MITSUBISHI

PROGRAMMABLE CONTROLLER

# MELSEC-A

User's Manual

# 802.3/MAP interface module type AJ71M56EF[ ]

MITSUBISHI ELECTRIC

## REVISIONS

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

| Print Date | *Manual Number | Revision |
|---|---|---|
| Jun.,1993 | IB (NA) 66409-A | First edition |

# INTRODUCTION

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

## CONTENTS

# 1. GENERAL DESCRIPTION

This manual describes the specifications, handling, and programming methods of the AJ71M56EF[ ] 802.3/ MAP interface module (referred to as the "AJ71M56EF[ ]") used to integrate the A series programmable controller into a 802.3/MAP network system.
The general functions of the AJ71M56EF[ ] are as follows.

(1) 802.3/MAP communication is enabled by connecting the AJ71M56EF [ ] with the A series programmable controller.
The AJ71M56EF[ ] functions as an MMS server in the 802.3/MAP network allow the programmable controller to be started and stopped and the sequence program to be up/down loaded by the commands given by the other client device. When used as a client, it is possible to read/write variables from/to the other server device using a sequence program. It has the full-MAP specifications (for use with MAP3.0 version, 1988 + 802.3) which support the first to seventh layers in the OSI protocol. The AJ71M56EF[ ] is treated as a special function module by the ACPU.
The available MMS services when the AJ71M56EF[ ] is used as a server and client are given in Appendix 2 "LIST OF MMS SERVICES".

(2) The AJ71M56EF[ ] is used with the A series peripheral devices.
Either the A6GPPE intelligent GPP (referred to as the "GPP")or the A6PHPE plasma handy graphic programmer (referred to as the "PHP") started up by the SW0GP-M56PC MAP interface software package (referred to as the "SW0GP-M56PC") can be used as the I/O console for the AJ71M56EF[ ].
The SW0GP-M56PC allows the AJ71M56EF[ ] parameters, etc. to be set, MAP protocol communication data to be traced, and statistic information to be monitored.

AJ71M56EF[ ]
└─1 or 2
1 ..... MMS is "DIS" version.
2 ..... MMS is "IS" version.

**POINT**

The MMS Interface Manual gives details about the MMS services transmitted from the client and the responses.

In this manual, the CPU models are classified as shown below.

| | | |
|---|---|---|
| PC CPUs | Building block type CPUs | A1N, A2N, A2N-S1<br>A3NCPU(P21/R21), A1<br>A2, A2-S1<br>A3CPU(P21/R21)<br>A3HCPU(P21/R21)<br>A3MCPU(P21/R21)<br>A2A, A2A-S1<br>A3ACPU(P21/R21) |
| | Small size building block type CPU | A1SCPU |
| | Compact type CPUs | A0J2CPU(P23/R23)<br>A0J2HCPU(P21/R21) |

**POINT**

This manual discusses the I/O addresses of the I/F module when using a building block-type CPU with the I/F module loaded into slot No. 0 of the main base unit. If the I/F module is loaded into another slot other than No. 0 or an A1SCPU or compact type CPU is used, perform programming using the I/O addresses assigned to the I/F module.

**CAUTION**

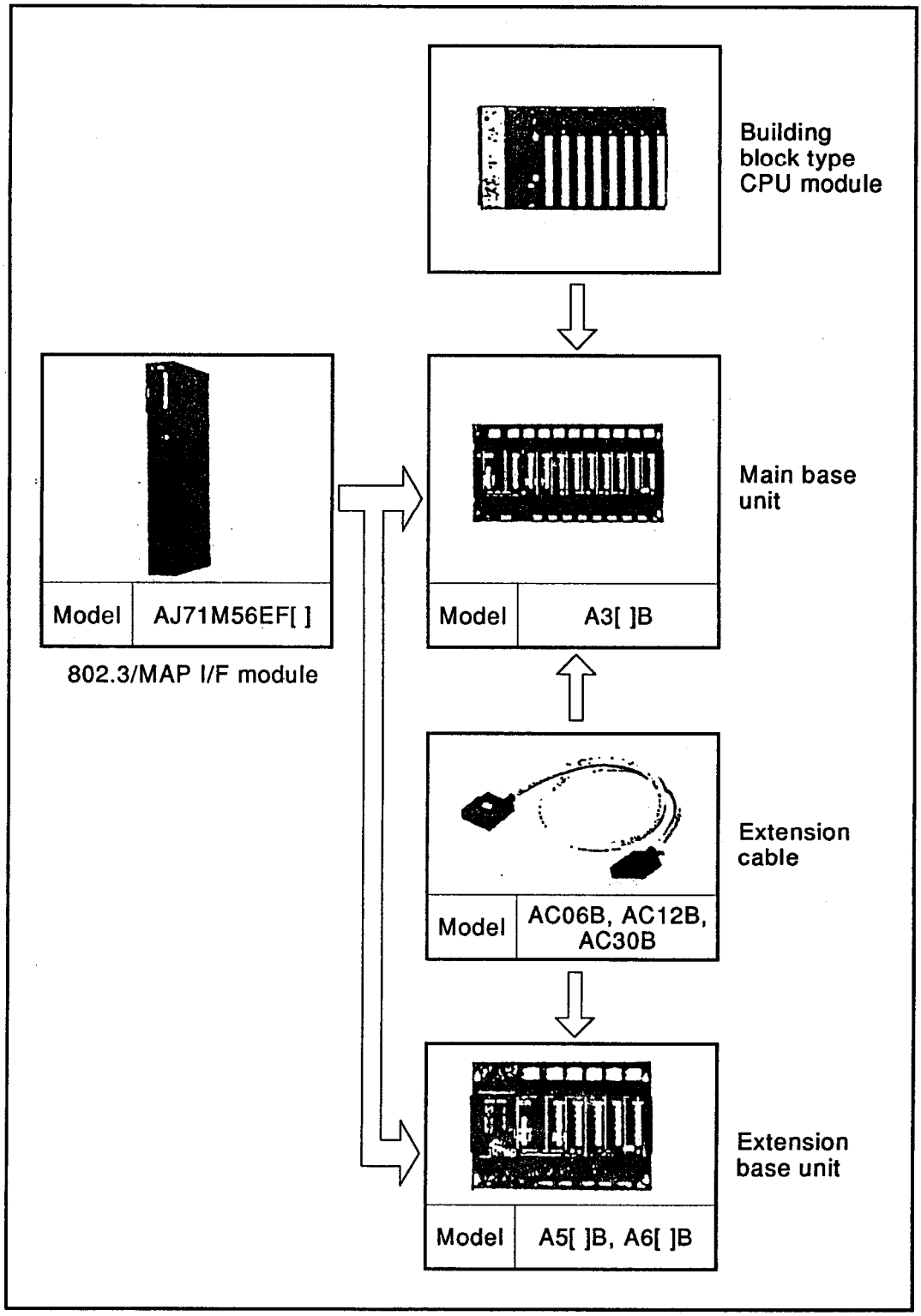
Mitsubishi does not guarantee the system performance if other operations than those included in this manual are executed.

# 2. SYSTEM CONFIGURATION

## 2.1 Overall Configuration

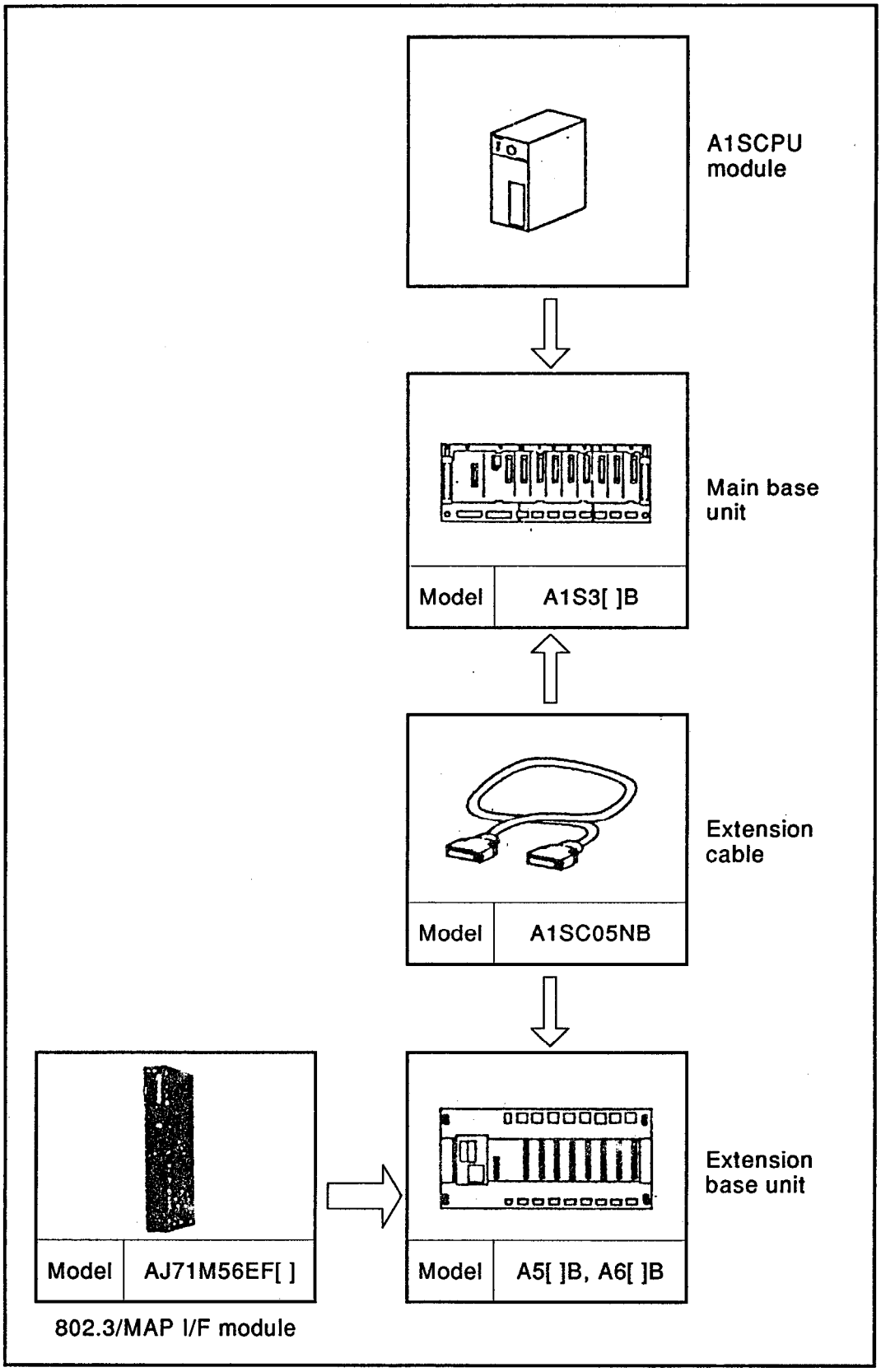
(1) In the case of a building block type CPU

This section gives the overall configuration, including the I/F module, when using a building block type CPU.



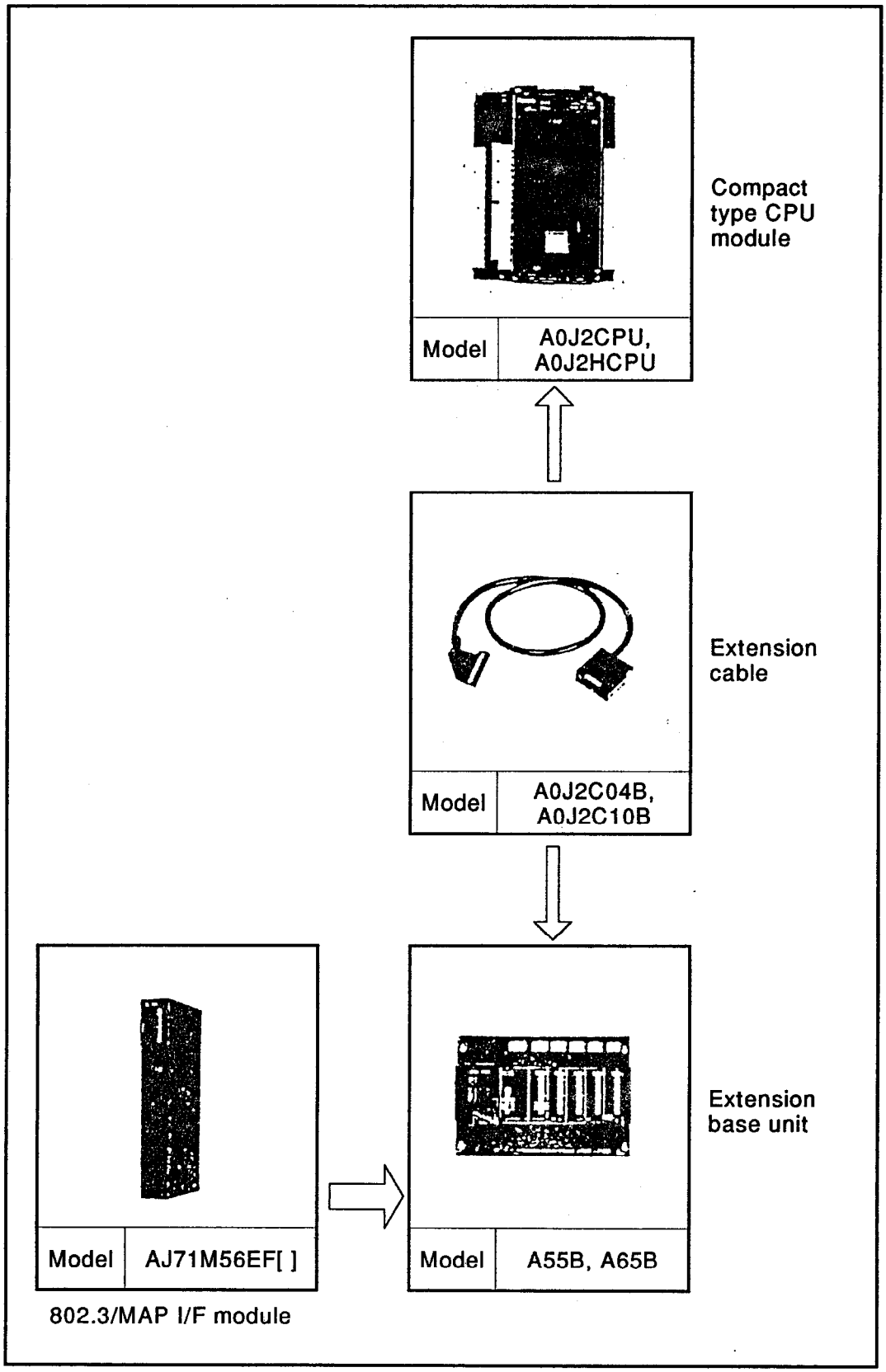
(2) In the case of an A1SCPU module

This section gives the overall configuration, including the I/F module, when using an A1SCPU module.

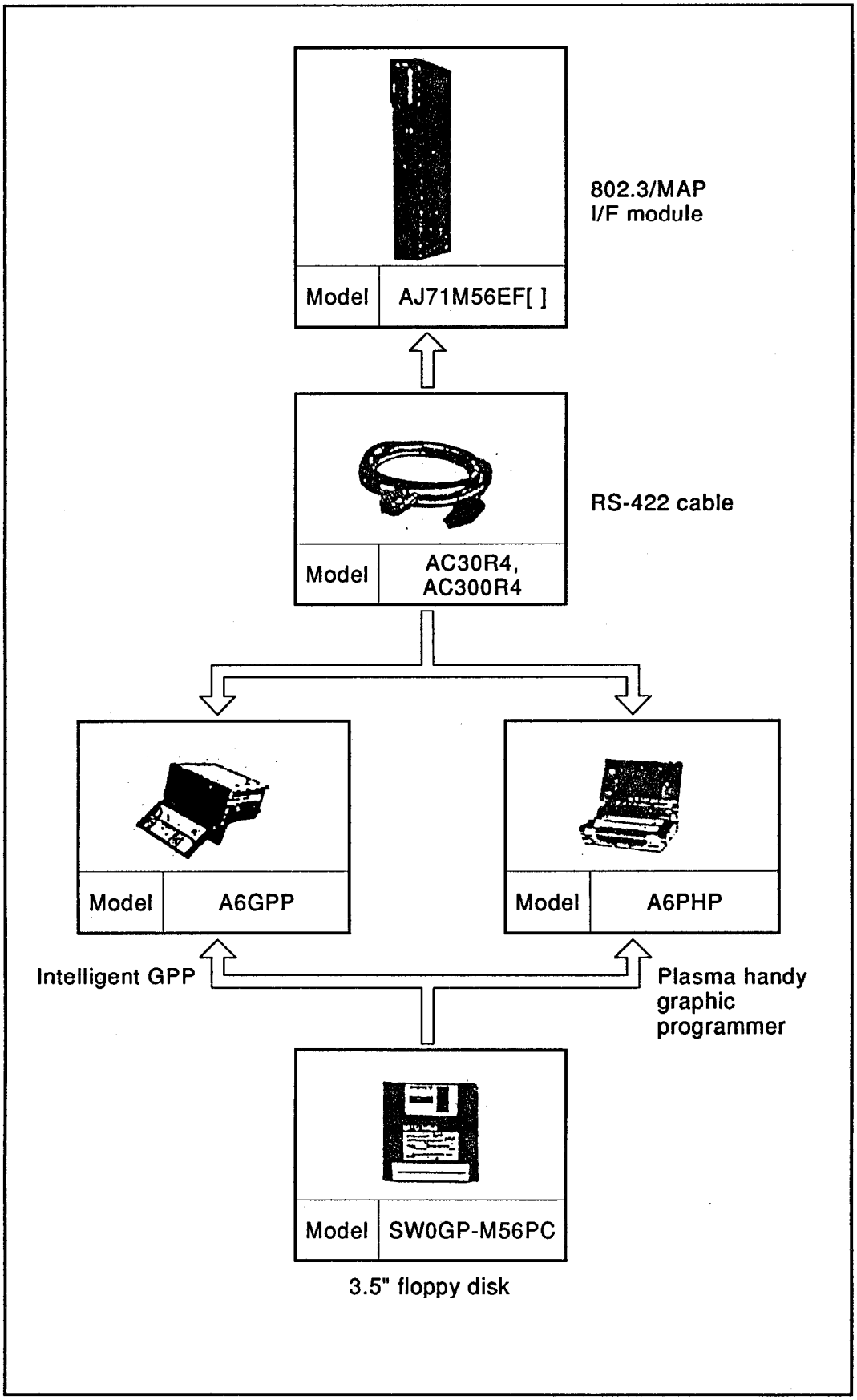


(3) In the case of a compact type CPU

This section gives the overall configuration, including the I/F module, when using a compact type CPU.



(4) Peripheral devices configuration



## 2.2 Applicable Systems

(1) The following CPUs can be used with the I/F module.

| | | |
|---|---|---|
| Applicable models : | A0J2CPU (P23/R23) | A0J2HCPU (P21/R21) |
| | A1NCPU (P21/R21) | A1CPU (P21/R21) |
| | A2NCPU (P21/R21) | A2CPU (P21/R21) |
| | A2NCPU (P21/R21) -S1 | A2CPU (P21/R21) -S1 |
| | A3NCPU (P21/R21) | A3CPU (P21/R21) |
| | A3HCPU (P21/R21) | A3MCPU (P21/R21) |
| | A2ACPU (P21/R21) | |
| | A2ACPU (P21/R21) -S1 | A3ACPU (P21/R21) |
| | A1SCPU | |

(2) A single I/F module can be loaded for each CPU.

1) When using the AJ71M56EF[ ] with an A0J2CPU (P23/R23), it is impossible to utilize an AD51 and/or an A0J2C214.

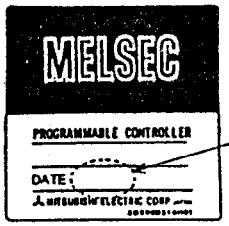
2) When using the AJ71M56EF[ ] with an A2ACPU (P21/R21), A2ACPU (P21/R21) -S1, or A3ACPU (P21/R21), it is possible to utilize up to 6 of the modules given below.

3) When using the AJ71M56EF[ ] with an applicable CPU other than ones given in 1) and 2), it is possible to utilize up to 2 of the modules given below.

- AJ71C24(S3/S6), AD51(S3), AD51H, AD57G, AJ71C22, AJ71P41, AJ71E71

**POINT**

PC CPUs manufactured in or after March, 1986 can be used with the AJ71M56EF[ ]. Check the date on the name plate of the utilized PC CPU to make sure it is suitable. Check the date as shown below.




PC CPU that can be used with the AJ71M56EF[ ]

603

This indicates it was manufactured in March, 1986.

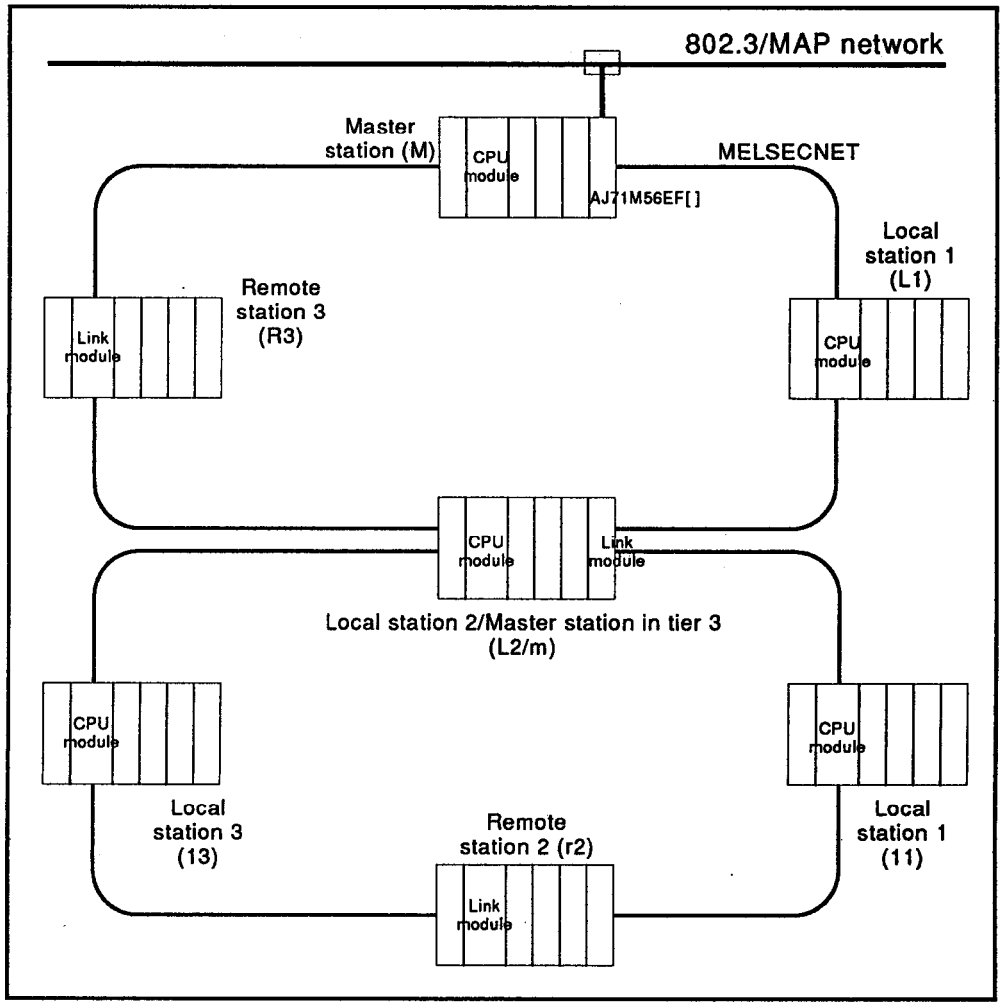
## 2.3 System Configuration Precautions

(1) The I/F module can be loaded into any slot of a main base unit except for the following cases.

1) Whenever possible avoid loading the AJ71M56EF[ ] into an extension base unit which does not have a power module (A5[ ] extension base unit). Doing so may cause a power shortage.
If the AJ71M56EF[ ] must be loaded into such an extension base unit, consult the CPU User's Manual, and carefully select a suitable power supply and extension cable.

2) The AJ71M56EF[ ] cannot be loaded into the last slot of the extension unit's seventh stage in A3CPU.

(2) The AJ71M56EF[ ] must be installed in a master station in the MELSECNET data link system. The AJ71M56EF[ ] cannot be used in a local station or remote I/O station.




In the above system, the MELSECNET stations that can communicate with the 802.3/MAP network are

(1) Host (master station)
(2) All local stations in tier 2 (L1, L2/m)
(3) Remote I/O stations having a special-function module in tier 2 (R3)

## 2.4 Wiring Precautions

Full utilization of the performance of the AJ71M56EF[ ] requires that the external wiring be free from abnormal noise. The following gives the precautions to when doing external wiring of the AJ71M56EF[ ].

(1) Separate the external cables from any main circuit wiring, high-voltage cables, or loaded cables coming from other than the PC to avoid abnormal noise and surge induction.
Make sure that the external cables are at least 100 mm(3.94 in.) away from such wiring.

(2) Grounding

1) When using the AJ71M56EF[ ], Mitsubishi recommends that the FG and LG terminals of the PC power module be grounded (see Appendix 5"PC CPU GROUNDING".).

2) However if grounding prevents communications due to different voltages being applied on the FG terminal, the PC CPU may be used without grounding.

(3) Equipment necessary to construct a network

The equipment shown in Figure 1 are to be prepared by user to construct a 10BASE5 (Ethernet) network.

1) Use the coaxial cables for Ethernet, the N type connectors, the N type terminators, the transceivers and the transceiver cables that satisfy the standards for IEEE 802.3 10BASE5.

2) Use a 12 VDC power supply for the transceivers that satisfies the specification of the transceiver and the transceiver cables.

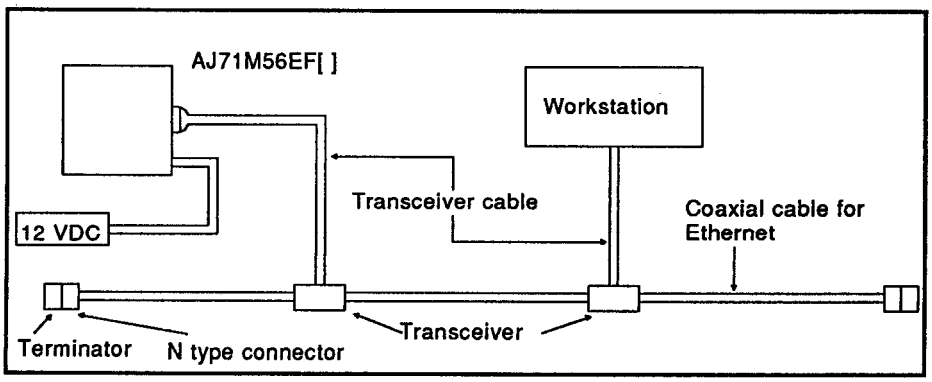



**Fig. 1 Network System Configuration Example**

The equipment shown in Figure 2 are to be prepared by user to construct a 10BASE2 (Cheapernet) network.

3) Use the coaxial cables for Cheapernet, the BNC plug, the BNC "T" adapter and the plug type terminators that satisfy the standards for IEEE 802.3 10BASE2.

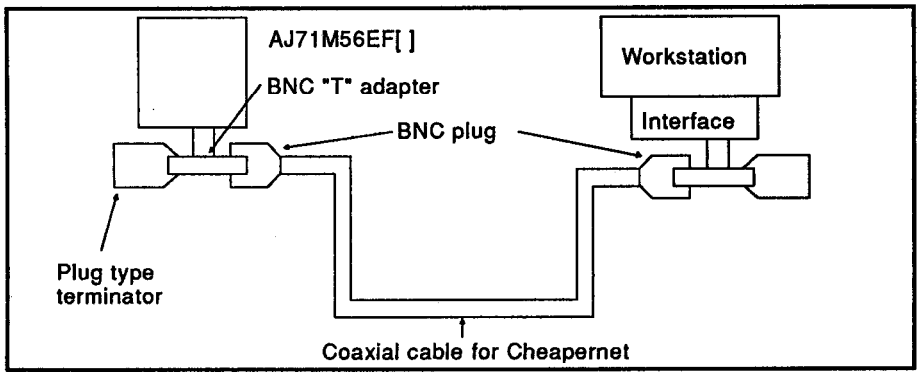



**Fig. 2 Network System Configuration Example**

# 3. SPECIFICATIONS

## 3.1 General Specifications

Each A-series PC has the following general specifications.

<table>
<tr><th>Item</th><th colspan="5">Specification</th></tr>
<tr><td>Operating ambient temperature</td><td colspan="5">0 to 55°C</td></tr>
<tr><td>Storage ambient temperature</td><td colspan="5">–20 to 75°C</td></tr>
<tr><td>Operating ambient humidity</td><td colspan="5">10 to 90% RH, non-condensing</td></tr>
<tr><td>Storage ambient humidity</td><td colspan="5">10 to 90% RH, non-condensing</td></tr>
<tr><td rowspan="3">Vibration resistance</td><td rowspan="3">*2<br>Conforms to JIS C 0911.</td><td>Frequency</td><td>Acceleration</td><td>Amplitude</td><td>Sweep count</td></tr>
<tr><td>10 to 55 Hz</td><td>————</td><td>0.075 mm (0.003 in.)</td><td rowspan="2">10 times<br>*1<br>(1 octave/min)</td></tr>
<tr><td>55 to 150 Hz</td><td>1 g</td><td>————</td></tr>
<tr><td>Shock resistance</td><td colspan="5">*2 Conforms to JIS C 0912 (10 g, 3 times in 3 directions).</td></tr>
<tr><td>Noise durability</td><td colspan="5">By noise simulator of 1500 Vpp noise voltage, 1 μs noise width and 25 to 60 Hz noise frequency</td></tr>
<tr><td>Dielectric withstand voltage</td><td colspan="5">1500 VAC for 1 min across AC external terminals and ground<br>500 VAC for 1 min across DC external terminals and ground</td></tr>
<tr><td>Insulation resistance</td><td colspan="5">5 MΩ or larger by 500 VDC insulation resistance tester across DC external terminals and ground.</td></tr>
<tr><td>Operating ambience</td><td colspan="5">No corrosive gasses and minimum dust.</td></tr>
<tr><td>Cooling method</td><td colspan="5">Self-cooling</td></tr>
</table>

**REMARKS**

*1: 1 octave indicates a change from an initial frequency to double or half that frequency. For example, any of the changes from 10 to 20 Hz, from 20 to 40 Hz, from 40 to 20 Hz, and 20 to 10 Hz are referred to as 1 octave.

*2: JIS: Japanese Industrial Standard

## 3.2 Performance Specifications

(1) Hardware Specifications

The AJ71M56EF[ ] module has the following hardware specifications, e.g. memory capacity:

**Hardware Specifications**

| Item | Specification |
|---|---|
| General-purpose I/O | 8 general-perpose input points,<br>4 general-perpose output points |
| Buffer memory | 1105 words (2210 bytes) |
| Built-in interface | RS422 interface for A6GPPE/PHPE |
| Console | A6GPPE/PHPE |
| Number of I/O points occupied | 32 points in one slots |
| Internal current consumption (5 V) | 1.8 A (MAX) |
| External size | 250 (H) x 37.5 (W) x 119 (D) mm |
| Weight | 0.8 kg |

(2) Transmission Specifications

The AJ71M56EF[ ] module has the following transmission specifications:

**Transmission Specifications**

| Item | Specification | |
|---|---|---|
| | 10BASE5 | 10BASE2 |
| Data transmission velocity | 10 M bps | |
| Transmission method | Base band | |
| Network length | 2500 m | 925 m |
| Segment length | 500 m | 185 m |
| Number of nodes | 100 / segment | 30 / segment |
| Node interval | 2.5 m | 0.5 m |

## 3.3 Protocol Specifications

The AJ71M56EF[ ] module has the following protocols specifications, which conform to the following

**Standards**

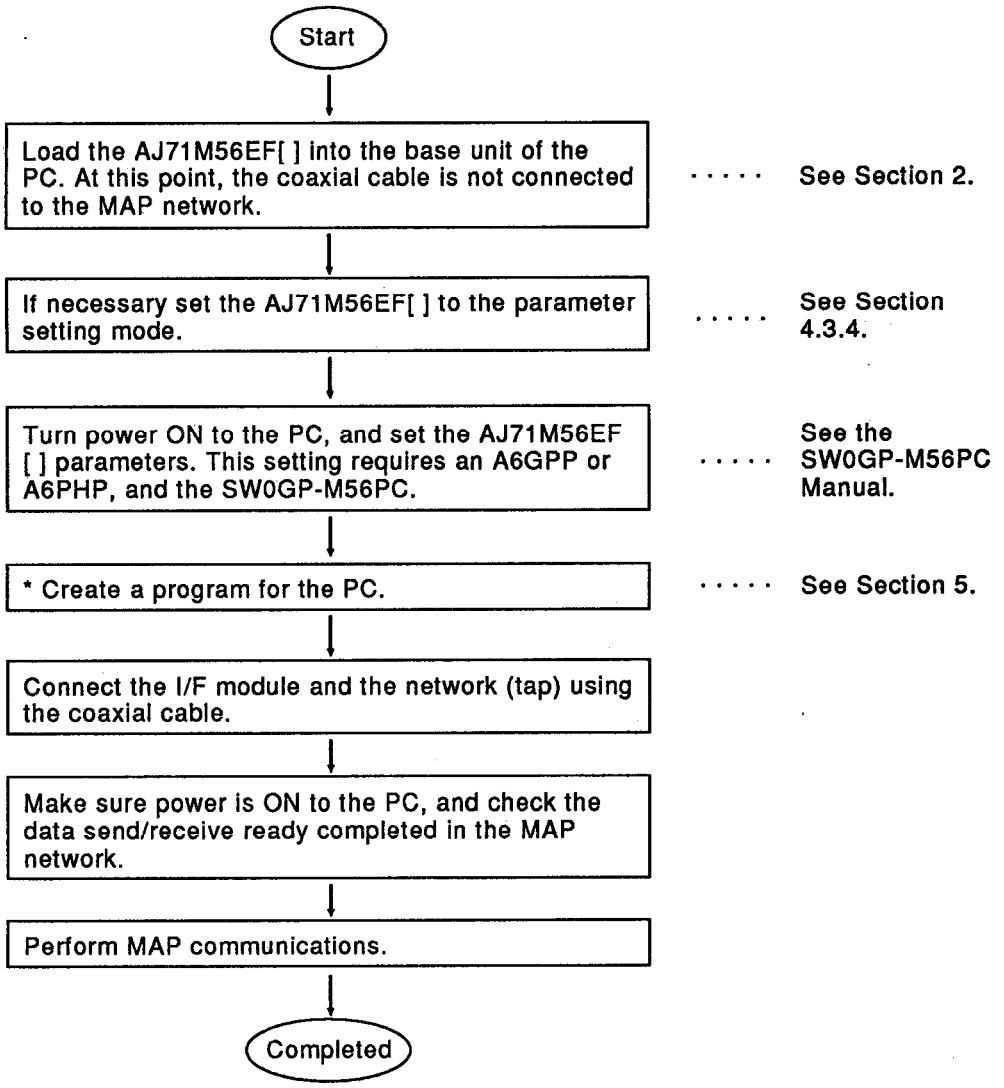
| OSI Layer | MAP Protocol | Standard | Remark |
|---|---|---|---|
| Application | ACSE | ISO 8649, 8650, 8824, 8825 | |
| | MMS | ISO 9506-1, 9506-2 | IS or DIS |
| Presentation | | ISO 8822, 8823, 8824, 8825 | |
| Session | | ISO 8326, 8327 | |
| Transport | Class 4 | ISO 8072, 8073 | |
| Network | ES-IS, IP | ISO 8348, 8473, 8648, 9542 | |
| Data link | LLC Class 3 | IEEE 802.2 | |
| | MAC | IEEE 802.3 | |
| Physical | | IEEE 802.3<br>10BASE5/10BASE2 | |

# 4. PRE-OPERATION SETTINGS AND PROCEDURES

This section describes the pre-operation setting, nomenclature, rotary switch/DIP switch setting of the I/F module.

## 4.1 Pre-Operation Settings and Procedures

Connect the PC CPU to the existing 802.3/MAP network in the following procedure:




**POINT**

The sequence program (marked "*") is necessary when voluntarily communicating from the PC CPU or the PC CPU is used as a client. If the PC is used as a server only to respond requests from the client, this sequence program is not necessary.

## 4.2 Precautions When Handling the AJ71M56EF[ ]

This section describes the precautions to take when handling the I/F module.

(1) Since the module case is made of plastic, make sure not to drop it or subject it to severe impacts.

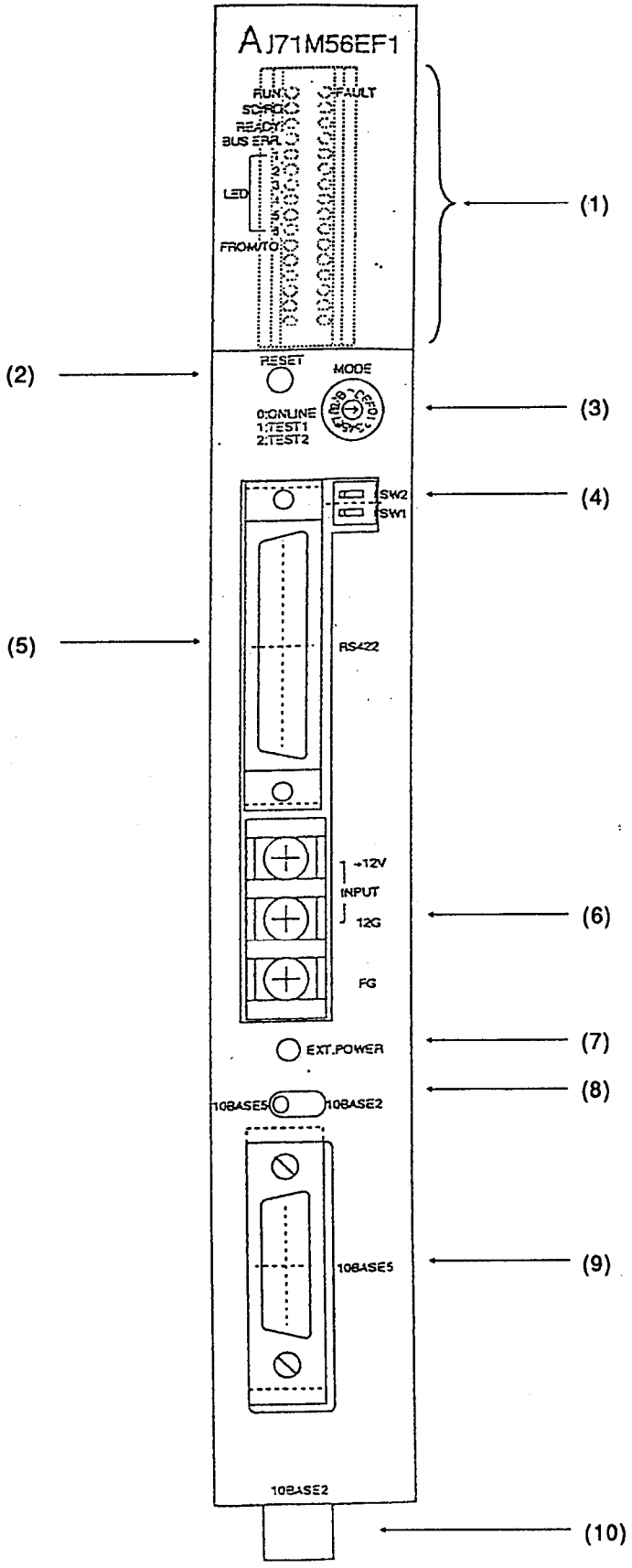
(2) Do not remove the printed circuit board from the case. Doing so may cause a hardware fault.

(3) When wiring, make every effort o prevent foreign matter (ex. pieces of wiring) from dropping into the module.

(4) When loading the module to the base, firmly press the module to ensure the hook is securely engaged with the base.
When removing the module from the base, completely disengage the hook, and pull the module forward. (The corresponding User's Manual gives details.)

(5) Tighten the module fixing screws to 8 to 14 kg·cm.(This operation is unnecessary in the normal operating mode.)

## 4.3 Nomenclature



| No. | Name | Description |
|---|---|---|
| (1) | Display LED | Indicates operating states, data communications displays, and error descriptions.<br>Each LED reflects various aspects of the AJ71M56EF[ ] operation, so ON/OFF states cannot be directly referred to in the same meaning. The ON/OFF state has different meanings for different LEDs. (See Section 4.3.1) |
| (2) | Reset switch | Pressed to stop all operations of the AJ71M56EF[ ] module, e.g. communication processing and initialize the AJ71M56EF[ ] module.<br>The reset switch of the programmable controller CPU cannot initialize the AJ71M56EF[ ] module.<br>(See Section 4.3.2) |
| (3) | Mode setting switch 1 | This selects the operating mode for online and self diagnostic tests.<br>It is factory-set at "O" (online). (See Section 4.3.3) |
| (4) | Mode setting switch 2 | Select 802.3/MAP communication parameter write enable or disable. (See Section 4.3.4) |
| (5) | RS422 connector | Used as aport for connection of the console, i.e. A6GPPE/PHPE, which allows the 802.3/MAP communication parameters to be set, 802.3/MAP communication data to be traced, and statistic information to be monitored. |
| (6) | External power supply terminal | When used with a 10BASE5, the power to the transceiver is supplied here.<br>This is not used with a 10BASE2. |
| (7) | External power supply input confirmation | When used with a 10BASE5, this lamp confirms whether power is supplied to the transceiver, or not.<br>This is not used with a 10BASE2. |
| (8) | 10BASE5/10BASE 2 changeover switch | This changes the interface of an AJ71M56EF[ ] as 10BASE5 or 10BASE2.<br>It is factory-set at the 10BASE5 side. |
| (9) | 10BASE5 connector | This connects an AJ71M56EF[ ] to a 10BASE5, which comforms with IEEE 802.3 pin assign. |
| (10) | 10BASE2 connector | This connects an AJ71M56EF[ ] to a 10BASE2. |

### 4.3.1 Status indicator LEDs

This section describes the LEDs on the upper part of the AJ71M56EF[ ]'s front panel.

| LED Name | Description |
|---|---|
| RUN | ON while the I/F module is working correctly. If there is a hardware fault, this LED will go OFF. |
| SD/RD | ON during data communications over the MAP network. |
| READY | Goes ON when the MAP network data send/receive ready is completed. |
| BUS ERR. | Goes ON when a non-memory area is accessed or communication hardware fault. |
| FROM/TO | ON when executing a FROM/TO instruction from the PC CPU. |
| FAULT | Goes ON when an unrecovered fault occurs, and becomes unoperable. |
| LED1 to 6 | Self-diagnosis program status indicator LEDs (for details, see APPENDIX 1) |

**CAUTION**

The READY LED is OFF while setting parameters or executing a self-diagnosis program.

### 4.3.2 Reset switch

This section discusses the reset switch.

Pressing this switch cancels all operations being processed and returns the unit to the initial state.
The reset switch is used when initialization is necessary. The reset switch location is designed to prevent it from being accidentally pressed. To press it, use the tip of a small screw driver.

**CAUTION**

It is impossible to initialize the MAP interface using the PC CPU reset switch.

### 4.3.3 Mode setting switch

This switch is used for setting the normal operating mode (ONLINE) and the self-diagnosis modes (TEST1, TEST2).

| Setting | Content | |
|---|---|---|
| 0 | ONLINE | Normal operation setting |
| 1 | TEST1 | Self-diagnosis mode setting. Checks the CPU of the I/F module and the MAP communications IC functions. The self-diagnosis is executed in an endless mode. |
| 2 | TEST2 | Self-diagnosis mode setting. In addition to the check items in TEST1, checks the memory of the I/F module. The self-diagnosis is executed in an endless mode. |
| 3 to F | Do not set. | |

**CAUTION**

Appendix 1 gives details about self-diagnosis.

### 4.3.4 Mode setting switch 2

This is used for setting parameters. The only valid mode is ONLINE (0).

| | |
|---|---|
| SW1 | Used to select either the parameter setting mode or the communications mode. |
| SW2 | Used to enable or disable parameter write. When writing parameters, turn this switch ON. (normally OFF) |

**CAUTION**

Set the switches before turning ON the power.
Even if the switch setting is changed during operations, the following operations will be executed in the same mode. Therefore, turn OFF the power or reset to change a switch setting.

# 5. PROGRAMMING

This section describes the programming for communications between the AJ71M56EF[ ] and a PC CPU.
The MMS Interface Manual gives details about MMS services and responses.

## 5.1 AJ71M56EF[ ] Communications

(1) Client and Server

The AJ71M56EF[ ] is normally used as a server. The AJ71M56EF[ ] can also be used as a client by setting the parameters with the A6GPP/PHP software package (optional).
Up to 16 associations (divided into client and server associations) can be established. The number of client associations ranges from 0 to 8, and the number of server associations from 8 to 16. These are both factory-set to 8. (Using the client functions requires an SW0GP-M56PC.)

**REMARK**

Appendix 2 describes the services that can be used in each mode.

## 5.2 Inputs/Outputs From/To a PC CPU

It is possible to receive/send ON/OFF signals from/to a PC CPU using the I/F module general-purpose I/O signals. This section describes the applicable general-purpose I/O signal numbers and their functions. Assume that the I/F module is loaded into slot No. 0 of the main base unit.

### 5.2.1 I/O signal list

<table>
<tr><th colspan="2">Signal Direction : AJ71M56EF[ ] → PC CPU</th><th colspan="2">Signal Direction : PC CPU → AJ71M56EF[ ]</th></tr>
<tr><th>Device Number</th><th>Description</th><th>Device Number</th><th>Description</th></tr>
<tr><td>X00<br>X01<br>X02<br>X03</td><td>Request processing completed signal (Area No. 1)<br>Request processing completed signal (Area No. 2)<br>Request processing completed signal (Area No. 3)<br>Request processing completed signal (Area No. 4)</td><td>Y00<br>Y01<br>Y02<br>Y03</td><td>Request demand signal (Area No. 1)<br>Request demand signal (Area No. 2)<br>Request demand signal (Area No. 3)<br>Request demand signal (Area No. 4)</td></tr>
<tr><td rowspan="5">X04<br>to<br>X1A</td><td rowspan="5">Unusable</td><td>Y04</td><td>Unused</td></tr>
<tr><td>Y05<br>Y06</td><td>Reserved for system</td></tr>
<tr><td>Y07<br>to<br>Y0F</td><td>Unused</td></tr>
<tr><td>Y10</td><td>Use prohibited</td></tr>
<tr><td>Y11<br>to<br>Y19</td><td>Unused</td></tr>
<tr><td>X1B<br>X1C<br>X1D</td><td>MAP I/F communications ready signal<br>MAP I/F fault signal<br>MAP I/F module READY signal</td><td rowspan="2">Y1A<br>to<br>Y1F</td><td rowspan="2">Reserved for system</td></tr>
<tr><td>X1E<br>X1F</td><td>Unusable</td></tr>
</table>

**REMARKS**

(1) X1B is the ready signal as interlock with a request demand signal, and goes OFF when X1C fault signal is ON.

(2) The Y unused area can be used instead of the internal relay M.

(3) The appropriate PC CPU Manual gives details about the relationship between the I/O numbers and slots.

### 5.2.2 I/O signals

(1) The request processing completed signals (X00 to X03) and request demand signals (Y00 to Y03) are used as handshake signals for the PC CPU to make voluntary MAP communications. Sections 5.3.1 and 5.3.2 describe how to use these signals.

(2) MAP interface communications ready signal (X1B)

Goes ON when the AJ71M56EF[ ] is ready to communicate. Perform the programming so that the PC CPU starts MAP communications after this signal has been turned ON.

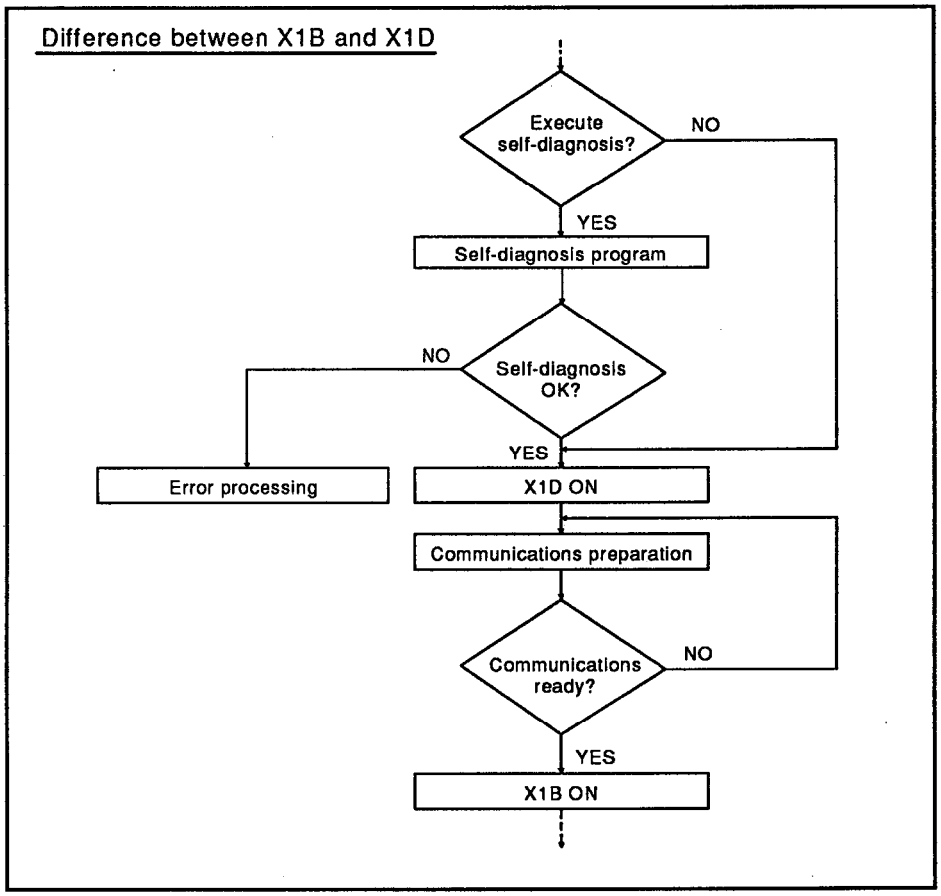
(3) MAP interface fault signal (X1C)

Goes ON when the AJ71M56EF[ ] detects an unrecovered fault other than the precaution error in appendix.

(4) MAP AJ71M56EF[ ] ready signal (X1D)

Goes ON when the AJ71M56EF[ ] is ready. When self-diagnosis has been selected, this signal will go ON when the self-diagnosis operation is completed correctly. The following flowchart describes the difference between the communications ready signal (X1B) and the (X1D) signal.

Difference between X1B and X1D



## 5.3 Buffer

The AJ71M56EF[ ] has a buffer for data receive/transmission from/to a PC CPU. This memory is accessed using a sequence program FROM/TO instruction. The AJ71M56EF[ ] buffer consists of 4 request areas, 4 request answer areas, and 4 read/write areas as shown below.

| Addresses (decimal/hexadecimal) | | In units of words (16 bits) |
|---|---|---|
| 0/ | 0 | **Request area No. 1**<br>Description : Used by a PC CPU to set request data. Sections 5.3.2 and 5.3.3 describe how to use this area. |
| 63/ | 3F | |
| 64/ | 40 | **Request answer area No. 1**<br>Description : Returns an answer to the request set in request area No. 1. Sections 5.3.2 and 5.3.3 describe how to use this area. |
| 127/ | 7F | |
| 128/ | 80 | **Request area No. 2**<br>Description : Same as in Request area No. 1. |
| 191/ | BF | |
| 192/ | C0 | **Request answer area No. 2**<br>Description : Same as in Request answer No. 1. |
| 255/ | FF | |
| 256/ | 100 | **Request area No. 3**<br>Description : Same as in Request area No. 1. |
| 319/ | 13F | |
| 320/ | 140 | **Request answer area No. 3**<br>Description : Same as in Request answer area No. 1. |
| 383/ | 17F | |
| 384/ | 180 | **Request area No. 4**<br>Description : Same as in Request area No. 1. |
| 447/ | 1BF | |
| 448/ | 1C0 | **Request answer area No. 4**<br>Description : Same as in Request answer area No. 1. |
| 511/ | 1FF | |
| 512/ | 200 | **Information area**<br>Description : Displays association information. Section 5.3.4 describes how to use this area. |
| 1152/ | 480 | |
| | | |
| 1536/ | 600 | **Read/Write area No. 1**<br>Description : To set data to be read/written using the client functions with request area No. 1. |
| 2047/ | 7FF | |
| 2048/ | 800 | **Read/Write area No. 2**<br>Description : Same as in Read/Write area No. 1. |
| 2559/ | 9FF | |
| 2560/ | A00 | **Read/Write area No. 3**<br>Description : Same as in Read/Write area No. 1. |
| 3071/ | BFF | |
| 3072/ | C00 | **Read/Write area No. 4**<br>Description : Same as in Read/Write area No. 1. |
| 3583/ | DFF | |

### 5.3.1 Commands that use the request and request answer areas

The following services are executed using these areas.

| | Service | Command | Description |
|---|---|---|---|
| Server | Abort | 0110h | Used to cancel an association. |
| | InformationReport | 0300h | Used to transmit data |
| | UnsolicitedStatus | 0301h | Used to notify the PC CPU state. |
| | RequestDomainDownload | 0400h | Device data download request. |
| | RequestDomainUpload | 0401h | Parameter upload request. |
| Client | Initiate | 0100h | Used to establish an association. |
| | Conclude | 0101h | Used to cancel an association. |
| | Abort | 0120h | Used to cancel non-association communications. |
| | Read | 0200h | Used to read data. |
| | Write | 0201h | Used to write data. |

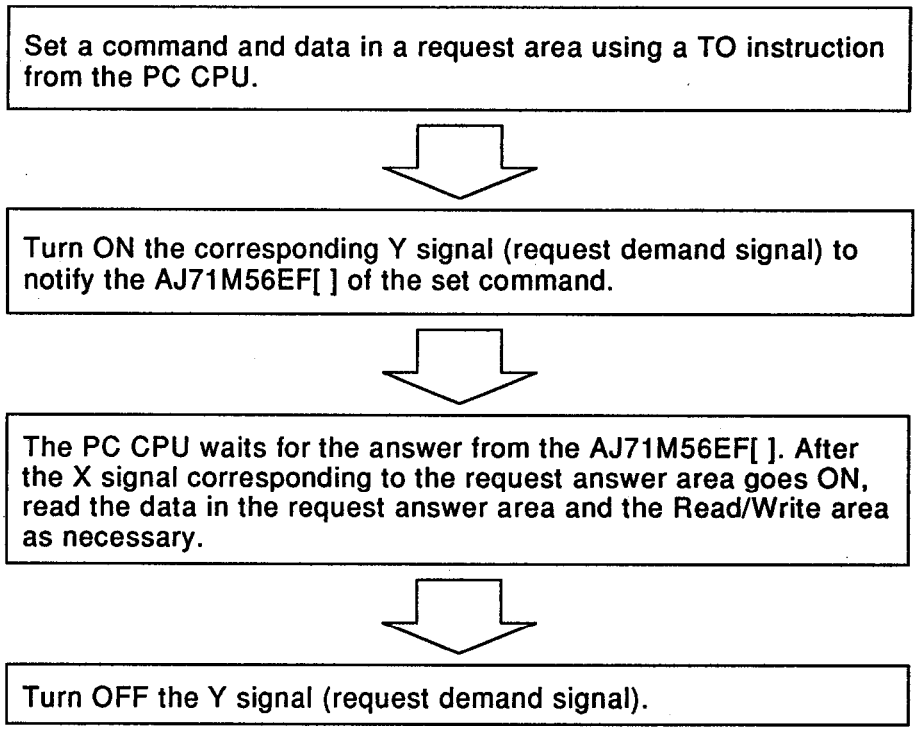
**POINT**

Preparations for using client functions, and named variables.

- Client functions
  To use client functions, it is necessary to set the SAP/AE parameters of the communicating station. The SW0GP-M56PC Operating Manual gives details about how to set these parameters.
- Named variables
  If a variable with a name is used along with the AJ71M56EF[ ] as a server, set the named variable and its corresponding device by the named variable parameters. The SW0GP-M56PC Operating Manual gives details about setting these parameters.

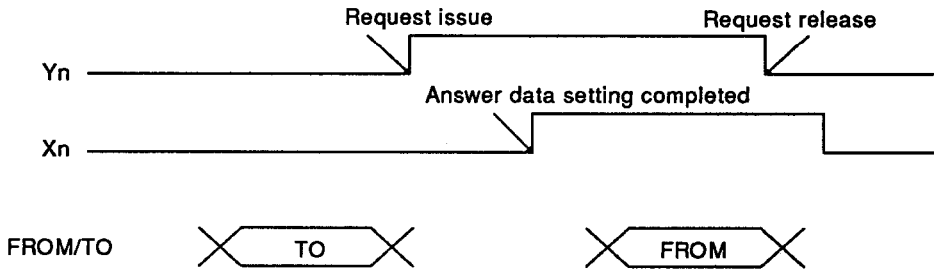
### 5.3.2 Timing chart and program examples

This section gives the procedure for executing a service.




**Timing chart**

The following timing chart illustrates the above-mentioned procedure.



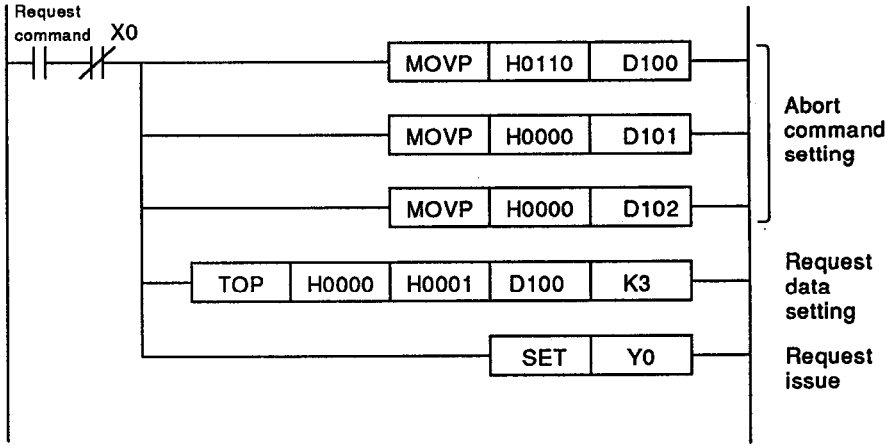
**Sequence program examples:**

A sequence program example when the abort and write services are executed using request area No. 1 is given below.
Assume that the AJ71M56EF[ ] is loaded into slot No. 0. Section 5.3.3 Command functions gives details about the meanings of each data item.

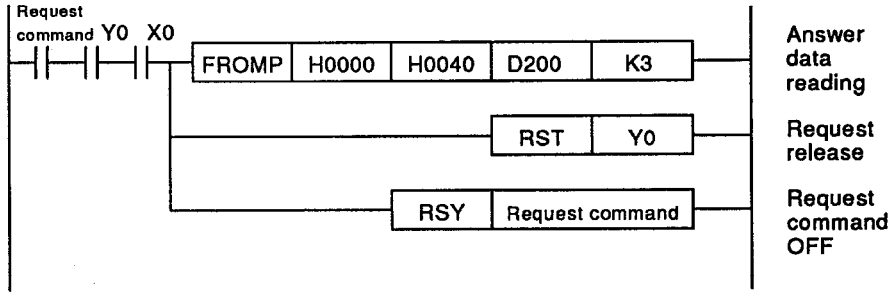
(1) Abort

Gives an example when setting the abort command using the PC CPU data register D100 and storing the answer in D200.

Request data set (TO instruction)



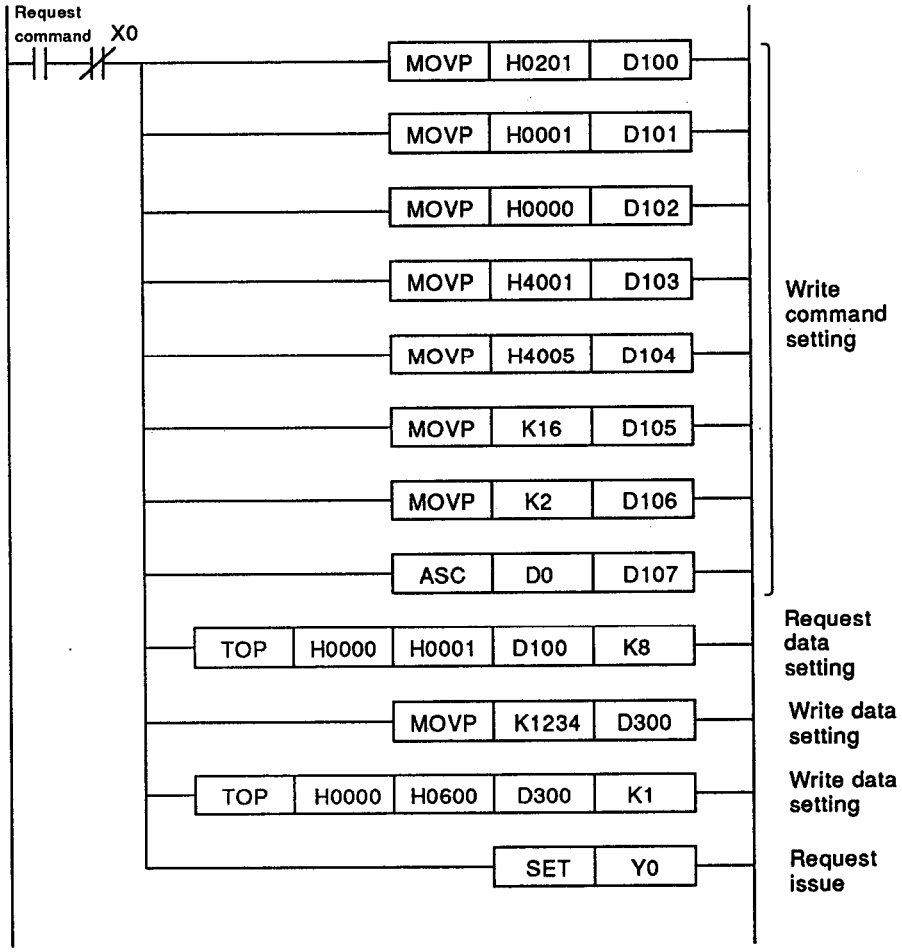

Answer data storage (FROM instruction)



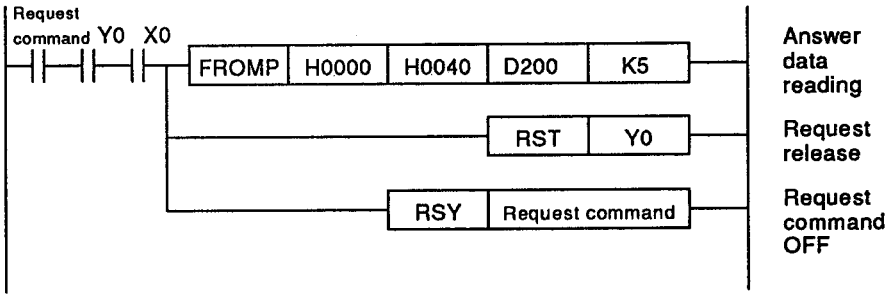
(2) Write

Gives an example when setting the write command using the PC CPU data register D100, the data to be written using D300, and storing the answer in D200.

Request data set (TO instruction)




Answer data storage (FROM instruction)




**REMARK**

The PC CPU Operating Manual gives details about FROM/TO instructions.

### 5.3.3 Command functions

This section describes how to set specific data to the AJ71M56EF[ ] buffer when request area No. 1 is used. If another request area (No. 2 to No. 4) is used, the addresses should be changed accordingly.

(1) Server functions

1) Abort
Used to cancel an association.

- Request area

| | | |
|---|---|---|
| 0 | * | |
| 1 | 0110h | ← Abort command |
| 2 | □□□□ | ← Association identifier |
| 3 | 0 | ← Set the association identifier *1 (to be canceled) of the communicating station. Make sure to set 0. |
| 4 | * | |
| : | * | |
| 63 | * | |

- Request answer area

| | | |
|---|---|---|
| 64 | * | |
| 65 | * | |
| 66 | □□□□ | ← When successful, 0 is set; otherwise an error code is set. *2 |
| 67 | * | |
| : | * | |
| 127 | * | |

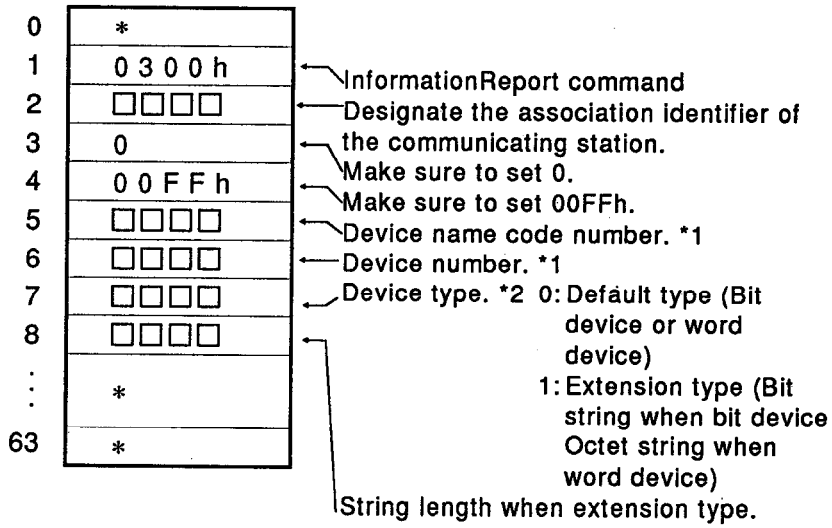
**REMARKS**

*1 The association identifier is a number assigned to each association when establishing the order (first: 0, second: 1,....).

*2 Appendix 4 gives details about the error codes.
Data need not be set to the areas marked *. If set, it will be ignored. The values set in request answer areas are undefined.

2) InformationReport
This is the command used for sending data (in registers). (Data transmission is performed in units of bits or words.)

- Request area



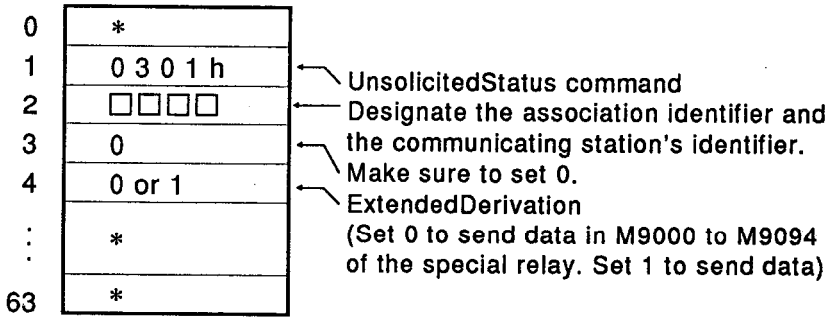

**REMARK**

*1 Appendix 3 gives details about the device name code numbers and device numbers.
*2 When named variable is specified by device name code number, the device type is not necessary to be set, because the device type of named variable is configured by SW0GP-M56PC.

- Request answer area
Same as in Abort.

3) UnsolicitedStatus
This is the command used for notifying the communicating station of the PC CPU status (special relay).

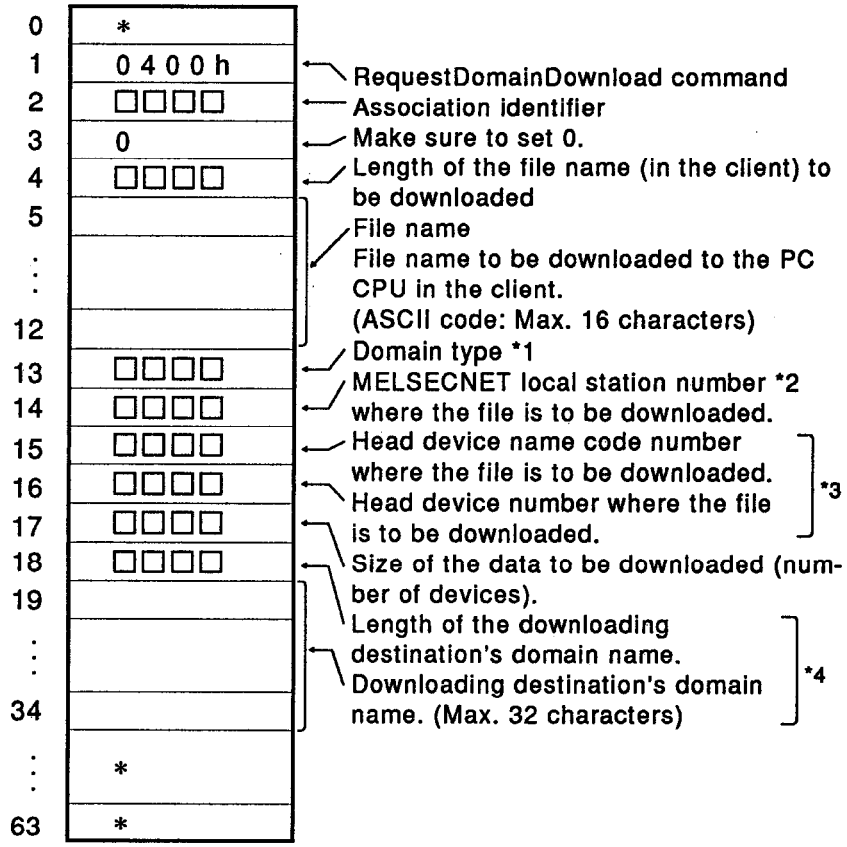
- Request area




- Request answer area
Same as in Abort.

4) RequestDomainDownload
This is the command used for the PC CPU to request the client to download data to a device.

- Request area




**REMARKS**

*1 To download to an extension file register, set 8; otherwise set 7.

*2 In the case of the self station, set FFh. In the case of a local station, set its number. (The AJ71M56EF[ ] can only be installed in a master station.)

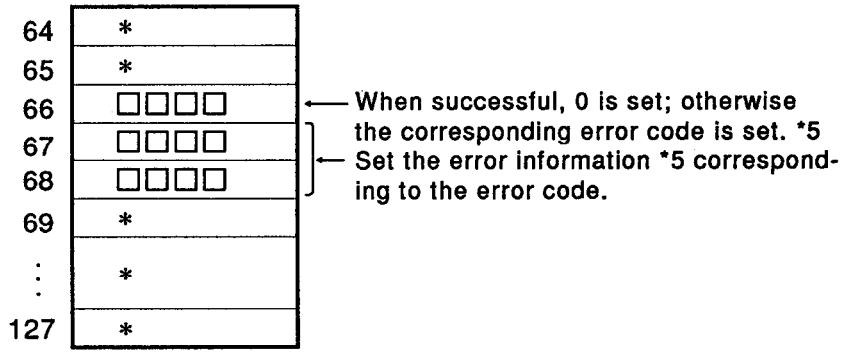
*3 Appendix 3 gives details.

*4 Optional. If no name is set, a name (listed in the MMS Interface Manual) in ending with "_dflt" will automatically be created.

**CAUTION**

The size, domain name, and domain type downloaded from the client take priority over those designated in a request area.
Even when the size, domain name, and domain designated in the request area do not match those which are downloaded, no error will occur.

- Request answer area

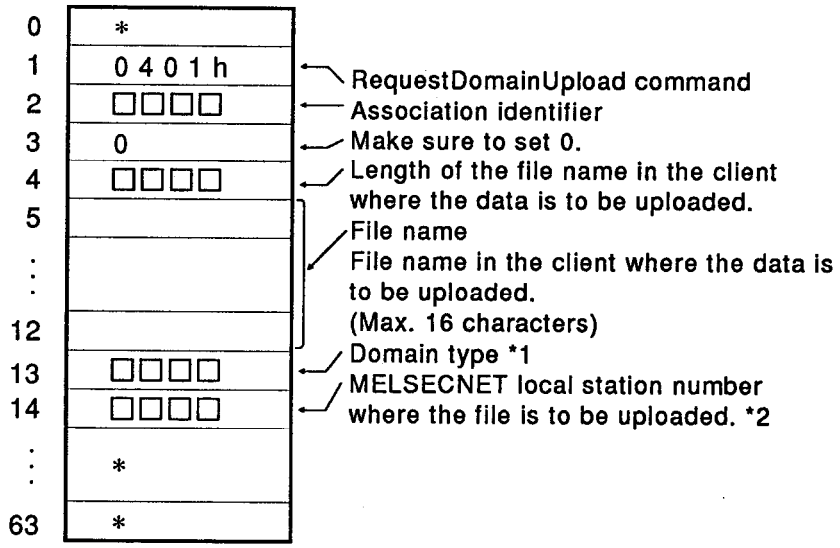



**REMARK**

*5 Appendix 4 gives details about the error codes and error information.

5) RequestDomainUpload
This is the command used for the PC CPU to request the client to upload data (ex. programs).

- Request area




**REMARKS**

*1 Set as follows:

Main sequence program : 1
Sub sequence program : 2
Main microcomputer program : 3
Sub microcomputer program : 4
Comment data : 5
Parameter : 6
Device : 7
Extension file register : 8
Extension comment data : 13 (decimal)

*2 In the case of the self station, set FFh. In the case of a local station, set its number. (The AJ71M56EF[ ] can only be installed in a master station.)

**CAUTION**

If there are several domains of the same type in a MELSECNET station, a request to upload will be made to the first-defined domain.

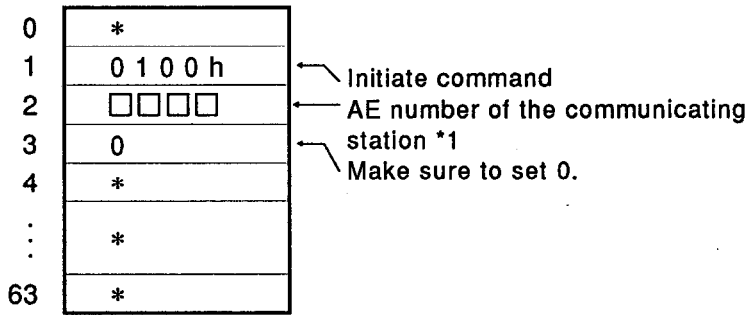
- Request answer area
Same as in RequestDomainDownload.

(2) Client functions

To use the client functions, set the SAP/AE parameters using the SW0GP-M56PC.

1) Initiate
Establish the logical communications line (association) by setting the communication conditions corresponding to the communicating station.

- Request area



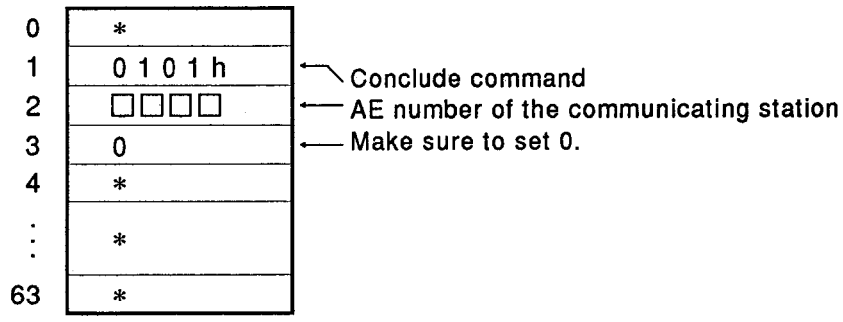

**REMARK**

*1 Designate the table number already specified when the SAP/AE parameters are set using the SW0GP-M56PC.

- Request answer area
Same as in RequestDomainDownload.

2) Conclude
The logical communica-tions line (association) is released at the end of communications.

- Request area




- Request answer area
Same as in RequestDomainDownload.

3) Abort
The logical communications line (association) is forcibly released at the end of communications.

- Request area

| | | |
|---|---|---|
| 0 | * | |
| 1 | 0110h or 0120h | ← Abort command |
| 2 | □□□□ | ← When the command is 0110h, set the association identifier. *1 |
| 3 | 0 | ← When it is 0120h, set the AE number of the communicating station. |
| 4 | * | ← Make sure to set 0. |
| ⋮ | * | |
| 63 | * | |

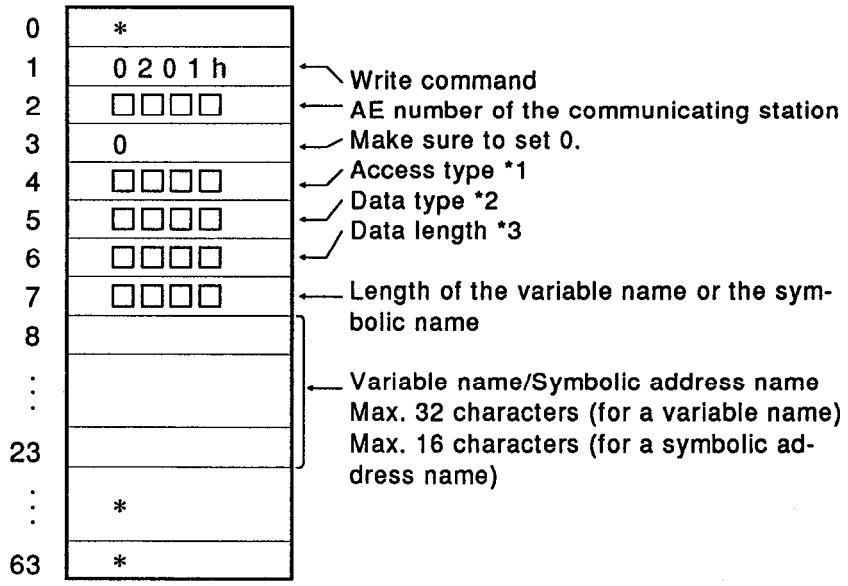
- Request answer area
Same as in Abort.

**POINT**

*1: Normally, the client abort command is used by designating the AE number of the communicating station with the command 0120h. When all associations must be released due to an error, use the command 0110h to change the association identifier from 0 to the total number of associations minus 1, issuing the abort command. This operation can efficiently release the associations.

4) Write
This is the command used for the PC CPU to write data (variable) to the server.

- Request area




**REMARKS**

*1 Set as follows:
Named variable: 4000h
Symbolic address: 4001h
Variable description: 4002h

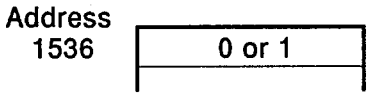
*2 Set as follows:
Boolean: 4003h
Integer: 4005h
Bit string: 4004h
Octet string: 4009h

*3 Set as follows :
Integer: 16 (16-bit integer)
32 (32-bit integer)
Bit string: Bit length (1 to 8192 bits)
Octet string: Octet length (1 to 1024 octets)

- Request answer area
Same as in RequestDomainDownload.

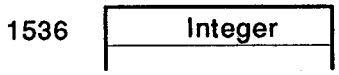
- Read/Write area
  Set the data to be written in accordance with the data type as shown below.

  i) Boolean

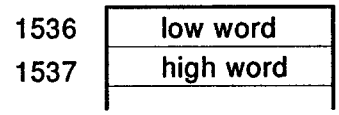



  ii) Integer

  - 16 bits

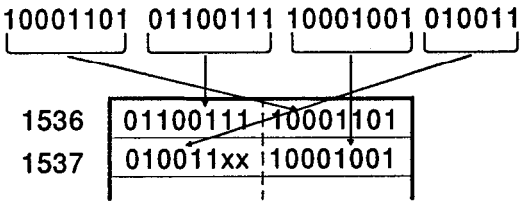



  - 32 bits




  iii) Bit string

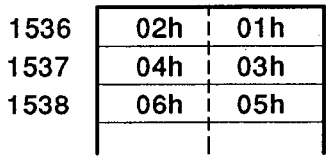
  If the values are




  Then, they will be set in addresses 1536 and 1537 as shown above.

  iv) Octet string

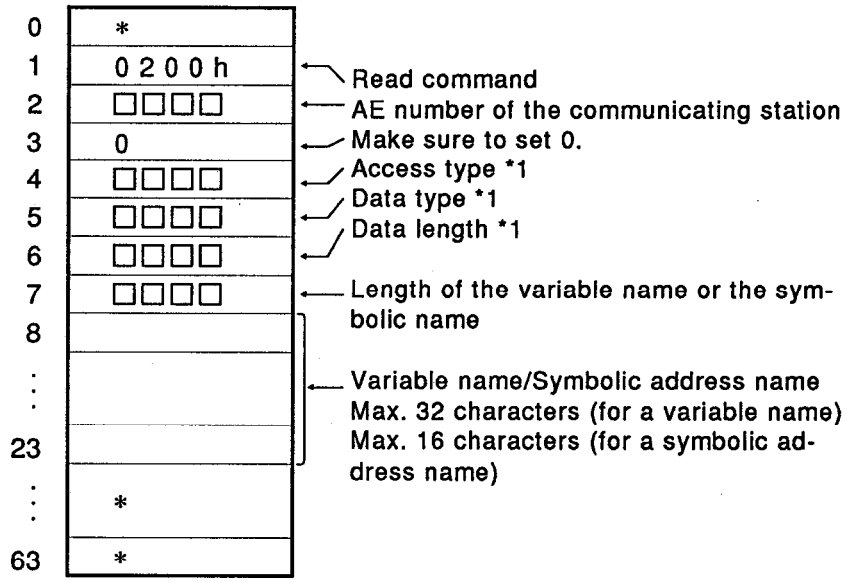
  If the values are 01h 02h 03h 04h 05h 06h




  Then, they will be set in addresses 1536, 1537, and 1538 as shown above.

5) Read
This is the command used for the PC CPU to read data (variable) from the server.

- Request area

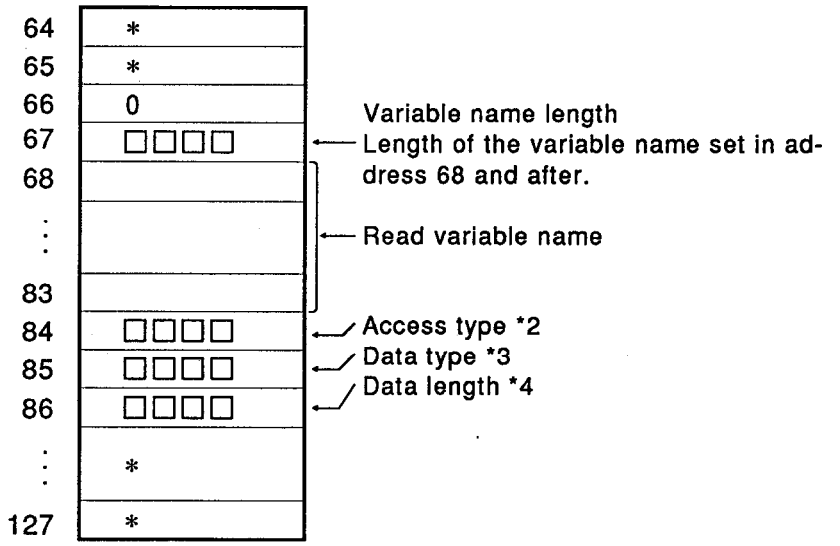



**REMARK**

*1 Set in the same manner as described in Write.
The Data length is necessary only for the access type of variable description.

- Request answer area

i) Normal end



**REMARKS**

*2 Set as follows :
Named variable: 4000h
Symbolic address: 4001h
Variable description: 4002h

*3 Set as follows :
Boolean: 4003h
Integer: 4005h
Bit string: 4004h
Octet string: 4009h

*4 Set as follows :
Integer: 32 (32-bit integer)
Bit string: Bit length (1 to 8192 bits)
Octet string: Octet length (1 to 1024 octets)

**CAUTION**

- The size, domain name, and domain type read from the server is set. This data can be different from that set in the request area.
- An integer has a fixed length of 32 bits. Even if the server sends a 16-bit integer, the data will be converted to 32-bit data and stored in the request answer area.

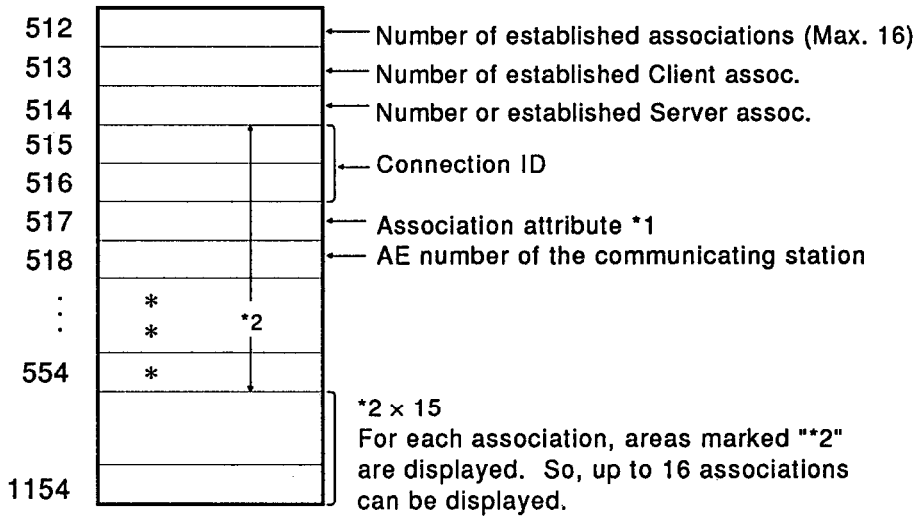
ii) Abnormal end

Same as in RequestDomainDownload.

- Read/Write area
  In the case of a normal end, the read data is set according to the data type in the same manner as described in Write.

### 5.3.4 Information area

The PC CPU can get information such as the present number of associations by reading this area.
This area format is as given below.




**REMARK**

*1 The following table gives the value of associations attribute and their correspondence.

| | |
|---|---|
| Server | 0001h |
| Client | 0101h |

# 6. TROUBLESHOOTING

## 6.1 How to Check Problems

Since the system cannot be started up quickly if errors frequently occur during start-up, it is important to identify the cause as soon as possible when an error occurs.
This section describes the four steps to be taken during troubleshooting.

(1) Visual checks

Items to check visually:

1) Power ON/OFF
2) Wiring state
3) Setting switch states (rotary switch and DIP switch)
4) Parameter setting
5) LED indication state

Reconfirm the operation after checking the above items.

(2) When did the problem occur?

Items to check : Which operation caused the problem?
In what situation did the problem occur?
For example, when the power is turned ON, at the execution of a service, etc.

(3) Self-diagnosis program execution

Execute a self-diagnosis program to verify whether the problem was caused by an I/F module internal fault or an external factor. Appendix 1 describes how to execute the self-diagnosis program.

(4) Problem location

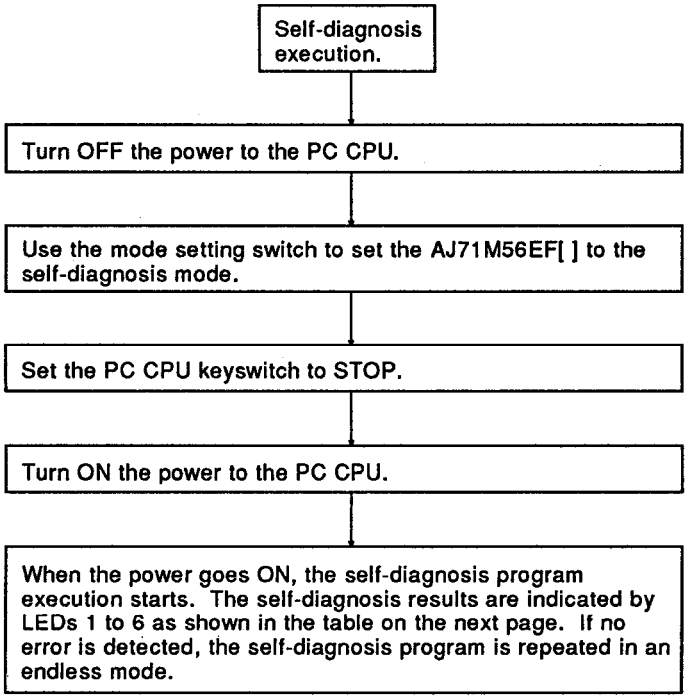
Perform the above three steps to locate the cause (in the I/F module or elsewhere).

# APPENDICES

## APPENDIX 1 HOW TO EXECUTE A SELF-DIAGNOSIS PROGRAM

(1) Procedure

This section describes the procedure for executing a self-diagnosis program:




See Section 4.3.3.

**CAUTION**

1. When executing the self-diagnosis program, make sure that the PC CPU is set to STOP. If it is not set to STOP, the PC CPU can detect a SP UNIT DOWN error.
2. After executing the self-diagnosis program, set the PC CPU to the normal state by turning OFF the power to the PC CPU, shifting the setting switch to ONLINE, and turn the power back ON.

(2) Self-diagnosis program results indication

The indication states of the LEDs (1 to 6) when the self-diagnosis program is executed are listed below.

| Test item | State | LED ON/OFF state | | | | | |
|---|---|---|---|---|---|---|---|
| | | LED6 | LED5 | LED4 | LED3 | LED2 | LED1 |
| MPU test | Testing | X | O | X | X | X | O |
| | Error | X | X | X | X | X | O |
| Memory test | Testing | X | O | X | X | O | X |
| | Error | X | X | X | X | O | X |
| Timer test | Testing | X | O | X | X | O | O |
| | Error | X | X | X | X | O | O |
| Interruption test | Testing | X | O | X | O | X | X |
| | Error | X | X | X | O | X | X |
| Collision detect test | Testing | X | O | O | X | X | X |
| | Error | X | X | O | X | X | X |
| Internal loopback test | Testing | X | O | O | X | X | O |
| | Error | X | X | O | X | X | O |
| External loopback test | Testing | X | O | O | X | O | X |
| | Error | X | X | O | X | O | X |

**REMARKS**

1. In the above table, O indicates ON and X indicates OFF.
   (When a self-diagnosis program is not being executed, LEDs 1 to 6 are OFF.)
2. If an error is indicated by executing the self-diagnosis program, the I/F module could be faulty. In this case, consult your nearest Mitsubishi representative.
3. External loopback test is executed when sw1 is turned ON.
   However, the dummy packet sent for master station is received.

## APPENDIX 2 LIST OF MMS SERVICES

This section lists the MMS services supported by the AJ71M56EF[ ].
O: Indicates supported by the AJ71M56EF[ ].

| Classification | Service | Server | Client |
|---|---|---|---|
| Connection management | Initiate | O | O |
| | Conclude | O | O |
| | Abort | O | O |
| | Refect | O | O |
| VMD management | Status | O | |
| | UnsolicitedStatus | O | |
| | GetNameList | O | |
| | Identify | O | |
| | GetCapabilityList | O | |
| Domain management | InitiateDownloadSequence | O | |
| | DownloadSegment | O | |
| | TerminateDownloadSequence | O | |
| | InitiateUploadSequence | O | |
| | UploadSegmant | O | |
| | TerminateUploadSequence | O | |
| | DeleteDomain | O | |
| | GetdomainAttributes | O | |
| | RequestDomainDownload | O | |
| | RequestDomainUpload | O | |
| Program management | CreateProgramInvocation | O | |
| | DeleteProgramInvocation | O | |
| | Start | O | |
| | Stop | O | |
| | Resume | O | |
| | Reset | O | |
| | GetProgramInvocationAttributes | O | |
| Variable management | Read | O | O |
| | Write | O | O |
| | InformationReport | O | |
| | GetVariableAccessAttributes | O | |

## APPENDIX 3 DEVICE NAME CODE NUMBER, DEVICE NUMBER AND ACCESS TYPE

This section describes the device name code numbers, device numbers and access types used for InformationReport, Read, Write, RequestDomain-Download and RequestDomainUpload.

| Symbol | Device Name | Device Name Code Number (Decimal) | Access Type | Device Number *1 |
|---|---|---|---|---|
| X | Input | 1 | Bit | 0 to 7FFh |
| Y | Output | 2 | Bit | 0 to 7FFh |
| L | Latch relay | 3 | Bit | 0 to 8191 |
| M | Internal relay | 4 | Bit | 0 to 8191 |
| SM | Special relay | 5 | Bit | 0 to 255 (correspond to M9000 to M9255 respectively) |
| F | Annunciator | 6 | Bit | 0 to 2047 |
| TT | Timer contact | 7 | Bit | 0 to 2047 |
| TC | Timer coil | 8 | Bit | 0 to 2047 |
| CT | Counter contact | 9 | Bit | 0 to 1023 |
| CC | Counter coil | 10 | Bit | 0 to 1023 |
| TN | Timer current data | 11 | Word | 0 to 2047 |
| CN | Counter current data | 12 | Word | 0 to 1023 |
| D | Data register | 13 | Word | 0 to 6143 |
| SD | Special register | 14 | Word | 0 to 255 (correspond to M9000 to M9255 respectively) |
| TM | Timer set data main | 15 | Word | 0 to 2047 |
| TS | Timer set data sub | 16 | Word | 0 to 2047 |
| CM | Counter set data main | 17 | Word | 0 to 1023 |
| CS | Counter set data sub | 18 | Word | 0 to 1023 |
| A | Accumulator | 19 | Word | 0, 1 |
| Z | Indexing register | 20 | Word | 0 to 6 |
| V | Indexing register | 21 | Word | 0 to 6 |
| R | File register | 22 | Word | 0 to 8191 |
| B | Link relay | 23 | Word | 0 to FFFh |
| W | Link register | 24 | Word | 0 to FFFh |
| 1R | Extension file register No. 1 | 31 | Word | 0 to 8191 |
| . | . | . | . | . |
| . | . | . | . | . |
| . | . | . | . | . |
| 48R | Extension file register No. 48 | 78 | Word | 0 to 8191 |
| | Named variable | FFFFh (Hexadecimal) | | Table number set using the SW0GP-M56PC |

**CAUTION**

*1 The capacity and number of a device depends on the PC CPU used and the parameter setting. The corresponding PC CPU Manual gives details.

- *The access type and length cannot be changed using the InformationReport service (fixed to 1 bit or 1 word).

## APPENDIX 4 ERROR CODES

The error codes set in the request answer areas of the buffer are listed below.
The addresses below assume that request area No. 1 is used. In the case of other request areas, change the addresses accordingly.
If the error code is 201A or 2054, please check the parameter of Initiate request/response service.
Other error codes are related with the parameter of each service, and don't effect on the functionalities.
The 205F, timeout of application, may be related with the status of the communication station.

(1) Error codes

These are set in address 66.

Information Report

| Error Code | Description | Action |
|---|---|---|
| 2005h | Incorrect string length was designated. | Set 1 to 1024 for octet-string, and 1 to 8192 for bit-string. |
| 201Ah | Higher-tier communication error | Thoroughly check the communications parameters by referring to the error information. |
| 201Eh | Incorrectly-named variable was designated. | • Designate the table number of the defined named variable.<br>• The length of strings in the named variable is exceeded the max. Change the length by SW0GP-M56PC. |
| 201Fh | Incorrect data type was designated. | Set a correct data type. |
| 2020h | Incorrect device name was designated. | Set a correct device name code number. |
| 202Ah | Incorrect device number was designated. | Set a correct device number. |
| 2035H | A value other than 0xff was designated in address 04h. | Set 0xff. |
| 2037H | Value other than 0 or 1 was designated. | Set 0 (default type) or 1 (extention type) |

Unsolicited Status

| Error Code | Description | Action |
|---|---|---|
| 201Ah | Higher-tier communication error | Thoroughly check the communications parameters by referring to the error information. |

RequestDomainDownload

| Error Code | Description | Action |
|---|---|---|
| 201Ah | Higher-tier communication error | Thoroughly check the communications parameters by referring to the error information. |
| 201Bh | MMS negative acknowledge was received. | Check the data set in the buffer by referring to the error information. |
| 202Fh | Incorrect domain type was designated. | In the case of a normal device, set 7. In the case of an extension file register, set 8. |
| 2030h | File name length is 0 or greater than 16. | The file name length must range from 1 to 16. |
| 2032h | Non-existing MELSECNET local station was designated. | Set a correct station number. |
| 2033h | Domain name length exceeded 32. | The domain name length must be 32 or less. |

RequestDomainUpload

| Error Code | Description | Action |
|---|---|---|
| 201Ah | Higher-tier communication error | Thoroughly check the communications parameters by referring to the error information. |
| 201Bh | MMS negative acknowledge was received. | Check the data set in the buffer by referring to the error information. |
| 202Fh | Incorrect domain type was designated. | Designate a defined domain type. |
| 2030h | File name length is 0 or greater than 16. | The file name length must range from 1 to 16. |
| 2032h | Non-existing MELSECNET local station was designated. | Set a correct station number. |

Initiate

| Error Code | Description | Action |
|---|---|---|
| 2054h | Higher-tier communication error | Thoroughly check the communications parameters by referring to the error information. |
| 2055h | MMS negative acknowledge was received. | Check the data set in the buffer by referring to the error information. |
| 205Fh | Time-out error occurred during timer monitoring. | Check the communications line state and the operating state of the communicating station. |
| 2060h | Incorrect AE number of the communicating station was designated. | Designate the AE number of a defined station. |
| 2061h | Same AE/SAP initiate request was made to the communicating station whose association was already established. | Alter the AE/SAP data set in the AE table of the communicating station. |

Conclude

| Error Code | Description | Action |
|---|---|---|
| 2054h | Higher-tier communication error | Thoroughly check the communications parameters by referring to the error information. |
| 2055h | MMS negative acknowledge was received. | Check the data set in the buffer by referring to the error information. |
| 205Fh | Time-out error occurred during timer monitoring. | Check the communications line state and the operating state of the communicating station. |

Read

| Error Code | Description | Action |
|---|---|---|
| 2051h | Incorrect access type was designated. | Set a correct access type. |
| 2053h | Incorrect data type was designated. | Set a correct data type. |
| 2054h | Higher-tier communication error | Thoroughly check the communications parameters by referring to the error information. |
| 2055h | MMS negative acknowledge was received. | Check the data set in the buffer by referring to the error information. |
| 2057h | Read error occurred at the communicating station. | Check the data set in the buffer and the state of the communicating station. |
| 2059h | Incorrect bit string length was designated. | Set a number ranging from 1 to 8192. |
| 205Ah | Incorrect octet string length was designated. | Set a number ranging from 1 to 1024 (in units of bytes). |
| 205Bh | Incorrect integer-type bit length was designated. | Set 16 or 32. |
| 205Ch | Incorrect named-variable length was designated. | Set a variable ranging from 1 to 32. |
| 205Dh | Incorrect symbolic address name length was designated. | Set an address name length ranging from 1 to 16. |
| 205Fh | Time-out error occurred during timer monitoring. | Check the communications line state and the operating state of the communicating station. |

Write

| Error Code | Description | Action |
|---|---|---|
| 2051h | Incorrect access type was designated. | Set a correct access type. |
| 2053h | Incorrect data type was designated. | Set a correct data type. |
| 2054h | Higher-tier communication error | Thoroughly check the communications line state and communications parameters by referring to the error information. |
| 2055h | MMS negative acknowledge was received. | Check the data set in the buffer by referring to the error information. |
| 2056h | Write error occurred at the communicating station. | Check the data set in the buffer and the state of the communicating station. |
| 2059h | Incorrect bit string length was designated. | Set a number ranging from 1 to 8192. |
| 205Ah | Incorrect octet string length was designated. | Set a number ranging from 1 to 1024 (in units of bytes). |
| 205Bh | Incorrect integer-type bit length was designated. | Set 16 or 32. |
| 205Ch | Incorrect named-variable length was designated. | Set a variable ranging from 1 to 32. |
| 205Dh | Incorrect symbolic address name length was designated. | Set an address name length ranging from 1 to 16. |
| 205Fh | Time-out error occurred during timer monitoring. | Check the communications line state and the operating state of the communicating station. |

Others

| Error Code | Description | Action |
|---|---|---|
| 2100h | Identifier or communicating station's AE number whose association was not established was designated. | Make sure that the association is established. |
| 2101h | Association including a service being processed was designated. | Issue another service after the service being processed has been completed. |
| 2103h | Unusable service was designated. | The available services for the client are different from those for the server. |
| 2104h | The previous transmission of the designated association (transmission of request/confirm) has not been completed. | Issue another service. |

(1) Error information

a. In the case of a higher-tier communication error

When an error whose code is 201Ah or 2054h occurs, a valid value is written in address 67 of the buffer.

| | |
|---|---|
| 3004h | Request was made to send a PDU larger than the max. segment size defined in the initiate service. |
| 300Dh | Number of issued initiate services exceeded the set number of client associations. |
| 3012h | Service that is not included in the services determined by the initiate service was requested. |
| 3015h | Conclude request was made while a confirmation type service was being processed. |
| 301Ah | Confirmation-type service was requested beyond the max. service outstanding determined by the initiate service. |
| 3029h | Service using VNAM designated as unsupported by the initiate service was issued. |
| 302Ah | Service using VADR designated as unsupported by the initiate service was issued. |

b. In case of a received negative acknowledge

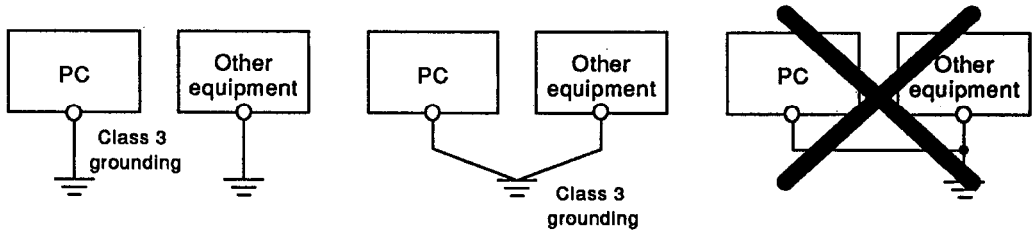
When an error whose code is 201Bh or 2055h occurs, a valid value is written in addresses 67 and 68 of the buffer.

Address 67 : MMS negative acknowledge ErrorClass + 4000h
Address 68 : MMS negative acknowledge ErrotCode

## APPENDIX 5 PC CPU GROUNDING

(1) Ground the PC independently if possible. Class 3 grounding should be used (grounding resistance: 100 Ω or less).

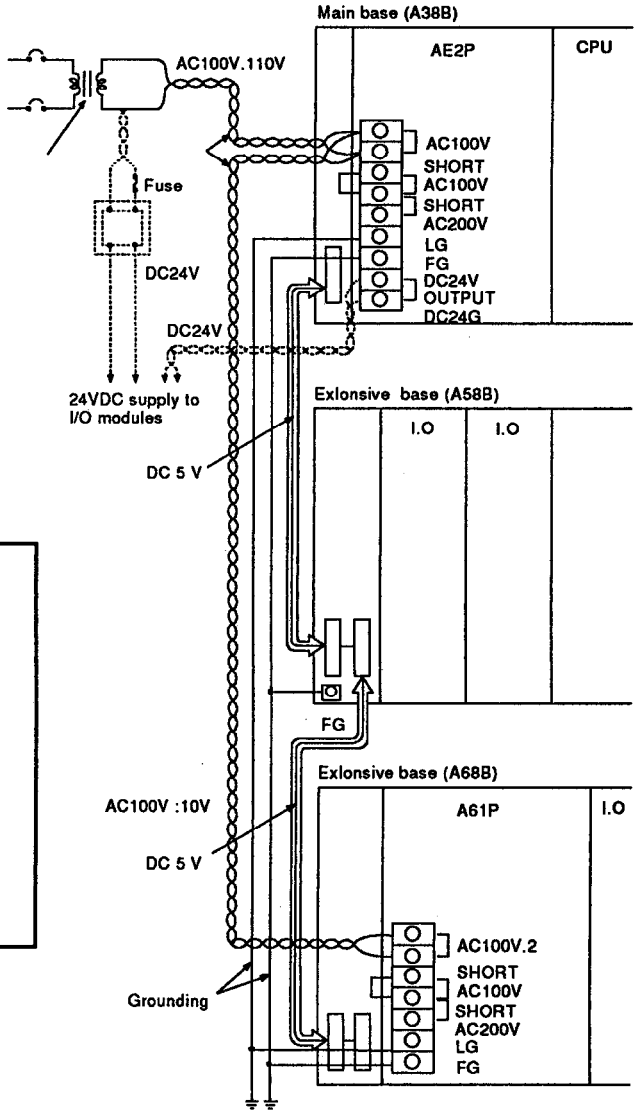
(2) If the PC cannot be independently grounded, use the grounding method given in (b) below:




(a) Independent grounding : Best (b) Joint grounding Good (c) Joint grounding : Not allowed

(3) Use 2 $mm^2$ or thicker grounding cable. The grounding point should be as near as possible to the PC to minimize the cable length.

(4) Example of grounding cable wiring to main and extension bases




**CAUTION**

When the LG terminals and FG terminals are connected, make sure to ground the wires. If the LG terminals and FG terminals are connected without grounding the wires, the PC may be susceptible to abnormal noise. In addition, since the LG terminals have half the potential of the input voltage, the operator could receive an electric shock when touching metal parts.

## APPENDIX 6 TERMINOLOGY

(1) AE (Application Entity)

An application entity that has MAP communications ability in an open system.

(2) AP (Application Process)

User application processing.

(3) API (Application Program Interface)

Programming language interface between the application layer and the AP.

(4) Association

A logical communications line between AEs.

(5) Broadband

Communications method by which a frequency band is divided into several parts and several communications channels are established on the same communications medium.

(6) Baseband

Communications method by which digital signals are not converted into the frequency to be transmitted. The baseband can only use a single channel.

(7) CBB (Conformance Building Block)

Parameters represents the conformity to MMS.

(8) CCITT (International Telegraph and Telephone Consultative Committee)

(9) Client

The system uses VMD via a service request for a specific purpose.

(10) Companion Standard

The standards applicable to machines (such as PCs, NCs, robots, etc.) when they are used together in MMS.

MMS provides for general requirements for message communications, not for each machine.

(11) Confirm

One of the four basic primitives; response received by the client from the server via the MMS interface.

(12) Domain

MMS object which usually refers to the VMD source subset equipment used for a specific purpose, the program area, or other memory areas.

(13) DIS (Draft International Standard)

(14) IEEE (Institute of Electrical and Electronics Engineers)

(15) IEEE802.3

CSMA/CD standard set by IEEE802 Standards Committee.

(16) Indication

One of the four basic primitives; request received by the server from the client via the MMS interface.

(17) IS (International Standard)

(18) ISO (International Organization for Standardization)

(19) LAN (Local Area Network)

Data communications network using a non-public communications line.

(20) LLC (Logical Link Control)

Transparently transfers data between adjacent nodes.

(21) LSAP (LLC Service Access Point)

LLC sub-layer service access point.

(22) MAC (Medium Access Control)

Controls both data transfer to each device and access to a physical medium.

(23) MAP (Manufacturing Automation Protocol)

Communications protocol for interconnection between open systems in FA.

(24) Medium

Entire cable system including wiring, taps, flow divider, etc.

(25) MMS (Manufacturing Message Specification)

Production message service. The application layer protocol offers a message communications function with in-factory programmable devices (robot, NC, PC, etc.).

(26) NSAP address

Used in the same meaning as the network address.

(27) Octet

Data unit of eight bits.

(28) OSI (Open Systems Interconnection)

(29) PDU (Protocol Data Unit)

Data format for describing the protocol parameters.

(30) PI (Program Invocation)

MMS object represents the start of a program.

(31) PICS (Protocol Implementation Conformance Statement)

Represents the conformance of a protocol implementation.

(32) Primitive

Basic event generated between an application program and the MMS interface.

(33) Protocol

Communications rules.

(34) PSAP (Presentation Service Access Point)

Presentation layer service access point.

(35) Request

One of the four basic primitives; request transmitted by the client to the server via the MMS interface.

(36) Response

One of the four basic primitives; response transmitted by the server to the client via the MMS interface.

(37) SAP (Service Access Point)

Access medium for adjacent-layer communications entities to use/offer services.

(38) Server

Externally works as a VMD for each service request, offering services to the client.

(39) SSAP (Session Service Access Point)

Session layer service access point.

(40) TSAP (Transport Service Access Point)

Transport layer service access point.

(41) Variable

MMS object represents VMD variables.

(42) VMD (Virtual Manufacturing Device)

Abstractly models the manufacturing device as external operations.

**IMPORTANT**

(1) Design the configuration of a system to provide an external protective or safety inter locking circuit for the PCs.

(2) The components on the printed circuit boards will be damaged by static electricity, so avoid handling them directly. If it is necessary to handle them take the following precautions.

(a) Ground your body and the work bench.

(b) Do not touch the conductive areas of the printed circuit board and its electrical parts with non-grounded tools, etc.

Under no circumstances will Mitsubishi Electric be liable or responsible for any consequential damage that may arise as a result of the installation or use of this equipment.

All examples and diagrams shown in this manual are intended only as an aid to understanding the text, not to guarantee operation. Mitsubishi Electric will accept no responsibility for actual use of the product based on these illustrative examples.

Owing to the very great variety in possible applications of this equipment, you must satisfy yourself as to its suitability for your specific application.

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