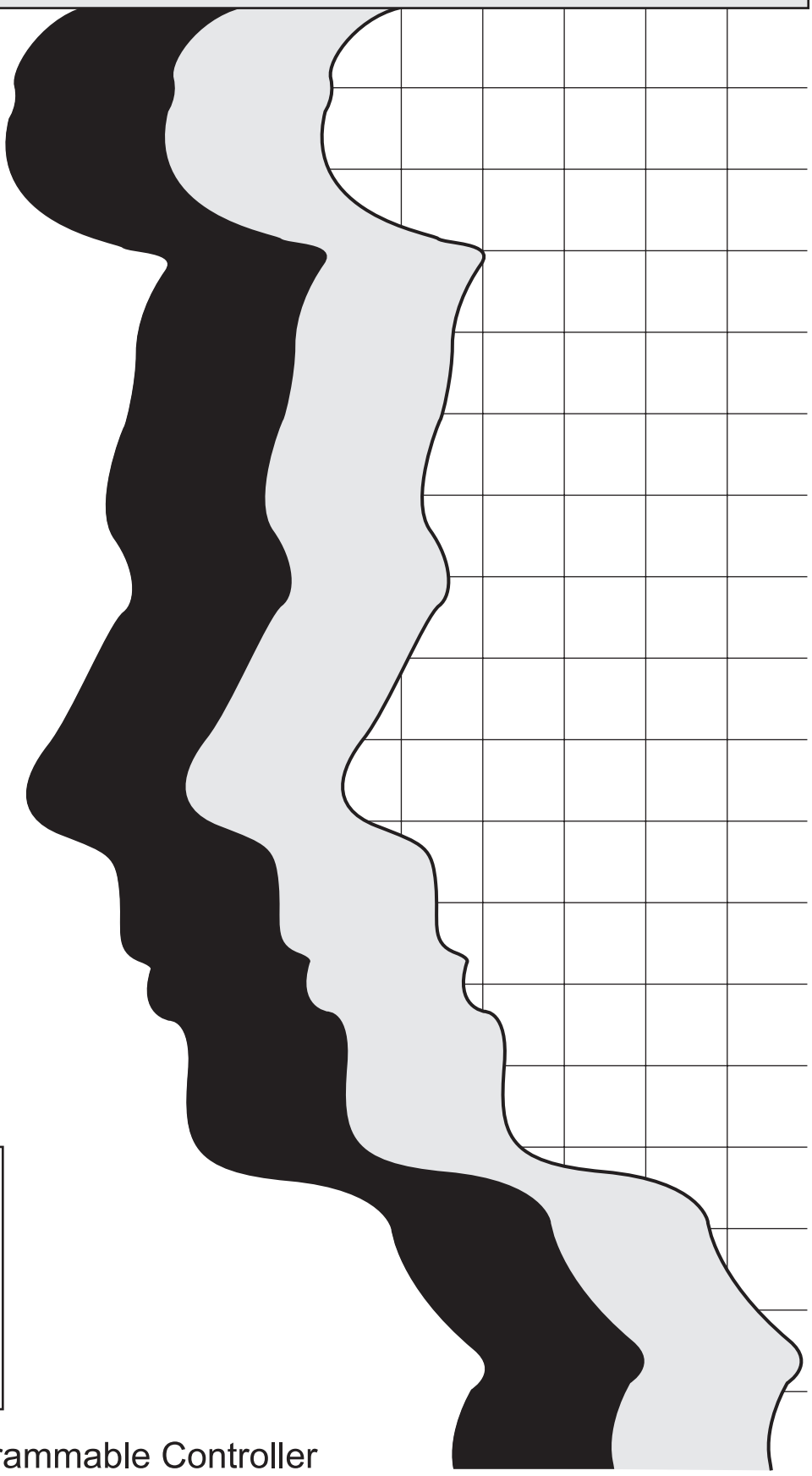
MITSUBISHI

Type A1S/A1SC24-R2/A2SCPU(S1)

User's Manual



A

MELSEC

Mitsubishi Programmable Controller

● SAFETY PRECAUTIONS ●

(Be sure to read these instructions before use.)

Before using the product, read this and relevant manuals carefully and handle the product correctly with full attention to safety.
In this manual, ●SAFETY PRECAUTIONS● are classified into 2 levels: "DANGER" and "CAUTION".

⚠ DANGER	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 medium or slight personal injury or physical damage.

Under some circumstances, failure to observe the ⚠ CAUTION level instructions may also lead to serious results.
Be sure to observe the instructions of both levels to ensure the safety.

Please keep this manual in a safe place for future reference and also pass this manual on to the end user.

[DESIGN PRECAUTIONS]

⚠ DANGER

● Create a safety circuit outside the PLC to ensure the whole system will operate safely even if an external power failure or a PLC failure occurs.
Otherwise, incorrect output or malfunction may cause an accident.

(1) For an emergency stop circuit, protection circuit and interlock circuit that is designed for incompatible actions such as forward/reverse rotation or for damage prevention such as the upper/lower limit setting in positioning, any of them must be created outside the PLC.

(2) When the PLC detects the following error conditions, it stops the operation and turn off all the outputs.
- The overcurrent protection device or overvoltage protection device of the power supply module is activated.
- The PLC CPU detects an error such as a watchdog timer error by the self-diagnostics function.

In the case of an error of a part such as an I/O control part that cannot be detected by the PLC CPU, all the outputs may turn on.In order to make all machines operate safely in such a case, set up a fail-safe circuit or a specific mechanism outside the PLC.For a fail-safe circuit example, refer to "LOADING AND INSTALLATION" in this manual.

(3) Depending on the failure of the output module's relay or transistor, the output status may remain ON or OFF incorrectly.
For output signals that may lead to a serious accident, create an external monitoring circuit.

[DESIGN PRECAUTIONS]

⚠DANGER

- If load current more than the rating or overcurrent due to a short circuit in the load has flowed in the output module for a long time, it may cause a fire and smoke. Provide an external safety device such as a fuse.

- Design a circuit so that the external power will be supplied after power-up of the PLC.
  Activating the external power supply prior to the PLC may result in an accident due to incorrect output or malfunction.

- For the operation status of each station at a communication error in data link, refer to the respective data link manual.
  The communication error may result in an accident due to incorrect output or malfunction.

- When controlling a running PLC (data modification) by connecting a peripheral device to the CPU module or a PC to a special function module, create an interlock circuit on sequence programs so that the whole system functions safely all the time.
  Also, before performing any other controls (e.g. program modification, operating status change (status control)), read the manual carefully and ensure the safety.
  In these controls, especially the one from an external device to a PLC in a remote location, some PLC side problem may not be resolved immediately due to failure of data communications.
  To prevent this, create an interlock circuit on sequence programs and establish corrective procedures for communication failure between the external device and the PLC CPU.

- When setting up the system, do not allow any empty slot on the base unit.
  If any slot is left empty, be sure to use a blank cover (A1SG60) or a dummy module (A1SG62) for it.
  When using the extension base unit, A1S52B(S1), A1S55B(S1) or A1S58B(S1), attach the included dustproof cover to the module in slot 0.
  Otherwise, internal parts of the module may be flied in the short circuit test or when an overcurrent or overvoltage is accidentally applied to the external I/O section.

⚠CAUTION

- Do not install the control lines or communication cables together with the main circuit or power lines, or bring them close to each other.
  Keep a distance of 100mm (3.94inch) or more between them.
  Failure to do so may cause malfunctions due to noise.

- When an output module is used to control the lamp load, heater, solenoid valve, etc., a large current (ten times larger than the normal one) may flow at the time that the output status changes from OFF to ON. Take some preventive measures such as replacing the output module with the one of a suitable current rating.

[INSTALLATION PRECAUTIONS]

⚠CAUTION

- Use the PLC under the environment specified in the user's manual.
  Otherwise, it may cause electric shocks, fires, malfunctions, product deterioration or damage.

- Insert the module fixing projection into the fixing hole in the base unit and then tighten the module fixing screw within the specified torque.
  When no screw is tightened, even if the module is installed correctly, it may cause malfunctions, a failure or a drop of the module.
  Tightening the screw excessively may damage the screw and/or the module, resulting in a drop of the module, a short circuit or malfunctions.

- Connect the extension cable to the connector of the base unit or module.
  Check for incomplete connection after installing it.
  Poor electrical contact may cause incorrect inputs and/or outputs.

- Insert the memory cassette and fully press it to the memory cassette connector.
  Check for incomplete connection after installing it.
  Poor electrical contact may cause malfunctions.

- Be sure to shut off all phases of the external power supply used by the system before mounting or removing the module.
  Failure to do so may damage the module.

- Do not directly touch the conductive part or electronic components of the module.
  Doing so may cause malfunctions or a failure of the module.

[WIRING PRECAUTIONS]

⚠DANGER

- Be sure to shut off all phases of the external power supply used by the system before wiring.
  Failure to do so may result in an electric shock or damage of the product.

- Before energizing and operating the system after wiring, be sure to attach the terminal cover supplied with the product.
  Failure to do so may cause an electric shock.

⚠CAUTION

- Ground the FG and LG terminals correctly.
  Failure to do so may cause an electric shock or malfunctions.

- Wire the module correctly after confirming the rated voltage and terminal layout.
  Connecting a power supply of a different voltage rating or incorrect wiring may cause a fire or failure.

- Do not connect multiple power supply modules to one module in parallel.
  The power supply modules may be heated, resulting in a fire or failure.

- Press, crimp or properly solder the connector for external connection with the specified tool.
  Incomplete connection may cause a short circuit, fire or malfunctions.

- Tighten terminal screws within the specified torque range.
  If the screw is too loose, it may cause a short circuit, fire or malfunctions.
  Tightening the screw excessively may damage the screw and/or the module, resulting in a drop of the module, a short circuit or malfunctions.

- Carefully prevent foreign matter such as dust or wire chips from entering the module.
  Failure to do so may cause a fire, failure or malfunctions.

- Install our PLC in a control panel for use.
  Wire the main power supply to the power supply module installed in a control panel through a distribution terminal block.
  Furthermore, the wiring and replacement of a power supply module have to be performed by a maintenance worker who acquainted with shock protection.
  (For the wiring methods, refer to Section 8.7.)

[STARTUP AND MAINTENANCE PRECAUTIONS]

⚠ DANGER

- Do not touch any terminal during power distribution.
  Doing so may cause an electric shock.

- Properly connect batteries.
  Do not charge, disassemble, heat or throw them into the fire and do not make them short-circuited and soldered.
  Incorrect battery handling may cause personal injuries or a fire due to exothermic heat, burst and/or ignition.

- Be sure to shut off all phases of the external power supply used by the system before cleaning or retightening the terminal screws or module mounting screws.
  Failure to do so may result in an electric shock.
  If they are too loose, it may cause a short circuit or malfunctions.
  Tightening the screw excessively may damage the screw and/or the module, resulting in a drop of the module, a short circuit or malfunctions.

⚠ CAUTION

- When performing online operations (especially, program modification, forced output or operating status change) by connecting a peripheral device to the running CPU module, read the manual carefully and ensure the safety.
  Incorrect operation will cause mechanical damage or accidents.

- Do not disassemble or modify each of modules.
  Doing so may cause failure, malfunctions, personal injuries and/or a fire.

- When using a wireless communication device such as a mobile phone, keep a distance of 25cm (9.84inch) or more from the PLC in all directions.
  Failure to do so may cause malfunctions.

- Be sure to shut off all phases of the external power supply used by the system before mounting or removing the module.
  Failure to do so may result in failure or malfunctions of the module.

- Do not drop or apply any impact to the battery.
  Doing so may damage the battery, resulting in electrolyte spillage inside the battery.
  If any impact has been applied, discard the battery and never use it.

- Do not mount/remove the module onto/from base unit more than 50 times (IEC61131-2-compliant), after the first use of the product.

- Before handling modules, touch a grounded metal object to discharge the static electricity from the human body.
  Failure to do so may cause failure or malfunctions of the module.

[DISPOSAL PRECAUTIONS]

⚠ CAUTION
● When disposing of the product, treat it as an industrial waste. When disposing of batteries, separate them from other wastes according to the local regulations. (For details of the battery directive in EU member states, refer to Appendix 6.)

[TRANSPORTATION PRECAUTIONS]

⚠ CAUTION
● When transporting lithium batteries, make sure to treat them based on the transportation regulations. (Refer to Appendix 6 for details of the relevant models.)

REVISIONS

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

Print Date	*Manual Number	Revision
Jun., 1991	IB (NA) 66320-A	First edition
Mar., 1992	IB (NA) 66320-B	Addition of models A1SX20, A1SX30, A1SX40-S1, A1SX40-S2, A1SX41-S2, A1SX42-S2, A1SX71, A1SX80-S2, A1SX81-S2, A1SY60, A1SY71, A1SH42, A1SG62, A1S33B, A1S63P Correction CONTENTS, Page1-1, 1-2, 2-2, 2-4, 2-5, 2-7, 3-1, 4-2, 4-9, 4-20, 4-21, 4-23, 4-33, 4-37, 4-39, 5-2 to 5-5, 5-8, 5-16, 5-20, 5-21, 5-22, 5-26, 5-29, 6-1, 9-13, APP-17, APP-18, APP-22, APP-25 to 34 Addition Page 2-4, 2-6, 4-43, 11-11, APP-35
May, 1993	IB (NA) 66320-C	Addition of models A1SX80-S1, A1SY18A, A1SY28A, A1SY60E, A1SY68A, A1S42X, A1S42Y, A1SCPU-S1 Correction CONTENTS, Section 1.1.1, 2.2.2, 2.3, 2.4, 4.1, 4.1.7, 4.4.1, 5.1, 5.2.3, 5.2.6, 5.2.11, 5.3.3, 5.3.5, 5.3.8, 5.3.9, 5.3.12, 5.3.13, 5.4.1, 6.1.1, 8.1.2, 11.4.1, APP. 2.2, APP. 3.1 Addition Section 5.2.3, 5.3.2, 5.3.4, 5.3.10, 5.3.11, 5.4.2, 5.4.3
Dec., 1993	IB (NA) 66320-D	Addition of models A1SX48Y18, A1SX48Y58, S1-type extension base unit Correction CONTENTS, Section 1, 1.1, 2.1, 2.3, 2.4, 3.1, 4.1, 4.1.8, 4.4.1, 5.1, 5.2.3 to 5.2.6, 5.2.8 to 5.2.10, 5.2.12 to 5.2.16, 5.3.2, 5.3.7, 5.3.10, 5.3.12 to 5.3.14, 5.4.1, 5.4.4, 5.4.5, 5.6, 6.1.2, 6.2.1, 6.2.2, 7.1.1 to 7.1.3, 7.2.2, 7.2.3, 8.1, 9.1, 9.4.2, 9.6, 9.7.1, 9.7.2, 11.1, 11.2.7, 11.4.1, 11.4.2, APP. 2.1, APP. 2.2, APP. 3.1, APP. 3.5.2, APP. 3.5.3 Addition Section 5.4.2, 5.4.3, 7.3, APP. 3.4.6 to APP. 3.4.10, APP. 3.5.4, APP. 3.10, APP. 3.10.1, APP. 3.10.2

Japanese Manual Version SH-3504-I

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

Print Date	*Manual Number	Revision
Apr., 1994	IB (NA) 66320-E	Addition of models A2SCPU, A2SCPU-S1 Correction CONTENTS, Section 1, 1.1, 2.1, 2.2.1, 2.2.2, 2.3, 2.4, 3.1, 4.1, 4.1.7, 4.1.8, 4.1.9, 4.3, 4.4.1, 4.4.3, 8.1.1, 8.1.4, 10.3.1, 11.3.1, 11.4.1, APP. 2.2, APP. 3.1, APP. 3.2 Addition Section APP. 3.7.1, APP. 3.7.2, APP. 3.8.1, APP. 3.8.2
Oct., 1994	IB (NA) 66320-F	Review of entire content
Jan., 1995	IB (NA) 66320-G	Addition of models A1SCPUC24-R2 Correction Contents, Sections 1, 1.1, 2.1, 2.2.1, 2.2.2, 2.3, 2.4, 3.1, 4.1, 4.1.1, 4.1.2, 4.1.3, 4.1.4, 4.1.5, 4.1.6, 4.1.7, 4.2, 4.3, 4.4.1, 4.4.3, 5.1, 5.1.1, 5.2, 6.1, 6.1.1, 6.1.2, 6.2, 7.1.1, 7.1.3, 7.1.4, 7.2, 7.2.1, 8, 8.1, 8.3, 8.4, 8.4.1, 8.4.2, 8.5, 8.6, 8.7.1, 8.7.2, 9.2, 9.3, 9.3.1, 9.3.2, 10.2.1, 10.2.4, 10.2.7, 10.3.1, 10.4.1, APP. 1, APP. 2.1, APP. 2.2, APP. 3.1.1, APP. 3.1.2, APP. 3.2, APP. 3.4.1, APP. 3.4.2, APP. 3.4.3, APP. 3.4.4, APP. 3.4.5, APP. 3.5.1 Addition Outline, 4.4.4, 4.5 Deletion INPUT AND OUTPUT MODULES Specifications
Dec., 2003	IB (NA) 66320-H	Addition of models A1SY42P Correction Section 2.3, 7.2.1 Addition CONTENTS, Section APP. 5, APP. 5.1, APP. 5.2
May, 2007	IB (NA) 66320-I	Correction SAFETY PRECAUTIONS, Section 2.3, Chapter 3, Section 5.2, 6.1.1, 8.2, 8.4.1, 8.7.1, 8.7.2, 10.3.1, 10.4.1, 10.4.2, APP. 2.1, APP. 2.2 Deletion Section 4.2.1, 4.2.2, 4.2.3, 4.2.4, 4.2.5, 4.2.6, 4.2.7, 4.2.8, 4.2.9

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Print Date	*Manual Number	Revision
Jul., 2007	IB (NA) 66320-J	Correction Section 3.4.1, 3.4.3, 3.4.4, 3.4.8, 3.4.9, 3.4.10
Oct., 2008	IB (NA) 66320-K	Correction SAFETY PRECAUTIONS, Chapter 3, Section 7.2.1 Addition Appendix 6, 6.1, 6.2

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

Manuals

The following manuals are also relevant to this product.

Related manuals

- **ACPU Programming Manual (Fundamentals) (IB-66249)**
  This manual describes programming methods required to create programs, device names, parameters, types of program, configuration of the memory area, etc.

- **ACPU Programming Manual (Common Instructions) (IB-66250)**
  This manual describes how to use the sequence instructions, basic instructions, application instructions and micro-computer programs.

- **Computer Link Module User's Manual (Com. link func./Print func.) (SH-3511)**
  This manual describes communication between the A1SCPUC24-R2 and external devices using the dedicated protocol, no protocol, and bidirectional modes, and the settings, wiring, programming, troubleshooting, etc., for this module. (Purchased separately)

- **Computer Link Module Guidebook (SH-3510)**
  This manual gives the basic information required to execute data communication with external devices (computers, for example), in each mode of the computer link function.

- **AnS Module Type I/O User's Manual (IB-66541)**
  This manual gives the specifications for AnS module type I/O modules.

MEMO

1. GENERAL DESCRIPTION

This manual describes the functions, specifications, and handling instructions for the A1SCPU(S1) general purpose programmable controller (hereafter referred to as A1SCPU(S1)), the A2SCPU(S1) general purpose programmable controller (hereafter referred to as A2SCPU(S1)), and the A1SCPUC24-R2 general purpose programmable controller (hereafter referred to as A1SCPUC24-R2). ((1) on the next page gives differences between A1SCPU(S1) and A2SCPU(S1).)
Also, except in cases where there is a need to distinguish between the A1SCPU(S1), A1SCPUC24-S1 and A2SCPU(S1), the generic term "AnSCPU" is used to cover both.
AnSCPUs are miniature building block programmable controllers, which have been downsized to occupy one third of the volume of conventional building block type programmable controllers, and are designed to be easy to use in spite of their small size.

Sequence programs that have been created for the existing A0J2CPU, A0J2HCPU and A[ ]NCPU models can be used by changing the CPU type specification for the program. Moreover, since modules for use with A[ ]NCPU can be used by installing them on an extension base unit for A[ ]NCPU use, it is possible to extend the functions of an AnSCPU.

The AnSCPU has functions equivalent to those of the A2NCPU and we urge you to make the best use of these functions in order to use the equipment efficiently.

This user's manual refers to peripheral devices (A6GPP, A6PHP, A6HGP, IBM PC/AT, A7PU, A7PUS, and A8PUE) by using the following abbreviations.

A6GPP, A6PHP, A6HGP, and IBM PC/AT
(started up with SW0IX-GPPAE, MELSEC-MEDOC)
. . . . . Abbreviated as "GPP function".
A7PU, A7PUS, and A8PUE . . . . Abbreviated as "PU".

- This manual only gives information relating to the PC CPU.
  The computer link function of the A1SCPUC24-R2 is the same as that of the A1SJ71C24-R2. For information on the parts relevant to this function, refer to the following user's manuals.
  - Computer Link Module User's Manual (Com. link func./Print func.) SH-3511

  However, note that when using a manual that does not specifically refer to the A1SCPUC24-R2, the I/O signals for the PC CPU will differ from those indicated in the manual as shown below.

  - A1SJ71C24-R2
    X_n0 to X_nF
    $Y_{(n+1)}0$ to $Y_{(n+1)}F$
  ⇨
  - A1SCPUC24-R2
    XE0 to XEF
    YF0 to YFF
    (fixed)

- After unpacking the A1SCPUC24-R2, check that the following items have been supplied.

Item Name	Quantity
A1SCPUC24-R2 module	1
9-pin Dsub (male) connector, screw-mounted type, made by DDK 17JE-23090-02-D8A	1

(1) Differences between A2SCPU(S1) and A1SCPU(S1)/A1SCPUC24-R2

Item \ Model		A2SCPU	A2SCPU-S1	A1SCPU	A1SCPU-S1	A1SCPUC24-R2
Number of I/O points		512 points (X/Y000 to 1FF)	1024 points (X/Y000 to 3FF)	256 points (X/Y000 to 0FF)	512 points (X/Y000 to 1FF)	256 points (X/Y000 to 0FF)
SFC(MELSAPII)		Usable			Unusable	Usable
Main program capacity		14k steps		8k syeps		
Mamory capacity and memory cassette type	Memory capacity (build-in RAM)	64k bytes	192k bytes	32k bytes		
	EPROM type memory cassette	A2SMCA-14KP		A1SMCA-8KP		
	EEPROM type memory cassette	A2SMCA-14KE		A1SMCA-2KE A1SMCA-8KE		
Memory write adapter		A2SWA-28P		A6WA-28P		
Comment		Max. 4032 points		Max. 1600 points		
Special registers		16-point unit bit pattern of a fuse-blown module (D9100 to D9103)				
		D9100 : Y000 to 0FF D9101 : Y100 to 1FF	D9100 : Y000 to 0FF D9101 : Y100 to 1FF D9102 : Y200 to 2FF D9103 : Y300 to 3FF	D9100 : Y000 to 0FF	D9100 : Y000 to 0FF D9101 : Y100 to 1FF	D9100 : Y000 to 0FF
		16-point unit bit pattern of an I/O module verify error (D9116 to D9119)				
		D9116 : X/Y000 to 0FF D9117 : X/Y100 to 1FF	D9116 : X/Y000 to 0FF D9117 : X/Y100 to 1FF D9118 : X/Y200 to 2FF D9119 : X/Y300 to 3FF	D9116 : X/Y000 to 0FF	D9116 : X/Y000 to 0FF D9117 : X/Y100 to 1FF	D9116 : X/Y000 to 0FF
Current consumption (5 VDC)		0.47 A		0.4 A		0.56 A
Weight kg(lb)		0.43 (0.95)		0.37 (0.81)		0.41 (0.90)

1.1 Features

(1) Compact size

The outside dimensions of the AnSCPU system with one power supply module, one CPU, and eight 16-point I/O modules for use with AnS mounted to the main base unit are:
430 mm (16.9 inch) (W); 130 mm (5.12 inch) (H); and 110 mm (4.33 inch) (D).

(2) An AnSCPU can control a maximum of 256/512/1024 inputs and outputs.

The A1SCPU and A1SCPUC24-R2 can control up to 256 inputs and outputs (X/Y00 to X/YFF). (In the case of the A1SCPUC24-R2, the 32 points from X/YE0 to X/YFF are allocated to the built-in computer link function.)
The A1SCPU-S1 and A2SCPU can control up to 512 inputs and outputs (X/Y00 to X/Y1FF). The A2SCPU-S1 can control up to 1024 inputs and outputs (X/Y00 to X/Y3FF).

(3) Max. 8k/14k steps of program

An AnSCPU allows the creation of a program of up to 8k (A1SCPU(S1)/A1SCPUC24-R2)/14k (A2SCPU(S1)) steps containing up to 26 sequence instructions, 131 basic instructions, and 106 application instructions.

In addition, micro computer programs and utility programs created by the user can be used.

(4) 32/64k byte RAM memory embedded, memory cassette can be installed

- The A1SCPU(S1)/A1SCPUC24-S1 has 32k bytes of built-in RAM memory and the A2SCPU(S1) has 64k bytes of built-in RAM memory with battery backup possible.
- An EPROM or EEPROM cassette is available for sequence program storage. The EEPROM can write while the CPU is stopped.

(5) SFC language compatible

An AnSCPU contains a microcomputer program area, so it can use an SFC program by using the MELSAP-II software on an IBM personal computer.

(6) Two extension connectors, on the right and left sides.

In order to facilitate wiring wherever the extension base unit is installed, extension connectors are provided at both left and right sides of the AnSCPU and extension cables that suit the requirements imposed by different mounting locations are available.

(7) Use either screws or DIN rail for panel installations

The A1S base unit is provided both with screw holes and, on its rear face, the fixture for mounting it to a DIN rail.

(8) Easy-to-see terminal block symbol sheet

- A terminal block symbol sheet is attached to the front of AnS I/O modules.

It is possible to write I/O device numbers, connector numbers, etc. on one side of the sheet.

- Terminal symbols for 16 I/O signals can be written on the other side.

(9) A[ ]N, A[ ]A-series I/O module and special-function module compatible.

By connecting an A[ ]N, A[ ]A-series extension base unit, A[ ]N, A[ ]A I/O modules or special-function modules can be used.

(10) Same programming environment as other MELSEC-A CPU modules.

A sequence program can be created using the peripheral device currently used for other MELSEC-A CPU modules.

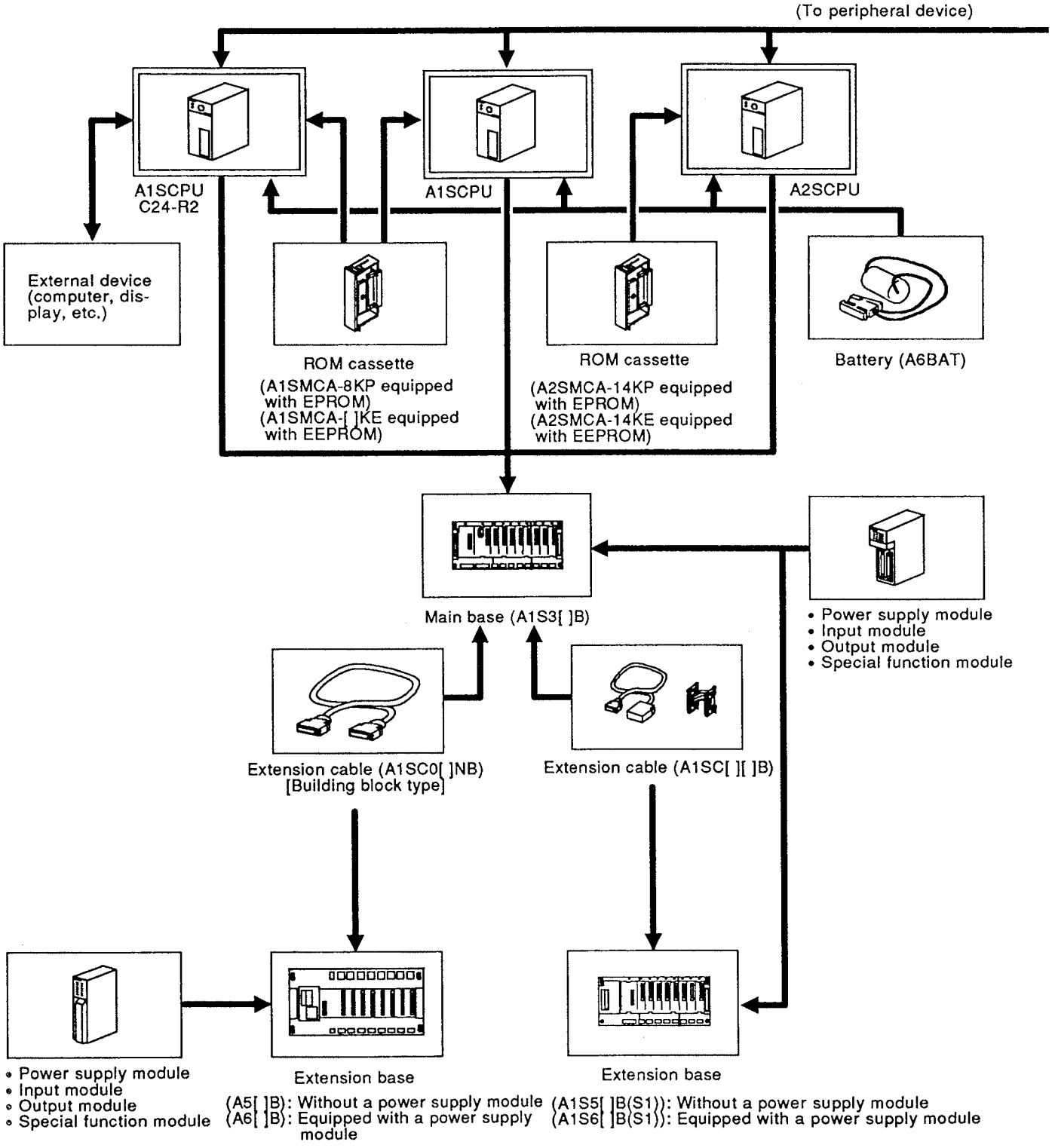
For details on the applicable peripheral devices, see Section 2.2 "Cautions on System Configuration".

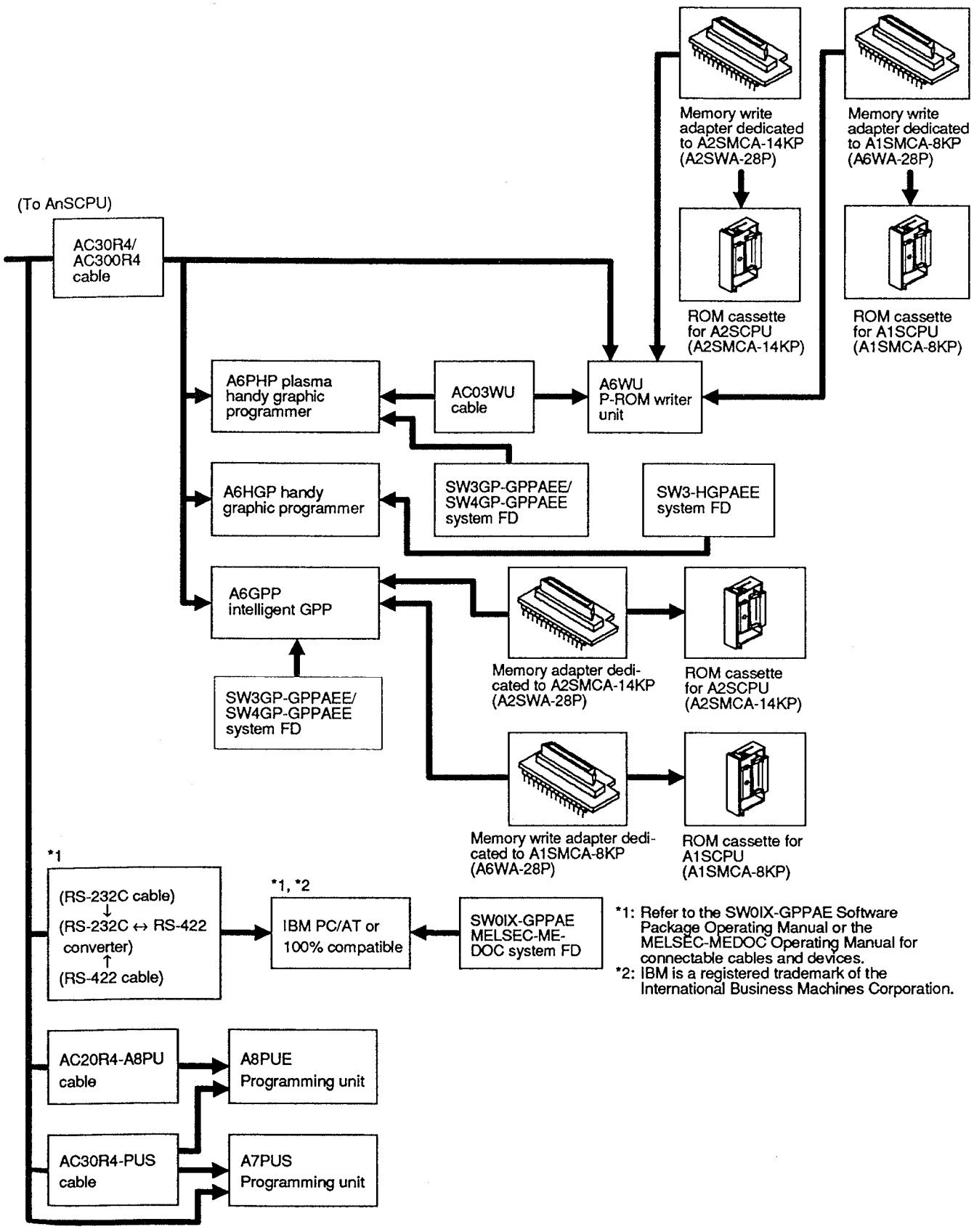
2. SYSTEM CONFIGURATION

This section describes the applicable system configurations, cautions on configuring a system, and component devices of the AnSCPU.

2.1 Overall Configuration

The figure below shows a system configuration when the AnSCPU is used independently.





POINT

For applicable printers, cables, and ROM writers, refer to the operating manual for each peripheral device used.

2.2 Cautions on Configuring a System

This section describes the hardware and software that can be used with the AnSCPU.

2.2.1 Hardware

(1) I/O module

An A[ ]N or A[ ]A building-block type I/O module can be used by loading it to the A5[ ]B/A6[ ]B extension base.

(2) Special function module

(a) An A[ ]N or A[ ]A special function module can be used by loading it to the A5[ ]B/A6[ ]B extension base.

(b) Limits are imposed on the number of the following special function modules that can be loaded.

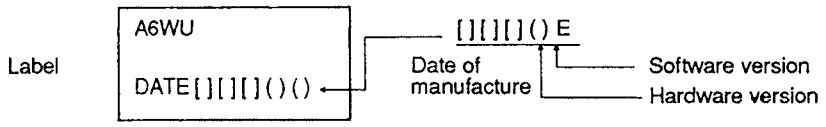
AD51(S3) AD51FD(S3) AJ71C24(S3/S6/S8) AJ71P41	AD51H(S3) AD57G(S3) AJ71C22 AJ71UC24 AJ71E71	Up to 2 (Only one A1SCPUC24-R2 can be installed.)
A1SD51S A1SJ71C24-R2(PRF/R4) A1SJ71UC24-R2(PRF/R4)		
AI61(S1)		Only 1
A1SI61		
AJ71AP21 AJ71AT21B AJ71BR11	AJ71AR21 AJ71LP21	Only 1
A1SJ71AT21B A1SJ71AP21	A1SJ71AR21	

(3) Peripheral device

(a) Points to note when using an A6WU P-ROM writer

1) When using an A1SCPU(S1)/A1SCPUC24-R2

Use an A6WU P-ROM writer unit whose software version is "E" or later.



2) When using an A2SCPU

All A6WU P-ROM writer versions can be used.

(b) The A6WU P-ROM writer unit cannot be installed directly on the AnSCPU (add-on installation impossible).
Only handheld connection using cables is possible.

(c) Among the programming units (A7PU, A7PUS and A8PUE), only the A7PUS can be added on.
The other models (A7PU and A8PUE) are available only as the handheld installation type which requires cables.

(4) EPROM memory cassette ROM partition

Partitioning the EPROM memory cassette with an A6GPP (SW4GP-GPPA)/A6WU requires a memory write adapter (optional). The valid combinations of memory cassette and memory write adapter are as follows:

CPU Model	Memory Cassette Model	Memory Write Adapter Model
A1SCPU, A1SCPUC24-R2	A1SMCA-8KP	A6WA-28P
A2SCPU	A2SMCA-14KP	A2SWA-28P

(5) Program write during operation with EEPROM

(a) When an operation is executed using an EEPROM, writing is not possible in the RUN state. If writing is attempted in this state, the following messages will be sent to the peripheral devices:

- When the SW3GP-GPPA is used : "PC COMMUNICATIONS ERROR: ERROR CODE = 17" is displayed.
- When SW0RX-GPPA is used : "PC COMMUNICATIONS ERROR: ERROR CODE = 17" is displayed.
- When the A7PU is used : "PC NOT RESPOND" is displayed.

(b) Programs cannot be written from peripheral devices which are connected to the computer link module or other stations of the MELSECNET.

Write programs from peripheral devices connected to the AnSCPU's RS-422.

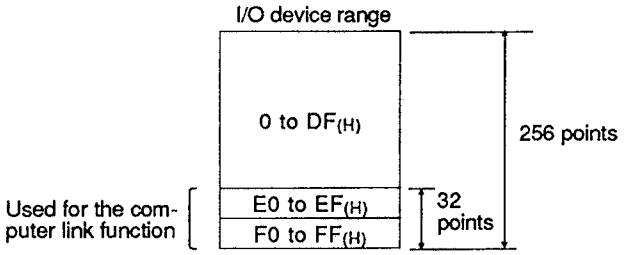
(c) When writing a program to the A1SMCA-2KE, set the parameter for main sequence program capacity to 2k steps or less.

Programs written with a main sequence program capacity setting of 3K steps or over cannot work properly.

Checking between the AnSCPU and a peripheral device will result in a mismatch.

(6) I/O signal ranges when using A1SCPUC24-R2

(a) In the case of the A1SCPUC24-R2, the 32 points for input signals X/Y E0 to FF(H) are allocated to the built-in computer link function.



When installing an I/O module, or special function module, etc., configure the system so that the I/O signal range is kept within 0 to DF (H).

(b) The following restrictions apply when performing data communication in the networks indicated.

	MELSECNET(II)	MELSECNET/B	MELSECNET/10
Remote I/O system	Link not possible (because X/Y link cannot be used)		—
Master/local system (PC-to-PC network)	Only communication of link relays (B) and link registers (W) is possible. (X/Y link cannot be used)		

2.2.2 Software packages

(1) CPU type selection

When using any of the software packages for programming or monitoring, "A2", "A1S" or "A0J2H" should be selected as the CPU type. If the EPROM write facility is required, it should be used off-line and either "A0J2H" or "A1S"(for A1SCPU(S1)/A1SCPUC24-R2) and "A2"(for A2SCPU(S1)) should be selected as the CPU type. If the software package does not have either of these two selections, the EPROM write facility is not available. Please refer to the table below as a guide to the software packages available and choose the CPU type for the AnSCPU.

(a) A1SCPU/A1SCPUC24-R2

Peripheral Device	Software Package	CPU Type		Remarks
		On-Line	Off-Line	
A6PHP	SW3GP-GPPAEE	A2	—	EPROM write not possible.
	SW4GP-GPPAEE	A0J2H	A0J2H/A1S	Select "A1S" when the software version is "R" or later.
A6GPP	SW3-GPPAEE	A2	—	EPROM write not possible.
	SW3GP-GPPAEE			
	SW4GP-GPPAEE	A0J2H	A0J2H/A1S	Select "A1S" when the software version is "R" or later.
A6HGP	SW3-HGPAEE	A2	—	EPROM write not possible.
IBM PC/AT	SW0IX-GPPAE	A1S	A0J2H/A1S	
	MEDOC	A2	—	
	MELSEC-MEDOC	A1S	—	
A6WU		A1S	—	• "A1S" is displayed when the system is started up with software version "E" or later. Cannot be used if software version "D" or before. • Add-on mounting is not possible.
A7PU		A2	—	• "A2" is displayed when the system is started up with software version "E" or earlier. Cannot be used if the software version is "F" or later • Add-on mounting is not possible.
A7PUS, A8PUE		A1S	—	"A1S" is displayed when the system is started up.

(b) A1SCPU-S1

Peripheral Device	Software Package	CPU Type		Remarks
		On-Line	Off-Line	
A6PHP	SW3GP-GPPAEE	A2	—	EPROM write not possible.
	SW4GP-GPPAEE		A0J2H/A1S	
A6GPP	SW3-GPPAEE	A2	—	EPROM write not possible.
	SW3GP-GPPAEE			
	SW4GP-GPPAEE		A0J2H/A1S	
A6HGP	SW3-HGPAEE	A2	—	EPROM write not possible.
IBM PC/AT	SW0IX-GPPAE	A2	A0J2H/A1S	
	MEDOC		—	
	MELSEC-MEDOC			
A6WU		—	—	Cannot be used

Peripheral Device	Software Package	CPU Type		Remarks
		On-Line	Off-Line	
A7PU		A2	—	• "A2" is displayed when the system is started up. • Add-on mounting is not possible.
A7PUS		A2	—	"A2" is displayed when the system is started up.
A8PUE				

(c) A2SCPU(S1)

Peripheral Device	Software Package	CPU Type		Remarks
		On-Line	Off-Line	
A6PHP	SW3GP-GPPAEE	A2	—	EPROM write not possible.
	SW4GP-GPPAEE		A2	
A6GPP	SW3-GPPAEE		—	EPROM write not possible.
	SW3GP-GPPAEE			
	SW4GP-GPPAEE		A2	
A6HGP	SW3-HGPAEE		—	EPROM write not possible.
IBM PC/AT	SW0IX-GPPAE		A2	
	MEDOC		—	
	MELSEC-MEDOC		—	
A6WU			—	• "A2" is displayed when the system is started up. • Add-on mounting is not possible.
A7PU			—	• "A2" is displayed when the system is started up. • Add-on mounting is not possible.
A7PUS			—	"A2" is displayed the system is started up.
A8PUE			—	• "A2" is displayed when the system is started up. • Add-on mounting is not possible.

POINTS

(1) When an A6GPP, A6HGP, or A6PHP is used, use SW3-GPPAEE, SW3-HGPAEE, SW3GP-GPPAEE, or SW4GP-GPPAEE as the system startup software.
Other old software packages cannot be used.

(2) Procedure for storing a program of the A1SCPU-S1 in the ROM in the off-line state.

1) Create a program by selecting "A2" as the PC type and save the program in a file.

2) Change the PC type to "A0J2H" or "A1S".

3) Read the parameter and the main program from the file.

a) If using SW0IX-GPPAE, read in the file maintenance mode.

b) If using SW4GP-GPPAEE, read in the FDD mode.
The message "PC MISMATCH" is displayed. Ignore this and execute read by pressing the [CR] key.

4) Store the read program to an EPROM.

(2) Utility package

The applicable utility packages are listed below.

- SW0GHP-UTLPC-FN1
- SW0GHP-UTLPC-PID
- SW0GHP-UTLP-FD1
- SW0GHP-UTLPC-FN0
- SW1GP-AD57P
- SW0-AD57P

(a) Select "A2CPU" when an SW0GHP-UTLPC-FN1 or SW0GHP-UTLP-FD1 is started up.

(b) If both an SW1GP-AD57P and another utility package are used in combination, specify "AD57P-COM" as the file name.

2.3 System Equipment

The following table shows the list of modules and devices which can be used for an AnS system.

(1) AnSCPU dedicated modules

Item	Model	Description		Number of Inputs/ Outputs [I/O Allocation Module Type]	Current Consumption 5 VDC	Current Consumption 24 VDC	Remarks	* Approved Standard
CPU module	A1SCPU	See the "Performance Specifications" in Section 4. (Number of I/O points : 256, memory capacity : 32K bytes)		—	0.40		RAM memory embedded	UL/CSA
	A1SCPU-S1	See the "Performance Specifications" in Section 4. (Number of I/O points : 512, memory capacity : 32K bytes)						
	A1SCPUC24-R2	See the "Performance Specifications" in Section 4. (Number of I/O points : 512, memory capacity : 32K bytes)		Built-in computer link: 32[Special 32-point]	0.56	—	RAM memory embedded See 2.2.1 (6) for details on number of occupied points.	
	A2SCPU	See the "Performance Specifications" in Section 4. (Number of I/O points : 512, memory capacity : 64K bytes)		—	0.47		RAM memory embedded	UL/CSA
	A2SCPU-S1	See the "Performance Specifications" in Section 4. (Number of I/O points : 1024, memory capacity : 192K bytes)						
Power supply module	A1S61P	5 VDC, 5 A	Input 100/200 VAC	—	—	—	Loaded to the slot for main base or extension base power supply.	
	A1S62P	5 VDC, 3 A/24 VDC 0.6A						
	A1S63P	5 VDC, 5 A	Input 24 VDC					
Input module	A1SX10	16-input 100 VAC input module		16 [16 inputs]	0.05	—		UL/CSA
	A1SX20	16-input 200 VAC input module		16 [16 inputs]	0.05	—		
	A1SX30	16-input 12/24 VDC, 12/24 VAC input module		16 [16 inputs]	0.05	—		UL/CSA
	A1SX40	16-input 12/24 VDC input module		16 [16 inputs]	0.05	—		
	A1SX40-S1	16-input 24 VDC input module		16 [16 inputs]	0.05	—		
	A1SX40-S2	16-input 24 VDC input module		16 [16 inputs]	0.05	—		
	A1SX41	32-input 12/24 VDC input module		32 [32 inputs]	0.08	—		
	A1SX41-S2	32-input 24 VDC input module		32 [32 inputs]	0.08	—		
	A1SX42	64-input 12/24 VDC input module		64 [64 inputs]	0.09	—		
	A1SX42-S2	64-input 24 VDC input module		64 [64 inputs]	0.09	—		
	A1SX71	32-input 5/12 VDC input module		32 [32 inputs]	0.075	—		

*: Class 2 power supply recognized by the UL/CSA Standard is required for 5/12/24 VDC modules.

Item	Model	Description	Number of Inputs/ Outputs [I/O Allocation Module Type]	Current Consumption		Remarks	* Approved Standard
				5 VDC	24 VDC		
Input module	A1SX80	16-input 12/24 VDC sink/source input module	16 [16 inputs]	0.05	—		UL/CSA
	A1SX80-S1	16-input 24 VDC sink/source input module	16 [16 inputs]	0.05	—		
	A1SX80-S2	16-input 24 VDC input module	16 [16 inputs]	0.05	—		
	A1SX81	32-input 12/24 VDC sink/source input module	32 [32 inputs]	0.08	—		
	A1SX81-S2	32-input 24 VDC input module	32 [32 inputs]	0.08	—		
Output module	A1SY10	16-output relay contact output module (2 A)	16 [16 outputs]	0.12	0.09		
	A1SY18A	8-point relay contact output module (2A) All points independent	16 [16 outputs]	0.24	0.075		
	A1SY22	16-output triac output module (0.6 A)	16 [16 outputs]	0.27	(200 VAC) 0.004		UL/CSA
	A1SY28A	8-point triac output module (1A) All points independent	16 [16 outputs]	0.11	—		
	A1SY40	16-output 12/24 VDC transistor output module (0.1 A) sink type	16 [16 outputs]	0.27	0.016		UL/CSA
	A1SY40P	16-output 12/24 VDC transistor output module (0.1 A) sink type	16 [16 outputs]	0.08	0.011		
	A1SY41	32-output 12/24 VDC transistor output module (0.1 A) sink type	32 [32 outputs]	0.50	0.016		
	A1SY41P	32-output 12/24 VDC transistor output module (0.1 A) sink type	32 [32 outputs]	0.14	0.012		
	A1SY42	64-output 12/24 VDC transistor output module (0.1 A) sink type	64 [64 outputs]	0.93	0.016		
	A1SY42P	64-output 12/24 VDC transistor output module (0.1 A) sink type	64 [64 outputs]	0.17	0.014		
	A1SY50	16-output 12/24 VDC transistor output module (0.5 A) sink type	16 [16 outputs]	0.12	0.12		
	A1SY60	16-output 24 VDC transistor output module (2 A) sink type	16 [16 outputs]	0.12	0.015		
	A1SY60E	16-output 12 VDC transistor output module (1A) source type	16 [16 outputs]	0.20	0.01		
	A1SY68A	8-point 5/12/24/48 VDC transister output module sink/source type All points independent	16 [16 outputs]	0.13	—		
	A1SY71	32-output 5/12 VDC transistor output module (0.016 A) sink type	32 [32 outputs]	0.40	0.15		
	A1SY80	16-output 12/24 VDC transistor output module (0.8 A) source type	16 [16 outputs]	0.12	0.04		
	A1SY81	32-output 12/24 VDC transistor output module (0.1 A) source type	32 [32 outputs]	0.50	0.016		
Input/ output combi-nation module	A1SH42	32-input 12/24 VDC input module 32-output 12/24 VDC transistor output module (0.1A) sink type	32 [32 outputs]	0.50	0.008		
	A1SX 48Y18	8-input 24 VDC input module 8-output relay contact output module	16 [16 outputs]	0.085	0.045		
	A1SX 48Y58	8-input 24 VDC input module 8-output 12/24 VDC transistor output module	16 [16 outputs]	0.06	0.06		UL/CSA
Dynamic input module	A1S42X	16-, 32-, 48- and 64-point 12/24 VDC dynamic input module	Number of set points (Inputs [ ])	0.08	—		

*: Class 2 power supply recognized by the UL/CSA Standard is required for 5/12/24 VDC modules.

Item	Model	Description	Number of Inputs/ Outputs [I/O Allocation Module Type]	Current Consumption		Remarks	* Approved Standard
				5 VDC	24 VDC		
Dynamic output module	A1S42Y	16-, 32-, 48-, and 64-point 12/24 VDC dynamic output module	Number of set points (Outputs [ ])	0.18	0.055		UL/CSA
Blank cover	A1SG60	Keeps unused slots free from dust.	16 [empty]	—	—		
Dummy module	A1SG62	16-, 32-, 48-, and 64-input selectable module	Number of set points ([ ] inputs)	—	—		
40-pin connector	A6CON1	Soldered joint type	—	—	—		UL/CSA
	A6CON2	Solderless attachment type					
	A6CON3	Pressed joint type					
37-pin D-sub connector	A6CON1E	Soldered joint type					
	A6CON2E	Solderless attachment type					
	A6CON3E	Pressed joint type					
Pulse catch module	A1SP60	Pulse input module with short ON time (Pulse : min. 0.5 msec) 16-point inputs	16 [16 outputs]	0.055	—		UL/CSA
Analog timer module	A1ST60	For changing timer set values(0.1 to 1.0 sec, 1 to 10 sec, 10 to 60 sec, 60 to 600 sec) by potensiometer. Analog timer 8 points	16 [16 outputs]	0.055	—		
Interrupt module	A1SI61	For specifying execution of an interrupt program. Interrupt module (Interrupt input points : 16)	32 [Special 32-point]	0.057	—		
High-speed counter module	A1SD61	32-bit signed binary 50 KBPS, 1 channel	32 [Special 32-point]	0.35	—		
A-D converter module	A1S64AD	4 to 20 mA / 0 to 10 V Analog 4 channels	32 [Special 32-point]	0.4	—		
Temperature-digital converter module	A1S62RD3	For connecting a Pt100 (3-wire type) Temperature input: 2 channels	32 [Special 32-point]	0.49	—		
	A1S62RD4	For connecting a Pt100 (4-wire type) Temperature input: 2 channels	32 [Special 32-point]	0.39	—		
D-A converter module	A1S62DA	4 to 20 mA / 0 to 10 V Analog output: 2 channels	32 [Special 32-point]	0.8	—		
Computer link module	A1SJ71(U)C24-R2	Computer link functions RS-232C: 1 channel	32 [Special 32-point]	0.1	—		
	A1SJ71(U)C24-PRF	Computer link and printer functions RS-232C: 1 channel	32 [Special 32-point]	0.1	—		
	A1SJ71(U)C24-R4	Computer link and multidrop link functions RS-422/485: 1 channel	32 [Special 32-point]	0.1	—		
Intelligent communication module	A1SD51S	Interpreter BASIC, Compile BASIC RS-232C 2 channels RS-422/485 1 channel	32 [Special 32-point]	0.4	—		
Positioning module	A1SD70	For 1 axis position control, speed control, speed - position control. Analog voltage output (0 to ±10 V)	32 [Special 32-point]	0.3	—		UL/CSA
	A1SD71-S2	For position control, for speed control, for speed-position control. Pulse train output, 2 axes (independent/simultaneous 2 axes control, direct interpolation)	48 [Special 48-point]	0.8	—		

*: Class 2 power supply recognized by the UL/CSA Standard is required for 5/12/24 VDC modules.

Item	Model	Description	Number of Inputs/ Outputs [I/O Allocation Module Type]	Current Consumption		Remarks	* Approved Standard
				5 VDC	24 VDC		
Position-ing module	A1SD71-S7	Allows alteration of the output speed setting of a manual pulse generator for position control. Pulse train output, 2 axes (independent/simultaneous 2 axes control, direct interpolation)	48 [Special 48-point]	0.8	—		
Analog I/O module	A1S63ADA	Analog input: 2 channel Simple loop Analog output: 1 channel Control possible	32 [Special 32-point]	0.8	—		
MELSEC-NET (II) data link module	A1SJ71AP21	For master or local station of MELSECNET (II) optical data link	32 [Special 32-point]	0.33	—		
	A1SJ71AR21	For master or local station of MELSECNET (II) coaxial data link	32 [Special 32-point]	0.8	—		
MELSEC-NET/B data link module	A1SJ71AT21B	For master or local station of MELSECNET/B data link system	32 [Special 32-point]	0.66	—		
	A1SJ72T25B	For remote I/O station of MELSECNET/B data link system	—	0.3	—		
MELSEC-NET/MINI-S3 master module	A1SJ71PT32-S3	Used to control up to 64 MELSECNET/MINI-S3 master stations, and a total of 512 remote I/O points and remote terminals.	Exclusive I/O mode: 32 [Special 32-point] Expansion mode: 48 [Special 48-point]	0.35	—		
Main base unit	A1S32B	Up to two I/O modules can be loaded.	—	—	—	Equipped with two extension connectors: one is on the right; the other on the left side.	UL/CSA
	A1S33B	Up to three I/O modules can be loaded.					
	A1S35B	Up to five I/O modules can be loaded.					
	A1S38B	Up to eight I/O modules can be loaded.					
Extension base unit	A1S52B(S1)	Up to two I/O modules can be loaded.	—	—	—	Power supply module cannot be loaded (power is supplied from the main base unit).	
	A1S55B(S1)	Up to five I/O modules can be loaded.					
	A1S58B(S1)	Up to eight I/O modules can be loaded.					
	A1S65B(S1)	Up to five I/O modules can be loaded.	—	—	—	Needs a power supply module.	
	A1S68B(S1)	Up to eight I/O modules can be loaded.					
Extension cable	A1SC01B	0.055 m (2.17 inches) long flat cable	—	—	—	For extension on the right side	
	A1SC03B	0.33 m (11.8 inches) long	—	—	—	Extension base unit connection cable	
	A1SC07B	0.7 m (27.6 inches) long					
	A1SC12B	1.2 m (47.24 inches) long					
	A1SC30B	3 m (118.11 inches) long					
	A1SC60B	6 m (236.22 inches) long					
	A1SC05NB	0.45 m (17.72 inches) long	—	—	—	A[ ]N, A[ ]A extension base cable	
	A1SC07NB	0.7 m (27.6 inches) long					

*: Class 2 power supply recognized by the UL/CSA Standard is required for 5/12/24 VDC modules.

Item		Model	Description	Applicable Model	* Approved Standard
Memory cassette	EPROM	A1SMCA-8KP	8k steps, equipped with ROM (directly)	For A1SCPU: A6WA-28P required	UL/CSA
		A2SMCA-14KP	14k steps, equipped with ROM (directly)	For A2SCPU: A2SWA-28P required	
	EEPROM	A2SMCA-2KE	2k steps, equipped with 4K EROM (directly)	For A1SCPU Writing/reading directly from the peripheral device is possible	
		A1SMCA-8KE	8k steps, equipped with 16K EROM (directly)		
		A2SMCA-14KE	14k steps, equipped with 28K EROM (directly)	For A2SCPU Writing/reading directly from the peripheral device is possible	
Memory write adapter		A6WA-28P	Used for memory cassette connector/EPROM 28-pin	For A1SMCA-8KP Used to partition ROM in A1SMCA-8KP	
		A2SWA-28P	Used for memory cassette connector/EPROM 28-pin	For A2SMCA-14KP Used to partition ROM in A2SMCA-14KP	
Battery		A6BAT	IC-RAM battery backup	Mounted in A1SCPU/A2SCPU body	
Connector/terminal block conversion module		A6TBXY36	For sink type input module and sink type output module (standard type)	A1SX41(S2), A1SX42(S2), A1SY41, A1SY42, A1SY42P, A1SH42, AX42(S1), AY42(S1/S3/S4), AH42	
		A6TBXY54	For sink type input module and sink type output module (2-wire type)		
		A6TBX70	For sink type input module (3-wire type)	A1SX41(S2), A1SX42(S2), A1SH42, AX42(S1), AH42	
		A6TBX36-E	For source type input module (standard type)	A1SX81(S2), AX82	
		A6TBY36-E	For source type output module (standard type)	A1SY81, AY82EP	
		A6TBX54-E	For source type input module (two-wire type)	A1SX81(S2), AX82	
		A6TBY54-E	For source type output module (two-wire type)	A1SY81, AY82EP	
		A6TBX70-E	For source type input module (3-wire type)	A1SX81(S2), AX82	
Cable for connector/terminal block conversion module		AC05TB	0.5 m (1.64 ft) for source module	A6TBXY36, A6TBXY54, A6TBX70	
		AC10TB	1 m (3.28 ft) for source module		
		AC20TB	2 m (6.56 ft) for source module		
		AC30TB	3 m (9.84 ft) for source module		
		AC50TB	5 m (16.4 ft) for source module		
		AC05TB-E	0.5 m (1.64 ft) for source module	A6TBX36-E, A6TBY36-E, A6TBX54-E, A6TBY54-E, A6TBX70-E	
		AC10TB-E	1 m (3.28 ft) for source module		
		AC20TB-E	2 m (6.56 ft) for source module		
		AC30TB-E	3 m (9.84 ft) for source module		
		AC50TB-E	5 m (16.4 ft) for source module		
Relay terminal unit		A6TE2-16SR	For sink type output module	A1SY41, A1SY42, A1SY42P, A1SH42, AY42, AY42-S1, AY42-S3, AY42-S4, AH42	
Cable for connecting relay terminal unit		AC06TE	0.6 m (1.97 ft) long	A6TE2-16SR	
		AC10TE	1 m (3.28 ft) long		
		AC30TE	3 m (9.84 ft) long		
		AC50TE	5 m (16.4 ft) long		
		AC100TE	10 m (32.8 ft) long		

*: Class 2 power supply recognized by the UL/CSA Standard is required for 5/12/24 VDC modules.

REMARK

I/O cables with connectors for I/O modules with 40-pin connector specifications (A1SX41, A1SX42, A1SY41, A1SY42, A1SY42P etc.) or 37-pin D-sub connector specifications (A1SX81, A1SY81) are available.
Consult your nearest Mitsubishi representative for I/O cables with connectors.

POINT

Hardware compatible with A1SCPU-S1

1) I/O modules
All I/O modules compatible with A1SCPU can be used.

2) Special function modules
All special function modules compatible with A1SCPU can be used.

3) Extension base unit
The maximum number of extensions is 3.

(2) A[ ]NA[ ]A extension base unit

The following table shows the modules that can be loaded to the A[ ]NA[ ]A extension base units: A65B; A68B; A55B; or A58B.

For details on the specifications of each module see the appropriate module manual.

POINT

(1) All A[ ]NA[ ]A "building block type I/O modules" are compatible with the AnSCPU.

Item	Model
Single-axis positioning module	AD70, AD70D
Positioning module	AD71, AD71S1, AD72
Position detection module	A61LS, A62LS
High speed counter module	AD61, AD61S1
A-D converter module	A68AD, A68ADS2, A616AD, A60MX A60MXR, A68ADN
Temperature input module	A616TD, A60MXT
D-A converter module	A62DA, A62DAS1, A616DAI, A616DAV, A68DAV, A68DAI
A-D/D-A converter module	A84AD
CRT control/LCD control module	AD57, AD57S1, AD58
Graphic controller module	AD57G, AD57GS3
Memory card, parrallel interface module	AD59, AD59S1

Item	Model
Voice output module	A11VC
Computer link module	AJ71C24(S3/S6/S8), AJ71UC24
Intelligent communication module	AD51E, AD51ES3, AD51H(S3)
Terminal interface module	AJ71C21, AJ71C21S1
MELSECNET/MINI (S3) data link module	AJ71PT32, AJ71PT32-S3
Data link module	AJ71AP21, AJ71AR21, AJ71AT21B
SUMINET interface module	AJ71P41
Ethernet interface module	AJ71E71
Multidrop data link module	AJ71C22
Interrupt module	AI61
Power supply module	A61P, A62P, A63P, A65P, A66P, A67P, A68P
Extension base module	A62B, A65B, A68B, A52B, A55B, A58B

(3) Peripheral devices

Item	Module	Remarks	
Plasma handy graphic programmer	A6PHP-SET	• A6PHP • SW[ ]GP-GPPAEE: A-series GPP function system disk • SW[ ]GP-GPPKEE: K-series GPP function system disk • SW0-GPPU: User disk (2DD) • AC30R4: RS-422 cable (3m (9.84 ft) length)	
Intelligent GPP	A6GPP-SET	• A6GPP • SW[ ]GP-HGPAEE: A-series GPP function system disk • SW[ ]GP-HGPKEE: K-series GPP function system disk • SW0-GPPU: User disk (2DD) • AC30R4: RS-422 cable (3m (9.84 ft) length)	
Handy graphic programmer	A6HGP-SET	• A6HGP • SW[ ]GP-HGPAEE: A-series GPP function system disk • SW[ ]GP-HGPKEE: K-series GPP function system disk • SW0-GPPU: User disk (2DD) • AC30R4: RS-422 cable (3m (9.84 ft) length)	
Composite video cable	AC10MD	• Connects A6GPP and monitor display. (1 m (3.28 ft) length)	
RS-422 cable	AC30R4	3 m (9.84 ft) length	Connects CPU and A6GPP/A6PHP.
	AC300R4	30 m (98.4 ft) length	
User disk	SW0-GPPU	2DD	Used for storing user program (3.5 inch, formatted)
	SW0S-USER	2HD	
Cleaning disk	SW0-FDC	Applicable to A6GPP/A6PHP	Used for cleaning disk drive.
Programming unit	A7PU	• Connected directly to the CPU with an RS-422 cable (AC30R4, AC300R4) to read and write programs. Provided with an MT function. • The product package includes a cable used for connection to an audio cassette recorder.	
	A7PUS	Connected directly to the CPU with an RS-422 cable (AC30R4-PUS) to read and write programs.	
	A8PUE	Connected directly to the CPU with an RS-422 cable (AC30R4-PUS, AC20R4-A8PU) to read and write programs.	

Item	Module	Remarks
RS-422 cable	AC30R4, AC300R4	Used to connect an A7PU to the CPU. Length: 3 m/30 m (9.84/98.4 ft)
	AC30R4-PUS	Used to connect an A7PUS or A8PUE to the CPU. Length: 3 m (9.84 ft)
	AC20R4-A8PU	Used to connect an A8PUE to the CPU. Length: 2 m (6.56 ft)
P-ROM writer module	A6WU	• Used for writing a program in the CPU/A6PHP to ROM, or for reading a CPU program from ROM. • Connected to CPU/A6PHP using an AC30R4/AC03WU cable.
RS-422 cable	AC30R4, AC300R4	Connects CPU and A6WU. 3 m/30 m (9.84 ft/98.4 ft) length
	AC03WU	Connects A6PHP and A6WU. 0.3 m (0.98 ft) length

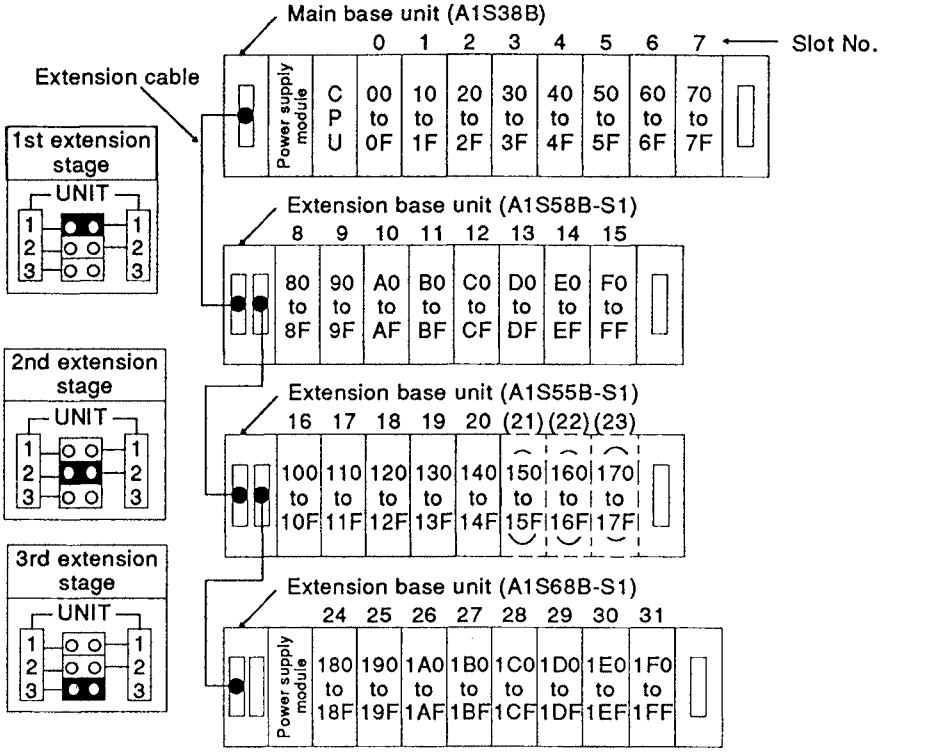
POINTS

(1) Programming devices compatible with A1SCPU-S1
A6WU P-ROM writer unit cannot be used.
All programming devices compatible with A1SCPU can be used, excluding A6WU.
(When A7PU, A7PUS, A8PU or A8PUE is used, the CPU type "A2" is displayed when started up.)

(2) Software packages compatible with A1SCPU-S1
All utility packages compatible with A1SCPU can be used.

2.4 General Description of System Configuration

The following gives the system configuration, number of inputs/outputs, I/O number allocation, etc. when the AnSCPU is used as an independent system.

System configuration	 * The figure above shows the configuration when 16-input/output modules are loaded to each slot.
Maximum Number of Extension Stages	Three
Maximum number of input/output points	A1SCPU, A1SCPUC24-R2: 256 points, A1SCPU-S1: 512 points, A2SCPU: 512 points, A2SCPU-S1: 1024 points
Main base units	A1S32B, A1S33B, A1S35B, A1S38B
Extension base units	A1S52B(S1), A1S55B(S1), A1S58B(S1), A1S65B(S1), A1S68B(S1), A52B, A55B, A58B, A62B, A65B, A68B
Extension cables	A1SC01B, A1SC03B, A1SC07B, A1SC12B, A1SC30B, A1SC60B, AC06B, AC12B, AC30B, A1SC05NB, A1SC07NB
Notes	(1) Only the 1st extension base unit can be used when extension base units of types other than the AnS S1 are equipped. (The S1 type and other types must not be used together.) (2) To use the AnS S1 type extension base unit with an A[ ]N or A[ ]A type, the latter must be equipped with the last extension base unit. (The A[ ]N or A[ ]A extension base unit cannot be connected to the AnS S1 type.) (3) When an A1S52B (S1), A1S55B (S1), A1S58B (S1), A52B, A55B, or A58B is used, a voltage of 5 VDC is supplied from the power supply module. See Section 7.1.3, and consider the application. (4) The extension cable should be used for distances of up to 6m (19.68 ft). (5) The extension cable must not be bundled with or laid near the main circuit (high voltage, high current) lines.
I/O number allocation	(1) Allocate I/O numbers to the extension base units in order of extension base unit number, not in extension cable connection order. (2) I/O numbers are allocated on the assumption that both the main base unit and the extension base units have eight slots. Sixteen input/output points will be allocated to each slot indicated by dotted lines in the above system configuration figure. (3) Allocate 16 input/output points to empty slots. (4) If the setting of an extension base unit has been omitted, make the allocation on the assumption that each of the eight slots of the relevant base unit occupies 16 input/output points. (5) Items (2) to (4) can be changed by performing "I/O allocation". For details, see the ACPU Programming Manual (Fundamentals).

3. SPECIFICATIONS

The general specification common to various modules is shown.

<table>
<tr><th>Item</th><th colspan="6">Specifications</th></tr>
<tr><td>Operating ambient temperature</td><td colspan="6">0 to 55℃</td></tr>
<tr><td>Storage ambient temperature</td><td colspan="6">-20 to 75℃</td></tr>
<tr><td>Operating ambient humidity</td><td colspan="6">10 to 90 % RH, No-condensing</td></tr>
<tr><td>Storage ambient humidity</td><td colspan="6">10 to 90 % RH, No-condensing</td></tr>
<tr><td rowspan="5">Vibration resistance</td><td rowspan="5">Conforming to JIS B 3502, IEC 61131-2</td><td></td><td>Frequency</td><td>Acceleration</td><td>Amplitude</td><td>Sweep count</td></tr>
<tr><td rowspan="2">Under intermittent vibration</td><td>10 to 57Hz</td><td>-</td><td>0.075mm (0.003inch)</td><td rowspan="2">10 times each in X, Y, Z directions</td></tr>
<tr><td>57 to 150Hz</td><td>9.8m/s^2</td><td>-</td></tr>
<tr><td rowspan="2">Under continuous vibration</td><td>10 to 57Hz</td><td>-</td><td>0.035mm (0.001inch)</td><td rowspan="2">-</td></tr>
<tr><td>57 to 150Hz</td><td>4.9m/s^2</td><td>-</td></tr>
<tr><td>Shock resistance</td><td colspan="6">Conforming to JIS B 3502, IEC 61131-2 (147m/s^2 , 3 times in each of 3 directions XYZ)</td></tr>
<tr><td>Operation ambiance</td><td colspan="6">No corrosive gasses</td></tr>
<tr><td>Operating elevation*3</td><td colspan="6">2000m (6562ft.) or less</td></tr>
<tr><td>Installation location</td><td colspan="6">Control panel</td></tr>
<tr><td>Over voltage category*1</td><td colspan="6">II max.</td></tr>
<tr><td>Pollution degree*2</td><td colspan="6">2 max.</td></tr>
<tr><td>Equipment category</td><td colspan="6">Class I</td></tr>
</table>

*1 This indicates the section of the power supply to which the equipment is assumed to be connected between the public electrical power distribution network and the machinery within premises.
Category II applies to equipment for which electrical power is supplied from fixed facilities. The surge voltage withstand level for up to the rated voltage of 300 V is 2500 V.

*2 This index indicates the degree to which conductive material is generated in terms of the environment in which the equipment is used.
Pollution level 2 is when only non-conductive pollution occurs. A temporary conductivity caused by condensing must be expected occasionally.

*3 Do not use or store the PLC in the environment when the pressure is higher than the atmospheric pressure at sea level.
Otherwise, malfunction may result.
To use the PLC in high-pressure environment, please contact your local Mitsubishi representative.

4. AnSCPU

4.1 Performance Specifications

The memory capacities of AnSCPU modules, performances of devices, etc., are presented below.

Table 4.1 Performance Specifications

Item \ Type	A1SCPU(S1)	A1SCPUC24-R2	A2SCPU(S1)
Control system	Repeated operation (using stored program)		
I/O control method	Refresh mode/Direct mode selectable		
Programming language	Language dedicated to sequence control. Relay symbol type and logic symbolic language, MELSAP-II(SFC) (for A1SCPU).		
Number of instructions (Types)	Sequence instructions: 26		
	Basic instructions: 131		
	Application instructions: 104		
Processing speed (sequence instruction) (μ sec/step)	Direct : 1.0 to 2.3 Refresh : 1.0		
I/O points	A1S: 256, A1S-S1: 512	256 (32 points are used for the computer link function)	A2S: 512, A2S-S1: 1024
Watchdog timer (WDT)(msec)	10 to 2000		
Memory capacity *1 (built-in RAM)	32k bytes		A2S: 64k bytes, A2S-S1: 192k bytes
Program capacity: Main sequence	Max. 8k steps		Max. 14k steps
Program capacity: Sub sequence	Unavailable		
Internal relay (M) (point)	1000 (M0 to 999)	The number of M + L + S = 2048 (set in parameters)	
Latch relay (L) (point)	1048 (L1000 to 2047)		
Number of step relays (S) (point)	0 (Defaults to no value)		
Link relay (B) (point)	1024 (B0 to 3FF)		
Timer (T)	256 points 100 msec timer : setting time 0.1 to 3276.7 sec (T0 to 199) 10 msec timer : setting timer 0.01 to 327.67 sec (T200 to 255) 100 msec retentive timer : depending on setting (setting time 0.1 to 3276.7 sec) } Set in parameters		
Counter (C)	256 points Normal counter : Setting range 1 to 32767 (C0 to 255) Interrupt program counter : Setting range 1 to 32767 → Counter to be used in interrupt program } Set in parameters		
Data register (D) (points)	1024 (D0 to D1023)		
Link register (W) (points)	1024 (W0 to W3FF)		
Annunciator (F) (points)	256 (F0 to F255)		
File register (R) (points)	Max. 4096 (R0 to R4095)		
Accumulator (A) (points)	2 (A0, A1)		
Index register (V,Z) (points)	2 (V,Z)		
Pointer (P) (points)	256 (P0 to P255)		
Interrupt pointer (I) (points)	32 (I0 to I31)		

Table 4.1 Performance Specifications (Continued)

Item \ Type	A1SCPU(S1)	A1SCPUC24-R2	A2SCPU(S1)
Special relay (M) (points)	256 (M9000 to M9255)		
Special register (D) (points)	256 (D9000 to D9255)		
Comment (points) (Specify in batches of 64 points)	Max. 1600 *2		Max. 4032
Self-diagnostic functions	Watchdog error monitor, Memory error detection, CPU error detection, I/O error detection, battery error detection, etc.		
Operation mode at the time of error	STOP/CONTINUE		
STOP → RUN output mode	Output data at time of STOP restored/data output after operation execution		
Clock function	Year, month, day, hour, minute, second (Automatically recognizes leap years.) Accuracy -2.3 to +4.4 s (TYP. +1.8 s)/d at 0°C -1.1 to +4.4 s (TYP. +2.2 s)/d at 25°C -9.6 to +2.7 s (TYP. -2.4 s)/d at 55°C		
Allowable momentary power interruption time	20 msec		
Current consumption (5 VDC)	0.4 A	0.56 A	0.47A
Weight (kg) (lb)	0.37 (0.81)	0.41 (0.90)	0.43 (0.95)
Standard	UL/CSA	—	UL/CSA

*1 The maximum total memory that can be used for parameters, T/C set values, program capacity, file registers, number of comments, sampling trace, and status latch is 32K/64K bytes.
The memory capacity is fixed. No expansion memory is available.
Section 4.1.7 shows how to calculate the memory capacity.

*2 Up to 1600 comments can be stored in the A1SCPU. In the GPP/PHP/HGP, 4032 comments can be written.

4.1.1 AnSCPU operation processing

This section explains the operation processing which takes place from the time the AnSCPU power is switched ON until the sequence program is executed.
AnSCPU processing is generally divided into the following four types:

(1) Initial processing

This is the pre-processing for executing sequence operations. Initial processing is executed once at power up or after key reset.

(a) Resetting the I/O module.

(b) Initialization of the data memory's unset latch area (bit devices turned OFF, word devices set to 0).

(c) I/O module addresses are automatically assigned in accordance with the I/O module type and where the module is installed on a base unit.

(d) Automatic diagnostic check of parameter settings and operation circuits is executed (see Section 4.1.6).

(e) If the AnSCPU is used in the master station of an MELSECNET(II) MELSECNET/B, data link operation begins after setting the link parameter data in the data link module.

(2) I/O module refresh processing

If the refresh mode for both input and output is set with the I/O control switch, the I/O module is refreshed (see Section 4.1.5).

(3) Sequence program operation processing

The sequence program written in the AnSCPU is executed from step 0 to the END instruction.

(4) END processing

When sequence program processing reaches the END instruction, the sequence program is returned to step 0.

(a) Self-diagnosis checks for blown fuses, I/O module verification, low battery voltage, etc., are executed (see Section 4.1.6).

(b) T/C present values are updated and contacts are turned ON/OFF. (The ACPU Programming Manual (Fundmentals) gives details.)

(c) Data read or write from/to computer link modules (A1SJ71(U)C24, AJ71C24(S8), AD51(S3), etc.)

(d) Link refresh processing is executed when the link refresh request is given from the MELSECNET data link.

Note that the AnSCPU can enable and disable execution of link refresh by turning M9053 ON/OFF and by issuing DI/EI instructions.

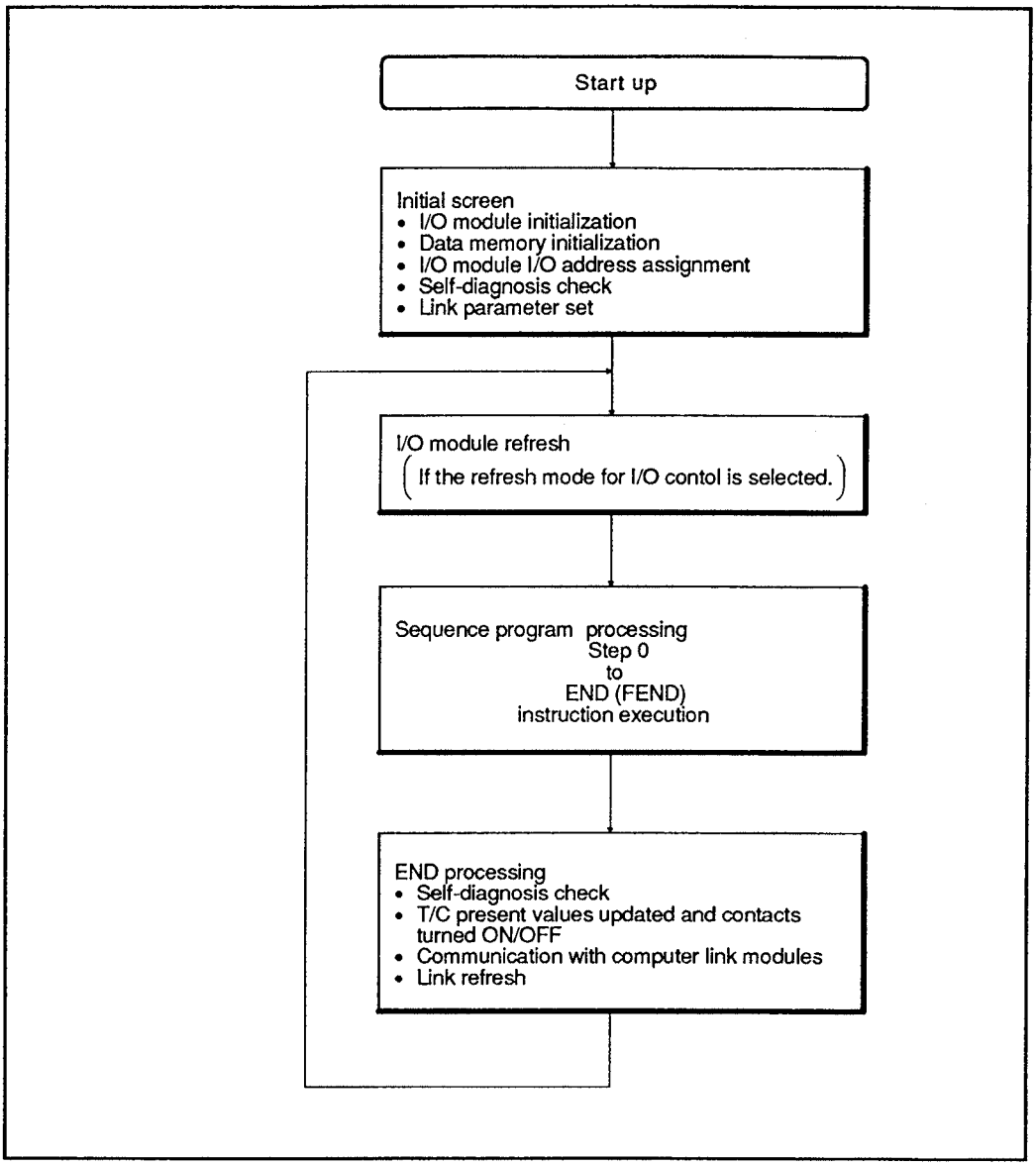


Fig. 4.1 AnSCPU Operation Processing

4.1.2 Operation processing in the RUN, STOP, PAUSE states

The PC CPU can be operated in the RUN, STOP and PAUSE states as described below.

(1) RUN operation

RUN indicates repeated operations of the sequence program from step 0 to the END (FEND) instruction.

When a CPU changes its status to the RUN mode, the CPU restores all output data which was saved when the CPU was stopped, in accordance with the STOP → RUN mode set in the parameters.

The PC CPU needs initialization time before starting a sequence program operation. It requires two to three seconds after a power ON or reset, and one to three seconds after the mode is changed from STOP to RUN.

(2) STOP operation

STOP indicates stopping of sequence program operation by executing a STOP instruction or by using the remote STOP function (see Section 4.2.3).

When the CPU is set to STOP, the output status is saved and all outputs are switched OFF. Data other than the outputs (Y) is retained.

(3) PAUSE operation

PAUSE indicates stopping of sequence program operation with the output and data memory states retained.

POINT

An AnSCPU executes the following operations at any time in the RUN, STOP or PAUSE mode:
- Refresh processing of the I/O module when the refresh mode is set,
- Data communications with computer link modules,
- Link refresh processing.

Therefore, the following operations are possible even when the AnSCPU is in the STOP or PAUSE state:
- Monitoring I/O status and testing using a peripheral device,
- Read/write with computer link modules, and
- Communications with other stations in the MELSECNET data link system.

4.1.3 Watchdog timer (WDT)

The watchdog timer is an internal system timer which monitors the scan time of sequence program execution to detect program errors. The WDT also detects PC hardware faults.

The default value for the watchdog timer is 200 msec. This value can be changed from 10 to 2000 msec in the parameters.

(1) Normal operation (scan time is within the set value)

The watchdog timer is reset after the execution of an END instruction.

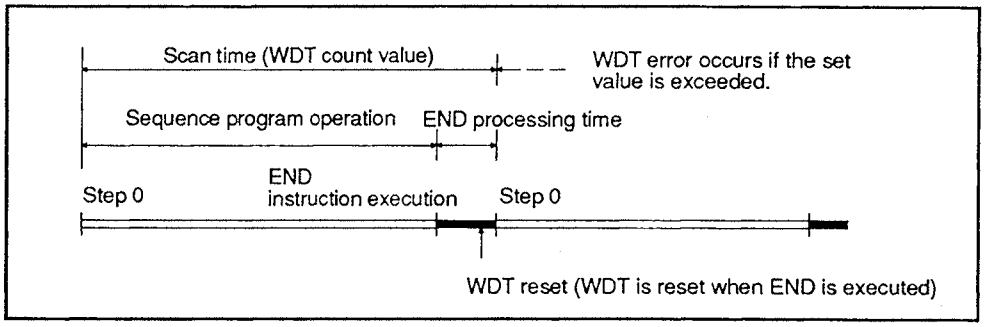
(2) Faulty operation (scan time is not within the set value)

(a) A watchdog timer is detected, then, the CPU stops program processing and flashes the RUN LED on its front face.

(b) There are two types of error code for the watchdog timer, error codes "22" and "25".

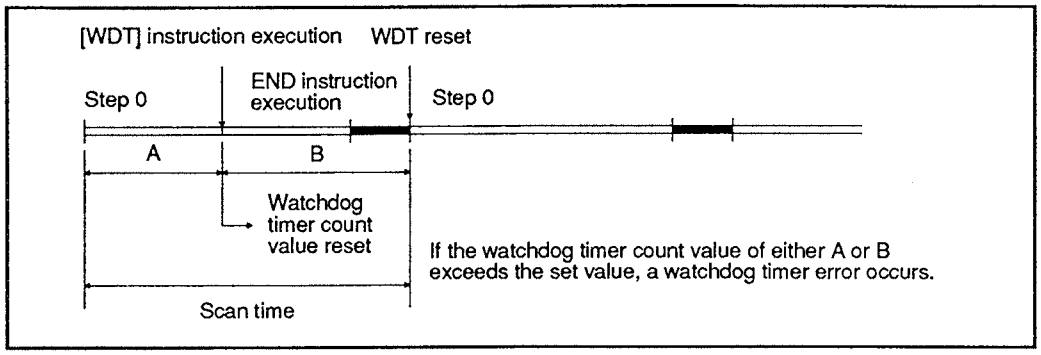
Error code 22 signifies that an END instruction is executed after the WDT has exceeded its set value.

Error code 25 signifies that the CPU is executing a dead-loop program and never reaches an END instruction. This error could occur if the PC hardware is faulty or branch instructions are used incorrectly in the program.



(3) Watchdog timer reset using the sequence program

The watchdog timer is reset with a [WDT] instruction in the sequence program.
The watchdog timer begins counting again from 0.
However, the scan time values registered in D9017 to D9019 are not reset when the WDT instruction is executed.



(4) When a watchdog timer error occurs, check the error by referring to Section 11 (Troubleshooting), then turn the RESET switch to clear the error.

4.1.4 Operation processing when a momentary power interruption occurs

When voltage supplied to the power supply module is below the specified range, the AnSCPU detects a momentary power interruption.

When the AnSCPU detects a momentary power interruption, the following operations are executed:

(1) Momentary power interruption within 20 msec

(a) Program processing is stopped and the output is retained.

(b) Program processing is resumed when the power is restored.

(c) The watchdog timer (WDT) continues counting even while the operation is stopped.
For example, if a momentary power interrutption of 20 msec occurs when the scan time is 190 msec, a watchdog timer error (200 msec) occurs.

(2) Momentary power interruption over 20 msec

The AnSCPU is reset and returns to the initial start status. The necessary operations are the same as when the CPU power is turned ON or when the CPU is reset.

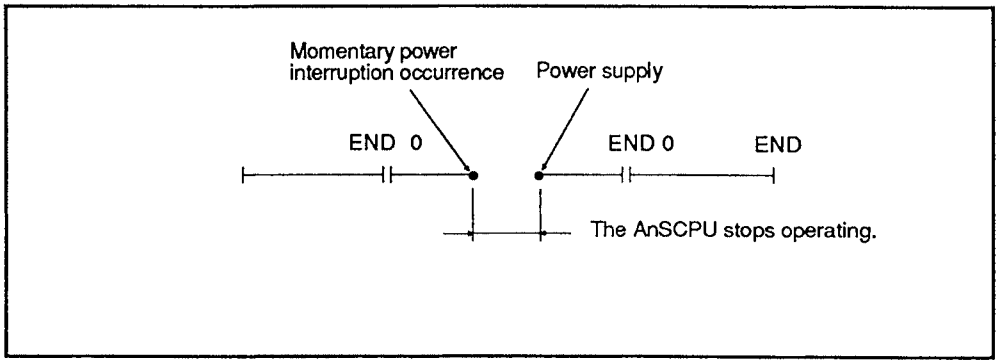


Fig. 4.2 Operation Processing When a Momentary Power Interruption Occurs

4.1.5 I/O control method

The I/O control method for the AnSCPU can be selected as either of the following two modes using the I/O control switch:

(1) Direct mode for both input and output

(2) Refresh mode for both input and output

The direct and refresh modes are explained below. Processing in the direct and refresh modes differs only for inputs (X) and outputs (Y). Processing for other devices and for special function-modules (FROM/TO instruction) is the same in both modes.

(1) Direct mode

I/O modules are accessed whenever a CPU executes an instruction with an input (X) or output (Y).
One scan time at most is necessary from the input status change to the change in the output status which corresponds to the input.

(2) Refresh mode

I/O modules are batch accessed before executing step 0 of the sequence program.
This is called I/O module refresh processing. Input module statuses are read to the data memory input (X). Data memory output (Y) statuses are output to output modules.
When a CPU executes an instruction with an input (X) or output (Y), it only accesses the data memory of the input (X) or output (Y).
Two scan times at most is necessary from the input status change to the output status change which corresponds to the input.

POINT

When the refresh mode has been selected, use the SEG instruction when accessing one segment of an I/O module in the same way as with the direct mode. The ACPU Programming Manual (Common Instructions) gives details.

4.1.6 Self-diagnosis

The self-diagnosis function allows the AnSCPU to detect its own errors.

Self-diagnosis is carried out when the PC power supply is turned ON and if an error occurs while the PC is in the RUN state. If the AnSCPU detects an error, it displays an error message and stops to prevent faulty PC operation.

The operation of the AnSCPU when an error is detected by the self-diagnosis function can be selected as either stop mode or continuous mode by making a parameter setting. In the stop mode, PC operation is stopped when the error is detected; in the continuous mode, PC operation is continued.

When an error occurs, the error occurrence and the error content are stored in a special relay (M) and special register (D). In the continuous mode, in particular, the program should read the details of the error and take appropriate action to prevent faulty PC and machine operations.

Operation stops and all outputs (Y) are immediately turned OFF after the self-diagnosis function detects an error which stops PC operation.

If the self-diagnosis function detects an error during which PC operation continues, the part of the program where the error was detected is skipped and the rest of the program is executed.

If an I/O module verify error is detected, the operation is continued with the I/O addresses at the time the error occurred.

Explanations of the errors detected by the self-diagnosis function are given in Table 4.2.

REMARKS

(1) In Table 4.2, in the I/O error, I/O module verify, fuse blown, special-function module error, and operation check error diagnoses, the CPU status can be selected as either stop or run; and the RUN LED status as either flashing or ON by using peripheral devices.

(2) The LED Display Message column in Table 4.2 lists messages displayed by the peripheral devices' PC diagnosis.

Table 4.2 Self-Diagnosis

Diagnosis	Diagnosis Timing	CPU Status	"RUN" LED Status	LED Display Message
Memory error Instruction code check	When the corresponding instruction is executed	Stop	Flashing	INSTRUCT. CODE ERR.
Parameter setting check	When power is switched ON or a reset is executed When switched from STOP/PAUSE to RUN			PARAMETER ERROR
No END instruction	When M9056 or M9057 is switched ON When switched from STOP/PAUSE to RUN			MISSING END INS.
Instruction execution disable	When CJ, SCJ, JMP, CALL(P), FOR and NEXT instruction is executed When switched from STOP/PAUSE to RUN			CAN'T EXECUTE (P)
Format (CHK instruction) check	When switched from STOP/PAUSE to RUN			CHK FORMAT ERR.
Instruction execution disable	When an interrupt occurs When switched from STOP/PAUSE to RUN			CAN'T EXECUTE (I)
CPU error RAM check	When power is switched ON or a reset is executed When M9084 is switched ON during STOP	Stop	Flashing	RAM ERROR
Operation circuit check	When power is switched ON or a reset is executed			OPE. CIRCUIT ERR.
Watchdog error check	When an END instruction is executed			WDT ERROR
END instruction not executed	When program processing reaches the end of the program			END NOT EXECUTE
Endless loop execution	At any time			WDT ERROR
I/O error I/O module verify	When an END instruction is executed (Not checked when M9084 is on)	Stop / Run	Flashing / ON	UNIT VERIFY ERR.
Fuse blown	When an END instruction is executed (not checked when M9084 is ON)			FUSE BREAK OFF.
Special function module error Control bus check	When a FROM, TO instruction is executed	Stop	Flashing	CONTROL-BUS ERR.
Special-function module error	When a FROM, TO instruction is executed			SP. UNIT DOWN
Link module error	When power is switched ON or a reset is executed When switched from STOP/PAUSE to RUN			LINK UNIT ERROR
I/O interruption error	When an interruption occurs			I/O INT. ERROR
Special-function module assignment	When power is switched ON or a reset is executed When switched from STOP/PAUSE to RUN			SP. UNIT LAY. ERR.
Special-function module error	When a FROM, TO instruction is executed	Stop / Run	Flashing / ON	SP. UNIT ERROR
Link parameter error	When power is switched ON or a reset is executed When switched from STOP/PAUSE to RUN	Run	ON	LINK PARA. ERROR
Battery error Battery low	At any time (not checked When M9084 is ON)	Run	ON	BATTERY ERROR
Operation check error	When the corresponding instruction is executed	Stop / Run	Flashing / ON	OPERATION ERROR

4.1.7 Devices

A device is any contact, coil, or timer used in PC program operations.

AnSCPU devices and their range of use are shown below. The items marked "*" can be used and set for range change by setting the parameters.

Set parameters which are appropriate for the system configuration and its program. Section 4.1.6 gives details about parameter settings.

Table 4.3 Devices

Device		Application Range (Number of points)		Explanation
X	Input	A1SCPU : X/Y00 to X/YFF (X, Y total 256 points) A1SCPUC24-R2 : X/Y00 to X/YDF (X, Y total 224 points, X/YE0 to X/YFF are used for the computer link function) A1SCPU-S1, A2SCPU : X/Y000 to X/Y1FF (X, Y total 512 points) A2SCPU-S1 : X/Y0 to X/Y3FF (X, Y total 1024 points)		Provides a command or data from an external device, (e.g. pushbutton, select switch, limit switch, digital switch) to the PC.
Y	Output			Provides the program control result to an external device, e.g. solenoid, magnetic switch, signal light, digital display.
M	Special relay	M9000 to M9255 (256 points)		Predefined internal relay for special purposes.
M	Internal relay*	M0 to M999 (1000 points)	Number of M + L + S = 2048	Internal relay in the PC which cannot be directly output.
L	Latch relay*	L1000 to L2047 (1048 points)		Internal relay in the PC which cannot be directly output. Backed up during power failure.
S	Step relay*	Can be used by setting a parameter (0)		Used in the same manner as an internal relay (M) e.g., as a relay indicating the stage number of a step-by step process operation program.
B	Link relay	B0 to B3FF (1024 points)		Internal relay for MELSECNET which cannot be output. May be used as an internal relay if not assigned for data link use.
F	Annunciator	F0 to F255 (256 points)		Used to detect a fault. When switched ON during RUN by a fault detection program, it stores a corresponding number in a special register D.
T	100 msec timer*	T0 to T199 (200 points)		Forward timers are available in 100 msec, 10 msec and 100 msec retentive types.
T	10 msec timer*	T200 to T255 (56 points)		
T	100 msec retentive timer*	Can be used by setting a parameter (0 points)		
C	Counter*	C0 to C255 (256 points)		Forward counters are available in normal and interrupt types.
C	Interrupt counter*	Can be used by setting a parameter (0 points)		
D	Data register	D0 to D1023 (1024 points)		Memory for storing values.
D	Special register	D9000 to D9255 (256 points)		Predefined data memory for special purposes.
W	Link register	W0 to W3FF (1024 points)		Data register for MELSECNET. May be used as a data register if not assigned for MELSECNET use.
R	File register*	Can be used by setting a parameter (0 points)		Extends the data register utilizing the user memory area.
A	Accumulator	A0, A1 (2 points)		Data register for storing the operation results of basic and application instructions.
Z	Index register	Z (1 point)		Used to index device numbers (X, Y, M, L, B, F, T, C, D, W, R, K, H, P).
V	Index register	V (1 point)		
N	Nesting	N0 to N7 (8 levels)		Indicates the nesting of master controls.

Table 4.3 Devices (Continued)

Device		Application Range (Number of points)	Explanation
P	Pointer	P0 to P255 (256 points)	Indicates the destination of branch instructions (CJ, SCJ, CALL, JMP).
I	Pointer for interruption	I0 to I31 (32 points)	Indicates an interrupt program corresponding to the interrupt source.
K	Decimal constant	K-32768 to 32767 (16-bit instruction) K-2147483648 to 2147483647 (32-bit instruction)	Used to specify the timer/counter set value, pointer number, interrupt pointer number, the number of bit device digits, and basic and application instruction values.
H	Hexadecimal constant	H0 to FFFF (16-bit instruction) H0 to FFFFFFFF (32-bit instruction)	Used to specify the basic and application instruction values.

REMARK

The step relay (S) may be used in the same manner as the internal relay (M). The step relay is useful when writing a program which has two functions or applications, i.e., the step relay can be used specifically in accordance with the function or application, independently of the internal relay.

4.1.8 Parameter setting ranges

The parameters specify various PC functions, device ranges and user memory assignments of the AnSCPU.

As shown in Table 4.4, the parameters have default settings so the user doesn't have to set all the parameter items. If any parameter item needs to be modified, please refer to the table for the allowed setting range.

The operating manuals for each peripheral device give details on parameter settings.

Table 4.4 Parameter Setting Ranges

Item \ Setting			Default Value	Setting Range	Valid Peripheral Devices	
					PU	GPP
Main sequence program area		A1SCPU(S1) A1SCPUC24-R2	6k steps	1 to 8k steps (in units of 1k steps)	o	o
		A2SCPU(S1)		1 to 14k steps (in units of 1k steps)	o	o
File register capacity			None	1 to 4k points (in units of 1k points)	o	o
Comment capacity		A1SCPU(S1) A1SCPUC24-R2	None	0 to 1600 points (in units of 64 points)	–	o
		A2SCPU(S1)		0 to 4032 points (in units of 64 points)		
Status latch	Memory capacity		None	0/8 to 16k bytes	–	o
	Data memory			Absent/present		
	File register			Absent/present (2 to 8k bytes)		
Sampling trace	Memory capacity		None	0/8k bytes	–	o
	Device setting			Device number		
	Execution condition			Per scan		
				Per time		
	Sampling count			0 to 1024 times (in units of 129 times)		
Microcomputer program capacity	A1SCPU		None	0 to 14k bytes (in units of 2k bytes)	–	o
	A2SCPU			0 to 26k bytes (in units of 2k bytes)		
Setting of latch (power interruption compensation) range	Link relay (B)		Only for L1000 to L2047. None for others.	B0 to B3FF (in units of 1 point)	o	o
	Timer (T)			T0 to T255 (in units of 1 point)		
	Counter (C)			C0 to C255 (in units of 1 point)		
	Data register (D)			D0 to D1023 (in units of 1 point)		
	Link register (W)			W0 to W3FF (in units of 1 point)		
Setting of link range	Number of link stations		None	1 to 64	–	o
	Input (X)	A1SCPU		X0 to FF (in units of 16 points)		
		A1SCPUC24-R2		Unusable		
		A1SCPU-S1		X0 to 1FF (in units of 16 points)		

Table 4.4 Parameter Setting Ranges (Continued)

Item / Setting			Default Value	Setting Range	Valid Peripheral Devices	
					PU	GPP
Setting of link range	Input (X)	A2SCPU	None	X0 to 1FF (in units of 16 points)	–	o
		A2SCPU-S1		X0 to 3FF (in units of 16 points)		
	Output (Y)	A1SCPU		Y0 to FF (in units of 16 points)		
		A1SCPUC24-R2		Unusable		
		A1SCPU-S1		Y0 to 1FF (in units of 16 points)		
		A2SCPU		Y0 to 1FF (in units of 16 points)		
		A2SCPU-S1		Y0 to 3FF (in units of 16 points)		
	Link relay (B)			B0 to B3FF (in units of 16 points)		
	Link register (W)			W0 to W3FF (in units of 1 point)		
I/O assignment			None	X/Y0 to X/Y1FF (in units of 16 points)	–	o
Setting of internal relay (M), latch relay (L), and step relay (S) setting			M0 to M999 L1000 to L2047 None for S	M/L/S 0 to 2047 (M, L, S are serial numbers)	o	o
Watchdog timer setting			200 msec	10 msec to 2000 msec (in units of 10 msec)	o	o
Setting of timer			100 msec: T0 to T199 10 msec: T200 to T255	256 points of 100 msec, 10 msec, and integrating timers (in units of 8 points) Timers have serial numbers.	o	o
Setting of counter			No interrupt counter	256 points (in units of 8 points) for counters and interrupt counters Must be consecutive numbers	–	o
Setting of remote RUN/PAUSE contact *		A1SCPU	None	X0 to XFF	–	o
		A1SCPUC24-R2		X0 to XDF		
		A1SCPU-S1, A2SCPU		X0 to X1FF		
		A2SCPU-S1		X0 to X3FF		
Operation mode at the time of error	Fuse blown		Continuation	Stop/continuation	–	o
	I/O verify error		Stop			
	Operation error		Continuation			
	Special function unit check error		Stop			
STOP → RUN display mode			Operation status prior to re-output of STOP	Output before STOP or after operation execution	–	o
Print title entry			None	Up to 128 characters	–	o
Keyword entry			None	Max. 6 digits in hexadecimal (0 to 9, A to F)	o	o

* It is not possible to set a PAUSE contact alone.

4.1.9 Memory capacity settings (main programs, file registers, comments, etc.)

The A1SCPU(S1)/A1SCPUC24-R2 provides 32k bytes of user memory area (RAM) and the A2SCPU(S1) provides 64k (192k) bytes of user memory area (RAM).
Data for parameters, T/C set values, main programs, sampling trace, status latch, file registers, and comments can be stored in the user memory area.

(1) Calculating memory capacity

The user memory can be divided into several memory blocks in accordance with the parameter settings.

Table 4.5 Parameter Settings and Memory Capacity

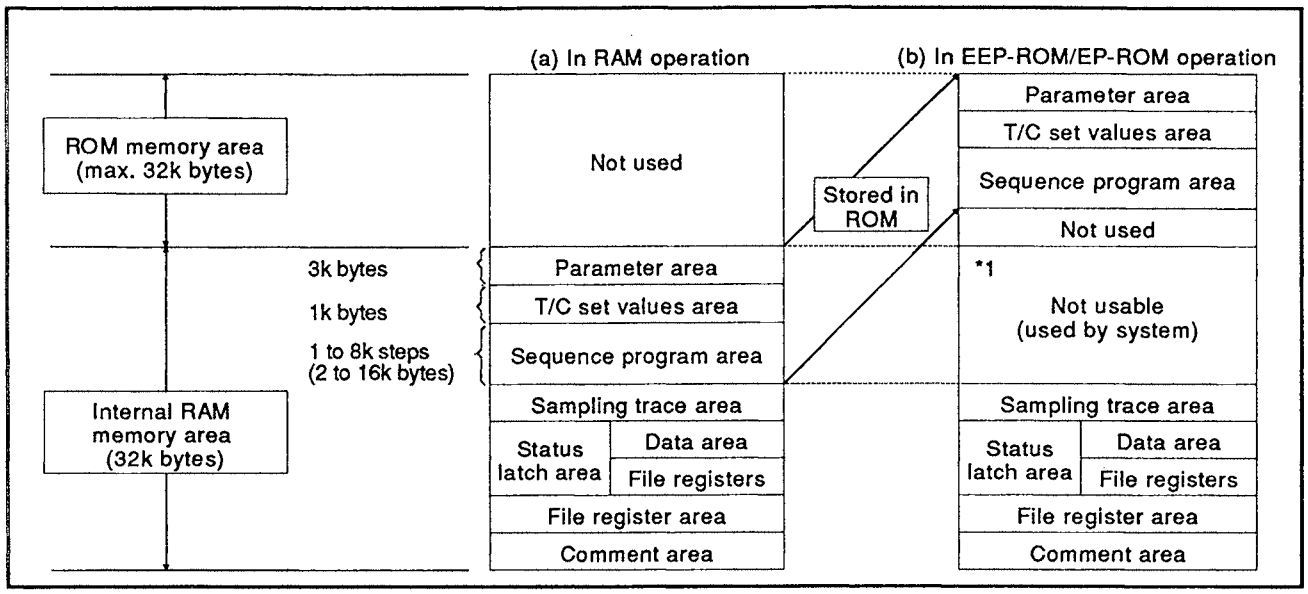
Item		Setting Unit	Memory Capacity	Storage onto ROM	Remark
Main program	Parameter, T/C set values	–	4k bytes (fixed)	Possible	Occupies 4k bytes for parameters and T/C set values
	Sequence program	1k steps	(Main sequence program capacity) x 2k bytes		
	Microcomputer program	2k bytes	(Main micro computer program capacity) x 1k byte		
Sampling trace		Not available/ available	0/8k bytes	Impossible	
Status latch	Data memory	Not available/ available	0/8k bytes		The memory capacity for the file register status latch is determined by the number of file register points set using parameters.
	File registers	Not available/ available	(File registers' memory capacity) 1k byte		
File registers		1k points	(File registers' number of points) x 2k bytes		
Comments		64 points	$\frac{\text{(Number of comments)}}{64}$ + 1k byte		1k byte is occupied by the system when setting comment capacity.

(2) Storage priority in user memory

The data set in the parameters is stored in the following sequence.
Make sure that the memory protect range does not cover the areas, such as sampling trace and file register, to which data will be written during sequence program execution.

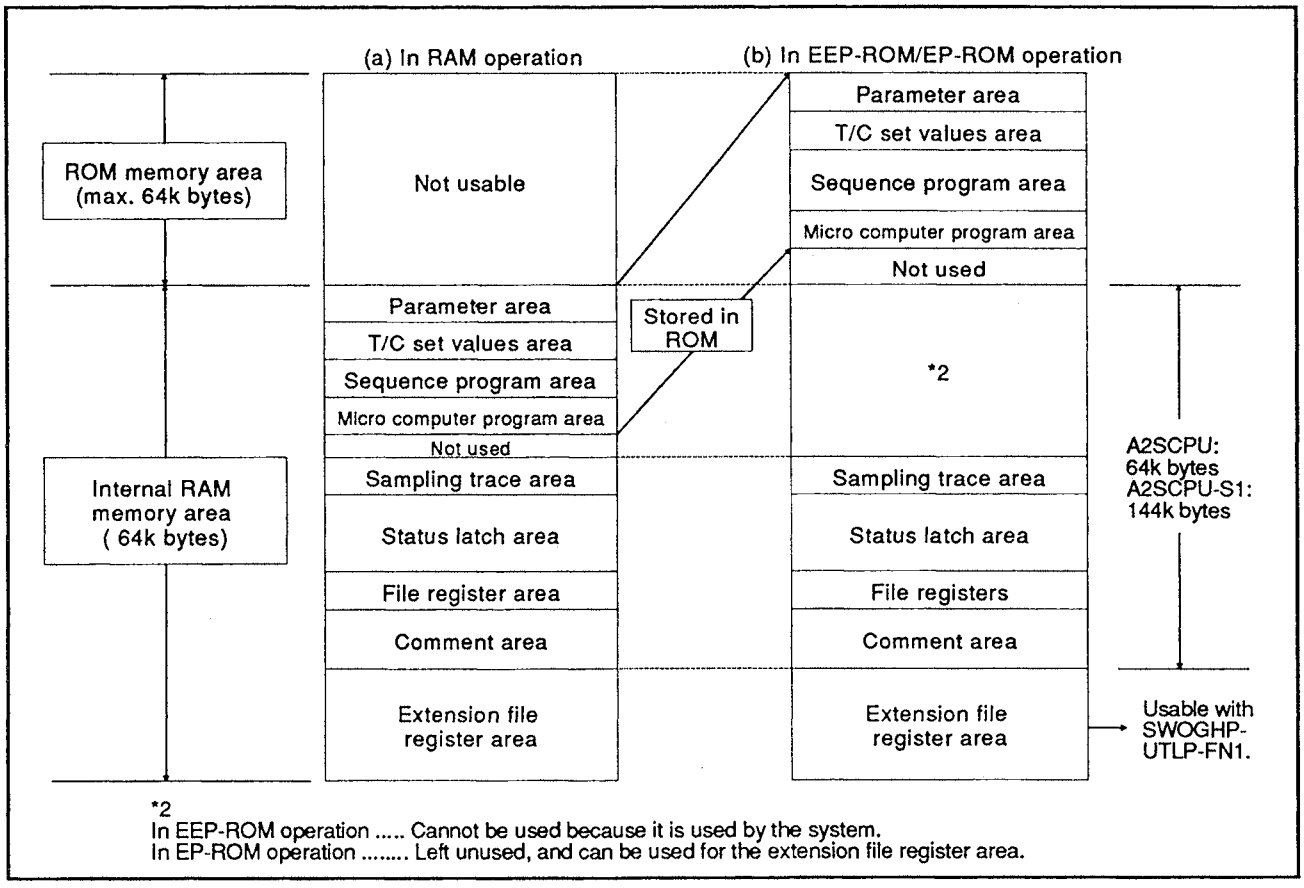
(a) When the A1SCPU(S1)/A1SCPUC24-R2 is used

Even if the main program is stored in an EEP-ROM/EP-ROM, the capacities of the sampling trace, status latch, file register, and comment areas cannot be increased, because the system uses the internal RAM area (area indicated by *1 in the following figure) as in RAM operation.



(b) When the A2SCPU(S1) is used

When the main program is stored in an EP-ROM, the area assigned to the program used in RAM operation is left unused, and can be used for the extension file register area.
But, even if the main program is stored in an EEP-ROM, the area cannot be used for the extension file register, because the system uses the internal RAM area (area indicated by *2 in the following figure) as in RAM operation.



4.2 Functions

The following table describes the functions of the AnSCPU.

Table 4.6 List of Functions

Function	Description	Section Reference
Constant scan	• Executes the sequence program at the predetermined intervals independently of the scan time. • Setting allowed from 10 to 2000 msec.	4.2.1
Latch (power interruption compensation)	• Retains device data while the PC is switched OFF or reset or a momentary power interruption of 20 msec or longer occurs. • L, B, T, C, D and W can be latched	4.2.2
Remote RUN/STOP	• Allows remote RUN/STOP control from an external device (e.g. peripheral, external input, computer) with the RUN/STOP switch in the RUN position.	4.2.3
PAUSE	• Stops operation with the output (Y) status retained. • Pause function may be switched ON by using either of the following: Remote PAUSE contact Peripheral device	4.2.4
Status latch	• Stores all device data in the status latch area in the AnS when the status latch condition is switched ON. • The stored data can be monitored by a peripheral device.	4.2.5
Sampling trace	• Samples the specified device operating statuses at predetermined intervals and stores the sampling result in the sampling trace area in the AnS. • The stored data can be monitored by a peripheral device.	4.2.6
Offline switch	• Allows the device (Y, M, L, S, F, B) used with the OUT instruction to be disconnected from the sequence program processing.	4.2.7
Priority setting ERROR LED	• Sets the ON/OFF status of the ERROR LED in the event of an error .	4.2.8
Clock	• Executes clock operation in the CPU module. • Clock data includes the year, month, day, hour, minute, second, and day of the week. • Clock data can be read from special registers D9025 to D9028.	4.2.9

REMARK

The AnSCPU cannot do "step operation", "PAUSE using RUN/STOP key switch", or "I/O module replacement at online".

4.3 Handling Instructions

This section gives handling instructions from unpacking to installation of the AnSCPU, I/O module, extension base unit, , etc.

(1) Since the case, terminal block connector, and pin connector of this PC are made of plastic, do not drop them or subject them to mechanical shock.

(2) Do not remove the printed circuit board of any unit from its case. Removal may cause board damage.

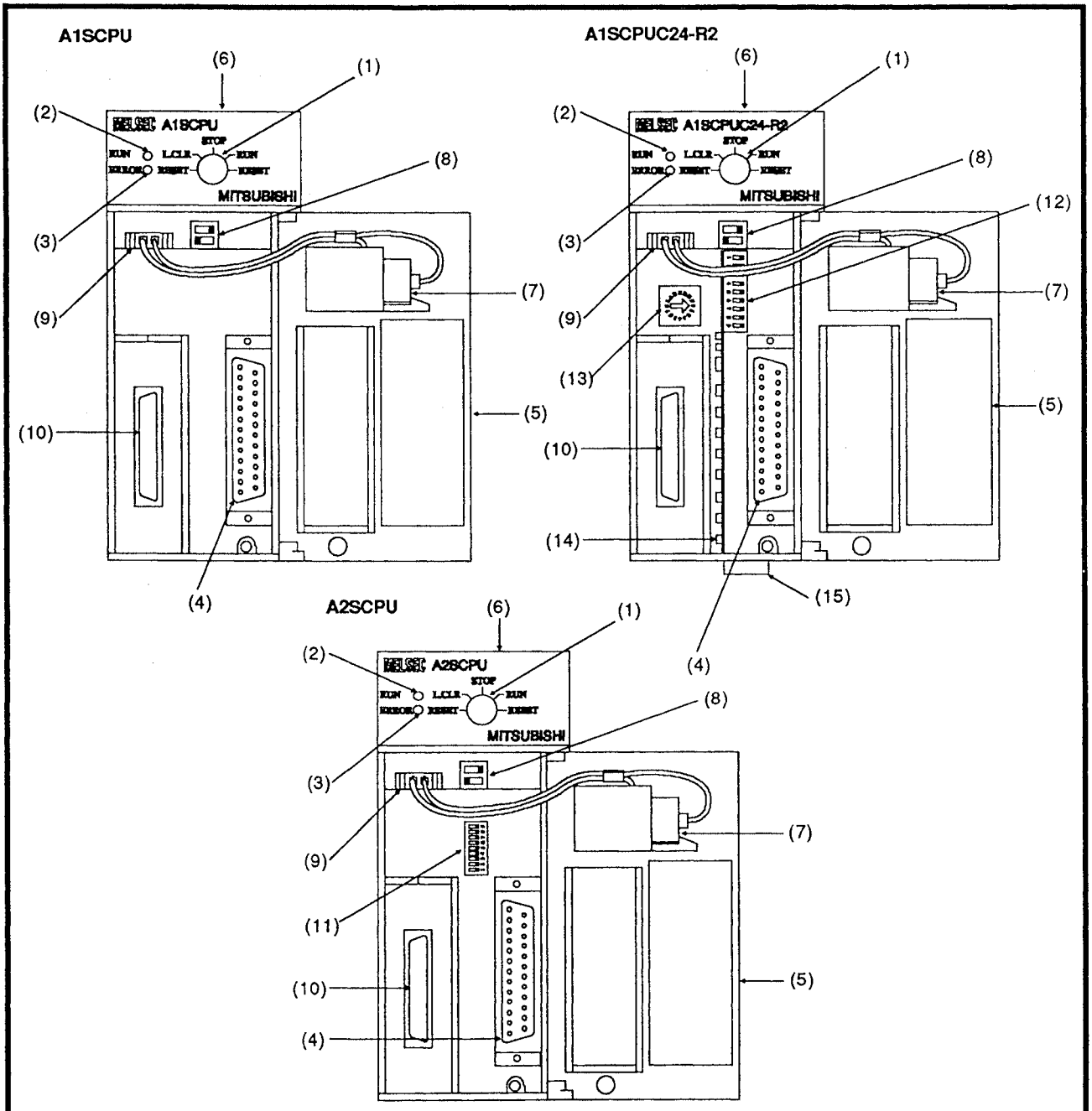
(3) When wiring, take care to prevent entry of wire offcuts into the unit. If any conductive debris enters the unit, make sure that it is removed.

(4) Tighten the unit mounting screws and terminal screws as indicated below.

Screw	Tightening Torque Range N•cm [Kg•cm] (lb•inches)
Module mounting screw (M4 screw)	78 to 118 [8 to 12] (6.93 to 10.39)
I/O module terminal block terminal screw (M3.5 screw)	59 to 88 [6 to 9] (5.2 to 7.79)

4.4 Part Identification and Setting of AnSCPU

4.4.1 Part identification



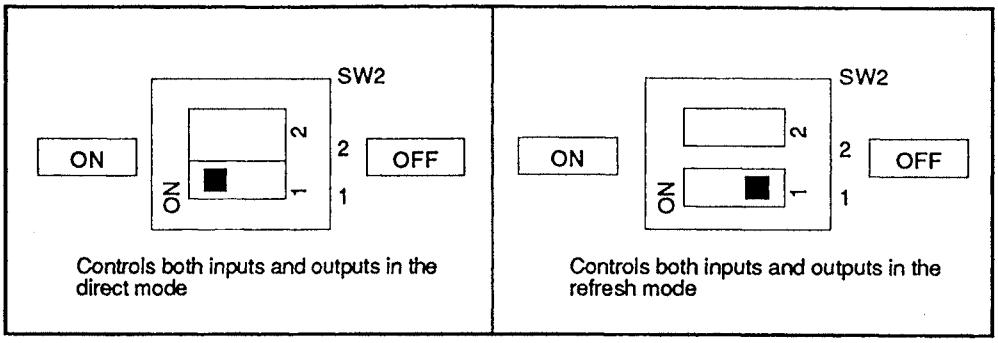
No.	Name	Function
(1)	RUN/STOP key switch	• RUN/STOP : To start/stop running a sequence program. • RESET : To reset the hardware. To reset an error occurring during operation to initialize operation. • LATCH CLEAR (L.CLR) : To clear (turn OFF, or clear to "0") the devices in the latch range and non-latch range which are set by parameter. For the latch clear operation procedure, refer to Section 4.4.4

No.	Name	Function
(2)	"RUN" LED	• ON : Indicates that a sequence program operation is being executed with the RUN key switch set to the RUN position. (The LED remains lit if an error (Section 10.3), which permits sequence operation to continue, occurs.) • OFF : The RUN LED goes out in the following cases: • When the RUN key switch is in the STOP position. • When the remote STOP signal is input. • When the remote PAUSE signal is input. • Flashing : The RUN LED flashes in the following cases: • When an error which causes sequence operation to stop is detected by the self-diagnosis function. • When the latch clear operation is executed.
(3)	"ERROR" LED	• ON : Indicates that the self-diagnosis function has detected an error. (When the detected error is set to "not lit" in the ERROR LED indication priority setting.) • OFF : Indicates that no error has occurred or that a malfunction has been detected by the [CHK] instruction. • Flashing : An annunciator (F) is turned ON by the sequence program.
(4)	RS-422 connector	• Used to connect a peripheral device to write/read, monitor, or test a program using a peripheral device. • Close with the cover when not connected to a peripheral device.
(5)	Cover	• Protects AnSCPU printed circuit board, memory cassette, RS-422 connector, battery, etc. • Execute the following operations with the cover open. • Memory cassette connection/disconnection • Setting a dip switch • Connection to battery connector • For mounting the module to the base unit battery replacement
(6)	Module fixing screws	• For mounting the module to the base unit
(7)	Battery	• For retaining data such as programs, device latch ranges, file registers, etc. (See 7.2 for battery replacement.)
(8)	DIP switch	• Used for switching the I/O control method and for setting the memory-protect function. (See sections 4.4.2 and 4.4.3)
(9)	Battery connector	• For connection to the battery
(10)	Memory cassette installing connector	• For installing the memory cassette
(11)	DIP switch for memory protect	• Used for the memory-protect function. (See section 4.4.3)
(12)	Transmission specification setting switches	• Used to set the transmission specifications for the computer link. (For details on each of the switches, see Section 4.4.4)
(13)	Mode setting switch	• Switch used to set the RS-232C interface mode in accordance with the computer link function used. (For details on each switch setting, see Section 4.4.4)
(14)	Computer link LEDs	• Indicate the operating state of the computer link, the data communication in progress status, the contents of errors, etc. (For details on the significance of each LED, see Section 4.4.4)
(15)	RS-232C connector	• Used to connect an external device (e.g. computer). (For RS-232C connector specifications, see Section 4.5)

4.4.2 I/O control switch setting

The I/O control system uses either the direct mode or the refresh mode. Use the DIP switch (SW2-1) to switch the I/O control mode.

On shipment from the factory, the direct mode is set for both inputs and outputs (SW2-1: ON).



POINT

Make sure that the power is OFF be to reswitching the I/O control mode.

4.4.3 Memory protect switch setting

The memory protect switch is designed to protect data in the RAM memory from being overwritten due to incorrect operation or malfunctioning of a peripheral device.

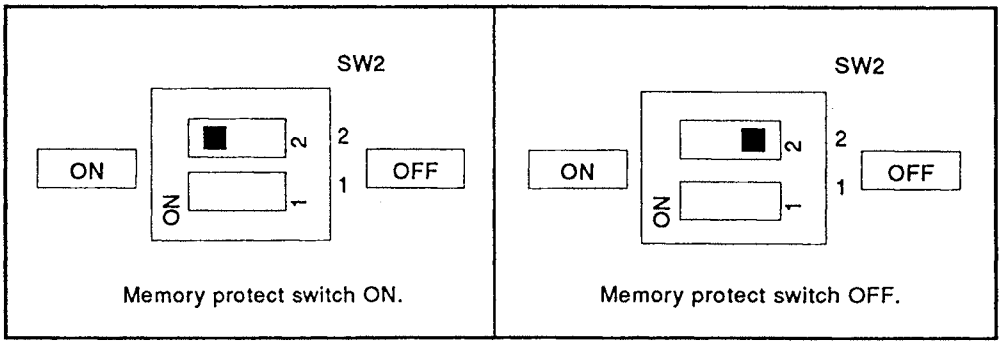
It is used to prevent overwriting or deletion of created programs.

To modify data in RAM memory, the memory protect switch must be turned OFF.

The memory protect switch is set to OFF (SW2-2: OFF) before shipment from the factory.

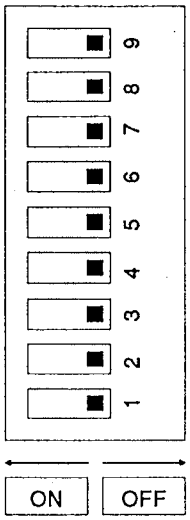
(1) When the A1SCPU(S1)/A1SCPUC24-R2 is used

The memory protect function of the A1SCPU(S1)/A1SCPUC24-R2 is set ON/OFF by using a DIP switch (SW2-2). The memory protect function protects the first 20 kbytes of the 32 kbyte user memory area. (When the CPU is equipped with a memory cassette or operated using a ROM or EEP-ROM, the memory protect switch setting is invalid.)



(2) When the A2SCPU(S1) is used

The memory protect range can be changed by changing the settings of the memory protect DIP switches. For details, refer to Fig. 4.3. The SW2-2 may be in the ON or OFF position.



Memory Protect Range (kbytes)	Switch Settings
0 to 16	Set switch 1 to ON.
16 to 32	Set switch 2 to ON.
32 to 48	Set switch 3 to ON.
48 to 64	Set switch 4 to ON.
64 to 80	Not used
80 to 96	Not used
96 to 112	Not used
112 to 144	Not used
144 to 192	Not used

Fig. 4.3 Memory Protect DIP Switch Settings

POINT

(1) Set the memory protect range according to the address (step number) of each memory area (sequence program, comment, sampling trace, status latch, file register).

(2) Do not use the memory protect function when executing a sampling trace or status latch since it will make it impossible to store the data in the memory.

REMARK

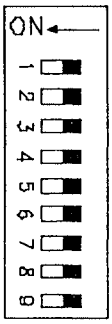
When using the A2SMCA-14KE, the memory protect function can be set by setting its memory protect setting pins. See Section 7.1.5

4.4.4 Settings when using the computer link function (A1SCPUC24-R2 only)

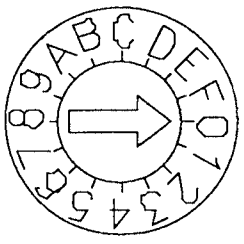
The switch settings and LED indications when an A1SCPUC24-R2 is used for computer link operation are shown below.

For full details on the items to be set and LED indications, refer to the Computer Link Module User's Manual.

(1) Setting the transmission specification setting switches

Setting of Switches	Switch	Setting Item	Position of Setting Switch								Remarks
			ON				OFF				
	1	Write during RUN	Enabled				Disabled				For use with dedicated protocol
		Transmission speed (BPS)	300	600	1200	2400	4800	9600	19200	Unus-able	—
	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 not included
	6	Parity check	Enabled				Disabled				—
	7	Parity setting	Even				Odd				Valid only when parity check "enabled" is selected.
	8	Stop bit	2 bits				1 bit				—
	9	Sum check	Enabled				Disabled				For use with dedicated protocol

(2) Setting the mode setting switches

Mode Setting Switch	Mode Setting (Factory Setting: 0)		Notes
	Mode	Mode Settings	
 MODE	0	Unusable	
	1	Protocol 1	This mode is used to enable a dedicated protocol computer link with all devices connected to the RS-232C interface.
	2	Protocol 2	
	3	Protocol 3	
	4	Protocol 4	
	5	No-protocol	This mode is used to enable a no-protocol computer link with all devices connected to the RS-232C interface.
	6 to E	Unusable	
	F	For module test	This mode is used for testing the module.

(3) LED indications for computer link

	LED No.	LED	Meaning of LED Display	LED ON (Lit/Flashing)	LED OFF	Initial Status of LED
0	0	RUN	Normal run	Normal	Error	ON
1	1	SD	RS-232C transmitting	Flashes during data transmission		OFF
2	2	RD	RS-232C receiving	Flashes during data reception		OFF
3	3	CPU	Communications with the PC CPU	Flashes during communication with the PC CPU (lit when not communicating)		ON
4	4	NEU	RS-232C neutral	Transmission sequence initial state (waiting for ENQ)	ENQ received	*1
5	5	ACK	RS-232C ACK	After sending ACK	After sending NAK	OFF
6	6	NAK	RS-232C NAK	After sending NAK	After sending ACK	OFF
7	7	C/N	Result of RS-232C and PC CPU communications	*2	ormal	OFF
8	8	P/S	RS-232C parity/sum check error	Parity/sum check error	Normal	OFF
9	9	PRO	RS-232C protocol error	Communications protocol error	Normal	OFF
10	10	SI0	RS-232C SIO error	Overrun, framing error, or data discarded because OS area is full	Normal	OFF

*1: "ON" if the mode setting switch is set to a position from 1 to 4. "OFF" if it is at any other position.

*2: Lights in the following cases:

(1) When an illegal access is attempted from a computer link module while the PC CPU is in the RUN status (e.g. an attempt to write while a program is being executed).

(2) When PC CPU accessing is not executed normally.

4.4.5 Clearing latched data

Follow the procedure described below to clear latched data using the RUN/STOP key switch. The latch clear operation also clears unlatched device data.

(1) Turn the RUN/STOP key switch from the "STOP" position to the "L.CLR" position several times to make the "RUN" LED flash quickly (ON for approximately 0.2 seconds and OFF for approximately 0.2 seconds). The quickly flashing "RUN" LED indicates that the preparation for the latch clear operation is completed.

(2) Turn the RUN/STOP key switch from the "STOP" position to the "L.CLR" position again while the "RUN" LED is flashing. The latched data will be cleared, and the "RUN" LED will go OFF.
To cancel the latch clear operation, turn the RUN/STOP key switch to the "RUN" position to make the AnSCPU start processing, or to the "RESET" position to reset the AnSCPU.

REMARK

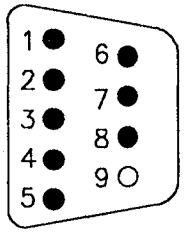
Latched data can be cleared using the GPP function.

The A6GPP, for example, performs latch clear using "DEVICE MEMORY ALL CLEAR" of the test functions of the PC mode.

Refer to the GPP Operating Manual for details.

4.5 RS232C interface (A1SCPUC24-R2 only)

(1) RS-232C connector specificatins



Pin Number	Signal Abbreviation	Signal Name	Signal Direction A1SCPUC24-R2↔External Device
1	CD	Receive carrier detection	←
2	RD(RXD)	Receive data	←
3	SD(TXD)	Send data	→
4	DTR(ER)	Data terminal ready	→
5	SG	Signal ground	←
6	DSR(DR)	Data set ready	←
7	RS(RTS)	Request to send	→
8	CS(CTS)	Clear to send	←

(2) RS-232C cable

For the RS-232C cable, use a cable that conforms to the RS-232C standard and is no longer than 15 m.

(Recommended cable)

7/0. 127[ ]P HRV-SV.....(RS-232C cable made by Oki Densen)
↑
Specify the number of wire pairs.
For example, if the number of pairs is thirteen:
7/0. 127 13P HRV-SV

(3) Connecting the RS-232C connectors

The standard method for connecting the RS-232C connectors is shown below.
For details on the connection method, refer to the Computer Link Module User's Manual (Com. link func./Print func.).

(a) Example connection to an external device in which the CD signal (pin No.8) can be switched ON and OFF.

A1SCPUC24-R2		Cable Connections and Signal Directions	External Device
Signal Names	Pin Number		Signal Names
CD	1		CD
RD(RXD)	2		RD(RXD)
SD(TXD)	3		SD(TXD)
DTR(ER)	4		DTR(ER)
SG	5		SG
DSR(DR)	6		DSR(DR)
RS(RTS)	7		RS(RTS)
CS(CTS)	8		CS(CTS)

(b) Example connection to an external device in which the CD signal (pin No.8) cannot be switched ON and OFF.

In the case of a connection to a device in which the device's CD signal cannot be switched ON and OFF, set non-execution of the buffer memory address 10BH RS232C CD terminal check.

1) Example connection to an external device in which DC code control or DTR/DSR code control is executed.

A1SCPUC24-R2		Cable Connections and Signal Directions	External Device
Signal Names	Pin Number		Signal Names
CD	1		CD
RD(RXD)	2		RD(RXD)
SD(TXD)	3		SD(TXD)
DTR(ER)	4		DTR(ER)
SG	5		SG
DSR(DR)	6		DSR(DR)
RS(RTS)	7		RS(RTS)
CS(CTS)	8		CS(CTS)

2) Example connection to an external device in which DC code control is executed.

A1SCPUC24-R2		Cable Connections and Signal Directions	External Device
Signal Names	Pin Number		Signal Names
CD	1		CD
RD(RXD)	2		RD(RXD)
SD(TXD)	3		SD(TXD)
DTR(ER)	4		DTR(ER)
SG	5		SG
DSR(DR)	6		DSR(DR)
RS(RTS)	7		RS(RTS)
CS(CTS)	8		CS(CTS)

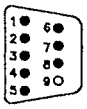
4.6 Self-Loopback Test (A1SCPUC24-R2 only)

The self-loopback test checks whether or not the isolated A1SCPUC24-R2 (not connected to any external devices) will operate correctly.

For details on the self-loopback test, refer to the Computer Link Module User's Manual (Com. link func./Printer func.).

Connect the cables

- Connect cables to the RS-232C connectors.



Pin Number	Signal Abbreviation	Signal Name	Cable Connections
1	CD	Receive carrier detection	
2	RD(RXD)	Receive data	
3	SD(TXD)	Send data	
4	DTR(ER)	Data terminal ready	
5	SG	Signal ground	
6	DSR(DR)	Data set ready	
7	RS(RTS)	Request to send	
8	CS(CTS)	Clear to send	

Set the mode setting switch

- Set the mode setting switch to "F".

Execute the self-loopback test

- Turn the PC CPU power supply ON or reset the PC CPU.

Check the LED display status

Check Item	Display When Normal		Display in Error Status	
PC CPU communications check	C/N	OFF	C/N (LEDNo.7)	ON
	CPU	Flicker		
RS-232C communications check	SIO	OFF	SIO (LEDNo.10)	ON
	SD	Flicker		
	RD			

Completed

- Turn the power supply OFF.

5. POWER SUPPLY MODULE

5.1 Specifications

Table 5.1 shows the specifications of the power supply modules.

Table 5.1 Power Supply Module Specifications

Item		Specifications		
		A1S61P	A1S62P	A1S63P
Base loading position		Power supply module loading slot		
Input voltage		100 to 120 VAC $^{+10\%}_{-15\%}$ (85 to 132 VAC)		DC24V $^{+30\%}_{-35\%}$ (15.6 to 31.2 VDC)
		200 to 240 VAC $^{+10\%}_{-15\%}$ (170 to 264 VAC)		
Input frequency		50/60 Hz ±3 Hz		—
Max. input apparent power		105 VA		41W
Inrush current		20A within 8 msec		81A within 1 msec
Rated output current	5 VDC	5 A	3 A	5A
	24 VDC±10%		0.6 A	
*1 Overcurrent protection	5 VDC	5.5 A or higher	3.3 A or higher	5.5 A or higher
	24 VDC		0.66 A or higher	
*2 Overvoltage protection	5 VDC	5.5 to 6.5 V	5.5 to 6.5 V	5.5 to 6.5 V
	24 VDC		—	
Efficiency		65% or higher		
Power indicator		Power LED display		
Terminal screw size		M3.5 x 7		
Applicable wire size		0.3 to 2 mm^2		
Applicable solderless terminals		1.25-3.5, V1.25-YS3A, 2-3.5, 2-YS3A V1.25-M3, V2-YS3A, V2-S3, V2-YS3A		
Applicable tightening torque		83 to 113N (8.5 to 11.5 kg·cm)		
External dimensions mm (inch)		130 x 55 x 94 (5.12 x 2.17 x 3.70)		
Weight kg (lb)		0.53 (1.17)	0.55 (1.21)	0.5 (1.1)
*3 Allowable momentary power interruption time		within 20 msec		within 10 msec

POINTS

*1 : Overcurrent protection

The overcurrent protection device shuts off the 5V, 24 VDC circuit and stops the system if the current flowing in the circuit exceeds the specified value.
When this device is activated, the power supply module LED is switched OFF or dimly lit. If this happens, eliminate the cause of the overcurrent and start up the system again.

*2 : Overvoltage protection

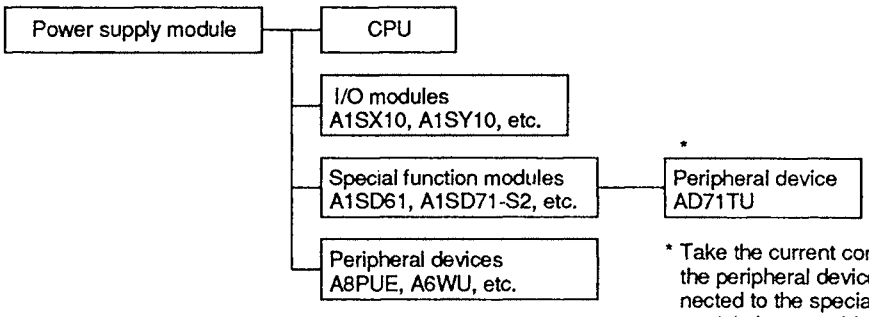
The overvoltage protection device shuts off the 5 VDC circuit and stops the system if a voltage of 5.5 to 6.5 V is applied to the circuit.
When this device is activated, the power supply module LED is switched OFF. If this happens, switch the input power OFF, then ON to restart the system.
The power supply module must be changed if the system is not booted and the LED remains OFF.

*3 : Allowable momentary power interruption time

This value indicates the momentary power interruption time allowed for the PC CPU and varies according to the power supply module used with the PC CPU module.
The allowable momentary power interruption time for a system in which an A1S63P is used is defined as starting when the primary power supply of the 24 VDC stabilized power supply of the A1S63P is turned OFF and lasting until the 24 VDC becomes less than the specified voltage (15.6 VDC).

5.1.1 Selection of the power supply module

Select the power supply module according to the total current consumption of I/O modules, special function modules and peripheral devices supplied by the power supply module. When an A1S52B(S1), A1S55B(S1), A1S58B(S1), A52B, A55B or A58B is used, the power is supplied from the power supply module of the main base unit. This point should also be taken into consideration.
Refer to Section 2.3 for details of the 5 VDC current consumptions of I/O modules, special function modules, and peripheral devices.



(1) Power supply module when an extension base A1S52B(S1), A1S55B(S1), A1S58B(S1), A52B, A55B or A58B is used

When an extension base A1S52B(S1), A1S55B(S1), A1S58B(S1), A52B, A55B or A58B is used, the 5 VDC is supplied from the power supply module of the main base unit through the extension cable. Note the following points regarding the use of an extension base from among A1S52B(S1), A1S55B(S1), A1S58B(S1), A52B, A55B and A58B:

(a) Select a power supply module for the main base unit whose 5 VDC capacity can cover the 5 VDC current consumption of the A1S52B(S1), A1S55B(S1), A1S58B(S1), A52B, A55B or A58B.

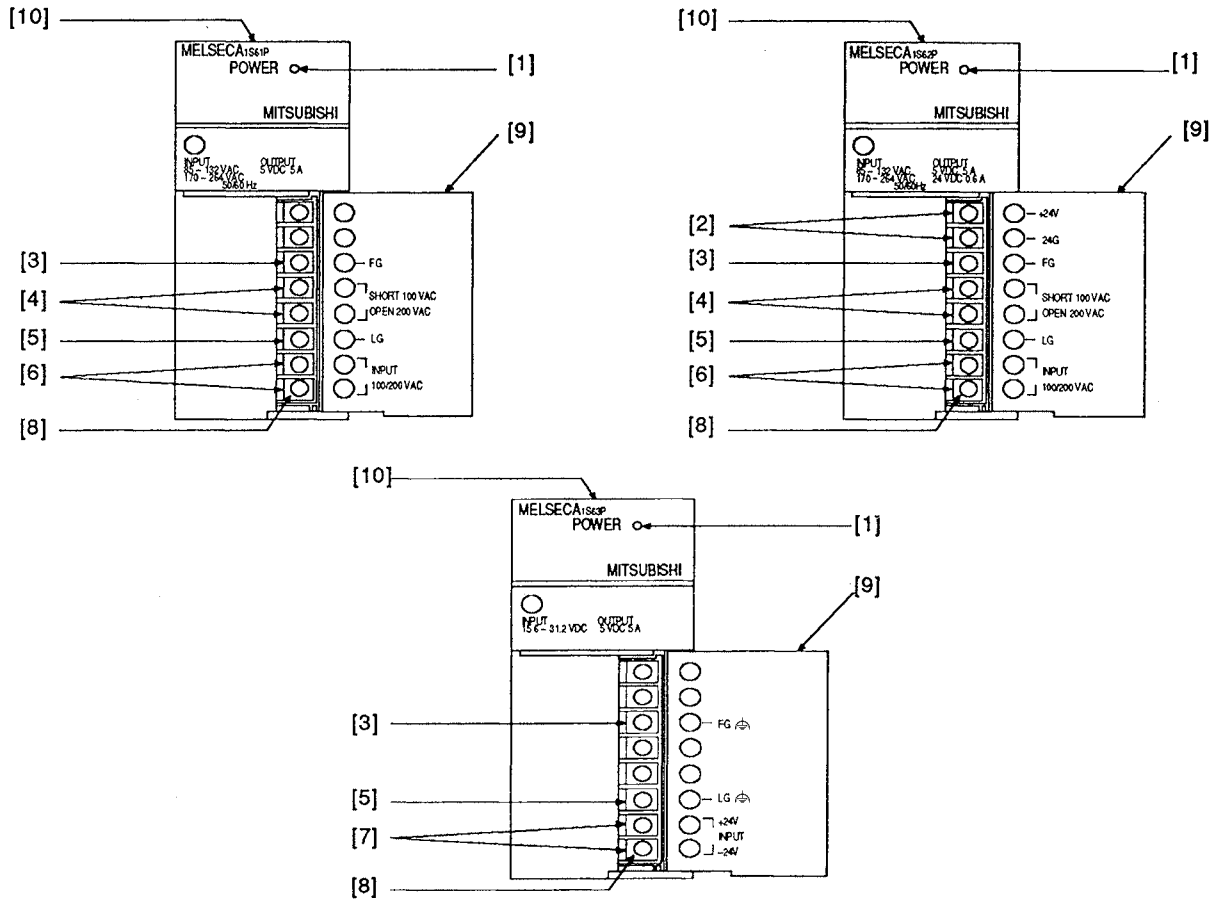
[Example]

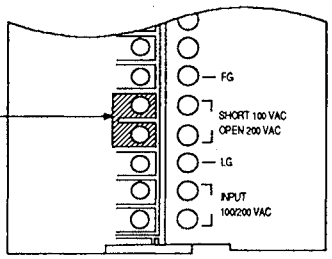
When the 5 VDC current consumption by the main base unit is 3 A and that by the A1S55B(S1) is 1 A, the power supply module installed at the main base unit must be A61P (5 VDC, 5 A).

(b) Since the power is supplied to the A1S52B(S1), A1S55B(S1), A1S58B(S1), A52B, A55B or A58B through the extension cable, some voltage drop occurs in the cable. It is necessary to select a power supply module and length of cable which can provide 4.75 VDC or more at the receiving end.
For details of voltage drop and other information, refer to Section 6.1.3 "Application standards for extension base units".

5.2 Names of parts and settings

The following gives the names and description of the parts of the power supply modules:



No.	Name	Description
[1]	POWER LED	The indicator LED for the 5 VDC power.
[2]	24V and 24G terminals	Used to supply 24 VDC to inside the output module (using external wiring).
[3]	FG terminal	The grounding terminal connected to the shield pattern of the printed circuit board.
[4]	Input voltage select terminals	Either a 100 VAC or 200 VAC power supply can be connected: when using 100 VAC, short the two input voltage terminals with the jumper supplied as an accessory; to use 200 VAC, leave these terminals open. < Setting when the power supply voltage is 100 VAC > Short using the jumper provided as an accessory. 

[5]	LG terminal	Grounding for the power supply filter. The potential of this terminal is 1/2 of the input voltage.
[6]	Power supply input terminals	Used to connect a 100 VAC or 200 VAC power supply.
[7]	Power supply input terminals	Used to connect a 24 VDC power supply.
[8]	Terminal screw	M3.5 x 7
[9]	Terminal cover	The protective cover of the terminal block.
[10]	Module fixing screw	Used to fix the module to the base unit.

POINT

If the setting differs from the supply line voltage, the following results will occur. Do not make the wrong setting.

	Supply Line Voltage	
	100 VAC	**200 VAC**
Setting to 100 VAC (Short the input voltage select terminals.)	—	The power supply module is damaged. (The CPU is not damaged.)
Setting to 200 VAC (Open the input voltage select terminals.)	No error occurs in the module. However, the CPU does not operate.	—

6. BASE UNIT AND EXTENSION CABLE

6.1 Specifications

This section describes the specifications for the base units (main base units, extension base units) that can be used in the system, and the application standards for extension base units.

6.1.1 Specifications of base units

(1) Specifications of main base units

Table 6.1 Main Base Unit Specifications

Item \ Model	A1S32B	A1S33B	A1S35B	A1S38B
Number of I/O modules	2 can be loaded	3 can be loaded	5 can be loaded	8 can be loaded
Extension connection	Enabled			
Installation hole size	ϕ6-mm (0.24 inch) slot (for M5 screw)			
External dimensions mm(in)	220 x 130 x 28 (8.66 x 5.12 x 1.10)	255 x 130 x 28 (10.04 x 5.12 x 1.10)	325 x 130 x 28 (12.80 x 5.12 x 1.10)	430 x 130 x 28 (16.93 x 5.12 x 1.10)
Weight kg(lb)	0.52 (1.14)	0.65 (1.43)	0.75 (1.65)	0.97 (2.13)
Accessory	Four mounting screws (M5 x 25)			

(2) Specifications of extension base units

Table 6.2 Extension Base Unit Specifications

Item \ Model	A1S65B(S1)	A1S68B(S1)	A1S52B(S1)	A1S55B(S1)	A1S58B(S1)
Number of I/O modules	5 can be loaded	8 can be loaded	2 can be loaded	5 can be loaded	8 can be loaded
Power supply module loading	Required		Not required		
Installation hole size	ϕ6-mm (0.24 inch) slot (for M5 screw)				
Terminal screw size	—	—	M4 x 6 (FG terminal)		
Applicable wire size	—	—	0.75 to 2 mm^2		
Applicable solderless terminal size	—	—	(V)1.25-4, (V)1.25-YS4, (V)2-YS4A (Applicable tightening torque: 12 kg/cm [118N·cm](67.1 lb/inch)		
External dimensions mm(inch)	315 x 130 x 28 (12.40 X 5.12 X 1.10)	420 x 130 x 28 (16.54 X 5.12 X 1.10)	155 x 130 x 28 (5.31 X 5.12 X 1.10)	260 x 130 x 28 (10.24 X 5.12 X 1.10)	365 x 130 x 28 (14.37 X 5.12 X 1.10)
Weight kg(lb)	0.71 (1.56)	0.95 (2.09)	0.38 (0.84)	0.61 (1.34)	0.87 (1.91)
Accessory	Four mounting screws (M5 x 25)		*1 One dustproof cover (for I/O module) Four mounting screws (M5 x 25)		

*1: For the installation of the dustproof cover, see Section 8.6.

POINT

When using one of the base units A1S52B(S1), A1S55B(S1) or A1S58B(S1), which do not require a supply module, refer to Section 5.1.1 "Selection of the power supply module" and Section 6.1.3.

6.1.2 Specifications of extension cables

Table 6.3 shows the specifications of the extension cables which can be used for the AnSCPU system.

Table 6.3 Extension Cable Specifications

Item \ Model	A1SC01B	A1SC03B	A1SC07B	A1SC12B	A1SC30B	A1SC60B	A1SC05NB	A1SC07NB
Cable length m(ft)	0.055 (0.18)	0.33 (1.08)	0.7 (2.3)	1.2 (3.94)	3.0 (9.84)	6.0 (19.68)	0.45 (1.48)	0.7 (2.3)
Resistance of 5 VDC supply line (Ω at 55 °C)	0.02	0.021	0.036	0.055	0.121	0.182	0.037	0.045
Application	Connection between main base unit and A1S5[ ]B(S1)/A1S6[ ]B(S1)						Connection between main base unit and A5[ ]B/A6[ ]B	
Weight kg (lb)	0.025 (0.055)	0.01 (0.022)	0.14 (0.31)	0.20 (0.44)	0.4 (0.88)	0.65 (1.43)	0.2 (0.44)	0.22 (0.48)

6.1.3 Application standards for extension base units (A1S52B(S1), A1S55B(S1), A1S58B(S1), A52B, A55B, A58B)

When an extension base unit of one of the models A1S52B(S1), A1S55B(S1), A1S58B(S1), A52B, A55B, or A58B is used, make sure a voltage of 4.75 V or higher is supplied to the receiving end (at the module installed in the last slot of the extension base unit).

With the A1S52B(S1), A1S55B(S1), A1S58B(S1), A52B, A55B, and A58B extension base units, 5 VDC is supplied from the power supply module of the main base unit via an extension cable. Therefore, some voltage drop occurs in the extension cable and the specified voltage may not be supplied to the receiving end, resulting in incorrect operation.

If the voltage at the receiving end is less than 4.75 V, use an extension base unit of one of the models A1S65B(S1), A1S68B(S1), A62B, A65B, or A68B, equipped with a power supply unit.

(1) Selection conditions

The voltage received by the module installed in the last slot of an A1S52B(S1), A1S55B(S1), A1S58B(S1), A52B, A55B, or A58B extension base unit must be 4.75 V or higher.

Since the output voltage of the power supply module is set at 5.1 V or higher, the voltage drop must be 0.35 V or less.

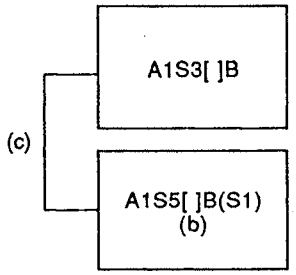
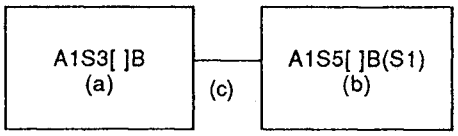
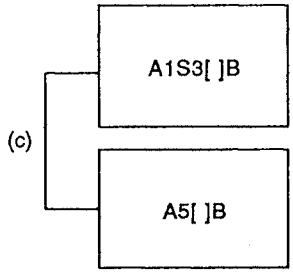
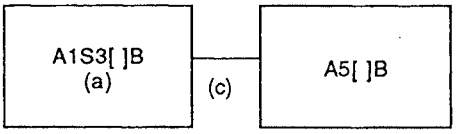
(2) Factors of voltage drop

Voltage drop may involve the following factors (a), (b), and (c) depending on the connecting method and type of extension base units.

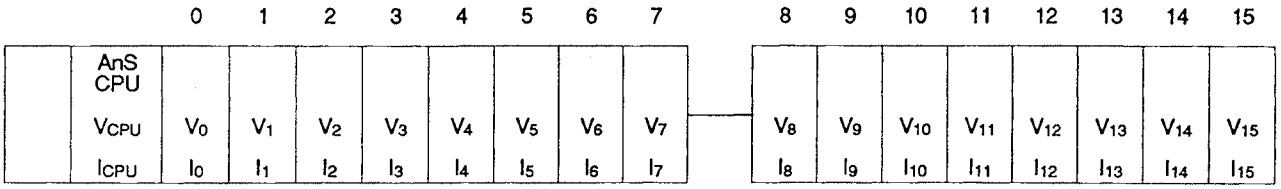
(a) Voltage drop of a main base unit

(b) Voltage drop of an extension base unit

(c) Voltage drop in an extension cable

	Extension cable connected to the left side of main base unit (serial)	Extension cable connected to the right side of main base unit (parallel)
A1S52B(S1), A1S55B(S1), or A1S58B(S1) extension base unit is used	 Voltage drop of the main base unit can be ignored.	
A52B, A55B or A58B extension base unit is used	 Voltage drop of the main and extension base units can be ignored.	 Voltage drop of the extension base units can be ignored.

(3) Calculation of the receiving-end voltage



V_{CPU}, V_0 to V_7 : Voltage drop of each slot of a main base unit
I_{CPU}, I_0 to I_7 : Current consumption of each slot of a main base unit
V_8 to V_{15} : Voltage drop of each slot of an extension base unit
I_8 to I_{15} : Current consumption of each slot of an extension base unit

(a) Calculation of voltage drop of a main base unit (A1S32B, A1S33B, A1S35B, A1S38B)

Each slot of a main base unit has a resistance of 0.007 Ω. Calculate the voltage drop of each slot, to obtain the total voltage drop of a main base unit.

1) Voltage drop of a CPU module: V_{CPU}

$$V_{CPU} = 0.007 \times (0.4 + I_0 + I_1 + I_2 + I_3 + I_4 + I_5 + I_6 + I_7 + I_8 + I_9 + I_{10} + I_{11} + I_{12} + I_{13} + I_{14} + I_{15})$$

2) Voltage drop of slot 0: V_0

$$V_0 = 0.007 \times (I_0 + I_1 + I_2 + I_3 + I_4 + I_5 + I_6 + I_7 + I_8 + I_9 + I_{10} + I_{11} + I_{12} + I_{13} + I_{14} + I_{15})$$

3) Voltage drop of slot 1: V_1

$$V_1 = 0.007 \times (I_1 + I_2 + I_3 + I_4 + I_5 + I_6 + I_7 + I_8 + I_9 + I_{10} + I_{11} + I_{12} + I_{13} + I_{14} + I_{15})$$

4) Voltage drop of slot 2: V_2

$$V_2 = 0.007 \times (I_2 + I_3 + I_4 + I_5 + I_6 + I_7 + I_8 + I_9 + I_{10} + I_{11} + I_{12} + I_{13} + I_{14} + I_{15})$$

5) Voltage drop of slot 3: V_3

$$V_3 = 0.007 \times (I_3 + I_4 + I_5 + I_6 + I_7 + I_8 + I_9 + I_{10} + I_{11} + I_{12} + I_{13} + I_{14} + I_{15})$$

6) Voltage drop of slot 4: V_4

$$V_4 = 0.007 \times (I_4 + I_5 + I_6 + I_7 + I_8 + I_9 + I_{10} + I_{11} + I_{12} + I_{13} + I_{14} + I_{15})$$

7) Voltage drop of slot 5: V_5

$$V_5 = 0.007 \times (I_5 + I_6 + I_7 + I_8 + I_9 + I_{10} + I_{11} + I_{12} + I_{13} + I_{14} + I_{15})$$

8) Voltage drop of slot 6: V_6

$$V_6 = 0.007 \times (I_6 + I_7 + I_8 + I_9 + I_{10} + I_{11} + I_{12} + I_{13} + I_{14} + I_{15})$$

9) Voltage drop of slot 7: V_7

$$V_7 = 0.007 \times (I_7 + I_8 + I_9 + I_{10} + I_{11} + I_{12} + I_{13} + I_{14} + I_{15})$$

10)Total voltage drop of a main base unit: V_K

$$V_K = V_{CPU} + V_0 + V_1 + V_2 + V_3 + V_4 + V_5 + V_6 + V_7$$

(b) Calculation of voltage drop of an extension base unit (A1S52B(S1), A1S55B(S1), A1S58B(S1))

Each slot of an extension base unit has a resistance of 0.006 Ω. Calculate the voltage drop of each slot, to obtain the total voltage drop of an extension base unit.

1) Voltage drop of slot 8: V_8

$V_8 = 0.006 \times (I_8 + I_9 + I_{10} + I_{11} + I_{12} + I_{13} + I_{14} + I_{15})$

2) Voltage drop of slot 9: V_9

$V_9 = 0.006 \times (I_9 + I_{10} + I_{11} + I_{12} + I_{13} + I_{14} + I_{15})$

3) Voltage drop of slot 10: V_{10}

$V_{10} = 0.006 \times (I_{10} + I_{11} + I_{12} + I_{13} + I_{14} + I_{15})$

4) Voltage drop of slot 11: V_{11}

$V_{11} = 0.006 \times (I_{11} + I_{12} + I_{13} + I_{14} + I_{15})$

5) Voltage drop of slot 12: V_{12}

$V_{12} = 0.006 \times (I_{12} + I_{13} + I_{14} + I_{15})$

6) Voltage drop of slot 13: V_{13}

$V_{13} = 0.006 \times (I_{13} + I_{14} + I_{15})$

7) Voltage drop of slot 14: V_{14}

$V_{14} = 0.006 \times (I_{14} + I_{15})$

8) Voltage drop of slot 15: V_{15}

$V_{15} = 0.006 \times I_{15}$

9) Total voltage drop of an extension base unit: V_Z

$V_Z = V_8 + V_9 + V_{10} + V_{11} + V_{12} + V_{13} + V_{14} + V_{15}$

(c) Calculation of voltage drop in extension cables

[1] Total current consumption of an extension base unit: I_Z

$I_Z = I_8 + I_9 + I_{10} + I_{11} + I_{12} + I_{13} + I_{14} + I_{15}$

[2] Voltage drop in an extension cable: V_C

V_C = (Resistance of an extension cable) x I_Z

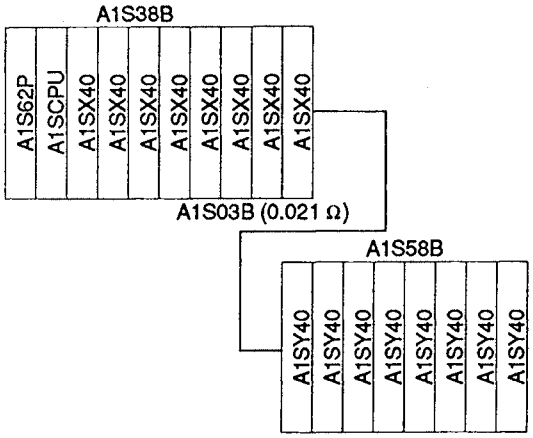
Resistance of extension cables

A1SC01B ..... 0.02 Ω A1SC30B ..... 0.121 Ω
A1SC03B ..... 0.021 Ω A1SC60B ..... 0.182 Ω
A1SC07B ..... 0.036 Ω A1SC05NB .... 0.037 Ω
A1SC12B ..... 0.055 Ω A1SC07NB .... 0.045 Ω

(d) Voltage at the receiving end

(5.1 (V) - VK - VZ - VC) ≥ 4.75 (V)

(4) Examples



(a) Calculation of voltage drop of the main base unit

$VK = 0.007 \times \{0.4 + 0.05 \times (8 + 7 + 6 + 5 + 4 + 3 + 2 + 1) + (0.27 \times 8) \times 8\} = 0.13636$

(b) Calculation of voltage drop of the extension base unit

$VZ = 0.006 \times 0.27 \times (8 + 7 + 6 + 5 + 4 + 3 + 2 + 1) = 0.05832$

(c) Calculation of voltage drop in the extension cable

$VC = 0.036 \times (0.27 \times 8) = 0.07776$

(d) Voltage at the receiving end

$5.1 - 0.13636 - 0.05832 - 0.07776 = 4.82756(V)$

Since the voltage at the receiving end is more than 4.75V, the system can be put into operation.

(5) Minimizing the voltage drop

Try the following measures to minimize the voltage drop:

(a) Change the positions of modules.

Install the modules of the main base unit from slot 0 in descending order of current consumption. Install modules with small current consumption in the extension base units.

(b) Connect the base units in series.

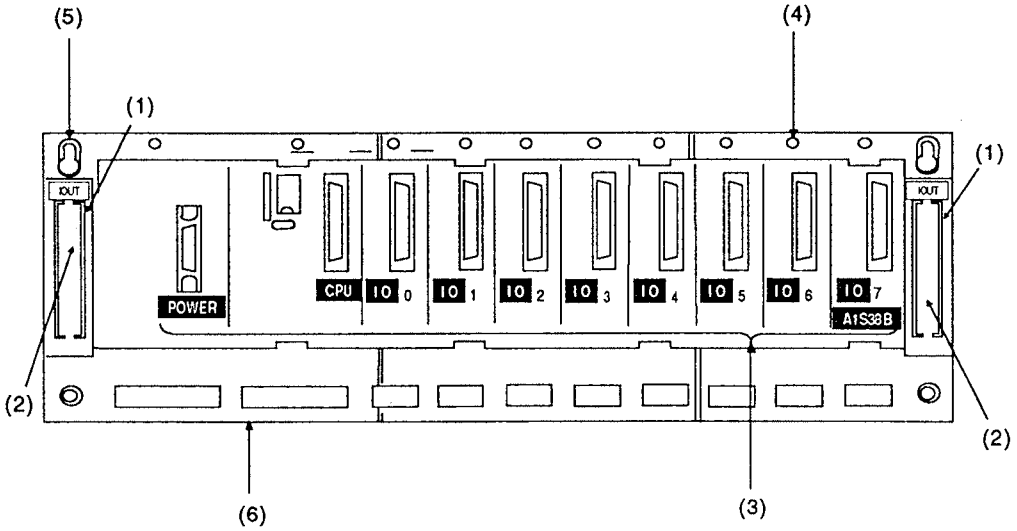
By connecting the base units in series (connecting an extension cable to the left side of a main base unit, see Section 8.4.2), the voltage drop of the main base unit can be minimized. But when a long extension cable is used for this connection, the extension cable may cause a larger voltage drop than that of the main base unit. In such a case, calculate the voltage drop as described in (3).

(c) Use a short extension cable.

The shorter the extension cable, the lower its and the smaller its voltage drop. Use extension cables that are as short as possible.

6.2 Nomenclature and settings

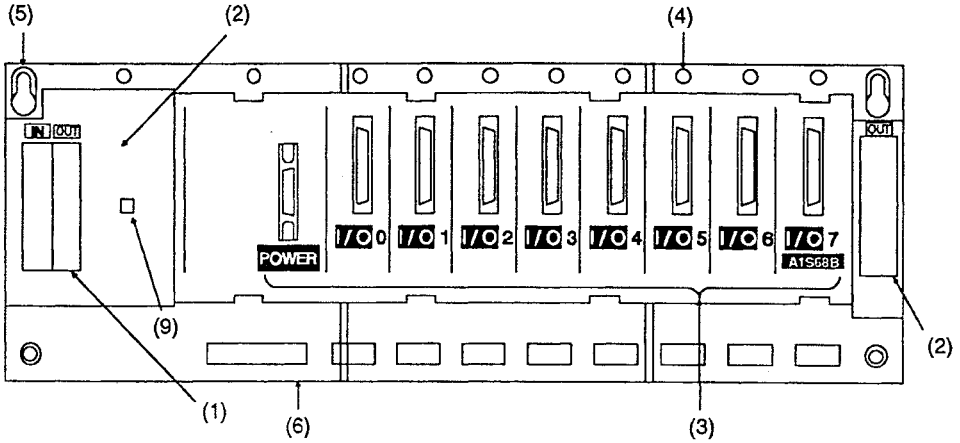
(1) Main base unit (A1S32B, A1S35B, A1S38B)



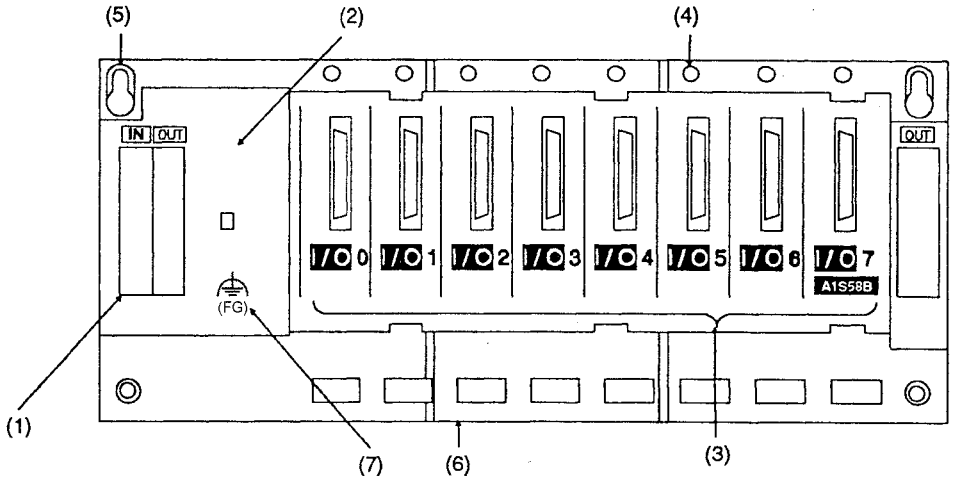
No.	Name	Application
(1)	Connector for extension cable	Connector for sending and receiving signals to and from the extension base unit.
(2)	Base cover	Cover to protect the connector for the extension cable. When connecting an extension cable, remove the appropriate base cover located below the word "OUT" with nippers or a similar tool.
(3)	Module connectors	Connectors where the power supply module, CPU module, I/O module, special-function modules are loaded. Fit the connector cover or blank cover (A1SG60) to vacant connectors, in order to protect the module from dust.
(4)	Module fixing screw	Screw to fix a module to the base unit. Screw size: M4 x 12 screw
(5)	Guide hole for base installation	Slot for mounting this base unit to the panel of control box, etc. (For M5 screw)
(6)	DIN rail hook	Hook to install on a DIN rail. A1S32B, A1S33B 1 A1S35B, A1S38B 2

(2) Main base units (A1S52B(S1), A1S55B(S1), A1S58B(S1), A1S65B(S1), A1S68B(S1))

A1S65B(S1), A1S68B(S1)



A1S52B(S1), A1S55B(S1), A1S58B(S1)



No.	Name	Purpose
(1)	Extension cable connector	Used to connect an extension cable to a main base unit. Remove the connector cover attached to the unit and connect the extension cable.
(2)	Base cover	Extension cable connector protective cover.
(3)	Module connector	Used to load a power supply module, I/O or special function module. Put a supplied cover or blank cover (A1SG60) on any unused connector to protect it from dust.
(4)	Module fixing screw	Used to secure a module to the base unit. Screw size: M4 x 12
(5)	Base mounting hole	Used to mount the base unit to a control panel. (for M5 screw)
(6)	DIN rail hook	Used to install on a DIN rail. A1S52B(S1), A1S55B(S1): One hook A1S65B(S1), A1S68B(S1), A1S58B(S1): Two hooks
(7)	FG terminal	Grounding terminal connected to the shield pattern on the PC board.

6.3 Installing on a DIN rail

Both main base units and extension base units are equipped with hooks for mounting on a DIN rail.

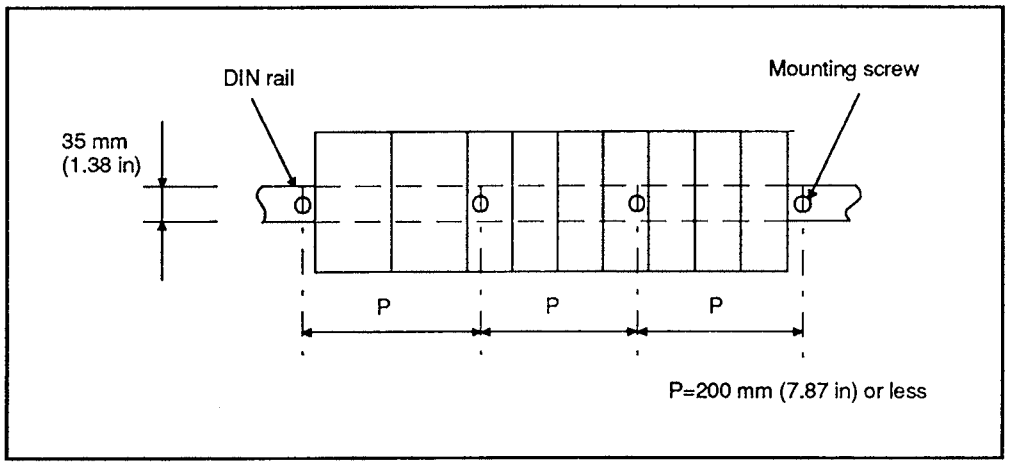
The method for mounting them on a DIN rail is explained below:

(1) Applicable DIN rails (JIS-C2B12)

TH35-7.5 Fe
TH35-7.5 Al
TH35-15 Fe

(2) Mounting screw interval

When a TH35-7.5 Fe or TH35-7.5 Al rail is mounted, fix it with screws spaced no more than 200 mm apart.



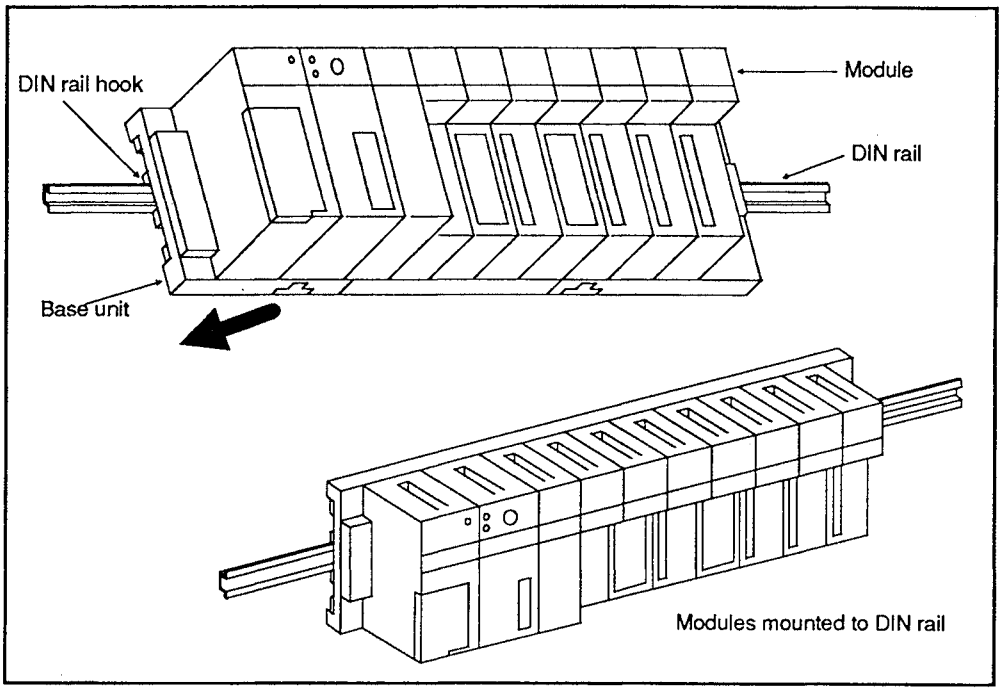
(3) Mounting/removing on/from a DIN rail

(a) Mounting procedure

Mount a base unit on a DIN rail as follows:

1) Engage the hook of the base unit with the rail from above the rail.

2) Push the base unit onto the rail and fix it in position.

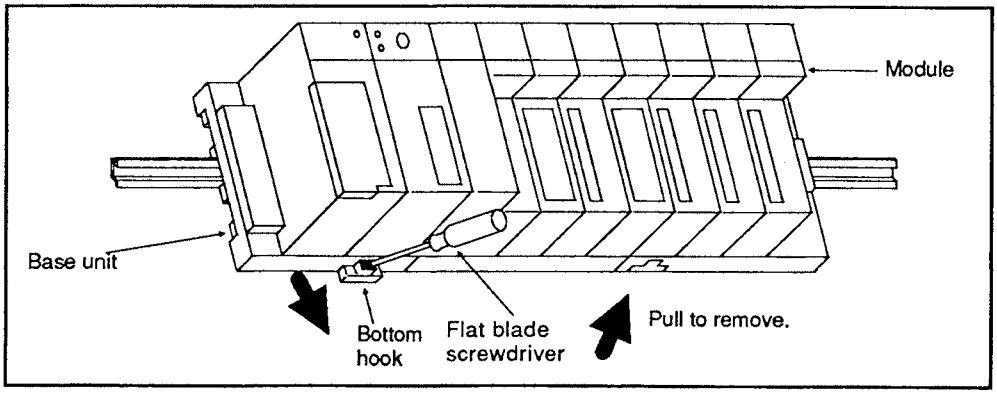


(b) Removing procedure

Remove a base unit from the DIN rail as follows:

1) Pull down the bottom hook of the base unit using a flat blade screwdriver.

2) Pull the base unit away from the rail while pulling down the bottom hook.



7. MEMORY ICs AND BATTERY

7.1 Memory ICs

This section describes the specifications, handling instructions and installation of the memory ICs used in the AnSCPU.

7.1.1 Specifications

Table 7.1 shows the specifications of the ROMs.

Table 7.1 Memory Specifications

Item \ Model	A1SCPU(S1), A1SCPUC24-R2			A2SCPU(S1)	
	A1SMCA-2KE	A1SMCA-8KE	A1SMCA-8KP	A2SMCA-14KE	A2SMCA-14KP
Memory specifications	EEP-ROM		EP-ROM	EEP-ROM	EP-ROM
Memory capacity (bytes)	8k bytes (max. 2k steps)	32k bytes (max. 8k steps)	32k bytes (max. 8k steps)	64k bytes (max. 14k steps)	
Outside dimension mm (in)	15 x 68.6 x 42 (0.59 x 2.7 x 1.65)				
Weight (kg) (lb)	0.03 (0.06)				

7.1.2 Handling instructions

(1) Handle memory cassettes and pin connectors with care since their plastic body cannot resist strong impacts.

(2) Do not remove the printed circuit board from its enclosure.

(3) Take care not to let chips of wires and other foreign material enter the memory cassette.

(4) When installing a memory cassette in an AnSCPU module, push it in so that the connectors engage securely.

(5) Never place a memory cassette on metal, which may allow current flow, or on an object which is charged with static electricity, such as wood, plastic, vinyl, fiber, cable or paper.

(6) Do not touch or bend the leads of memory chips.

(7) Do not touch the connectors of a memory cassette. This could cause insecure contact.

IMPORTANT

(1) Always turn OFF the power to an AnSCPU module when installing or removing a memory cassette. If a memory cassette is installed or removed with the power to the CPU ON, the data contents of the memory may be destroyed while the AnSCPU power is live.

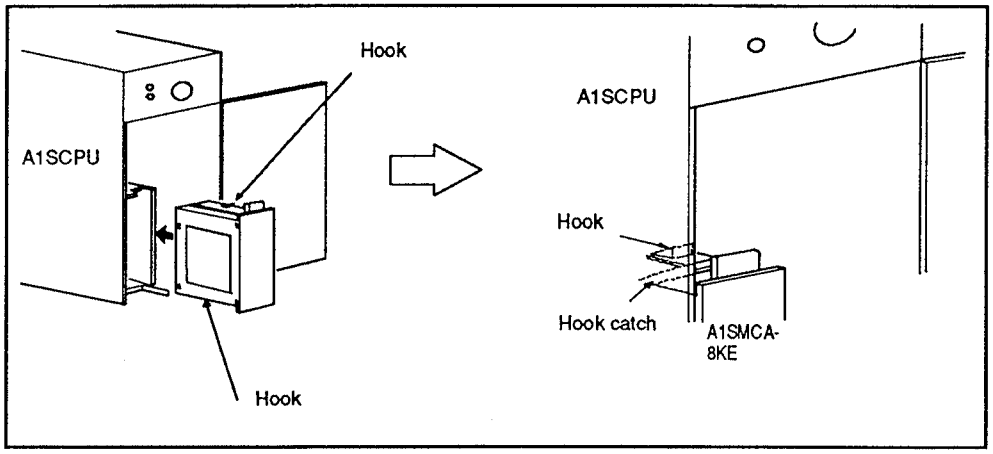
(2) If the power is turned ON when the memory cassete is installed, the program in the built-in RAM memory of the AnSCPU is overwritten by that of the memory cassette.
If the program in the RAM memory needs to be saved, install the memory cassette after making a backup of the program by using a programming device.

7.1.3 Installing and removing a memory cassette

The procedure used to install the memory cassette is the same for all AnSCPU modules.

In the description of the installation and removal procedure given below, the A1SCPU is used as an example.

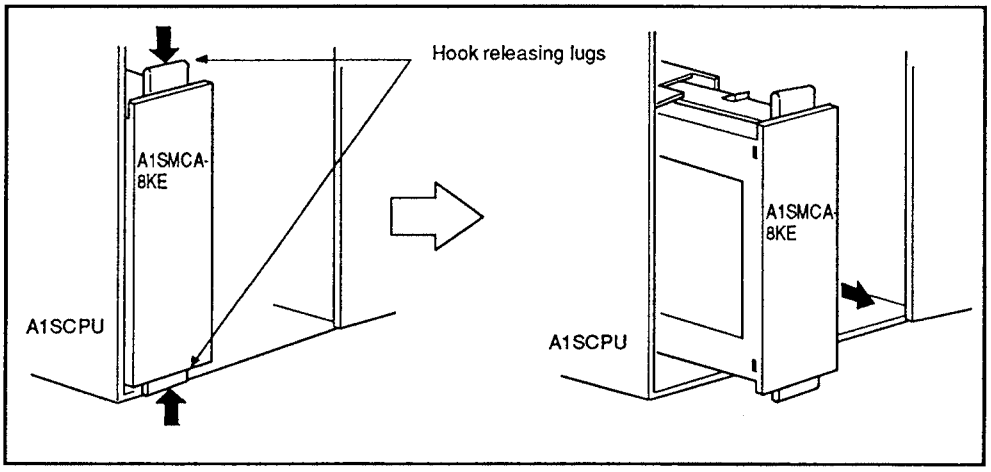
(1) Installing a memory cassette



(a) Hold the memory cassette vertically so that its model name is right side up and its connector faces the A1SCPU module. Insert the memory cassette all the way in the A1SCPU module so that the hooks of the memory cassette are completely engaged (they will click).

(b) Make sure the hooks are completely engaged. (If the memory cassette is not inserted all the way, the front lid of the AnSCPU cannot be closed.)

(2) Removing a memory cassette



(a) Pull out the memory cassette while pushing the hook releasing lugs that are provided at the top and the bottom of the memory cassette.

7.1.4 Writing a sequence program to a memory cassette

A sequence program can be written to, or erased from, an A1SMCA-8KP or A2SMCA-14KP using a ROM writer/eraser.

If a memory cassette is installed in the ROM socket of an A6GPP or A6WU, use either of the following memory write adapters.

CPU Model	Memory Cassette Model	Memory Write Adapter
A1SCPU, A1SCPUC24-R2	A1SMCA-8KP	A6WA-28P
A2SCPU	A2SMCA-14KP	A2SWA-28P

POINT

- The A2SWA-28P cannot be used with the A1SMCA-8KP, and the A6WA-28P is incompatible with the A2SMCA-14KP.

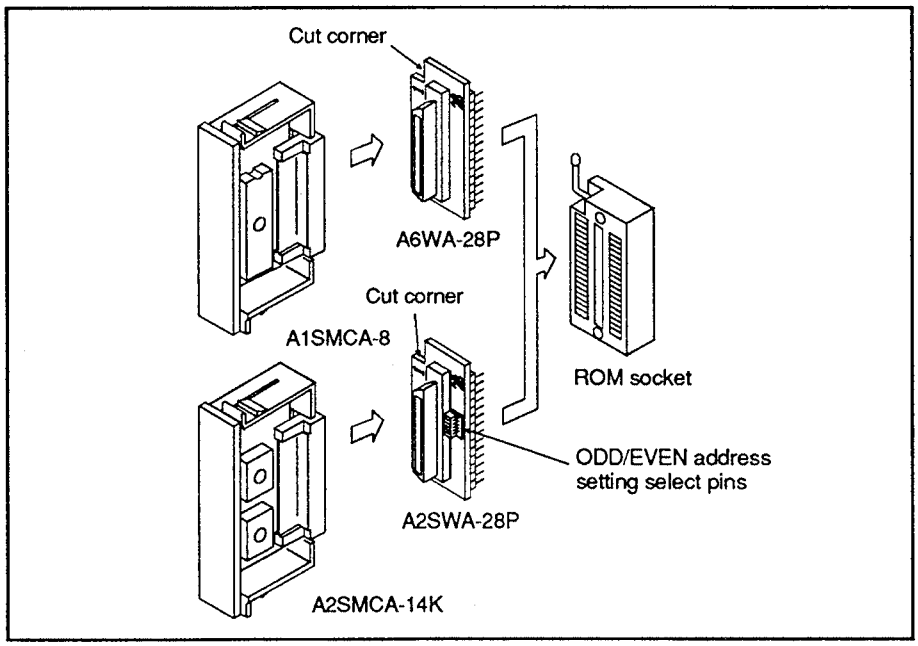
Use a memory write adapter as follows:

(1) A sequence program must be written separately to the even- and odd-numbered addresses of the A2SMCA-14KP by setting the ODD/EVEN address setting select pins of the A2SWA-28P.

Set the address type using the ODD (odd)/EVEN (even) address setting select pins of the A2SWA-28P.

(2) Mount a memory cassette to the memory write adapter. Couple the connectors correctly.

(3) Mount the memory write adapter coupled with the memory cassette to the ROM socket of an A6GPP or A6WU in the correct orientation. The pin on the cut corner side of the memory write adapter is pin No.1.



7.1.5 A2SMCA-14KE Memory Protect Setting

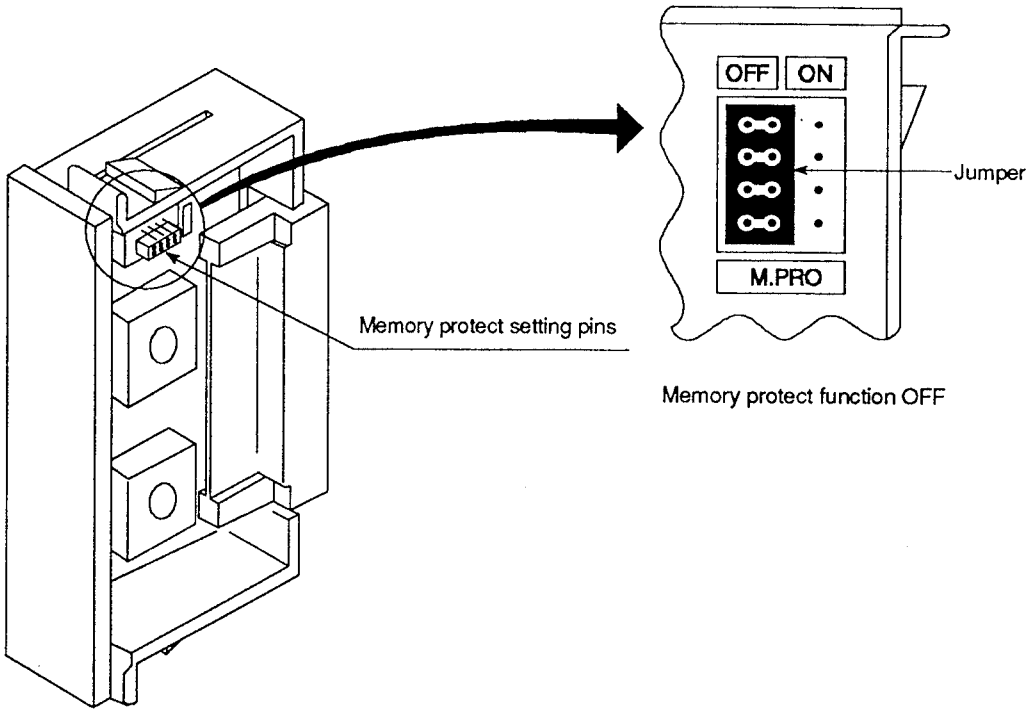
When an A2SMCA-14KE is mounted to an A2SCPU(S1), the memory protect function can be set on the A2SMCA-14KE to protect data in the EEP-ROM memory from being overwritten due to incorrect operation of a peripheral device.

By setting the memory protect setting pins to ON, the 64k byte user memory area can be batch-protected.

To modify data in the ROM memory, turn OFF the memory protect function.

The memory protect setting pins are set to OFF before shipment from the factory.

For memory area assignment, refer to Section 4.1.7.



7.2 Battery

This section describes the specifications, handling instructions, and installation procedure for the battery.

7.2.1 Specifications

Table 7.2 shows specifications of the battery used to retain data stored in memory when a power interruption occurs.

Table 7.2 Battery Specifications

Item \ Model	A6BAT
Classiffication	Thionyl chloride lithium battery
Normal voltage	3.6 VDC
Guaranteed life	5 years
Application	For IC-RAM memory backup and power interruption compensation function
External dimensions mm(in)	ϕ16(0.63)×30(1.18)

REMARK

For the battery directive in EU member states, refer to Appendix 6.

7.2.2 Handling instructions

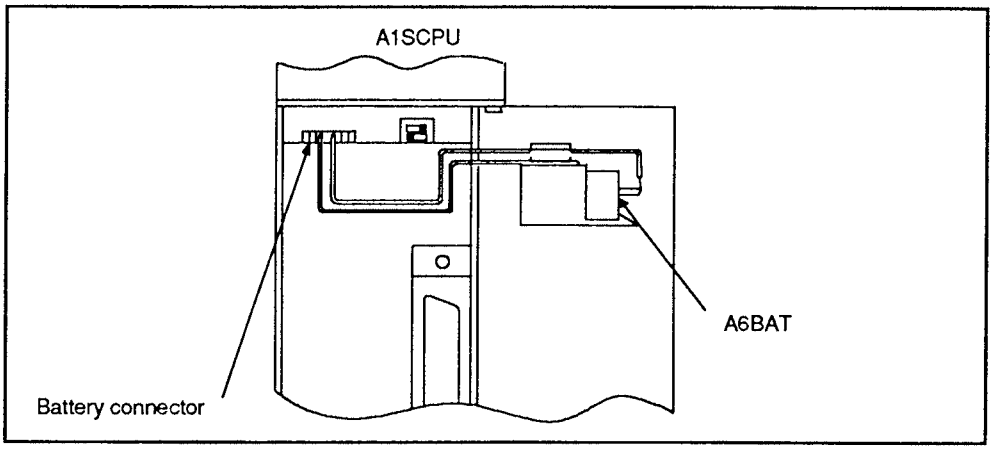
(1) Do not short circuit.
(2) Do not disassemble.
(3) Do not expose to naked flame.
(4) Do not heat.
(5) Do not solder the battery terminals.

7.2.3 Installation

The battery lead connector is disconnected from the battery connector on the AnSCPU board to prevent discharge during transportation and storage.

Before starting the AnSCPU, plug the battery connector into the battery connector on the AnSCPU board.

- To use a sequence program stored in the user program area in the AnSCPU if a power interruption occurs.
- To retain the data if a power interruption occurs.



8. LOADING AND INSTALLATION

This section describes the procedure for loading and installation and gives relevant precautions to ensure that the system performs with high reliability and that its functions are used to best effect.

8.1 Safety Consideration

When the power to the system is turned ON or OFF, the process output may not perform normally at times due to the difference between the delay time and the rise time of the power supply of the PC CPU main module and the external power supply (especially DC). Also, if there is an error in the external power supply, the output process may malfunction.

For example, if the power supply to the PC is switched on after switching on the external power supply for the sequence program operation at a DC output module, the DC output module may temporarily output erroneous signals when the power to the PC is switched on. A circuit that allows the power to the PC to be switched on first must therefore be provided.

In addition, if there is an abnormality in the external power supply or trouble in the PC, this could cause malfunctions.

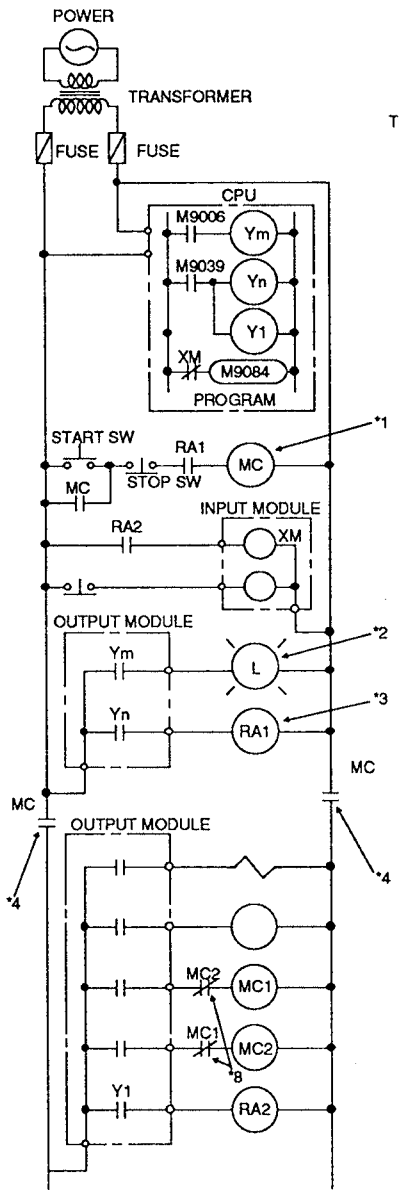
To (a) prevent erroneous operation of the entire system, and (b) ensure safety, prepare circuits (such as an emergency stop circuit, protection circuit, and interlock circuit) that prevent machine damage and/or accidents due to erroneous operation of peripheral devices. An example system design circuit based on this concept is shown on the following page.

POINT

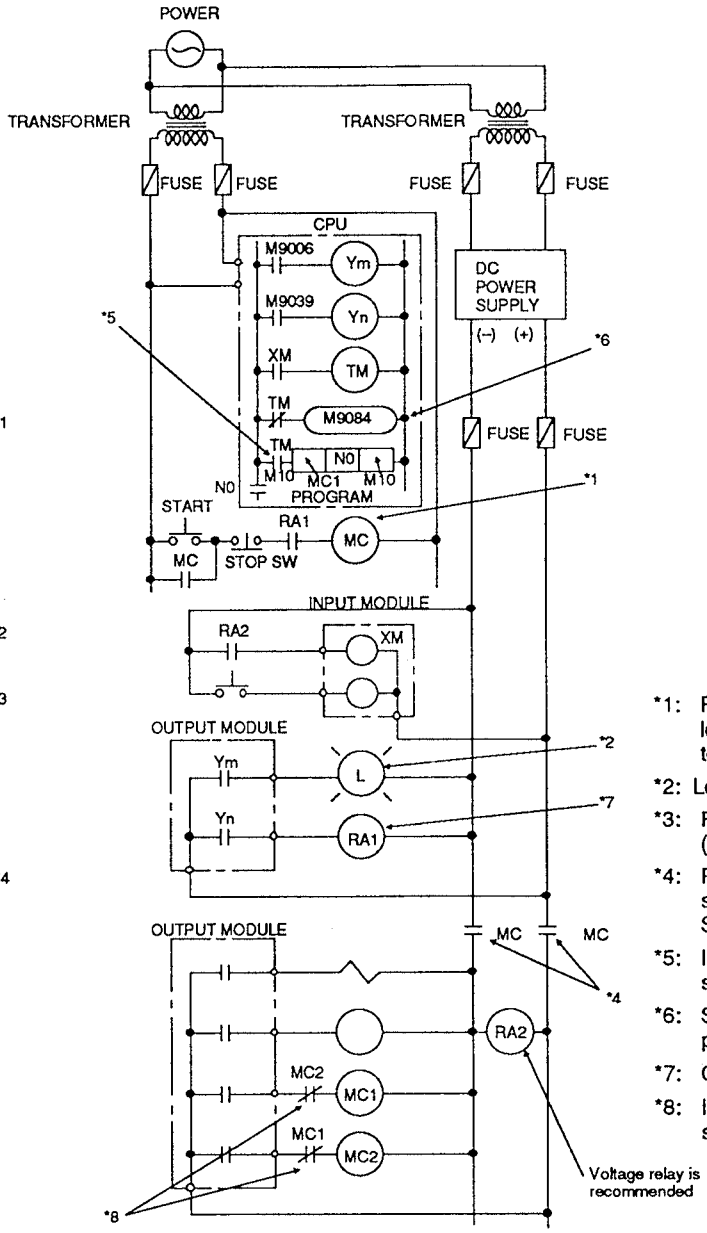
Some types of A1S series output module detect a blown fuse error as soon as the external power supply is turned OFF.
In the example circuit illustrated on the next page, since the start-up of the AnSCPU takes place earlier than the rise of the external power supply to the output module, a blown fuse error is detected.
To solve this problem, the system is designed to keep the M9084 ON until the external power supply rises so as not to check for blown fuses.
(When M9084 is ON, the I/O module comparison and battery checks are not performed.)

(1) System design circuit example

ALL AC



Mixed AC and DC



*1: RUN/STOP circuit interlocked with RA1 (run monitor relay)

*2: Low battery alarm

*3: RA1 switched ON by M9039 (run monitor relay)

*4: Power to output equipment switched OFF when the STOP signal is given.

*5: Input switched when power supply established.

*6: Set time for DC power supply to be established.

*7: ON when run by M9039

*8: Interlock circuits as necessary.

The power-ON procedure is as follows:

For AC

1) Set the CPU to RUN.
2) Switch ON the power.
3) Turn ON the start switch.
4) When the magnetic contactor (MC) comes in, the output equipment is powered and may be driven by the program.

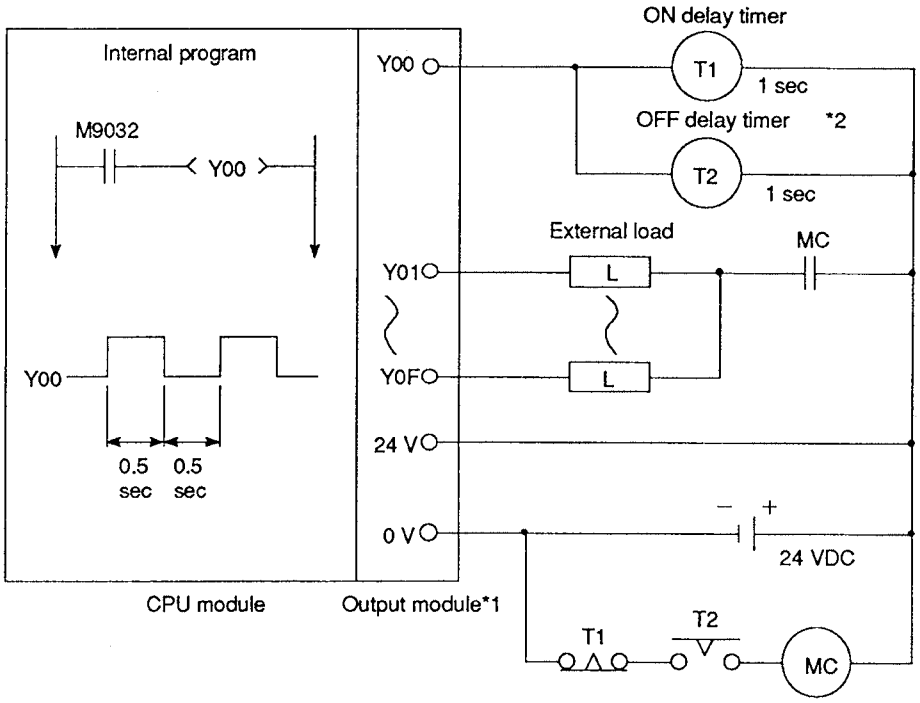
For AC/DC

1) Set the CPU to RUN.
2) Switch ON the power.
3) Turn ON the start switch.
4) When DC power is established, RA2 comes ON.
5) Timer (TM) times out after the DC power reaches 100%.

   (The TM set value should be the period of time from when RA2 comes ON to the establishment of 100% DC voltage. Set this value to approximately 0.5 seconds.)
6) When the magnetic contactor (MC) comes in, the output equipment is powered and may be driven by the program. (If a voltage relay is used at RA2, no timer (TM) is required in the program.)

(2) Fail-safe measures against PC failures

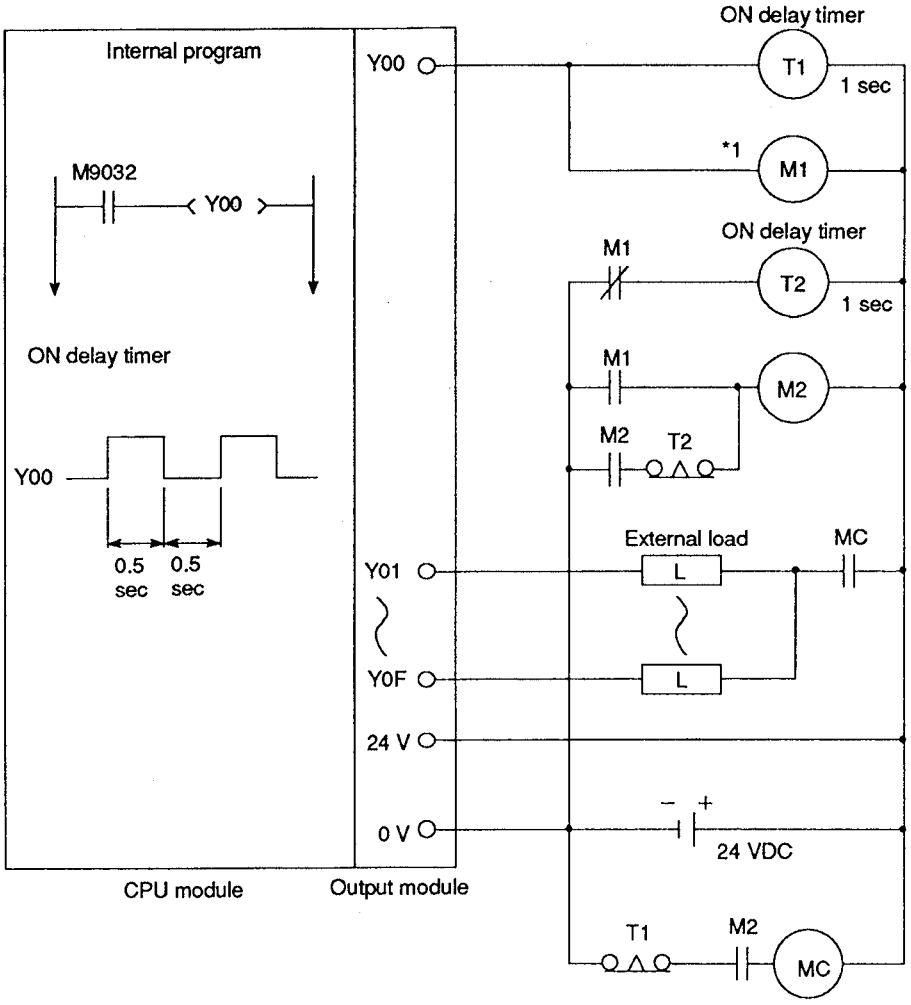
Problems with the CPU or memory can be detected by the self diagnosis function. However, problems with the I/O control area may not be detected by the CPU.
If such a problem arises, all I/O points turn ON or OFF depending on the nature of the problem, and it may not be possible to maintain normal operating conditions and operating safety.
Although Mitsubishi PCs are manufactured under strict quality control, they may fail or operate abnormally due to unspecifiable reasons. To prevent the abnormal operation of the whole system, machine breakdown, and accidents, build a fail-safe circuit outside the PC.
The following is an example of a fail-safe circuit.



*1: Y00 repeats turning ON and then OFF at 0.5 second intervals. Use a no-contact output module (transistor in the example shown above).

*2: If an OFF delay timer (especially a miniature timer) is not available, use ON delay timers to make a fail-safe circuit as shown on the next page.

A fail-safe circuit built with ON delay timers



*1: Use a solid-state relay for the M1 relay.

8.2 Installation Environment

Never install the AnSCPU system in the following environments:

(1) Locations where the ambient temperature is outside the range of 0 to 55°C.

(2) Locations where the 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 and/or combustible gasses.

(5) Locations where there is a high level of conductive powder (such as dust and iron filings, oil mist, salt, and organic solvents).

(6) Locations exposed to the direct rays of the sun.

(7) Locations where strong power and magnetic fields are generated.

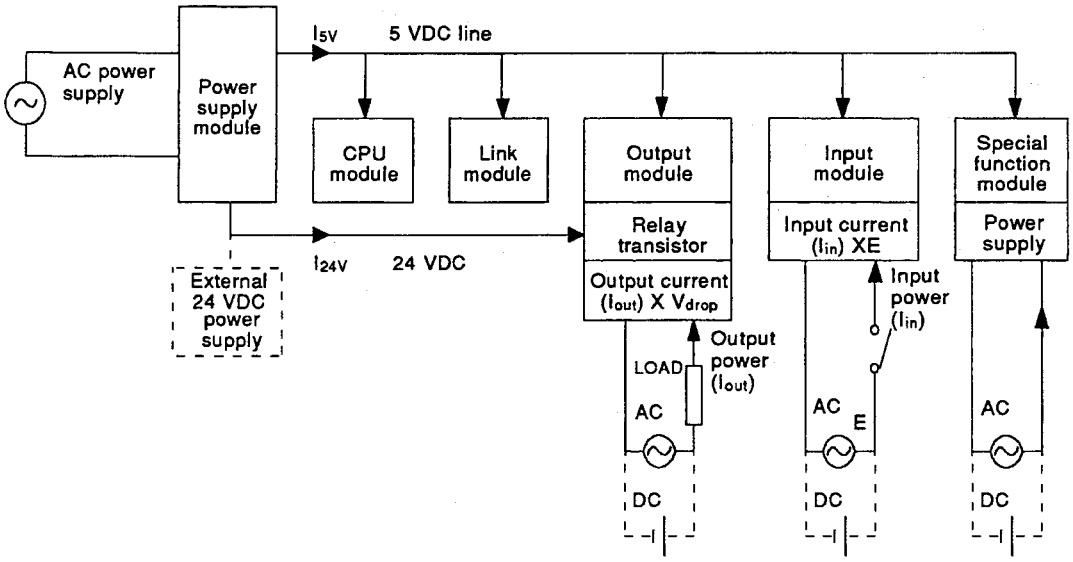
(8) Locations where vibration and shock are directly transmitted to the main module.

8.3 Calculation of Heat Generated by the Programmable Controller System

The operating ambient temperature in the panel where the PLC is stored must be kept 55°C or less. For heat dissipation design of the panel, it is necessary to know the average power consumption (heat generation) of the devices and machinery stored inside. In this section, a method to obtain the average power consumption of the PLC system is explained.
Calculate the temperature rise inside the panel from the power consumption.

Average power consumption

The power consuming parts of the PLC may be roughly classified into the following blocks:



(1) Power consumption by power supply module
The power conversion efficiency of the power supply module is about 70%, and 30% is consumed as heat generated, thus, 3/7 of the output power is the power consumption. Therefore, the calculation formula is:

$$Wpw = \frac{3}{7}\left\{(I_{5V} \times 5)+(I_{15V} \times 15)+(I_{24V} \times 24)\right\}(W)$$

I_{5V} : Current consumption of 5VDC logic circuit of each module

I_{15V} : Current consumption of 15VDC external power supply part of special function module

I_{24V} : Average current consumption of 24VDC power supply for output module's internal consumption
(Current consumption equivalent to the points simultaneously ON)
..... Not applicable to a system where 24VDC is supplied externally and a power module which does not have a 24VDC output is used.

(2) Total power consumption of each module at 5VDC logic part
Power of the 5VDC output circuit of the power supply module is the power consumption of each module.

$$W_{5V} = I_{5V} \times 5 \ (W)$$

(3) Total 24VDC average power consumption of the output module (power consumption equivalent to the points simultaneously ON)
Average power of the 24VDC output circuit of the power supply module is the total power consumption of each module.

$$W_{24V} = I_{24V} \times 24 \ (W)$$

(4) Total 24VDC average power consumption of the output module
(power consumption equivalent to the points simultaneously ON)

W_{OUT} = I_{OUT} × Vdrop × Output points × Simultaneous ON ratio (W)

I_{OUT} :Output current (current actually used) (A)
Vdrop :Voltage dropped across each output module (V)

(5) Average power consumption of the input modules at the input part (power consumption equivalent to the points simultaneously ON)

W_{IN} = I_{IN} × E × Input points × Simultaneous ON (W)

I_{IN} :Input current (effective value for AC) (A)
E :Input voltage (actual operating voltage) (V)

(6) Power consumption of the external power supply part of the special function module is:

$W_S = I_{+15V} \times 15 + I_{-15V} \times 15 + I_{24V} \times 24$ (W)

The total of the power consumption values obtained for each block is power consumption of the entire PLC system.

$W = W_{PW} + W_{5V} + W_{24V} + W_{OUT} + W_{IN} + W_S$ (W)

Calculate the amount of heat generation and temperature increase inside the panel from the total power consumption (W).

Simplified calculation formula to obtain temperature increase inside panel is shown next:

$$T = \frac{W}{UA} [°C]$$

W : Power consumption of the PLC system as a whole (the value obtained above)

A : Inside surface area of the panel [m^2]

U : When the temperature inside panel is kept constant by a fan, etc. 6
When the air inside panel is not circulated 4

POINT

If the temperature inside the panel exceeds the specified range, it is recommended to install a heat exchanger to the panel to lower the inside temperature.
If an ordinary ventilation fan is used, it sucks dust together with the outside air and it may affect the performance of the PLC.

8.4 Module Mounting

This section gives the mounting instructions for the main base unit and extension base units.

8.4.1 Mounting instructions

The instructions for mounting the PC to a panel, etc. are presented below:

(1) To improve ventilation and facilitate the replacement of the module, provide 30 mm (1.18 in.) or more of clearance around the PC.

However, when an extension base unit of one of models A52B, A55B, A58B, A62B, A65B, and A68B is used, allow a clearance of 80 mm (3.15 in.) or more between the top face of the module and the surface of a structure or component.

(2) Do not mount the base unit vertically or horizontally since this will obstruct ventilation.

(3) Ensure that the base unit mounting surface is uniform to prevent strain. If excessive force is applied to the printed circuit boards, this will result in incorrect operation. Therefore, mount the base unit on a flat surface.

(4) Avoid mounting the base unit close to vibration sources, such as large magnetic contactors and no-fuse breakers, install the base unit in another panel or distance the base unit from the vibration source.

(5) Provide a wiring duct as necessary.

However, if the dimensions from the top and bottom of the PC are less than those shown in Fig. 8.1, note the following points:

(a) When the duct is located above the PC, the height of the duct should be 50 mm (1.97 in.) or less to allow for sufficient ventilation.

Between the duct and the top of the PC, provide a sufficient distance to allow the cable to be removed by opening the cable connector fixing lever.

If the lever at the top of the module cannot be opened, it will not be possible to replace the module.

(b) If a duct is built under the PC, provide a clearance between the bottom surface of the PC and the surface of the duct so that the input power cable (100/200 VAC) of the power supply module and the I/O cables and the cable for 12/24 VDC of I/O modules are not affected or bent.

(6) If an equipment which generates noise or heat is positioned in front of the PC (i.e, mounted on the back side of a panel door), allow a clearance of 100 mm (3.94 in.) or more between the PC and the equipment.

Also allow a clearance of 50 mm (1.97 in.) or more between the right/left side of a base unit and this equipment.

(7) When installing the base unit to DIN rail in an environment with large vibration, use a vibration-proofing bracket (A1S-PLT-D). Mounting the vibration-proofing bracket (A1S-PLT-D) enhances the resistance to vibration.
Depending on the environment to set up the base unit, it is also recommended to fix the base unit to the control panel directly.

8.4.2 Installation

This section explains how to mount main and extension base units.

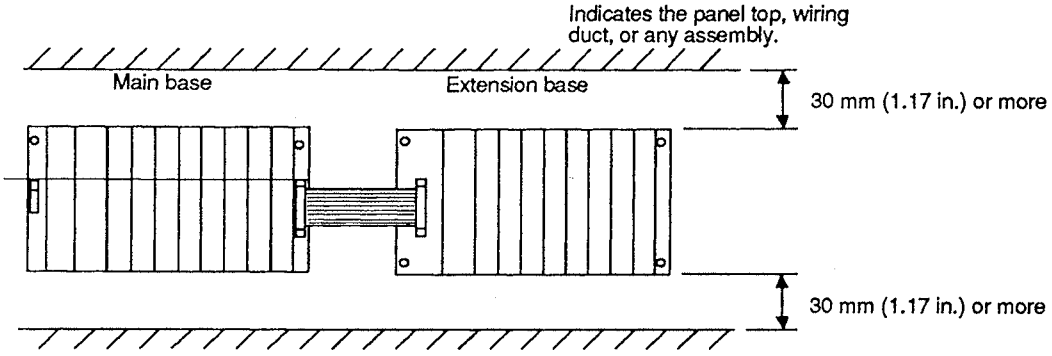


Fig. 8.1 Parallel Mounting

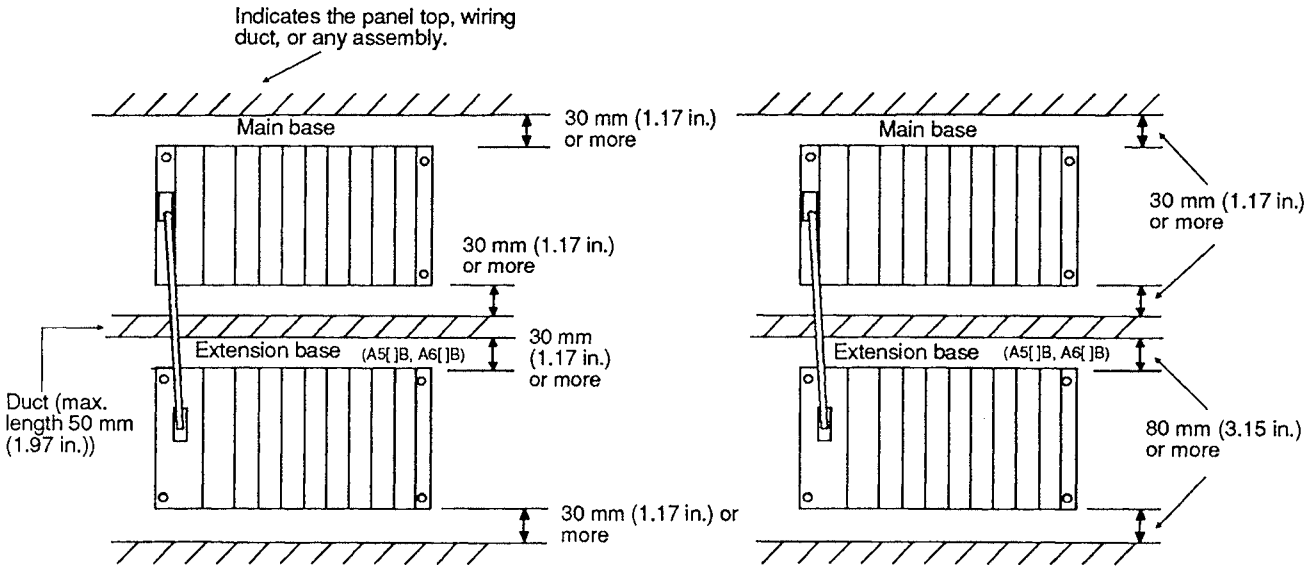


Fig. 8.2 Serial Mounting

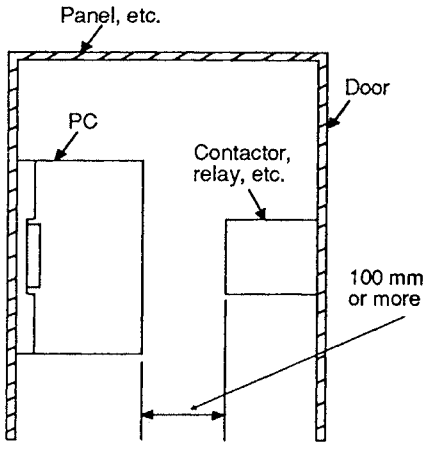


Fig. 8.3 Minimum Front Clearance with Panel Door

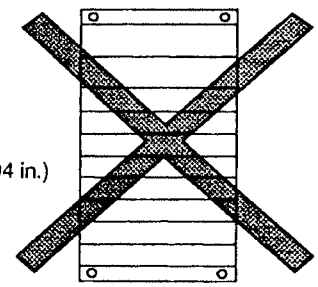


Fig. 8.4 Vertical Mounting (Not allowed)

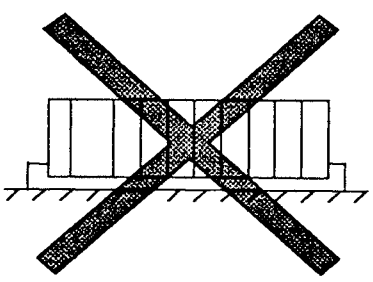


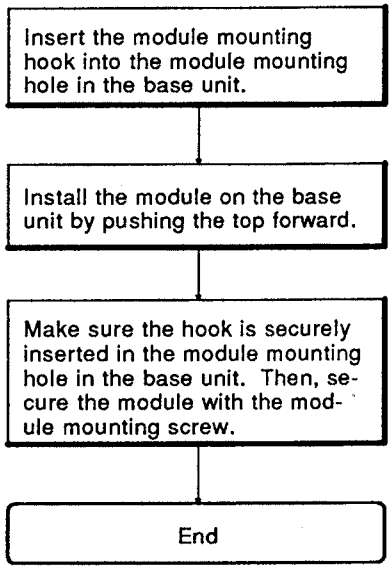
Fig. 8.5 Horizontal Mounting (Not allowed)

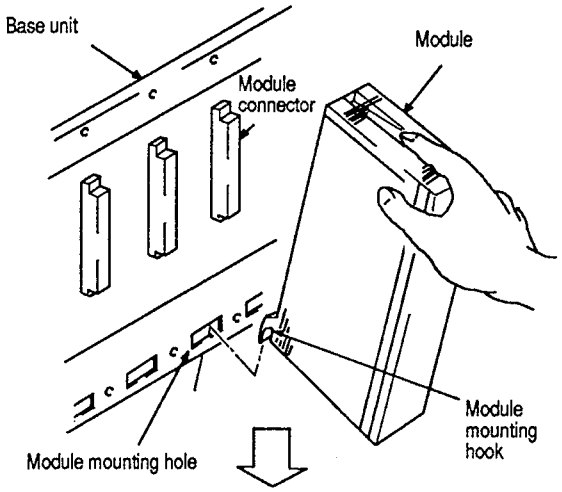
8.5 Installation and Removal of Module

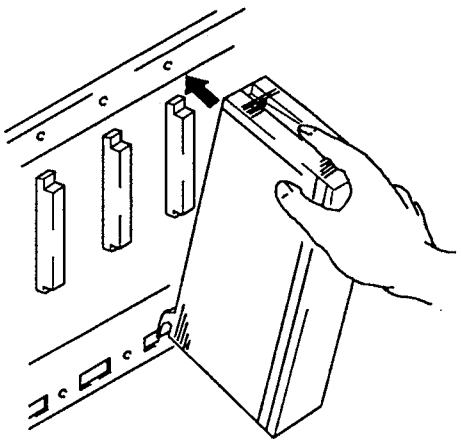
This section explains the mounting and removal of I/O module and special-function module, etc., to and from the base unit.

(1) Module mounting

The module mounting procedure is as follows.



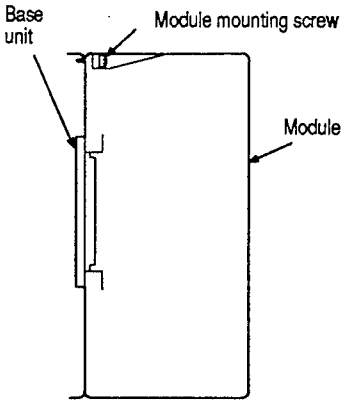




POINTS

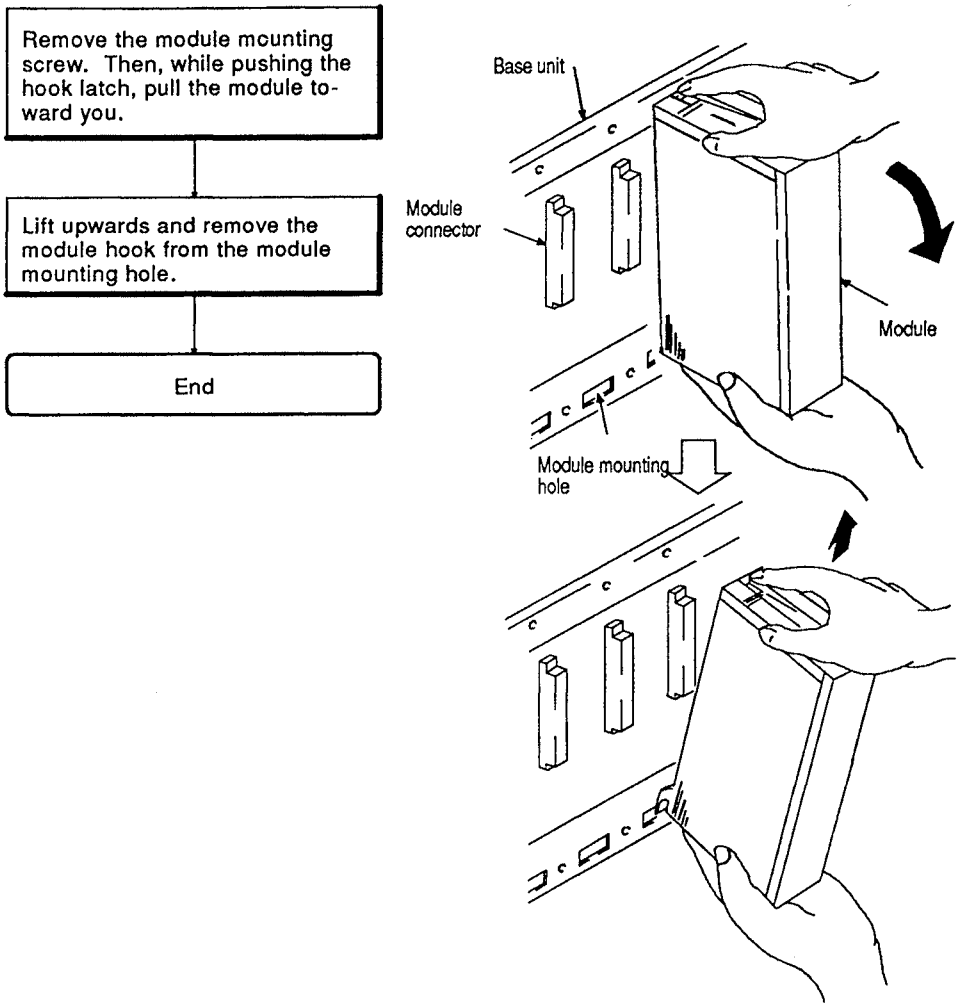
(1) When securing the module, be sure to insert the module mounting hook into the module mounting hole. If the module is forcibly secured without insertion, the unit's connector or the unit itself may be damaged.

(2) Always turn the power supply OFF before mounting or removing any module.



(2) Module removal

The module removal procedure is as follows.



POINTS

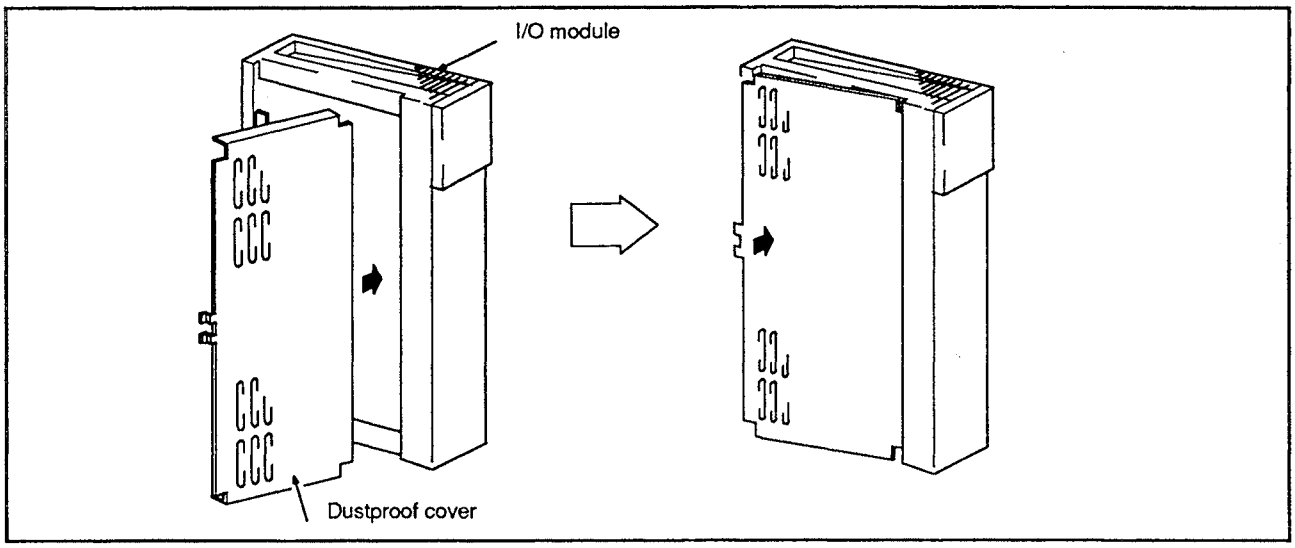
(1) When removing the module, be sure to remove the module mounting screw first and then remove the module mounting hook from the module mounting hole. If the module is forcibly removed, the screw or module mounting hook will be damaged.

(2) Always turn the power supply OFF before mounting or removal.

8.6 Installing and Removing the Dustproof Cover

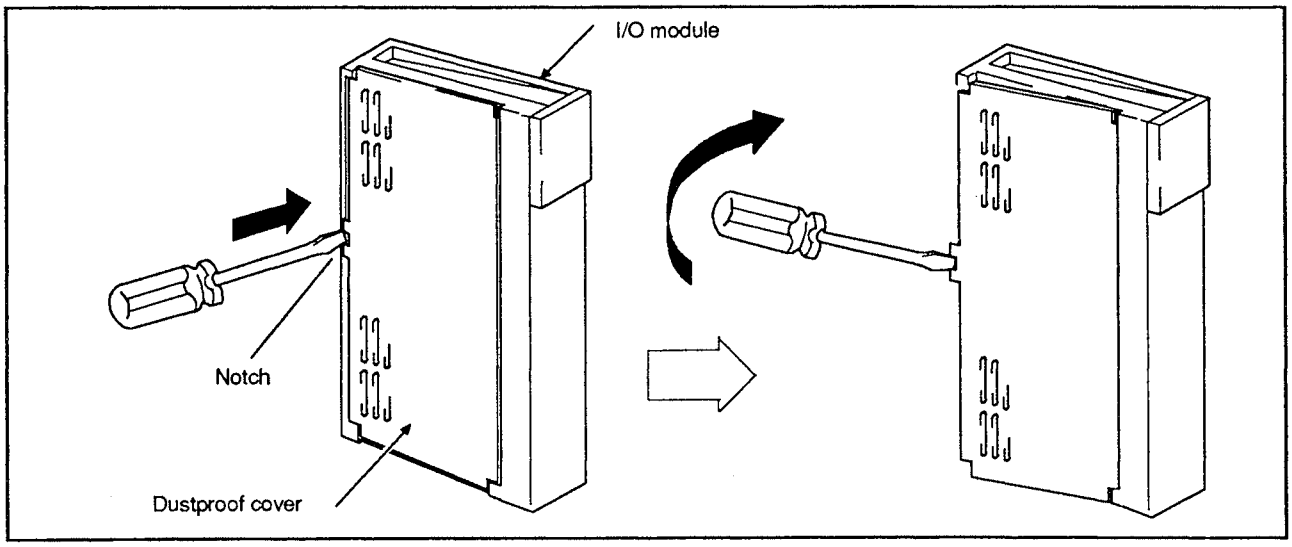
When an A1S52B(S1), A1S55B(S1), or A1S58B(S1) is used, it is necessary to mount the dustproof cover, which is supplied with the base, to the I/O module loaded at the left end to prevent foreign matter from entering the I/O module. If the dustproof cover is not mounted, foreign matter will enter the I/O module, resulting in malfunctions. The following explains the installation and removal of the dustproof cover.

(1) Installation



To fit the dustproof cover to the I/O module, first insert it at the terminal side and then press it against the I/O module as shown in the figure.

(2) Removal



Fit the tip of a flat blade screwdriver into the notch on the left side of the dustproof cover. While keeping the screwdriver tip in the notch, gently move the screwdriver to the left (as shown above) until the cover snaps open.

8.7 Wiring

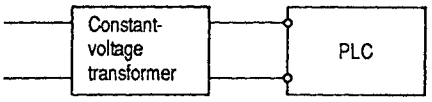
This section gives the wiring instructions for the system.

8.7.1 Wiring instructions

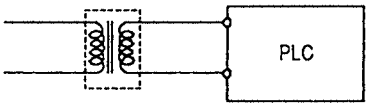
Instructions for wiring the power cable and I/O cables.

(1) Wiring of the power supply

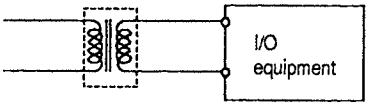
(a) When voltage fluctuations are larger than the specified value, connect a constant-voltage transformer.



(b) Use a power supply which generates minimal noise between wires and between the PLC and ground. If excessive noise is generated, connect an insulating transformer.



Insulating transformer



Insulating transformer

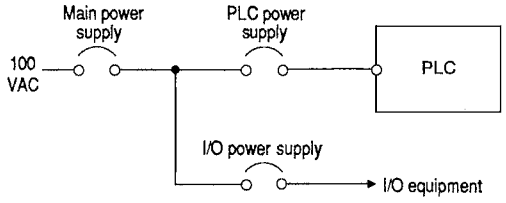
(c) When a power transformer or insulating transformer is employed to reduce the voltage from 200 VAC to 100 VAC, use one with a capacity greater than those indicated in the following table.

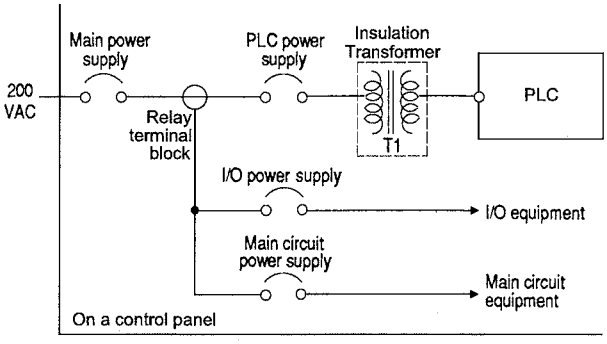
Power Supply Module	Transformer Capacity
A1S61P	110VA x n
A1S62P	110VA x n

"n" stands for the number of power supply modules.

(d) When wiring, separate the PLC power supply from the I/O and power equipment as shown below.

(e) Taking rated current or inrush current into consideration when wiring the power supply, be sure to connect a breaker or an external fuse that have proper blown and detection.
When using a single PLC, a 10A breaker or an external fuse are recommended for wiring protection.

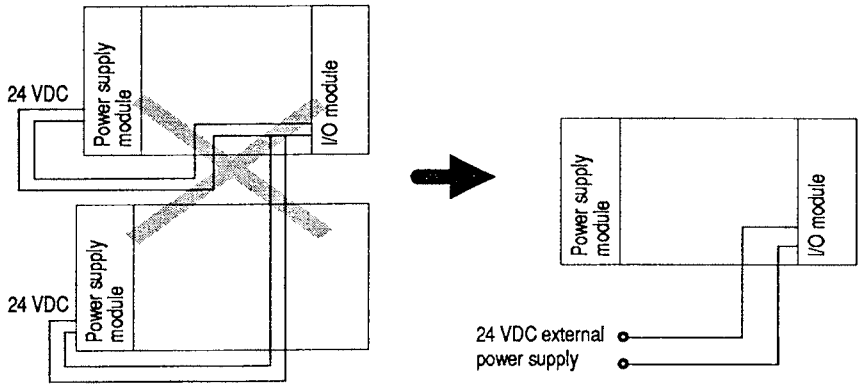




(f) Note on using the 24 VDC output of the A1S62P power supply module.

To protect the power supply modules, do not supply one I/O module with 24 VDC from several power supply modules connected in parallel.

If the 24 VDC output capacity is insufficient for one power supply module, supply 24 VDC from the external 24 VDC power supply as shown below:

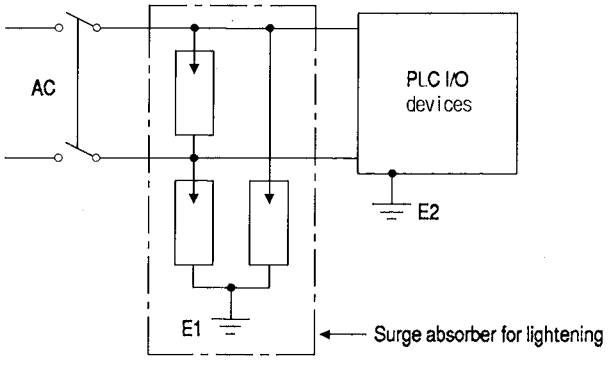


(g) Twist the 100 VAC, 200 VAC, and 24 VDC cables as closely as possible. Connect modules with the shortest possible wire lengths.

(h) To minimize voltage drop, use the thickest (max. 2 mm^2 (14 AWG)) wires possible for the 100VAC, 200 VAC, and 24 VDC cables.

(i) Do not bundle the 100 VAC and 24 VDC cables with main-circuit wires or the I/O signal wires (high-voltage, large-current), or lay these cables and wires close to each other when wiring. If possible, provide a distance of more than 100 mm (3.94 in.) between the cables and wires.

(j) As a lightning-protection measure, connect a surge absorber as shown below.



POINT

(1) Ground the surge absorber (E1) and the PC (E2) separately from each other.

(2) When selecting a surge absorber, make sure that the maximum permitted circuit voltage for the surge absorber will not be exceeded.

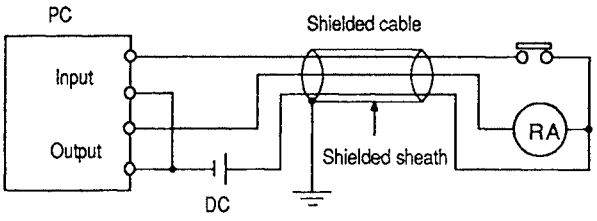
(2) Wiring of I/O equipment

(a) The applicable size of wire for connection to the terminal block connector is 0.75(18) to 1.5 mm^2 (14 AWG). However, it is recommended to use wires of 0.75 mm^2 (18 AWG) for convenience.

(b) Separate the input and output lines.

(c) I/O signal wires must be at least 100 mm (3.94 in.) away from high-voltage and large-current main circuit wires.

(d) If the I/O signal wires cannot be separated from the main circuit wires and power wires, ground at the PC side with batch-shielded cables. Under some conditions, it may be preferable to ground at the other side.



(e) If wiring has been done with piping, ground the piping.

(f) Separate the 24 VDC I/O cables from the 100 VAC and 200 VAC cables.

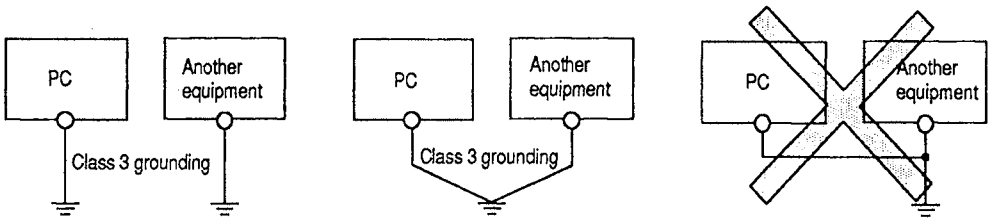
(g) If wiring over 200 m (0.12 mile) or longer distances, problems can be caused by leakage currents due to line capacity. Take corrective action as described in Section 10.4.

(3) Grounding

Grounding must be done in conformance with (a) to (d) below

(a) Ground the PC as independently as possible. Class 3 grounding should be used (grounding resistance 100 Ω or less).

(b) If independent grounding is impossible, use the joint grounding method as shown in the figure below (2).



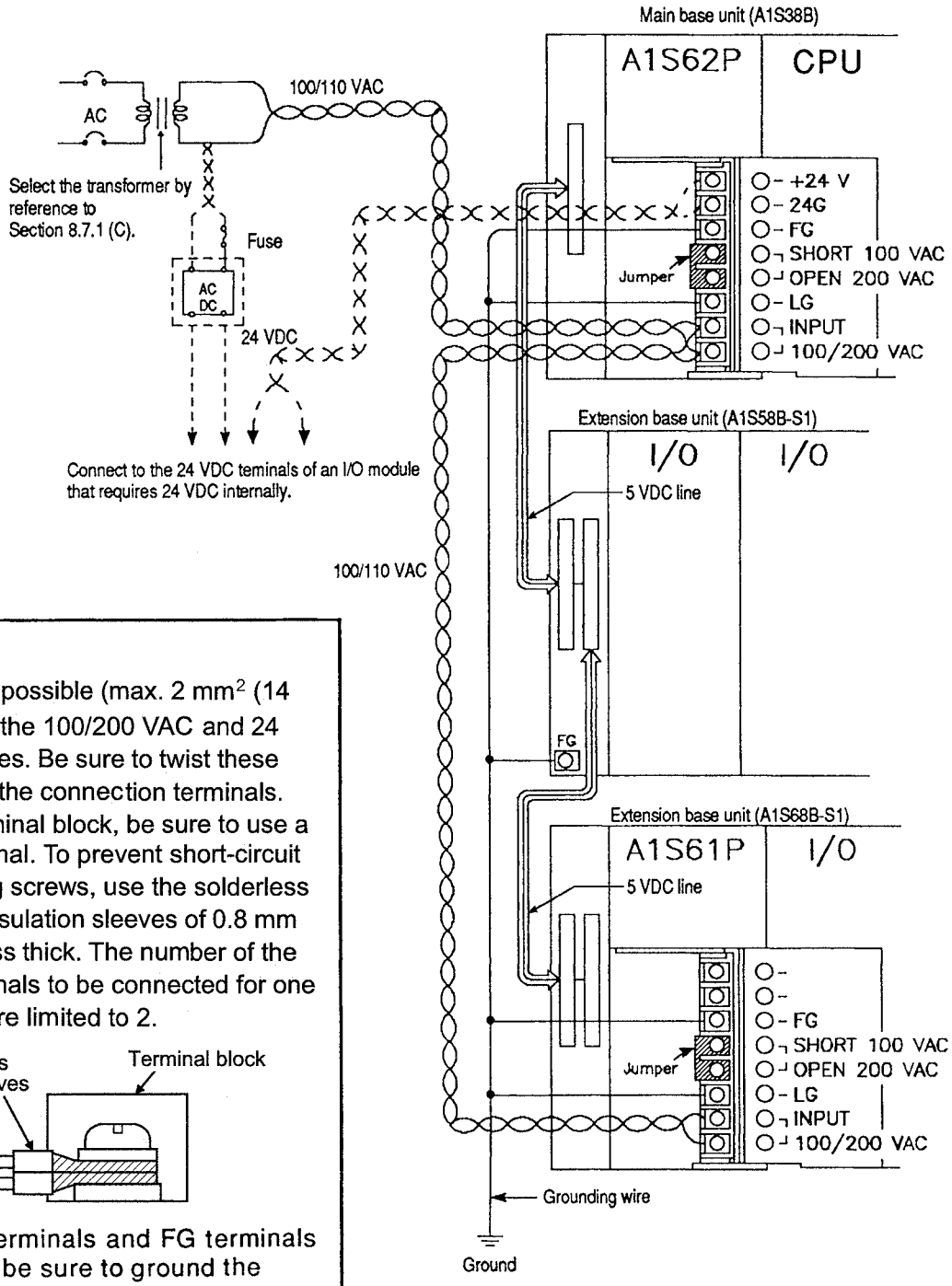
(1) Independent grounding...Best (2) Joint grounding.....Good (3) Joint grounding.....Not allowed

(c) Use a wire with a cross-sectional area of at least 2 mm^2 for grounding. Make the grounding point as close to the PC as possible so that the grounding wire is not too long.

(d) If any malfunction occurs due to grounding, disconnect either or both of the LG and FG terminals of the base unit from the ground.

8.7.2 Wiring to unit terminals

This section explains the wiring of power lines and grounding lines to the main and extension bases.



POINT

(1) Use the thickest possible (max. 2 mm^2 (14 AWG)) wires for the 100/200 VAC and 24 VDC power cables. Be sure to twist these wires starting at the connection terminals. For wiring a terminal block, be sure to use a solderless terminal. To prevent short-circuit due to loosening screws, use the solderless terminals with insulation sleeves of 0.8 mm (0.03 inch) or less thick. The number of the solderless terminals to be connected for one terminal block are limited to 2.

(2) When the LG terminals and FG terminals are connected, be sure to ground the wires. Do not connect the LG terminals and FG terminals to anything other than ground. If LG terminals and FG terminals are connected without grounding the wires, the PC may be susceptible to noise. In addition, since the LG terminals have potential, rminals the operator may receive an electric shock when touching metal parts.

9. MAINTENANCE AND INSPECTION

This chapter describes items to be checked in daily and periodic maintenance and inspection in order to maintain the programmable controller in the normal and optimum condition.

9.1 Daily Inspection

Table 9.1 shows the inspection and items which are to be checked daily.

Table 9.1 Daily Inspection

No.	Check Item		Check Point	Judgment	Corrective Action
1	Base unit mounting conditions		Check for loose mounting screws and cover.	The base unit should be securely mounted.	Retighten screws.
2	Mounting conditions of I/O module, etc.		Check if the module is disengaged and if the hook is securely engaged.	The hook should be securely engaged and the module should be positively mounted.	Securely engage the hook.
3	Connecting conditions		Check for loose terminal screws.	Screws should not be loose.	Retighten terminal screws.
			Check distance between solderless terminals.	The proper clearance should be provided between solderless terminals.	Correct.
			Check connectors of extension cable.	Connections should not be loose.	Retighten connector mounting screws.
4	CPU module indicator lamps	"POWER" LED	Check that the LED is ON.	ON (OFF indicates an error.)	See Section 10.2.2.
		"RUN" LED	Check that the LED is ON during RUN.	ON (OFF or flashing indicates an error.)	See Section 10.2.3 and 10.2.4.
		"ERROR" LED	Check that the LED is ON when an error occurred.	OFF (ON when an error occurred.)	See Section 10.2.5 and 10.2.6.
		Input LED	Check that the LED turns ON and OFF.	ON when input is ON. OFF when input is OFF. (Display, other than above, indicates an error.)	See Section 10.2.7.
		Output LED	Check that the LED turns ON and OFF.	ON when output is ON. OFF when output is OFF. (Display, other than above, indicates an error.)	See Section 10.2.7.

9.2 Periodic Inspection

This section explains the inspection items which are to be checked every six months to one year. This inspection should also be performed when the equipment is moved or modified or the wiring is changed.

Table 9.2 Periodic Inspection

No.	Check Item		Checking Method	Judgment	Corrective Action
1	Ambient environment	Ambient temperature	Measure with thermometer and hygrometer. Measure corrosive gas.	0 to 55°C	When PC is used inside a panel, the temperature in the panel is the ambient temperature.
		Ambient humidity		10 to 90 %RH	
		Ambience		There should be no corrosive gases.	
2	Line voltage check.		Measure voltage across 100/200 VAC terminal.	85 to 132 VAC	Change supply power.
				170 to 264 VAC	
3	Mounting conditions	Looseness, play	Move the unit.	The module should be mounted securely and positively.	Retighten screws.
		Ingress of dust or foreign material	Visual check.	There should be no dust or foreign material in the vicinity of the PC.	Remove and clean.
4	Connecting conditions	Loose terminal screws	Retighten.	Connectors should not be loose.	Retighten.
		Distances between solderless terminals.	Visual check.	The proper clearance should be provided between solderless terminals.	Correct.
		Loose connector	Visual check.	Connectors should not be loose.	Retighten connector mounting screws.
5	Battery		Check battery status by mounting special auxiliary relays M9006 and M9007.	Preventive maintenance	If battery capacity reduction is not indicated, change the battery when specified service life is exceeded.

9.3 Replacement of Battery

M9006 or M9007 turns ON when the voltage of the battery for program backup and power interruption compensation falls.

Even if this special relay turns ON, the contents of the program and the power interruption compensation function are not lost immediately.

However, if the ON state is overlooked, the PC data contents may be lost.

Special auxiliary relays M9006 and M9007 are switched ON to indicate that the battery has reached the life time (minimum) indicated in Table 9.3 and it must be replaced if continued use of the power interruption RAM and /or data backup is required.

The following sections give the battery service life and the battery changing procedure.

9.3.1 Service life of battery

Table 9.3 shows the service life of the battery.

Table 9.3 Battery Life

Battery Life / CPU Model	Battery Life (Total Power Interruption Time) [Hr]		
	Guaranteed Value (MIN)	Actual Service Value (TYP)	After M9006 or M9007 is Turned ON
A1SCPU(S1), A1SCPUC24-R2	5400	13000	168
A2SCPU(S1)	3600	9000	168

* The actual service value indicates a typical life time and the guaranteed value indicates the minimum life time.

Preventive maintenance is as follows.

(1) Even if the total power interruption time is less than the guaranteed value in the above table, change the battery after four to five years.

(2) When the total power interruption time has exceeded the guaranteed value in the table above and M9006 has turned ON, change the battery.

9.3.2 Battery replacement procedure

When the service life of the battery has expired, replace the battery using the following procedure:

Even if the battery is removed, the memory is backed up by a capacitor for some time.

However, if the replacement time exceeds the guaranteed value shown in the following table, the contents of the memory may be lost. Therefore, replace the battery as quickly as possible.

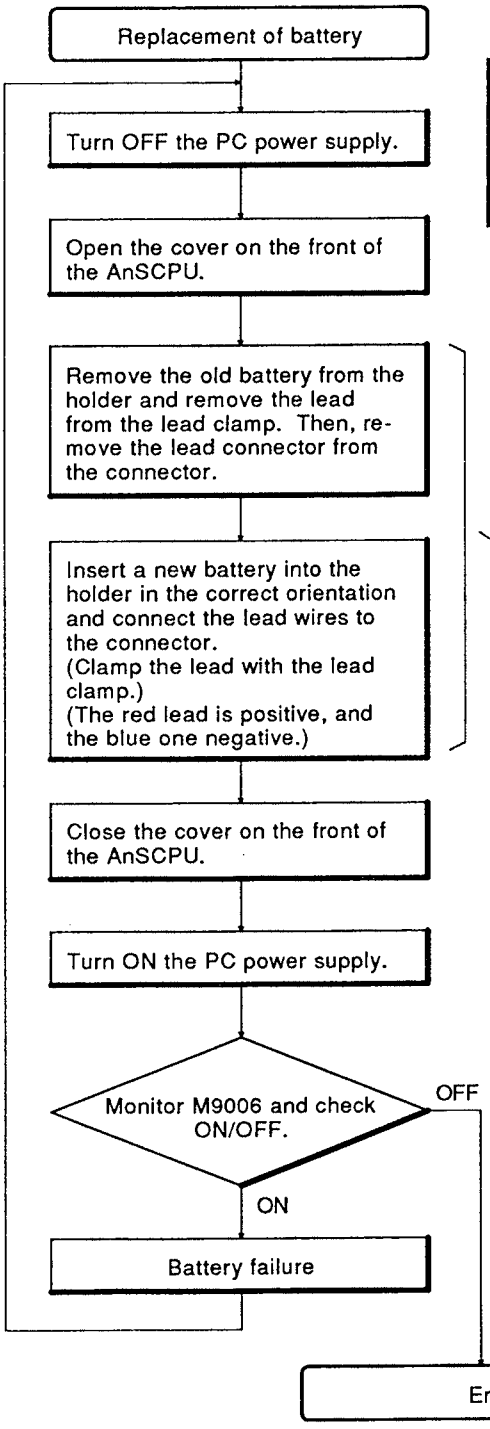
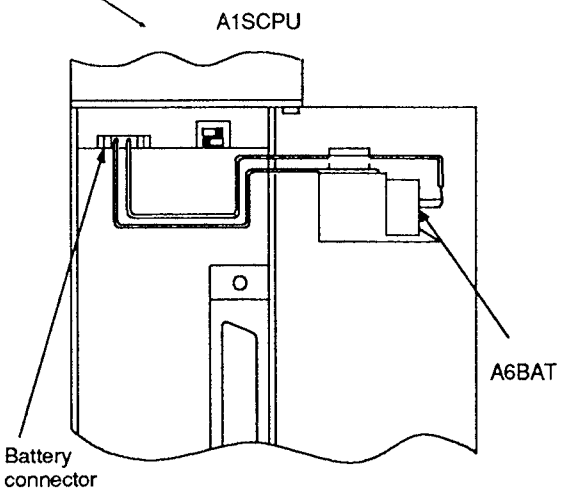


Table 9.4 Backup Time by Capacitor

Capacitor Backup Time (Minutes)	
Guaranteed value (MIN)	Actually applied value (TYP)
5	15



10. TROUBLESHOOTING

This section describes various procedures for troubleshooting, and corrective action.

10.1 Basic Troubleshooting

System reliability depends not only on reliable equipment but also on short down-times in the event of faults.

The three basic points to be kept in mind in troubleshooting are:

(1) Visual checks

Check the following points

(a) Machine motion (in the stopped and operating states)

(b) Power ON or OFF

(c) Status of I/O equipment

(d) Condition of wiring (I/O wires, cables)

(e) Display states of various indicators (such as the POWER LED, RUN LED, ERROR LED, and I/O LED)

(f) States of various setting switches (such as extension base and power interruption compensation)

After checking (a) to (f), connect the peripheral equipment and check the running status of the PC CPU and the program contents.

(2) Trouble check

Observe any changes in the error condition when performing the following operations:

(a) Set the RUN/STOP keyswitch to the STOP position.

(b) Reset using the RUN/STOP keyswitch.

(c) Turn the power ON and OFF.

(3) Narrow down the possible causes of the trouble:

Deduce where the fault lies, i.e:

(a) Inside or outside the PC CPU.

(b) In the I/O module or another module.

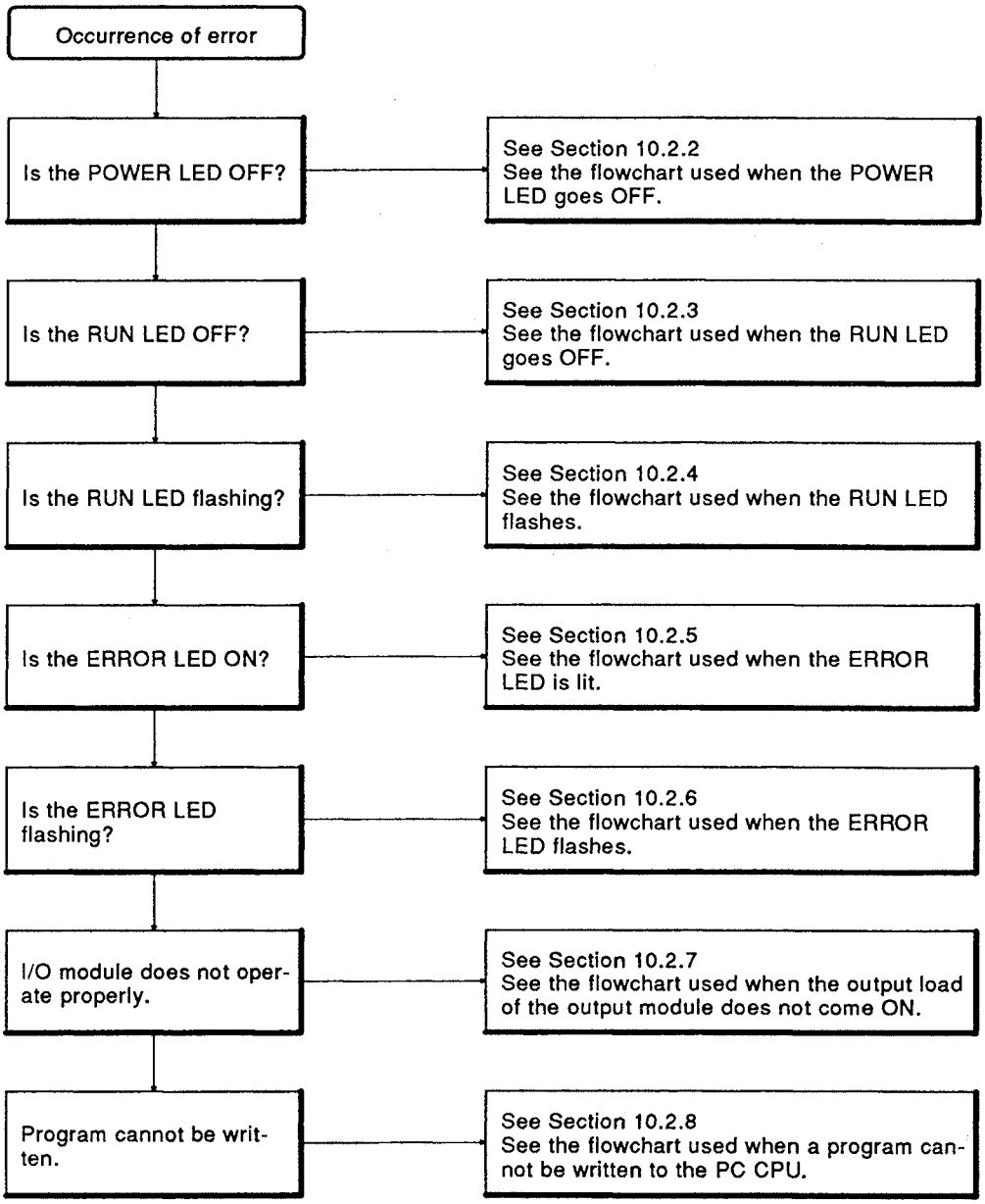
(c) In the sequence program.

10.2 Troubleshooting

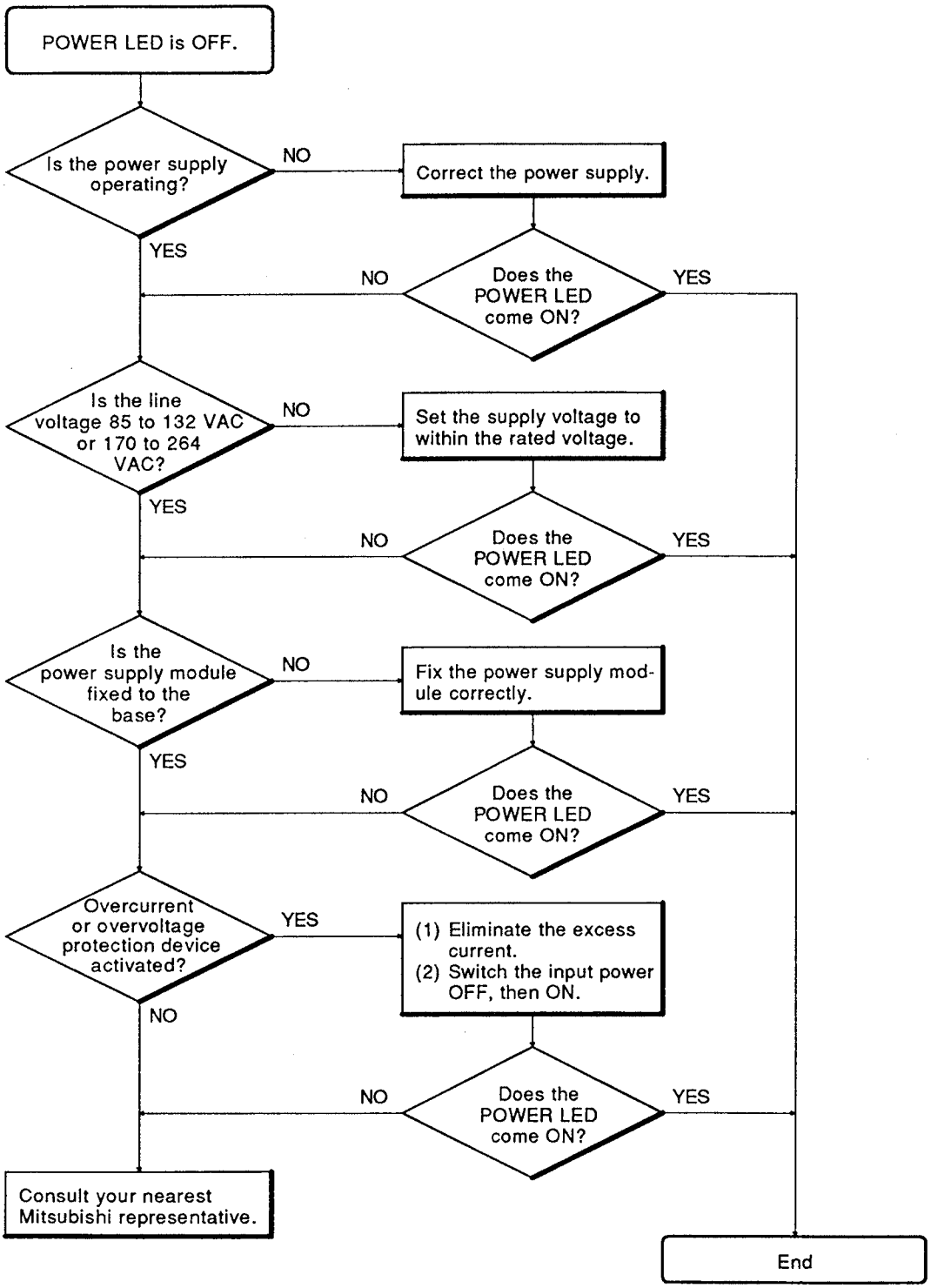
This section explains the procedure for determining the cause of problems, errors, and corrective action to be taken in response to error codes.

10.2.1 Troubleshooting flowcharts

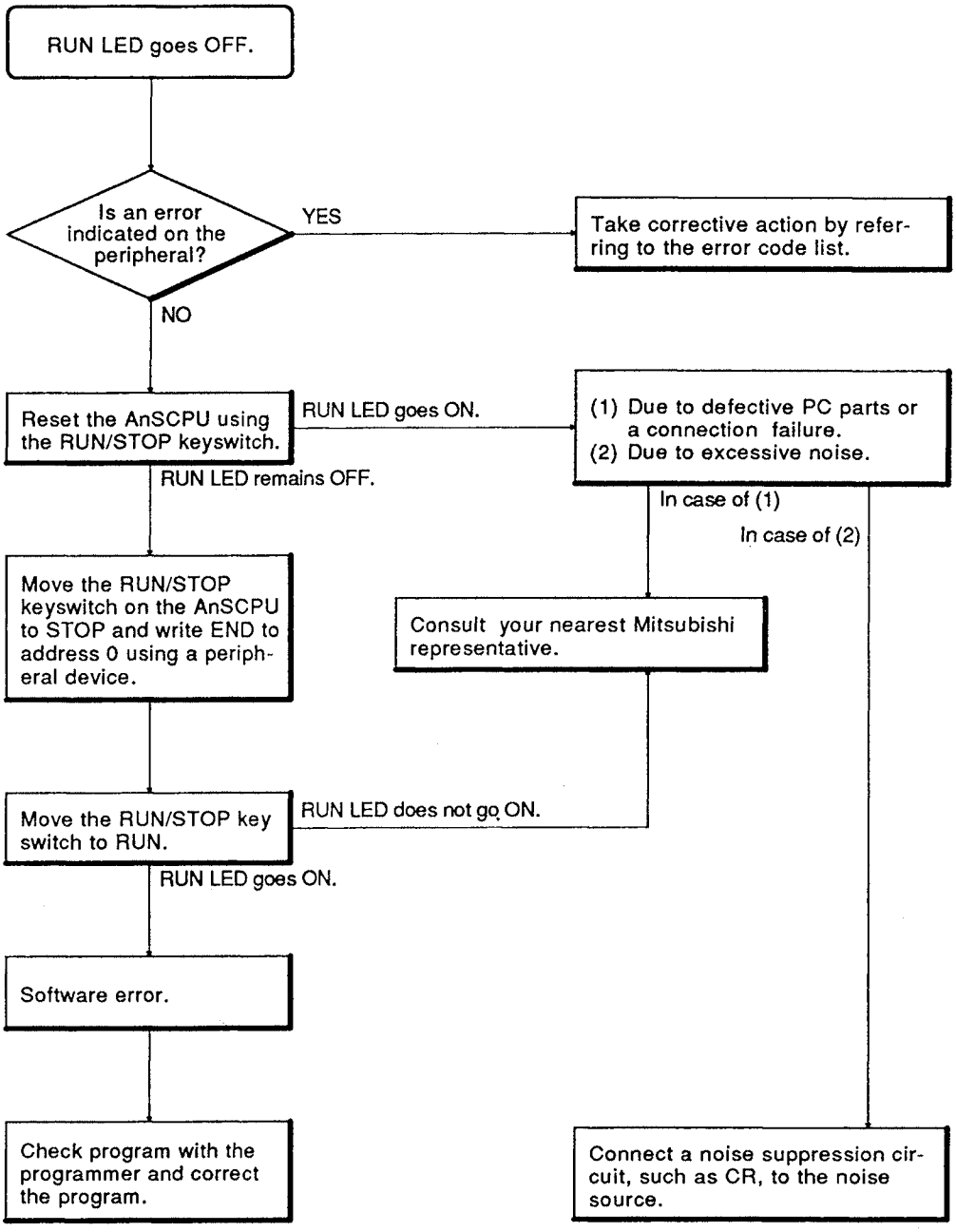
The procedures for troubleshooting are given in the following flowcharts:



10.2.2 Flowchart used when the POWER LED goes OFF

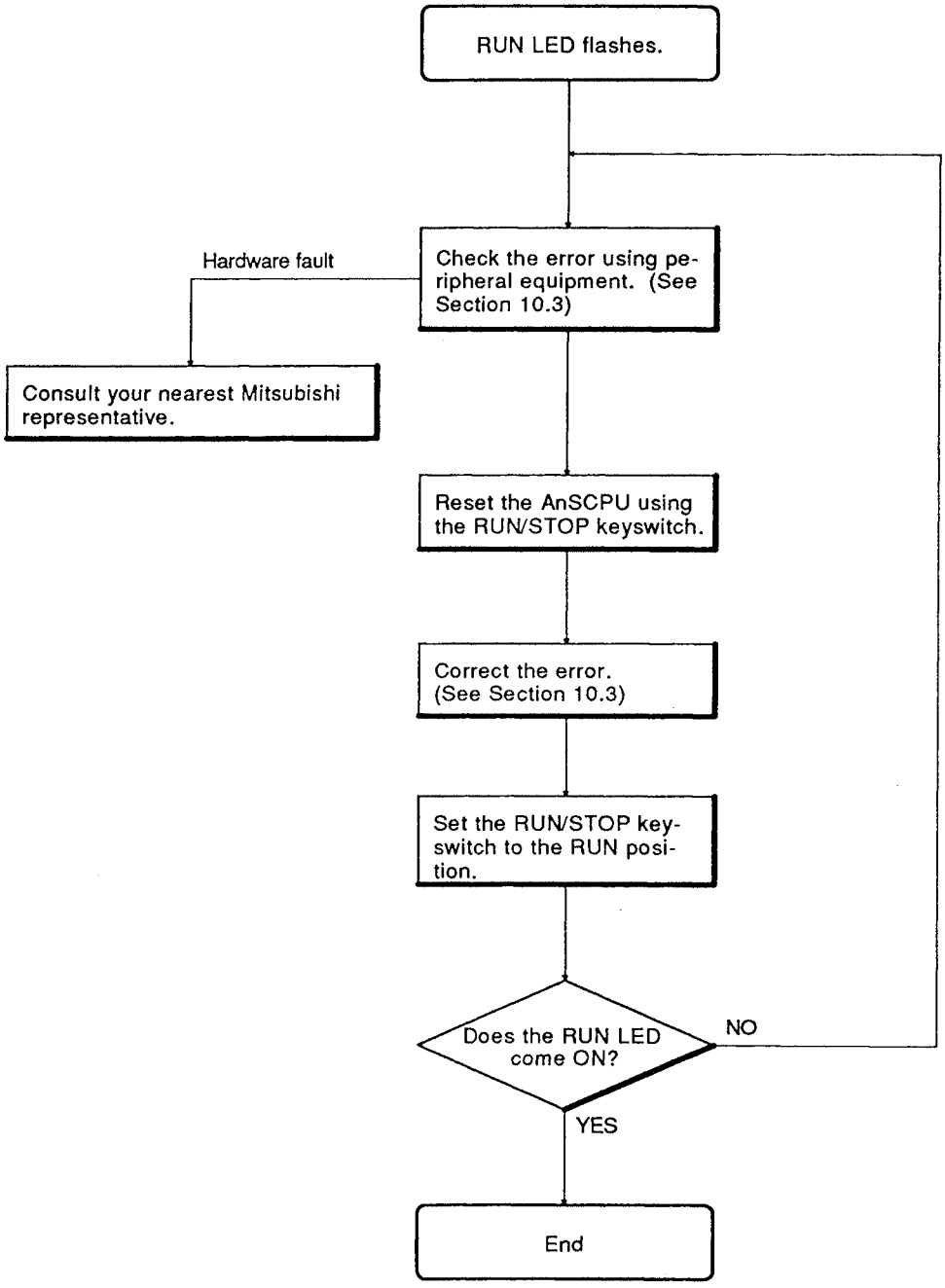


10.2.3 Flowchart used when the RUN LED goes OFF



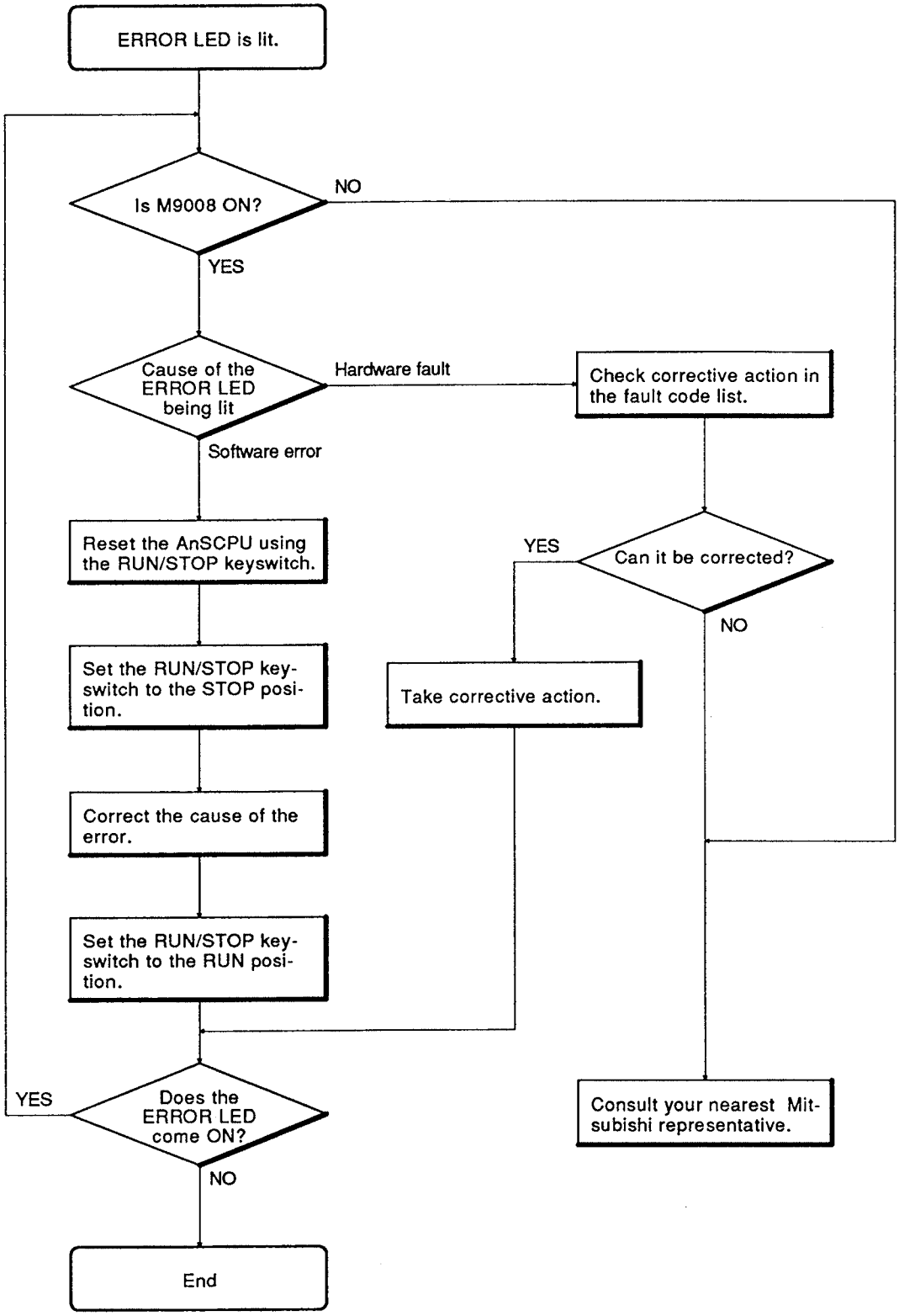
10.2.4 Flowchart used when the RUN LED flashes

The following shows the corrective measures to take if the RUN LED flashes when the power is switched ON, when operation is started, or during operation.



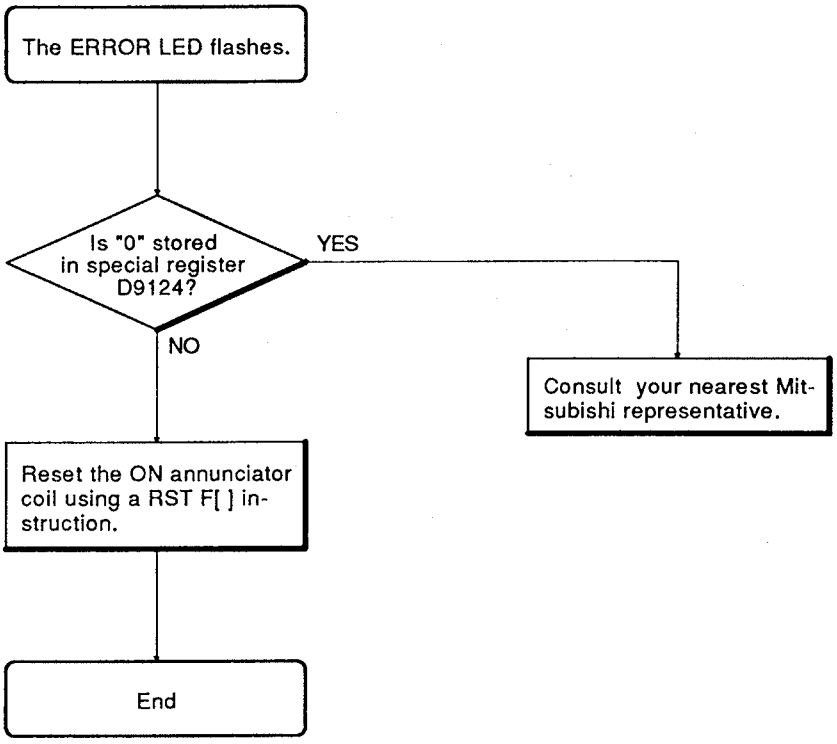
10.2.5 Flowchart used when the ERROR LED is lit

The following shows the corrective measures when the ERROR LED is lit in the RUN state.

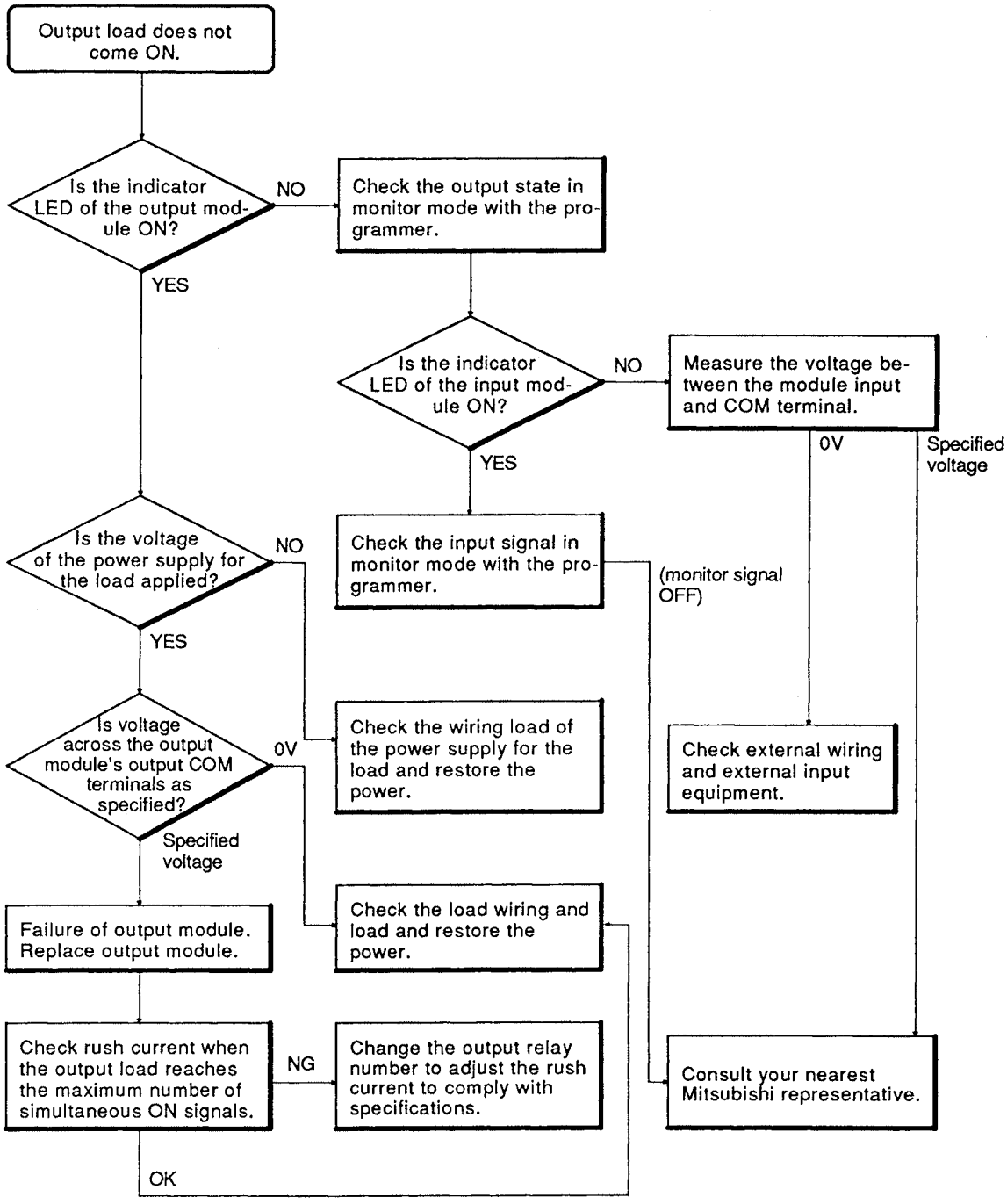


10.2.6 Flowchart used when the ERROR LED flashes

The following shows the corrective measures when the ERROR LED flashes.



10.2.7 Flowchart used when the output load of the output module does not come ON

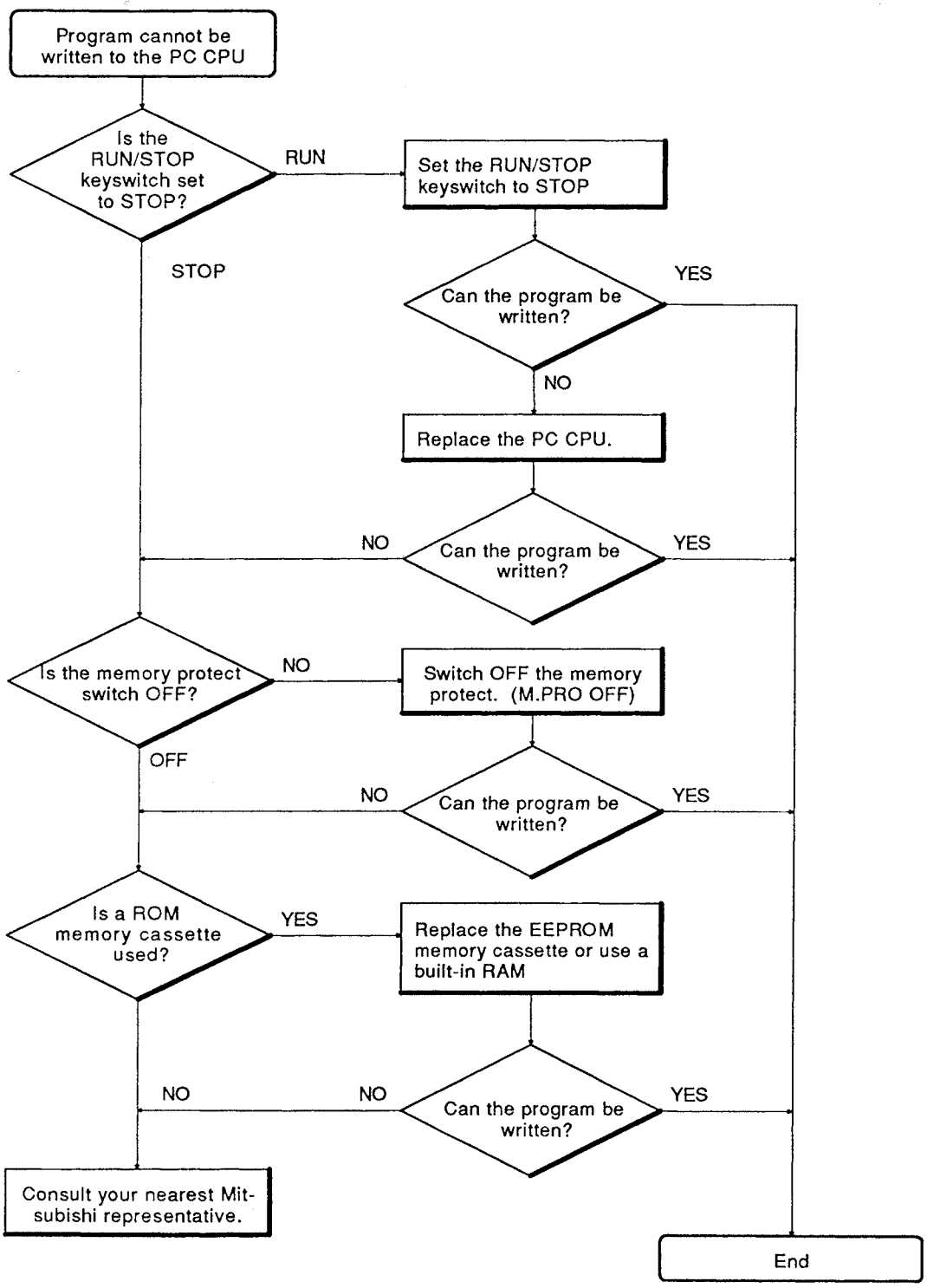


POINT

If the input or load signals are not switched OFF, see Section 10.4 I/O Connection Troubleshooting and take corrective measures.

10.2.8 Flowchart used when a program cannot be written to the PC CPU

The following shows the corrective measures when a program cannot be written to the PC CPU.



10.3 Error Code List

If an error occurs in the RUN mode, an error display or error code (including a step number) is stored in the special register by the self diagnosis function. The error code reading procedure and the causes of and corrective actions for errors are shown in Table 10.1.

10.3.1 Error codes

Table 10.1 Error Codes

Error Message	Error Code (D9008)	CPU States	Error and Cause	Corrective Action
"INSTRCT. CODE ERR" (Checked at the execution of instruction)	10	Stop	Instruction code, which cannot be decoded by CPU, is included in the program. (1) EP-ROM or memory cassette, which cannot be decoded, has been loaded. (2) Since the memory contents have changed for some reason, instruction code, which cannot be decoded, has been included.	(1) Read the error step by use of a peripheral equipment and correct the program at that step. (2) In the case of EP-ROM or memory cassette, rewrite the contents or replace with an EP-ROM or memory cassette which stores correct contents.
"PARAMETER ERROR" (Checked at power-on, STOP → RUN, and PAUSE → RUN)	11	Stop	(1) Capacity larger than the memory capacity of CPU module has been set with the peripheral equipment and then write to CPU module has been performed. (2) The contents of parameters of CPU memory have changed due to noise or the improper loading of memory. (3) RAM is not loaded to the A1 or A1NCPU.	(1) Check the memory capacity of CPU with the memory capacity set by peripheral equipment and re-set incorrect area. (2) Check the loading of CPU memory and load it correctly. Read the parameter contents of CPU memory, check and correct the contents, and write them to CPU again. (3) Install the RAM and write parameter contents from a peripheral device.
"MISSING END INS." (Checked at STOP → RUN)	12	Stop	(1) There is no END (FEND) instruction in the program. (2) When subprogram has been set by the parameter, there is no END instruction in the subprogram.	Write END instruction at the end of program.

Table 10.1 Error Codes (Continued)

Error Message	Error Code (D9008)	CPU States	Error and Cause	Corrective Action
"CAN'T EXECUTE(P)" (Checked at the execution of instruction)	13	Stop	(1) There is no jump destination or multiple destinations specified by the CJ, SCJ, CALL, CALLP, or JMP instruction. (2) There is a CHG instruction and no setting of subprogram. (3) Although there is no CALL instruction, the RET instruction exists in the program and has been executed. (4) The CJ, SCJ, CALL, CALLP, or JMP instruction has been executed with its jump destination located below the END instruction. (5) The number of the FOR instructions is different from that of the NEXT instructions. (6) A JMP instruction is given within a FOR to NEXT loop causing the processing to exit the loop. (7) Processing exited subroutine by the JMP instruction before execution of the RET instruction. (8) Processing jumped into a step in a FOR to NEXT loop or into a subroutine by the JMP instruction. (9) The STOP instruction is given in an interrupt program, a subroutine program or in a FOR to NEXT loop.	Read the error step by use of peripheral equipment and correct the program at that step. (Insert a jump destination or reduce multiple destinations to one.)
"CHK FORMAT ERR" (Checked at STOP/PAUSE → RUN)	14	Stop	(1) Instructions (including NOP) except LD X□, LDI X□, AND X□ and ANI X□ are included in the CHK instruction circuit block. (2) Multiple CHK instructions are given. (3) The number of contact points in the CHK instruction circuit block exceeds 150. (4) There is no ⊣CJ P□⊢ circuit block before the CHK instruction circuit block. (5) The device number of D1 of the CHK D1 D2 instruction is different from that of the contact point before the CJ P□ instruction. (6) Pointer P254 is not given to the head of the CHK instruction circuit block. P254⊣CHK D1 D2⊢	Check the program in the CHK instruction circuit block according to items (1) to (6) in the left column. Correct problem using the peripheral and perform operation again.
"CAN'T EXECUTE (I)" (Checked at the occurrence of interruption)	15	Stop	(1) Although the interrupt module is used, there is no number of interrupt pointer I, which corresponds to that module, in the program or there are multiple numbers. (2) No IRET instruction has been entered in the interrupt program. (3) There is IRET instruction in other than the interrupt program.	(1) Check for the presence of interrupt program which corresponds to the interrupt unit, create the interrupt program, and reduce the same numbers of I. (2) Check if there is IRET instruction in the interrupt program and enter the IRET instruction. (3) Check if there is IRET instruction in other than the interrupt program and delete the IRET instruction.

Table 10.1 Error Codes (Continued)

Error Message	Error Code (D9008)	CPU States	Error and Cause	Corrective Action
"CASSETTE ERROR" (Checked at power-on) An, AnN only	16	Stop	The memory cassette is not loaded.	Turn off the power, insert the memory cassette and turn on the power again.
"ROM ERR"	17	Stop	Parameters and/or sequence programs are not correctly written to the mounted memory cassette.	(1) Correctly write parameters and/or sequence programs to the memory cassette. (2) Remove the memory cassettes that contain no parameters or sequence programs.
			Parameters stored in the memory cassette have exceeded the limit of available program capacity. Ex.) Default parameters (program capacity: 6k steps) are written to A1NMCA-2KE.	(1) Adjust the program capacity for parameters to the memory cassette used. (2) Use the memory cassette of which memory capacity is larger than the program capacity for parameters.
"RAM ERROR" (Checked at power-on)	20	Stop	The CPU has checked if write and read operations can be performed properly to the data memory area of CPU, and as a result, either or both has not been performed.	Since this CPU hardware error, consult Mitsubishi representative.
"OPE. CIRCUIT ERR" (Checked at power-on)	21	Stop	The operation circuit, which performs the sequence processing in the CPU, does not operate properly.	
"WDT ERROR" (Checked at the execution of END processing)	22	Stop	Scan time exceeds watch dog error monitor time. (1) Scan time of user program has been exceeded for some conditions. (2) Scan time has lengthened due to instantaneous power failure which occurred during scan.	(1) Calculate and check the scan time of user program and reduce the scan time using the CJ instruction or the like. (2) Monitor the content of special register D9005 by use of peripheral equipment. When the content is other than 0, line voltage is insufficient. When the content is other than 0, the power voltage is unstable.
"SUB-CPU ERROR" (Checked continuously)	23 (During run) 26 (At power-on)	Stop	Sub-CPU is out of control or defective.	Since this CPU hardware error, consult Mitsubishi representative.
"END NOT EXECUTE" (Checked at the execution of END instruction)	24	Stop	(1) When the END instruction was to be executed, the instruction was read as other instruction code due to noise or the like. (2) The END instruction has changed to another instruction code for some reason.	Perform reset and run. If the same error is displayed again, it is the CPU hardware error, consult Mitsubishi representative.
"WDT ERROR" (Checked continuously)	25	Stop	The CPU is executing an endless loop.	Since the program is in an endless lop due to the JMP and CJ instructions, check the program.
"MAIN CPU DOWN" (Checked continuously)	26	Stop	Main-CPU is out of control or defective. (Sub-CPU checked it.)	Since this is a CPU hardware error, consult Mitsubishi representative.

Table 10.1 Error Codes (Continued)

Error Message	Error Code (D9008)	CPU States	Error and Cause	Corrective Action
"UNIT VERIFY ERR. " (Checked continuously)	31	Stop or Continue (set by parameter)	I/O module data are different from those at power-on. The I/O module (including the special function module) is incorrectly loaded or has been removed, or a different unit has been loaded.	(1) Among special registers D9116 to D9123, the bit corresponding to the module of verify error is "1". Therefore, use peripheral equipment to monitor the registers and check for the module with "1" and make replacement. (2) When the present unit arrangement is OK, perform reset with the reset switch.
"FUSE BREAK OFF" (Checked continuously)	32	Stop or Continue (set by parameter)	(1) A fuse is blown in an output modul. (2) The external output supply for output load is not turned off or not connected.	(1) Check the fuse blown indicator LED of output module and change the fuse of module of which LED is on. (2) Among special registers D9100 to D9107, the bit corresponding to the unit of fuse break is "1". Replace the fuse of a corresponding module. Monitor and check it. (3) Check if the external power supply for output load is turned on or off.
"CONTROL-BUS ERR. " (Checked at the execution of FROM and TO instructions)	40	Stop	The FROM and TO instructions can-not be executed. Error of control bus with special function module.	Since this is a hardware error of a special function module, CPU module, or base unit, replace the module and check the defective module, consult Mitsubishi representative.
"SP. UNIT DOWN" (Checked at the execution of FROM and TO instructions.)	41	Stop	When the FROM or TO instruction is executed, access has been made to the special function module but the answer is not given. The accessed special function module is defective.	Since this is an accessed special function module error, consult Mitsubishi representative.
"LINK UNIT ERROR"	42	Stop	The data link module is loaded in the master station.	Remove the data link module from the master station. After correction, reset and start from the initialization.
"I/O INT. ERROR"	43	Stop	Although the interrupt module is not loaded, interruption has occurred.	Since this is a hardware error of a specific module, replace the module and check the defective module, consult Mitsubishi representative.
"SP. UNIT LAY. ERROR."	44	Stop	(1) Three or more computer link units are loaded with respect to one CPU module. (A1SCPU24-R2 is also counted as one unit.) (2) Two or more data link modules are loaded. (3) Two or more interrupt units are loaded. (4) A special function module is assigned in place of an I/O module, or vice versa, at I/O assignment of parameters on peripheral devices. (5) The input/output modules or special function modules are loaded at the input/output numbers exceeding the number of input/output points, or GOT is connected via bus line.	(1) Reduce the computer link modules to two or less. (2) Reduce the data link modules to one or less. (3) Reduce the interrupt module to one. (4) Re-set the I/O assignment of parameter setting by use of peripheral devices according to the actually loaded special function module. (5) Review the input/output numbers, and remove the modules at the input/output numbers beyond the number of input/output points or GOT.

Table 10.1 Error Codes (Continued)

Error Message	Error Code (D9008)	CPU States	Error and Cause	Corrective Action
"SP. UNIT ERROR" (Checked at the execution of FROM and TO instructions)	46	Stop or Continue (set by parameter)	Access (execution of FROM to TO instruction) has been made to a location where there is not special function unit.	Read the error step by use of peripheral equipment, and check and correct the content of FROM or TO instruction at that step.
"LINK PARA. ERROR"	47	Continue	(1) If a data link CPU is used to set a master station (station number "00") : The contents written to the parameter area of link by setting the link range in the parameter setting of peripheral devices are different from the link parameter contents for some reason. Or, link parameters are not written. (2) The setting of the total number of slave stations is 0.	(1) Write parameters again and make check. (2) Check setting of station numbers. (3) When the error is displayed again, it is hardware error. Therefore, consult Mitsubishi representative.
"OPERATION ERROR" (Checked during execution of instruction)	50	Continue	(1) The result of BCD conversion has exceeded the specified range (9999 or 99999999). (2) Operation impossible because specified device range has been exceeded. (3) File registers used in program without capacity setting. (4) Operation error occurred during execution of the RTOP, RFRP, LWTP or LRDP instruction.	Read the error step using peripheral devices and check the program at the error step, and correct it. (Check the specified device range, BCD conversion, or the like.)
"MAIN CPU DOWN" (Interrupt fault) AnNCPU only	60	Stop	(1) INT instruction processed in microcomputer program area. (2) CPU malfunction due to noise. (3) Hardware error of CPU module.	(1) Because the INT instruction cannot be used in the microcomputer program, remove it. (2) Take measures against noises. (3) Consult Mitsubishi representative.
"BATTERY ERROR" (Checked at power-on)	70	Continue	(1) The battery voltage has dropped to below the specified value. (2) The lead connector of the battery is not connected.	(1) Replace battery. (2) Connect the lead connector if RAM memory or power failure compensation function is used.

10.4 I/O Connection Troubleshooting

This section explains possible problems with I/O circuits.

10.4.1 Input circuit troubleshooting

This section describes possible problems with input circuits, and corrective action.

Table 10.2 Input Circuit Problems and Corrective Action

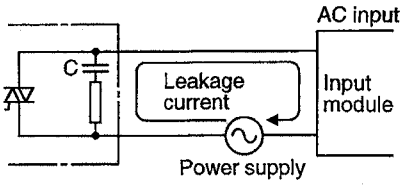
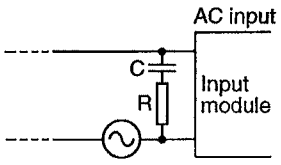
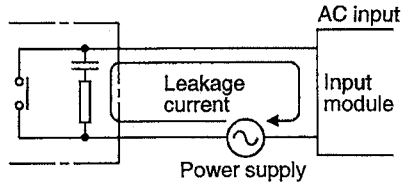
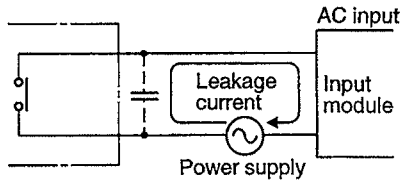
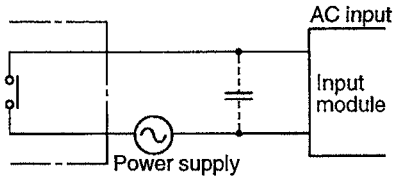
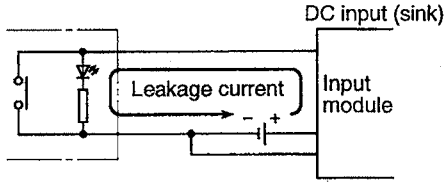
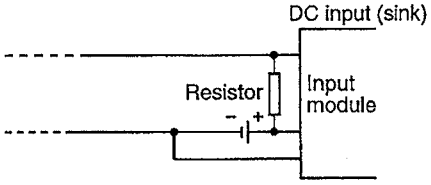
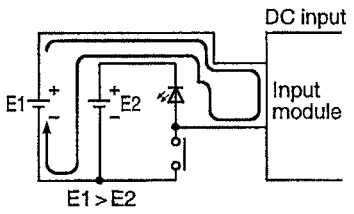
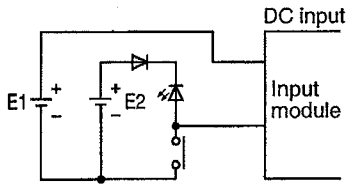
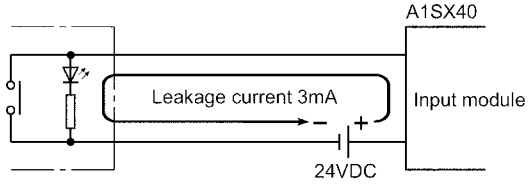
	Condition	Cause	Corrective Action
Example 1	Input signal does not turn OFF.	Leakage current of input switch (e.g. drive by non-contact switch). 	• Connect an appropriate resistor which will make the voltage across the terminals of the input module lower than the OFF voltage value.  It is recommended to use 0.1 to 0.47 μF + 47 to 120 Ω (1/2 W) for the CR constant.
Example 2	Input signal does not turn OFF.	Drive by a limit switch with neon lamp. 	• Same as Example 1. • Or make up another independent display circuit.
Example 3	Input signal does not turn OFF.	Leakage current due to line capacity of wiring cable. (Line capacity C of twisted pair wire is approx. 100 PF/m). 	• Same as Example 1. • However, leakage current is not generated when the power supply is located in the input equipment side as shown below. 
Example 4	Input signal does not turn OFF.	Drive by switch with LED indicator. 	• Connect a register which will make the voltage between the input module terminal and common higher than the OFF voltage, as shown below.  * An example calculation of a value for a connected resistor is given on the following page.

Table 10.2 Input Circuit Problems and Corrective Action (Continued)

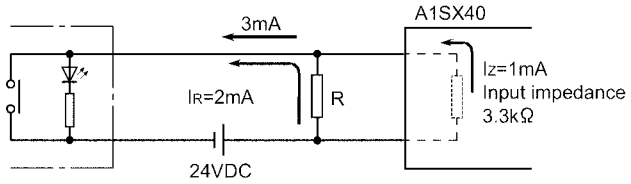
	Condition	Cause	Corrective Action
Example 5	Input signal does not turn OFF.	• Sneak path due to the use of two power supplies. 	• Use only one power supply. • Connect a sneak path prevention diode. (Figure below) 

Calculation example for Example 4

Consider a switch with LED indicator connected to the A1SX40, giving a leakage current of 3mA when a 24VDC power is turned on.



(1) The 1.7mA OFF current of the A1SX40 is not satisfied. Hence,connect a resistor as shown below.



(2) Calculate the resistor value R as indicated below.
To satisfy the 1.7mA OFF current of the A1SX40, the resistor R to be connected may be the one where 0.63mA or more will fiow.
$I_R : I_Z = Z(\text{Input impedance}) : R$

$$R \leqq \frac{I_Z}{I_R} \times Z(\text{Input impedance}) = \frac{1.0}{2.0} \times 3.3 = 1.65[k\Omega]$$

(3) Connect a resistor of 1.5(kΩ) and 2 to 3(w) to a terminal which may cause an error, since the power capacity of a resistor is seiected so that will be 3 to 5 times greater than the actual power consumption.

(4) Also,OFF voltage when resistor R is conned will be as follows.

$$\frac{1}{\frac{1}{1.5[k\Omega]} + \frac{1}{3.3[k\Omega]}} \times 3[mA] = 3.09[V]$$

- This satisfies 6V or less OFF voltage of A1SX40.

10.4.2 Output circuit failures and corrective action

Table 10.3 Output Circuit Failures and Corrective Action

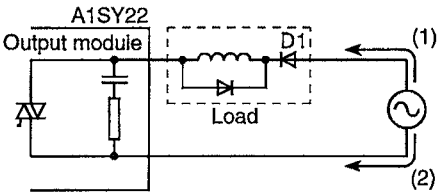
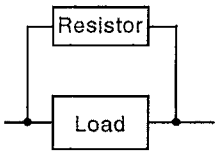
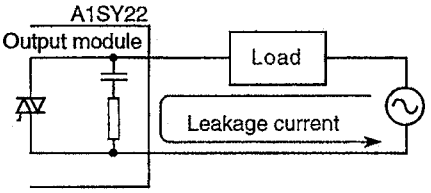
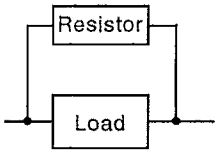
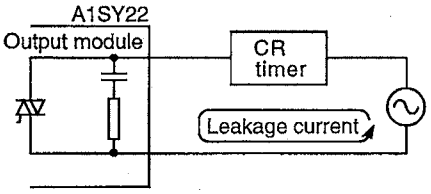
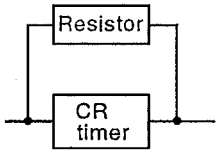
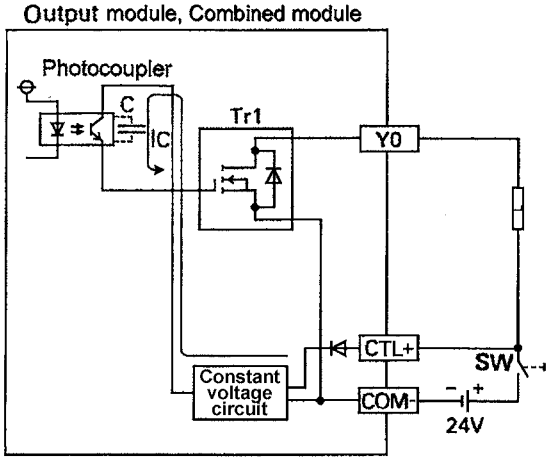
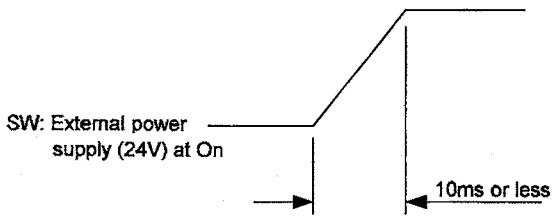
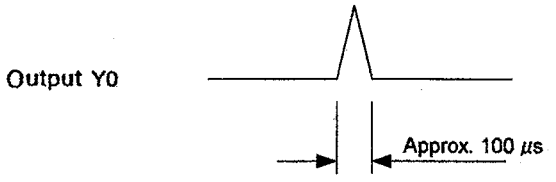
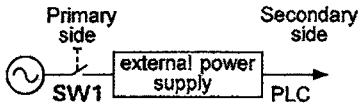
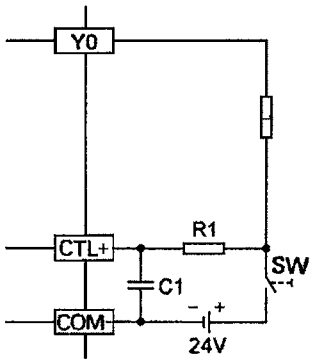
	Condition	Cause	Corrective Action
Example 1	When the output is OFF, excessive voltage is applied to the load.	• Load is half-wave rectified inside (in some cases, this is true of a solenoid).  • When the polarity of the power supply is as shown in [1], C is charged. When the polarity is as shown in [2], the voltage charged in C plus the line voltage are applied across D1. Max. voltage is approx. 2.2E.	• Connect a resistor of 10 to 99 kΩ. across the load. (If a resistor is used in this way, it does not pose a problem to the output element. But it may cause the diode, which is built into the load, to deteriorate, resulting in a fire, etc.) 
Example 2	The load does not turn OFF (triac output).	• Leakage current due to built-in noise suppression 	• Connect C and R across the load. (When the wiring distance from the output card to the load is long, there may be a leakage current due to the line capacity.) 
Example 3	When the load is a CR type timer, time constant fluctuates (triac output).		• Drive the relay using a contact and drive the CR type timer using the same contact. (Some timers have half-wave rectified internal circuits. Therefore, take the precautions indicated in the example1.)  Calculate the CR constant depending on the load.

Table 10.3 Output Circuit Failures and Corrective Action (Continued)

	Condition	Cause	Corrective Action
Example 4	When the external power supply turns on, the load turns on for a moment.	Erroneous output due to the stray capacitance (C) between collector and emitter of hotocoupler. { There is no erroneous output at normal road. An erroneous output may occur at high sensitivity load (such as solid state relay). } Output module, Combined module  If the external power supply is turned on precipitously, Ic current flows due to the stray capacitance (C) between collector and emitter of hotocoupler Ic current flows to the next stage of transistor Tr1 gate and Y0 output turns on by 100 μs.   	When the external power supply turns ON/OFF, check that the external power supply rising edge must be 10ms or more, and switch the SW1 to the primary side of external power supply.  When switching to the secondary side of the external power supply is required, the external power supply rising edge connected a condenser must be slow, and measured 10ms or more.  R1: Several tens of ohms Power capacity ≧ (external power supply current*1)^2 × resistance value × (3 to 5)*2 C1:several hundreds of microfarads 50V *1 Refer to consumption current of the external power supply for modules used in this manual. *2 Select the power capacity of resistance to be 3 to 5 times lager than the actual power consumption. (Example) R1=40 Ω, C1=300 μF Use the below expression to calculated a time constant $C1 \times R1 = 300 \times 10^{-6} \times 40$ $= 12 \times 10^{-3}$s =12ms

MEMO

APPENDICES

APPENDIX 1 INSTRUCTIONS

Instructions used with the AnSCPU are listed below.
Refer to the following programming manuals for details of the instructions.

- ACPU Programming Manual (Fundamentals)
- ACPU Programming Manual (Common Instructions)

(1) Sequence instructions

(a) Contact instruction

Contact	LD, LDI, AND, ANI, OR, ORI

(b) Connection instruction

Connection	ANB , ORB, MPS, MRD, MPP

(c) Output instruction

Output	OUT, SET, RST, PLS, PLF, CHK

(d) Shift instruction

Shift	SFT, SFTP

(e) Master control instruction

Master control	MC, MCR

(f) Termination instruction

Program end	FEND, END

(g) Other instructions

Stop	STOP
No operation	NOP
Page feed (page feed operation of printer output)	NOPLF

(2) Basic instructions

(a) Comparison instructions

=	16 bits	LD=, AND=, OR=
	32 bits	LDD=, ANDD=, ORD=
< >	16 bits	LD<>, AND<>, OR<>
	32 bits	LDD<>, ANDD<>, ORD<>
>	16 bits	LD>, AND>, OR>
	32 bits	LDD>, ANDD>, ORD>
≤	16 bits	LD<=, AND<=, OR<=
	32 bits	LDD<=, ANDD<=, ORD<=
<	16 bits	LD<, AND<, OR<
	32 bits	LDD<, ANDD<, ORD<
≥	16 bits	LD>=, AND>=, OR>=
	32 bits	LDD>=, ANDD>=, ORD>=

(b) BIN arithmetic operation instruction

+ Addition	16 bits	Two types each for + and +P
	32 bits	Two types each for D+ and D+P
- Subtraction	16 bits	Two types each for - and -P
	32 bits	Two types each for D- and D-P
* Multiplication	16 bits	*, *P
	32 bits	D*, D*P
/ Division	16 bits	/, /P
	32 bits	D/, D/P
+1 Addition	16 bits	INC, INCP
	32 bits	DINC, DINCP
-1 Subtraction	16 bits	DEC, DECP
	32 bits	DDEC, DDECP

(c) BCD arithmetic operation instructions

+ Addition	BCD 4 digits	Two types each for B+ and B+P
	BCD 8 digits	Two types each for DB+ and DB+P
- Subtraction	BCD 4 digits	Two types each for B- and B-P
	BCD 8 digits	Two types each for DB and DB-P
* Multiplication	BCD 4 digits	B*, B*P
	BCD 8 digits	DB*, DB*P
/ Division	BCD 4 digits	B/, B/P
	BCD 8 digits	DB/, DB/P

(d) BCD - BIN conversion instructions

BIN→BCD	16 bits	BCD, BCDP
	32 bits	DBCD, DBCDP
BCD→BIN	16 bits	BIN, BINP
	32 bits	DBIN, DBINP

(e) Data transfer instructions

Transfer	16 bits	MOV, MOVP
	32 bits	DMOV, DMOVP
Change	16 bits	XCH, XCHP
	32 bits	DXCH, DXCHP
Undefined transfer	16 bits	CML, CMLP
	32 bits	DCML, DCMLP
Block transfer	16 bits	BMOV, BMOVP
Repeat data block transfer	16 bits	FMOV, FMOVP

(f) Program branch instructions

Jump	CJ, SCJ, JMP
Subroutine call	CALL, CALLP, RET
Interrupt program enable/disable	EI, DI, IRET
Microcomputer program call	SuB

(g) Refresh instructions

Link refresh	COM
Link refresh enable/disable	EI, DI
Partial refresh	SEG

(3) Application instructions

(a) Logical operation instruction

Logical product	16 bits	Two types each for WAND and WANDP
	32 bits	DAND, DANDP
Logical sum	16 bits	Two types each for WOR and WORP
	32 bits	DOR, DORP
Exclusive logical sum	16 bits	Two types each for WXOR and WXORP
	32 bits	DXOR, DXORP
NOT exclusive logical sum	16 bits	Two types each for WXNR and WXNRP
	32 bits	DXNR, DXNRP
2's complement (reversed sign)	16 bits	NEG, NEGP

(b) Rotation instructions

Right ward rotation	16 bits	ROR, RORP, RCR, RCRP
	32 bits	DROR, DRORP, DRCR, DRCRP
Left ward rotation	16 bits	ROL, ROLP, RCL, RCLP
	32 bits	DROL, DROLP, DRCL, DRCLP

(c) Shift instructions

Right ward shift	16 bits	SFR, SFRP, BSFR, BSFRP
	Per device	DSFR, DSFRP
Left ward shift	16 bits	SFL, SFLP, BSFL, BSFLP
	Per device	DSFL, DSFLP

(d) Data processing instruction

Data search	16 bits	SER, SERP
Bit check	16 bits	SUM, SUMP
	32 bits	DSUM, DSUMP
Decode	2^n bits	DECO, DECOP
	16 bits	SEG
Encode	2^n bits	ENCO, ENCOP
Bit set	16 bits	BSET, BSETP
Bit reset	16 bits	BRST, BRSTP
Dissociation	16 bits	DIS, DISP
Association	16 bits	UNI, UNIP

(e) FIFO instructions

Write	16 bits	FIFW, FIFWP
Read	16 bits	FIFR, FIFRP

(f) ASCII instructions

ASCII conversion	ASC
ASCII print	Two types each for PR and PRC

(g) Buffer memory access instructions

Data read	1 word	FROM, FROMP
	2 words	DFRO, DFROP
Data write	1 word	TO, TOP
	2 words	DTO, DTOP

(h) FOR NEXT instruction

Repetition	FOR, NEXT

(i) Data link unit instructions

Data read	1 word	LRDP, RFRP
Data write	1 word	LWTP, RTOP

(j) Display instructions

Display reset	LEDR

(k) Other instructions

WDT reset		WDT, WDTP
Fault check		CHK
Status latch		SLT, SLTR
Sampling trace		STRA, STRAR
Carry flag set/reset	1 bit	STC, CLC
Timing clock	1 bit	DUTY

APPENDIX 2 SPECIAL RELAY, SPECIAL REGISTER LIST

2.1 Special Relay List

(1) Special relay list

Special relays are internal relays whose uses are determined inside the PC. Therefore, they cannot be turned ON/OFF as coils is a program. (Except for *1 and *2 in the table)

Table 2.1 Special Relay List

Number	Name	Description	Details	Applicable CPU	
*1 M9000	Fuse blown	OFF:Normal ON: Fuse blown unit	• Turned on when there is one or more output units of which fuse has been blown or external power supply has been turned off (only for small type). Remains on if normal status is restored. Output modules of remote I/O stations are also checked fore fuse condition.	○	Usable with all types of CPUs (Only remote I/O station information is valid for A2C.)
*2 M9002	I/O unit verify error	OFF:Normal ON: Error	• Turned on if the status of I/O module is different from entered status when power is turned on. Remains on if normal status is restored. I/O module verification is done also to remote I/O station modules. (Reset is enabled only when special registers D9116 to D9123 are reset.)	○	Usable with all types of CPUs (Only remote I/O station information is valid for A2C.)
M9004	MINI link master module error	OFF:Normal ON: Error	• Turned on when the MINI (S3) link error is detected on even one of the MINI (S3) link modules being loaded. Remains on if normal status is restored.	—	Dedicated to AnA, A2AS, AnU and QCPU-A (A Mode).
*1 M9005	AC DOWN detection	OFF:AC power good ON: AC power DOWN	• Turned on when an momentary power failure of 20 msec or less occurred. Reset when POWER switch is moved from OFF to ON position.	○	Usable with all types of CPUs.
M9006	Battery low	OFF:Normal ON: Battery low	• Turned on when battery voltage reduces to less than specified. Turned off when battery voltage becomes normal.	○	Usable with all types of CPUs.
*1 M9007	Battery low latch	OFF:Normal ON: Battery low	• Turned on when battery voltage reduces to less than specified. Remains on if battery voltage becomes normal	○	Usable with all types of CPUs.
*1 M9008	Self-diagnostic error	OFF:No error ON: Error	• Turned on when error is found as a result of self-diagnosis.	○	Usable with all types of CPUs.
M9009	Annunciator detection	OFF:No detection ON: Detected	• Turned on when OUT F of SET F instruction is executed. Switched off when D9124 data is zeroed.	○	Usable with all types of CPUs.
M9010	Operation error flag	OFF:No error ON: Error	• Turned on when operation error occurs during execution of application instruction. Turned off when error is eliminated.	△	Unusable with A3H, A3M, AnA, A2AS, A3A board, AnU and QCPU-A (A Mode).
*1 M9011	Operation error flag	OFF:No error ON: Error	• Turned on when operation error occurs during execution of application instruction. Remains on if normal status is restored.	○	Usable with all types of CPUs.
M9012	Carry flag	OFF:Carry off ON: Carry on	• Carry flag used in application instruction.	○	Usable with all types of CPUs.

Table 2.1 Special Relay List (Continued)

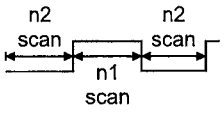
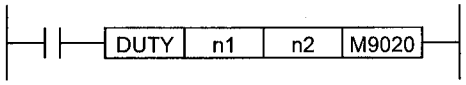
Number	Name	Description	Details	Applicable CPU	
M9016	Data memory clear flag	OFF: No processing ON: Output clear	• Clears the data memory including the latch range (other than special relays and special registers) in remote run mode from computer, etc. when M9016 is on.	○	Usable with all types of CPUs.
M9017	Data memory clear flag	OFF:No processing ON: Output clear	• Clears the unlatched data memory (other than special relays and special registers) in remote run mode from computer, etc. when M9017 is on.	○	Usable with all types of CPUs.
*2 M9018	Data link monitor switching	OFF:F link ON: R link	• Specifies the lines to be monitored for link monitoring.	—	Dedicated to A3V.
M9020	User timing clock No. 0		• Relay that repeats on/off at intervals of predetermined scan. • When power is turned on or reset is per-formed, the clock starts with off. • Set the intervals of on/off by DUTY instruction. 	○	Usable with all types of CPUs.
M9021	User timing clock No. 1				
M9022	User timing clock No. 2				
M9023	User timing clock No. 3				
M9024	User timing clock No. 4				
*2 M9025	Clock data set request	OFF:No processing ON: Set requested	• Writes clock data from D9025-D9028 to the clock element after the END instruction is executed during the scan in which M9025 has changed from off to on.	△	Unusable with An, A3H, A3M, A3V, A2C and A0J2H.
M9026	Clock data error	OFF:No error ON: Error	• Switched on by clock data (D9025 to D9028) error and switched off without an error.	△	Unusable with An, A3H, A3M, A3V, A2C and A0J2H.
M9027	Clock data display	OFF:No processing ON: Display	• Clock data such as month, day, hour, minute and minute are indicated on the CPU front LED display.	△	Usable with A3N, A3A, A3U, A4U, A73 and A3N board.
*2 M9028	Clock data read request	OFF:No processing ON: Read request	• Reads clock data to D9025-D9028 in BCD when M9028 is on.	△	Unusable with An, A3H, A3M, A3V, A2C and A0J2H.
*2 M9029	Data communication request batch process	OFF:No batch process ON: Batch process	• Turn M9029 on in the sequence program to process all data communication requests, which have been received in the entire scan, during END process of the scan. • The data communication request batch process can be turned on or off during operation. • OFF in default state (Each data communication request is processed at the END process in the order of reception.)	△	Usable with AnU and A2US(H).

Table 2.1 Special Relay List (Continued)

Number	Name	Description	Details	Applicable CPU	
M9030	0.1 second clock	0.05 seconds / 0.05 seconds	• 0.1 second, 0.2 second, 1 second, 2 second, and 1 minute clocks are generated. • Not turned on and off per scan but turned on and off even during scan if corresponding time has elapsed. • Starts with off when power is turned on or reset is performed.	△	Unusable with A3V.
M9031	0.2 second clock	0.1 seconds / 0.1 seconds			
M9032	1 second clock	0.5 seconds / 0.5 seconds			
M9033	2 second clock	1 second / 1 second			
M9034	1 minute clock	30 seconds / 30 seconds			
M9036	Normally ON	ON / OFF	• Used as dummy contacts of initialization and application instruction in sequence program. • M9036 and M9037 are turned on and off without regard to position of key switch on CPU front. M9038 and M9039 are under the same condition as RUN status except when the key switch is at STOP position, and turned off and on. Switched off if the key switch is in STOP position. M9038 is on for one scan only and M9039 is off for one scan only if the key switch is not in STOP position.	○	Usable with all types of CPU.
M9037	Normally OFF	ON / OFF			
M9038	On only for 1 scan after run	ON / OFF, 1 scan			
M9039	RUN flag (off only for 1 scan after run)	ON / OFF, 1 scan			
M9040	PAUSE enable coil	OFF:PAUSE disabled ON: PAUSE enabled	• When RUN key switch is at PAUSE position or remote pause contact has turned on and if M9040 is on, PAUSE mode is set and M9041 is turned on.	○	Usable with all types of CPU.
M9041	PAUSE status contact	OFF:Not during pause ON: During pause			
M9042	Stop status contact	OFF:Not during stop ON: During stop	• Switched on when the RUN key switch is in STOP position.	○	Usable with all types of CPU.
M9043	Sampling trace completion	OFF:During sampling trace ON: Sampling trace completion	• Turned on upon completion of sampling trace performed the number of times preset by parameter after STRA instruction is executed. Reset when STRAR instruction is executed.	△	Unusable with A1 and A1N.
M9044	Sampling trace	OFF → ON: STRA Same as execution ON → OFF: STRAR Same as execution	• Turning on/off M9044 can execute STRA / STRAR instruction. (M9044 is forcibly turned on/off by a peripheral device.) When switched from OFF to ON: STRA instruction When switched from ON to OFF: STRAR instruction The value stored in D9044 is used as the condition for the sampling trace. At scanning, at time → Time (10 msec unit)	△	Unusable with A1 and A1N.
M9045	Watchdog timer (WDT) reset	OFF:WDT not reset ON: WDT reset	• Turn on M9045 to reset the WDT upon execution of a ZCOM instruction or data communication request batch process. (Use this function for scan times exceeding 200 ms.)	△	Unusable with A1 and A1N.

Table 2.1 Special Relay List (Continued)

Number	Name	Description	Details	Applicable CPU	
M9046	Sampling trace	OFF:Except during trace ON: During trace	• Switched on during sampling trace.	△	Unusable with A1 and A1N.
M9047	Sampling trace preparation	OFF:Sampling trace stop ON: Sampling trace start	• Turn on M9047 to execute sampling trace. Sampling trace is interrupted if M9047 is turned off.	△	Unusable with A1 and A1N.
*2 M9048	RUN LED flicker flag	ON: Flickers at annunciator on. OFF:No flicker at annunciator on.	• Sets whether the RUN LED flickers or not when the annunciator relay F □ is turned on when the A0J2H is used.	—	Usable with A0J2H.
M9048	Memory card battery voltage detection	OFF:Low voltage is not detected. ON: Low voltage is detected.	• Turned ON when the drop in the battery voltage for the memory card is detected. (Automatically turned OFF when the voltage recovers to normal.)	—	Dedicated to QCPU-A (A Mode).
M9049	Switching the number of . output characters	OFF:Up to NUL code are output. ON: 16 characters are output.	• When M9049 is off, up to NUL (00H) code are output. • When M9049 is on, ASCII codes of 16 characters are output.	△	Unusable with An, A3V, A2C and A52G.
*2 M9050	Operation result storage memory change contact (for CHG instruction)	OFF:Not changed ON: Changed	• Switched on to exchange the operation result storage memory data and the save area data.	—	Dedicated to A3.
M9051	CHG instruction execution disable	OFF:Enable ON: Disable	• Switched on to disable the CHG instruction. • Switched on when program transfer is requested and automatically switched off when transfer is complete.	—	Usable with A3, A3N, A3H, A3M, A3V, A3A, A3U, A4U, A73 and A3N board.
*2 M9052	SEG instruction switching	OFF:7SEG display ON: Partial refresh	• Switched on to execute the SEG instruction as a partial refresh instruction. Switched off to execute the SEG instruction as a 7SEG display instruction.	△	Unusable with An, A3H, A3M, A3V, AnA, AnU, A3V and A3A board.
*2 M9053	EI / DI instruction switching	OFF:Sequence interrupt control ON: Link interrupt control	• Switched on to execute the link refresh enable, disable (EI, DI) instructions.	△	Unusable with An, A3V and A3N board.
M9054	STEP RUN flag	OFF:Other than step run ON: During step run	• Switched on when the RUN key switch is in STEP RUN position.	△	Unusable with An, AnS, AnSH, A1FX, A2C, A0J2H, and A52G.
M9055	Status latch complete flag	OFF:Not complete ON: Complete	• Turned on when status latch is completed. Turned off by reset instruction.	△	Unusable with A1 and A1N.
M9056	Main program P, I set request	OFF:Other than P, I set request ON: P, I set request	• Provides P, I set request after transfer of the other program (for example subprogram when main program is being run) is complete during run. Automatically switched off when P, I setting is complete.	—	Usable with A3, A3N, A3H, A3M, A3V, A3A, A73, A3U, A4U and A3N board.
M9057	Subprogram 1 P, I set request	OFF:Except during P, I set request ON: During P, I set request			
M9060	Subprogram 2 P, I set request			—	Dedicated to A4U.
M9061	Subprogram 3 P, I set request				

Table 2.1 Special Relay List (Continued)

Number	Name	Description	Details	Applicable CPU	
M9060	Remote terminal error	OFF:Normal ON: Error	• Turned on when one of remote terminal modules has become a faulty station. (Communication error is detected when normal communication is not restored after the number of retries set at D9174.) • Turned off when communication with all re-mote terminal modules is restored to normal with automatic online return enabled. • Remains on when automatic online return is disabled. • Not turned on or off when communication is suspended at error detection.	—	Usable with A2C and A52G.
M9061	Communication error	OFF:Normal ON: Error	• Turned on when communication with a remote terminal module or an I/O module is faulty. • Communication error occurs due to the following reasons. • Initial data error • Cable breakage • Power off for remote terminal modules or I/O modules • Turned off when communication is restored to normal with automatic online return enabled. • Remains on when communication is suspended at error detection with automatic online return disabled.	—	Usable with A2C and A52G.
M9065	Divided transfer status	OFF:Other than divided processing ON: Divided processing	• Turned on when canvas screen transfer to AD57 (S1)/AD58 is done by divided processing, and turned off at completion of divided processing.	—	Usable with AnA, and AnU.
*2 M9066	Transfer processing switching	OFF:Batch transfer ON: Divided transfer	• Turned on when canvas screen transfer to AD57 (S1)/AD58 is done by divided processing.	—	Usable with AnA, and AnU.
M9067	I/O module error detection	OFF:Normal ON: Error	• Turned on when one of I/O modules has become a faulty station. (Communication error is detected when normal communication is not restored after the number of retries set at D9174.) • Turned off when communication with all I/O modules is restored to normal with automatic online return enabled. • Remains on when automatic online return is disabled. • Not turned on or off when communication is suspended at error detection.	—	Usable with A2C and A52G.
M9068	Test mode	OFF:Automatic online return enabled Automatic online return disabled Communication suspended at online error ON: Line check	• Turned on when line check with I/O modules and remote terminal modules is performed. • Turned off when communication with I/O modules and remote terminal modules is per-formed.	—	Usable with A2C and A52G.
M9069	Output at line error	OFF:All outputs are turned off. ON: Outputs are retained.	• Sets whether all outputs are turned off or retained at communication error. OFF: All outputs are turned off at communication error. ON: Outputs before communication error are retained.	—	Usable with A2C and A52G.

Table 2.1 Special Relay List (Continued)

Number	Name	Description	Details	Applicable CPU	
*2 M9070	Time required for search of A8UPU/A8PUJ	OFF:Reading time reduction OFF ON: Reading time reduction ON	• Turn on to reduce the search time of A8UPU/ A8PUJ. (In this case, the scan time of the CPU module extends by 10%.)	△	Usable with AnU and A2US(H).
*1 M9073	WDT error flag	OFF:No WDT error ON: WDT error	• Turns on when WDT error is detected by the self-check of the PCPU.	—	Dedicated to A73.
M9073	Clock data set request	OFF:No processing ON: Set request is made	• The clock data registered in D9073 to D9076 is written to the clock device after the execution of the END instruction of the scan in which the state of M9073 changes from OFF to ON.	—	Dedicated to A2CCPUC24 (-PRF).
M9073	Setting of writing to flash ROM	OFF:Disables writing to ROM ON: Enables writing to ROM	• Turned on to enable writing to the flash ROM. (DIP switch 3 should be set to ON.)	—	Dedicated to QCPU-A (A Mode).
M9074	PCPU ready complete flag	OFF:PCPU ready incomplete ON: PCPU ready complete	• Set if the motor is not running when it is checked at PC ready (M2000) on. Turned off when M2000 is turned off.	—	Dedicated to A73.
M9074	Clock data error	OFF:No error ON: Error occurred	• This goes ON when a clock data (D9073 to D9076) error occurs. This remains OFF when there is no error.	—	Dedicated to A2CCPUC24 (-PRF).
M9074	Request for writing to flash ROM	OFF → ON: Starts writing to ROM	• When turned from OFF to ON, writing to the built-in ROM is started.	—	Dedicated to QCPU-A (A Mode).
M9075	Test mode flag	OFF:Other than test mode ON: Test mode	• Turned ON when a test mode request is made from a peripheral device. Reset when test mode is finished.	—	Dedicated to A73.
M9075	Successful completion of writing to built-in ROM	OFF:Failed writing to ROM ON: Successfully completed writing to ROM	• Turned on when writing to the built-in ROM is successfully completed. (This status is stored in D9075.)	—	Dedicated to QCPU-A (A Mode).
M9076	External emergency stop input flag	OFF:External emergency stop input is on. ON: External emergency stop input is off.	• Turned off when the external emergency stop input connected to the EMG terminal of A70SF is turned on. Turned on when the external emergency stop input is turned off.	—	Dedicated to A73.
M9076	Clock data read request	OFF:No procesing ON: Read request is made	• When M9076 is ON, clock data is read out to D9073 to D9076 in BCD values.	—	Dedicated to A2CCPUC24 (-PRF).
M9076	Status of writing to built-in ROM	OFF:Writing to ROM disabled ON: Writing to ROM enabled	• Turns ON when writing to built-in ROM is enabled. (Turns ON when DIP switch and M9073 are ON.)	—	Dedicated to QCPU-A (A Mode).
M9077	Manual pulse generator axis setting error flag	OFF:All axes normal ON: Error axis detected	• Turned on when there is an error in the contents of manual pulse generator axis setting. Turned off if all axes are normal when the manual pulse generator enable flag is turned on.	—	Dedicated to A73.

Table 2.1 Special Relay List (Continued)

<table>
<tr><th>Number</th><th>Name</th><th>Description</th><th>Details</th><th colspan="2">Applicable CPU</th></tr>
<tr><td>M9077</td><td>Sequence accumulation time measurement</td><td>OFF:Time not elapsed
ON: Time elapsed</td><td>• Compares the setting value at D9077 with the time elapsed from the start of measurement (accumulation time) at every scan. Then, performs the following operations:
Setting value > Accumulation time:
Turns M9077 ON and clears the accumulation time.
Setting value < Accumulation time:
Turns M9077 from ON to OFF and clears the accumulation time. When M9077 is already OFF, clears the accumulation time.
* When 1 to 255 is designated at D9077, M9077 is turned ON at the first scan.
* When the value other than 1 to 255 is designated at D9077, the value in D9077 is reset to 0 and M9077 is always turned OFF.</td><td>—</td><td>Dedicated to QCPU-A (A Mode).</td></tr>
<tr><td>M9078</td><td>Test mode request error flag</td><td>OFF:No error
ON: Error</td><td>• Turned on when test mode is not available though a test mode request was made from a peripheral device. Turned off if test mode becomes available by making another test mode request.</td><td>—</td><td>Dedicated to A73.</td></tr>
<tr><td>M9079</td><td>Servo program setting error flag</td><td>OFF:No data error
ON: Data error</td><td>• Turned on when the positioning data of the servo program designated by the DSFRP instruction has an error.
Turned off when the data has no error after the DSFRP instruction is executed again.</td><td>—</td><td>Dedicated to A73.</td></tr>
<tr><td>M9080</td><td>BUSY flag for execution of CC-Link dedicated instruction</td><td>OFF: Number of remaining instructions executable simultaneously: 1 to 10
ON: Number of remaining instructions executable simultaneously: 0</td><td>Turned ON/OFF according to the number of remaining instructions (RIRD / RIWT / RISEND / RIRCV) being executable simultaneously at one scan.
OFF: Number of remaining instructions executable simultaneously: 1 to 10
ON: Number of remaining instructions executable simultaneously: 0
By assigning M9080 as execution condition, the number of instructions above executed simultaneously at one scan can be limited to 10 or less.
*4: This function is available with the CPU of the following S/W versions or later.
<table>
<tr><th>CPU Type Name</th><th>Software Version</th></tr>
<tr><td>Q02CPU-A, Q02HCPU-A, Q06HCPU-A</td><td rowspan="2">Available with all versions</td></tr>
<tr><td>A1SJHCPU, A1SHCPU, A2SHCPU</td></tr>
<tr><td>A2UCPU(S1), A3UCPU, A4UCPU</td><td>S/W version Q (Manufactured in July, 1999)</td></tr>
<tr><td>A2USCPU(S1)</td><td>S/W version E (Manufactured in July, 1999)</td></tr>
<tr><td>A2USHCPU-S1</td><td>S/W version L (Manufactured in July, 1999)</td></tr>
</table></td><td>△</td><td>Can be used only with AnU, A2US, or AnSH, QCPU-A (A Mode). *4</td></tr>
</table>

Table 2.1 Special Relay List (Continued)

Number	Name	Description	Details	Applicable CPU	
M9081	Registration area busy signal for communication request	OFF:Communication request to remote terminal modules enabled ON: Communication request to remote terminal modules disabled	• Indication of communication enable/disable to remote terminal modules connected to the MINI (S3) link module, A2C or A52G.	—	Usable with AnA, AnA, AnU, A2AS, QCPU-A (A Mode) A2C and A52G.
M9082	Final station number disagreement	OFF:Final station number agreement ON: Final station number disagreement	• Turned on when the final station number of the remote terminal modules and remote I/O modules connected to the A2C or A52G disagrees with the total number of stations set in the initial setting. • Turned off when the final station number agrees with the total number of stations at STOP → RUN.	—	Dedicated to A2C and A52G.
*2 M9084	Error check	OFF:Checks enabled ON: Checks disabled	• Specify whether the following errors are to be checked or not after the END instruction is executed (to set END instruction processing time): • Fuse blown • I/O unit verify error • Battery error	△	Unusable with An, A2C and A3V.
M9086	BASIC program RUN flag	OFF:A3M-BASIC stop ON: A3M-BASIC run	• Turned on when the A3M-BASIC is in RUN state, and turned off when it is in STOP state.	—	Dedicated to A3M.
M9087	BASIC program PAUSE flag	OFF:A3M-BASIC RUN enable ON: A3M-BASIC disable	• Specifies enable/disable of A3M-BASIC execution when the A3MCPU is in PAUSE state. OFF: A3M-BASIC is executed. ON: A3M-BASIC is not executed.	—	Dedicated to A3M.
M9090	Power supply problem status on the PC side	OFF:Normal ON: Power off	• Turns on if the power to the PC side is shut off when the external power supply is connected to the CPU board. It stays on even after the status becomes normal.	—	Dedicated to A2USH board.
*1 M9091	Operation error detail flag	OFF:No error ON: Error	• Turned on when an operation error detail factor is stored at D9091, and remains ON after normal state is restored.	—	Usable with AnA, A2AS, AnU and QCPU-A (A Mode).
*1 M9091	Microcomputer subroutine call error flag	OFF:No error ON: Error	• Turned on when an error occurred at execution of the microcomputer program package, and remains ON after normal state is restored.	—	Unusable with AnA, A2AS, AnU and QCPU-A (A Mode).
M9092	External power supply problem status	OFF:Normal ON: Power off	• Turns on when the external power being supplied to the CPU board is shut off. It stays on even after the status becomes normal.	—	Dedicated to A2USH board.
M9092	Duplex power supply overheat error	OFF:Normal ON: Overheat	• Turned on when overheat of a duplex power supply module is detected.	—	Dedicated to A3V.
M9093	Duplex power supply error	OFF:Normal ON: Failure or AC power supply down	• Turned on when a duplex power supply module caused failure or the AC power supply is cut down.	—	Dedicated to A3V.

Table 2.1 Special Relay List (Continued)

Number	Name	Description	Details	Applicable CPU	
*2 *3 M9094	I/O change flag	OFF: Changed ON: Not changed	• After the head address of the required I/O module is set to D9094, switching M9094 on allows the I/O module to be changed in online mode. (One module is only allowed to be changed by one setting.) • To be switched on in the program or peripheral device test mode to change the module during CPU RUN. To be switched on in peripheral device test mode to change the module during CPU STOP. • RUN/STOP mode must not be changed until I/O module change is complete.	—	Usable with An, AnN, AnA, AnU.
M9095	Duplex operation verify error	OFF: Normal ON: Duplex operation verify error	• During duplex operation of the operating CPU with a stand-by CPU, verification is performed by the both to each other. Turned on when a verify error occurred.	—	Dedicated to A3V.
M9096	A3VCPU A selfcheck error	OFF: No error ON: Error	• Turn on when a self-check error occurred on the A3VCPU A mounted next to the A3VTU.	—	Dedicated to A3V.
M9097	A3VCPU B selfcheck error	OFF: No error ON: Error	• Turn on when a self-check error occurred on the A3VCPU B mounted next to the A3VCPU A.	—	Dedicated to A3V.
M9098	A3VCPU C selfcheck error	OFF: No error ON: Error	• Turn on when a self-check error occurred on the A3VCPU C mounted next to the A3VCPU B.	—	Dedicated to A3V.
M9099	A3VTU selfcheck error	OFF: No error ON: Error	• Turned on when a self-check error occurred on the A3VTU.	—	Dedicated to A3V.
M9100	SFC program registration	OFF: No SFC program ON: SFC program registered	• Turned on if the SFC program is registered, and turned off if it is not.	—	Usable with AnN*, AnA*, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.
*2 M9101	SFC program start/stop	OFF: SFC program stop ON: SFC program start	• Should be turned on by the program if the SFC program is to be started. If turned off, operation output of the execution step is turned off and the SFC program is stopped.	—	Usable with AnN*, AnA*, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.
*2 M9102	SFC program starting status	OFF: Initial start ON: Continuous start	• Selects the starting step when the SFC program is restarted using M9101. ON: Started with the step of the block being executed when the program stopped. OFF: All execution conditions when the SFC program stopped are cleared, and the program is started with the initial step of block 0. • Once turned on, the program is latched in the system and remains on even if the power is turned off. Should be turned off by the sequence program when turning on the power, or when starting with the initial step of block 0.	—	Usable with AnN*, AnA*, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.

*: Usable with AnN and AnA which are compatible with SFC.
For the AnN and AnA which are compatible with SFC, refer to the MELSAP-II Programming Manual.

Table 2.1 Special Relay List (Continued)

Number	Name	Description	Details	Applicable CPU	
M9103 *2	Consecutive step transfer enable/disable	OFF: Consecutive step transfer disable ON: Consecutive step transfer enable	• Selects consecutive or step-by-step transfer of steps of which transfer conditions are established when all of the transfer conditions of consecutive steps are established. ON: Consecutive transfer is executed. OFF: One step per one scan is transferred.	—	Usable with AnN*, AnA*, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.
M9104	Consecutive transfer prevention flag	OFF: Transfer complete ON: Transfer incomplete	• Turned on when consecutive transfer is not executed with consecutive transfer enabled. Turned off when transfer of one step is completed. Consecutive transfer of a step can be prevented by writing an AND condition to corresponding M9104.	—	Usable with AnN*, AnA*, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.
M9108 *2	Step transfer monitoring timer start (corresponds to D9108)	OFF: Monitoring timer reset ON: Monitoring timer reset start	• Turned on when the step transfer monitoring timer is started. Turned off when the monitoring timer is reset.	—	Usable with AnN*, AnA*, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.
M9109 *2	Step transfer monitoring timer start (corresponds to D9109)				
M9110 *2	Step transfer monitoring timer start (corresponds to D9110)				
M9111 *2	Step transfer monitoring timer start (corresponds to D9111)				
M9112 *2	Step transfer monitoring timer start (corresponds to D9112)				
M9113 *2	Step transfer monitoring timer start (corresponds to D9113)				
M9114 *2	Step transfer monitoring timer start (corresponds to D9114)				

*: Usable with AnN and AnA which are compatible with SFC.
For the AnN and AnA which are compatible with SFC, refer to the MELSAP-II Programming Manual.

Table 2.1 Special Relay List (Continued)

Number	Name	Description	Details	Applicable CPU	
M9180	Active step sampling trace complete flag	OFF:Trace start ON: Trace complete	• Turned on when sampling trace of all specified blocks is completed. Turned off when sampling trace is started.	—	Usable with AnN*, AnA*, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.
M9181	Active step sampling trace execution flag	OFF:Trace not executed. ON: Trace being executed.	• Turned on when sampling trace is being executed. Turned off when sampling trace is completed or suspended.	—	Usable with AnN*, AnA*, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.
*2 M9182	Active step sampling trace enable	OFF:Trace disable/ suspend ON: Trace enable	• Selects sampling trace execution enable/disable. ON: Sampling trace execution is enabled. OFF: Sampling trace execution is disabled. If turned off during sampling trace execution, trace is suspended.	—	Usable with AnN*, AnA*, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.
*2 M9196	Operation output at block stop	OFF:Coil output off ON: Coil output on	• Selects the operation output when block stop is executed. ON: Retains the ON/OFF status of the coil being used by using operation output of the step being executed at block stop. OFF: All coil outputs are turned off. (Operation output by the SET instruction is retained regardless of the ON/OFF status of M9196.)	—	Usable with AnN*, AnA*, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.
M9197 M9198	Fuse blow, I/O verify error display switching	M9197 / M9198 / I/O numbers to be displayed: OFF / OFF / X/Y0 to 7F0 ON / OFF / X/Y800 to FF0 OFF / ON / X/Y1000 to 17F0 ON / ON / X/Y1800 to 1FF0	• Switches I/O numbers in the fuse blow module storage registers (D9100 to D9107) and I/O module verify error storage registers (D9116 to D9123) according to the combination of ON/OFF of the M9197 and M9198.	—	Usable with AnU, A2AS and QCPU-A (A Mode).
M9199	Data recovery of online sampling trace / status latch	OFF:Data recovery OFF ON: Data recovery ON	• When sampling trace / status latch is executed, the setting data stored in the CPU module is recovered to enable restart. • Turn on M9199 to execute again. (There is no need to write data with the peripheral device.)	—	Usable with AnU, A2AS and QCPU-A (A Mode).

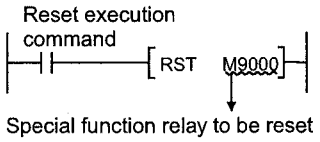
*: Usable with AnN and AnA which are compatible with SFC.
For the AnN and AnA which are compatible with SFC, refer to the MELSAP-II Programming Manual.

POINT

(1) Contents of the M special relays are all cleared by power off, latch clear or reset with the reset key switch. When the RUN/STOP key switch is set in the STOP position, the contents are retained.

(2) The above relays with numbers marked *1 remain "on" if normal status is restored. Therefore, to turn them "off", use the following method:

(a) Method by use program
Insert the circuit shown at right into the user program and turn on the reset execution command contact to clear the special relay M.



(b) Use the test function of the peripheral device to reset forcibly.
For the operation procedure, refer to the manuals for peripheral devices.

(c) By moving the RESET key switch on the CPU front to the RESET position, the special relays are turned off.

(3) Special relays marked *2 above are switched on/off in the sequence program.

(4) Special relays marked *3 above are switched on/off in test mode of the peripheral equipment.

(5) Turn OFF the following special relays after resetting the related special resisters. Unless the related special registers are reset, the special relays will be turned ON again even if they are turned reset. (Except for the AnU, A2US(H), and QCPU-A (A mode).)

Special Relay	Related Special Resister
M9000	D9100 to D9107
M9001	D9116 to D9123

2.2 Special Registers D

The special registers are data registers used for specific purposes. Therefore, do not write data to the special registers in the program (except the ones with numbers marked *2 in the table).

Table 2.2 Special Registers List

<table>
<tr><th>Number</th><th>Name</th><th>Description</th><th>Details</th><th colspan="2">Applicable CPU</th></tr>
<tr><td>D9000</td><td>Fuse blow</td><td>Fuse blow module number</td><td>• When fuse blown modules are detected, the lowest number of detected units is stored in hexadecimal. (Example: When fuses of Y50 to 6F output modules have blown, "50" is stored in hexadecimal) To monitor the number by peripheral devices, perform monitor operation given in hexadecimal.
(Cleared when all contents of D9100 to D9107 are reset to 0.)
• Fuse blow check is executed also to the output modules of remote I/O stations.</td><td>△</td><td>Unusable with A0J2H.
(Only remote I/O station information is valid for A2C.)</td></tr>
<tr><td>D9001</td><td>Fuse blow</td><td>Fuse blow module number</td><td>• Stores the module numbers corresponding to setting switch numbers or base slot numbers when fuse blow occurred.
<table>
<tr><th colspan="2">I/O Module for A0J2</th><th colspan="2">Extension Base Unit</th></tr>
<tr><th>Setting Switch</th><th>Stored Data</th><th>Base Unit Slot No.</th><th>Stored Data</th></tr>
<tr><td>0</td><td>1</td><td>0</td><td>5</td></tr>
<tr><td>1</td><td>2</td><td>1</td><td>6</td></tr>
<tr><td>2</td><td>3</td><td>2</td><td>7</td></tr>
<tr><td>3</td><td>4</td><td>3</td><td>8</td></tr>
<tr><td>4</td><td>5</td><td></td><td></td></tr>
<tr><td>5</td><td>6</td><td></td><td></td></tr>
<tr><td>6</td><td>7</td><td></td><td></td></tr>
<tr><td>7</td><td>8</td><td></td><td></td></tr>
</table>
• In case of remote I/O station, (module I/O number/10H) + 1 is stored.</td><td>—</td><td>Dedicated to A0J2H.</td></tr>
<tr><td rowspan="2">D9002</td><td rowspan="2">I/O module verify error</td><td rowspan="2">I/O module verify error unit number</td><td>• If an I/O module whose data is different from the entered data when the power is turned on is detected, the head I/O number of the detected module is stored in hexadecimal. When the situation is detected in multiple modules, the lowest number among the module will be stored. (Storing method is the same as that of D9000.) To monitor the number by peripheral devices, perform monitor operation given in hexadecimal.
(Cleared when all contents of D9116 to D9123 are reset to 0.)
• I/O module verify check is executed also to the modules of remote I/O terminals.</td><td>△</td><td>Unusable with A0J2H.
(Only remote I/O station information is valid for A2C.)</td></tr>
<tr><td>• If an I/O module, of which data is different from data entered, is detected when the power in turned on, the I/O number corresponding to the setting switch No. or base unit No. is stored.(Storing method is the same as that of D9001).
• In case of remote I/O station, (module I/O number/10H) + 1 is stored.</td><td>—</td><td>Dedicated to A0J2H.</td></tr>
</table>

Table 2.2 Special Registers List (Continued)

Number	Name	Description	Details	Applicable CPU	
D9003	SUM instruction detection bits	The number of bits detected by SUM instruction detection.	• The number of bits detected by execution of the SUM instruction are stored. in BIN code and updated every execution thereafter.	—	Dedicated to A0J2H.
*1 D9004	MINI link master module error	Error detection status	• Error status of the MINI (S3) link detected on loaded MINI (S3) link module is stored. b15 to b8 b7 to b0 8 7 6 5 4 3 2 1 | 8 7 6 5 4 3 2 1 Data communication between the PLC CPU and MINI (S3) link module is disabled. Bits which correspond to the signals of MINI (S3) link module, shown below, are turned on as the signals are turned on. · Hardware error (X0/X20) · MINI(S3) link error detection (X6/X26) · MINI(S3) link communication error (X7/X27)	—	Usable with AnA, A2AS, AnA board and AnU.
*1 D9005	AC DOWN counter	AC DOWN count	• 1 is added each time input voltage becomes 85% or less of rating while the CPU unit is performing operation, and the value is stored in BIN code.	○	Usable with all types of CPUs.
D9006	Battery low	Indicates the CPU module of which battery voltage is low.	• Bits which correspond to CPU of which battery is low are turned on in D9006, as shown below. B15 B3 B2 B1 B0 0 0 CPU A CPU B CPU C 0: Normal 1: Battery low	—	Dedicated to A3V.
*1 D9008	Shelf-diagnostic error	Self-diagnostic error number	• When error is found as a result of self-diagnosis, error number is stored in BIN code.	○	Usable with all types of CPUs.
D9009	Annunciator detection	F number at which external failure has occurred	• When one of F0 to 255 is turned on by OUT F or SET F , the F number, which has been detected earliest among the F numbers which have turned on, is stored in BIN code. • D9009 can be cleared by RST F or LEDR instruction. If another F number has been detected, the clearing of D9009 causes the next number to be stored in D9009.	△	Unusable with A3, A3N, A3A, A73 and A3N board.
			• When one of F0 to 255 is turned on by OUT F or SET F , the F number, which has been detected earliest among the F numbers which have turned on, is stored in BIN code. • D9009 can be cleared by executing RST F or LEDR instruction or moving INDICATOR RESET switch on CPU front to ON position. If another F number has been detected, the clearing of D9009 causes the nest number to be stored in D9009.	—	Usable with A3, A3N, A3A, A73 and A3N board.

Table 2.2 Special Registers List (Continued)

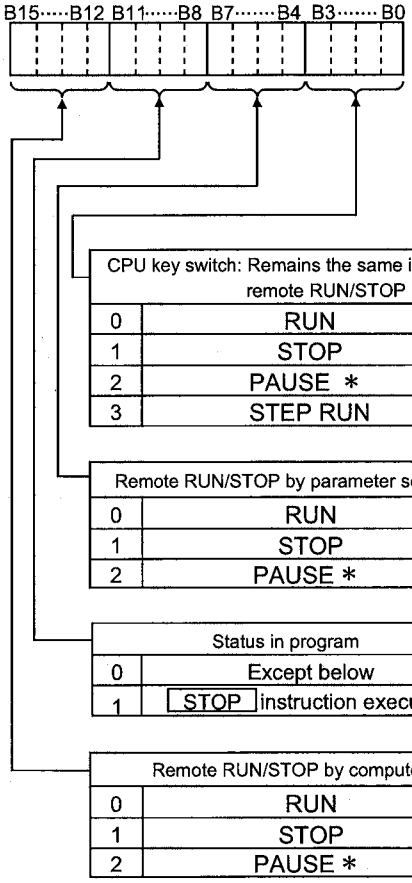
Number	Name	Description	Details	Applicable CPU	
D9010	Error step	Step number at which operation error has occurred	• When operation error has occurred during execution of application instruction, the step number, at which the error has occurred, is stored in BIN code. Thereafter, each time operation error occurs, the contents of D9010 are renewed.	△	Unusable with A3H and A3M.
D9011 *1	Error step	Step number at which operation error has occurred	• When operation error has occurred during execution of application instruction, the step number, at which the error has occurred, is stored in BIN code. Since storage into D9011 is made when M9011 changes from off to on, the contents of D9010 cannot be renewed unless M9011 is cleared by user program.	○	Usable with all types of CPUs.
D9014	I/O control mode	I/O control mode number	• The I/O control mode set is returned in any of the following numbers: 0. Both input and output in direct mode 1. Input in refresh mode, output in direct mode 3. Both input and output in refresh mode	△	Unusable with An, A3H and A3M.
D9015	CPU operating states	Operating states of CPU	• The operation states of CPU as shown below are stored in D9015.  * When the CPU is in RUN mode and M9040 is off, the CPU remains in RUN mode if changed to PAUSE mode.	○	Usable with all types of CPUs.

Table 2.2 Special Registers List (Continued)

Number	Name	Description	Details	Applicable CPU	
D9016	ROM/RAM setting	0: ROM 1: RAM 2: E^2PROM	• Indicates the setting of memory select chip. One value of 0 to 2 is stored in BIN code.	—	Usable with A1 and A1N.
	Program number	0: Main program (ROM) 1: Main program (RAM) 2: Subprogram (RAM)	• Indicates which sequence program is run presently. One value of 0 to 2 is stored in BIN code. ("2" is not stored when AnS, AnSH, A1FX, A0J2H, A2C, A2, A2N, A2A, A2AS and A2U is used.)	△	Unusable with A1 and A1N.
		0: Main program (ROM) 1: Main program (RAM) 2: Subprogram 1 (RAM) 3: Subprogram 2 (RAM) 4: Subprogram 3 (RAM) 5: Subprogram 1 (ROM) 6: Subprogram 2 (ROM) 7: Subprogram 3 (ROM) 8: Main program (E^2PROM) 9: Subprogram 1 (E^2PROM) A: Subprogram 2 (E^2PROM) B: Subprogram 3 (E^2PROM)	• Indicates which sequence program is run presently. One value of 0 to B is stored in BIN code.	—	Dedicated to AnU.
D9017	Scan time	Minimum scan time (per 10 ms)	• If scan time is smaller than the content of D9017, the value is newly stored at each END. Namely, the minimum value of scan time is stored into D9017 in BIN code.	○	Usable with all types of CPUs.
D9018	Scan time	Scan time (per 10 ms)	• Scan time is stored in BIN code at each END and always rewritten.	○	Usable with all types of CPUs.
D9019	Scan time	Maximum scan time (per 10 ms)	• If scan time is larger than the content of D9019, the value is newly stored at each END. Namely, the maximum value of scan time is stored into D9019 in BIN code.	○	Usable with all types of CPUs.
D9020 *2	Constant scan	Constant scan time (Set by user in 10 ms increments)	• Sets the interval between consecutive user program starts in multiples of 10 ms. 0: No setting 1 to 200: Set. Program is executed at intervals of (set value) × 10 ms.	△	Unusable with An.
D9021	Scan time	Scan time (1 ms unit)	• Scan time is stored and updated in BIN code after every END.	—	Usable with AnA, A2AS, AnU, AnA board and QCPU-A (A Mode).
D9022	1 second counter	Counts 1 every second.	• When the PC CPU starts running, it starts counting 1 every second. • It starts counting up from 0 to 32767, then down to -32768 and then again up to 0. Counting repeats this routine.	—	

Table 2.2 Special Registers List (Continued)

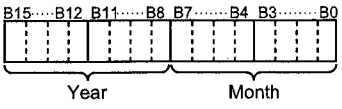
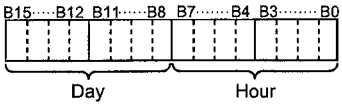
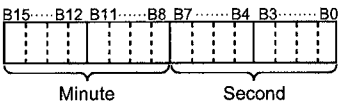
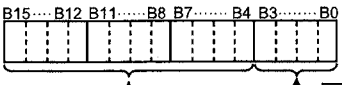
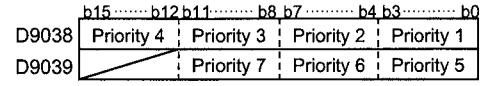
Number	Name	Description	Details	Applicable CPU	
*2 D9025	Clock data	Clock data (Year, month)	• Stores the year (2 lower digits) and month in BCD.  Example: 1987,July H8707	△	Unusable with An, A3H, A3M, A3V, A2C and A0J2H.
*2 D9026	Clock data	Clock data (Day, hour)	• Stores the day and hour in BCD.  Example: 31th,10 o'clock H3110	△	
*2 D9027	Clock data	Clock data (Minute, second)	• Stores the Minute and second in BCD.  Example: 35 minutes, 48 seconds H3548	△	
*2 D9028	Clock data	Clock data (, day of the week)	• Stores the day of the week in BCD.  Example: Friday H0005 0 must be set. Day of the week: 0 Sunday; 1 Monday; 2 Tuesday; 3 Wednesday; 4 Thursday; 5 Friday; 6 Saturday	△	Unusable with An, A3H, A3M, A3V, A2C and A0J2H.

Table 2.2 Special Registers List (Continued)

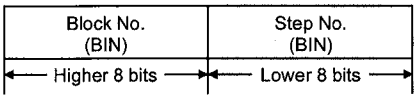
<table>
<tr><th>Number</th><th>Name</th><th>Description</th><th>Details</th><th colspan="2">Applicable CPU</th></tr>
<tr><td>D9021
D9022
D9023
D9024
D9025
D9026
D9027
D9028
D9029
D9030
D9031
D9032
D9033
D9034</td><td>Remote terminal parameter setting</td><td>1 to 61</td><td>• Sets the head station number of remote terminal modules connected to A2C and A52G. Setting is not necessarily in the order of station numbers.
A2CCPUC24:1 to 57
Other CPUs:1 to 61
• Data configuration
D9021 Remote terminal module No.1 area
D9022 Remote terminal module No.2 area
D9033 Remote terminal module No.13 area
D9034 Remote terminal module No.14 area</td><td rowspan="2">—</td><td rowspan="2">Usable with A2C and A52G.</td></tr>
<tr><td>D9035</td><td>Attribute of remote terminal module</td><td>0: MINI standard protocol
1: No protocol</td><td>• Sets attribute of each remote terminal module connected to A2C and A52G with 0 or 1 at each bit.
0: Conforms to the MINI standard protocol or remote terminal unit.
1: No-protocol mode of AJ35PTF-R2
• Data configuration
D9035 b15 b14 b13 b12 b11 b10 b9 b8 b7 b6 b5 b4 b3 b2 b1 b0
Remote terminal No.1
Remote terminal No.2
Remote terminal No.3
Remote terminal No.13
Remote terminal No.14</td></tr>
<tr><td>D9035</td><td>Extension file register</td><td>Use block No.</td><td>• Stores the block No. of the extension file register being used in BCD code.</td><td>—</td><td>Usable with AnA, A2AS, AnU and QCPU-A (A Mode).</td></tr>
<tr><td>D9036</td><td>Total number of stations</td><td>1 to 64</td><td>• Sets the total number of stations (1 to 64) of I/O modules and remote terminal modules which are connected to an A2C or A52G.</td><td>—</td><td>Usable with A2C and A52G.</td></tr>
</table>

Table 2.2 Special Registers List (Continued)

Number	Name	Description	Details	Applicable CPU	
D9036 D9037	For designation extension file register device numbers	The devise number used for getting direct access to each device for extension file register	• Designate the device number for the extension file register for direct read and write in 2 words at D9036 and D9037 in BIN data. Use consecutive numbers beginning with R0 of block No. 1 to designate device numbers. 	—	Usable with AnA, A2AS, AnU and QCPU-A (A Mode).
D9038 D9039	LED indication priority	Priority 1 to 4 Priority 5 to 7	• Sets priority of ERROR LEDs which illuminate (or flicker) to indicate errors with error code numbers. • Configuration of the priority setting areas is as shown below.  • For details, refer to the applicable CPUs User's Manual and the ACPU (Fundamentals) Programming manual.	—	Usable with A2C, AnS, AnSH, A1FX, A0J2H, A52G AnA, A2AS, AnU and QCPU-A (A Mode).
D9044	Sampling trace	Step or time during sampling trace	• The value stored in D9044 is used as the condition of the sampling trace when M9044 is turned on or off with the peripheral device to start sampling trace STRA or STRAR . At scanning ... 0 At time ..... Time (10 ms unit) Stores the value in BIN code for D9044.	Δ	Usable with A1 and A1N.
D9049	SFC program execution work area	Expansion file register block number to be used as the work area for the execution of a SFC program.	• Stores the block number of the expansion file register which is used as the work area for the execution of a SFC program in a binary value. • Stores "0" if an empty area of 16K bytes or smaller, which cannot be expansion file register No. 1, is used or if M9100 is OFF.	—	Usable with AnN*, AnA*, AnU, A2AS, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.
D9050	SFC program error code	Code number of error occurred in the SFC program	• Stores code numbers of errors occurred in the SFC program in BIN code. 0: No error 80: SFC program parameter error 81: SFC code error 82: Number of steps of simultaneous execution exceeded 83: Block start error 84: SFC program operation error		
D9051	Error block	Block number in which an error occurred.	• Stores the block number in which an error occurred in the SFC program in BIN code. In the case of error 83 the starting block number is stored.	—	

*: Usable with AnN and AnA which are compatible with SFC.
For the AnN and AnA which are compatible with SFC, refer to the MELSAP-II Programming Manual.

Table 2.2 Special Registers List (Continued)

<table>
<tr><th>Number</th><th>Name</th><th>Description</th><th>Details</th><th colspan="2">Applicable CPU</th></tr>
<tr><td>D9052</td><td>Error step</td><td>Step number in which an error occurred.</td><td>• Stores the step number in which error 84 occurred in the SFC program in BIN code.
Stores "0" when errors 80, 81 and 82 occurred.
Stored the block starting step number when error 83 occurred.</td><td>—</td><td rowspan="3">Usable with AnN*, AnA*, AnU, A2S, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.</td></tr>
<tr><td>D9053</td><td>Error transfer</td><td>Transfer condition number in which an error occurred.</td><td>• Stores the transfer condition number in which error 84 occurred in the SFC program in BIN code.
Stored "0" when errors 80, 81, 82 and 83 occurred.</td><td>—</td></tr>
<tr><td>D9054</td><td>Error sequence step</td><td>Sequence step number in which an error occurred.</td><td>• Stores the sequence step number of transfer condition and operation output in which error 84 occurred in the SFC program in BIN code.</td><td>—</td></tr>
<tr><td>D9055</td><td>Status latch execution step number</td><td>Status latch execution step number</td><td>• Stores the step number when status latch is executed.
• Stores the step number in a binary value if status latch is executed in a main sequence program.
• Stores the block number and the step number if status latch is executed in a SFC program.
  </td><td>—</td><td>Usable with AnA, A2AS, AnA bpard, AnU and QCPU-A (A Mode).</td></tr>
<tr><td>D9060</td><td>Software version</td><td>Software version of internal system</td><td>Stores the software version of the CPU module's internal system in ASCII codes.
Example: Stores "41H" for version A.
Note)The software version of the internal system may be different from the version marked on the housing.
*5: This function is available with the CPU of the following S/W versions or later.
<table><tr><th>CPU Type Name</th><th>Software Version</th></tr><tr><td>A2ACPU (P21/R21), A2ACPU-S1 (P21/R21)</td><td>S/W version W (Manufactured in July, 1998)</td></tr><tr><td>A3ACPU (P21/R21)</td><td>S/W version X (Manufactured in July, 1998)</td></tr><tr><td>A2UCPU (S1), A3UCPU, A4UCPU</td><td>S/W version H (Manufactured in July, 1998)</td></tr><tr><td>A1SJHCPU, A1SHCPU, A2SHCPU</td><td>S/W version H (Manufactured in May, 1998)</td></tr><tr><td>A2USCPU (S1)</td><td>S/W version Y (Manufactured in July, 1998)</td></tr><tr><td>A2USHCPU-S1</td><td>S/W version E (Manufactured in July, 1998)</td></tr></table></td><td>△</td><td>Can be used only with AnU, A2US, or AnSH. *5</td></tr>
<tr><td>D9061</td><td>Communication error code</td><td>0: Normal
1: Initial data error
2: Line error</td><td>• Stores error code when M9061 is turned on (communication with I/O modules or remote terminal modules fails).
• 1 .....Total number of stations of I/O modules or remote terminal modules or number of retries is not normal. Initial program contains an error.
• 2 .....Cable breakage or power supply of I/O modules or remote terminal modules is turned off.</td><td>—</td><td>Usable with A2C and A52G.</td></tr>
</table>

*: Usable with AnN and AnA which are compatible with SFC.
For the AnN and AnA which are compatible with SFC, refer to the MELSAP-II Programming Manual.

Table 2.2 Special Registers List (Continued)

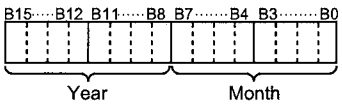
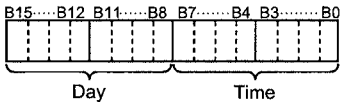
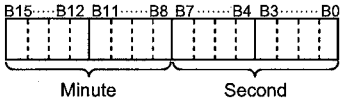
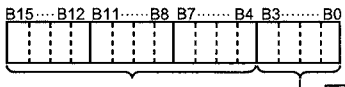
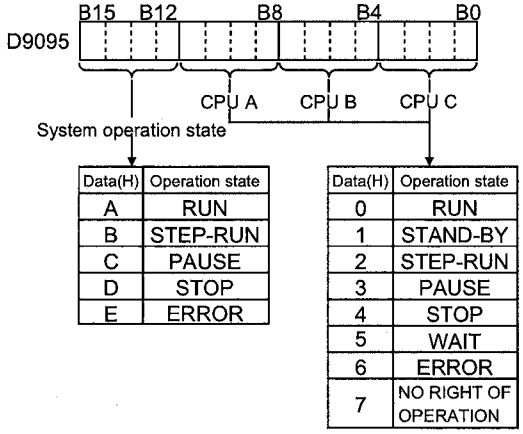
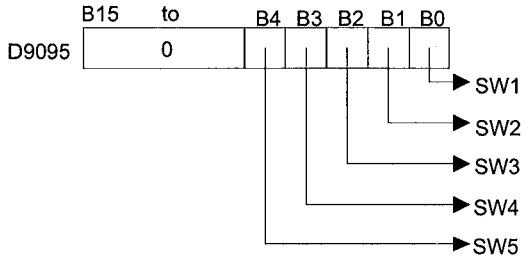
Number	Name	Description	Details	Applicable CPU	
D9068	Abnormal base module	Stores the bit pattern of the abnormal base module	Stores the bit pattern of the base module in abnormal condition. When basic base module is abnormal: Bit 0 turns ON. When 1st expansion base module is abnormal: Bit 1 turns ON. When 2nd expansion base module is abnormal: Bit 2 turns ON. : When 7th expansion base module is abnormal: Bit 7 turns ON.	—	Dedicated to QCPU-A (A Mode).
D9072	PC communication check	Data check by AJ71C24	• In the loopback test mode of individual AJ71C24, the AJ71C24 automatically executes data write/read and communication check.	O	Usable with all types of CPUs.
D9073	Clock data	Clock data (year, month)	• Two digits showing the year (XX of 19XX) and month are stored to D9073 in BCD codes, as shown below.  Example: 1987,July H8707	—	Dedicated to A2CCPUC24 (-PRF).
D9074	Clock data	Clock data (day, time)	• Two digits showing the day and time are stored to D9074 in BCD codes, as shown below.  Example: 31th,10 o'clock H3110		
D9075	Clock data	Clock data (minute, second)	• Two digits showing the minute and second are stored to D9075 in BCD codes, as shown below.  Example: 35 minutes, 48 seconds H3548		Dedicated to A2CCPUC24 (-PRF).
D9075	Result of writing to built-in ROM	Stores the status of writing to the built-in ROM	Stores the status of writing to the built-in ROM. 0: Writing enabled F1H: During RAM operation F2H: Writing to built-in ROM disabled F3H: Failed to erase F4H: Failed to write FEH: Checking erasing FFH: During writing	—	Dedicated to QCPU-A (A Mode).
D9076	Clock data	Clock data (day of the week)	• Two day of the week is stored to D9076 in BCD codes, as shown below.  These digits are always set to 0. Day of the week: 0 Sunday; 1 Monday; 2 Tuesday; 3 Wednesday; 4 Thursday; 5 Friday; 6 Saturday	—	Dedicated to A2CCPUC24 (-PRF).
D9076	Status of writing to built-in ROM	Stores the status of writing (enabled/disabled) to the built-in ROM	Stores the status of writing (enabled/disabled) to the built-in ROM. Statuses of DIP switch 3 and M9073 0: SW3 is OFF, M9073 is OFF/ON 1: SW3 is ON, M9073 is OFF 2: SW3 is ON, M9073 is ON	—	Dedicated to QCPU-A (A Mode).

Table 2.2 Special Registers List (Continued)

<table>
<tr><th>Number</th><th>Name</th><th>Description</th><th>Details</th><th colspan="2">Applicable CPU</th></tr>
<tr><td>D9077</td><td>Sequence accumulation time measurement</td><td>Accumulation time setting</td><td>• Stores the accumulation time used by M9077.
Setting range: 1 to 255ms (Default: 5ms)
* When the value other than 1 to 255 ms is designated, the value in D9077 is reset to 0.</td><td>—</td><td>Dedicated to QCPU-A (A Mode).</td></tr>
<tr><td>D9080</td><td>Number of executable CC-Link dedicated instructions</td><td>Stores the number of remaining CC-Link dedicated instructions being executable</td><td>Stores the number of remaining instructions (RIRD / RIWT / RISEND / RIRCV) being executable simultaneously at one scan.
(With QCUP-A or AnUCPU)
Number of remaining instructions being executable = 10 – Number of instructions executed simultaneously
(With AnSHCPU)
Number of remaining instructions being executable = 64 – Number of instructions executed simultaneously
*6: This function is available with the CPU of the following S/W versions or later.
<table>
<tr><th>CPU Type Name</th><th>Software Version</th></tr>
<tr><td>Q02CPU-A, Q02HCPU-A, Q06HCPU-A</td><td rowspan="2">Available with all versions</td></tr>
<tr><td>A1SJHCPU, A1SHCPU, A2SHCPU</td></tr>
<tr><td>A2UCPU (S1), A3UCPU, A4UCPU</td><td>S/W version Q (Manufactured in July, 1999)</td></tr>
<tr><td>A2USCPU (S1)</td><td>S/W version E (Manufactured in July, 1999)</td></tr>
<tr><td>A2USHCPU-S1</td><td>S/W version L (Manufactured in July, 1999)</td></tr>
</table></td><td>△</td><td>Can be used only with AnU, A2US, QCPU-A (A Mode) or AnSH.*6</td></tr>
<tr><td>D9081</td><td>Number of vacant registration areas for communication requests</td><td>0 to 32</td><td>• Stores the number of vacant registration areas for communication requests executed to remote terminal modules connected to MINI (S3) link module, A2C and A52G.</td><td>—</td><td>Usable with AnA, A2AS, QCPU-A (A Mode), AnU, A2C and A52G.</td></tr>
<tr><td>D9082</td><td>Final connected station number</td><td>Final connected station number</td><td>• Stores the final station number of remote I/O modules and remote terminal modules connected to A2C and A52G.</td><td>—</td><td>Usable with A2C and A52G.</td></tr>
<tr><td>D9085</td><td>Time check time</td><td>1 s to 65535 s</td><td>• Sets the time check time of the data link instructions (ZNRD , ZNWR) for the MELSECNET/10.
• Setting range: 1 s to 65535 s (1 to 65535)
• Setting unit: 1 s
• Default value: 10 s (If 0 has been set, default 10 s is applied)</td><td>—</td><td>Usable with AnU and A2AS, QCPU-A (A Mode).</td></tr>
<tr><td>D9090</td><td>Microcomputer subroutine input data area head device number</td><td>Depends on the micro-computer program package to be used.</td><td>• For details, refer to the manual of each microcomputer program package.</td><td>△</td><td>Unusable with AnA, A2AS, QCPU-A (A Mode) and AnU.</td></tr>
<tr><td rowspan="2">D9091</td><td>Instruction error</td><td>Instruction error detail number</td><td>• Stores the detail code of cause of an instruction error.</td><td>—</td><td>Usable with AnA, A2AS, QCPU-A (A Mode),AnA board and AnU.</td></tr>
<tr><td>Microcomputer subroutine call error code</td><td>Depends on the micro-computer program package to be used.</td><td>• For details, refer to the manual of each microcomputer program package.</td><td>△</td><td>Unusable with AnA, A2AS, QCPU-A (A Mode),AnA board and AnU.</td></tr>
</table>

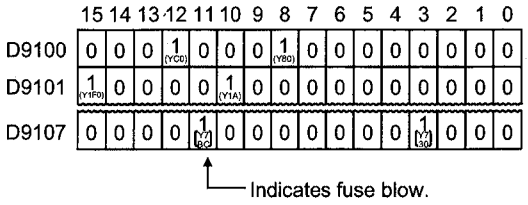
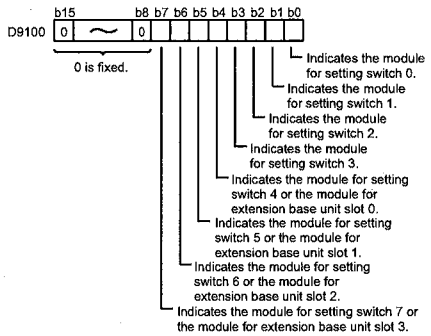
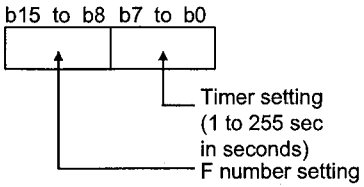
Table 2.2 Special Registers List (Continued)

<table>
<tr><th>Number</th><th>Name</th><th>Description</th><th>Details</th><th colspan="2">Applicable CPU</th></tr>
<tr><td>D9091</td><td>SFC program detail error number</td><td>Detail error number of the error which occurred in a SFC program</td><td>• Stores the detail error number of the error occurred in a SFC program in a binary value.</td><td>—</td><td>Usable with AnN*, AnA*, AnU, A2US(H), A2C, AOJ2H, QCPU-A (A Mode), AnS, AnSH, A1FX.</td></tr>
<tr><td>*2 *3
D9094</td><td>Changed I/O module head address</td><td>Changed I/O module head address</td><td>• Stores upper 2 digits of the head I/O address of I/O modules to be loaded or unloaded during online mode in BIN code.
Example) Input module X2F0 → H2F</td><td>—</td><td>Unusable with AnN, A3V, AnA, A73, AnU.</td></tr>
<tr><td rowspan="2">D9095</td><td>Operation state of the A3VTS system and A3VCPU</td><td>Stores operation with 4 hexadecimal digits.</td><td>• Monitors operation state of the A3VTS system and the A3VCPU.
 

<table>
<tr><th>Data(H)</th><th>Operation state</th></tr>
<tr><td>A</td><td>RUN</td></tr>
<tr><td>B</td><td>STEP-RUN</td></tr>
<tr><td>C</td><td>PAUSE</td></tr>
<tr><td>D</td><td>STOP</td></tr>
<tr><td>E</td><td>ERROR</td></tr>
</table>
<table>
<tr><th>Data(H)</th><th>Operation state</th></tr>
<tr><td>0</td><td>RUN</td></tr>
<tr><td>1</td><td>STAND-BY</td></tr>
<tr><td>2</td><td>STEP-RUN</td></tr>
<tr><td>3</td><td>PAUSE</td></tr>
<tr><td>4</td><td>STOP</td></tr>
<tr><td>5</td><td>WAIT</td></tr>
<tr><td>6</td><td>ERROR</td></tr>
<tr><td>7</td><td>NO RIGHT OF OPERATION</td></tr>
</table></td><td>—</td><td>Dedicated to A3V.</td></tr>
<tr><td>Dip switch information</td><td>Dip switch information</td><td>• Dip switch information of CPU module is stored as follows.
0:ON
1:OFF
 
</td><td>—</td><td>Usable wtih QCPU-A (A mode) only.</td></tr>
<tr><td>D9096</td><td>A3VCPU A Self-check error</td><td>Self-check error code</td><td>• Error code of self-check error on CPU A is stored in BIN code.
• Cleared when D9008 of CPU A is cleared.</td><td>—</td><td>Dedicated to A3V.</td></tr>
<tr><td>D9097</td><td>A3VCPU B Self-check error</td><td>Self-check error code</td><td>• Error code of self-check error on CPU B is stored in BIN code.
• Cleared when D9008 of CPU B is cleared.</td><td>—</td><td>Dedicated to A3V.</td></tr>
<tr><td>D9098</td><td>A3VCPU C Self-check error</td><td>Self-check error code</td><td>• Error code of self-check error on CPU C is stored in BIN code.
• Cleared when D9008 of CPU C is cleared.</td><td>—</td><td>Dedicated to A3V.</td></tr>
<tr><td>D9099</td><td>A3VTU Self-check error</td><td>Self-check error code</td><td>• Error code of self-check error on A3VTU is stored in BIN code.</td><td>—</td><td>Dedicated to A3V.</td></tr>
</table>

*: Usable with AnN and AnA which are compatible with SFC.
For the AnN and AnA which are compatible with SFC, refer to the MELSAP-II Programming Manual.

Table 2.2 Special Registers List (Continued)

Number	Name	Description	Details	Applicable CPU	
*1 D9100 *1 D9101 *1 D9102 *1 D9103 *1 D9104 *1 D9105 *1 D9106 *1 D9107	Fuse blown module	Bit pattern in units of 16 points of fuse blow modules	• Output module numbers (in units of 16 points), of which fuses have blown, are entered in bit pattern. (Preset output unit numbers when parameter setting has been performed.)  • Fuse blow check is executed also to the output module of remote I/O station. (If normal status is restored, clear is not performed. Therefore, it is required to perform clear by user program.) (For the AnU, A2US(H) and QCPU-A (A mode)) • Data clear of D9100 to D9107 is executed by turning off M9000 (fuse blown). (For the CPU other than the AnU, A2US(H) and QCPU-A (A mode)) • Data clear of D9100 to D9107 is executed by turning off D9100 to D9107 (fuse blown).	O	Usable with all types of CPUs (Only remote I/O station information is valid for A2C.)
*1 D9100	Fuse blow module	Fuse blow module bit pattern	• Stores the output module number of the fuses have blown in the bit pattern. 	—	Dedicated to A0J2H.
*2 D9108 *2 D9109 *2 D9110 *2 D9111 *2 D9112 *2 D9113 *2 D9114	Step transfer monitoring timer setting	Timer setting value and the F number at time out	• Sets value for the step transfer monitoring timer and the number of F which turns on when the monitoring timer timed out.  (By turning on any of M9108 to M9114, the monitoring timer starts. If the transfer condition following a step which corresponds to the timer is not established within set time, set annunciator (F) is tuned on.	—	Usable with AnN, AnA, AnU, A2AS, AnA board, QCPU-A (A Mode), A2C, A0J2H, AnS, AnSH, A1FX and A52G.

*: Usable with AnN and AnA which are compatible with SFC.
For the AnN and AnA which are compatible with SFC, refer to the MELSAP-II Programming Manual.

Table 2.2 Special Registers List (Continued)

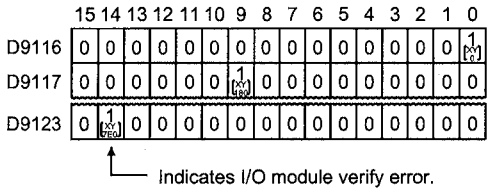
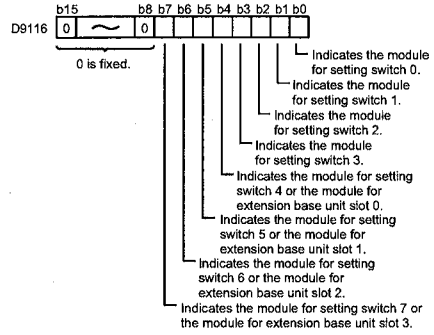
Number	Name	Description	Details	Applicable CPU	
*1 D9116 *1 D9117 *1 D9118 *1 D9119 *1 D9120 *1 D9121 *1 D9122 *1 D9123	I/O module verify error	Bit pattern in units of 16 points of verify error units	• When I/O modules, of which data are different from those entered at power-on, have been detected, the I/O unit numbers (in units of 16 points) are entered in bit pattern. (Preset I/O unit numbers when parameter setting has been performed.)  • I/O module verify check is executed also to remote I/O station modules. (If normal status is restored, clear is not performed. Therefore, it is required to perform clear by user program.)	O	Usable with all types of CPUs (Only remote I/O station information is valid for A2C.)
*1 D9116	I/O module verification error	Bit pattern of verification error module	• When an I/O module different from the I/O module data registered during power-on is detected, this register indicates the bit pattern of the I/O module number. 	—	Dedicated to A0J2H.
D9124	Annunciator detection quantity	Annunciator detection quantity	• When one of F0 to 255 (F0 to 2047 for AnA and AnU) is turned on by SET F 1 is added to the contents of D9124. When RST F or LEDR instruction is executed, 1 is subtracted from the contents of D9124. (If the INDICATOR RESET switch is provided to the CPU, pressing the switch can execute the same processing.) • Quantity, which has been turned on by SET F is stored into D9124 in BIN code. The quantity turned on with SET F is stored up to "8."	O	Usable with all types of CPUs.

Table 2.2 Special Registers List (Continued)

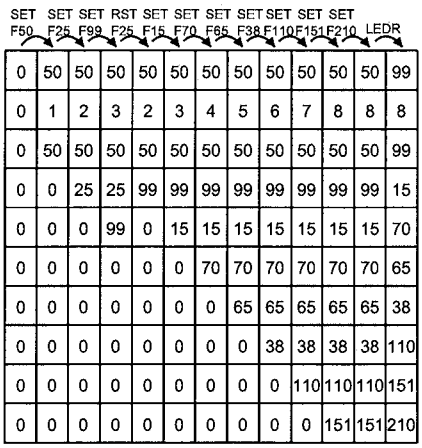
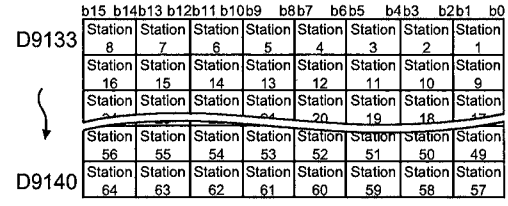
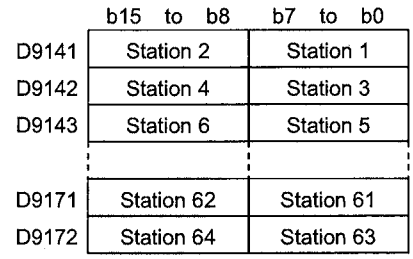
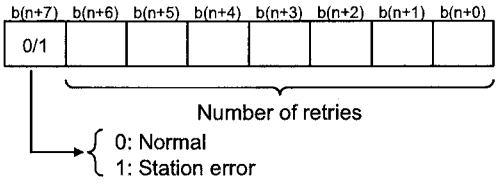
<table>
<tr><th>Number</th><th>Name</th><th>Description</th><th>Details</th><th colspan="2">Applicable CPU</th></tr>
<tr><td>D9125
D9126
D9127
D9128
D9129
D9130
D9131
D9132</td><td>Annunciator detection number</td><td>Annunciator detection number</td><td>• When one of F0 to 255 (F0 to 2047 for AnA and AnU) is turned on by [SET F], F number, which has turned on, is entered into D9125 to D9132 in due order in BIN code.
F number, which has been turned off by [RST F], is erased from D9125 to D9132, and the contents of data registers succeeding the data register, where the erased F number was stored, are shifted to the preceding data registers.
By executing [LEDR] instruction, the contents of D9125 to D9132 are shifted upward by one. (With a CPU equipped with an INDICATOR RESET switch, the same process occurs when the switch is pressed.
When there are 8 annunciator detections, the 9th one is not stored into D9125 to 9132 even if detected.

</td><td>O</td><td>Usable with all types of CPUs.</td></tr>
<tr><td>D9133
D9134
D9135
D9136
D9137
D9138
D9139
D9140</td><td>Remote terminal card information</td><td>00: No I/O module or remote terminal module or initial communication impossible
01: Input module or remote terminal module
10: Output module</td><td>• Stores information of I/O modules and remote terminal modules connected to the A2C and A52G corresponding to station number.
• Information of I/O modules and remote terminal modules is for input, output and remote terminal module identification and expressed as 2-bit data.
00: No I/O module or remote terminal module or initial communication is impossible.
01: Input module or remote terminal module
10: Output module
• Data configuration

</td><td></td><td>Usable with A2C and A52G.</td></tr>
</table>

Table 2.2 Special Registers List (Continued)

<table>
<tr><th>Number</th><th>Name</th><th>Description</th><th>Details</th><th colspan="2">Applicable CPU</th></tr>
<tr><td>D9141
D9142
D9143
D9144
D9145
D9146
D9147
D9148
D9149
D9150
D9151
D9152
D9153
D9154
D9155
D9156
D9157
D9158
D9159
D9160
D9161
D9162
D9163
D9164
D9165
D9166
D9167
D9168
D9169
D9170
D9171
D9172</td><td>Number of times of retry execution</td><td>Number of retries</td><td>• Stores the number of retries executed to I/O modules or remote terminal modules which caused communication error.
(Retry processing is executed the number of times set at D9174.)
• Data becomes 0 when communication is restored to normal.
• Station number setting of I/O modules and remote terminal modules is as shown below.
 

• Retry counter uses 8 bits for one station.
 

* "n" is determined by station number of I/O module or remote terminal module.
Odd number stations: b0 to b7 (n = 0)
Even number stations: b8 to b15 (n = 8)</td><td>—</td><td>Usable with A2C and A52G.</td></tr>
</table>

Table 2.2 Special Registers List (Continued)

<table>
<tr><th>Number</th><th>Name</th><th>Description</th><th colspan="3">Details</th><th colspan="2">Applicable CPU</th></tr>
<tr><td rowspan="4">D9173</td><td rowspan="4">Mode setting</td><td rowspan="4">0: Automatic online return enabled
1: Automatic online return disabled
2: Transmission stop at online error
3: Line check</td><td colspan="3">Mode setting</td><td rowspan="4">—</td><td rowspan="4">Usable with A2C and A52G.</td></tr>
<tr><td>0</td><td>Auto-matic online return enabled</td><td>• When an I/O module or a remote terminal module caused communication error, the station is placed offline.
• Communication with normal stations is continued.
• The station recovering from a communication error automatically resumes communication.</td></tr>
<tr><td>1</td><td>Auto-matic online return disabled</td><td>• When an I/O module or a remote terminal module caused communication error, the station is placed offline.
• Communication with normal stations is continued.
• Though a faulty station returned to normal, communication is not restored unless the station module is restarted.</td></tr>
<tr><td>2</td><td>Trans-mission stop at online error</td><td>• When an I/O module or a remote terminal module caused communication error, communication with all stations is stopped.
• Though a faulty station returned to normal, communication is not restored unless the station module is restarted.</td></tr>
<tr><td>3</td><td>Line check</td><td>• Checks hardware and connecting cables of I/O modules and remote terminal modules.</td><td>—</td><td>Usable with A2C and A52G.</td></tr>
<tr><td>D9174</td><td>Setting of the number of retries</td><td>Number of retries</td><td colspan="3">• Sets the number of retries executed to I/O modules and remote terminal modules which caused communication error.
• Set for 5 times at power on.
• Set range: 0 to 32.
• If communication with an I/O module or a remote terminal module is not restored to normal after set number of retries, such module is regarded as a faulty station.</td><td>—</td><td>Usable with A2C and A52G.</td></tr>
<tr><td>D9175</td><td>Line error retry counter</td><td>Number of retries</td><td colspan="3">• Stores the number of retries executed at line error (time out).
• Data becomes 0 when line is restored to normal and communication with I/O modules and remote terminal modules is resumed.</td><td>—</td><td>Usable with A2C and A52G.</td></tr>
<tr><td>D9180
D9181
D9182
D9183
D9184
D9185
D9186
D9187
D9188
D9189
D9190
D9191
D9192
D9193</td><td>Remote terminal module error number</td><td>Remote terminal number</td><td colspan="3">• Stores error code of a faulty remote terminal module when M9060 is turned on.
• The error code storage areas for each remote terminal module are as shown below.
D9180 Remote terminal module No.1
D9181 Remote terminal module No.2
D9182 Remote terminal module No.3
⋮
D9192 Remote terminal module No.13
D9193 Remote terminal module No.14
Remote terminal module numbers from 1 to 14 are set with D9020 to D9034.
• Error code is cleared in the following cases.
• When the RUN key switch is moved from STOP to RUN.
(D9180 to D9183 are all cleared.)
• When Yn4 of each remote terminal is set from OFF to ON.</td><td>—</td><td>Usable with A2C and A52G.</td></tr>
</table>

Table 2.2 Special Registers List (Continued)

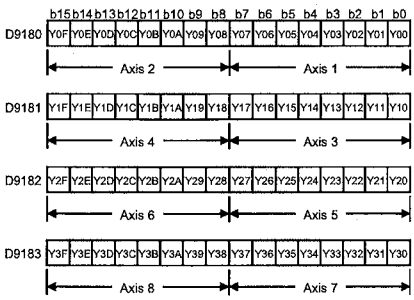
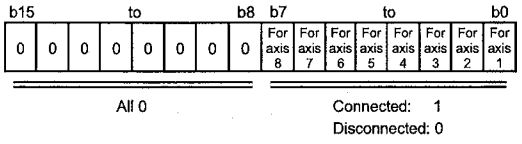
Number	Name	Description	Details		
D9180	Limit switch output state torage areas for axes 1 and 2	Bit pattern of limit switch function output state	• Stores output state of limit switch function.  "1" is stored in the bit which corresponds to output (Y) which is turned on. "0" is stored when output state is turned off.	—	Dedicated to A73.
D9181	Limit switch output state storage areas for axes 3 and 4			—	Dedicated to A73.
D9182	Limit switch output state storage areas for axes 5 and 6			—	Dedicated to A73.
D9183	Limit switch output state storage areas for axes 7 and 8			—	Dedicated to A73.
D9184	Cause of PCPU error	PCPU error code	• Stores error codes occurred at the PCPU in BIN code. 0 : Normal 1 : A73CPU hardware error 2 : PCPU error 10: A70AF error 11: A70AF error 12: A70MDF error 13: AY42 error	—	Dedicated to A73.
D9185	Servo amplifier connection data	Bit pattern of servo amplifier connection state	• Servo amplifier connection state is checked and the result is stored in the bit which corresponds to each axis number. Connection state is continuously checked. Axes which changed from disconnected state to connected state are regarded as connected. But, axes which changed from connected state to disconnected state are still regarded as connected. 	—	Dedicated to A73.

Table 2.2 Special Registers List (Continued)

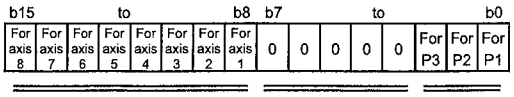
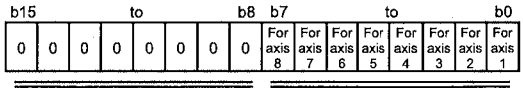
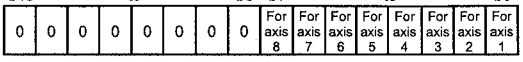
Number	Name	Description	Details		
D9187	Manual pulse generator axis setting error	Manual pulse generator axis setting error code	• Stores error code when the manual pulse generator axis setting error flag (M9077) is turned on in the bit each corresponds to each axis number.  "1" is stored in the bit which corresponds to the axis number which caused 1 pulse input magnification setting error. 0: Normal 1: Input magnification is out of the range from 1 to 100. (Not used) "1" is stored in the bit which corresponds to the manual pulse generator number which caused manual pulse generator axis setting error. 0: Normal 1: Axis setting is out of the range from 1 to 8.	—	Dedicated to A73.
D9188	Starting axis number at test mode request error	Starting axis number	• Stores axis number in the bit which corresponds to the axis which was running when a test mode request was given and test mode request error occurred.  (Not used) "1" is stored when running. "0" is stored when not running.	—	Dedicated to A73.
D9189	Error program number	Error program number	• Stores error servo program number (0 to 4095) when the servo program setting error flag (M9079) is turned on.	—	Dedicated to A73.
D9190	Data setting error	Data setting error number	• Stores error code which corresponds to the error setting item when the servo program setting error flag (M9079) is turned on.	—	Dedicated to A73.
D9191	Servo amplifier type	Bit pattern of the axis connected to a general-purpose servo amplifier	• Stores type of connected servo amplifier in the bit which corresponds to each axis number. 0: MR-SB/MR-SD/MR-SB-K is connected or not connected. 1: General-purpose servo amplifier is connected.  All 0 Type of servo amplifier set at each axis is stored with "0" or "1".	—	Dedicated to A73.

Table 2.2 Special Registers List (Continued)

Number	Name	Description	Details		
D9196 D9197 D9198 D9199	Faulty station detection	Bit pattern of the faulty station	• Bit which corresponds to faulty I/O module or remote terminal module is set (1). (Bit which corresponds to a faulty station is set when normal communication cannot be restored after executing the number of retries set at D9174.) • If automatic online return is enabled, bit which corresponds to a faulty station is reset (0) when the station is restored to normal. • Data configuration.	—	Usable with A2C and A52G.

Address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
D9196	Stasion 16	Stasion 15	Stasion 14	Stasion 13	Stasion 12	Stasion 11	Stasion 10	Stasion 9	Stasion 8	Stasion 7	Stasion 6	Stasion 5	Stasion 4	Stasion 3	Stasion 2	Stasion 1
D9197	Stasion 32	Stasion 31	Stasion 30	Stasion 29	Stasion 28	Stasion 27	Stasion 26	Stasion 25	Stasion 24	Stasion 23	Stasion 22	Stasion 21	Stasion 20	Stasion 19	Stasion 18	Stasion 17
D9198	Stasion 48	Stasion 47	Stasion 46	Stasion 45	Stasion 44	Stasion 43	Stasion 42	Stasion 41	Stasion 40	Stasion 39	Stasion 38	Stasion 37	Stasion 36	Stasion 35	Stasion 34	Stasion 33
D9199	Stasion 64	Stasion 63	Stasion 62	Stasion 61	Stasion 60	Stasion 59	Stasion 58	Stasion 57	Stasion 56	Stasion 55	Stasion 54	Stasion 53	Stasion 52	Stasion 51	Stasion 50	Stasion 49

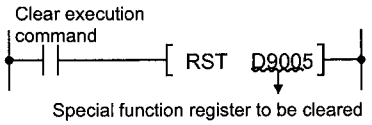
1: Error
0: Normal

POINT

(1) Special registers are cleared when the PC is switched off or the RESET switch is set to LATCH CLEAR or RESET. Data remains unchanged when the RUN/STOP key switch is set to STOP.

(2) The above special registers marked *1 above are latched and their data will remain unchanged after normal status is restored. For this reason, use one of the following methods to clear the registers.

(a) Method by user program
Insert the circuit shown at right into the program and turn on the clear execution command contact to clear the contents of register.



(b) Method by peripheral equipment
Set the register to "0" by changing the present value by the test function of peripheral equipment or set to "0" by forced reset. For the operation procedure, refer to the Instruction Manual for peripheral equipment.

(c) By moving the RESET key switch at the CPU front to the RESET position, the special register is set to "0".

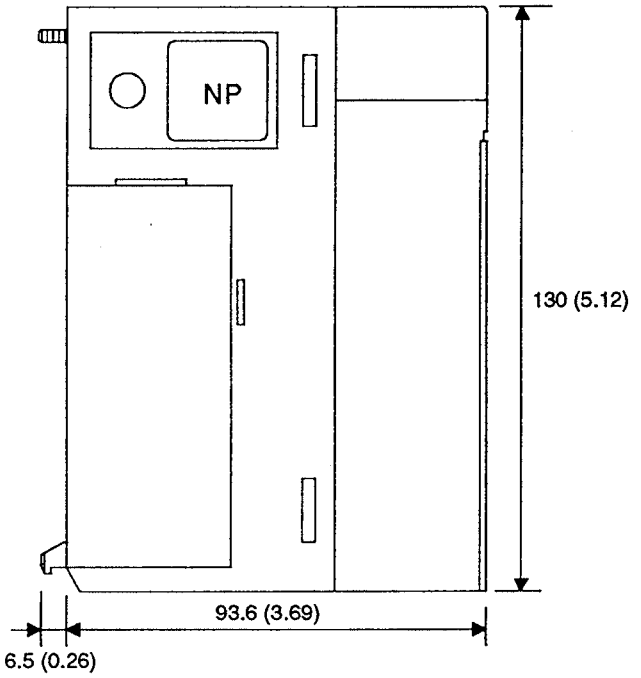
(3) Data is written to special registers marked *2 above in the sequence program.

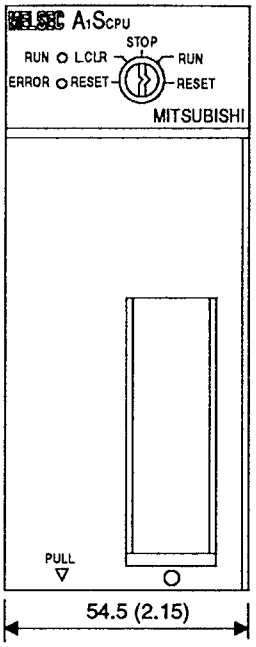
(4) Data is written to special registers marked *3 above in test mode of the peripheral equipment.

APPENDIX 3 OUTSIDE DIMENSIONS

3.1 CPU Module

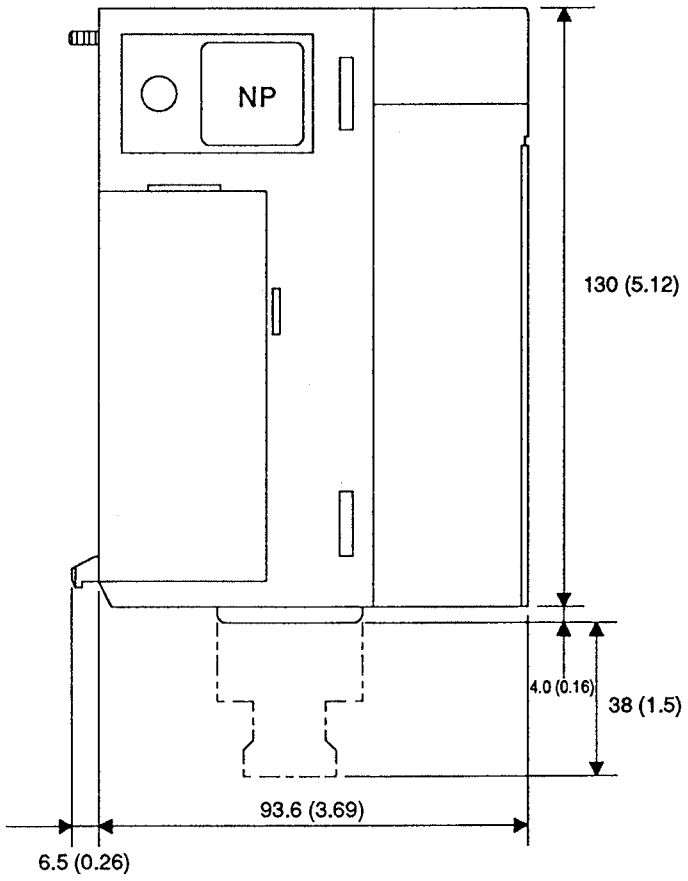
3.1.1 A1SCPU/A2SCPU module

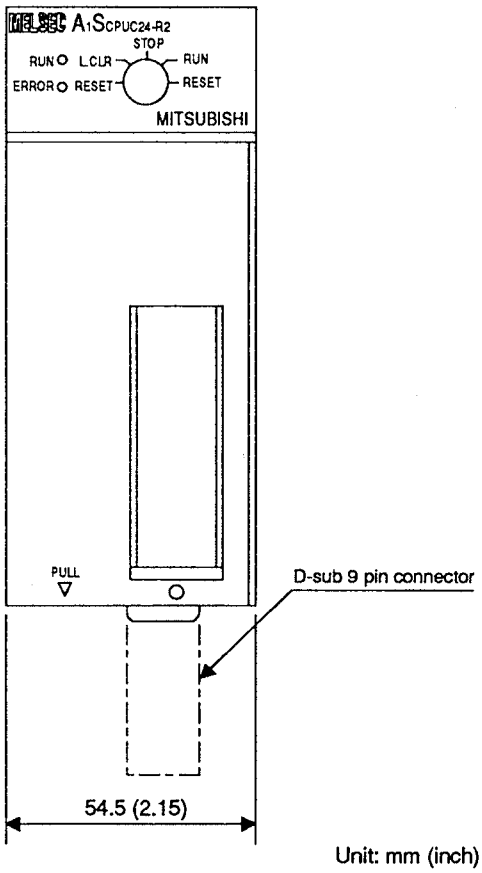




Unit: mm (inch)

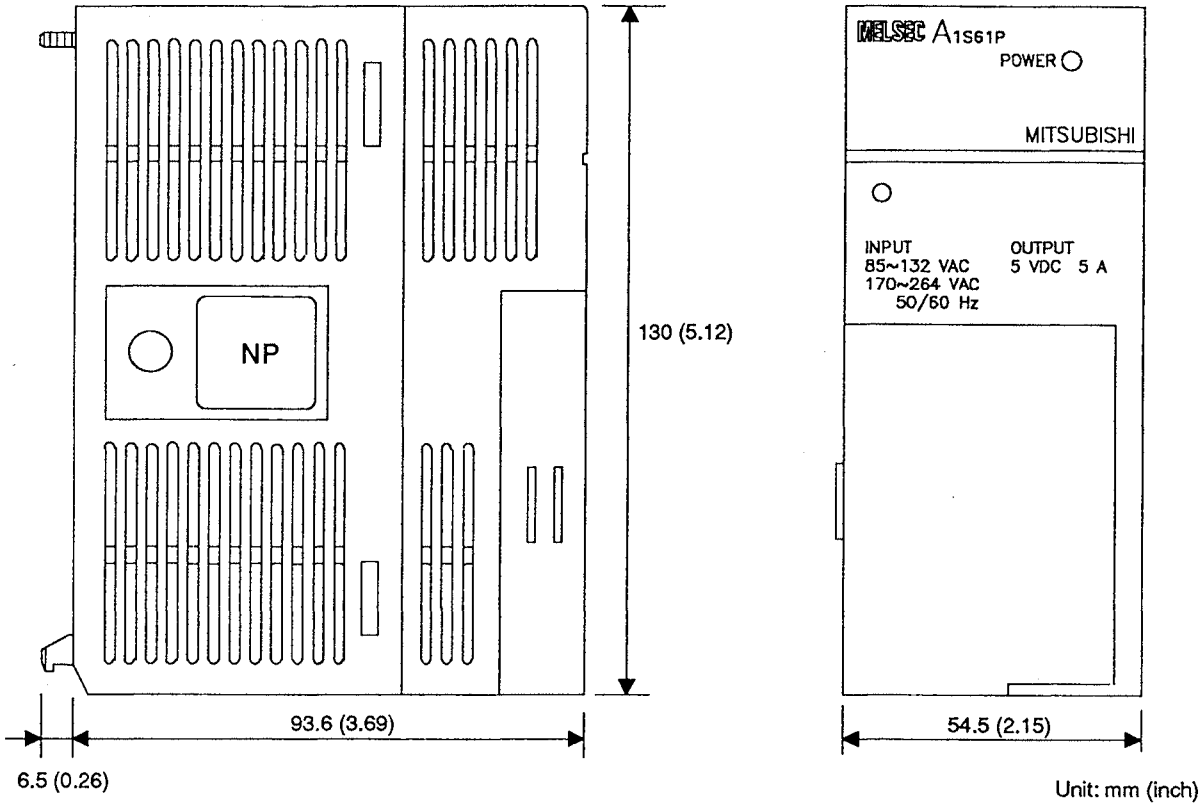
3.1.2 A1SCPUC24-R2 module





Unit: mm (inch)

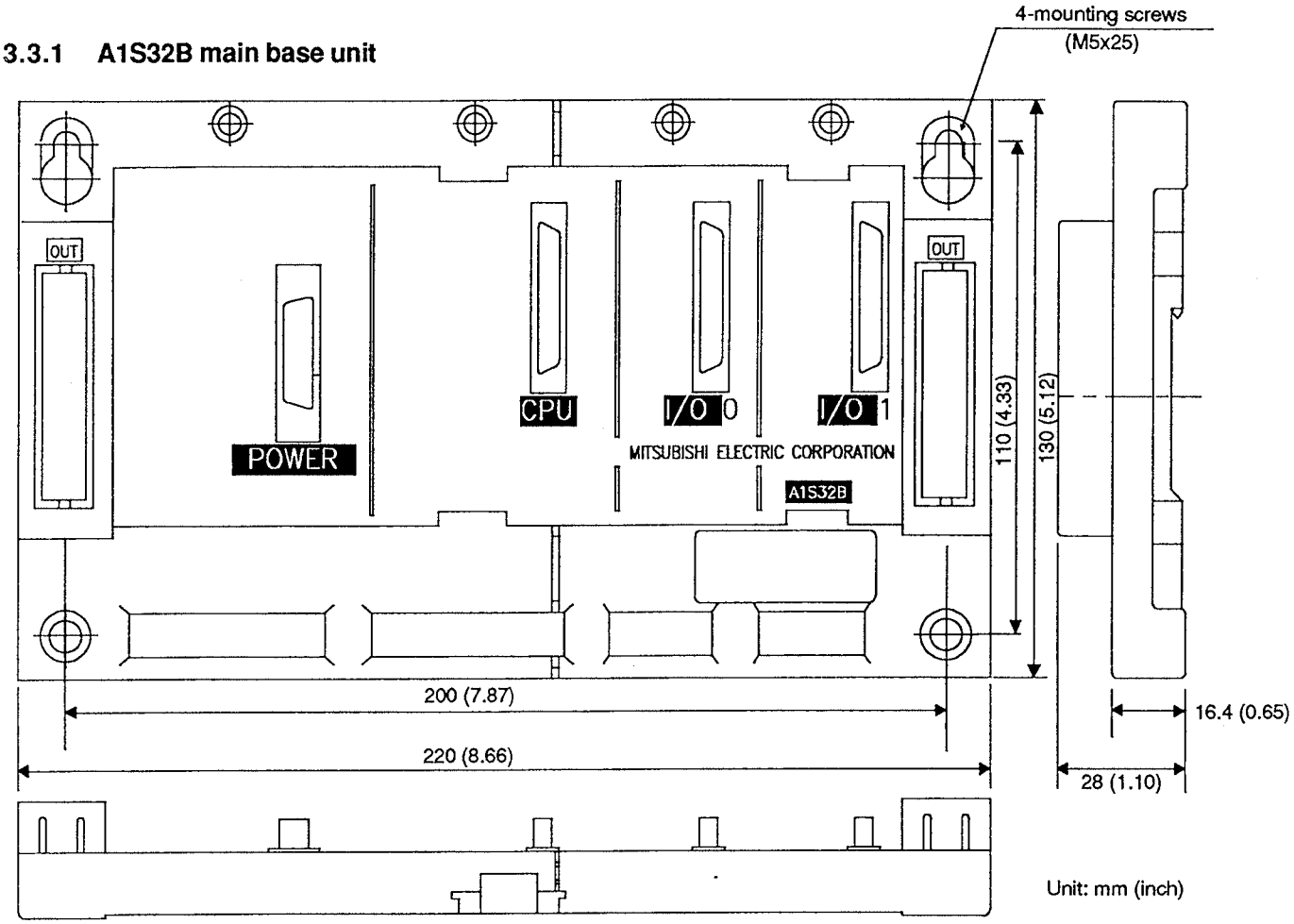
3.2 A1S61P/A1S62P/A1S63P Power Supply Module



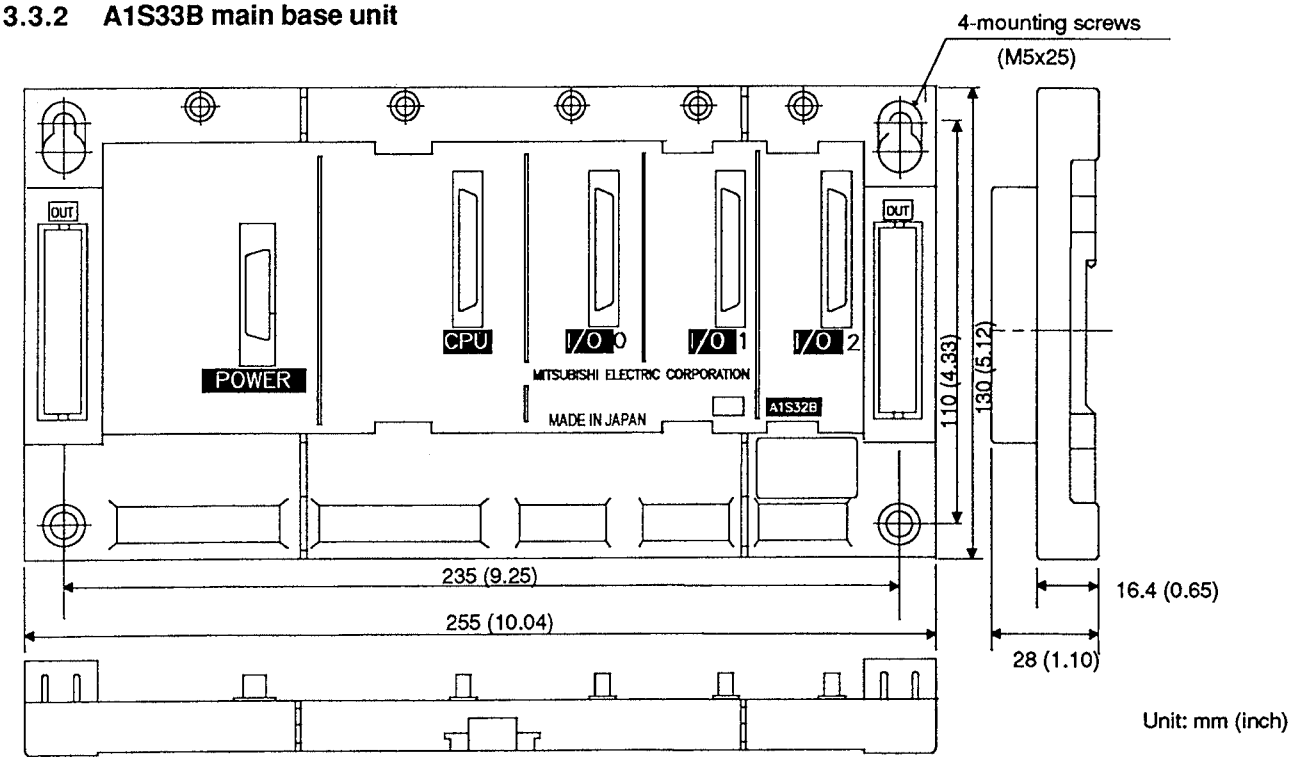
Unit: mm (inch)

3.3 Main Base Units

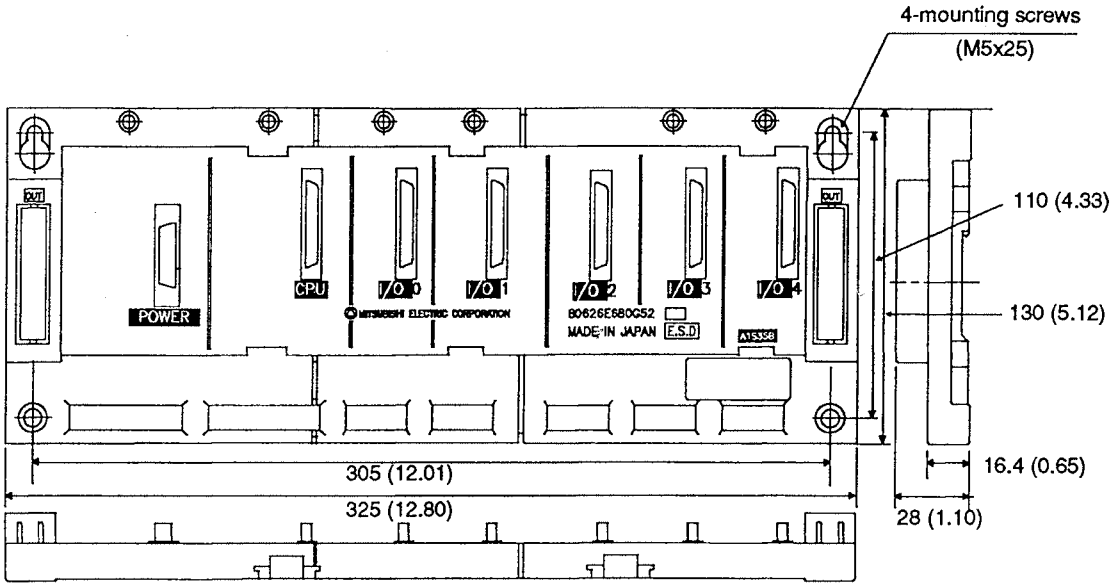
3.3.1 A1S32B main base unit



3.3.2 A1S33B main base unit

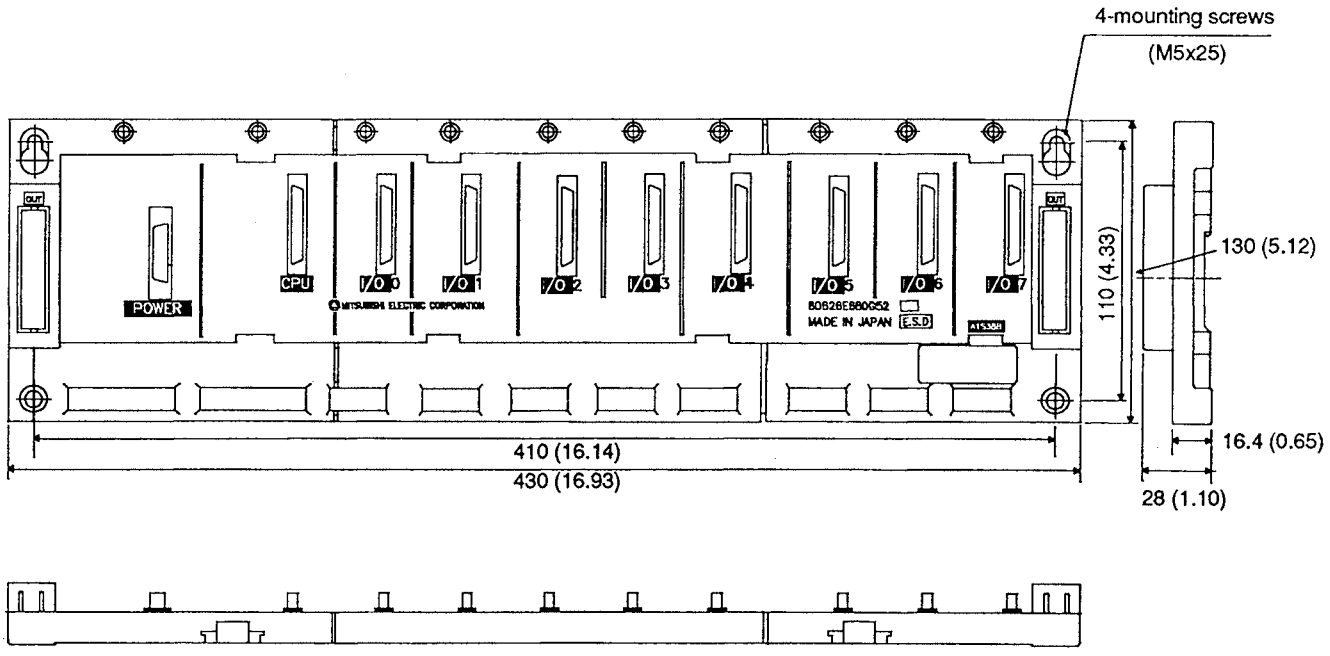


3.3.3 A1S35B main base unit



Unit: mm (inch)

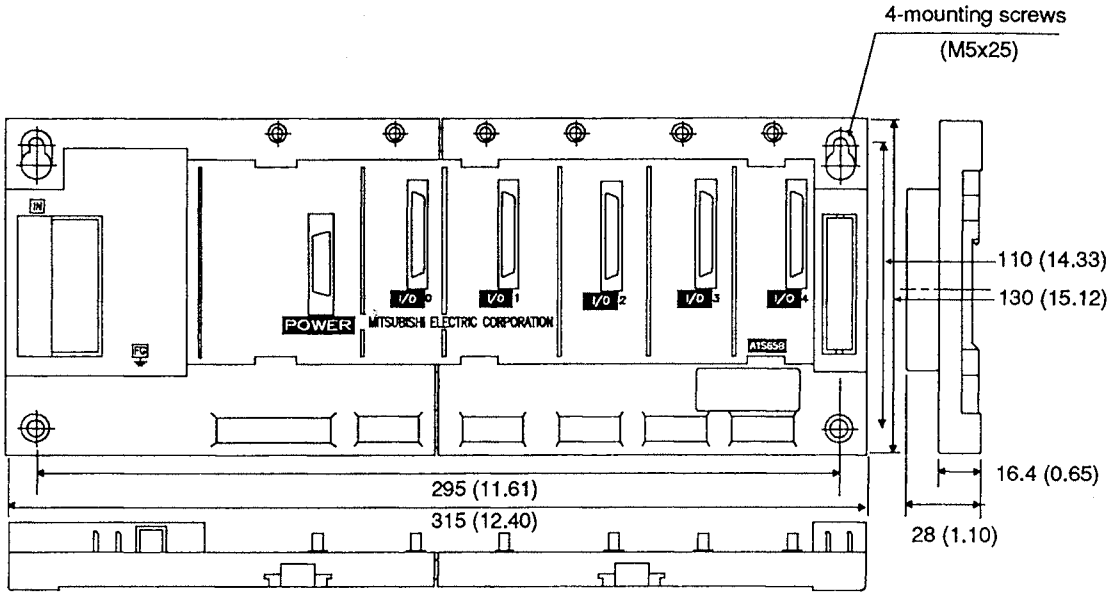
3.3.4 A1S38B main base unit



Unit: mm (inch)

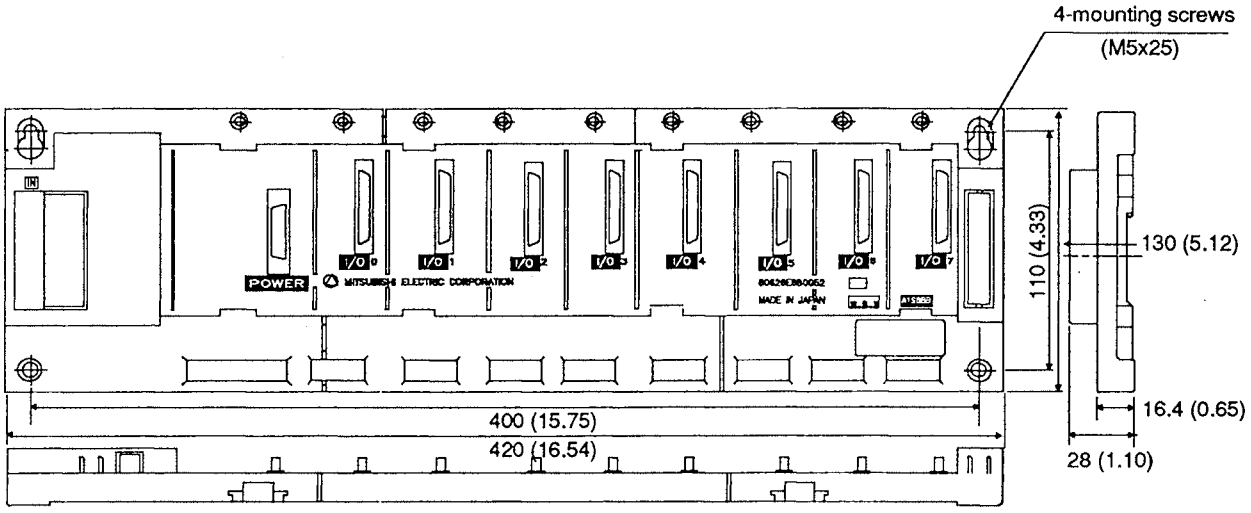
3.4 Extension Base Units

3.4.1 A1S65B extension base unit



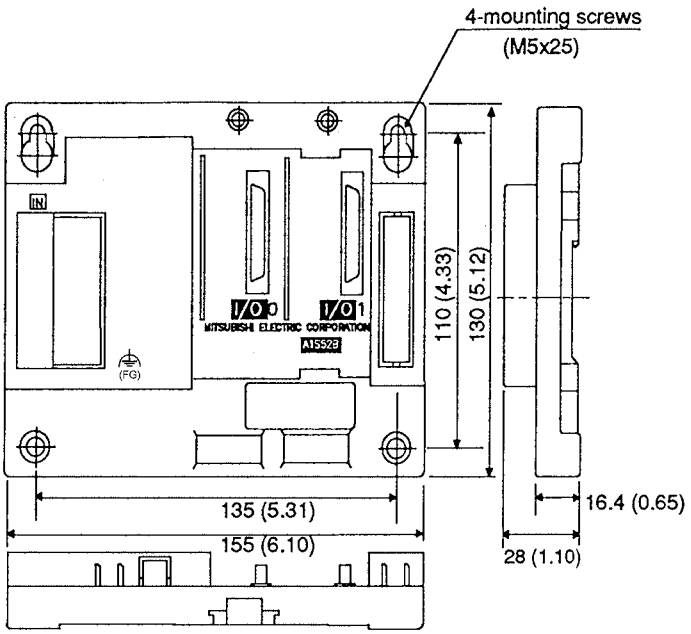
Unit: mm (inch)

3.4.2 A1S68B extension base unit



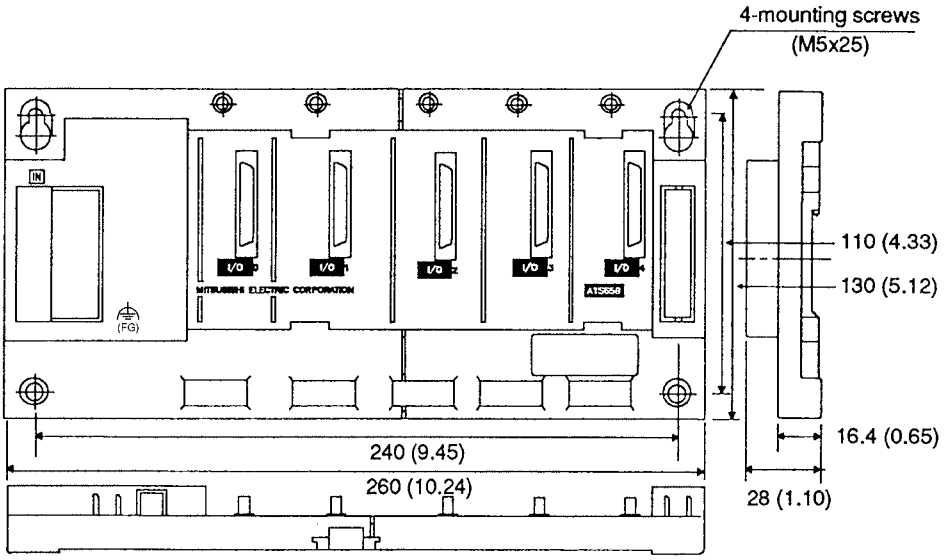
Unit: mm (inch)

3.4.3 A1S52B extension base unit



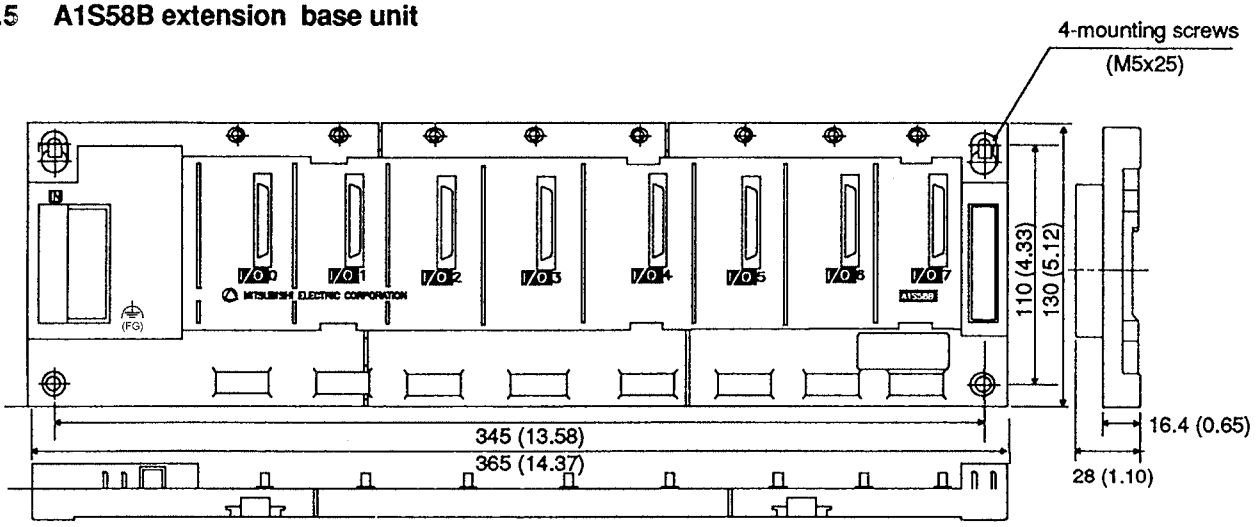
Unit: mm (inch)

3.4.4 A1S55B extension base unit



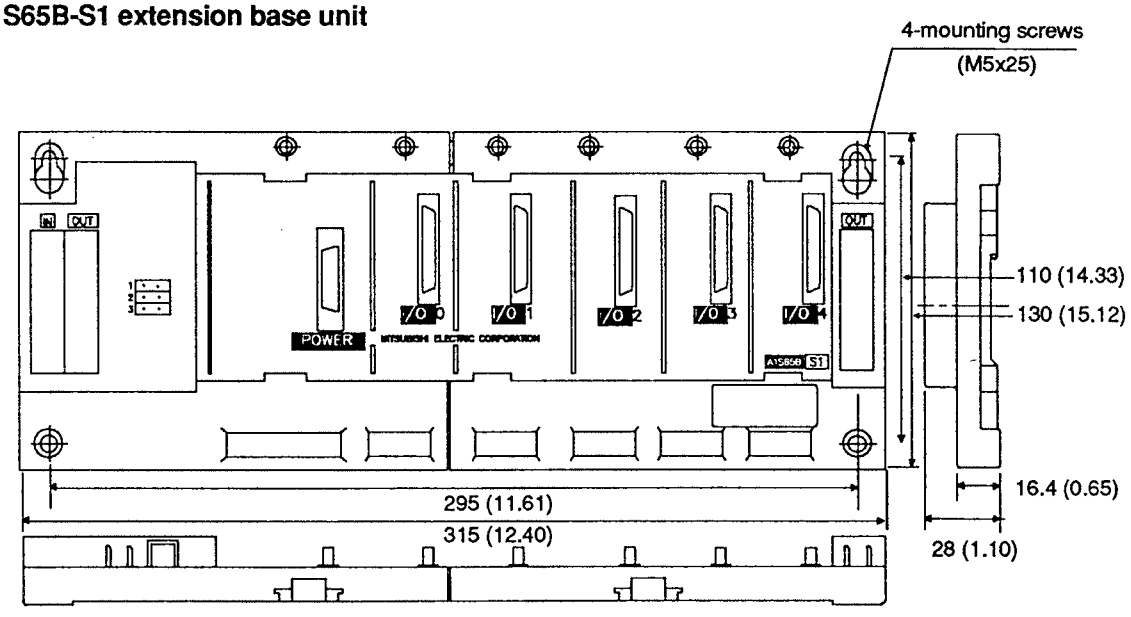
Unit: mm (inch)

3.4.5 A1S58B extension base unit



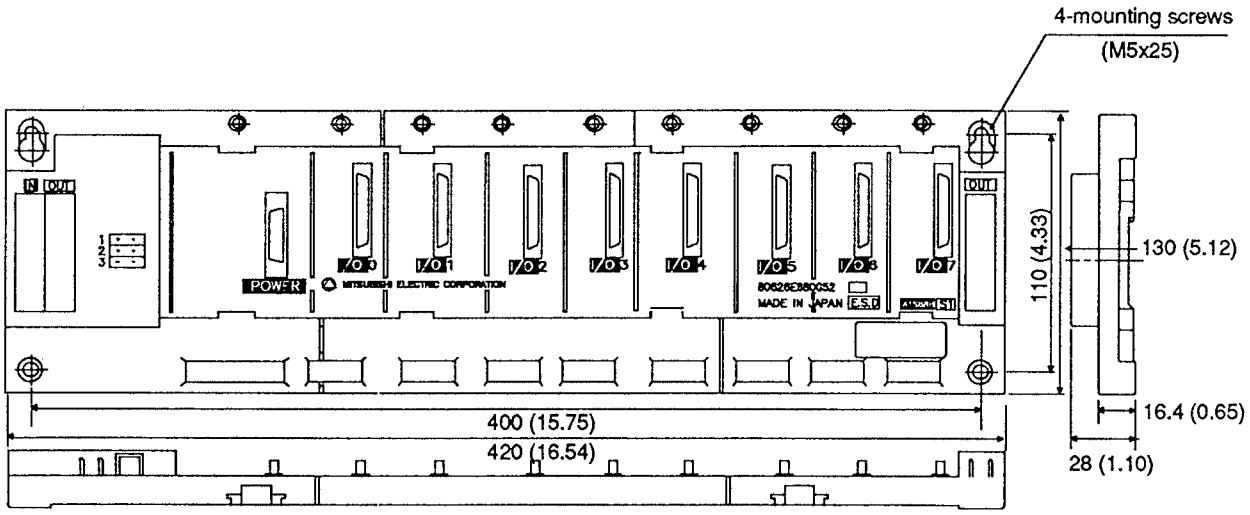
Unit: mm (inch)

3.4.6 A1S65B-S1 extension base unit



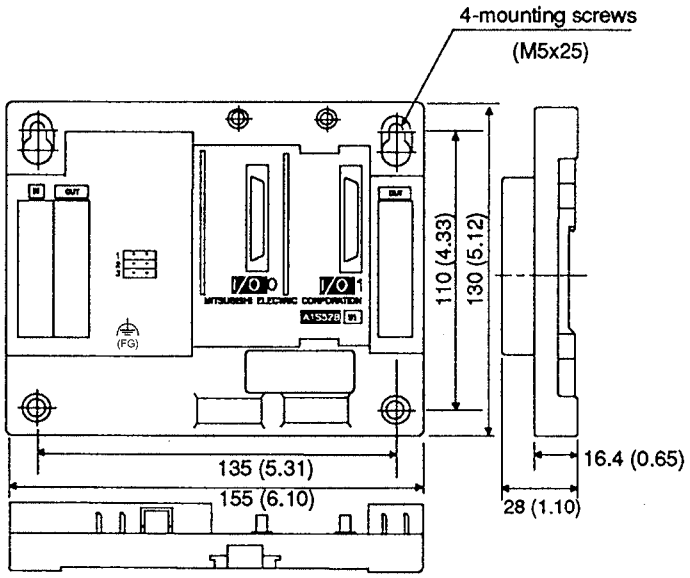
Unit: mm (inch)

3.4.7 A1S68B-S1 extension base unit



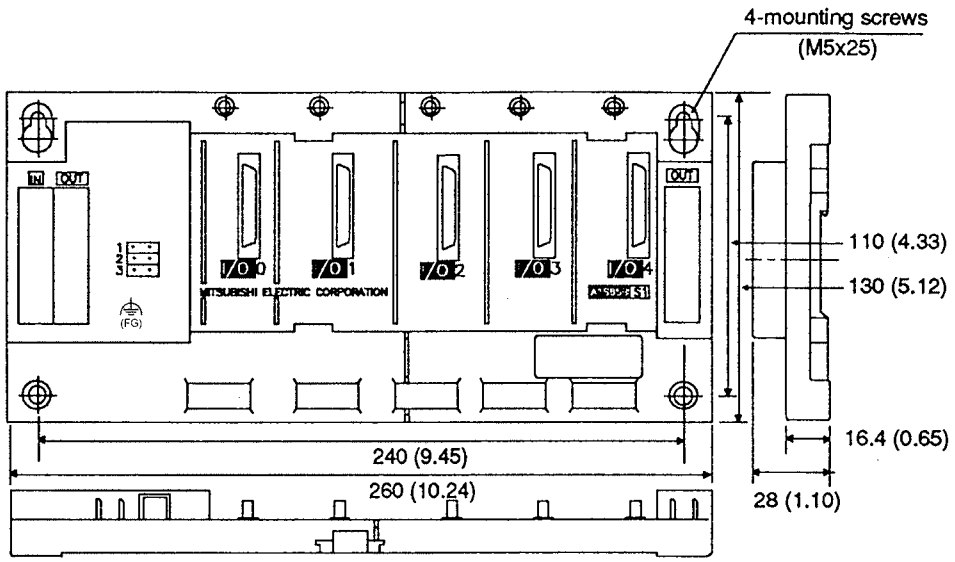
Unit: mm (inch)

3.4.8 A1S52B-S1 extension base unit



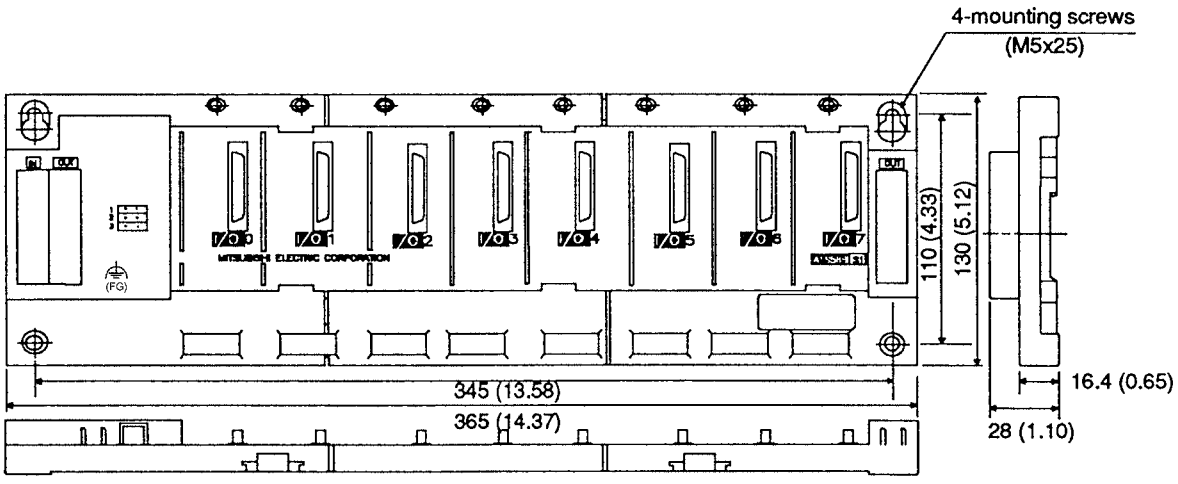
Unit: mm (inch)

3.4.9 A1S55B-S1 extension base unit



Unit: mm (inch)

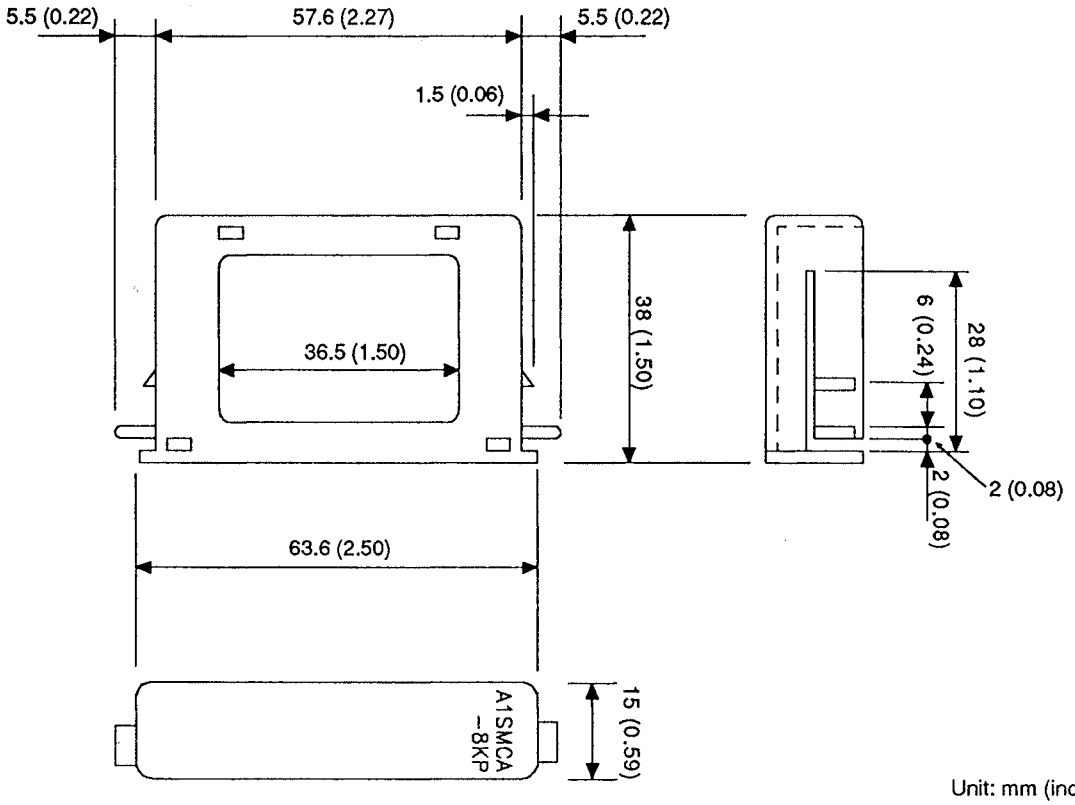
3.4.10 A1S58B-S1 extension base unit



Unit: mm (inch)

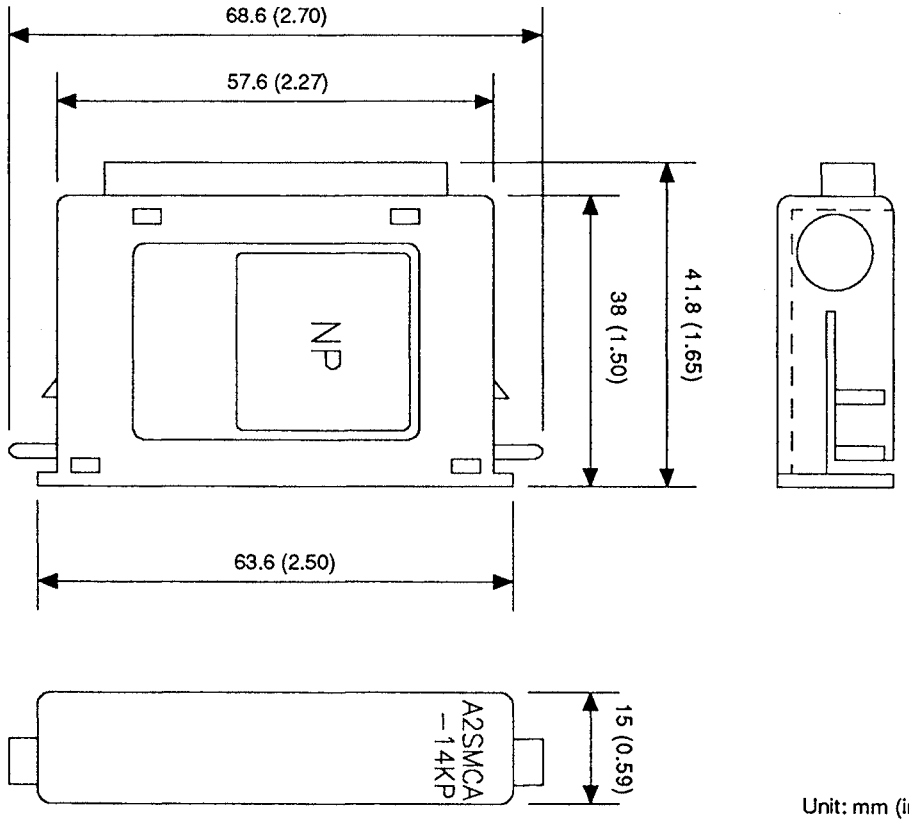
3.5 Memory Cassette

3.5.1 A1SMCA-[ ] memory cassette



Unit: mm (inch)

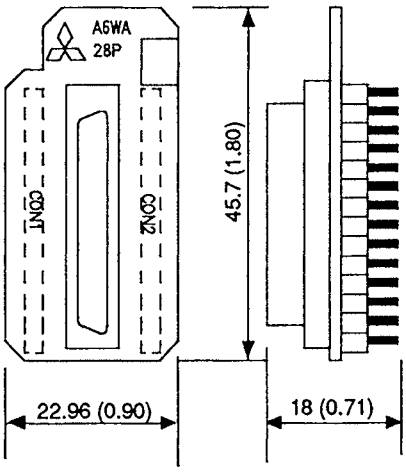
3.5.2 A2SMCA-[ ] memory cassette



Unit: mm (inch)

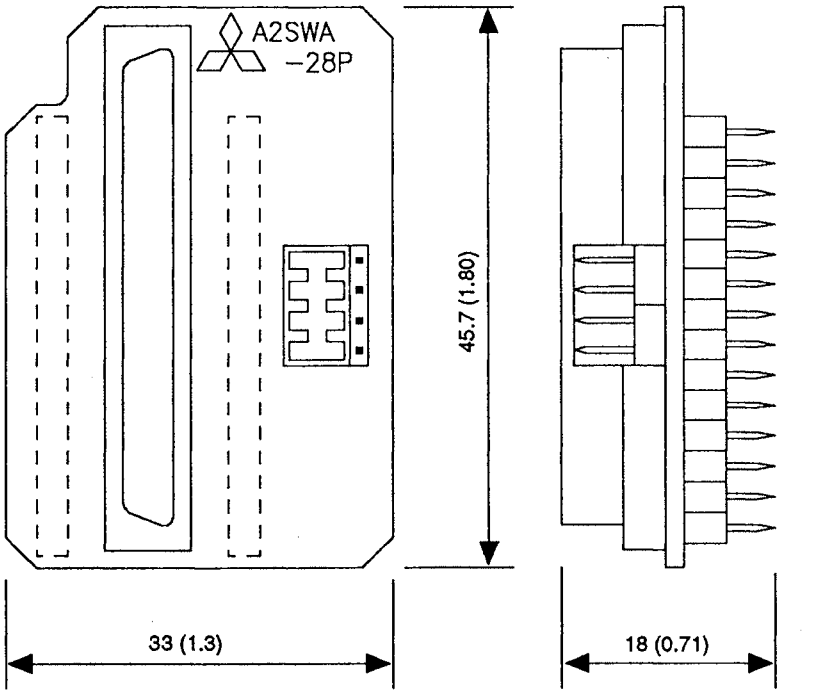
3.6 Memory Write Adapter

3.6.1 A6WA-28P memory write adapter



Unit: mm (inch)

3.6.2 A2SWA-28P memory write adapter



Unit: mm (inch)

APPENDIX 4 INSTRUCTION PROCESSING TIME

An AnSCPU requires the instruction processing time as much as an An CPU does except the following instructions. See the ACPU Programming Manual (Common Instructions) for the processing time for each instruction.

Instruction	Condition	Processing Time (μsec)	
		Direct Method	Refresh Method
OUT F	When not executed	61	62
	When executed	267	270
SET F	When not executed	3.2	2.7
	When executed	237	232
RST F	When not executed	3.0	3.6
	When executed	283	296
LEDR	When not executed	54	55
	When executed	283	283
CHK	With 1 contact condition	240	—
	With 50 contact conditions	3905	—
	With 100 contact conditions	7820	—
	With 150 contact conditions	11470	—

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.

APPENDIX 5 TRANSPORTATION PRECAUTIONS

When transporting lithium batteries, make sure to treat them based on the transport regulations.

5.1 Controlled Models

The batteries for AnSCPU (including memory cards) is classified as follows:

Product Name	Model	Product supply status	Classification for transportation
A series battery	A6BAT	Lithium battery	Non-dangerous goods

5.2 Transport Guidelines

Comply with IATA Dangerous Goods Regulations, IMDG code and the local transport regulations when transporting products after unpacking or repacking, while Mitsubishi ships products with packages to comply with the transport regulations.
Also, contact the transporters.

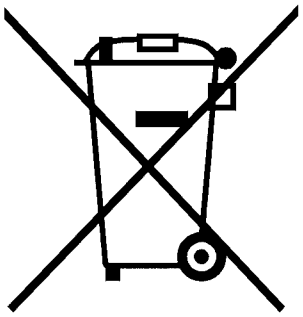
APPENDIX 6 HANDLING OF BATTERIES AND DEVICES WITH BUILT-IN BATTERIES IN EU MEMBER STATES

This section describes the precautions for disposing of waste batteries in EU member states and exporting batteries and/or devices with built-in batteries to EU member states.

Appendix 6.1 Disposal precautions

In EU member states, there is a separate collection system for waste batteries. Dispose of batteries properly at the local community waste collection/recycling center.

The following symbol is printed on the batteries and packaging of batteries and devices with built-in batteries used for Mitsubishi programmable controllers.



Note: This symbol is for EU member states only.
The symbol is specified in the new EU Battery Directive (2006/66/EC) Article 20 "Information for end-users" and Annex II.

The symbol indicates that batteries need to be disposed of separately from other wastes.

Appendix 6.2 Exportation precautions

The new EU Battery Directive (2006/66/EC) requires the follwoing when marketing or exporting batteries and/or devices with built-in batteries to EU member states.

- To print the symbol on batteries, devices, or their packaging
- To explain the symbol in the manuals of the products

(1) Labelling

To market or export batteries and/or devices with built-in batteries, which have no symbol, to EU member states on September 26, 2008 or later, print the symbol shown on the previous page on the batteries, devices, or their packaging.

(2) Explaining the symbol in the manuals

To export devices incorporating Mitsubishi programmable controller to EU member states on September 26, 2008 or later, provide the latest manuals that include the explanation of the symbol.

If no Mitsubishi manuals or any old manuals without the explanation of the symbol are provided, separately attach an explanatory note regarding the symbol to each manual of the devices.

POINT

The requirements apply to batteries and/or devices with built-in batteries manufactured before the enforcement date of the new EU Battery Directive (2006/66/EC).

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.

6. Product application

(1) In using the Mitsubishi MELSEC programmable controller, the usage conditions shall be that the application will not lead to a major accident even if any problem or fault should occur in the programmable controller device, and that backup and fail-safe functions are systematically provided outside of the device for any problem or fault.
(2) The Mitsubishi programmable controller has been designed and manufactured for applications in general industries, etc. Thus, applications in which the public could be affected such as in nuclear power plants and other power plants operated by respective power companies, and applications in which a special quality assurance system is required, such as for Railway companies or Public service purposes shall be excluded from the programmable controller applications.
In addition, applications in which human life or property that could be greatly affected, such as in aircraft, medical applications, incineration and fuel devices, manned transportation, equipment for recreation and amusement, and safety devices, shall also be excluded from the programmable controller range of applications.
However, in certain cases, some applications may be possible, providing the user consults their local Mitsubishi representative outlining the special requirements of the project, and providing that all parties concerned agree to the special circumstances, solely at the users discretion.

Type A1S/A1SC24-R2/A2SCPU(S1)

User's Manual

MODEL	A1SCPU-U-E
MODEL CODE	13J672
IB(NA)-66320-K(0810)MEE	

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