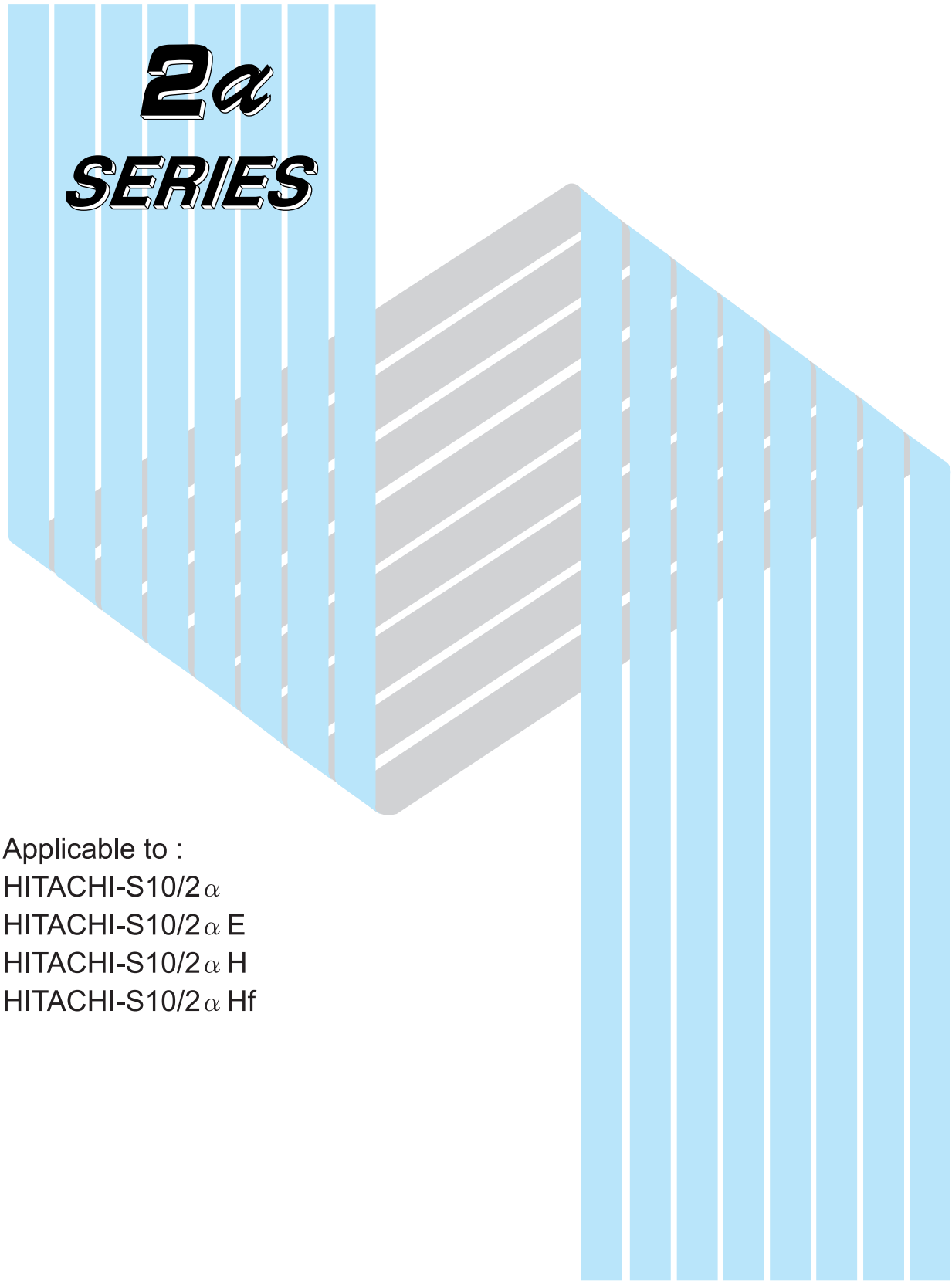
HITACHI
S10α SERIES

HARDWARE MANUAL
CPU

2α SERIES CPU

2α
SERIES



Applicable to :
HITACHI-S10/2α
HITACHI-S10/2α E
HITACHI-S10/2α H
HITACHI-S10/2α Hf

SAE-2-001 (D)

HITACHI

NOTE

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BI-KB-TN<HE-NS> (MC-PM5.0, AI3.2, PS3.0)

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SAFETY AWARENESS SUMMARY

The following are general safety precautions which must be observed in the application, operation, and maintenance of this equipment. Failure to comply with these precautions or the other caution statements in the manuals violates safety standards of design, manufacture, and intended use. Hitachi assumes no liability for the user's failure to comply with these requirements. This summary, and the caution statements in the manuals, represent warnings of certain dangers of which we are aware. You, as the end user of the equipment, must follow these warnings and all other applicable precautions, including codes and laws, to achieve safe application and operation of this equipment.

Safety Disconnects

As outlined in the manuals, you must provide means to disable the control and power circuits to guard against unexpected or sudden motion or energization of equipment during operation and maintenance. NEVER WORK ON WIRING WHICH IS ENERGIZED.

Care in Programming and Precautions Against Equipment Failure

The user must follow procedures as indicated in the manuals and as dictated by sound engineering judgment. Mistakes in programming may result in sudden or unexpected motion or energization. To protect against programming errors or equipment failure, you must provide physical guards and cages to prevent physical contact with equipment, and back-up safety equipment independent of the programmable controller; the latter includes overspeed protection, overtemperature protection, and electro-mechanical stop switches. NEVER DEPEND ON SOFTWARE OR CONTROLS TO PROTECT PERSONNEL WITHOUT PREPARING APPROPRIATE LOCKOUTS AND EQUIPMENT GUARDS.

Warning Devices

The user should provide audible and visual warning devices to warn persons to get clear of machines before they start. The user must properly program the programmable controller to operate these devices before the machine starts.

Environmental Requirements

This equipment is not suitable for use in an explosive atmosphere. If inputs or outputs are wired to devices in an explosive atmosphere, you must insert appropriate approved electrical barriers in the wiring conduit, install the equipment in explosion—proof cabinets and wire the installation according to the appropriate electrical code (ex. National Electric Code.) The other environmental requirements in the manuals must also be met, otherwise equipment failure could cause personal injury or property damage.

Do Not Service or Adjust Internal Parts

Personal injury may result from unauthorized servicing or adjusting parts inside the cabinets.

Prevent Spillage of Liquid onto the Equipment

Personal injury could result if any liquid is spilled or poured onto this equipment. The equipment is general purpose (NEMA Type A) and not waterproof.

Prevent Entry of Foreign Matter into the Equipment

Permitting metal chips and/or other foreign matter to enter the equipment could cause a short–circuit that could result in personal injury or property damage.

Keep the Plant Free of Vermin

Rodents, like rats and mice, may chew on cables and equipment. This could cause personal injury or property damage.

Do not Install the Equipment Near Strong Magnetic Fields

Operating the equipment near a strong magnetic field could cause malfunctions that could result in personal injury or property damage.

Protect From Shock and Vibration

Subjecting the equipment to shock or vibration could cause malfunctions that could result in personal injury or property damage.

Dangerous Voltages

Dangerous voltages are present whether the equipment is running or not. These voltages could be inside the programmable controller enclosure or in external control devices.

Danger of Manually Operating Limit Switches or Pushbuttons

Never operate a limit switch by hand. The resulting motion could cause personal injury. If you plan to operate a limit switch, be certain that you are clear of any other moving parts, then use a long wooden pole. Do not operate a pushbutton during checkout or at any other time unless you are sure what action the pushbutton causes, and are sure nobody is near any part that might move or be energized unexpectedly.

"RUN/STOP" SWITCH CAUTION

The "RUN/STOP" switch only stops execution of the ladder logic program or Hi-Flow program. Digital and analog outputs are left in the active state when execution stops, unless the optional rungs described in the CPU manual have been added. The "RUN/STOP" switch does not affect the operation of C-language or FA-BASIC language programs. Outputs can still be produced in response to C-language or FA-BASIC programs, or by the action of programmers typing in commands in these languages, while the "RUN/STOP" switch is in the "STOP" position.

DO NOT DEPEND ON THE STOP SWITCH TO STOP MOVING PARTS OR TO PREVENT UNEXPECTED MOTION OR ENERGIZATION. USE HARDWIRED SAFETY STOPPING DEVICES, AS EXPLAINED IN THE CPU MANUAL. ALWAYS DISCONNECT AND LOCK OUT POWER AND CONTROL VOLTAGES BEFORE WORKING ON ELECTRICAL CIRCUITS OR PARTS THAT CAN MOVE.

General Specifications

Supply voltage		100-120 VAC, single-phase 50/60 Hz±4 Hz
Supply voltage range		85-132 VAC
Permissible duration of momentary power failure		10 ms or less (at rated input)
Temperature	Operational	32 to 131 °F (0 to 55 ℃)
	Storage	−4 to 158 °F (-20 to 70 ℃)
Humidity	Operational	30−90% RH
	Storage	10−90% RH
Vibration resistance (Max)		5.8 m/s^2 (1000 rpm)
Impact resistance (Max)		98 m/s^2
Electrical noise tolerance		Noise Voltage 1,200 Vpp Noise duration 1 μsec Noise frequency 50 Hz
Voltage resistance		1,500 VAC, 1 min. between each external AC terminal and case
Insulation resistance		5 MΩ or more as measured with 500 VDC insulation resistance meter between each external AC terminal and case
Resistance to ground		Less than 100 ohms
Dust/gases		0.1 mg/m^3 or less; no corrosive gas permitted
Cooling method		Natural cooling

Programming Terminal
PSEα Specifications

Supply voltage		100—120 VAC $^{+10}_{-15}$% single-phase 50/60 Hz±4 Hz	
Power requirement	Continuous	130 VA	
	Surge	6,000 VA	
Temperature		Operational	Storage
		50 to 95 °F (10 to 35 ℃)	23 to 122 °F (—5 to +50 ℃)
Humidity		40—80% RH	10—98% RH
Vibration (Max)		4.9 m/s^2, 17 Hz vibration applied for 30 s	
Dust		0.1 mg/m^3 or less	
Dimensions	EL cover closed	400 W×110 H×350 D (mm)	
	EL cover open	400 W×230 H×350 D (mm)	
Weight		Approx. 4.5 kg (10 lb)	

PREFACE

This CPU manual is devoted to the use of CPU, consisting of the following 3 chapters.

Chapter 1 explains the basic use of the CPU and its maintenance.
Chapter 2 describes the operations of the CPU in detail.
Chapter 3 is concerned with the knowledge which should be useful to persons interested in the function to link with the host computer.

Reading of this manual helps provide correct and optimum use of CPU.

> NOTE
>
> The word "CPU" and/or "CPU Module" means "2 α " and/or "2 α E" and/or "2 α H" and/or "2 α Hf" in this manual.
> And Photographs of CPU in this manual are those of 2 α .

This manual supports the following system versions:

PSE α	Compact PMS	Version 5.0 Revision 0.0 and later
	LADDER	Version 5.0 Revision 0.0 and later
Windows®	CPMS load system	CPMS Load System For Windows® 06-00 or later
	CPMSE load system	CPMSE Load System For Windows® 06-00 or later
	Ladder Drawing System	Ladder Drawing System For Windows® 06-00 or later

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PCs : Programmable Controllers
2 α : HITACHI-S10/2 α
2 α E : HITACHI-S10/2 α E
2 α H : HITACHI-S10/2 α H
2 α Hf : HITACHI-S10/2 α Hf

* Microsoft® Windows® operating system, Microsoft® Windows® 95 operating system and Microsoft® Windows® 98 operating system are registered trademarks of Microsoft Corporation in the United States and/or other countries.

CONTENTS

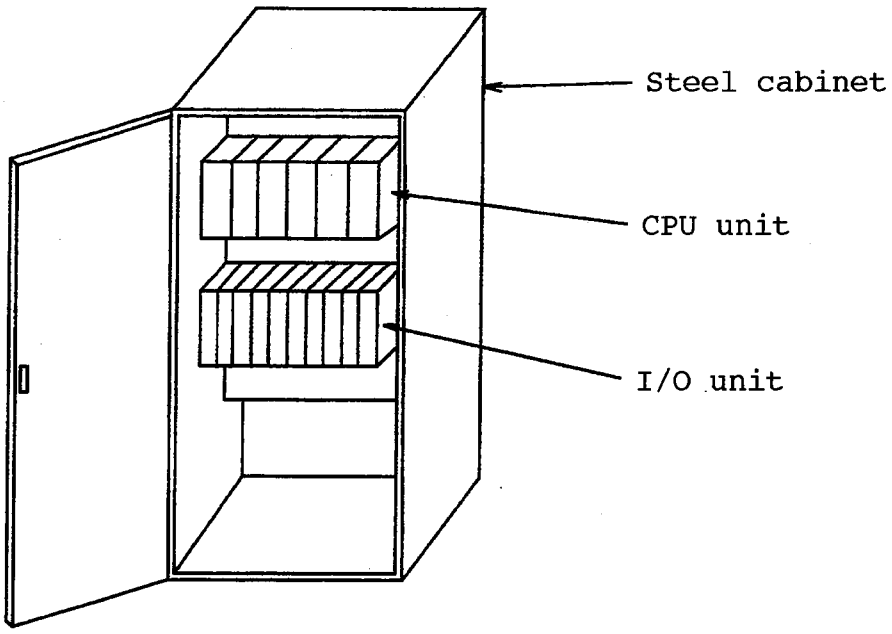
1 HANDLING GUIDE

1.1 Before Using the PCs

Before using the programmable controller PCs, note the following:

(1) The PCs is a product using electronic circuits and processor technology, requiring the following consideration:

① The PCs is not fireproof, dustproof, or dripproof. When installing the PCs, encase it in a steel, dustproof, dripproof cabinet.

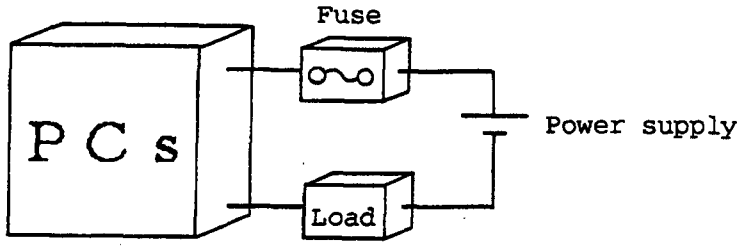


② Make sure that temperature, humidity, atmosphere conditions, and other environmental parameters are to the specifications:

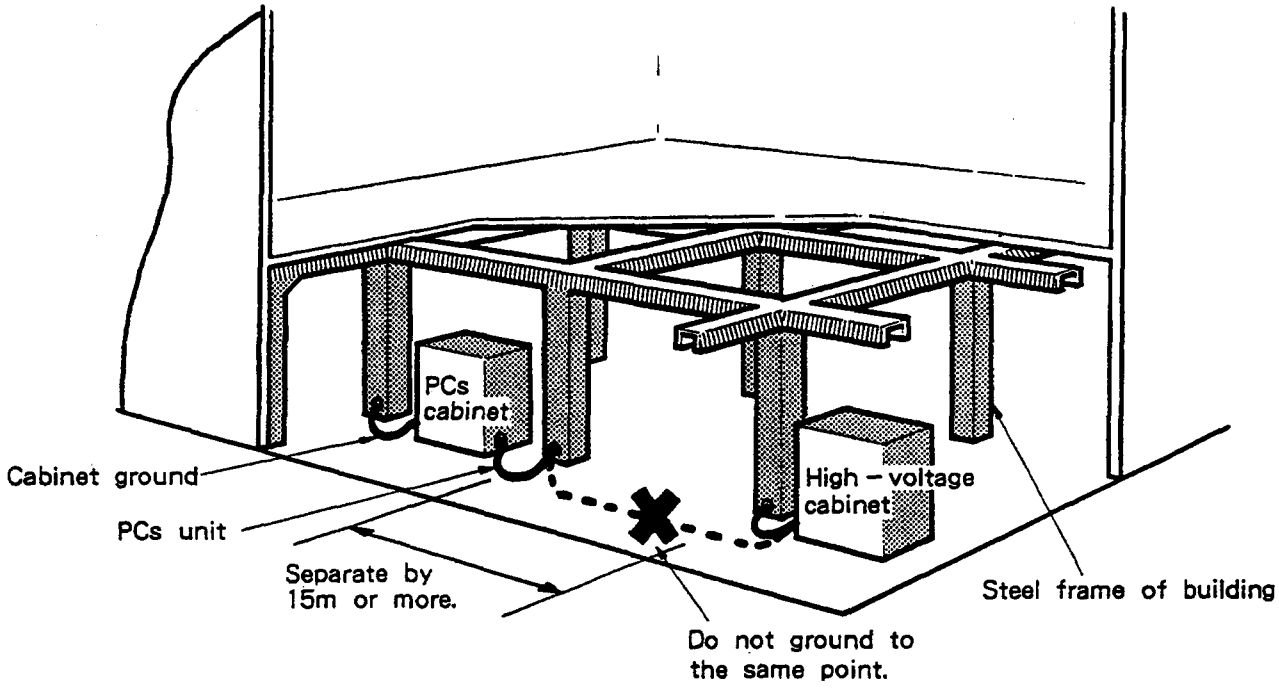
Parameter	Specifications
Temperature	0 to 55℃
Relative humidity	30% to 90% (no condensation)
Atmosphere	No corrosive gases
Vibration	None
Shock	None

Check whether the environment conforms to the specifications, as necessary.

③ Install a fuse to protect the output module against load short-circuits. Make sure that the fuse is suitable for the rating of the load. If an inappropriate fuse is used, a short-circuit of the load will burn the PC board or case.



④ Do not share the ground wire connected to high-voltage equipment with the PCs. Ground the PCs with a separate wire conforming to Class D grounding (*) or better. It is best to weld the ground wire to a steel frame of the building. (For details, see the Wiring Manual (SAE-4-001.)



* Class D grounding is defined in the Technical Standard for Electrical Facilities of Japan. This standard states that the grounding resistance must be 100 ohms for equipments operating on 300 VAC or lower and 500 ohms or less for those to be shut down automatically within 0.5 second when earthing occurs in low tension lines.

⑤ Do not install the PCs in or near a cabinet in which an inverter or another high-voltage device is included. If such installation is unavoidable, install a shielding plate to shut out electromagnetic and electrostatic induction to the PCs and its cables.

⑥ Even a partial failure may affect the entire system. The emergency stop circuits of the device into which to incorporate the PCs should be made up of external relay circuits.

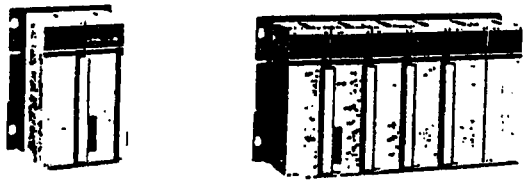
⑦ If the PCs incurs failure, the user must not attempt to replace internal parts. Replace the entire module. (Otherwise, internal parts may be damaged.)

⑧ Installing a terminal block

Two types of terminal blocks are available : one-row, 20-point terminal block and two-row, 40-point terminal block. You cannot use a 40-point terminal block as a substitute for the 20-point terminal block. Use a terminal block that is suitable for a specific module. It is probable that the 20- and 40-point terminal blocks will be erroneously interchanged particularly when the digital I/O module is used. Therefore, see the table below and exercise care not to make a mistake.

CPU Unit

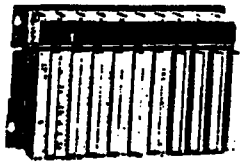
Use 40-points terminal blocks for all CPUs.



I/O Unit

Station module (LWS010) : Use 20-points terminal block.

Power module (LWV050) : Use 20-points terminal block.



I/O Module

Kind		Type	Number of Points	Specifications	Terminal Board
Input	AC	LWI000	32 points	100-120 VAC contact input	40 points
		LWI050	16 points	100-120 VAC contact input	20 points
		PDG330	16 points	200 VAC contact input	20 points
	DC	LWI100	32 points	12-24 VDC contact input	40 points
		LWI150	16 points	12-24 VDC contact input	20 points
Output	AC/DC	LWO000	32 points	100-220 VAC, 12-110 VDC contact output	40 points
		LWO050	16 points	100-220 VAC, 12-110 VDC contact output	20 points
		LWO060	16 points	100-220 VAC, 12-110 VDC contact output (Independent contact)	40 points
		PDS360	16 points	100 VAC, 12-110 VDC contact output (with fuse)	20 points
	AC	PDS330	16 points	100 VAC triac output (fuse attached)	20 points
		LWO200	32 points	100 VAC triac output	40 points
	DC	LWO100	32 points	12-24 VDC Transistor output	40 points
		LWO150	16 points	12-24 VDC Transistor output (with fuse)	20 points

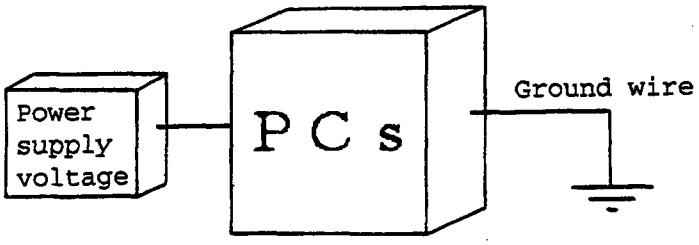
■ When expanding or changing peripheral equipment

● When expanding or changing peripheral equipment, check the PCs for abnormal conditions as described in "1.8.1 Preventive maintenance." Particularly, note the following points:

● Power supply voltage

* Check the power supply voltage and its waveform.

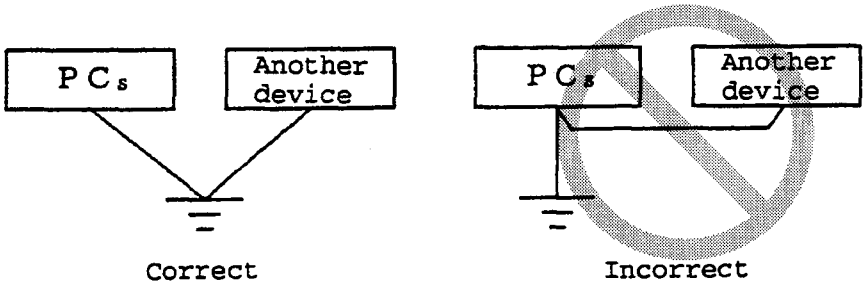
- Is the voltage dropping?
- Does the noise on the power supply line cause a problem?



● Ground wire

* Check the ground wire.

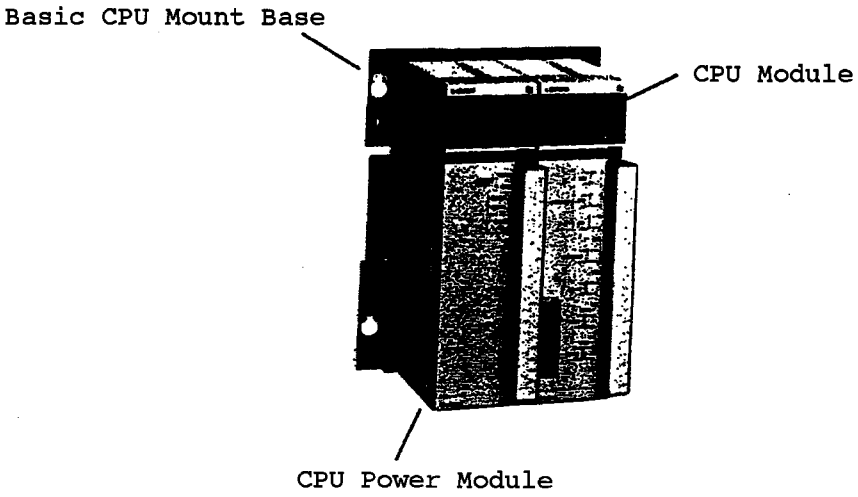
- Is the ground wire connected to another ground wire?
- Is the ground wire separated from the ground wire of the high-voltage cabinet?



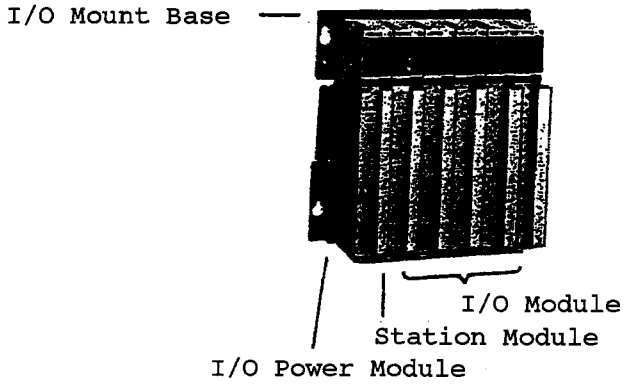
Check whether signal cables such as remote I/O cables are sufficiently separated from the power cord.

1.2 Name of Each Part and Its Function

● CPU Unit

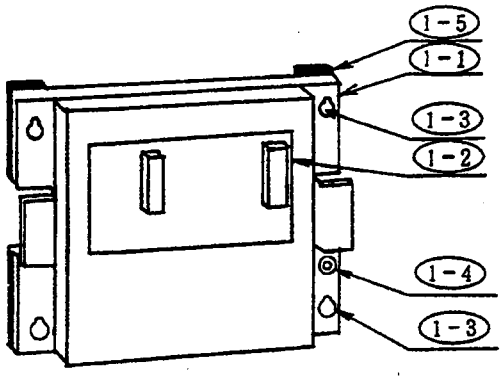


● I/O Unit



1.2.1 Name and Function of Each Part of CPU

① CPU Mount Base



(1-1) CPU Mount Base
Mounts the CPU Power and CPU modules and is used for fixing the modules onto the user board.

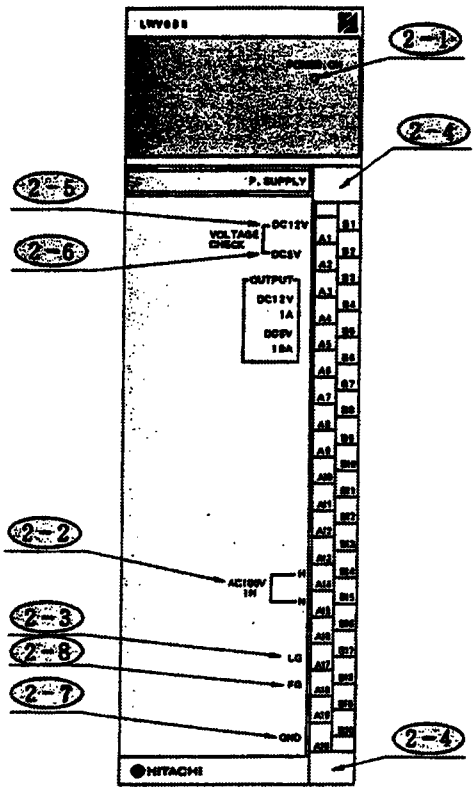
(1-2) Connector
Connects the CPU Power and CPU module electrically.

(1-3) Mounting Holes
Are used for mounting the CPU onto the user's vertical panel.

(1-4) Earth Terminal (M4)
Screw hole used for grounding the CPU Unit. (The resistance between the grounding points and earth must be less than 100 ohms.)

(1-5) Insulating Bushing
A part to insulate the CPU from the user's panel.

② CPU Power Module



(2-1) POWER ON LED
Is lit when power is supplied to the CPU.

(2-2) Power Supply Terminals
Used for 120 VAC power to the CPU.

(2-3) Line Ground
Ground terminal of the power line filter.

(2-4) Terminal Block Mounting

(2-5) Voltage Check Terminal (12 VDC)
(For use by HITACHI service personnel)
Is used for measuring the voltage given to the CPU (12 VDC to GND) External wiring is strictly prohibited.

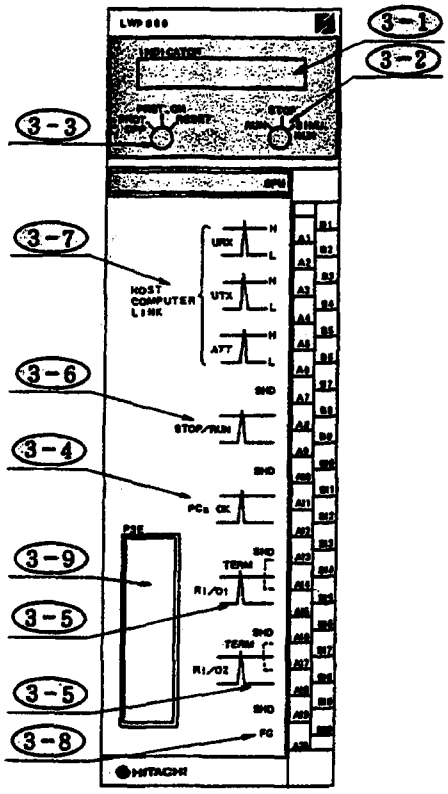
(2-6) Voltage Check Terminal (5 VDC) (For HITACHI service personnel)
Is used for measuring the voltage given to the CPU (5 VDC to GND) External wiring is strictly prohibited.

(2-7) Voltage Check Terminal (GND) (For use by HITACHI service personnel)
Ground terminal (0 VDC) of the circuits within CPU. External wiring is strictly prohibited.

(2-8) Frame Ground
Connect this ground to the CPU unit mount base (1-4).

③ CPU Module

S10/2 α



(3-1) Indicator

Indicates the operating status.

(3-2) Can be programmed to display various info.

(3-3) PROT. OFF/PROT. ON/RESET Key Switch

RUN/STOP/SIMU. RUN Key Switch

RUN: CPU operation (RUN status)

STOP: CPU stop (STOP status)

SIMU. RUN: CPU simulation (SIMULATION RUN status)

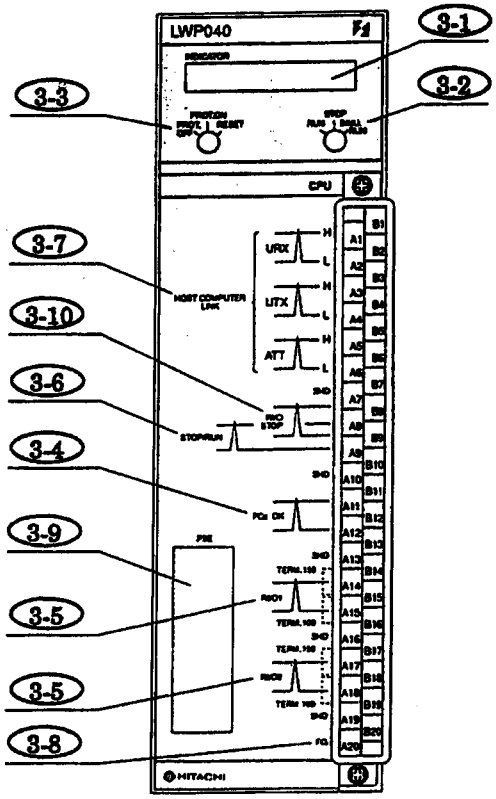
Ascertains a program operation by turning ON and OFF the input points through the programming device instead of external input/output.

PROT. OFF: Enables the entire write-enable area of the memory to be modified. No protection.

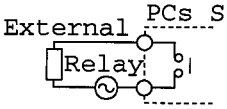
PROT. ON : Disables write operation to areas (protect) other than the ON/OFF status memory of the sequence program (called the I/O memory).

RESET : Sets the I/O memory except K. C. DW, FW. to OFF ('0') state. CPU stops. (The same as the power recovery)

S10/2 α E



(3-4) PCs OK External Output Terminal



Contact Capacity
100 VAC 1A MAX.
30 VDC 2A MAX.

The contact is made open by any of STOP, SIMU. RUN, power failure, PCs failure (CPU failure) and rewriting during RUN (under the following conditions).

		When the 2 α H or 2 α Hf uses ladder or CPMS Version 5.0 or later	Other than the case on the left
Rewriting during RUN	PRESET DATA REWRITE	no	no
	INSERT/DEL	no	√

no : The PCs OK is not opened.

√ : The PCs OK is opened for one sequence cycle during rewriting.

SHD : Terminal used for the external wiring shield. Connect to the ground as necessitated, as it is not connected internally. (SHDs are connected with each other.)

(3-5) RI/O1-RI/O2 Connecting Terminal

Connecting terminals for remote I/O 1024 points, No. 000 to 3FF, are supported on the RI/O1, and 1024 points, 400 to 7FF, on the RI/O2.

(3-6) STOP/RUN External Input Terminal

Used for switching RUN/STOP externally by remote operation. Stopped if shorted.

(3-7) HOST COMPUTER LINK I/O Terminal

URX-H - HIGH side

Terminal for signals received from a host computer

L - LOW side

UTX-H - HIGH side

Terminal for signals sent to a host computer

L - LOW side

ATT-H - HIGH side

Terminal for interrupt signals to a host computer

L - LOW side

* HOST COMPUTER LINK is made in H-7338 system, a HITACHI, LTD. Control Computer (HITACHI Control Computers) Interface.

(3-8) Frame Ground

Connect this ground to the CPU unit mount base (1-4) or optional module FG terminal.

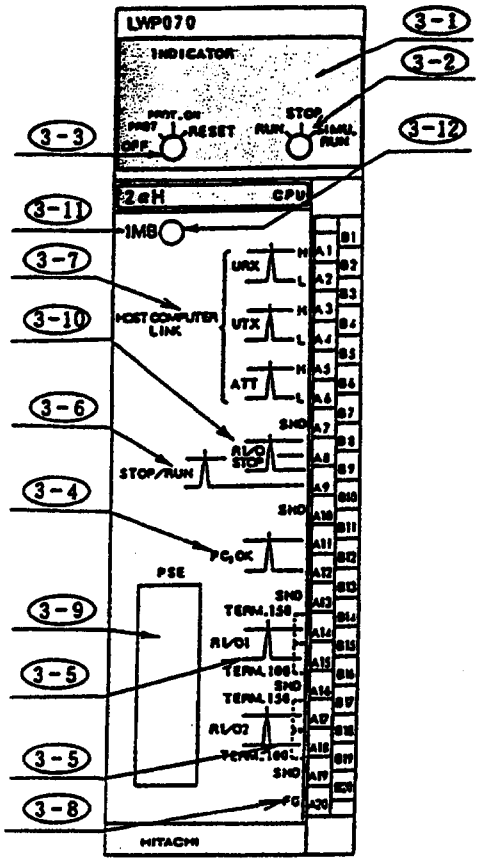
(3-9) PSE Connector

Is used for connecting the PSE cable.

(3-10) RI/O STOP External Input Terminal (only for 2 α E, 2 α H, 2 α Hf)

Used for stopping Digital and Analog Input/Output by remote operation. Stopped if shorted.

S10/2 α H



(3-11) 1MB mark

Indicates that 1M-byte memory for computer processing is incorporated.

Starting address is fixed to /100000.

(3-12) Clock mark

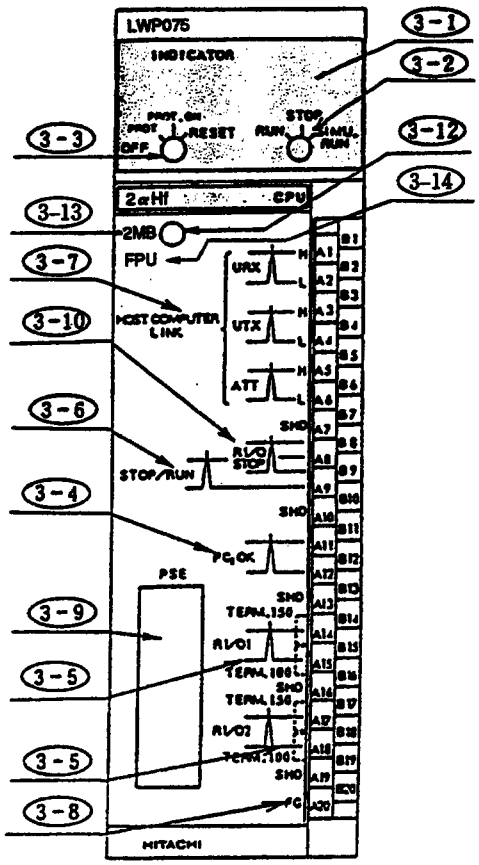
Indicates that the clock is incorporated.

⚠ CAUTION

- 2 α H incorporates 1M bytes memory for computer processing. Starting address is fixed to /100000. To add an optional expansion memory (LWM***) , assign /200000 to the starting address of expansion memory.
- The following table shows the statuses of the ladder program and remote I/O transfer at the RUN, STOP, and SIMU.RUN positions of the key switch on the CPU module.

Program \ Key position	RUN	STOP	SIMU. RUN
Ladder program	Operating	Stopped	Operating
C mode program	Operating	Operating	Operating
Remote I/O transfer	Operating	Operating	Stopped

S10/2 α Hf



(3-13) 2MB mark

Indicates that 2M-byte memory for computer processing is incorporated.

Starting address is fixed to /100000.

(3-14) FPU mark

Indicates that a floating-point arithmetic coprocessor is incorporated.

(1) Terminal block arrangement: The same terminal block arrangement is employed for the 2 α E, 2 α H, and 2 α Hf.

(2) Clock function: The 2 α H and 2 α Hf incorporate a clock function, but the 2 α and 2 α E do not.

(3) FPU: Only the 2 α Hf incorporates a floating-point arithmetic processor.

(4) System startup: The 2 α E, 2 α H, and 2 α Hf cannot be started up from the ladder system. Start them from the CPMS system. Note that the 2 α can be started up from either system.

Differences between the 2 α H and 2 α Hf

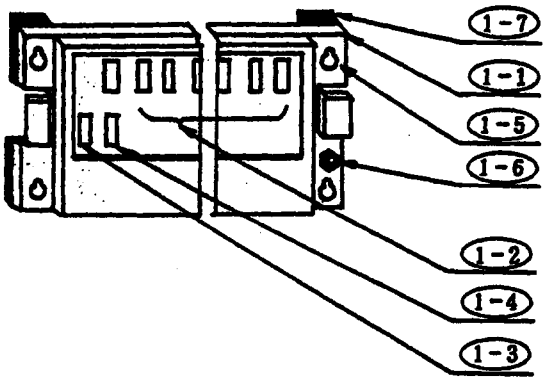
			2 α H	2 α Hf	Remarks
Internal memory			1MB (H100000-H1FFFFF)	2MB (H100000-H2FFFFF)	
FPU			Without	With	
System floppy disk	PSE α	CPMS	V4.2 R3.0 or later	V4.2 R3.0 or later	V5.0 or later supports rewriting during high-speed running as well as the FPU.
	PC98	CPMS LOAD	V1.2 R5.0 or later	V1.2 R5.0 or later	V2.0 or later supports rewriting during high-speed running as well as the FPU.
	PS2	CPMS LOAD	V1.2 R5.0 or later	V1.2 R5.0 or later	V2.0 or later supports rewriting during high-speed running as well as the FPU.

⚠ CAUTION

2 α Hf incorporates 2M bytes memory for computer processing. Starting address is fixed to /100000. To add an optional expansion memory (LWM***) , assign /300000 to the starting address of expansion memory.

1.2.2 Name and Function of Each Part of I/O

① I/O Mount Base



(1-1) I/O Mount Base
Mounts the I/O Power, Station, and I/O modules and is used for mounting to user's panel.
Three types are available according to the number of slots for mounting the I/O modules.

(1-2) Connectors (For I/O)
Are used for mounting the I/O modules.

(1-3) Connector (For I/O Power)
Is used for mounting the I/O Power module.

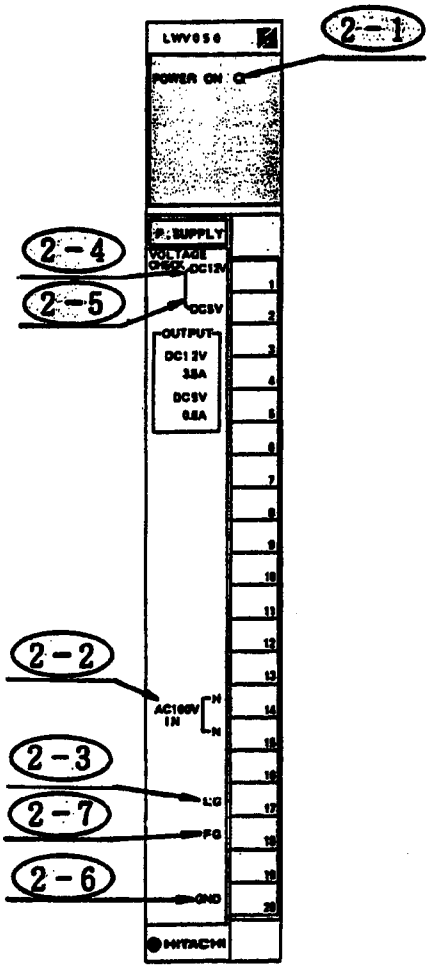
(1-4) Connector (For Station)
Is used for mounting the Station module.

(1-5) Panel Mounting Holes
These holes are used for mounting the I/O unit on a user panel.

(1-6) Earth Ground Terminal (M4)
Screw hole used for grounding the I/O Unit. (The resistance between the grounding points and earth must be less than 100 ohms.)

(1-7) Insulating Bushing
Is used for insulating the I/O Unit from the user panel.

② I/O Power Module



(2-1) Power ON LED
This LED remains lit as long as the I/O unit power is supplied.

(2-2) Power Supply Terminal
Is used for applying a.c. power to the I/O Unit.

(2-3) Line Ground
Ground Terminal of the power line filter.

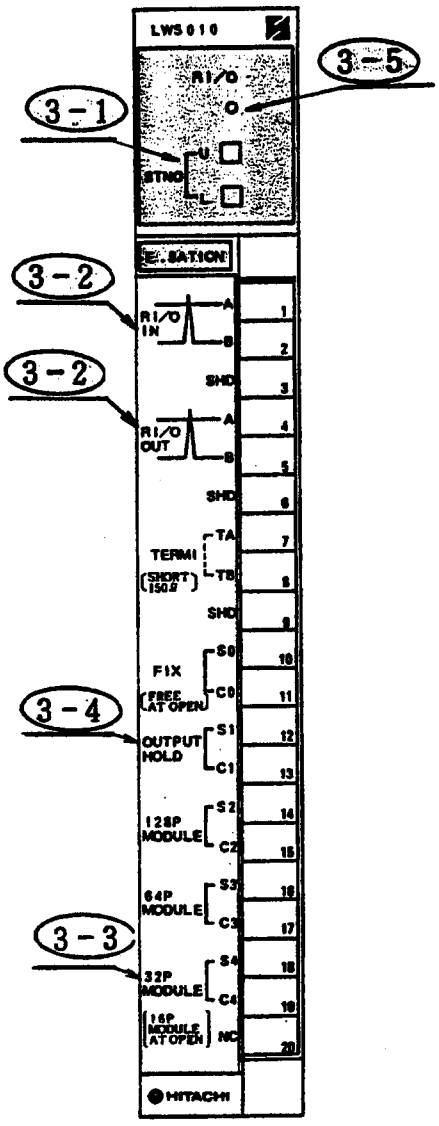
(2-4) Voltage Check Terminal (12 VDC)
(For use by HITACHI service personnel)
External wiring is strictly prohibited.

(2-5) Voltage Check Terminal (5 VDC)
(For use by HITACHI service personnel)
External wiring is strictly prohibited.

(2-6) Voltage Check Terminal (GND)
(For use by HITACHI service personnel)
External wiring is strictly prohibited.

(2-7) Frame Ground
No wiring is necessary as it is connected to (1-6) within the I/O Unit.

③ Station Module



(3-1) Station No. Set Switch
Sets the leading address of an I/O Module in units of 16 points.

(3-2) RI/O (Remote I/O) Connecting Terminal

RI/O IN : Connecting Terminal for the RI/O close to the CPU module

RI/O OUT : Connecting Terminal for the next RI/O Unit

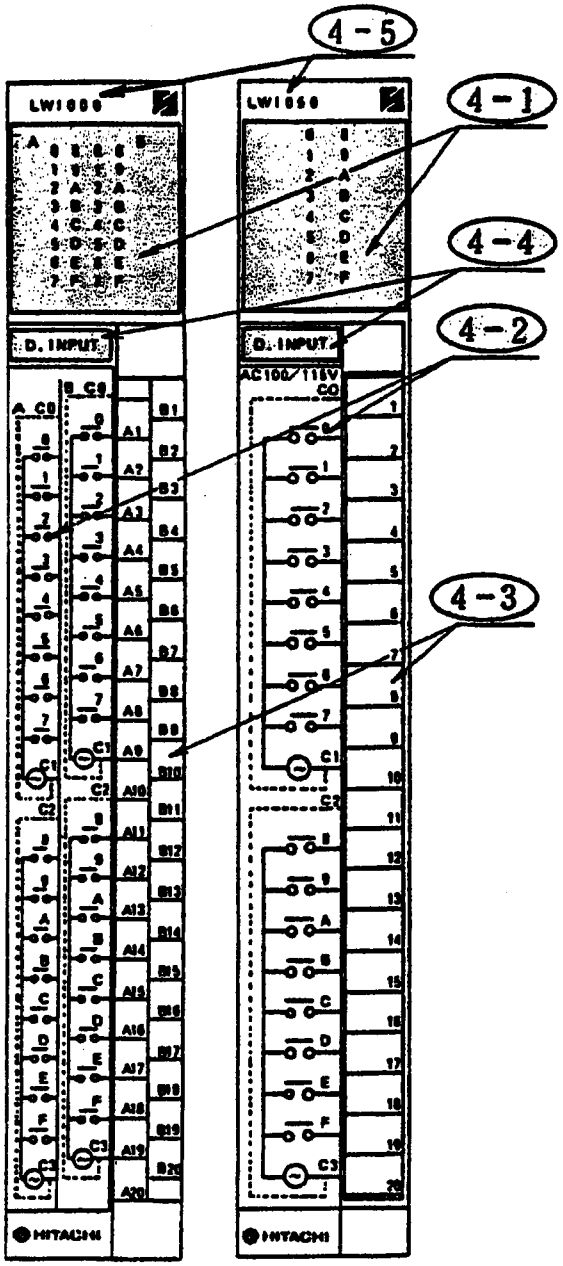
TERMI : For the last I/O unit served by the port, install a jumper between TA and TB. (The terminating resistor, 150 ohms, (built-in) is connected between RI/O OUT A and B.)

(3-3) 32-point Input/Output Module Selection Terminal
When the I/O mounting base will contain 1 or more 32-point input or output module, connect a jumper from S4-C4. (For detail, see Setting in Section 1.5.)

(3-4) Output Module Hold Terminal
Is used to hold (retain) the output ON/OFF of the output module at STOP, SIMU. RUN, PCs abnormal, CPU power "fail" , or when the RI/O line is in trouble. Connect a jumper from Sl to Cl to enable the hold feature.

(3-5) RI/O LED
Is lit when I/O transfer is being made to and from the CPU.

④ I/O Module



(4-1) Monitor Lamps
When the external input/output is ON, the corresponding LED (No.) is lighted.

(4-2) Input/Output Wiring Schematic
Label showing the external connections.

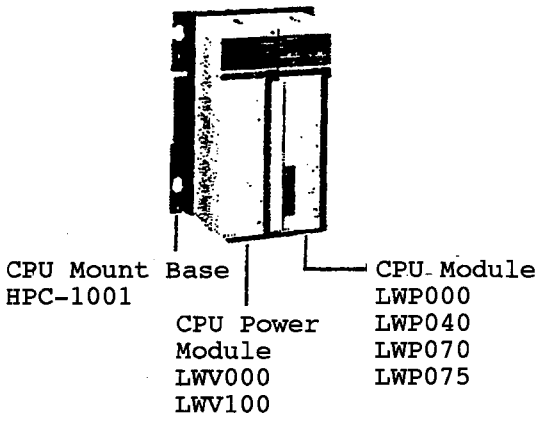
(4-3) External Input/Output Terminal

(4-4) Types of I/O
Shows the type of the Input/Output Module

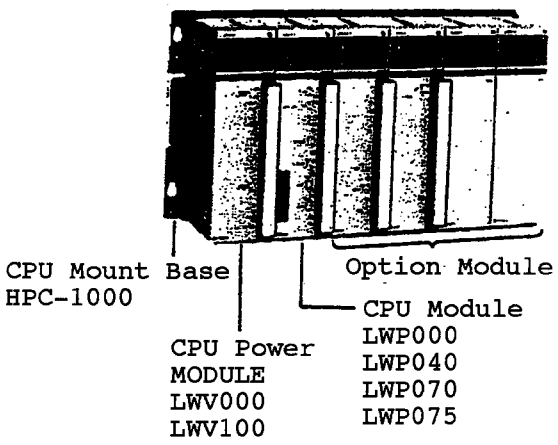
(4-5) Type Label
Label showing the Input/Output Module Type

1.2.3 Type List

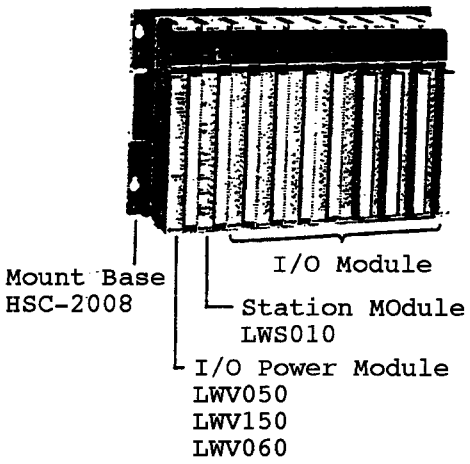
● Basic Unit



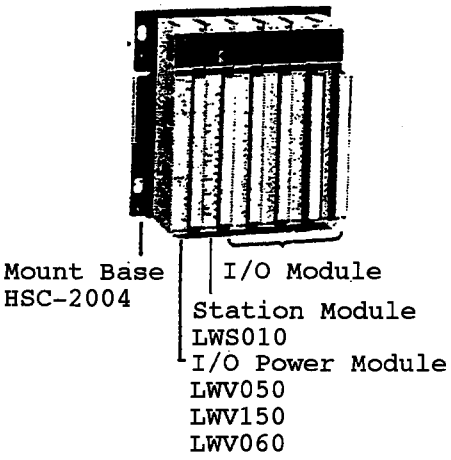
● Expansion Unit



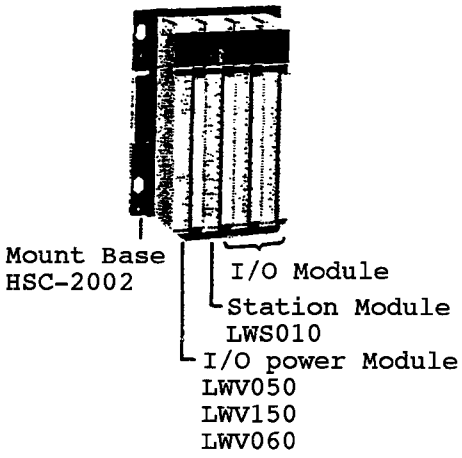
● 8-slot I/O



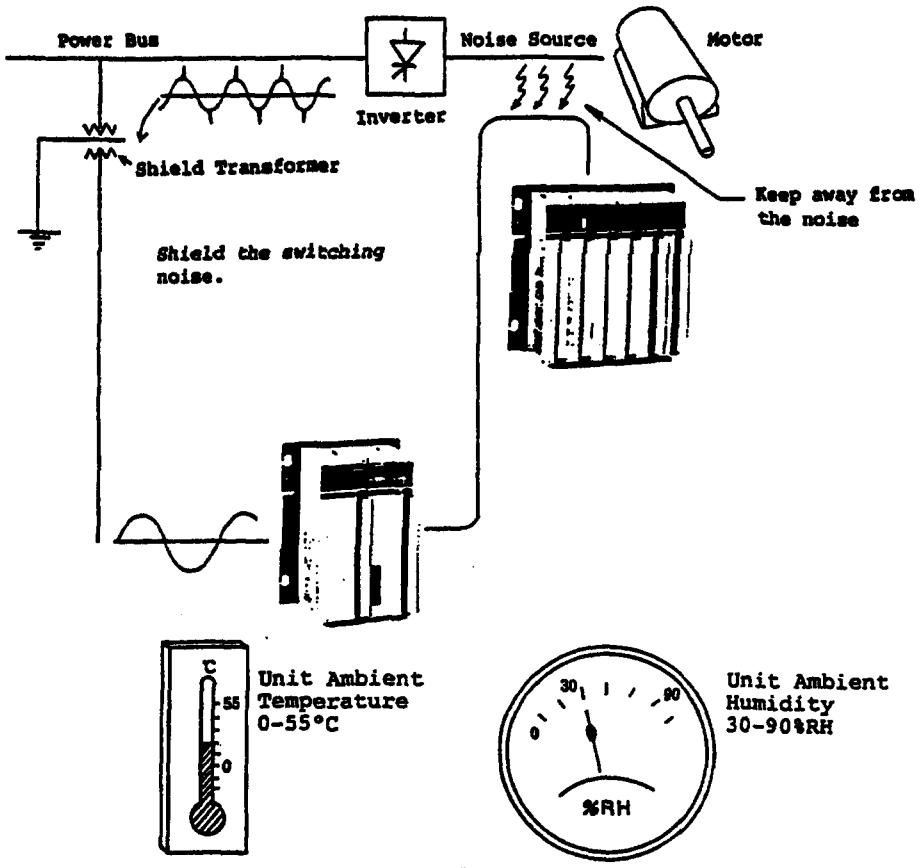
● 4-slot I/O



● 2-slot I/O

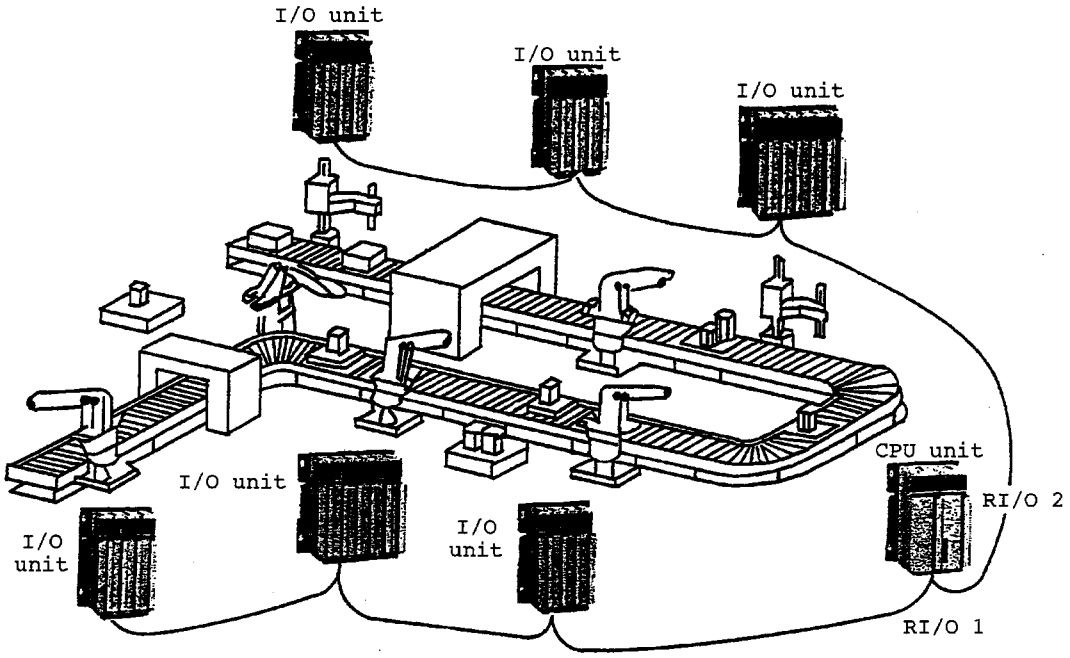


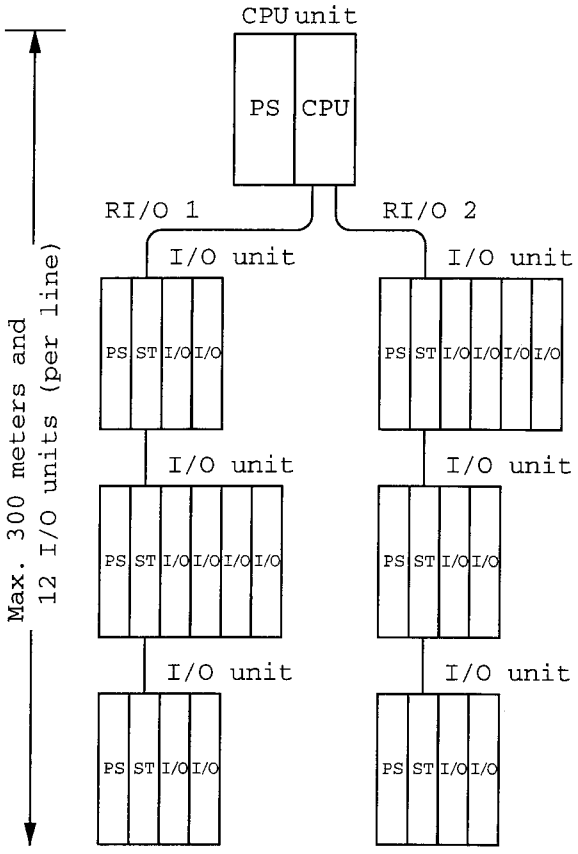
1.3 Installation Environment



Power Voltage	100-120 VAC Single-phase 50/60Hz±4Hz
Range of Power Voltage	85-132 VAC
Temperature	Working : 0-55℃ Storage : -20-70℃
Humidity (No condensation)	Working : 30-90%RH Storage : 10-90%RH
Vibration proof	5.8m/s^2(1000 rpm)
Shock resistance	98m/s^2
Working Atmosphere	Dust : Below 0.1mg/m^3 No corrosive gas

1.4 Installation and Wiring



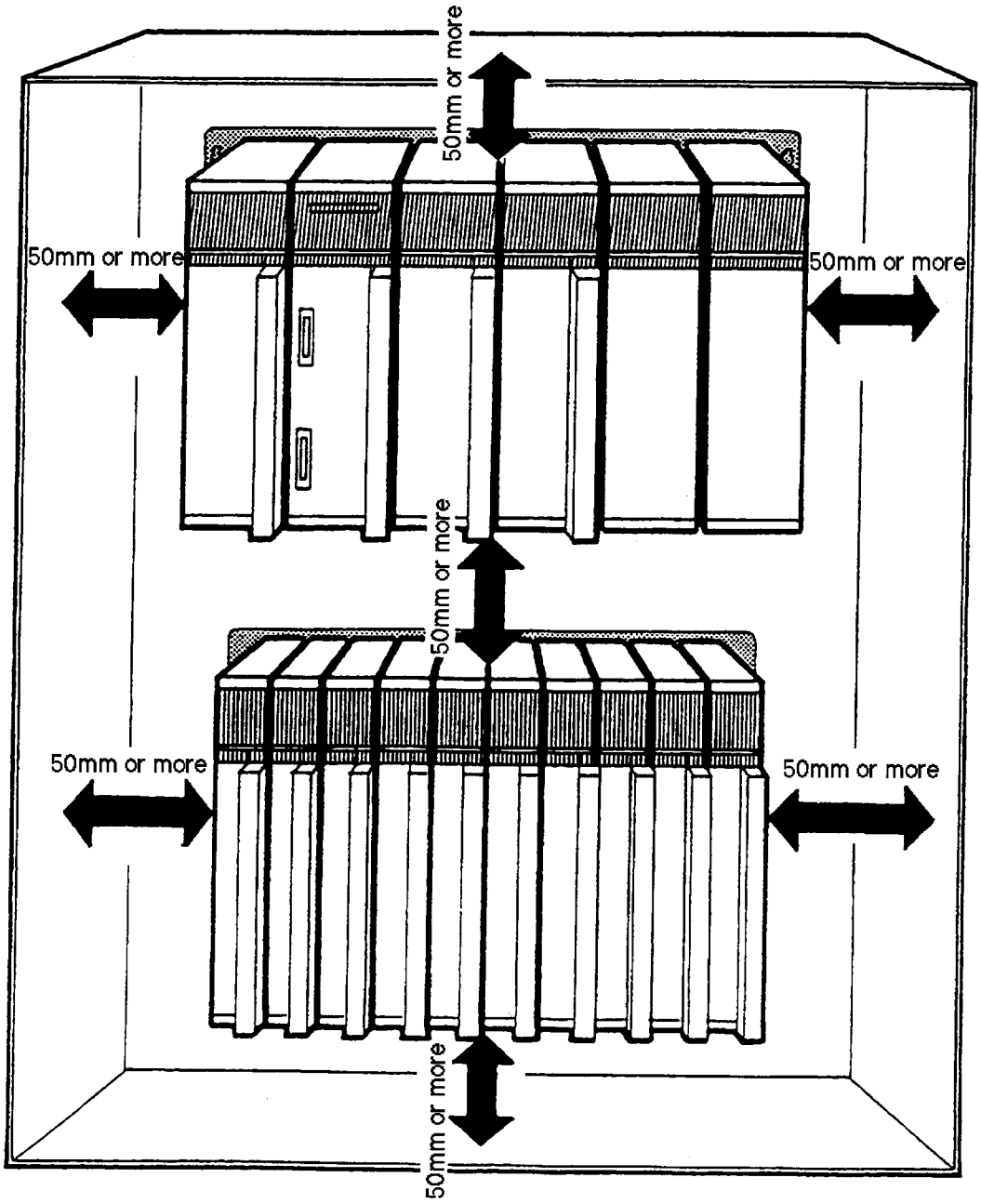


- An I/O unit can be placed maximum of 300 m apart from the CPU unit.
- An I/O unit can be installed near the user equipment with one twisted pair cable.
- Any combination of 8-, 4-, and 2-slot I/O units and amall-sized I/O units can be used depending on the number of I/O points of the equipment. I/O units can be distributively installed at maximum of 12 I/O units.

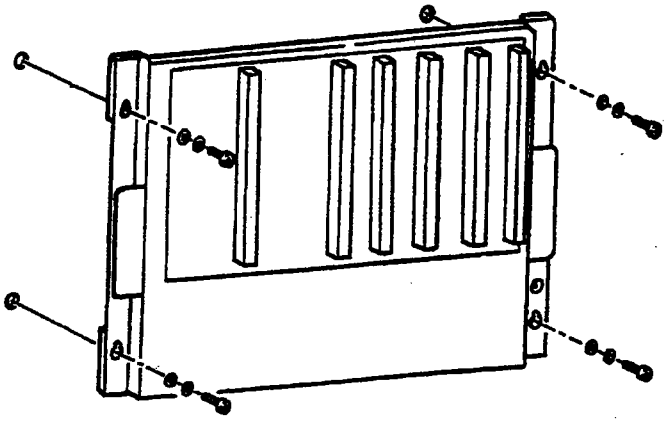
1.4.1 Mounting

PC unit mounting

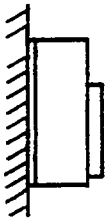
In order to ventilate PC units, mount PC units into an enclosure with 50 mm or more space at the top, bottom, and sides of them as shown below.



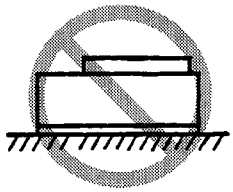
Mount base mounting



Place both CPU and I/O units mounted on a mount base vertically as shown in the figure (A) below. Placing them horizontally as shown in the figure (B) prevents air circulation in modules and causes a temperature rise inside them. It may reduce the module life.

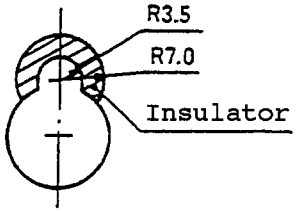


(A) Vertically mounted units

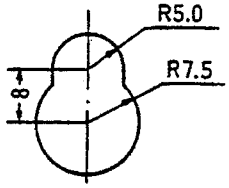


(B) Horizontally mounted units

Mount base mounting hole

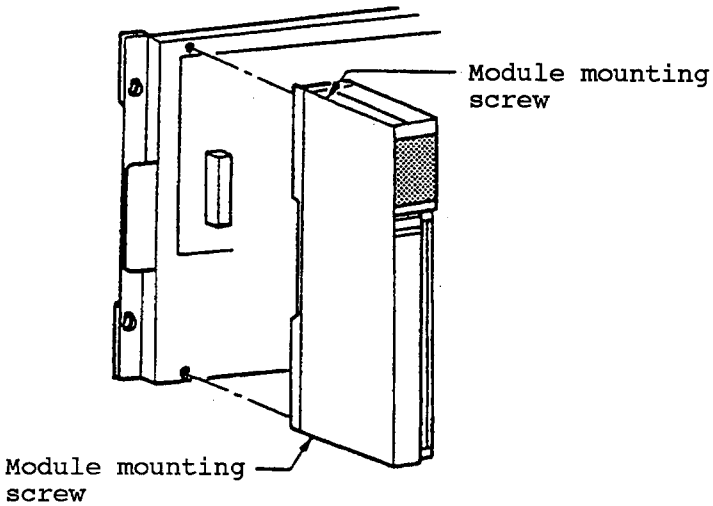


With insulator



With insulator

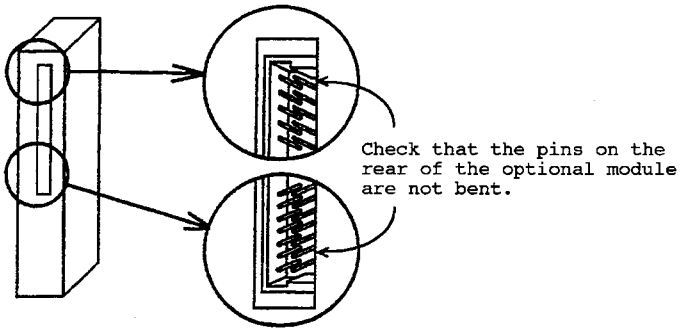
Module mounting



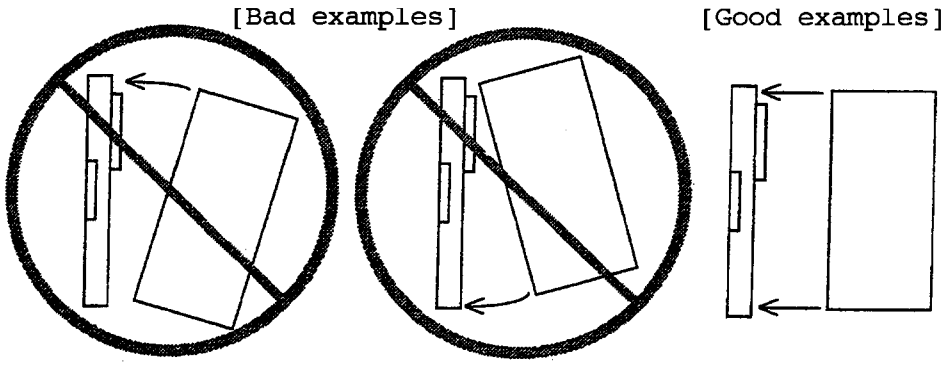
Installing a module

When installing an optional module, observe the following precautions:

- Make sure that the connector pins are not bent.



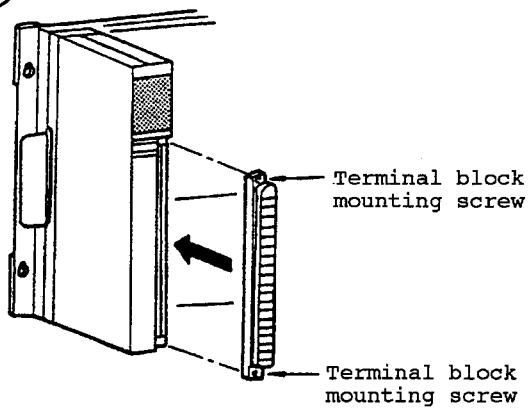
- Access the mount base from its front and squarely position the optional module on the mount base. (If the optional module is obliquely mounted as shown in bad examples, the pins may bend, causing the module to malfunction.)



⚠ CAUTION

If the mount base is positioned overhead due to the employed cabinet structure, use a stepladder or the like and exercise care not to mount the optional module obliquely.

Terminal block mounting

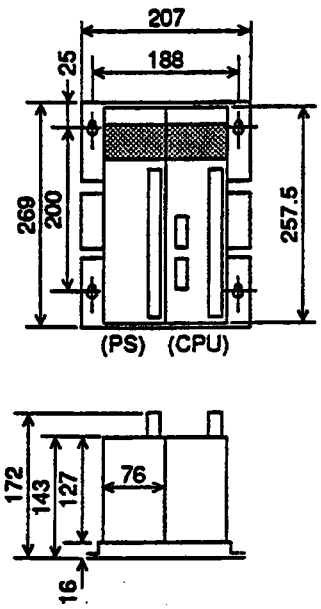


1.4.2 Dimensions

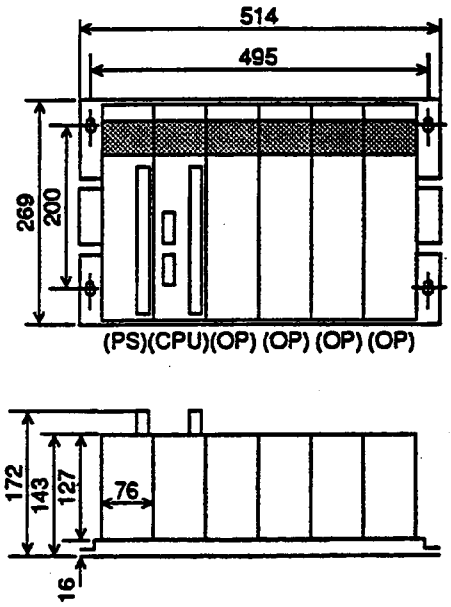
CPU units

Unit: mm

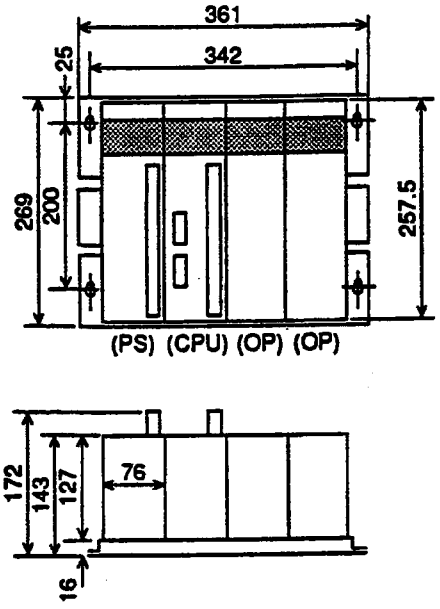
Base unit



8-slot expansion unit



4-slot expansion unit

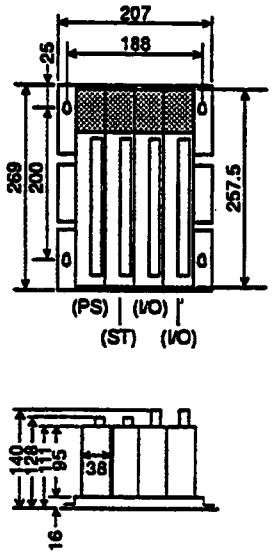
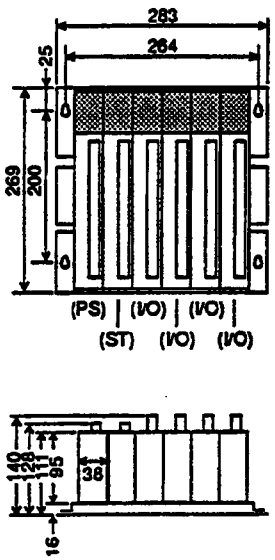
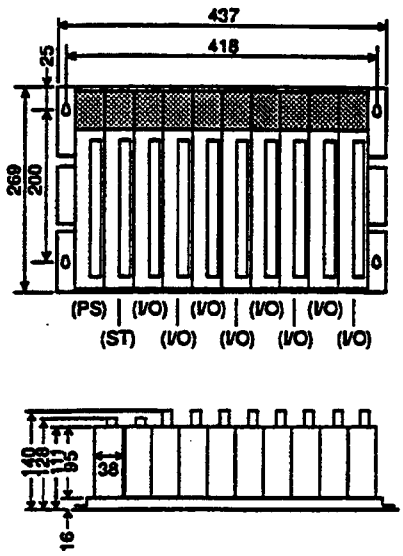


- PS ..... Power supply module
- CPU . CPU module
- OP .... Optional module

  Each optional module in these figures is mounted on 2 slots.

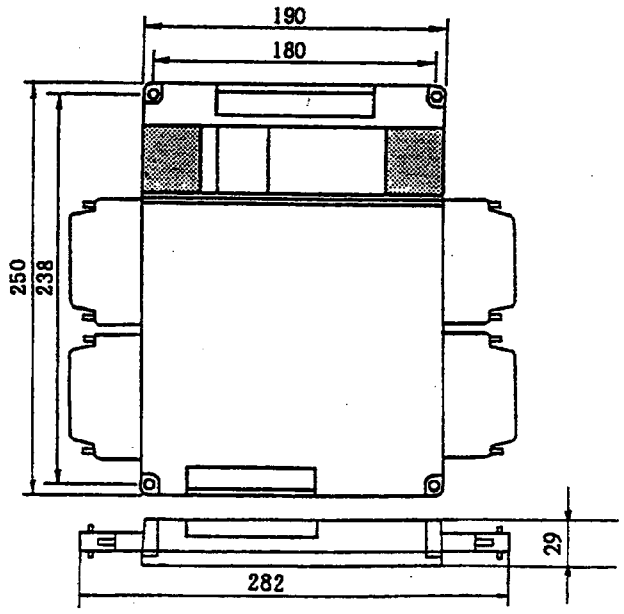
I/O units

Unit: mm

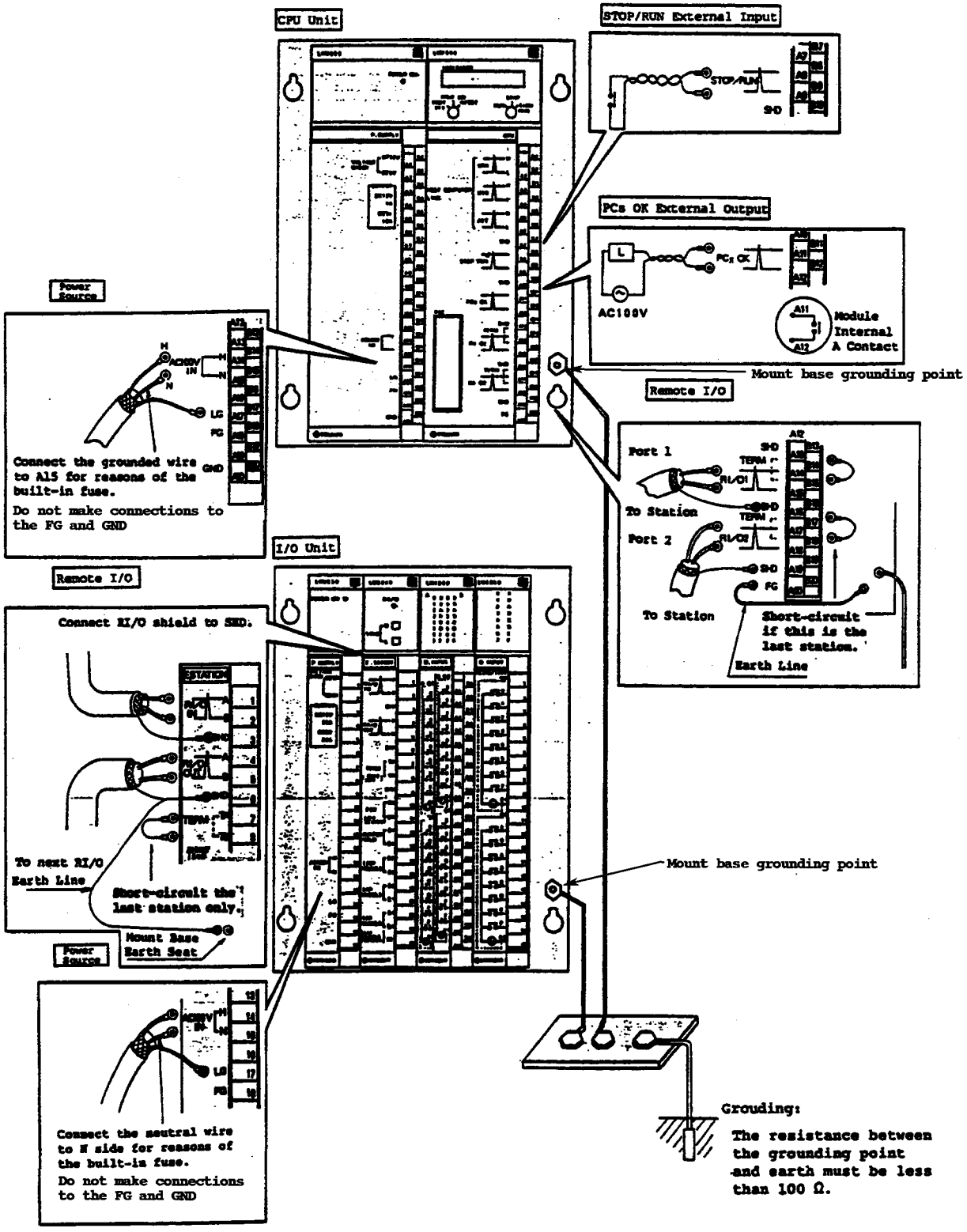
2-slot I/O unit	4-slot I/O unit	8-slot I/O unit
		

- PS ... Power supply module
- ST ... Station module
- I/O .. I/O module

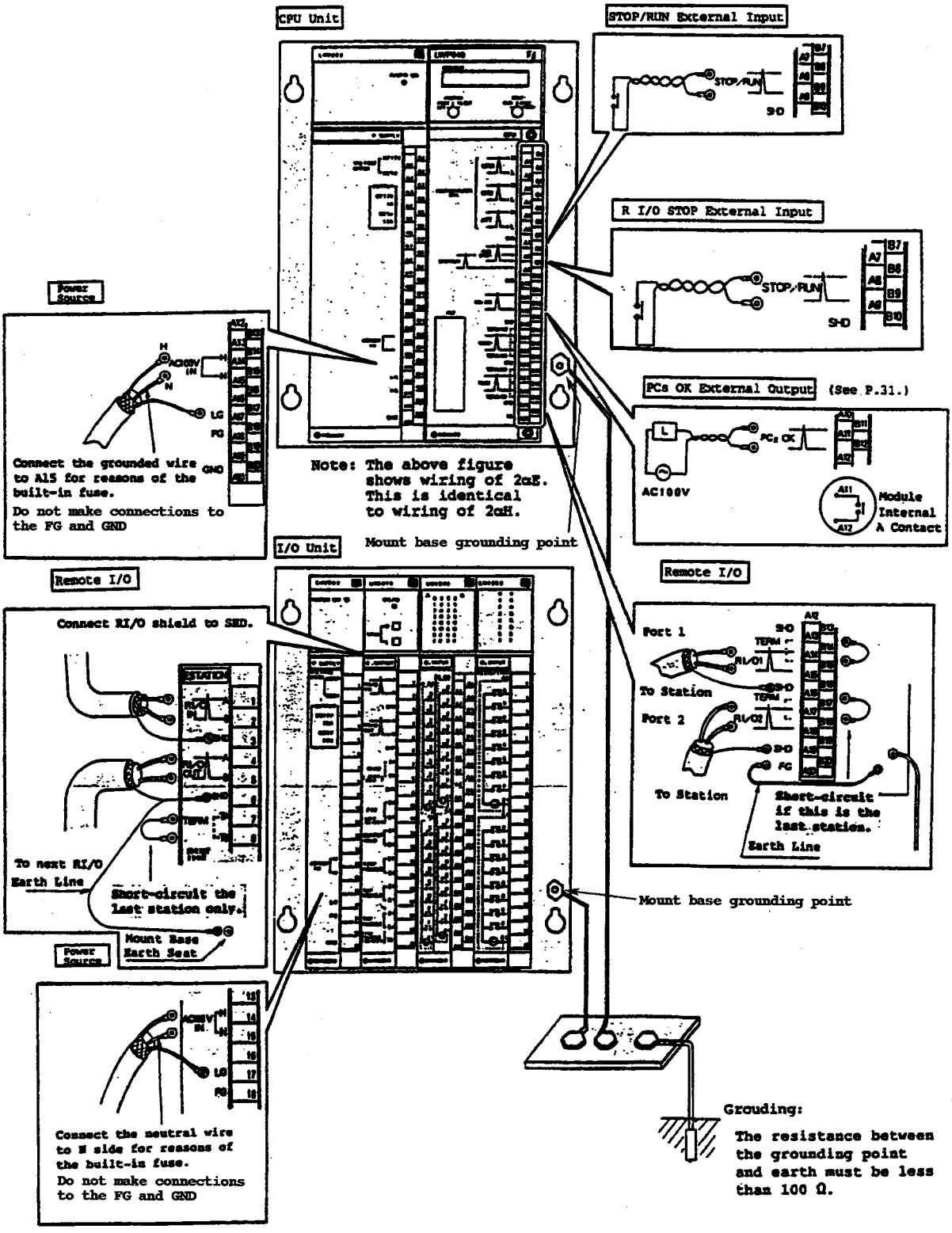
Small-sized I/O unit



1.4.3 Cabling (2 α)



1.4.4 Cabling (2 α E, 2 α H, 2 α Hf)

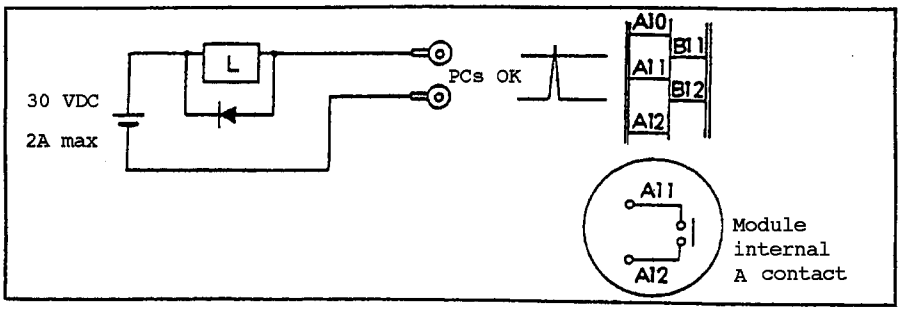


1.4.5 Cables

Remote I/O Cable	
When the total cable length is 980 ft (300 m) or less/port :	
• Characteristics impedance	150ohms ±10ohms (500 kHz)
• Attenuation rating	6 dB/km
• Area of wire	More than 0.75 mm^2 (18 AWG)
• Recommended cable	CO-EV-SX-1P 0.75mm^2 (Hitachi Cable, Ltd.)
When the total cable length is 100 m or less/port :	
• Recommended cable	CO-SPEV-SB-1P 0.3 mm^2 (Hitachi Cable, Ltd.)
* Use the same cable. Normal operation cannot be expected if different cables are used in combination.	
PCs OK	
• Twisted pair cable	
• Cable length	Less than 650 ft (200 m)
CPU STOP/RUN	
• Twisted pair cable	
• Cable length	15 ft (5 m) or less
Power/Earth Lines (By user)	
• Wire gage	More than 2.0 mm^2 (12 AWG)
Terminal Block	
• Terminal block	40-point
• Wiring screws	M3 × 8 screws
• Suitable wire	0.5-1.25 mm^2 (20-16 AWG)
• Clamping torque	6-8 kg-cm (5-7 in-lb)
R I/O STOP (only for 2 α E, 2 α H, 2 α Hf)	
• Twisted pair cable	
• Cable length	15 ft (5 m) or less
Windows® personal computer connection cable	
• Cable type	H24-IFC3-W (Hitachi, Ltd.)

● Note on using the PCs OK external output

To drive the L load with the DC power supply, be sure to attach the surge absorption circuit (see the figure below).

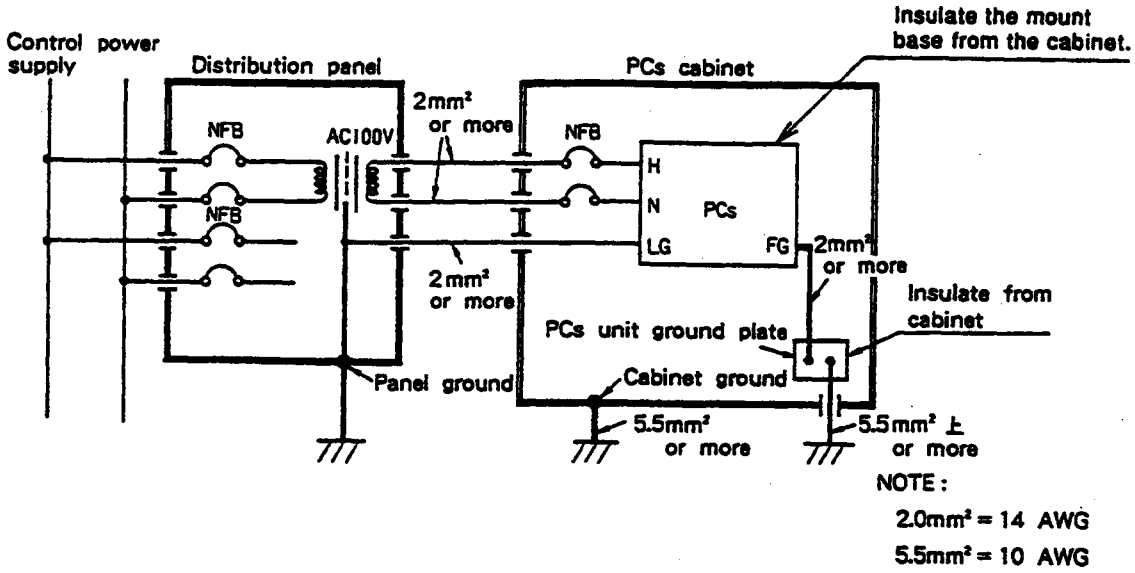


Note : Use a diode of which the reverse withstand voltage is ten times the circuit voltage and of which forward current is not lower than the load current.

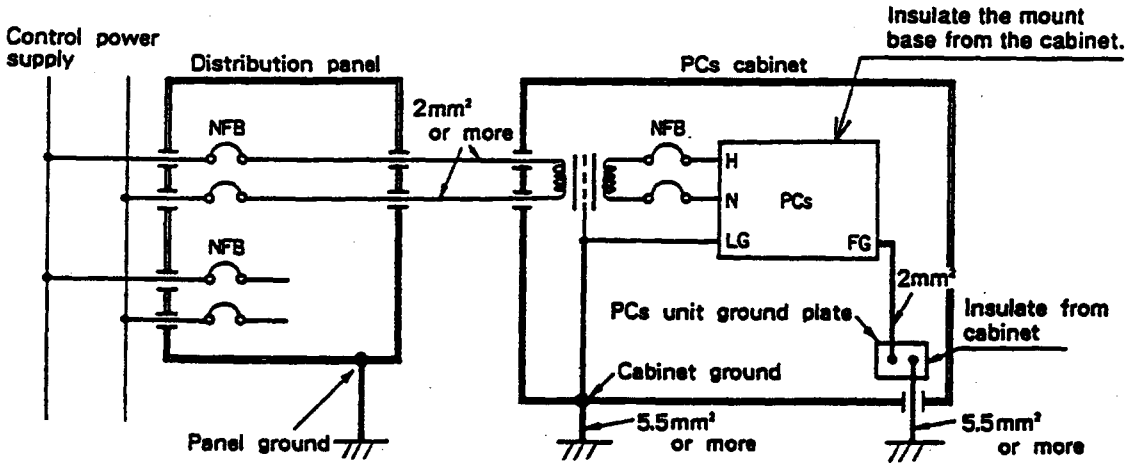
1.4.6 Power Supply Wiring

Power Supply Wiring Methods

When a transformer is used in the distribution panel



When a transformer is used in the PCs cabinet

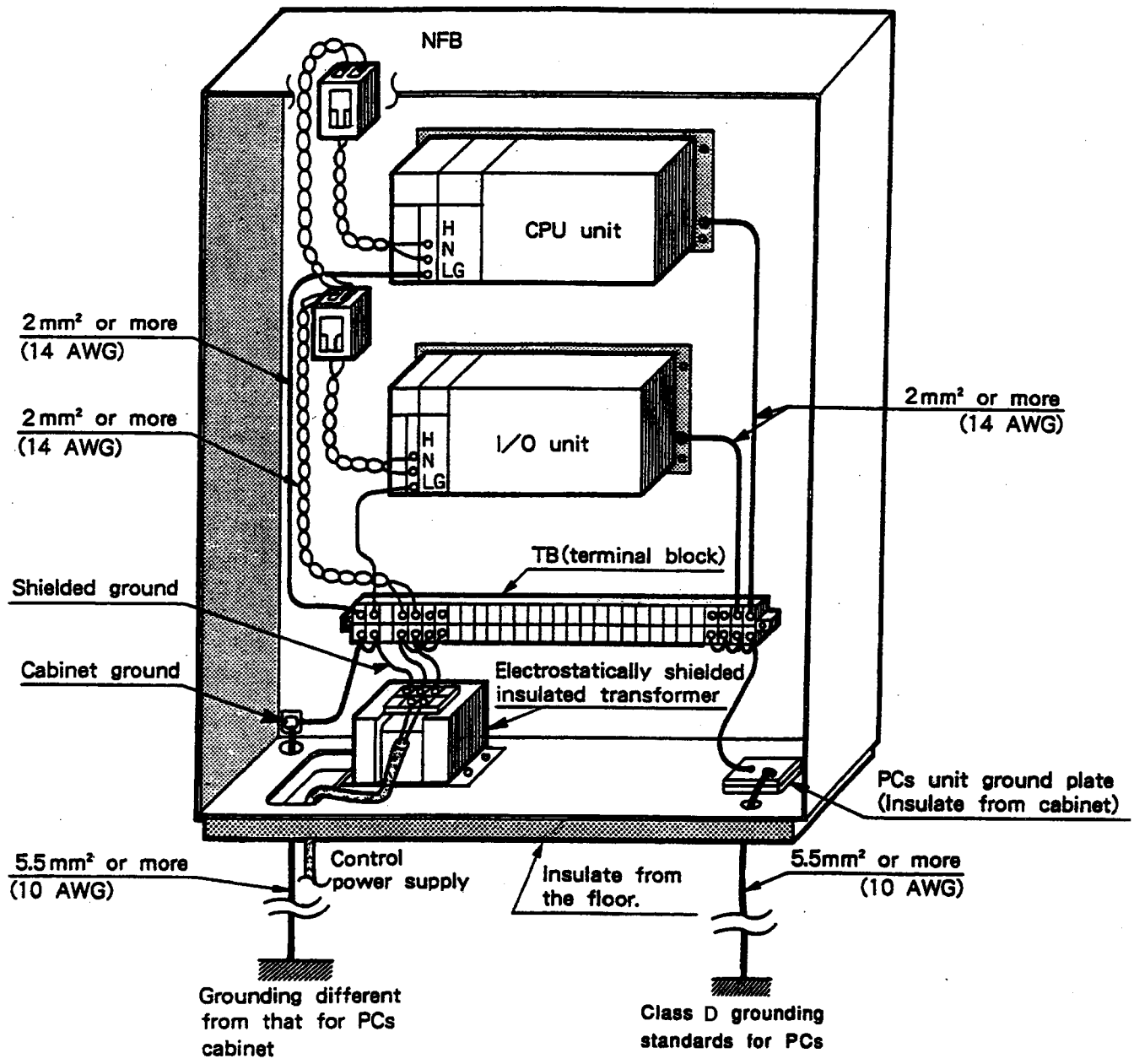


NFB: Non fuse breaker

⚠ CAUTION

- Isolate the control power supply from the PCs power supply with an electrostatically shielded insulated transformer.
- The power source voltage range of the 100 VAC supplied to the PCs shall be from 85V to 132V, and a power supply without waveform distortion shall be used.
- Insulate the PCs unit ground terminal and the mount base from the cabinet.

Wiring Example in the PCs Panel



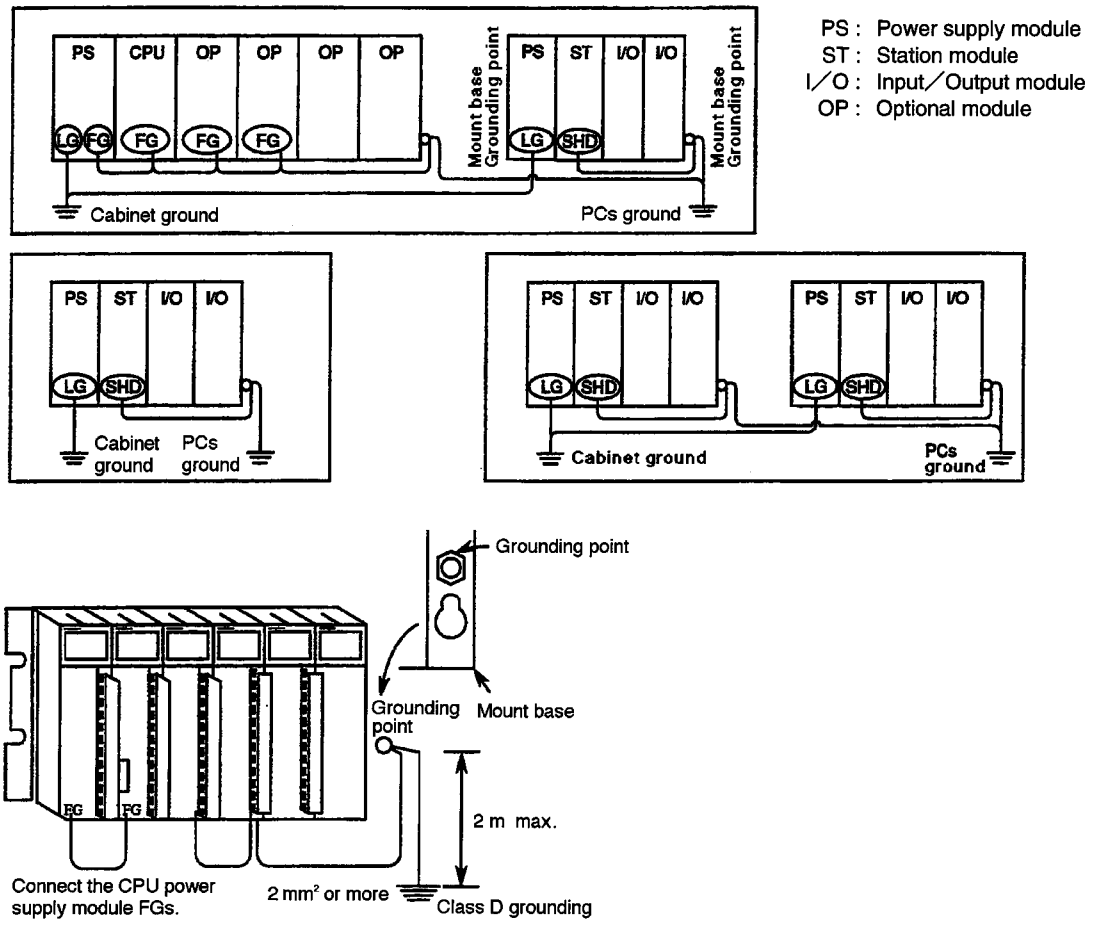
1.4.7 Ground wiring

① Separate the cabinet ground and the PCs ground.

② Insulate the PCs ground from the cabinet.

③ Connect the power supply module FG to the CPU module FG terminal or mount base grounding point.

④ When the option or the I/O has an FG (or SHD terminal) do not connect it to the mount base grounding point.
Connect the PAF *** and PAN *** GND terminals of the analog I/O module to the mount base grounding point.



REQUIREMENT

- For FG (frame ground) wiring, connect the FG terminal of a module having external terminals to the grounding point on the mount base. Ensure that the ground wiring distance does not exceed 2 m. Use the mount base grounding point to establish a Class D ground connection.
- Use a 2 mm^2 or larger ground wire.

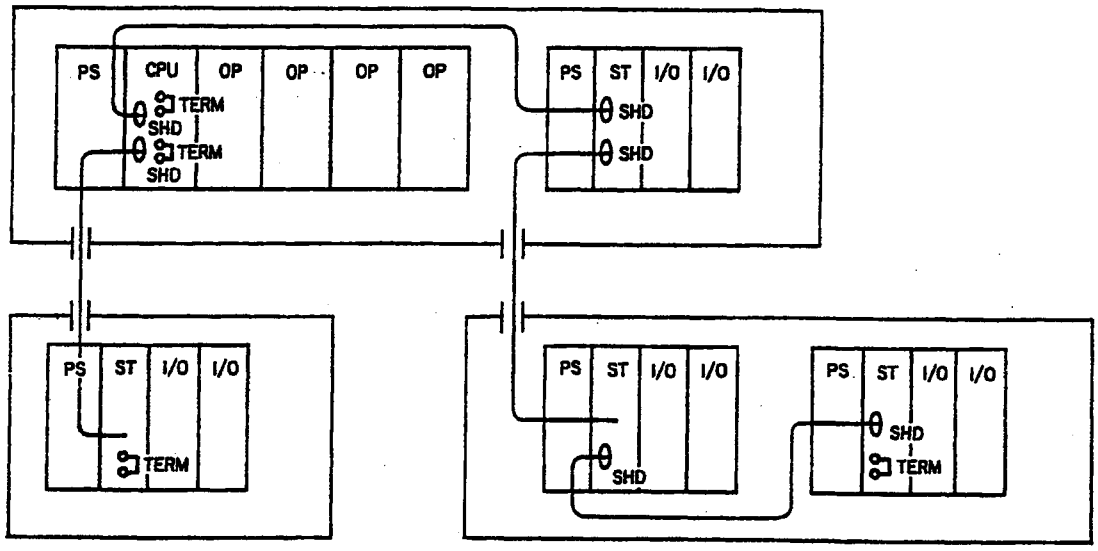
1.4.8 Shield wiring

① When the shield wiring is connected to the same cabinet, ground it at both ends (SHD connection).

② When the shield is connected to separate cabinets, and it cannot be grounded to the same point, Ground one end only (SHD connection).

<Reason>

When the leads are not grounded at the same point, the ground potential may differ, and it is easy for noise to be generated.



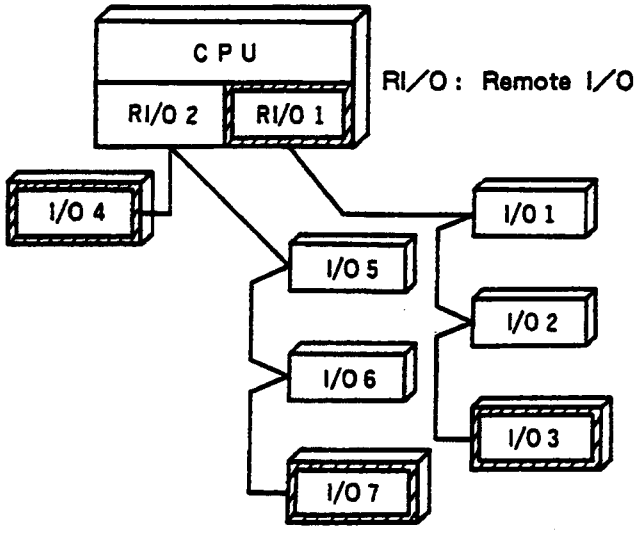
1.4.9 Installing terminating resister

The remote I/O CIRCUIT and the CPU LINK CIRCUIT perform high-speed data transfers. When a signal is transmitted through a cable, a phenomenon called "reflection" takes place. When this occurs, the signal is not transmitted properly. To prevent this, a terminating resister is required.

Location of the terminating resister

As shown below, a terminating resister is required when there is only one cable connected to the module (the terminal module).

For the remote I/O circuit

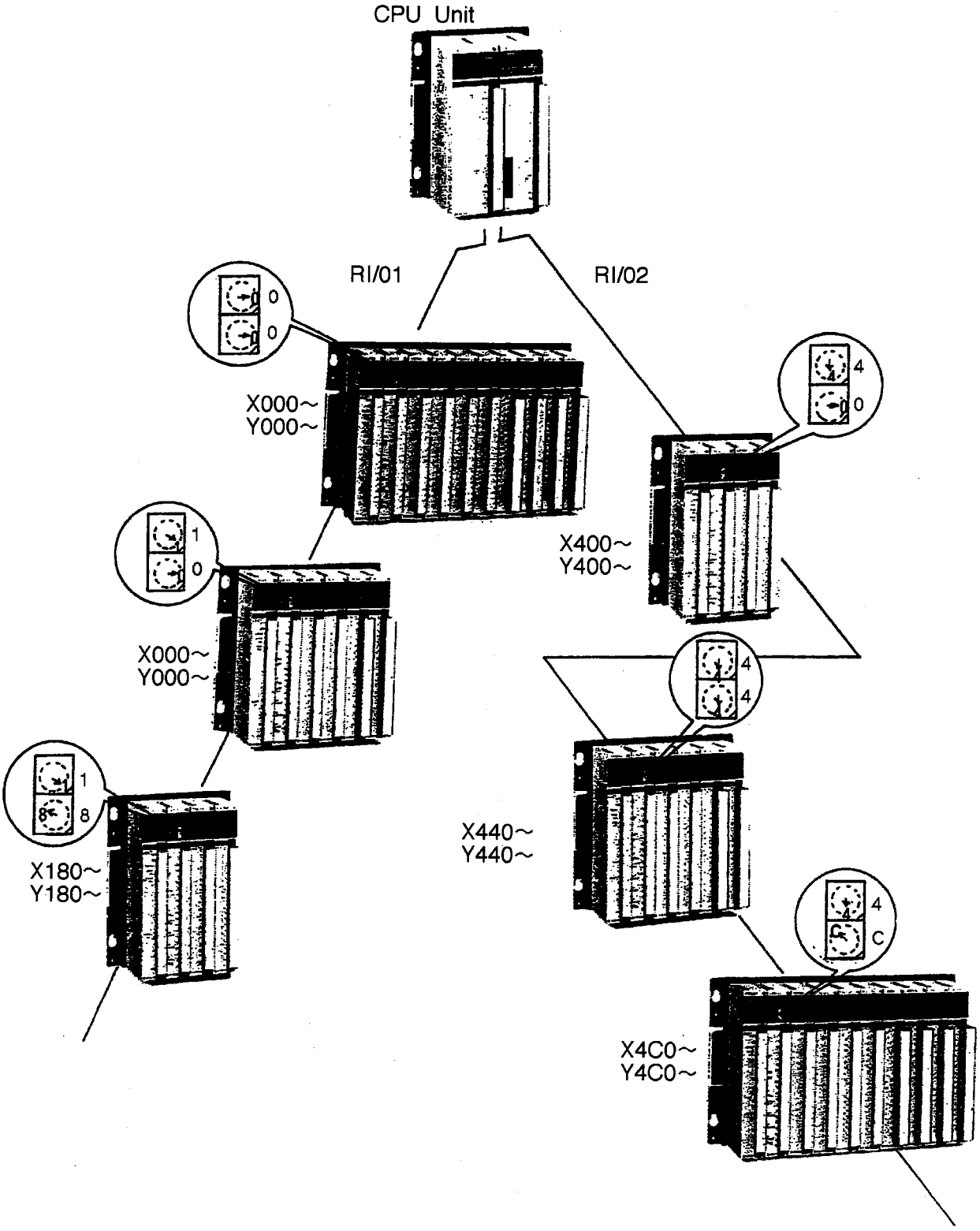



: Location of terminating resister

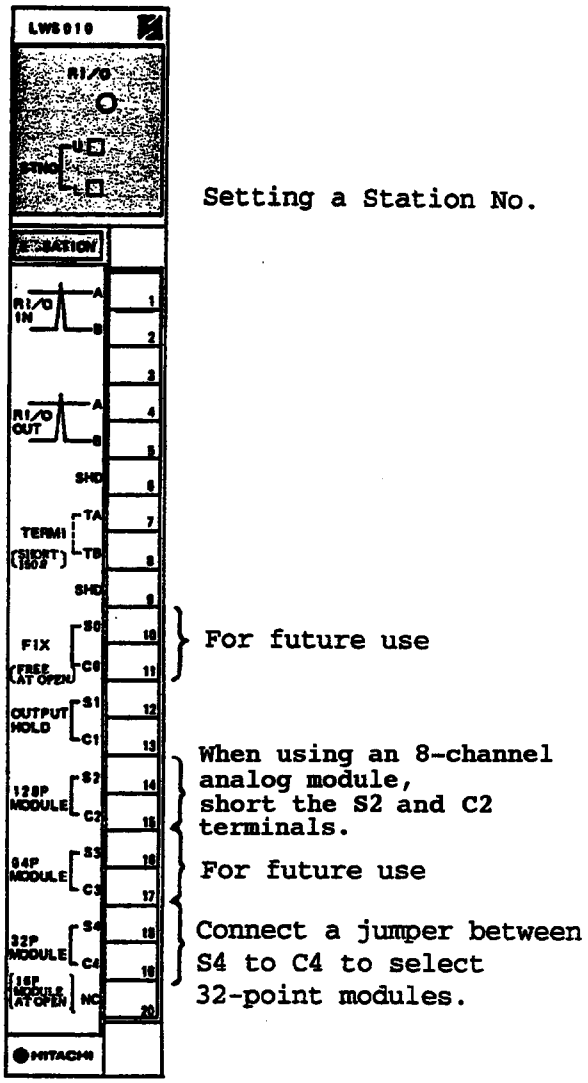
As shown in the connection example on the left, on the RI/O 1 side, the RI/O 1 and I/O 3 are the ends, so they require terminating resisters. On the RI/O 2 side, I/O 4 and I/O 7 need terminating resisters.

Note : Both RI/O 1 and RI/O 2 need terminating resisters

1.5 RI/O Address Setting



1.5.1 I/O Address Setting



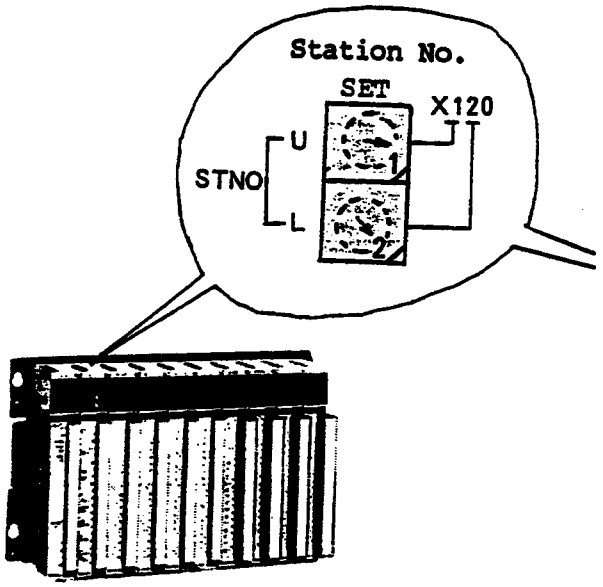
The station number sets the leading address of the mounted I/O modules on the I/O Mount Base on which they are mounted without regard to the number of points of the I/O modules (16 or 32) and the number of slots provided on the I/O Mount Base (8, 4, or 2).

- For determination of the addresses following the leading address, all of the above factors interact. See the previous and following pages for explanation.
- Input and output modules can be handled quite the same way (Free Location).
  The same address is used for both input and output. For example, if Input module X140 to X14F is changed for an output module, the output module becomes Output module Y140 to Y14F.
- Set the station No. of a station connected to the RI/O1 side of the CPU to 00-38 (up to 3C in case of 4-slot mount base or up to 3E in case of 2-slot mount base).
  If a station is connected to the RI/O2 side, set the station No. to 40-78 (up to 7C with a 4-slot mount base or 7E with a 2-slot mount base.)

■ Example 1 : Mounting 16-point input modules

Leave off jumper S4-C4.

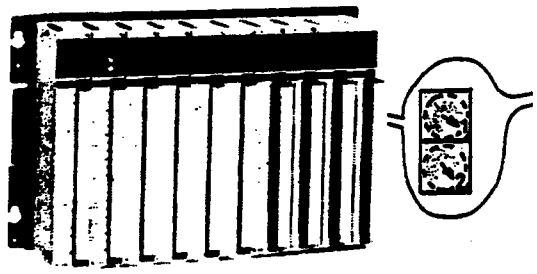
STNO ┬ U □ ··· Upper one-digit
     └ L □ ··· Upper two-digits



Slot No.	0	1	2	3	4	5	6	7
I/O Address	X120	X130	X140	X150	X160	X170	X180	X190
	≀	≀	≀	≀	≀	≀	≀	≀
	X12F	X13F	X14F	X15F	X16F	X17F	X18F	X19F

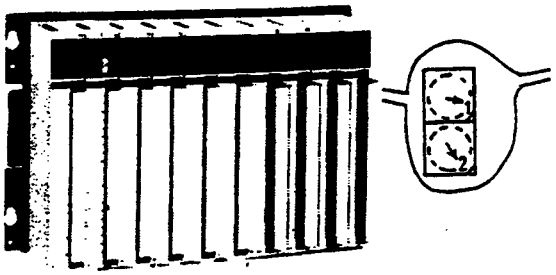
■ Example 2 : Mounting 32-point input modules

Put a jumper on S4-C4.



Slot No.	0	1	2	3	4	5	6	7
I/O Address	X120	X140	X160	X180	X1A0	X1C0	X1E0	X200
	⎜	⎜	⎜	⎜	⎜	⎜	⎜	⎜
	X13F	X15F	X17F	X19F	X1BF	X1DF	X1FF	X21F

■ Example 3 : Mounting a combination of 16-point and 32-point input modules. Jumper S4-C4 not installed.



Slot No.	0	1	2	3	4	5	6	7
I/O Address	X120	X140	X160	X180	X1A0	X1C0	X1E0	X200
	X12F	X14F						
	X130	X150						
	X13F	X15F						
			X17F	X19F	X1BF	X1DF	X1FF	X21F

( ) : vacant address

X130-X13F contains the same data as X120-X12F while
X150-X15F contains the same data as X140-X14F.

- In this example, a 32-point module functions as 16-point module (16 points in Col. A only) if the jumper S4-C4 is not installed. In almost all cases this would be wasteful of I/O capacity and should be avoided.

Slot No.	0	1	2	3	4	5	6	7
I/O Address	X120	X130	X140	X150	X160	X170	X180	X190
	X12F	X13F	X14F	X15F	X16F	X17F	X18F	X19F

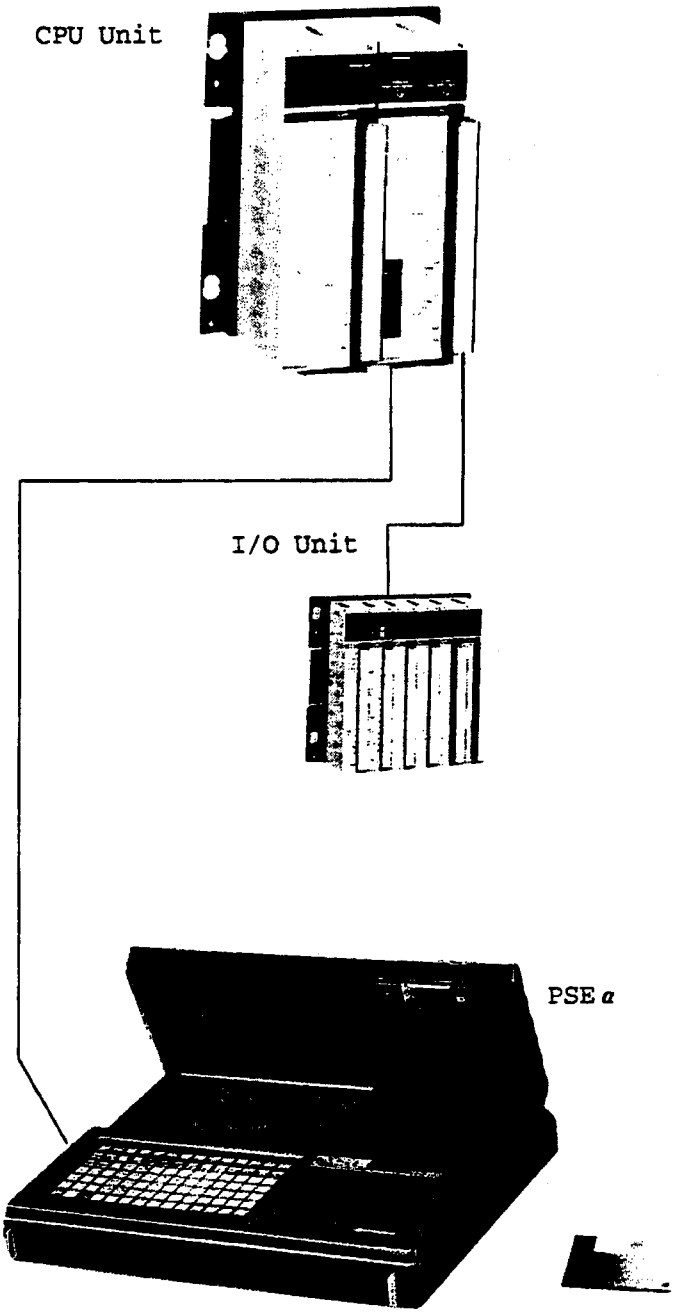
■ In case there is a vacant slot where no I/O module is mounted:

- The I/O addresses for the number of slots are reserved whether the modules are actually mounted or not so that the whole of the addresses is not affected by adding or removing modules.
- Setting the number of I/O mount base slots

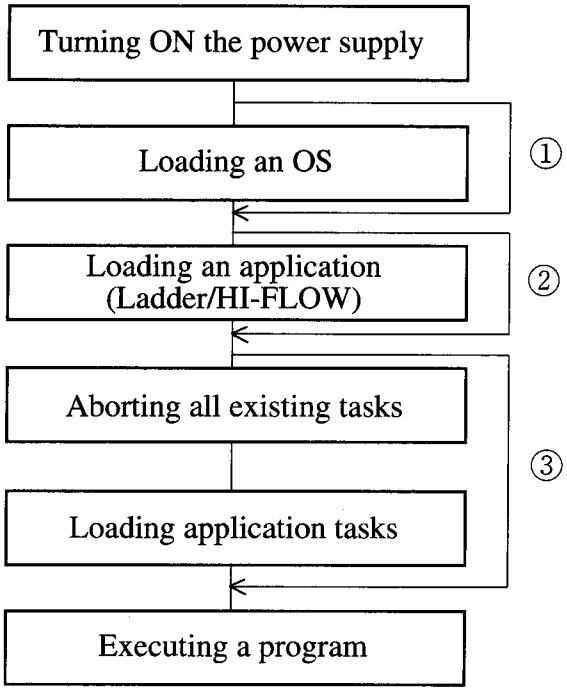
  For the S10/2 station module (Model PST350/PST360), the mount base type was formerly set. When the S10/2a Series station module (Model LWS010) is used, however, there is no need to set the number of slots because operations are performed with automatic recognition accomplished.

1.6 Procedures when Using the PSE α

This section describes the procedures for operating the PCs that works with the PSE α used as the programming device. When using a personal computer, see "1.7 Procedures when Using a PC Programming System."



1.6.1 PCs Operation



① After the OS software is loaded, it is battery backed. Therefore, it is not necessary to reload it even after power OFF/ON.

② Ladder and HI-FLOW need to be loaded for the first time only. It they are modified, reload them.

③ Tasks need to be loaded for the first time only. When they are to be loaded after modifications or the like, be sure to abort all the existing tasks and then load them anew. Note that tasks are running even when the CPU key switch is placed in the STOP position. Therefore, if you rewrite running tasks, a CPU error may occur.

Relationship between CPU key switch and application software status

CPU key switch / Application	STOP	RUN	SIMU. RUN
Ladder/HI-FLOW	Not running	Running	Running
Application task	Running	Running	Running

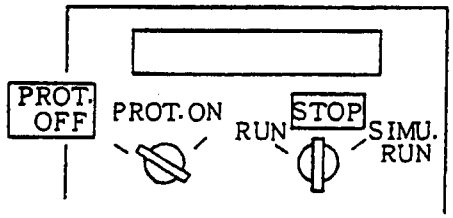
- When the CPU key switch is in the SIMU.RUN position, no RI/O transfer is made (the RI/O operation comes to a stop).
- The internal battery of the CPU unit keeps the program running even when a power failure occurs.
- Individual operations are explained below.

(1) Applying power :
Before the ladder program is loaded, set the Key Switch to the STOP position prior to applying the power.
(Once the ladder program has been loaded, the ladder program executes immediately after the power application, if the power is applied with the Key Switch being placed on the RUN or SIMU. RUN position.)
When the power is applied, POWER ON LED on the power module is lighted. If the LED does not light, check the power cables and its voltage. ROM IDLE LOAD OS does not appear if the OS program has already been loaded.

Confirming cabling
(especially the power cabling)

↓

Setting key switches on CPU module to STOP/PROT OFF, respectively.



Review the wiring and supply voltage.

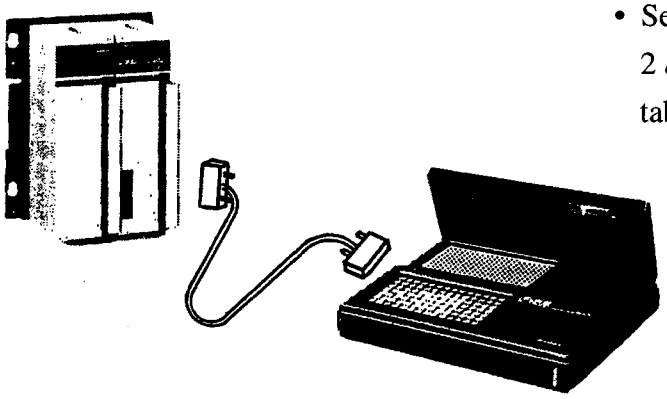
↓

Applying power
(POWER ON LED on the power module is lit, and the console LED on the CPU module displays ROM IDLE LOAD OS).

(2) Loading OS program

OS Program Loading

① Connect the PSE to CPU.



② Turn the PSE power ON.

③ Insert the PSE system floppy disk into PSE.

The PSE operation to load the System program is described in the following:

- Select the operating system to be loaded in the 2 α , 2 α E, 2 α H, or 2 α Hf from the following table.

2 α	2 α E, 2 α H
S10 α series CPMS system or ladder diagram system	S10 α series CPMS system V4.2, R3.0 or later
	2 α Hf
	S10 α series CPMS system V5.0, R0.0 or later

Display on PSE

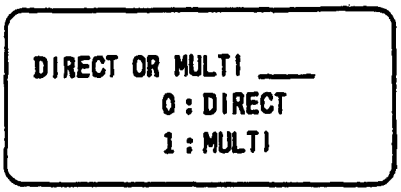
④
```
STRIKE ANY KEY
```

▶ Press any key on the PSE

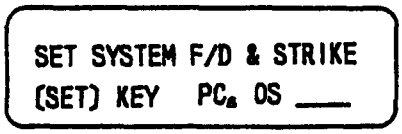
⑤
```
REMOTE OR LOCAL ___
        0 : REMOTE
        1 : LOCAL
```

▶ Key-in [0].

Do as follows, if the message shown on the left appears.

⑥


▶ Key-in [0].

⑦


▶ Press the [SET] key.

If this message does not appear, the OS program has already been loaded. The operation ends here.

⑧


▶ Now loading the OS program.
Wait until it is completed.

⑨


▶ OS program loading has been completed.

(3) Loading ladder circuit program (created by user)

[Ladder Circuit Preparation]

The method of preparing a simple ladder circuit is explained, first.

① Turn the PSE power ON.

② Insert the PSE system floppy disk into the PSE.

Program generation by only using the PSE (local function) is described below:
(For detail, refer to a paragraph for program generation in "PSE α Operation Manual".

Display on PSE

Do as follows when the messages shown on the left appear:

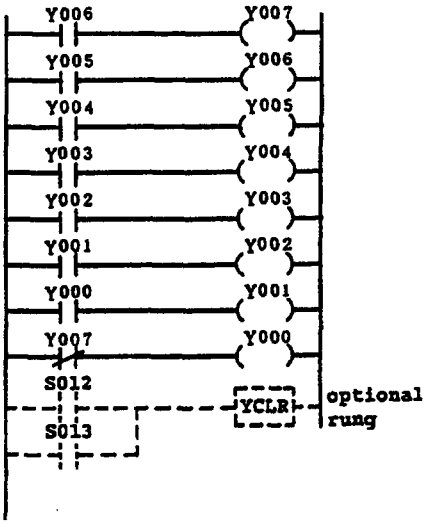
③ STRIKE ANY KEY ▶ Press any key on the PSE.

④
```
REMOTE OR LOCAL ____
        0 : REMOTE
        1 : LOCAL
```
▶ key-in [1].

⑤ FUNC. OR S-PROG. KEY IN !

Now, begin the creation of a ladder program.

Example of program ▶ Key-in as follows:



⊣⊢	Y	0	0	6	⊣( )⊢	Y	0	0	7
⊣⊢	Y	0	0	5	⊣( )⊢	Y	0	0	6
⊣⊢	Y	0	0	4	⊣( )⊢	Y	0	0	5
⊣⊢	Y	0	0	3	⊣( )⊢	Y	0	0	4
⊣⊢	Y	0	0	2	⊣( )⊢	Y	0	0	3
⊣⊢	Y	0	0	1	⊣( )⊢	Y	0	0	2
⊣⊢	Y	0	0	0	⊣( )⊢	Y	0	0	1
⊣⊢	Y	0	0	7	⊣( )⊢	Y	0	0	0

SAVE

Now, save this program in a floppy disk.

⑥

```
FUNC. OR S-PROG. KEY IN !
```

▶ Press [F/D] key. Perform formatting described in the next page before the next operation, if only new blank disks are available.

⑦

```
FLOPPY MENU
 KEY IN NO = ____
  1 : DIRECTORY
  2 : PC-E→FLOPPY
```

▶ Key-in [2].

⑧

```
PC-E→FLOPPY
-----
FILE NAME :
PC-E No.    : 0001
PC-E TYPE   : 00F2
Y-M-D-H     :
COMMENT     :
```

▶ Key-in as follows:

[S][A][M][P][L][E][SET]
[SET]
[8][7][0][1][0][1][0][0]
[T][E][S][T][SET]
[SET]

(When a wrong key is pressed, press RESET. Backspace for 1 character is effected.)

⑨

```
PC-E→FLOPPY
HEADER OK ? ----
```

▶ Press the [SET] key.

⑩

```
PC-E→FLOPPY
START PC-E→FLOPPY
PC-E→FLOPPY
SUCCESS ----
```

▶ Press the [END] key.

Now, the program has been saved on a floppy disk.

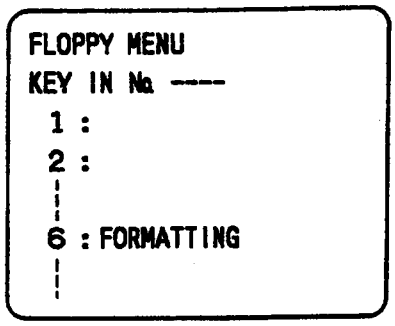
For your reference : Formatting

The following formatting procedure must be executed before using a new blank floppy disk.

The contents of a used diskette are erased whenever it is used again!!

Display on PSE

Do as follows if the messages shown on the left are displayed:

① 

▶ Key-in [6].

② 

▶ Insert a new blank disk.

Press the [SET] key.

③ 

▶ Key-in [0].
PSE performs formatting.

④ 

▶ Formatting has been completed.

Press the [END] key.

Loading

⑪ Connect the PSE to CPU.

⑫ Press the RESET switch on the PSE.

Display on PSE

Do as follows when the messages shown on the left appear:

⑬
```
REMOTE OR LOCAL ----
      0 : REMOTE
      1 : LOCAL
```
▶ Key-in [0].

⑭
```
DIRECT OR MULTI ----
      0 : DIRECT
      1 : MULTI
```
▶ Key-in [0].

⑮
```
FUNC. OR S-PROG. KEY IN !
```
▶ Press the [F/D] key .

⑯
```
FLOPPY MENU
  KEY IN NO = ----
   1 : ----
   2 : ----
   3 : FLOPPY→PC
   !
   !
```
▶ Key-in [3].

⑰
```
FLOPPY→PC
  F-NAME = ----
```
▶ [S][A][M][P][L][E][SET]

⑱
```
FLOPPY→PC
  F-NAME = SAMPLE. PSE ----
```
▶ Press the [SET] key.

⑲
```
FLOPPY→PC
  HEADER OK ? ----
    -------
  FILE NAME : SAMPLE. PSE
```
▶ Press the [SET] key.

⑳
```
FLOPPY→PC
  START FLOPPY→PC
```
▶ Now loading

㉑
```
FLOPPY→PC
  SUCCESS ----
```
▶ Press the [END] key.

Now, loading has been completed.

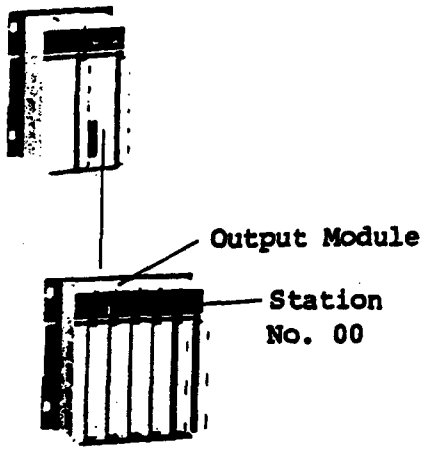
(4) Execution of Program

To have the ladder program created in (3) execute,

1) Set it in Station No.00,

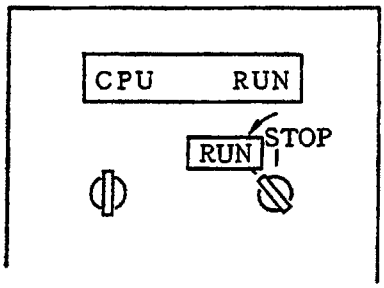
and

2) Mount an Output Module onto Slot No. 0.



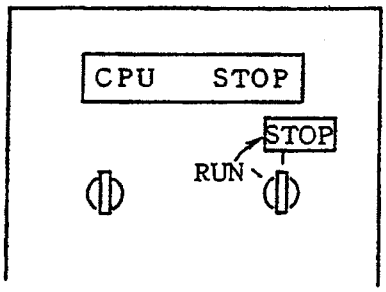
RUN

When the Key Switch on the CPU is placed to the RUN position from the STOP position, the ladder program starts. CPU RUN is displayed, and I/O Y000 to Y007 repeats turning ON and OFF every about 240 ms.



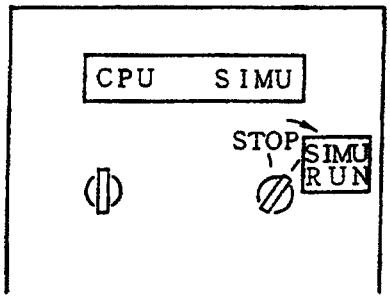
STOP

CPU STOP appears, and the execution of ladder program is stopped. The result of the operation is retained by the I/O operation. (The outputs remain set unless the optional rung is included.)



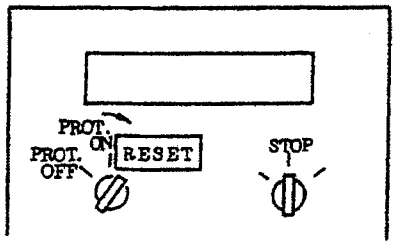
SIMU. RUN

CPU SIMU is displayed and the ladder program is executed. But, the I/O operation does not work, since the remote I/O transfer is not performed.
This simulation is used for program debugging without making the I/O operation operate.

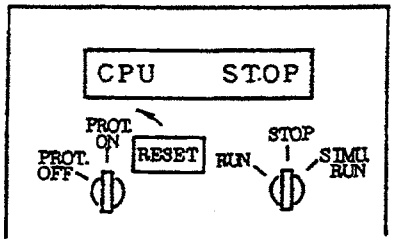


RESET

Remote I/O transfer is also stopped during a period of RESET. Outputs are all disabled and the program execution halts.



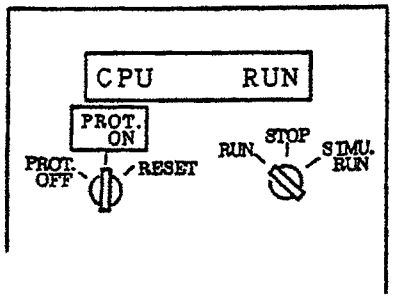
If the switch is moved from the RESET position, the same initialization as that at power application is performed first, and then the operation starts according to RUN, STOP, or SIMU. RUN. This initialization does not clear the Keep Relay (K) , Counter (C) , and Fixed Constant (D) with "0" , though it clears the I/O (X and Y) and the internal registers (R, etc.) with 0.



PROT. ON

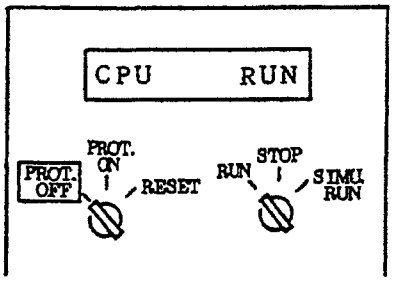
Set the switch to PROT. ON in normal operations.
The PROT. ON function protects the OS program, ladder program, and other set values against inadvartent writing into those area by a user program written in C Language when it operates.

(Although the optional Expansion Memory Module has a write-protect switch, this PROT. ON has nothing to do with the protection of the Expansion Memory.)



PROT. OFF

The contents of the entire memory of the CPU module may be rewritten by a user program developed using the C Language. Use this PROT. OFF function only when rewrite is imperative for timer, one-shot, counter set value, etc.

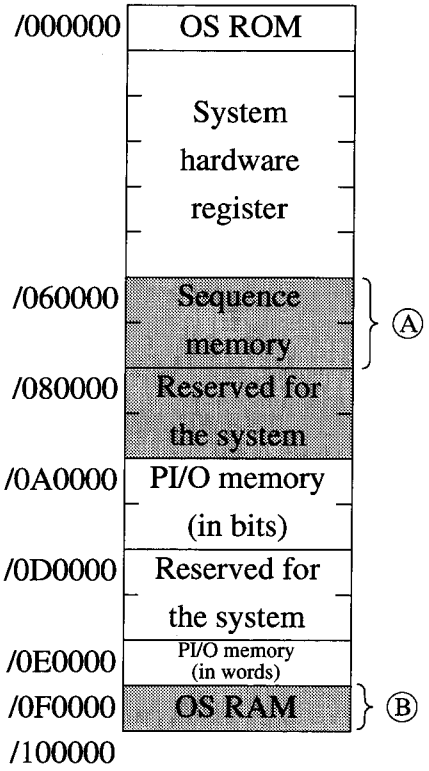


Protect key switches on the 2 α , 2 α E, 2 α H, and 2 α Hf

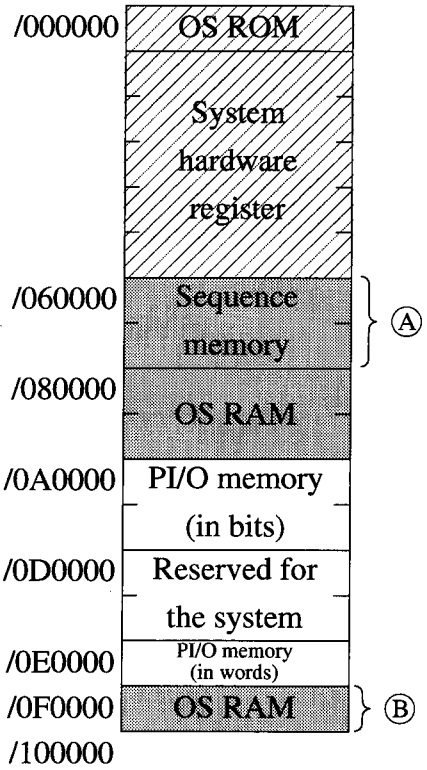
These protect key switches are memory protect functions that prevent the system area from being destroyed inadvertently by user tasks (in C or FA-BASIC). These functions have no effect for arithmetic functions including user arithmetic functions.

● Effective range of memory protection

• 2 α



• 2 α E, 2 α H, 2 α Hf



▨ : Protected during read/write operation.

▩ : Protected only during write operation, and not protected during read operation.

Ⓐ : The LPET, DW register, and TUC setting are included.

Ⓑ : The UFET, PRET, and TUC count are included.

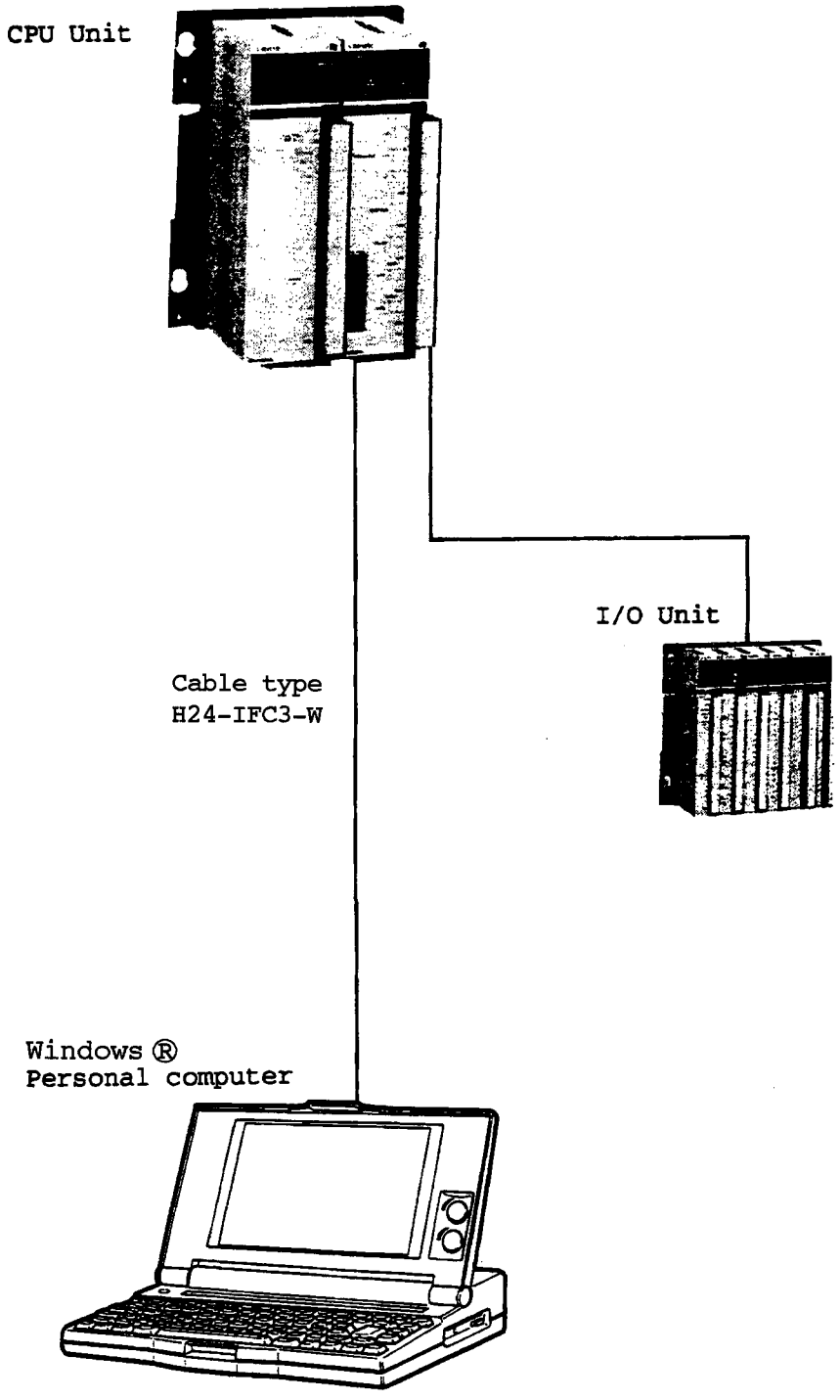
● Protect error

When a user task accesses a protected area with the protect key switch set to ON, a protect error occurs. In this case, only the user task is aborted.

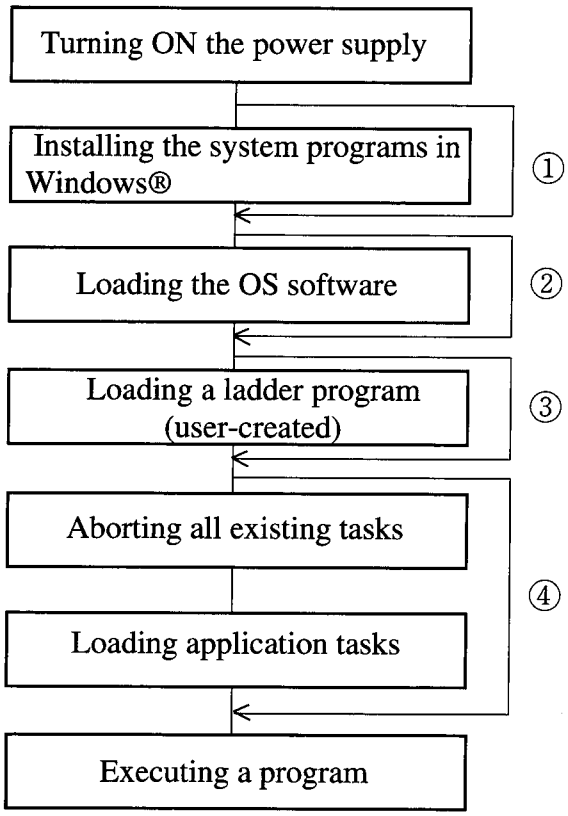
When a user task is registered in the user arithmetic function registration table (UFET) rather than the program edition table (PRET), protection is disabled.

1.7 Procedures when a PC Programming System is Used

This section assumes that the user uses a personal computer as the programming device. When using the PSE α , see "1.6 Procedure when Using the PSE α ."



1.7.1 PCs Operation



① Once the system programs are installed in Windows®, they need not be reinstalled even after the power to the Windows® machine is subsequently turned OFF and ON.

② Once the OS software is loaded, it need not be reloaded even after the power is subsequently turned OFF and ON.

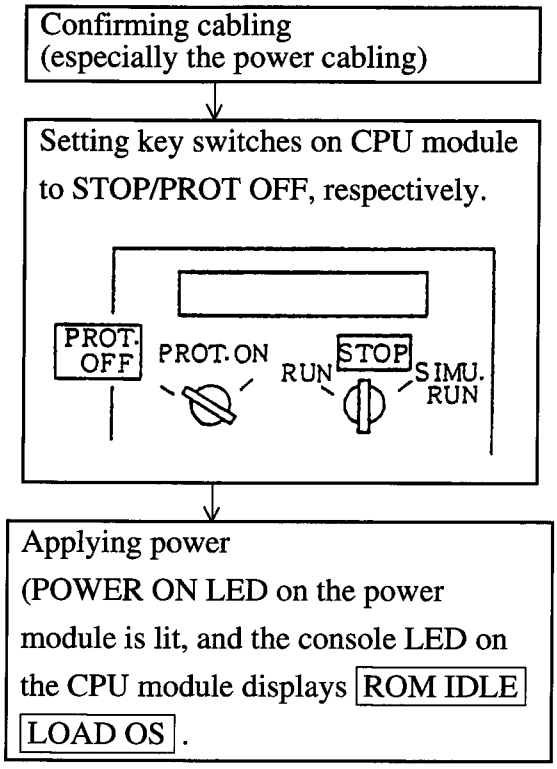
③ Once the ladder program is loaded, it need not be reloaded except when it is modified.

④ Tasks need to be loaded for the first time only. When they are to be loaded after modifications or the like, be sure to abort all the existing tasks and then load them anew. Note that tasks are running even when the CPU key switch is placed in the STOP position. Therefore, if you rewrite running tasks, a CPU error may occur.

CPU key switch / Application	STOP	RUN	SIMU. RUN
Ladder	Not running	Running	Running
Application task	Running	Running	Running

■ When the CPU key switch is in the SIMU.RUN position, no RI/O transfer is made (the RI/O operation comes to a stop).
■ The internal battery of the CPU unit keeps the program running even when a power failure occurs.

(1) Applying power :
Before the ladder program is loaded, set the Key Switch to the STOP position prior to applying the power.
(Once the ladder program has been loaded, the ladder program executes immediately after the power application, if the power is applied with the Key Switch being placed on the RUN or SIMU. RUN position.)
When the power is applied, POWER ON LED on the power module is lighted. If the LED does not light, check the power cables and its voltage. ROM IDLE LOAD OS does not appear if the OS program has already been loaded.



(2) Installing the system programs

Install the CPMS Load System (CPMSE Load System) and Ladder Drawing System in the Windows® system.

To install CPMS Load System (CPMSE Load System), run the setup program from its first floppy disk.

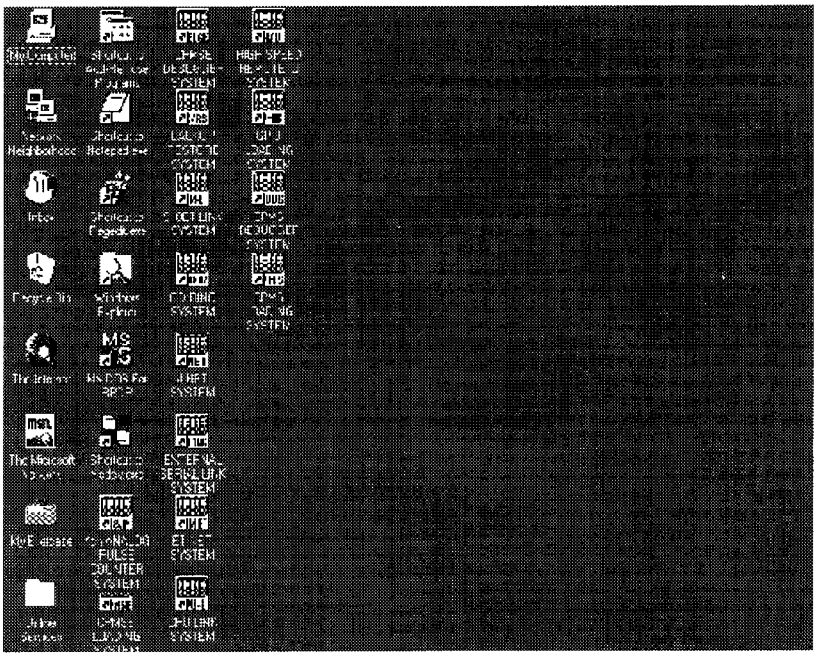
Click "Add/Remove Programs" from Windows®'s Control Panel and then click the [Install] button on the "Install/Uninstall" tab. When a window opens after completion of installation, right-click the shortcut in the window to copy it and then paste it onto the desktop.

For Ladder Drawing System, perform the same procedure.

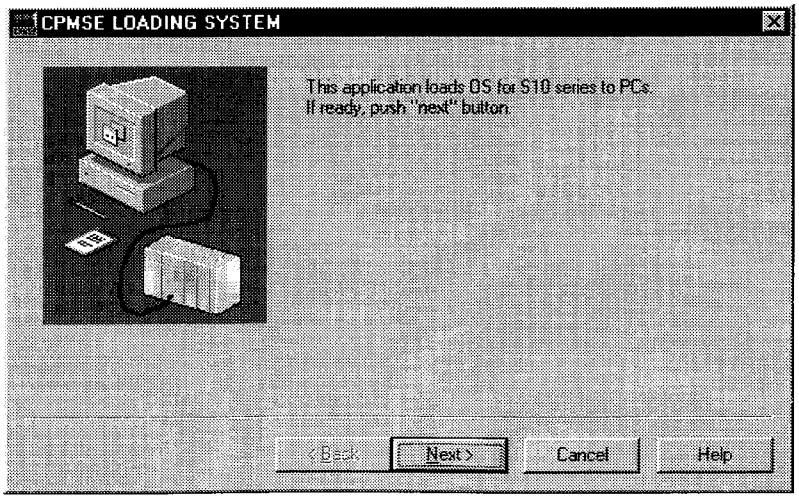
(3) Loading the OS software

① Launch CPMS Load System (CPMSE Load System) by double-clicking its icon in the Windows® screen or selecting it from Start button's pull-down menu.

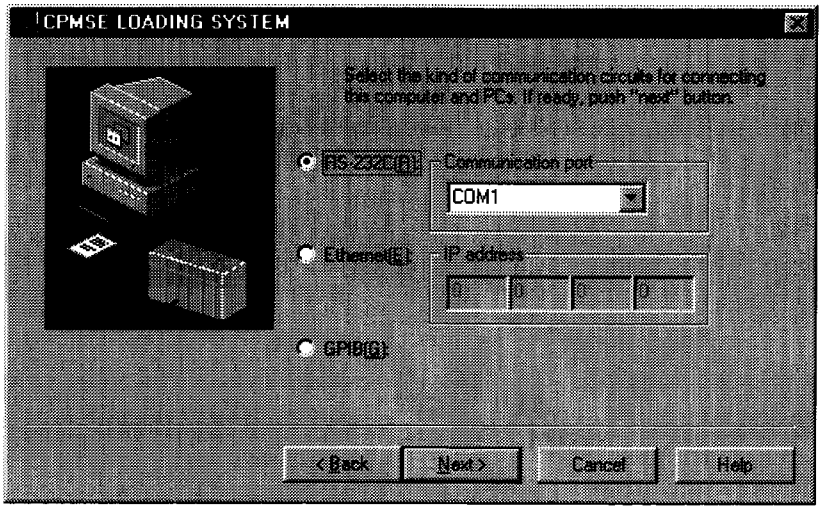
2 α (LWP000)	2 α E (LWP040), 2 α H(LWP070) , 2 α Hf (LWP075)
CPMS Load System for Windows 06-00	CPMSE Load System for Windows 06-00



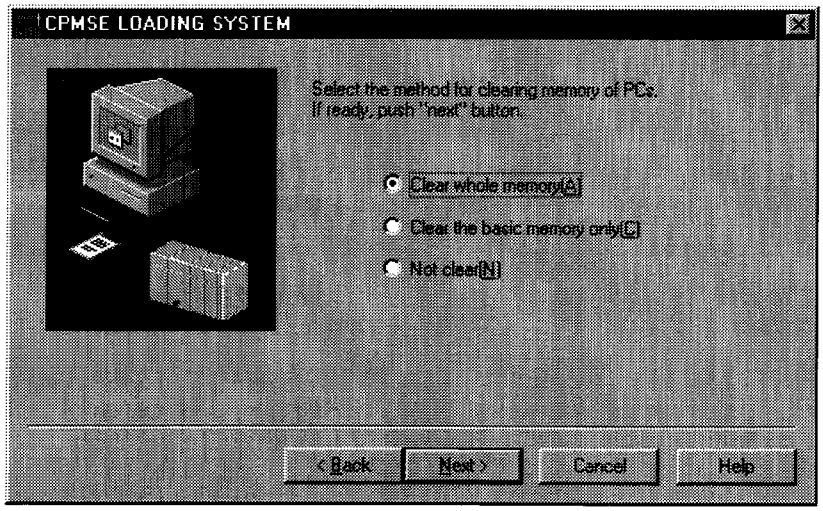
② The CPMS Load System (CPMSE Load System) window then opens. Click the [Next] button.



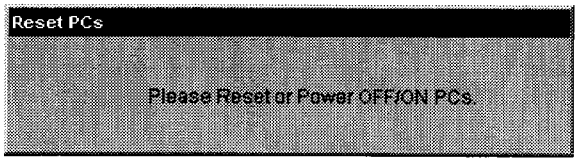
③ When the communication type setting window opens, select the connected communication circuit type and then click the [Next] button. Here, let us assume that you choose "RS-232C" and select a communication port.



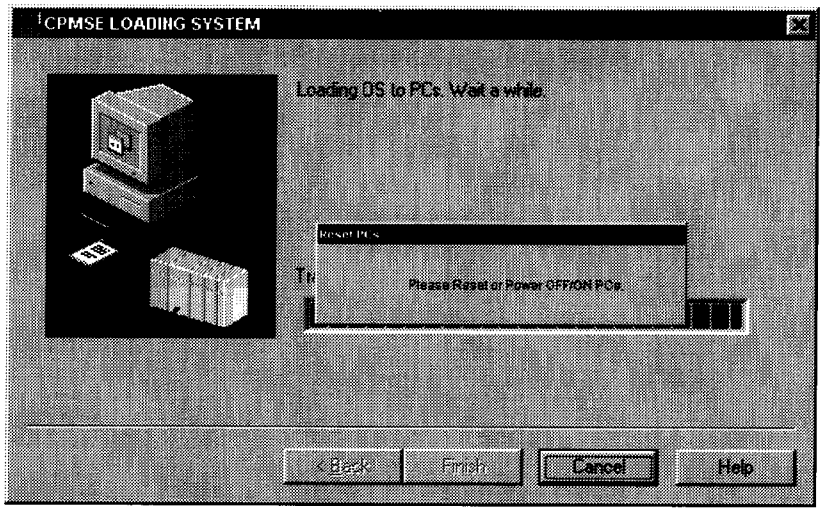
④ When the memory clear setting window opens, select a memory clear method and then click the [Next] button. You can choose not to transfer information by clicking the [Cancel] button.



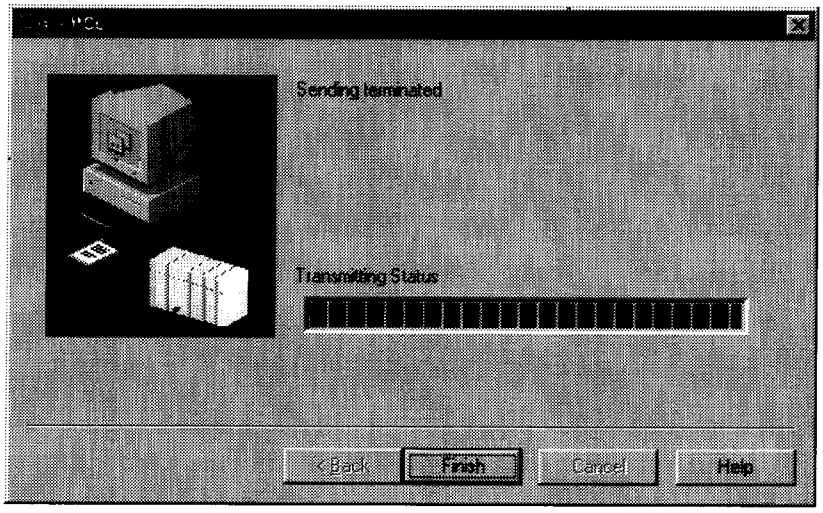
⑤ When the following message appears, reset the CPU unit. This starts a CPMS (CPMSE) transfer to the CPU unit.



⑥ When the following message appears upon completion of CPMS (CPMSE) transfer, reset the CPU unit.



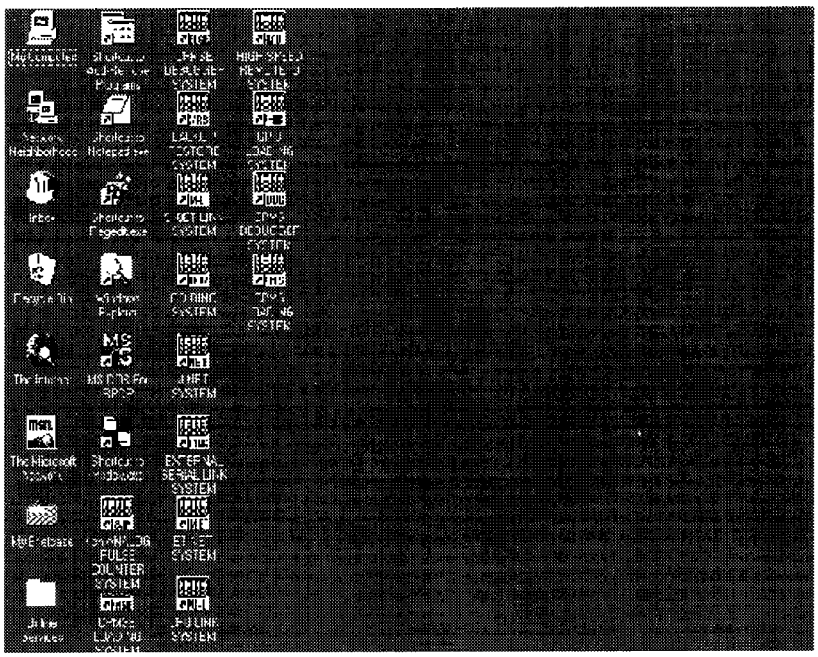
⑦ When the following window opens, click the [Finish] button. CPMS Load System (CPMSE Load System) then terminates.



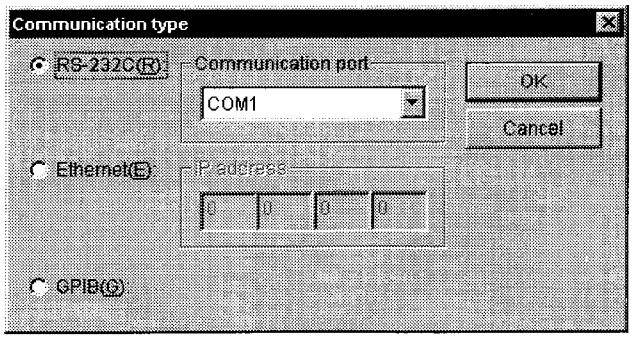
(4) Loading a ladder program (user-created)

Starting Ladder Drawing System

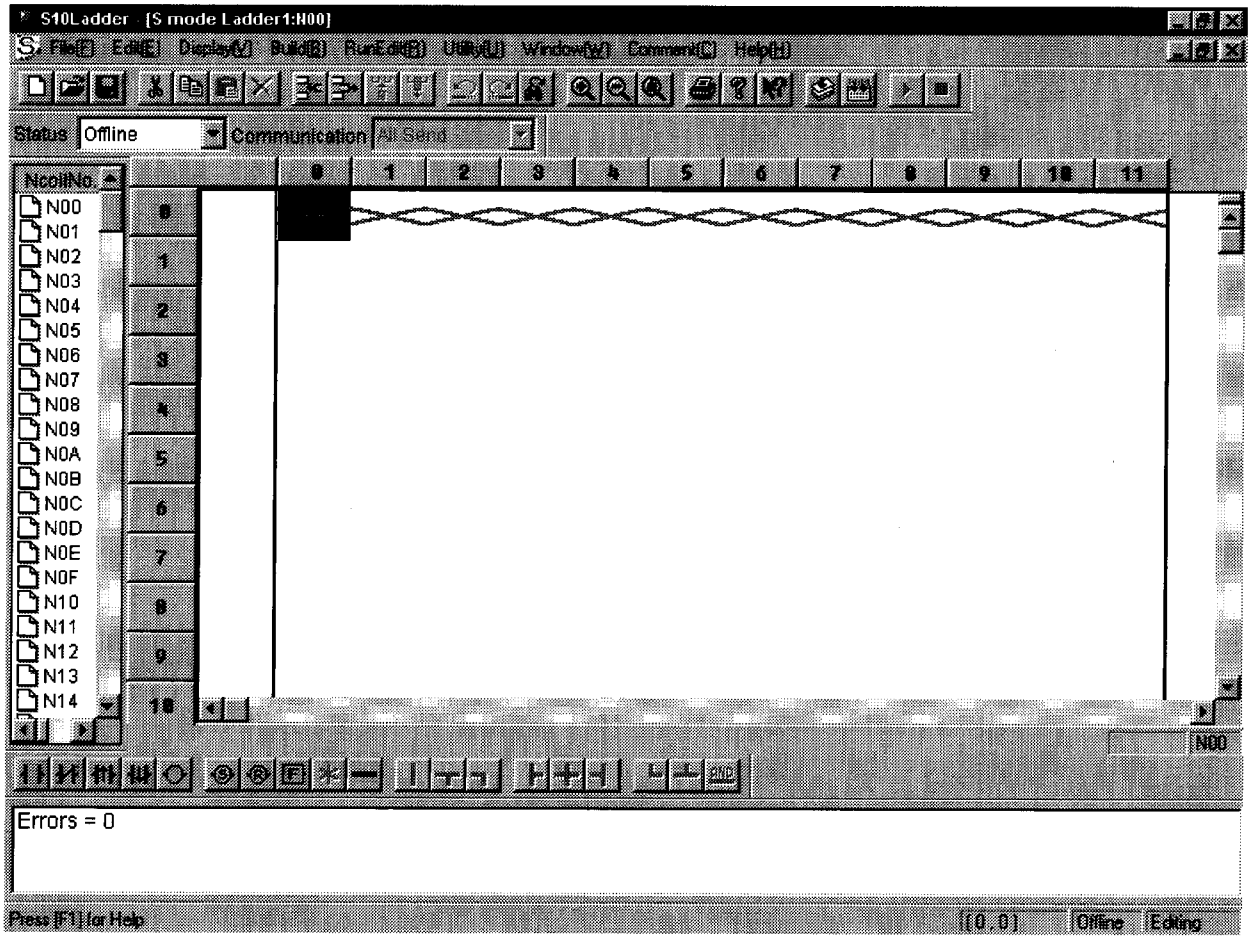
① Launch Ladder Drawing System by double-clicking its icon in the Windows® screen or selecting it from Start button's pull-down menu.



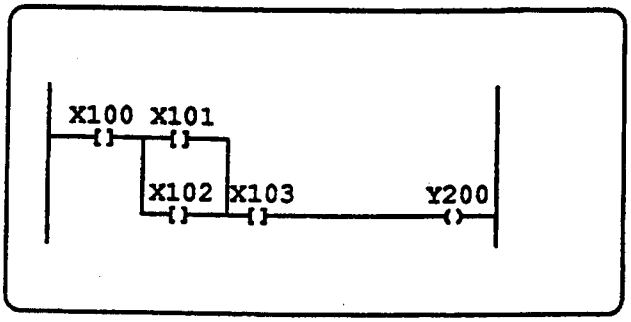
② Sequentially choose "Utility" and "Communication type" from the toolbar, and then verify the communication type selection. Here, let us assume that you choose "RS-232C" and select a communication port.



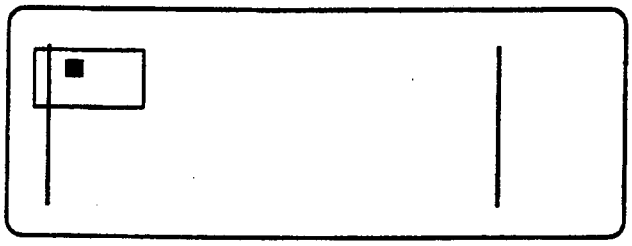
③ Sequentially choose "File" and "New" from the toolbar. Invoke the ladder drawing input state as shown below and place the communication in the on-line condition.



Ladder circuit generation

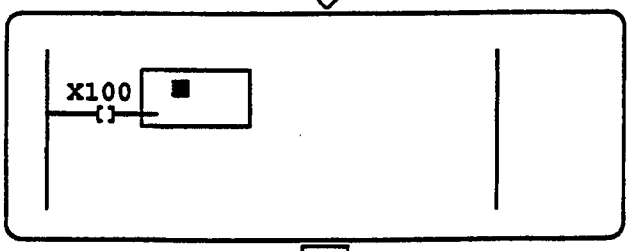


▶ The generation procedure is described in the following using a circuit shown at the left as an example.

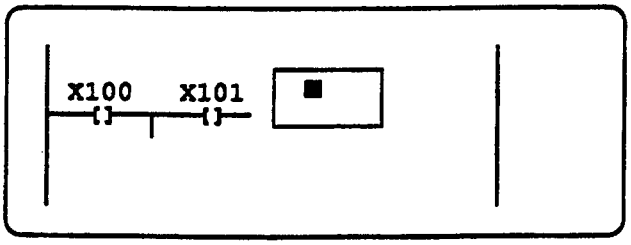


▶ Enter the leading symbol of the circuit.
ALT A X 1 0 0 ↵
(⊣⊢)

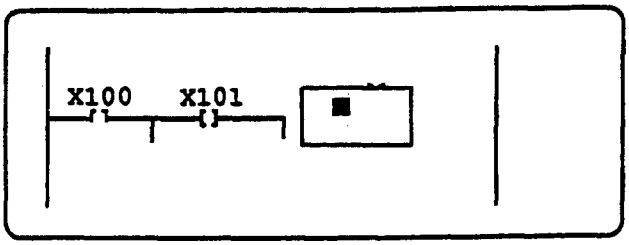
- In this case, no branch is entered as the circuit begins at the common line.



▶ ALT 8 ALT A X 1 0 1 ↵
(⊤) (⊣⊢)

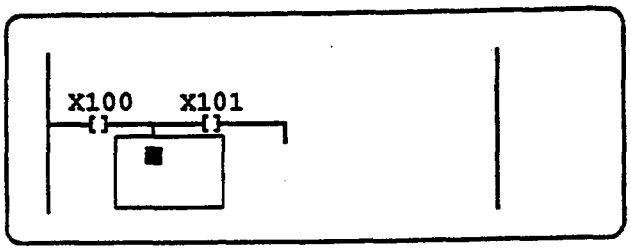


▶ ALT 9
(┐)



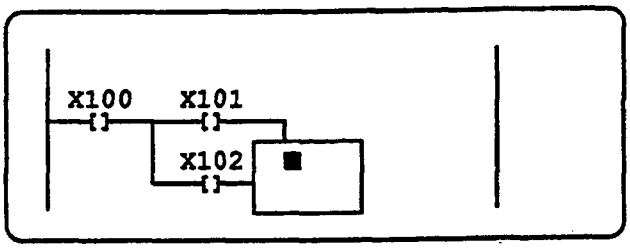
▶ [→]

- By operating the [->] key, move the box cursor to a target position.



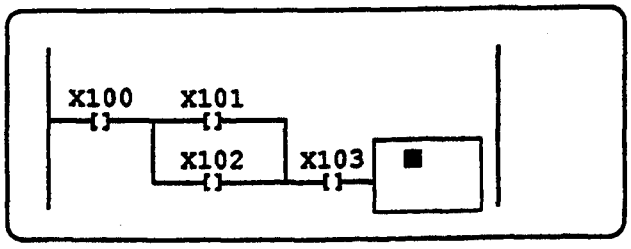
▶ [ALT][1] [ALT][A] [X][1][0][2] [↵]

(└) (-[ ]-)



▶ [ALT][2] [ALT][B] [X][1][0][3] [↵]

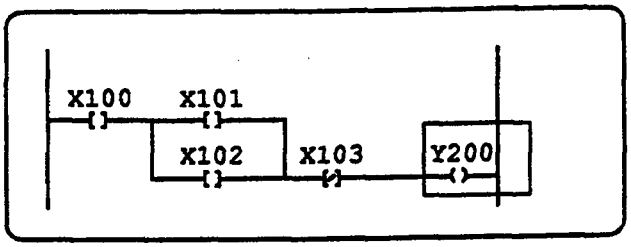
(┴) (-[/]-)



▶ [ALT][C] [Y][2][0][0] [↵]

(-( )-)

- For AND connection (-) , any branch symbol is not required.

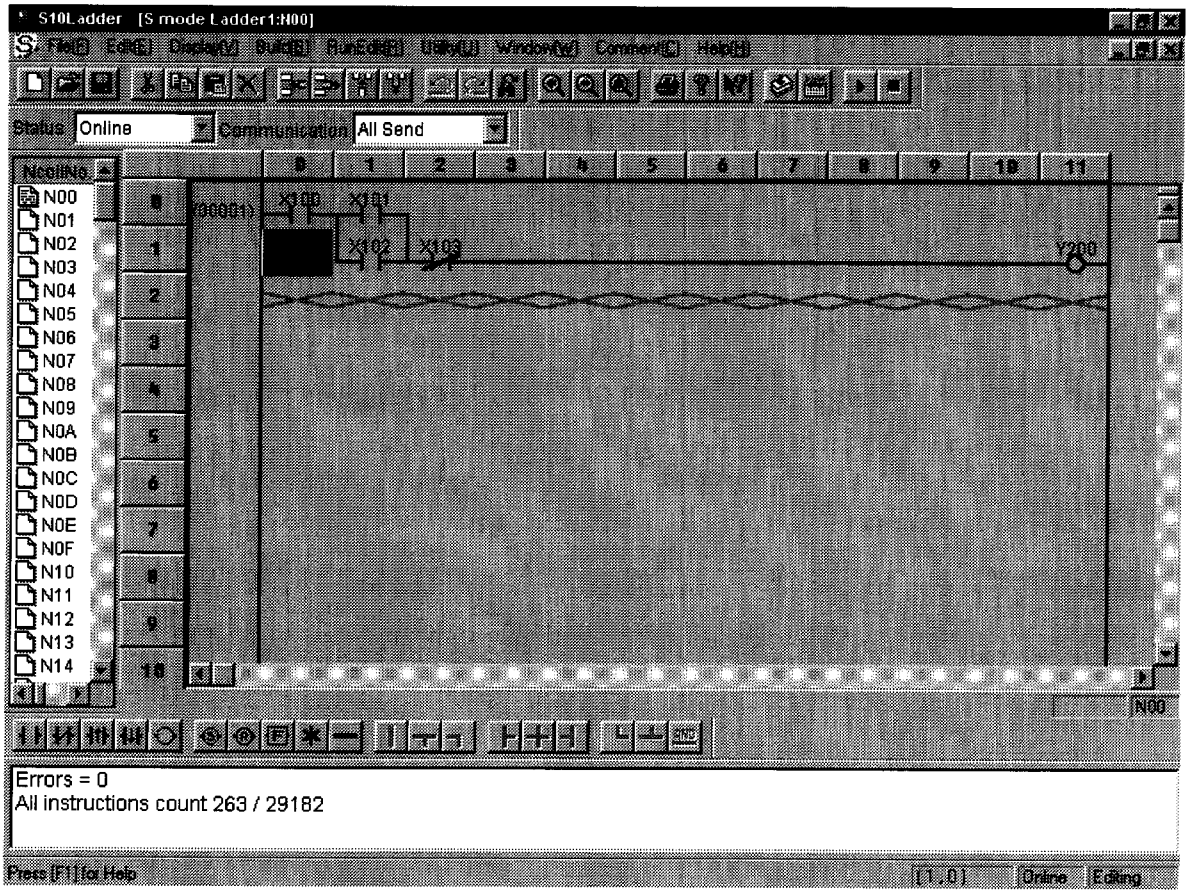


▶ Sequentially choose "Build" and "Batch Compile" from the toolbar to perform sequence circuit compilation. After completion of compilation, sequentially choose "Build" and "Send" from the toolbar to load the sequence circuit into the CPU unit.

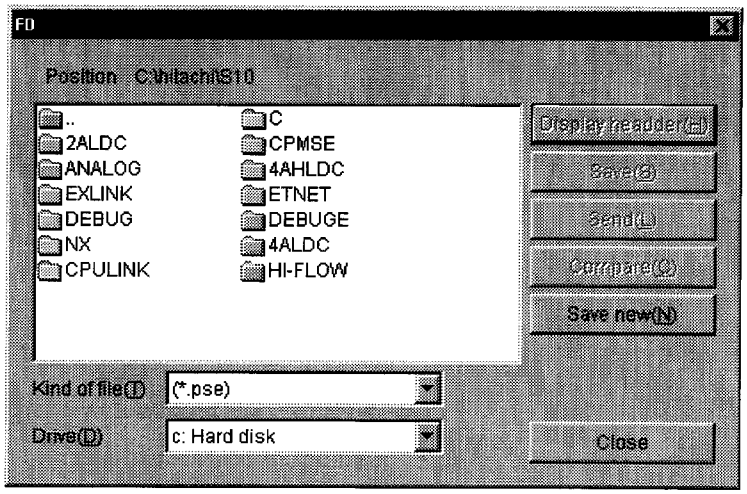
FD Save

Use this option to save CPU unit data (ladder drawing or the like).

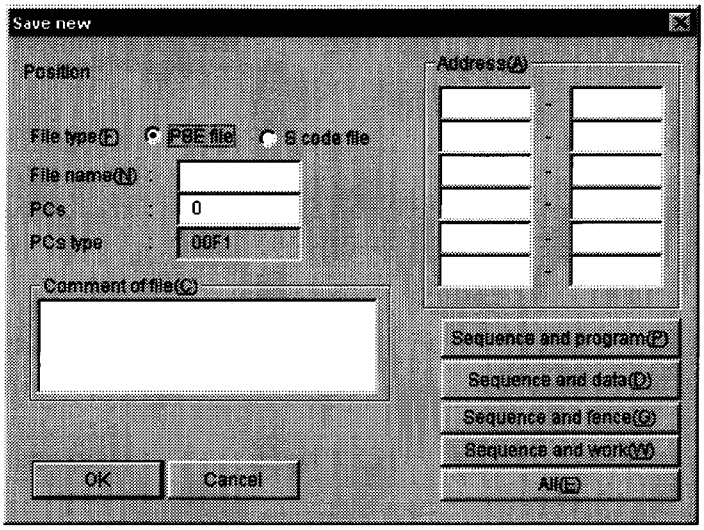
① From the toolbar, sequentially choose "Utility" and "FD" to open the FD window.



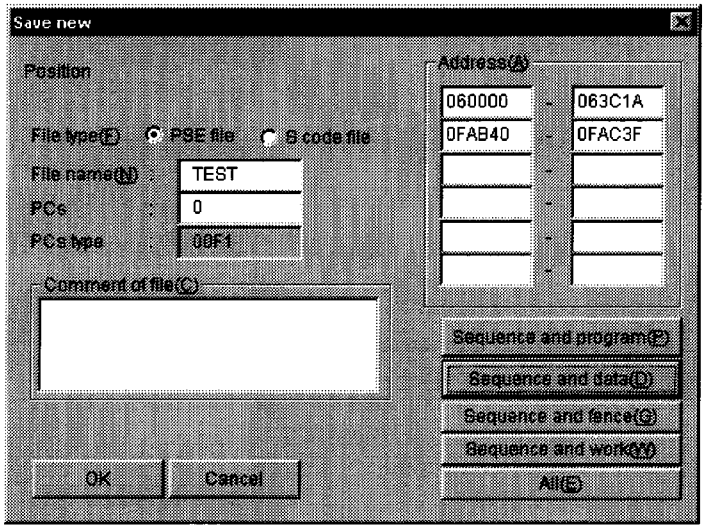
② Switch to the drive onto which the data is to be saved, and then click the Save new button.



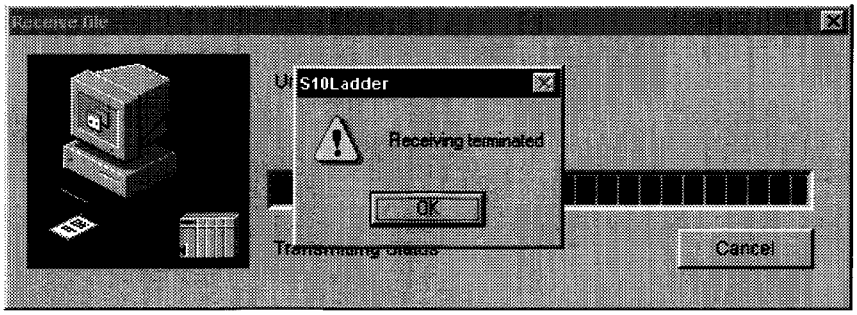
③ From the "Save new" window shown below, enter a file name, PCs number, and save destination address. Here, let us assume that you enter the file name "TEST" , PCs number "0" , and address "Sequence and data".



④ Verify the file name, PCs number, and save destination address entries in the "Save new" window, and then click the OK button to start saving data.



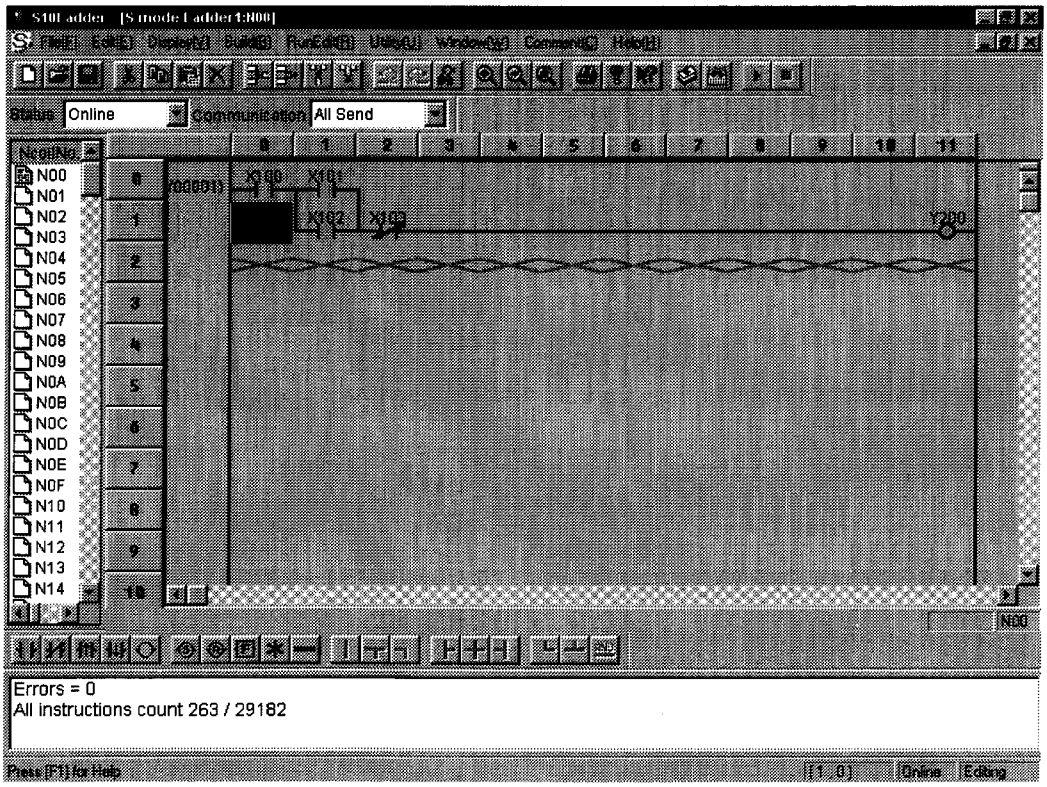
⑤ When the following message appears after the data is saved, click the OK button.



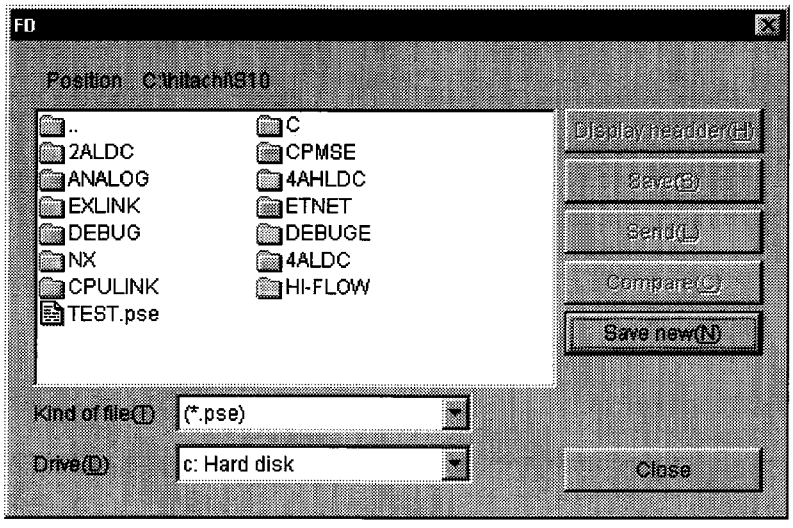
FD Load

Use this option to load data (ladder drawing or the like) into the CPU unit.

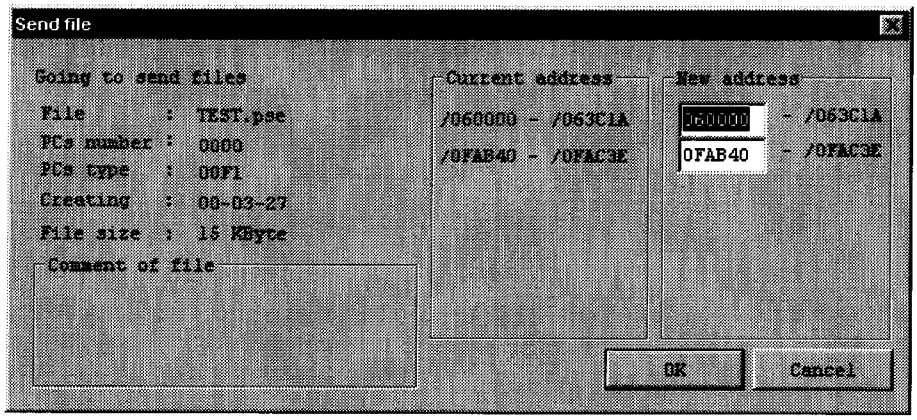
① From the toolbar, sequentially choose "Utility" and "FD" to open the FD window.



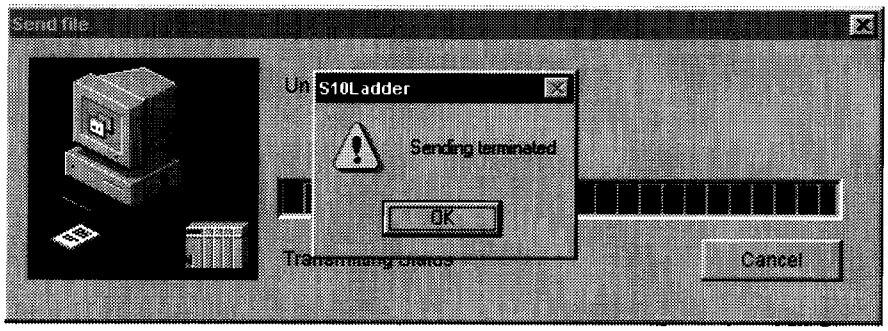
② Switch to the drive from which the data is to be loaded, select the data file to be loaded, and click the Send button. Here, let us assume that you choose the "TEST.pse" file.



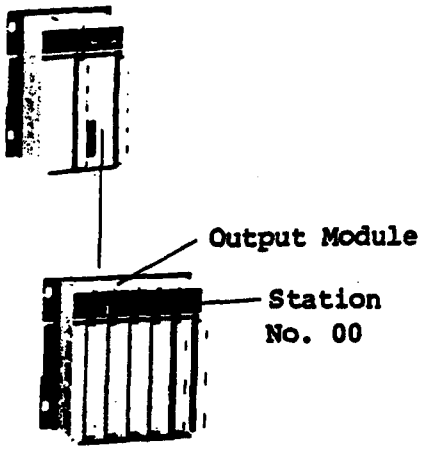
③ Verify the contents of the "Send file" (load) window shown below, and then click the OK button to start a file transfer.



④ When the following message appears upon completion of file transfer, click the OK button.



(5) Execution of Program



To have the ladder Program created in (4) execute,

1) Set it in Station No. 00,

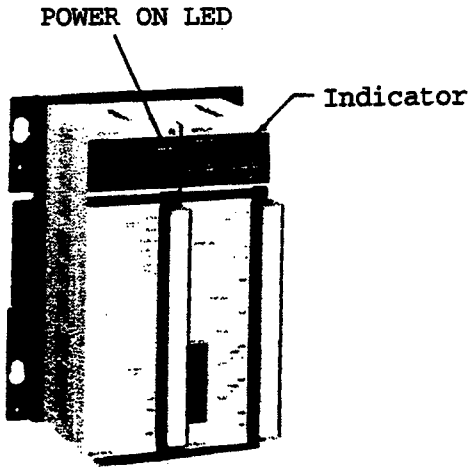
and

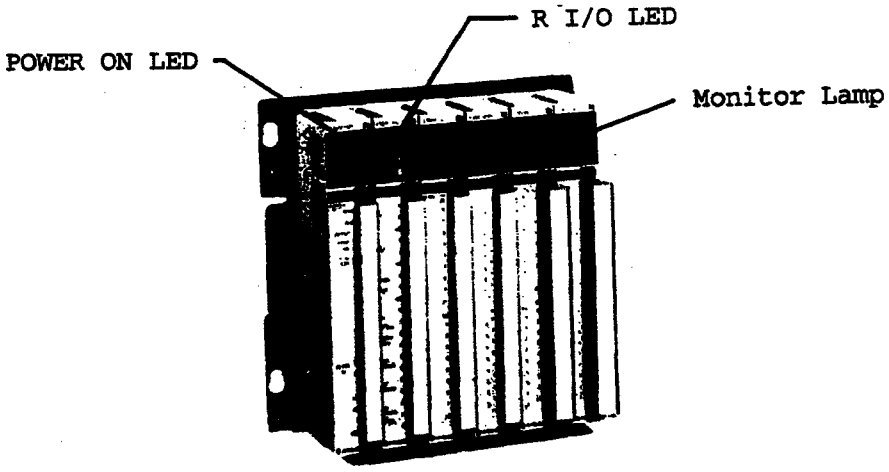
2) Mount an Output Module onto Slot No. 0.

Note : Programs are executed in the same way, regardless of the programming tool.
See "(4) Execution of Program" in 1.6.

1.8 Maintenance

The CPU unit and I/O units are shown below. Check the operation status with the LEDs and other indicators.





1.8.1 Preventive maintenance

To use the PCs under the optimal conditions, perform the following checks daily or at regular intervals (at least twice per year).

Check list
Outside of modules
Looseness of installation screws and terminal block screws
Sheaths of cables and codes
Dust build-ups
Power supply voltage of 85 to 132 VAC
Indication of LEDs

① Outside of modules

Check the module cases for cracks. If the cases are in abnormal conditions, internal circuits may be damaged, resulting in system malfunction.

② LEDs (POWER ON LED, LED on the CPU console, I/O module LEDs, etc.)

Check whether the statuses of the LEDs are normal.

③ Looseness of installation screws and terminal block screws

Check the module installation screws, terminal block screws, and other screws for looseness. If there are loose screws, tighten them. Loose screws may cause the system to malfunction. In addition, the system may burn due to excessive heat.

④ Module replacement

If a module is replaced while power is turned on, hardware and software may be destroyed. Be sure to turn power off before replacing a module.

⑤ Sheaths of cables and cords

Check whether the sheaths of the cables and cords are normal. Peeled sheaths may cause system malfunction, electric shock, or burning due to shorts.

⑥ Dust build-ups

Check the modules for dust build-ups. If any, remove them with an vacuum cleaner. Dust build-ups may cause internal circuits to be shored, resulting in burning.

⑦ Power supply voltage

Check whether the voltages of the module power supplies and external power supply are within their specified ranges. Out-of-range power supply voltages may cause the system to malfunction.

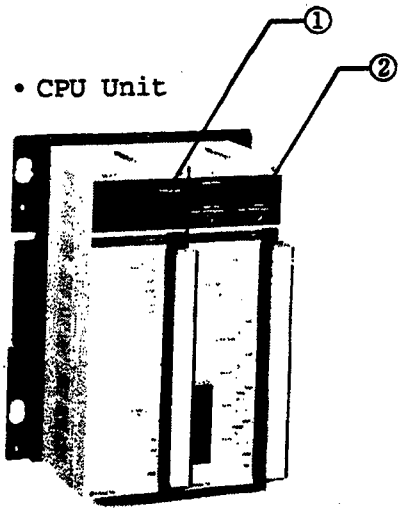
(For the operating power supply voltage of each module and the external power supply voltage, see their respective manuals.)

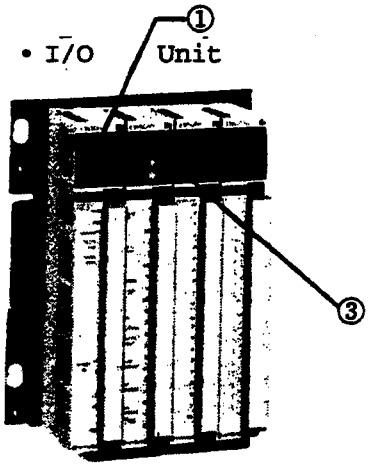
⑧ Others

The relays in I/O modules (such as LWO000) have a limited life. When frequently turning on and off relays, plan replacement of I/O modules, regarding that they are consumables. For relay life, see the I/O manual.

1.8.2 Troubleshooting-Fault Messages

(1) Trouble?





① Power Module POWER ON LED

Turned OFF → Check 120 VAC power source and wave form.

② CPU Module Indicators

"ROM IDLE" → Load the OS program. (See 1.6.1 (2).)
"NST OVER" → Ladder program nesting is too deep (More than 5). Modify the program to 4 or less nests.
"PROT ERR" → A user program written in the C Language writes data into the write-protect area of the CPU memory.
Take actions given below :
Action 1 : Correct the program if programming error.
Action 2 : Place the CPU Key switch on the PROT. OFF position if write is necessitated.
"IO-F-ΔΔΔ" → A fuse is open between I/O address YΔΔ0 and YΔΔF.
"10-F-□□□" → Replace the fuse on the I/O module whose FU LED is turned on.
"10-T-ΔΔ0" → Remote I/O transfer from I/O address ΔΔ0 is not possible. Check the I/O power, remote I/O cabling, terminating cabling, and station No. setting.
"OS TYPE" → System Floppy is not correct. You must use the System Floppy "CPMS System V4.2 R3.0".
Normal Display
"NΔΔΔ" } → Programs NΔΔΔ and PΔΔΔ
"PΔΔΔ" } are not in execution.
"EΔΔΔ" → Event coil EΔΔΔ has been turned ON.

③ Station R I/O LED

Turned OFF
(1) Place the CPU Key Switch in the STOP or RUN position, if it is set to the SIMU. RUN position.
(2) Is the CPU normal?
(3) Is the station No. set correctly?
(4) Is the number of remote I/O transfer points correctly set to 512 or 1024 points? (Refer to a paragraph for PCs Edition in "PSE α Operation Manual.)

(2) Troubles and Module Change

If a trouble persists after following the procedures in (1), take the actions as stated below :

Trouble		Action
Power module	POWER ON LED does not turn ON.	Replacement of Power Module
I/O module	All I/O modules do not operate.	Replacement of CPU Module
	All the modules mounted on a certain I/O mount base do not operate.	Replacement of station module
	A specific I/O module does not work.	Replacement of I/O module
Indication of CPU console LED	"CPU CELL" , "EXΔΔ CEL" , "RTC CELL" (The battery built in CPU, abnormal)	Replacement of CPU module
	"SSP OVER" "WDT ERR" "OS PTY" (OS program, abnormal) "EXΔΔ CEL" (Computer processing memory, abnormal)	Reset the CPU key Switches, and then, (1) loads the OS program, if "LOAD OS" is not displayed, or (2) replace the CPU module, if "LOAD OS" is not shown on the CPU console LED.
	"SMD PTY" "SMD INVL" (Ladder program memory, abnormal) "SMD CERR" (The ladder program table is invalid.) "SMD PERR" (Ladder program error)	(1) Reload the ladder program. If the problem is still not corrected, load the OS program again. (2) Replace the CPU module.
	"FBRAN ER" "FINEX ER" "FZERO ER" "FUNDER ER" "FOPRN ER" "FOVER ER" "FNAN ER"	The FPU detected an error. Correct the C-mode program that caused the error.

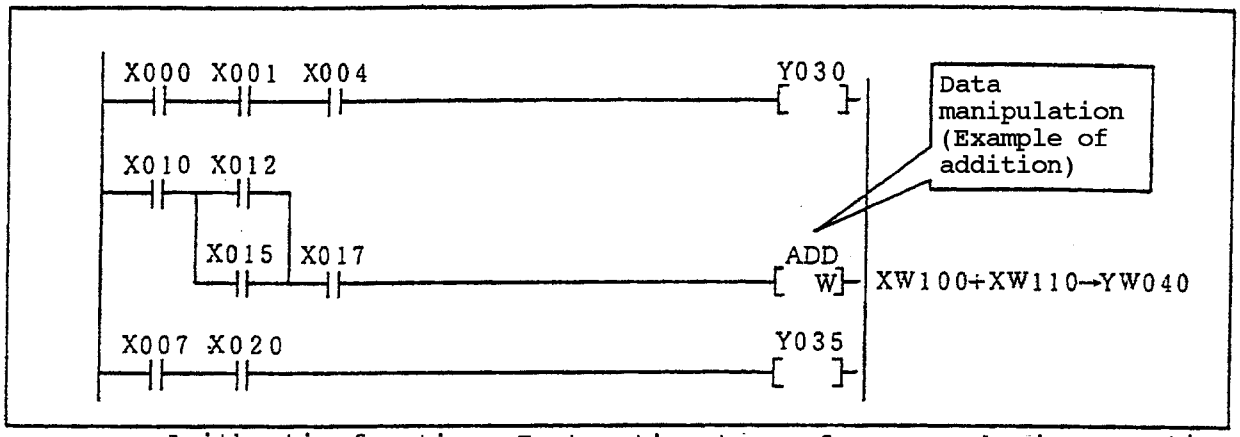
PROHIBIFION

The user must not replace internal parts. Replace the entire module. (Otherwise, internal parts may be damaged.)

2 DESCRIPTION OF OPERATIONS

2.1 Execution of Ladder Circuit Program

When the CPU Key Switch is placed on the RUN or SIMU. RUN position, a ladder program performs operations in the sequence in which they are programmed.



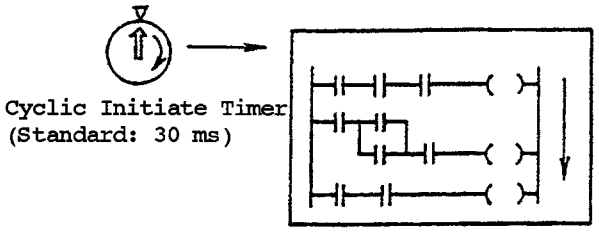
Arithmetic function: Instruction to perform a numberic operation

2.1.1 Initiation of Ladder Circuit Program

A ladder program may be initiated by one of the following two methods :

1) Cyclic initiation

A ladder circuit program is initiated every previously-set sequence cycle time, and waits until the next initiation time if the program has been executed to its end. This method is used when operations at every certain period of time are desired (For instance, integration, derivation, and so on). A program is executed by this method, when the sequence cycle time is set longer than the time required for actual execution. For applications with heavy use of high level programs and light use of ladder logic, the cyclical initiation with typically 30 ms. sequence cycle times would be selected.

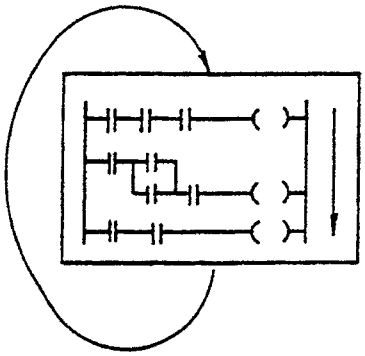


2) Continuous iterative initiation

When a ladder circuit program is executed to its end, the program execution is iterated, starting at the beginning of the program.

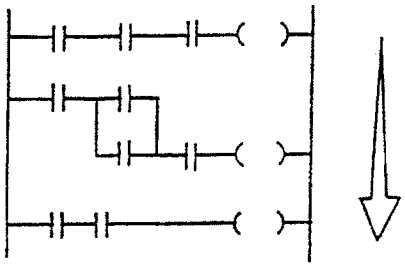
A program is executed by this method, if the sequence cycle time is set shorter than the time required for actual execution.

In normal operation, there is no significant difference between 1) and 2) in the above.



2.1.2 Execution of Ladder Circuit Program

The program is executed from top to bottom (in programming sequence).

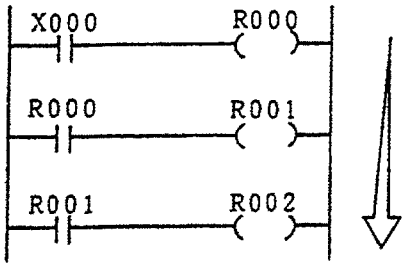


(Operational difference due to the execution sequence)

The time required for operation differs, for instance, as shown in the next examples.

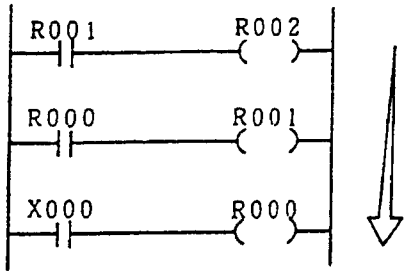
In general, since the program execution time is far shorter than the system response time, the sequence of program execution is not so significant. However, when the time required for program execution is a prime consideration, the difference in the time necessary for operation depending on the program execution sequence must be taken into consideration.

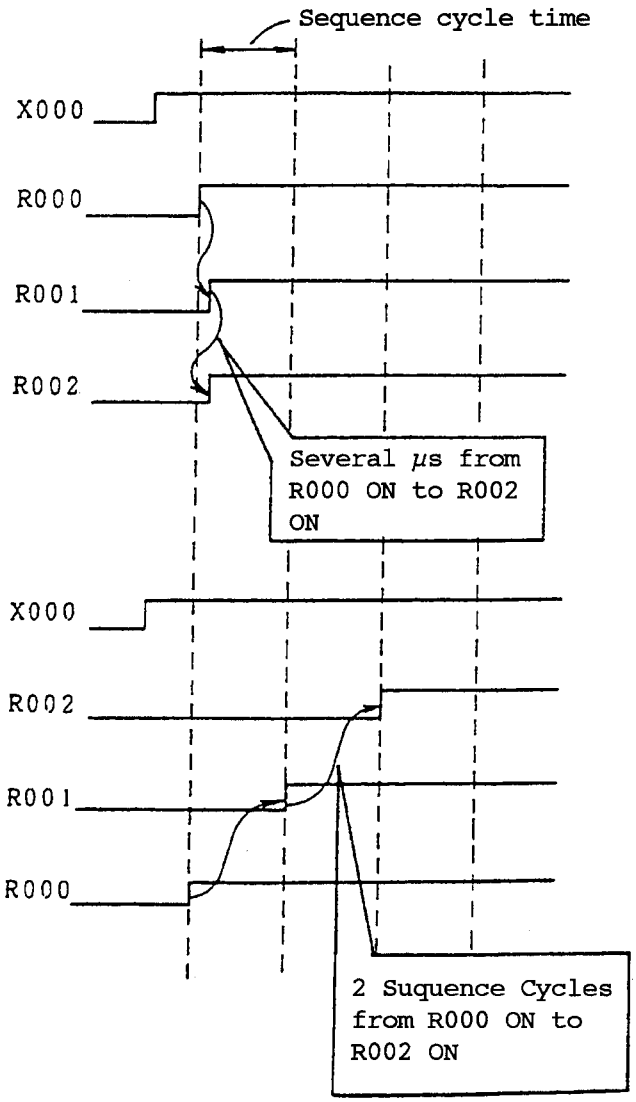
■ Example 1



■ Example 2

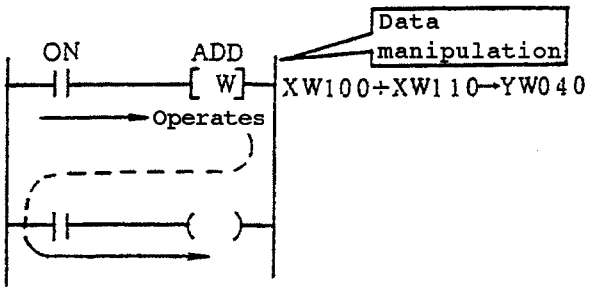
When (Example 1) is reversed :



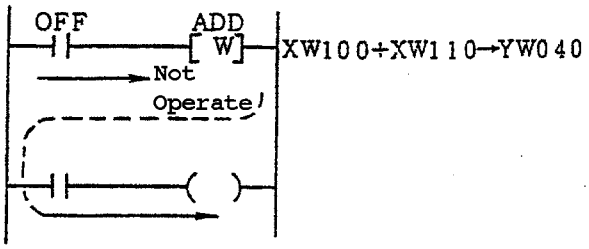


2.1.3 Execution of Data Manipulation

Energizing (ON) the data manipulation (symbol of coil) causes the data manipulation being executed. In the example given on the left, a value contained in XW100 is added to a value in XW110, and the result is placed in YW040. The data manipulation, while energized, performs the operation at every sequence cycle.



The data manipulation does not work, if it is not energized. In the example on the left, no output is produced in YW040, retaining a value contained in YW040.

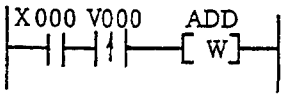


■ Example : To execute the operation only at the rising of a signal

The function uses V ΔΔΔ rising and falling contacts.

V000 ↑ The operation is performed only when X000 signal rises (OFF to ON), as rising of signal is fetched at V000.

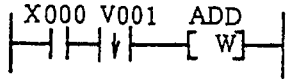
The operation is not performed again if X000 remains ON or turns OFF.



■ Example : To execute the operation only at the falling of a signal

⊣↓⊢ The operation is performed only when X000 signal falls (ON TO OFF), as of signal is fetched at V000.

The operation is not performed if X000 turns ON or OFF in succession.

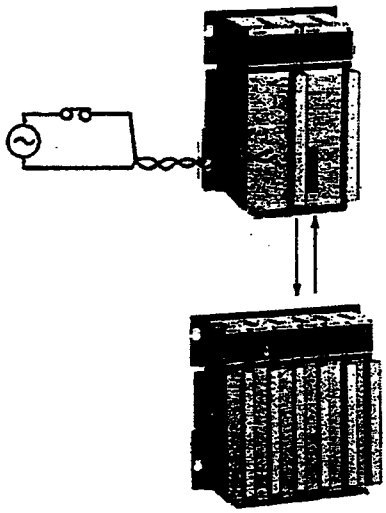


- Both V000 and V001 are the contacts for fetching a rise and fall, and used only for the instructions, ⊣↑⊢ and ⊣↓⊢. The VΔΔΔ contact is used with each number being assigned to ⊣↑⊢ and ⊣↓⊢ instructions to avoid duplication.

2.2 Remote I/O Transfer Operation

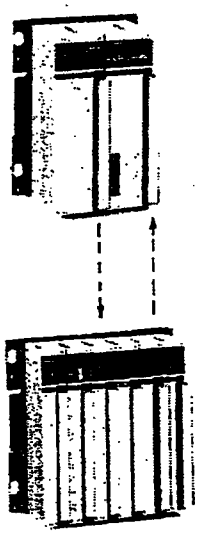
POWER ON

By turning the power ON, the remote I/O transfer operation automatically starts. If the CPU key switch is placed on the STOP position in this POWER ON case, the remote I/O initialization, or I/O Zero clear, starts automatically.



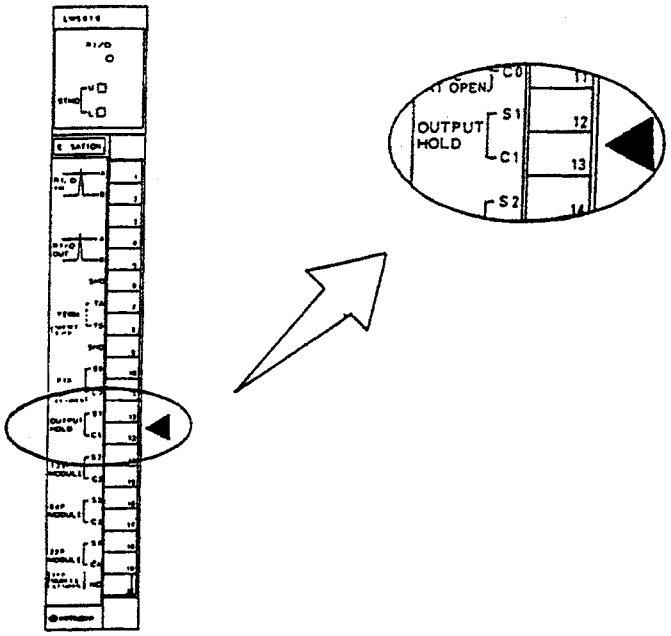
POWER OFF | RESET | SIMU. RUN

The remote I/O transfer is not made while the power is turned OFF or the CPU Key Switch is placed to the RESET or SIMU. RUN position. During this period of time, the I/O operation is performed as described below :



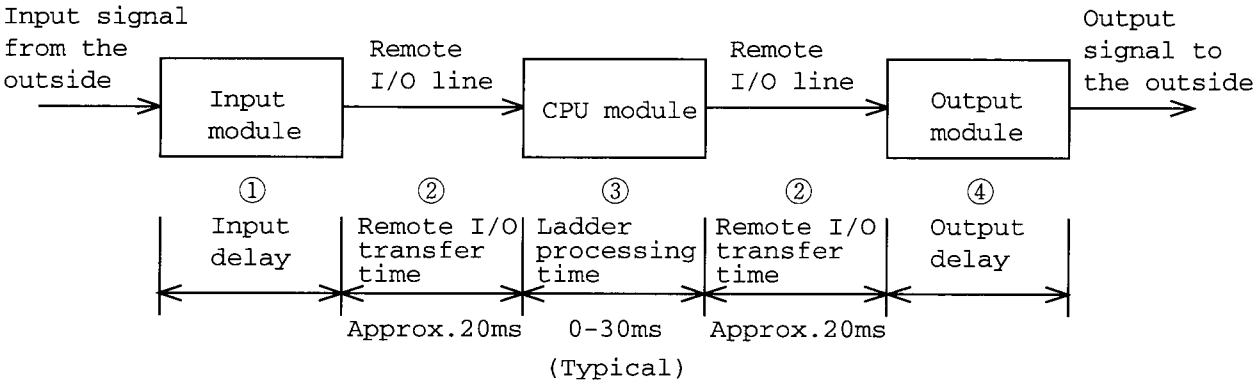
I/O Operation on Remote I/O Transfer Stop

The output from the I/O module is cleared with "0" in case the OUTPUT HOLD of the station module is open (not connected).
The output from the I/O module retains its previous state if the OUTPUT HOLD jumper is installed on the station module (S1 and C1).



2.3 Processing Time Taken by the PCs

This section explains how to calculate the time from when an input signal is input to the input module and operation is performed to when the result is output from the output module to the outside as an output signal.



① Input delay

This time is the response time taken by the input module. The time depends on the type of the input module. See the I/O manual.

② Remote I/O transfer time

This time is the data transfer time taken by the remote I/O which connects the CPU unit to I/O units. The transfer time depends on the number of I/O units. The transfer time for input is the same as that for output.

512 I/Os : Approx. 5 ms
1024 I/Os : Approx. 10 ms
1536 I/Os : Approx. 15 ms
2048 I/Os : Approx. 20 ms

③ Ladder processing time

In cyclic activation, the maximum delay is the sequence cycle time.

④ Output delay

This time is the response time taken by the output module. The time depends on the type of the output module. See the I/O manual.

2.4 Clock Functions

The Hitachi S10/2 α H (LWP070) and 2 α Hf (LWP075) contain a built-in clock. This section describes the clock function and its setup procedure.

2.4.1 System register for clock control

This register is used when executing real time control by the ladder program.

(1) Time storing register

This register stores the time information year, month, day, hour, minute and second. The time can be obtained by reading this register. To set or correct the time, place the time values into this area as binary data.

(MSB) 2^{15}		2^{8} 2^{7}	2^{0} (LSB)
SW280	Unused		Second
SW290	Unused		Minute
SW2A0	Unused		Hour
SW2B0	Unused		Day
SW2C0	Unused		Month
SW2D0	Year (dominical year or year A.D.)		
SW2E0	Unused		Week day

Setting range

The setting range for the above register is shown below.

You cannot enter a setting outside the range.

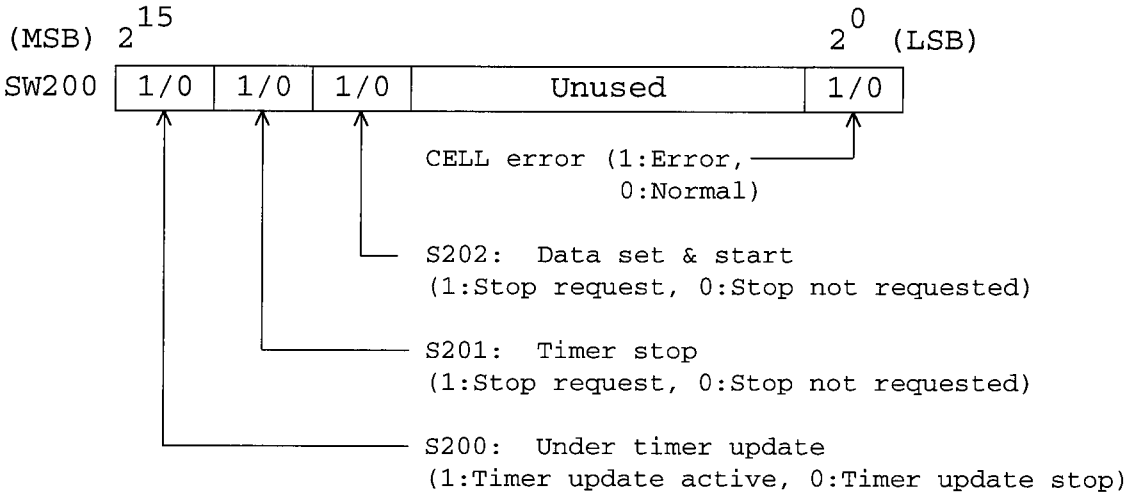
① Second ··· 0 to 59
② Minute ··· 0 to 59
③ Hour ··· 0 to 23
④ Day of the month ··· 1 to 31
⑤ Month ··· 1 to 12
⑥ Year ··· 1900 to 2199
⑦ Day of the week ··· 1 to 7

Note: The day-of-the-week entries (1 to 7) are defined as follows.

1: Sunday; 2: Monday; 3: Tuesday; 4: Wednesday; 5: Thursday; 6: Friday; 7: Saturday

(2) Time control register

This register is used to display the timer status and set the time.



When setting the time to the timer, follow the procedure given below.

① Set 1 to the timer control register S201 to stop the timer from counting.

↓

② Set the timer data to the time storing register SW280 - SW2E0.

↓

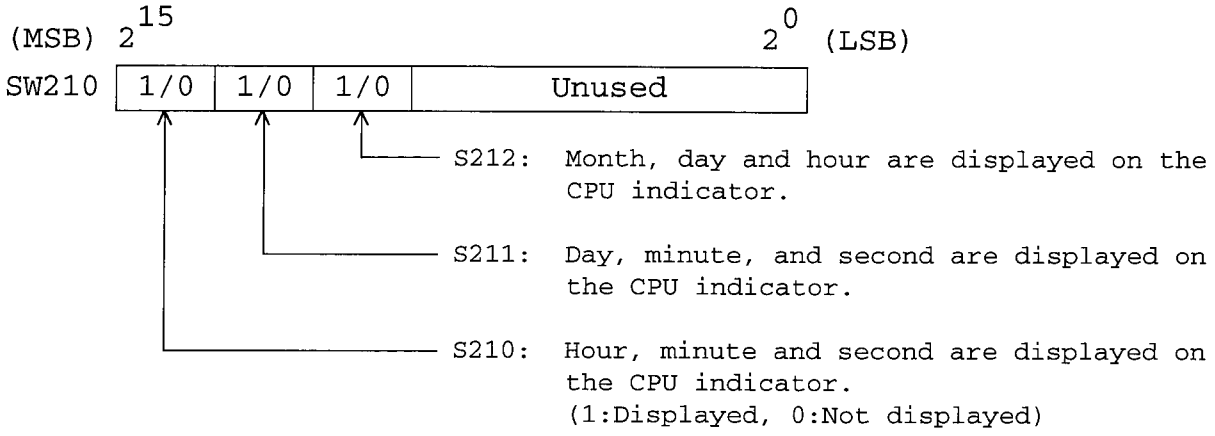
③ Set 1 to the timer control register S202 to execute the timer set start.

↓

④ Set 0 to the timer control register S201/S202 to release the time set status.

(3) Time display control register

When displaying the time on the CPU indicator, set an arbitrary bit in the following register to 1. (The time and the CPU status are displayed alternately.)



Note:

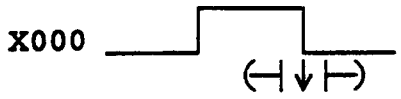
When two or more bits are set, the MSB side (lowers-number) is displayed. (For example, when S210 and S211 are set, S210 is displayed.) If no bit is set, year, month and day aredisplayed on the CPU indicator.

When this register is set, the time is displayed on the CPU indicator regardless of RUN/STOP on the sequence program.

2.4.2 Example of time setting

(1) An example of time setting by the ladder program is given below.

[Explanation of Operations]
When X000 is changed over from ON to OFF, the time data, which is in function words FW100 to FW108, is set in the timer register.



① 1 ⇒ S201

↓

②

FW100	Second		SW280	Second
FW101	Minute		SW290	Minute
FW102	Hour		SW2A0	Hour
FW103	Day	⇒	SW2B0	Day
FW104	Month		SW2C0	Month
FW105	Year		SW2D0	Year
FW106	Week day		SW2E0	Week day

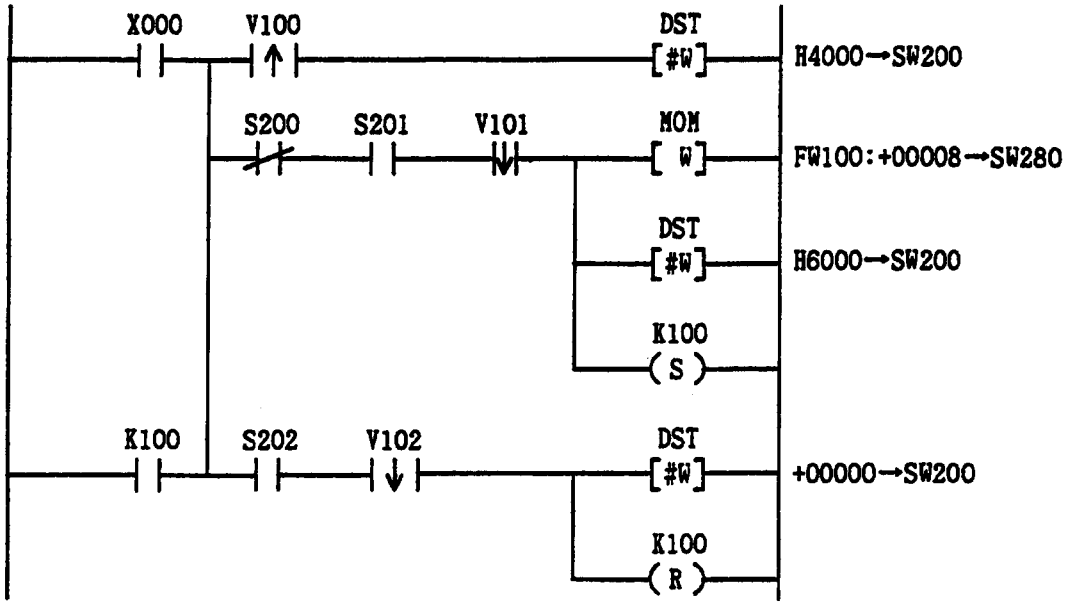
↓

③ 1 ⇒ S202

↓

④ 0 ⇒ S201
0 ⇒ S202

[Ladder Program]



Note :

The above explanation is limited only to the items required for ladder program creation. The user of the CPMS system should refer to 3.3.5 "CMPS system macro instructions for timer" (Manual No. SP-62-009).

2.4.3 Date updating

The date is automatically updated as follows.

31st day of January, March, May, July, August, October or December . . . lst day of the next month

30th day of April, June, September and November . . . first day of the next month

28th day of February in a non-leap year . . . first day of March

29th of February in a leap year . . . first day of March

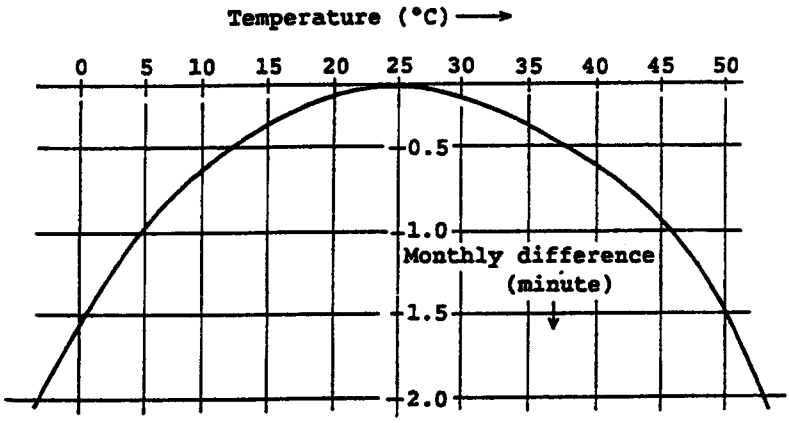
2.4.4 Restrictions on time setting

If the following time is set when setting data and time, correct data updating may be impossible. Accordingly, don't set the following time.

Setting date, setting time and status after time and date updating	Concrete Example
When "29 day 59 minute 59 second" of any month is set, it is updated into the first day of the next month. (Except February in a leap year)	29th day, March → 1st day, April
When "30 day 23 hour 59 minute 59 second" of April, June, September or November is set, it is updated into the 31st day of the next month.	30th day, April → 31st day, April
When "28 day 23 hour 59 minute 59 second" of February in a non-leap year is set, it is updated into the 29th day of February.	28th day, Feb. → 29th day, Feb.
When "28 day 23 hour 59 minute 59 second" of February in a leap year is set, it is updated into the first day of March.	28th day, Feb. → 1st day, March

2.4.5 Accuracy of Real Timer

[Temperature characteristic]



Note:

The above characteristic graph shows mean values. As they differ with products, please use a graph value plus/minus 1 minute per month as a standard.

For control requiring time accuracy, use this timer, while correcting its time according to the PSE α or the host computer via host computer linkage.

2.5 Operation and Statuses of I/O and Internal Registers at Occurrence of Errors

Name \ Operation			Initial status	Setup	Normal operation				Error			
			ROM IDLE	OS loading	Power on, reset, off →On→ Off	STOP →RUN	STOP→ SIMU. RUN	STOP	PROT. ERR	I/O error (*1)	CPU CELL	CPU down (*2)
I/O	External input	X	Input is stopped.	Zero-cleared	Input after zero-cleared	—	Input is stopped.	—	—	—	—	Input is stopped.
	External output	Y	Output is stopped.	Zero-cleared	Output after zero-cleared	—	Output is stopped.	—	—	—	—	Output is stopped.
Internal registers	Internal register	R	—	Zero-cleared	Zero-cleared	—	—	—	—	—	—	—
	Keep relay	K	—	Zero-cleared	Hold	—	—	—	—	—	—	—
	On-delay timer	T	Pause	Zero-cleared	Zero-cleared	Start	Start	Pause	—	—	—	Pause
	One-shot timer	U	Pause	Zero-cleared	Zero-cleared	Start	Start	Pause	—	—	—	Pause
	Up-down counter	CU CD CR CO	—	Zero-cleared	Hold	—	—	—	—	—	—	—
	Global link register	G	—	Zero-cleared	G input after zero-cleared	G input, G output	G input, G output	G input	—	—	—	G input
	Nesting coil	NM NZ NO	—	Zero-cleared	Zero-cleared	—	—	—	—	—	—	—
	Process register	P	—	Zero-cleared	Zero-cleared	—	—	—	—	—	—	—
	Event register	E	—	Zero-cleared	Zero-cleared	—	—	—	—	—	—	—
	Edge contact	V	—	Zero-cleared	Zero-cleared	—	—	—	—	—	—	—
	Z register	Z	—	Zero-cleared	Zero-cleared	—	—	—	—	—	—	—
	System register	S	The status at that time is stored.									
	Function data register	DW	—	Zero-cleared	Hold	—	—	—	—	—	—	—
	Function work register	FW	—	Zero-cleared	Hold	—	—	—	—	—	—	—
Program execution	Ladder program		STOP	Zero-cleared	STOP	RUN	RUN	STOP	—	—	—	STOP
	CPMS task (or P coil)		STOP	Zero-cleared	Abort	—	—	—	Only the task is aborted.	—	—	Abort
PCs OK			OFF	OFF	OFF	ON	OFF	OFF	—	—	—	OFF

*1 I/O phase error or I/O time-out

*2 NST OVER, SSP OVER, WDT ERR, OS RTY, SMD PTY, SMD INV

Note : A hyphen (-) indicates that there is no effect by the operation or status.

2.6 Limitations on Optional Module Mounting

2.6.1 Number of mountable optional modules

The table below shows the optional modules that can be mounted in the CPU unit.

Module name		Model	Number of slots	Maximum number of mountable modules				Number of modules in terms of functions (*1)	Remarks
				2 α	2 α E	2 α H	2 α Hf		
Expansion memory (2 slots)	256kB	LWM002	2	4 *2	4 *2	4 *2	4 *2	1	
Expansion memory with clock (1 slot)	512kB	LWM413	1	4 *2	4 *2	4 *2	4 *2	2 (1) *3	Usable only with OS Ver 3.0, Rev 0.1 or later (*4)
	1MB	LWM414	1	2 *2	4 *2	3 *2	2 *2	2 (1) *3	Usable only with OS Ver 3.0, Rev 0.1 or later (*4)
Expansion memory with ECC and clock	512kB	LWM423	1	4 *2	4 *2	4 *2	4 *2	2 (1) *3	Usable only with OS Ver 3.0, Rev 0.1 or later (*4)
	1MB	LWM424	1	2 *2	4 *2	3 *2	2 *2	2 (1) *3	Usable only with OS Ver 3.0, Rev 0.1 or later (*4)
CPU link (CPU link + α, CV-NET α)		LWE020	2	2	2	2	2	1	Mount CPU line modules into the free leftmost slots in such a way that the left slot is an even-numbered slot and the right slot is an odd-numbered slot.
PSE link		LWE040	2	1	1	1	1	1	Not mountable in the unit where an RS-232C (LWE480) module is mounted.
External equipment link		LWE046	2	2	2	2	2	1	Not mountable when two RS-232C (LWE450) modules are mounted.
High-speed remote I/O		LWE100	2	4	4	4	4	1	Not mountable in the unit where RS-232C (LWE450) modules are mounted at channels 2 and 3.
RS-232C		LWE450	1	2	2	2	2	2	• When RS-232C modules are mounted at channels 2 and 3, F link (LWE480) modules or high-speed remote I/O (LWE100) modules cannot be mounted in the unit where these RS-232C modules are mounted. • Only one RS-232C module can be mounted when one or two external equipment link (LWE046) modules are mounted.
S10ET link		LWE400	1	2	2	2	2	1	When two S10ET modules are mounted in one unit, the transceiver of at least module must have an AC power supply.
F link		LWE480	1	2	2	2	2	1	• Mount F link modules in odd-numbered slots, starting from the free leftmost slot. • Not mountable in the unit where PSE (LWE040) modules are mounted. (In V3.0 R0.0 and later, only sampling link modules can be mounted in the unit where PSE link modules are mounted.) • Not mountable in the unit where RS-232C (LWE450) modules are mounted at channels 2 and 3.
FSC		LWE200	2	4	4	4	4	0	
Parallel interface		LWZ400	1	1	1	1	1	0	Mount this module in the free leftmost odd-numbered slot.
Optical adapter		LWZ440	1	1	1	1	1	0	
Analog slicer		LWA200	1	4	4	4	4	0	
J.NET		LWE580	1	2	2	2	2	1	Mount this module in the free leftmost odd-numbered slot.
OD.RING		LWE500	1	2	2	2	2	1	Mount this module in the free leftmost odd-numbered slot.
ET.NET		LWE550	1	2	2	2	2	1	Mount this module in the free leftmost odd-numbered slot.

*1 In terms of functions, up to eight modules can be mounted for the 2 α, up to 16 for 2 α E, up to 14 for 2 α H, and up to 13 for the 2 α Hf.

*2 When different model memory modules are mounted, a total of up to 2M bytes of memory can be mounted for the 2 α, a total of up to 4M bytes for the 2 α E, a total of up to 3M bytes for the 2 α H, and a total of up to 2M bytes for the 2 α Hf.

*3 When the first address in expansion memory is not H100000, the number of mountable modules in terms of functions is indicated in parentheses.

*4 These modules can be mounted only when the OS is loaded from the ladder diagram or compact PMS system floppy disk in Ver3.0 Rev 0.1 or later. (The CPU LED displays "CPU V3.0" for the 2 α ladder OS, "CPMS 3.0" for the 2 α CPMS, and "CPMS E10" or later for the 2 α E CPMS.)

2.6.2 Notes on mounting optional modules

1. Limitation on the optional module mounting count

   There is a limitation on the mounting count for optional modules mounted in the CPU unit. This count is not the number of optional modules but is represented in terms of functions or the number of channels.

   [Conversion to mounting count]

   - RS-232C module (LWE450) : 2
   - Memory module with a clock (LWM413 or LWM414)
     When the first address is H100000 : 2
     When the first address is not H100000 : 1
   - Other optional modules : 1

   [Mounting count]

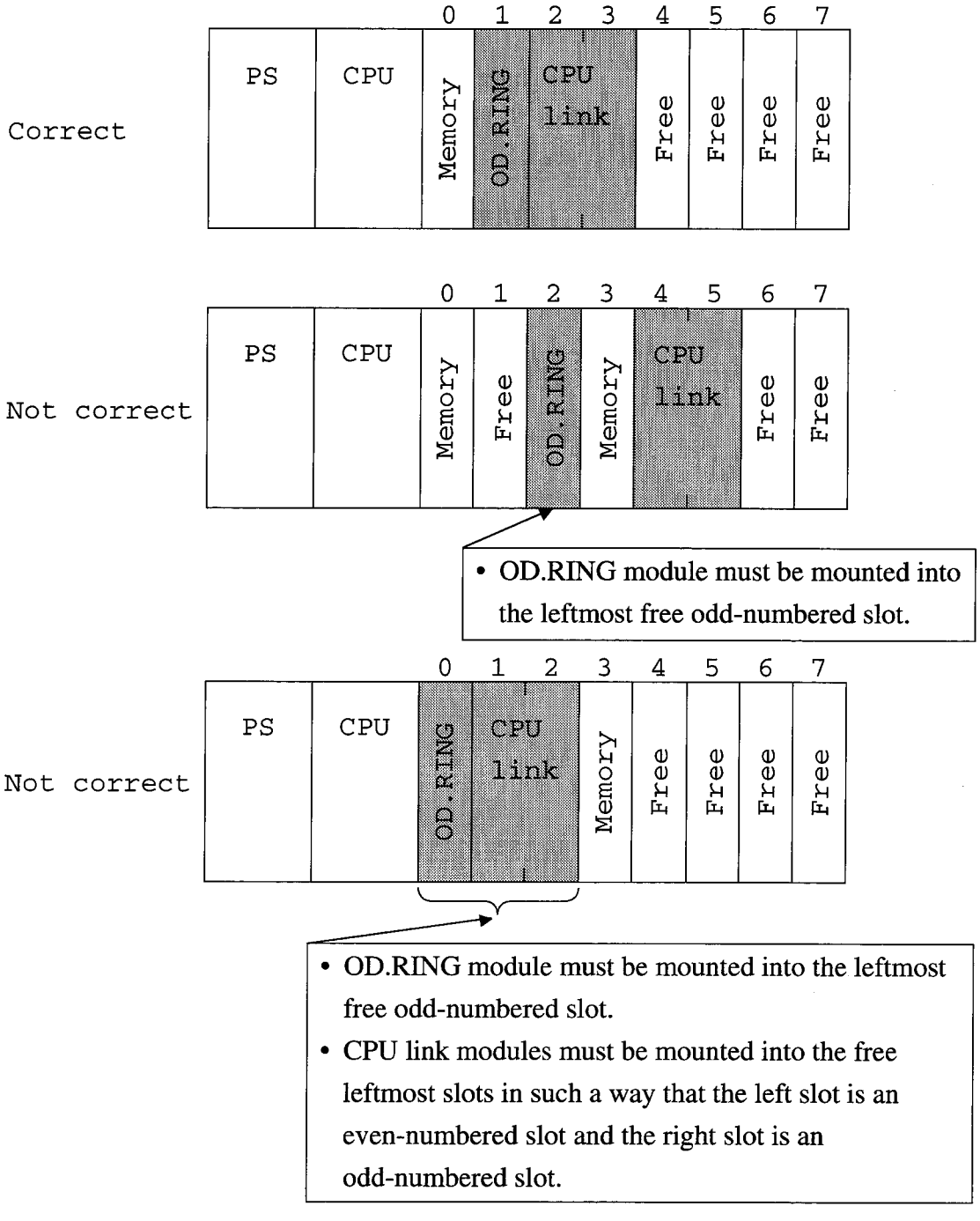
   - When the CPU is the S10/2 α (LWP000) : 8
   - When the CPU is the S10/2 α E (LWP040) : 16
   - When the CPU is the S10/2 α H (LWP070) : 14
   - When the CPU is the S10/2 α Hf (LWP075) : 13

2. Limitation on mounting slots

When modules of the same type use two slots, mount them into the free leftmost slots in such a way that the left slot is an even-numbered slot and the right slot is an odd-numbered slot.

The F link (LWE480) module, parallel interface (LWZ400) module, OD RING (LWE500) module, ET NET (LWE550) module or J.NET (LWE580) module must be mounted into the leftmost free odd-numbered slot.

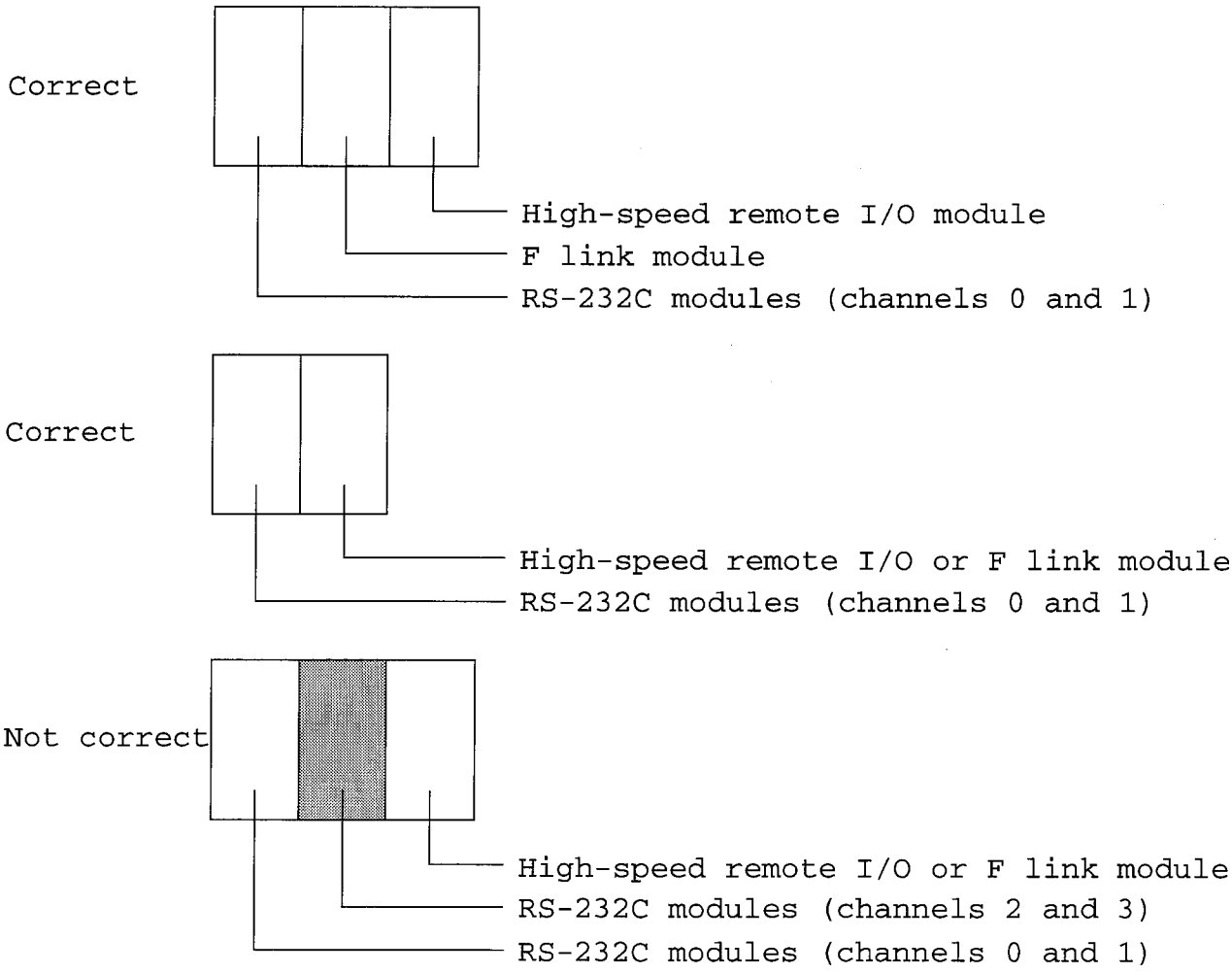
[Sample mounting]



3. Use of both the F link module and PSE link module
   The F link (LWE480) module and the PSE link (LWE040) module cannot be mounted in the same CPU unit.

4. Use of both the RS-232C module and the high-speed remote I/O or F link module
   When software supporting four channels of RS-232C (LWE450) modules, channels 2 and 3 cannot be mounted in the CPU module where the high-speed remote I/O (LWE100) module or F link (LWE480) module is mounted.

   [Sample mounting]



5. Limitation on mounting the F link and S10ET link modules
   For the F link (LWE480) module and S10ET link (LWE400) module, sub-modules cannot be mounted without main modules.

6. Transceiver for the S10ET link module
   When two S10ET (LWE400) modules are mounted in one CPU, the transceiver of at least module must have an AC power supply.
   Recommended transceiver (including a power supply)
   : H-7612-64/68 (from Hitachi, Ltd.)

2.6.3 Limitations on optional module use

1. J.NET module (LWE580)
   When you use a combination of the 2 α CPU unit (LWP000) and J.NET module (LWE580) and gain access from a JEMA net compliant station (graphics panel, etc.), do not access the following addresses. When the J.NET module is used in conjunction with the 2 α CPU unit, the following addresses are not accessible (these addresses are accessible if the J.NET module is combined with a CPU unit [LWP040, LWP070, or LWP075] other than the 2 α):

   Registers not supported by 2 α CPU unit

Register	Address	Use
DW000~DWFFF	/61000~/62FFE	Function data register
TS000~TS1FF	/63000~/633FE	Timer setting
US000~US0FF	/63400~/635FE	One-shot counter setting
CS000~CS0FF	/63600~/637FE	Counter setting

2.7 Procedure for Replacing the CPU Module or Optional Modules

When the 2 α (25E), 2 α E, 2 α H or 2 α Hf CPU module or an optional module is replaced, programs must be re-loaded. To assure re-setup, all systems and user programs should be re-loaded.

The re-loading procedure is explained below.

The procedure described below can also be used to change the type of the CPU module or the operating system (for example, to change the 2 α ladder operating system to the 2 α E CPMS). When the type of the CPU and the operating system remain unchanged, the batch save/load function of the PC programming tool can be used. For details, see the Programming Support System Operation Manual.

(1) Back up the user programs and user registration tables. For their addresses, see the Addresses of user programs and user registration tables.

(2) Replace the CPU module and/or optional modules. When changing from 2 α (25E) or 2 α E to the 2 α H or 2 α Hf, also remove the expansion memory module (first 1M to 2M bytes). If the expansion memory is taken out from an odd-numbered slot (1, 3, 5, or 7), move the other slots so that there are no free odd-numbered slots.

(3) Load the ladder operating system or CPMS. In this case, select "Memory All Clear."

(4) Load the system program for each optional module. (*1)

(5) Load all backups created in step (1) above.

(6) Reset the CPU. (Resetting the CPU is requested several times during system program loading. In addition, be sure to reset the CPU after all programs have been completed.)

*1 When the CPU link, CPU link + α , or CV-NET α (LWE020) module is used, set the following data, reset the CPU, then load the system programs. When loading is carried out from the PC programming tool, this step is not required.

Main module : /F08000 → /0000, /F08002 → /0000
Sub-module : /F18000 → /0000, /F18002 → /0000

Addresses of user programs and user registration tables

<table>
<tr><th colspan="4">Item</th><th>Address</th><th>Remarks</th></tr>
<tr><td colspan="4">Ladder program
System table
Data register (DW)
Settings (TS, US, and CS)</td><td>/060000 - /07FFFE</td><td rowspan="2">When SEQUENCE + WORK is selected, addresses are automatically set.</td></tr>
<tr><td colspan="4">Work registers (FW and BD)</td><td>/0E2000 - /0E3FFA</td></tr>
<tr><td colspan="4">Keep relay (K)</td><td>/0E1000 - /0E11FE</td><td rowspan="3"></td></tr>
<tr><td colspan="4">Counters (C, CU, CD, and CR)</td><td>/0E1600 - /0E17FE</td></tr>
<tr><td colspan="4">Counter value (CC)</td><td>/0E0600 - /0F07FE</td></tr>
<tr><td colspan="4">User task</td><td>(/110000 - /4FFFFE)</td><td>The range is user-specifiable.</td></tr>
<tr><td colspan="4">User task registration table (PRET)</td><td>/0FA700 - /0FAAFE</td><td></td></tr>
<tr><td colspan="4">User arithmetic function registration table (UFET)</td><td>/0FAB40 - /0FAD3E</td><td></td></tr>
<tr><td colspan="3" rowspan="4">LGB table for external equipment link module and RS-232C module</td><td>Ch. 0</td><td>/F48100 - /F481FE</td><td rowspan="4"></td></tr>
<tr><td>Ch. 1</td><td>/F58100 - /F581FE</td></tr>
<tr><td>Ch. 2</td><td>/F68100 - /F681FE</td></tr>
<tr><td>Ch. 3</td><td>/F78100 - /F781FE</td></tr>
<tr><td rowspan="6">Table to register external equipment link module, RS-232C module, and received user tasks</td><td rowspan="4">Ver 2.0 Rev 0.0 or later</td><td>Ch. 0</td><td>/1070CA - /1070D0</td><td rowspan="6">This table is required only when the task system is used. When the arithmetic function system is used, backup is not required.</td></tr>
<tr><td>Ch. 1</td><td>/10714A - /107150</td></tr>
<tr><td>Ch. 2</td><td>/1071CA - /1071D0</td></tr>
<tr><td>Ch. 3</td><td>/10724A - /107250</td></tr>
<tr><td rowspan="2">Ver 1.2 Rev 6.0 or earlier</td><td>Ch. 0</td><td>/0FD048 - /0FD04E</td></tr>
<tr><td>Ch. 0</td><td>/0FD050 - /0FD056</td></tr>
<tr><td colspan="3" rowspan="2">F link station information table</td><td>Main</td><td>/B17000 - /B177FE</td><td rowspan="2">This table is not required when the F link module is not replaced.</td></tr>
<tr><td>Sub</td><td>/B57000 - /B577FE</td></tr>
<tr><td rowspan="2">ET link</td><td colspan="3">HOSTS table</td><td>/160000 - /161FFE</td><td>This table is not required when HOSTS is not registered.</td></tr>
<tr><td colspan="3">Host name, IP address</td><td>/C18FE0 - /C18FF2</td><td>This table is not required when the ET link module is not replaced.</td></tr>
</table>

2.8 Memory Battery Backup

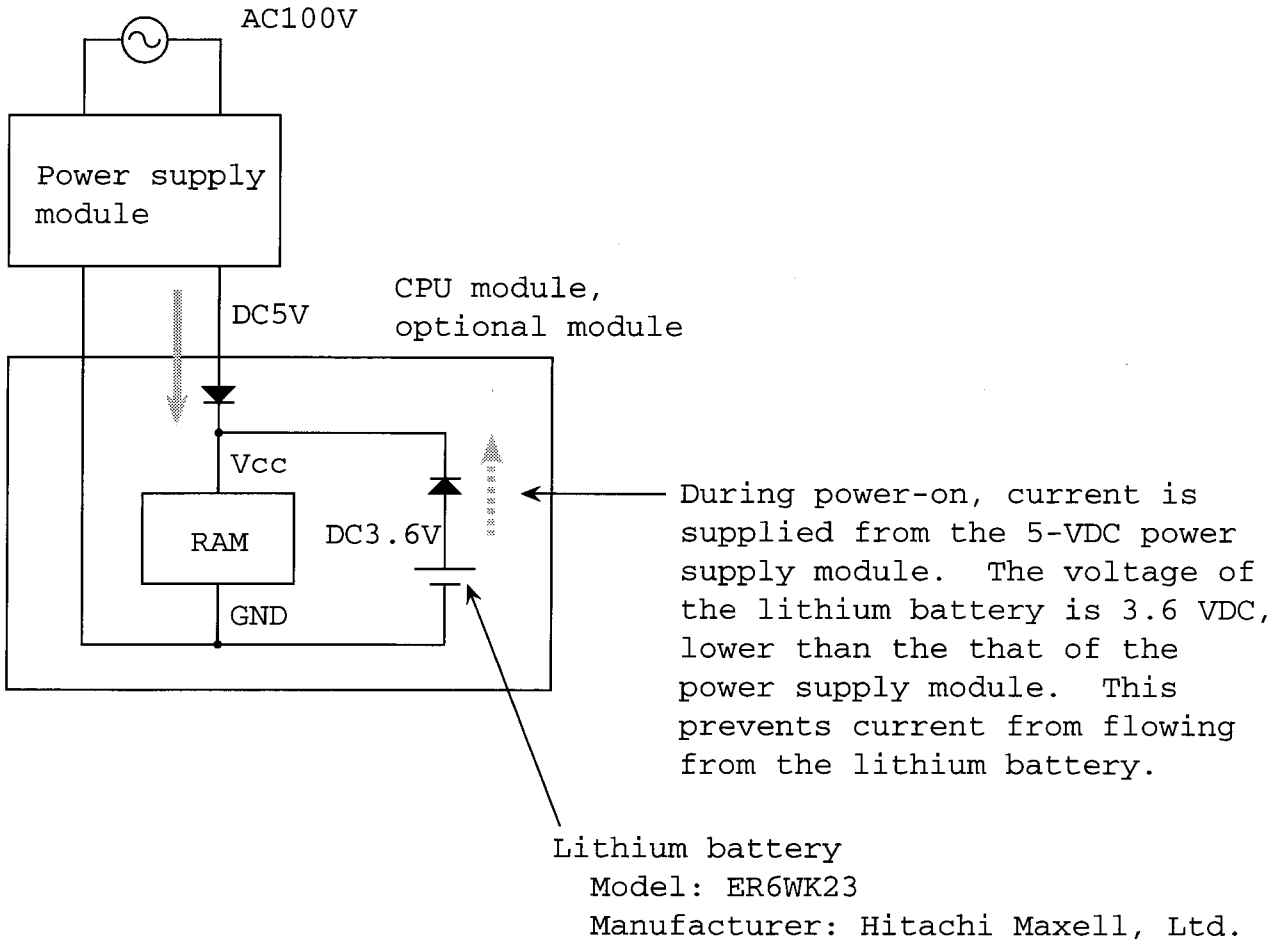
1. Overview

   All user programs in the S10 α series are stored in random access memory (RAM) which can be written to and read from. Since RAM is battery-backed, data in it is not lost at power-off.

2. Battery backup period

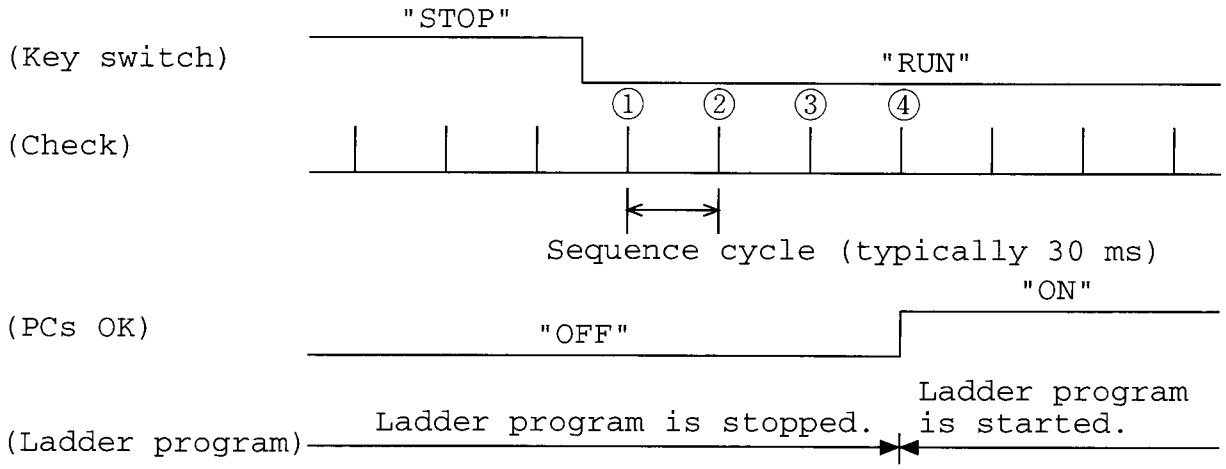
   The battery lasts six to seven years when power is not supplied. During power-on, the battery is not exhausted. Therefore, the battery does not need to be replaced under normal usage conditions.

3. Principle of battery backup



2.9 Output Timing of the PCs OK Signal

The PCs OK output signal is turned on as shown in the following timing chart.



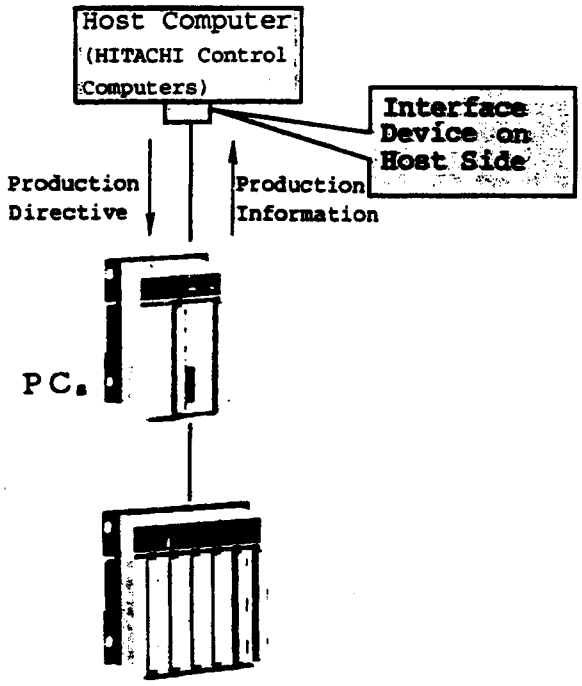
As shown above, the PCs OK signal is turned on typically 90 to 120 ms (3 or 4 sequence cycles) after the setting of the key switch is changed from STOP to RUN.

Even while the ladder program stops, the remote I/O module continues transfer, enabling data in PI/O memory to be retained.

3 LINKAGE WITH HOST COMPUTER

3.1 What is Linkage with Host Computer?

Production directives can be given to PCs from the host computer (HITACHI Control Computers) and the production information may be sent back to the host computer from the PCs.



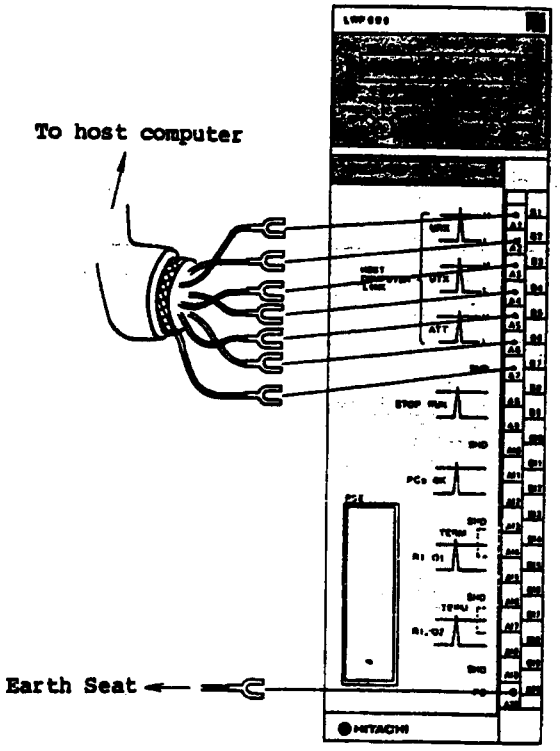
3.2 Cabling

■ Host Computer Interface Cable

- Type of Cable: Instrumentation-class shield twisted pair cable More than 0.3 mm^2, 3Pair
  Recommended cable : KPEV-SB-3P 0.5MM^2 By Hitachi Cable, Ltd.
- Cable Length: 300 m, max.
- Cable
  Shield cable: Connect it to the SHD terminal on the CPU module on the PCs side.
  (Shield cable is not connected on the host computer side.)

■ Grounding

- Connect the FG terminal of the CPU module to the earth seat on the CPU mount base.



■ Same as for 2 α E (LWP040) , 2 α H (LWP070) and 2 α Hf (LWP075).

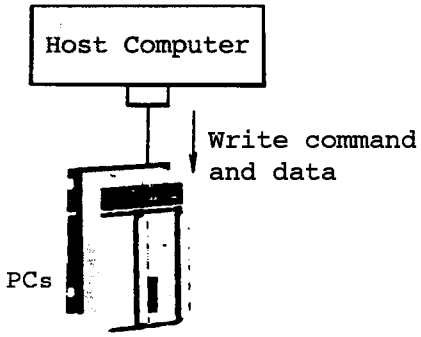
3.3 How To Use

3.3.1 Communication System

The entire communication process is performed by the PCs OS software. Therefore, the PCs user does not have to perform programming concerning communications.

(1) Sending data to PCs from host computer

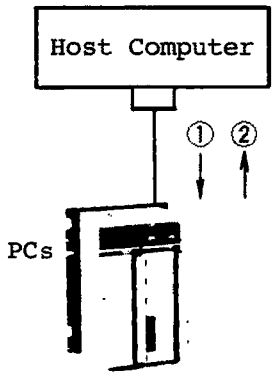
The host computer issues a write command and data.



(2) Collecting data to host computer from PCs

① The host computer issues the read command.

② PCs sends data associated to ①. Since the whole of the communication process is performed by the OS program, the PCs user need not be concerned with the programs for communication.



(3) Making a report to host computer from PCs

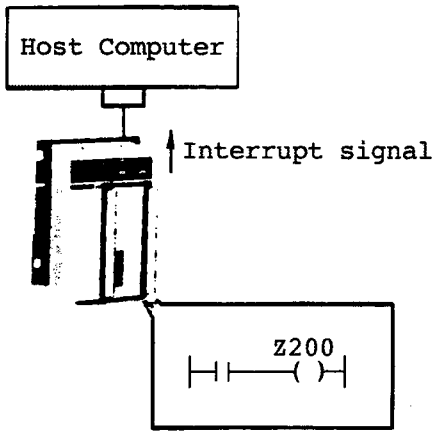
PCs sends an interrupt signal to the host computer.

The host computer performs data receive/transfer in responce to this interrupt signal as stated in (1) and (2).

The actions in response to this interrupt should have been defined by an application program.

Energizing (turning ON) a coil, Z200 sends an interrupt signal with 150 ms width.

The μ ΣNETWORK LINK-PC (interface device on host computer side) is not provided with the function to accept this interruption.



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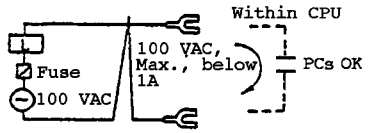
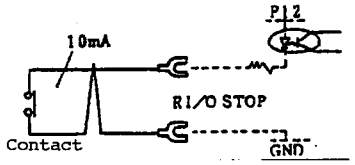
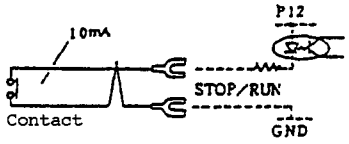
4 SPECIFICATIONS

Item \ Model				2α (LWP000)	2α E (LWP040)	2α H (LWP070)	2α Hf (LWP075)
Number of I/O points				2,048	←	←	←
Program language	Sequence control			Ladder diagram	←	←	←
	HI-FLOW			Optional	←	←	←
	FA-BASIC			Optional	←	←	←
	C			Optional	←	←	←
Instructions	Ladder instructions			18 types	←	←	←
	Application instructions			125 types	←	←	←
	Computer instructions			Possible (68000 processor)	Possible (68020 processor)	←	←
Memory	Device Battery Backup time			CMOS-RAM Lithium battery 7 years (25℃)	←	←	←
Program size	For ladder program			28K steps	←	←	←
	For computer processing			Up to 2M bytes (optional)	Up to 4M bytes (optional)	1M byte (built-in), up to 3M bytes (optional)	2M bytes (built-in), up to 2M bytes (optional)
Processing speed	Basic ladder instructions			0.33 μs/step	←	0.075 μs/step	0.075 μs/step
	Application instructions			Average 300 μs /instruction	Average 180 μs /instruction	←	←
	Scan time			About 30 ms/28K steps	←	←	←
Internal auxiliary functions	Internal registers		R	2,048	←	←	←
	Keep relays		K	512	←	←	←
	Timer	Count	T	512	←	←	←
		Type		On-delay	←	←	←
		Setting		0.1 to 999.9s	←	←	←
	One-shot	Count	U	256	←	←	←
		Type		One-shot multivibrator	←	←	←
		Setting		0.1 to 999.9s	←	←	←
	Counter	Count	C	256	←	←	←
		Type		Up-down	←	←	←
		Setting		1 to 9999	←	←	←
	Global link register		G	4,096 registers. The link to the CPU is supported.	←	←	←
	Nesting coil		N	256 coils. Either master control or zone control can be selected.	←	←	←
	Process register		P	128 registers. Used to start computer-mode programs.	←	←	←
	Event register		E	256 registers. Used to indicate equipment failures.	←	←	←
	Edge contact		V	2,048 contacts. Either a rising edge or falling edge can be selected.	←	←	←
	Z register		Z	32 registers. Used for tracing.	←	←	←
	System register		S	3,072 registers. Used for blown fuse events or as flags.	←	←	←
	Data register		DW	4,096 registers, each of which consists of one word.	←	←	←
	Work register		FW	3,072 registers, each of which consists of one word	←	←	←
Floating-point arithmetic coprocessor				No	No	No	Yes

Item \ Model					2 α , 2 α E, 2 α H, and 2 α Hf
Environment	Temperature		During operation		0 to 55 ℃
			During storage		-20 to 70 ℃
	Relative humidity		During operation		30% to 90%, no condensation
			During storage		10% to 90%, no condensation
	Resistance to vibration				5.8 m/s² (1000 rpm)
	Resistance to shock				98 m/s²
	Dielectric strength				1500 VAC between all AC external terminals and case, for one minute
	Grounding				Class D
	Atmosphere				Dust: 0.1 mg/m³ or less, Corrosive gases: None
Power supply	Voltage				100 to 120 VAC, single-phase, 50 or 60 Hz ±4 Hz
	Voltage fluctuation				85 to 132 VAC
	Allowable outage time				10 ms or less at the rated voltage
	Power consumption	During normal operation	CPU power supply LWV000		200 VA when 100 V is input (maximum load)
			I/O power supply LWV050		130 VA when 100 V is input (maximum load)
		At activation	CPU power supply LWV000		2,000 VA when 100 V is input (maximum load)
			I/O power supply LWV050		2,000 VA when 100 V is input (maximum load)
Weight	CPU		Basic mount base		0.8kg
			Expanded mount base		2.3kg
			CPU power supply		1.2kg
			CPU module		1.1kg
	I/O		I/O mount base	8 slots	1.9kg
				4 slots	1.3kg
				2 slots	1.0kg
			I/O power supply module		0.7kg
			Station module		0.5kg
			I/O module		See the I/O manual.
External signals input to or output from CPU module (common to all models)			PCs OK output		
			STOP or RUN input		
External signals input to CPU module (only for 2 α E, 2 α H, and 2 α Hf)			RI/O STOP input		

● Note on use of the external PCs OK output signal

When driving L with the DC power supply, be sure to install a surge eliminating circuit (see the figure below).