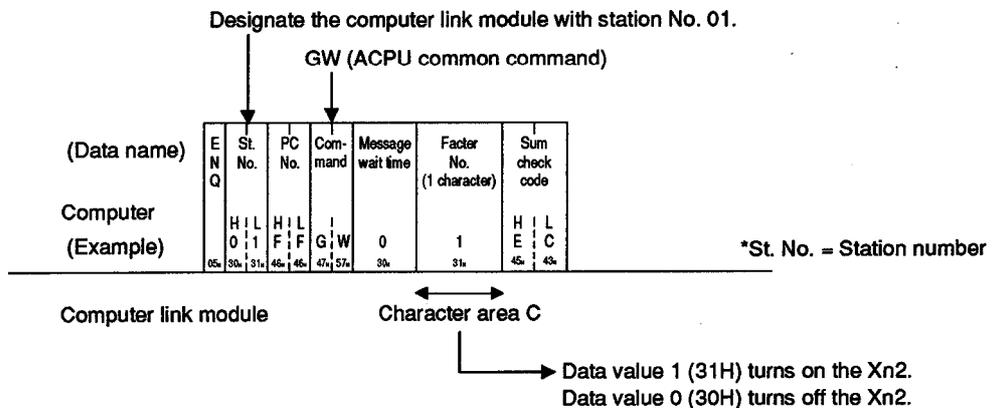
The protocol shown below is in control format 1.

To access device memory in control format 2, 3 or 4, use the protocol described in Section 5.4.3 or 5.4.5 as well as by reference to the protocol in this section.

(1) To turn on the input signal at a station

(Input signal turning on conditions)

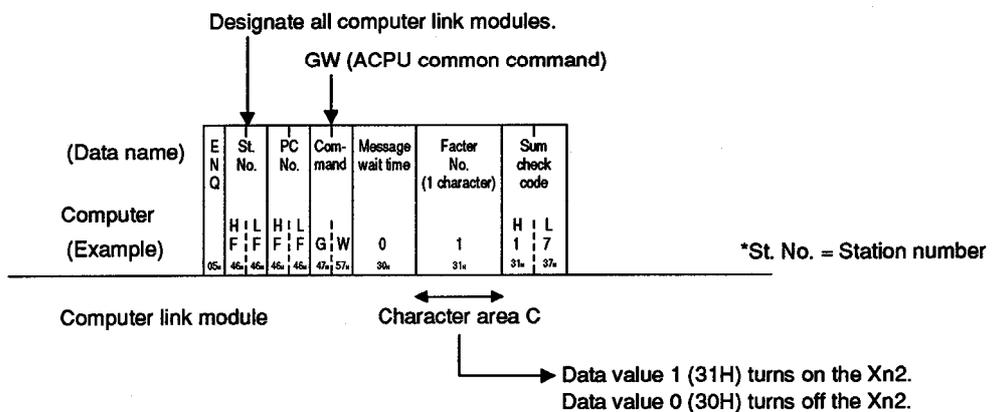
- 1) The message wait time is 0 ms.
- 2) The input signal (Xn2) at the PC CPU loaded with a computer link module (station No. 01) is to be turned on.



(2) To turn on the input signal at all multidrop-linked stations

(Input signal turning on conditions)

- 1) The message wait time is 0 ms.
- 2) The input signal (Xn2) at all multidrop-linked PC CPUs loaded with a computer link module is to be turned on.



5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

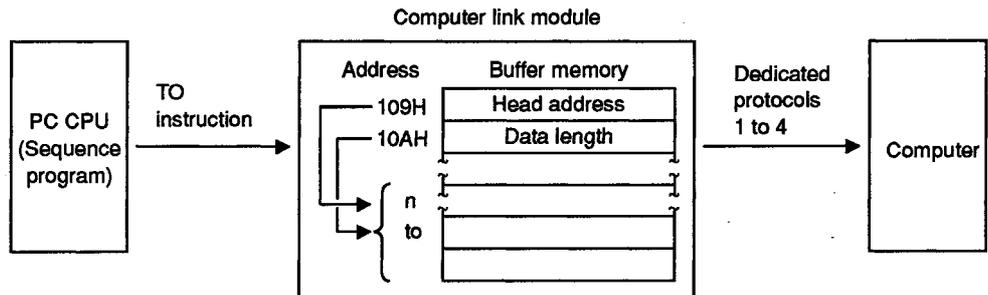
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5.14 On-Demand Function

The on-demand function is used when the PC CPU has data to transmit to the computer. In this case, the PC CPU specifies the buffer memory area in which the data to be transmitted is stored and then starts transmission.

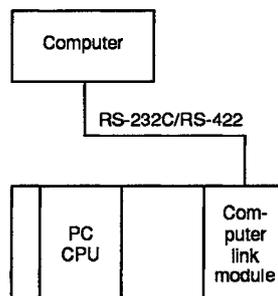
During data transmission between the computer and PC CPU using dedicated protocols 1 to 4, communications is normally initiated by the computer.

If the PC CPU has emergency data to transmit to the computer, the on-demand function is used.



POINT

This on-demand function is available when the computer-to-PC-CPU ratio is 1:1.



Do not use the on-demand function when the system configuration is not 1:1. If it is used when the ratio between the computer and the PC CPU, which are multidrop-linked with each other, is 1:n, 2:n or m:n, communications data in control formats 1 to 4 or data sent on demand is destroyed, or data cannot be sent normally.

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5.14.1 On-demand handshake I/O signal and buffer memory

(1) On-demand handshake I/O signal

The on-demand I/O handshake signal turns ON when the PC CPU transmits a data send request to the computer to start transmission, and turns OFF when transmission of the data specified by the computer link module is completed. It acts as an interlock to prevent on-demand requests from being made simultaneously.

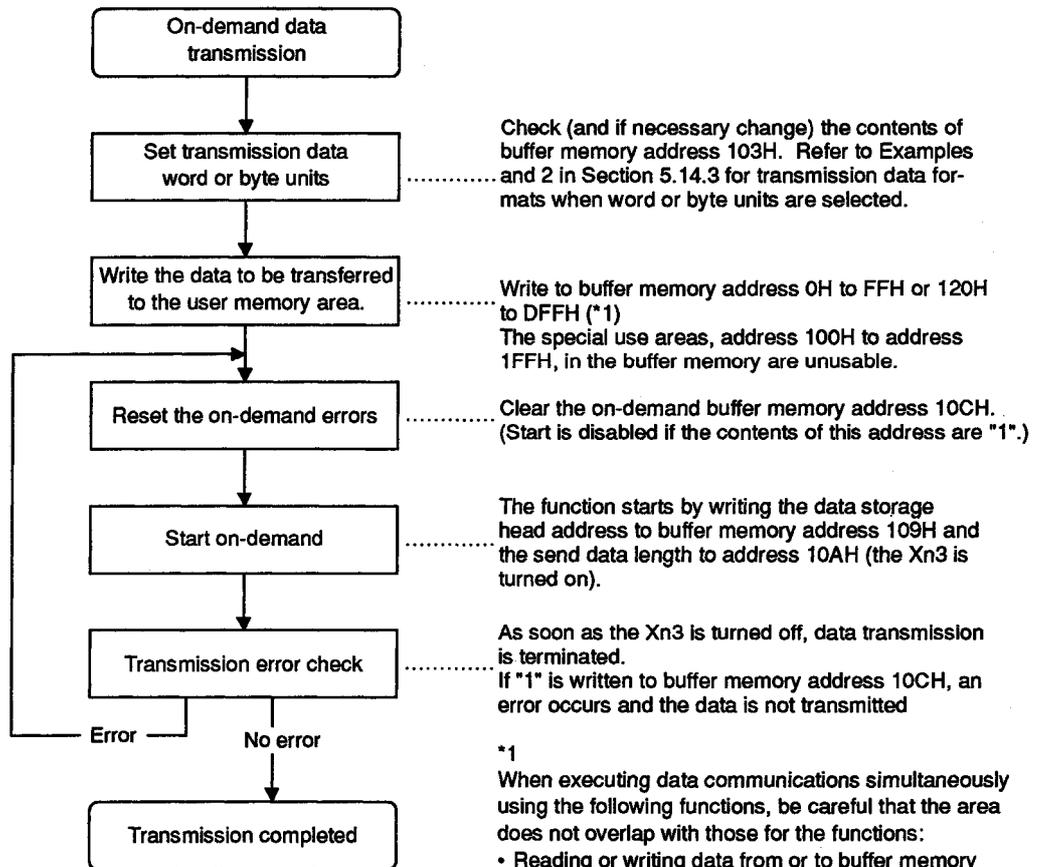
Handshake Signal	Description	Signal Turned ON/OFF by
Xn3	During execution of on-demand function ON : transmission underway OFF : transmission completed	Computer link module

(2) Buffer memory used by the on-demand function

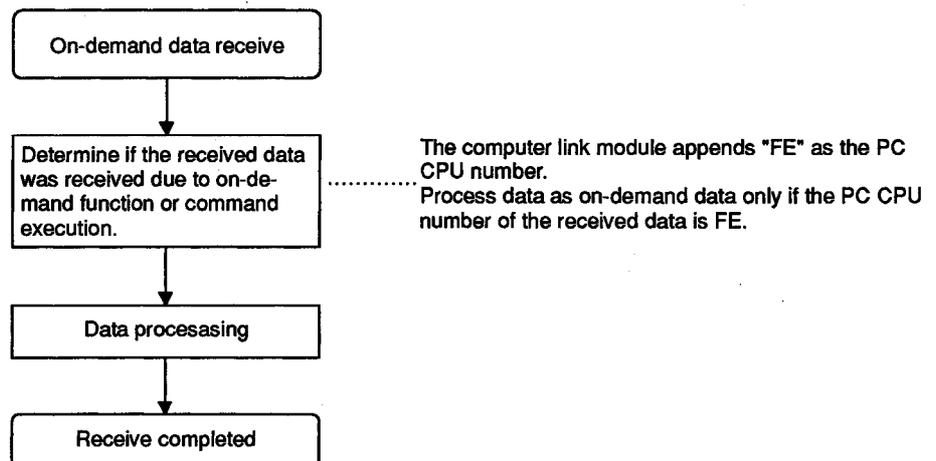
Address	Name	Description
109H	Area to specify head address in on-demand buffer memory	The head address of the data stored in the buffer memory to be transmitted by the on-demand function is specified by the TO instruction of the Sequence program.
10AH	Area to specify data length	The length of the data to be transmitted by the on-demand function is specified by the PC CPU TO instruction of the sequence program.
10CH	On-demand error storage area	The computer link module writes a "1" to this address if a transmission error occurs during on-demand data transmission. 0 : No error 1 : Error

5.14.2 On-demand function execution procedure

(1) PC CPU execution procedure



(2) Computer execution procedure



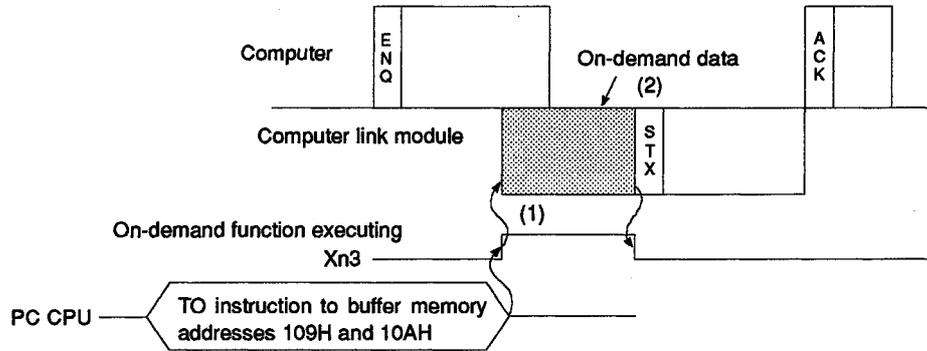
5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

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(3) On-demand request processing timing chart

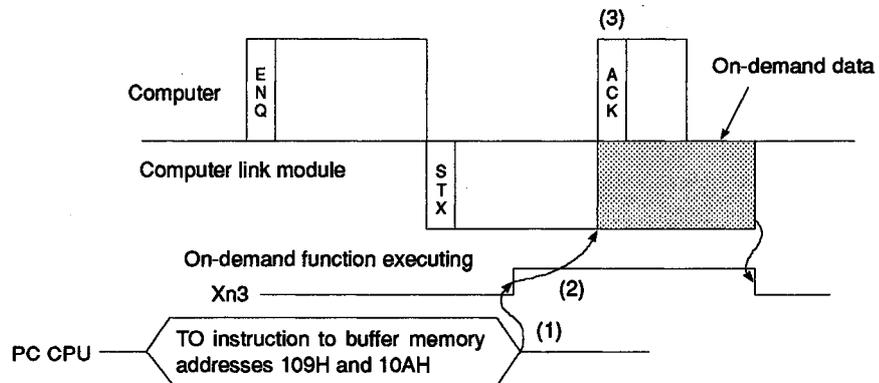
(a) Full-duplex communications

Computer is transmitting data



- 1) The on-demand function executing signal (Xn3) turns ON immediately and , the on-demand data is transmitted when the on-demand request is made.
- 2) Transmission of response data (beginning with STX) to the command data (beginning with ENQ) is suspended until the completion of on-demand data transmission.

Computer is receiving data



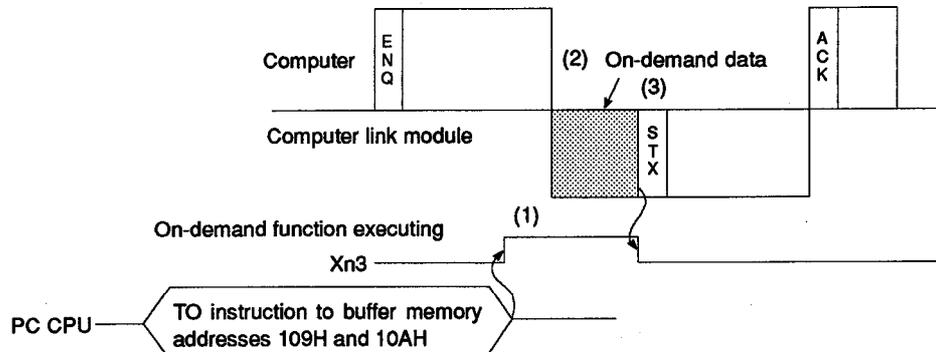
- 1) The on-demand function executing signal (Xn3) turns ON immediately when the on-demand request is made.
- 2) Transmission of the on-demand data is suspended until the completion of the response data (beginning with STX) to the command data (beginning with ENQ).
- 3) Transmission of the response data (beginning with ACK) from the computer in response to the response data (beginning with STX) from the computer link module is possible while the on-demand data is received.

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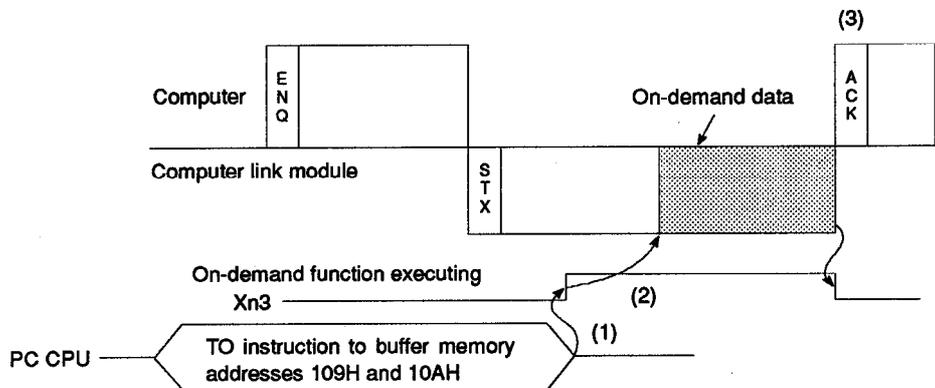
(b) Half-duplex communications Refer to Section 10.

Computer is transmitting data



- 1) The on-demand function executing signal (Xn3) turns on immediately when the on-demand request is made.
- 2) Transmission of on-demand data is suspended until the completion of command data receive (beginning with ENQ) from the computer.
- 3) Transmission of response data (beginning with STX) to the command data (beginning with ENQ) is suspended until the completion of on-demand data transmission.

Computer is receiving data



- 1) The on-demand function executing signal (Xn3) turns ON immediately when the on-demand request is made.
- 2) Transmission of the on-demand data is suspended until the completion of the response data (beginning with STX) to the command data (beginning with ENQ).
- 3) Transmission of the response data (beginning with ACK) from the computer in response to the response data (beginning with STX) from the computer link module should be made after the completion of on-demand data receive.

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

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5.14.3 Control protocols for the on-demand function

In this section, examples are quoted to describe the control protocols for sending data from the PC CPU to the computer using a dedicated protocol.

[Control protocol]

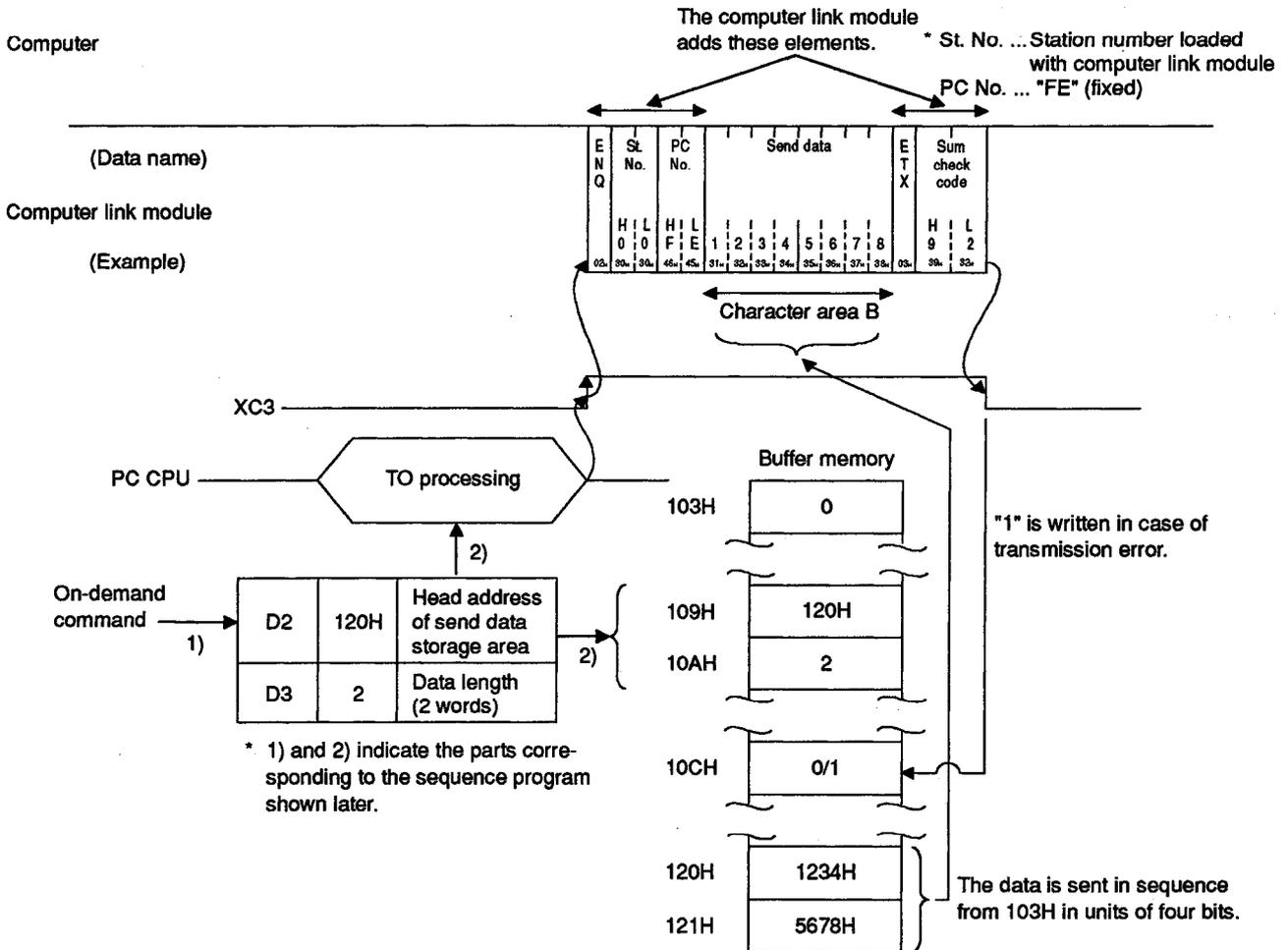
The protocols shown below are in control format 1.

To access buffer memory in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocols in this section.

- (1) When "units of words" is set at computer link module buffer memory address 103H "area to specify word or byte units in no-protocol mode"

(Transmission conditions)

- 1) Data written at computer link module buffer memory addresses 120H and 121H is to be sent.
- 2) The I/O addresses in the computer link module are C0H to DFH.



POINTS

- (1) When the data is sent in control format 2, the block number is 00H.
- (2) Number of sent data characters = data length x 4 characters (One-word data uses four characters. Four digits (hexadecimal) represent one-word data.)

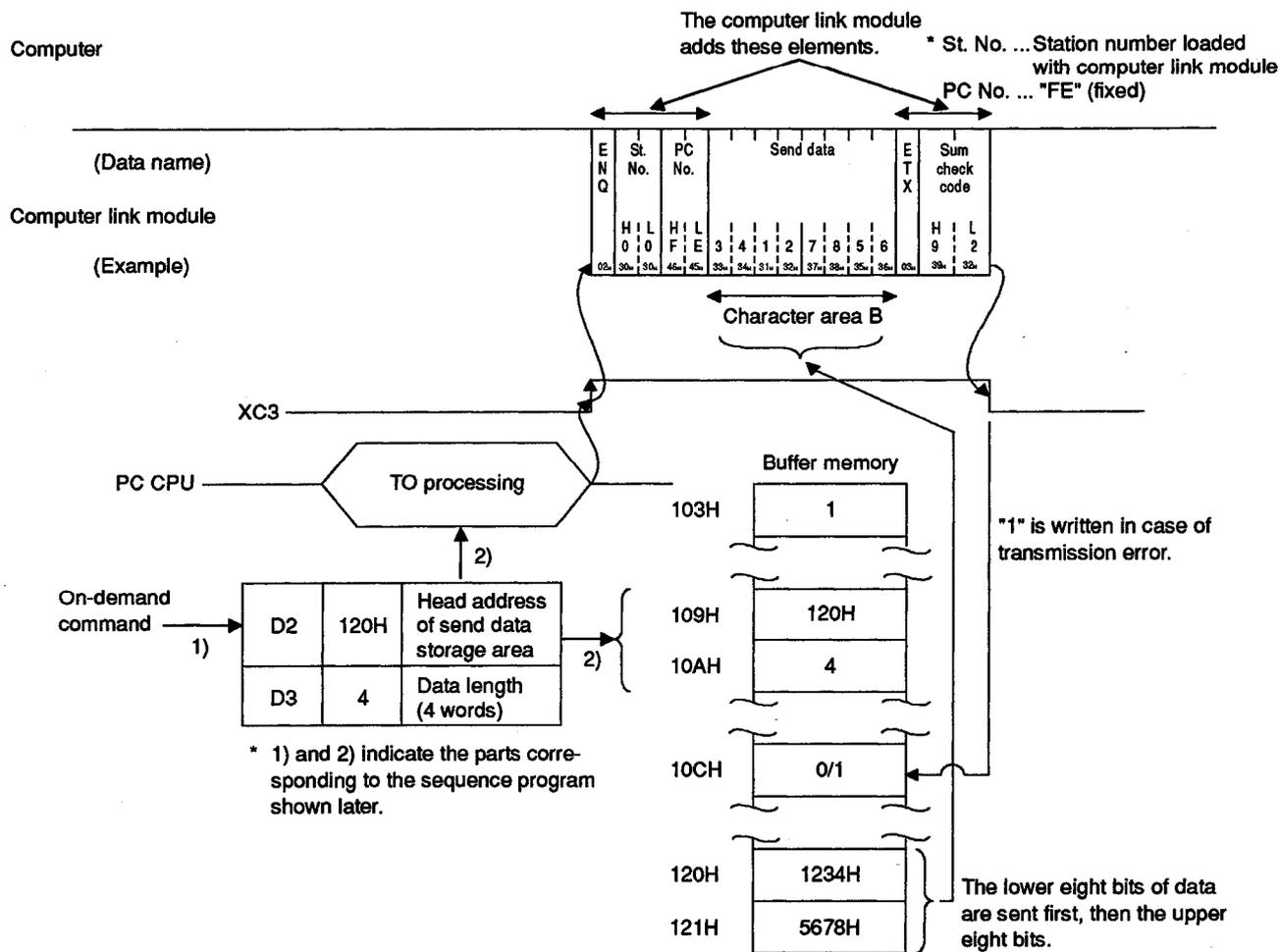
5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

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(2) When "units of bytes" is set at computer link module buffer memory address 103H "area to specify word or byte units in no-protocol mode"

(Transmission conditions)

- 1) Data written to computer link module buffer memory addresses 120H and 121H is to be sent.
- 2) The I/O addresses in the computer link module are C0H to DFH.



POINTS

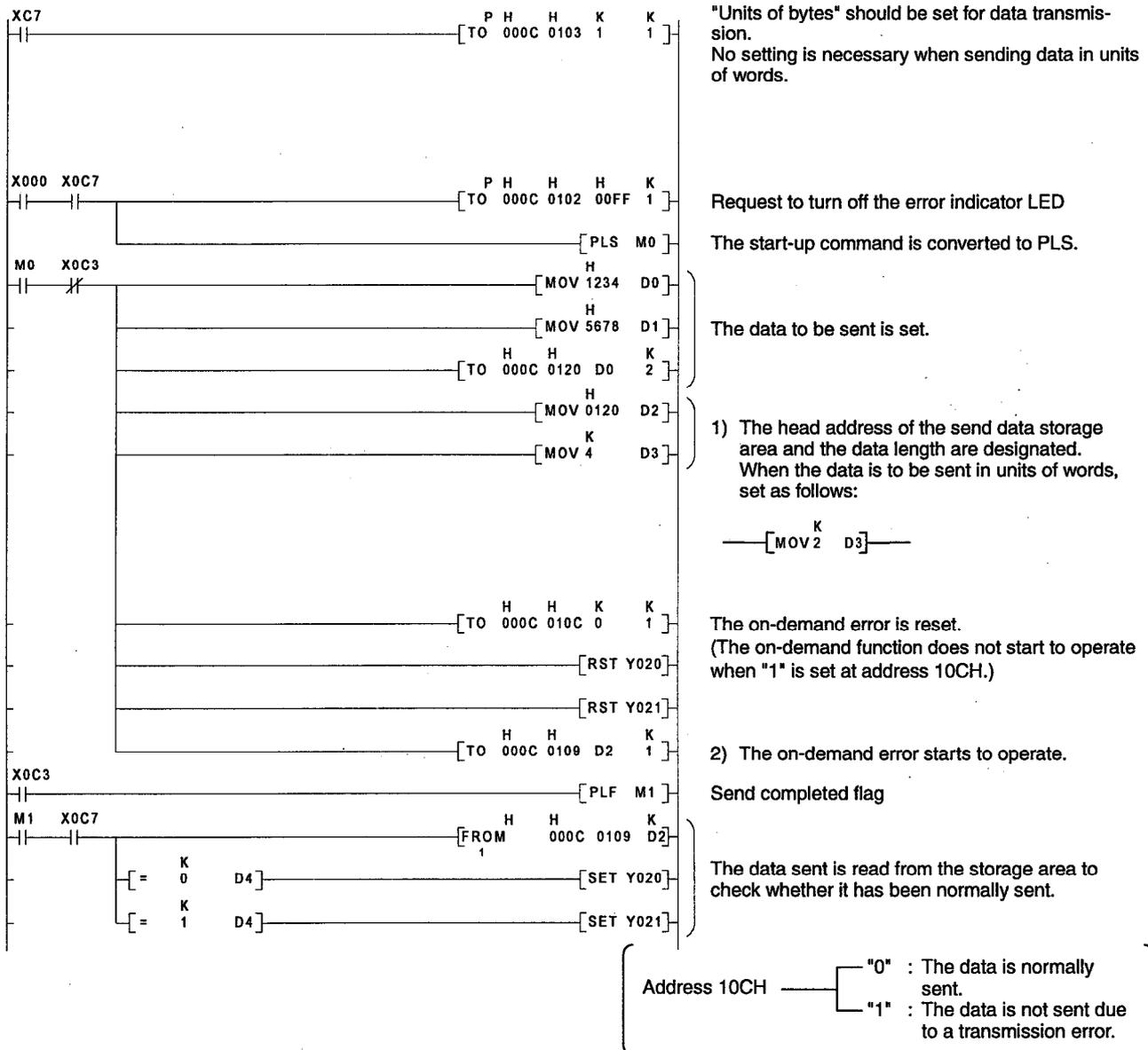
- (1) When the data is sent in control format 2, the block number is 00H.
- (2) Number of sent data characters = data length x 2 characters
(One-byte data uses two characters. Two digits (hexadecimal) represent one-byte data.)
- (3) When the value of data length is odd, the lower byte of data (bit 0 to bit 7) at the last designated address in the buffer memory is sent.

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(3) Example of sequence program for the on-demand function

Shown below is an example of sequence program for data transmission described in (1) and (2) on the previous pages using the on-demand function.



POINTS

- (1) Buffer memory addresses 100H to 11FH are specific use areas.
Do not use them as send data storage areas.
When reading or writing data from or to buffer memory using a dedicated protocol or when sending or receiving data in the no-protocol or bidirectional mode, the area for send data storage must not overlap with the areas for these operations.
- (2) Designate the data length within the following address ranges:
 - When buffer memory addresses 0H to FFH are used

$$\text{Head address} + \text{designated data length} - 1 \leq \text{FFH}$$
 - When buffer memory addresses 120H to DFFH are used

$$\text{Head address} + \text{designated data length} - 1 \leq \text{DFFH}$$

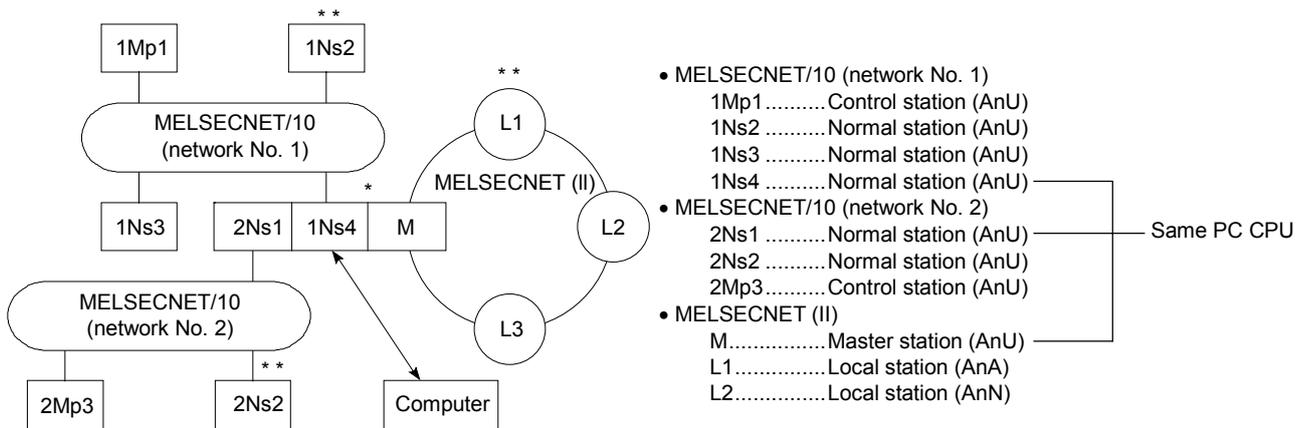
5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

5.15 Switching between the Data Link System and the Network System to Access Another Station (for AnUCPU)

To establish a computer link between the computer and PC CPUs, which are not connected to the computer, in the following system configuration, the network must be registered beforehand, as described in this section.

- (1) The PC CPU loaded with a computer link module is an AnUCPU.
- (2) The PC CPUs of the stations to be accessed by the computer are connected through the MELSECNET (II), MELSECNET/B or MELSECNET/10.

(Example) MELSECNET (II)-MELSECNET/10 composite system



- * : Station loaded with a computer link module
- ** : PC CPU to be accessed by the computer

This section describes the following processing operations necessary for computer-linking the computer and the PC CPUs in the above system configuration:

- Network registration
- Network reading
- Routing parameters reading

REMARK

When the PC CPU loaded (or to be loaded) with a computer link module is not an AnUCPU, the above-mentioned processing operations need not be executed on the computer. Skip this section.

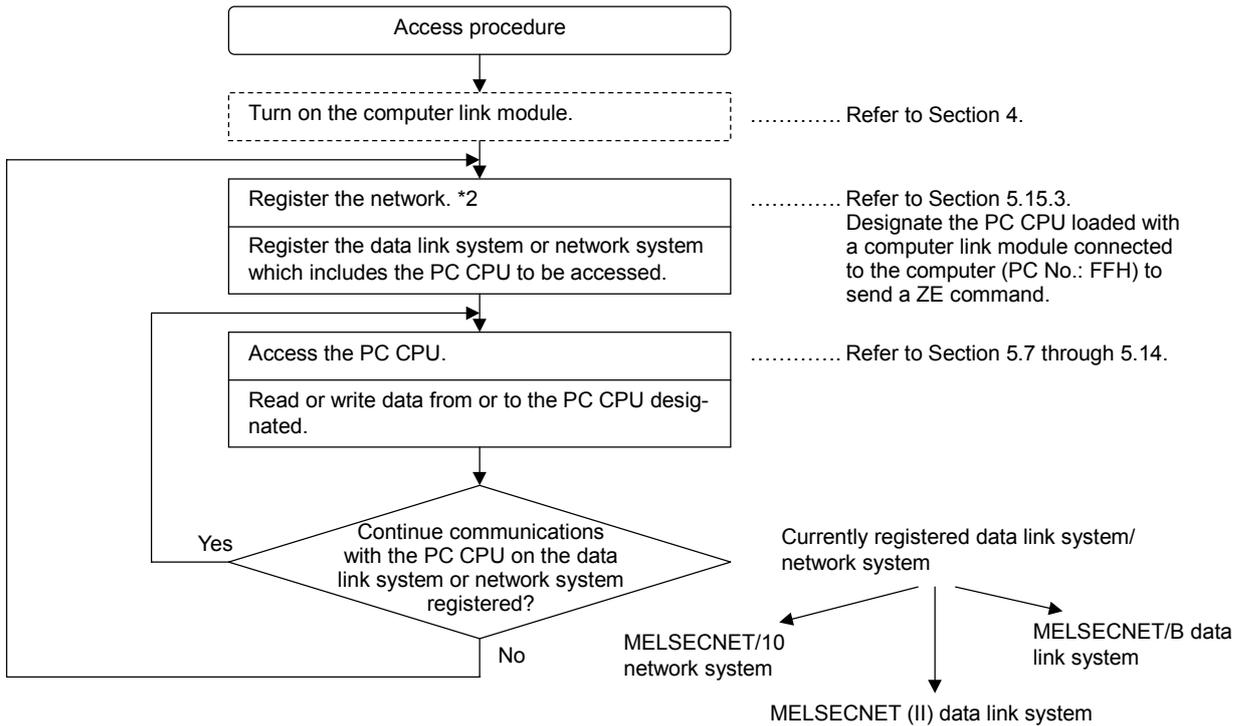
5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

5.15.1 Procedure for accessing another station

This section describes the procedure for making access from the computer to the PC CPU of another station when the PC CPU loaded with a computer link module is an AnUCPU.

Before turning on the computer link module, write parameters for the MELSECNET (II), MELSECNET/B and MELSECNET/10 to the PC CPUs concerned by the use of the GPP function of the MELSEC-A series.

For the parameters which should be written, refer to the Reference Manual for the data link system or network system adopted.*1

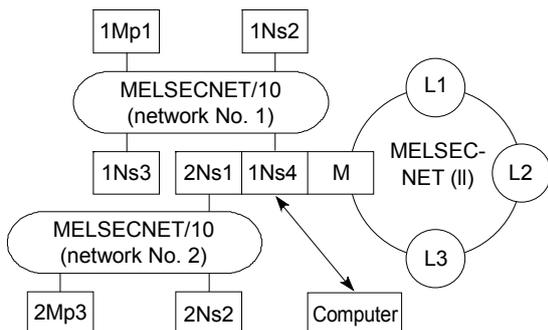


*1 Before registering the network, the following among the network parameters must be set with the PC CPU of the self station and of the relay stations:

- Number of modules set (All AnUCPUs must be set.)
- Routing parameters (They must be set with the self station and all relay stations.)

*2 Only one network can be registered.

(MELSECNET (II)-MELSECNET/10 composite system)



The following table shows the system codes and the network numbers which must be designated with regard to the left system in registering the network:

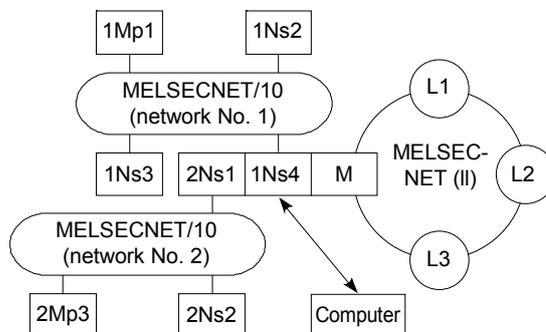
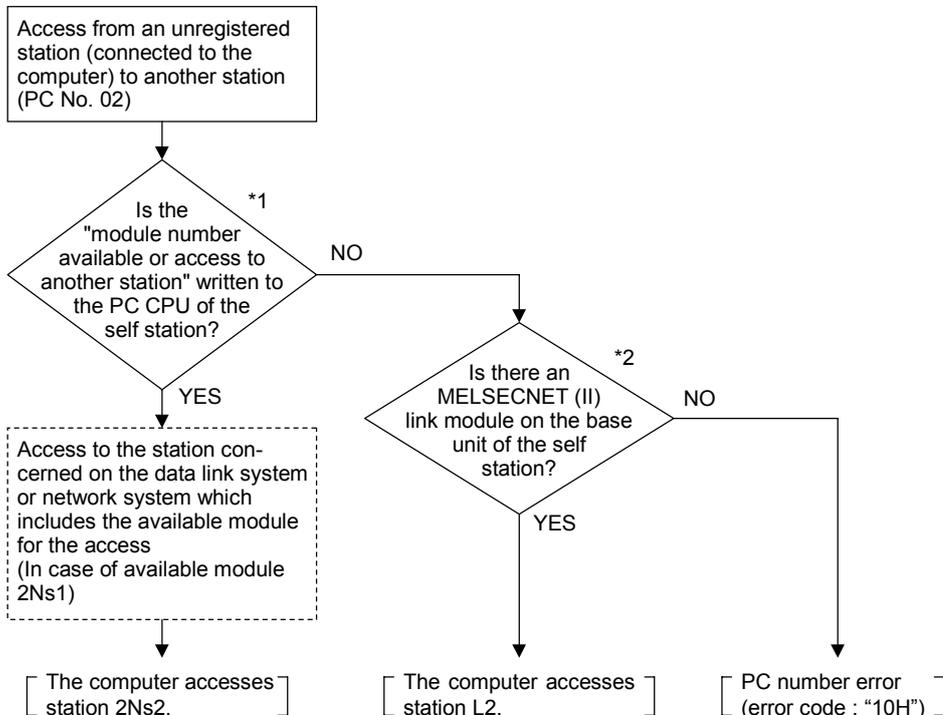
No.	PC CPU to be Accessed	System Code to be Designated	Network No. to be Designated
1	PC CPU on MELSECNET/10 (network No. 1)	01H	01H
2	PC CPU on MELSECNET/10 (network No. 2)	01H	02H
3	PC CPU on MELSECNET (II)	02H	00H

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POINT

Before accessing another station, register the network with the self station.
If an attempt to access another station is made without registering the network, the following problems may occur:
(Example: MELSECNET/10-MELSECNET (II) composite system)



*1: Set the "module number available for access to another station" in setting the number of modules by the use of the GPP function for the MELSECNET/10.
Refer to the GPP Function Operating Manual for the MELSECNET/10.

*2: When two MELSECNET (II) or MELSECNET/B link module are used, the computer accesses only the tier with the module loaded in the lower-numbered slot.

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5.15.2 Commands and their functions

(1) AnUCPU dedicated commands

Item	Command		Description	Number of Points Processed per Communication	PC CPU State			Reference Section
	Symbol	ASCII Code			During STOP	During RUN		
						Write Enabled	Write Disabled	
Network registration	ZE	5AH, 45H	Registers the name and network number of the system in which the station to be accessed is included.	—	○	○	○	5.15.3
Network reading	ZR	5AH, 52H	Reads the data on the network registered with the self station, an error code with the PC CPU or MELSECNET/10 or the name and network number of the system to be accessed.					5.15.4
Routing parameters reading	ZT	5AH, 54H	Reads the data on the network registered with the self station or the routing parameters set with the station to be accessed.					5.15.5

Note : ○..... Executable

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

Function	Computer link function											
	AJ71UC24			A1S/J1UC24			A1S/J1C24			A1SCPU	A2CCPU	A2CCPU
Applicable module	-R2	-R4	-PRF	-R2	-R4	-PRF	-R2	-R4	-PRF	C24-R2	C24	C24-PRF
Remarks	O	O	O	O	Δ	Δ	Δ	Δ	Δ	O	Δ	Δ
	(Ver.M)						(Ver.K)					

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5.15.3 Network registration

In this section, examples are quoted to describe the control protocols for registering a network using a ZE command.

[Control protocols]

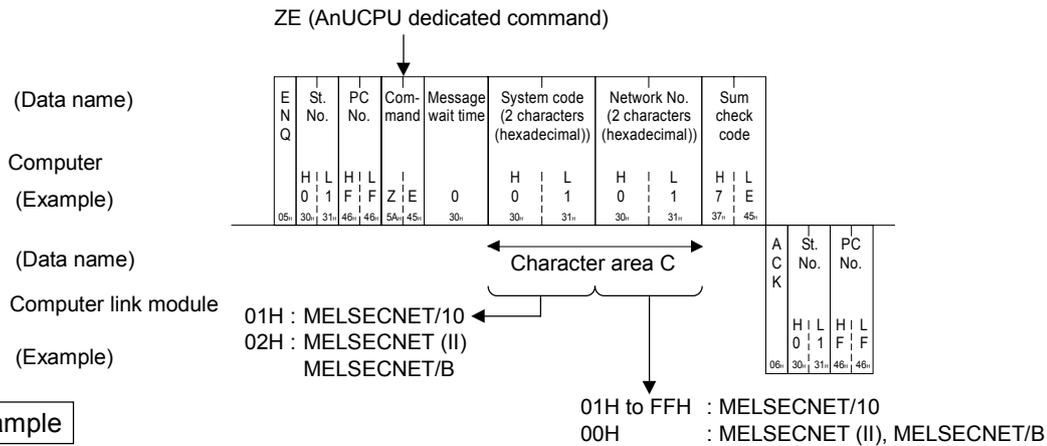
The protocols shown below are in control format 1.

To access the system in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocols in this section.

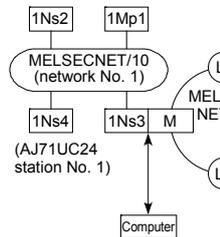
(1) When registering the MELSECNET/10 (network No. 1)

(Network registration conditions)

- 1) The message wait time is 0 ms.
- 2) Register the MELSECNET/10 (network No. 1) in the left system.



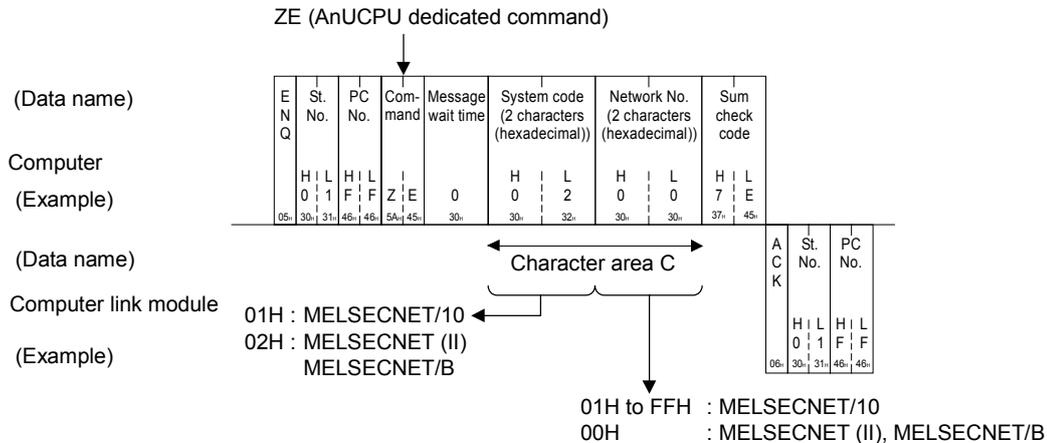
System example



(2) When registering the MELSECNET (II)

(Network registration conditions)

- 1) The message wait time is 0 ms.
- 2) Register the MELSECNET (II) in the left system.



POINT

(1) Since a network can be registered only with the self station, designate FFH for the PC No.

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

Function	Computer link function									
	A1SJ71UC24				A1SJ71C24					
Applicable module	AJ71UC24	-R2	-R4	-PRF	-R2	-R4	-PRF	A1SCPU C24-R2	A2CCPU C24	A2CCPU C24-PRF
Remarks	○	○	○	○	△	△	△	○	△	△

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5.15.4 Network reading

The network reading function is used to help the computer check the following information:

(1) Error code

When the computer sends a command shown in Section 5.7 or the following sections, the computer link module returns a NAK message. When 40H or 41H is returned as an error code, the computer further identifies the error code.

(2) System code and network number

The computer checks the data on the currently registered network shown in Section 5.15.3.

(3) Data link module/Network module data

The computer checks the information about the data link module (MELSECNET (II), MELSECNET/B) or network module (MELSECNET/10) installed on the base unit of the PC CPU loaded with a computer link module.

In this section, an example is quoted to describe the control protocol for reading a network using a ZR command.

POINTS			
<p>(1) Only the stations on the network number to be registered or already registered with the self station are accessible.</p> <p>(2) The information returned from the computer link module includes the data on the station (connected station) loaded with a computer link module connected to the computer and its station number, and the data on the station (accessed station) designated as the PC No.</p>			
Information Name	Station about Which Information is Returned		Description
	Connected Station	Accessed Station	
Error code	○	—	Information indicating the hexadecimal, ASCII code of an error existing in the MELSECNET/10 or the station (self station) loaded with a computer link module. (1) 1338H (4920) or higher error code: Indicates an error in the MELSECNET/10. Refer to the MELSECNET/10 Network System Reference Manual. (2) 1337H (4919) or lower error code: Indicates an error in the PC CPU. Refer to the User's Manual for the PC CPU concerned.
System code	○	—	Information about the currently registered network.
Network No.	○	—	
Data link module/Network module data			—
(1) System code	—	○	Information indicating the data link module (MELSECNET (II), MELSECNET/B) or network module (MELSECNET/10).
(2) Network No.	—	○	
(3) Data link system/ Network system station No.	—	○	Information indicating the hexadecimal, ASCII station number code of the PC CPU concerned on the data link system or network system.
(4) Group No.	—	○	Information indicating the hexadecimal, ASCII code of the group number set with the PC CPU concerned on the network system. The code is "00" when no group number is set with the PC CPU concerned or when the PC CPU concerned is a data link module.

For the group number, refer to the MELSECNET/10 Network System Reference Manual.

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

[Control protocols]

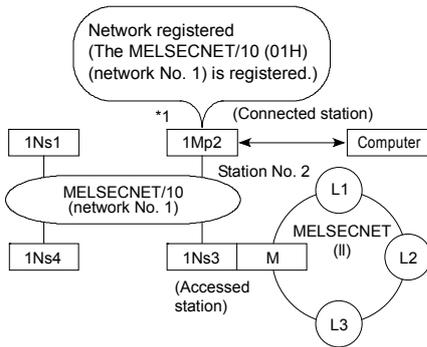
The protocol shown below is in control format 1.

To access the station concerned in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

(Network information reading conditions)

- 1) The message wait time is 0 ms.
- 2) The information about the network registered with the PC CPU (station 1Ns3/M) on the MELSECNET/10 (network No. 1) is to be read through the PC CPU (station 1Mp2) loaded with a computer link module (station No. 02) in the following system.

System example



*1
 In the system example, the station number of the computer link module loaded in the station (1Mp2) connected to the computer is "2".
 When network No. 1 is registered with station 1Mp2, the stations on the network are accessible.

*St. No. = Station number

ZR (AnUCPU dedicated command)

(Data name)	ENQ	St. No.	PC No.	Command	Message wait time	Sum check code
Computer (Example)	H ₀₅ L ₃₀	H ₀₂ L ₃₂	H ₀₃ L ₃₃	Z:R	0 ₃₀	H ₄₁ L ₃₁

Character area A is not set.

(Data name)	STX	St. No.	PC No.	Error code (4 characters hexadecimal)	System code	Network No.	Number of installed data link module/network module	Data link module/Network link module data (1)(2)(3)(4)	Data link module/Network link module data (1)(2)(3)(4)	ETX	Sum check code
Computer link module (Example)	H ₀₂ L ₃₀	H ₀₂ L ₃₂	H ₀₃ L ₃₃	0000	H ₀₁ L ₃₁	H ₀₁ L ₃₁	H ₀₀ L ₃₂	H ₀₁ L ₃₁ H ₀₁ L ₃₁ H ₀₃ L ₃₃ H ₀₀ L ₃₀	H ₀₂ L ₃₂ H ₀₀ L ₃₀ H ₀₀ L ₃₀ H ₀₀ L ₃₀	H ₄₂ L ₃₃	H ₄₂ L ₃₃

Character area B

Information about MELSECNET/10 or PC CPU of connected station

- 0000H : No error
- 0001H to 1337H : Error in PC CPU
- 1338H or higher : Error in MELSECNET/10

Information about network registered with connected station

- System code
- 00H : No network registered
- 01H : MELSECNET/10
- 02H : MELSECNET (II), MELSECNET/B
- Network No.
- 00H : No network No. registered, MELSECNET (II), MELSECNET/B
- Other than 00H : Registered network No.

Information about accessed station

- (1) System code
 - 01H : MELSECNET/10
 - 02H : MELSECNET (II), MELSECNET/B
- (2) Network No.
 - 00H : MELSECNET (II), MELSECNET/B
 - Other than 00H : Set network No.
- (3) Data link system/Network system station No.
 - 00H to 40H : Station No. on data link system or network system concerned
- (4) Group No.
 - 00H : No group No. set, MELSECNET (II), MELSECNET/B
 - Other than 00H : Set group No.

Information about accessed station

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

Function	Computer link function									
	AJ71UC24	A1SJ71UC24			A1SJ71C24			A1SCPU C24-R2	A2CCPU C24	A2CCPU C24-PRF
Applicable module		-R2	-R4	-PRF	-R2	-R4	-PRF			
Remarks	○	○	○	○	△	△	△	○	△	△

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5.15.5 Routing parameters reading

The routing parameters reading function is used to help the computer check the routing parameters set with the designated PC CPU.

In this section, an example is quoted to describe the control protocol for reading routing parameters using a ZT command.

POINTS

- (1) Only the stations on the network number to be registered or already registered with the self station are accessible.
- (2) When routing parameters are not set with the accessed station, the computer returns a NAK message and "32" as an error code.
- (3) The information returned from the computer link module includes the data on the station (connected station) loaded with a computer link module connected to the computer and its station number, and the data on the station (accessed station) designated as the PC No.

Information Name	Station about Which Information is Returned		Description
	Connected Station	Accessed Station	
System code	○	—	Information about the currently registered network.
Network No.	○	—	
Number of installed data link module/ network module	—	○	Information indicating the hexadecimal, ASCII code of the number of installed data link module or network module.
Number of set routing parameters	—	○	Information indicating the hexadecimal, ASCII code of the number of set routing parameters.
Routing parameter	—	○	Information indicating the hexadecimal, ASCII code of a set routing parameter.

For routing parameters, refer to the MELSECNET/10 Network System Reference Manual.

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

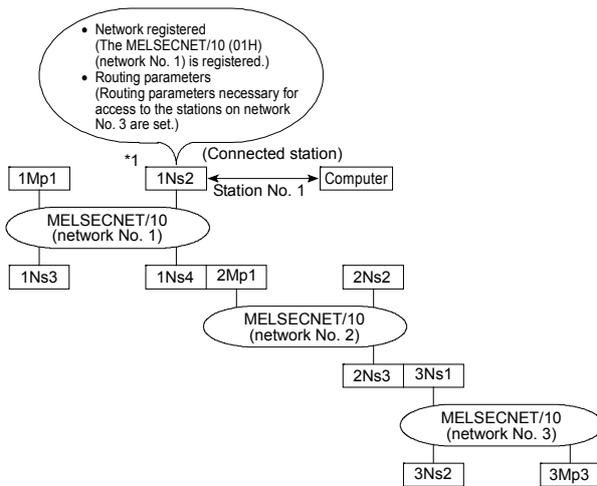
[Control protocol]

The protocol shown below is in control format 1.
 To access the station concerned in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

(Routing parameters reading conditions)

- 1) The message wait time is 0 ms.
- 2) Routing parameters (two parameters) set with the PC CPU (station 1Ns2, self station) loaded with a computer link module (station No. 01) in the following system are to be read.

System example



*1
 In the system, the station number of the computer link module loaded with the station (station 1Ns2) connected to the computer is "1".
 When network No. 1 is registered with station 1Ns2, the stations on the network are accessible.

*St. No. = Station number

ZT (AnUCPU dedicated command)

(Data name)	E N Q	St. No.	PC No.	Command	Message wait time	Sum check code
Computer (Example)	H:0, L:0	H:1, L:1	H:F, L:F	ZIT	0	H:C, L:B

Character area A is not set.

(Data name)	S T X	St. No.	PC No.	System code	Network No.	Number of installed data link unit/network	Number of set routing parameters	Routing parameter (1) (2) (3)	Routing parameter (1) (2) (3)	E T X	Sum check code
Computer link module (Example)	H:0, L:0	H:1, L:1	H:F, L:F	H:0, L:1	H:0, L:1	H:0, L:1	H:0, L:2	H:0, L:2	H:0, L:1	H:0, L:1	H:C, L:4

Character area B

Information about network registered with connected station

System code

- 00H : No network registered
- 01H : MELSECNET/10
- 02H : MELSECNET (II), MELSECNET/B

Network No.

- 00H : No network No. registered, MELSECNET (II), MELSECNET/B
- Other than 00H : Registered network No.

Information about accessed station (connected station in the above figure)

- (1) : Destination network No.
- (2) : Relay network No.
- (3) : Relay network station No.

* Meanings of settings in the above figure

First Setting	Second Setting
Network No. 2 is accessed through station No. 4 (1Ns4/2Mp1) on network No. 1.	Network No. 3 is accessed through station No. 4 (1Ns4/2Mp1) on network No. 1.

5. COMMUNICATIONS WITH A COMPUTER IN THE DEDICATED PROTOCOL

5.16 Loopback Test

The loopback test function is used to check whether the computer and the computer link module communicate normally with each other. In this section, an example is quoted to describe the control protocol for using the function.

(1) ACPU common command and its functions

The following table shows the TT command to be used to conduct a loopback test, and its function.

Item	Command		Description	Number of Points Processed per Communication	PC CPU State		
	Symbol	ASCII Code			During STOP	During RUN	
						Write Enabled	Write Disabled
Loopback test	TT	54H, 54H	Echoes back the characters to the computer as they are received	254 characters	O	O	O

Note : O..... Executable

(2) Loopback test control protocol

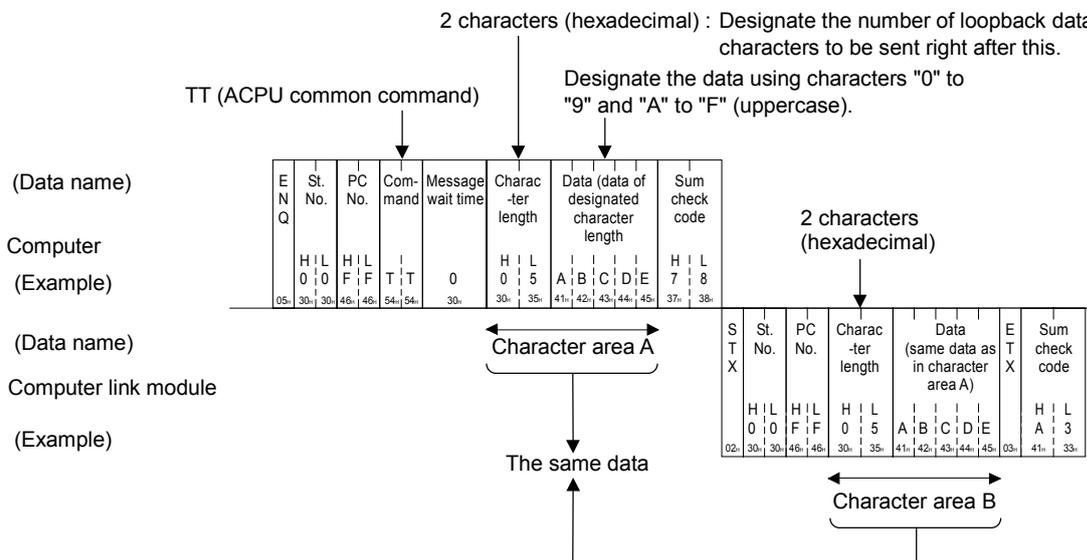
[Control protocol]

The protocol shown below is in control format 1.

To access the station concerned in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

(Loopback test conditions)

- 1) The message wait time is 0 ms.
- 2) Five characters "ABCDE" are to be sent and received as loopback data.



POINTS

- (1) To designate the character length, the following condition must be met:
 - $1 \leq \text{character length} \leq 254$
- (2) Designate "FF" for the PC No.

6. COMMUNICATIONS WITH EXTERNAL DEVICES IN THE NO-PROTOCOL MODE

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6. COMMUNICATIONS WITH EXTERNAL DEVICES IN THE NO-PROTOCOL MODE

This section describes how to link the PC CPU with an external device (computers, printers, etc.) in the no-protocol mode.

Read this section when using the RS-422 or RS-232C interface in the no-protocol mode by 1) setting the mode setting switch of the computer link module in a position of "1" to "9", or 2) switching the mode to 1 to 9. If these are used with the dedicated protocols and in the bidirectional mode, it is not necessary to read this section.

6.1 Data Flow in the No-Protocol Mode

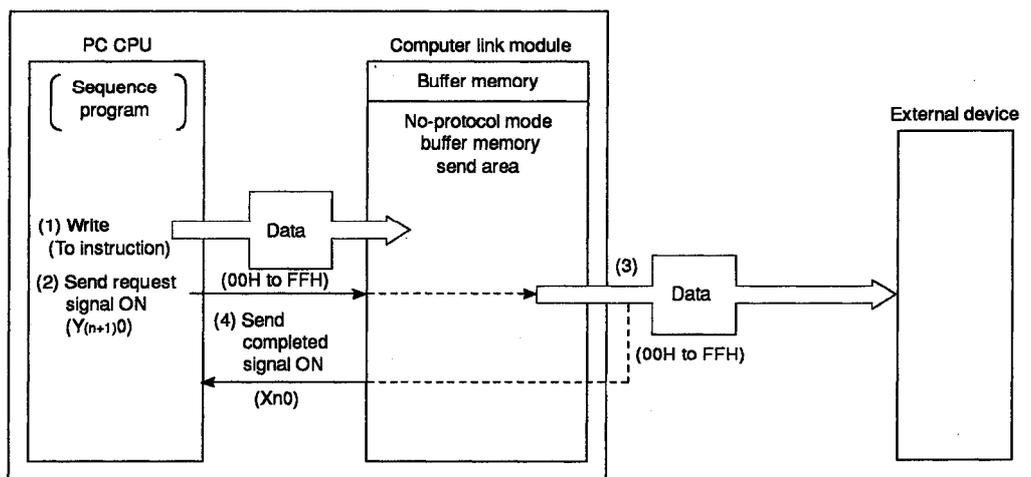
The diagrams below are schematic representations of data communications between the PC CPU and the external device.

The computer link module transmits the data designated by the PC CPU to the external device in the same code.

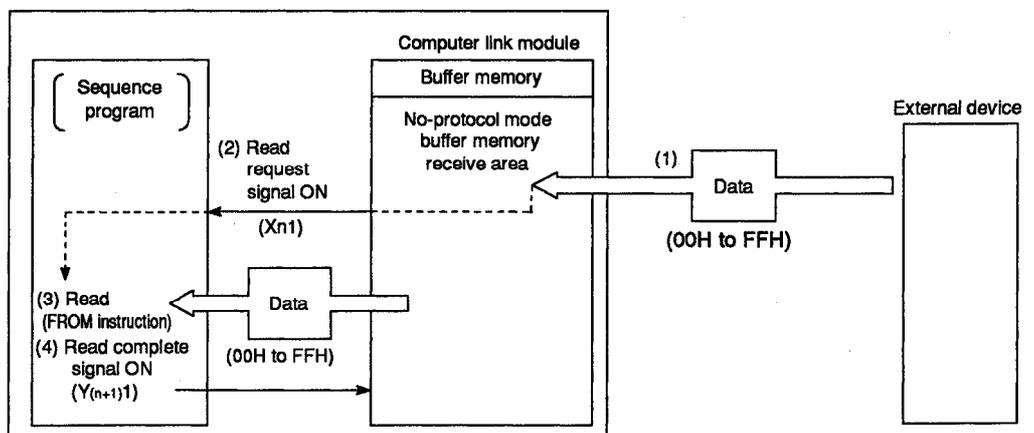
The computer link module transmits the data received from an external device to the PC CPU also in the same code.

Thus, binary data (numeric data) can be received and sent in the no-protocol mode.

(1) When the PC CPU transmits data to the external device.



(2) When the PC CPU reads data received from an external device.



6. COMMUNICATIONS WITH EXTERNAL DEVICES IN THE NO-PROTOCOL MODE

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6.2 Programming Hints

The following are hints concerning writing a program for linking a computer with an external device.

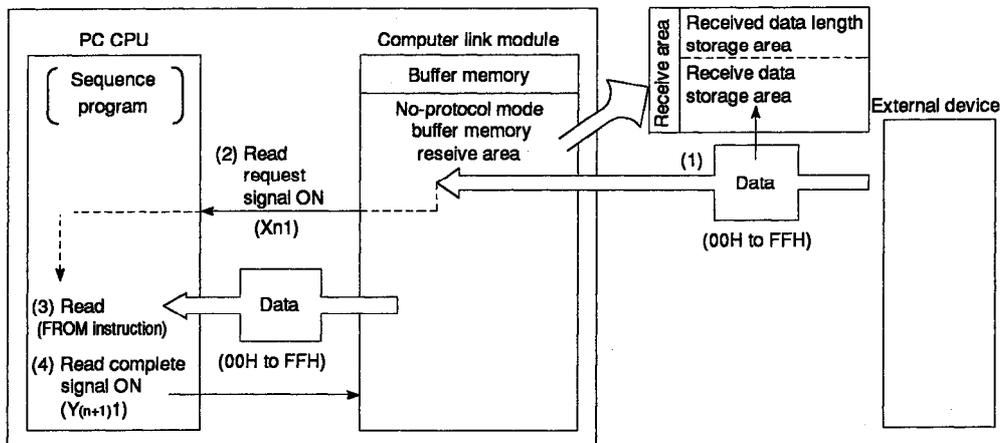
POINT

Functions in the no-protocol mode cannot be used in combination with functions in the bidirectional mode described in Section 7. Select either mode by setting the mode setting switch of the computer link module (refer to Section 4.2.1) and set the buffer memory specific use area to the bidirectional mode designation area (refer to Sections 3.10 and 7.2.6).

6. COMMUNICATIONS WITH EXTERNAL DEVICES IN THE NO-PROTOCOL MODE

6.2.1 Receiving data from external device

This section describes the information about the procedure to operate the PC CPU to read data received from an external device.



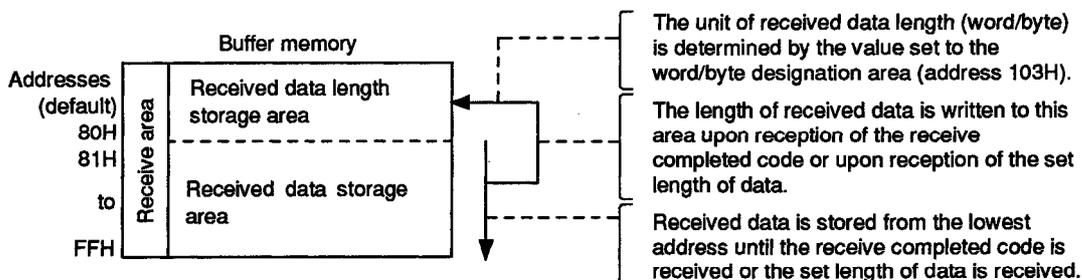
(1) How to use the receive area

The receive area is provided in the buffer memory for storing data received from an external device and the length of the received data before the PC CPU reads the received data from this receive area.

The buffer memory addresses 80H to FFH are allocated as the receive area by default.

The receive area can be changed according to the purpose of data transmission, the specifications of the external device, and the received data length.

(Refer to 6.2.4(2)(d) for how to change the received data area.)



POINT

The amount of data sent from an external device to the computer link module in a single transmission operation should be kept below the size of the received data storage area.

(Received data storage area) \geq (amount of data sent from an external device)

Change the receive area if it is necessary to send a greater amount of data than can be stored in the received data storage area.

For this purpose, the addresses and the size of the receive area can be changed.

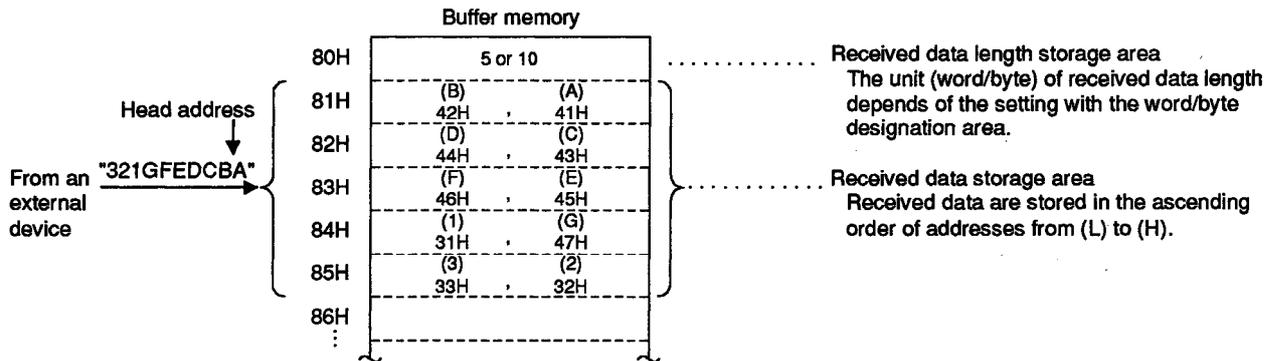
6. COMMUNICATIONS WITH EXTERNAL DEVICES IN THE NO-PROTOCOL MODE

(2) How to read received data

There are two methods available to enable the sequence program to read data received by the computer link module from an external device. The user can choose either method.

In either method, the data received from an external device is read from the received data storage area.

Example: To read received data ABCDEFG123. (The receive area in the example is default.)



The computer link module turns ON the received data read request signal (Xn1) to be sent to the sequence program when it receives 1) the receive completed data length set by the user or 2) the receive completed code.

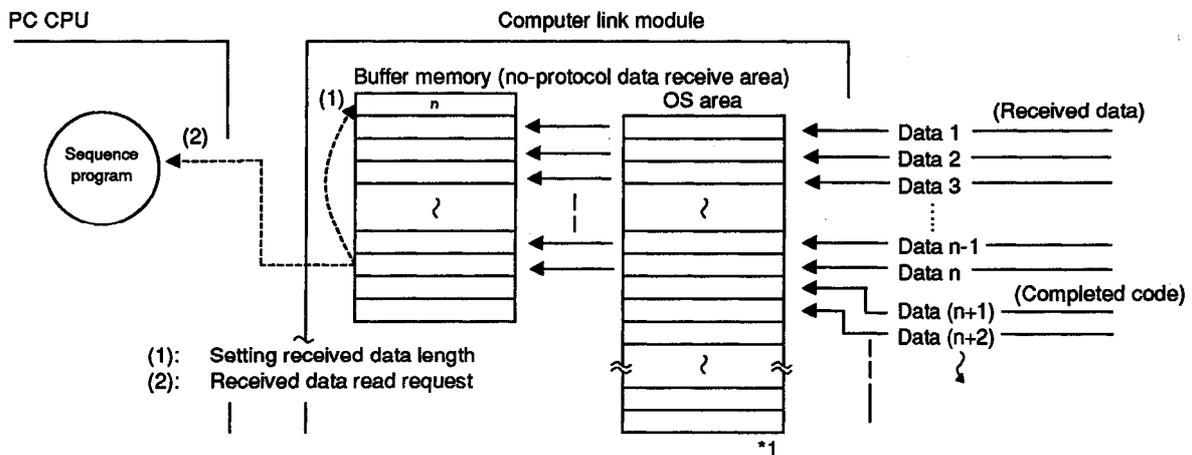
(a) Reading received data upon reception of receive completed code (Data receive in variable length)

The computer link module makes a request to read the received data to the sequence program when it receives the receive completed code, set by the user to buffer memory address 100H.

Upon receiving the read request made by the computer link module, the sequence program reads the data received from an external device up to the receive completed code.

The receive completed code may be changed to any value which makes one word (one byte) in the range of 00H to FFH according to the specifications of the external device.

For the procedure to change the receive completed code, refer to Section 6.2.4 (2)(a).



Upon reception of the value set in the receive completed code designation area, the computer link module makes a read request to the PC CPU as follows. (In the explanation below, the CR code is 0DH and the LF code 0AH.)

- 1) If the receive completed code is not changed (default: 0A0DH).
 - a) When data is received within 60 ms after reception of CR.
 - The received data up to CR is stored in the receive area of the buffer memory and the read request signal is sent to the PC CPU.
 - The data received from this point on is stored in the OS area until it is read in the subsequent reading operations.
 - b) When data other than LF is received within 60 ms after reception of CR.
 - The received data up to CR is stored in the receive area of the buffer memory and the read request signal is sent to the PC CPU.
 - The data received after CR is stored in the OS area to be read in the following read operation.
 - c) When LF is received within 60 ms after reception of CR.
 - The received data up to LF(CR+LF) is stored in the receive area of the buffer memory and the read request signal is sent to the PC CPU.
 - The data that will be (or has been) received after LF is stored in the OS area to be read in the subsequent reading operations.
 - d) When LF is received before CR.
 - The received data up to LF is stored in the receive area of the buffer memory and the read request signal is sent to the PC CPU.
 - The data received after LF is stored in the OS area to be read in the subsequent reading operations.
- 2) If the default receive completed code is changed to 00[]H.
 - a) When a user designated receive completed code is received.
 - The received data up to the user designated read completed code is stored in the receive area of the buffer memory and the read request signal is sent to the PC CPU.
 - The data that will be (or has been) received after the read completed code is stored in the OS area to be read in the subsequent reading operations.
- 3) If the read completed code is not set (FFFFH is set).

This enables only the read of received data by fixed data length. See (b) of this section for details.

POINT

With the computer link modules with the software versions or later indicated in the table, it is possible to allow the read request signal to be turned ON only when CR and LF are received if the no-protocol receive completed codes are set as follows.

Applicable Module	AJ71UC24	A1SJ71UC24-R2/PRF/R4	A1SJ71C24-R2/PRF/R4	A1SCPUC24-R2	A2CCPUC24/-PRF
Version	M	R	M	A	K

(No-protocol completed code designation area)

Buffer memory address 100H b15 to b0 Default value 0D0AH(CR, LF)

* Set a desired value when starting up the computer link module.

- Write 8000H to designate CR and LF as the completed codes.
- To designate a code making one character (one byte) as the completed code, write the designated code in the lower byte and 00H in the higher byte (00[][]H).
- If using no completed code, write FFFFH.

Upon reception of the code set in the receive completed code designation area, the computer link module makes the read request to the PC CPU as follows.

- 1) In the default setting of 0D0AH.
 - Refer to 1) a) to d) in the previous page.
- 2) When 8000H is set.
 - Only when CR and LF are sequentially received, the received data up to LF is stored in the receive area of the buffer memory and the read request signal is sent to the PC CPU.
(No limit is set on the interval between the reception of CR and LF.)
 - The data received after LF is stored in the OS area to be read in the subsequently reading operations.
- 3) If the default receive completed code is changed to 00[][]H.
 - Refer to 2) in the previous page.
- 4) When FFFFH is set.
 - Only data reading by the set data length is enabled.
See (b) for details.

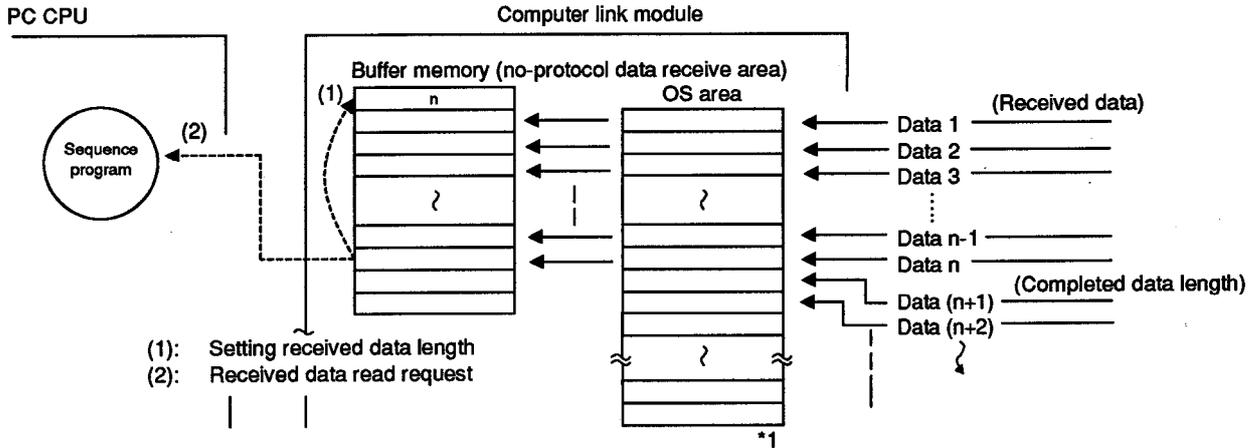
(b) Reading data by the set data length (data receive in fixed data length)

The computer link module makes a read request to the sequence program when it receives data which is equal to the number of data length set by the user to the buffer memory (address 108H) from the external device.

The sequence program can read the set length of data received from the external device when it has received the read request from the computer link module.

Default setting for the set data length is 127 words, but this value may be changed to any value not exceeding the size of the received data storage area.

(For the procedure to change the data length setting, refer to Section 6.2.4 (2)(b) and (e).)



*1 The OS area, as shown in the above diagram, is a memory provided in the computer link module for storing data received after the receive complete code or the set length of data is received.

The computer link module models covered by this manual are provided with OS areas with various capacities as indicated below.

The user cannot read or write these OS areas.

- AJ71UC24 279 bytes
- A1SJ71C24-R2, A1SJ71C24-PRF 304 byte
- A1SJ71C24-R4 304 bytes
- A1SJ71UC24-R2/PRF/R4 304 bytes
- A2CCPUC24, A2CCPUC24-PRF 279 bytes

After the sequence program has been read the received data in response to the current read request, both the received data in the OS area and the data to be received subsequently is transferred to the data receive area in the buffer memory.

When the size of the vacant area in the OS area, where received data is stored, becomes smaller than 10 bytes, the following control operations are executed according to preset transmission control specifications. (For details, refer to Section 9. The RS signal is not turned OFF.)

- If the DTR control is enabled, the computer link module interrupts ongoing data communications with an external device by turning OFF the DTR signal.
- If the DC1/DC3 send control is enabled, the computer link module interrupts ongoing data communications with an external device by sending the DC3 code.

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When there is no vacant area left in the OS area, so that no more received data can be stored, 2-SIO/4-SIO LEDs turn ON. From this point on, all the data subsequently received is abandoned until vacancy is made in the OS area.

POINT

When the receive completed code and the receive completed data length are set to the specific use area in the buffer memory, they are both effective. In this case, if it receives the receive completed code before the data length to complete receive, the computer link module outputs the read request to the sequence program (Xn1 is ON).

REMARKS

- (1) If the received data length exceeds the capacity of the received data storage area, the data is processed as described below.

(a) When the receive completed code is used:

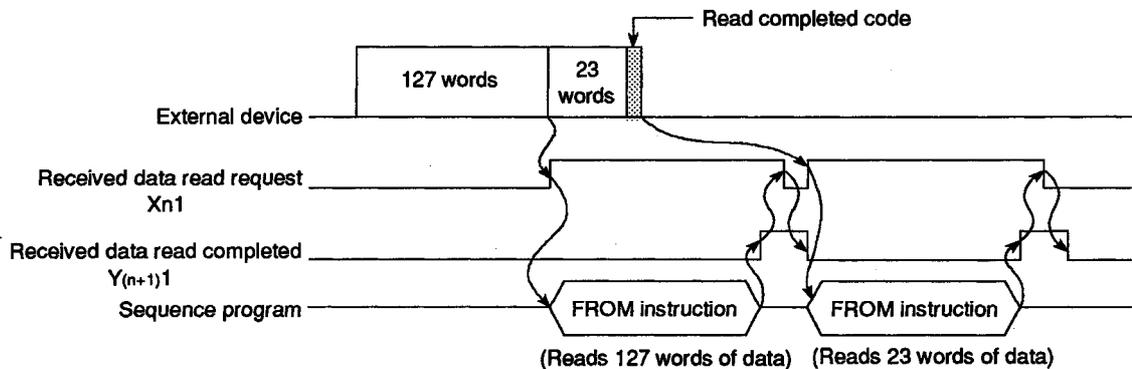
If the computer link module receives data that exceeds the received data storage area, it turns ON the received data read request signal Xn1 when data equivalent to the received data storage area has been received.

Reading the remaining data is enabled at the time the sequence program turns the receive data read completed signal Y(n+1)1 ON.

These steps are repeated until the receive completed code is received.

Set the receive area size so that "receive-completion data length" is less than "no-protocol mode receive buffer memory size".

Example: To receive 150 words of data while receive area is set at 80H to FFH (default).



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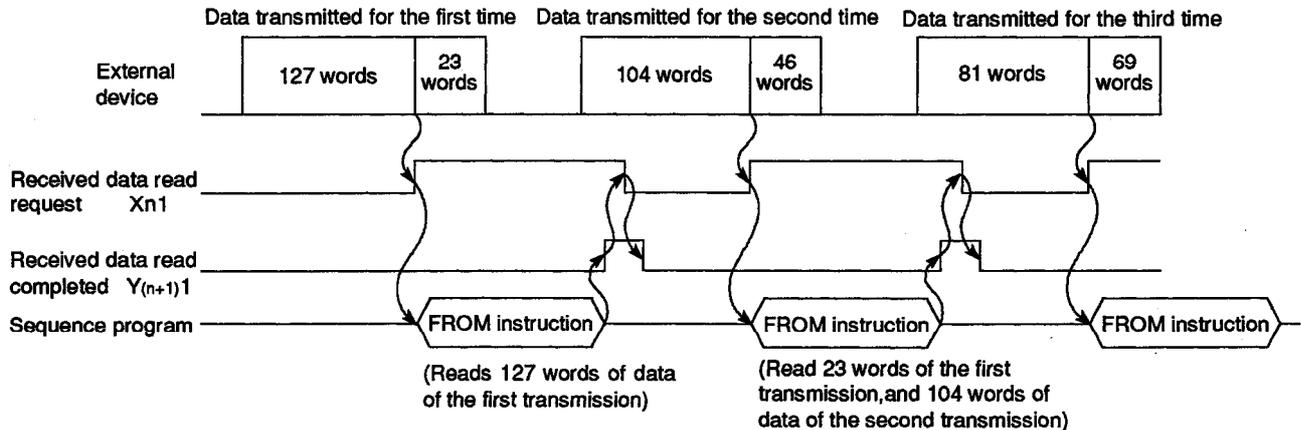
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(b) When receive completion data length is used:

If the receive completion data length is set greater than the received data storage area, the no-protocol receive buffer memory size (default: 128 words) which is set at buffer memory address 107H is taken as the receive completion data length.

Set the receive area size so that "receive completion data length" is less than "no-protocol mode receive buffer memory size".

Example: To receive 150 words of data while receive area is set at 80H to FFH (default setting).



(2) Note that if the CD signal is turned OFF or the mode is switched during data communications with an external device the received data may be cleared as described below.

(a) If the CD signal is turned OFF:

- While data communication with an external device through the RS-232C line with the CD terminal check enabled and with no read request is being made to the PC CPU, received data is cleared if the CD signal is turned OFF for 4 ms or longer on the external device. (The receive area is not cleared.)
- If the CD signal goes OFF when a read request is being made to the PC CPU, the computer link module continues to process the read request to the PC CPU. The received data the PC CPU is request to read is not cleared.
- To resume data send from an external device, turn ON the CD signal.

(b) When the mode is switched:

- If the mode of the module is forcibly switched as described in Section 12, the computer link module goes into the initialized state as immediately after power application, thus clearing the data. (The receive area is initialized.)
- To continue data communication, it is necessary to carry out initial settings of the specific use area in the buffer memory.
- Do not resume data communication from an external device until after the ready signal (Xn7) is turned ON and initial settings are completed to the specific use area in the buffer memory.
(With some computer link systems, it is first necessary for the PC CPU to send a send resume enabled signal to an external device first before resuming data send from the external device.)

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(3) Error detection (by reading the error LED display area or the buffer memory)

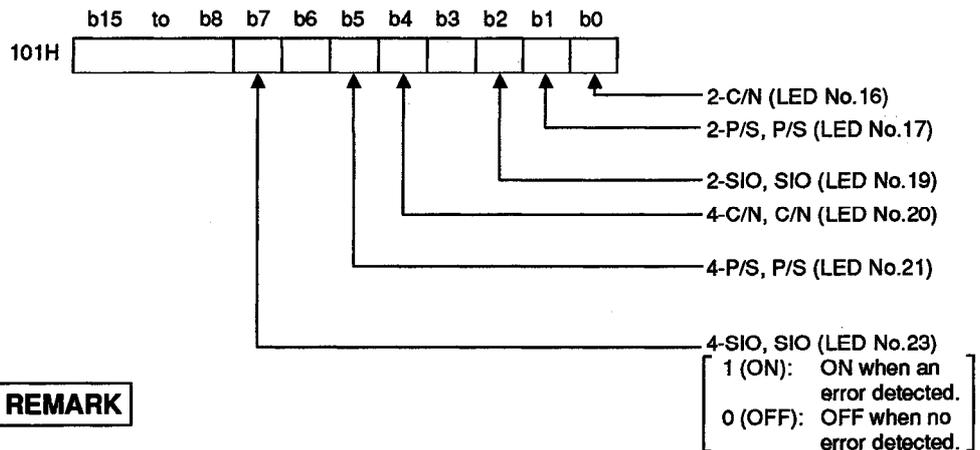
If the computer link module detects an error in the data received from an external device in the no-protocol mode, the computer link module turns ON the LEDs (2-C/N to 2-SIO or 4-C/N to 4-SIO) provided on its front panel and stores the error information in the buffer memory address 101H.

Check the occurrence of a data receive error by the LEDs located on the front side of the module on by reading the above-mentioned buffer memory by the sequence program.

(a) Applicable LEDs on the front panel

LED Layout (AJ71UC24)	LED No.	LED Name	Meaning of LED Display	LED ON	LED OFF	LED Initial Status																																																																								
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>(For explanation)</p> <table border="1"> <tr><th>LED NO.</th><td>0</td><td>RUN</td><td>○</td></tr> <tr><td>1</td><td>2-SD</td><td>○</td></tr> <tr><td>2</td><td>2-RD</td><td>○</td></tr> <tr><td></td><td>(Unused)</td><td>○</td></tr> <tr><td>4</td><td>2-NEU</td><td>○</td></tr> <tr><td>5</td><td>2-ACK</td><td>○</td></tr> <tr><td>6</td><td>2-NAK</td><td>○</td></tr> <tr><td>7</td><td>4-NEU</td><td>○</td></tr> <tr><td>8</td><td>4-ACK</td><td>○</td></tr> <tr><td>9</td><td>4-NAK</td><td>○</td></tr> <tr><td>10</td><td>4-SD</td><td>○</td></tr> <tr><td>11</td><td>4-RD</td><td>○</td></tr> <tr><td></td><td>(Unused)</td><td>○</td></tr> </table> </div> <div style="width: 45%;"> <p>(For explanation)</p> <table border="1"> <tr><th>LED NO.</th><td>16</td><td>2-C/N</td><td>○</td></tr> <tr><td>17</td><td>2-P/S</td><td>○</td></tr> <tr><td>18</td><td>2-PRO</td><td>○</td></tr> <tr><td>19</td><td>2-SIO</td><td>○</td></tr> <tr><td>20</td><td>4-C/N</td><td>○</td></tr> <tr><td>21</td><td>4-P/S</td><td>○</td></tr> <tr><td>22</td><td>4-PRO</td><td>○</td></tr> <tr><td>23</td><td>4-SIO</td><td>○</td></tr> <tr><td>25</td><td>CPU RW</td><td>○</td></tr> <tr><td></td><td>(Unused)</td><td>○</td></tr> </table> </div> </div>	LED NO.	0	RUN	○	1	2-SD	○	2	2-RD	○		(Unused)	○	4	2-NEU	○	5	2-ACK	○	6	2-NAK	○	7	4-NEU	○	8	4-ACK	○	9	4-NAK	○	10	4-SD	○	11	4-RD	○		(Unused)	○	LED NO.	16	2-C/N	○	17	2-P/S	○	18	2-PRO	○	19	2-SIO	○	20	4-C/N	○	21	4-P/S	○	22	4-PRO	○	23	4-SIO	○	25	CPU RW	○		(Unused)	○	16	2-C/N	C/N	Result of communications between PC CPU and RS-232C	Refer to Section 4.3 (4).	Normal	OFF
	LED NO.	0	RUN	○																																																																										
	1	2-SD	○																																																																											
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	(Unused)	○																																																																												
	17	2-P/S	P/S	Parity error on RS-232C	Parity error	Normal	OFF																																																																							
	19	2-SIO	SIO	SIO error on RS-232C	Overrun, framing error	Normal	OFF																																																																							
	20	4-C/N	C/N	Result of communications between PC CPU and RS-422	Refer to Section 4.3 (4).	Normal	OFF																																																																							
	21	4-P/S	P/S	Parity error on RS-422	Parity error	Normal	OFF																																																																							
	23	4-SIO	SIO	SIO error on RS-422	Overrun, framing error	Normal	OFF																																																																							
<p>When an LED turns ON, it stays ON even when the cause of the error is eliminated. To turn OFF an LED, follow the procedure described in Section 8.1.</p>																																																																														

(b) Buffer memory (See Section 8.1 for details.)



Connect signals such as the READY signal from an external device to the PC CPU as an input signal and then run a time-out check on the ON/OFF intervals of the signal to determine the status of the external device.



The status of an external device may also be determined by running a time-out check on intervals of data reception.

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(4) Clearing received data

If an error occurs due to failure of an external device, for example, while receiving data from an external device in the no-protocol mode, the data received up to the error may be incorrect or interrupted.

To recover after an error has occurred it is possible to clear all received data and initialize the buffer memory.

To clear all received data, write and read to the buffer memory as described below.

When all received data is cleared, the computer link module nullifies the received data, so that there is no received data left.

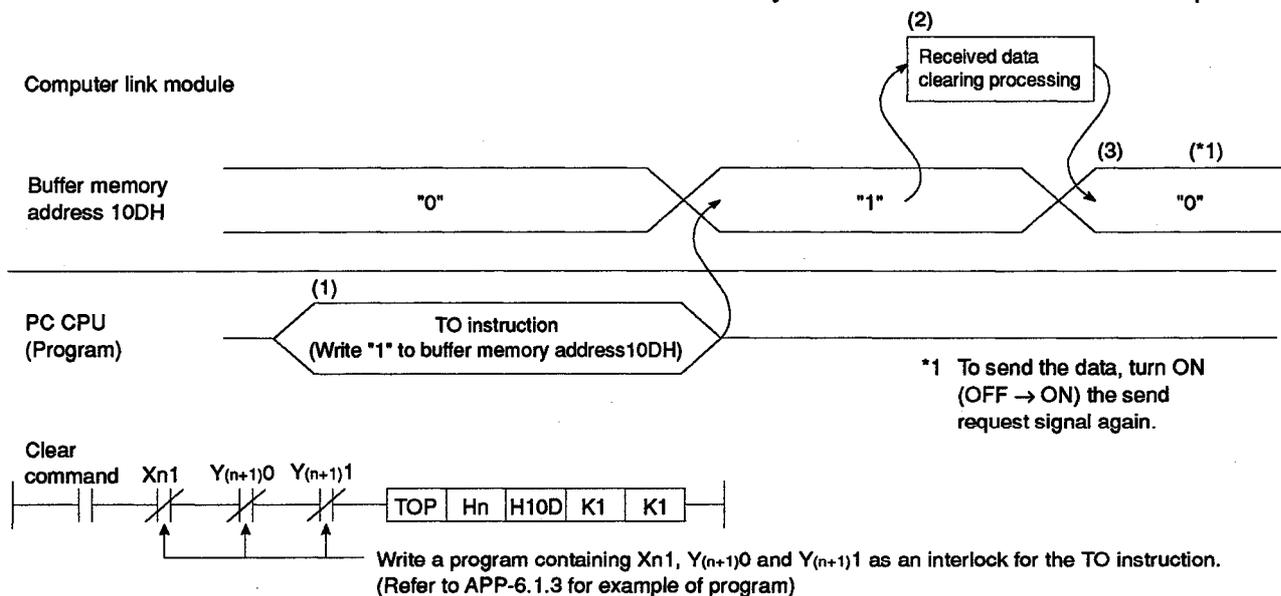
(The previous data in the receive area of the buffer memory remains un-cleared.)

Do not resume data send from an external device until after buffer memory address 10DH is changed to "0".

(With some computer link systems, it is first necessary for the PC CPU to send a send resume enabled signal to an external device before resuming data send from the external device.)

(How to clear received data)

- Write "1" to buffer memory address 10DH using the TO instruction of the sequence program while the received data read request signal (X_{n1}), the received data read completed signal ($Y_{(n+1)1}$) and the send request signal ($Y_{(n+1)0}$) are OFF.
- Now the computer link module clears the received data.
- After clearing the received data, the computer link module clears the "1" that was written to buffer memory address 10DH and write "0" in its place.



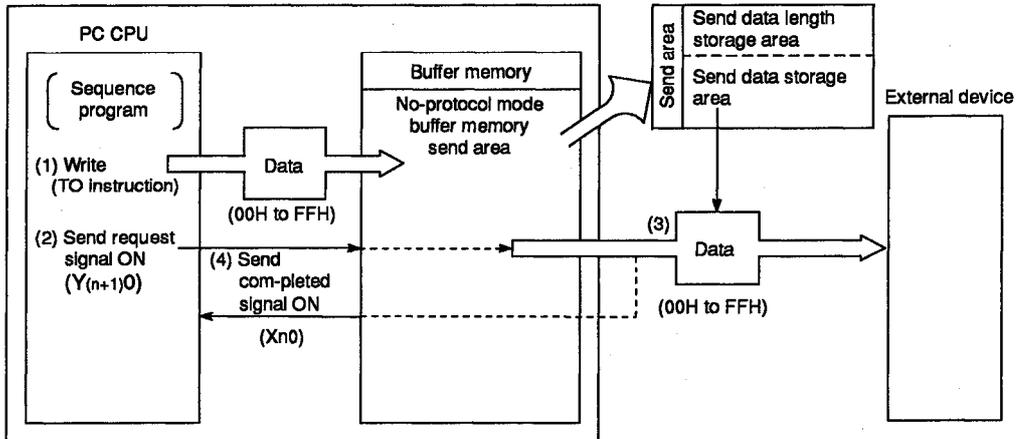
REMARK

Do not issue a receive data clear request as described above while the send request signal ($Y_{(n+1)0}$) is ON and data is being sent from a computer link module to an external device, otherwise the computer link module will stop sending the data and the send completed signal (X_{n0}) will come ON.

6. COMMUNICATIONS WITH EXTERNAL DEVICES IN THE NO-PROTOCOL MODE

6.2.2 Sending data to external device

This section describes matters to be attended to for sending data to an external device.



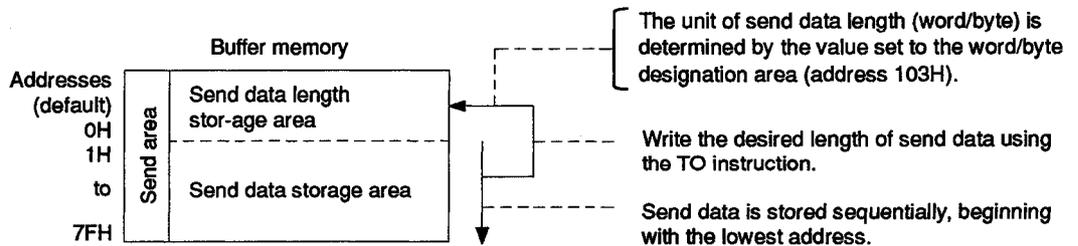
(1) Data send area

The data send area is the buffer memory area provided in the computer link module where the PC CPU stores send data to be sent to the external device and the length of the send data.

The buffer memory addresses 0H to 7FH are allocated as the send area by default.

The send area can be changed according to the purpose of data send, the specifications of the external device, and the sent data length.

(See Section 6.2.4(2)(c) for how to change the received data area.)



POINT

There is a limit of the amount of data that can be sent from the PC CPU to an external device in a single transmission operation.

Such amount of data should be kept below the size of the send data storage area.

(Send data storage area) >= (amount of data sent from the PC CPU to an external device)

Change the receive area if it is necessary to send a greater amount of data than can be stored in the send data storage area in a single transmission operation.

For this purpose, the addresses and the size of the receive area can be changed.

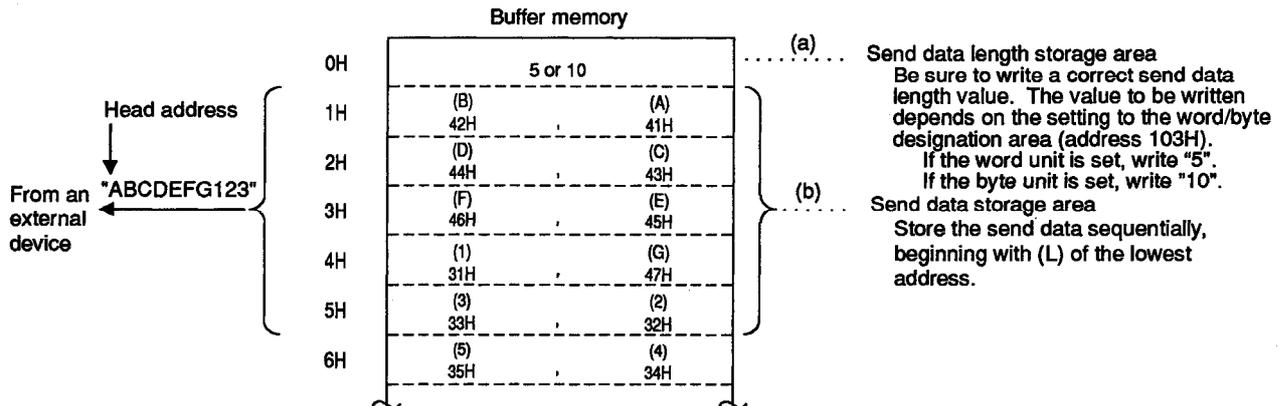
6. COMMUNICATIONS WITH EXTERNAL DEVICES IN THE NO-PROTOCOL MODE

(2) How to write send data

The send data length and send data are written to the send data area as shown below.

- (a) The length of send data to be written (or having been written) to the send data storage area is written to the no-protocol send data length storage area in either words or bytes.
- (b) The data to be sent is written to the send data storage area.

Example: "ABCDEFGH123" is sent. (The send area addresses are default.)



When the send request signal ($Y_{(n+1)0}$) is turned ON after (a) and (b) above have been executed, the computer link module transmits the set length of data from the send data storage area from the lowest address.

(3) How to detect a send error

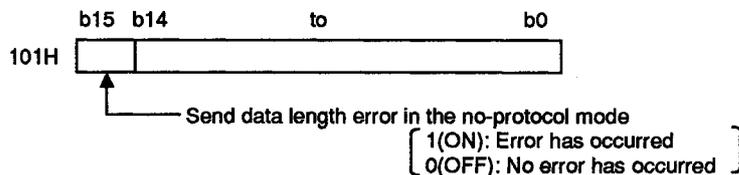
The only error detection the computer link module can carry out in the data send to an external device in the no-protocol mode is whether a correct value is written to the send data length storage area in the buffer memory.

If the set length of send data is incorrect, the computer link module stores the error code at address 101H in the buffer memory.

To confirm occurrence of an error, check for the code at the buffer memory address using the sequence program.

Execute other error detecting procedures at an external device.

- Buffer memory (See Section 8.1 for details.)



REMARK

Determining the operating status of an external device

Connect signals such as the READY signal from an external device to the PC CPU as the input signal and then run a time-out check on the ON/OFF intervals of the signal to determine the status of the external device.



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6.2.3 Handshake I/O Signals

Signals known as I/O handshake signals are required for no-protocol communications.

These signals (a) output data received from the sequence program to an external device, or (b) detect signals from an external device to enable the sequence program to read them.

	Signal	Timing
PC CPU ↓ External device	$Y_{(n+1)0}$ (Send request) X_{n0} (Send completed)	<p>Turned ON by program</p> <p>Turned OFF by program</p> <p>Turned ON by computer link module</p> <p>Turned OFF by computer link module</p>
External device ↓ PC CPU	X_{n1} (Received data read request) $Y_{(n+1)1}$ (Receive data read completed)	<p>Turned ON by computer link module</p> <p>Turned OFF by computer link module</p> <p>Turned ON by program</p> <p>Turned OFF by program</p>

The number "n" appended to X and Y is determined according to the position where the computer link module is loaded and the number of I/O modules loaded to this module.

REMARK

The I/O signals, other than those mentioned above, available in bidirectional mode are: X_{n7} (computer link module READY signal) and X_{nD} (computer link module watchdog timer error signal).

Refer to Section 3.9 for the I/O signals used with the PC CPU.

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6.2.4 Reading and writing buffer memory

A sequence program for reading/writing buffer memory is necessary to execute the operations using the computer link module in the no-protocol mode.

(Refer to the buffer memory list in Section 3.10.)

Write a sequence program as required.

At a start-up of the computer link module, the default values are written to the specific use area in the buffer memory.

	Reading and Writing Operations that Need Sequence Programs	Reference Sections
(1)	To change the default value set to the buffer memory specific use area of the computer link module	Sections 6.2.4(2) and (3)
(2)	To receive data from an external device	Sections 6.2.1 and 6.4
(3)	To transmit data to an external device	Sections 6.2.2 and 6.5
(4)	To clear (nullify) all the data received up to the present from an external device	Section 6.2.1(4)
(5)	To read the LED ON/OFF statuses of the computer link module or turn OFF LEDs during computer linking.	Section 8
(6)	To read the module/signal statuses during computer linking.	Section 8
(7)	To execute transmission control with an external device using the DC code.	Section 9
(8)	To execute half-duplex communication on the RS-232C interface of the computer link module	Section 10

(1) Precautions on reading/writing the buffer memory specific use area

(a) The buffer memory is not backed up by a battery.

All data in buffer memory is reset to the default values when power is turned ON, when the PC CPU is reset, or when the mode is switched. Data changed from the default values must be written whenever any of these events takes place.

(b) Only TO instruction can be used to write data to the specific use area (100H to 11FH). Data written with any other instruction is invalid. If data is written to the buffer memory using the command in a computer program, the computer module will not operate correctly.

(c) If the following functions are used together, make sure to allocate the user area in buffer memory so that the same area will not be used by different functions.

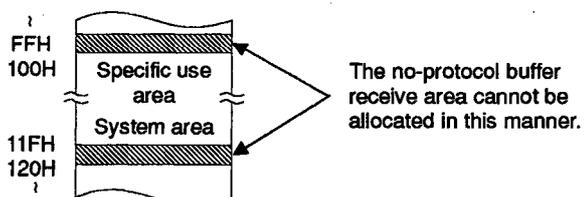
If the same area is allocated to different functions, the data in this area is rewritten and communication will not be correctly executed.

- No-protocol mode send
- No-protocol mode receive
- Buffer memory read/write (CR/CW commands) functions
- On-demand functions

The memory areas preceding and following the specific use area cannot be allocated as a single area.

The areas 0H to FFH and 120H to DFFH must be recognized as independent areas.

Example)



6. COMMUNICATIONS WITH EXTERNAL DEVICES IN THE NO-PROTOCOL MODE

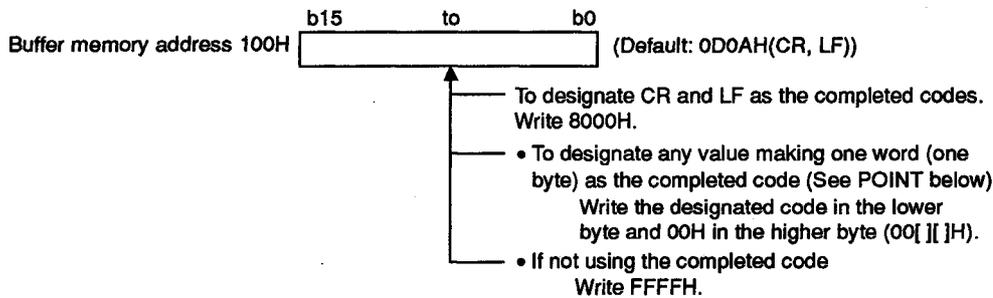
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(2) Changing default values in the buffer memory specific use area

Write an applicable sequence program to change a default value in the specific use area in the buffer memory as follows.

- (a) The no-protocol mode receive completed code designation area (address: 100H)
- By default the computer link module makes a read request to the PC CPU if the variable length data received from an external device contains either or both of the completed code CR and LF. (If both of the CR and LF codes are to be received, the LF code must be received within 60 ms from the reception of the RC code.)
 - To change the completed codewrite a desired receive completion code at the start of the computer link module or at the timing explained in item (4).

SETTING METHOD



POINTS

- (1) Refer to Section 6.2.1(2)(a) for the timing in which the computer link module makes a read request to the PC CPU after receiving the value set to the receive completed code designation area.
- (2) When LF is received after CR with 8000H set as the completed code, the computer link module makes a read request to the sequence program (Xn1 is ON).
No limit is set on the interval between the reception of CR and LF.
It is possible to designate 8000H as the completed code with the computer link modules with the indicated software versions or later in the table.

Applicable Module	AJ71UC24	A1SJ71 UC24-R2/R4/PRF	A1SJ71 C24-R2/R4/PRF	A1SCPU C24-R2	A2CCPU C24	A2CCPU C24-PRF
Version	M	R	M	A	K	K

- (3) The default completed code may be changed to any code making 1 byte in the range of 00H to FFH.
- (4) If no completed code is used, write FFFFH at buffer memory address 100H.
This makes only the setting of data length effective, thus enabling only the read of received data by set data length.
- (5) If the receive complete data length has also been set, a received data request is output (Xn1 comes ON) as soon as the receive completed code is received before receiving the data which is equal to the set complete data length.

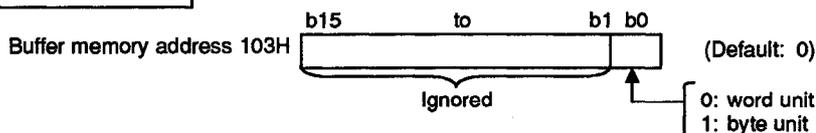
6. COMMUNICATIONS WITH EXTERNAL DEVICES IN THE NO-PROTOCOL MODE

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(b) The no-protocol mode word/byte designation area (address: 103H)

- When the computer link module is started up, the default setting of the length of the data which is sent and received between the PC CPU and the computer link module is the word unit.
- To change the default setting to the byte unit, write "1" at address 103H after the computer link module has started up.
- These units are also used as the unit of send data length in the on-demand functions in the dedicated protocol.

SETTING METHOD



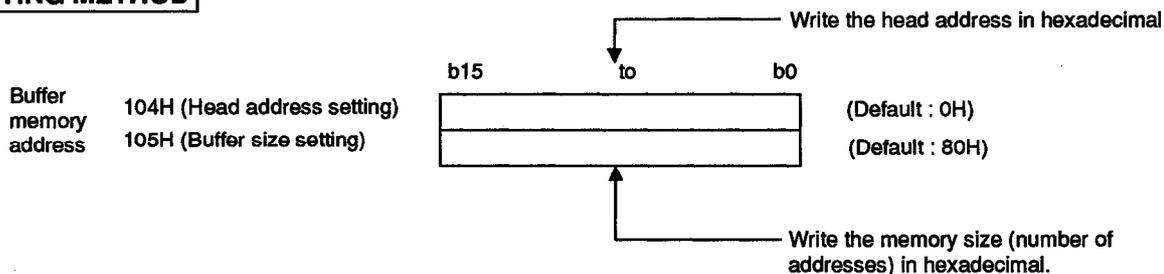
(c) The addresses for changing the buffer memory send area

The no-protocol send buffer memory area head address designation area (Address: 104H)

The no-protocol send buffer memory length designation area (Address: 105H)

- By default, buffer memory addresses of 0H to 7FH (size: 80H) are allocated to store send data from the PC CPU and also the length of the data.
- To change the default send data length and buffer memory area to store send data, write the head address of the new buffer memory area and the new buffer memory size when the computer link module is started up.
- Buffer memory areas 0H to FFH or 120H to DFFH can be allocated to the no-protocol mode send buffer memory (refer to (1)(c)).

SETTING METHOD



POINTS

- (1) Buffer memory addresses 100H to 11FH are for the specific use area and should not be set.
- (2) Buffer memory address 105H should include the storage area of the no-protocol send data length.
- (3) If any range except the user area is set, the computer link module will execute operations with defaults.

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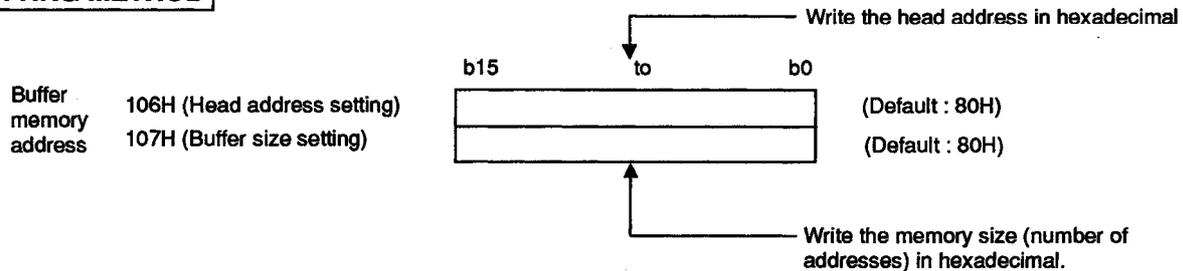
(d) The addresses for changing the buffer memory receive area

The no-protocol receive buffer memory area head address designation area (Address: 106H)

The no-protocol receive buffer memory length designation area (Address: 107H)

- By default, buffer memory addresses of 80H to FFH (size: 80H) are allocated to store data that has been sent from an external device and is to be received by the PC CPU and the length of such data.
- To change the default receive data length and buffer memory area to store received data, write the head address of the new buffer memory area and the new buffer memory size when the computer link module is started up.
- Buffer memory areas 0H to FHH or 120H to DFFH can be allocated to the no-protocol mode receive buffer memory. (Refer to (1)(c).)

SETTING METHOD



POINTS

- (1) Buffer memory addresses 100H to 11FH are for the special application area and should not be set.
- (2) Buffer memory address 107H should include the storage area of the no-protocol receive data length.
- (3) If any range except the user area is set, the computer link module will execute operations with defaults.

(e) The no-protocol receive completion data length designation area (Address: 108H)

- In the default setting of the set data length reception, the computer link module makes a request to read data to the PC CPU when it has received 127 words of data.
(The data unit of the receive completion data length is determined by the value set at memory buffer address 103H.)
- To change the completion data length, write the desired receive completion data length at the start of the computer link module or at the timing explained in item (4).

6. COMMUNICATIONS WITH EXTERNAL DEVICES IN THE NO-PROTOCOL MODE

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SETTING METHOD

Buffer memory address 108H b15 to b0 (Default: 127 words)

↑
Write the length of received data.

POINTS

- (1) Set the length of data to complete the data receive in the following ranges:
 - Length of data received ≤ no-protocol mode buffer size (when word units are set)
 - Length of data received ≤ no-protocol mode buffer size x 2 (when byte units are set)
 - If the received data length is larger than the no-protocol mode buffer memory size, then it is automatically set equal to the no-protocol mode buffer memory size.
- (2) The unit (word/byte) for the data length to complete data receive is determined by the setting described in (2).
- (3) If the receive completed code is set as well, the read request for the received data is sent when the receive completed code is received even if the set data length of data is not received. (Xn1 is ON.)
- (4) To read the received data by fixed data length without setting the completed code, do the following setting:

Buffer memory address 100H b15 to b8 b7 to b0

↑ Write FFFFH.

Buffer memory address 108H b15 to b8 b7 to b0

↑ Write received data length. (Default: 127 words)

- (f) RS-232C CD terminal check designation area (Address: 10BH)
- When an external device is connected on the RS-232C of the computer link module, the setting described in Section 4.6.2 needs to be done.
 - The default setting of the CD terminal check is ON.
 - To turn OFF the CD terminal check, write "1" to buffer memory address 108H when the computer link module is started up.
 - This setting is effective for any function in the dedicated protocol and no-protocol mode.

SETTING METHOD

Buffer memory address 10BH b15 to b1 b0 (Default: 0)

↑ Write 0 or 1

0: Signal status checked (Present)

1: Signal status not checked (Absent)

Ignored

REMARK

For the operation of the computer link module to the CD signal in an RS-232C CD terminal check, refer to Section 4.6.2.

6. COMMUNICATIONS WITH EXTERNAL DEVICES IN THE NO-PROTOCOL MODE

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- (g) The no-protocol receive data clear request area (address: 10DH)
- All received data can be cleared by using this area if an error or some other trouble occurs while receiving data from an external device,
 - Refer to Section 6.2.1 (4) for how to make the received data clear request.
- (h) Areas for changing the communications mode of the RS-232C interface
- RS-232C communications mode setting area (address: 10FH)
 - Simultaneous send priority/non-priority setting area (address: 110H)
 - Send method setting area when transmission is resumed (address: 111H)
- When an external device is connected to the RS-232C interface of the computer link module, the full-duplex transmission with the external device is possible when the computer link module is started up.
 - To perform half-duplex transmission, change the default values when the computer link module is started up as described in Section 10.
- (i) Areas for changing the transmission control mode with the external device
- Transmission control specification area (address: 11AH)
 - DC1/DC3 control code specification area (address: 11BH)
 - DC2/DC4 control code specification area (address: 11CH)
- When the computer link module is started up, DTR/DSR control for the external device is executed only at the RS-232C interface.
 - To execute DC code control at the RS-232C and RS-422 interfaces, change the default settings when the computer link module is started up, as described in Section 9.
 - This setting is effective to all functions available with dedicated protocols and the no-protocol mode.

6. COMMUNICATIONS WITH EXTERNAL DEVICES IN THE NO-PROTOCOL MODE

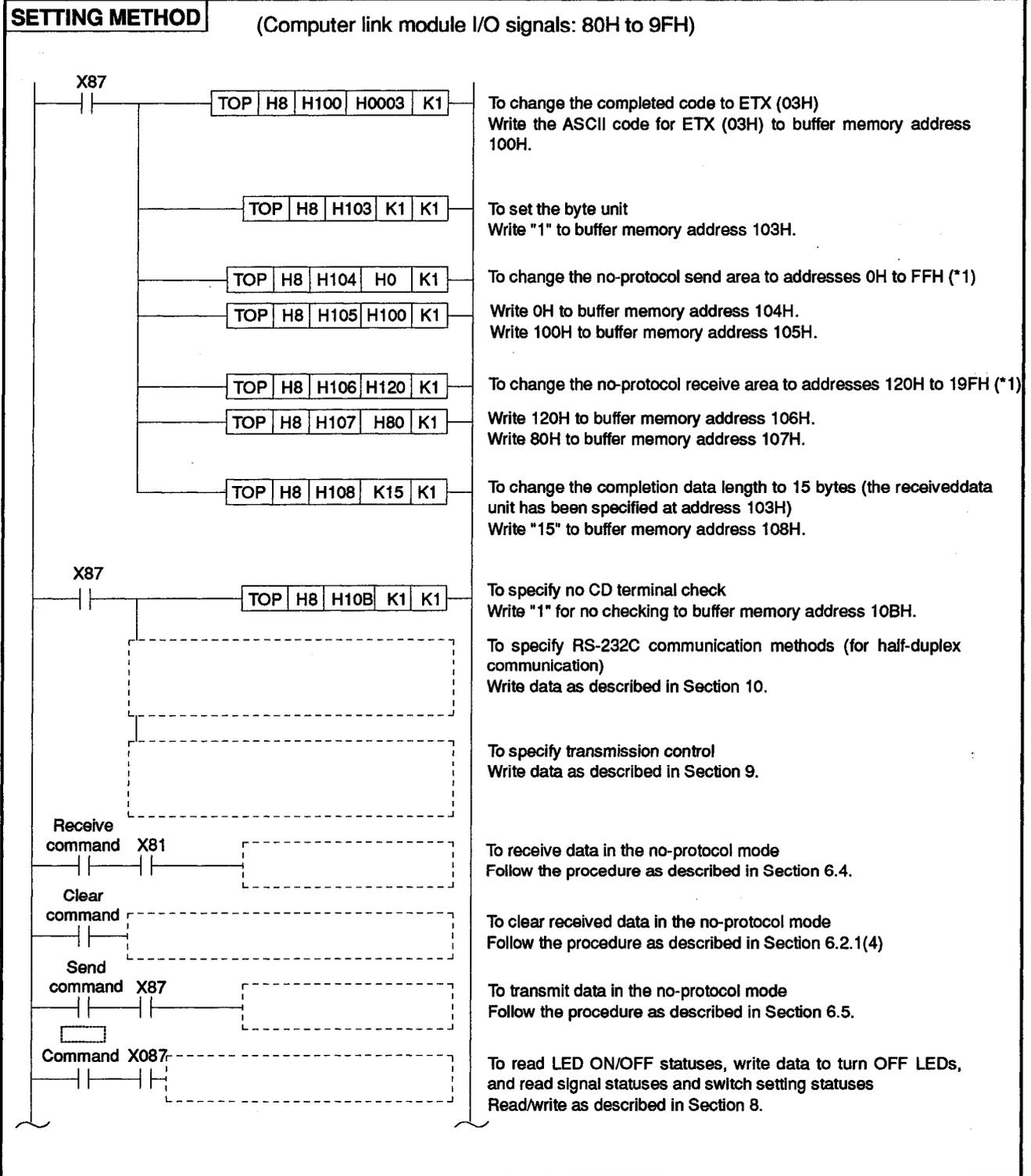
MELSEC-A

(3) Program examples to change the default values in the buffer memory specific use area

The following are program examples to change default values in the buffer memory specific use area.

Incorporate necessary programs only.

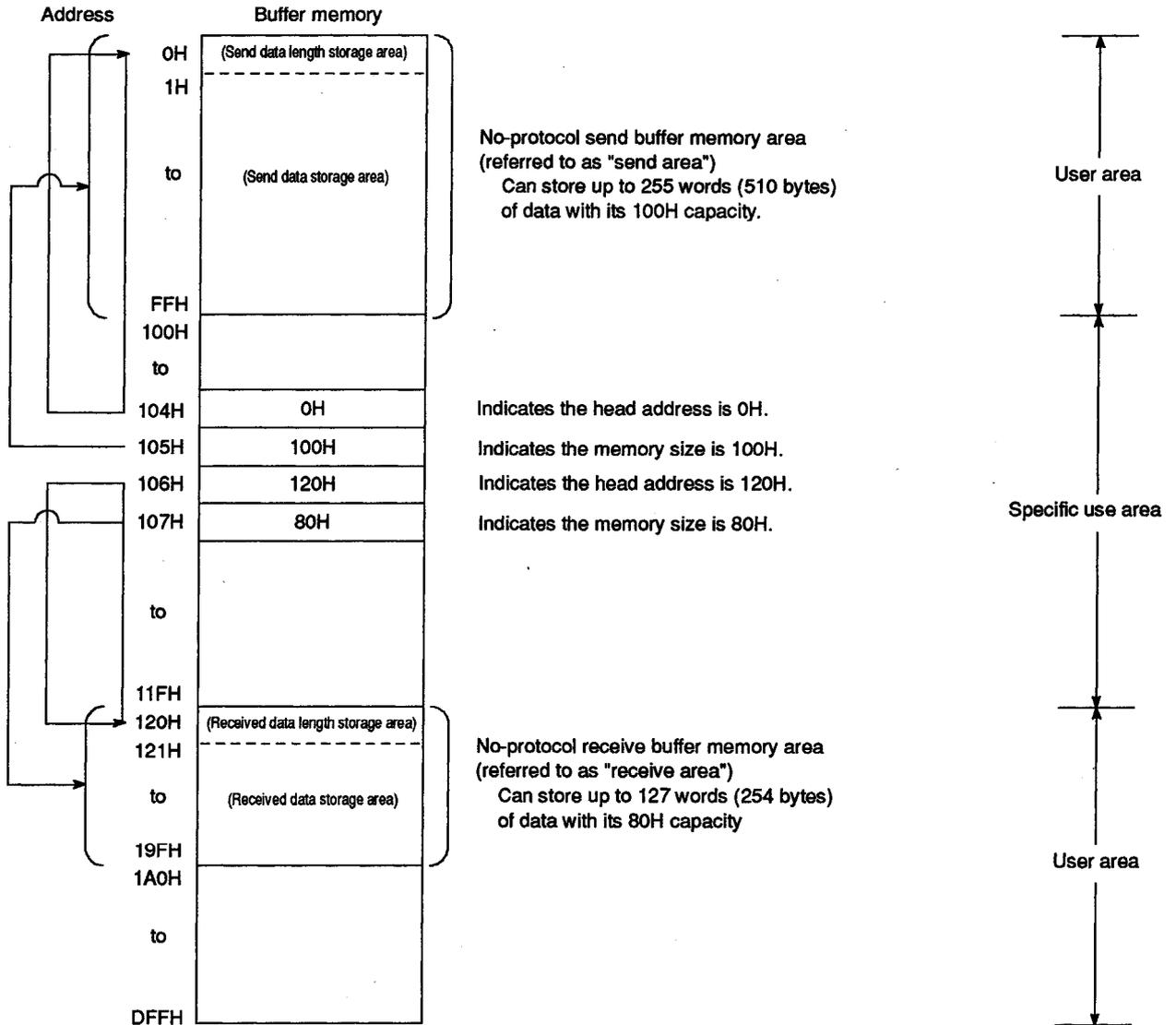
In the following examples, the I/O signals of the computer link module are 80H to 9FH which are handled by the PC CPU.



6. COMMUNICATIONS WITH EXTERNAL DEVICES IN THE NO-PROTOCOL MODE

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*1 The following diagram shows the locations of the send area and the receive area according to the above examples.



REMARK

Refer to Section 3.10 for details of the user area and the specific use area.

6. COMMUNICATIONS WITH EXTERNAL DEVICES IN THE NO-PROTOCOL MODE

Function	Computer link function									
	AJ71UC24	A1SJ71UC24			A1SJ71UC24			A1SCPUC24-R2	A2CCPUC24	A2CCPUC24-PRF
Applicable module	△	-R2	-R4	-PRF	-R2	-R4	-PRF	△	△	△
Remarks	See Section 6.2.4 (4)							See Section 6.2.4 (4)		

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- (4) The following explains the restrictions on modules, and the timing and procedure for changing the settings to continue data receive processing by changing the settings for receiving the data in the no-protocol mode after starting data communication.

- (a) Type names of applicable computer link module

Data receive processing can be continued after changing the settings of the receive completion code and data length after starting data communication.

(): Software version of the corresponding module.

- AJ71UC24 (Version M and later)
- A1SJ71UC24-R2, A1SJ71UC24-R4, A1SJ71UC24-PRF (Version M and later)
- A1SCPUC24-R2 (Version A and later)
- A2CCPUC24, A2CCPUC24-PRF (Version K and later)

- (b) Settings that can be changed

Among the initial settings at the buffer memory of the computer link module, the following setting can be changed after starting data communication.

- No-protocol receive completion code (buffer memory address: 100H)
- No-protocol receive completion data length
(buffer memory address: 108H)

* Conventionally, the setting could be changed only at the start up of the module (computer link module ready signal (Xn7) going from OFF to ON).

For other settings, change them at the start up of the computer link module as made previously.

- (c) Timing and procedure for changing the setting

1) Timing

To change the receive completion code and/or the receive completion data length after starting data communication, do so when the I/O signals, related to reading of the receive data, between the PC CPU and the computer link module are in the state indicated below.

- Receive data read request signal (Xn1) : ON
- Receive data read completion signal (Y(n+1)1) : OFF

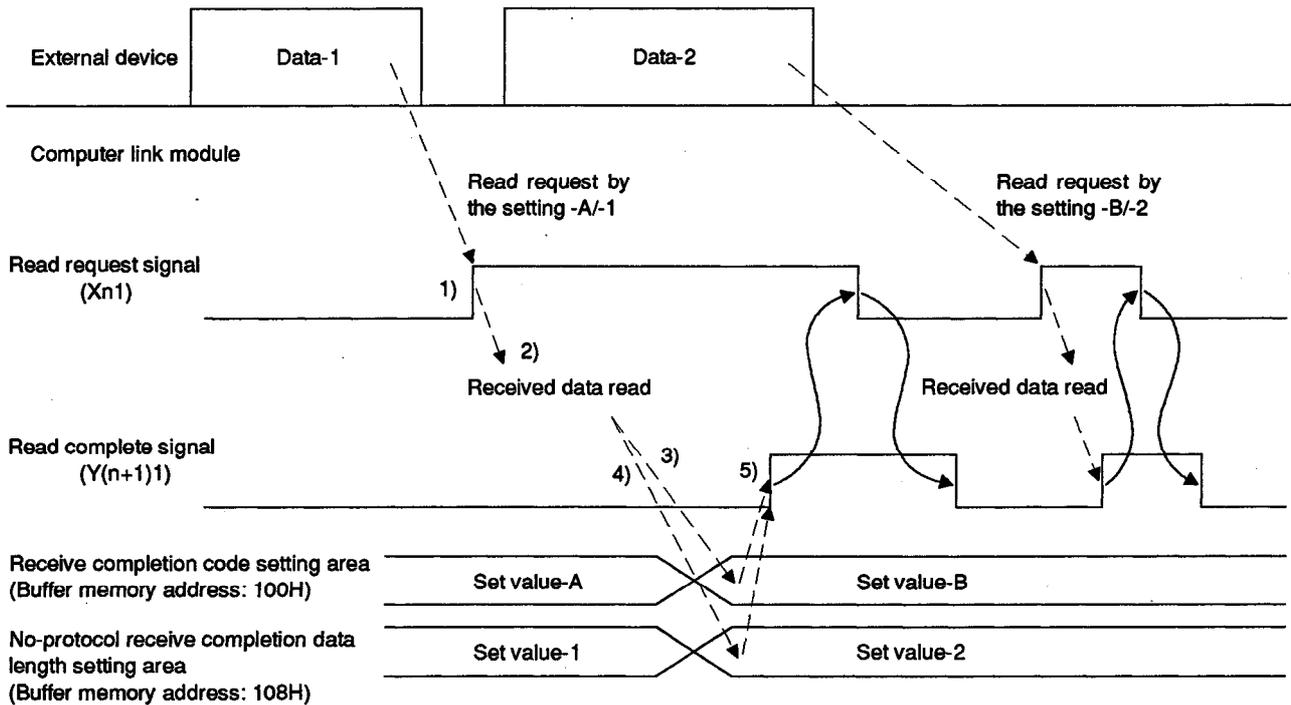
2) Procedure

Turn ON the receive data read completion signal after executing the following when the receive data read request signal is turned ON in response to the receiving of the data from an external device.

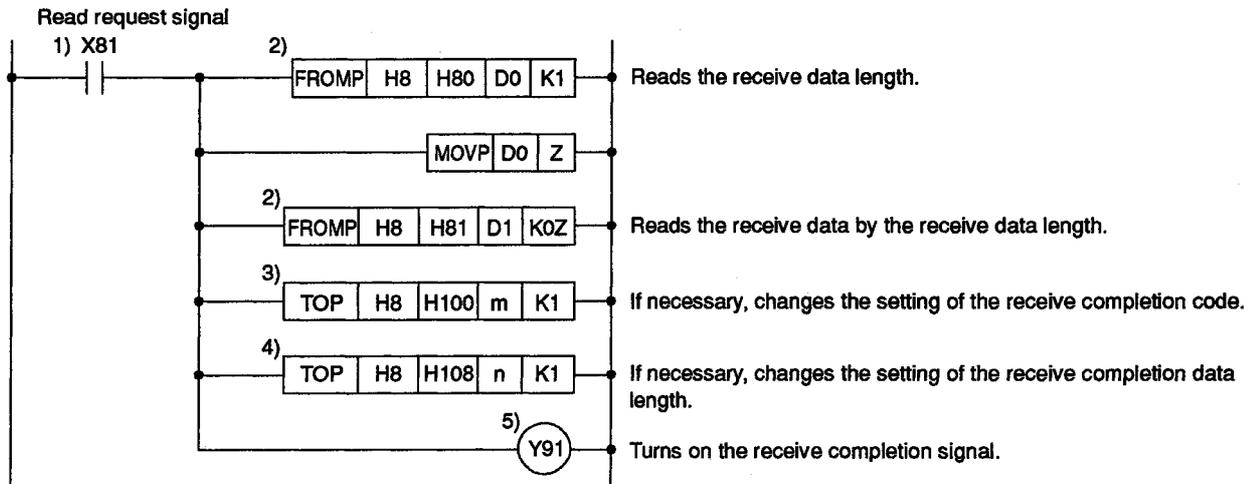
- Reading the received data.
- Changing the no-protocol receive completion code and the no-protocol receive completion data length.

6. COMMUNICATIONS WITH EXTERNAL DEVICES IN THE NO-PROTOCOL MODE

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(Program exampleComputer link module I/O signals: 80H to 9FH)



6. COMMUNICATIONS WITH EXTERNAL DEVICES IN THE NO-PROTOCOL MODE

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6.2.5 Precautions during data communications

- (1) Conditions when the computer link module transmission sequence is initialized

The transmission sequence is initialized in the following cases:

- When the power is turned ON, the PC CPU is reset by the reset switch, or the mode is switched
- If the CD signal is turned OFF during send or receive processing when CD terminal check is enabled on the RS-232C in full duplex communications.

- (2) Using a FROM/TO instruction to access the computer link module

A FROM/TO instruction to access the computer link module from a PC CPU should only be used when absolutely necessary.

This is because when data is transmitted from the computer link module to an external device at the same time a FROM/TO instruction from a PC CPU to the computer link module is executed, the FROM/TO instruction has priority and is processed first.

This delays the data send time from the computer link module by how long it takes to process the FROM/TO instruction.

- (3) Data code conversion

In the no-protocol mode, data is not converted to ASCII code in the computer link module. If ASCII or JIS codes are required, the data must be processed into ASCII or JIS code in the PC CPU or an external device.

- (4) Occurrence of framing errors on the external device

A framing error might occur at an external device while nothing is sent from the computer link module to the external device via the RS-422 interface. (Refer to Section 3.8.3.)

To prevent this, add an identification code to the head of sent data using a sequence program so that the head of the data processed by the computer link module can be recognized as such.

Before conducting data communications via the RS-422 interface, refer to the interface specifications of the computer link module shown in Section 3.8.3.

- (5) Communications with the computer in multidrop link

In the 1:n multidrop link, the data sent from the computer is received by each computer link module.

The message must contain the objective PC CPU where the data is sent and, at the same time, it is necessary to write the sequence program that ignores the received data addressed to other stations.

(Message example)

STX (02H)	Space (20H)	Station number 0 (30H)	2 (32H)	Data length (Binary data)	Data	CR (0DH)	LF (0AH)
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6. COMMUNICATIONS WITH EXTERNAL DEVICES IN THE NO-PROTOCOL MODE

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(6) Combined use with dedicated protocols

When data communications is executed in the no-protocol mode, if the computer link module mode setting switch (refer to Section 4.2.1) is placed in any position from 1 to 8, or any mode number from 1 to 8 is designated by the mode switching function, data communications with the other interface can be executed using the dedicated protocol.

Data communications cannot be executed by setting one interface to the bidirectional mode and the other to the no-protocol mode.

(7) Operations prohibited during data send

Do not attempt either or the following while data is being sent from a computer link module to an external device, otherwise the computer link module will stop sending the data and the send completed signal (Xn0) will come ON.

(Prohibited operations)

- When executing data communication via an RS232C interface, switching the CD signal OFF when "CD terminal check enabled" has been set in buffer memory address 10BH and the external device is controlling the CD signal of computer link module. (The computer link module will also fail to send data and will switch the send completed signal ON if the CD signal is OFF when sending is started.)
- Issuing a receive data clear request.

(8) Changing the receive completion code and the receive completion data length

To continue data receive processing by changing the setting for data receive processing (receive completion code and receive completion data length) after starting the data receive processing, change the setting at the timing and in the procedure described in 6.2.4, item (4).

6.3 Pre-Operation Check Points

Refer to Section 4 for the start-up procedure of the computer link module in the no-protocol mode.

Recheck the following items before starting operations to secure normal performance of the computer link module.

	Check Item	Reference Sections
(1)	Switch settings	Section 4.2
(2)	Operation of the computer link module	Sections 4.5 and 4.8.1
(3)	Connection with an external device	Section 4.6
(4)	Connection/setting of a terminal resistor	Section 4.7

POINT

Unless these items are correctly set in the no-protocol mode, normal computer linking cannot be established.

Recheck the above items before starting operations.

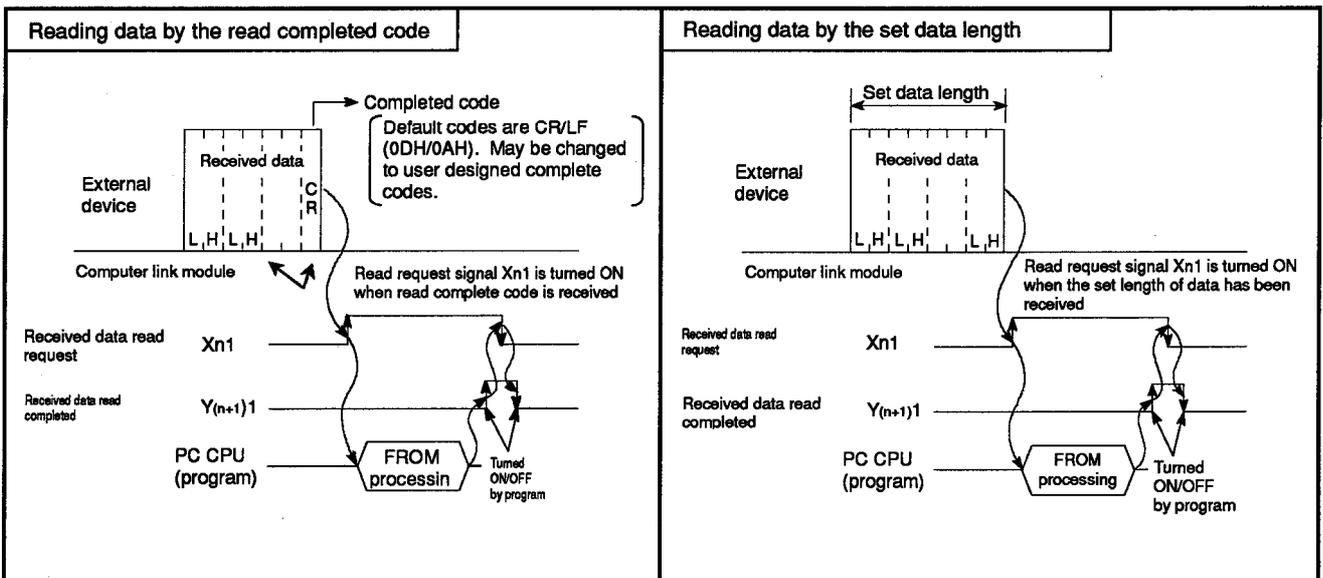
6. COMMUNICATIONS WITH EXTERNAL DEVICES IN THE NO-PROTOCOL MODE

6.4 Data Receiving Procedure in the No-Protocol Mode (External Device → Computer Link Module)

"Data receiving" is data processing where the computer link module stores data received from an external device in the buffer memory data receive area and then a sequence program reads the stored data using the FROM instruction.

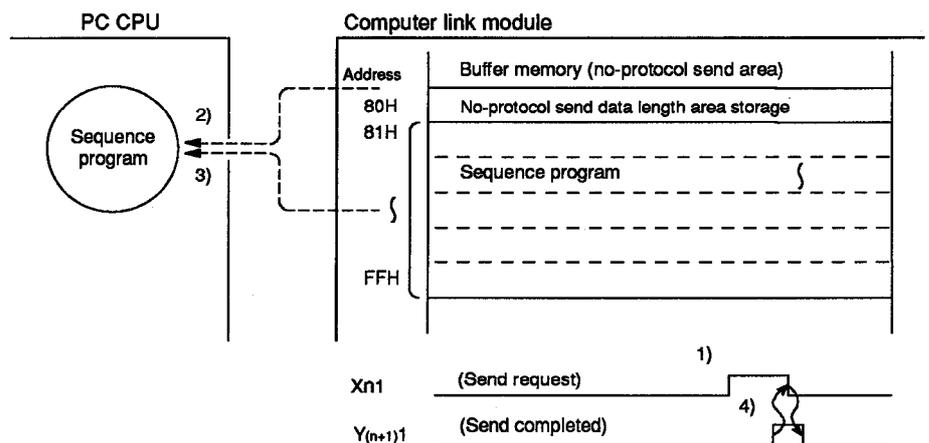
6.4.1 Data receive procedure

The following diagrams show the data receive process to read out data to the PC CPU in the no-protocol mode.



6.4.2 Data receive program

Shown below are basic sequence programs and programming examples to read data from the buffer memory (receive area) to the PC CPU. Data is read from the buffer memory receive area (default: 80H to FFH).



1) to 4) in the diagram corresponds to 1) to 4) in (1)(a) and (2)(a) of this section.

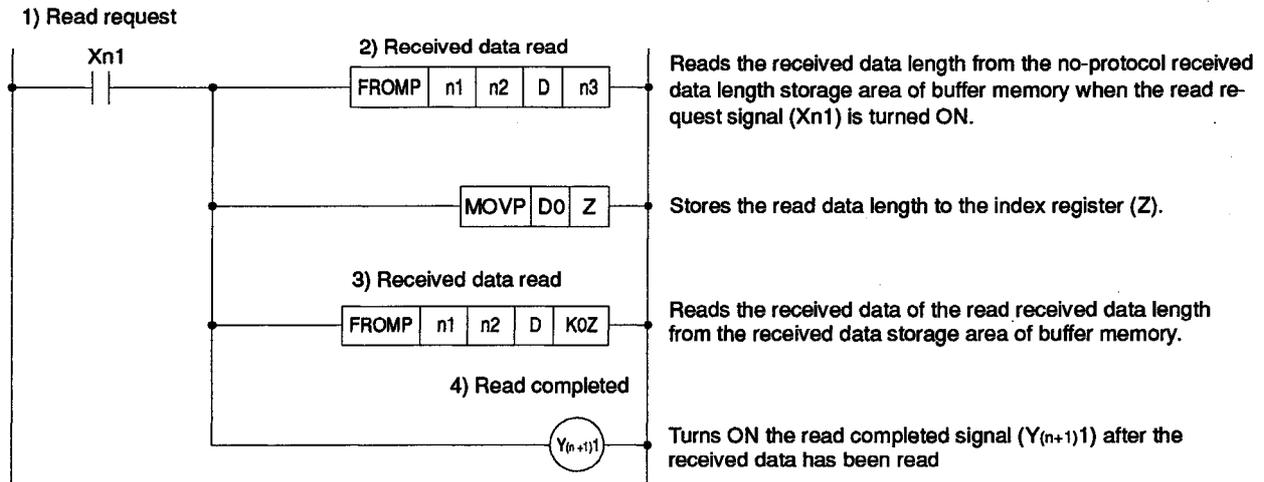
6. COMMUNICATIONS WITH EXTERNAL DEVICES IN THE NO-PROTOCOL MODE

(1) Basic sequence program to use application instructions (FROM, FROMP, DFRO, DFROP instructions)

(a) Format to read from the receive area

Refer to the Programming Manual (Common Instructions) for details.

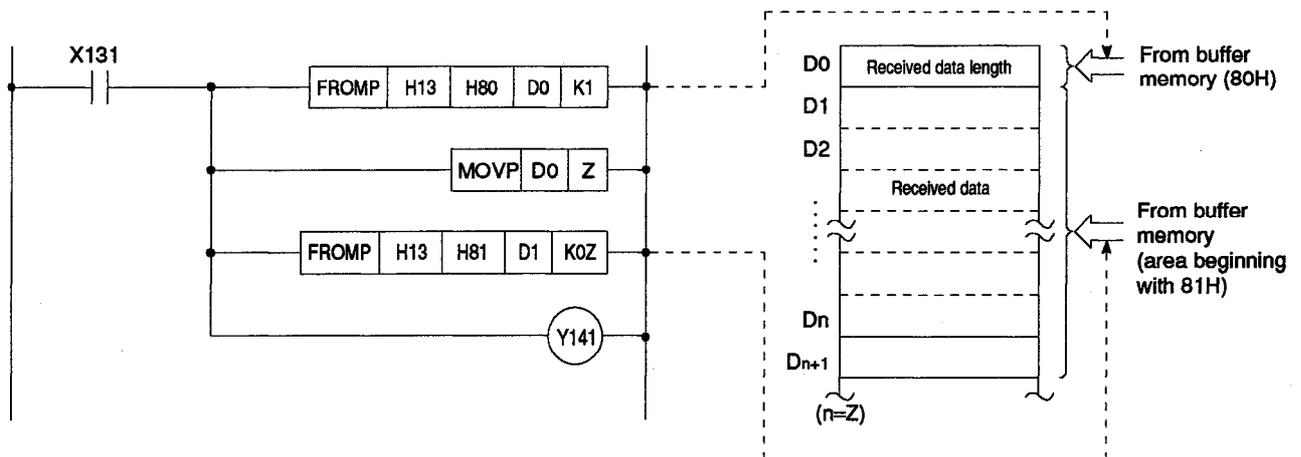
FORMAT



* Data read by program 3) is processed as the received data.

(b) Programming example

To read the data of (n+1) words from the area, beginning with buffer memory address 80H, to the area beginning with D0 when the computer link module I/O numbers are allocated to 130H to 14FH.



6. COMMUNICATIONS WITH EXTERNAL DEVICES IN THE NO-PROTOCOL MODE

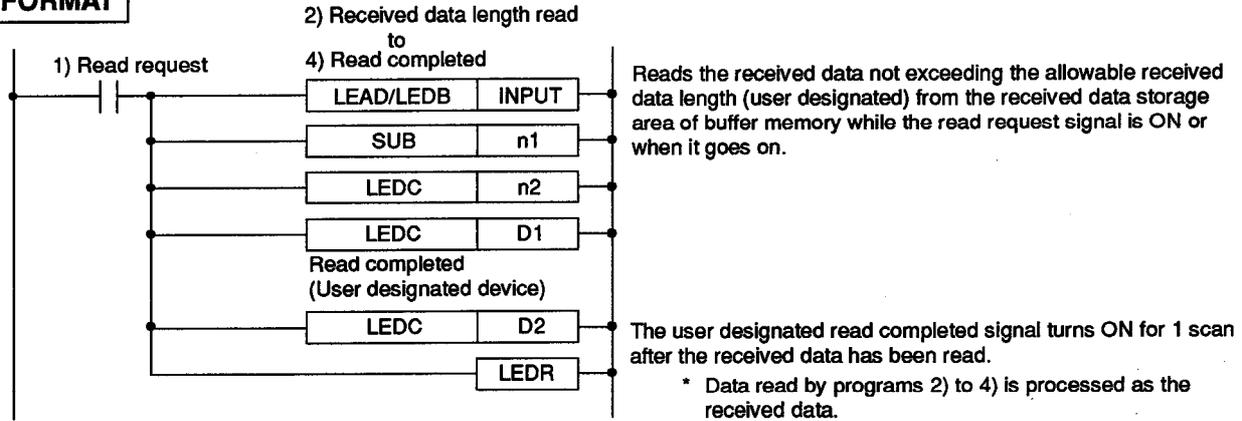
MELSEC-A

(2) Basic sequence program to use the dedicated instruction (INPUT in-struction)

(a) Format to read from the receive area

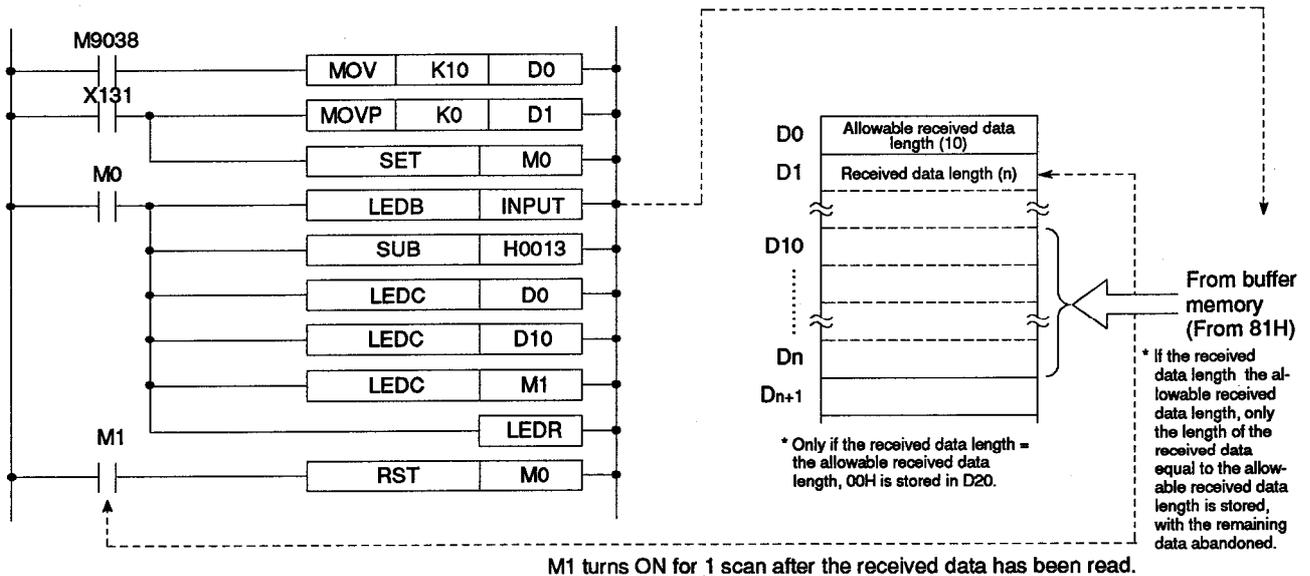
Refer to the Programming Manual (Dedicated Instructions) for details.

FORMAT



(b) Programming example

To transmit received data not exceeding 10 words to the memory area from D10 when the I/O signals of the computer link module are allocated to 130H to 14FH.



POINT

If the dedicated instructions are used, set the number of I/O points (F32 points) and the model name of the applicable module (as given in the table below) to the area for the slot to mount the computer link module in the I/O allocation parameters to be written to the PC CPU. Refer to the Programming Manual (Dedicated Instructions) for details.

PC CPU Mounted with a Computer Link Module	Mounted Computer Link Module					
	AJ71UC24	A1SJ71UC24-R2/R4/PRF	A1SJ71C24-R2/R4/PRF	A1SCPU C24-R2	A2CCPU C24	A2CCPU C24-PRF
AnUCPU	AJ71UC24		AJ71C24S3			
AnACPU	AJ71C24S3					
Other than AnA/AnUCPU	No setting necessary; dedicated instructions unusable					

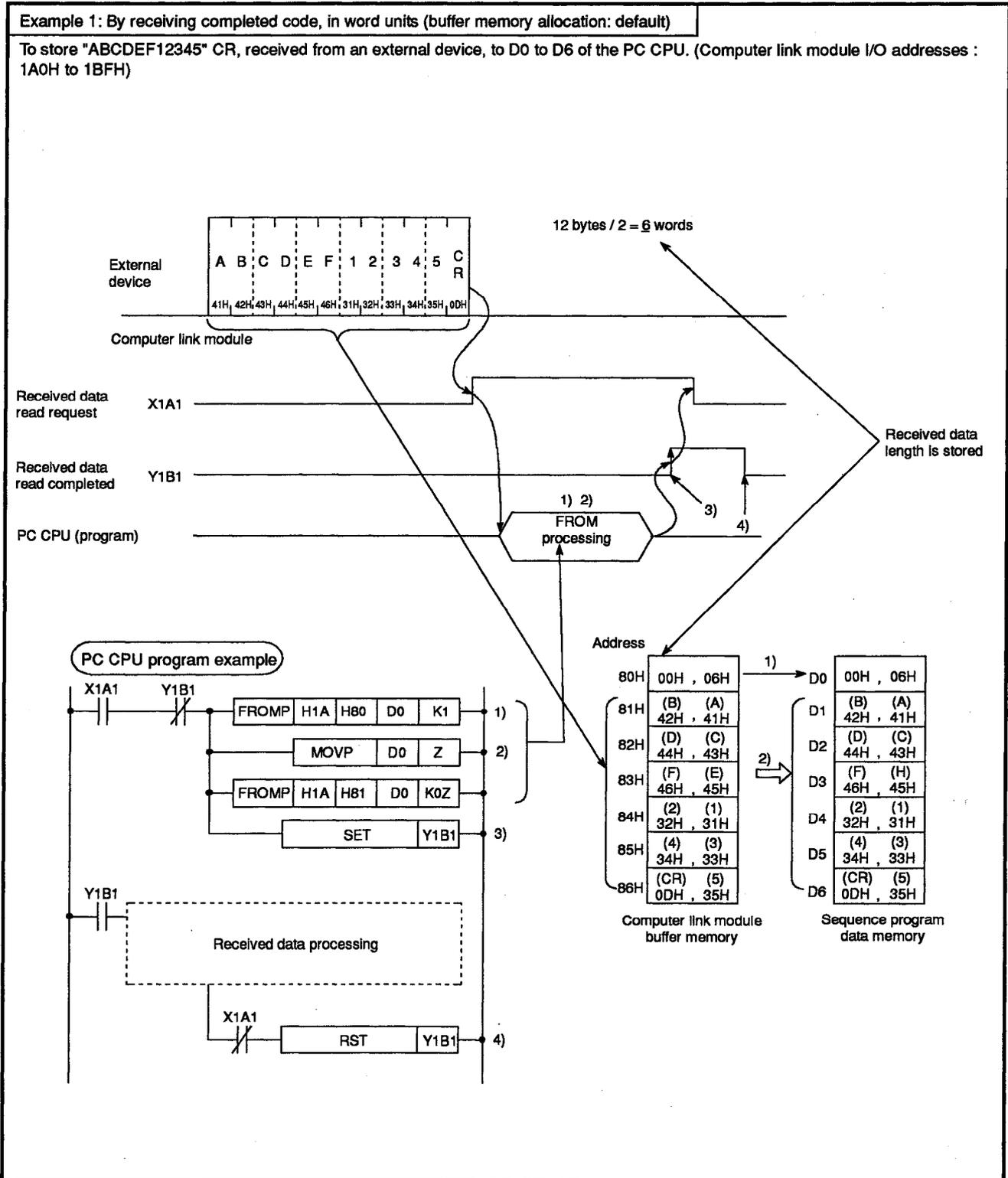
6. COMMUNICATIONS WITH EXTERNAL DEVICES IN THE NO-PROTOCOL MODE

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(3) Application example

The following describes examples to store received data in the read data register using application instructions.

Even if a dedicated instruction is used, the same result can be obtained, although different sequence programs are used.

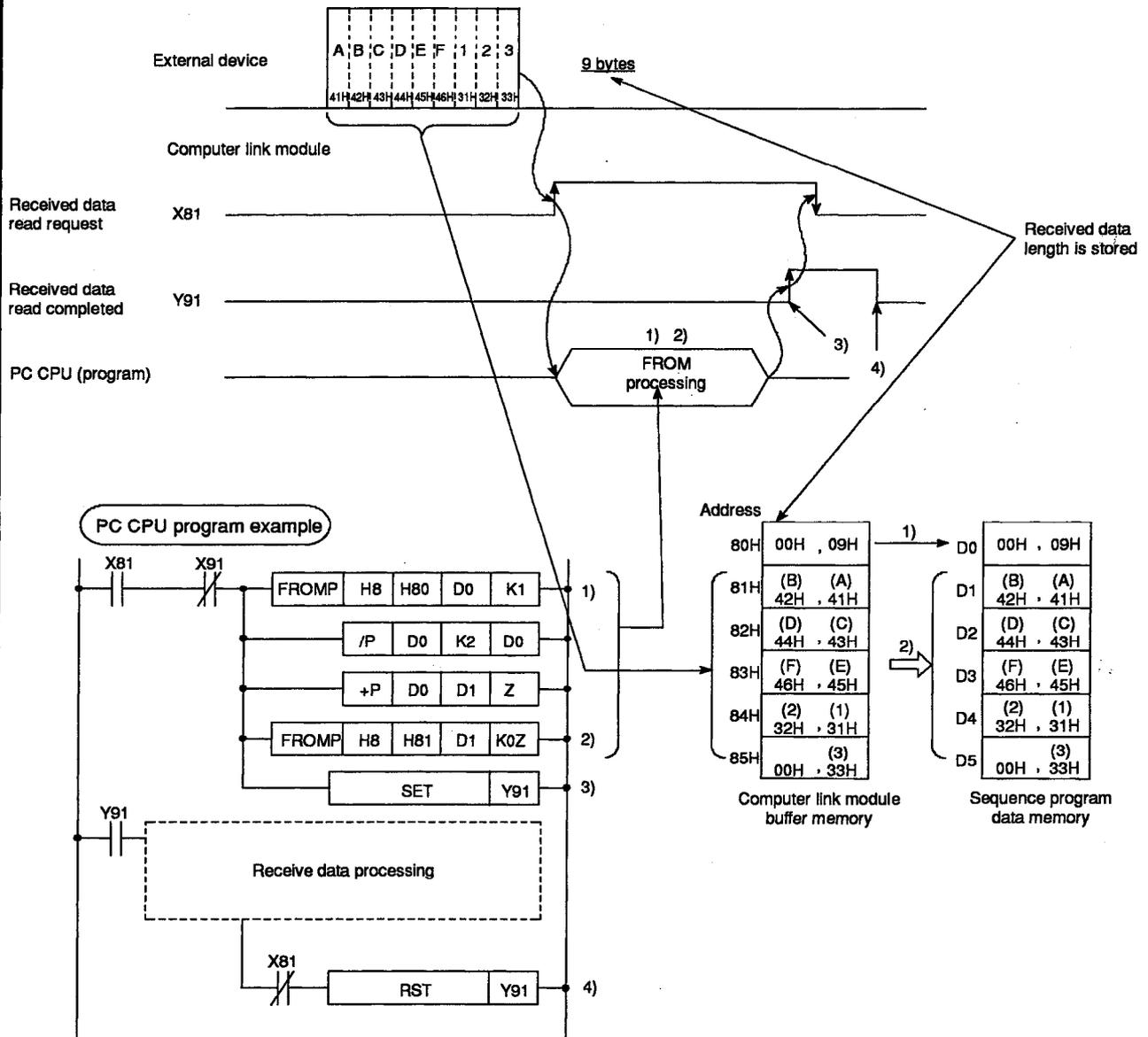


6. COMMUNICATIONS WITH EXTERNAL DEVICES IN THE NO-PROTOCOL MODE

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Example 2: By receiving the set length of data, in byte units (receive area allocation: default)

To receive "ABCDEF123" from an external device and store it to D0 to D5 of the PC CPU with the receive complete data length set as "9". (Computer link module I/O addresses: 80H to 9FH)



POINTS

- (1) Even if transmission data units are set to byte units, the FROM instruction in a sequence program operates in word units. Therefore, the length of receive data must be converted to the number of buffer memory points (word units).
In the above example, 9 bytes of data must be converted into 5 words ($9 \div 2 = 4.5 \dots 5$).
- (2) When an odd number of bytes of data is received, the higher 8 bits of the last address read by the FROM instruction are "00H".

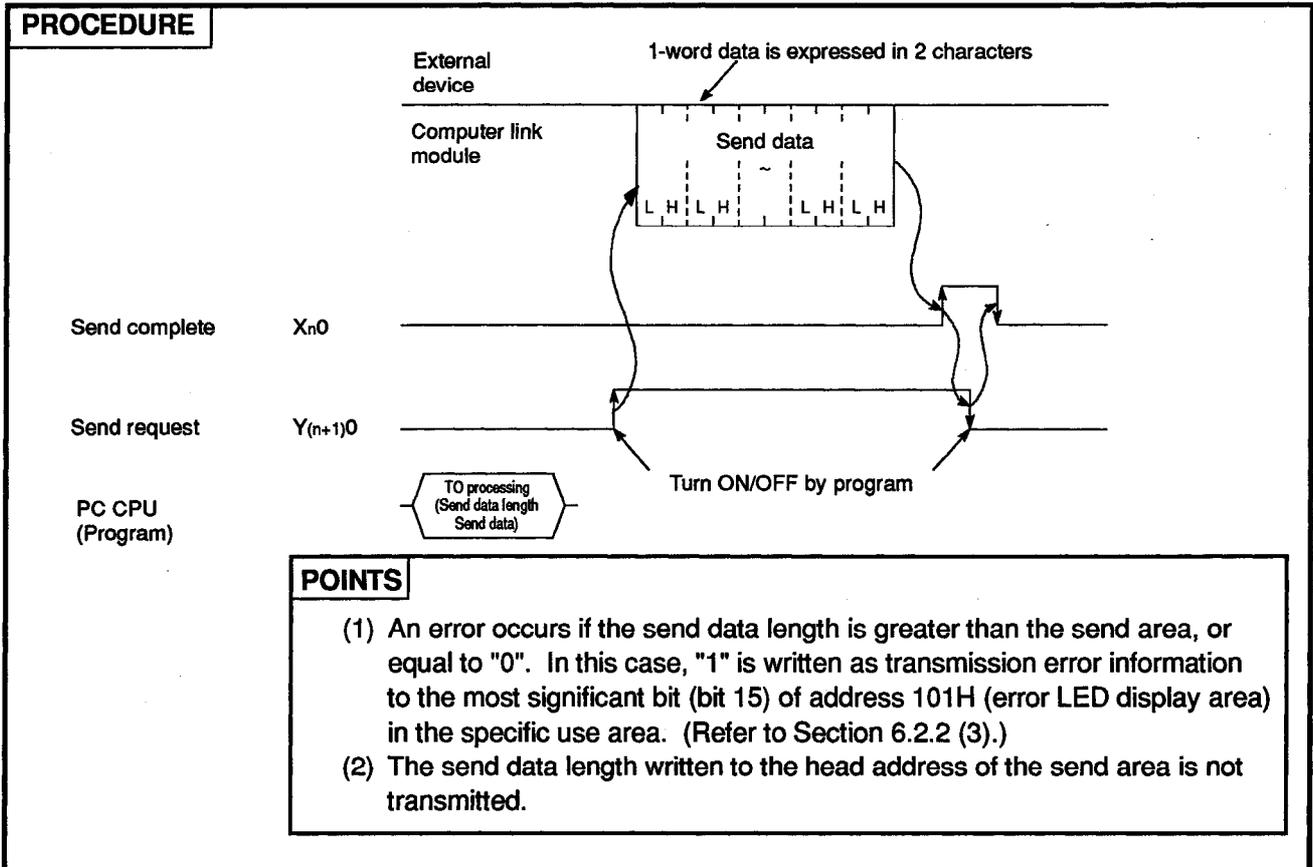
6. COMMUNICATIONS WITH EXTERNAL DEVICES IN THE NO-PROTOCOL MODE

6.5 Data Sending Procedure in the No-Protocol Mode (Computer Link Module → External Device)

"Data sending" is data processing where, in response to the send request signal (Y(n+1)0) from the PC CPU, the computer link module transmits data written to the buffer memory send area by a sequence program using the TO instruction to an external device.

6.5.1 Data sending procedure

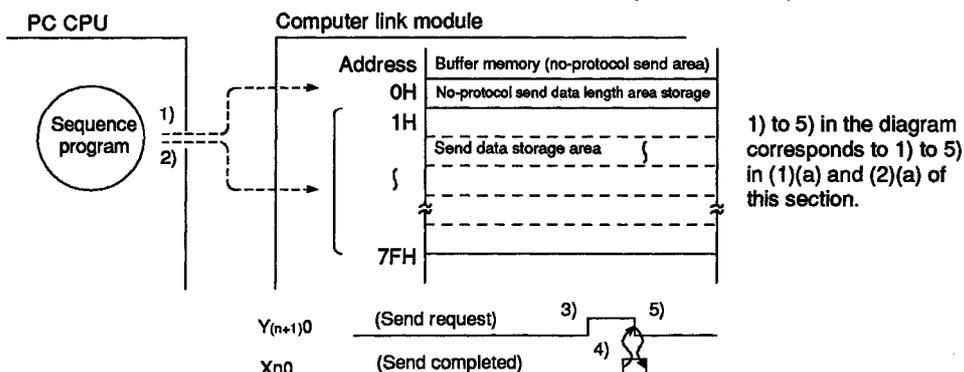
The following describes the procedure to send data written to the send area to an external device.



6.5.2 Data sending program

Shown below are basic programs and programming examples to send data from the PC CPU to an external device.

Data is written to the buffer memory send area (default addresses: 0H to 7FH).



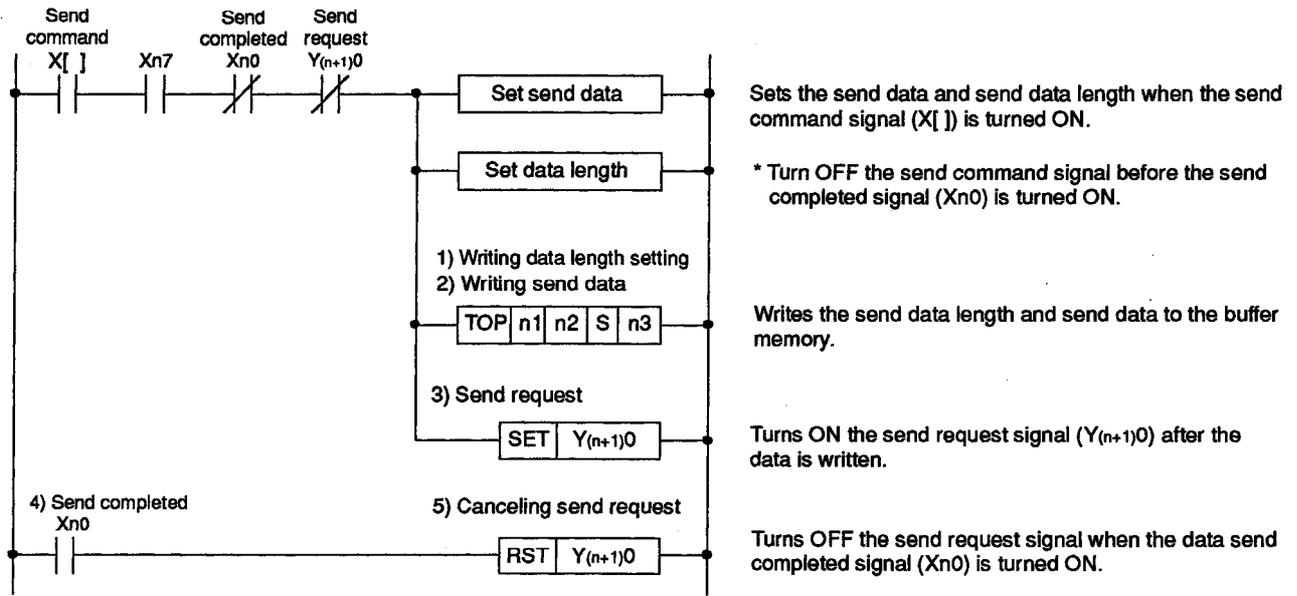
6. COMMUNICATIONS WITH EXTERNAL DEVICES IN THE NO-PROTOCOL MODE

(1) Basic sequence program to use application instructions (TO, TOP, DTO, DTOP instructions)

(a) Format to write to the send area

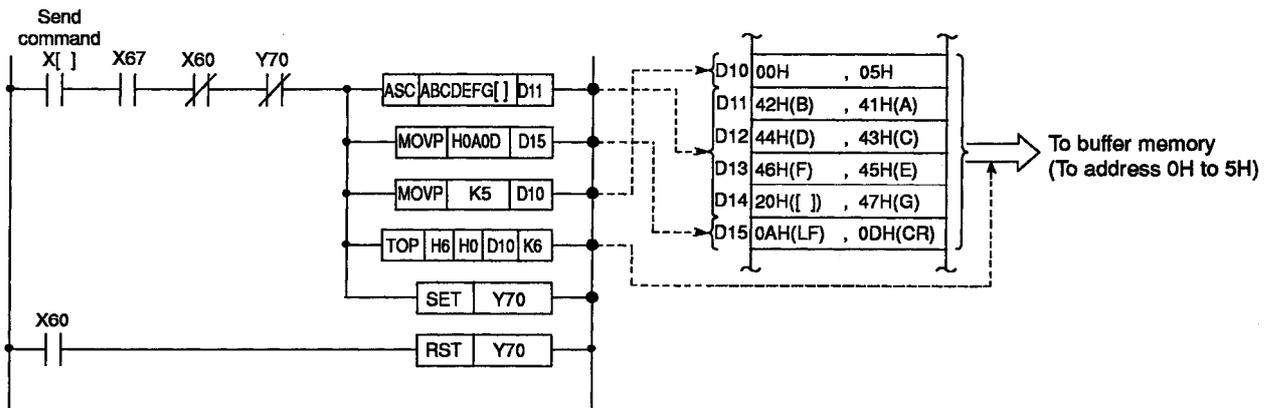
Refer to the Programming Manual (Common Instructions) for details.

FORMAT



(b) Programming example

To transmit 5-word data after writing "ABCDEFGG_CR.LF" to the buffer memory area from 1H when the computer link module I/O numbers are allocated to 60H to 7FH. (The designated unit of data is "word" in the example.)



6. COMMUNICATIONS WITH EXTERNAL DEVICES IN THE NO-PROTOCOL MODE

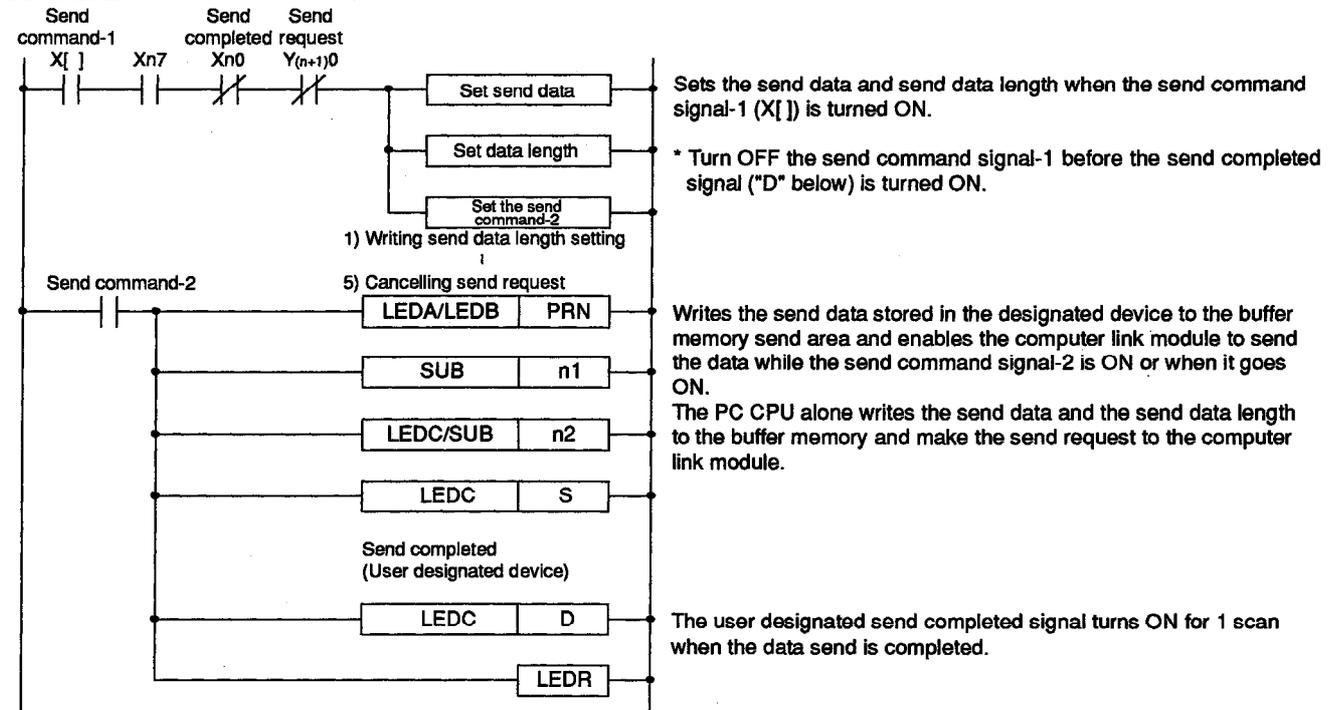
(2) Basic sequence program to use dedicated instructions (PRN, PR instructions)

[When to use the PRN instruction]To transmit set length of data in byte/word units

(a) Format to write to the send area

Refer to the Programming Manual (Dedicated Instructions) for details.

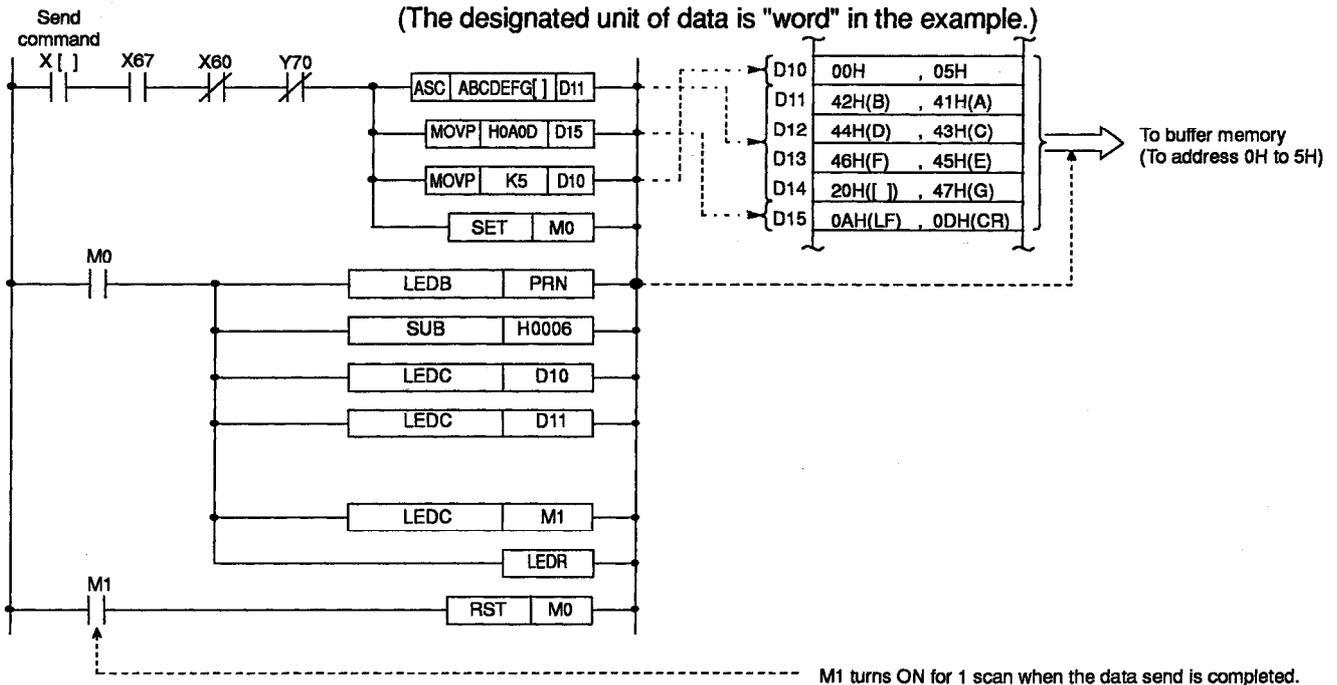
FORMAT



(b) Programming example

To transmit 5-word-long data after writing "ABCDEFGG_CR.LF" to the buffer memory when the I/O numbers of the computer link module are allocated to 60H to 7FH.

(The designated unit of data is "word" in the example.)

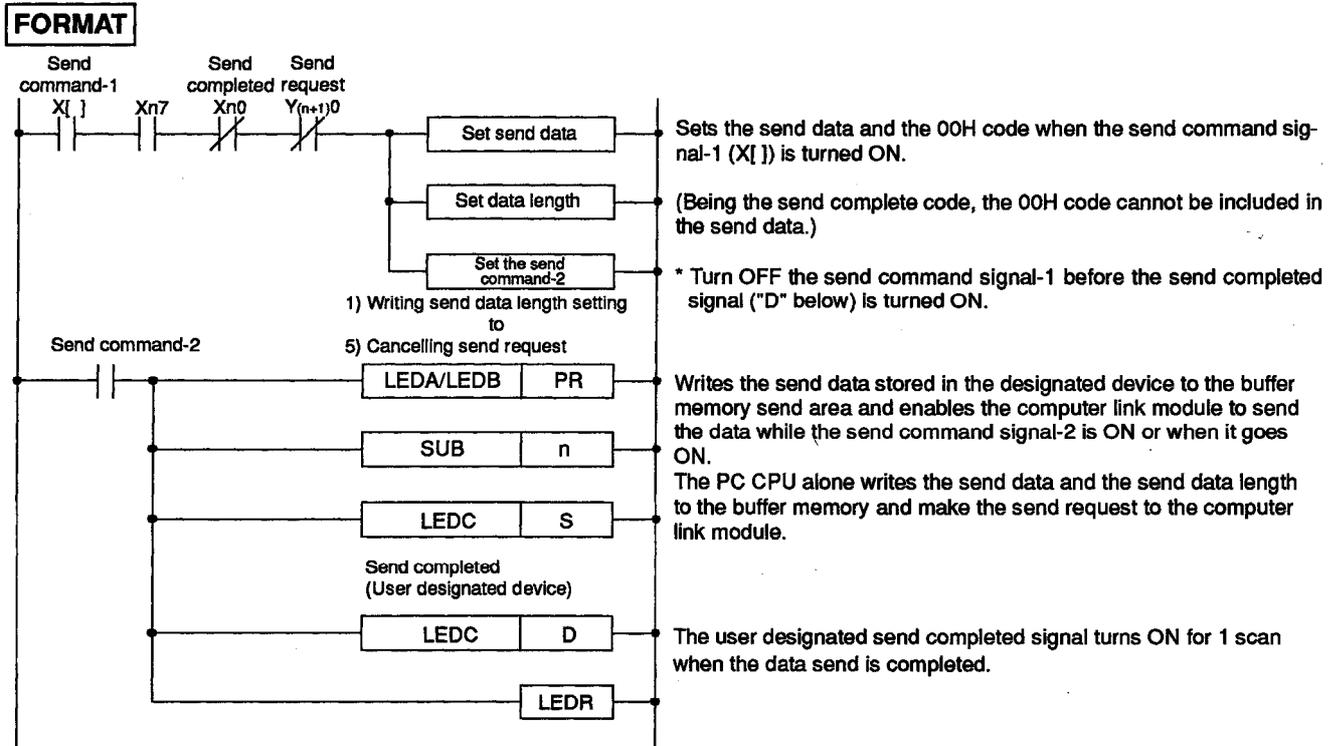


6. COMMUNICATIONS WITH EXTERNAL DEVICES IN THE NO-PROTOCOL MODE

[To use the PR instruction] To transmit data up to the address immediately before the 00H code.

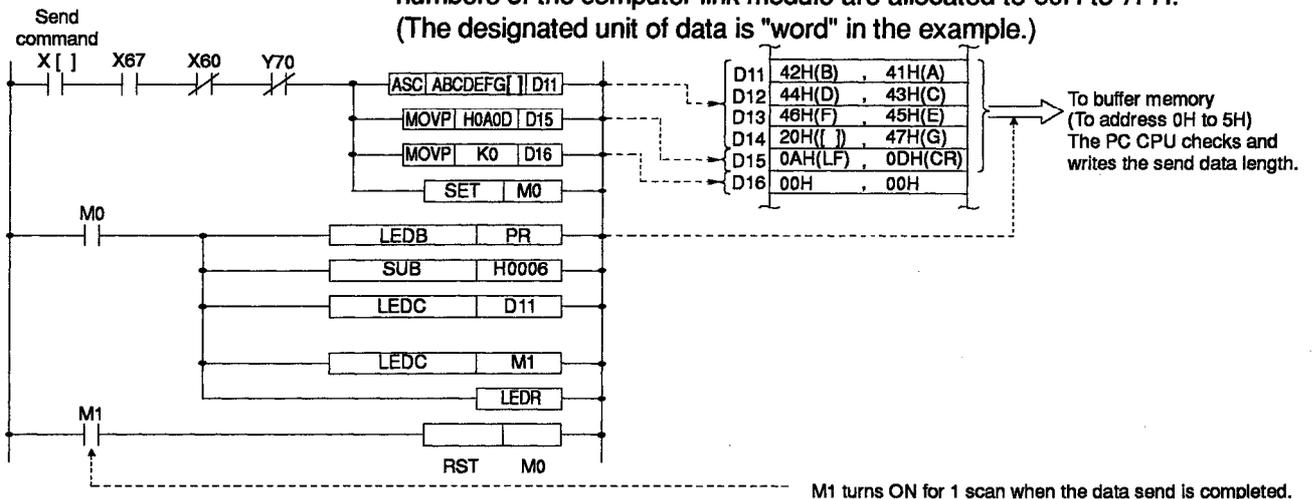
(a) Format to write to the send area

Refer to the Programming Manual (Dedicated Instructions) for details.



(b) Programming example

To transmit "ABCDEFGH_CR.LF" to the buffer memory when the I/O numbers of the computer link module are allocated to 60H to 7FH. (The designated unit of data is "word" in the example.)



POINT

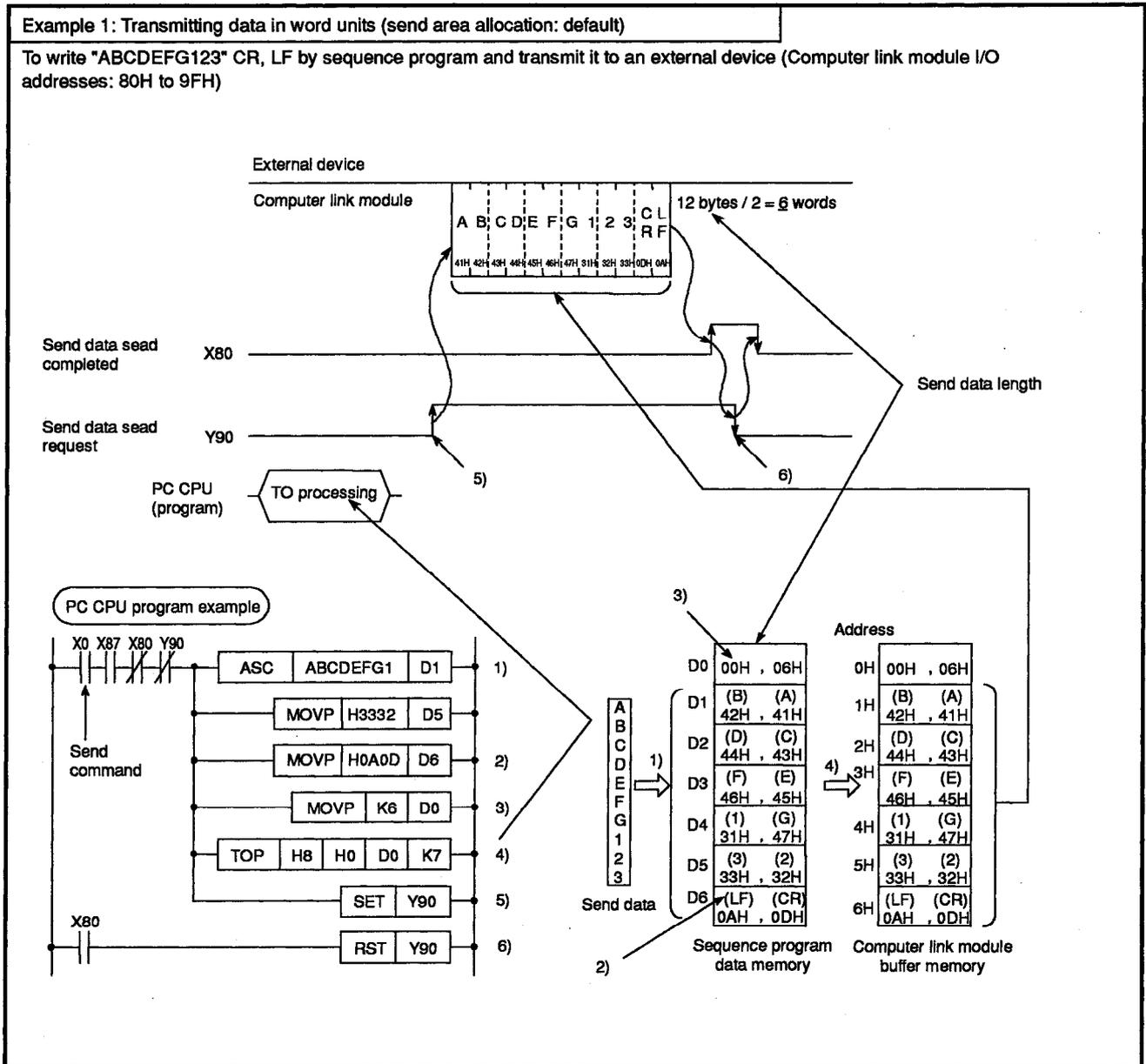
If the dedicated instructions are used, set the number of I/O points (F32 points) and the model name of the applicable module (as given in the table below) to the area for the slot to mount the computer link module in the I/O allocation parameters to be written to the PC CPU. For the applicable model names, refer to POINT in Section 6.4.2(2). Refer to the Programming Manual (Dedicated Instructions) for details.

6. COMMUNICATIONS WITH EXTERNAL DEVICES IN THE NO-PROTOCOL MODE

(3) Examples of application instructions

The following describes examples to store received data in the read data register using application instructions.

Even if a dedicated instruction is used, the same result can be obtained, although different sequence programs are used.

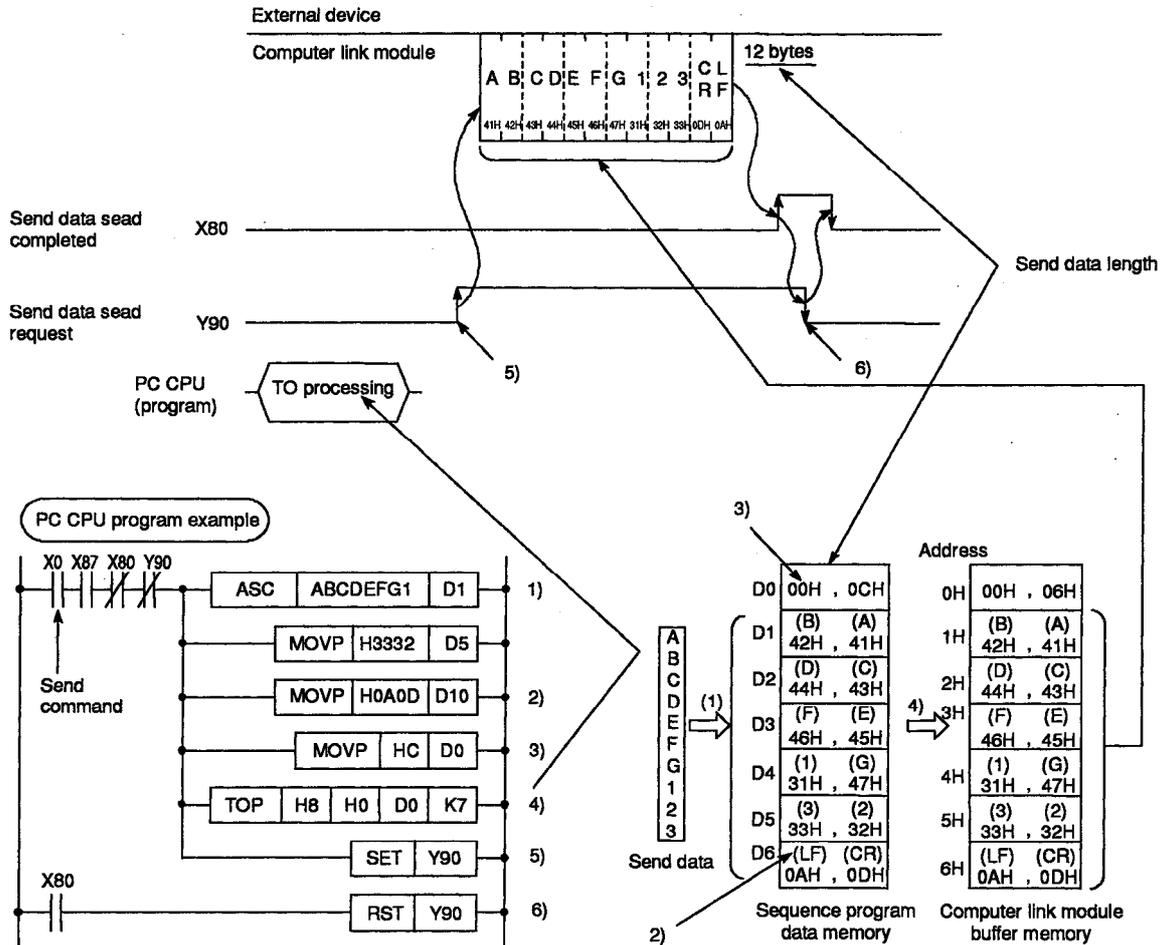


6. COMMUNICATIONS WITH EXTERNAL DEVICES IN THE NO-PROTOCOL MODE

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Example 2: Transmitting data in byte units (send area allocation: default)

To write "ABCDEFG123" CR, LF by sequence program and transmit it to an external device (Computer link module I/O addresses: 80H to 9FH)



POINT

Even if transmission data units are set byte units, the TO instruction in a sequence program operates in word units. Therefore, the length of send data differs from the data length set with the TO instruction.

7. COMMUNICATIONS WITH A COMPUTER IN THE BIDIRECTIONAL MODE

MELSEC-A

7. COMMUNICATIONS WITH A COMPUTER IN THE BIDIRECTIONAL MODE

This section describes the method applied to link a computer with a PC CPU for bidirectional transmissions (supported in bidirectional mode).

Bidirectional communications with a computer is possible only when a computer and a computer link module are linked in a 1 : 1 ratio.

Always read this section when the RS-422 and RS-232C interfaces are used in the bidirectional mode with the mode setting switch of the computer link module being set to any position from "1" to "8" or with the mode switching function being used to set the mode number to any of "1" to "8".

It is not necessary to read this section when the interfaces are used with a dedicated protocol and in the no-protocol mode.

POINT

Buffer memory used in the bidirectional mode

In sections other than this, buffer memory used in the bidirectional mode is described as the buffer memory used for the no-protocol mode. Because the application purposes are the same, simply think of the "no-protocol mode" as the "bidirectional mode".

Examples:

- No-protocol mode send area
→ Bidirectional mode send area
- No-protocol send buffer memory head address setting area
→ Bidirectional send buffer memory head address setting area

7. COMMUNICATIONS WITH A COMPUTER IN THE BIDIRECTIONAL MODE

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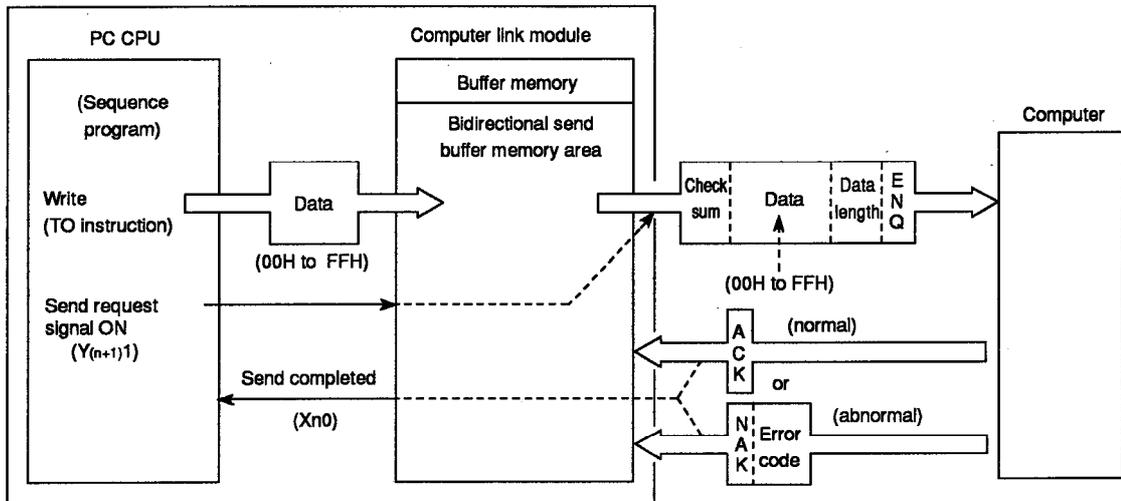
7.1 Data Flow in the Bidirectional Mode

The following figures show schematic data transmission processes between a PC CPU and a computer.

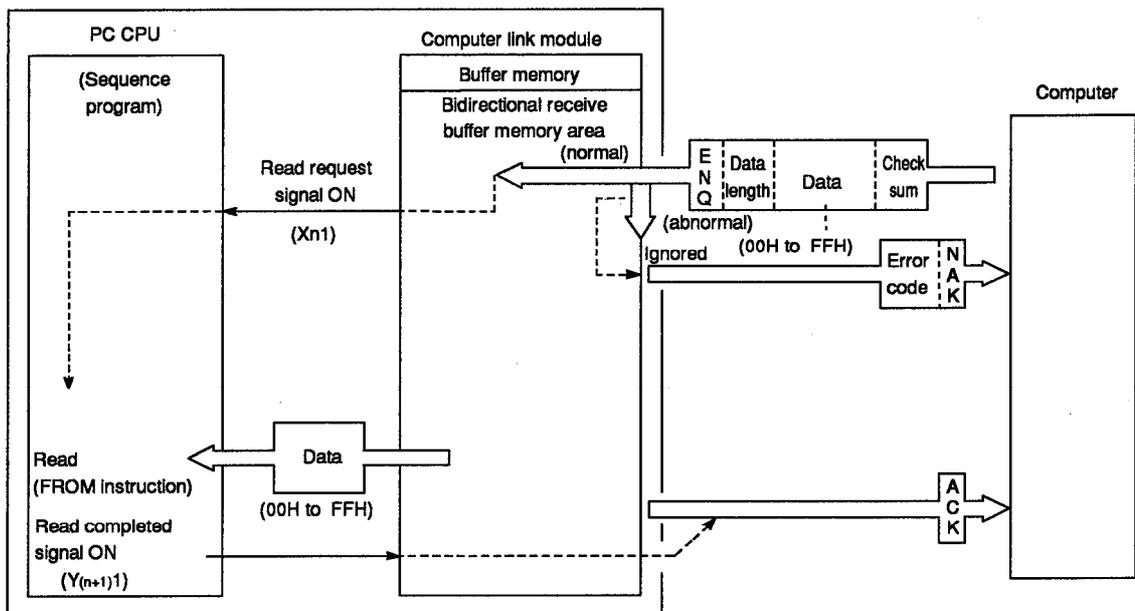
When data is sent to a computer, the computer link module adds a control code etc. to the send data designated by the PC CPU and sends it to the computer. (The send data designated by the PC CPU is sent without changing its code.)

When data is received, the computer link module removes a control code etc. from the received message and transfers it to the PC CPU without changing its code. Therefore, the BIN data (numeric data) can be handled as the transmission data.

(1) When a PC CPU sends data to a computer



(2) When a PC CPU reads data received from a computer



7. COMMUNICATIONS WITH A COMPUTER IN THE BIDIRECTIONAL MODE

7.2 Programming Hints

Described below are precautions for preparing a program for a computer link in bidirectional mode.

POINT
It is impossible to use the functions available in bidirectional mode together with the functions available in no-protocol mode mentioned in Section 6. The computer link in bidirectional mode is enabled by making settings with the mode setting switch on the computer link module (Section 4.2.1) and the bidirectional mode designation area in the buffer memory specific use area (Sections 3.10 and 7.2.6 (2) (f)).

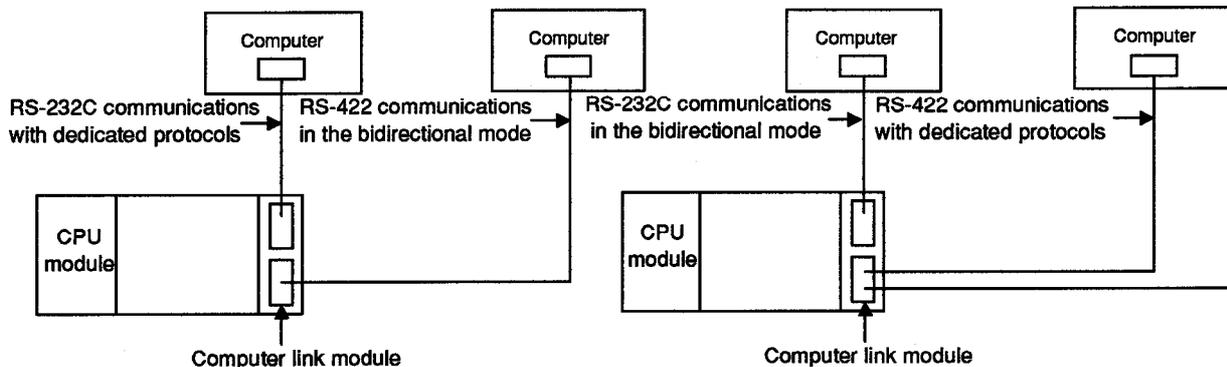
7.2.1 System configuration and communications mode for bidirectional mode communications

(1) System configuration and the computer link module mode setting

Data communications in the bidirectional mode is possible only in the system where a computer and the computer link module are linked in a 1 : 1 ratio. The mode setting switch in the computer link module should be set in any position of "1" to "8" (refer to Section 4.2.1), or the mode switching function can be used to set the mode number from "1" to "8" (refer to Sections 3.6 and Section 12).

(2) Usable with dedicated protocols

When data communications is executed in the bidirectional mode, data communications using the dedicated protocol is possible with the other interface.

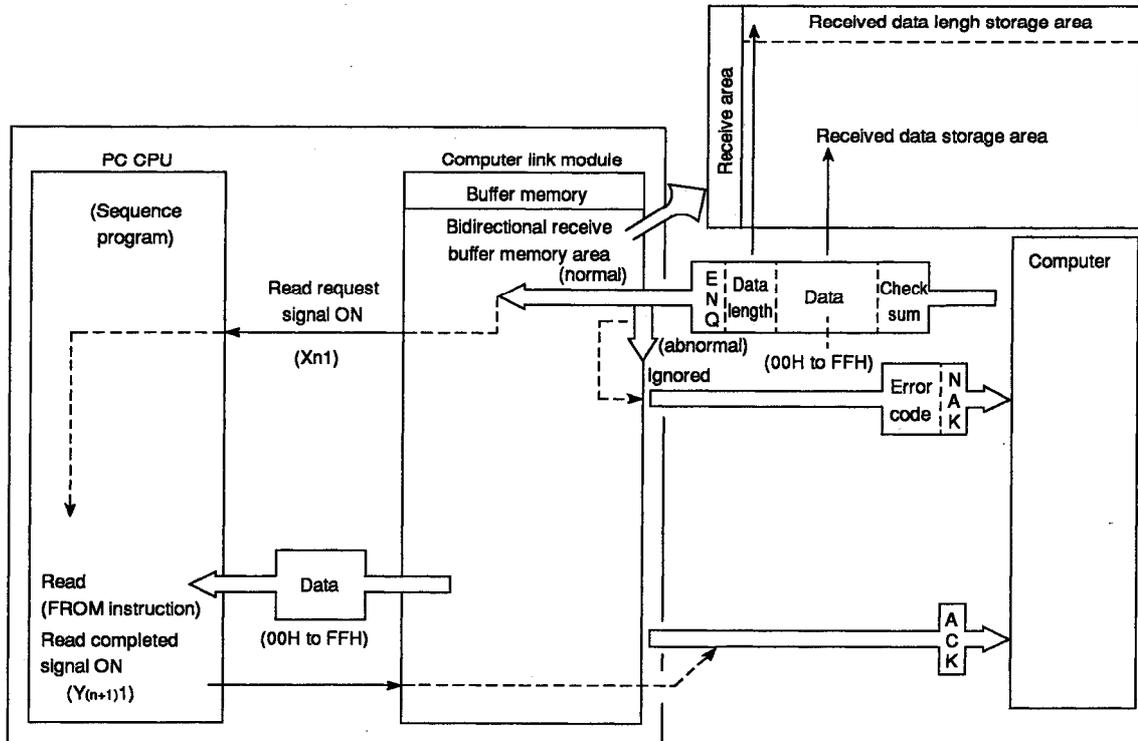


7. COMMUNICATIONS WITH A COMPUTER IN THE BIDIRECTIONAL MODE

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7.2.2 Receiving data from the computer

This section gives the items required to be understood to operate the PC CPU to read data received from the computer.

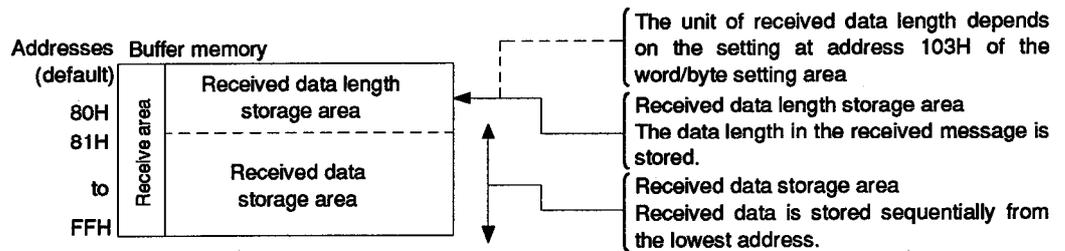


(1) Allocating the receive area

Receive area is a buffer memory area in the computer link module where the data and data length received from a computer are stored so that the PC CPU can read them.

Default settings of the receive area allocation are buffer addresses 80H to FFH. The receive area allocation can be changed according to the purpose of data transmission, computer specifications, and receive data length.

(Refer to Section 7.2.6 (2) (c) for the changing procedure.)



POINT

The length of data per one time of sending from a computer to the computer link module must be smaller than the size of the received data storage area in the computer link module.

(Received data storage area) \geq (Data length received from a computer)

When it is necessary to send data whose length exceeds the size of the received data storage area, take either of the following methods.

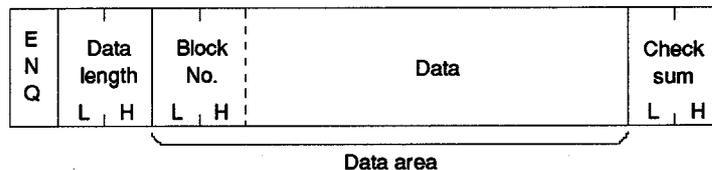
(1) Changing the receive area

Change the address and size of the receive area.

(2) Dividing the send data

Divide the send data into parts so that each part is smaller than the receive area size. Add block numbers to such divided parts of data for identification.

(Message format example)



7. COMMUNICATIONS WITH A COMPUTER IN THE BIDIRECTIONAL MODE

(2) Reading received data

The computer link module issues a received data read request to the PC CPU by turning ON a received data read signal (Xn1) at the timing when the conditions are established as described below.

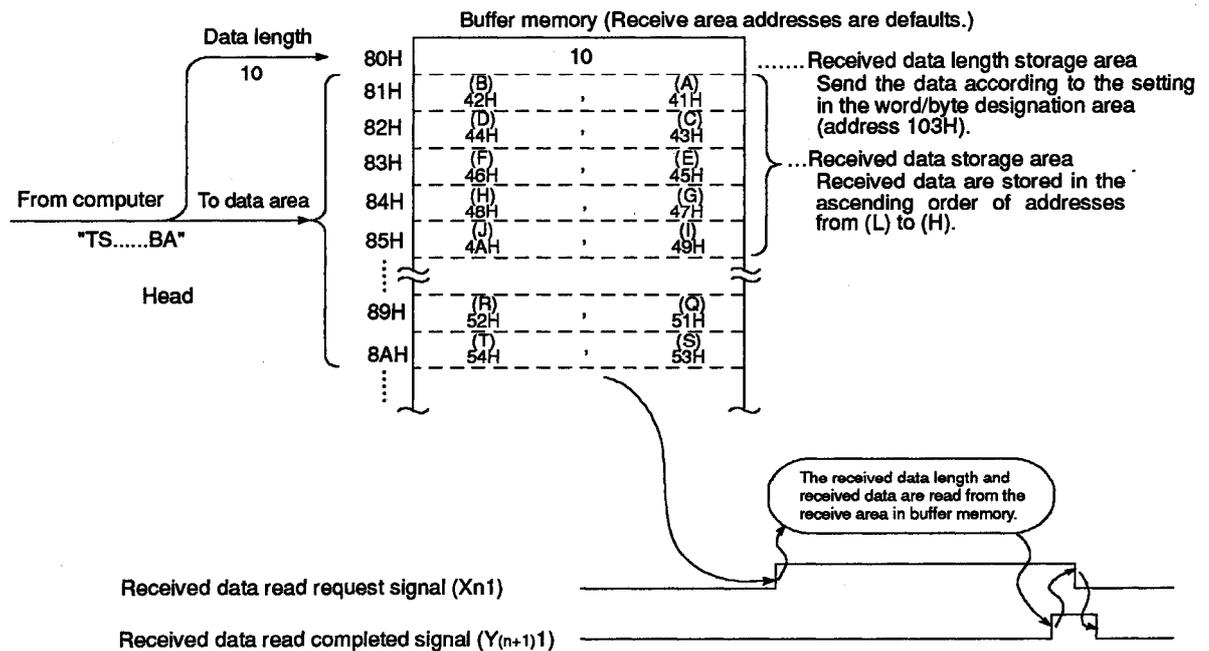
- When the data length in the received message is received and a data area which is equivalent to the word or byte length set with the bidirectional word/byte designation area (buffer address 103H) is received.
- When a check sum is handled, the condition is established when the above data area and a check sum are received.

(Example)

Word/byte designation area setting Word unit
Data length in the received message..... 10

In this case, the computer link module issues a received data read request to the PC CPU when a data area of 10 words (or a data area of 10 words and a check sum of 1 word) has been received.

When a received data read request (Xn1) has been issued (ON), read the received data length and the data equivalent to the received data length by using a FROM instruction in a sequence program. And then, turn a received data read completed signal (Y(n+1)1) from OFF to ON.



POINT

Set the data length in the sending and receiving message so that the same data length unit (word or byte) is used between the computer and the PC CPU.

The data length unit used with the PC CPU can be designated by setting it with the bidirectional word/byte designation area (address 103H) in buffer memory of the computer link module.

REMARK

If a CD signal is turned OFF or mode switching is performed during communications with a computer, received data will be cleared. The following gives precautions for the operation.

(1) If a CD signal is turned OFF:

- During data communications with a computer through an RS-232C channel when the CD terminal check function has been set, if a CD signal of the computer link module is turned OFF (4 ms or over) by the computer when a read request to the PC CPU has not been made, received data will be cleared. (The receive area will not be initialized.)
- If a CD signal is turned OFF when a read request to the PC CPU has been made, the computer link module continues to issue the read request to the PC CPU. (The received data for which the read request is made will not be cleared.)
If the CD signal is (has been) turned ON after the received data read has been completed, the computer link module sends an ACK message to the computer.
- To restart data sending from the computer, turn ON the CD signal.

(2) If mode switching is performed:

- If the computer link module's operation mode is forcibly switched as described in Section 12, the computer link module turns into the initial start-up state and the received data will be cleared. (The receive area is initialized.)
- To perform subsequent data communications, setting with the specific use area in buffer memory is necessary.
- When restarting data sending from the computer, start sending after the computer link module READY signal (Xn7) has turned ON and settings with the specific use area have been completed.

(Depending on the structure of the computer link system, it may be necessary to, before restarting data sending from the computer, notify the computer from the PC CPU of the state in which communications can be restarted.)

7. COMMUNICATIONS WITH A COMPUTER IN THE BIDIRECTIONAL MODE

(3) Detecting a receive error (by the LEDs and buffer memory)

If the computer link module detects an error in the data received from the computer in bidirectional mode, the computer link module indicates it with the LEDs (2-C/N to 2-SIO or 4-C/N to 4-SIO) and stores the error information to buffer address 101H. Or, it stores corresponding error code to buffer address 117H.

Check the occurrence of a data receive error by the LEDs located on the front side of the module or by reading the above-mentioned buffer memory by the sequence program.

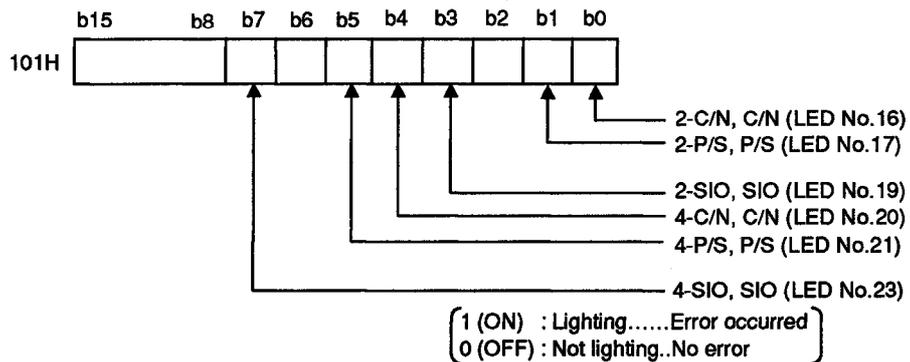
(a) Error indicating LEDs on the front side of the module

LED Layout (AJ71UC24)	LED No.	LED Name	Meaning of LED Display	LED ON	LED OFF	LED Initial Status																																																			
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>(for de- scription)</p> <table border="1"> <tr><td>LED No.</td><td></td></tr> <tr><td>0</td><td>RUN</td></tr> <tr><td>1</td><td>2-SD</td></tr> <tr><td>2</td><td>2-RD</td></tr> <tr><td>(Unused)</td><td></td></tr> <tr><td>4</td><td>2-NEU</td></tr> <tr><td>5</td><td>2-ACK</td></tr> <tr><td>6</td><td>4-NEU</td></tr> <tr><td>7</td><td>4-NAK</td></tr> <tr><td>8</td><td>4-ACK</td></tr> <tr><td>9</td><td>4-NAK</td></tr> <tr><td>10</td><td>4-SD</td></tr> <tr><td>11</td><td>4-RD</td></tr> <tr><td>(Unused)</td><td></td></tr> </table> </div> <div style="width: 45%;"> <p>(for de- scription)</p> <table border="1"> <tr><td>LED No.</td><td></td></tr> <tr><td>16</td><td>2-C/N</td></tr> <tr><td>17</td><td>2-P/S</td></tr> <tr><td>18</td><td>2-PRO</td></tr> <tr><td>19</td><td>2-SIO</td></tr> <tr><td>20</td><td>4-C/N</td></tr> <tr><td>21</td><td>4-P/S</td></tr> <tr><td>22</td><td>4-SIO</td></tr> <tr><td>23</td><td>(Unused)</td></tr> <tr><td>25</td><td>CPURW</td></tr> <tr><td>(Unused)</td><td></td></tr> </table> </div> </div>	LED No.		0	RUN	1	2-SD	2	2-RD	(Unused)		4	2-NEU	5	2-ACK	6	4-NEU	7	4-NAK	8	4-ACK	9	4-NAK	10	4-SD	11	4-RD	(Unused)		LED No.		16	2-C/N	17	2-P/S	18	2-PRO	19	2-SIO	20	4-C/N	21	4-P/S	22	4-SIO	23	(Unused)	25	CPURW	(Unused)		16	2-C/N	C/N	Result of communications between PC CPU and RS-232C	Refer to Section 4.3 (4).	Normal	OFF
	LED No.																																																								
	0	RUN																																																							
	1	2-SD																																																							
	2	2-RD																																																							
	(Unused)																																																								
	4	2-NEU																																																							
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23	(Unused)																																																								
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(Unused)																																																									
	17	2-P/S	P/S	Parity error on RS-232C	Parity error	Normal	OFF																																																		
	19	2-SIO	SIO	SIO error on RS-232C	Overflow, framing error	Normal	OFF																																																		
	20	4-C/N	C/N	Result of communications between PC CPU and RS-422	Refer to Section 4.3 (4).	Normal	OFF																																																		
	21	4-P/S	P/S	Parity error on RS-422	Parity error	Normal	OFF																																																		
	23	4-SIO	SIO	SIO error on RS-422	Overflow, framing error	Normal	OFF																																																		

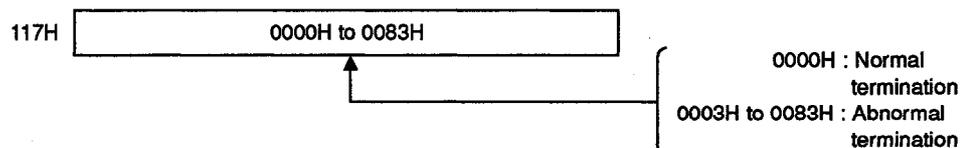
When an LED turns ON, it stays ON even when the cause of the error is eliminated.
To turn OFF an LED, follow the procedure described in Section 8.1.

(b) Buffer memory

- Buffer memory address 101H (See Section 8.1 for the details.)



- Buffer memory address 117H (Refer to Section 13.2 for the error codes and error contents.)



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(4) Clearing the received data

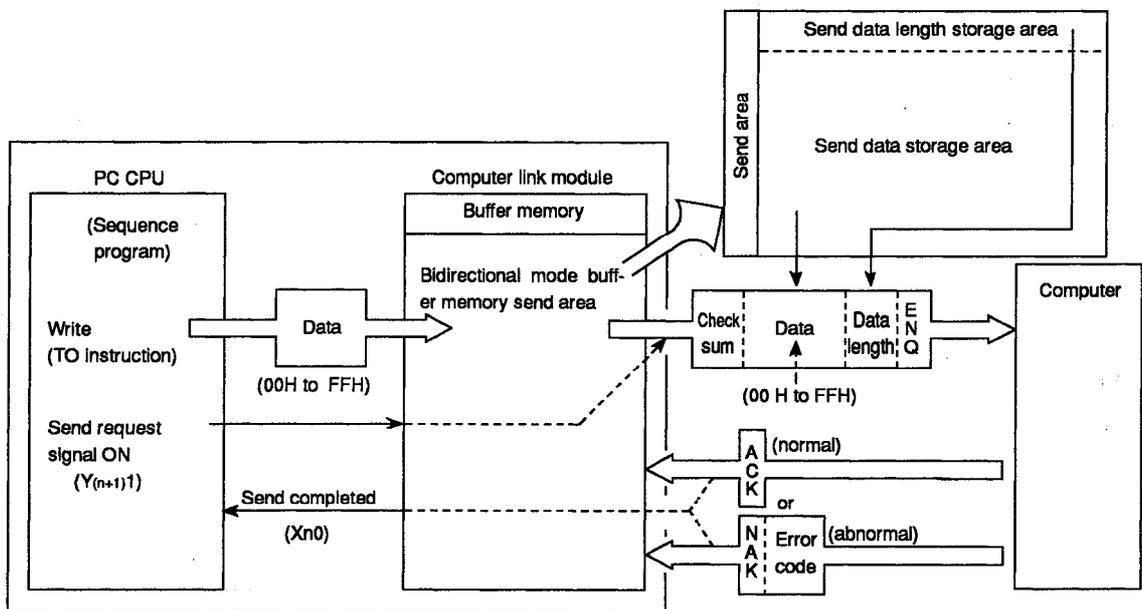
Data transmission in bidirectional mode must be performed after receiving a response message to the previous data sending.

If the computer link module detects an error during data receiving, it sends a NAK message (response message) to the computer and ignores the data received when the error was detected.

Therefore, no processing is necessary to clear the received data.

7.2.3 Sending data to the computer

This section gives the items required to be understood to send data to the computer.



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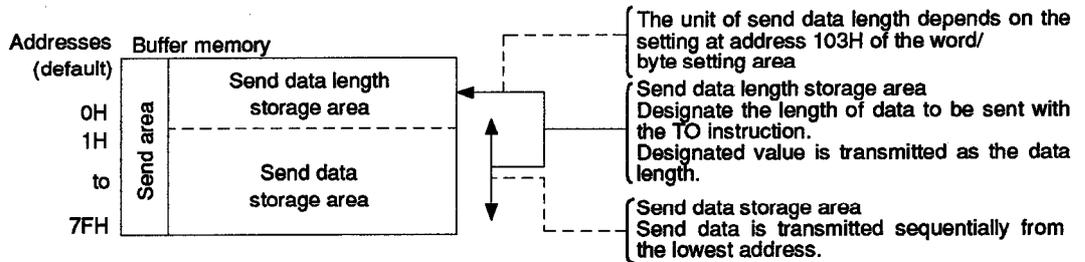
(1) Allocating the send area

Send area is a buffer memory area in the computer link module where the data and data length to be sent from the PC CPU to the computer are stored.

Default settings of the send area allocation are buffer addresses 0H to 7FH.

The send area allocation can be changed according to the purpose of data transmission, computer specifications, and send data length.

(Refer to Section 7.2 (2) (b) for the changing procedure.)



POINT

The length of data per one time of sending from the PC CPU to the computer must be smaller than the size of the send data storage area in the computer link module.

(Send data storage area) \geq (Data length sent from PC CPU)

When it is necessary to send data whose length exceeds the size of the send data storage area, take either of the following methods.

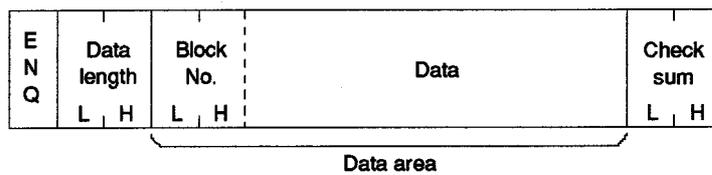
(1) Changing the send area

Change the address and size of the send area.

(2) Dividing the send data

Divide the send data into parts so that each part is smaller than the send area size. Add block numbers to such divided parts of data for identification.

(Message format example)



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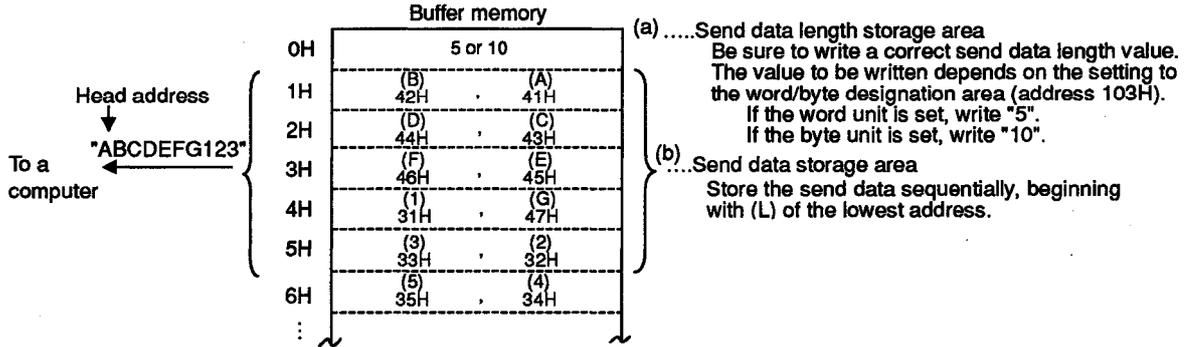
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(2) Writing send data

The send data length and send data are written to the send area.

- (a) The length of data to be written (having been written) to the bidirectional send data length storage area in either words or bytes.
- (b) The data to be transmitted is written to the send data storage area.

(Example) To send "ABCDEFGH123" (Send area addresses are defaults.)



After the operations (a) and (b), turn ON the send request signal (Y_{(n+1)0}). The computer link module starts sending the designated data of the designated data length beginning with the lowest address in the send data storage area.

POINT

Set the data length in the sending and receiving message so that the same data length unit (word or byte) is used between the computer and the PC CPU.

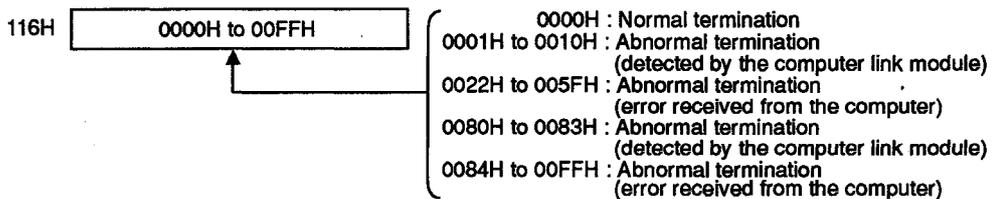
The data length unit used with the PC CPU can be designated by setting it with the bidirectional word/byte designation area (address 103H) in buffer memory of the computer link module.

(3) Detecting a send error

If the computer link module detects an error in the data when sending to the computer received in bidirectional mode, the computer link module stores the error code to buffer address 116H.

Check the occurrence of a data send error by reading the above-mentioned buffer memory by the sequence program after the data send completed signal (X_{n0}) turned ON.

- Buffer memory (refer to Section 13.2 for the error codes and error contents)



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7.2.4 Processing a computer link module for simultaneous send in full-duplex mode

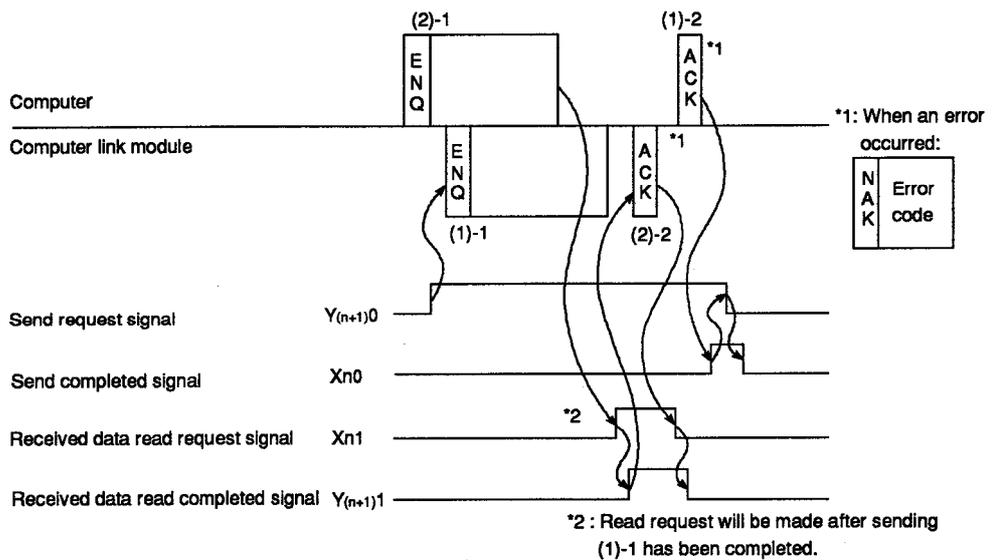
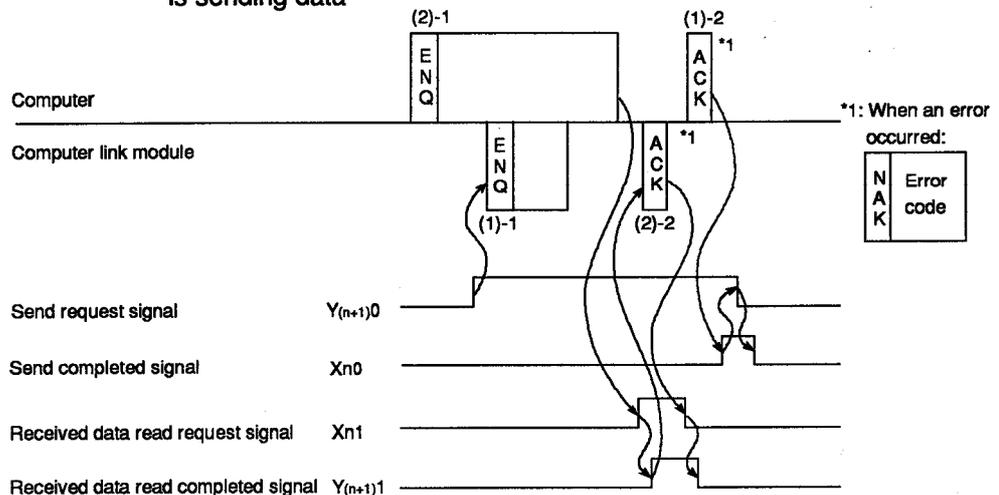
The following describes the processing in the computer link module when the computer and the computer link module simultaneously execute sending in bidirectional mode.

If the data communication by the half-duplex transmission is executed conforming to Section 10, sending from the computer and the computer link module will not be executed simultaneously. In that case, it is not necessary to read this section.

Processing by the computer link module varies depending on the setting (valid/invalid setting at simultaneous transmission) when the computer and the computer link module transmit data at the same time to each other.

The following shows the processing in the computer link module for respective settings.

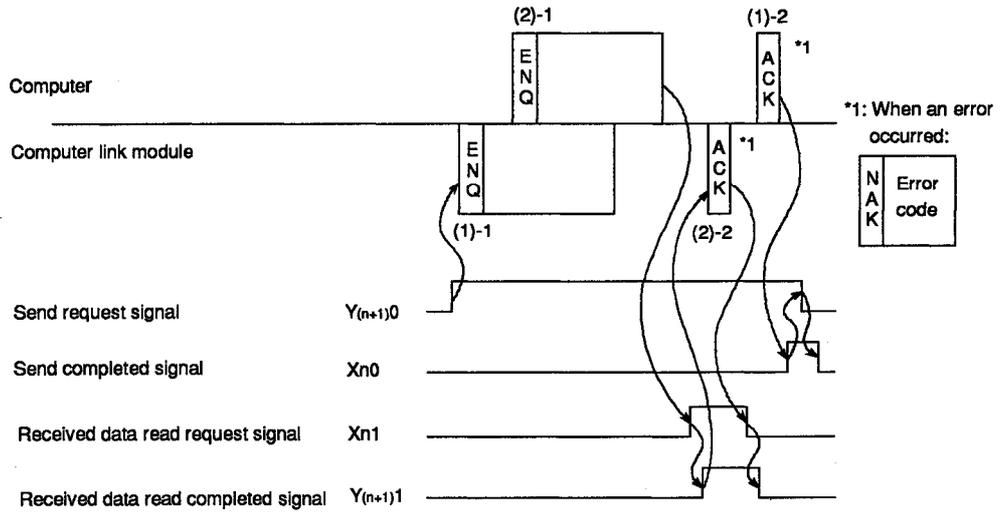
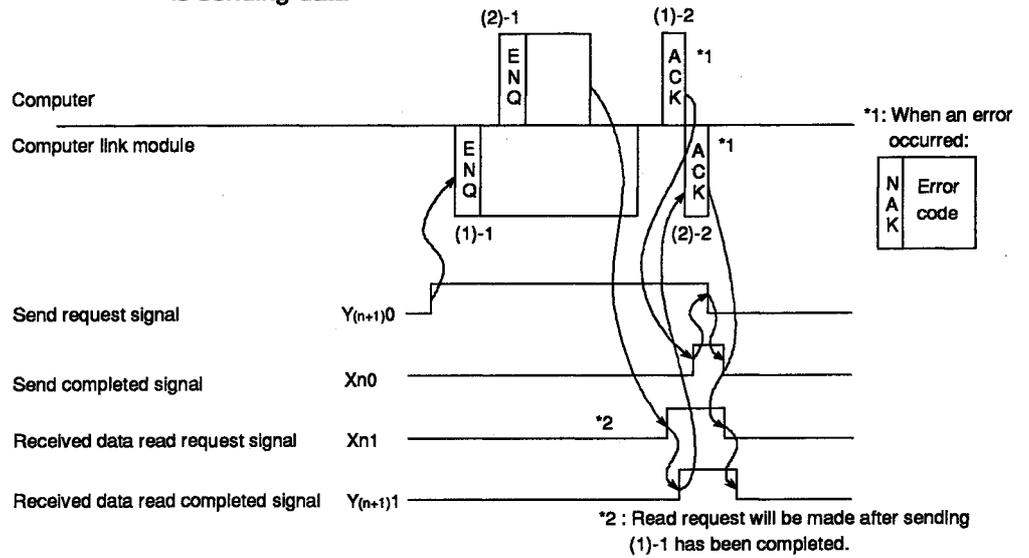
(Example 1) When the computer link module sends data while the computer is sending data



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(Example 2) When the computer sends data while the computer link module is sending data



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Buffer Memory Setting (Address 114H)	Setting	Processing Computer Link	
		Send Processing	Receive Processing
0000H	Send data : Valid Received data : Valid	After completing data send ((1)-1), the computer link module waits for response ((1)-2) while checking time-out error. Normal or abnormal send completion is confirmed by response and its status is transmitted to the sequence program via the buffer memory.	After completing data receive ((2)-1), the computer link module transmits the response ((2)-2). The received data and receive result are transmitted to the sequence program via the buffer memory.
0100H	Send data : Invalid Received data : Valid	After completing data send ((1)-1), the computer link module transmits the sequence program of a simultaneous transmission error (error code: 3) via the buffer memory. The computer link module does not wait for a response ((1)-2).	After completing data receive ((2)-1), the computer link module transmits the response ((2)-2). The received data and receive result are transmitted to the sequence program via the buffer memory.
0001H	Send data : Valid Received data : Invalid	After completing data send ((1)-1), the computer link module waits for response ((1)-2) while checking time-out error. Normal or abnormal send completion is confirmed by response and its status is transmitted to the sequence program via the buffer memory.	Data receive ((2)-1) is ignored and received data is discarded. The response ((2)-2) is not transmitted. Data receive is not transmitted to the sequence program.
0101H	Send data : Invalid Received data : Invalid	After completing data send ((1)-1), the computer link module transmits the sequence program of a simultaneous transmission error (error code: 3) via the buffer memory. The computer link module does not wait for a response ((1)-2).	Data receive ((2)-1) is ignored and received data is discarded. The response ((2)-2) is not transmitted. Data receive is not transmitted to the sequence program.

POINT

When the transmission control mentioned in Section 9 has been executed and when "send data valid" and "received data valid" are set with the simultaneous send data valid/invalid designation area (address 114H), the computer link module executes data send and receive processings as follows.

(1) Data send

- When it receives a send discontinue request (DC3 is received or DSR signal is OFF) from the computer during the data send, it will discontinue the data send.
- When it receives a receive enabled signal (DC1 is received or DSR signal is ON), it will restart sending.

(2) Data receive

- When sending a response message for the data receive to the computer and if it is impossible to send the response message due to a send discontinue request (DC3 is received or DSR signal is OFF) from the computer, it will send the response message after a send enabled state is established (DC1 is received or DSR signal is ON).

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7.2.5 Handshake I/O signals

Signals known as I/O handshake signals are required for communications in the bidirectional mode.

These signals output data received from the sequence program to a computer or detect signals from an external device to enable the sequence program to read them.

	Signal	Timing
PC CPU ↓ Computer	$Y_{(n+1)0}$ (Send request) X_{n0} (Send completed)	<p>Turned ON by program</p> <p>Turned OFF by program</p> <p>Turned ON by computer link module</p> <p>Turned OFF by computer link module</p>
Computer ↓ PC CPU	X_{n1} (Received data read request) $Y_{(n+1)1}$ (Receive data read complete)	<p>Turned ON by computer link module</p> <p>Turned OFF by computer link module</p> <p>Turned ON by program</p> <p>Turned OFF by program</p>

The number "n" appended to X and Y is determined according to the position where the computer link module is loaded and the number of I/O modules loaded prior to this module.

REMARK

The I/O signals, other than those mentioned above, available in bidirectional mode are:

X_{n7} (computer link module READY signal) and X_{nD} (computer link module watchdog timer error signal).

Refer to Section 3.9 for the I/O signals used with the PC CPU.

7.2.6 Reading and writing buffer memory

A sequence program for reading/writing buffer memory is necessary to execute the operations using the computer link module in the bidirectional mode. (Refer to the buffer memory list in Section 3.10.)

Write a sequence program as required.

At a start-up of the computer link module, the default values are written to the specific use area in the buffer memory.

	Reading and Writing Operations that Need Sequence Programs	Reference Sections
(1)	To change the default value set to the buffer memory specific use area of the computer link module	Section 7.2.6 (2) and (3)
(2)	To receive data from the computer	Sections 7.2.2, 7.4, 7.5
(3)	To transmit data to the computer	Sections 7.2.3, 7.4, 7.6
(4)	To read the LED ON/OFF statuses of the computer link module or to turn OFF LEDs during computer linking	Section 8
(5)	To read the module/signal status during computer linking	Section 8
(6)	To execute the transmission control with the external device using the DC code	Section 9
(7)	To execute half-duplex communication on the RS-232C interface of the computer link module	Section 10

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(1) Precautions on reading/writing to the buffer memory specific use area

(a) The buffer memory is not backed up by a battery

All data in buffer memory is reset to the default values when power is turned ON, when the PC CPU is reset, or when the mode is switched. Data changed from the default values must be written whenever any of these events takes place.

(b) Data can be written to the specific use area (100H to 11FH) excluding the mode switching area only by using a TO instruction in a sequence program.

If data is written to the buffer memory using the command in a computer program, the computer module will not operate correctly.

(c) If the following functions are used together, make sure to allocate the user area in buffer memory so that the same area will not be used by different functions.

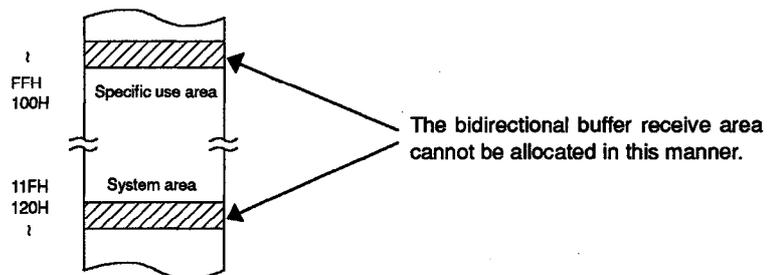
If the same area is allocated to different functions, the data in this area is rewritten and communication will not be correctly executed.

- Bidirectional mode send
- Bidirectional mode receive
- Buffer memory read/write (CR/CW commands) functions
- On-demand functions

The memory areas preceding and following the specific use area cannot be allocated as a single area.

The areas 0H to FFH and 120H to DFFH must be recognized as independent areas.

Example:



(d) Do not write "1" (request to clear) to the no-protocol received data clear request area (address 10DH).

If "1" is written, all received data may be cleared, and data communications might not be correctly executed.

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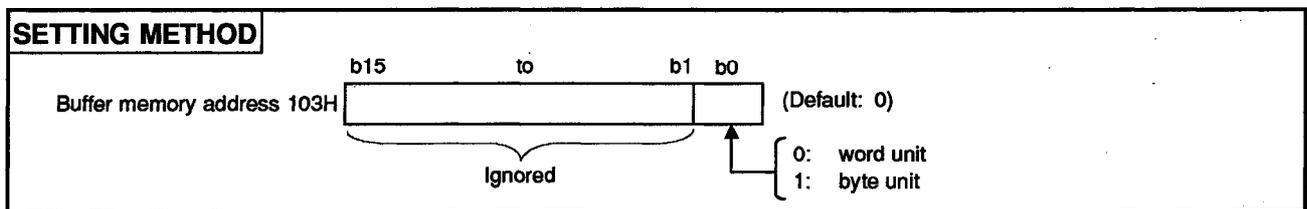
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(2) Changing the default values in the buffer memory specific use area

Write an applicable sequence program to change a default value in the specific use area in the buffer memory as follows.

(a) Bidirectional word/byte designation area (address: 103H)

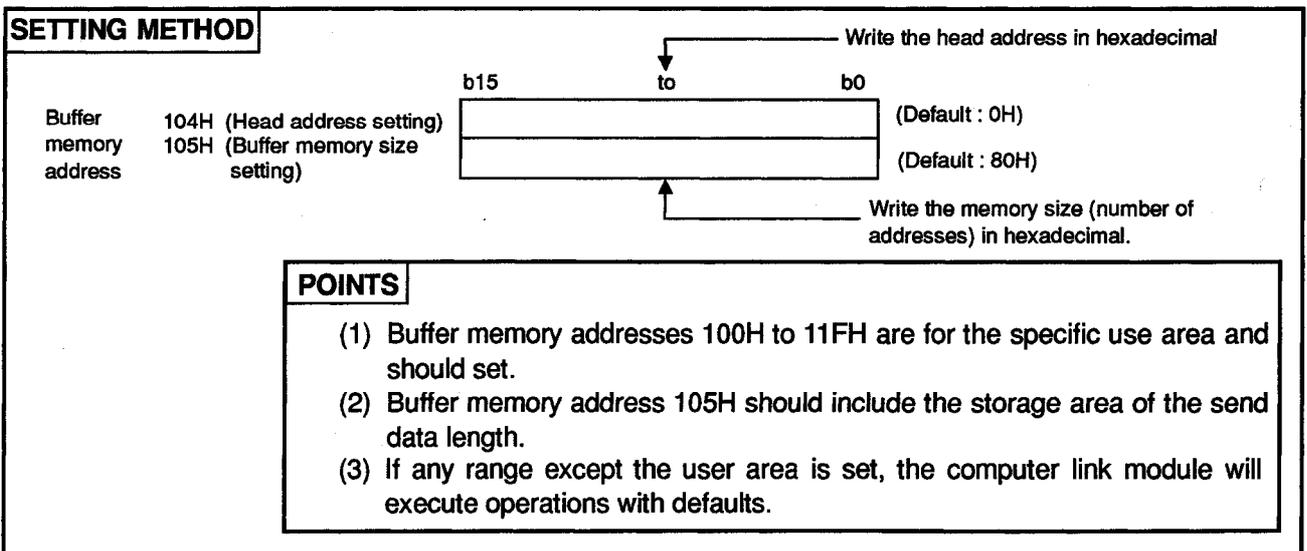
- When the computer link module is started up, the word unit is used for the send data length and received data length handled between the PC CPU and the computer link module and for the data size handled between the computer and the computer link module.
- To change the unit of the send data length, received data length, and data size to the byte unit, write "1" when the computer link module is started up.
- This unit is also used as the unit of send data length in the on-demand function in the dedicated protocol.



(b) The addresses for changing the buffer memory send area

The no-protocol send buffer memory area head address designation area (Address: 104H)
 The no-protocol send buffer memory length designation area (Address: 105H)

- By default, buffer memory addresses of 0H to 7FH (size: 80H) are allocated to store send data from the PC CPU and also the length of the data.
- To change the default send data length and buffer memory area to store send data, write the head address of the new buffer memory area and the new buffer memory size when the computer link module is started up.
- Buffer memory areas 0H to FFH or 120H to DFFH can be allocated to the no-protocol mode send buffer memory (refer to (1)(c)).



7. COMMUNICATIONS WITH A COMPUTER IN THE BIDIRECTIONAL MODE

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(c) The addresses for changing the buffer memory receive area

The bidirectional receive buffer memory area head address designation area (Address: 106H)

The bidirectional receive buffer memory length designation area (Address: 107H)

- By default, buffer memory addresses of 80H to FFH (size: 80H) are allocated to store data that has been sent from an external device and is to be received by the PC CPU and the length of such data.
- To change the default receive data length and buffer memory area to store received data, write the head address of the new buffer memory area and the new buffer memory size when the computer link module is started up.
- Buffer memory areas 0H to FHH or 120H to DFFH can be allocated to the bidirectional mode receive buffer memory. (Refer to (1)(c).)

SETTING METHOD

Buffer memory address	106H (Head address setting) 107H (Buffer memory size setting)		(Default : 80H) (Default : 80H)
-----------------------	--	--	------------------------------------

POINTS

- (1) Buffer memory addresses 100H to 11FH are for the specific use area and should not be set.
- (2) Buffer memory address 107H should include the storage area of the receive data length.
- (3) If any range except the user area is set, the computer link module will execute operations with defaults.

(d) RS-232C CD terminal check designation area (Address: 10BH)

- When an external device is connected on the RS-232C of the computer link module, the setting described in Section 4.6.2 needs to be done.
- The default setting of the CD terminal check is ON.
- To turn OFF the CD terminal check, write "1" to buffer memory address 10BH when the computer link module is started up.
- This setting is effective for any function in the dedicated protocol and bidirectional mode.

SETTING METHOD

Buffer memory address 10BH		(Default: 0)
----------------------------	--	--------------

REMARK

For the operation of the computer link module to the CD signal in an RS-232C CD terminal check, refer to Section 4.6.2.

7. COMMUNICATIONS WITH A COMPUTER IN THE BIDIRECTIONAL MODE

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(e) Areas for changing the communications mode of the RS-232C interface

- RS-232C communications mode setting area (address: 10FH)
- Simultaneous send priority/non-priority setting area (address: 110H)
- Send method setting area when transmission is resumed (address: 111H)

- When the RS-232C interface of the computer link module is connected to an external device, the full-duplex transmissions with the external device is possible when the computer link module is started up.
- To perform half-duplex transmission, change the default values when the computer link module is started up as described in Section 10.

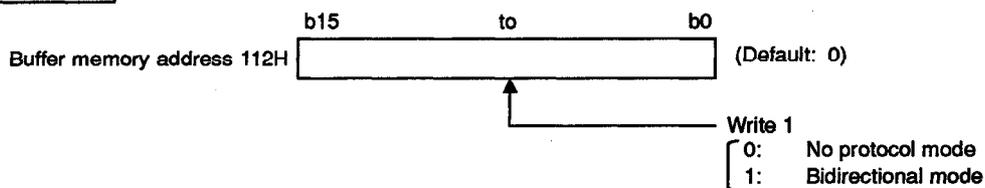
(f) Bidirectional mode designation area (address: 112H)

- The interfaces are set to the following modes according to the mode setting switch settings when the computer link module is started up:

Mode Setting Switch Settings	RS-232C Interface	RS-422 Interface	Remark
0	—————		Setting impossible
1 to 4	Dedicated protocol	No-protocol mode	Bidirectional mode possible
5 to 8	No-protocol mode	Dedicated protocol	Bidirectional mode possible
9	No-protocol mode		Bidirectional mode impossible
A to D	Dedicated protocol		Bidirectional mode impossible
E	—————		Setting impossible
F	—————		For self-loopback test

- To set the no-protocol mode interface to bidirectional mode when the mode setting is 1 to 8, write "1" when the computer link module is started up.

SETTING METHOD



POINT

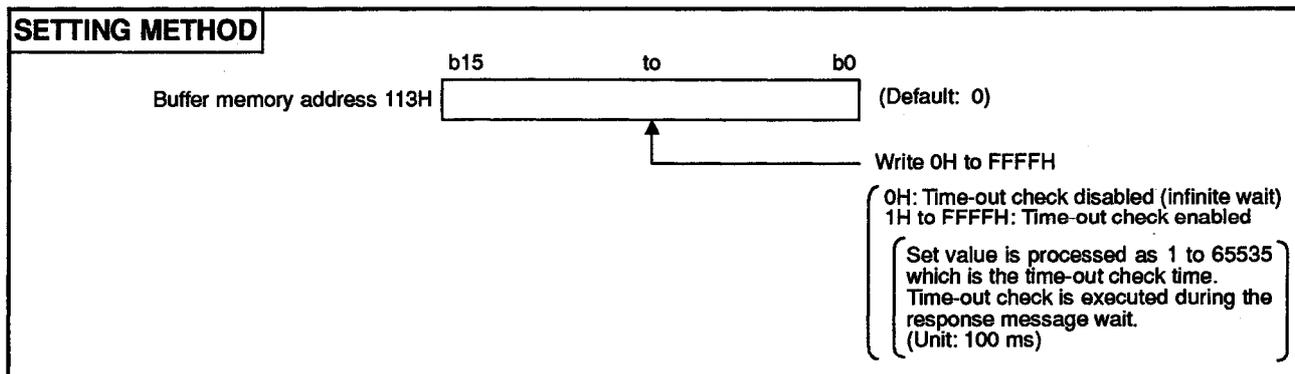
When the bidirectional mode is set, settings with buffer memory addresses 113H to 115H are valid.

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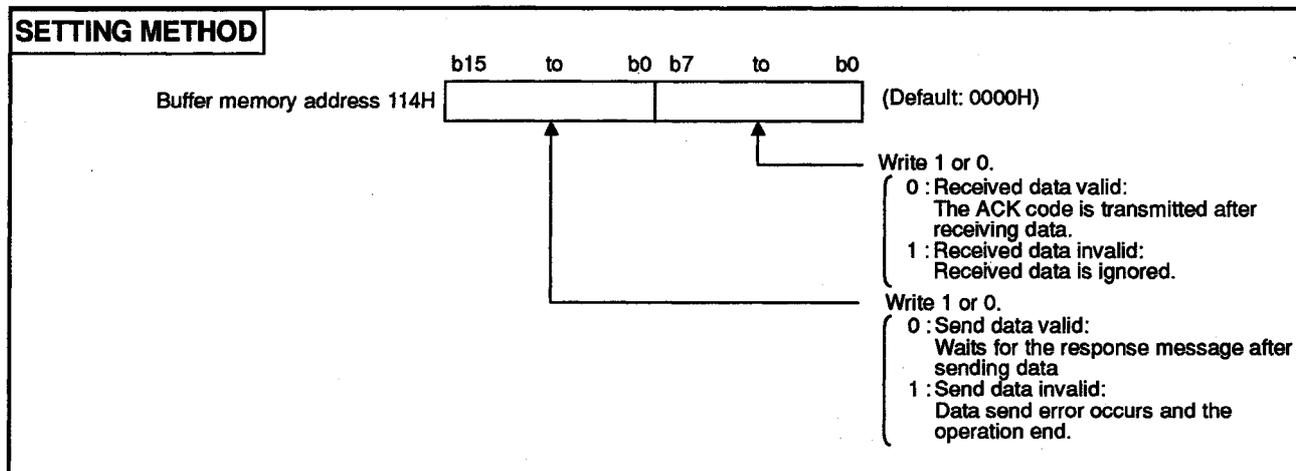
(g) Time-out check time designation area (address: 113H)

- When data is sent from the PC CPU to the computer, the time-out check time setting for the reception of a response message is infinite when the computer link module is started up.
- To change the time-out check time setting, write the check time when the computer link module is started up.
- If a response message is not received within the designated time after data has been sent, the computer link module generates a time-out error. When the data send is completed, read buffer address 116H and check the result of data send.



(h) Simultaneous send data valid/invalid designation area (address: 114H)

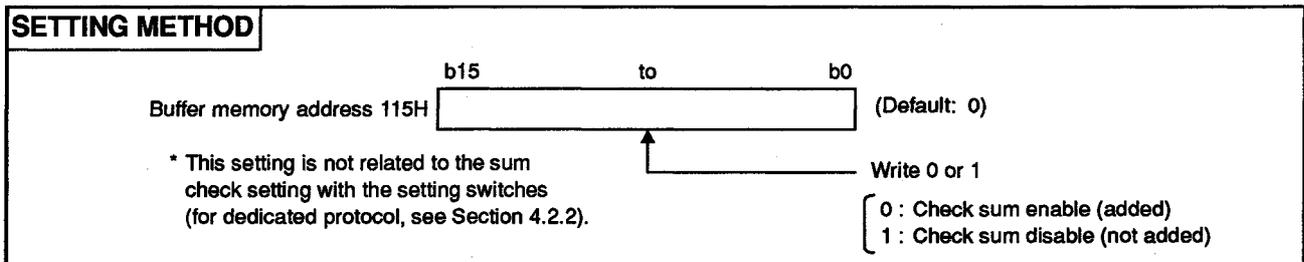
- When the computer and the PC CPU simultaneously send data, both the data sent to the computer and the data received from the computer are valid when the computer link module is started up.
- To change the data valid/invalid setting in the computer link module at the simultaneous data send mentioned above, designate "send data invalid" or "received data invalid" when the computer link module is started up. (Refer to Section 7.2.4 for the operation contents)
- If "received data invalid" has been designated, the computer link module will ignore received data when it detects a simultaneous send.
- If "send data invalid" has been designated, the computer link module will generate a simultaneous send error when it detects a simultaneous send. When the data send is completed, read buffer address 116H and check the result of data send.



7. COMMUNICATIONS WITH A COMPUTER IN THE BIDIRECTIONAL MODE

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- (i) Check sum enable/disable designation area (address: 115H)
- "Check sum enabled" is set when the computer link module is started up.
 - To set "check sum disabled", write "1" when the computer link module is started up.
 - When "check sum disabled" has been set, the computer link module will not add check sum to the send message.
And, messages received from the computer are regarded that check sum is not added.



- (j) Data send error storage area (address: 116H)
- When an error occurs during the data send to the computer due to a request by the PC CPU, the computer link module stores a corresponding error code to the send error storage area.
(When a NAK message (response) to the data send is received, the received error code is stored to the send error storage area.)
 - Before issuing a data send request, write "0" to buffer address 116H.
 - When the data send is completed, read buffer address 116H and check the result of data send.
The send error codes are listed in Section 13.2.
- (k) Data receive error storage area (address: 117H)
- When an error occurs during the data receive from the computer, the computer link module stores a corresponding error code to the receive error storage area.
 - When the data receive from the computer is faulty, read buffer address 117H and check the error content if necessary.
The receive error codes are listed in Section 13.2.
- (l) Area for changing the transmission control mode with the external device
- | | |
|---------------------------------------|-----------------|
| Transmission control designation area | (address: 11AH) |
| DC1/DC3 control code designation area | (address: 11BH) |
| DC2/DC4 control code designation area | (address: 11CH) |
- When the computer link module is started up, the DTR/DSR control for the external device is executed only at the RS-232C interface.
 - To execute the DC code control at the RS-232C and RS-422 interfaces, change the default settings when the computer link module is started up as described in Section 9.
 - This setting is effective to all functions available with the dedicated protocol and bidirectional mode.

7. COMMUNICATIONS WITH A COMPUTER IN THE BIDIRECTIONAL MODE

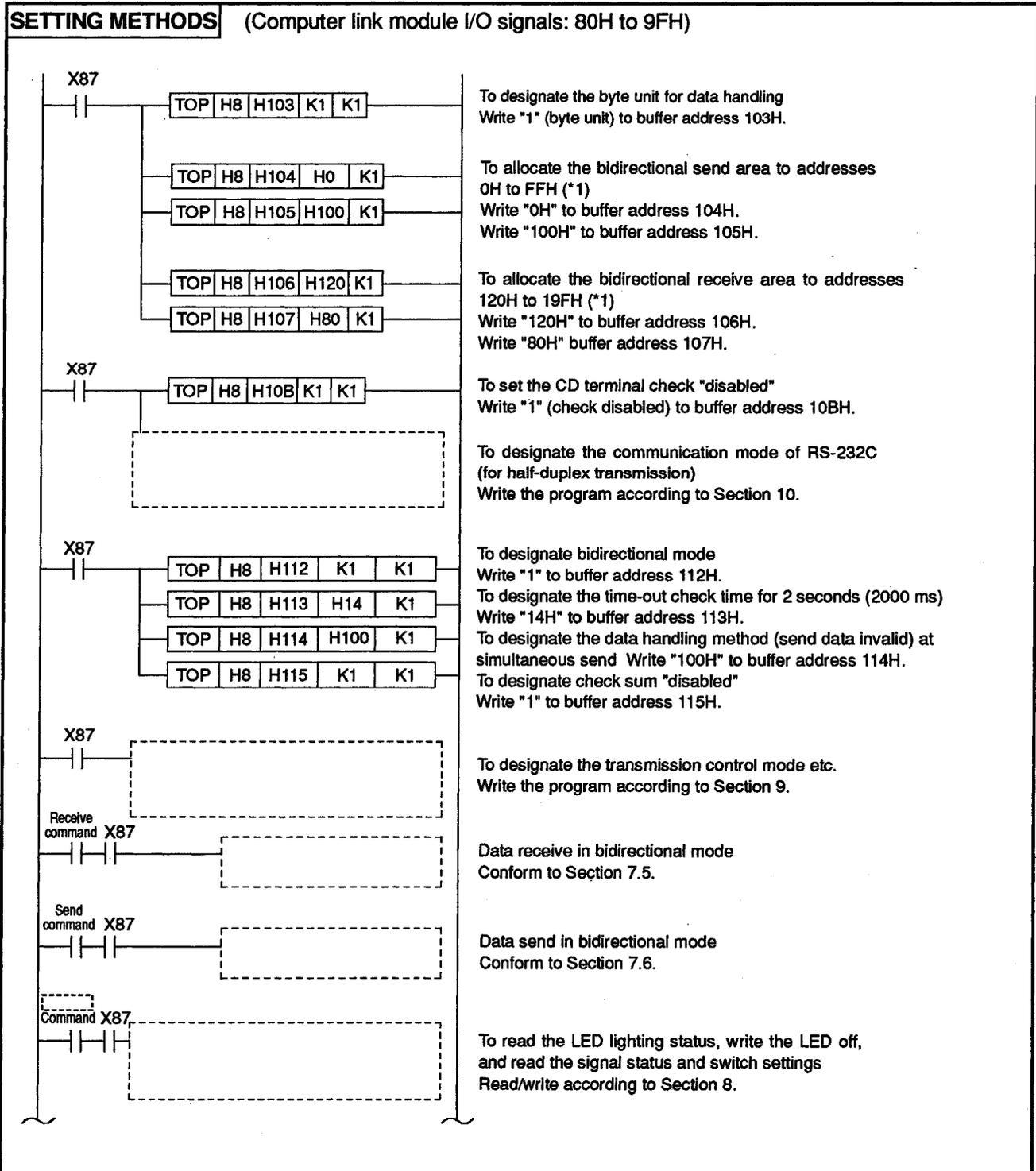
MELSEC-A

(3) Program examples change the default values in the buffer memory specific use area

The following are program examples change the default values in the buffer memory specific use area.

Incorporate necessary programs only.

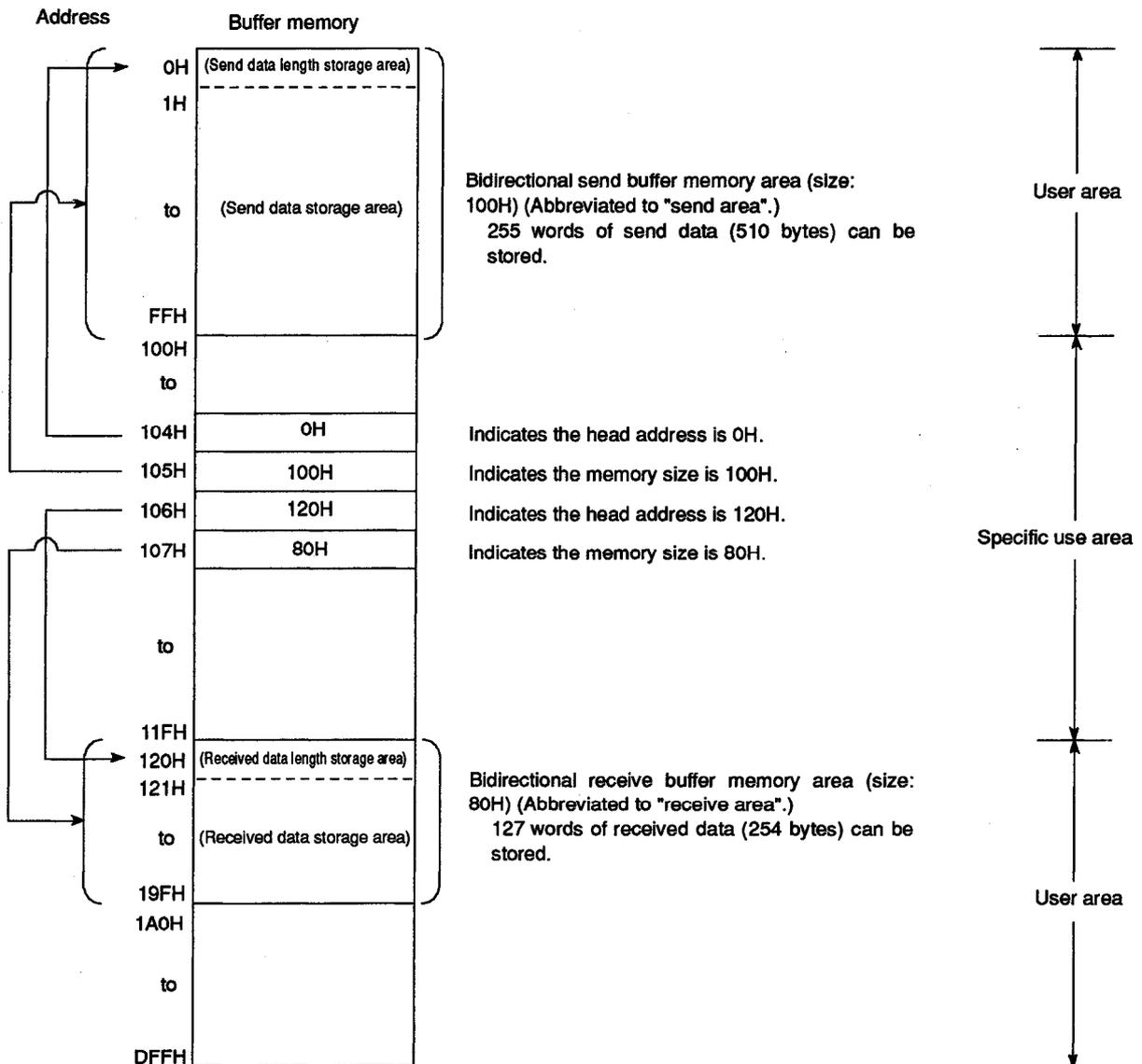
In the following examples, the I/O signals of the computer link module are 80H to 9FH which are handled by the PC CPU.



7. COMMUNICATIONS WITH A COMPUTER IN THE BIDIRECTIONAL MODE

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*1 The following diagram shows the locations of the send and receive areas in bidirectional mode as designated in the example program given on the previous page.



REMARK

Refer to Section 3.10 for the user area and the specific use area.

7.2.7 Precautions during data communications

- (1) Conditions when the computer link module transmission sequence is initialized:
 - The power supply is turned ON, the PC CPU is reset with the reset switch, or the mode is switched.
 - A response message (ACK, NAK) to the data send is received.
 - The response message (ACK or NAK) is transmitted.
 - When full-duplex transmission with the CD terminal check enabled is performed by the RS-232C (refer to Sections 4.6.2 and 7.2.6 (2) (d)), the CD signal is turned OFF.

- (2) Send request signal made by the computer link module to PC CPU

To transmit data from a computer link module send area to a computer receive area, follow the steps described in Section 7.6.

Once the send request signal is turned OFF by turning ON the send completed signal, read the error code storage area (116H) for data transmission to check the send result before proceeding next transmission.

- (3) When transmitting data from the computer or computer link module in bidirectional mode, follow the steps below.
 - After completing the initial setting (No-protocol mode → Bidirectional mode, etc.) of the computer link module by turning on the PC, start the data communication.
 - After completing the receiving/transmission of the message in response to the previous data transmission/receiving, start the next data communication.

- (4) Send/receive data length and data area

Set the data length unit (word or byte) to be transmitted between the computer and the PC CPU so that the data is handled in the same unit.

For the PC CPU side, this setting can be made with the bidirectional word/byte designation area (address 103H) in the computer link module buffer memory.

The data area length in the message must be shorter than the size of the send data storage area and the received data storage area as mentioned in POINTS in Sections 7.2.2 (1) and 7.2.3 (1).

- (5) NAK code

- (a) Transmitting NAK from a computer link module to a computer

In full-duplex mode communication, a NAK is returned from the computer link module to the computer immediately on detection of a data length error, and after reception of the error message in the case of other errors. In half-duplex mode communication, the NAK is returned after the error detection message has been received.

(A computer link module ignores the designated length of received data if it detects an error while receiving data. if the data length is incorrect, the data received is ignored until ENQ code received.)

(b) Transmitting NAK from a computer to a computer link module

To transmit the NAK from a computer to a computer link module, transmit a 2-byte error code following the NAK code.

If the NAK code is received as the response, execute error processing according to the error code received directly after the NAK code.

The error codes related to the bidirectional mode communications are described in Section 13.2.

When the computer link module receives a NAK response when sending data to the computer, it reads the NAK after the data send is completed, writes the error code to buffer memory, and turns ON the send completed signal.

(6) Time-out check by a computer

If a time-out check is made for data transmitted from a computer send area to a computer link module receive area in the bidirectional mode, the time-out check time to be set must be longer than the value shown below.

(Maximum scan time of the PC CPU x 2) + 100 ms

(7) Data code

The computer link module in bidirectional mode does not convert data to the ASCII code. If it is necessary to handle data in either ASCII or JIS code, the data must be handled in ASCII or JIS code by the computer or the PC CPU.

(8) Framing error in the computer

A framing error happens to occur in the computer when there is no data being sent from the computer link module to the computer through the RS-422 channel.

In that case, the data received by the computer before ENQ, ACK, or NAK is sent from the computer link module must be ignored by the computer.

When using the RS-422 channel, make sure the interface specifications of the computer link module given in Section 3.8.3 before performing the data communications.

(9) Using a FROM/TO instruction to access the computer link module

A FROM/TO instruction to access the computer link module from a PC CPU should only be used when absolutely necessary.

This is because when data is transmitted from the computer link module to an external device at the same time as a FROM/TO instruction from a PC CPU is executed, the FROM/TO instruction has priority and is processed first.

This delays the data send time from the computer link module by how it takes to process the FROM/TO instruction.

(10) Data bit setting

If a check sum is communicated during data communications with a computer, set the data bit (set with a computer), set the data bit to eight bits.

Section 4.2.2 gives details about data bit setting.

7. COMMUNICATIONS WITH A COMPUTER IN THE BIDIRECTIONAL MODE

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7.3 Pre-Operation Check Points

Refer to Section 4 for the start-up procedure of the computer link module in bidirectional mode.

Recheck the following items before starting the operations to ensure normal performance of the computer link module.

	Confirm Item	Reference Sections
(1)	Switch settings	Section 4.2
(2)	Operation of the computer link module	Sections 4.5, 4.8.1
(3)	Connection with the external devices	Section 4.6
(4)	Connection/setting of a terminal resistor	Section 4.7

POINT

Unless these items are correctly set in the bidirectional mode, normal computer linking cannot be established.
Recheck the above items before starting operations.

7. COMMUNICATIONS WITH A COMPUTER IN THE BIDIRECTIONAL MODE

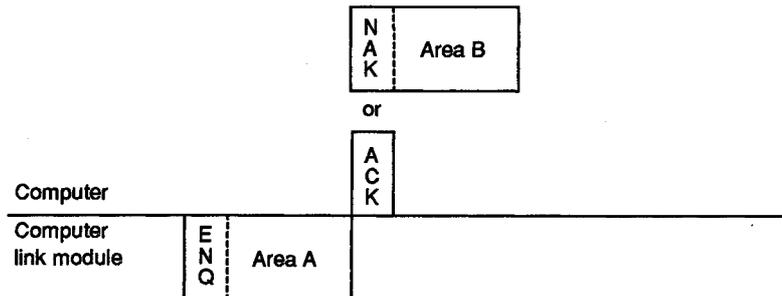
7.4 Bidirectional Control Procedure Basics

The following gives the control protocols and the contents of the items designated with the control protocols in bidirectional mode.

7.4.1 How to read the charts of bidirectional control protocols

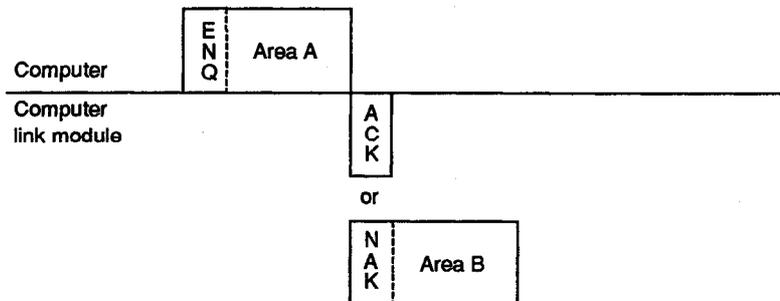
This section explains how to read the charts of control protocols given in Section 7.4.2 and subsequent sections.

(1) Transmitting data from a computer link module to a computer



- (a) Area A: Data send from a computer link module to a computer
- (b) Area B: Data send from a computer to a computer link module
- (c) Write a program so that data is transmitted from left to right.
(Example: For area A, data is transmitted ENQ to right)

(2) Transmitting data from a computer to a computer link module



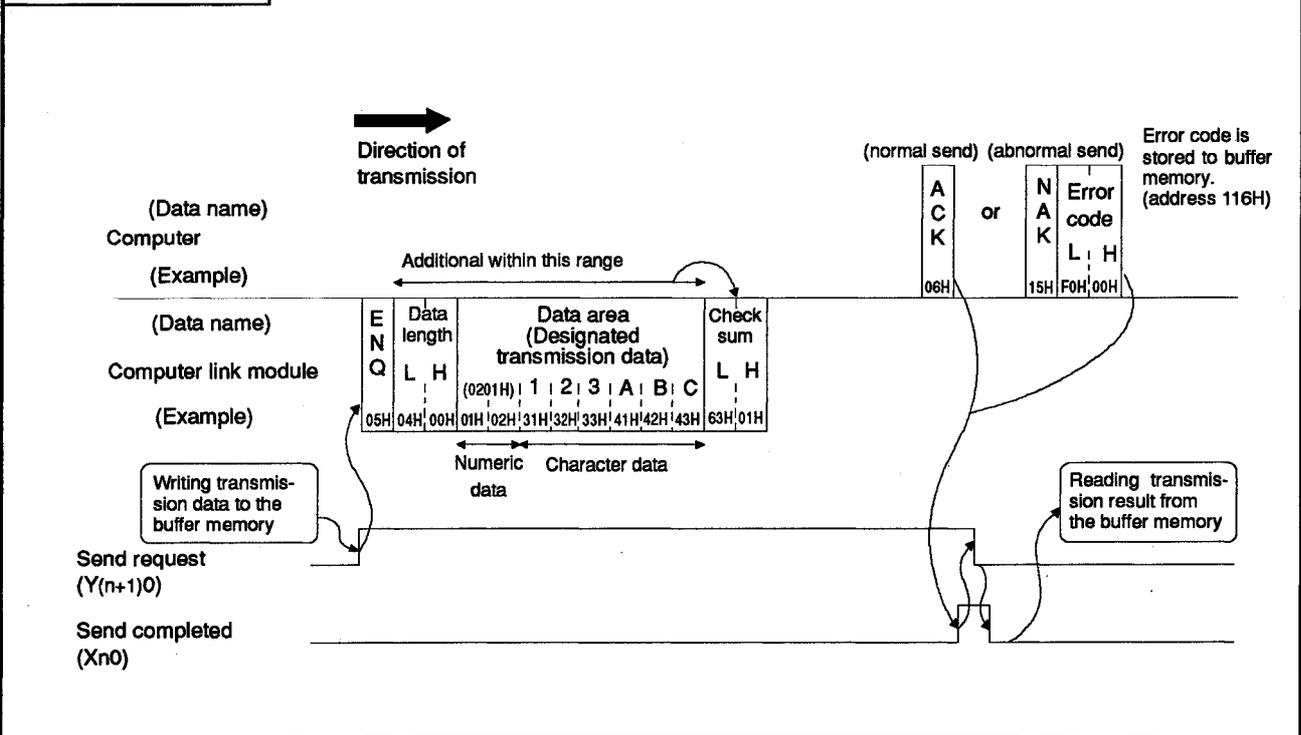
- (a) Area A: Data send from a computer to a computer link module
- (b) Area B: Data send from a computer link module to a computer
- (c) Write a program so that data is transmitted from left to right.
(Example: For area A, data is transmitted ENQ to right)

7. COMMUNICATIONS WITH A COMPUTER IN THE BIDIRECTIONAL MODE

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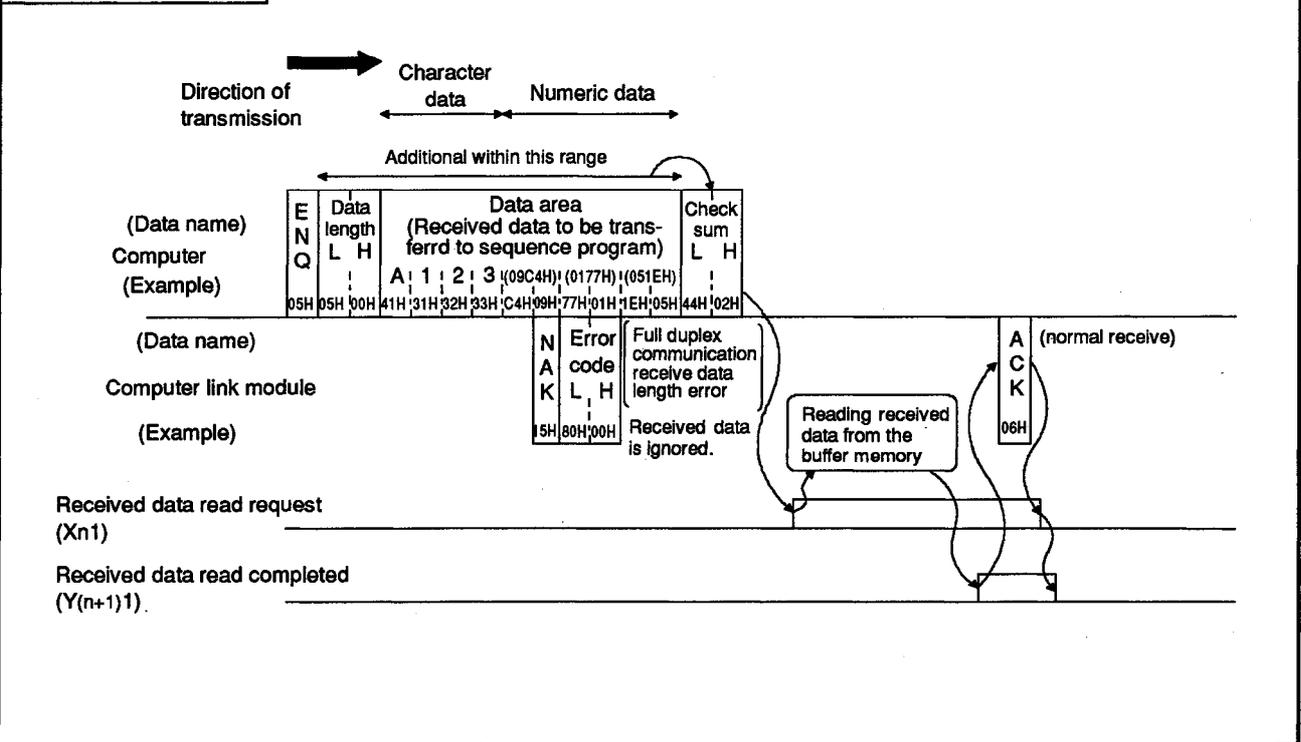
SETTING EXAMPLE

Data length: Word unit



SETTING EXAMPLE

Data length: Word unit



7. COMMUNICATIONS WITH A COMPUTER IN THE BIDIRECTIONAL MODE

7.4.3 Contents of data designation items in bidirectional mode

This section gives the contents of data designated in the message sent and received between the computer and the computer link module.

(1) Control code

Signal Name	Code (Hexadecimal)	Meaning	Application
ENQ	05H	Enquiry	The code used to begin data send.
ACK	06H	Acknowledge	The code returned to the mating station when data has been received correctly.
NAK	15H	Negative Acknowledge	The code return to the sending stations when data has not been receiving correctly. (immediately followed by an error code)

(a) Data send from a computer link module to a computer

The computer link module appends the control code to be transmitted.

(b) Data send from a computer to a computer link module

The computer link module checks the control code received. It is not possible to read the control code from a sequence program.

(2) Data length

Data length expresses the number of bytes or words of data in the data area in 2-byte binary data. Data length units are determined according to the setting at address 103H of the buffer memory.

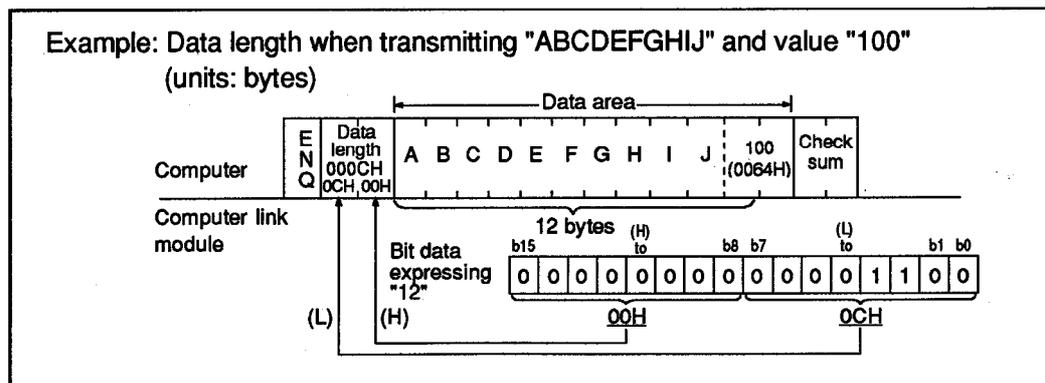
(a) Data send from a computer link module to a computer

The data length to be transmitted is the value written to the send data length storage area of the computer link module buffer memory by the TO instruction in a sequence program.

The computer link module transmits the written value as it is from the lower byte (L).

(b) Data send from a computer to a computer link module

The computer link module checks the received data length. When it is correct, the computer link module writes the first 1 byte to the lower byte position (L) of the received data length storage area of the computer link module buffer memory.



(3) Data area

The data of 00H to FFH code can be processed in a string of 1-byte data as the send data.

(a) Data send from a computer link module to a computer

The data area to be transmitted is the value written to the send data storage area of the computer link module buffer memory by the TO instruction in a sequence program.

The computer link module transmits the data according to the designated length and byte/word units sequentially from the lower address in unchanged codes.

(b) Data send from a computer to a computer link module

The data area received is written to the received data storage area sequentially from the lower address in unchanged codes as they are received.

The data length to be written is determined by the data length in the received message (refer to (2)) and the designated word/byte units.

(4) Check sum

The check sum is the lower 2 bytes (16 bits) of the result obtained by adding the data length and the data area in the message as binary data.

If the setting at address 115H is "1", the check sum is not required.

(a) Data send from a computer link module to a computer

The computer link module calculates and adds the check sum.

If the check sum is not processed, the check sum is not transmitted.

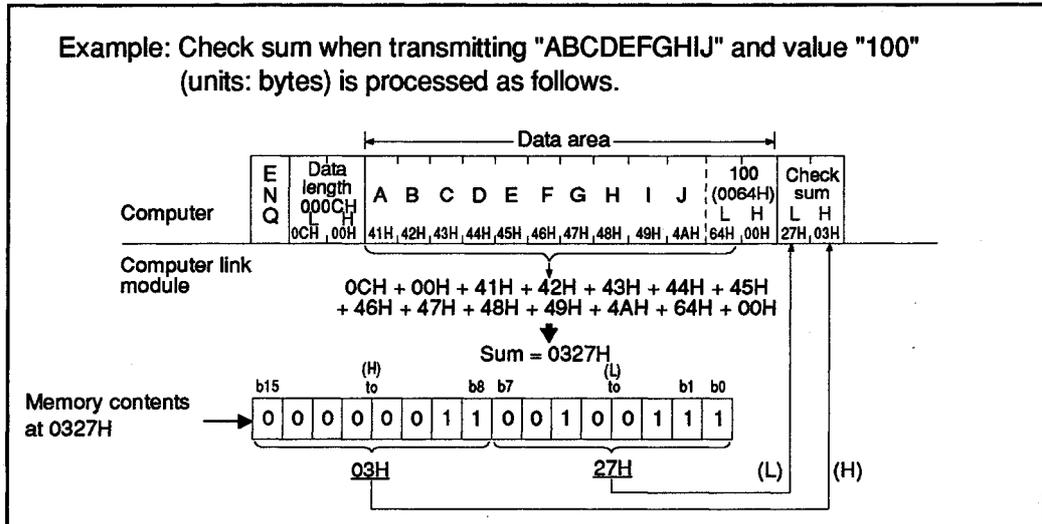
7. COMMUNICATIONS WITH A COMPUTER IN THE BIDIRECTIONAL MODE

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(b) Data send from a computer to a computer link module

The computer link module checks and processes the check sum received. It is not possible to read the check sum from a sequence program.

When the setting is "check sum is disabled", the received data following the data of the designated length is ignored up to the next control code (refer to (1)).



(5) Error code

An error code indicates the error content when an NAK response is received. The code is transmitted and received in the range of 0001H to 00FFH. Section 13.2 gives error code details.

(a) Data send from a computer link module to a computer

The computer link module appends the error code.

When transmitting an error code the computer link module writes the same error code to its error code storage area in the received data buffer memory area.

(b) Data send from a computer to a computer link module

The computer link module writes the received error code to the error code storage area in its send data buffer memory area.

POINT

In bidirectional communications, check sum and error codes are all binary data. Note that in the dedicated protocol, they are handled in ASCII code.

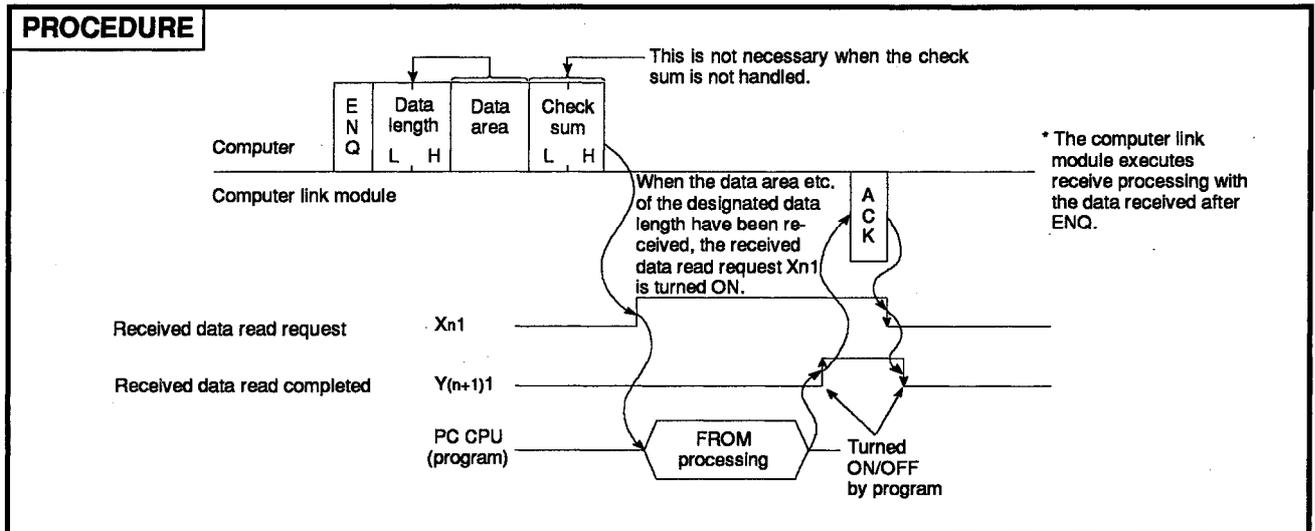
7. COMMUNICATIONS WITH A COMPUTER IN THE BIDIRECTIONAL MODE

7.5 Data Receiving Procedure in the Bidirectional Mode (Computer → Computer Link Module)

Receive processing stores the data received from the computer to the bidirectional receive buffer memory area (hereafter abbreviated to receive area) and reads the data by using a FROM instruction of the sequence program.

7.5.1 Data receive procedure

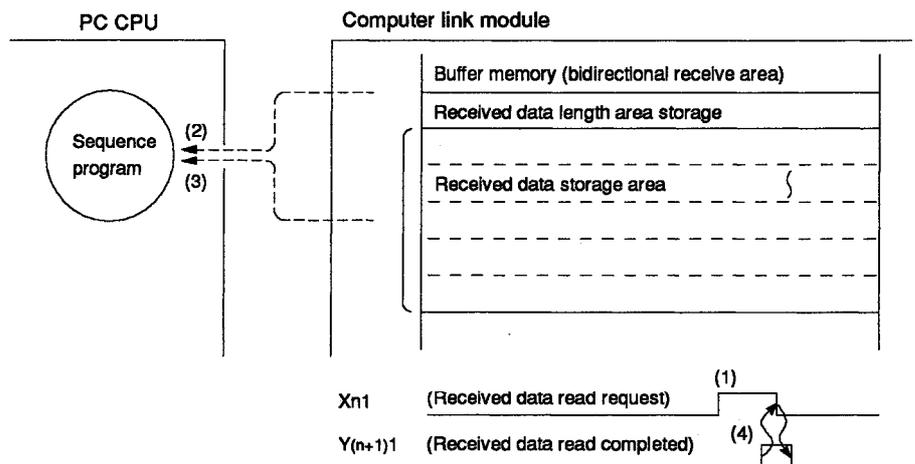
The following diagrams show the data receive process to read out data to the PC CPU in the bidirectional mode.



7.5.2 Data receive program

Shown below are basic sequence programs and programming examples when the PC CPU reads the data stored in the computer link module buffer memory (receive area) by using an application instruction.

The received data is read from the receive area (default: 80H to FFH).



(1) to (4) in the diagram corresponds to (1) to (4) in (1)(a) and (2)(a) of this section.

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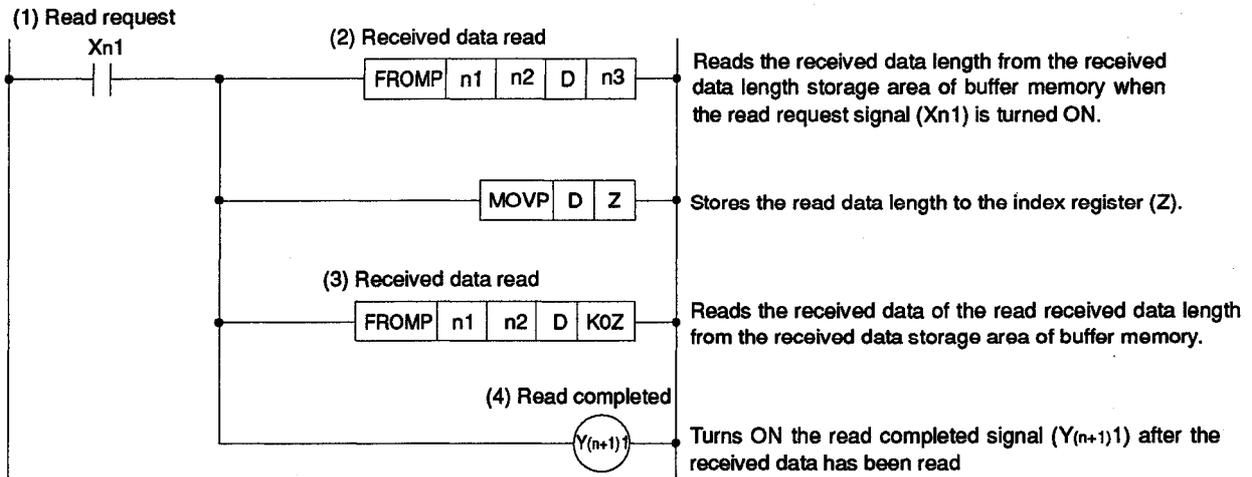
MELSEC-A

(1) Basic sequence program (FROM, FROMP, DFRO, and DFROP instructions)

(a) Format to read from the receive area

Refer to the Programming Manual (Common Instructions) for the details.

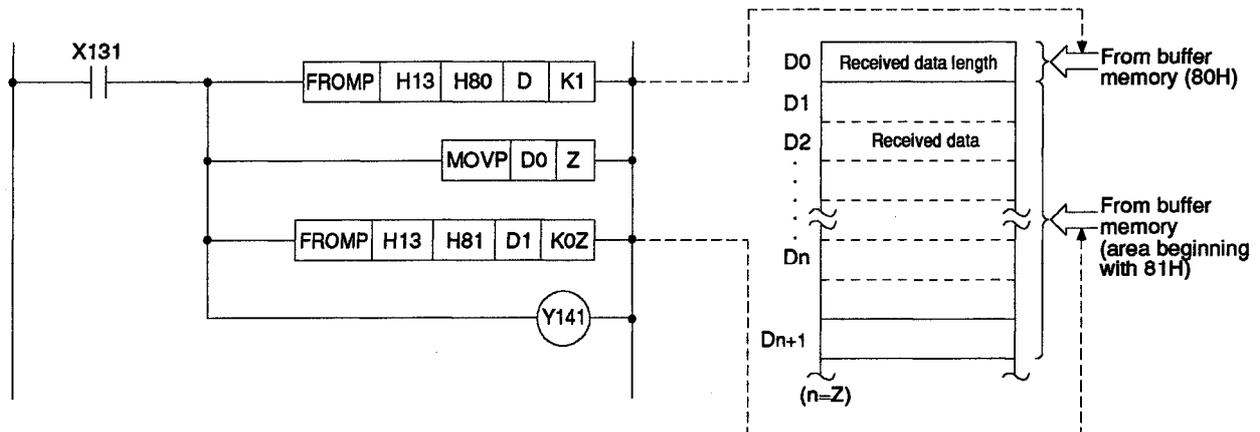
FORMAT



* Data read by program (3) is processed as the received data.

(b) Programming example

To read the data of n+1 words from buffer address 80H to D0 and after when the computer link module I/O signals are allocated to 130H to 14FH. (The designated unit of data is "word" in the example.)



REMARK

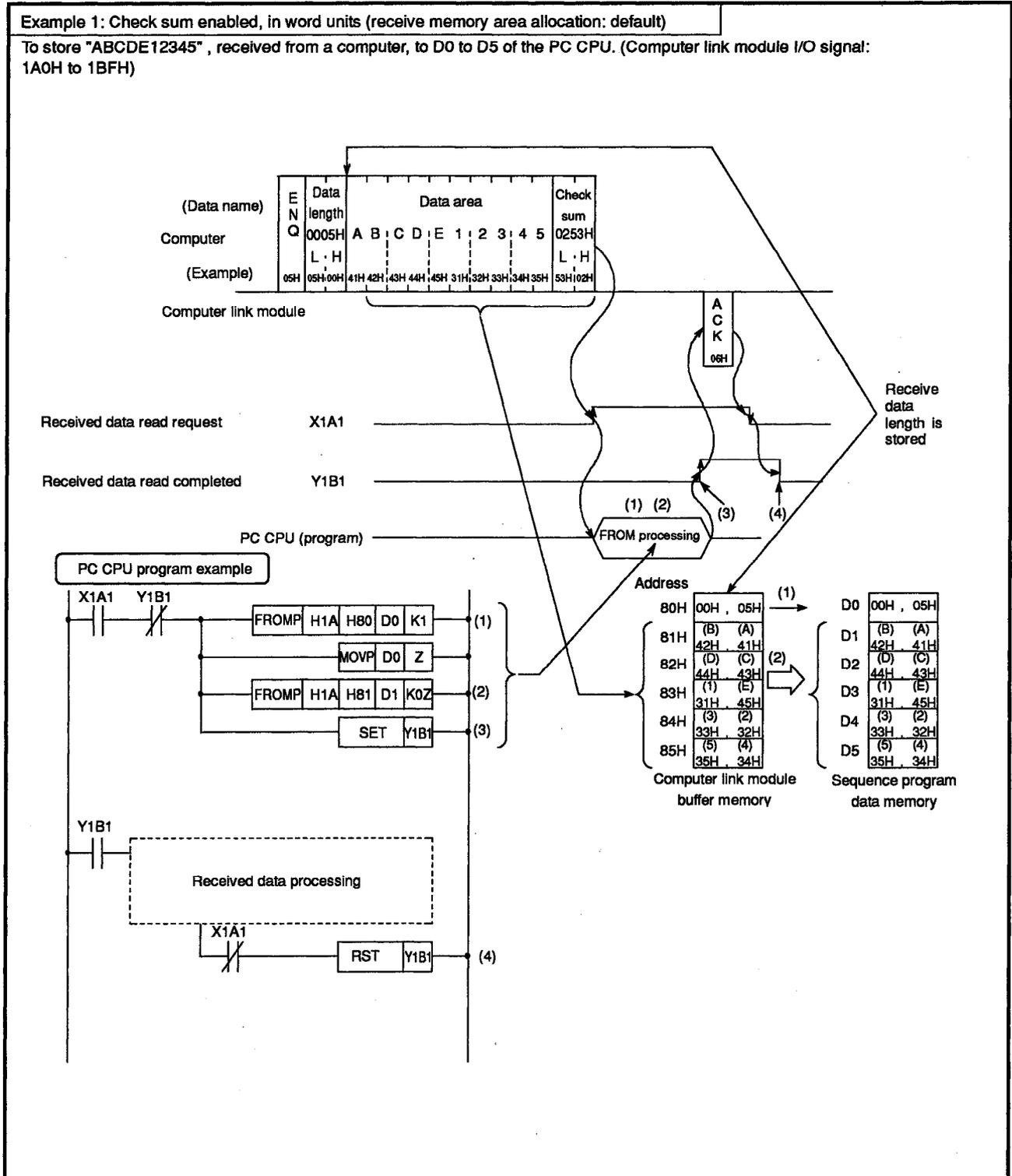
The AnA/AnUCPU dedicated instructions are not available for bidirectional mode.

7. COMMUNICATIONS WITH A COMPUTER IN THE BIDIRECTIONAL MODE

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(2) Application example

The following gives an application example to read received data and to store it to the data register.

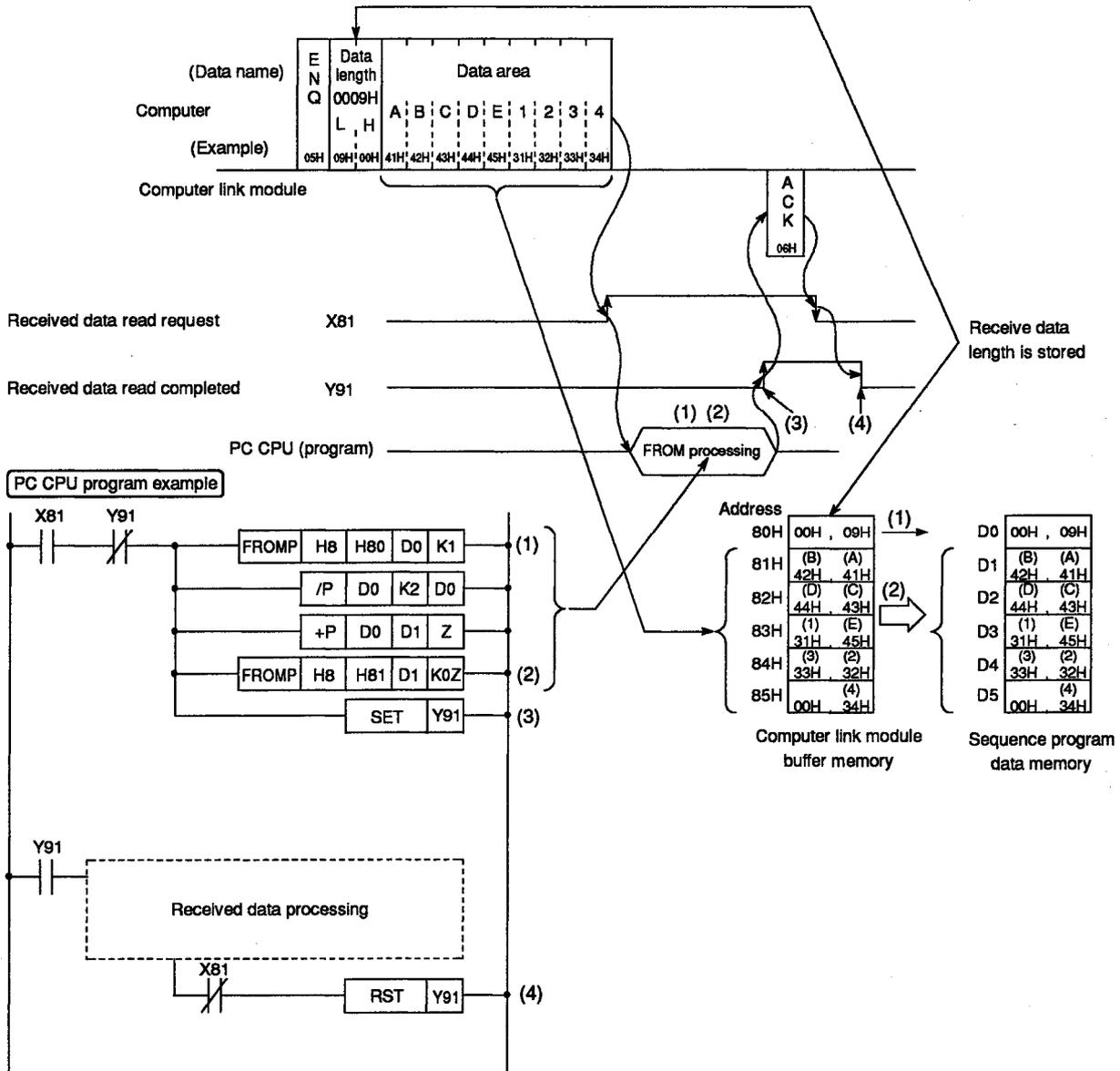


7. COMMUNICATIONS WITH A COMPUTER IN THE BIDIRECTIONAL MODE

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Example 2: Check sum disabled, in word units (receive memory area allocation: default)

To store "ABCDE1234", received from a computer, to D0 to D5 of the PC CPU. (Computer link module I/O signal: 80H to 9FH)



POINTS

- Even if send data units are set to byte units, the FROM instruction in a sequence program operates in word units. Therefore, the received data length must be converted to the number of buffer memory points (word units).
In the above example, 9 bytes of data must be converted into 5 words (9 ÷ 2 = 4.5...5).
- When an odd number of bytes of data is received, the higher 8 bits of the last address read by the FROM instruction are "00H".

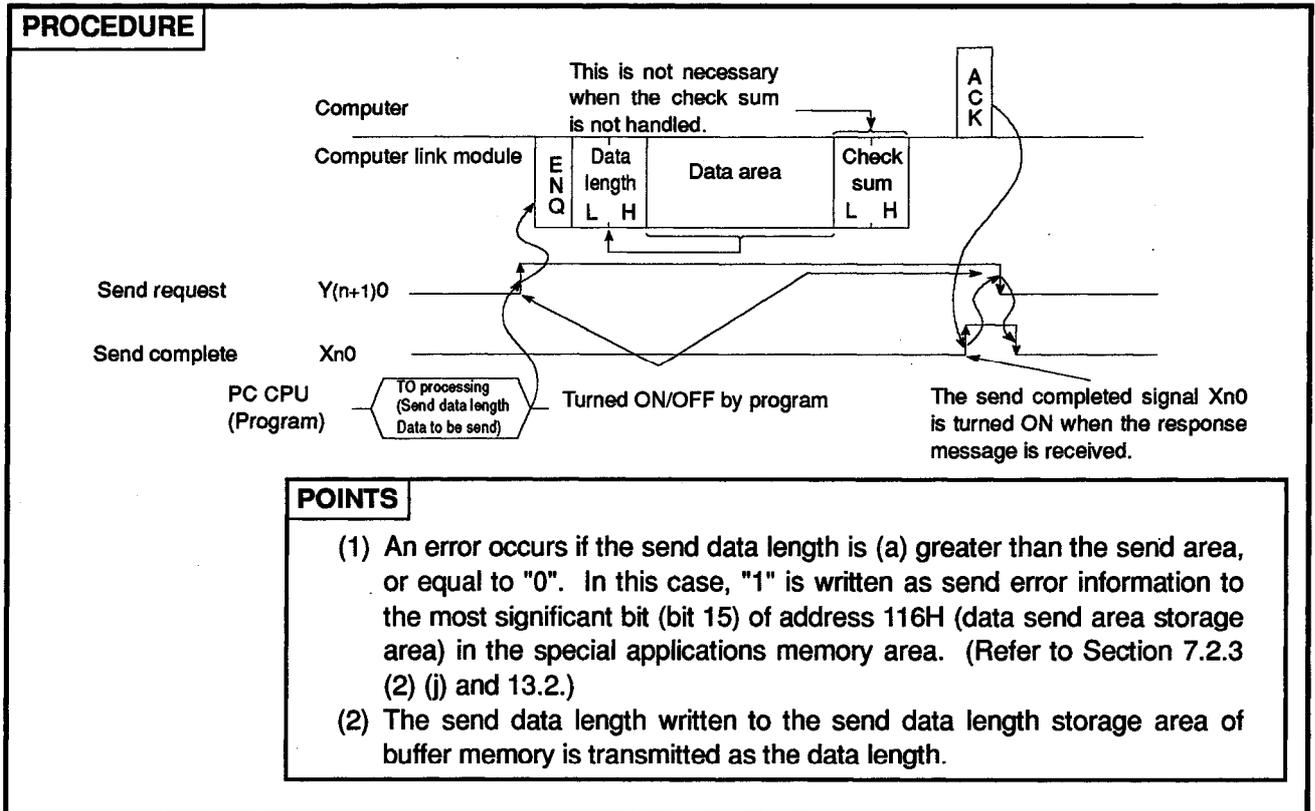
7. COMMUNICATIONS WITH A COMPUTER IN THE BIDIRECTIONAL MODE

7.6 Data Sending Procedure in the Bidirectional Mode (Computer link module → Computer)

"Data sending" is outputting data which was written to the bidirectional mode send buffer memory area (hereafter referred to as the send area), from the computer link module to a computer in response to turning ON the PC CPU send request signal ($Y_{(n+1)0}$)

7.6.1 Data sending procedure

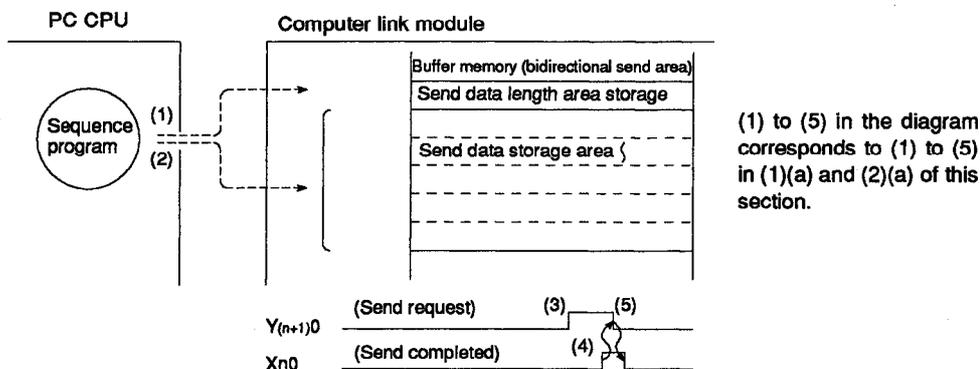
The chart given below shows the send protocol when the data written in send area is sent to the computer.



7.6.2 Data sending program

Shown below are basic programs and programming examples when data is sent from the PC CPU to the computer by using an application instruction.

The send data is written to the send area (default addresses: 0H to 7FH).



7. COMMUNICATIONS WITH A COMPUTER IN THE BIDIRECTIONAL MODE

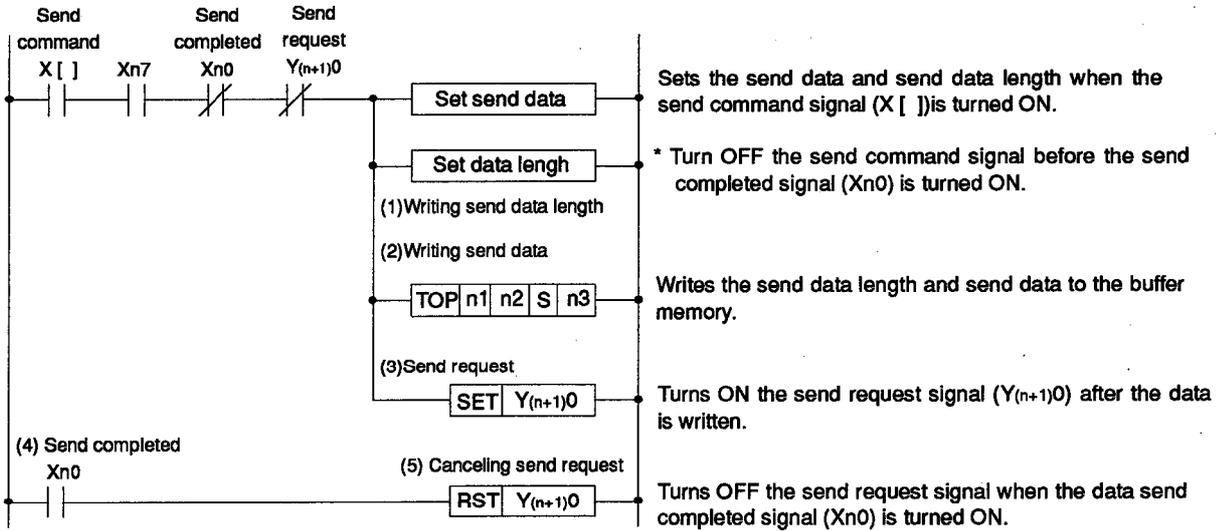
MELSEC-A

(1) Basic sequence program (TO, TOP, DTO, and DTOPI instructions)

(a) Format to write the send area

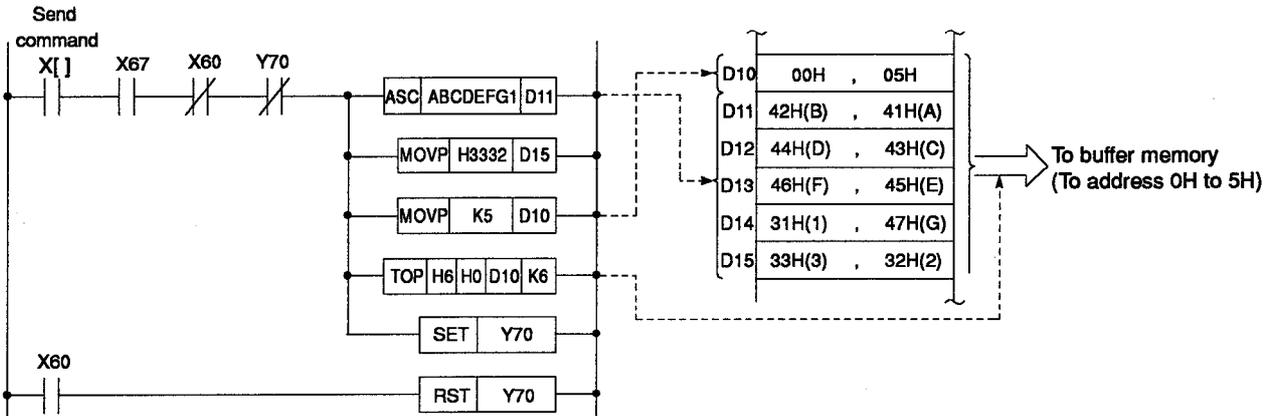
Refer to the Programming Manual (Common Instructions) for the details.

FORMAT



(b) Programming example

To transmit 5-word data after writing "ABCDEFG123" to the buffer memory area from 1H when the computer link module I/O numbers are allocated to 60H to 7FH. (The designated unit of data is "word" in the example.)



REMARK

The AnA/AnUCPU dedicated instructions are not available for bidirectional mode.

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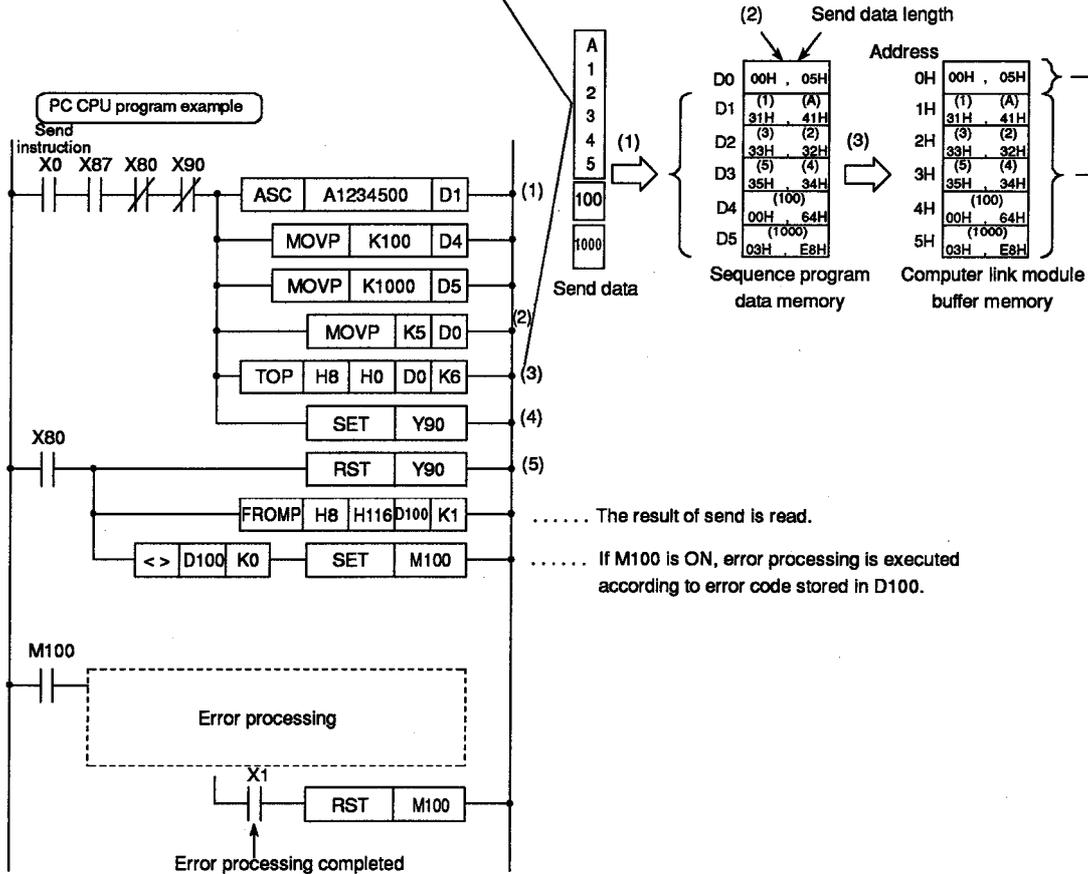
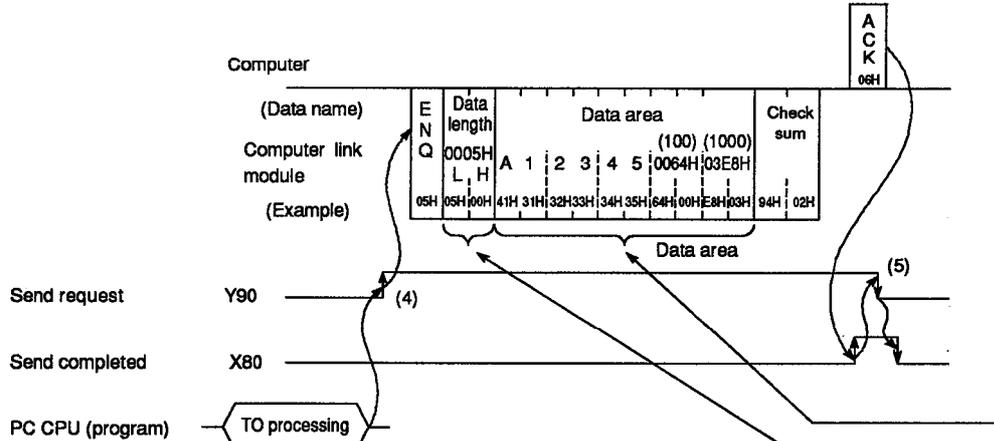
MELSEC-A

(2) Application example

The following gives an application example to send data to the computer.

Example 1: Check sum enabled, in word units (Send area allocation: default)

To transmit character data "A12345" and integer data "100,1000" (decimal) from the sequence program to a computer after writing it to buffer memory. (Computer link module I/O signal: 80H to 9FH)

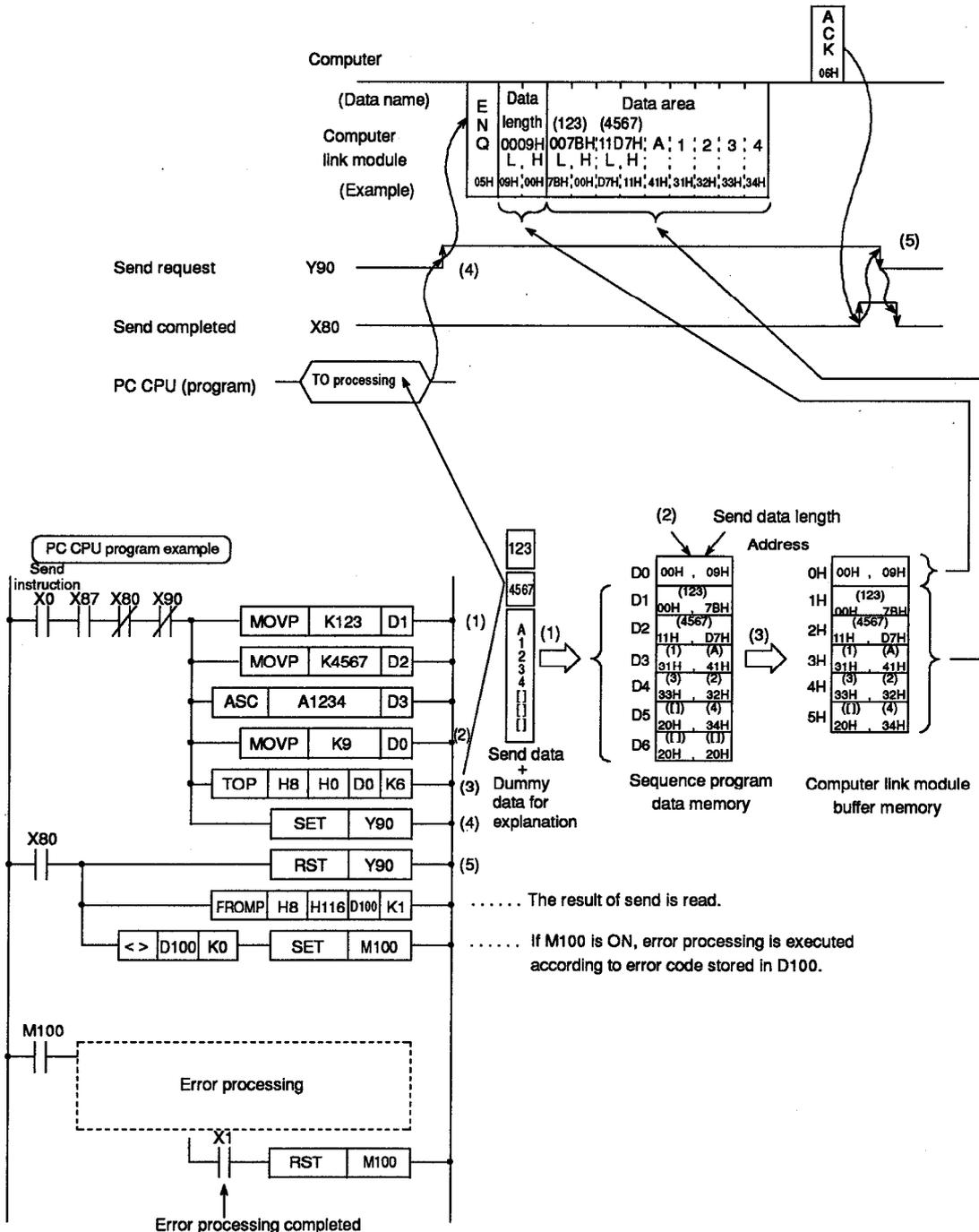


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Example 2: Check sum disabled, in word units (Send area allocation: default)

To transmit character data "A1234" and integer data "123,4567" (decimal) from the sequence program to a computer after writing it to buffer memory. (Computer link module I/O signal: 80H to 9FH)



POINT

- Even if transmission data units are set byte units, the TO instruction in a sequence program operates in word units. Therefore, the length of send data differs from the data length set with the TO instruction.

8. WHEN READING SIGNAL/SETTING INFORMATION IN THE COMPUTER LINK

This section gives the procedures etc. to check the computer link module status or signal status by using a sequence program when a computer link is established with dedicated protocols and in no-protocol mode or bidirectional mode. Insert necessary parts into the program.

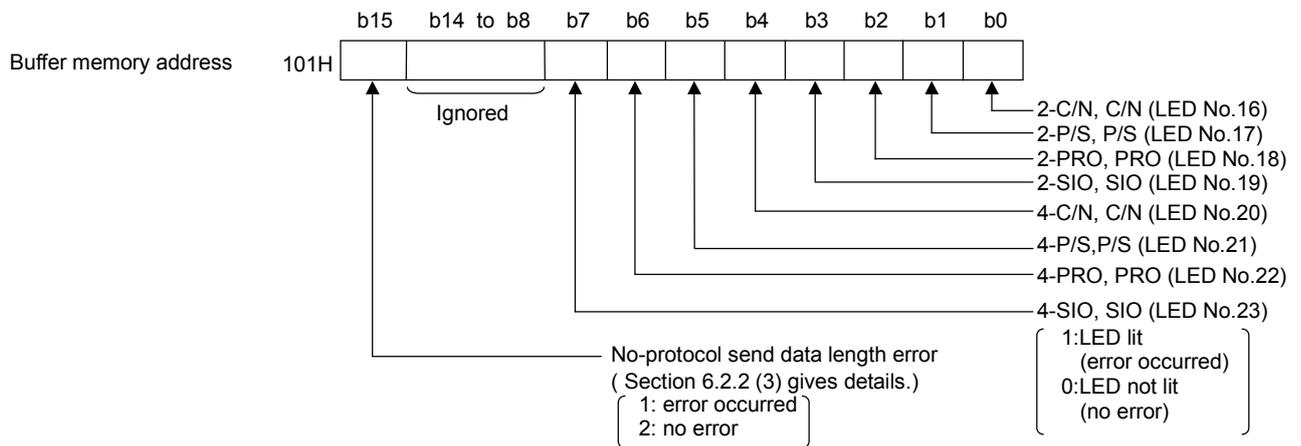
8.1 Reading Transmission Error Data and Turn-OFF Request

This section explains the contents of the buffer memory area where the ON/OFF status of the error LEDs are stored. It also shows how to turn OFF LEDs which are lit.

8.3.1 Reading the error LED display status

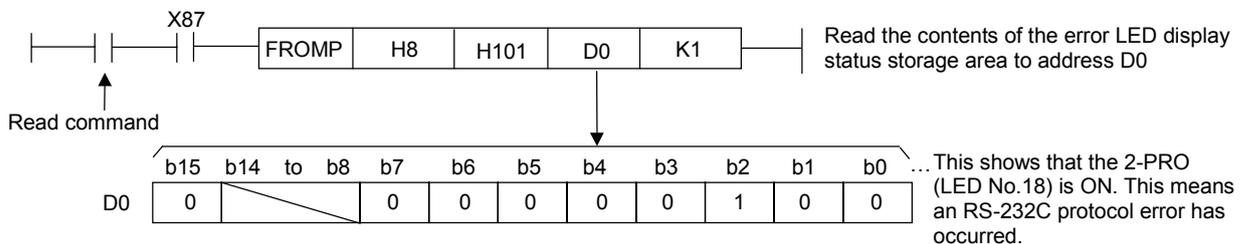
(1) Error LED display status storage area (Address: 101H)

The ON/OFF status of the error LEDs are stored in address 101H of the buffer memory (see below).



(2) Program example to read the error LED display status storage area

The following gives an example program used to read the error LED display status by using FROM instruction. (Computer link module I/O signal: 80H to 9FH)



REMARK

Section 4.3 gives details about the ON/OFF state of each bit in the error LED display area.
Section 13 gives details about error processing.
Section 9 and gives details about 2-SIO (LED No.19) and 4-SIO (LED No.23).

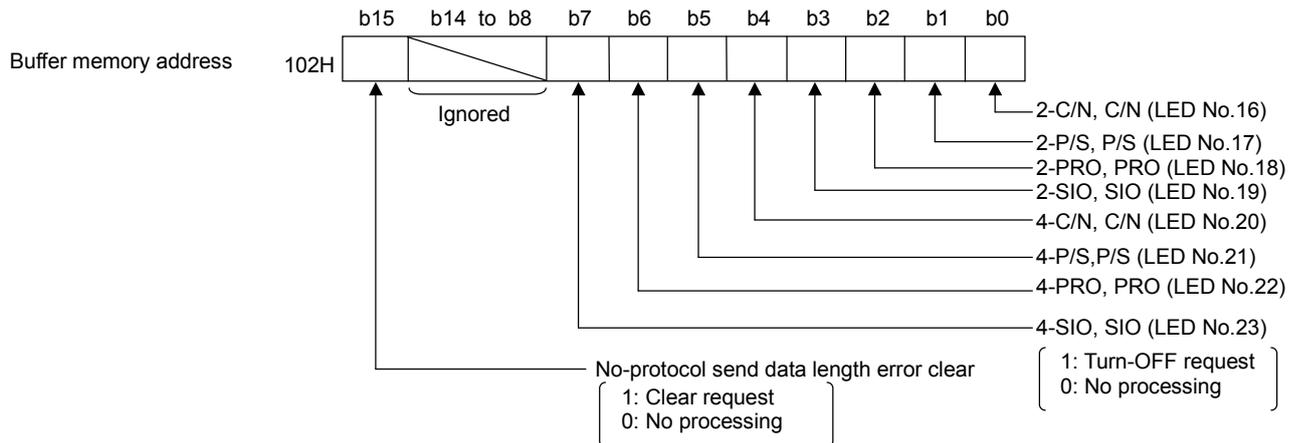
8. WHEN READING SIGNAL/SETTING INFORMATION IN THE COMPUTER LINK

8.1.2 Turning OFF error LEDs

When an error LED turns ON, it stays ON (lit) even when the cause of the error has been eliminated.

To turn OFF the lit LED, "1" must be written to the appropriate bit of address 102H of the buffer memory, using the sequence program TO instruction.

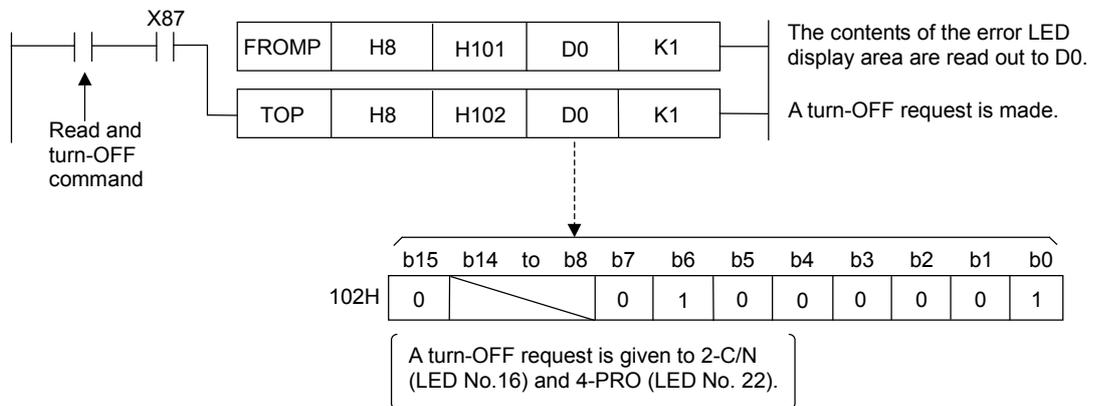
(1) Error LED turn-OFF request area (Address: 102H)



(2) Program example to turn OFF error LEDs

The following gives an example program used to issue a turn-OFF request with a TO instruction to all lit LEDs.

(computer link module I/O signals: 80H to 9FH)



POINTS

- (1) The LED turn-OFF request is only valid when it is written.
- (2) Relevant data in the error LED display status storage area at address 101H is cleared when the LED turn-OFF request is made. Data at address 102H remains as written.
- (3) If the error data has not been cleared after the LED turn-OFF request is made, the corresponding bit in the error LED display status storage area turns the error LED ON again

8. WHEN READING SIGNAL/SETTING INFORMATION IN THE COMPUTER LINK

Function	Computer link function									
	A1SJ71UC24			A1SJ71C24			A1SCPU C24-R2		A2CCPU C24	A2CCPU C24-PRF
Applicable module	AJ71UC24	-R2	-R4	-PRF	-R2	-R4	-PRF	O	Δ	Δ
Remarks	O	O	O	Δ	Δ	Δ	Δ	O	Δ	Δ

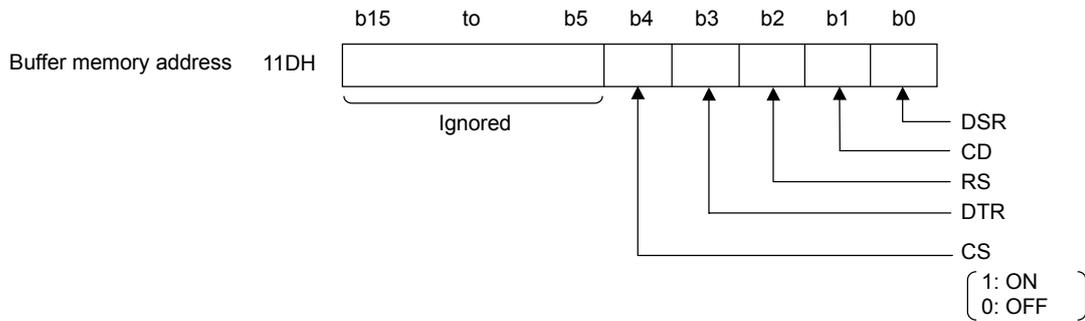
MELSEC-A

8.2 Reading the RS-232C Signal Status

This section explains the reading of the RS-232C control signal status stored in buffer memory.

(1) RS-232C signal status storage area (address: 11DH)

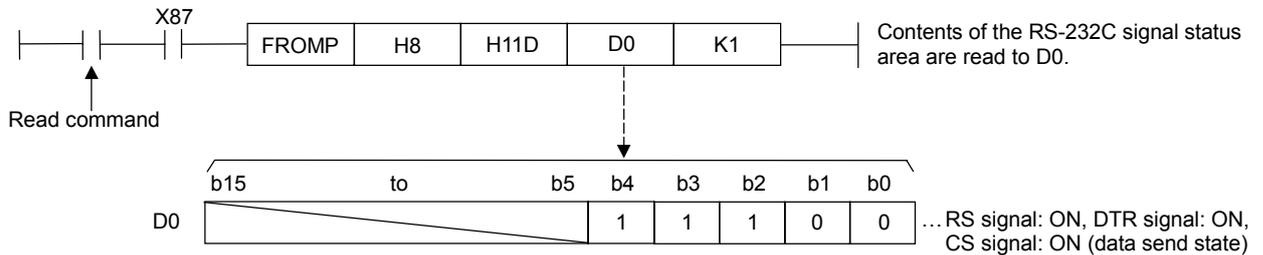
The RS-232C signal status is stored to buffer address 11DH as shown below.



(2) Program example to read the RS-232C signal status storage area

The following gives an example program used to read the RS-232C signal status by using a FROM instruction.

(Computer link module I/O signals: 80H to 9FH)



REMARKS

- (1) Refer to Section 3.7.1 for the RS-232C signals.
- (2) The signals (RS, DTR) output from the computer link module are controlled by the OS of the computer link module. They cannot be controlled directly by the sequence program.

8. WHEN READING SIGNAL/SETTING INFORMATION IN THE COMPUTER LINK

Function	Computer link function									
	AJ71UC24		A1SJ71UC24			A1SJ71C24			A1SCPU	A2CCPU
Applicable module	-R2	-R4	-PRF	-R2	-R4	-PRF	C24-R2	C24	C24-PRF	
Remarks	○	○	○	○	△	△	△	○	△	△
					(Ver. M)					(Ver. K)

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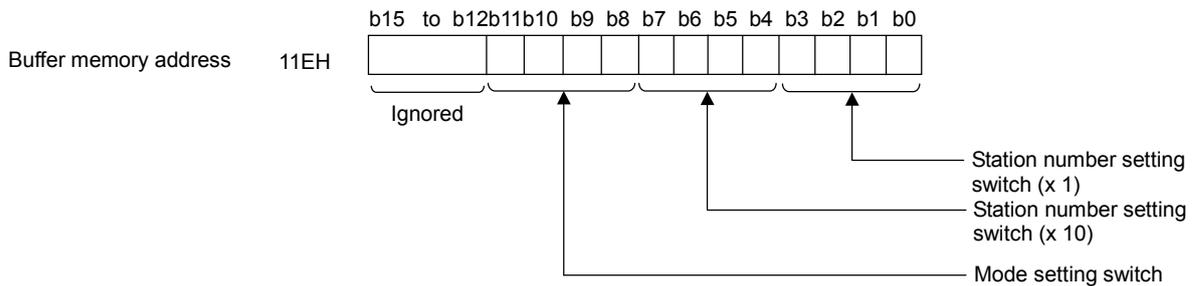
8.3 Reading Switch Settings and Operation Mode

This section describes how to read the switch settings and the operation mode from the buffer memory.

8.3.1 Reading the settings of the mode setting switch and station number setting switches

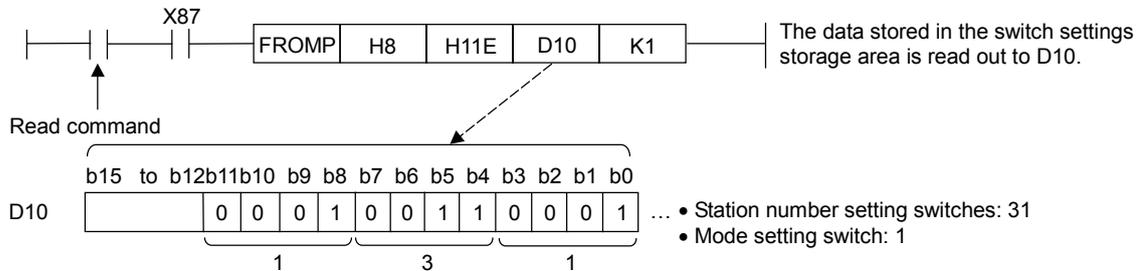
(1) Switch settings storage area (address: 11EH)

The settings of the mode setting switch and station number setting switches are stored at buffer memory address 11EH, as shown below. Ignore the setting(s) of the switch(es) which the computer link module does not have.



(2) Programming example for reading the switch settings storage area

The following gives an example program used to read the switch settings from the switch settings storage area with a FROM instruction: (Computer link module I/O signals: 80H to 9FH)



REMARK

When the ongoing operation mode does not correspond to the setting of the mode setting switch after mode switching described in Section 12, their settings can be verified at the following addresses:

- Ongoing operation mode number (Address 118H, refer to Section 8.3.3.)
- Set number of mode setting switch (Address 11EH, refer to Section 4.2.1 for details of the numbers.)

8. WHEN READING SIGNAL/SETTING INFORMATION IN THE COMPUTER LINK

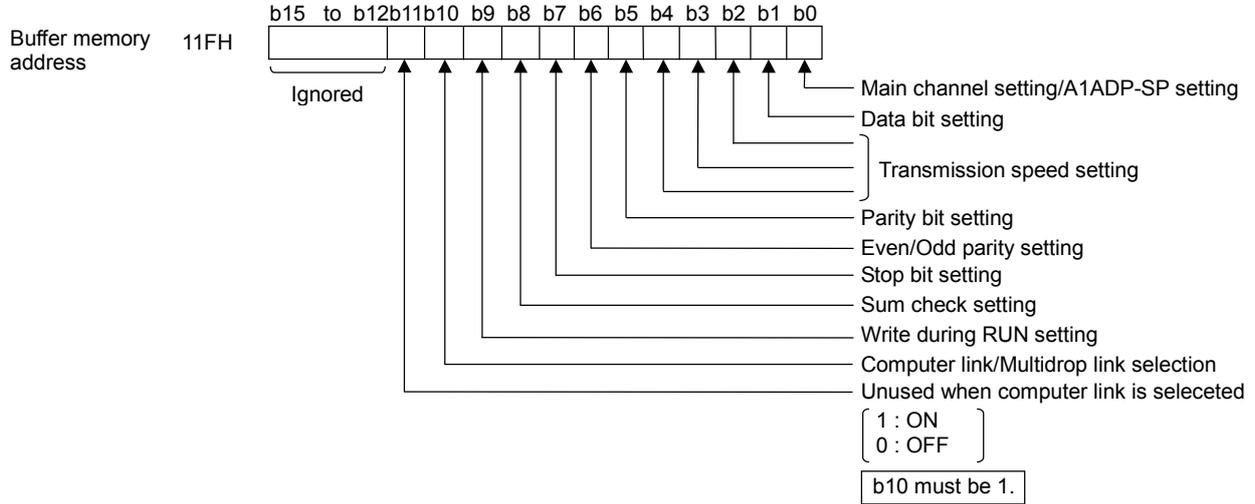
Function	Computer link function									
	A1SJ71UC24			A1SJ71C24			A1SCPU		A2CCPU	A2CCPU
Applicable module	AJ71UC24	-R2	-R4	-PRF	-R2	-R4	-PRF	C24-R2	C24	C24-PRF
Remarks	O	O	O	O	Δ	Δ	Δ	O	Δ	Δ
					(Ver. M)					(Ver. K)

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8.3.2 Reading the settings of the transmission specification setting switches

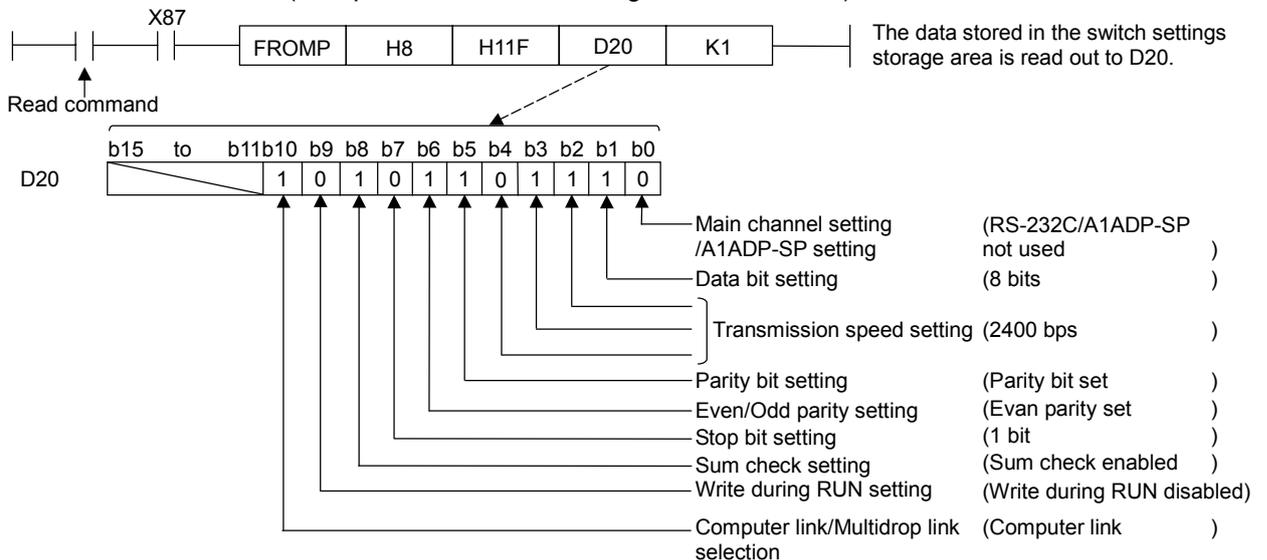
(1) Switch settings storage area (address: 11FH)

The settings of the transmission specification setting switches are stored at buffer memory address 11FH, as shown below. Ignore the setting(s) of the switch(es) which the computer link module does not have.



(2) Programming example for reading the switch settings storage area

The following gives an example program used to read the switch settings from the switch settings storage area with a FROM instruction:
(Computer link module I/O signals: 80H to 9FH)



REMARK

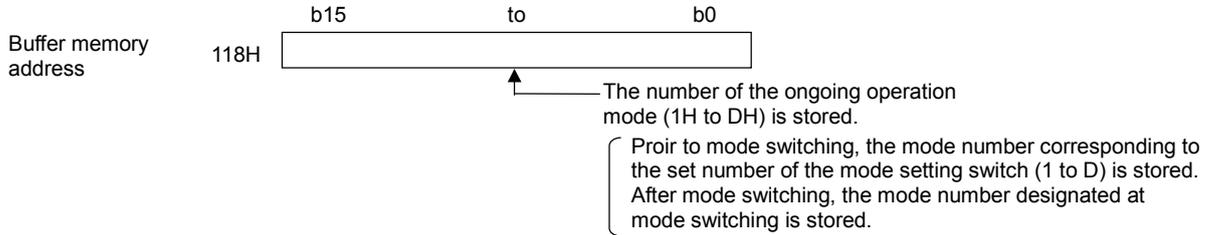
The data of each bit in the switch settings storage area depends on the setting of the corresponding transmission specification setting switch (refer to Section 4.2.2) on the computer link module.

8. WHEN READING SIGNAL/SETTING INFORMATION IN THE COMPUTER LINK

8.3.3 Reading the ongoing operation mode

(1) Operation mode storage area (address: 118H)

The operation mode is stored at buffer memory address 118H, as shown below:



POINT

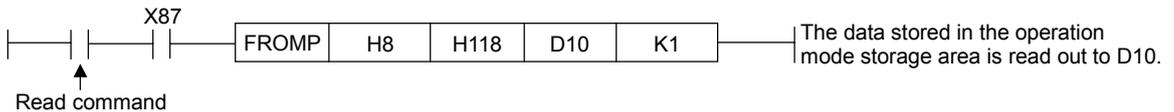
The mode number (1H to DH) stored in the operation mode storage area corresponds to the set number of the mode setting switch (1 to D) described in Section 4.2.1.

The mode numbers and their operation modes (modes at each interface) are as follows:

Mode No./Mode Setting Switch No.	Mode at Each Interface	
	RS-232C	RS-422
0	(Unusable)	
1	Protocol 1	No-protocol mode
2	Protocol 2	No-protocol mode
3	Protocol 3	No-protocol mode
4	Protocol 4	No-protocol mode
5	No-protocol mode	Protocol 1
6	No-protocol mode	Protocol 2
7	No-protocol mode	Protocol 3
8	No-protocol mode	Protocol 4
9	No-protocol mode	No-protocol mode
A	Protocol 1	Protocol 1
B	Protocol 2	Protocol 2
C	Protocol 3	Protocol 3
D	Protocol 4	Protocol 4
E	(Unusable)	
F	(For module test)	

(2) Programming example for reading the operation mode storage area

The following gives an example program used to read the ongoing operation mode from the operation mode storage area with a FROMP instruction:
(Computer link module I/O signals: 80H to 9FH)



REMARK

When the ongoing operation mode does not correspond to the setting of the mode setting switch after mode switching described in Section 12, their settings can be verified at the following addresses:

- Ongoing operation mode number (Address 118H)
- Set number of mode setting switch (Address 11EH, refer to Section 4.2.1 for details of the numbers.)

9. WHEN COMMUNICATING DATA AFTER CHANGING TO DC1 TO DC4 CONTROL METHOD

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9. WHEN COMMUNICATING DATA AFTER CHANGING TO DC1 TO DC4 CONTROL METHOD

This section describes the function used to turn ON and OFF the DTR/DSR signal (at the RS-232C interface only) between the computer link module and the external device, or to control data communications with a DC signal (DC1 to DC4).

The DTR/DSR control is available every time the computer link module is turned ON, however, the user can switch the transmission control method according to the external device specifications.

POINT

The computer link module controls all transmission from the PC CPU in the user-designated transmission control method.

It is not necessary to control it using the sequence program.

9.1 Precautions when Controlling Transmission

This section gives the precautions to take when using the computer link module transmission control function.

- (1) Determining which items are required to control data communications between the external device and the PC CPU
 - (a) Is the transmission control function used? If so, which type of control is used?
 - (b) How is transmission controlled?
 - (c) If DC code control is used, which combination of codes is utilized?
(DC1 to DC4 codes can be switched.)
- (2) Conditions for using the transmission control function
 - (a) Transmission cannot be controlled using both DTR/DSR signals and DC codes at the same time.
Select one type of control using the computer link module buffer's transmission control designation area (address 11AH).
 - (b) In DC control, the same transmission control is performed at both RS-232C interface and RS-422 interface of the computer link module.
 - (c) In DTR/DSR control, connect the DTR signal and DSR signal pins of the computer link module to the external device. (Refer to Section 4.6.)
- (3) Interfaces and modes available for transmission control

The following table shows the transmission control methods, and the interfaces and computer link module modes available for transmission control:

9. WHEN COMMUNICATING DATA AFTER CHANGING TO DC1 TO DC4 CONTROL METHOD

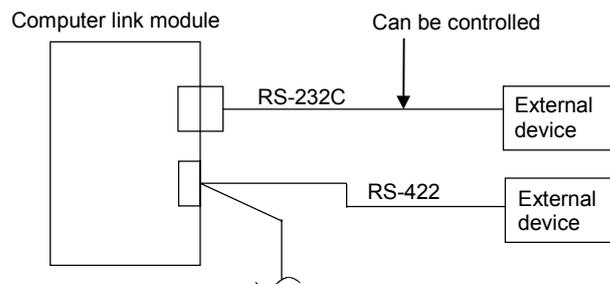
Transmission Control Function	Type of Control	Interface Used	Modes Where Transmission Controls are Valid			Remarks	
			No-Protocol	Bidirectional	Dedicated Protocol		
DTR/DSR controls *1	DTR control	RS-232C	O	—	—	The RS-422 is ignored.	DTR/DSR control or DC code control can be used.
	DSR control		O	O	O		
DC code control *1	DC1/DC3 transmission control	RS-232C	O	—	—	Controlled via both the RS-232C and RS-422.	
	DC1/DC3 receive control		O	O	O		
	DC2/DC4 transmission control	RS-422	O	O	O		
	DC2/DC4 receive control		O	O	O		

O : Enabled (Transmission is controlled)
 — : Disabled

*1 For full-duplex transmission through a computer link in the bidirectional mode, refer to POINTS in Section 7.2.4.

(4) DTR/DSR control

Since there are no DTR/DSR signals in the RS-422 interface, when DTR/DSR control is designated, data cannot be communicated via the RS-422.



(5) DC code control

(a) DC1/DC3 transmission codes and DC1/DC3 receive codes can be controlled when executing full-duplex data communications between the computer link module and its communicating device. Data communications cannot be controlled using DC1/DC3 codes when executing half-duplex data communications.

(b) Avoid using DC1 to DC4 codes in the user's data. If those codes must be used, take one of the following measures:

- Use DTR/DSR controls.
- Switch DC codes (refer to Section 9.3.2).
- Do not use the transmission control function (refer to Section 9.3.1).

POINT

When using a DC1/DC3 code to control data receive or DC2/DC4 code to control data receive, the computer link module will execute the corresponding DC code control if the user's data (received from the external device) contains a DC code. However, if the user's data (whose request to send was transmitted by a PC CPU) contains a DC code, that data will be transmitted.

9. WHEN COMMUNICATING DATA AFTER CHANGING TO DC1 TO DC4 CONTROL METHOD

(6) Handling DTR/DSR signals when DTR/DSR controls are not used

When DTR/DSR controls are not used, the computer link module handles DTR/DSR signals as follows:

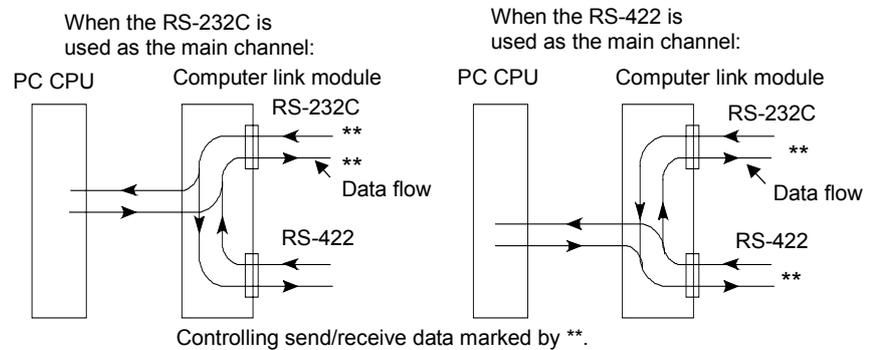
- (a) DTR signal is normally ON.
- (b) The DSR signal ON/OFF state is ignored.

(7) Transmission control when the computer link module mode number is 9 to D

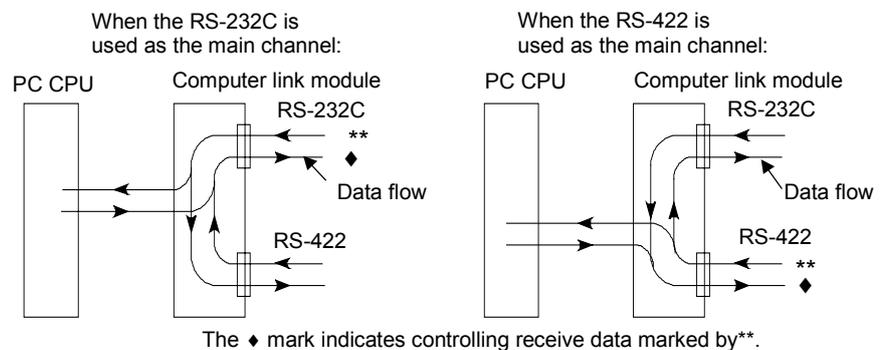
When the computer link module RS-232C and RS-422 are set to the same mode, the computer link module controls data communications as shown below:

(mode number 9: no-protocol mode, modes A to D: dedicated protocol (formats 1 to 4))

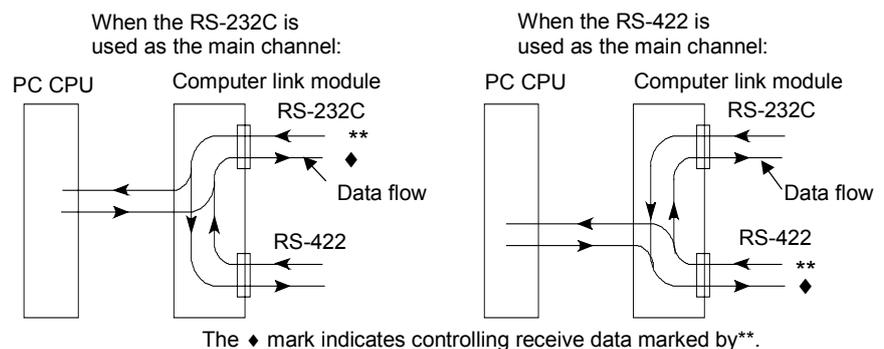
(a) When DTR/DSR controls are executed



(b) When DC1/DC3 transmission control is executed

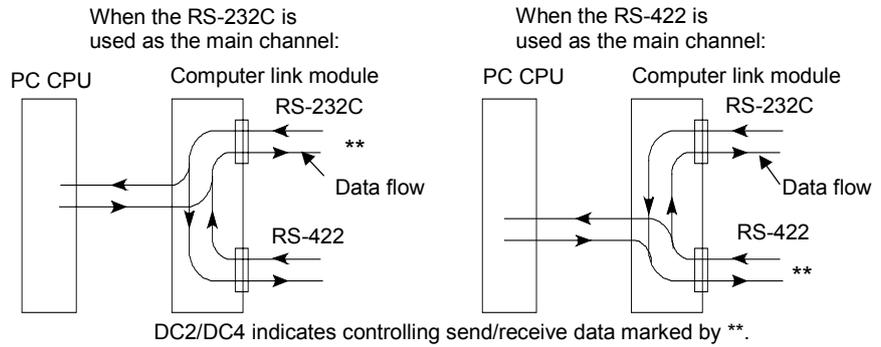


(c) When DC1/DC3 receive control is executed

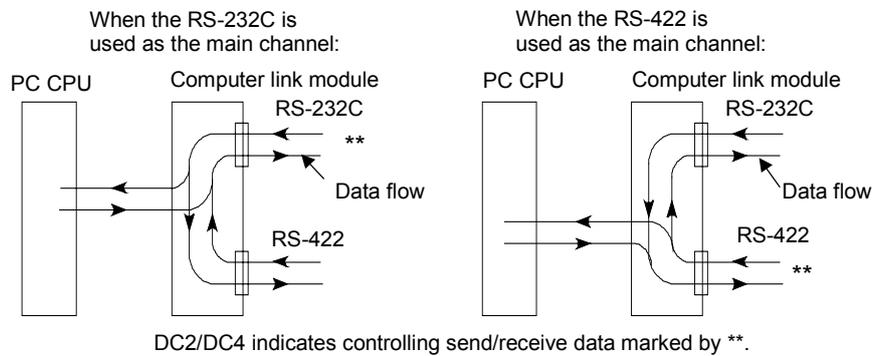


9. WHEN COMMUNICATING DATA AFTER CHANGING TO DC1 TO DC4 CONTROL METHOD

(d) When DC2/DC4 transmission control is executed



(e) When DC2/DC4 receive control is executed



9.2 Transmission Control

This section describes the details of DTR/DSR control and DC code control of the computer link module.

9.2.1 DTR/DSR (ER/DR) control

This section describes DTR/DSR (ER/DR) control.

(1) What is DTR/DSR control?

DTR/DSR control enables and disables data communications with an external device via the computer link module RS-232C by means of the DSR (DR) and DTR (ER) signals.

DTR/DSR control is not available for the RS-422.

(2) Description of computer link module DTR control

This control function, using a DTR signal, informs the external device of whether the computer link module receives data normally.

Data transmitted from the external device in the no-protocol mode will be stored through the OS area into the no-protocol receive buffer memory area. (Refer to Section 6.2.1 (2) *1.)

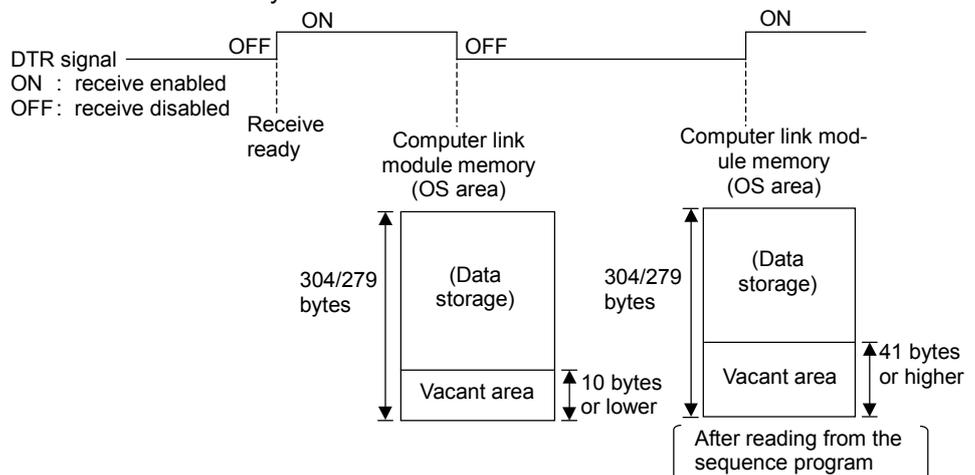
Under the following conditions, the computer link module temporarily stores received data to its OS area. When transfer to the no-protocol receive buffer memory is enabled (read request signal Xn1 is OFF), data is transferred until the receive completed code is received, or until the fixed length of data has been transmitted.

Conditions:

- (a) When there is too much data for the buffer memory because the received data length exceeds the no-protocol receive buffer memory area.
- (b) When the next data received before the PC CPU reads the data received previously.

According to the free capacity of the OS area, the computer link module turns the DTR signal ON and OFF as follows:

- Less than 10 bytes vacant area: OFF
- More than 41 bytes vacant area: ON



REMARKS

- Clearing received data as described in Section 6.2.1 (4) clears the data stored in the OS area. (The receive area in the buffer memory is not cleared.)
- When the above-mentioned OS area has no vacant area, receiving data causes an error, and the data is ignored until the OS area has enough vacant area. When this happens, the 2-SIO or 4-SIO LED goes ON (refer to Section 4.3).

(3) Computer link module DSR control

This control function, using a DSR signal, allows the computer link module to check whether the external device receives data normally, thereby controlling data transmission to the external device by turning ON or OFF the signal, as described below:

- (a) When the computer link module DSR signal is ON, if there is send data that data will be sent to an external device.
- (b) When the computer link module DSR signal is OFF, even if send data exists that data will not be sent to an external device.

9.2.2 DC1/DC3 transmission control

This section describes DC1/DC3 transmission control.

(1) What is DC1/DC3 transmission control?

When data communications is executed in the no-protocol mode, this notifies the external devices whether the computer link module can or cannot receive data using the DC1/DC3 code.

(2) Description of computer link module DC1/DC3 transmission control

The principles behind it are the same as those of DTR control in Section 9.2.1 (2).

The computer link module sends DC1 or DC3 to the external device without turning the DTR signal ON/OFF.

Section 9.2.1 gives details about DC1/DC3 transmission timing.

DTR signal state corresponds to the data transmission as shown below:

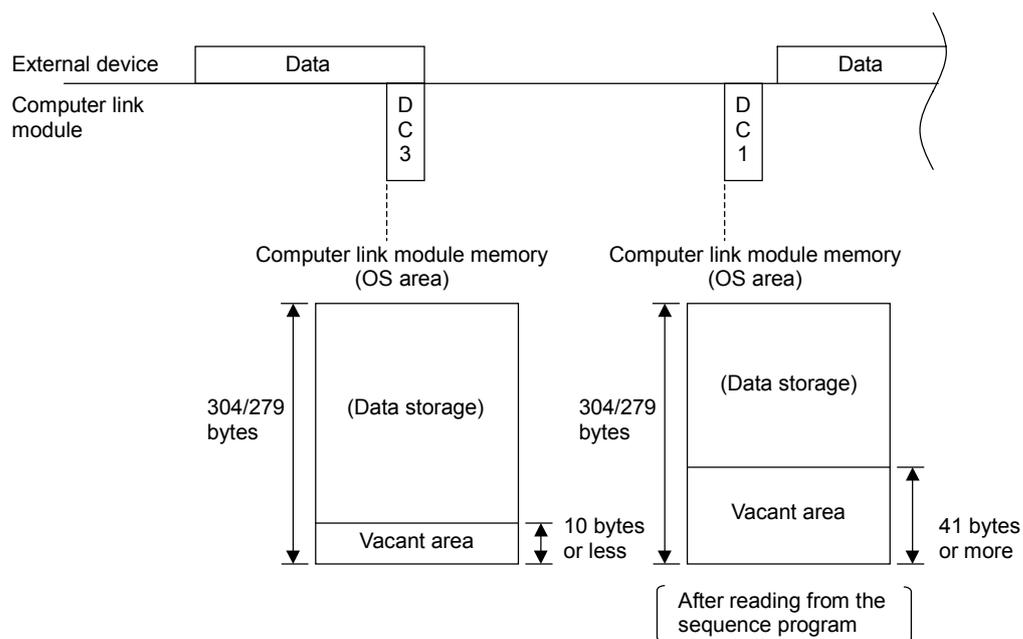
(DTR control) (DC1/DC3 transmission control)

DTR signal is OFF : DC3 transmission
Transmitted when the free capacity of the OS area is 10 bytes or less.

DTR signal is ON : DC1 transmission
Transmitted when the free capacity of the OS area is 41 bytes or over.

9. WHEN COMMUNICATING DATA AFTER CHANGING TO DC1 TO DC4 CONTROL METHOD

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POINTS

- (1) When power to the PC CPU is turned ON, the PC CPU is reset, or the mode is switched, DC1 code is not sent to the external device. This is the same state as when DC1 has already been sent.
- (2) DC1/DC3 codes to be sent can be changed. Section 9.3 tells how to change codes.

REMARKS

- When received data is cleared according to Section 6.2.1 (4), the data stored in the OS area as well as in the no-protocol receive buffer memory area will also be cleared.
- When data is transmitted to the above-mentioned OS area with no free capacity, an SIO error will occur, and all the data transmitted will be ignored until an enough free capacity is reserved. In such a case, the 2-SIO and 4-SIO LEDs will come ON. (Refer to Section 4.3.)

9. WHEN COMMUNICATING DATA AFTER CHANGING TO DC1 TO DC4 CONTROL METHOD

9.2.3 DC1/DC3 receive control

This section describes DC1/DC3 receive control.

(1) What is DC1/DC3 receive control?

This control function allows the computer link module to check when a DC1 or DC3 code is received whether the external device receives data normally, thereby controlling data transmission to the external device.

(2) Description of computer link module DC1/DC3 receive control

(a) Receiving DC3 code from an external device suspends computer link module data send.
The received DC3 code cannot be read by the sequence program.

(b) Receiving DC1 code from an external device resumes computer link module data send.
(The computer link module restarts transmitting data from where transmission was suspended by receiving DC3.)

The received DC1 code cannot be read by the sequence program.



(c) After DC1 code is received, if another DC1 code is received, that code will be ignored and will be removed from the received data.

POINT

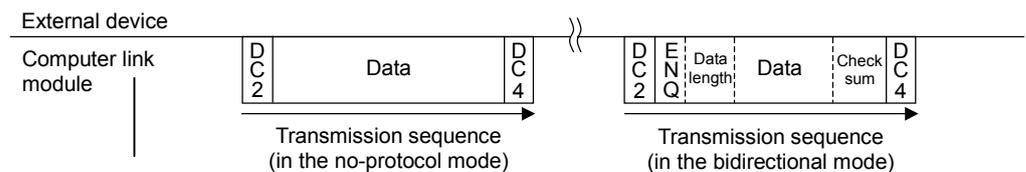
When power to the PC CPU is turned ON, the PC CPU is reset, or the mode is switched, even if a DC1 code is not transmitted, the state will be the same as when DC1 code has already been sent.

9.2.4 DC2/DC4 transmission control

This section describes DC2/DC4 transmission control.

(1) What is DC2/DC4 transmission control?

When data is sent from the computer link module to an external device, the computer link module adds DC2 and DC4 codes at the beginning and end of data respectively.



9. WHEN COMMUNICATING DATA AFTER CHANGING TO DC1 TO DC4 CONTROL METHOD

9.2.5 DC2/DC4 receive control

This section describes DC2/DC4 receive control.

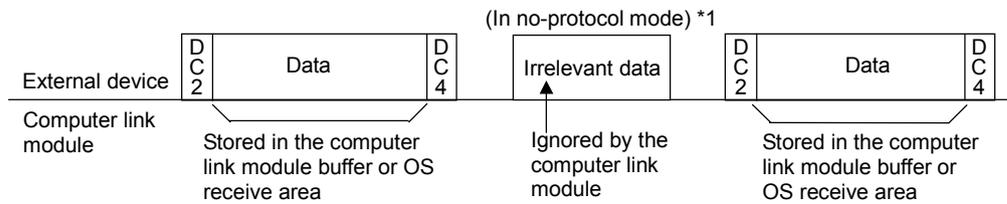
(1) What is DC2/DC4 receive control?

By using DC2 and DC4 codes, this function determines the data range when the computer link module receives data from an external device.

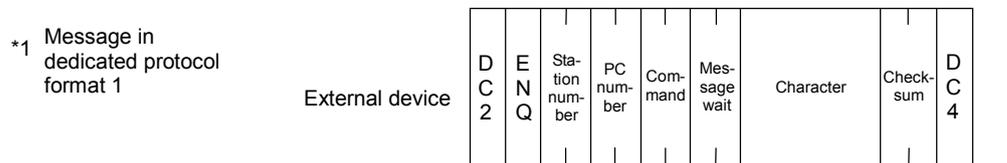
(2) Description of computer link module DC2/DC4 receive control

(a) When the computer link module receives DC2 code from an external device, the computer link module handles data in the range between DC2 and DC4 as valid data.
The received DC2 code cannot be read by the sequence program.

(b) When DC4 code is received from the external device, the computer link module will ignore subsequent received data until another DC2 code is received.
The received DC4 code cannot be read by the sequence program.



(c) After DC2 code is received, if another DC2 code is received, that code will be ignored, and will be removed from the received data.



9. WHEN COMMUNICATING DATA AFTER CHANGING TO DC1 TO DC4 CONTROL METHOD

9.3 Writing Data to Buffer Memory Specific Use Area

To switch the transmission control method from DTR/DSR control to DC code control for data communications or to change DC codes (control codes), the corresponding value must be written to the appropriate buffer memory specific use areas.

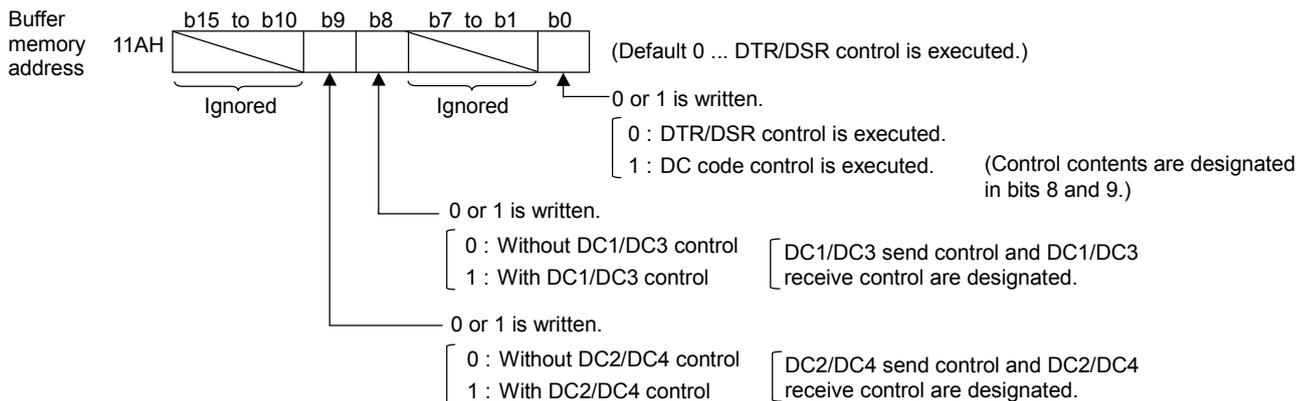
This section describes how to write values to such buffer memory specific use areas for changing the transmission control method and DC codes.

Every time the computer link module is turned ON, DTR/DSR control is available at the RS-232C interface only, and 11H to 14H can be used as the DC1 to DC4 codes for DC code control.

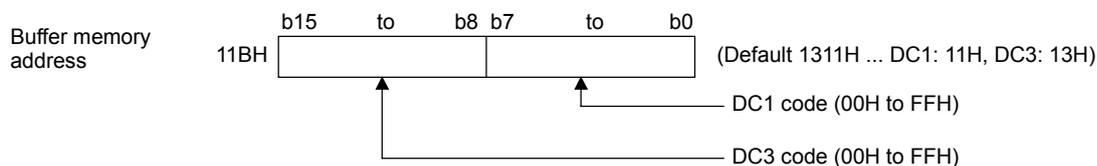
By writing proper data to the transmission control specification area at buffer memory address 11AH or to the control code specification areas at addresses 11BH and 11CH when data communications is not carried out with the computer link module ON, the transmission control method for the RS-232C and RS-422 interfaces or the DC codes to be used can be changed.

(1) Transmission control specification area and control code specification areas (addresses: 11AH to 11CH)

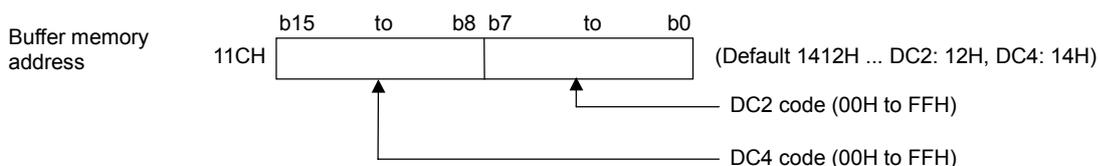
(a) Transmission control specification area



(b) DC1/DC3 control code specification area



(c) DC2/DC4 control code specification area



9. WHEN COMMUNICATING DATA AFTER CHANGING TO DC1 TO DC4 CONTROL METHOD

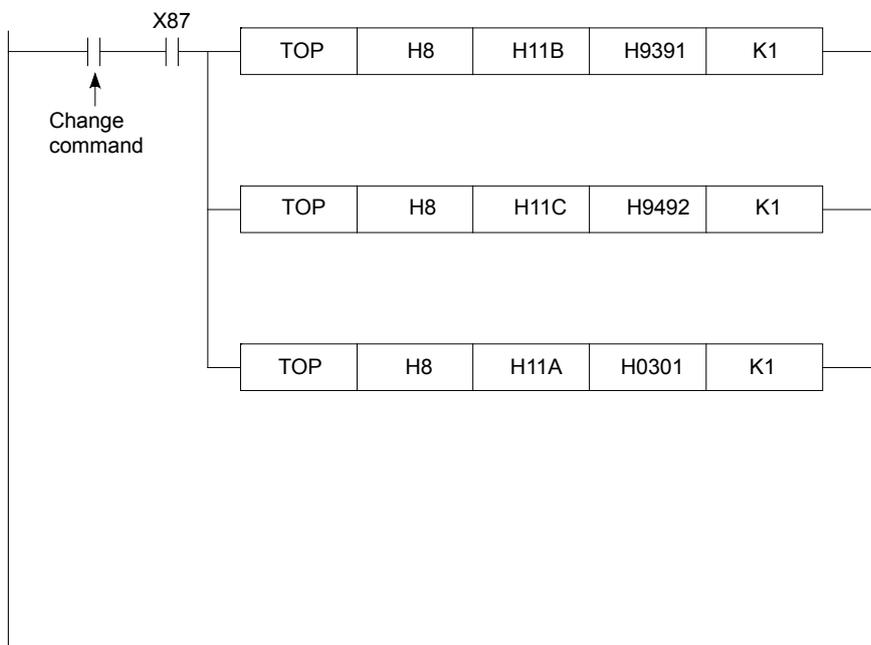
POINT

When changing the default values of DC codes, designate DC1/DC3 control and DC2/DC4 control to buffer address 11AH after changing the values in buffer addresses 11BH to 11CH.

(2) Programming examples for changing the transmission control method and the control codes

The following gives example programs used to change the transmission control method and the DC1 to DC4 codes with a TO instruction:
(Computer link module I/O signals 80H to 9FH)

(a) When DC code control is executed



When changing the DC1 and DC3 codes to 91H and 93H (*1)
Write 91H for the DC1 code and 93H for the DC3 code to buffer memory address 11BH.

When changing the DC2 and DC4 codes to 92H and 94H (*2)
Write 92H for the DC2 code and 94H for the DC4 code to buffer memory address 11CH.

Write DC code control set to buffer memory address 11AH (when DC1/DC3 or DC2/DC4 control is set).

Write one of the following values (*3):

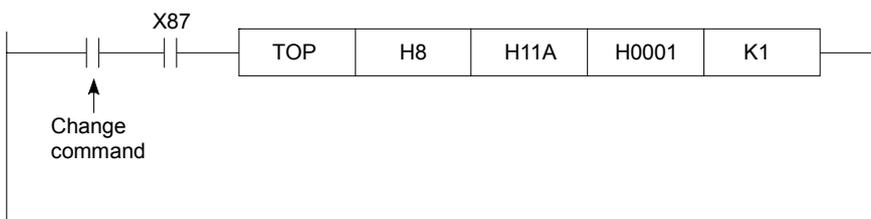
- When DC1/DC3 control is set but DC2/DC4 control is not → 0101H
- When DC1/DC3 control is not set but DC2/DC4 control is set → 0201H
- When both DC1/DC3 control and DC2/DC4 control are set → 0301H

*1 When the DC1 and DC3 codes are not changed, writing to buffer memory address 11BH is not necessary.

*2 When the DC2 and DC4 codes are not changed, writing to buffer memory address 11CH is not necessary.

*3 Write one of the values listed above according to the control method to be used.

(b) When the transmission control function is not used



Write 0001H to buffer memory address 11AH.

- Bit 0 ... DC code control will be executed.
- Bit 8 ... DC1/DC3 control will not be executed.
- Bit 9 ... DC2/DC4 control will not be executed.

9. WHEN COMMUNICATING DATA AFTER CHANGING TO DC1 TO DC4 CONTROL METHOD

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POINT

Values designated to use or disuse the transmission control function

The following table shows what value should be written to the buffer memory transmission control specification area (address 11AH) to use or disuse the transmission control function of the computer link module.

A value must be designated and written when the power to the PC CPU is ON or the PC CPU is reset, or when data is not transmitted or received at computer link module mode switching.

Mode No.		1 to 4		5 to 8		9		A to D		Refer to Section 4.2.1.
Interface		232C	422	232C	422	232C	422	232C	422	232C: RS-232C 422: RS-422
Mode		Dedicated protocol	No-protocol/ Bidirectional	No-protocol/ Bidirectional	Dedicated protocol	No-protocol		Dedicated protocol		
Value designated for transmission control	DTR/DSR control	0000H (default value)								Only 232C will be controlled.
	DC code control	0101H, 0201H or 0301H								Both 232C and 422 will be controlled in the same method.
	When transmission control function is not to be used	0001H								Transmission control will not be executed.

10. WHEN COMMUNICATING DATA AFTER CHANGING TO HALF-DUPLEX TRANSMISSIONS

Function	Computer link function									
	A1S17UC24			A1S17IC24						
Applicable module	AJ71UC24	-R2	-R4	-PRF	-R2	-R4	-PRF	A1SCPU C24-R2	A2CCPU C24	A2CCPU C24-PRF
Remarks	○	○	○	○	○	○	○	○	○	○

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10. WHEN COMMUNICATING DATA AFTER CHANGING TO HALF-DUPLEX TRANSMISSIONS

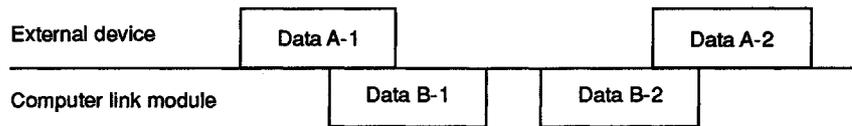
This section describes the half-duplex transmission function which prevents the computer link module and the external device from transmitting data simultaneously during data communications between them through the RS-232C interface. Full-duplex transmission is available every time the computer link module is turned ON, however, the user can change the communications mode according to the external device specifications.

POINTS

(1) The computer link module controls communications at the PC CPU in either of the following user-designated communications modes. It is not necessary to control it using the sequence program.

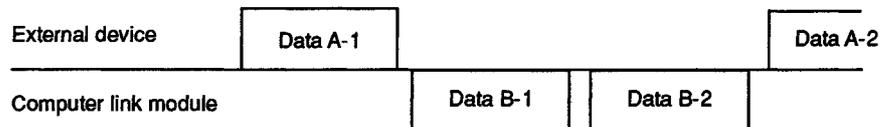
(a) Full-duplex transmission

This communications mode provides data communications with the communicating device just like a conversation over the phone. The computer link module can receive data while transmitting data to the external device. It can also transmit data while receiving data from the external device.



(b) Half-duplex transmission

This communications mode provides data communications with the communicating device just like a conversation on a transceiver. When it receives data from the external device while transmitting data to the device, the computer link module controls the transmission and receipt of data according to the "setting of priority/non-priority at simultaneous transmission". The computer link module does not transmit data while receiving data from the external device.



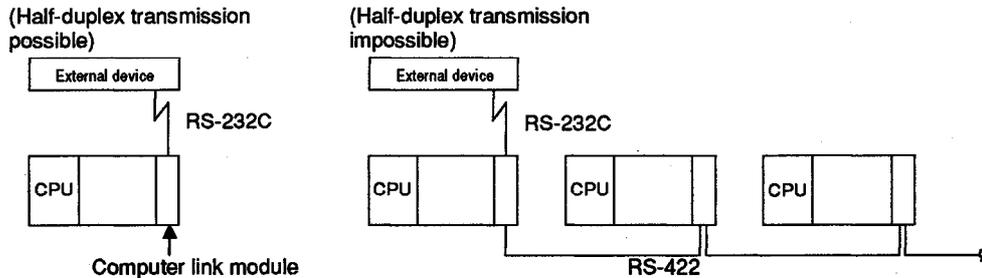
(2) On a computer link module equipped with RS-232C and RS-422/485 interfaces, the data will be controlled by full-duplex transmission even if half-duplex transmission has been selected for the former.

10. WHEN COMMUNICATING DATA AFTER CHANGING TO HALF-DUPLEX TRANSMISSIONS

10.1 Precautions for Half-Duplex Transmission

Described below are precautions for half-duplex transmission between the external device and the computer link module through the RS-232C interface.

- (1) System configuration and functions enabling half-duplex transmission
 Half-duplex transmission can be expected only from a system composed of a PC CPU and an external device.



Functions System Configurations (External device : PC CPU)	Dedicated Protocol		No-Protocol Mode/ Bidirectional Mode
	Data Communications by a Command Transmitted from the External Device	Data Send from the PC CPU by the On-Demand Function	Data Send and Data Receive
1 : 1	O	O *1	O *2
1 : n	X *3	X	X

O : Usable
 X : Unusable

*1 During data communication, the send timing of data that a sequence program requested to send changes due to the on-demand function. Refer to Section 5.14.2. The send timing also changes as mentioned in *2 below.

*2 Send timing of data sent from the computer link module and the external device changes according to the set timing of "priority/non-priority at the simultaneous transmission" set with the computer link module. Refer to Section 10.3.

*3 The computer link module executes data communications by half-duplex transmission. It is not necessary to make settings necessary for half-duplex transmission shown in this section.

- (2) Items to be determined and/or verified between the external device and the PC CPU

The following items should be determined and/or verified between the external device and the PC CPU:

- (a) Whether half-duplex transmission can be executed with the RS and CD signals at the computer link module.
- (b) ON/OFF timing of the RS and CD signals at the computer link module.
- (c) Data transmission timing from the computer link module and from the external device.
- (d) RS-232C cable connection.

- (3) Transmission control

Do not designate DC1/DC3 transmission control or DC1/DC3 receive control for half-duplex transmission using the transmission control function described in Section 9, because neither is executable during that communications.

10. WHEN COMMUNICATING DATA AFTER CHANGING TO HALF-DUPLEX TRANSMISSIONS

10.2 Connector Cable Connections for Half-Duplex Transmission

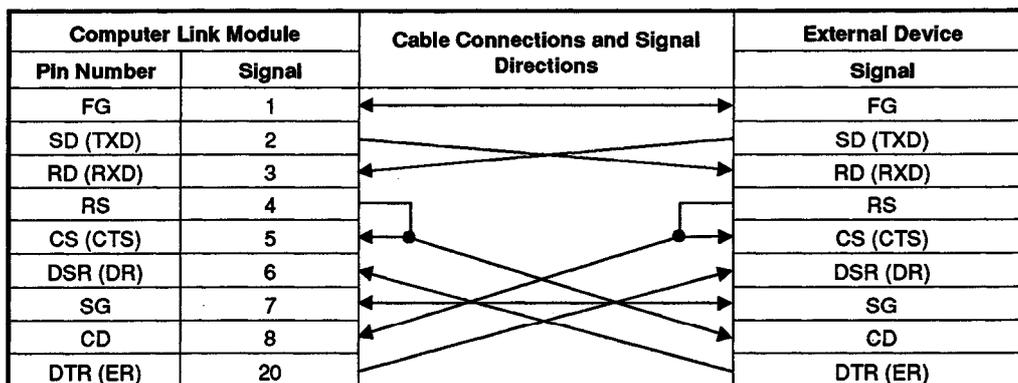
This section describes connector cable connections between the computer link module and the external device for half-duplex transmission through the RS-232C interface.

For half-duplex transmission, connect the connector cables between the computer link module and the external device according to (1) and (2) below and Section 4.6.2 (2) (a) "When connecting an external device which can turn ON and OFF the CD signal to the computer link module".

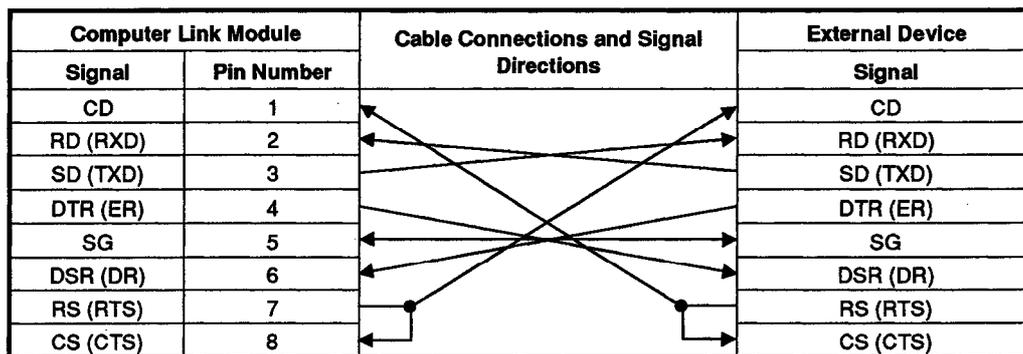
- (1) Connect the RS signal pin in the computer link module connector to a half-duplex transmission signal pin (CS, DSR or CD) in the external device connector.
- (2) Connect the CD signal pin in the computer link module connector to a half-duplex transmission signal pin (RS or DTR) in the external device connector.

(Connection examples)

- When the computer link module connector is a 25-pin type



- When the computer link module connector is a 9-pin type



POINT

The ON/OFF timing of the RS and CD signals at the computer link module for half-duplex transmission is described in Section 10.3.

10. WHEN COMMUNICATING DATA AFTER CHANGING TO HALF-DUPLEX TRANSMISSIONS

10.3 ON/OFF Timing of the CD and RS Signals of the Computer Link Module

When doing half-duplex communications, the data transmission timing is shown by using the CD and RS signals of the computer link module.

In half-duplex communications, an external device controls the CD signal of the computer link module.

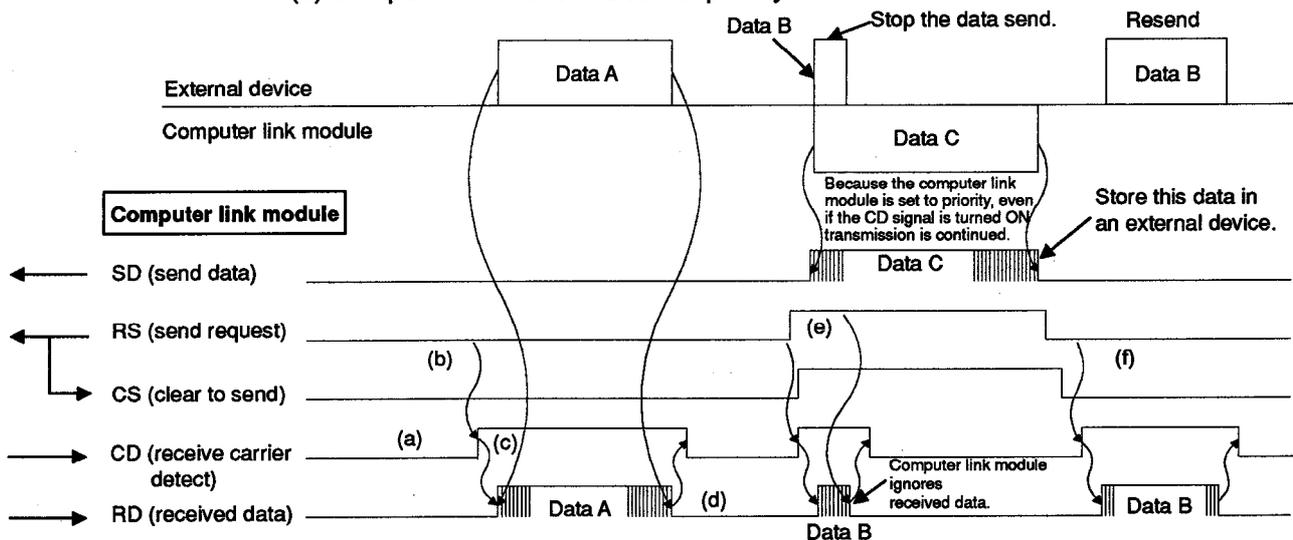
The computer link module system controls the RS signal of the computer link module.

10.3.1 Data transmission timing from an external device

When doing half-duplex communications, the data transmission timing from the external device is shown by using the CD and RS signals of the computer link module.

Setting the buffer memory of the computer link module to "priority/non-priority at simultaneous transmission" controls the CD signal of the computer link module.

(1) Computer link module is set to "priority".



The following steps describe the operations required for an external device at every timing mentioned by (a) to (f) in the above figure.

The signal names are of the signals of the computer link module.

- (a) When not transmitting data from the external device to the computer link module, turn the CD signal OFF.
- (b) When doing a data send, check the RS signal. If the RS signal is OFF, turn the CD signal ON. If the RS signal is ON, wait until it turns OFF. After the RS is turned OFF, turn the CD signal ON.
- (c) After turning the CD signal ON, transmit data.
- (d) After completing the data send, turn OFF the CD signal.

10. WHEN COMMUNICATING DATA AFTER CHANGING TO HALF-DUPLEX TRANSMISSIONS

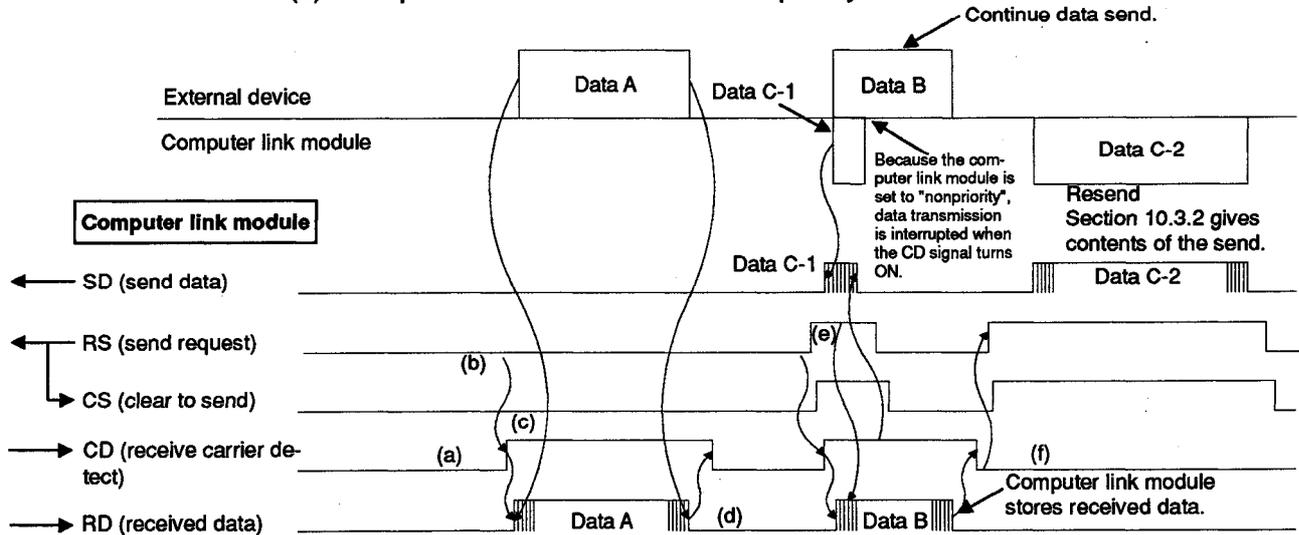
- (e) If the RS signal turns ON during the data send, stop the data send. Then, turn the CD signal OFF, and perform data receive processing. (When the computer link module and an external device start data transmission simultaneously, the RS signal turns ON.)
- (f) Resend all interrupted data from the external device to the computer link module after the data send from the computer link module is completed.

REMARK

When DTR/DSR control is selected from among the transmission control functions shown in Section 9, control data transmission from the external device to the computer link module, as described below:

- If the DTR signal is turned OFF at the computer link module, suspend data transmission.
- As soon as the DTR signal is turned ON at the computer link module after data transmission was suspended, restart transmitting data (from where transmission was suspended).

(2) Computer link module is set to "non-priority".



The following steps describe the operations required for an external device at every timing mentioned by (a) to (f) in the above figure.

The signal name is the signal of the computer link module.

As described in (1), turn ON/OFF the CD signal of the computer link module with the external device and do data transmission to the computer link module. (Note that (e) and (f) are different in the non-priority setting.)

- (a) When not transmitting data from the external device to the computer link module, turn the CD signal OFF.

10. WHEN COMMUNICATING DATA AFTER CHANGING TO HALF-DUPLEX TRANSMISSIONS

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- (b) When doing a data send, check the RS signal. If the RS signal is OFF, turn the CD signal ON.
If the RS signal is ON, wait until it turns OFF. After the RS is turned OFF, turn the CD signal ON.
- (c) After turning the CD signal ON, transmit data.
- (d) After completing the data send, turn OFF the CD signal.
- (e) Even if the RS signal turns ON during data transmission, continue the data send to the computer link module.
(This occurs when the computer link module and the external device start data transmission simultaneously.)
- (f) After the send from the external device is completed, transmit data from the computer link module to the external device.
Section 10.3.2 gives details.

REMARK

When DTR/DSR control is selected from among the transmission control functions shown in Section 9, control data transmission from the external device to the computer link module, as described below:

- If the DTR signal is turned OFF at the computer link module, suspend data transmission.
- As soon as the DTR signal is turned ON at the computer link module after data transmission was suspended, restart transmitting data (from where transmission was suspended).

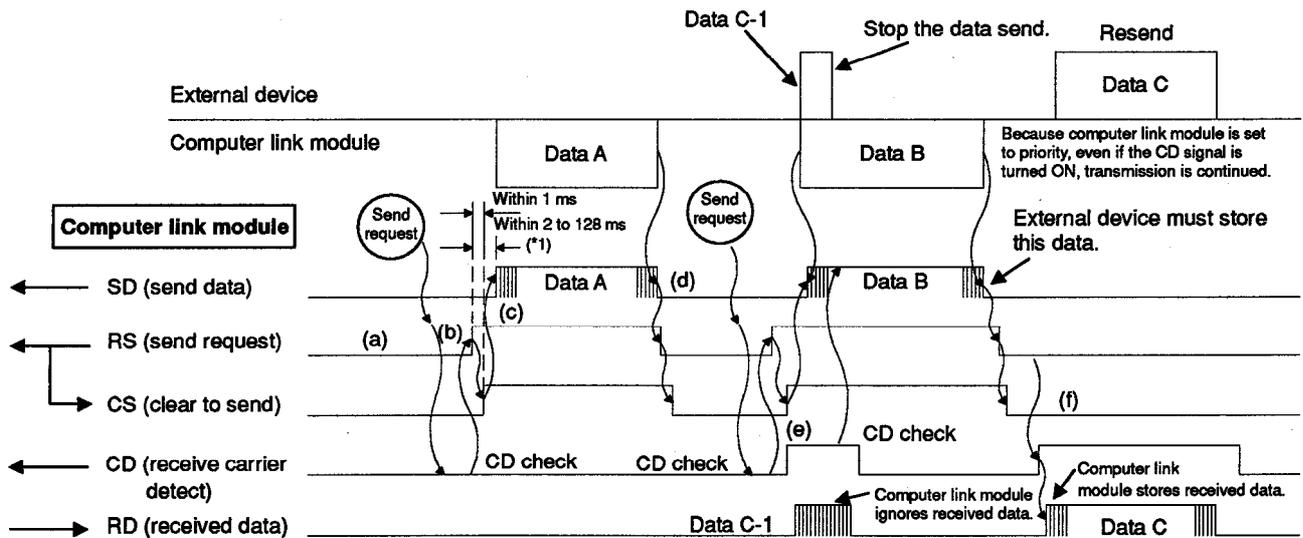
10. WHEN COMMUNICATING DATA AFTER CHANGING TO HALF-DUPLEX TRANSMISSIONS

10.3.2 Data transmission timing from a computer link module

When doing half-duplex communications, data transmission timing from an computer link module is shown by using the CD signal and RS signal of the computer link module.

Control the CD signal of the computer link module by setting the buffer memory of the computer link module to "priority/non-priority at simultaneous transmission" for data transmission.

(1) Computer link module is set to "priority".



The following steps describe the operation at every timing mentioned by (a) to (f) in the above figure.

The signal names are of the signals of the computer link module.

As described in (1), turn ON/OFF the RS signal of the computer link module with the external device and transmit data to the computer link module.

- (a) When not transmitting data from the external device to the computer link module, turn the RS signal OFF.
- (b) When doing a data send, check the CD signal. If the CD signal is OFF, turn the CD signal ON.
When the CD signal is ON, wait until it turns OFF. After the CD is turned OFF, turn the RS signal ON.
- (c) After turning the RS signal ON, transmit data.
- (d) After completing the data send, turn OFF the RS signal.
- (e) If the CD signal turns ON during the data send, continue transmitting data send to the computer link module. (This occurs when the computer link module and the external device start data transmission simultaneously.)

10. WHEN COMMUNICATING DATA AFTER CHANGING TO HALF-DUPLEX TRANSMISSIONS

- (f) Transmit all interrupted data from the external device to the computer link module after data send from the computer link module is completed.

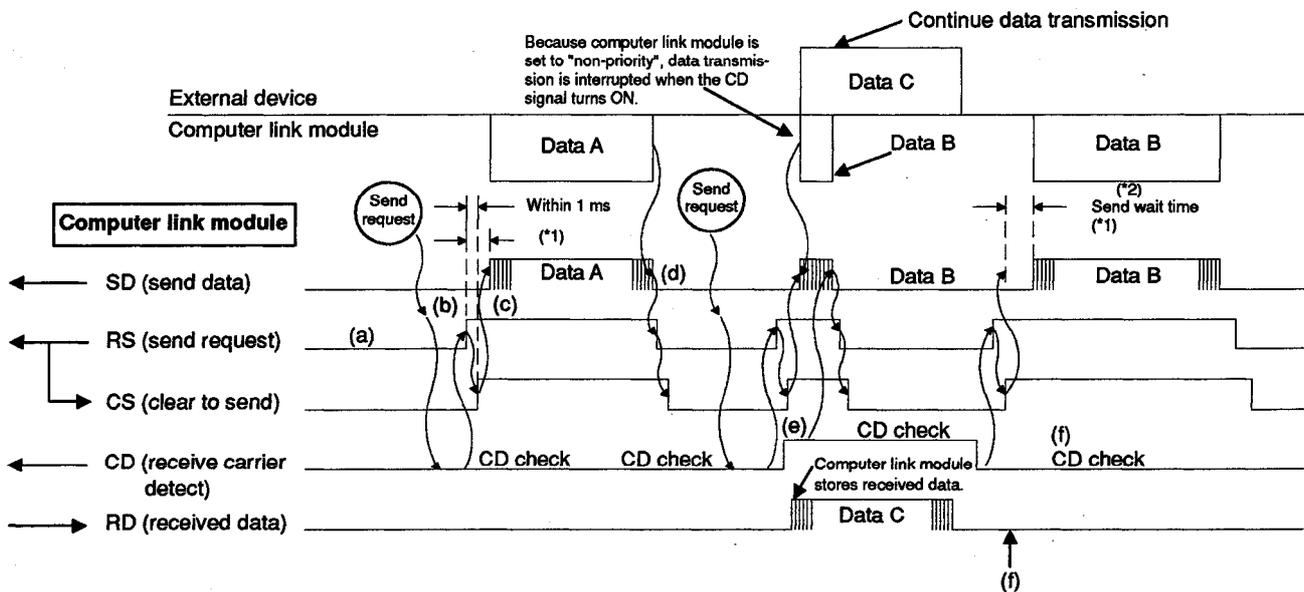
*1 The time from when the RS signal turns ON until communications start varies with the data transmission speed.
The faster the transmission speed is, the sooner communications will start.

REMARK

When DTR/DSR control is selected from among the transmission control functions shown in Section 9, control data transmission from the computer link module to the external device, as described below:

- If the DSR signal is turned OFF at the computer link module, suspend data transmission.
- As soon as the DSR signal is turned ON at the computer link module after data transmission was suspended, restart transmitting data (from where transmission was suspended).

- (2) Computer link module is set to "non-priority".



The following steps describe the operations performed by computer link module at every thing. The signal names are of the signals of the computer link module.

As described in (1), turn ON/OFF the RS signal of the computer link module and do data transmission to the external device.

Note that e) is different.

- (a) When not transmitting data from the external device to the computer link module, turn the RS signal OFF.
- (b) When doing a data send, check the CD signal. If the CD signal is OFF, turn the RS signal ON.
If the CD signal is ON, wait until it turns OFF. After the CD is turned OFF, turn ON the RS signal.
- (c) After turning the RS signal ON, transmit data.

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- (d) After completing the data send, turn OFF the RS signal.
 - (e) If the CD signal turns ON during data send, stop the data send. Then, turn the RS signal OFF and perform data receive processing. (This occurs when the computer link module and an external device start data transmission simultaneously.)
 - (f) After transmission from the external device is completed, resend all data from the beginning, or transmit data remaining after the send interruption in 5).
- *1 Data set at buffer address 110H is not transmitted.
- *2 Resend all data from the beginning, or transmit data remaining after the send interruption according to the setting of buffer address 111H.

REMARK

When DTR/DSR control is selected from among the transmission control functions shown in Section 9, control data transmission from the computer link module to the external device, as described below:

- If the DSR signal is turned OFF at the computer link module, suspend data transmission.
- As soon as the DSR signal is turned ON at the computer link module after data transmission was suspended, restart transmitting data (from where transmission was suspended).

10. WHEN COMMUNICATING DATA AFTER CHANGING TO HALF-DUPLEX TRANSMISSIONS

10.4 Writing Data to Buffer Memory Specific Use Areas

To switch the communications mode from full-duplex transmission to half-duplex transmission for data communications, the corresponding value must be written to the appropriate buffer memory specific use area.

This section describes how to write a value to such a buffer memory specific use area to switch the communications mode.

Every time the computer link module is turned ON, full-duplex transmission is available at the RS-232C interface.

By writing proper data to buffer memory addresses 10FH (RS-232C communications mode setting area) to 111H (send method setting area when transmission is resumed) when data communications are not executed with the computer link module on, the RS-232C interface communications mode can be switched.

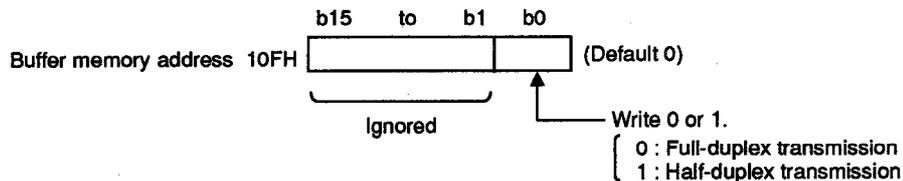
REMARK

Full-duplex transmission does not require writing data to buffer memory addresses 10FH, 110H and 111H.

(1) Buffer memory specific use area for half-duplex transmission

(a) RS-232C communications mode setting area (address: 10FH)

Set "1" for half-duplex transmission.



POINT

15 bits b1 to b15 of address 10FH to either 0 or 1.
(The computer link module will ignore the settings.)

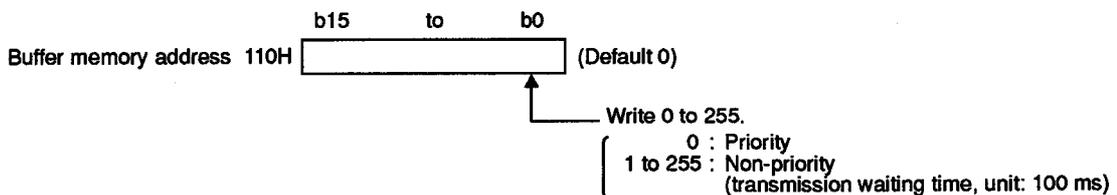
(b) Simultaneous send priority/non-priority setting area (address: 110H)

This area is used to determine whether data transmission from the computer link module should be continued ("priority") or suspended ("non-priority") when the external device and the module simultaneously start transmitting data in half-duplex transmission.

Designate "0" for "priority".

To select "non-priority", designate a number between "1" and "255".

The designated value represents the transmission waiting time (unit: 100 ms) from the point when data transmission can be restarted to the point when data is actually transmitted.



10. WHEN COMMUNICATING DATA AFTER CHANGING TO HALF-DUPLEX TRANSMISSIONS

POINTS

(1) When "priority" is selected for the computer link module, it ignores data transmitted from the external device after it started transmitting data, and continues data transmission.
 To stop the computer link module from ignoring data received from the external device, set them to do the following between them:

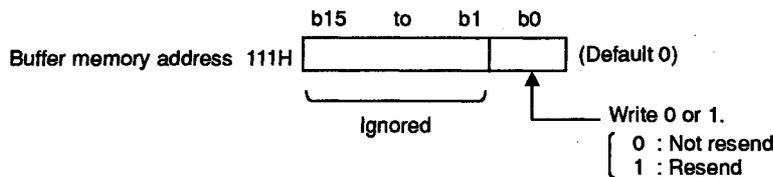
- Transmission and receipt of a response message to data transmitted
- Response message time-out check and data retransmission in case of time-out error

(2) Selecting priority (0) between priority and non-priority at simultaneous transmission is not required to be written to buffer memory address 111H.

(c) Send method setting area when transmission is resumed (address: 111H)

The setting in this area becomes valid only when "half-duplex transmission" and "non-priority" are set in the areas described in (1) and (2) above. This area is used to determine whether the computer link module, which suspends data transmission after starting transmission simultaneously with the external device, should restart transmitting the suspended data from the beginning ("retransmission") or from where it was suspended ("no retransmission").

Set "1" for "retransmission".
 To select "no retransmission", set "0".



POINT

15 bits b1 to b15 of address 10FH to either 0 or 1.
 (The computer link module will ignore the settings.)

(d) RS-232C CD terminal check setting area (address: 10BH)

In half-duplex transmission, the computer link module CD signal must be controlled by the external device.

Do not change the default value of this area (0: check CD terminal).

Refer to the following sections for the description of the check in each mode:

- Dedicated protocol..... Section 5.2.1 (2) (b)
- No-protocol mode Section 6.2.4 (2) (f)
- Bidirectional mode Section 7.2.6 (2) (d)

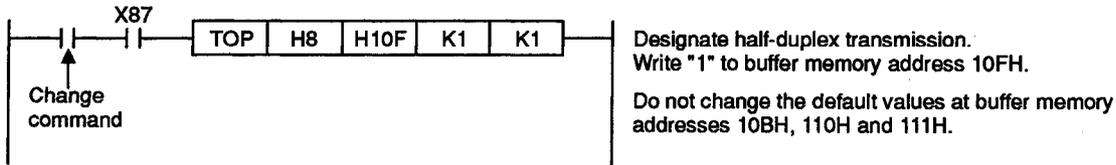
10. WHEN COMMUNICATING DATA AFTER CHANGING TO HALF-DUPLEX TRANSMISSIONS

(2) Programming examples for switching the transmission mode

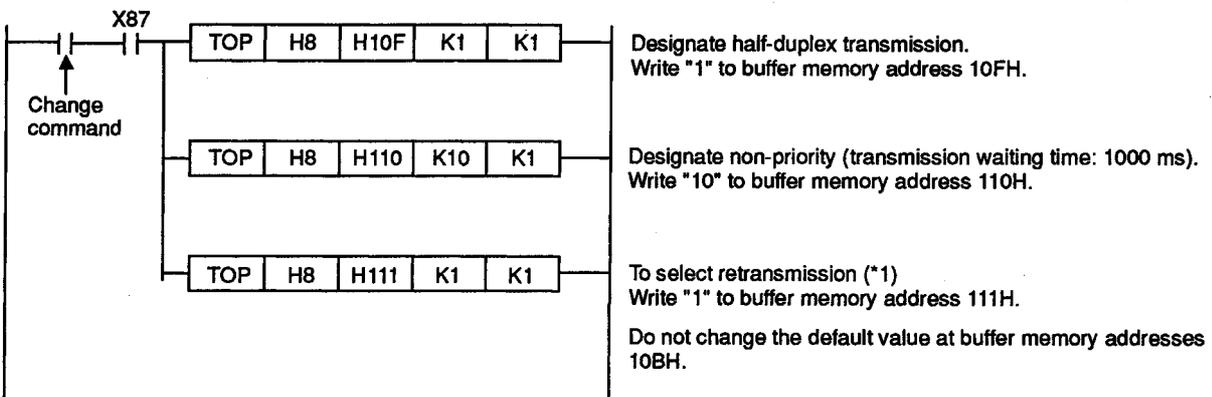
The following gives example programs used to switch the transmission mode with a TO instruction:

(Computer link module I/O signals: 80H to 9FH)

(a) When selecting priority for transmission from the computer link module in half-duplex transmission



(b) When selecting non-priority for transmission from the computer link module in half-duplex transmission



*1 It is not necessary to change the value at address 111H to select no retransmission.

11. WHEN COMMUNICATING DATA WITH M:N RATIO OF COMPUTER TO PC CPU FOR CONNECTION

Function	Computer link function									
	A1S71UC24			A1S71G24			A1SCPU	A2CCPU	A2CCPU	A2CCPU
Applicable module	_R2	_R4	_PRF	_R2	_R4	_PRF	C24-R2	C24	C24-PRF	C24-PRF
Remarks	○	○		○				○		○

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11. WHEN COMMUNICATING DATA WITH M:N RATIO OF COMPUTER TO PC CPU FOR CONNECTION

This section describes how to do data communications using an m : n multidrop link. This section only applies to m : n multilink data communications.

A computer link module can perform data communications with several computers by constructing a multidrop link consisting of several computers (m stations) and several computer link modules (n stations). (The maximum number of m and n stations is 32.)

A computer link can be made with the full-duplex communications method using the RS-232C and RS-422 lines by constructing an m : n multidrop link. In addition, data transmission is initiated by a command from the computer in the dedicated protocol.

11.1 Key Points

- (1) When using an m : n multidrop link system, only one computer can perform data communications with a single PC CPU.

Set up the computers so that a computer and a PC CPU can do 1 : 1 communications. Sections 11.2 and 11.3 give the conditions and procedures for computer interlocking.

- (2) Data communications between a computer and a PC CPU can only be done in the following way:

- Full-duplex communications must be used. (m : n data communications cannot be done with half-duplex communications.)
- Transmit a command from a computer using the dedicated protocol (except for protocol 3). (Data communications with protocol 3 and data transmission from the sequence program using the on-demand function cannot be done.)

- (3) All computers (including the computer that transmitted the data) receive data from either computer. In addition, all computers receive data transmitted from a PC CPU.

Therefore, every computer that receives data addressed to other stations (as specified by the station number in the message) must ignore that data.

The computer link module which is connected to the PC CPU ignores the receive data which is addressed to other stations.

- (4) The station number of a computer is expressed as eight-bit data. Use switch SW12 to set the data bit for communications to eight bits (refer to Section 4.2.2).

Section 11.2.1 gives details about data bit setting.

- (5) Follow the procedure described in Section 4.6.3 (2) (C) in connecting more than one computer to a PC CPU.

Connect or set a terminal resistor to the RS-232C interface according to Section 4.7 or 4.2.2.

- (6) The mode setting switch set at "A", "B", or "D" enabled the computer link module to communicate data only with the computer connected to the interface set as the main channel (refer to Section 4.2.2).

11. WHEN COMMUNICATING DATA WITH M:N RATIO OF COMPUTER TO PC CPU FOR CONNECTION

11.2 Conditions for Computer Interlock

When constructing an m : n multidrop link using computers and PC CPUs, all computers must be interlocked to prevent several computers from simultaneously communicating with PC CPUs.

This section explains how to interlock computers to allow data communications between a computer and a PC CPU. The term "interlocking" used in this section means the procedure which provides a computer priority to use a communications line. This priority is called an "access right".

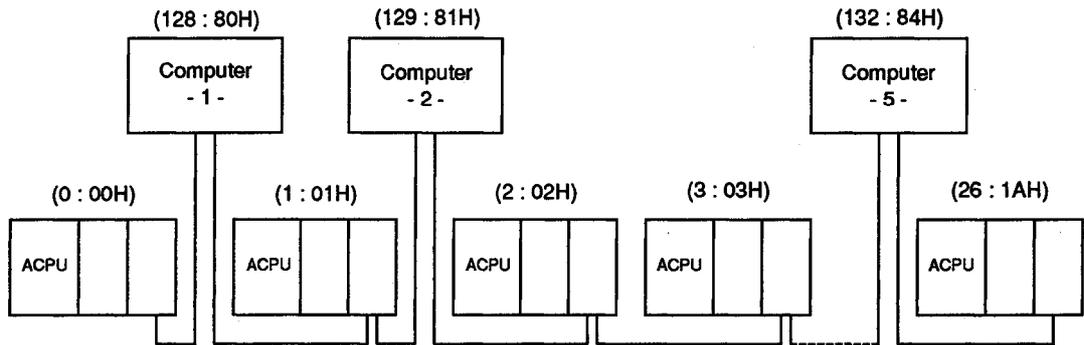
11.2.1 Computer station number allocation

For data communications with a designated computer, allocate a station number within the range of 128 to 159 (80H to 9FH) to each computer.

Set the station number for broadcasting to all computers at 160 (A0H).

Example: m : n = 5 : 27

() shows each station number of a computer and an computer link module.
(Decimal : hexadecimal)



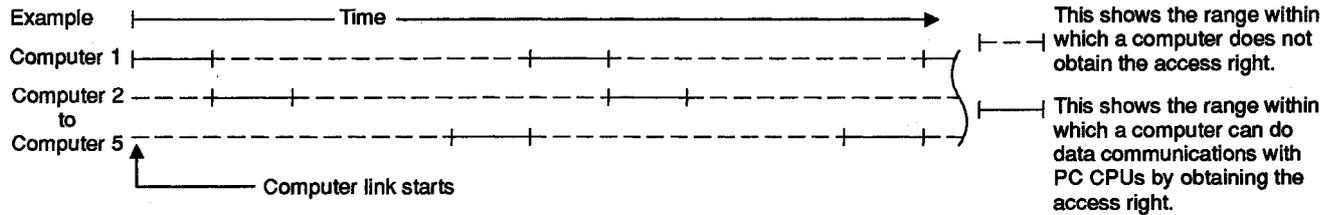
11. WHEN COMMUNICATING DATA WITH M:N RATIO OF COMPUTER TO PC CPU FOR CONNECTION

11.2.2 Maximum data communications time per computer

Set the maximum time so that, after obtaining an access right, each computer can perform data communications with PC CPUs.

(In the following figure, each of these |——| means time duration.)

Even if the computer that obtains the access right malfunctions, data communications can be done between other computers and PC CPUs by setting the maximum data communications time.



POINT

Set the maximum data communications time per computer to a time that is sufficient for data communications with PC CPUs in the computer link system. After the computer link system starts, the computer that obtains the access right must complete data communications with PC CPUs within the maximum data communications time.

When unable to complete data communications, the computer with the access right transmits the CL code to communicating PC CPUs within the maximum data communications time, and initializes a transmission sequence to a computer link module (refer to Section 5.4.6 (1)(c)).

While a computer and PC CPUs are performing data communications, the time-out check function must be used with other computers to block data transmission from those computers.

11. WHEN COMMUNICATING DATA WITH M:N RATIO OF COMPUTER TO PC CPU FOR CONNECTION

11.2.3 Command and message format for data communications among computers

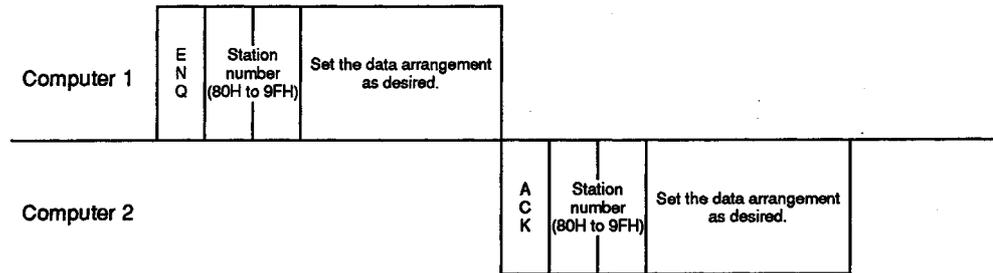
A command and message format for data communications among computers with the dedicated protocol must be set.

Use any command except the commands used with the dedicated protocol of a computer link module. Refer to Section 3.2.1.

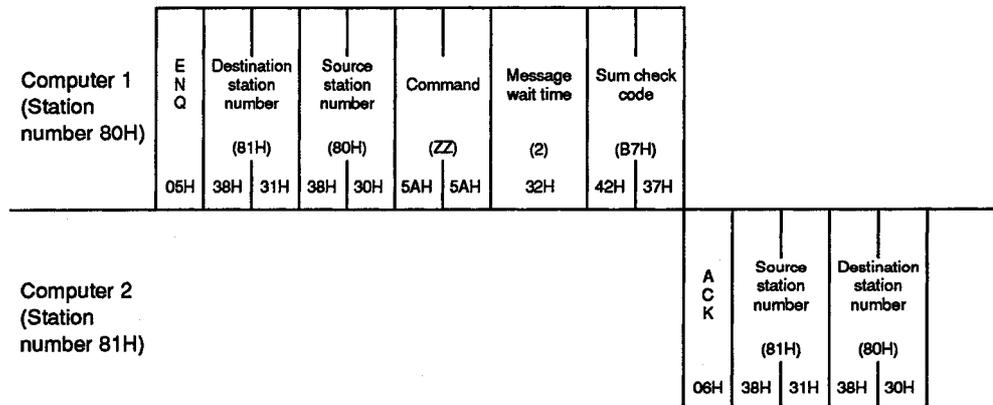
The message format basically follows the control procedure set by the mode setting switch of each computer link module. Refer to Section 5.4.

Set the data arrangement after the PC number in the message as desired.

(1) Protocol 1 when doing data communications



(2) Example of a message format (when station numbers 80H and 81H perform data communications)



REMARKS

- (1) When the mode setting switch of a computer link module is set for the dedicated protocol mode (1 to 4) and when the station number written in a message to be transmitted from computer 1 is 00H to 31H (designating computer link module), the designated station (computer link module) determines that message to be a faulty message. Then, it transmits back a message beginning with NAK to computer 1.
Always use station numbers 80H to 9FH for communications between the computers.
- (2) Section 5.4.1 explains how to read the message format figures.

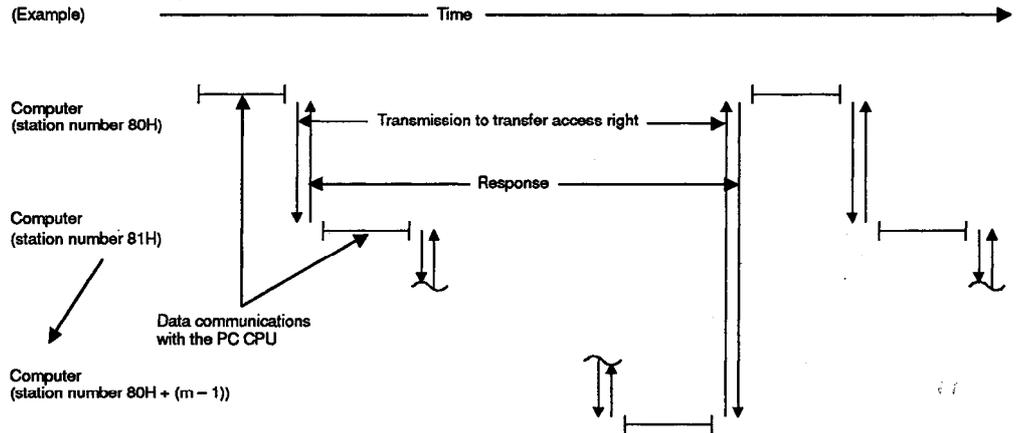
11. WHEN COMMUNICATING DATA WITH M:N RATIO OF COMPUTER TO PC CPU FOR CONNECTION

11.3 Procedure for Data Communications with a PC CPU

This section explains the procedure for computer interlocking and data communications with a PC CPU when constructing an m : n multidrop link.

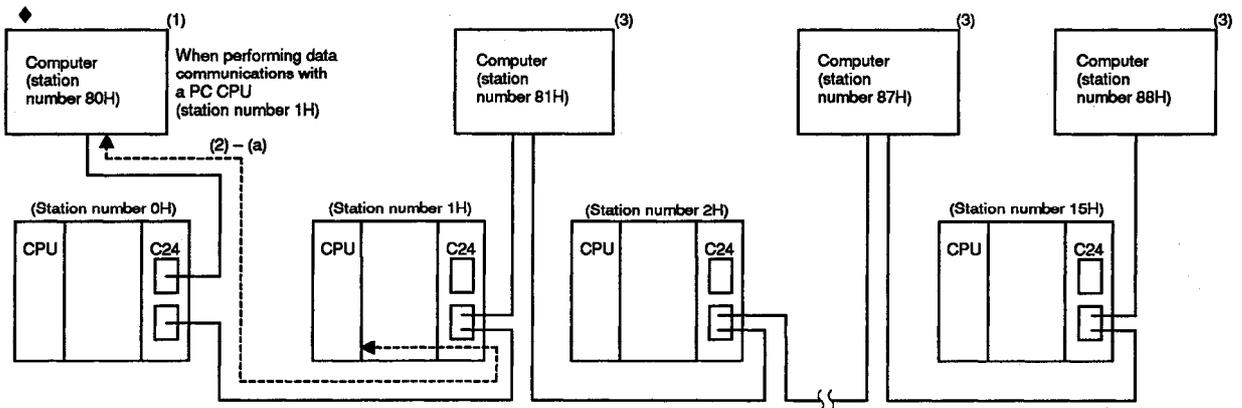
11.3.1 Communications between each computer and PC CPUs

Each computer obtains the access right (one after another according to the order of the station number of each computer) and then does data communications with PC CPUs.



The following example shows the procedure for data communications between each computer and PC CPUs.

◆ : Computer with the access right

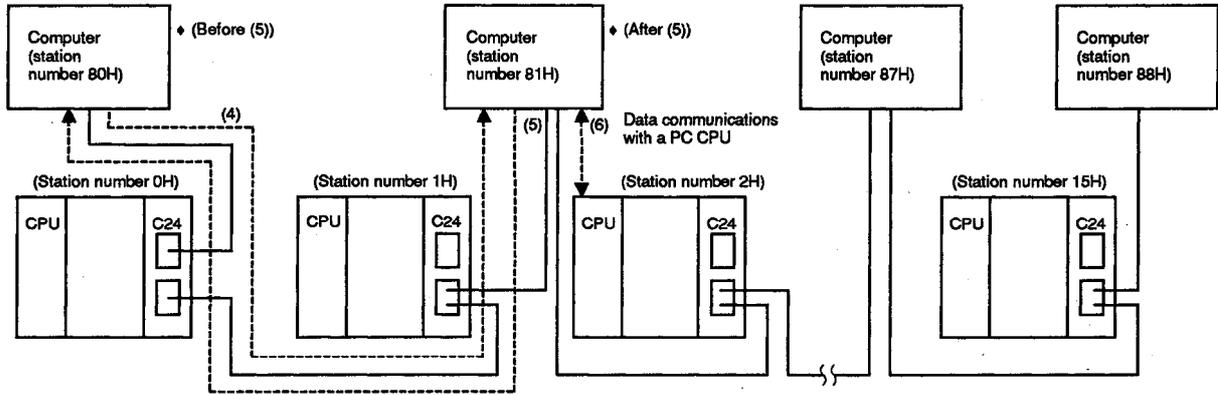


- (1) When starting a system, the computer allocated with the minimum station number (80H) obtains the access right.
- (2) The computer which has the access right:
 - (a) Performs data communications with PC CPUs within the maximum data communications time set among computers, and then, starts procedure (4).
 - (b) Starts procedure (4) if it does not perform data communications with PC CPUs.

11. WHEN COMMUNICATING DATA WITH M:N RATIO OF COMPUTER TO PC CPU FOR CONNECTION

- (3) Each computer without the access right checks the access right time (the maximum data communications time) of the computer with the access right and ignores incoming data which is addressed to others. When the access right time exceeds the maximum data communications time, each computer executes the processing mentioned in (7).

◆ : Computer with the access right

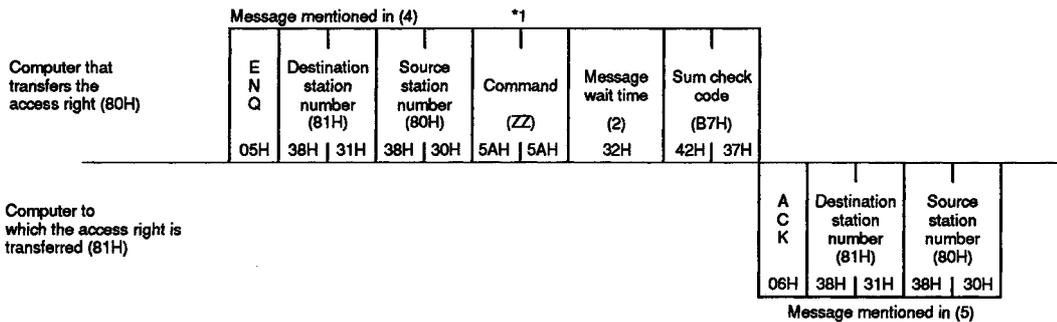


- (4) The computer that has finished data communications with PC CPUs and the computers that do not need data communications with PC CPUs transmit the access right transfer data to the computer at the next station number.

When a computer is unable to receive a response message (refer to (5)) from the next computer to which the access right is to be transferred, it keeps on transmitting the access right transfer data to the following computers in the order of station numbers until the access right transfer is completed.

- (5) The computer to which the access right is given transmits a response message to the computer that gave the access right.

(An example of data communications using dedicated protocol 1)



*1 The command symbol "ZZ" in this example is indicated only for explanation. Use any desired symbol for the transfer command to obtain the access right. See Section 5.4.1 tells how to read the message format figure.

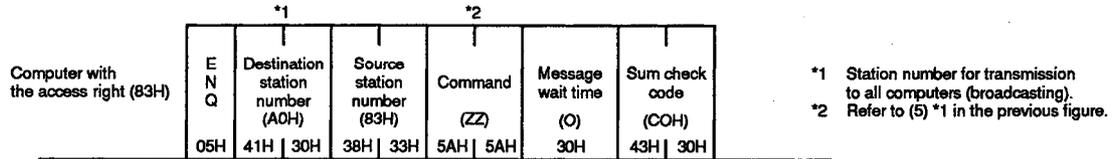
- (6) The computer that transmitted a response message and obtained the access right executes the processing mentioned in (2).

11. WHEN COMMUNICATING DATA WITH M:N RATIO OF COMPUTER TO PC CPU FOR CONNECTION

(7) When the access right time of a computer with the access right exceeds the maximum data communications time

(a) The computer at the next station number transmits broadcast data to all computers, obtains the access right, and executes the processing mentioned in (2).

(An example of data communications using dedicated protocol 1)



(b) Other computers check if they received the data transmitted to all computers.

Computers which received the data execute the processing mentioned in (3).

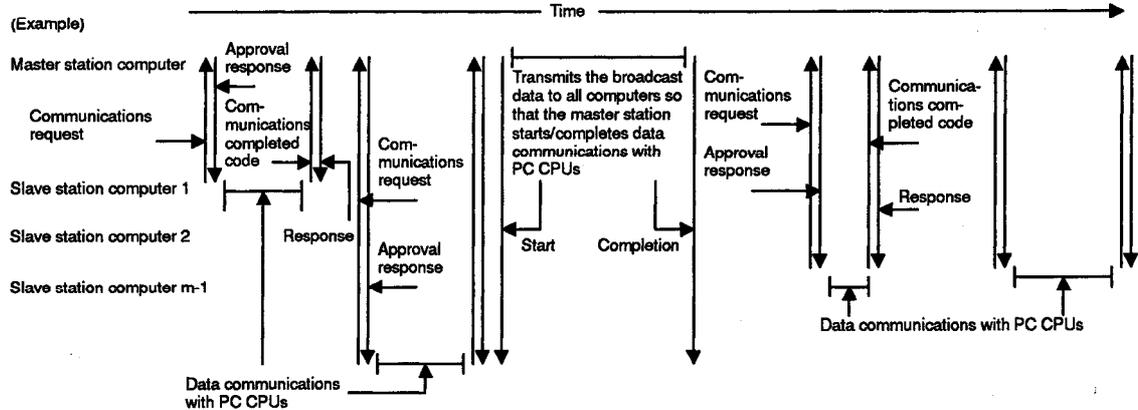
If a computer failed to receive the data, the next computer transmits data to all computers, obtains the access right, and executes the processing mentioned in (2).

Other computers execute the check mentioned above.

11. WHEN COMMUNICATING DATA WITH M:N RATIO OF COMPUTER TO PC CPU FOR CONNECTION

11.3.2 Data communications with PC CPUs by setting a master station and slave stations

One of the computers is set as a master station and the other computers are set as slave stations which need the approval of the master station to perform data communications with PC CPUs.

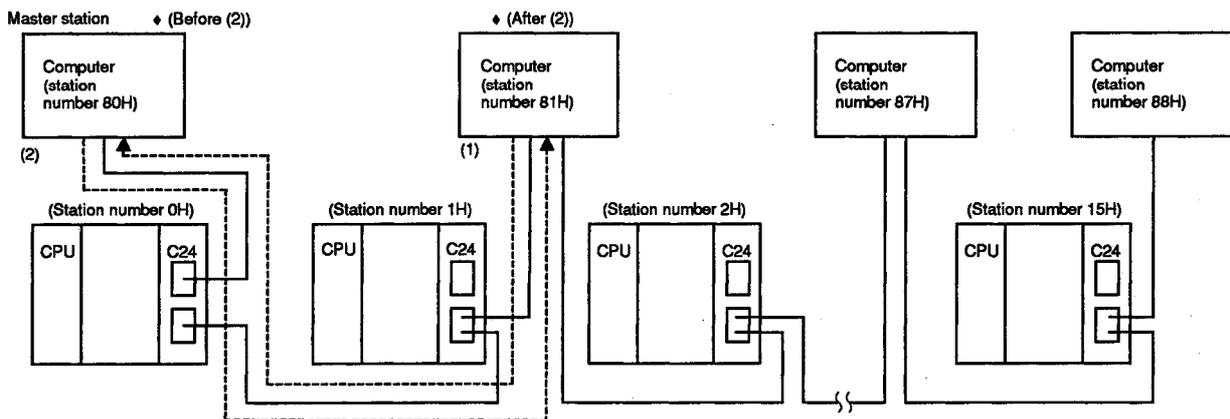


The following example shows how each computer performs data communications with PC CPUs.

After the start of data communications between a computer and PC CPUs, each computer executes the time-out check of the maximum data communications time. A computer at a slave station that is not performing data communications with a PC CPU checks the communications completed code which is transmitted from the computer when it has completed data communications with PC CPUs.

In the following figure, the computer at the minimum station number 80H is set as the master station and other computers are set as slave stations.

◆ : Computers with the access right



11. WHEN COMMUNICATING DATA WITH M:N RATIO OF COMPUTER TO PC CPU FOR CONNECTION

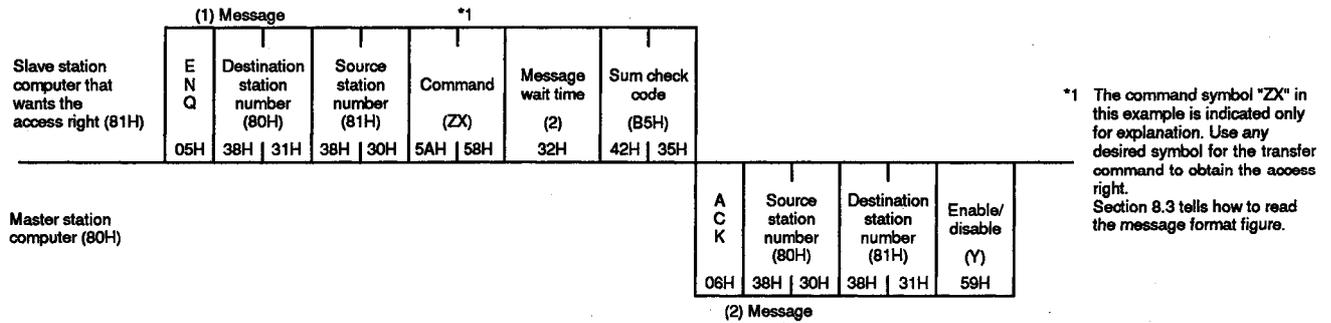
MELSEC-A

- (1) A slave station that requires data communications with a PC CPU transmits a communications request to obtain the access right to the master station.

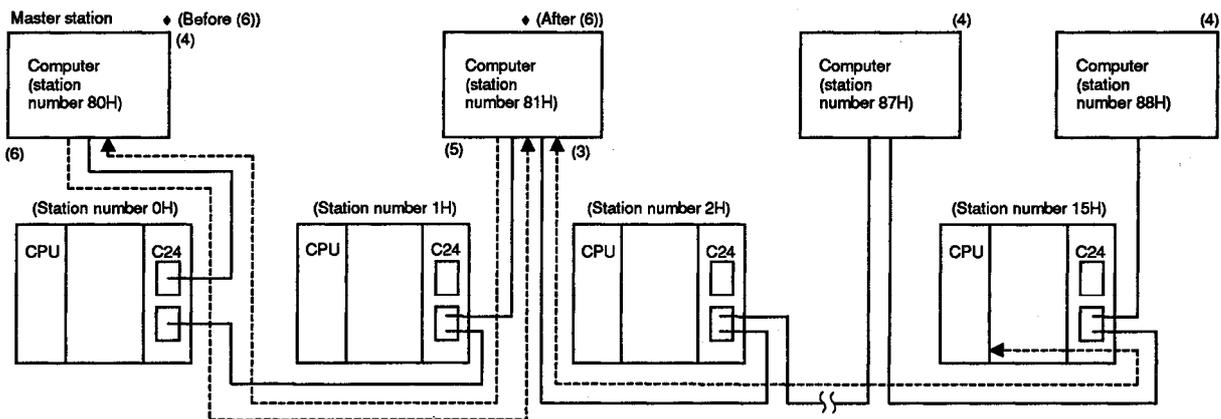
An example of the message format is shown in (2) below.

- (2) The master station transmits an approval response to the slave station that made the communications request.

(An example of data communications using dedicated protocol 1)



◆ : Computer with the access right



- (3) After performing data communications with a PC CPU within the maximum data communications time set among computers, the slave station that received an approval response executes the processing as shown in (5) below.

- (4) The master station that transmitted the approval response and the slave stations that do not have the access right check the access right time of the slave station that obtains the access right, and, ignore received data which is addressed to other stations.

If the access right time of a computer with the access right exceeds the maximum data communications time, each computer executes the processing mentioned in (7).

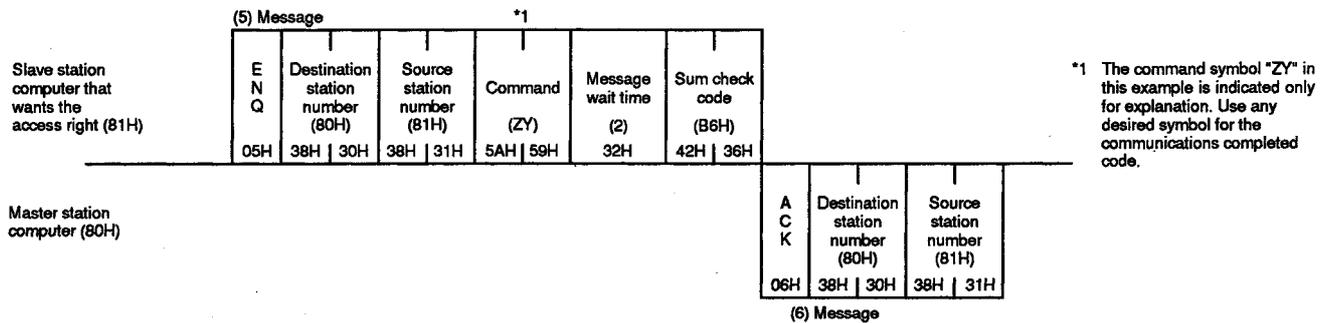
11. WHEN COMMUNICATING DATA WITH M:N RATIO OF COMPUTER TO PC CPU FOR CONNECTION

- (5) A slave station that has finished data communications with PC CPUs transmits the communications completed code to the master station. An example of the message format is shown in (6) below.

Slave stations which are not performing data communications with PC CPUs check the transmission of the communications completed code. During this checking, the slave stations must not perform data communications with the master station.

- (6) The master station that received the communications completed code transmits a response to the slave station that transmitted the communications completed code.

(An example of data communications using dedicated protocol 1)



- (7) After the processing given in (6) is completed or when the access right time of a slave station with the access right exceeds the maximum data communications time:

- (a) The master station waits for a communications request from a slave station.

When the master station receives a communications request, the processing mentioned in (2) is executed.

- (b) Until data communications with PC CPUs is required, a slave station does not perform data communications with the master station.

When data communications with PC CPUs is required, the processings in and after (1) are executed.

11. WHEN COMMUNICATING DATA WITH M:N RATIO OF COMPUTER TO PC CPU FOR CONNECTION

- (8) If no slave station obtains the access right, the master station transmits broadcast data to all stations and obtains the access right and performs data communications with PC CPUs.

The master station transmits the broadcast data to all computers after completing data communications with PC CPUs to inform slave stations of the completion of data communications with PC CPUs.

(An example of data communications using dedicated protocol 1)

Master station computer with the access right (80H)	*1					
	ENQ	Destination station number (A0H)	Source station number (80H)	Command (ZX)	Message wait time (0)	Sum check code (BBH)
	05H	41H | 30H	38H | 30H	5AH | 58H	30H	42H | 42H

*1 The command symbols "ZX" and "ZY" in this example are indicated only for explanation. Use any desired symbol for communications between the master station and slave stations.

The master station computer transmits the communications completed code. (80H)	*1					
	ENQ	Destination station number (A0H)	Source station number (80H)	Command (ZY)	Message wait time (0)	Sum check code (BCH)
	05H	41H | 30H	38H | 30H	5AH | 59H	30H	42H | 43H

12. WHEN CHANGING OVER MODE DURING OPERATION OF COMPUTER LINK

Function	Computer link function									
	A1SJ71UC24			A1SJ71C24			A1SGCPU C24-R2		A2CCPU C24	A2CCPU C24-PRF
Applicable module	AJ71UC24	R2	R4	PRF	R2	R4	PRF			
Remarks	O	O	O	O	Δ	Δ	Δ			
					Normal switching/Ver. A Forced switching/Ver. M			Normal switching/Ver. A Forced switching/Ver. K		

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12. WHEN CHANGING OVER MODE DURING OPERATION OF COMPUTER LINK

This section describes the function capable of switching the current mode of the computer link module's RS-232C and RS-422 interfaces (dedicated protocol, no-protocol or bidirectional mode) to another from the computer or PC CPU after starting computer linking.

The RS-232C and RS-422 interfaces are controlled in the mode set by the mode setting switch when the computer link module is turned ON, however, the user can change the mode of each interface according to the application of the computer link function.

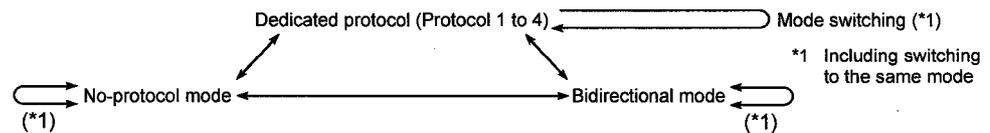
12.1 Precautions When Mode Switching

Described below are precautions for data communications by switching the mode of the computer link module after starting computer linking.

(1) Settings between an external device and a PC CPU

Set the following items required to switch the mode between an external device and a PC CPU.

- (a) Is the mode switched from an external device or a PC CPU?
- (b) At what intervals are modes switched for each mode switching pattern?



- (c) How is an interlock provided for all connected devices?
 - Method and message used to notify all connected stations of mode switching.
 - Method and message used to notify all connected stations that mode switching has been completed.
 - Device number and data description when PC CPU word devices are used.
- (d) Structure of message for mode switching in the no-protocol or bidirectional mode

(2) Mode switching from an external device

- (a) After switching the mode, a computer cannot be used to switch set data in the computer link module buffer's specific use area.

If set data must be changed after switching the mode, write necessary data from the PC CPU (refer to Section 12.4 and 12.5 for the write timing).

When set data is not changed from the PC CPU, communicate by using the default data in the specific use area.

- (b) When both the RS-232C and RS-422 are set to the no-protocol mode (mode switching designation data in 0109H), the mode cannot be switched by using a computer.

(This is because data cannot be written from the computer to the buffer's specific use area.)

POINT

Mitsubishi recommends using a PC CPU for mode switching.

12. WHEN CHANGING OVER MODE DURING OPERATION OF COMPUTER LINK

12.2 Mode Switching Function and Operation of the Computer Link Module

12.2.1 Mode switching function

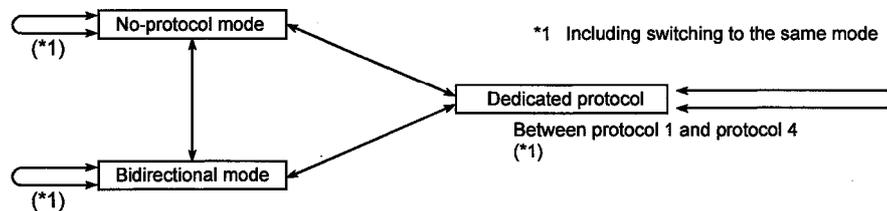
There are two types of mode switching function: normal mode switching and forced mode switching. As shown in the following table, the mode can be switched from the PC CPU or computer.

(1) Mode switching function

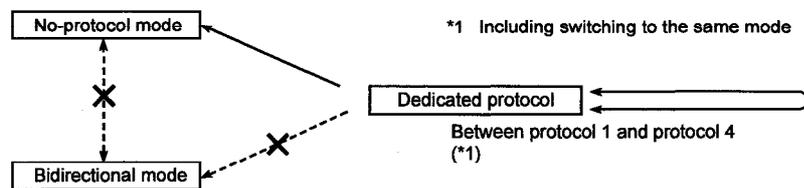
Mode Switching Function	State When Mode Switching Request is Made	Description of Processing
Normal mode switching	When data communications is executed	The mode will be switched after data communications is completed.
	When data communications is not executed	The mode will be switched when a mode switching request is issued.
Forced mode switching	When data communications is executed	Data communications will be forced to complete when a mode switching request is issued to switch the mode.
	When data communications is not executed	The mode will be switched when a mode switching request is issued.

(2) Modes that can be switched

(a) Modes that can be switched from the PC CPU



(b) Modes that can be switched from the computer



12.2.2 Operation (Processing) of the computer link module during mode switching

This section describes the processing the computer link module performs when it receives a mode switching request from the PC CPU or computer.

(1) The initial processing when a mode switching request is received is as follows:

(When the computer link module receives a normal mode switching request)

- When data communication is not executed, mode switching immediately starts.
- When data communication is executed, mode switching starts after the ongoing communications are completed.

(When data communication is executed using a dedicated protocol or in the bidirectional mode, mode switching starts after a response message is transmitted or received. In the case of data communications in the no-protocol mode, mode switching starts after the request-to-send signal is turned OFF and the received-data-read signal is turned ON.)

(When the computer link module receives a forced mode switching request)

- When data communication is not executed, mode switching immediately starts.
- When data communication is executed, mode switching starts after the ongoing communication is forced to complete.

(2) First turns OFF the computer link module READY signal (Xn7).

(3) Initializes the computer link module and starts it up (takes about four to six seconds).

During this operation, the following processings take place at the same time:

- Signals sent to the PC CPU (input signals (X) at the PC CPU) are all turned OFF.
- Set data in the specific use area of the computer link module buffer memory (addresses 100H to 11FH) is returned to the default state (except for address 119H).
- Received data (stored in the computer link module's buffer memory and the OS area) during data communications in the no-protocol/bidirectional mode is cleared.

(4) Turns ON the computer link module READY signal (Xn7).

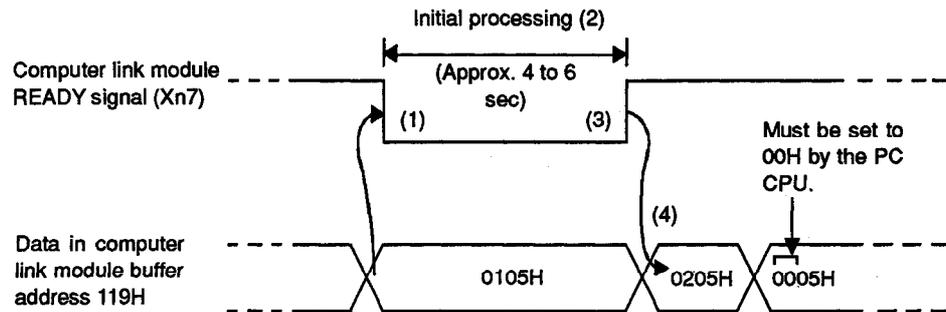
12. WHEN CHANGING OVER MODE DURING OPERATION OF COMPUTER LINK

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- (5) Switches the higher bytes in the computer link module buffer memory's mode switching designation area (address 119H) from 01H to 02H. The mode switching operation is completed.

Example:

When switching the RS-232C to the no-protocol mode and the RS-422 to the dedicated protocol (protocol 1) mode respectively
(Example of processing in response to a normal mode switching request)



POINTS

- (1) The only difference between normal mode switching and forced mode switching is the processing by the computer link module between the receive of the mode switching request and the start of mode switching ((1) above).
The forced mode switching function starts mode switching, irrespective of whether data communications is being executed. This function should be used to restart communications avoiding communications trouble.
- (2) When sending a forced mode switching request from the PC CPU or computer to the computer link module to enable the module to establish a normal computer link after mode switching, turn OFF all output signals (Y) from the PC CPU to the module beforehand.

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12.3 Handshake I/O Signals for Mode Switching and Buffer Memory

This section describes the handshake I/O signals to be exchanged with the PC CPU when the PC CPU or computer requests the computer link module to switch the mode, and a buffer memory specific use area for reading and writing data.

For use of the handshake I/O signals and the buffer memory specific use area, refer to Sections 12.4 and 12.5.

(1) Handshake I/O signals to be exchanged with the PC CPU

The following handshake I/O signals are used to switch the mode from the PC CPU.

	Signal	Timing
Mode switching	Y(n+1)9 (Mode switching request)	
	Xn9 (Mode switching completed)	

The number "n" appended to X and Y is determined according to the position where the computer link module is loaded and the number of I/O modules loaded prior to this module.

REMARK

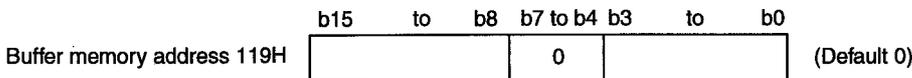
The I/O signals, other than those mentioned above, available in bidirectional mode are: Xn7 (computer link module READY signal) and XnD (computer link module watchdog timer error signal).

Refer to Section 3.9 for the I/O signals used with the PC CPU.

(2) Buffer memory specific use area (mode switching designation area)

The buffer memory area illustrated below is intended to make normal or forced mode switching from the PC CPU or computer.

(a) When mode switching is requested



Write a number between 1H and DH (new mode number).

The numbers 1H to DH correspond to the positions of the mode setting switch (1 to D) (refer to Section 4.2.1).

* When 0H or FH is written, the set number of the mode setting switch is used.

Write the next value.

To switch the mode from the PC CPU
 00H: Normal mode switching request
 81H: Forced mode switching request

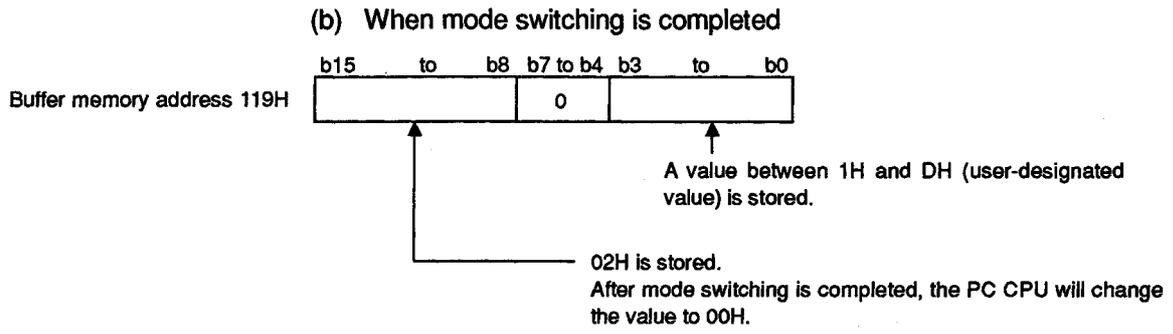
* The mode will be switched in response to bit 8 or bit 15. Bits 9 to 14 will be ignored. When bit 8 is turned ON (01H, 81H), normal or forced mode switching will be executed, irrespective of the mode switching request signal.

To switch the mode from the computer
 01H: Normal mode switching request
 81H: Forced mode switching request

* The mode will be switched in response to bit 8 or bit 15. Bits 9 to 14 will be ignored.

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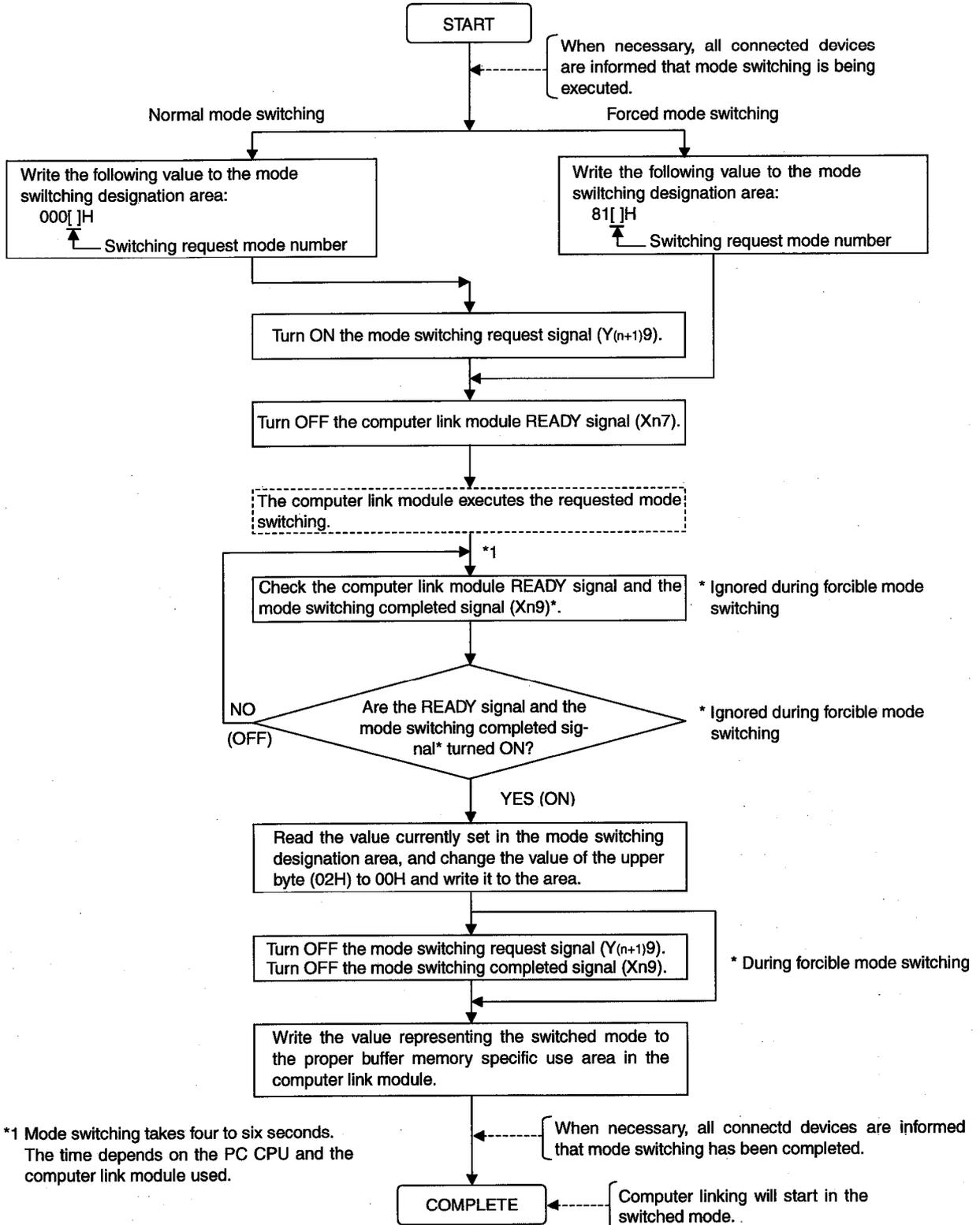


12. WHEN CHANGING OVER MODE DURING OPERATION OF COMPUTER LINK

12.4 Mode Switching from the PC CPU

This section describes how to switch the mode from the PC CPU, and a sequence program for switching the mode and writing a mode switching request value to the mode switching designation area.

12.4.1 Mode switching procedure



12. WHEN CHANGING OVER MODE DURING OPERATION OF COMPUTER LINK

12.4.2 Mode switching program example

Shown below is an example of a sequence program which carries out the following processing after computer linking starts.

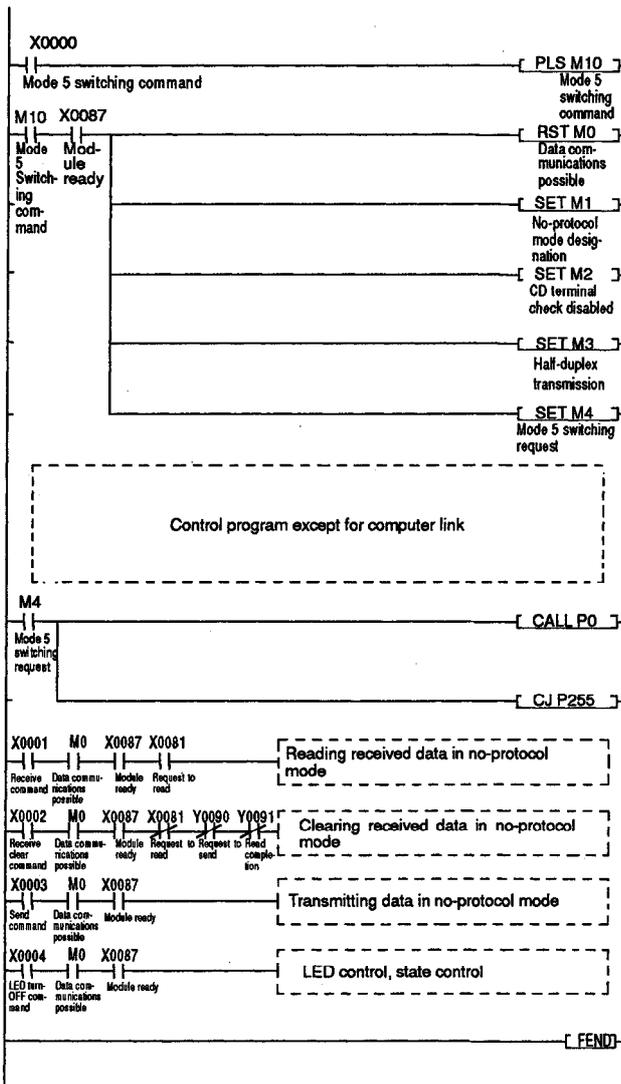
For details, refer to the sections mentioned in the program.

(Computer link module I/O signals 80H to 9FH)

- (1) Set mode number 5 to switch the mode. (Switch the mode of the RS-232C interface from dedicated protocol 1 to the no-protocol.)
- (2) After mode switching, write values to the appropriate buffer memory specific use areas for computer linking in the no-protocol mode through the RS-232C interface and using the control function.
- (3) After mode switching, execute computer linking in the no-protocol mode through the RS-232C interface.

A comment is attached to each device used in the program, which describes the application of the device.

The numbers in parentheses in the program correspond to the numbers in the explanatory diagram shown at the end of this section.



A mode switching command is entered.

The data communications enable flag (M0) is turned ON to switch the mode.

*M0 is set to turn ON after the computer link module is turned ON.

After mode switching, the initial setting flags (M1, M2, M3) in the buffer memory specific use area concerned are turned ON to start data communications in the no-protocol mode.

The mode switching request flag (M4) is turned ON.

Refer to Section 6.4.

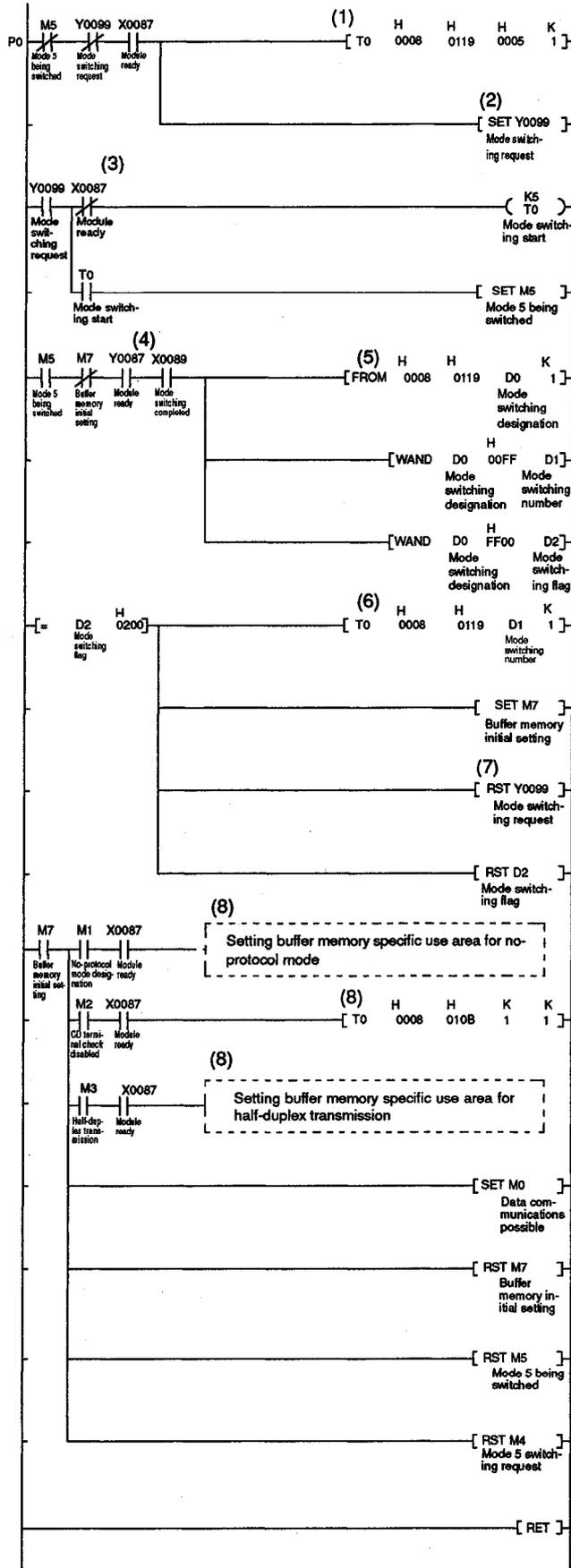
Refer to Section 6.2.1 (4)

Refer to Section 6.5.

Refer to Section 8.

Program for data communications through RS-232C interface after mode switching

12. WHEN CHANGING OVER MODE DURING OPERATION OF COMPUTER LINK

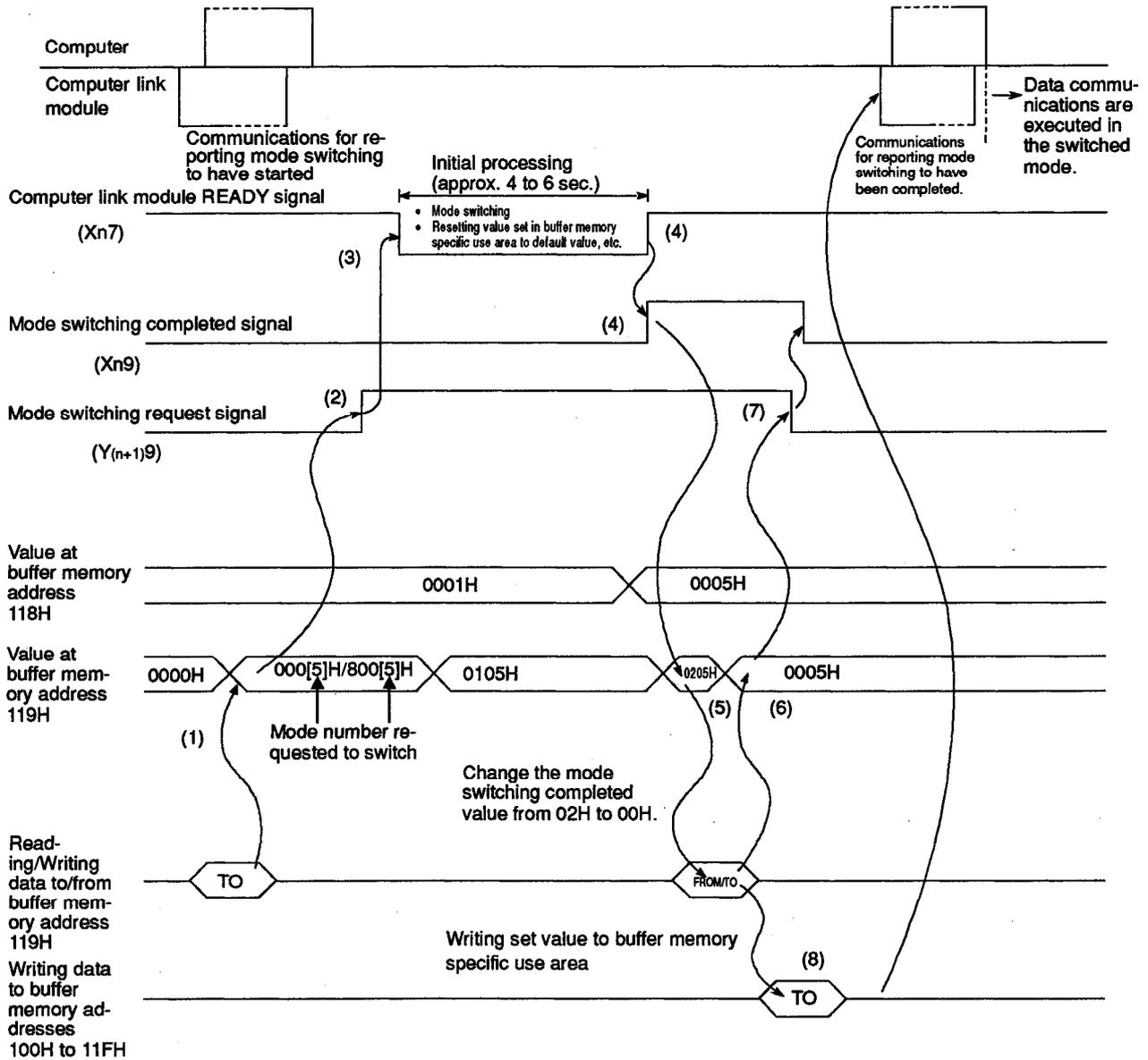


CIRCUIT END

- (1) Write a normal mode switching request.
For forced mode switching, write 8005H.
- (2) The mode switching request signal is turned ON.
- (3) The start of mode switching is confirmed with the module ready signal turned OFF.
- (4) When mode switching is completed, the data stored in the mode switching designation area is read.
- (5) The value of the lower byte is fetched (for writing to buffer memory).
- (6) The value of the upper byte is fetched (for checking whether mode switching is completed).
- (6) Write 0005H to the mode switching designation area.
- (7) When mode switching is completed, the initial setting request flag (M7) in the buffer memory specific use area concerned is turned ON.
- (7) Mode switching request signal is turned OFF.
- (8) The mode switching completed confirmation register (D2) is initialized.
- Refer to Section 6.2.4 (2) (3).
- Initial setting program for data communications in the no-protocol mode through the RS-232C interface after mode switching
- Refer to Section 10.
- When mode switching and initial setting are completed, the data communications enable flag (M0) is turned ON.
- When mode switching is completed, the initial setting request flag (M7) in the buffer memory specific use area concerned is turned OFF.
- The mode switching start detection flag (M5) is initialized.
- The mode switching request flag (M4) is turned OFF.

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- POINTS**
- (1) Whether normal or forced mode switching is executed from the PC CPU, the sequence program initially set in the proper buffer memory specific use area must be processed in the same manner later.
 - (2) The current mode number switched by the mode switching function can be verified with the mode setting state storage area (address 118H) in the buffer memory.
 For the procedure, refer to either of the following sections:
 - For verification using the sequence program, refer to Section 8.3.3. The mode number can be read from the buffer memory using a FROM instruction.
 - For verification on the computer, refer to Section 5.9. The mode number can be verified by the buffer memory read function using a dedicated protocol.

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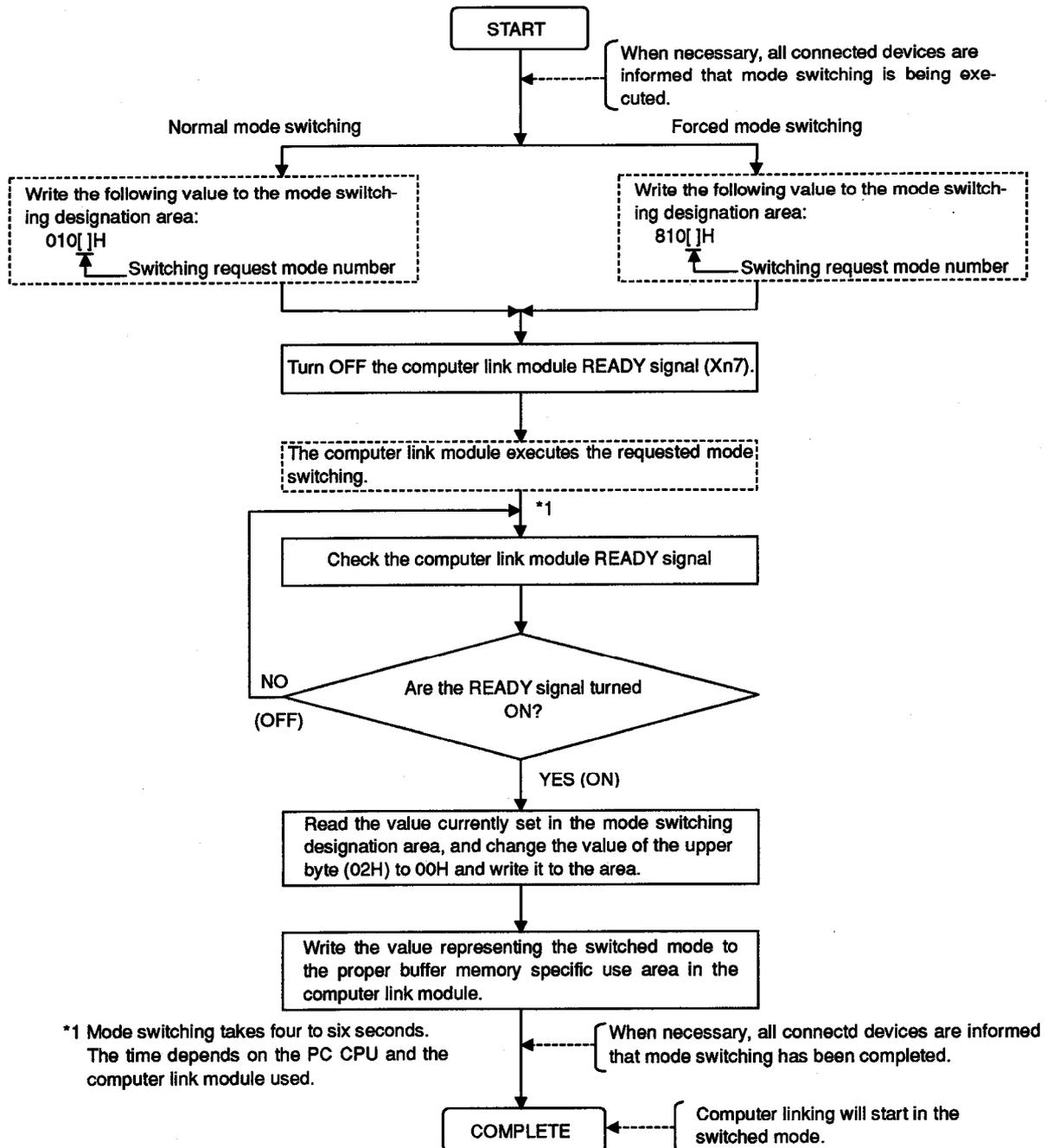
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12.5 Mode Switching from the Computer

This section describes the procedure for mode switching from the computer, and a sequence program for writing a mode switching request value to the mode switching designation area.

The mode of the computer link module can be switched only from a computer which is computer-linked with a dedicated protocol.

12.5.1 Mode switching procedure



12. WHEN CHANGING OVER MODE DURING OPERATION OF COMPUTER LINK

12.5.2 Mode switching program example

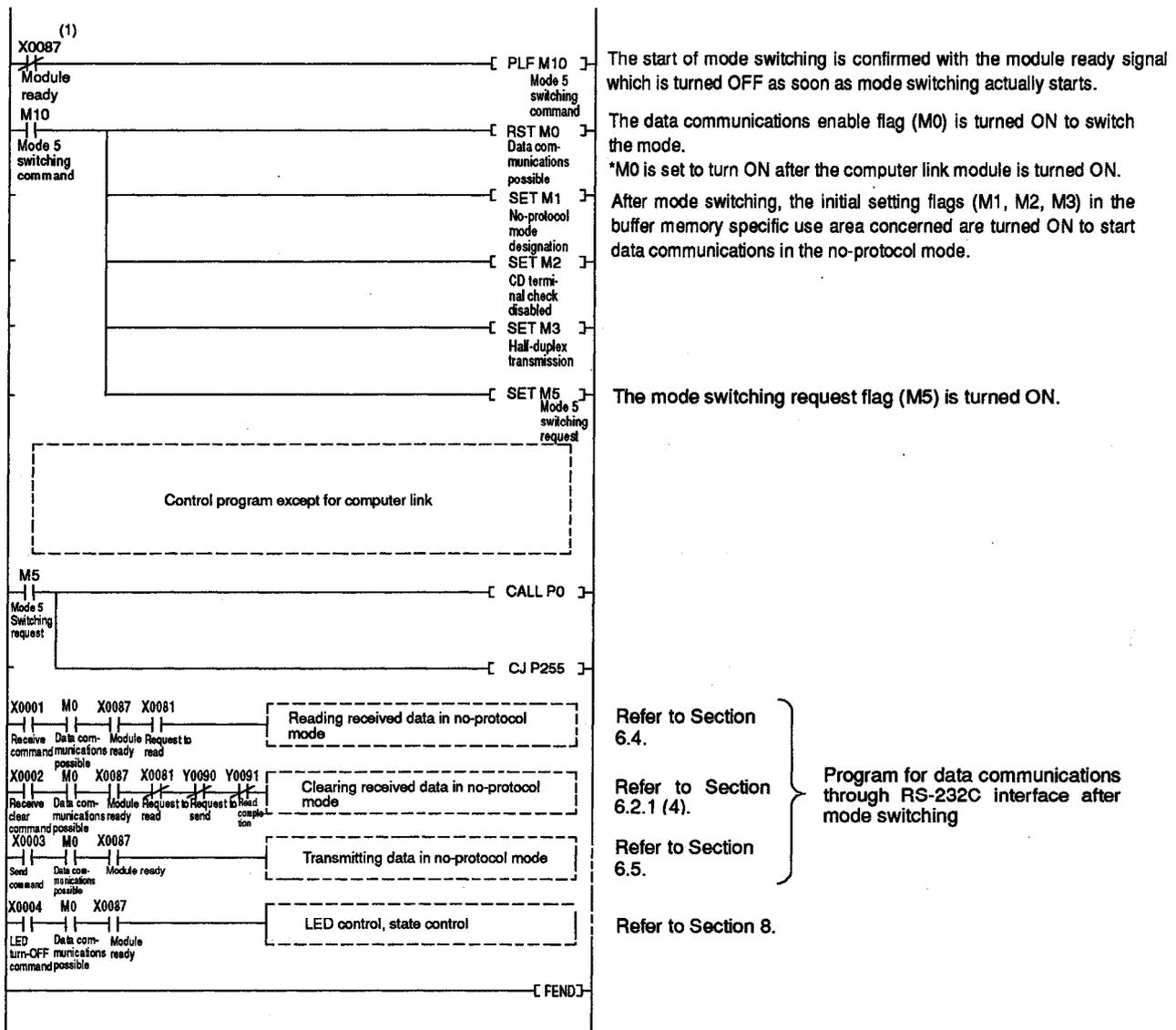
Shown below is an example of a program which carries out the following processing after mode number 5 is set and the computer switches the mode. (Example of program after the mode of the RS-232C interface is switched from dedicated protocol 1 to the no-protocol)

For details, refer to the sections mentioned in the program.
(Computer link module I/O signals: 80H to 9FH)

- (1) After mode switching, write values to the appropriate buffer memory specific use areas for computer linking in the no-protocol mode through the RS-232C interface and using the control function.
- (2) After mode switching, execute computer linking in the no-protocol mode through the RS-232C interface.

A comment is attached to each device used in the program, which describes the application of the device.

The numbers in parentheses in the program correspond to the numbers in the explanatory diagram shown at the end of this section.



The start of mode switching is confirmed with the module ready signal which is turned OFF as soon as mode switching actually starts.

The data communications enable flag (M0) is turned ON to switch the mode.
*M0 is set to turn ON after the computer link module is turned ON.

After mode switching, the initial setting flags (M1, M2, M3) in the buffer memory specific use area concerned are turned ON to start data communications in the no-protocol mode.

The mode switching request flag (M5) is turned ON.

Refer to Section 6.4.

Refer to Section 6.2.1 (4).

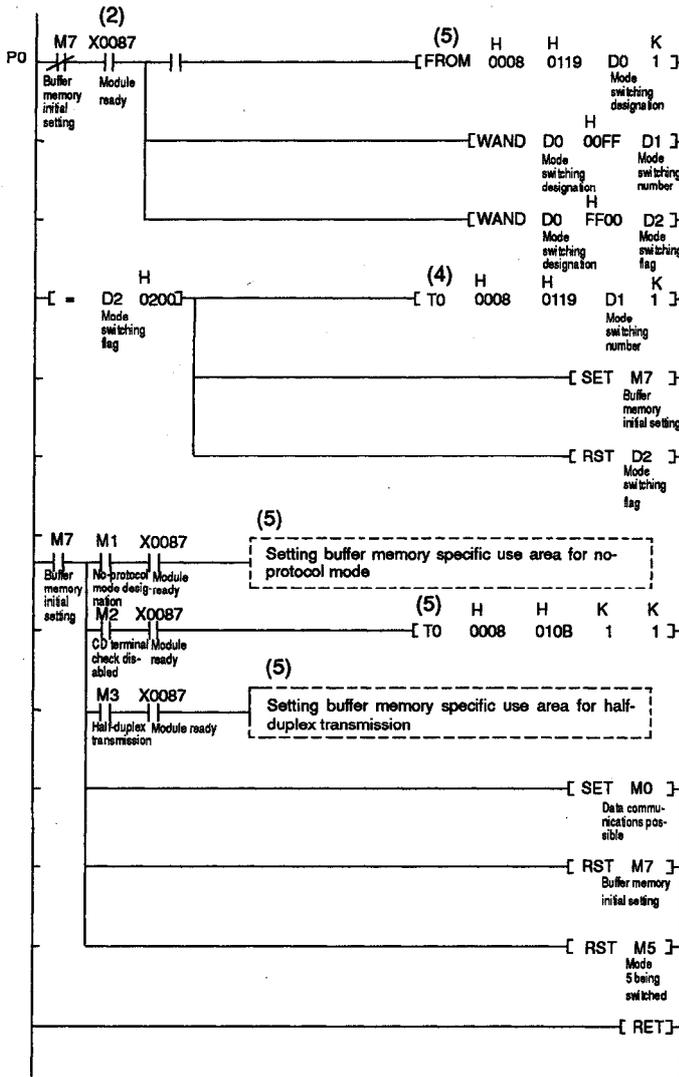
Refer to Section 6.5.

Refer to Section 8.

Program for data communications through RS-232C interface after mode switching

12. WHEN CHANGING OVER MODE DURING OPERATION OF COMPUTER LINK

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CIRCUIT END

When mode switching is completed, the data stored in the mode switching designation area is read.

The value of the lower byte is fetched (for writing to buffer memory).

The value of the upper byte is fetched (for checking whether mode switching is completed).

Write 0005H to the mode switching designation area.

When mode switching is completed, the initial setting request flag (M7) in the buffer memory specific use area concerned is turned ON.

The mode switching completed confirmation register (D2) is initialized.

Refer to Section 6.2.4 (2) (3).

CD terminal check disabled is set. Refer to Section 6.2.4(2)(f).

Refer to Section 10.

Initial setting program for data communications in the no-protocol mode through the RS-232C interface after mode switching

When mode switching and initial setting are completed, the data communications enable flag (M0) is turned ON.

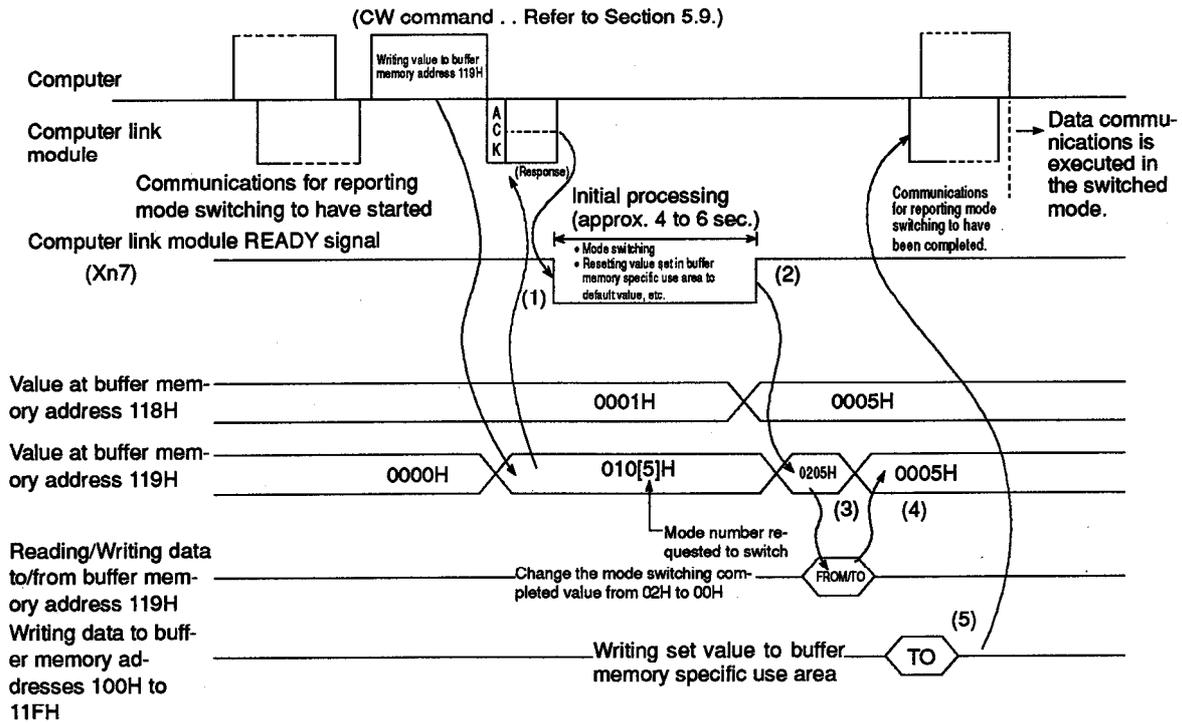
When mode switching is completed, the initial setting request flag (M7) in the buffer memory specific use area concerned is turned OFF.

The mode switching request flag (M5) is turned OFF.

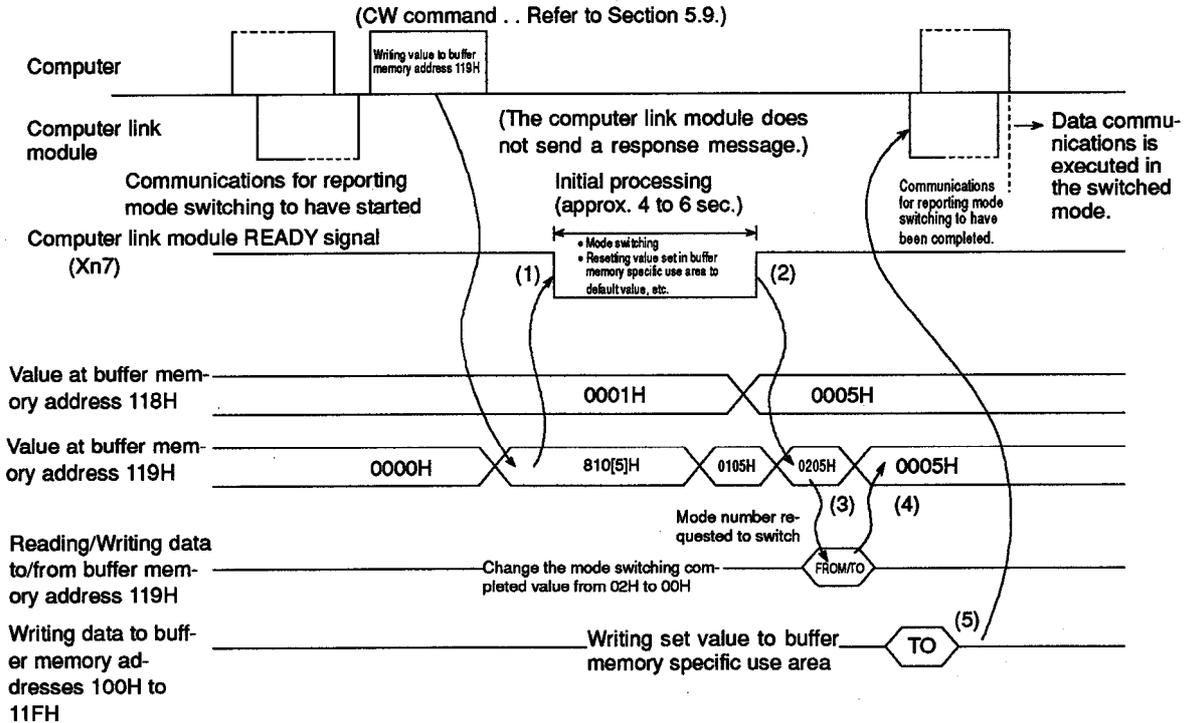
12. WHEN CHANGING OVER MODE DURING OPERATION OF COMPUTER LINK

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(Normal mode switching request)



(Forced mode switching request)



POINTS

- (1) Whether normal or forced mode switching is executed from the PC CPU, the sequence program initially set in the proper buffer memory specific use area must be processed in the same manner later.
- (2) The current mode number switched by the mode switching function can be verified with the mode setting state storage area (address 118H) in the buffer memory.
For the procedure, refer to either of the following sections:
 - For verification using the sequence program, refer to Section 8.3.3. The mode number can be read from the buffer memory using a FROM instruction.
 - For verification on the computer, refer to Section 5.9. The mode number can be verified by the buffer memory read function using a dedicated protocol.

13. TROUBLESHOOTING OF COMPUTER LINK FUNCTIONS

This chapter describes errors which can occur with the computer link module procedures.

13.1 NAK Error Codes with Dedicated Protocols

Table 13.1 gives the error codes and their descriptions when the NAK code is transmitted between the computer and the computer link module as 2-digit ASCII (hexadecimal) between 00H and FFH.

If two or more errors occur at the same time, the computer link module sends the error code of the error it detects first. If any of the following errors occur, the transmission sequences are initialized and LEDs 2-NEU and 4-NEU (LED Nos. 4 and 7) are turned ON.

Table 13.1 Error Code List

Error Code (Hexadecimal)	Error	Error Description	Indicator LED No.	Corrective Actions
00H	Disable during RUN	Invalid access has been made during RUN. (1) Data has been written to a PC CPU with the write during RUN enabled/disabled setting switch OFF (write disable during RUN). (2) Sequence program and parameters have been written	2-C/N (LED No.16) 4-C/N (LED No.20)	(1) Start communications after turning ON the switch. (2) Write parameters after setting the PC CPU to STOP.
01H	Parity error	Parity error With the parity bit setting switch ON (parity enabled), the parity check result does not match the state of the even/odd parity setting switch (odd/even parity).	2-P/S (LED No.17) 4-P/S (LED No.21)	Check control protocol, change the SW setting or data.
02H	Sum check error	Sum check error With the sum check setting switch ON (sum check enabled), the sum check result of received data does not match the sum check code of transmitted data, i.e., send data is different from received data.	2-P/S (LED No.17) 4-P/S (LED No.21)	Check data transmitted from computer and sum check result. Correct invalid data.
03H	Protocol error	Communications protocol not valid. Communications have been made with a protocol different from the one set by the mode setting switch.	2-PRO (LED No.18) 4-PRO (LED No.22)	Check and correct the mode setting switch position and control protocol and restart data communications.
04H	Framing error	Framing error Data does not match the setting of the stop bit setting switch.	2-SIO (LED No.19) 4-SIO (LED No.23)	Change the SW setting.
05H	Overrun error	Overrun error New data has been transmitted before computer link module receives all the preceding data.	2-SIO (LED No.19) 4-SIO (LED No.23)	Decrease the data transmission speed and restart data communications.

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Error Code (Hexadecimal)	Error	Error Description	Indicator LED No.	Corrective Actions
06H	Character area error	<p>Character area A, B, or C error, or designated command does not exist.</p> <p>(1) The designation of the character area A, B, or C for the control protocol set with the mode setting switch is not correct.</p> <p>(2) A command used with the protocol does not exist. The number of processing points is outside the allowable range, or the designated device number does not exist in the designated PC CPU. The set device number does not exist in the set PC CPU.</p> <p>(3) The device number is not set with the required number of characters. (ACPU common command: 5 characters, AnA/AnUCPU dedicated command: 7 characters)</p>	<p>2-PRO (LED No.18) 4-PRO (LED No.22)</p>	<p>(1) Check and correct the character area A,B, or C and restart data communications.</p> <p>(2) Refer to the functions list in Section 3.2.1 and the PC CPU User's Manual to correct the designated commands, and restart data communications.</p> <p>(3) Refer to Section 5.7.1 to correct the number of setting characters of the device number, and restart data communications.</p>
07H	Character error	<p>Character error received.</p> <p>A character other than "A to Z", "0 to 9", "—" and control codes in Section 5.4.6 (1) has been received.</p>	<p>2-PRO (LED No.18) 4-PRO (LED No.22)</p>	Check and correct data.
08H	Programmable controller CPU access error	<p>Buffer memory is unable to make communications with the PC CPU.</p> <p>It indicates that the PC CPU cannot communicate with the computer link module.</p>	<p>2-C/N (LED No.16) 4-C/N (LED No.20)</p>	Use a PC CPU which can perform data communications.
10H	PC number error	<p>Defined PC number does not exist.</p> <p>The PC number designated with the protocol was not the self (FFH), or a station number set with the MELSECNET link parameters or network parameters.</p>	<p>2-C/N (LED No.16) 4-C/N (LED No.20)</p>	Change the PC CPU number to the self (FFH) or a station number set with the MELSECNET link parameters, and restart data communications.
11H	Mode error	<p>Incorrect communications between a computer link module and a PC CPU.</p> <p>After the computer link module has correctly received a request from the computer, normal data communications is not performed between the computer link module and PC CPU due to noise or some other reason.</p>	—	Restart data communications. If the error recurs, (a) check for noise and/or other causes, or (b) replace the computer link module. Restart data communications. Or, perform a self-loopback test to check the computer link module for operation.
12H	Special function module designation error	<p>Special function module designation error.</p> <p>A special function module, having buffer memory and capable of performing data communications, is not placed in the designated special function module number's position. Or the module number is wrong.</p>	<p>2-C/N (LED No.16) 4-C/N (LED No.20)</p>	Check control protocol data or change the special function module location.
13H	Program step number designation error	<p>Error in the designation of a sequence program step number.</p> <p>(1) A step number was designated which lies outside the program range designated by the PC CPU parameters.</p> <p>(2) A subsequence program that does not exist (or cannot be designated) was designated.</p>	<p>2-PRO (LED No.18) 4-PRO (LED No.22)</p>	<p>(1) Designate a step number which lies within the designated range, or change the parameters and restart transmission.</p> <p>(2) Check the model name and the set parameter values of the corresponding PC CPU.</p>
18H	Remote error	<p>Remote RUN/STOP impossible.</p> <p>Remote STOP/PAUSE has already been executed from another module (such as another computer link module).</p>	<p>2-PRO (LED No.18) 4-PRO (LED No.22)</p>	Check for and reset remote STOP/PAUSE from another module.

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Error Code (Hexadecimal)	Error	Error Description	Indicator LED No.	Corrective Actions
20H	Data link error	Access was made to MELSECNET(II) or MELSECNET/10 has been discontinued.	2-C/N (LED No.16) 4-C/N (LED No.20)	Check the state of data link.
21H	Special function module bus error	Memory access to the special function module cannot be made (for command TR, TW). (1) Special function module control bus error. (2) Special function module breakdown.	2-C/N (LED No.16) 4-C/N (LED No.20)	PC CPU, base unit, special function module or computer link module hardware fault. Please consult your local Mitsubishi Electric system service center or representative.
31H	Command error	An AnUCPU dedicated command has been given to a PC CPU other than the AnU.	2-PRO (LED No.18) 4-PRO (LED No.22)	Check the available commands (refer to Section 3.2.1.).
32H	Network data error	Normal access to the designated PC CPU on the MELSECNET/10 is impossible.	2-C/N (LED No.16) 4-C/N (LED No.20)	Examine the network. Check the routing parameter to see if it matches the station to be accessed.
40H	MELSECNET/10 error	The MELSECNET/10 has developed an error.	2-C/N (LED No.16) 4-C/N (LED No.20)	Read four-digit error codes by network reading (refer to Section 5.15.4), and identify the existing error with the MELSECNET/10 Reference Manual to take corrective action.
41H	AnUCPU error	An error occurs in the AnUCPU of the self station on the MELSECNET/10.	2-C/N (LED No.16) 4-C/N (LED No.20)	Read four-digit error codes by network reading (refer to Section 5.15.4), and identify the existing error with the MELSECNET/10 Reference Manual to take corrective action.

REMARKS

- (1) Error codes 00H to 08H are transmitted to a computer after diagnosis by a computer link module, when access is made by the computer to the computer link module.
- (2) Error codes 10H to 21H, 31H to 32H, and 41H are transmitted from a computer link module to a computer after diagnosis by a PC CPU when access is made by a computer link module to the PC CPU.
- (3) Error code 40H is transmitted from the computer link module to the computer according to the decision by the PC CPU on the MELSECNET/10 accessed by the module.

13. TROUBLESHOOTING OF COMPUTER LINK FUNCTIONS

13.2 NAK Error Codes in the Bidirectional Mode

Table 13.2 gives the error codes, error descriptions, and corrective actions for errors which may occur during bidirectional mode communications.

The following error codes (1-word integers) are transmitted in order of the lower byte and the higher byte immediately following the NAK code when an error has occurred. (e.g., when the error code is 01H, 01H is transmitted first, and then 00H is transmitted.)

Table 13.2 Error Code List

Error Code (Hexadecimal)	Error Description	Corrective Actions
01H	Send data length error	Either (a) make the setting size of the send data length storage area in the buffer memory for bidirectional transmission smaller than the size of the send data storage area, or (b) set the send data length to "1" or greater. (Data which does not have a data part cannot be transmitted using the bidirectional mode.)
02H	Response message time-out error	Set the computer so that it transmits the response message (in response to the data received from the computer link module) to the computer link module within the set value of the time-out time setting area (address 113H) in the computer link module buffer memory.
03H	Simultaneous transmission error	Either (a) interlock the computer with the computer link module so that they cannot begin transmitting data simultaneously to each other, or (b) set the data valid/invalid setting area (address 114H) in the computer link module buffer memory to "valid".
10H	Error code is not received when the NAK code is received	When the computer transmits the NAK code to the computer link module in response to the data received from the computer link module, an error code should be added immediately after the NAK code.
22H to 5FH	Errors designated by the user	These error codes are added to immediately after the NAK code. Take corrective actions according to the procedure fixed by user.
80H	SIO error at data receive <div style="display: inline-block; vertical-align: middle;"> { Framing error } Overrun error </div>	<ul style="list-style-type: none"> • Transmit data from the computer according to the following settings with the computer link module (refer to Section 4.2.2 for setting switches). <ul style="list-style-type: none"> • Data bit length • Transmission speed • Stop bit length • Use insulation transformers (noise-cutting transformers) to eliminate noise.
81H	Check sum error Parity error (only at data receive)	<ul style="list-style-type: none"> • To transmit the check sum to the computer link module, obtain the check sum as described in Section 7.4.3 (4). Set the check sum enable/disable setting area (address 115H) in the computer link module buffer memory to "disable", so that the check sum is not transmitted. • Transmit data from the computer according to settings with switches of the computer link module.
82H	Received data length error	Either (a) make the data part length and the set value of the data part length of the receive message less than the size of the received data storage area, or (b) transmit correctly the data length (0001H or more) contained in the message which is transmitted to the computer link module. (Data which does not have the data part cannot be transmitted using the bidirectional mode.)
83H	Received data time-out error	When data is transmitted from the computer, set the actual length of the data area to the data length area. (The computer link module executes the time-out check (as set with address 113H of the buffer memory) if it fails to receive data of a set length. This error occurs when it fails to receive the next data within the set time.)

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13.3 Indications of LEDs in Case of Trouble and Corrective Action

This section describes the indications of the LEDs in case of trouble and corrective action.

LED Name	Normal State	Corrective Actions		
		During Communications Using Dedicated Protocol	During Communications in No-Protocol Mode	During Communications in Bidirectional Mode
RUN	ON	<ul style="list-style-type: none"> Examine the transmission speed setting. (Refer to Section 4.2.2.) Check the mode setting switch (refer to Section 4.2.1) for set number. Take corrective action according to Section 13.4.2. 		
2-SD	Flashes during transmission	<ul style="list-style-type: none"> Examine the RS-232C connector cable connections (refer to Section 4.6.2) by setting CD terminal check enabled. Check the main channel setting to see if it matches the set number of the mode setting switch (9 to D, refer to Section 4.2.1). (Refer to Section 4.2.2.) Check the communications status in DC1/DC3 receive control (refer to Section 9.2.3). Check the states of the signals at the RS-232C interface in half-duplex transmission (refer to Section 10). Examine the RS-232C connector cable connections (refer to Section 10.2.). 		
2-RD	Flashes during receive	<ul style="list-style-type: none"> Examine the RS-232C connector cable connections (refer to Section 4.6.2). Check the signals at the RS-232C interface whether they are turned ON or OFF (refer to Section 3.7.1). Check the communications status in DC1/DC3 transmission control (refer to Section 9.2.2). Check the states of the signals at the RS-232C interface in DTR/DSR control (refer to Section 9.2.1). Check the states of the signals at the RS-232C interface in half-duplex transmission (refer to Section 10). Examine the RS-232C connector cable connections (refer to Section 10.2.). 		
2-NEU	ON during waiting for ENQ	<ul style="list-style-type: none"> Check the mode setting switch (refer to Section 4.2.1) for set number, and the main channel setting (refer to Section 4.2.2). 		
		<ul style="list-style-type: none"> Examine the quantity of message data transmitted from the computer (refer to Section 5). Consult your nearest Mitsubishi representative. 	_____	
2-ACK	ON after ACK transmission	<ul style="list-style-type: none"> Check on the computer the error code received immediately after an NAK or NN code was sent, and take corrective action according to Section 13.1. 		
2-NAK	OFF			
4-NEU	ON during waiting for ENQ	<ul style="list-style-type: none"> Check the mode setting switch (refer to Section 4.2.1) for set number, and the main channel setting (refer to Section 4.2.2). 		
		<ul style="list-style-type: none"> Examine the quantity of message data transmitted from the computer (refer to Section 5). Consult your nearest Mitsubishi representative. 	_____	
4-ACK	ON after ACK transmission	Check on the computer the error code received immediately after an NAK or NN code was sent, and take corrective action according to Section 13.1.		
4-NAK	OFF			
4-SD	Flashes during transmission	<ul style="list-style-type: none"> Check the mode setting switch (refer to Section 4.2.1) for set number. Check the communications status in DC1/DC3 receive control (refer to Section 9.2.3). 		
4-RD	Flashes during receive	<ul style="list-style-type: none"> Examine the RS-422 connector cable connections (refer to Section 4.6.3). Check the communications status in DC1/DC3 transmission control (refer to Section 9.2.2). 		
2-C/N	OFF	<ul style="list-style-type: none"> Check the write during RUN enabled/disabled setting (refer to Section 4.2.2). Take corrective action according to Section 13.4.4. The LED goes OFF by writing 1 to buffer memory address 102H in the computer link module. 		

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LED Name	Normal State	Corrective Actions		
		During Communications Using Dedicated Protocol	During Communications in No-Protocol Mode	During Communications in Bidirectional Mode
2-P/S	OFF	<ul style="list-style-type: none"> Match the transmission specifications of the computer link module (refer to Section 4.2.2) with those of the external device. The LED goes OFF by writing 2 to buffer memory address 102H in the computer link module 		
		<ul style="list-style-type: none"> Examine how the sum check code should be treated (refer to Sections 4.2.2 and 5.4.6 (10)). Examine the calculation of the sum check code on the computer (refer to Section 5.4.6 (10)). 	_____	
2-PRO	OFF	<ul style="list-style-type: none"> The LED goes OFF by writing 4 to buffer memory address 102H in the computer link module. 		
		<ul style="list-style-type: none"> Check the mode setting switch (refer to Section 4.2.1) for set number. Examine the transmitted message on the computer. (Refer to Section 5.) Take corrective action according to Section 13.1. 	_____	
2-SIO	OFF	<ul style="list-style-type: none"> Match the transmission specifications of the computer link module (refer to Section 4.2.2) with those of the external device. Lower the transmission speed. The LED goes OFF by writing 8 to buffer memory address 102H in the computer link module. 		
		_____	Reduce the quantity of message data transmitted from the computer (refer to Section 9.2.1 and 9.2.2).	
4-C/N	OFF	<ul style="list-style-type: none"> Check the write during RUN enabled/disabled setting (refer to Section 4.2.2). Take corrective action according to Section 13.4.4. The LED goes OFF by writing 16 to buffer memory address 102H in the computer link module. 		
4-P/S	OFF	<ul style="list-style-type: none"> Match the transmission specifications of the computer link module (refer to Section 4.2.2) with those of the external device. The LED goes OFF by writing 32 to buffer memory address 102H in the computer link module. 		
		<ul style="list-style-type: none"> Examine how the sum check code should be treated (refer to Sections 4.2.2 and 5.4.6 (10)). Examine the calculation of the sum check code on the computer (refer to Section 5.4.6 (10)). 	_____	
4-PRO	OFF	<ul style="list-style-type: none"> The LED goes OFF by writing 64 to buffer memory address 102H in the computer link module. 		
		<ul style="list-style-type: none"> Check the mode setting switch (refer to Section 4.2.1) for set number. Examine the transmitted message on the computer (refer to Section 5). Take corrective action according to Section 13.1. 	_____	
4-SIO	OFF	<ul style="list-style-type: none"> Match the transmission specifications of the computer link module (refer to Section 4.2.2) with those of the external device. Lower the transmission speed. The LED goes OFF by writing 128 to buffer memory address 102H in the computer link module. 		
		_____	Reduce the quantity of message data transmitted from the computer (refer to Sections 9.2.1 and 9.2.2.).	
CPU R/W	ON/Flashes	<ul style="list-style-type: none"> Examine the programs for the PC CPU and the computer. Check the PC CPU and the computer for status. Check the mode setting switch (refer to Section 4.2.1) for set number. Consult your nearest Mitsubishi representative. 		

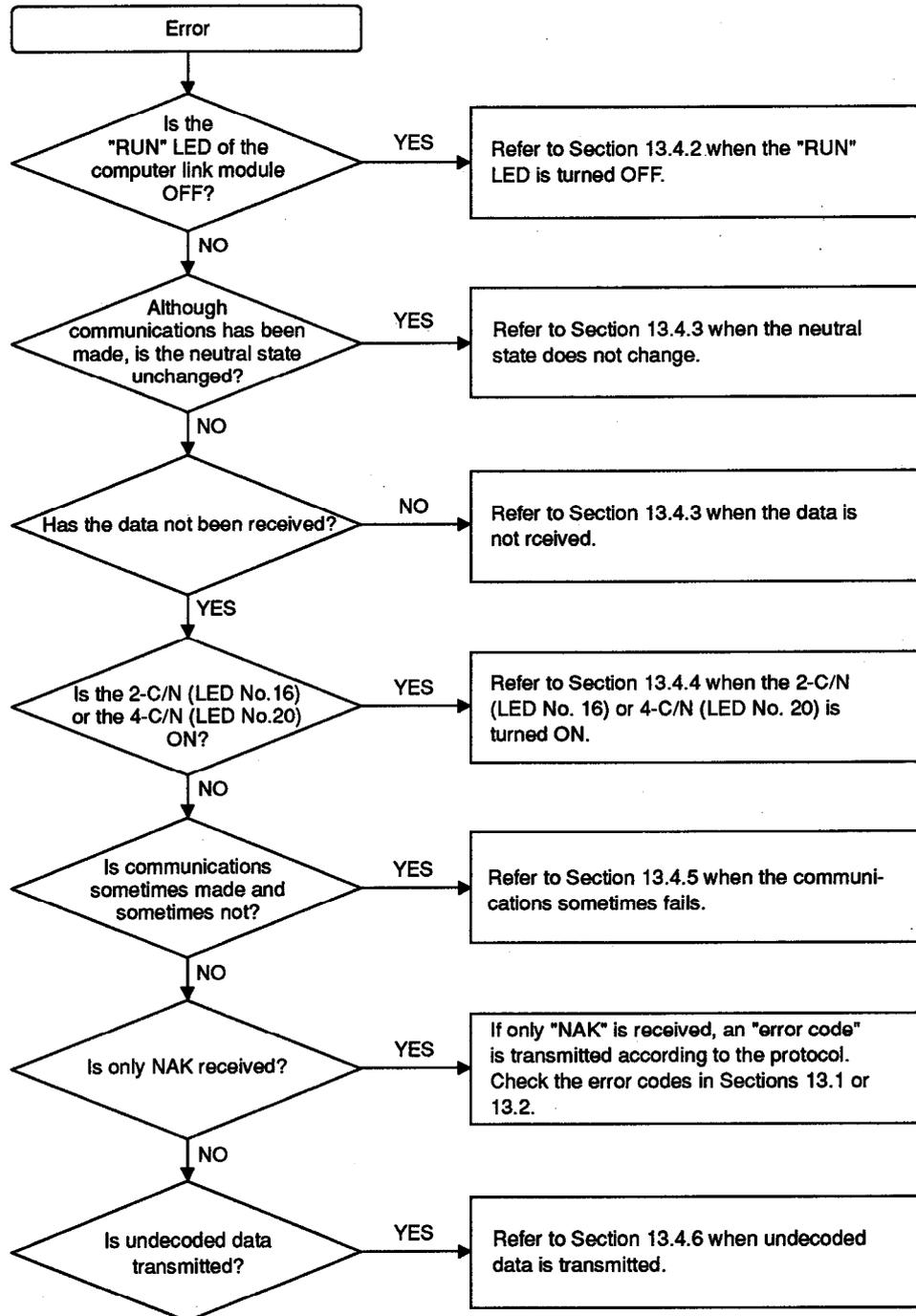
13.4 Troubleshooting OFF

This section describes basic troubleshooting procedures for the computer link module. The User's manuals give information on PC CPU module troubleshooting.

13.4.1 Troubleshooting flow chart

The state of errors is described as follows:

(1) Computer link function



REMARK

The matters to be noted when executing data communication with an external device via any interface of the computer link module are as follows:

- (1) When turning on the power of the computer link module, a receiving error may occur in an external device. When turning on the power of an external device, a receiving error may occur in the computer link module.
- (2) When turning on the power of an external device while sending data from the computer link module, a receiving error will occur in the external device. When turning on the power of the computer link module while sending data from an external device, a receiving error will occur in the computer link module.
- (3) If the error LED is lit up by the occurrence of a receiving error, turn off the LED following the Section 8.1.2.

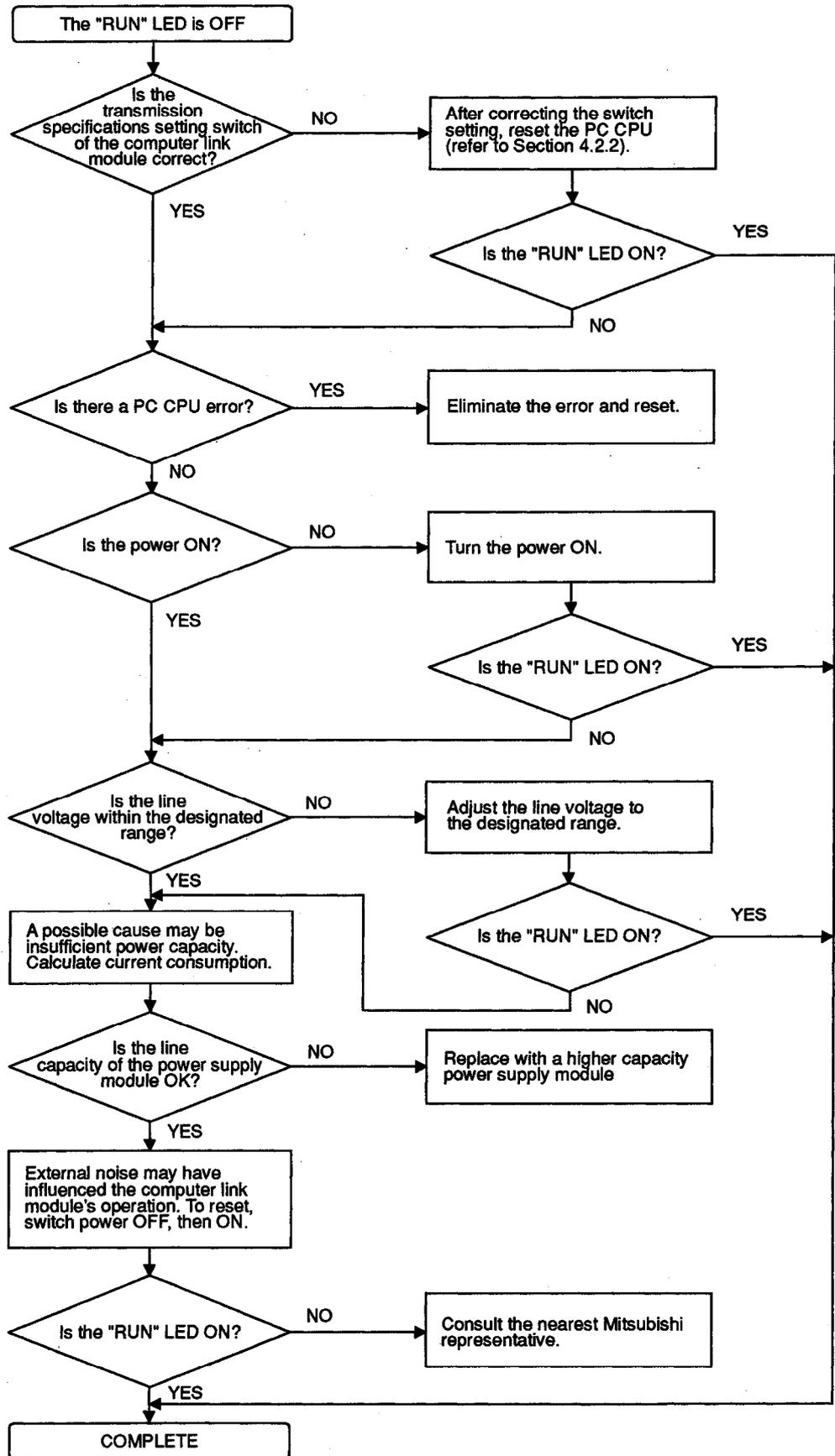
POINTS

When a receiving error occurs in the computer link module, refer to the following explanations:

- (1) When communicating with the dedicated protocol
When the calculator link module detects a receiving error after receiving the head data of command text in the set format, it ignores the received data, or returns the response text indicating an error end.
When the computer link module detects a receiving error before receiving the head data of command text in the set format, it ignores the received data.
- (2) When communicating in non-protocol mode
When the computer link module detects a receiving error, it ignores only the data in which an error was detected.
Refer to Sections 6.2.1 or 8.1, or APPENDIX 6.1.3 to detect a receiving error and clear the received data.
- (3) When communicating in bidirectional mode
When the computer link module detects a receiving error after receiving the head data of command text in the set format, it returns the response text indicating an error end.
When the computer link module detects a receiving error before receiving the head data of command text in the set format, it ignores the received data.

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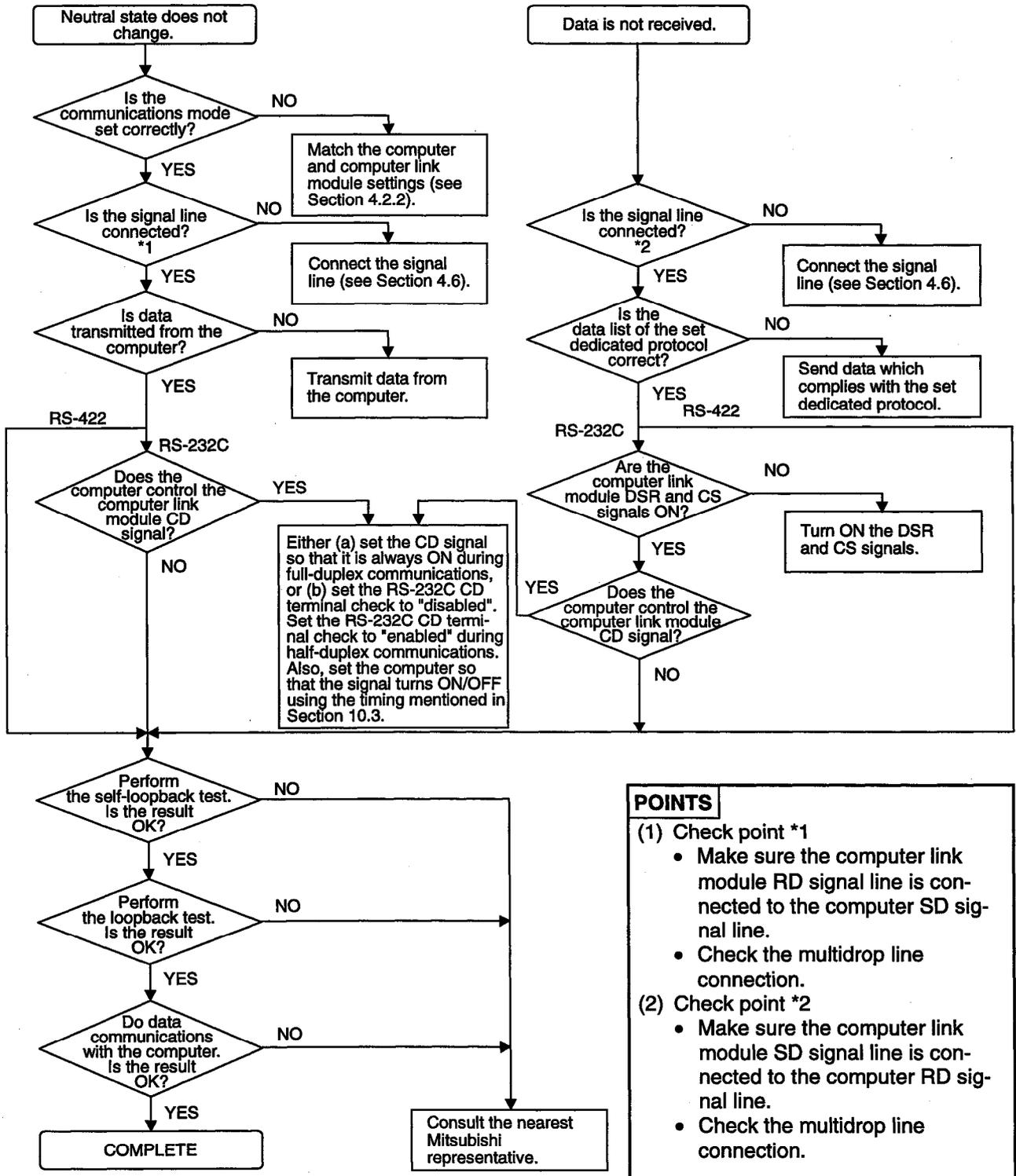
13.4.2 When the "RUN LED" is turned OFF



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13.4.3 When the neutral state does not change or data is not received

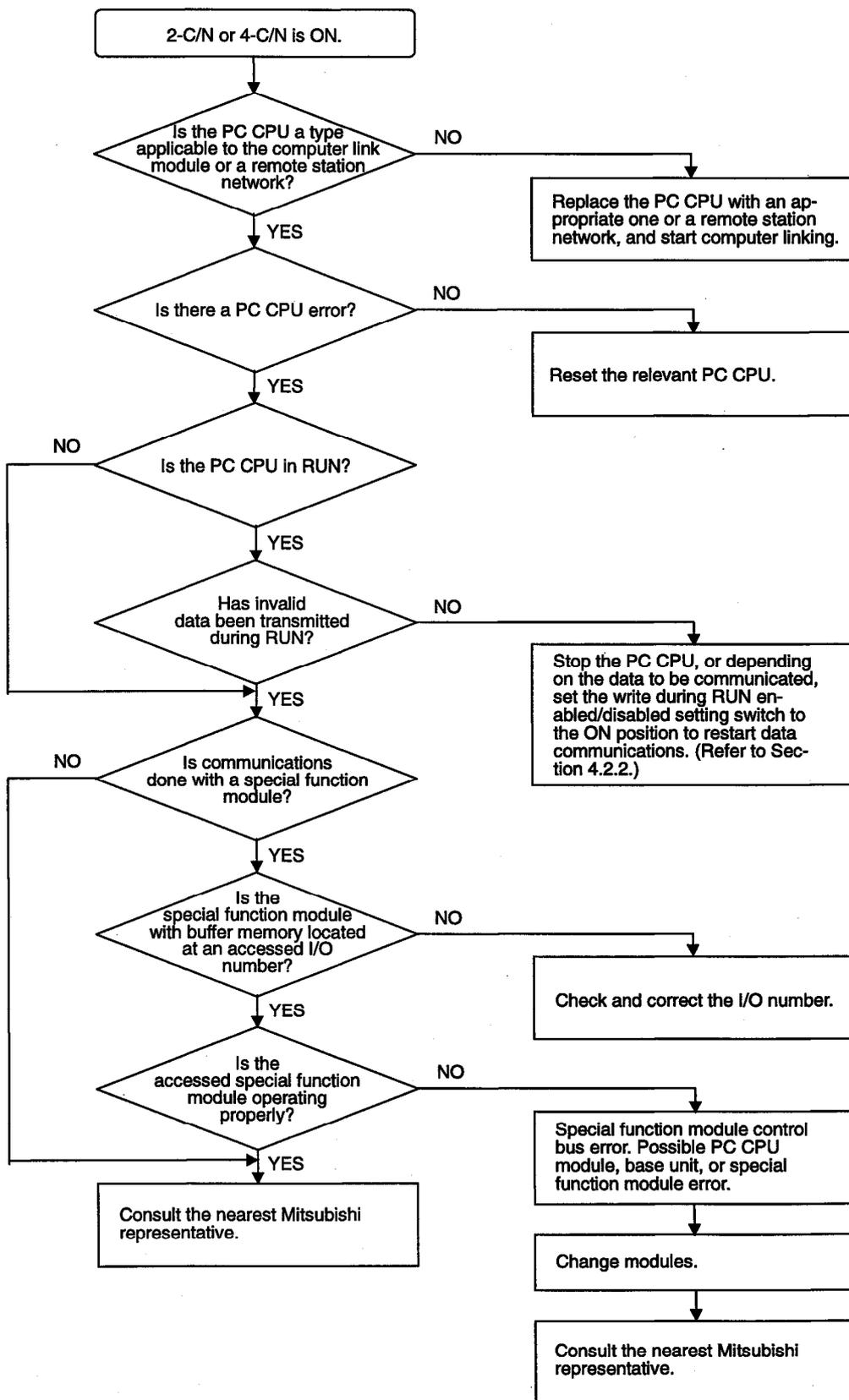
The computer link module LED remains ON indicating (a) the neutral state, or (b) that communications is disabled (even though a communications request is made to the computer link module). The computer cannot receive data.



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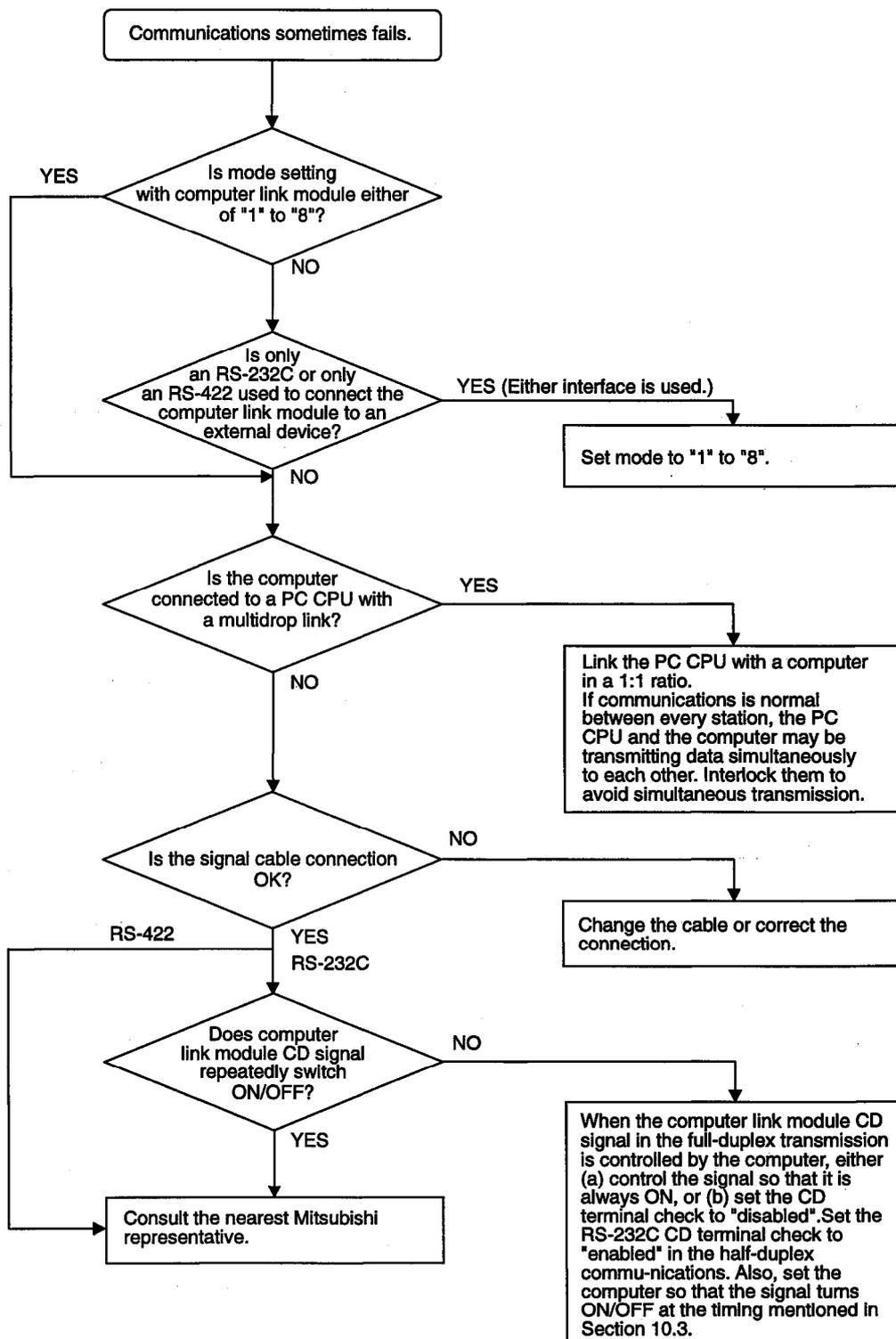
13.4.4 When the 2-C/N LED (C/N LED) or 4-C/N LED (C/N LED) is turned ON



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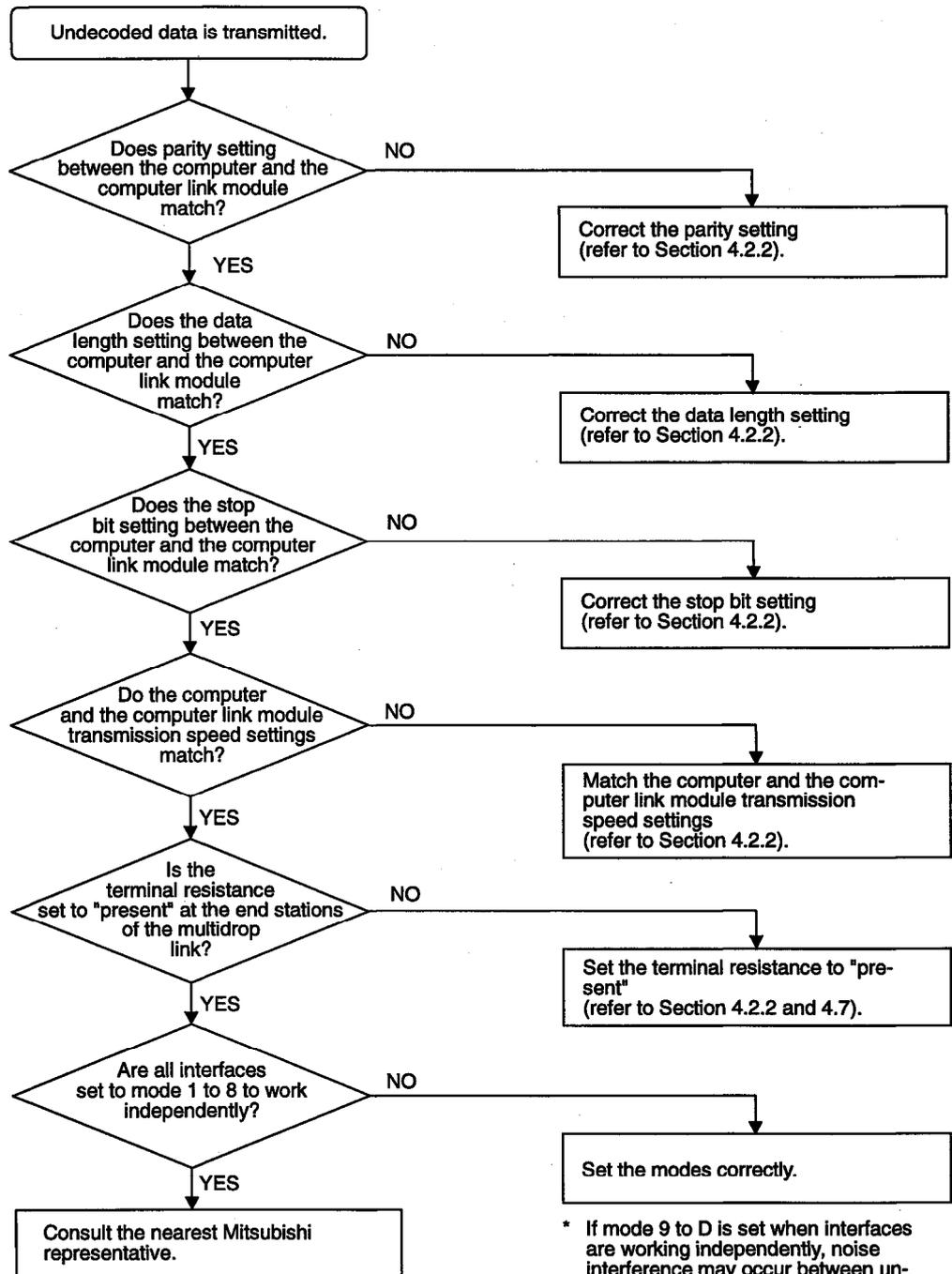
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13.4.5 When communications sometimes fails



13.4.6 When undercoded data is transmitted

Use this flow chart when the computer link module (in response to data from the computer) transmits code and data which is not included in the control code.



PRINTER FUNCTION

This part describes the registration, reading and output of messages when the printer functions are used with the computer link module.

14. SYSTEM CONFIGURATION AND AVAILABLE DEVICES

The printer functions of the computer link module is available for system configurations of which the printer- and computer-to-computer-link-module (PC CPU) ratios are 1:1 and 2:1 to 2:32.

Connect a printer which can be operated by the printer functions and a PC CPU to the RS-232C interface of the computer link module.

To the RS-422/485 interface (hereinafter called the RS-422 interface) of a computer link module, connect the computer and the PC CPU, which transmit and receive data between them using a dedicated protocol of the computer link function, in the ratio of 1:1 to 1:32 or m:n.

This section describes system configurations, and the printer functions and the computer link function available for such system configurations.

POINTS

(1) Among the computer link modules referred to in this manual, only the following types have the printer functions, and a printer or computer(s) can be connected to the interface(s) of each module:

(a) A1SJ71UC24-PRF, A1SJ71C24-PRF

- This type of module is equipped only with an RS-232C interface.
- The printer functions can be used only when the system is composed of a printer and a PC CPU.

(b) A2CCPUC24-PRF

- This type of module is equipped with an RS-232C interface and an RS-422/485 interface.
- The printer functions can be used for system configurations of which the printer- and computer-to-PC CPU ratios are 1:1, 2:1 to 2:32 or m:n.

Note that some computer link modules cannot establish systems consisting of a printer or computers and PC CPUs (computer link modules in this section) in the ratios ([]:[]) specified in this section.

(2) For systems applicable to the computer link modules described herein, refer to the User's Manual (Hardware) for the computer link module used.

14. SYSTEM CONFIGURATION AND AVAILABLE DEVICES

Function	Printer function						
	A1S/J71UC24		A1S/J71UC24		A1S/CPU C24-R2	A2C/CPU C24	A2C/CPU C24-PRE
Applicable module	-R2	-R4	-PRE	-R2	-R4	-PRE	0
Remarks			0			0	0

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14.1 1 : 1 Ratio of a Printer to a PC CPU

(1) The system configuration for a 1:1 ratio of a printer to a PC CPU is shown in Fig. 14.1 below.

(Mode: [] — []) in the figure indicates the range of setting set with the mode setting switch of a computer link module (refer to Section 4.2.1).

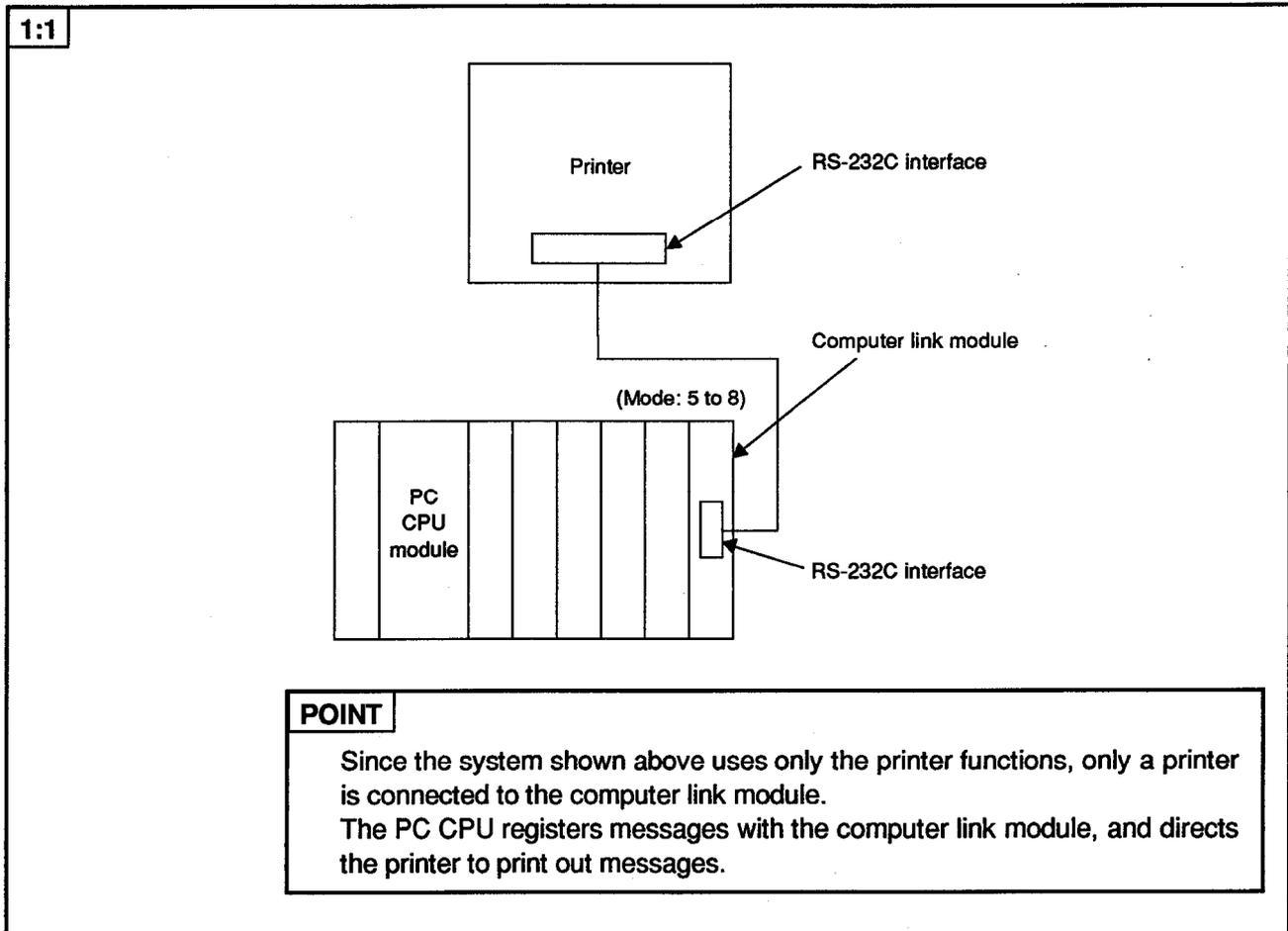


Fig. 14.1 System Configurations (I)

(2) The following table shows the printer functions available when the system consists of a printer and a PC CPU:

(a) Functions available when using the PC CPU

		Available Functions	Interface Connected with Computer: RS-422	Interface Connected with Printer: RS-232C	Remarks
Data communications with computer link module	Printer function	Message registrations/read		○	For registering/reading fixed and free messages
Data transmission to printer		Printer output		○	Message output to printer
		Test output		○	For test output to printer

14. SYSTEM CONFIGURATION AND AVAILABLE DEVICES

Function	Printer function									
	A1S/J1UC24			A1S/J1TC24						
Applicable module	AJ71UC24	-R2	-R4	-PRF	-R2	-R4	-PRF	A1SCPU C24-R2	A2CCPU C24	A2CCPU C24-PRF
Remarks										0

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14.2 2 : 1 Ratio of a Computer and Printer to a PC CPU

- (1) The system configuration for a 2:1 ratio of a computer and a printer to a PC CPU is shown in Fig. 14.2 below.

(Mode: [] to []) in the figure indicates the range of setting designated with the mode setting switch of a computer link module (refer to Section 4.2.1).

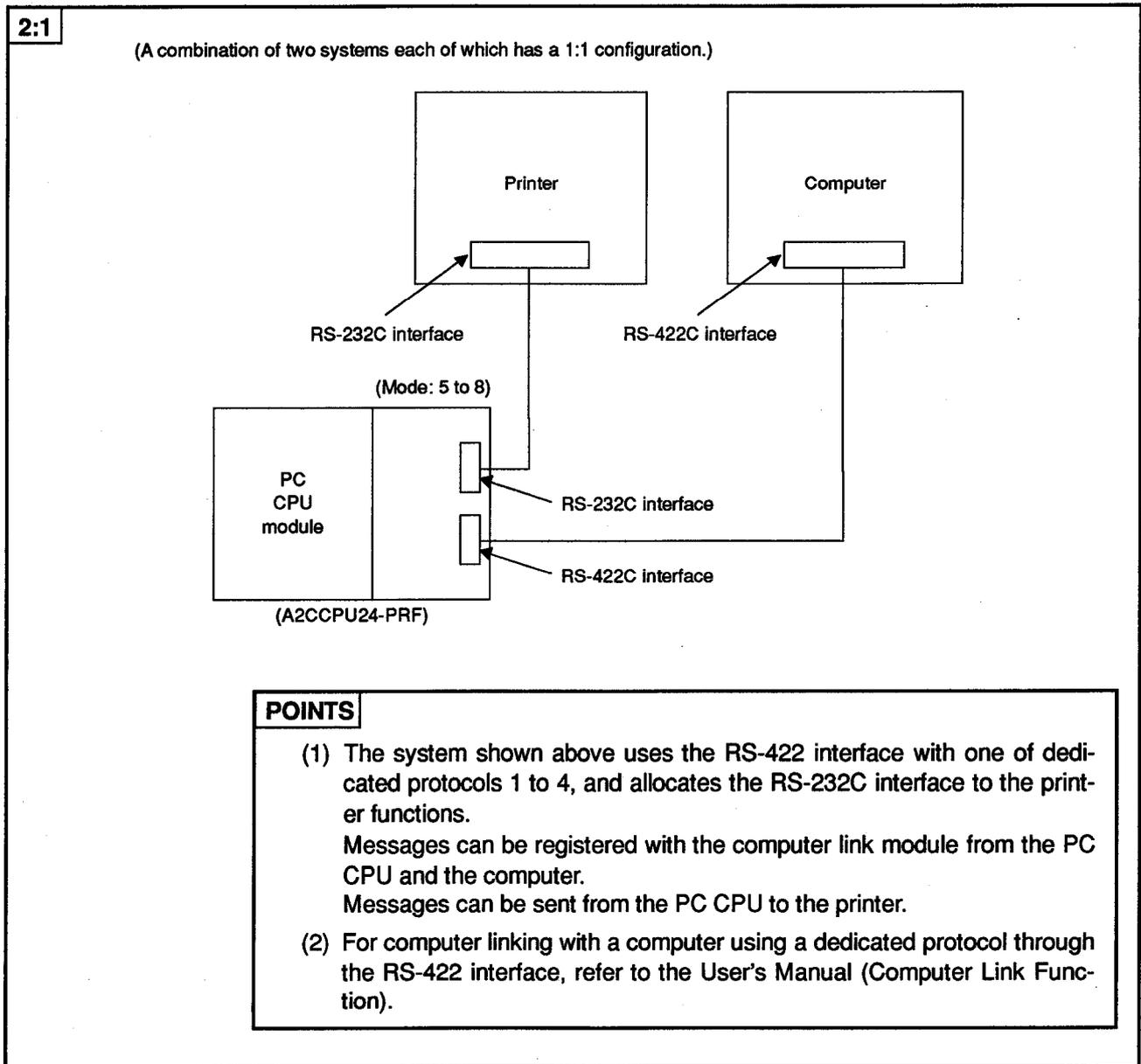


Fig. 14.2 System Configurations (II)

14. SYSTEM CONFIGURATION AND AVAILABLE DEVICES

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(2) The following tables list the functions available when a computer and a printer are linked with the PC CPU to make a 2:1 configuration.

(a) Functions available when using a PC CPU

		Available Functions	Interface Connected with Computer: RS-422	Interface Connected with Printer: RS-232C	Remarks
Data communications with computer link module	Printer function	Message registrations/read		O	For registering/reading fixed and free messages
Data transmission to printer		Printer output		O	For message output printer
		Test output		O	For test output to printer
Data communications with computer	Dedicated protocols	On-demand		O	For transmitting data from PC CPU to computer
	No-protocol mode	Send/Receive		X	For data communications between PC CPU and external device
	Bidirectional mode	Send/Receive		X	For data communications between PC CPU and external device

14. SYSTEM CONFIGURATION AND AVAILABLE DEVICES

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(b) Functions available when using a computer

		Available Functions	Interface Connected with Computer: RS-422	Interface Connected with Printer: RS-232C	Remarks	
Data transmission to printer	Printer function	Printer output		X	For message output printer	
		Test output		X	For test output to printer	
Data communications with computer link module	(For printer function)	Message registration/read (by the use of a dedicated protocol)		O	For registering/reading fixed messages	
Data communications with PC CPU	Dedicated protocols	Device memory	Read/Write	O	Including extension comments	
			Test			
			Monitor			
		Extension file register	Read/Write	O		
			Test			
			Monitor			
		Buffer memory (Computer link module of the self)	Read/Write	O		
		Special function module's buffer memory	Read/Write	O		
		Sequence/microcomputer program	Read/Write	O		
		Comment	Read/Write	O		Including extension comments
		Parameter	Read/Write	O		
		PC CPU	Remote RUN/Stop	O		
	PC CPU type read					
Global	Input signal (X) ON/OFF	O				
Self-loopback test	Transmission of received data	O				
No-protocol mode	Send/Receive		X	For data communications between PC CPU and external device		
Bidirectional mode	Send/Receive		X	For data communications between PC CPU and external device		

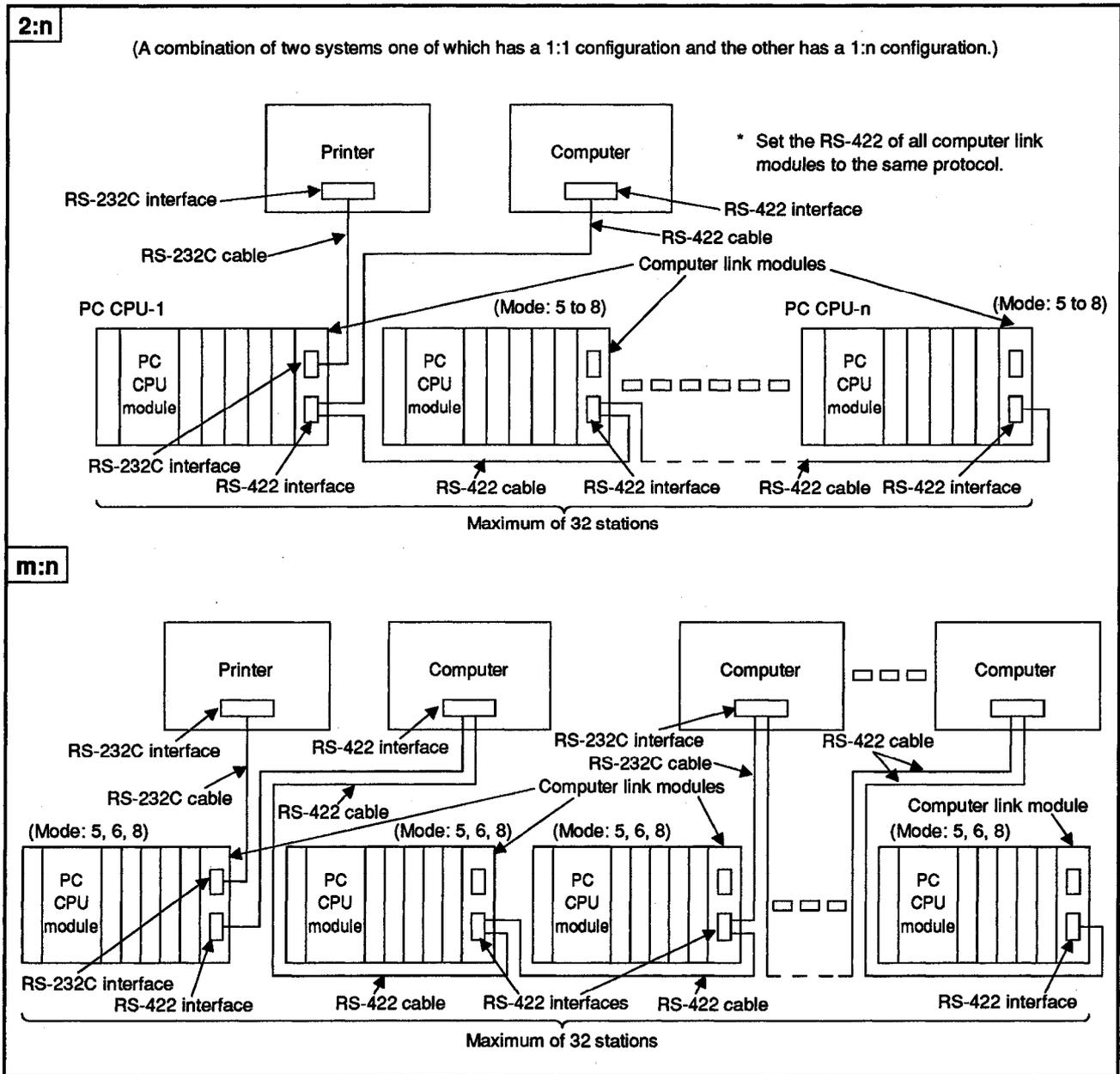
14. SYSTEM CONFIGURATION AND AVAILABLE DEVICES

Function	Printer function						A1SCPU C24-R2	A2CCPU C24	A2CCPU C24-PRF
	A171UC24	A1S771UC24 -R2	-R4	-PRF	A1S771C24 -R2	-R4			
Applicable module									
Remarks									0

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14.3 When the Computer- and Printer-to-PC CPU Ratios are 2:n and m:n

- (1) Fig. 14.3 below shows system configurations of which the computer- and printer-to-PC CPU ratios are 2:n (n = max. 32 stations) and m:n (m and n = max. 32 in all).
 (Mode: [] to []) in the figure indicates the range of setting set with the mode setting switch of a computer link module (refer to Section 4.2.1).



14. SYSTEM CONFIGURATION AND AVAILABLE DEVICES

POINTS

(1) The systems shown in the previous page use the RS-422 interface with one of dedicated protocols 1 to 4, and allocate the RS-232C interface to the printer functions.
 Messages can be registered with the computer link module connected with the printer from the PC CPU connected with the printer and each computer.
 Messages can be sent from the PC CPU connected with the printer to the printer.

(2) For computer linking with a computer using a dedicated protocol, refer to the User's Manual (Computer Link Function).

(2) The following tables list the functions available when the printers are linked with the PC CPU to make a 2:n/m:n configuration.

(a) Functions available when using PC CPUs (station connected with printer)

		Available Functions	Interface Connected with Computer: RS-422	Interface Connected with Printer: RS-232C	Remarks
Data communications with computer link module	Printer function	Message registration/read		O	For registering/reading fixed and free messages
Data transmission to printer		Printer output		O	For message output printer
		Test output		O	For test output to printer
Data communications with computer	Dedicated protocols	On-demand		X	For transmitting data from PC CPU to computer
	No-protocol mode	Send/Receive		X	For data communications between PC CPU and external device
	Bidirectional mode	Send/Receive		X	For data communications between PC CPU and external device

14. SYSTEM CONFIGURATION AND AVAILABLE DEVICES

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(b) Functions available when using a computer

		Available Functions	Interface Connected with Computer: RS-422	Interface Connected with Printer: RS-232C	Remarks	
Data transmission to printer	Printer function	Printer output		X	For message output printer	
		Test output		X	For test output to printer	
Data communications with computer link module	(For printer function)	Message registration/read (by the use of a dedicated protocol)		O	For registering/reading fixed messages	
Data communications with PC CPU	Dedicated protocols	Device memory	Read/Write	O	Including extension comments	
			Test			
			Monitor			
		Extension file register	Read/Write	O		
			Test			
			Monitor			
		Buffer memory (Computer link module of the self)	Read/Write	O		
		Special function module's buffer memory	Read/Write	O		
		Sequence micro-computer program	Read/Write	O		
		Comment	Read/Write	O		Including extension comments
		Parameter	Read/Write	O		
		PC CPU	Remote RUN/Stop	O		
			PC CPU type read			
		Global	Input signal (X) ON/OFF	O		
Self-loopback test	Transmission of received data	O				
No-protocol mode	Send/Receive		X	For data communications between PC CPU and external device		
Bidirectional mode	Send/Receive		X	For data communications between PC CPU and external device		

15. SPECIFICATIONS

Function	Printer function									
	AJ71UC24	A1S171UC24			A1S171C24			A1SCPU C24-R2	A2CCPU C24	A2CCPU C24-PRF
Applicable module		-R2	-R4	-PRF	-R2	-R4	-PRF			
Remarks				○			○			○

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15. SPECIFICATIONS

This section describes the printer functions and the commands (for dedicated protocols) for registering or reading free and fixed messages with or from the computer, which will be sent to the printer.

15.1 Printer Function

15.1.1 Printer functions list

This section describes the printer functions.

Table 15.1 Printer Functions List

Function	Description	Reference Sections
Printer message registration and reading functions by a computer	Fixed messages of up to 80 characters can be registered and read out by using a CI (fixed message registration) command and a CJ (fixed message read) command in dedicated protocols 1 to 4 (modes 1 to4).	Section 17.3
Printer message registration and reading functions by a sequence program	Fixed messages or free messages of up to 80 characters can be registered and read out by using a sequence program.	Section 17.4
Printer output function	Fixed/free messages for designated data length can be output by a printer output request given from a sequence program.	Section 17.7
Printer test output function	Two kinds of test output are enabled by a printer output request given from a sequence program. (1) Registered fixed messages are output to the printer. (Registered message test output function) (2) ASCII codes (21H to 7FH) are output to the printer. (printer test function)	Section 17.5 Section 17.6

POINT

When using the following printer functions to send messages to the printer, refer to the corresponding sections:

(1) Transmission control function

This function enables the computer link module to control data communications with the external device with a DC code or DTR/DSR signal.

Refer to Section 3.3 and 9.

(2) Half-duplex transmission

This function function enables the computer link module to prevent itself and the external device with RS and CD signals from transmitting data simultaneously to each other during data communications between them through the RS-232C interface.

Refer to Sections 3.4 and 10.

15. SPECIFICATIONS

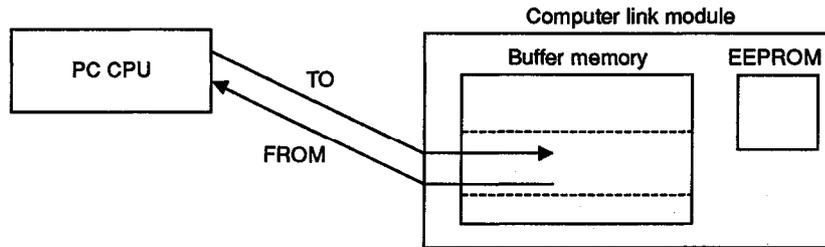
Function	Printer function								
Applicable module	A1S1UC24	A1S1J1UC24			A1S1J1C24		A1S1CPU C24-Pz	A2CCPU C24	A2CCPU C24-PRF
Remarks		-R2	-R4	-PRF	-R2	-R4	-PRF	O	O

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15.1.2 Free message and fixed message

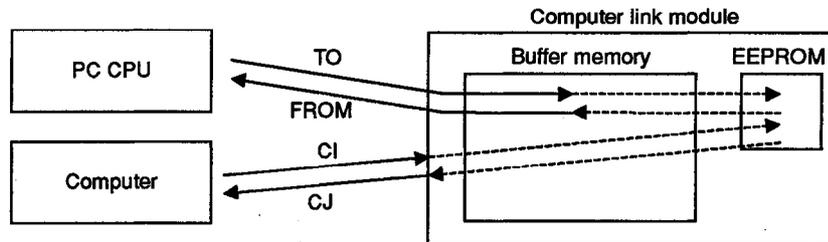
(1) Free message

- It is a message to be sent to the printer and registered in the computer link module buffer memory. Up to 31 free messages can be registered.
- To register free messages, designate addresses in the buffer memory with a TO instruction from the PC CPU. To read them, use a FROM signal.
- In the following output example using the printer functions, character strings of "O.K" and "Fault" are sent to the printer as free messages.



(2) Fixed message

- It is a message to be sent to the printer and registered in the computer link module EEPROM. Up to 400 fixed messages can be registered.
- To register fixed messages, designate messages number with a TO instruction from the PC CPU. To read them, use a FROM instruction. They can also be registered by designating message numbers with a CI command for dedicated protocols from the computer, or can be read with a CJ command.
- In the following output example using the printer functions, table frames, "Model", "Check Result" and character strings of model names ("A3UCPU", "A4UCPU") are registered as fixed messages and sent to the printer.



(3) Output example of table by the printer functions

- (a) Register table frames, "Model", "Check Result" and model names as fixed messages.

Model	Check Result
A3UCPU	
A4UCPU	

- (b) Register check results "O.K" and "Fault" as free messages.

- (c) The above fixed and free messages can create such a table as shown below:

Model	Check Result
A3UCPU	O.K
A4UCPU	Fault

Function	Printer function									
	A1S/J1UC24			A1S/J1C24			A1SCPU	A2CCPU	A2CCPU	A2CCPU
Applicable module	A171UC24	-R2	-R4	-PRF	-R2	-R4	-PRF	C24-R2	C24	C24-PRF
Remarks				RS-232C only			RS-232C only			

15. SPECIFICATIONS

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15.1.3 List of commands for registering or reading messages from the computer (for dedicated protocols)

This section describes the ACPU common commands for registering or reading messages, which will be sent to the printer by the printer functions, from the computer using one of dedicated protocols 1 to 4.

Table 15.2 List of Functions Available with Dedicated Protocols

Item	Command		Processing Contents	Number of Points Processed per Communication	Status of PC CPU		
	Symbol	ASCII Code			During Stop	During RUN	
						Write Enabled	Write Disabled
Message Registration	CI	43H, 49H	Registration of fixed message data (for up to 80 characters)	40 words	○	○	○
Message Read	CJ	43H, 4AH	Read of fixed message data	40 words	○	○	○

POINTS

- (1) When the computer is connected to the RS-422 interface of the A2CCPUC24-PRF, using a dedicated protocol for the computer link function makes it possible to register or read the above messages from the computer and to gain access to the PC CPUs shown in the User's Manual (Computer Link Function).
- (2) This section describes only the commands for the printer functions. For commands for the computer linking dedicated protocols and their applications, refer to the User's Manual (Computer Link Function).

15.2 RS-232C Interface Specifications

For the specifications of the computer link module RS-232C interface (including the connector and RS-232C cable specifications) to which a printer will be connected, refer to Section 3.7 of the User's Manual (Computer Link Function).

REMARK

The RS-232C connectors of all the computer link modules with the printer functions (A1S/J1UC24-PRF, A1S/J1C24-PRF, A2CCPUC24-PRF) described herein are a 9-pin type.

15.3 RS-422 Interface Specifications

For the specifications of the RS-422/RS-485 interface (terminal block specifications, RS-422 cable specifications) of the computer link module (A2CCPUC24-PRF) for computer linking using the printer functions and a dedicated protocol, refer to Section 3.8 of the User's Manual (Computer Link Function).

15. SPECIFICATIONS

Function	Printer function					
	A1SJ71UC24		A1SJ71C24		A1SJ71C24	
Applicable module	-R2	-R4	-PRF	-R2	-R4	-PRF
Remarks			O			O

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15.4 List of I/O Signals to the PC CPU

The computer link module I/O signals for the printer functions to be sent to or received from the PC CPU are as shown below.

The number (n) in the X and Y signal names depends on the I/O number of the slot in which the A1SJ71UC24-PRF or A1SJ71C24-PRF is loaded. (Example: When the computer link module is loaded in slot 0 in the main base unit Xn0 → X0)

The A2CCPUC24-PRF I/O signals for computer linking are fixed as X/Y1E0 to 1FF.

(1) Input signals (Computer link module → PC CPU)

Input signals are turned ON and OFF by the computer link module.

Table 15.3 Input Signals List

Input Signal	Signal Name	Description	Reference Sections
Xn7	Computer link module READY signal	(1) Goes ON when the computer link module is ready (after the power is turned ON, the PC CPU is reset, or the mode is switched). Turns ON when the computer link module becomes READY after the PC CPU is reset after (a) power to the PC CPU was turned ON, or (b) the mode was switched. (Turns ON a few seconds after the power is turned ON.) Turns OFF when an error (which discontinues the computer link module's operation) occurs. (2) Used as a communication READY signal when printer function is used.	—
Xn8	Printer processing completed	Turns ON when the message registration, read, or output to the printer is completed after Y(n+1)8 is turned ON. Turns OFF when Y(n+1)8 is turned OFF.	17.4 to 17.7
XnD	Watch dog timer error	Turns ON when a computer link watch dog timer error occurs or when the mode setting switch is improperly set. Remains OFF during normal operation.	—

(2) Output signals (PC CPU → Computer link module)

Output signals are turned ON and OFF by the sequence program.

Table 15.4 Output Signals List

Output Signal	Signal Name	Description	Reference Sections
Y(n+1)8	Printer processing request	Starts message registration, read, or output to the printer by turning ON this signal. With the Xn8 (printer processing completed) turned ON, the Y(n+1)8 turns OFF.	17.4 to 17.7
Y(n+1)C	Printer processing interrupt	Interrupts output to the printer by turning ON this signal. output to the printer by turning OFF this signal.	—

POINTS

(1) When a computer is connected to the computer link module used, using a dedicated protocol for the computer link function makes it possible to register or read messages for the printer function from the computer and to gain access to the PC CPUs shown in the User's Manual (Computer Link Function).

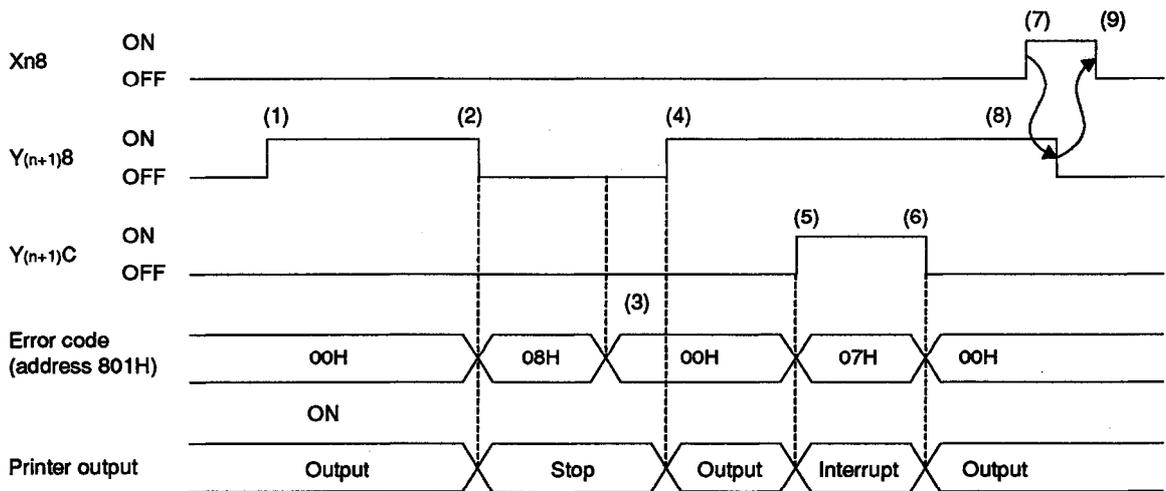
This section describes only the I/O signals for the printer functions. For I/O signals for computer linking and their applications, refer to the Computer Link Function section.

(2) In this manual, I/O signal numbers for the printer function are those used for A1S71UC24-PRF and A1SJ71C24-PRF unless otherwise specified. If you use A2CCPUC24-PRF, the numbers should be regarded as indicated below.

	(Nos. in manual)	(To be regarded as)
Input signals	Xn7, Xn8, XnD	→ X1E7, X1E8, X1ED
Output signals	Y(n+1)8, Y(n+1)C	→ Y1F8, Y1FC

REMARK

Use of Xn8, Y(n+1)8, and Y(n+1)C when printer function is used.



• Operation contents

- (1) When Y(n+1)8 is turned ON, the message output to the printer is started.
- (2) When Y(n+1)8 is turned OFF, the message output to the printer is forcibly completed. At this time, an error(08H) occurs.
- (3) 00H is written to buffer address 801H and an error is reset.
- (4) When Y(n+1)8 is turned ON, the message output to the printer is started.
- (5) When Y(n+1)C is turned ON, the message output to the printer is interrupted. At this time, an error(07H) occurs.
- (6) When Y(n+1)C is turned OFF, the interrupted messages are output to the printer. At this time, an error is automatically reset to 00H.
- (7) When the message output is completed, Xn8 is turned ON.
- (8) Y(n+1)8 is turned OFF by a sequence program.
- (9) When Y(n+1)8 is turned OFF, Xn8 is turned OFF.

15.5 Buffer Memory Applications and Allocation

The term "buffer memory" used in this manual refers to a memory area of an a computer link module used to store the control and communications data which is transmitted between an external device (e.g., a computer or a printer) and a PC CPU.

The buffer memory can be accessed from the sequence program by using the FROM/TO instruction.

The buffer memory can be accessed from a computer by using the buffer memory read/write command (CR, CW) with dedicated protocols 1 to 4 and the message registration/read commands (CI, CJ) for the printer functions.

(1) Buffer memory applications

There are two types of buffer memory area. One area may be used freely by the user, but the other area has a special application.

(a) User area (Address 0H to FFH, 120H to 7FFH)

It is used for the computer link function.

(b) Specific use area (Address 100H to 11FH, 800H to DFFH) when printer function is used

The applications of this memory area are fixed. They are used to determine the data communications format and to change the allocation of the memory area for section (a) above.

The areas at buffer memory addresses 800H to DFFH are specific use areas exclusively for the printer functions.

When the power is turned ON or the PC CPU is reset, default values are written to this special applications area.

Default values can be changed to suit the purposes and applications of data transmission and the specifications of the external device.

For areas among the specific use areas at addresses 100H to 11FH, which allow data to be read or written even when a dedicated protocol for the computer link function or the printer functions are used, refer to Section 3.10 of the User's Manual (Computer Link Function) and the reference sections mentioned in the table of the buffer memory addresses.

(2) Buffer memory allocation

The buffer memory consists of 16-bit addresses. The buffer memory has no back-up battery.

The buffer memory address names and values for each address are listed in the following table.

IMPORTANT

Among buffer memory addresses 100H to 11FH and 800H to DFFH, those with a note of "system area (unavailable)" are used by the system. The user should not write data to the areas. Data written to this area will prevent correct operation of the computer link module.

15. SPECIFICATIONS

Function	Printer function								
	A1S/J71UC24		A1S/J71UC24		A1S/J71C24		A1SCPU	A2CCPU	A2CCPU
Applicable module	-R2	-R4	-PRF	-R2	-R4	-PRF	C24-R2	C24	C24-PRF
Remarks			0			0			0

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The following table shows the contents of the buffer memory allocation

Table 15.5 Buffer Memory

Addresses	Buffer Memory Address Names		Default Values	Related Mode		
				Dedicated Protocol	Printer function	(Reference Sections)
0H	User area (256 words)	No-protocol send data length storage area	0	○	—	5.9 5.14
1H to 7FH		No-protocol send buffer memory area (Send data storage area)				
80H		No-protocol received data length storage area.				
81H to FFH		No-protocol receive buffer memory area (Received data storage area)				
100H	Area to specify receive completed code in no-protocol mode		0D0AH (CR, LF)	—	—	
101H	Error LED display OFF state storage area		0	△	△	8.1
102H	Error LED turn OFF request area		0	●	●	
103H●	Area to specify word or byte units in no-protocol mode		0 (words)	●	—	5.2.1(2)(a)
104H	Area to specify head address of send buffer memory for protocol mode		0	—	—	
105H	Area to specify send buffer size for no-protocol mode		80H			
106H	Area to specify head address of receive buffer memory for no-protocol mode		80H			
107H	Area to specify receive buffer size for no-protocol mode		80H			
108H	Area to specify receive completion 1 on data length in no-protocol mode		127 (words)			
109H	Area to specify head address of on-demand buffer memory		0	●	—	5.14
10AH	Area to specify on-demand buffer size		0	●	—	
10BH●	Area to specify RS-232C CD terminal check		—	●	●	5.2.1(2)(b) 17.2.1(2)(a)
10CH	Storage area for on-demand errors		0	△	—	5.14
10DH	Receive data clear request area for no-protocol mode		0	—	—	
10EH	System area (unavailable)		—	—	—	
10FH●	RS-232C communications mode setting area		0 (Full-duplex transmission)	●	●	10.4
110H●	Simultaneous send priority/non-priority setting area		0 (Priority)	●	●	
111H●	Send method setting area when transmission is resumed		0 (No retransmission)	●	●	
112H	Bidirectional mode setting area		0 (No-protocol mode)	—	—	
113H	Time-out check time setting area		0 (Infinite)			
114H	Simultaneous transmission data valid/invalid setting area		0 (Data valid)			
115H	Check sum enable/disable setting area		0 (Check sum enabled)			
116H	Data send error storage area		0			
117H	Data receive error storage area		0			

Table 15.5 Buffer Memory (Continued)

Addresses	Buffer Memory Address Names	Default Values	Related Mode		
			Dedicated Protocol	Printer function	(Reference Sections)
118H	Operation mode storage area	Set number of switch	Δ	Δ	8.3.3
119H	Mode switching specification area	0 (No switching)	○	○	12.4 12.5
11AH●	Transmission control specification area (DTR/DSR control, DC code control)	0 (DTR/DSR control)	●	●	9.3
11BH●	DC1/DC3 control code specification area	1311H	●	●	
11CH●	DC2/DC4 control code specification area	1412H	●	●	
11DH	RS-232C signal state storage area	—	Δ	Δ	8.2
11EH	Mode setting switch/Station number setting switch positions storage area	—	Δ	Δ	8.3.1
11FH	Transmission specification setting switch positions storage area	—	Δ	Δ	8.3.2
120H to 7FFH	User free area (1760 words)	0	○	—	5.9 5.14
800H to DF6H	Specific use area for printer function For details of allocation, refer to the following page.	(Shown on the following page)			
DF7H to DFFH	System area (Unavailable)	—	—	—	

The ●, ○, Δ and — symbols in the table indicate the following:

- : PC CPUs can read/write data from/to this area, and computers can read data from this area.
- : PC CPUs and computers can read/write from/to this area.
- Δ : PC CPUs and computers can only read from this area.
- : PC CPUs and computers do not need to read/write from/to this area.

IMPORTANT

Change the default values marked by the dot symbol (●) attached to the right of the address only when the READY signal of the computer link module is turned ON.

Table 15.6 List of Buffer Memory Specific Use Areas for Printer Functions

Addresses	Buffer Memory Address Names		Default Values	Related Mode			
				Dedicated Protocol	Printer Function	(Reference Sections)	
800H	Printer function designation area		0	—	●	17.2.1(2)(b) 17.4 to 17.7	
801H	Printer function error storage area			—	●	17.2.1(2)(c) 17.4 to 17.7	
802H	Output status storage area			—	Δ	17.2.1(2)(d)	
803H to 81FH	System area (Unusable)		—	—	—	—	
820H	Schedule area	CR/LF output designation area	0	—	●	17.2.1(2)(e) 17.2.4(4)	
821H		Output pointer designation area					
822H		Output quantity designation area					
823H		1st					
824H to 887H	Output number designation area	2nd to 100th					
888H to 89FH	System area (Unusable)		—	—	—	—	
8A0H	Fixed message access area	Message data length designation area	0	—	●	17.2.1(2)(f) 17.2.4(4) 17.3 17.4.1 17.4.2	
8A1H		Message number designation area					
8A2H to 8C9H		Fixed message registration data storage area					
8CAH to 8FFH	System area (Unusable)		—	—	—	—	
900H	Free message registration area *1	Message data length designation area	0	—	●	17.2.1(2)(g) 17.2.4(4) 17.4.3 17.4.4	
to		Free message area					Registration No. 1
		to					
DF6H		Message data length designation area					Registration No. 31
	Free message area						

*1 The following table shows registration numbers and their corresponding addresses in registering free messages from the PC CPU.

$$\text{Address} = (\text{Registration number (n)} - 1) \times 29\text{H} + 900\text{H} \quad n=1 \text{ to } 3+$$

Registration No.	Message Data Length Designation Area	Free Message Area
1	900H	901H to 928H
2	929H	92AH to 951H
3	952H	953H to 97AH
4	97BH	97CH to 9A3H
5	9A4H	9A5H to 9CCH
6	9CDH	9CEH to 9F5H
7	9F6H	9F7F to A1EH
8	A1FH	A20H to A47H
9	A48H	A49H to A70H
10	A71H	A72H to A99H
11	A9AH	A9BH to AC2H
12	AC3H	AC4H to AEBH
13	AECH	AEDH to B14H
14	B15H	B16H to B3DH
15	B3EH	B3FH to B66H
16	B67H	B68H to B8FH
17	B90H	B91H to BB8H
18	BB9H	BBAH to BE1H
19	BE2H	BE3H to C0AH
20	C0BH	C0CH to C33H
21	C34H	C35H to C5CH
22	C5DH	C5EH to C85H
23	C86H	C87H to CAEH
24	CAFH	CB0H to CD7H
25	CD8H	CD9H to D00H
26	D01H	D02H to D29H
27	D2AH	D2BH to D52H
28	D53H	D54H to D7BH
29	D7CH	D7DH to DA4H
30	DA5H	DA6H to DCDH
31	DCEH	DCFH to DF6H

POINT

When a computer is connected to the computer link module used, using a dedicated protocol for the computer link function makes it possible to register or read messages for the printer functions from the computer and to gain access to the PC CPUs shown in the User's Manual (Computer Link Function).

This section describes only the buffer memory addresses exclusively for the printer functions. For buffer memory addresses for the computer link function and their applications, refer to the reference sections mentioned in the table of the buffer memory addresses.

16. SETTINGS AND PROCEDURES BEFORE OPERATION

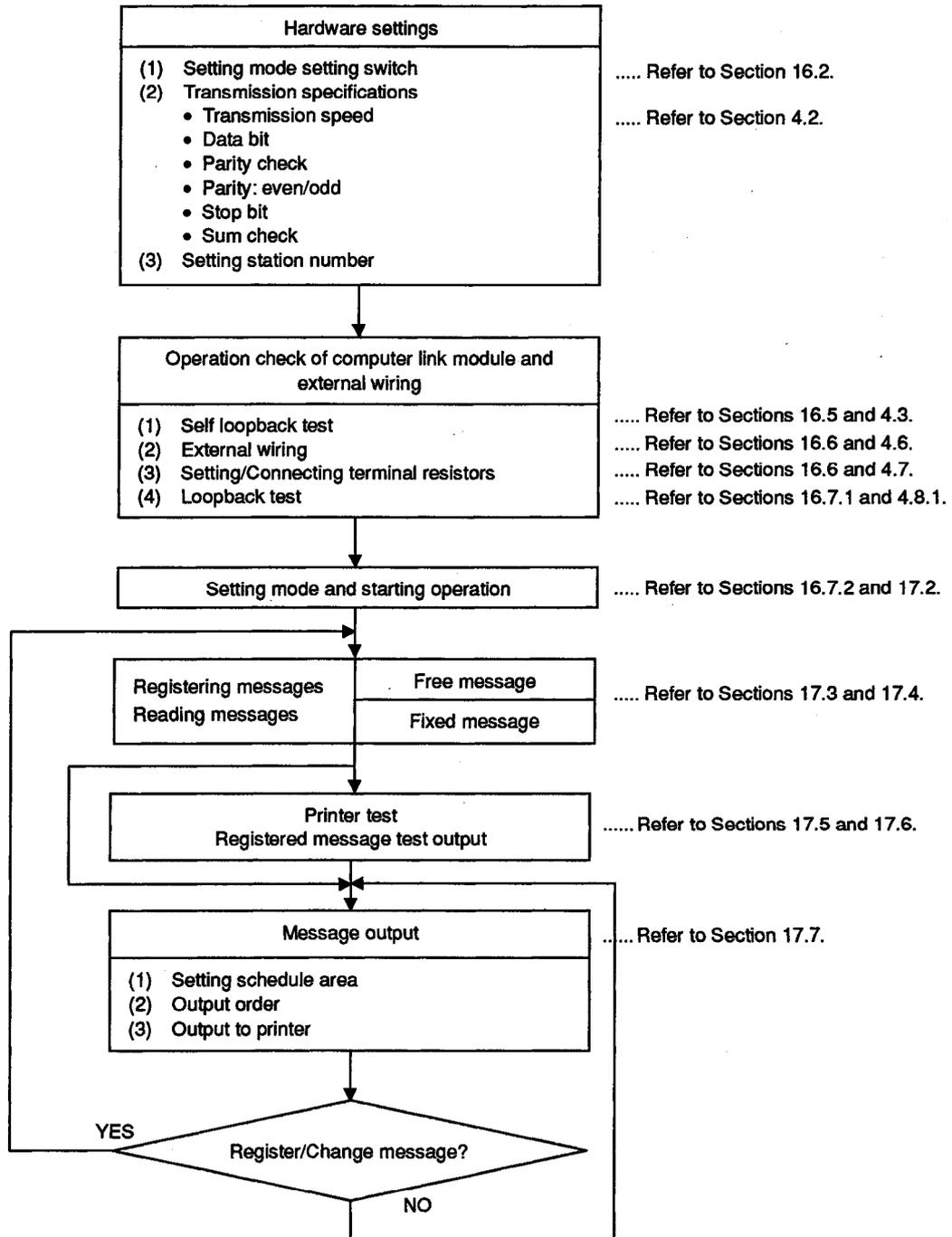
Function	Printer function						
	A1S/J1UC24		A1S/J1C24		A1SCPU C24-R2	A2CCPU C24	A2CCPU C24-PBF
Applicable module	-R2	-R4	-PRF	-R2	-R4	-PRF	0
Remarks			0			0	0

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16. SETTING AND PROCEDURES BEFORE OPERATION

16.1 Outline of Procedure Before Operation

This section outlines the procedure, from making settings to starting up the computer link module, to use the printer function.



16. SETTINGS AND PROCEDURES BEFORE OPERATION

Function	Printer function									
	A1S/J1UC24			A1S/J1C24						
Applicable module	A171UC24	-R2	-R4	-PRF	-R2	-R4	-PRF	A1SCPU C24-R2	A2CCPU C24	A2CCPU C24-PRF
Remarks			0				0			0

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16.2 Switch Setting

This section describes the settings of the switches on the computer link module necessary for the printer functions.

Set the transmission specifications according to the specifications of the printer used.

POINTS
(1) After changing the switch settings described in this section, turn ON then OFF the power to the PC CPU, or reset the PC CPU.
(2) The positions and shapes of the switches described in this section are different depending on the computer link module. Check the positions and shapes with Sections 4.1.2 and 4.2 of the User's Manual (Computer Link Function), and set the switches.

	Setting Switch	Setting Position			Reference Section		
		A1SJ71 UC24-PRF	A1SJ71 C24-PRF	A2CCPU C24-PRF			
(1)	Mode setting switch	5		5 to 8 *2	4.2.1		
(2)	Transmission specification setting	A1SJ71-UC24 PRF	A1SJ71 C24-PRF	A2CCPU C24-PRF	4.2.2		
	Transmission speed setting	SW05 to SW07		SW11 to SW13			
	Data bit setting	SW08		SW14			
	Parity bit setting	SW09		SW15			
	Even/Odd parity setting	SW10		SW16			
	Stop bit setting	SW11		SW17			
	Sum check setting	SW12		SW18		OFF	OFF *2
	Main channel setting	-		SW19		-	OFF
Write during RUN enabled/disabled setting	SW04		SW20	OFF	OFF *2		
(3)	Setting of terminal resistor setting pins	-		C *3			
(4)	Setting of station number setting switches	-		00 *2	4.2.3		

- : setting switch unequipped

*1 Set the switches according to the specifications of the printer.

*2 When a computer, which executes data communications using a dedicated protocol for the computer link function, is connected to the RS-422 interface, set the switches according to the specifications and set number of it.

*3 Set the pins to A or B if the computer link module is a terminal station when a computer is connected to the RS-422 interface. (Refer to Sections 4.2.2 and 4.7)

POINT
Set the mode setting switch to one of the numbers specified above. If not, error 09H will occur when the PC CPU turns ON the printer processing request signal (X _{(n+1)8}) and the request is executed. (The printer processing completed signal (X _{n8}) will not turn ON.) In case of error 09H, reset the mode setting switch to the proper number and start up the computer link module again.

16. SETTINGS AND PROCEDURES BEFORE OPERATION

Function	Printer function									
	AJ71UC24	A1SJ71UC24			A1SJ71C24			A1SCPU C24-R2	A2CCPU C24	A2CCPU C24-PRF
Applicable module		-R2	-R4	-PRF	-R2	-R4	-PRF	0		
Remarks				0			0			0

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16.3 Description of the Indicator LEDs

(Indicator LEDs on the A1SJ71UC24-PRF and A1SJ71C24-PRF)

(For description) (For description)

LED NO.		LED NO.
0	RUN <input type="checkbox"/>	4
1	SD <input type="checkbox"/>	ACK <input type="checkbox"/>
2	RD <input type="checkbox"/>	NAK <input type="checkbox"/>
25	CPU <input type="checkbox"/>	C/N <input type="checkbox"/>
33	PRT <input type="checkbox"/>	P/S <input type="checkbox"/>
	<input type="checkbox"/>	PRO <input type="checkbox"/>
	<input type="checkbox"/>	SIO <input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>

(Indicator LEDs on the A2CCPU-PRF)

LED NO.		LED NO.
0	L.RUN <input type="checkbox"/>	37
1	SD <input type="checkbox"/>	38
2	RD <input type="checkbox"/>	39
4	NEU <input type="checkbox"/>	16
	ACK <input type="checkbox"/>	17
	NAK <input type="checkbox"/>	19
	SD <input type="checkbox"/>	
	RD <input type="checkbox"/>	
25	CPU R/W <input type="checkbox"/>	
29	B0 <input type="checkbox"/>	
30	B1 <input type="checkbox"/>	
31	B2 <input type="checkbox"/>	

The LED numbers shown above are just for description. The actual modules do not bear such numbers. The LED numbers correspond to the numbers in Section 4.3. The LEDs without a number are those which are not used or necessary for the printer functions.

LED NO.	LED Name *1		Indication of LED	LED ON (Comes On/Flickers)	LED OFF (Goes Off)	Initial Status of LED
0	RUN	L.RUN	Normal run	Normal	Error	ON
1	SD		Data transmission status at RS-232C	Flickers during transmission of data		OFF
2	RD		Data receive status at RS-232C	Flickers during receipt of data		OFF
4	NEU		Dedicated protocol status	Improper setting of the mode setting switch	Normal	OFF
16	C/N		Result of communications between RS-232C and PC CPU	Refer to (4)	Normal	OFF
17	P/S		Parity/sum check error at RS-232C	Parity/Sum check error	Normal	OFF
19	SIO		SIO error at RS-232C	Overrun, framing error	Normal	OFF
25	CPUR/W	CPU	Status of communications with programmable controller CPU	Flickers during communications with programmable controller CPU (ON at no communications)		ON
			Transmission speed (BPS)	300 600 1200 2400 4800 9600 19200		*2
29	B0		Transmission speed setting	OFF ON OFF ON OFF ON OFF		
30	B1			OFF OFF ON ON OFF OFF ON		
31	B2			OFF OFF OFF OFF ON ON ON		
33	PRT		Printer message output	Comes ON when a printer message is output		OFF
37	POWER		Normal power supply	Normal	Error	ON
38	RUN		PC CPU run	ON: The sequence program is executed with the RUN key switch set in the RUN position. (The LED remains ON in case of error that the sequence program continues to be executed.) OFF: (1) The power is not turned on. (2) The RUN key switch is set in the STOP position. (3) A remote stop is set. (4) A remote pause is set. Flickers: (1) An error of suspending the execution of the sequence program was detected in a self-diagnosis. (2) A latch is cleared.		OFF

16. SETTINGS AND PROCEDURES BEFORE OPERATION

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LED NO.	LED Name		Indication of LED	LED ON (Comes On/Flickers)	LED OFF (Goes Off)	Initial Status of LED
39	ERROR		PC CPU error	Error detection status in a self-diagnosis. ON: An error was detected in a self-diagnosis. (It remains OFF in case of error for which "OFF" is selected in setting the LED indication priority.) OFF: Normal Flickers: The annunciator (F) is turned ON by the sequence program.		OFF

*1 The LEDs, which have two names in the LED column of the above table, are represented by the left names in this manual. (LED No. 0 with the names RUN and L.RUN, for example, is called RUN.)

*2 The LEDs come ON or go OFF according to the transmission speed setting of the transmission specification setting and main channel setting switches.

- (1) LEDs C/N to SIO (LED Nos.16 to 19) light when an error occurs.

The ON/OFF status of the LED Nos. 16 to 19 are stored in the buffer memory at address 101H. The status can be read using the PC CPU instruction which permits checking by a sequence program.

(Section 13 gives details about processing when an error is indicated.)

- (2) After any LED C/N to SIO (LED Nos. 16 to 19) is ON, they remain ON even when the cause of the error is eliminated.

It is necessary to send a turn-off request to address 102H of the buffer memory using the sequence program TO instruction to turn OFF the LED.

(Refer to Section 8.1)

- (3) LEDs RUN to NEU (LED Nos. 0 to 4), CPU R/W (LED No.25) and PRT (LED No. 33) light corresponding to the relevant status.

- (4) LEDs C/N (LED No. 16) light in the following circumstances:

(a) When the computer link module attempts to make an illegal access while the PC CPU is running (a write during program execution, for example).

(b) During abnormal PC CPU access.

- (5) The LED initial state means the state when the computer link module READY signal (Xn7) is ON after the power is turned, the PC CPU is reset or the mode is switched.

16. SETTINGS AND PROCEDURES BEFORE OPERATION

Function	Printer function						A1SCPU C24-R2	A2CCPU C24	A2CCPU C24-PRF
	A1SJ71UC24			A1SJ71C24					
Applicable module	AJ71UC24	-R2	-R4	-PRF	-R2	-R4	-PRF		
Remarks			O			O			O

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16.4 Loading and Installation

For general precautions for handling computer link modules, from unpacking to installation, and the desirable installation environment, refer to Section 4.4 of the User's Manual (Computer Link Function).

For details of the loading and installation of the computer module to be used, refer to its User's Manual.

16.5 Self-Loopback Test

The self-loopback test function is used to check the computer link module with no external device connected to see if its functions for data communications with an external device or PC CPU works properly.

For details of the self-loopback test procedure, functions to be checked and checking results, refer to Section 4.5 of the User's Manual (Computer Link Function).

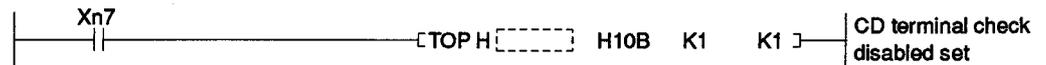
16.6 Connecting External Devices to the Computer Link Module

Precautions for connecting a printer to the RS-232C interface of the computer link module and their connections are described in Section 4.6 of the User's Manual (Computer Link Function).

Connect the printer cable according to either of the following sections, depending on whether the printer can turn ON and OFF the computer link module CD signal.

- (1) For a printer which can turn ON and OFF the CD signal
 Refer to Section 4.6.2 (2) (a).
- (2) For a printer which cannot turn ON and OFF the CD signal
 Refer to Section 4.6.2 (2) (b).

To connect a printer incapable of turning ON and OFF the computer link module CD signal, write the following sequence program (for details, refer to Section 17.2.1 (2) (a)):



REMARKS

- (1) The RS-232C connectors of all the computer link modules with the printer functions (A1SJ71UC24-PRF, A1SJ71C24-PRF, A2CCPUC24-PRF) described herein are a 9-pin type.
- (2) The specifications of the computer link module RS-232C interface (including the connector and RS-232C cable specifications) to which a printer will be connected are shown in Section 3.7 of the User's Manual (Computer Link Function).
- (3) For the connection of a computer for computer linking with a dedicated protocol to the A2CCPUC24-PRF to use the printer functions, refer to Section 4.6.3. The specifications of the RS-422/485 interface (including the terminal block and RS-422 cable specifications) are shown in Section 3.8 of the User's Manual (Computer Link Function).

16. SETTINGS AND PROCEDURES BEFORE OPERATION

Function	Printer function									
	A1SJ71UC24			A1SJ71C24						
Applicable module	AJ71UC24	-R2	-R4	-PRF	-R2	-R4	-PRF	A1SCPU C24-R2	A2CCPU C24	A2CCPU C24-PRF
Remarks			O			O				O

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16.7 Setting the Operation Mode and Starting Operation

After the computer link module proves normal and an external device is connected to it, the printer functions become available.

Sections 16.2 through 16.6 describe the flow of steps, from the completion of each operation to the execution of the printer functions.

16.7.1 Loopback test

The loopback test function is to check the connection between the computer and the computer link module as well as the communications functions by the use of dedicated protocols 1 to 4 and a dedicated command (TT).

Before reading or writing fixed or free messages for the printer functions from or to the computer, conduct a loopback test described in Section 4.8.1, if necessary.

16.7.2 Setting the mode

After connecting a printer or computer to the computer link module and checking the communications functions, set (or switch) a mode so that the RS-232C interface of the computer link module will be put in the no-protocol mode.

The available modes and their mode numbers are as shown in the table below. Any mode can be set by the mode setting switch or by the mode switching function. For details of the mode setting switch, refer to Section 4.2.1. After setting a mode, reset the power to the PC CPU or the PC CPU itself, and start up the computer link module again.

To set a mode by the mode switching function, follow Section 12, and start up the computer link module again

Mode Setting Switch Number	Mode Settings		A1SJ71 UC24-PRF	A1SJ71 C24-PRF	A2CCPU C24-PRF
	RS-232C	RS-422			
0	Unusable		-	-	-
1	Protcol 1	No-protocol	-	-	-
2	Protcol 2	No-protocol	-	-	-
3	Protcol 3	No-protocol	-	-	-
4	Protcol 4	No-protocol	-	-	-
5	No-protocol	Protcol 1	O	O	O
6	No-protocol	Protcol 2	-	-	O
7	No-protocol	Protcol 3	-	-	O
8	No-protocol	Protcol 4	-	-	O
9	No-protocol	No-protocol	-	-	-
A	Protcol 1 ← → Protcol 1		-	-	-
B	Protcol 2 ← → Protcol 2		-	-	-
C	Protcol 3 ← → Protcol 3		-	-	-
D	Protcol 4 ← → Protcol 4		-	-	-
E	Unusable		-	-	-
F	For loop-back test of single module				

O: Can be set -: Cannot be set

16. SETTINGS AND PROCEDURES BEFORE OPERATION

Function	Printer function									
	A1S/J1UC24			A1S/J1C24			A1SCPU	A2CCPU	A2CCPU	
Applicable module	A171UC24	.R2	.R4	.PRF	.R2	.R4	.PRF	C24-R2	C24	C24-PRF
Remarks				Q			Q			Q

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16.7.3 Writing values to buffer memory specific use areas and starting operation

When mode setting and restart-up of the computer link module are completed, the printer functions can be used.

Execute the printer functions according to Section 17.

Regarding the buffer memory specific use areas of the which set values must be changed (written) when the computer link module READY signal (Xn7) is ON (the areas indicated by • in Sections 3.10 and 15.5), follow the procedures described in the sections listed below:

- (1) When a computer for computer linking with a dedicated protocol is also connected.....Section 5.2.1
- (2) When only a printer is connectedSection 17.2.1

16.8 Maintenance and Inspection

There is no special need to inspect the computer link module alone, however, to keep the whole system in the optimum condition, inspect it for the points specified in the PC CPU User's Manual.

17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

Function	Printer function								
	A1S/J1UC24		A1S/J7UC24		A1S/JTC24		A1SCPU C24-R2	A2CCPU C24	A2CCPU C24-PRF
Applicable module	-R2	-R2	-PRF	-R2	-R2	-PRF			0
Remarks			0			0			0

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17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

This section describes the message output method using the printer functions.

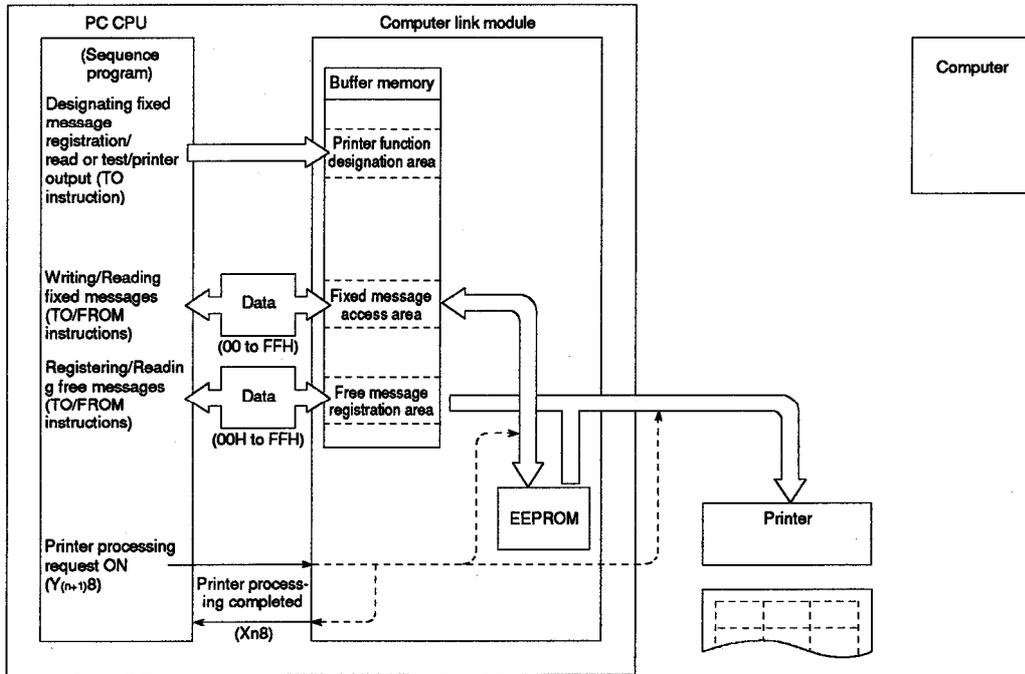
17.1 Flow of Data When the Printer Functions are Used

The following diagrams show the flow of data when registering or writing messages from the PC CPU or computer and when sending messages from the PC CPU to the printer.

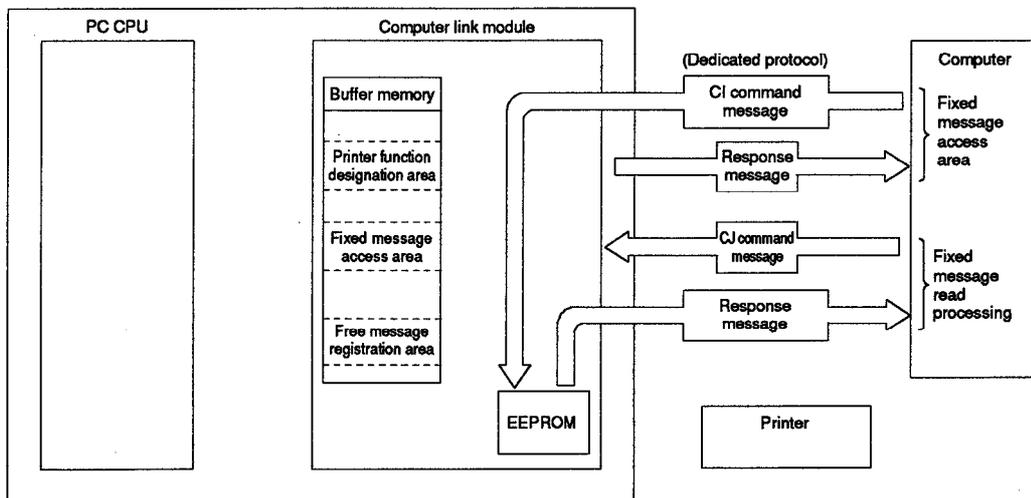
The computer link module registers messages designated by the PC CPU or computer as they are.

The computer link also sends out registered messages to the printer in the order in which they are designated.

(1) When registering/reading/sending messages to the printer or testing the printer from the PC CPU



(2) When registering/reading messages from the computer



17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

Function	Printer function						A1SCPU C24-R2	A2CCPU C24	A3CCPU C24-P1F
	AJ71UC24	A1S71UC24 -R2	A1S71UC24 -R4	A1S71UC24 -P1F	A1S71UC24 -R2	A1S71UC24 -R4			
Remarks				0		0			0

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17.2 Precautions Before Programming

This Section gives the precautions to take before starting the programming to use a printer function.

17.2.1 Reading/Writing data from/to buffer memory specific use areas

To use the printer functions, a sequence program and a computer program for reading or writing data from or to the buffer memory are required. (A list of the buffer memory addresses is shown in Sections 3.10 and 15.5.)

Before carrying out the following operations, read or write data from or to the buffer memory, if necessary.

Every time the computer link module is turned ON, the default values are stored in the buffer memory specific use areas.

	Reading and Writing Operations that Need Sequence and Computer Programs	Reference Section
(1)	To change the default value set to the buffer memory specific use area of the computer link module to communicate data with the computer using a dedicated protocol	Section 5.2.1 (2)
(2)	To register a fixed message from the computer	Section 17.3.2
(3)	To read a fixed message out to the computer	Section 17.3.3
(4)	To register a fixed message from the PC CPU	Section 17.4.1
(5)	To read a fixed message out to the PC CPU	Section 17.4.2
(6)	To register a free message from the PC CPU	Section 17.4.3
(7)	To read a free message out to the PC CPU	Section 17.4.4
(8)	To conduct a printer test from the PC CPU	Section 17.5
(9)	To test registered message output from the PC CPU	Section 17.6
(10)	To send a registered message from the PC CPU to the printer	Section 17.7
(11)	To read the LED ON/OFF statuses of the computer link module or turn OFF LEDs during computer linking	Section 8
(12)	To read the module/signal status during computer linking	Section 8
(13)	To execute the transmission control with the external device using the DC code	Section 9
(14)	To execute half-duplex transmission on the RS-232C interface of the computer link module	Section 10

(1) Precautions on reading/writing the buffer memory specific use areas

(a) The buffer is not backed up by a battery.

All data in buffer memory is reset to the default values when power is turned ON, when the PC CPU is reset, or when the mode is switched. Data changed from the default values must be written whenever any of these events takes place.

(b) Data can be written to the specific use area (100H to 11FH, 800H to DFFH) excluding the mode switching area only by using a TO instruction in a sequence program.

(c) Once the printer functions are used, the areas at buffer memory addresses 800H to DFFH become specific use areas exclusively for the functions. (They are user free areas when the computer link module is first turned ON.)

17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

(d) For reading or writing fixed messages from or to the computer with a dedicated protocol or for reading or writing data from or to the PC CPU, refer to Section 5.2.1 of the User's Manual (Compute Link Function).

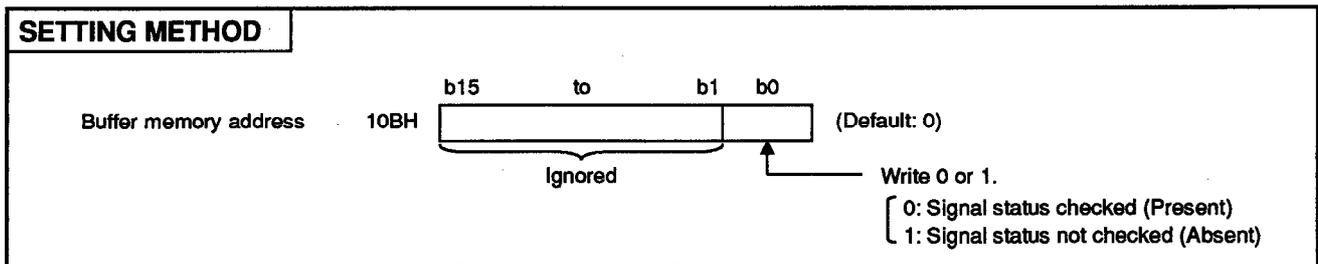
(2) Reading or writing data from or to the buffer memory specific use areas

For reading or writing data from or to the buffer memory specific use areas in the computer link module in order to utilize the printer functions, proper sequence programs must be written according to the following.

Examples of programs for reading or writing data from or to the buffer memory specific use areas for the printer functions are shown in the sections from 17.4.

(a) RS-232C CD terminal check setting area (address: 10BH)

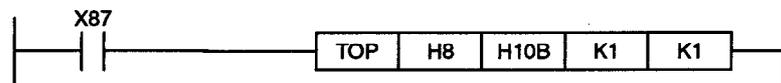
- When an external device is connected to the RS-232C interface of the computer link module, the setting described in Section 4.6.2 must be made.
- When the computer link module is first turned ON, CD terminal check enables is set.
- To select CD terminal check disabled, write "1" to the address after the computer link module is turned ON.



The following is an example of a program for changing the default value of the RS-232C CD terminal check setting area.

If necessary, write it to the sequence program.

In this examples, the computer link module I/O signals viewed from the PC CPU are 80H to 9FH.



REMARK

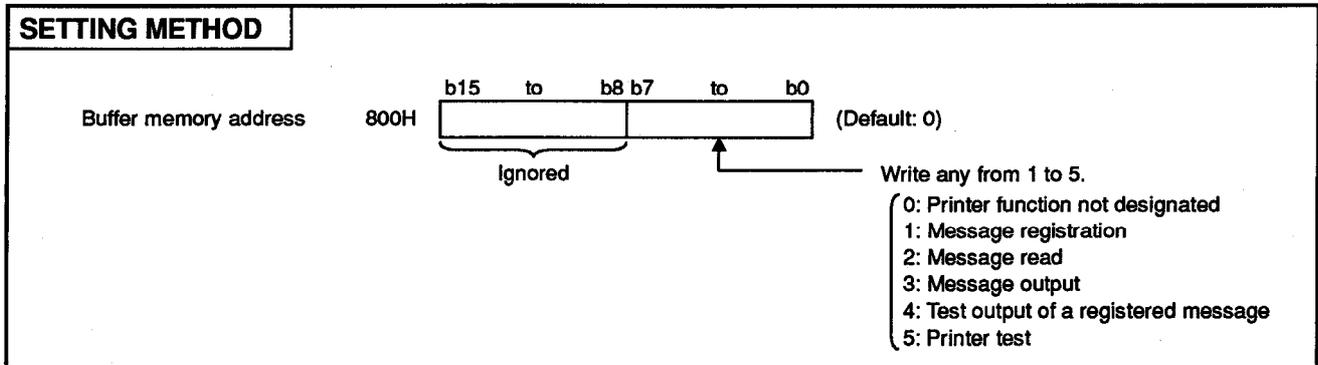
For the operation of the computer link module in response to the CD signal when the RS-232C CD terminal check setting is made, refer to Section 4.6.2.

17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

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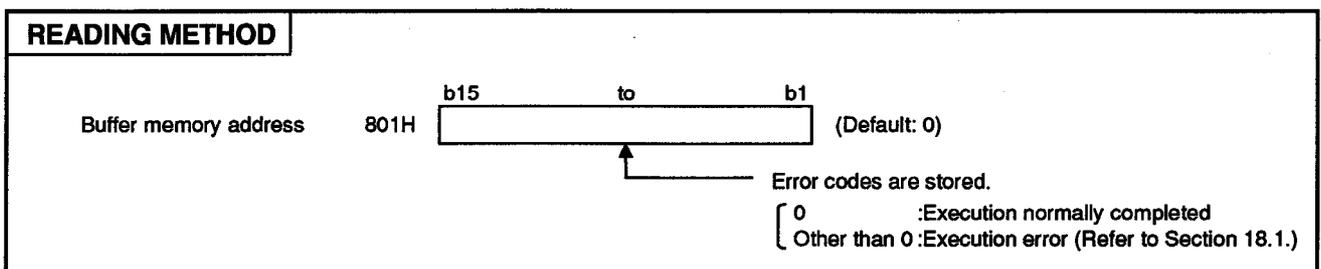
(b) Printer function designation area (address: 800H)

- This area is used to designate which of the printer functions will be used from the PC CPU.
- To use a printer function, write the number between "1" and "5" which corresponds to the function.



(c) Printer function error storage area (address: 801H)

- If an error arises from the execution of a printer function requested by the PC CPU, the computer link module stores its error code in the printer function error storage area.
(The error codes of errors related to the reading or writing of fixed messages in response to requests from the computer will not be stored.)
- When more than one error occurs, the computer link module stores the error code of the first error. an error code is stored in the printer function error storage area, write "0" to buffer memory address 801H from the PC CPU. (If an error code exists, the printer functions cannot operate.)
- After a PC CPU-requested printer function is executed, read the execution result from buffer memory address 801H.
- Refer to Section 18.1 for printer function error codes.



17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

- (d) Output status storage area (address: 802H)
 - While a message is being sent to the printer by request from the PC CPU, the computer link module stores the number of the message sent in the output status storage area.
"0" will be stored after all messages are sent.
 - To check the number of the message being sent, read the data from buffer memory address 802H.

READING METHOD

Buffer memory address

802H

b15 to b1

(Default: 0)

↑

The numbers of the messages being sent are stored.

0H	: Output completed or left undone
0001H to 0190H	: Number of fixed message being sent (1 to 400)
8001H to 801FH	: Number of free message being sent (1 to 31) (Free message numbers are stored as 8000H and each message number.)

POINT

The number stored in the area will be cleared by turning ON the printer processing completed signal (Xn8).

(e) Schedule area (addresses: 820H to 887H)

These areas are used to designate the output message number designation positions, the number of messages sent to the printer, and the output numbers.

1) CR/LF output designation area (address: 820H)

- When sending messages, which do not include a CR (code: 0DH) and an LF (code: 0AH), to the printer, this area is used to set whether the CR and the LF should be transmitted from the computer link module.
- To send the CR and the LF, write "1" to buffer memory address 820H before sending a message to the printer.
- When CR and LF output is set, the computer link module sends them after it transmits 80 characters of message which does not include the codes (or transmits two or more messages in sequence).
- For preparation of messages, refer to Section 17.2.4.
- Only messages including the CR and the LF can be transmitted whether CR and LF output is designated in the CR/LF output designation area or not.

SETTING METHOD

Buffer memory address

820H

b15 to b1 b0

(Default: 0)

↑

Write 0 or 1.

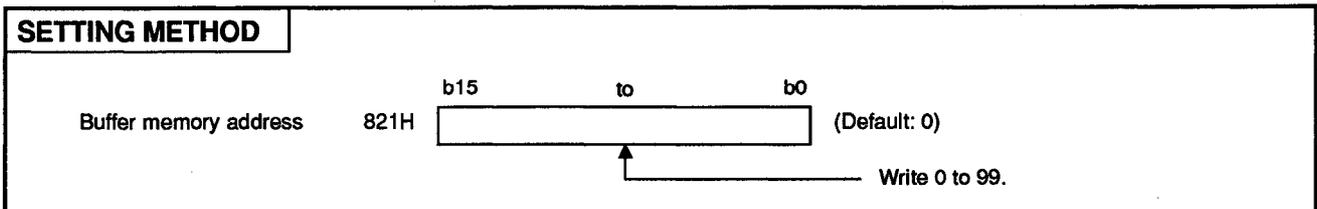
0	: No output
1	: Output

Ignored

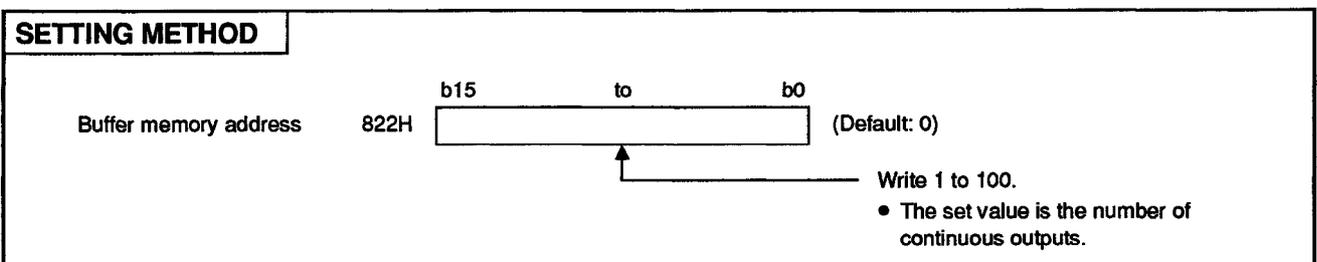
17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

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- 2) Output pointer designation area (address: 821H)
- For the purpose of sending messages to the printer in order of designation in the output number designation area (addresses: 823H to 887H), this area is used to designate the location of the output number designation area storing the number of the message to be transmitted first. (The number at the first output number designation area (address: 823H) is "0".)
 - Before sending messages to the printer, write a number between "0" and "99" to buffer memory address 821H.



- 3) Output quantity designation area (address: 822H)
- For the purpose of sending messages to the printer in order of designation in the output number designation area (addresses: 823H to 887H), this area is used to set the quantity of messages to be transmitted from the area designated in the output pointer designation area (address: 821H).
 - Before sending messages to the printer, write a number between "1" and "100" to buffer memory address 822H.



17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

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- 4) Output number designation area (addresses: 823H to 887H)
 - These area is used to designate the numbers of messages to be sent to the printer in order of output.
 - The computer link module transmits all messages designated in the output quantity designation area (address: 822H) from the area selected in the output pointer designation area (address: 821H) in the order set in this area.
 - Before sending messages, write message numbers between "0001H" and "0190H" and between "8001H" and "801FH" to buffer memory addresses 823H to 887H.

SETTING METHOD	
Buffer memory address	<div style="display: flex; align-items: center; gap: 20px;"> <div style="text-align: center;"> <p>823H to 887H</p> </div> <div style="border: 1px solid black; padding: 5px; display: flex; align-items: center; justify-content: center; gap: 10px;"> b15 to b0 </div> </div> <div style="margin-left: 20px;"> <p>↑</p> <p>Write the message number to be output. 0001H to 0190H: Fixed message number (1 to 400) 8001H to 801FH: Free message number (1 to 31) (Designate free message numbers as 8000H and each message number.)</p> </div>

REMARK

The following is an example of designation in the schedule area to send the messages designated at addresses 82DH to 831H (11th to 15th) in the output number designation area without CR and LF output (Section 17.7 (2) (b) shows an explanatory diagram):

- CR/LF output designation area (address: 820H) 0
- Output pointer designation area (address: 821H) 10
- Output quantity designation area (address: 822H) 5
- Output number designation area Random message number to each address (addresses: 82DH to 831H)

(f) Fixed message access area (addresses: 8A0H to 8C9H)

A fixed message is written to or read from this area in registering or reading it from the PC CPU.

1) Message data length designation area (address: 8A0H)

- When registering a fixed message in the fixed message registration data storage area (addresses: 8A2H to 8C9H), write the number of characters comprising it ("1" to "80") to this area.
- Fixed messages can be read without writing them to this area.

SETTING METHOD	
Buffer memory address	<div style="display: flex; align-items: center; gap: 20px;"> <div style="text-align: center;"> <p>8A0H</p> </div> <div style="border: 1px solid black; padding: 5px; display: flex; align-items: center; justify-content: center; gap: 10px;"> b15 to b0 </div> <div style="text-align: right;"> <p>(Default: 0)</p> </div> </div> <div style="margin-left: 20px;"> <p>↑</p> <p>Write the number of characters of the fixed message to be registered. [1 to 80: Number of characters</p> </div>

17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

- 2) Message number designation area (address: 8A1H)
- When registering a fixed message in the fixed message registration data storage area (addresses: 8A2H to 8C9H), write the corresponding message number between "0001H" and "0190H" (1 to 400) to this area.
 - To read a fixed message, write the corresponding message number between "0001H" and "0190H" (1 to 400) to this area.

SETTING METHOD	
Buffer memory address	8A1H <input type="text"/> (Default: 0)
	<p>↑ Write the message number of the message to be registered/read. [0001H to 0190H: Fixed message number (1 to 400)</p>

- 3) Fixed message registration data storage area (addresses: 8A2H to 8C9H)
- A fixed message should be registered with less than 80 characters.
 - Fixed messages can be read without writing them to this area.

SETTING METHOD																		
Buffer memory address	<table border="1"> <tr> <td></td> <td>b15 to b8</td> <td>b7 to b0</td> <td></td> </tr> <tr> <td>8A2H</td> <td>2nd character</td> <td>1st character</td> <td rowspan="4">} Write the characters of the message to be registered in order of output. (Up to 80 characters)</td> </tr> <tr> <td>8A3H</td> <td>4th character</td> <td>3rd character</td> </tr> <tr> <td>to</td> <td>⋮</td> <td>⋮</td> </tr> <tr> <td>AC9H</td> <td>80th character</td> <td>79th character</td> </tr> </table>		b15 to b8	b7 to b0		8A2H	2nd character	1st character	} Write the characters of the message to be registered in order of output. (Up to 80 characters)	8A3H	4th character	3rd character	to	⋮	⋮	AC9H	80th character	79th character
	b15 to b8	b7 to b0																
8A2H	2nd character	1st character	} Write the characters of the message to be registered in order of output. (Up to 80 characters)															
8A3H	4th character	3rd character																
to	⋮	⋮																
AC9H	80th character	79th character																
<table border="1"> <tr> <th>POINT</th> </tr> <tr> <td>A registered message will be sent to the printer, as shown in the above figure.</td> </tr> </table>		POINT	A registered message will be sent to the printer, as shown in the above figure.															
POINT																		
A registered message will be sent to the printer, as shown in the above figure.																		

REMARK

The following is an example of designation in the fixed message access area when registering a 18-character-long fixed message as message No. 2:

- Message data length designation area 18
(address: 8A0H)
- Message number designation area (address: 8A1H) ... 2
- Fixed message registration data storage area..... Character string of the message to be registered
(addresses: 8A2H to 8C9H)

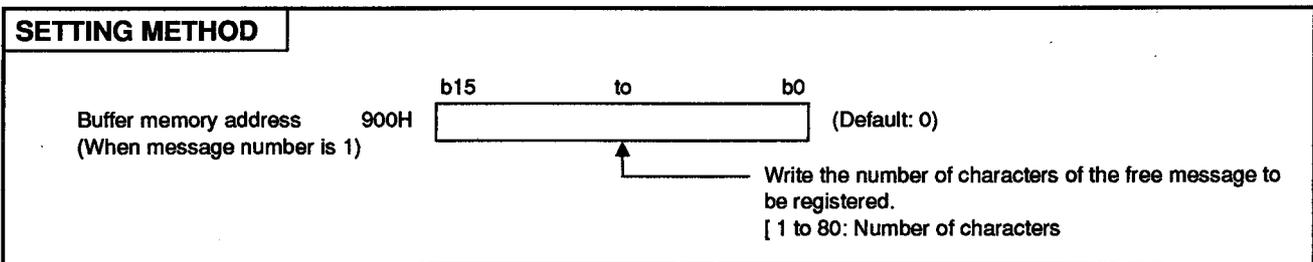
17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

(g) Free message registration area (addresses: 900H to DF6H)

A free message is written to or read from this area in registering or reading it from the PC CPU. (Free messages cannot be registered or read from the computer.)

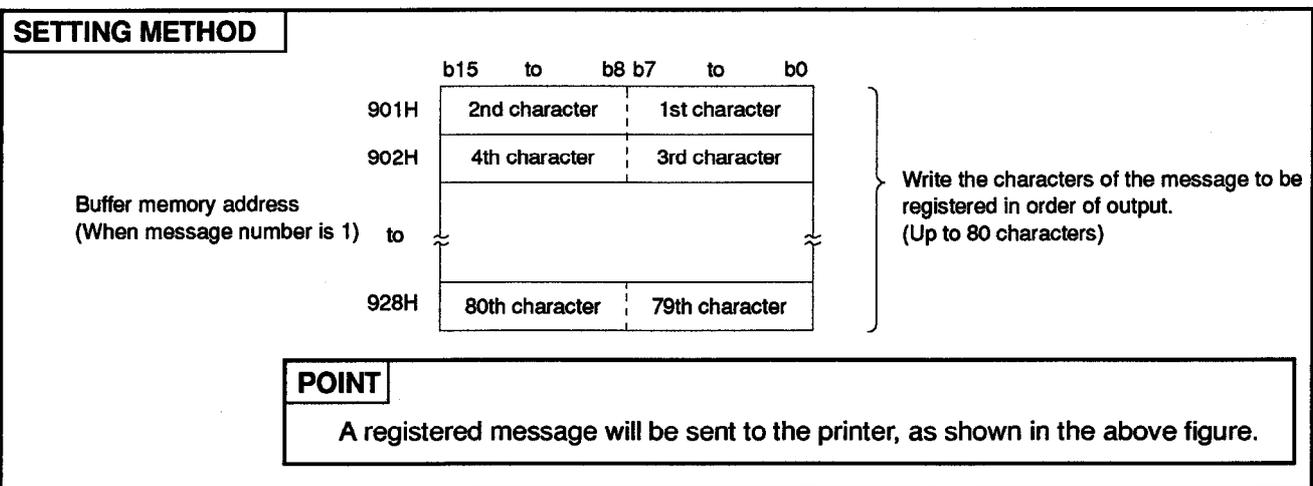
1) Message data length designation area (address: 900H etc.)

- When registering a free message in a proper free message area (addresses: 901H to 928H, etc.), write the number of character comprising it ("1" to "80") to this area.
- To read a free message, designate the address of the area where it is registered.
- The message data length designation area and the free message area in the free message registration area allocated to each free message number are shown at the end of Section 15.



2) Free message area (addresses: 901H to 928H, etc.)

- As a free message to be registered, write one consisting of the designated number of characters (less than 80 half-size characters) in the corresponding message data length designation area (address: 900H etc.).
- To read a free message, designate the address of the area where it is registered.
- The message data length designation area and the free message area in the free message registration area allocated to each free message number are shown at the end of Section 15.



REMARK

The following is an example of designation in the free message registration area when registering a 18-character-long free message as message No. 2. The message number is managed by the registration area.

- Message data length designation area 18
(address: 929H)
- Free message area Character string of the message to be registered
(addresses: 92AH to 951H)

(h) Areas for changing the RS-232C communications mode

- RS-232C communications mode setting area (address: 10FH)
- Simultaneous send priority/non-priority setting area (address: 110H)
- Send method setting area when transmission is resumed
(address: 111H)

- When an external device is connected to the RS-232C interface of the computer link module, the full-duplex transmission with the external device is possible when the computer link module is started up.
- To perform half-duplex transmission, change the default values according to Section 10 when the computer link module is started up.

(i) Areas for changing the transmission control mode with the external device

- Transmission control specification area (address: 11AH)
- DC1/DC3 control code specification area (address: 11BH)
- DC2/DC4 control code specification area (address: 11CH)

- When the computer link module is started up, DTR/DSR control for the external device is executed only at the RS-232C interface.
- To execute DC code control at the RS-232C and RS-422 interfaces, change the default settings according to Section 9 when the computer link module is started up.
- The setting is valid for communications using a protocol through the RS-422 interface.

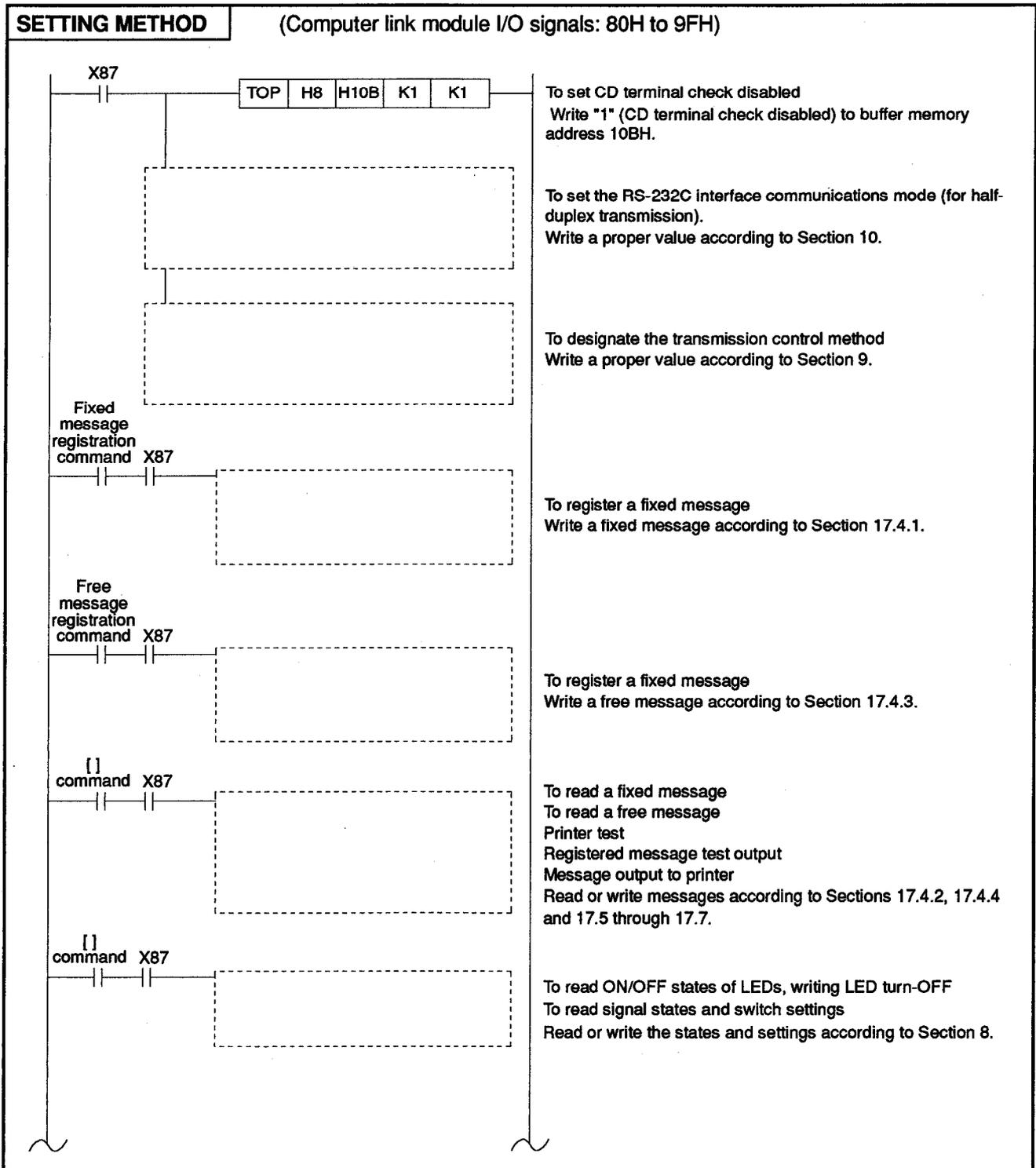
17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

- (3) Program example to change the default values in buffer memory specific use areas

The following is a program example to change the default values in the buffer memory specific use areas.

Incorporate necessary programs only.

In this example, the computer link module I/O signals are 80H to 9FH which are handled by the PC CPU.



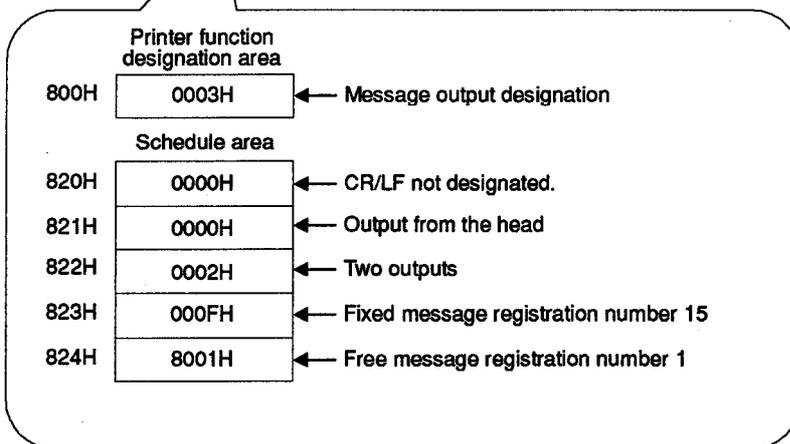
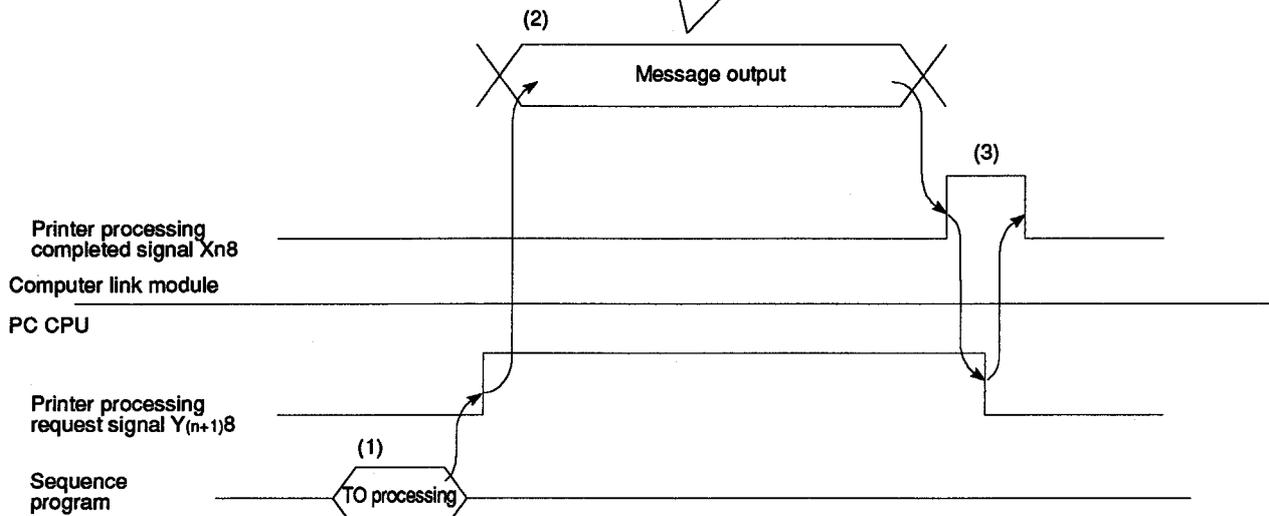
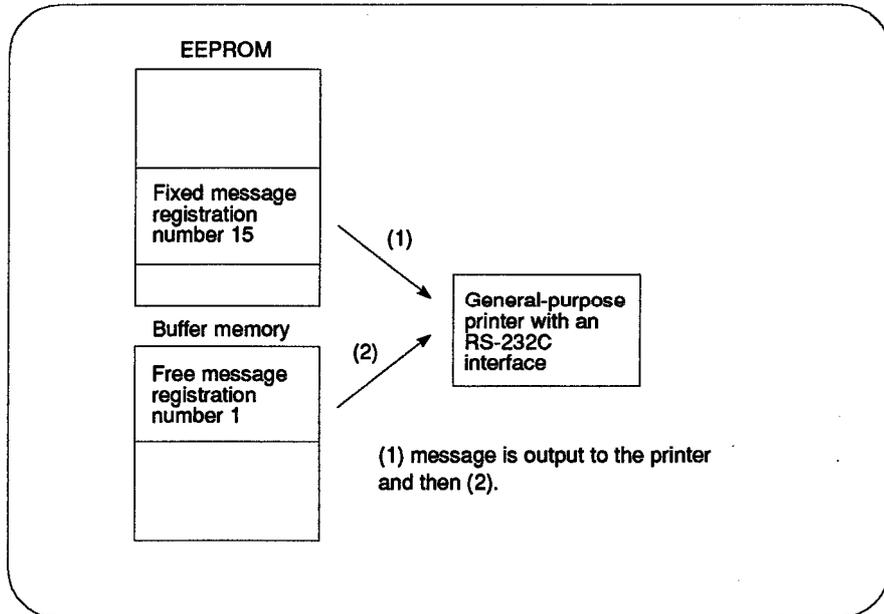
17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

Function	Printer function						
	A1SJ71UC24		A1SJ71C24		A1SCPU C24-R2	A2CCPU C24	A3CCPU C24-PRF
Applicable module	AJ71UC24	-R2	-R4	-PRF	-R2	-R4	-PRF
Remarks			O			O	

MELSEC-A

17.2.2 Message output timing

The following example explains the timing when registration number 15 of a fixed message and registration number 1 of a free message are output.



17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

MELSEC-A

- (1) Write a message output (03H) in buffer 800H with a sequence program, and set each item of a schedule area.

After writing to the buffer, use a sequence program to turn ON the printer processing request signal ($Y_{(n+1)8}$).

- (2) When the printer processing request signal ($Y_{(n+1)8}$) goes ON, messages are output in the order set by the computer link module at the schedule area. After outputting is completed, the computer link module turns ON the printer processing completed signal (X_{n8}).

- (3) After the printer function has turned ON the printer processing completed signal (X_{n8}), turn OFF the printer processing request signal ($Y_{(n+1)8}$) with a sequence program.

17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

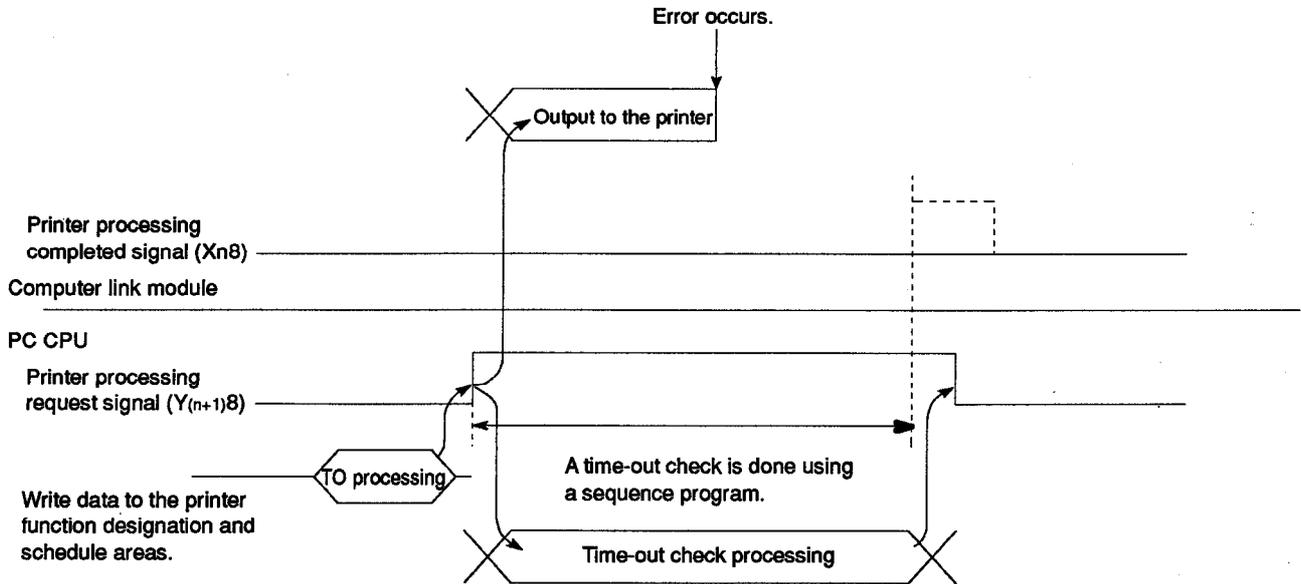
Function	Printer function									
	A1S171UC24			A1S171C24						
Applicable module	AJ71UC24	-R2	-R4	-PRF	-R2	-R4	-PRF	A1SCPU C24-R2	A2CCPU C24	A2CCPU C24-PRF
Remarks			O			O				O

MELSEC-A

17.2.3 Method of detecting a printer function error

When outputting messages to the printer, if (a) an error occurs, or (b) the printer is not connected, the printer processing completed signal (Xn8) will not go ON.

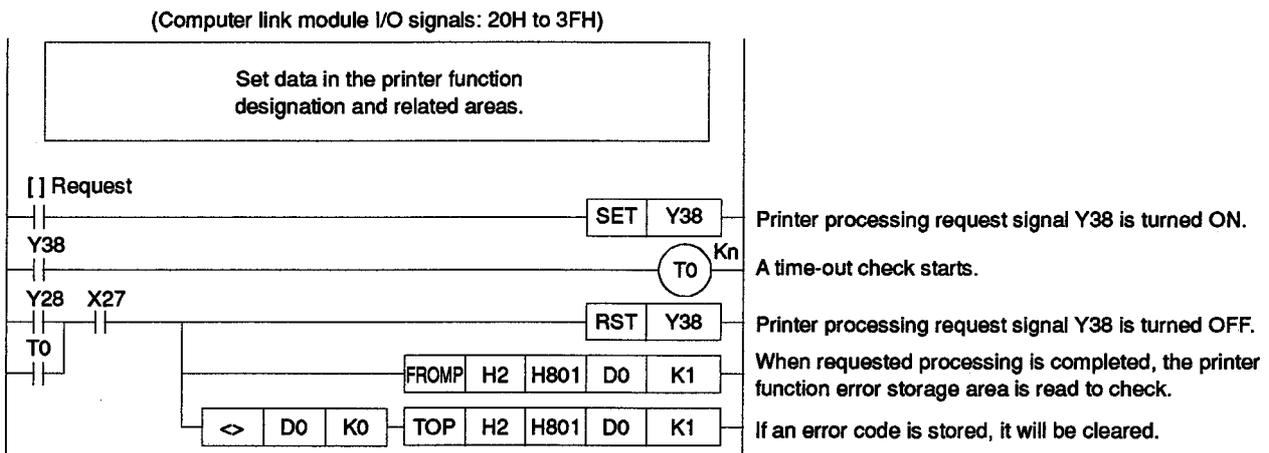
Therefore, it is necessary to do a time-out check using a sequence program.



After the printer processing request signal (Y_{(n+1)8}) goes ON, continue the time-out check until the printer processing completed signal (X_{n8}) is turned ON.

If an error occurs when a message is being output, the printer processing request signal (Y_{(n+1)8}) goes OFF.

To detect a printer error, add a sequence program as shown below.



POINT

Set the time-out period according to the printer specifications and the number of characters to be sent.

17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

Function	Printer function					
	A71UC24			A1SOPU C24-R2		
Applicable module	-R2	-R4	-PRF	-R2	-R4	-PRF
Remarks			0			0

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17.2.4 Precautions when using a printer function

(1) Dealing with an error while a printer function is used

Even if the printer processing request signal ($Y_{(n+1)8}$) is turned ON, the printer processing completed signal (X_{n8}) may not be turned ON because of an error. In such a case, carry out the following operations on the PC CPU:

- (a) Perform a time-out check described in Section 17.2.3 to detect the existing error.
- (b) When the printer processing completed signal (X_{n8}) is ON or a time-out error occurs, read the printer function error storage area (address: 801H) in the buffer memory to check whether it stores an error code.
- (c) If an error code is stored, turn OFF the printer processing request signal ($Y_{(n+1)8}$), then write "0" to the printer function error storage area.

(2) Number of fixed message registration times

More than 100,000 fixed messages cannot be written to EEPROM.

(3) Preparing messages to be registered

(a) How to prepare messages

- A message can be 1 to 80 characters long (1 to 80 bytes).
- If necessary, insert the control codes for printing (CR (code: 0DH), LF (code: 0AH), etc.) in the message in the code understandable for the printer connected.

(b) Message output

- Of the fixed messages (up to 400) or free messages (up to 31) registered by the user with the computer link module, one to 100 can be sent at a time. Or, two or more messages can be printed out on a line on a sheet of paper. Combine messages according to the number of characters the printer connected can print out on a line.

17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

Function	Printer function								
	A1S71UC24			A1S71UC24			A1SCPU C24-R2	A2CCPU C24	A2CCPU C24-PRF
Applicable module	A171UC24	-R2	-R4	-PRF	-R2	-R4	-PRF		
Remarks				○			○		○

MELSEC-A

(c) CR and LF output control

- When sending a message without the CR and the LF (or sending more than one message continuously), whether the codes should be sent from the computer link module after sending the 80 characters of the message can be set in the CR/LF output designation area (address: 820H) in the buffer memory. (Refer to Section 17.2.1 (2) (e).)
- The CR and LF code output cannot be set in the CR/LF output designation area if a message is more than 80 characters long, including the control codes for printing.
When a message is less than 80 characters long (80 bytes), add the required number of SPs (code: 20H) to the end of the message to make it 80 characters long.
* If CR/LF output is set when sending a message without the CR and the LF (or sending more than one message continuously), the codes will be sent after the 80 characters of the message are all sent.
- When CR/LF output is not set in the CR/LF output designation area, it is advisable to prepare a message or combine messages, including the control codes for printing, so that they can be printed out on a line on a sheet of paper.

(4) Precautions for using the computer link function

The A2CCPUC24-PRF can use the RS-232C interface for the printer functions and the RS-422 interface for the computer link function.

For precautions for using the computer link function, refer to Section 5.2 of the User's Manual (Computer Link Function).

IMPORTANT

When using the contents of buffer memory by registering them to a EEPROM in a module, do not switch off the power of the station where the module is mounted, or reset the PC CPU.

If the power is switched off at the station where the module is mounted or the PC CPU is reset, the contents of the data in the EEPROM will become indefinite, requiring the data to be registered to the EEPROM again. The module may also fail or malfunction.

17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

Function	Printer function					
	A1S/J71UC24			A1S/J71C24		
Applicable module	-R2	-R4	-PRF	-R2	-R4	-PRF
Remarks						

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17.3 Registering/Reading Fixed Messages from the Computer

In this section, a control protocol in format 1 is taken as a designation example to describe what must be designated for registering or reading fixed messages from the computer by the use of a dedicated protocol for the computer link function.

17.3.1 Commands and their functions

Item	Command		Processing Contents	Number of Points Processed per Communication	Status of PC CPU		
	Symbol	ASCII			During STOP	During RUN	
						Write Enabled	Write Disabled
Message registration	CI	43H, 49H	Registration of fixed message data	40 words	○	○	○
Message read	CJ	43H, 4AH	Read of fixed message data	40 words	○	○	○

17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

17.3.3 Method of reading fixed messages

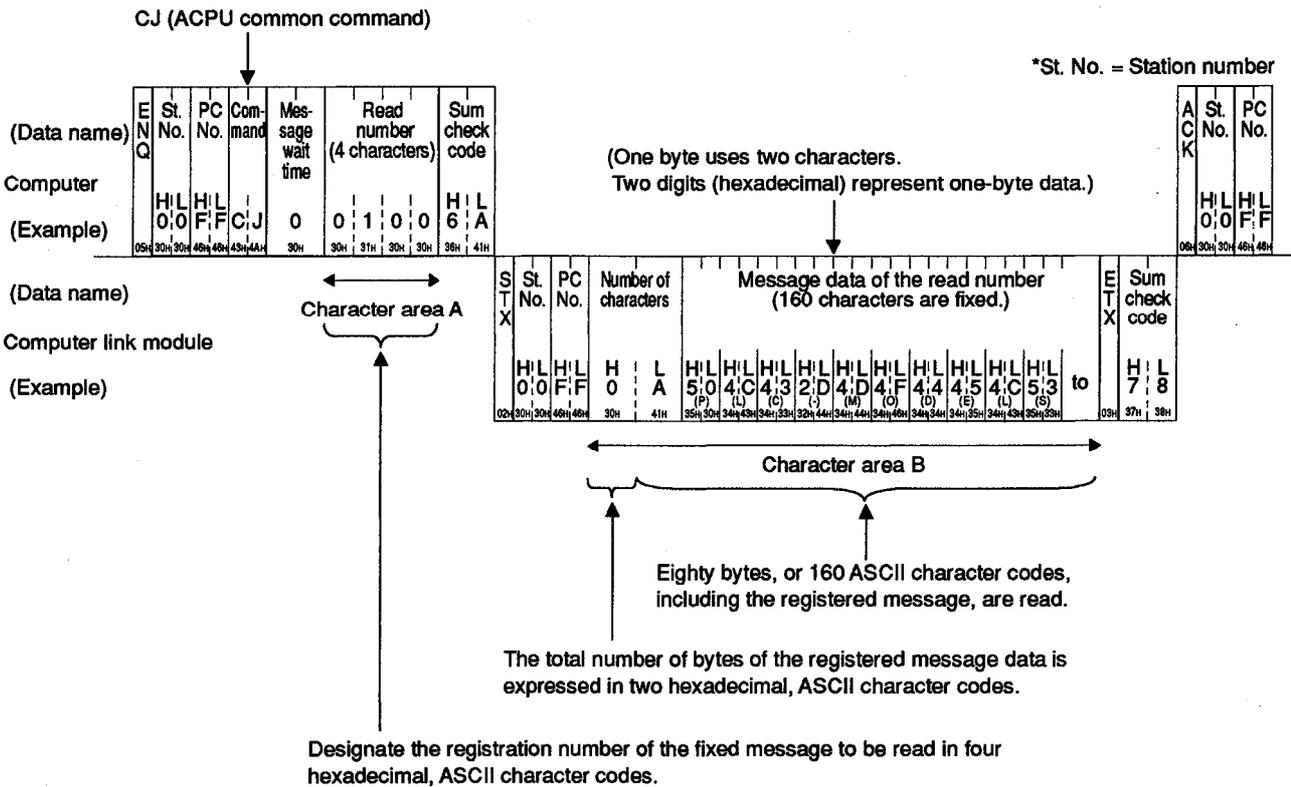
This section quotes a control protocol example to describe how to read fixed messages using a CJ command.

[Control protocol]

The protocol shown below is in control format 1.
To read fixed messages in control format 2, 3 or 4, use the protocol described in Section 5.4.3, 5.4.4 or 5.4.5 as well as by reference to the protocol in this section.

(Reading condition)

- 1) Registered message No. 100 is to be read.



POINTS

- (1) The designated range of the read number must satisfy the following condition:
 - $1 \leq \text{registration number} \leq 400$ (Set at "0001" to "0400".)
- (2) Eighty-byte (160-character) message data consisting of the registered message and the added characters (undefined characters) will be read.
- (3) For the description of the error codes when the computer link module responds with an NAK code and corrective action against them, refer to Section 18.1.

17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

Function	Printer function									
	A1S/J1UC24			A1S/J1C24						
Applicable module	AJ71UC24	-R2	-R4	-PRF	-R2	-R4	-PRF	A1SCPU C24-R2	A2CCPU C24	A2CCPU C24-PRF
Remarks			0			0				0

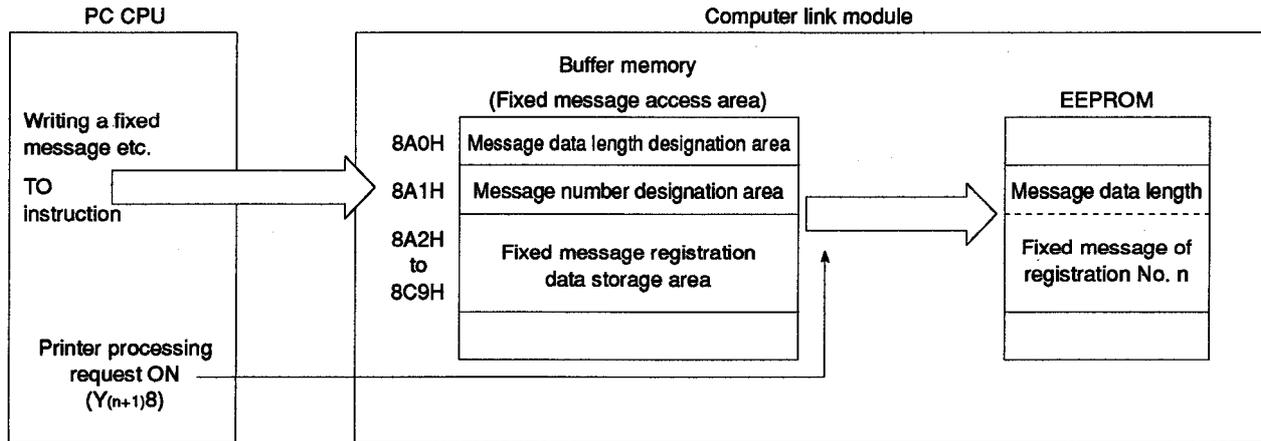
MELSEC-A

17.4 Registering/Reading Messages from the PC CPU

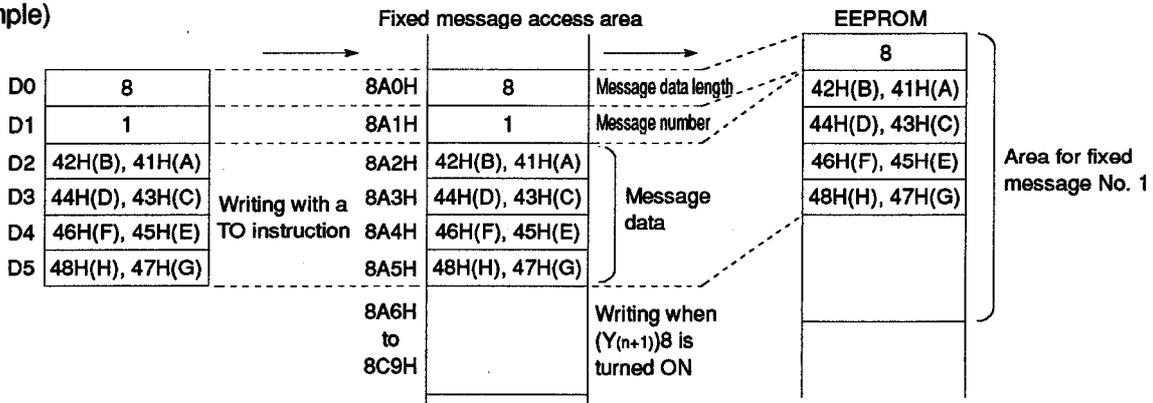
This section describes how to register or read messages from the PC CPU, and the sequence programs for these operations.

17.4.1 Method of registering fixed messages

This section describes how to register fixed messages in EEPROM from the PC CPU through the fixed message access area.

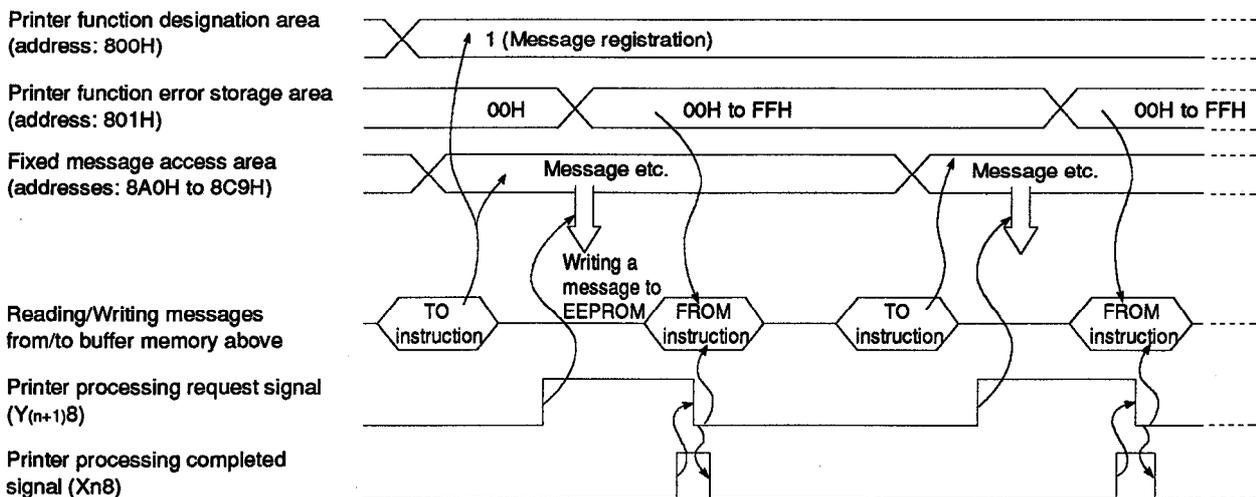


(Example)



(1) Procedure for registering fixed messages

The following is the procedure for registering fixed messages from the PC CPU:



17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

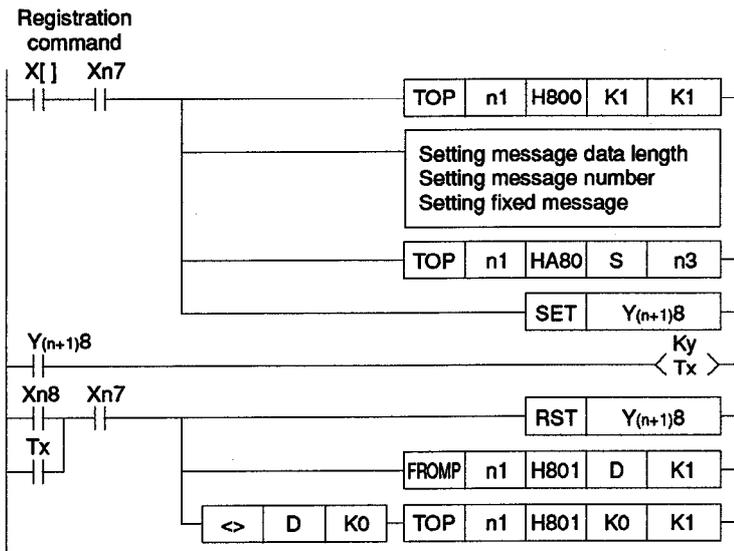
(2) Program for registering fixed messages

The format of the basic sequence program for registering fixed messages from the PC CPU and a program example are shown below:

(a) Basic sequence program format

For details, refer to the Programming Manual (Common Instructions).

Format



POINTS

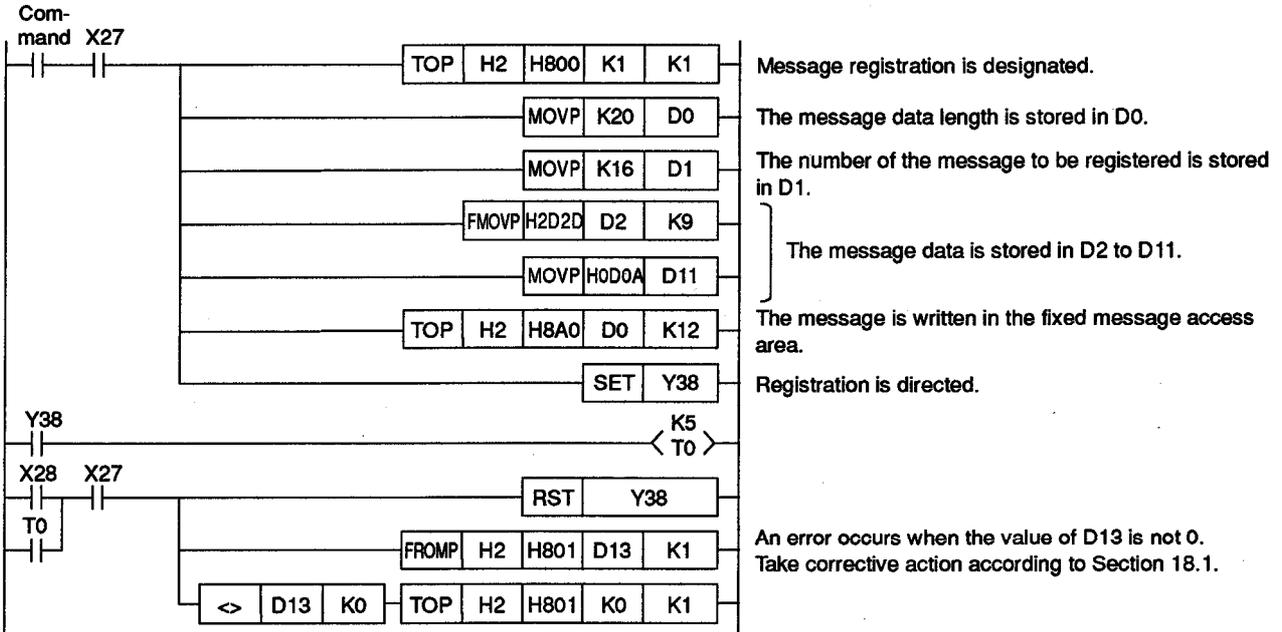
- (1) To designate the message data length (the number of characters) and the message number (registration number), the following conditions must be met:
 - $1 \leq \text{message data length} \leq 80$
 - $1 \leq \text{message number} \leq 400$
- (2) For the preparation of messages, refer to Section 17.2.4.

17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

(b) Programming example

Program for registering a fixed message when computer link module I/O signals are allocated to 20H to 3FH

1) Example of registering " - ff - C_RL_F" as fixed message No. 16



REMARK

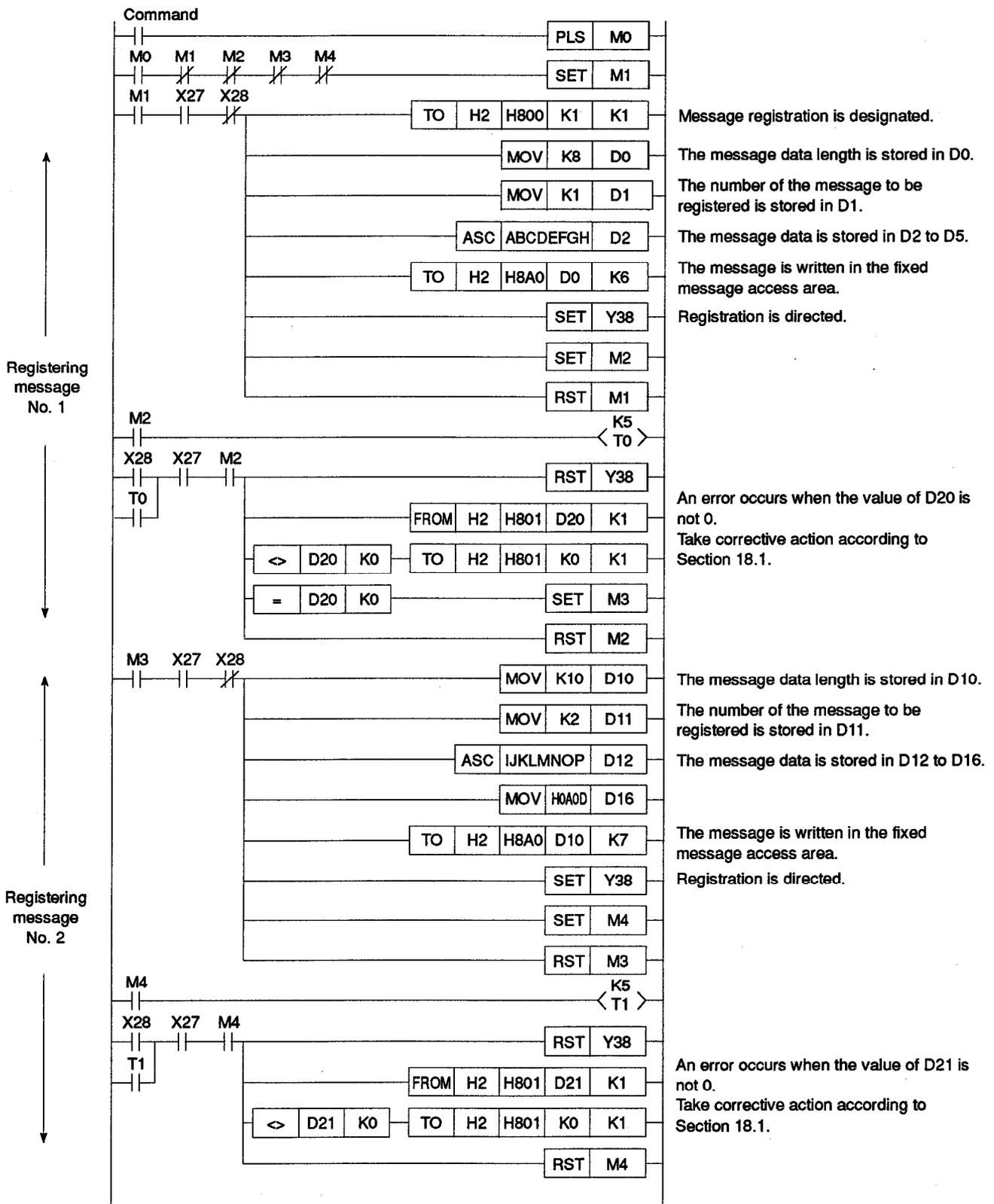
In the above example, the message is registered by the use of the control codes for the connected printer shown below:

- For CR, LF 0DH, 0AH

17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

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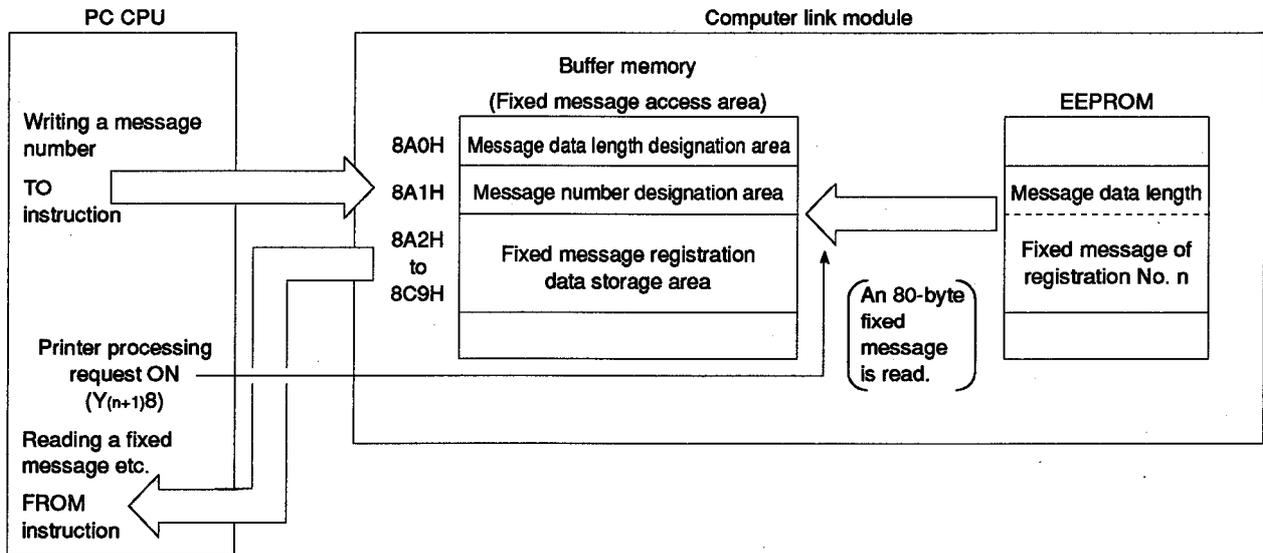
2) Example of registering "ABCDEFGH" as fixed message No. 1 and "IJKLMNOP" as fixed message No.2



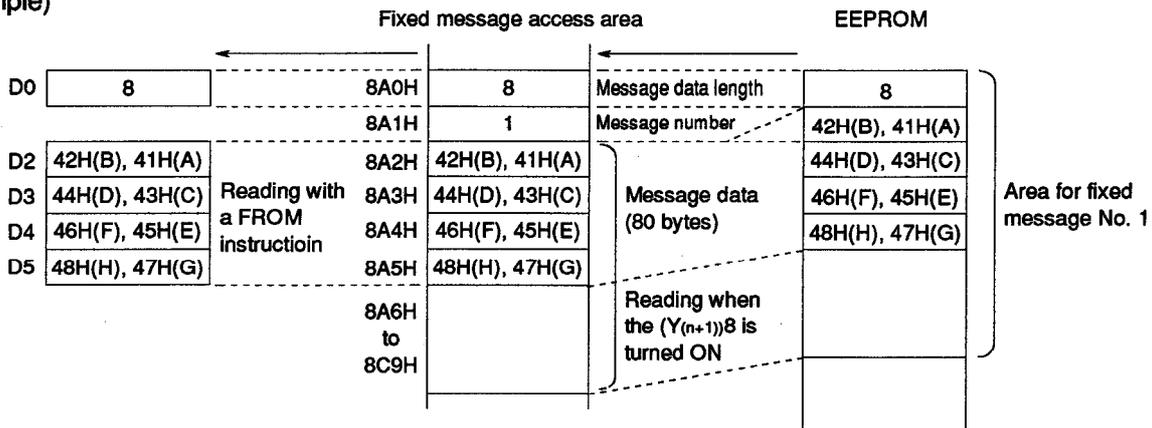
17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

17.4.2 Method of reading fixed messages

This section describes how to read fixed messages from EEPROM into the PC CPU through the fixed message access area.

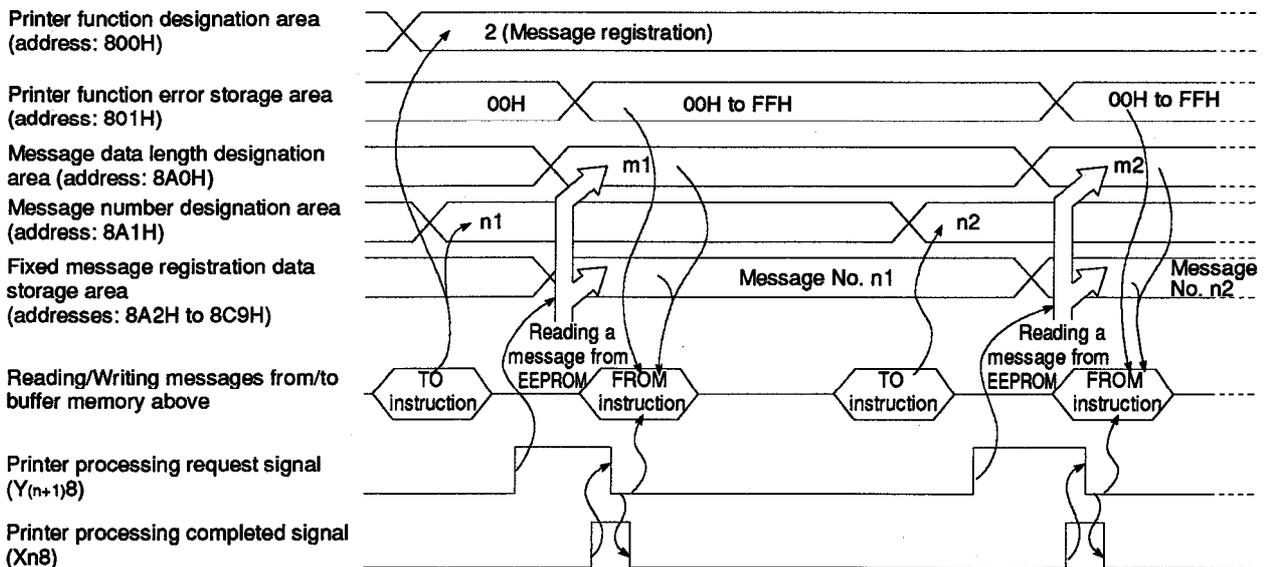


(Example)



(1) Procedure for reading fixed messages

The following is the procedure for reading fixed messages out into the PC CPU:



17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

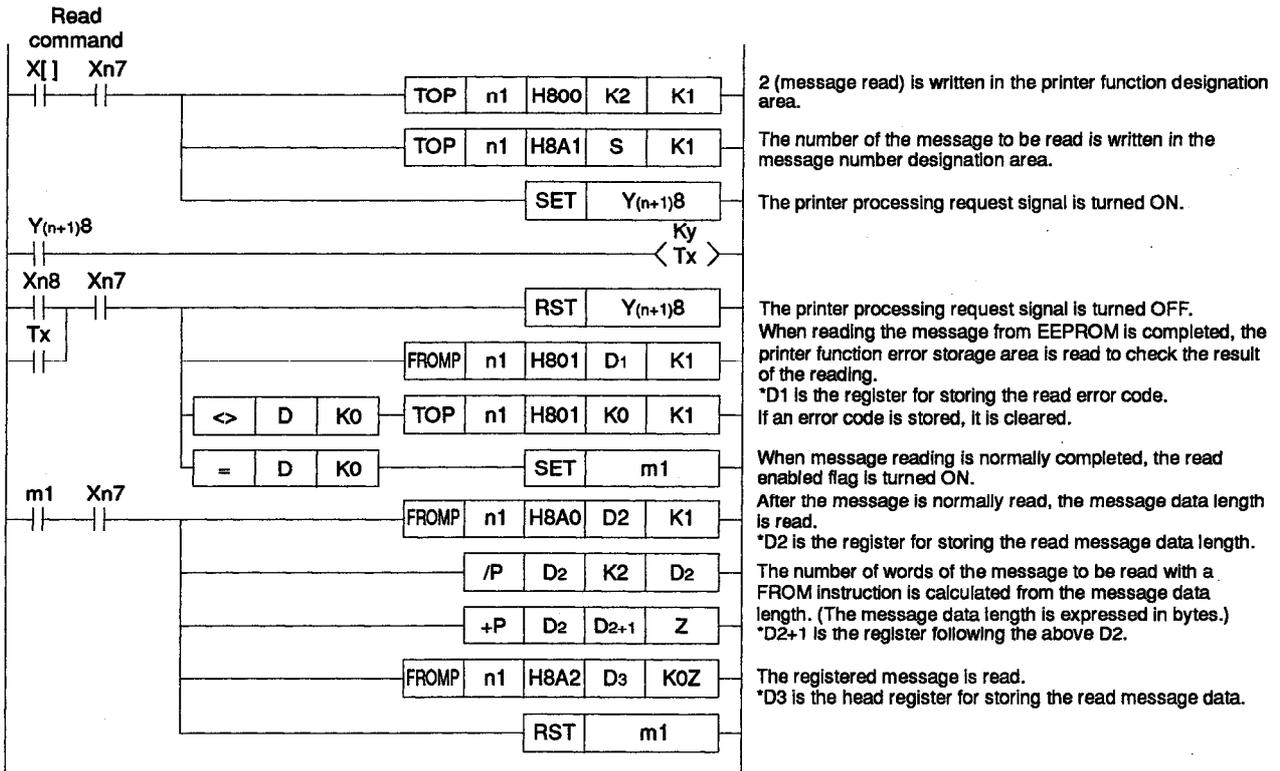
(2) Program for reading fixed messages

The format of the basic sequence program for reading fixed messages out into the PC CPU and a program example are shown below:

(a) Basic sequence program format

For details, refer to the Programming Manual (Common Instructions).

Format



POINTS

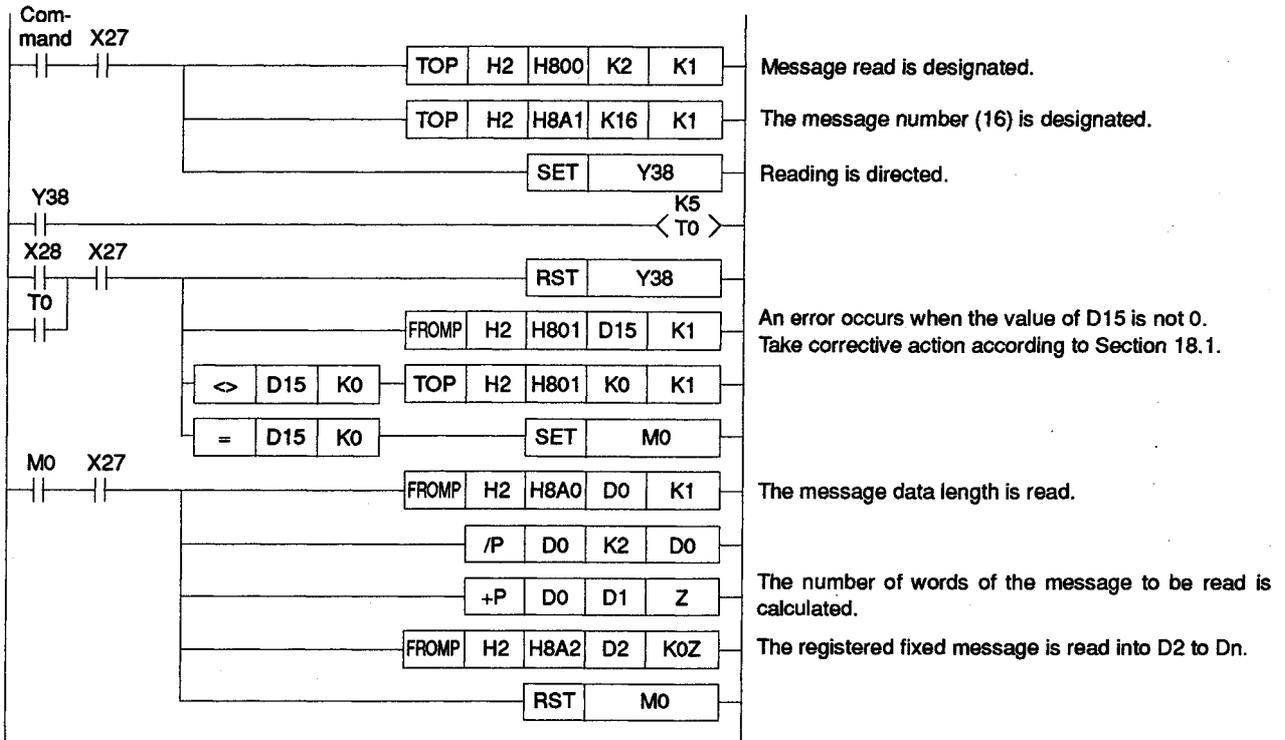
- (1) Designate the message number (registration number) between 1 and 400.
- (2) An 80-byte fixed message consisting of the registered message and the added characters (undefined characters) will be read from EEPROM into the fixed message access area.

17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

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(b) Programming example

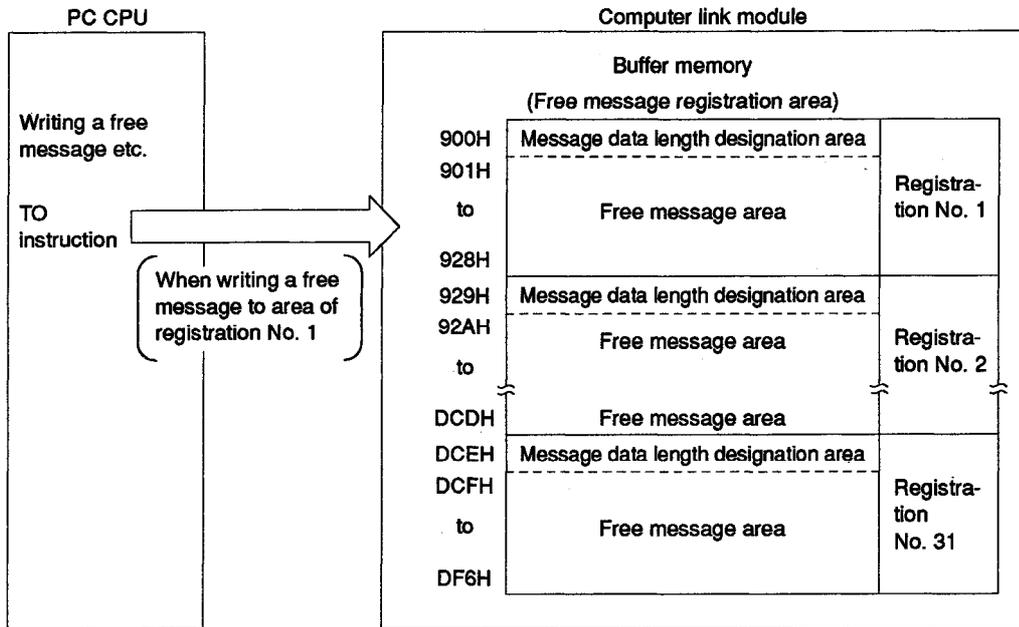
Program for reading a fixed message when computer link module I/O signals are allocated to 20H to 3FH.



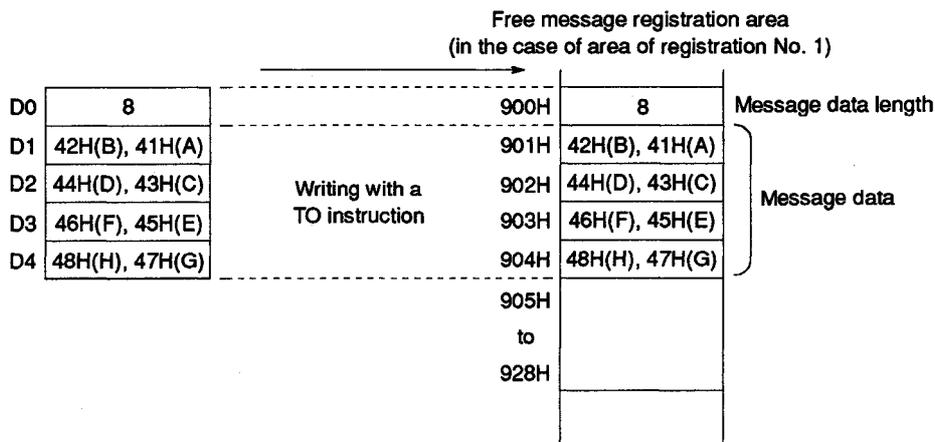
17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

17.4.3 Method of registering free messages

This section describes how to register free messages from the PC CPU into the free message registration area.

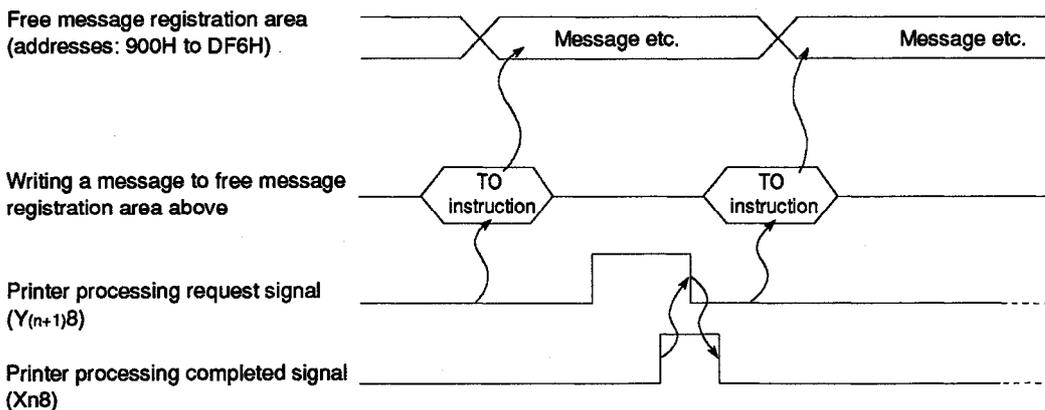


(Example)



(1) Procedure for registering free messages

To register a free message from the PC CPU, designate the address of the buffer memory free message registration area, and write the message data length and the message.



17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

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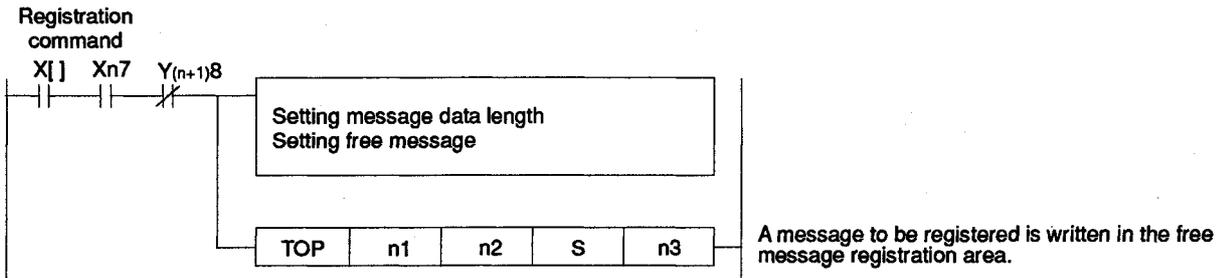
(2) Program for registering free messages

The format of the basic sequence program for registering free messages from the PC CPU and an program example are shown below:

(a) Basic sequence program format

For details, refer to the Programming Manual (Common Instructions).

Format



POINTS

- (1) Designate the message data length (the number of characters) between 1 and 80.
- (2) For the preparation of messages, refer to Section 17.2.4.
- (3) More than one free message can be registered at a time. In such a case, however, a PC CPU device for storing free messages, which has a capacity of 41 words x the number of messages to be registered, is required.
- (4) Register free messages when the printer processing request signal (Y(n+1)8) is OFF.

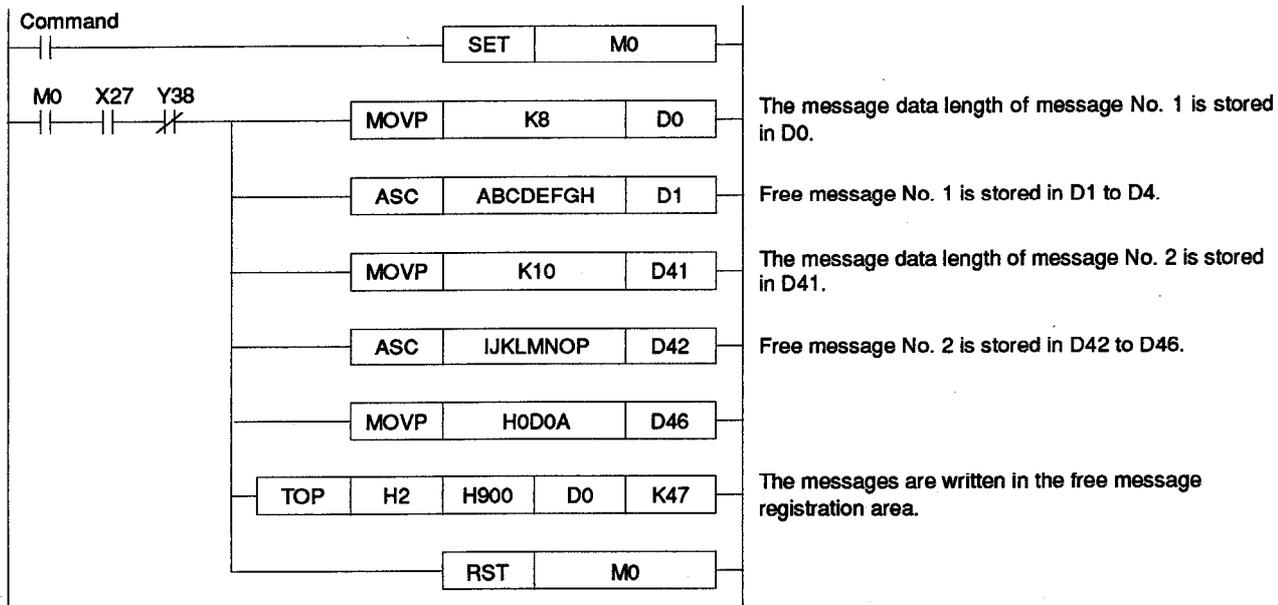
17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

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(b) Programming example

Program for registering a free message when computer link module I/O signals are allocated to 20H to 3FH

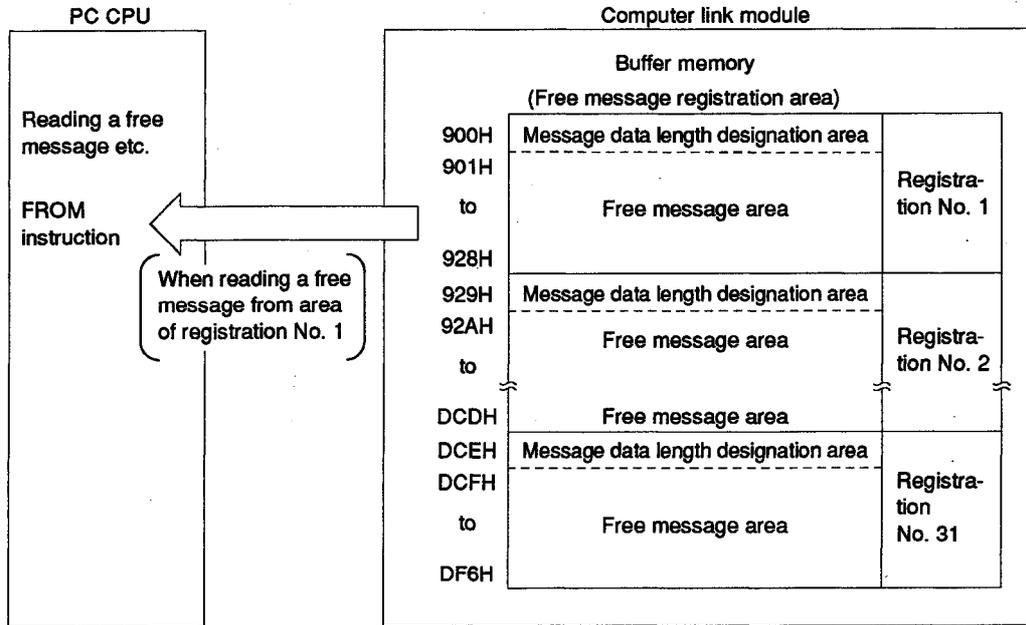
- Example of registering "ABCDEFGH" as free message No. 1 and "IJKLMNOP^C_R^L_F" as free message No. 2



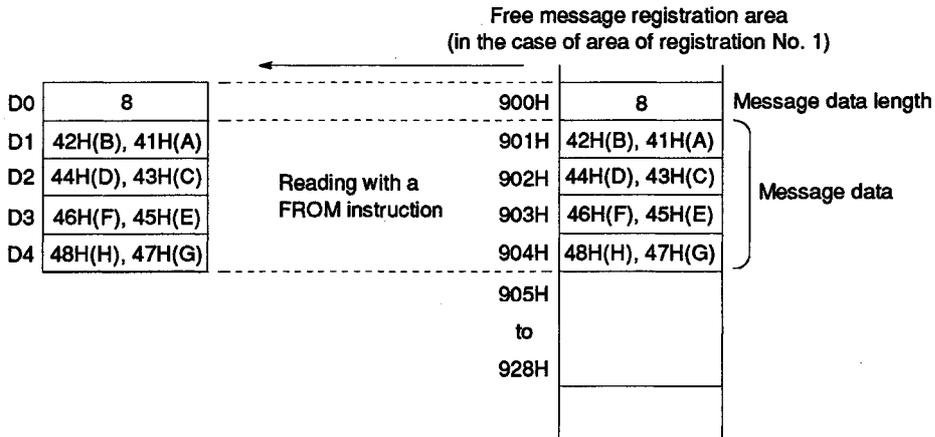
17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

17.4.4 Method of reading free messages

This section describes how to read free messages from the free message registration area into the PC CPU.

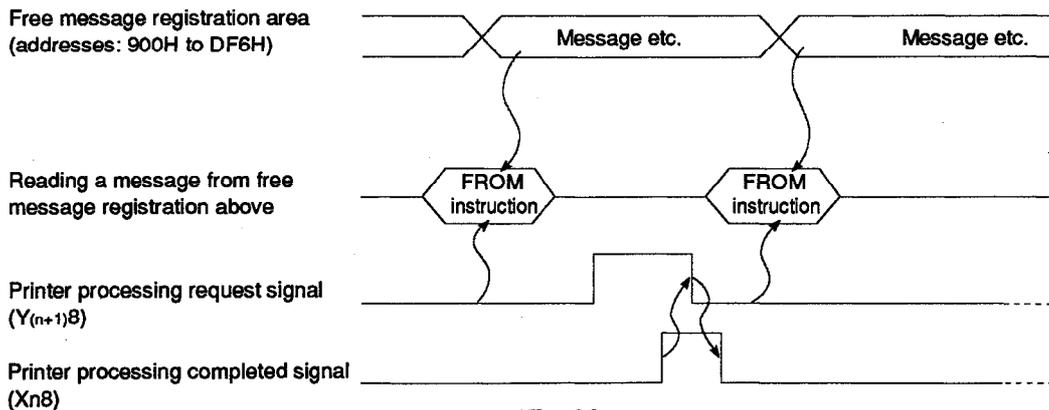


(Example)



(1) Procedure for reading free messages

To read a free message into the PC CPU, designate the address of the buffer memory free message registration area, and read the message data length and the message.



17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

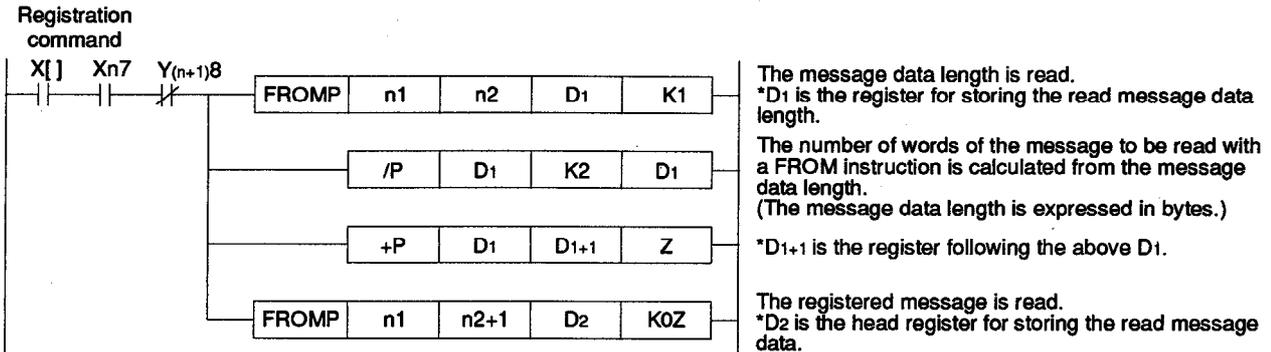
(2) Program for reading free messages

The format of the basic sequence program for reading free messages into the PC CPU and a program example are shown below:

(a) Basic sequence program format

For details, refer to the Programming Manual (Common Instructions).

Format

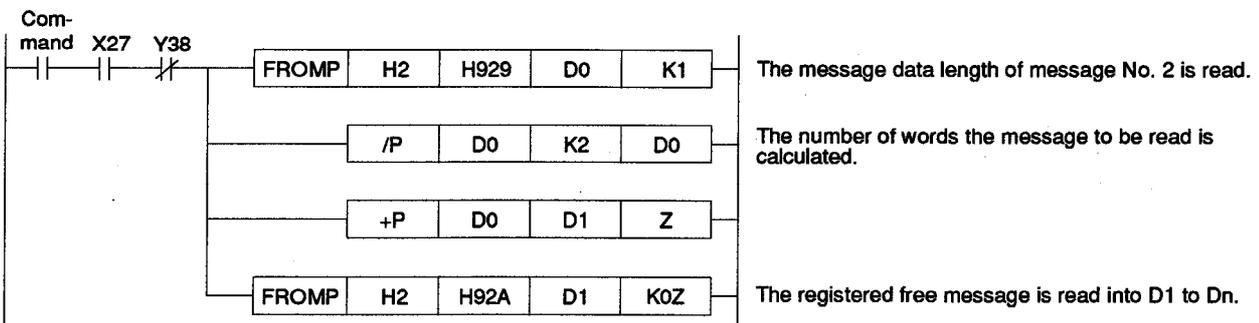


POINT

More than one free message can be read. In such a case, however, a PC CPU device for storing free messages, which has a capacity of 41 words x the number of messages registered, is required.

(b) Programming example

Program for reading free message No. 2 with computer link module I/O signals are allocated to 20H to 3FH.



17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

Function	Printer function						
	A1S/J71UC24		A1S/J71C24		A1SCPU C24-R2	A2CCPU C24	A3CCPU C24-PRF
Applicable module	AJ71UC24	-R2	-R4	-PRF	-R2	-R4	-PRF
Remarks			0			0	

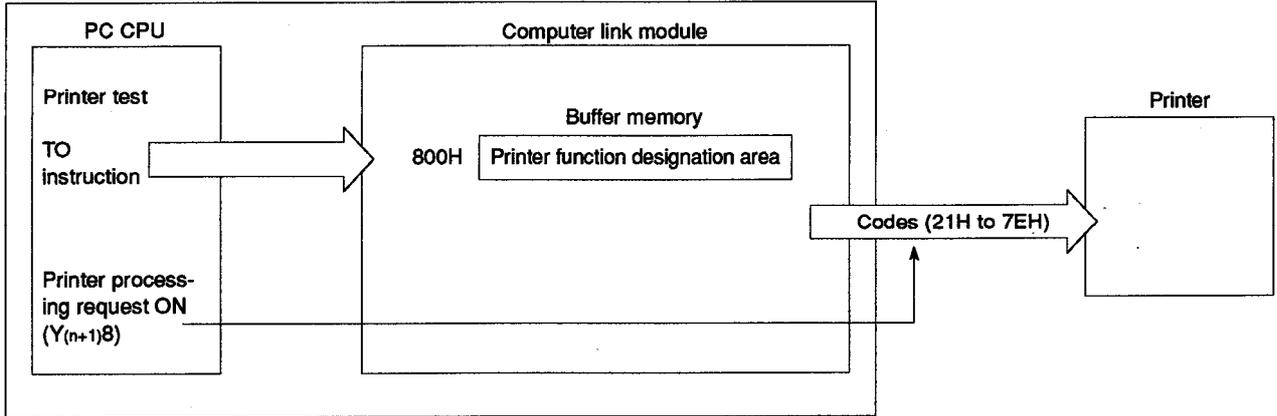
MELSEC-A

17.5 Printer Test

The printer test function is to test the connection between the computer link module and the printer and the printing function of the printer.

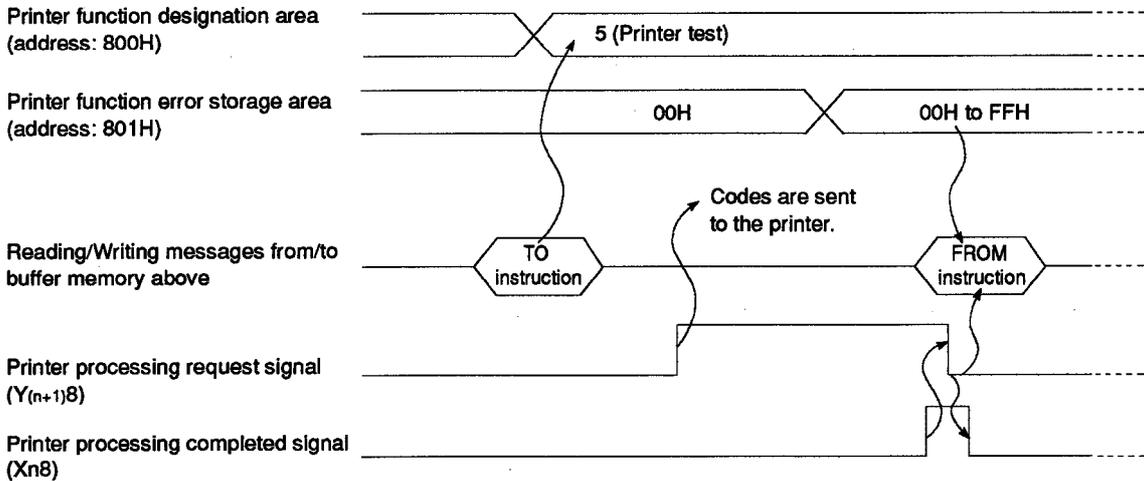
Since the computer link module sends ASCII character codes 21H to 7EH in sequence to the printer, it is possible to check whether the printer can print out the corresponding characters correctly.

This section describes the procedure for printer test from the PC CPU, and the printer test sequence program.



(1) Procedure for printer test

The procedure for printer test from the PC CPU is shown below:



17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

Function	Printer function						
	A1S71UC24		A1S71C24		A1S0CPU C24-R2	A2CCPU C24	A2CCPU C24-PF0
Applicable module	AJ71UC24	-R2	-R4	-PF0	-R2	-R4	-PF0
Remarks				0			0

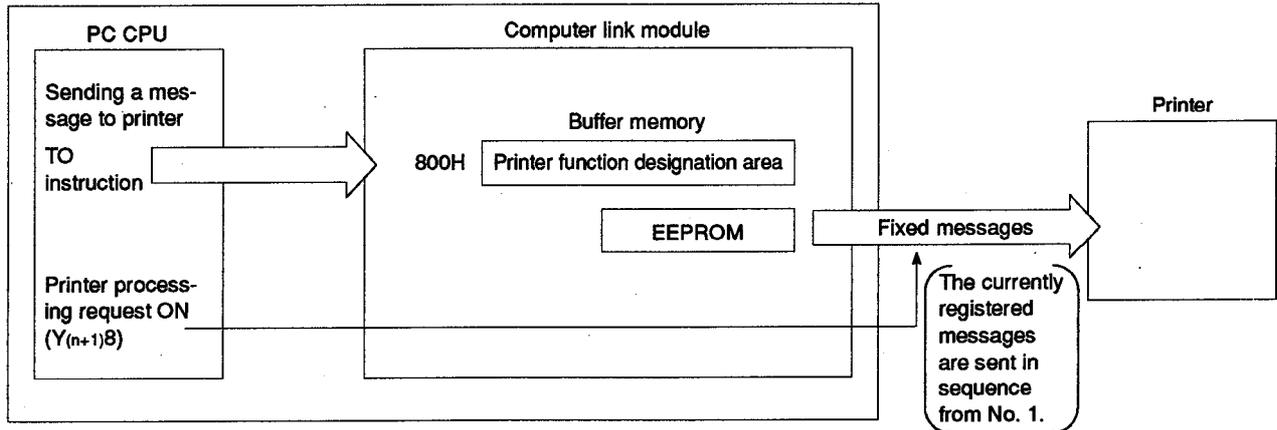
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17.6 Registered Message Test Output (Test Printing)

The registered message test output (test printing) function is to check if fixed messages from the PC CPU or computer are registered correctly.

Since the computer link module sends fixed messages in order of number, it is possible to check whether the messages are registered or printed out correctly.

This section describes the procedure for test output from the PC CPU, and the test output sequence program.

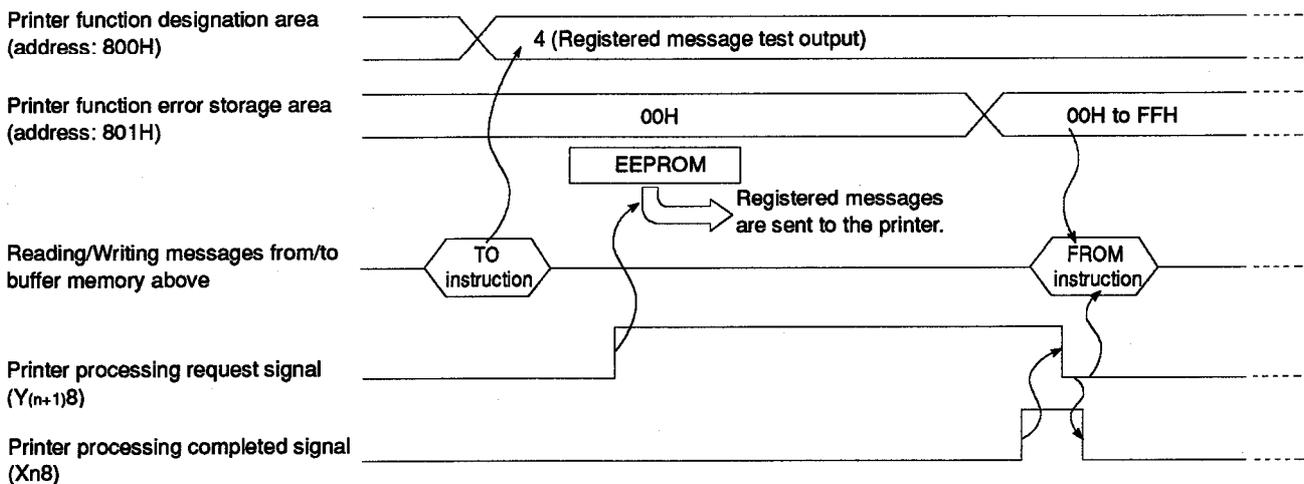


POINT

Before performing test output, register fixed messages from the computer or PC CPU.
An error will occur if a number with no registered message is found.

(1) Procedure for test output

The procedure for test output is shown below:



17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

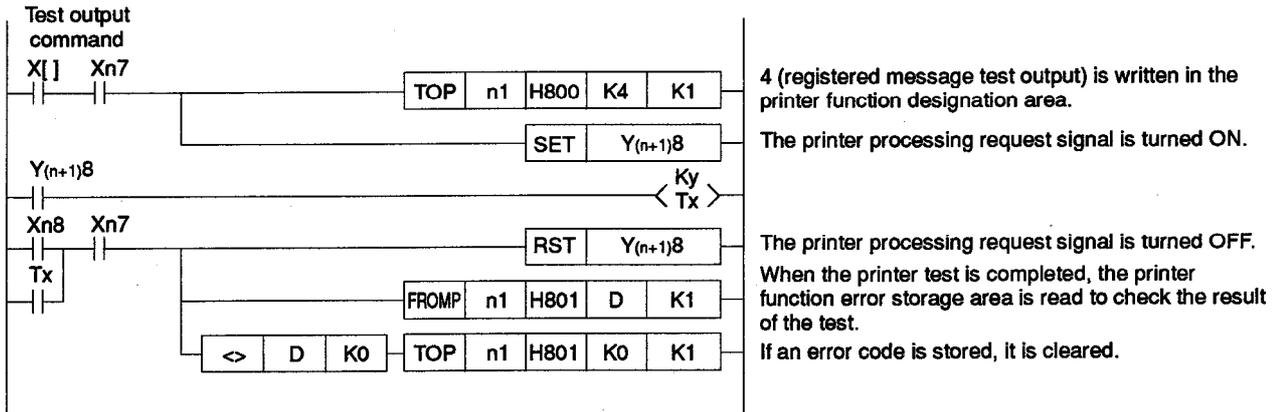
(2) Program for test output

The format of the basic sequence program for test output from the PC CPU and a program example are shown below:

(a) Basic sequence program format

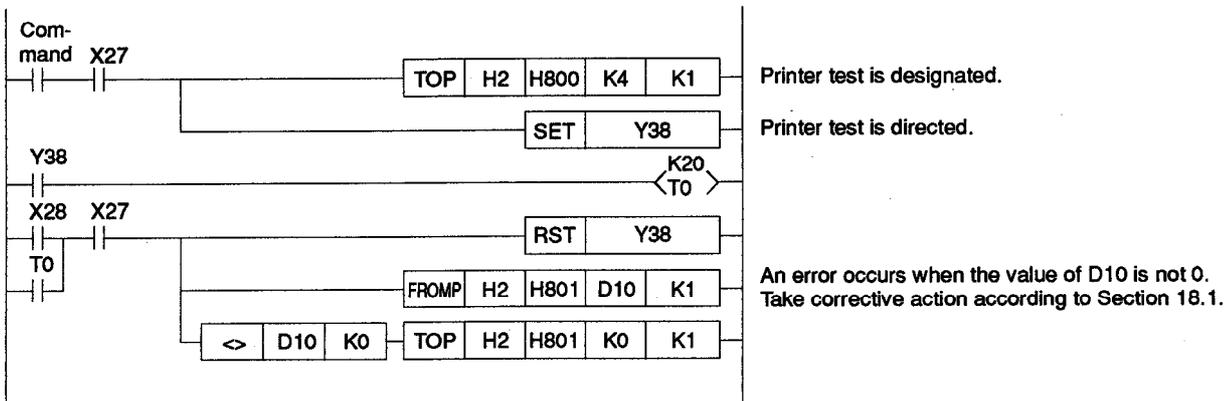
For details, refer to the Programming Manual (Common Instructions).

Format



(b) Programming example

Program for test output when computer link module I/O signals are allocated to 20H to 3FH.



Registered message test output example

```

**** 001 ****
MITSUBISHI
**** 002 ****
ELECTRIC
**** 003 ****
COMPUTER LINK
**** 004 ****
MODULE
    
```

17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

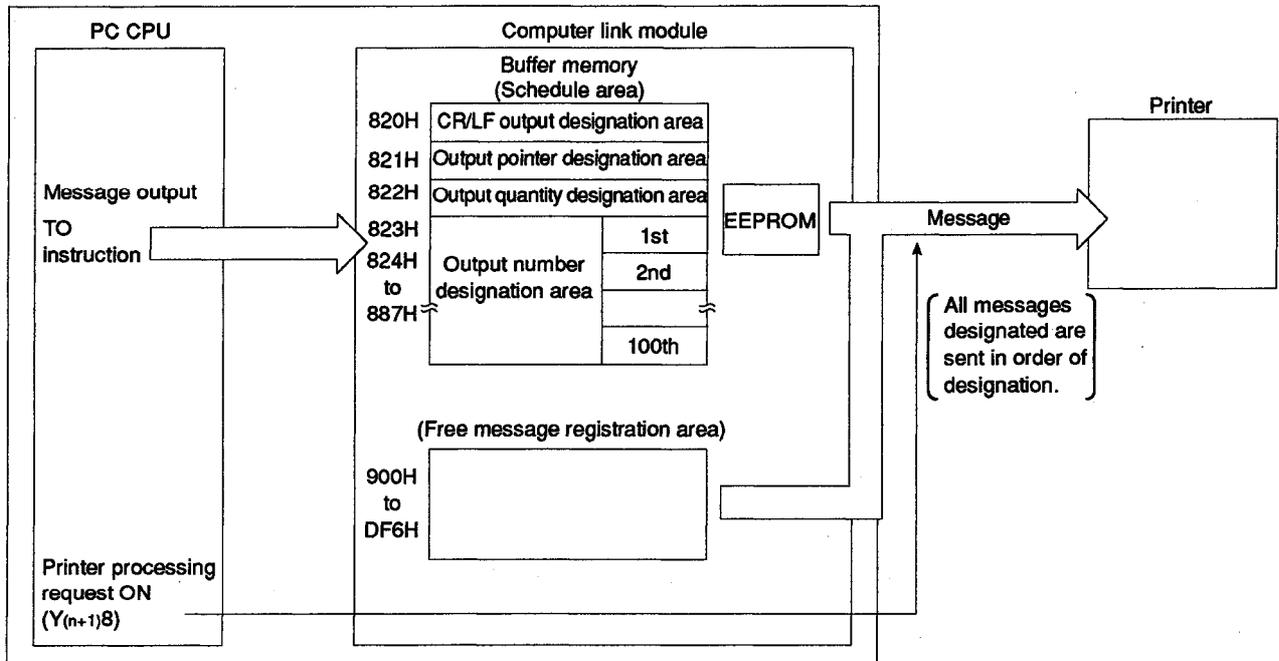
Function	Printer function						A1SCPU C24-P2	A2CCPU C24	A2CCPU C24-PRF
	A1S17UC24	A1S171UC24		A1S171C24		A1S171C24			
Application module	-R2	-R4	-PRF	-R2	-R4	-PRF			
Remarks			0			0			0

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17.7 Message Output to the Printer

This section describes how to send to the printer fixed messages registered from the PC CPU or computer and free messages registered from the PC CPU when the system is in operation.

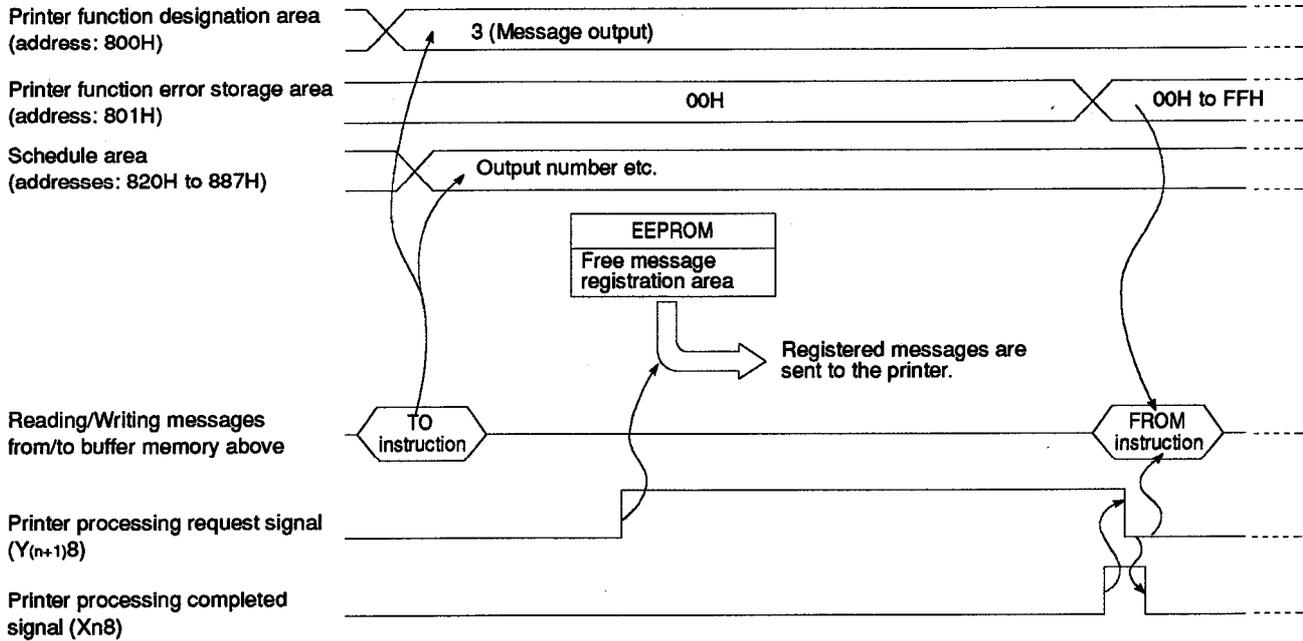
Up to 100 fixed messages or free messages (or both) can be sent at a time by designating them in the buffer memory schedule area (addresses: 820H to 887H).



17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

(1) Procedure for message output

The procedure for sending fixed and free messages registered with the computer link module to the printer is shown below:



(2) Program for sending messages to printer

The format of the basic sequence program for sending registered messages from the PC CPU to the printer and a program example are shown below:

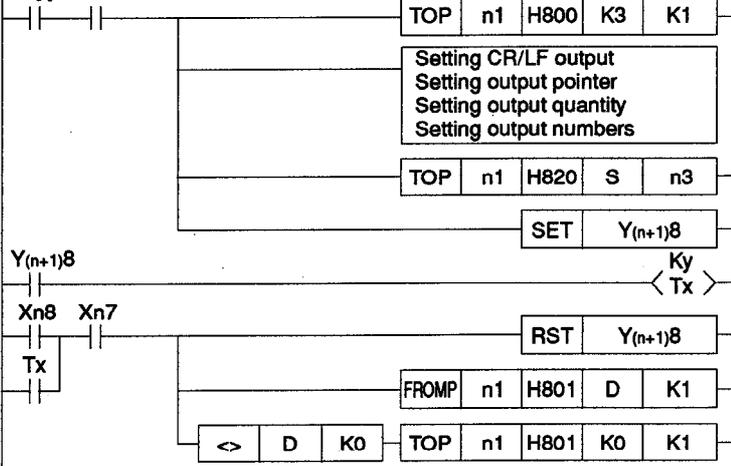
(a) Basic sequence program format

For details, refer to the Programming Manual (Common Instructions).

Format

Output command

X[] Xn7



3 (message output) is written in the printer function designation area.

The above set data is written in the schedule area

The printer processing request signal is turned ON.

The printer processing request signal is turned OFF. When messages output to the printer is completed, the printer function error storage area is read to check the result of the output.

If an error code is stored, it is cleared.

POINTS

(1) Described below is the outline of what should be designated in the buffer memory schedule area.

For details of designation, refer to Section 17.2.1 (2) (e).

(a) CR/LF output designation area (address: 820H)

- This area is used to designate whether the CR (code: 0DH) and the LF (code: 0AH) should be sent from the computer link module after an 80-character message without these codes is transmitted (or after two or more messages are transmitted). (Refer to Section 17.2.4 (4).)
- To send the CR and the LF, set "1" in the CR/LF output designation area.

(b) Output pointer designation area (address: 821H)

- This area is used to designate the address in the output number designation area, where the message number to be sent first is stored, to send the messages designated in the area in order of designation.
- Set "0" for the first output number designation area (address: 823H), and a number between "0" and "99" in the output pointer designation area.

(c) Output quantity designation area (address: 822H)

- This area is used to designate how many messages will be sent from the address designated in the output pointer designation area in sending messages to the printer in order of designation in the output number designation area.
- Set a number between "1" and "100" in the output quantity designation area.

(d) Output number designation area (addresses: 823H to 887H)

- This area is used to designate the message numbers (registration numbers) in the order in which they will be sent to the printer.
- Set the following designation values in the output number designation area:

Type of Message	Message No.	Designation Value	Remarks
Fixed message	1 to 400	0001H to 0190H (1 to 400)	Set as they are.
Free message	1 to 31	800H to 801FH (-32767 to -32737)	Set 8000H and each message number together.

(Designation example)

When sending messages designated at addresses 82DH to 831H (11th to 15th addresses) in the output number designation area to the printer without CR/LF output

- CR/LF output designation area (address: 820H) 0
- Output pointer designation area (address: 821H) 10
- Output quantity designation area (address: 822H) 5
- Output number designation area (addresses: 82DH to 831H)
..... Desired message number to each address

17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

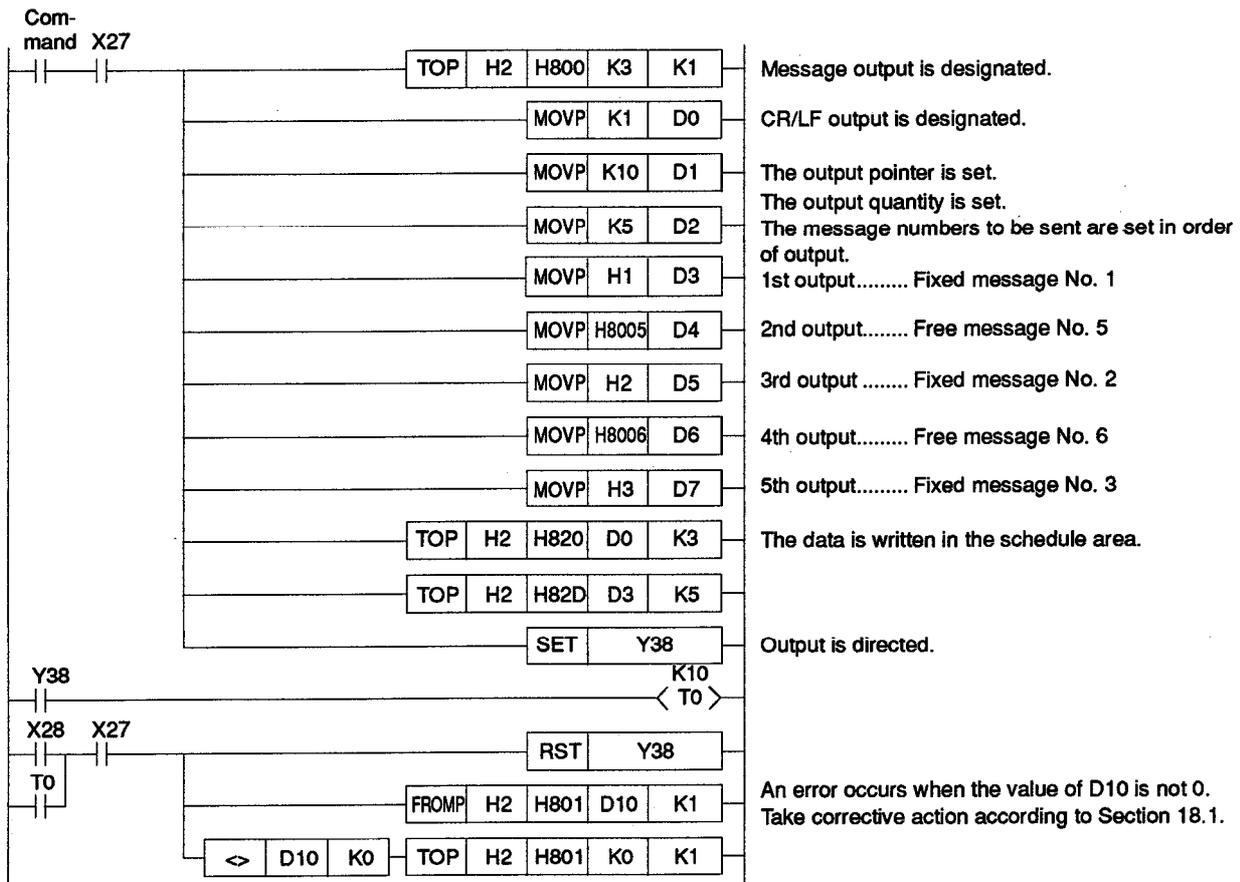
REMARK

When the printer processing interrupt signal (Y_{(n+1)C}) is turned ON in the middle of registered message output to the printer, the output will be suspended. After the signal is turned OFF, the output will restart.

(b) Programming example

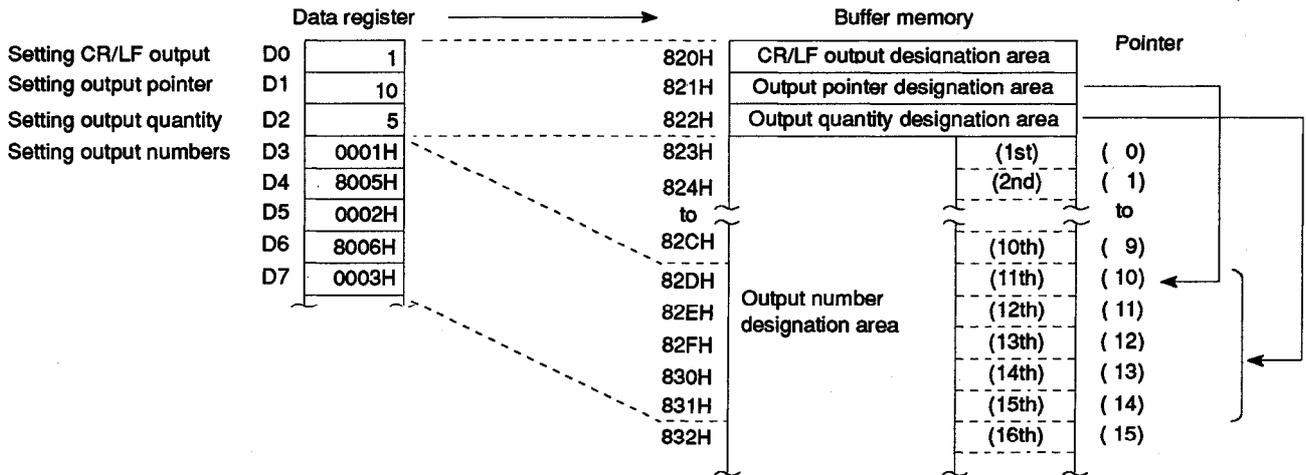
Program for sending messages to the printer when computer link module I/O signals are allocated to 20H to 3FH.

- Example of sending five messages in the order in which they are stored at addresses 82DH to 831H in the output number designation area



17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

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17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

Function	Printer function							
	A1S71UC24	A1S71UC24		A1S71C24		A1SCPU C24-PRF	A2CCPU C24	A2CCPU C24-PRF
Applicable module		-R2	-R4	-PRF	-R2	-R4	-PRF	0
Remarks			0			0		0

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17.8 Example of Program for Message Output to the Printer Using the Printer Functions

An example of a sequence program for sending the message shown in the output example below to the printer using the printer functions is shown below:

- (1) Printer used A7PR
- (2) Mode setting switch 5
- (3) Setting switches (transmission specifications etc.)

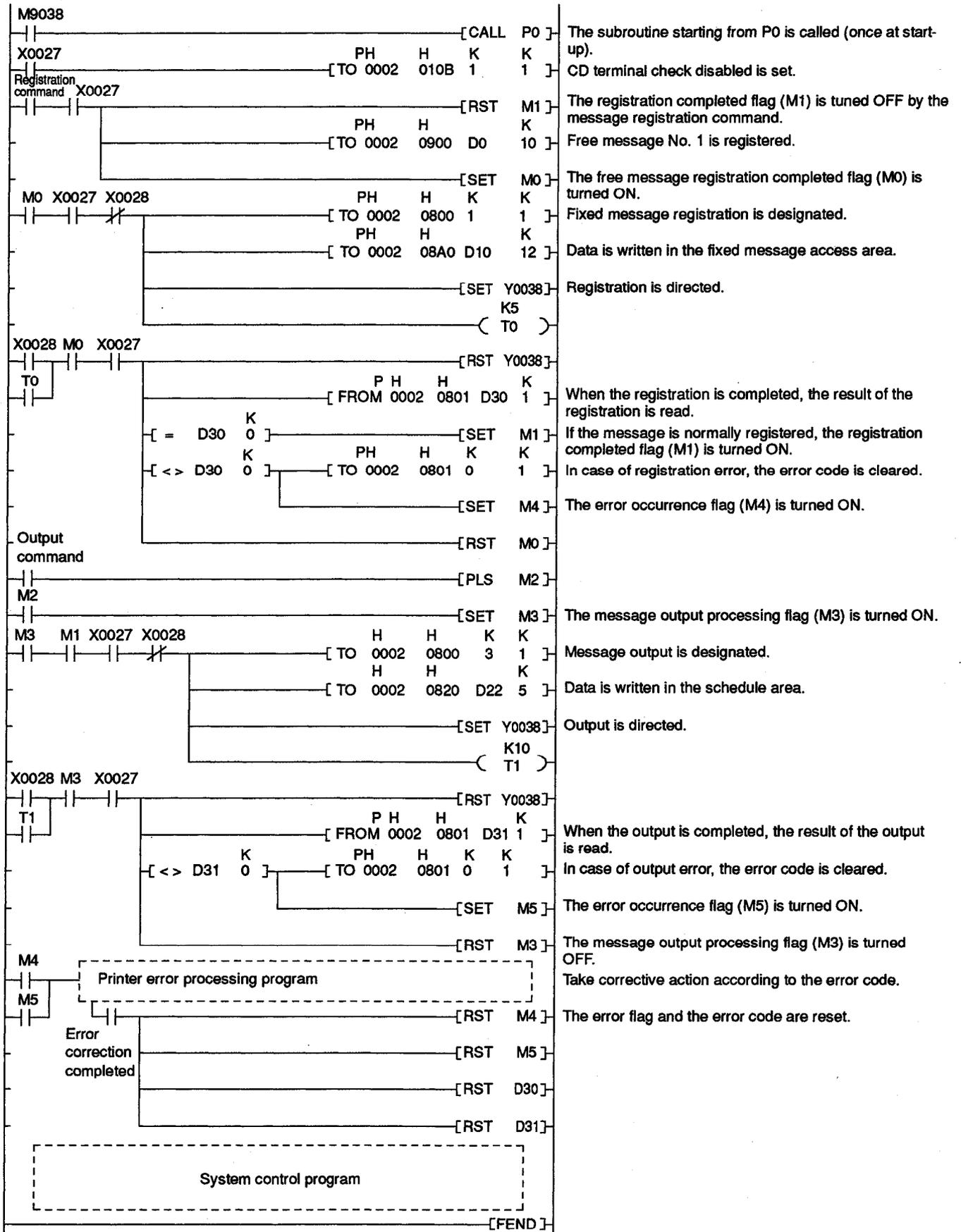
Setting Items	Setting Contents	A1S71UC24-PRF A1S71C24-PRF		A2CCPUC24-PRF	
		Setting Switch	Setting	Setting Switch	Setting
Unused	—	SW03	OFF	—	
Write during RUN enabled/disabled setting	Enabled	SW04	ON	SW20	OFF
Transmission speed setting	9600BPS	SW05	ON	SW11	ON
		SW06	OFF	SW12	OFF
		SW07	ON	SW13	ON
Data bit setting	8 bit	SW08	ON	SW14	ON
Parity bit setting	Set	SW09	ON	SW15	ON
Even/odd parity setting	Even parity	SW10	ON	SW16	ON
Stop bit setting	1 bit	SW11	OFF	SW17	OFF
Sum check setting	Not set	SW12	OFF	SW18	OFF
Main channel setting	RS-232C	—		SW19	OFF

- (4) Output example
System operation suspension

17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

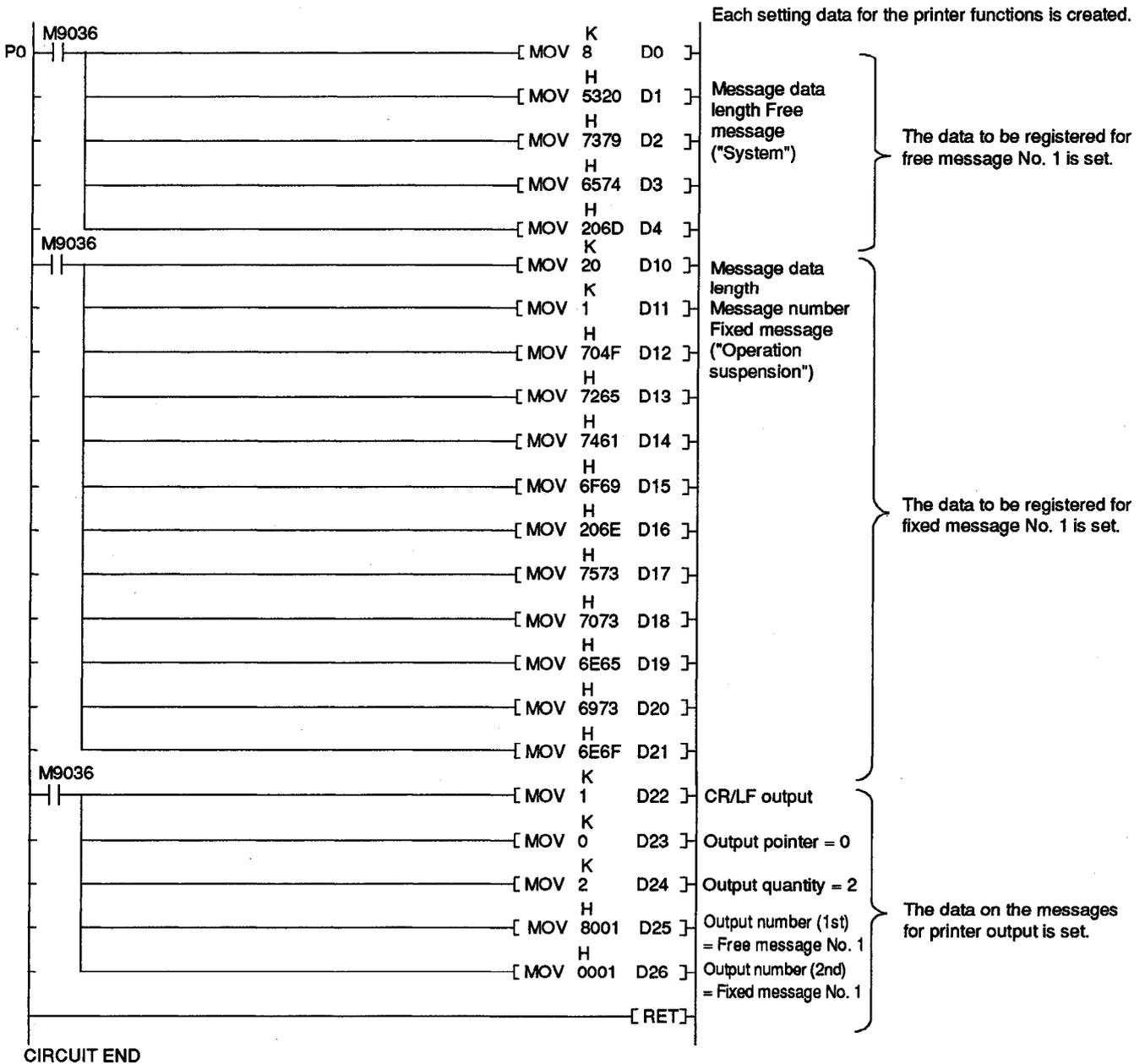
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(5) Sequence program example



17. MESSAGE PRINTING METHOD USING PRINTER FUNCTIONS

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18. TROUBLESHOOTING OF PRINTER FUNCTIONS

Function	Printer function									
	AJ71UC24	A1SJ71UC24			A1SJ71C24			A1SCPU C24-R2	A2CCPU C24	A2CCPU C24-PRF
Applicable module	-R2	-R4	-PRF	-R2	-R4	-PRF				
Remarks			○			○				○

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18. TROUBLESHOOTING OF PRINTER FUNCTIONS

18.1 Error codes when using a printer function

Table 18.1 gives the error codes, error contents, and corrective actions for errors which occur when using a printer function.

If an error code exists in the printer function error storage area (address: 801H) of the buffer memory, write "0" to the area after the PC CPU turns OFF the printer processing request signal (Y(n+1)B). (The printer functions are unavailable unless the existing error code is cleared from the area.)

Table 18.1 Error Code List

Error Code (Hexadecimal)	Error Description	Corrective Actions
00H	No error	—
01H	Function designation error	The number designated at buffer memory address 800H is not within the following range: 0 ≤ designated number ≤ 5 . Designate a number between 0 and 5.
02H	Designated number error	The designated message number is not in the following range: 0 < Designated number ≤ 400 Set the designated number in this range.
03H	Number of characters (Message data length) error	The designated number of characters is not in the following range: 0 < Number of characters ≤ 80 Set the number of characters in this range.
04H	Number of outputs error	The designated number of outputs is not in the following range: 0 < Number of outputs ≤ 99 Set the number of outputs in this range.
05H	Message designation error	The designated message does not exist in the free/fixed message areas. Designate a registered message number.
06H	EEPROM error	The designated fixed message is not written correctly in EEPROM. Check, correct, and rewrite it to EEPROM.
07H	Interruption	Because the printer processing interrupt signal (Y(n+1)C) is turned ON, printer output is interrupted. To restart printer output, turn OFF the signal.
08H	Printer processing error	The printer processing request signal (Y(n+1)B) turns ON but does not turn OFF before the printer processing completed signal (XnB) turns ON.
09H	Mode setting error	The mode setting switch is not set to a number from "5" to "8". Set it to "5" to "8".
30H	EEPROM write error	The writing frequency to the same area exceeds 100,000 cycles. Replace the module.
FFH	Buffer write error	An error occurred during data communications with a PC CPU. Reset the PC CPU and retry communications.

18. TROUBLESHOOTING OF PRINTER FUNCTIONS

Function	Printer function					
	A1S/J1UC24		A1S/J1UC24		A1S/J1UC24	
Applicable module	-R2	-R4	-PRF	-R2	-R4	-PRF
Remarks			0			0

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18.2 Indications of LEDs in Case of Trouble and Corrective Action

The following table shows corrective action to take when an LED indicates an error:

	LED Name	Normal State	Corrective Actions	
			During Communications Using Dedicated Protocol	During Output Using Printer Functions
—	RUN	ON	<ul style="list-style-type: none"> Examine the transmission speed setting (refer to Section 4.2.2). Check the mode setting switch (refer to Section 4.2.1) for set number (refer to Section 16.7.2). Take corrective action according to Section 13.4.2. 	
RS-232C interface	SD	Flashes during transmission	<ul style="list-style-type: none"> Examine the RS-232C connector cable connections (refer to Section 4.6.2.) by setting CD terminal check enabled. Check the states of the signals at the RS-232C interface in half-duplex transmission (refer to Section 10). Examine the RS-232C connector cable connections (refer to Section 4.6.2). 	
	NEU	OFF	<ul style="list-style-type: none"> Check the mode setting switch (refer to Section 4.2.1) for set number (refer to Section 16.7.2). 	
RS-422 interface	NEU	ON during waiting for ENQ	<ul style="list-style-type: none"> Check the mode seswitch (refer to Section 4.2.1) for set number (refer to Section 16.7.2). Examine the quantity of message data transmitted from the computer (refer to Section 5). Consult your nearest Mitsubishi representative. 	—
	ACK	ON after ACK transmission	Check on the computer the error code received immediately after an NAK or NN code was sent, and take corrective action according to Section 13.1.	—
	NAK	OFF		
	SD	Flashes during transmission	<ul style="list-style-type: none"> Check the mode setting switch (refer to Section 4.2.1) for set number (refer to Section 16.7.2). Check the communications status in DC1/DC3 receive control (refer to Section 9.2.3). 	
	RD	Flashes during receive	<ul style="list-style-type: none"> Examine the RS-422 connector cable connections (refer to Section 4.6.3). Check the communications status in DC1/DC3 transmission control (refer to Section 9.2.2). 	
	C/N	OFF	<ul style="list-style-type: none"> Check the write during RUN enabled/disabled setting (refer to Section 4.2.2). Take corrective action according to Section 13.4.4. The LED goes OFF by writing 16 to buffer memory address 102H in the computer link module. 	
	P/S	OFF	<ul style="list-style-type: none"> Match the transmission specifications of the computer link module (refer to Section 4.2.2) with those of the external device. The LED goes OFF by writing 32 to buffer memory address 102H in the computer link module. 	
			<ul style="list-style-type: none"> Examine how the sum check code should be treated (refer to Sections 4.2.2 and 5.4.6 (10)). Examine the calculation of the sum check code on the computer (refer to Section 5.4.6 (10)). 	—

18. TROUBLESHOOTING OF PRINTER FUNCTIONS

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	LED Name	Normal State	Corrective Actions	
			During Communications Using Dedicated Protocol	During Output Using Printer Functions
RS-422 interface	PRO	OFF	<ul style="list-style-type: none"> The LED goes OFF by writing 64 to buffer memory address 102H in the computer link module. Check the mode setting switch (refer to Section 4.2.1) for set number. Examine the transmitted message on the computer (refer to Section 5). Take corrective action according to Section 13.1. 	
	SIO	OFF	<ul style="list-style-type: none"> Match the transmission specifications of the computer link module (refer to Section 4.2.2) with those of the external device. Decelerate the transmission speed The LED goes OFF by writing 128 to buffer memory address 102H in the computer link module. 	
	CPU R/W	ON/Flashes	<ul style="list-style-type: none"> Examine the program for the PC CPU and the computer. Check the PC CPU and the computer for status. Check the mode setting switch (refer to Section 4.2.1) for set number (refer to Section 16.7.2). Consult your nearest Mitsubishi representative. 	

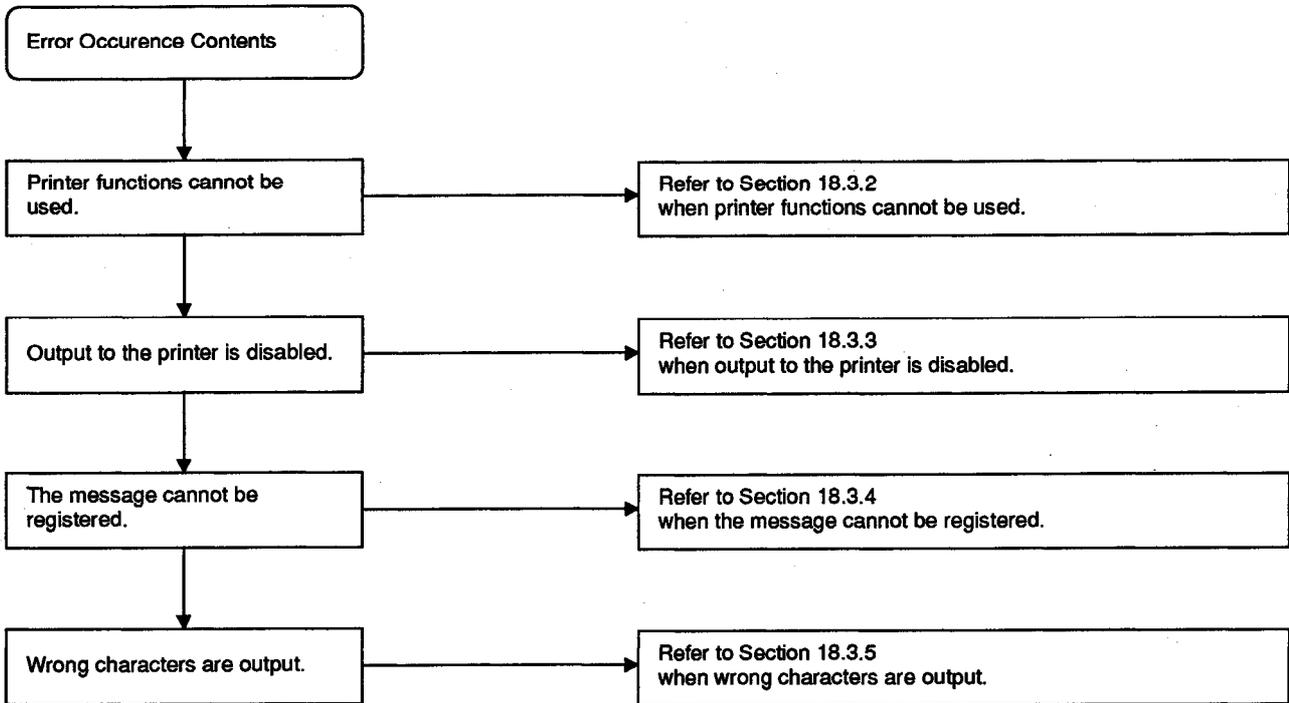
18. TROUBLESHOOTING OF PRINTER FUNCTIONS

Function	Printer function								
	A1S/J1UC24			A1S/J1TC24			A1SCPU	A2CCPU	A2CCPU
Applicable module	-R2	-R4	-PRF	-R2	-R4	-PRF	C24-R2	C24	C24-PRF
Remarks			O			O			O

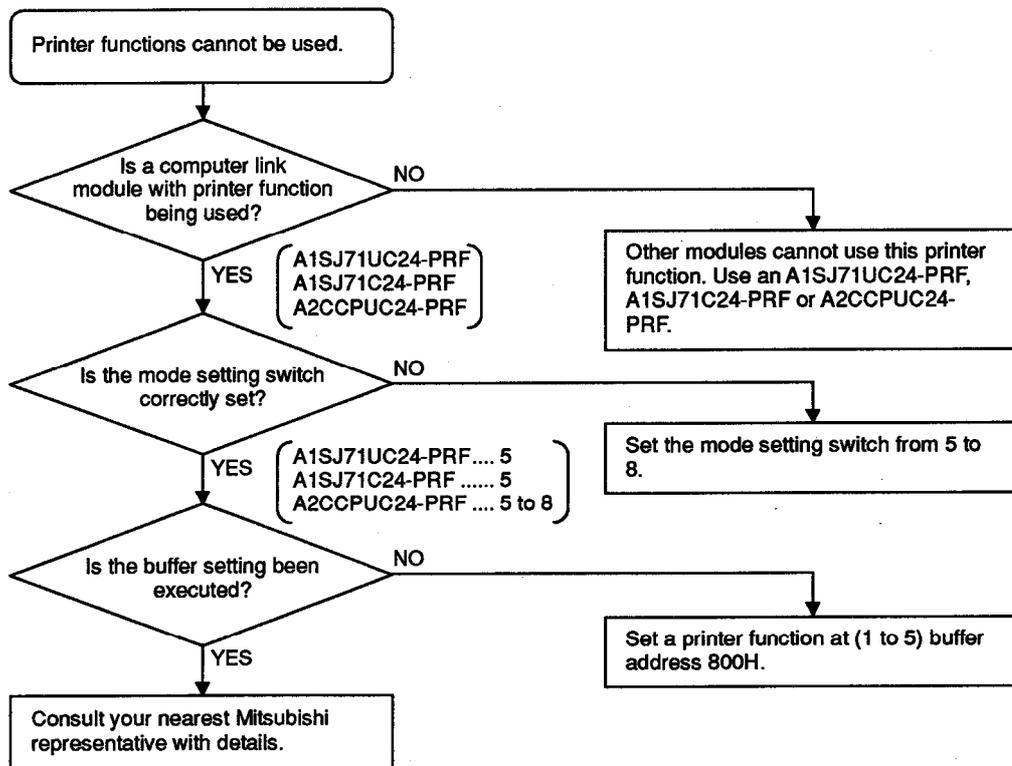
MELSEC-A

18.3 Troubleshooting

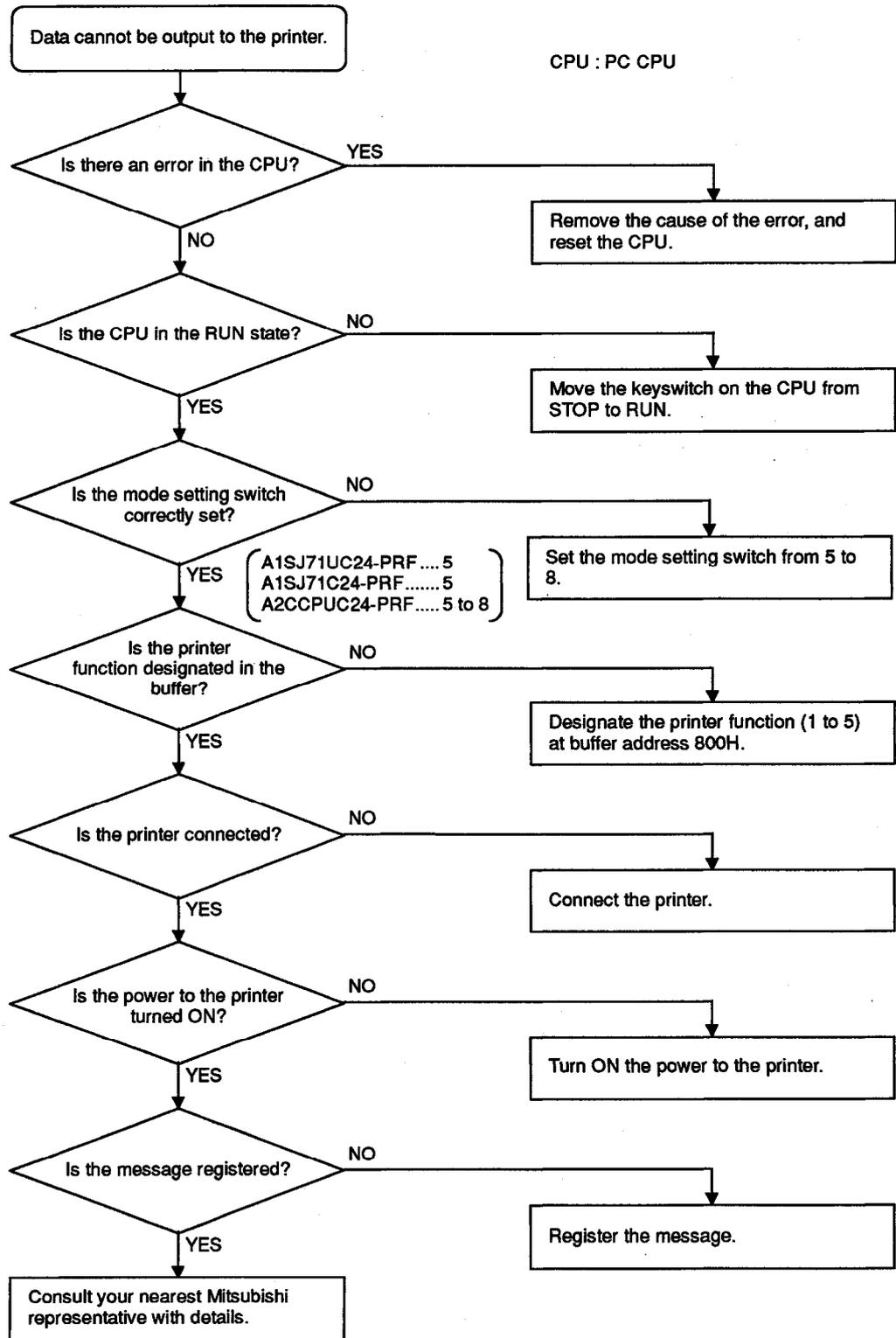
18.3.1 Troubleshooting flow chart



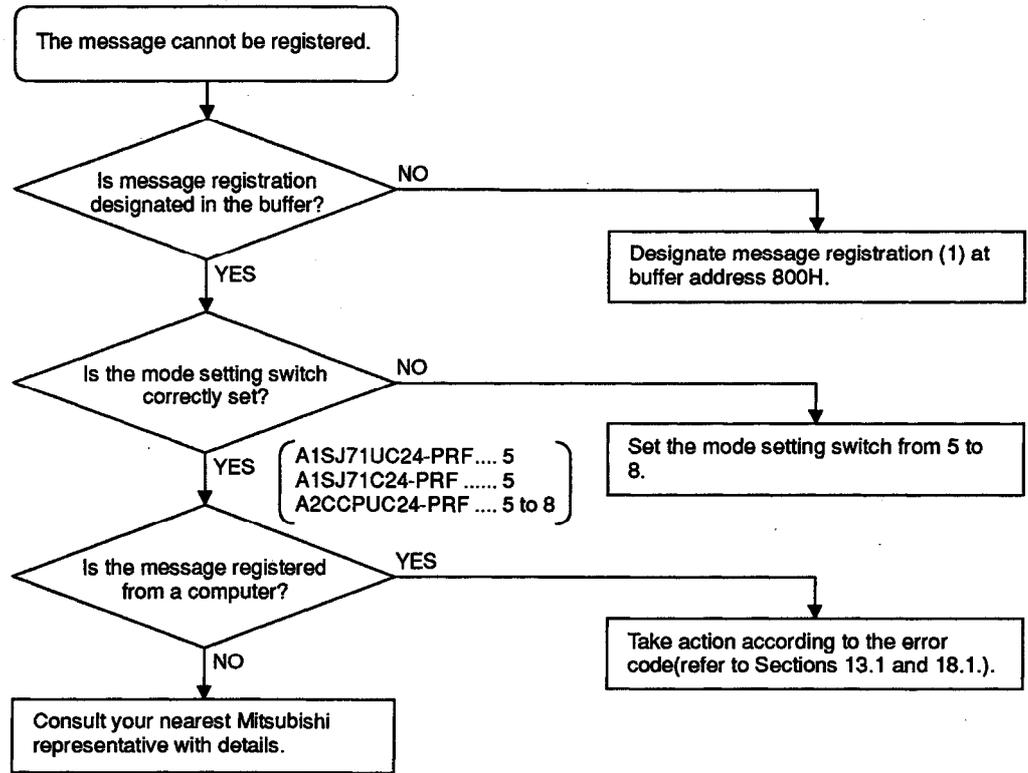
18.3.2 When printer functions cannot be used



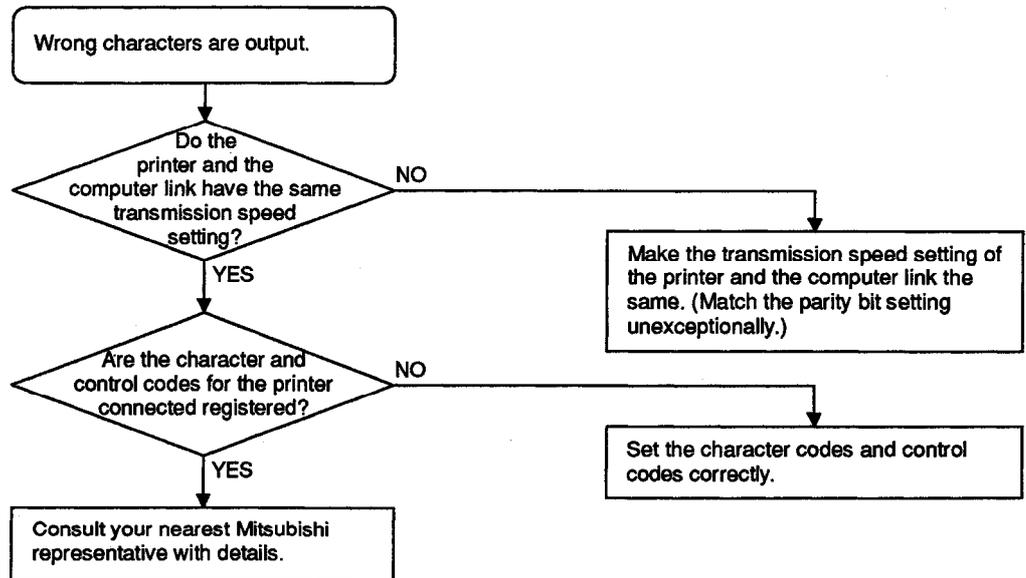
18.3.3 When output to the printer is disabled



18.3.4 When the message cannot be registered



18.3.5 When wrong characters are output



APPENDICES

This part describes ASCII code table, communication time between a CPU and a computer link, and the A-series special function module buffer addresses.

APPENDICES

APPENDIX 1 ASCII CODE TABLE

The following is the ASCII character codes table (7-bit codes).

Among ASCII character codes 00H and 1FH, those indicated by ★ are used as control codes for the computer link module. (DC codes 11H to 14H can be changed by the user.)

		MSD	0	1	2	3	4	5	6	7
			000	001	010	011	100	101	110	111
0	0000		NUL ★	DLE	SP	0	@	P		p
1	0001		SOH	DC1 ★	!	1	A	Q	a	q
2	0010		STX ★	DC2 ★	"	2	B	R	b	r
3	0011		ETX ★	DC3 ★	#	3	C	S	c	s
4	0100		EOT ★	DC4 ★	\$	4	D	T	d	t
5	0101		ENQ ★	NAK ★	%	5	E	U	e	u
6	0110		ACK ★	SYN	&	6	F	V	f	v
7	0111		BEL	ETB	/	7	G	W	g	w
8	1000		BS	CAN	(	8	H	X	h	x
9	1001		HT	EM	)	9	I	Y	i	y
A	1010		LF ★	SUB	*	:	J	Z	j	z
B	1011		VT	ESC	+	;	K	[	k	{
C	1100		FF ★	FS	,	<	L	\	l	|
D	1101		CR ★	GS	-	=	M	]	m	}
E	1110		SO	RS	.	>	N	↑	n	~
F	1111		SI	VS	/	?	O	←	o	DEL

APPENDIX 2 COMMUNICATION TIME BETWEEN A PC CPU AND A COMPUTER LINK MODULE (SCAN TIME INCREASE)

In response to a request from the computer link module using a dedicated protocol, the PC CPU, while running, processes as much data as it can deal with in a cycle of processing, which is described in Section 3.2.1, every time the END instruction is executed.

The intervening times (i.e. by how much the scan time increases) for each processing operation and its corresponding processing times (indicated in number of scans) are shown below. (For the scan time, refer to (2) of POINTS.)

(1) ACPU common command

Item				Com- mand	Intervening Times [ms] (Scan Time Increases)					Scan Count Required for Processing
					A0J2H, A1S, A1N, A2N, A3N	A3H	AnA	AnU	Access Data Unit	
Device data	Device memory	Batch read	Bit units	BR	0.76 ms	0.57 ms	1.38 ms	1.95 ms	256 devices	1 scan (2 scans for device "R" only)
			Word devices	WR	1.13 ms	0.81 ms	2.42 ms	3.51 ms	64 devices	
		Batch write	Bit units	BW	1.13 ms	0.94 ms	1.06 ms	1.65 ms	160 devices	2 scans (1 scan when "enable during RUN" is set [excluding R])
			Word devices	WW	1.13 ms	0.84 ms	2.60 ms	3.90 ms	64 devices	
		Test (random write)	Bit units	BT	1.13 ms	0.90 ms	1.06 ms	1.55 ms	20 devices	2 scans (1 scan when "enable during RUN" is set [excluding R])
			Word devices	WT	1.13 ms	0.90 ms	1.06 ms	0.95 ms	10 devices	
	Monitor data regist- ration	Bit units	BM	—	—	—	—	—	—	
		Word devices	WM	—	—	—	—	—	0 scan (1 scan for device "R" only)	
	Monitor	Bit units	MB	2.02 ms	0.93 ms	1.46 ms	0.70 ms	40 devices	1 scan	
		Word devices	MN	2.08 ms	0.96 ms	1.47 ms	0.70 ms	20 devices		
	Extension file register	Batch read		ER	1.27 ms	0.76 ms	2.42 ms	5.00 ms	64 devices	2 scan (3 scans for ET [only AnA/AnUCPU])
		Batch write		EW	1.27 ms	0.76 ms	2.60 ms	5.40 ms	64 devices	
		Test (Random write)		ET	1.31 ms	0.87 ms	0.97 ms	1.75 ms	10 devices	
		Monitor data registration		EM	—	—	—	—	—	—
Monitor		ME	1.75 ms	0.98 ms	1.42 ms	0.85 ms	20 devices	1 scan		
Buffer memory	Batch read		CR	—	—	—	—	—	—	
	Batch write		CW	—	—	—	—	—	—	
Special function module buffer memory		Batch read		TR	FROM instruction processing time + 1.13 ms	FROM instruction processing time + 0.81 ms	FROM instruction processing time + 0.75 ms	FROM instruction processing time + 1.20 ms	128 bytes	1 scan
		Batch write		TW	FROM instruction processing time + 1.13 ms	FROM instruction processing time + 0.81 ms	FROM instruction processing time + 0.75 ms	FROM instruction processing time + 1.20 ms	128 bytes	2 scans (1 scan when "enable during RUN" is set)

Item				Com- mand	Intervening Times [ms] (Scan Time Increases)				Access Data Unit	Scan Count Required for Processing	
					A0J2H, A1S, A1N, A2N, A3N	A3H	AnA	AnU			
Pro- gram	Sequence program	Batch read	Main	MR	1.20 ms	0.78 ms	0.70 ms	1.10 ms	64 steps	1 scan	
			Sub	SR	1.20 ms	0.84 ms	0.70 ms	1.05 ms		2 scans (1 scan when "enable during RUN" is set)	
			Main	XR	1.20 ms	0.78 ms	0.70 ms	1.00 ms			
		Sub 1	1.20 ms		0.84 ms	0.70 ms	1.00 ms				
		Sub 2	—		—	—	1.10 ms				
		Sub 3	—	—	—	1.05 ms	2 scans				
		Batch write	Main	MW	1.35 ms	0.75 ms	0.70 ms	0.75 ms		128 bytes	2 scans
			Sub	SW	1.70 ms	0.76 ms	0.70 ms	1.45 ms			
			Main	XW	1.35 ms	0.75 ms	0.70 ms	0.90 ms			2 scans
	Sub 1		1.70 ms		0.76 ms	0.70 ms	1.30 ms				
	Sub 2		—		—	—	1.20 ms	2 scans			
	Sub 3		—		—	—	1.25 ms	—			
	Micro- computer program	Batch read	Main	UR	1.35 ms	0.76 ms	—	—	128 bytes	2 scans	
			Sub	VR	1.35 ms	0.76 ms					
		Batch write	Main	UW	1.35 ms	0.73 ms					
			Sub	VW	1.53 ms	0.73 ms					
	Comment	Batch read		KR	1.35 ms	0.76 ms	2.42 ms	4.90 ms	128 bytes	2 scans	
		Batch write		KW	1.53 ms	0.73 ms	2.60 ms	5.35 ms			
Para- meter	Batch read		PR	0.68 ms	0.50 ms	2.42 ms	4.95 ms	128 bytes	2 scans (4 scans for AnUCPU)		
	Batch write		PW	—	—	—	—	—	—		
	Analysis request		PS	—	—	—	—	—	—		
Programmable controller CPU	Remote RUN		RR	—	—	—	—	—	—		
	Remote STOP		RS	—	—	—	—	—	—		
	CPU type read		PC, PU	—	—	—	—	—	—		
Global				GW	—	—	—	—	—		

(2) AnA/AnUCPU common command

Item				Command	Intervening Times (Scan Time Increases)			Scan Count Required for Processing	
					AnA	AnU	Access Data Unit		
Device data	Device memory	Batch read	Bit units	JR	1.19 ms	1.60 ms	256 devices	1 scan (2 scans for device "R" only)	
			Word units	QR	2.07 ms	3.61 ms	64 devices		
		Batch write	Bit units	JW	0.99 ms	1.65 ms	160 devices	2 scans (1 scan when "enable during RUN" is set [excluding R])	
			Word units	QW	2.32 ms	0.80 ms	64 devices		
		Test (random write)	Bit units	JT	0.91 ms	1.85 ms	20 devices	2 scans (1 scan when "enable during RUN" is set [excluding R])	
			Word units	QT	0.93 ms	0.95 ms	10 devices		
	Monitor data registration	Bit units	JM	—	—	—	—		
		Word units	QM	—	—	—	1 scan for device "R" only		
	Monitor	Bit units	MJ	1.34 ms	0.70 ms	40 devices	1 scan		
		Word units	MQ	1.35 ms	0.70 ms	20 devices			
	Extension file register	Direct read			NR	2.30 ms	4.90 ms	64 devices	3 scans (4 scans when a set range covers several blocks)
		Direct write			NW	2.57 ms	5.25 ms	64 devices	
Pro- gram	Extension comment	Batch read		DR	2.31 ms	5.05 ms	128 bytes	2 scans	
		Batch write		DW	2.59 ms	5.45 ms			

(3) AnUCPU common command

Item			Command	Intervening Times (Scan Time Increases)		Scan Count Required for Processing
				AnU	Access Data Unit	
Network	Network registration		ZE	—	—	—
	Network read		ZR	—	—	—
	Routing parameter read		ZT	4.10 ms	—	1 scan

POINTS

- (1) The PC CPU can only process one of these operations with each END processing. If the A6GPP and computer link module access a given PC CPU at the same time, one processing must wait until the other processing is completed. Therefore, the scan count required for processing further increases (refer to Section 5.2.3 (2)).
- (2) Even though communications using computer link module is not performed, scan time increases 0.2 ms (0.1 ms with A3HCPU, AnACPU, and AnUCPU).

APPENDIX 3 SPECIAL FUNCTION MODULE BUFFER MEMORY ADDRESSES

The special function module buffer memory addresses are listed below. They are used to read and write (commands TR, TW) data to and from the special function module buffer memory with protocols 1 to 4.

(1) Formula

The following formula converts the address (hexadecimal) to be designated in a computer using the address for the FROM/TO instructions.

<p style="text-align: center;">Designated address (hexadecimal) =</p> <p style="text-align: center;">address used with FROM/TO instructions x 2 converted into hexadecimal + head address of each module</p>
--

The User's Manual for each module gives details about the addresses of FROM/TO instructions.

Calculation example 1:

To designate the head address (the designated address of the FROM/TO instructions is 100H) of the specific use area of the AJ71UC24

Designated address (600H) =

address used with FROM/TO instructions (100H) x 2
+ head address (400H)

Calculation example 2:

To designate the preset value storage address (the designated address of the FROM/TO instructions is 1H) of CH1 of the AD61 high-speed counter module

Designated address (82H) =

address used with FROM/TO instructions (1H) x 2
+ head address (80H)

(2) Linkable special function modules and module numbers

Special Function Module Name	Buffer Memory Head Address (hexadecimal)	Module Number When Loaded in Slot No. 0
AD61(S1) high-speed counter module	80H	01H
A616AD analog-digital converter module	10H	01H
A616DAI digital-analog converter module	10H	01H
A616DAV digital-analog converter module	10H	01H
A616TD temperature-digital converter module	10H	01H
A62DA(S1) digital-analog converter module	10H	01H
A68AD(S2) analog-digital converter module	80H	01H
A68ADN analog-digital converter module	80H	01H
A68DAV/DAI digital-analog converter module	10H	01H
A68RD3/4 temperature-digital converter module	10H	01H
A84AD analog-digital converter module	10H	02H
A81CPU PID control module	200H	03H
A61LS position detection module	80H	01H
A62LS(S5) position detection module	80H	02H
AJ71(P)T32(S3) MELSECNET/MINI master module	20H	01H

Special Function Module Name	Buffer Memory Head Address (hexadecimal)	Module Number When Loaded in Slot No. 0
AJ65BT11 CC-Link system master · local module	2000H (*2)	01H
AJ71C22(S1) multidrop link module	1000H	01H
AJ71C24(S3/S6/S8) computer link module	1000H	01H
AJ71UC24 computer link module	400H	01H
AD51(S3) intelligent communications module	800H	02H
AD51H(S3) intelligent communications module	800H	02H
AJ71C21(S1) terminal interface module	400H	01H
AJ71B62(S3) B/NET interface module	20H	01H
AJ71P41 SUMINET interface module	400H	01H
AJ71E71(S3) Ethernet interface module	400H (*3)	01H
AD51FD(S3) external fault diagnosis module	280H	02H
AD57G(S3) graphic controller module	280H	02H
AS25VS vision sensor module	100H	02H
AS50VS vision sensor module	100H	02H
AS50VS-GN vision sensor module	80H	02H
AD59(S1) memory card interface module	1800H (*1)	01H
AJ71ID1(2)-R4 type ID interface module	280H	01H
AD70(D)(S2) positioning module	80H	01H
AD71(S1/S2/S7) positioning module	200H	01H
AD72 positioning module	200H	02H
AD75P1(P2/P3)(S3) positioning module	800H	01H
AD75M1(M2/M3) positioning module	800H	01H
A1SD61 high-speed counter module	10H	01H
A1SD62(E/D(S1))high-speed counter module	10H	01H
A1S62DA digital-analog converter module	10H	01H
A1S62RD3/4 temperature-digital converter module	10H	01H
A1S64AD analog-digital converter module	10H	01H
A1SJ71(U)C24-R2(R4/PRF) computer link module	400H	01H
A1SD51S type intelligent communication module	800H	01H
A1SJ71ID1(2)-R4 type ID interface module	280H	01H
A1SJ71E71-B2/B5(S3) Ethernet interface module	400H (*3)	01H
A1SD70 positioning module	80H	01H
A1SD71-S2(S7) positioning module	200H	02H
A1SD75P1(P2/P3)(S3) positioning module	800H	01H
A1SD75M1(M2/M3) positioning module	800H	01H
A1S63ADA analog I/O module	10H	01H
A1S64TCTT(BW)-S1 type temperature control module	20H	01H
A1S64TCRT(BW)-S1 type temperature control module	20H	01H
A1S62TCTT(BW)-S2 type temperature control module	20H	01H
A1S62TCRT(BW)-S2 type temperature control module	20H	01H
A1S68DAV/A1S68DAI type digital-analog conversion module	20H	01H
A1S68AD type analog-digital conversion module	20H	01H
A1S68TD type thermocouple input module	20H	01H
A1SJ71PT32-S3 MELSECNET/MINI master module	20H	01H
A1SJ65BT11 CC-Link system master · local module	2000H (*2)	01H

- *1 Read/write of the memory area where a memory card accesses is possible by changing the bank of the memory card with Y10 and Y11, which are input/output signals between the PC CPU and the AD59 (S1).
- *2 To read or write the buffer memory to the applicable bank, switch the buffer memory bank with the input/output signal Y1C/Y1D applied between the PC CPU and AJ61BT11/A1SJ61BT11.
- *3 To read/write the fixed buffer and random access buffer to the applicable bank, switch the buffer memory bank (channel) with the input/output signal Y1C applied between the PC CPU and Ethernet interface module.

REMARK

The head addresses 400H and 1000H in the computer link module designated by the computer are the head addresses in the buffer memory for reading or writing data from or to a computer link module unconnected to the computer which requests the operation.

(3) Addresses in special function modules to be designated from the computer

The following tables show the addresses in some special function modules to be designated from the computer:

(For AD61 high-speed counter module)

Buffer Memory Contents	Address Set by Computer		Address Set with FROM/TO Instruction	
	Channel 1	Channel 2	CH1	CH2
Unused area (unavailable)	80H	C0H	0	32
	81H	C1H		
Preset value write (lower bits)	82H	C2H	1	33
Preset value write (middle bits)	83H	C3H		
Preset value write (higher bits)	84H	C4H	2	34
	85H	C5H		
Mode register	86H	C6H	3	35
	87H	C7H		
Present value read (lower bits)	88H	C8H	4	36
Present value read (middle bits)	89H	C9H		
Present value read (higher bits)	8AH	CAH	5	37
	8BH	CBH		
Set value read/write (lower bits)	8CH	CCH	6	38
Set value read/write (middle bits)	8DH	CDH		
Set value read/write (higher bits)	8EH	CEH	7	39
	8FH	CFH		

Function	Computer link function									
	AJ71UC24	A1S/AJ71UC24			A1S/AJ71C24			A1SCPU C24-R2	A2CCPU C24	A2CCPU C24-PRF
Applicable module	AJ71UC24	-R2	-R4	-PRF	-R2	-R4	-PRF			
Remarks	0									

APPENDIX4 COMPATIBILITY BETWEEN AJ71UC24 AND AJ71C24-S8 AND PRECAUTIONS FOR SIMULTANEOUS USE OF THESE MODULES

This appendix describes the compatibility of the AJ71UC24 computer link/multidrop link module with the AJ71C24-S8 computer link module and the usability of the AJ71C24-S8 programs for the AJ71UC24 as well as precautions for replacing or adding a module.

4.1 Compatibility

The AJ71UC24 and the AJ71C24-S8 are equivalent in size, and use the same installation method and basic programs (for the PC CPU and the computer). All the functions of the AJ71C24-S8 can be expected from the AJ71UC24 which additionally provides higher transmission efficiency.

4.2 Precautions for Utilizing the AJ71UC24 Instead of the AJ71C24-S8

Described below are precautions for replacing the AJ71C24-S8 with the AJ71UC24:

- (1) Connecting terminal resistors and setting the transmission specification setting switches

While the terminal resistance during communications through the RS-422 interface is set by switches on the AJ71C24-S8, terminal resistors suitable for communications are connected to the AJ71UC24 because communications is executed via the RS-422 or RS-485 interface.

Among the transmission specification setting switches, the SW23 and the SW24 are different as follows.

- (1) The ON/OFF positions for switches are reversed.
- (2) The switch functions are different:
 - AJ71C24-S8 : Terminal resistor present/absent setting
 - AJ71UC24 : Function selection, etc. (see Section 4.2.2)

To use an AJ71UC24 with the computer link/printer function, set SW23 to ON and SW24 to OFF.

- (2) I/O signals to the PC CPU

The AJ71UC24 is provided with the mode switching request signal (Y(n+1)9) and the mode switching completed signal (Xn9) which the AJ71C24-S8 does not have.

Normal mode switching from the PC CPU takes place in response to the mode switching request signal.

(3) When an error occurs after replacing the AJ71C24-S8 with the AJ71UC24

Thanks to its improved transmission efficiency, the AJ71UC24 can transmit data at a rate almost equal to the set transmission speed.

It can also receive data transmitted as fast as the set transmission speed.

(AJ71C24-S8's transmission efficiency: approx. 91% at 4800 BPS, approx. 84% at 9600 BPS, approx. 76% at 19200 BPS)

If a communications error occurs in the communicating device because of the increase in transmission efficiency and data cannot be transmitted or received normally after replacing the AJ71C24-S8 of a computer link system, which operated normally with it, with an AJ71UC24, take the following corrective action:

- (a) Lower the transmission speed.
- (b) Set the stop bit length properly according to the computer link system.
- (c) Examine the data receive software for the communicating device (to improve transmission efficiency).
- (d) Use an AJ71C24-S8 again to establish a computer link within the capability of its functions.

* Calculation of data transmission time (unit: second) ... Reference value
 Total number of bits to be transmitted = (number of start bits + number of data bits + number of parity bits + number of stop bits) x number of bytes to be transmitted
 Data transmission time = (total number of bits to be transmitted/set transmission speed)/transmission efficiency

4.3 Comparison of Functions

The following table shows the functions of the AJ71UC24 which are upgraded from those of the AJ71C24-S8 and are added:

Function	Module Type	AJ71C24-S8	AJ71UC24	Reference Section
Interface specifications		• RS-232C, RS-422	• RS-232C, RS-422/485	Section 3.1
New buffer memory		—	• The buffer memory stores the information about RS-232C signals and the settings of the switches on the AJ71UC24 (mode setting/station number setting/transmission specification setting switches).	Section 3.10
Mode switching function		• Normal mode switching	• Both normal mode switching and forced mode switching are possible.	Section 12
AnUCPU access function		• Access to all extension devices of the AnACPU is possible.	• Access to all extension devices of the AnUCPU is possible with an AnA/AnUCPU common command.	Section 3.2.1
Access function to another network through MELSECNET/10		Impossible	• Access to another network through the MELSECNET/10 network system is possible.	Section 5.15
Multidrop link function		Impossible	• A link system (multidrop link system) can be established between an inexpensive master station and a local or remote station through the RS-422/485 interface.	User's Manual (Multidrop Link Function)

APPENDIX 5 USING THE COMPUTER LINK MODULE WITH A QnA PROGRAMMABLE CONTROLLER

The restrictions and other information that applies when using the computer link module at a QnACPU station or at a remote station of a MELSECNET/10 network system are indicated in the table below.

(1) Availability of the data communication function

The table below shows whether the data communication function can be used between the PC in which the computer link module is mounted and the external device access station.

Station where Computer Link Module Mounted	External Device Access Station	Possibility of Communication with an External Device		
		Dedicated Protocol	No-protocol Mode	Bi-directional Mode
QnACPU station	Self station (Station where computer link module is mounted)	Communication with the device memory is possible within the AnACPU ranges.	Communication possible	Communication possible
	Other stations (Via MELSECNET/10)	When communicating with a QnACPU station, only the AnACPU device ranges in the device memory can be used for communication.	Communication not possible	Communication not possible
	Other stations (Via MELSECNET (II), Via MELSECNET/B)	When using PC CPUs other than QnACPU, the entire ranges indicated in the specifications in section 5 can be used.	Communication not possible	Communication not possible
MELSECNET/10 remote station	Self station (Station where computer link module is mounted)	Communication with the following devices in the device memory is possible: B, W, X, Y, special devices in the M9000's, special devices in the D9000's. Communication with special function modules is possible.	Communication not possible	Communication not possible
	Other stations (Via MELSECNET/10)	When communicating with a QnACPU station, only the AnACPU device ranges in the device memory can be used for communication. When using PC CPUs other than QnACPU, the entire ranges indicated in the specifications in section 5 can be used.	Communication not possible	Communication not possible

(2) Mountable number of modules

At a QnA type programmable controller, a maximum of 6 computer link modules can be mounted.

For the mounting of a computer link module, refer to 2.7.

(3) Communications using the dedicated protocol

Carry out data communication after confirming the usable commands specified in Section 3.2.1.

Data can be read or write to the device memory of the QnACPU within the device range of the AnACPU (Data cannot be read or write to the file registers, latch relays, and step relays).

(4) Communications in the no-protocol mode and bi-directional mode

Data communications between QnA CPU and an external device using a computer link module can be executed in the same manner as data communications between A series PC CPU and an external device.

POINT

Since the performance differs between QnA CPUs and A series PC CPUs, the response speed of the PC CPU to the read/write request which is output by the computer link module varies accordingly.

When using a computer link module by mounting it at a QnA type programmable controller, it is necessary to test the correctness of the operation.

APPENDIX 6 EXAMPLES OF COMPUTER LINK PROGRAMS

This appendix shows examples of sequence programs for data communications in the no-protocol mode described in Section 6 of the User's Manual (Computer Link Function).

For sequence program and computer program examples for data communications using a dedicated protocol and in the bidirectional mode, refer to the following guidebook (separately available).

The guidebook also includes sequence program and computer program examples for data communications in the no-protocol mode.

Computer Link Module Guidebook ... SH-3510

6.1 Examples of Sequence Programs for Data Communications in the No-protocol Mode

Shown below are sequence programs for sending data stored in the data register (D), link register (W), file register (R), etc. and the present values of the timer (T) and counter (C) to the printer in the no-protocol mode and printing them out on it.

(2) Protocol for converting data stored in a data register to printer output data

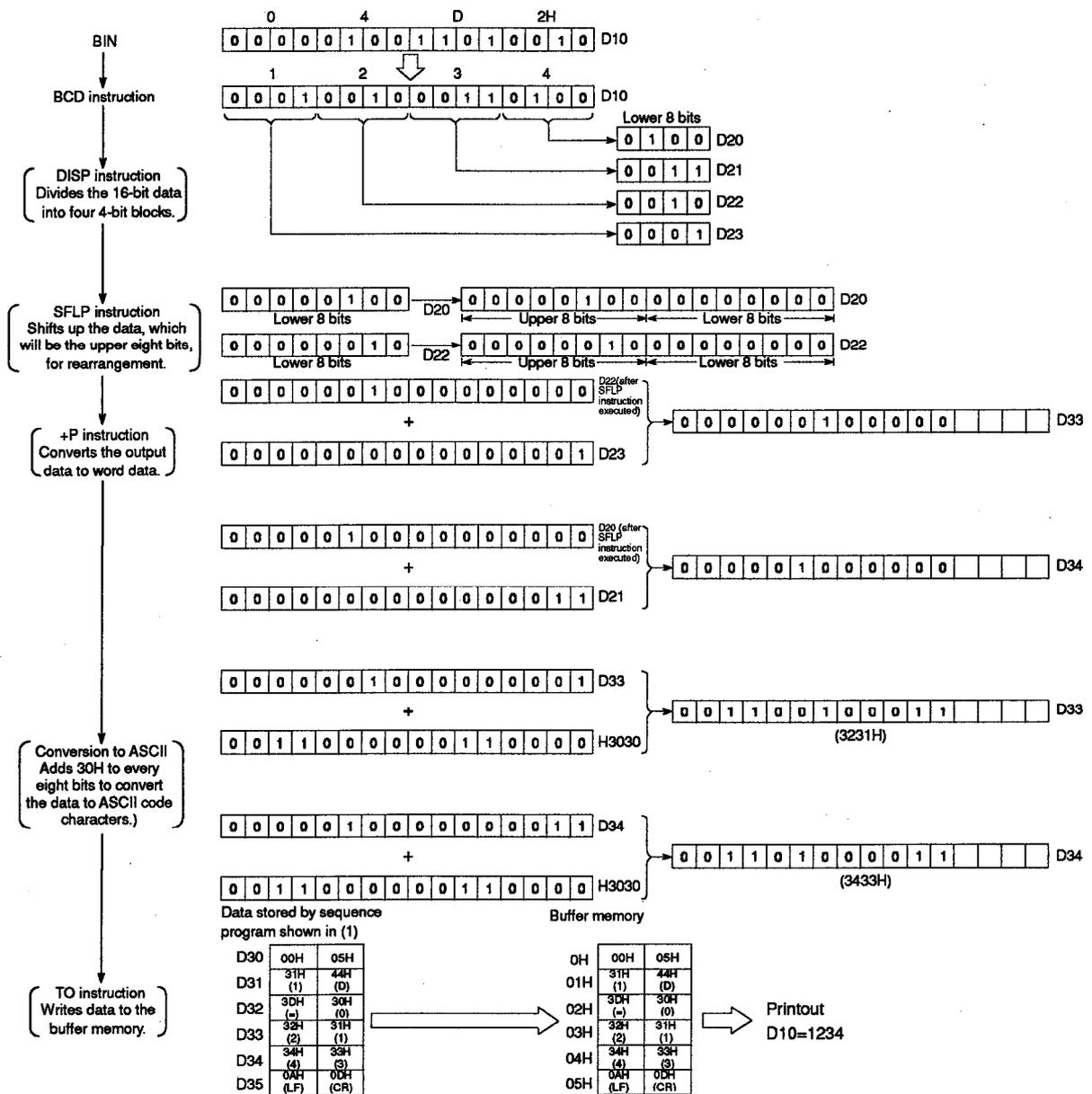
The PC CPU processes only binary numeric data.

It is, therefore, necessary to convert data to be printed out from BIN to ASCII. Data is transmitted from the lower eight bits first, then the upper eight bits from the buffer memory (from the lowest-numbered (head) to the highest-numbered addresses) to the printer.

The data must be rearranged in the desired order in which it will be transmitted on the sequence program.

The following is an example of a conversion protocol based on the sequence program shown in (1).

(Example) When converting data (1234) stored in a data register to ASCII code characters

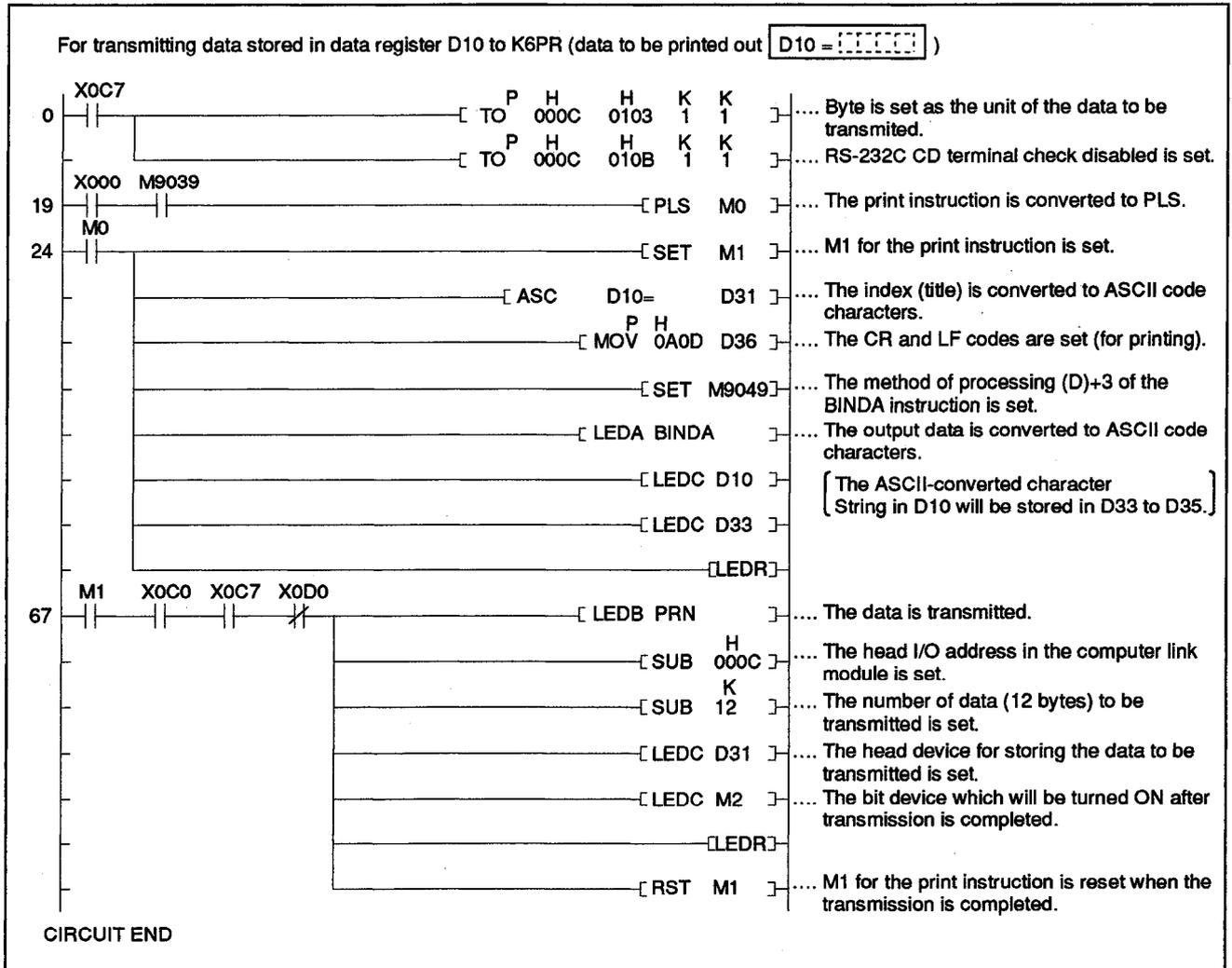


Function	Computer link function					
	A1S71UC24	A1S71UC24	A1S71UC24	A1S71UC24	A1SCPU C24-R2	A2CCPU C24
Applicable module	-R2	-R4	-PRF	-R2	-R4	-PRF
Remarks	0	0	0	0	0	0

6.1.2 Sequence program when dedicated instructions are used

The following is an example of a program for executing the same processing as performed by the sequence program shown in Appendix 6.1.1 by the use of AnA/AnUCPU dedicated instructions (BINDA, PRN).

(Computer link module I/O signals: C0H to DFH)



POINT

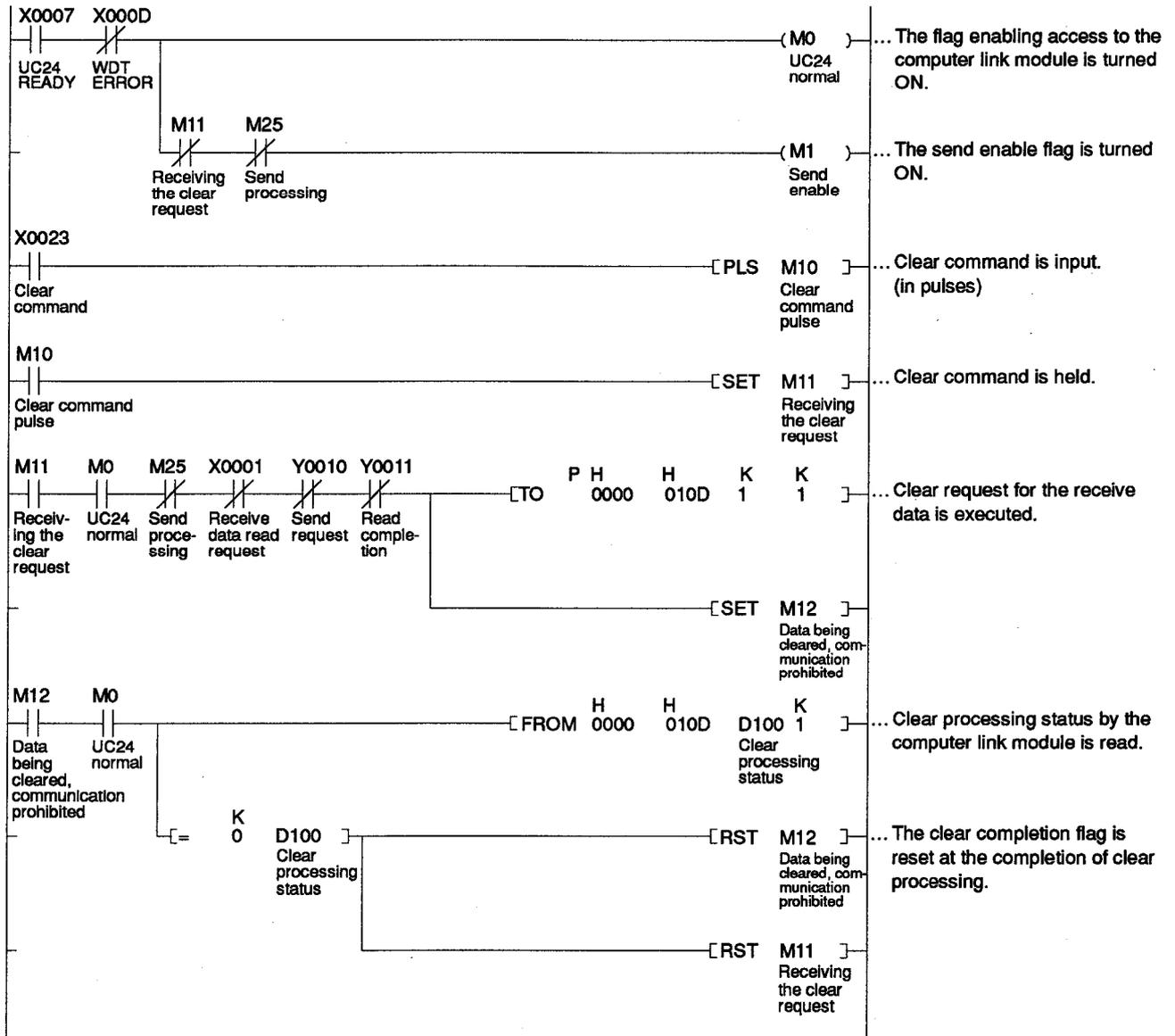
Before using a dedicated instruction for the computer link module, set the number of I/O points (F32 points) and the module type (refer to Section 6.4.2(2)) to the slot which holds the computer link module in it by I/O allocation of the parameters to be written to the PC CPU.

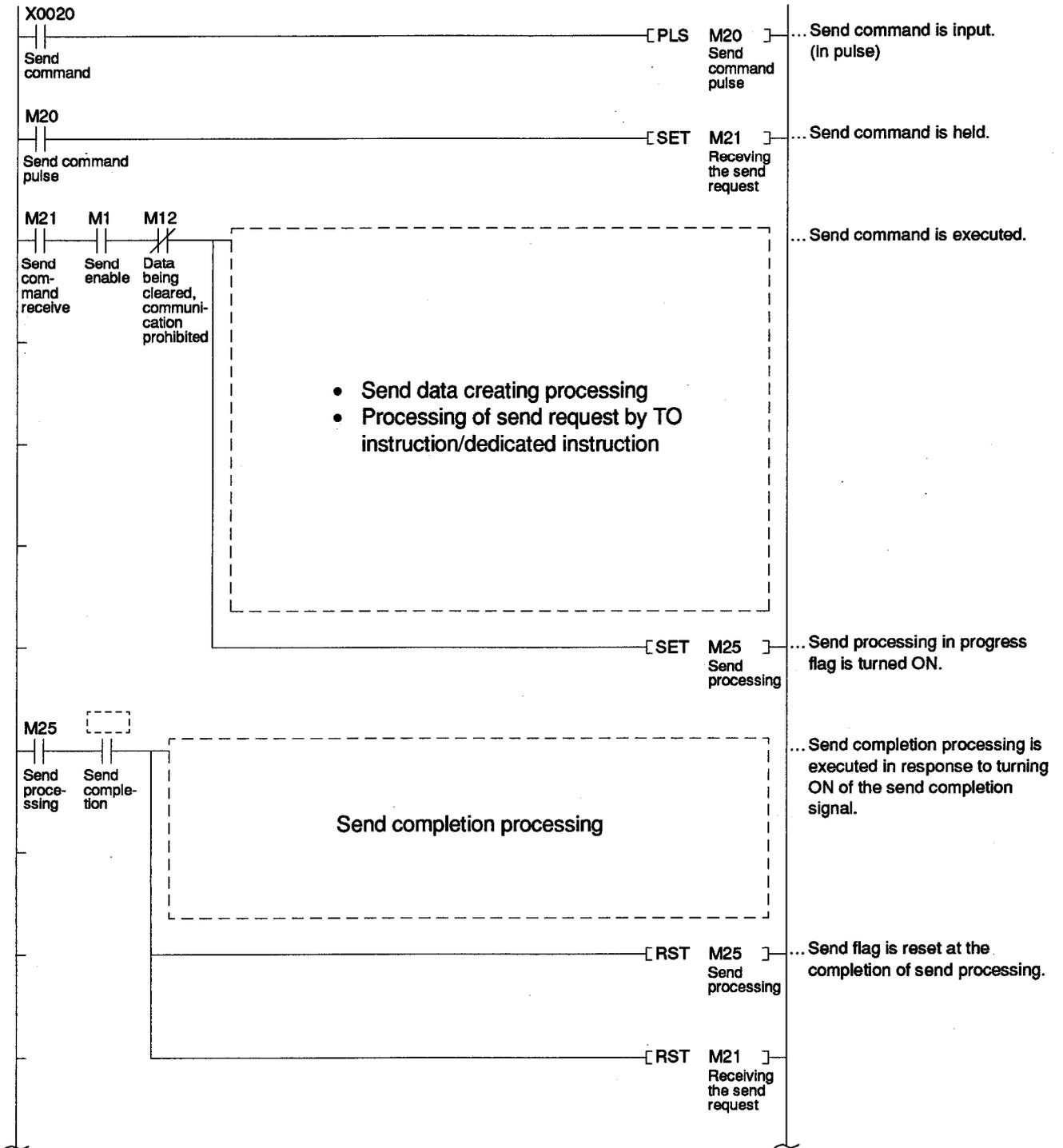
REMARK

For the transmission specifications of the computer link module for printer output, refer to Appendix 6.1.1.

6.1.3 Example of receive data clear processing program

An example of sequence program used for clearing the receive data which sent from an external device by using the receive data clear request area in the buffer memory as explained in 6.2.1 (4) is shown below for no-protocol mode data communications. (I/O signals of the computer link module: X/Y000 to X/Y01F)





APPENDIX 7 Communication support tool (MX Component)

MX Component supports every communication path between the DOS-V PC and programmable controller. It is an ActiveX control library realizing communication through only simple processes without consciousness of various communication protocols.

As well, variable programming languages are supported and development of a wide range of applications is enabled.

An outline of functions of MX Component and the procedure up to creation of an application is described below.

* Refer to the operating manual and programming manual of MX Component for details

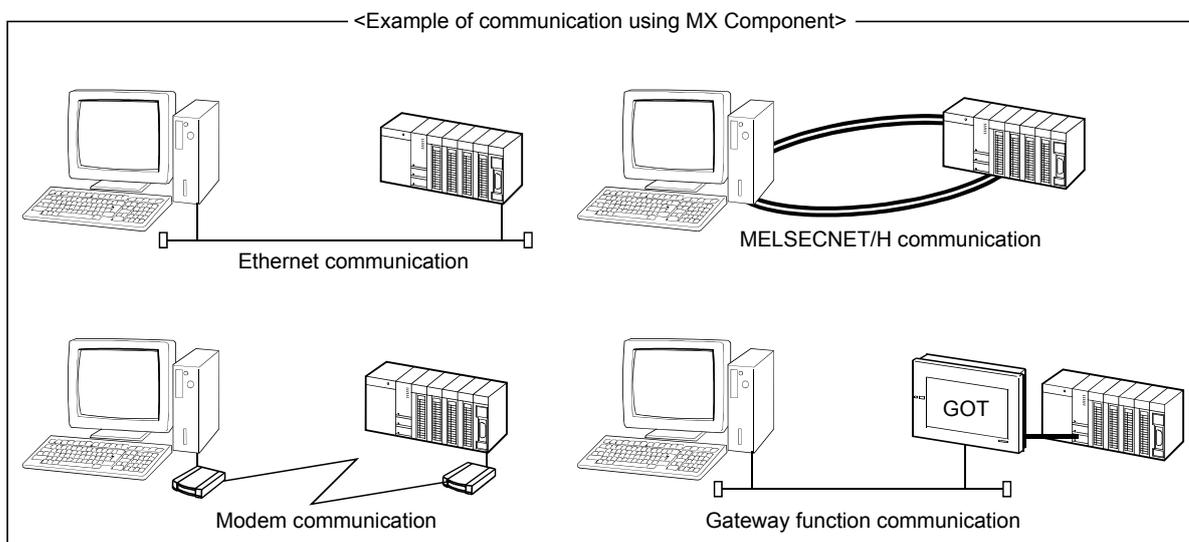
7.1 Outline of MX Component

An outline of MX Component is described.

The communication path, OS, programming language and functions supported by MX Component vary according to the version of MX Component to be used.

(1) Support for various communication paths to programmable controller

Because a wide range of communication paths to the programmable controller is supported, the system just fitting the user can be configured.



(2) Substantially increased efficiency in development of application

MX Component prepares a wizard type communication setting utility. The user can enter settings through interactive operation on the screen to realize communication settings for accessing the desired programmable controller CPU.

Once the communication settings are set up, you can access the desired programmable controller CPU with simple designation of the logical station number of the programmable controller CPU stored in the communication setting utility.

(3) Support for various types of operating system

MX Component runs on the following types of DOS/V PC.

- Microsoft® Windows® 95 Operating System
- Microsoft® Windows® 98 Operating System
- Microsoft® Windows® NT Workstation Operating System Version 4.0
- Microsoft® Windows® Millennium Edition Operating System
- Microsoft® Windows® 2000 Professional Operating System
- Microsoft® Windows® XP Professional Operating System
- Microsoft® Windows® XP Home Edition Operating System
- Microsoft® Windows Vista® Home Basic Operating System
- Microsoft® Windows Vista® Home Premium Operating System
- Microsoft® Windows Vista® Business Operating System
- Microsoft® Windows Vista® Ultimate Operating System
- Microsoft® Windows Vista® Enterprise Operating System

(4) Various programming languages are supported

MX Component supports the following programming languages.

Development of a wide range of applications is possible for each user.

Programming language	Development software
Visual Basic®	Microsoft® Visual Basic® 6.0, Microsoft® Visual Basic® .NET 2003, Microsoft® Visual Studio 2005 Visual Basic®
Visual C++®	Microsoft® Visual C++® 6.0, Microsoft® Visual C++® .NET 2003, Microsoft® Visual Studio 2005 Visual C++®
VBScript	Text editor and marketed HTML tool
VBA	Microsoft® Excel 2000, Microsoft® Excel 2002, Microsoft® Excel 2003, Microsoft® Excel 2007, Microsoft® Access 2000, Microsoft® Access 2002, Microsoft® Access 2003 or Microsoft® Access 2007

The shown above is information as of November 2008.

For the latest development software, refer to the MX Component Operating Manual.

- (5) Special functions exclusively for data communication with the programmable controller are supported.

MX Component prepares functions necessary for data communication with the programmable controller such as communication line opening/closing and device loading/writing.

Multi-function communication programs can be developed without difficulty.

Name of function	Function
Connect	Log-in the subscriber line
Open	Opening the communication line and subscriber line
Close	Closing the communication line
Disconnect	Disconnecting the subscriber line
Get Error Message	Showing description of error and remedy
Read Device Block	Batch loading devices (Long type)
Write Device Block	Batch writing devices (Long type)
Read Device Block 2	Batch loading devices (Short type/INT type)
Write Device Block 2	Batch writing devices (Short type/INT type)
Read Device Random	Random loading devices (Long type)
Write Device Random	Random writing devices (Long type)
Read Device Random 2	Random loading devices (Short type/INT type)
Write Device Random 2	Random writing devices (Short type/INT type)
Set Device	Setting one device point (Long type)
Get Device	Acquiring data from one device point (Long type)
Set Device 2	Setting one device point (Short type/INT type)
Get Device 2	Acquiring data from one device point (Short type/INT type)
Read Buffer	Loading buffer memory
Write Buffer	Writing buffer memory
Get Clock Data	Loading clock data of programmable controller CPU
Set Clock Data	Writing clock data to programmable controller CPU
Get Cpu Type	Loading programmable controller CPU model
Set Cpu Status	Remote RUN/STOP/PAUSE of programmable controller CPU
Entry Device Status	Monitoring and registering device status
Free Device Status	Canceling monitoring/registration of device status
On Device Status	Event notification

For details of the functions, refer to the MX Component Programming Manual.

- (6) Collecting data into Excel without program

When MX Component is combined with MX Sheet (SWnD5C-SHEET-J), the device data of the programmable controller can be collected into Excel with simple settings.

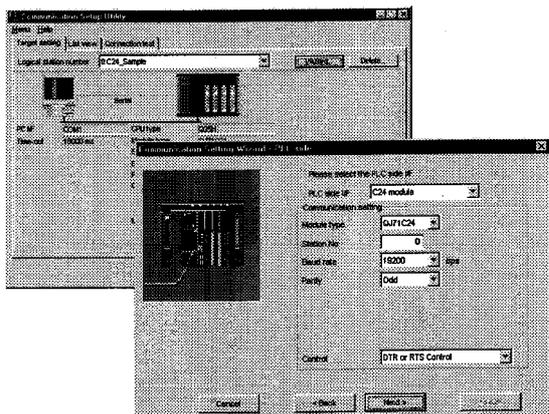
7.2 MX Component operating procedure

The programming procedure of MX Component and a sample program are shown below.

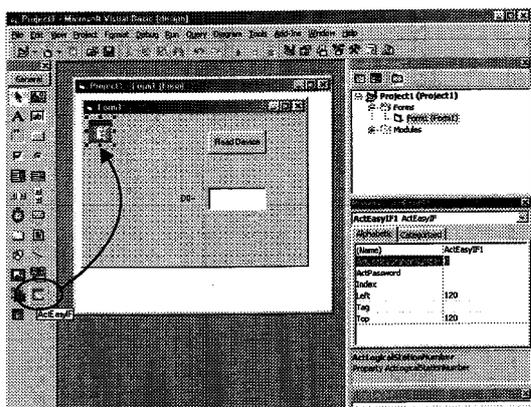
(1) Programming procedure

The programming procedure is as follows.

The following procedure is for Visual Basic® .



- 1) Set up the communication settings between the DOS/V PC and PLC through a wizard. (Only the program may be used instead of the wizard with some control.)
The wizard helps you to enter the logical station number, connection module type, destination PLC and other settings necessary for communications.

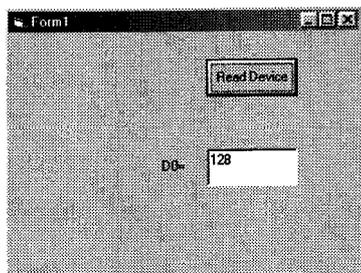


- 2) Paste the ACT control icon on the form and enter the logical station number, which is entered in step (1), in the properties of the pasted control.

```

Command1 Click
Private Sub Command1_Click()
    ret = ActEasyIF1.GetDevice("D0", lpData(0))
    Label1.caption = lpData(0)
End Sub
    
```

- 3) Use functions to describe a program for loading device data

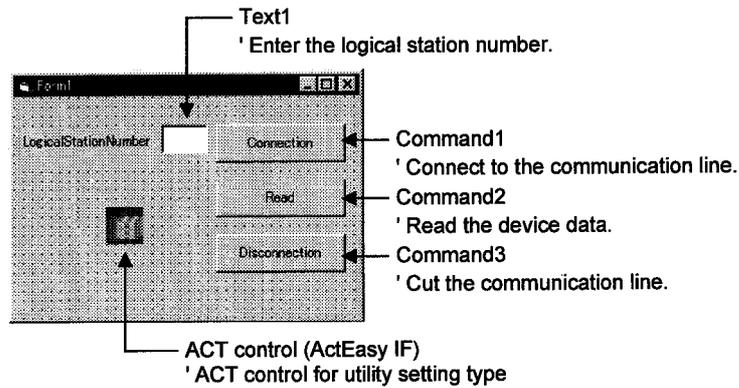


(2) Sample program

The following sample program reads D0 to D4 (five points) of the target PLC using the logical station number.

(a) When Visual Basic® is used

1) Screen example (Form1)



2) Program example

```

Private Sub Command1_Click()
'*****
' Connection
'*****
Dim rtn As Long

' Get LogicalstationNumber
ActEasyIF1.ActLogicalStationNumber = Val(Text1.Text)

' Connection
rtn = ActEasyIF1.Open()
If rtn = 0 Then
    MsgBox "The connection was successful"
Else
    MsgBox "Connection Error:" & Hex(rtn)
End If

End Sub

Private Sub Command2_Click()
'*****
' Read
'*****
Dim rtn As Long
Dim idata(5) As Integer

' D0-D4 are read
rtn = ActEasyIF1.ReadDeviceBlock2 ("D0", 5, idata(0))
If rtn = 0 Then
    MsgBox "D0-D5 = " & idata(0) & ", " & idata(1) & ", " & idata(2) & ", " & idata(3) & ", " & idata(4)
Else
    MsgBox "Read Error:" & Hex(rtn)
End If

End Sub
    
```

```
Private Sub Command3_Click()
' *****
' Disconnection
' *****
Dim rtn As Long

' Disconnection
rtn = ActEasyIF1.Close()
If rtn = 0 Then
    MsgBox "The disconnection was successful"
Else
    MsgBox "Disconnection Error:" & Hex(rtn)
End If

End Sub
```

(b) When Visual C++[®] is used

```
// *****
// Connection
// *****
void CVCDlg::OnOpen()
{
    long lRet;
    CString szMessage;

    // Reflects the logical station No. set in the text box on the variable.
    UpdateData();

    // Get LogicalStationNumber
    m_actEasyIf.SetActLogicalStationNumber ( m_lLogicalStationNumber );

    // Connection
    lRet = m_actEasyIf.Open();
    if ( lRet == 0 ) {
        MessageBox ( "The connection was successful" );
    } else {
        szMessage.Format ( "Connection Error: %x", lRet );
        MessageBox ( szMessage );
    }
}
```

```
// *****
// Read
// *****
void CVCDlg::OnRead()
{
    long lRet;
    short sData[5];
    CString szMessage;

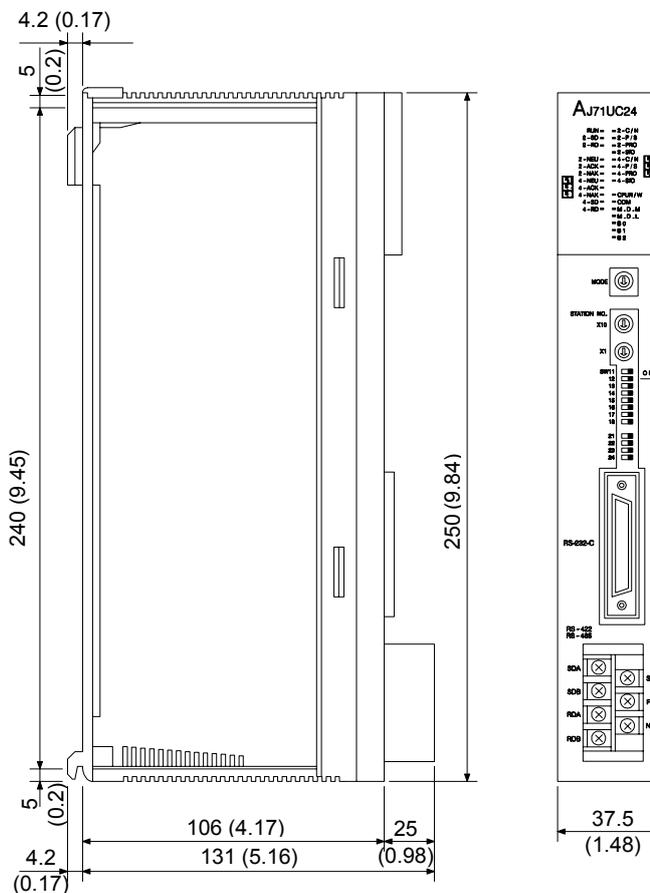
    // D0-D4 are read
    lRet = m_actEasyIf.ReadDeviceBlock2 ( "D0", 5, sData );
    if ( lRet == 0 ) {
        szMessage.Format ( "D0-D5 = %d, %d, %d, %d, %d",
                           sData[0], sData[1], sData[2], sData[3], sData[4] );
        MessageBox ( szMessage );
    } else {
        szMessage.Format ( "Read Error: %x", lRet );
        MessageBox ( szMessage );
    }
}

// *****
// Disconnection
// *****
void CVCDlg::OnClose()
{
    long lRet;
    CString szMessage;

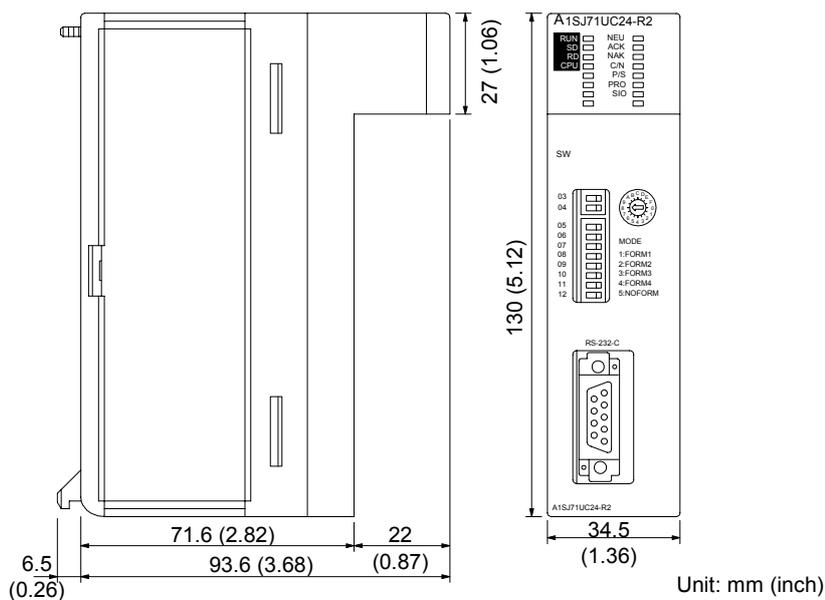
    // Disconnection
    lRet = m_actEasyIf.Close();
    if ( lRet == 0 ) {
        MessageBox ( "The disconnection was successful" );
    } else {
        szMessage.Format ( "Disconnection Error: %x", lRet );
        MessageBox ( szMessage );
    }
}
```

APPENDIX 8 EXTERNAL DIMENSIONS

(1) AJ71UC24

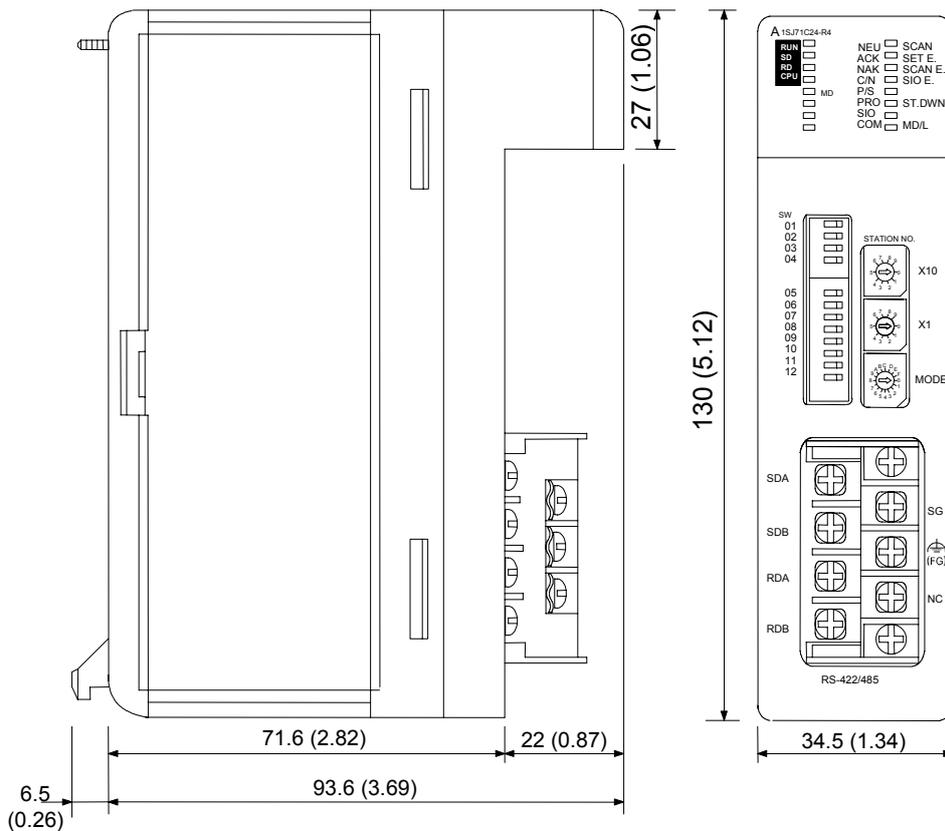


(2) A1SJ71UC24-R2/PRF, A1SJ71C24-R2/PRF



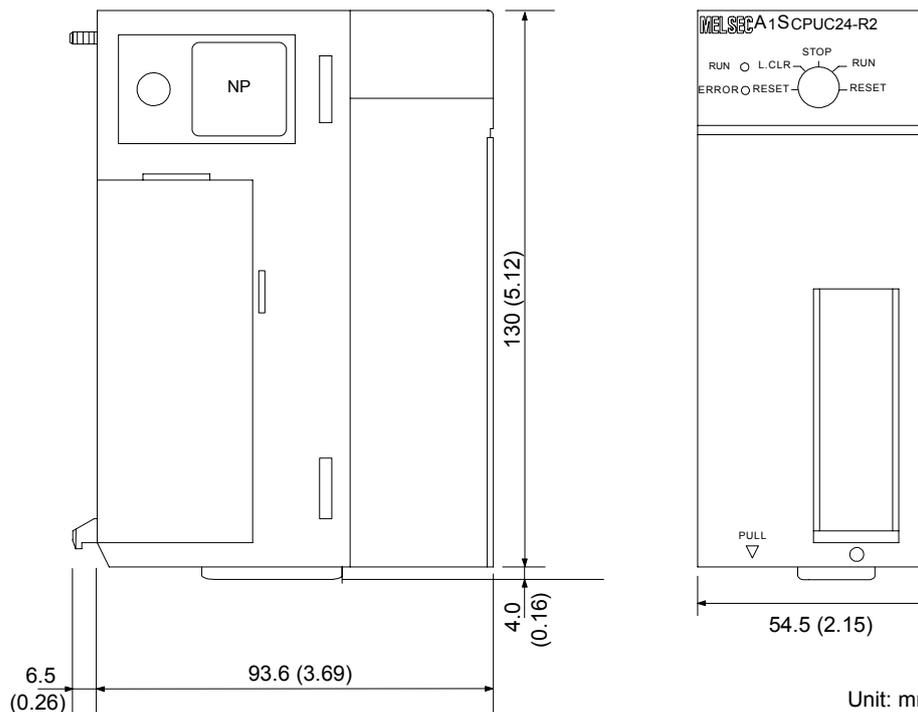
A1SJ71UC24-R2/PRF and A1SJ71C24-R2/PRF have the same external dimensions excluding the interface section. The illustrations above show A1SJ71UC24-R2.

(3) A1SJ71UC24-R4, A1SJ71C24-R4



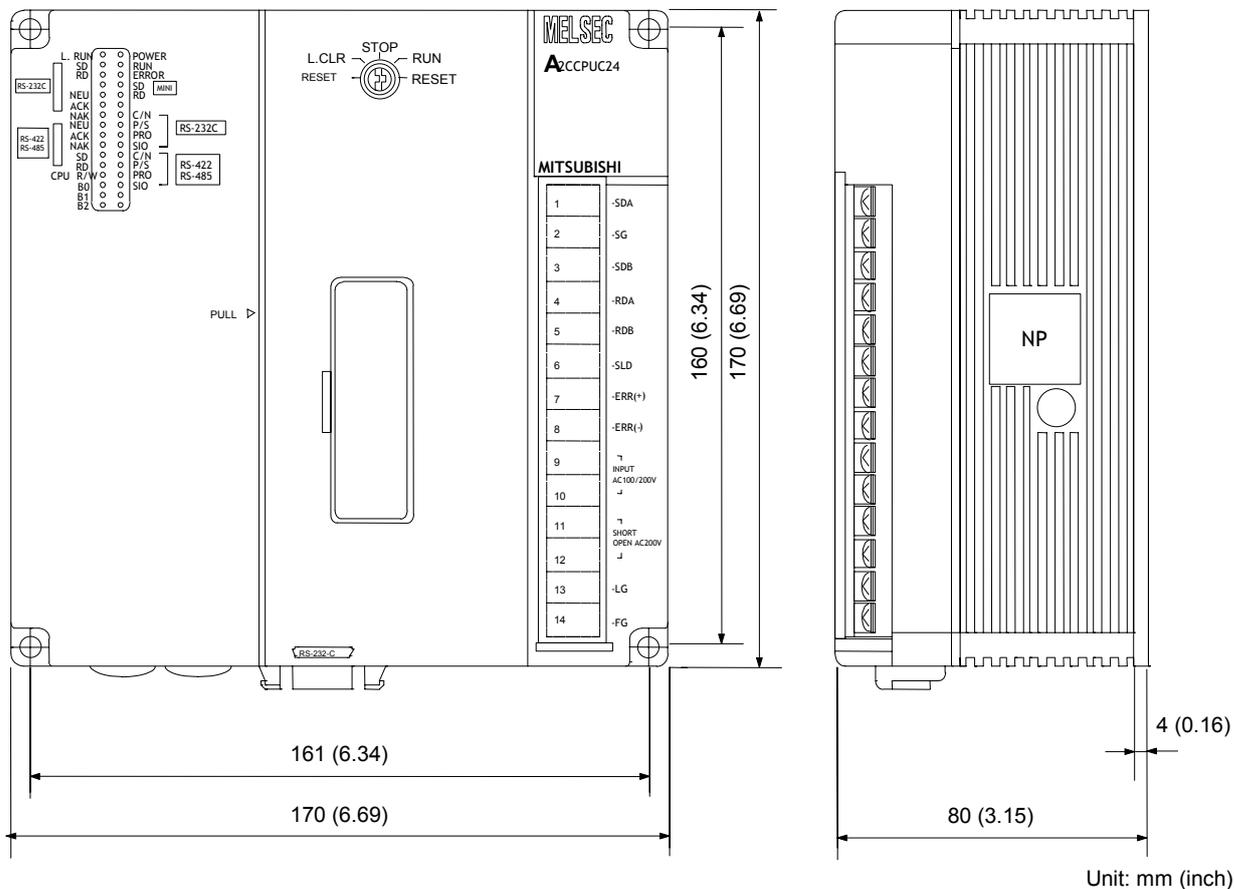
A1SJ71UC24-R4 and A1SJ71C24-R4 have the same external dimensions excluding the interface section. The illustrations above show A1SJ71UC24-R4.

(4) A1SCPUC24-R2



Unit: mm (inch)

(5) A2CCPUC24(-PRF)

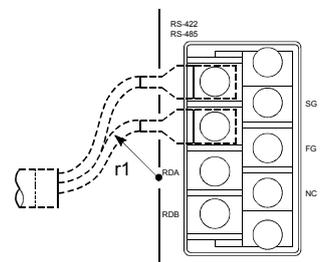
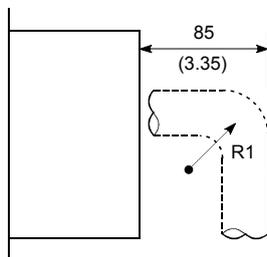
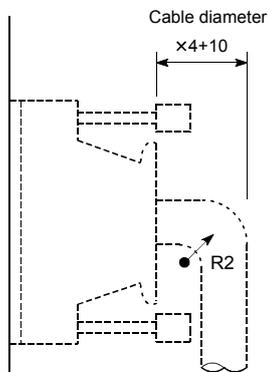


A2CCPUC24 and A2CCPUC24-PRF have the same external dimensions excluding the interface section. The illustrations above show A2CCPUC24.

* Cable bending radius for the cable connecting to an external device (for computer link function and printer function)

(Connection using a connector)

(connection using a terminal block)



- R1 (bending radius near terminal block) : Cable diameter x 4
- R2 (bending radius near connector) : Cable diameter x 4
- r1 (bending radius near crimp style terminal) : Connection is possible without bending the cable excessively.

APPENDIX 9 RS-232C INTERFACE CONNECTORS

The following models are used as RS-232C interface connectors.

Module model	Hardware version	Number of pins	Manufacturer	Connector model	Contact
AJ71UC24	—	25	DDK Ltd.	17L-10250-27-D9AC	http://www.ddknet.co.jp/English/
A1SJ71C24-R2	—	9	DDK Ltd.	17L-10090-27(D9AC)-FA	http://www.ddknet.co.jp/English/
A1SJ71UC24-R2	H or earlier	9	DDK Ltd.	17L-10090-27(D9AC)-FA	http://www.ddknet.co.jp/English/
	J or later		HIROSE ELECTRIC CO., LTD.	RDED-9SE-LN(55)	http://www.hirose-connectors.com/
A1SJ71C24-PRF	—	9	DDK Ltd.	17L-10090-27(D9AC)-FA	http://www.ddknet.co.jp/English/
A1SJ71UC24-PRF	H or earlier	9	DDK Ltd.	17L-10090-27(D9AC)-FA	http://www.ddknet.co.jp/English/
	J or later		HIROSE ELECTRIC CO., LTD.	RDED-9SE-LN(55)	http://www.hirose-connectors.com/
A1SJ71UC24-R4 A1SJ71C24-R4	—	No RS-232C interface			
A1SCPUC24-R2	—	9	DDK Ltd.	17L-10090-27(D9AC)-FA	http://www.ddknet.co.jp/English/
A2CCPUC24	—	9	DDK Ltd.	17L-10090-27(D9AC)-FA	http://www.ddknet.co.jp/English/
A2CCPUC24-PRF	—	9	DDK Ltd.	17L-10090-27(D9AC)-FA	http://www.ddknet.co.jp/English/

WARRANTY

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

1. Gratis Warranty Term and Gratis Warranty Range

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

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

[Gratis Warranty Term]

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

[Gratis Warranty Range]

- (1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.
- (2) Even within the gratis warranty term, repairs shall be charged for in the following cases.
 1. Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
 2. Failure caused by unapproved modifications, etc., to the product by the user.
 3. When the Mitsubishi product is assembled into a user's device, Failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
 4. Failure that could have been avoided if consumable parts (battery, backlight, fuse, etc.) designated in the instruction manual had been correctly serviced or replaced.
 5. Failure caused by external irresistible forces such as fires or abnormal voltages, and Failure caused by force majeure such as earthquakes, lightning, wind and water damage.
 6. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
 7. Any other failure found not to be the responsibility of Mitsubishi or that admitted not to be so by the user.

2. Onerous repair term after discontinuation of production

- (1) Mitsubishi shall accept onerous product repairs for seven (7) years after production of the product is discontinued. Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.
- (2) Product supply (including repair parts) is not available after production is discontinued.

3. Overseas service

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

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

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

5. Changes in product specifications

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

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Computer Link Module (Com. link func./Print. func.)

User's Manual

MODEL	COMP-LINK-U(C)-E
MODEL CODE	13JE77
SH(NA)-3511-N(1203)MEE	

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Specifications subject to change without notice.