

**SYSMAC
C200PC-TG001-EF2
C200PC-CPU_/_-BC_
C200PC-PCM01**

**Open PLC
ISaGRAF Target Software**

OPERATION MANUAL

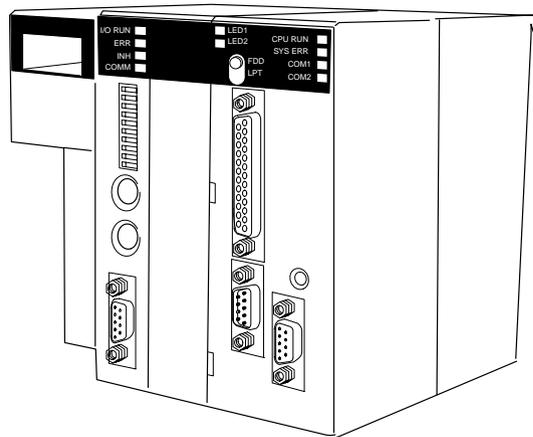
OMRON

Open PLC

ISaGRAF Target Software

Operation Manual

Revised June 2001



Notice:

OMRON products are manufactured for use according to proper procedures by a qualified operator and only for the purposes described in this manual.

The following conventions are used to indicate and classify precautions in this manual. Always heed the information provided with them. Failure to heed precautions can result in injury to people or damage to property.

 **DANGER** Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

 **WARNING** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

 **Caution** Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

OMRON Product References

All OMRON products are capitalized in this manual. The word “Unit” is also capitalized when it refers to an OMRON product, regardless of whether or not it appears in the proper name of the product.

The abbreviation “Ch” or “ch,” which appears in some displays and on some OMRON products, often means “word” and may be abbreviated “Wd” in documentation in this sense.

Example: ch 2000 = word 2000

In this manual, the abbreviation “PLC” means Programmable (Logic) Controller. “PC” means personal computer.

Visual Aids

The following headings appear in the left column of the manual to help you locate different types of information.

Note Indicates information of particular interest for efficient and convenient operation of the product.

1, 2, 3... 1. Indicates lists of one sort or another, such as procedures, checklists, etc.

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About this Manual:

This manual describes the installation and operation of the Open PLC and includes the sections described below. The Open PLC is designed to operate a software PLC using ISaGRAF Target Software.

Please read this manual carefully and be sure you understand the information provided before attempting to install and operate an Open PLC.

Section 1 Features and System Configuration describes the features and the system configuration of an Open PLC.

Section 2 Components describes the components of the C200PC-CPU01-R(-1) and C200PC-CPU15-G(-1) Open PLCs, ISaGRAF Target Software, and C200PC-PCM01 PC Card Board, and explains simply their functions. The C200H Units that can be used with an Open PLC are listed in *2-5 Applicable Units*. Refer to this section when purchasing Units.

Section 3 Preparing for Operation: Overview provides an overview of the Open PLC from setup to operation, and provides references to relevant sections. Read this section before setting or programming an Open PLC.

Section 4 Setup describes the name and function of each part of an Open PLC, and describes how to set up an Open PLC.

Section 5 Installation describes the installation procedures for ISaGRAF Target Software and OMRON Utilities (including I/O Boards), how to connect the cable between the personal computer and the Open PLC, and how to set the Open PLC system DIP switch.

Section 6 ISaGRAF Operation explains the basic operation of the ISaGRAF Workbench and OMRON I/O Boards (device drivers), and I/O Equipment (drivers for multiple I/O Boards). Refer to the ISaGRAF Workbench operation manual for details on the ISaGRAF Workbench.

Section 7 OMRON Utilities explains how to use the OMRON utilities, which provide expansion functions for the ISaGRAF Workbench.

Section 8 Cycle Time explains the methods for calculating cycle times and processing speeds for Open PLCs.

Section 9 PC Card Board explains how to mount and set the optional PC Card Board.

Section 10 Maintenance explains how to replace the fan and backup batteries.

Section 11 Troubleshooting provides information on error indications and OMRON error codes.

The **Appendices** describe the Open PLC and connector specifications, and the differences from the Standard ISaGRAF DOS Target software. These also describe how to use the I/O registers for the C200PC-CPU15-G, and contains a list of recommended peripheral devices. The Microsoft License Agreement is provided at the end of this manual.



WARNING

Failure to read and understand the information provided in this manual may result in personal injury or death, damage to the product, or product failure. Please read each section in its entirety and be sure you understand the information provided in the section and related sections before attempting any of the procedures or operations given.

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PRECAUTIONS

This section provides general precautions for using the Programmable Controller (PLC) and related devices.

The information contained in this section is important for the safe and reliable application of the Programmable Controller. You must read this section and understand the information contained before attempting to set up or operate a PLC system.

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1 Intended Audience

This manual is intended for the following personnel, who must also have good understanding of ISaGRAF operation and knowledge of electrical systems (an electrical engineer or the equivalent).

- Personnel in charge of installing FA systems.
- Personnel in charge of designing FA systems.
- Personnel in charge of managing FA systems and facilities.

2 General Precautions

The user must operate the product according to the performance specifications described in the operation manuals.

Before using the product under conditions which are not described in the manual or applying the product to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, and other systems, machines, and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative.

Make sure that the ratings and performance characteristics of the product are sufficient for the systems, machines, and equipment, and be sure to provide the systems, machines, and equipment with double safety mechanisms.

This manual provides information for programming and operating the Open PLC. Be sure to read this manual before attempting to use the Unit and keep this manual close at hand for reference during operation.

 **WARNING** It is extremely important that a PLC and all PLC Units be used for the specified purpose and under the specified conditions, especially in applications that can directly or indirectly affect human life. You must consult with your OMRON representative before applying a PLC System to the above-mentioned applications.

3 Safety Precautions

 **WARNING** Do not attempt to disassemble, repair, or modify any Units. Any attempt to do so may result in malfunction, fire, or electric shock.

 **WARNING** Do not touch any of the terminals or terminal blocks while the power is being supplied. Doing so may result in electric shock.

 **WARNING** Never short-circuit, charge, disassemble, apply pressure to cause deformation, nor dispose of in fire the lithium battery of the Memory Card. Doing any one of these may cause bursting, fire, or liquid leakage.

4 Operating Environment Precautions

 **Caution** Do not operate the control system in the following places:

- Locations subject to direct sunlight.
- Locations subject to temperatures outside the range of 0 to 50°C for the C200PC-CPU01-R(-V1) CPU Unit without a fan and the C200PC-CPU15-G CPU Unit, or 0 to 55°C for the C200PC-CPU01-R CPU Unit with a fan.

- Locations subject to condensation as a result of severe changes in temperature.
- Locations with a relative humidity outside the range of 10% to 90%.
- Locations subject to corrosive or flammable gases.
- Locations subject to dust (especially iron dust) or salts.
- Locations subject to exposure to water, oil, or chemicals.
- Locations subject to shock or vibration.

 **Caution** Take appropriate and sufficient countermeasures when installing systems in the following locations:

- Locations subject to static electricity or other forms of noise.
- Locations subject to strong electromagnetic fields.
- Locations subject to possible exposure to radioactivity.
- Locations close to power supplies.

 **Caution** The operating environment of the PC System can have a large effect on the longevity and reliability of the system. Improper operating environments can lead to malfunction, failure, and other unforeseeable problems with the PC System. Be sure that the operating environment is within the specified conditions at installation and remains within the specified conditions during the life of the system.

5 Application Precautions

Observe the following precautions when using the PLC System.

 **WARNING** Always heed these precautions. Failure to abide by the following precautions could lead to serious or possibly fatal injury.

- Always connect to a class-3 ground (to 100 Ω or less) when installing the Units. Not connecting to a class-3 ground may result in electric shock.
- Always turn off the power supply to the PLC before attempting any of the following. Not turning off the power supply may result in malfunction or electric shock.
 - Mounting or dismounting Power Supply Unit, I/O Units, CPU Units, Memory Cassettes, or any other Units.
 - Assembling the Units.
 - Setting DIP switches or rotary switches
 - Connecting or wiring the cables.
 - Connecting or disconnecting the connectors
 - Replacing the fan unit or removing the fan.

 **Caution** Execute online edit only after confirming that no adverse effects will be caused by extending the cycle time. Otherwise, the input signals may not be readable.

 **Caution** Confirm safety at the destination node before transferring a program to another node or changing the I/O memory area. Doing either of these without confirming safety may result in injury.

-  **Caution** Observe the environmental conditions specified, such as operating ambient temperature, when using the PC Cards. For details of these environmental conditions, refer to the applicable PC Card maker.
-  **Caution** Observe the following precautions when inserting and removing PC Cards.
- Allow a minimum of 10 seconds between removing and inserting a PC Card. Do not remove the PC Card for a minimum of 10 seconds after inserting it and do not insert a card for a minimum of 10 seconds after removing it. Failure to observe this precaution may result in data being lost or the Open PLC not operating.
 - Do not remove the PC Card while it is being accessed, i.e., while the CARD 1 or CARD 2 indicator is lit.
-  **Caution** Tighten the screws on the terminal block of the AC Power Supply Unit to the torque specified in the operation manual. The loose screws may result in burning or malfunction.
-  **Caution** Inspect the fan periodically. Breakdown of the fan may result in burning or malfunction.
-  **Caution** Failure to abide by the following precautions could lead to faulty operation of the PLC or the system, or could damage the PLC or PLC Units. Always heed these precautions.
- Fail-safe measures must be taken by the customer to ensure safety in the event of incorrect, missing, or abnormal signals caused by broken signal lines, momentary power interruptions, or other causes.
 - Interlock circuits, limit circuits, and similar safety measures in external circuits (i.e., not in the Programmable Controller) must be provided by the customer.
 - Always use the power supply voltage specified in the operation manuals. An incorrect voltage may result in malfunction or burning.
 - Take appropriate measures to ensure that the specified power with the rated voltage and frequency is supplied. Be particularly careful in places where the power supply is unstable. An incorrect power supply may result in malfunction.
 - Install external breakers and take other safety measures against short-circuiting in external wiring. Insufficient safety measures against short-circuiting may result in burning.
 - Do not apply voltages to the Input Units in excess of the rated input voltage. Excess voltages may result in burning.
 - Do not apply voltages or connect loads to the Output Units in excess of the maximum switching capacity. Excess voltage or loads may result in burning.
 - Disconnect the functional ground terminal when performing withstand voltage tests. Not disconnecting the functional ground terminal may result in burning.
 - Check polarities and orientation when connecting connectors or terminal blocks. Not doing so may result in malfunction.
 - Install the Unit properly as specified in the operation manual. Improper installation of the Unit may result in malfunction.
 - Be sure that the correct connectors are used.
 - Be sure that all the mounting screws, terminal screws, and cable connector screws are tightened to the torque specified in the relevant manuals. Incorrect tightening torque may result in malfunction.

- Leave the label attached to the Unit when wiring. Removing the label may result in malfunction.
- Remove the label after the completion of wiring to ensure proper heat dissipation. Leaving the label attached may result in malfunction.
- Use crimp terminals for wiring. Do not connect bare stranded wires directly to terminals. Connection of bare stranded wires may result in burning.
- Double-check all the wiring before turning ON the power supply. Incorrect wiring may result in burning.
- Mount the Unit only after checking the terminal block completely.
- Be sure that the terminal blocks, Memory Units, expansion cables, and other items with locking devices are properly locked into place. Improper locking may result in malfunction.
- Check the user program for proper execution before actually running it on the Unit. Not checking the program may result in an unexpected operation.
- Confirm that no adverse effect will occur in the system before attempting any of the following. Not doing so may result in an unexpected operation.
 - Changing the operating mode of the PLC.
 - Force-setting/force-resetting any bit in memory.
 - Changing the present value of any word or any set value in memory.
- Resume operation only after transferring to the new CPU Unit the contents of the DM and HR Areas required for resuming operation. Not doing so may result in an unexpected operation.
- Do not pull on the cables or bend the cables beyond their natural limit. Doing either of these may break the cables.
- Do not place objects on top of the cables. Doing so may break the cables.
- When replacing parts, be sure to confirm that the rating of a new part is correct. Not doing so may result in malfunction or burning.
- Before touching the Unit, be sure to first touch a grounded metallic object in order to discharge any static built-up. Not doing so may result in malfunction or damage.
- Do not pull out the PC card or turn OFF the power supply while accessing the PC card (while the indicator is ON). Doing so may result in malfunction.
- Secure the PC card in place with the PC card slot cover so that the PC card will not come out during operation. Not doing so may result in malfunction.
- Do not turn OFF the power supply while writing to the built-in flash disk, etc. Turning OFF the power supply may damage the file being written.

6 EC Directives

Open PLCs that meet EC Directives must be installed as follows:

- 1, 2, 3... 1. Open PLCs are designed for installation inside control panels. All Open PLCs must be installed within control panels. Use a closed steel control panel that has been grounded.
2. Use reinforced insulation or double insulation for the DC power supplies used for the communications power supply, internal circuit power supply, and the I/O power supplies.
3. Open PLCs that meet EC Directives also meet the Common Emission Standard (EN50081-2). When Open PLCs are built into equipment, however, the measures necessary to ensure that the standard is met will vary with the overall configuration of the control panel, the other devices connected to the control panel, and other conditions. You must therefore confirm that EC Directives are met for the overall machine or device.

Reduce noise by wiring the control panel with as thick and short electric lines as possible and grounding to 100 Ω min.

SECTION 1

Features and System Configuration

This section describes the features and the system configuration of an Open PLC.

1-1	Features	2
1-2	System Configuration	3

1-1 Features

The C200PC-CPU01-R(-V1) and C200PC-CPU15-G(-V1) Open PLCs have the following features.

ISaGRAF Target Software PLCs (IEC1131-3)

The Open PLC supports ISaGRAF Target Software conforming to IEC1131-3 and can be programmed in SFC (Sequential Function Chart), LD (Ladder Diagram), IL (Instruction List), ST (Structured Text), and FBD (Function Block Diagram) using program development tools (ISaGRAF Workbench made by CJ International).

C200H I/O Units and Backplanes

OMRON C200H I/O Units mounted to Backplanes and Expansion Backplanes can be controlled from the Software PLC (ISaGRAF Target Software) running on the Open PLC.

CompoBus/D and Other Remote I/O

The Open PLC supports CompoBus/D Master Units, CompoBus/S Master Units, etc. Message communications in CompoBus/D Systems, however, are not supported.

RAS Functions

The same RAS functions are supported as for the C200HX/HG/HE PLCs.

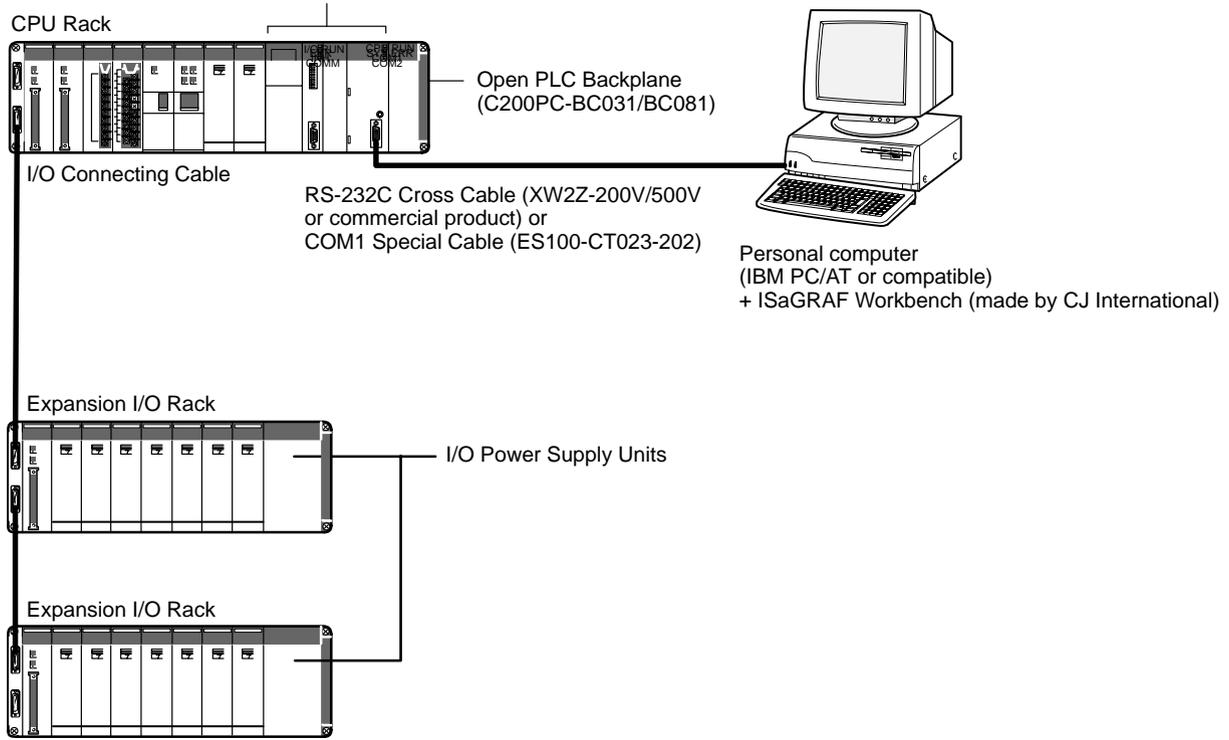
High Speed and Large Capacity

The C200PC-CPU15-G(-V1) has a built-in high-speed CPU, large-capacity main memory, VGA port, and printer port. Refer to *2-1 C200PC-CPU01-R(-V1)/CPU15-G(-V1) Open PLC* for differences between C200PC-CPU01-R(-V1) and C200PC-CPU15-G(-V1).

1-2 System Configuration

The following example illustrates the system configuration of an Open PLC.

C200PC-CPU01-R(-V1)/CPU15-G(-V1) Open PLC
+ C200PC-TG001-EF2 ISaGRAF Target Software



- A maximum of two Expansion I/O Racks can be connected.
- The CPU Rack in the above example uses a C200PC-BC081 8-slot Open PLC Backplane.

SECTION 2

Components

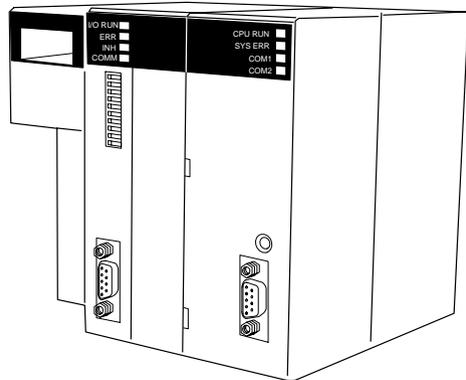
This section describes the components of the C200PC-CPU01-R and C200PC-CPU15-G Open PLCs, ISaGRAF Target Software, and C200PC-PCM01 PC Card Board, and explains simply their functions. The C200H Units that can be used with an Open PLC are listed in 2-5 *Applicable Units*. Refer to this section when purchasing Units.

2-1	Open PLC CPU Units	6
2-2	Open PLC Backplanes	7
2-3	ISaGRAF Target Software	8
2-4	PC Card Board	9
2-5	Applicable Units	9

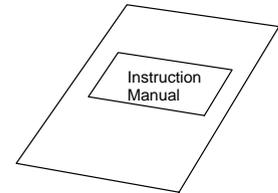
2-1 Open PLC CPU Units

This section shows the C200PC-CPU01-R(-V1) and C200PC-CPU15-G(-V1) Open PLC CPU Unit components.

C200PC-CPU01-R(-V1) Open PLC CPU Unit



C200PC-CPU01-R(-V1) Open PLC CPU Unit



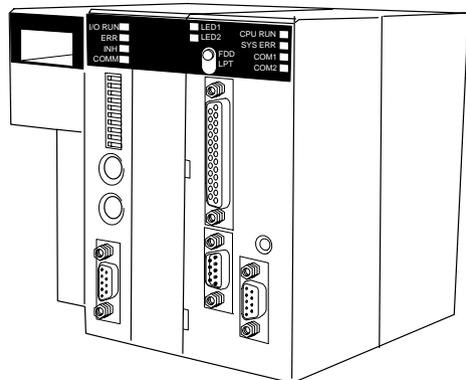
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Main Specifications

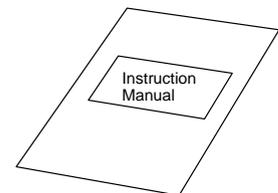
Model	CPU	Main memory	VGA board	Printer port
C200PC-CPU01-R	486DX2-50MHz	4 MB	None	None
C200PC-CPU01-R-V1	Am486DX2-66MHz	16 MB	None	None

Note Refer to *Section 4 Setup* for detailed specifications.

C200PC-CPU15-G Open PLC CPU Unit



C200PC-CPU15-G(-V1) Open PLC CPU Unit



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Main Specifications

Model	CPU	Main memory	VGA board	Printer port
C200PC-CPU15-G	486DX4-100MHz	36 MB	Included	Included
C200PC-CPU15-G-V1	Am5X86-133MHz	32 MB	Included	Included

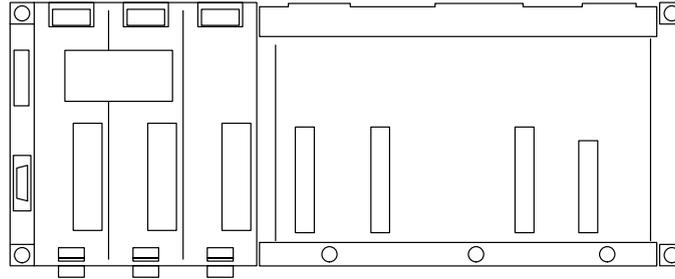
Note Refer to *Section 4 Setup* for detailed specifications.

2-2 Open PLC Backplanes

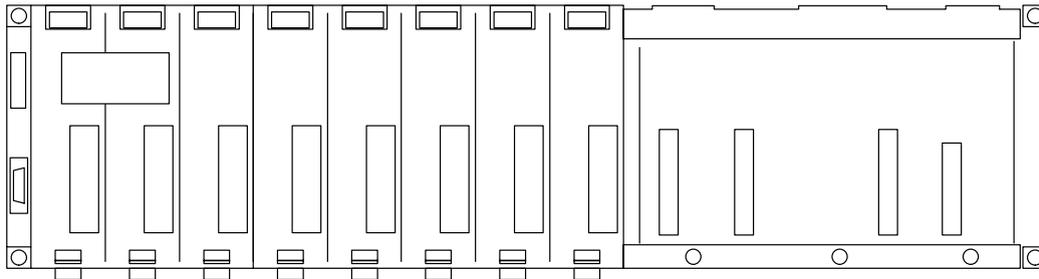
This section shows the components of the C200PC-BC031/BC081 Open PLC Backplane.

Note The Open PLC CPU Unit can be mounted only to a C200PC-BC031/BC081 Open PLC Backplane. CPU Units other than the Open PLC CPU Unit cannot be mounted to the C200PC-BC031/BC081 Open PLC Backplane.

C200PC-BC031 3-slot Open PLC Backplane



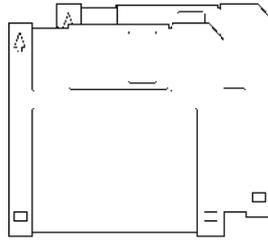
C200PC-BC081 8-slot Open PLC Backplane



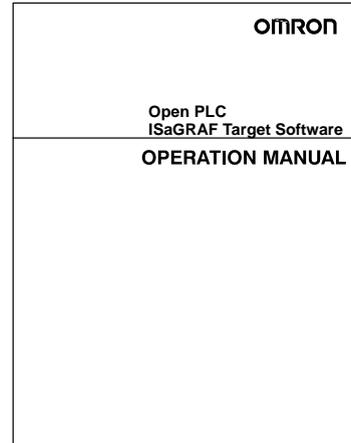
2-3 ISaGRAF Target Software

This section shows the C200PC-TG001-EF2 ISaGRAF Target Software components.

Note An Open PLC and the ISaGRAF Workbench (made by CJ International) are required to use ISaGRAF Target Software. Please be sure you have these products.



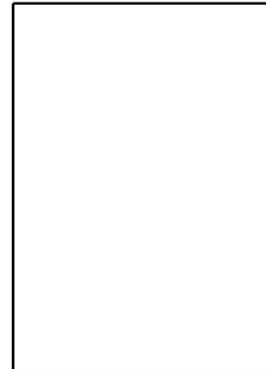
Install disks (two)



Manual



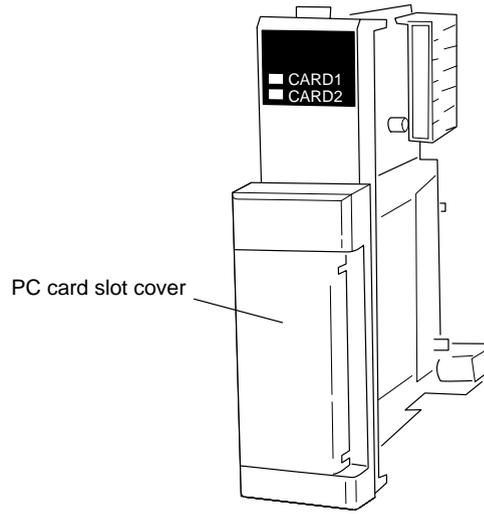
License seal



Software licensing agreement

2-4 PC Card Board

This section shows the C200PC-PCM01 PC Card Board components.



Note Refer to *Section 9 PC Card* for PC Card Board application.

2-5 Applicable Units

The C200H Units that can be used with the Open PLC are shown below.

Power Supply Units

Model	Power supply voltage	Remarks
C200HW-PA204	100 to120 VAC 200 to 240 VAC	---
C200HW-PA204S	100 to120 VAC 200 to 240 VAC	With 24-VDC service power supply.
C200HW-PA204R	100 to120 VAC 200 to 240 VAC	With RUN output contacts.
C200HW-PD024	24 VDC	---

I/O Backplanes

Model	No. of I/O slots
C200HW-BI031	3
C200HW-BI051	5
C200HW-BI081	8
C200HW-BI101	10

I/O Connecting Cables

Model	Cable length
C200H-CN311	30 cm
C200H-CN711	70 cm
C200H-CN221	2 m
C200H-CN521	5 m
C200H-CN131	10 m

Note The maximum cable length is 12 m.

I/O Units

Name	Model
AC Input Units	C200H-IA□□
DC Input Units	C200H-ID□□
AC/DC Input Units	C200H-IM□□
Relay Output Units	C200H-OC□□
Triac Output Units	C200H-OA□□
Transistor Output Units	C200H-OD□□
Analog Timer Unit	C200H-TM001

B7A Interface Units

Name	Model
Normal B7A Interface Units	C200H-B7A□□
Group-2 B7A Interface Units	C200H-B7A□□

High-density I/O Units

Name	Model
Group-2 High-density I/O Units	C200H-ID□□, C200H-OD□□
High-density I/O Unit classified as Special I/O Units	C200H-ID□□, C200H-OD□□, C200H-MD□□

Special I/O Units

Name	Model
Temperature Control Units	C200H-TC□□□
Heat/Cool Temperature Control Units	C200H-TV□□□
Temperature Sensor Units	C200H-TS□□□
PID Control Units	C200H-PID□□
Cam Positioner Unit	C200H-CP114
Analog Input Units	C200H-AD□□□
Analog Output Units	C200H-DA□□□
Motion Control Unit	C200H-MC221
Position Control Units	C200H-NC□□□
ID Sensor Units	C200H-IDS□□
Voice Unit	C200H-OV001
Fuzzy Logic Units	C200H-FZ001

Note Unit functions requiring IORD or IOWR instructions cannot be used.

Communications Units

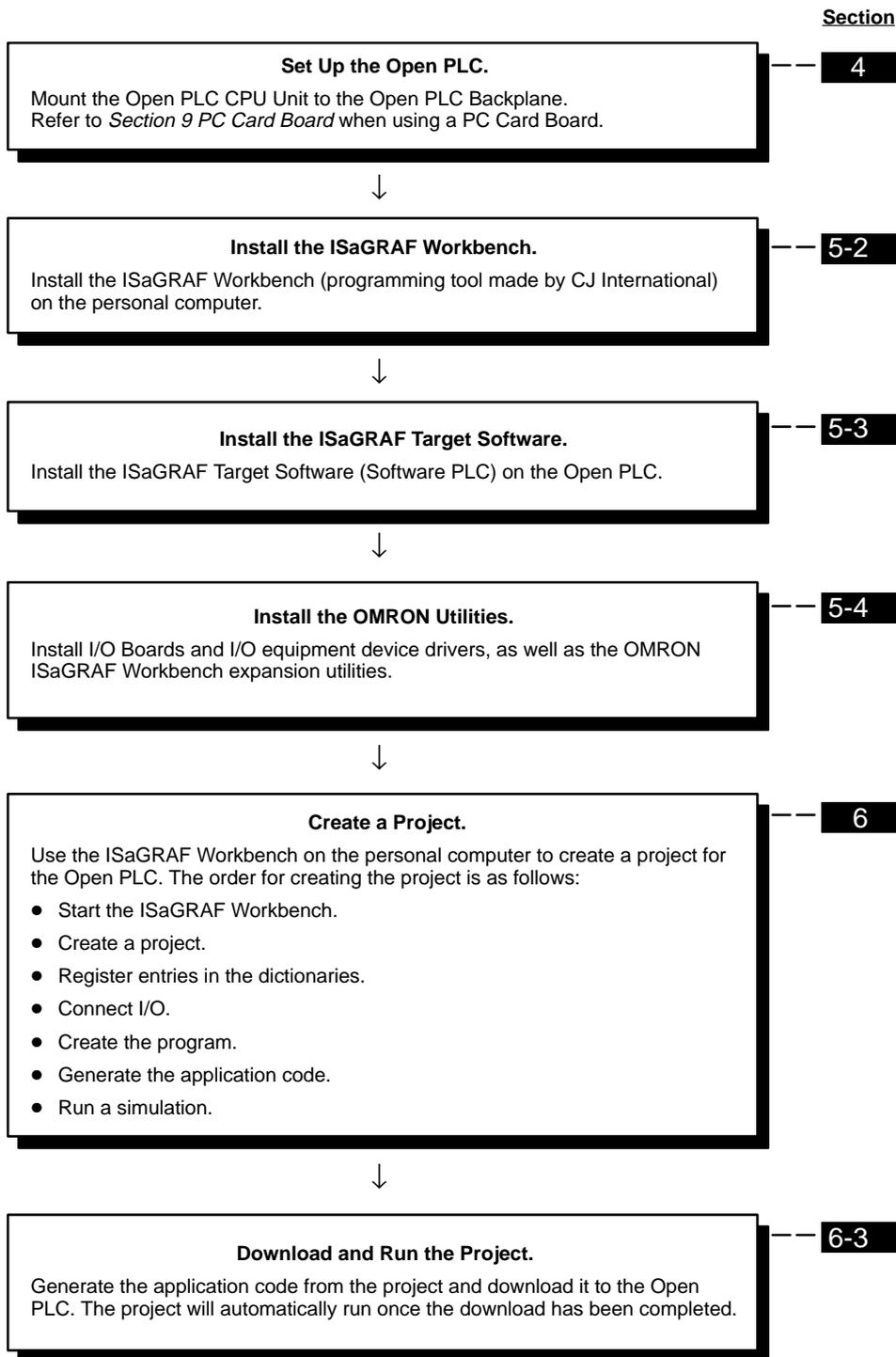
Name	Model
Host Link Units	C200H-LK□□□
CompoBus/D Master Unit	C200HW-DRM21-V1
CompoBus/S Master Unit	C200HW-SRM21
Remote I/O Master Units	C200H-RM□□□
PC Link Unit	C200H-LK401

SECTION 3

Preparing for Operation: Overview

This section provides an overview of the Open PLC from setup to operation, and provides references to relevant sections. Read this section before setting or programming an Open PLC.

This page provides an overview of the Open PLC from setup to operation, and provides references to relevant sections. The basic procedure is as follows:



SECTION 4

Setup

This section describes the name and function of each part of an Open PLC, and describes how to set up an Open PLC.

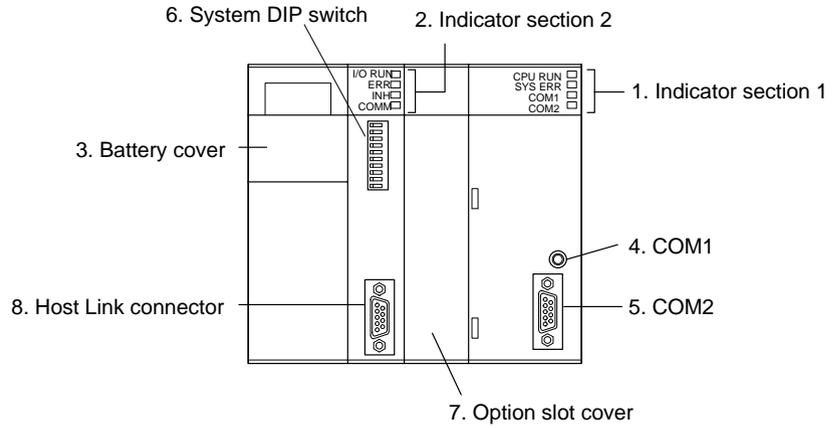
4-1	Component Names and Functions	14
4-1-1	Front Panel	14
4-1-2	Rear Panel	15
4-1-3	Indicators	16
4-2	Hardware Settings	19
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4-1 Component Names and Functions

This section describes the name and function of each part of the Open PLC.

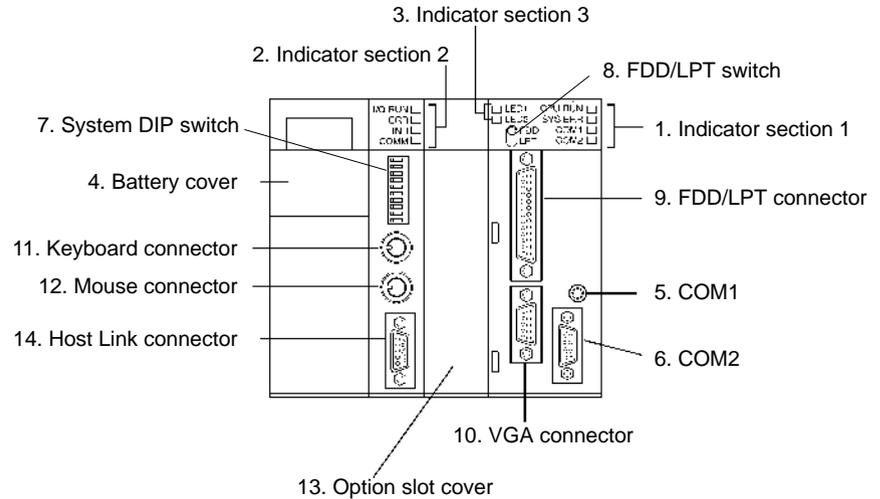
4-1-1 Front Panel

C200PC-CPU01-R(-V1) CPU Unit



No.	Component	Function	Page
1.	Indicator section 1	Shows the status of the Open PLC.	16
2.	Indicator section 2	Shows the status of the Open PLC.	17
3.	Battery cover	Houses the backup batteries.	90
4.	COM1	Serial communications port 1. Special 3-pin connector.	103
5.	COM2	Serial communications port 2. D-sub 9-pin male connector.	103
6.	System DIP switch	For Open PLC system settings.	19
7.	Option slot cover	Remove when mounting the PC Card Board.	83
8.	Host Link connector	Not normally used.	---

C200PC-CPU15-G(-V1) CPU Unit

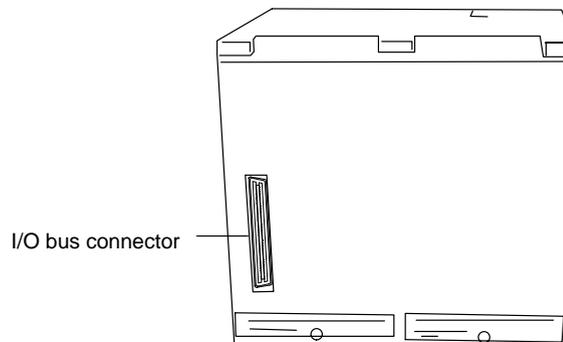


No.	Component	Function	Page
1.	Indicator section 1	Shows the status of the Open PLC.	16
2.	Indicator section 2	Shows the status of the Open PLC.	17
3.	Indicator section 3	User programmable.	18
4.	Battery cover	Houses the backup batteries.	90
5.	COM1	Serial communications port 1. Special 3-pin connector.	103
6.	COM2	Serial communications port 2. D-SUB 9-pin male connector.	103
7.	System DIP switch	For Open PLC system settings.	19
8.	FDD/LPT switch	Switches between floppy disk drive and printer.	---
9.	FDD/LPT connector	Connects floppy disk drive or printer. (See note.)	106 and 107
10.	VGA connector	Connects the VGA.	104
11.	Keyboard connector	Connects the keyboard.	105
12.	Mouse connector	Connects the mouse.	105
13.	Option slot cover	Remove when attaching the PC Card Board.	83
14.	Host Link connector	Not normally used.	---

Note A gender changer is required to connect a floppy disk drive. Refer to *Floppy Disk Drive Interface* under *Connector Specifications* in *Appendix B*.

4-1-2 Rear Panel

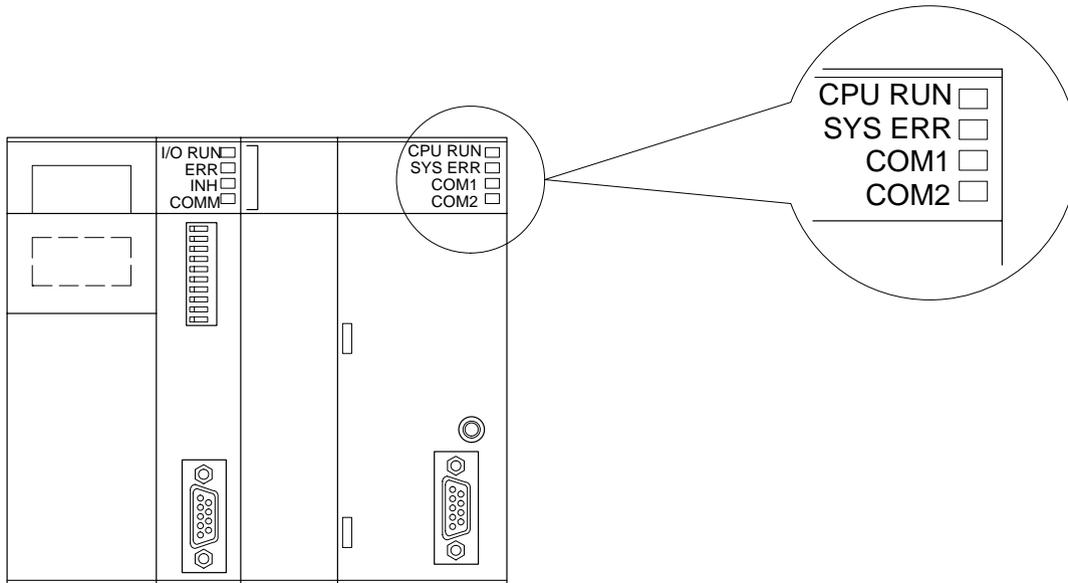
The rear panels are the same for both the C200PC-CPU01-R(-V1) and C200PC-CPU15-G(-V1) CPU Units.



4-1-3 Indicators

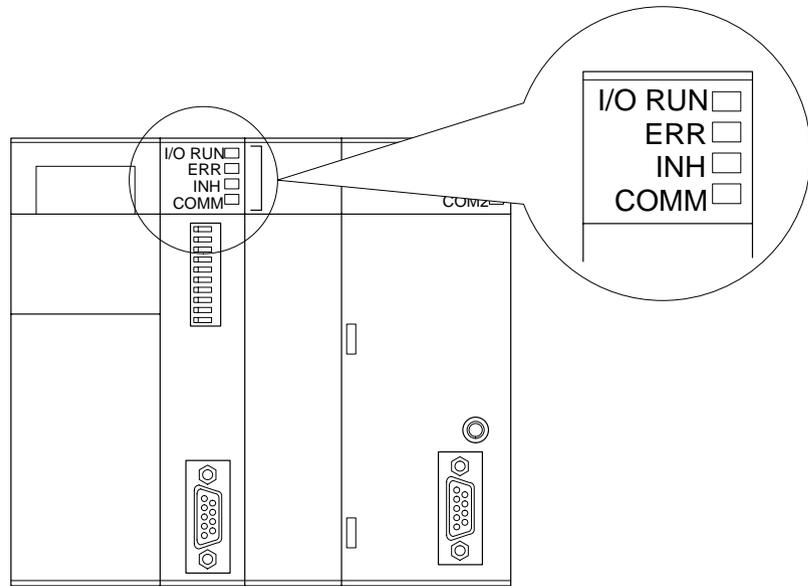
The operating status of the Open PLC is shown on the indicators. Refer to 11-2 *Indicators* for information on troubleshooting.

Indicator Section 1



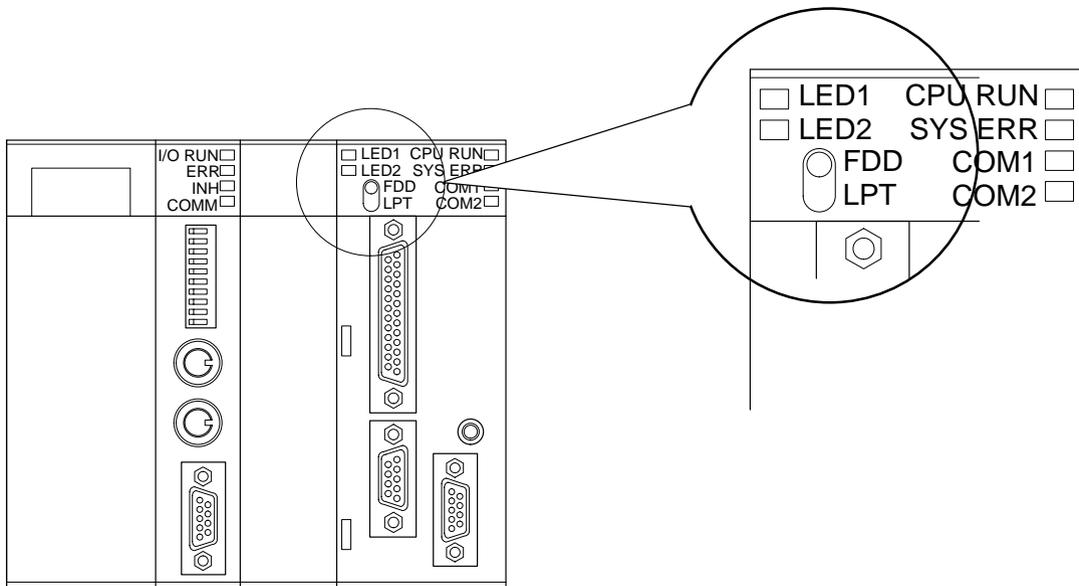
Label	Color	Description
CPU RUN	Green	Lit during normal PLC operation.
SYS ERR	Red	Lit when an error occurs.
COM1	Orange	Flashes when communicating with devices connected to serial communications port 1 (COM1).
COM2	Orange	Flashes when communicating with devices connected to serial communications port 2 (COM2).

Indicator Section 2



Display Item	Color	Description
I/O RUN	Green	Lit when ISaGRAF user program is being executed.
ERR	Red	Flashes when nonfatal error is detected through diagnosis. Lit when fatal error is detected through diagnosis and operation stops. The I/O RUN indicator will go out and all outputs from the Output Units will be turned OFF.
INH	Orange	Lit when the Output OFF Bit is ON. All outputs from the Output Unit will be OFF when this indicator is ON.
COMM	Orange	For future expansion.

Indicator Section 3



Display Item	Color	Description
LED1	Orange	Used with the user program. Refer to <i>Using the I/O Registers</i> in Appendix C.
LED2	Orange	

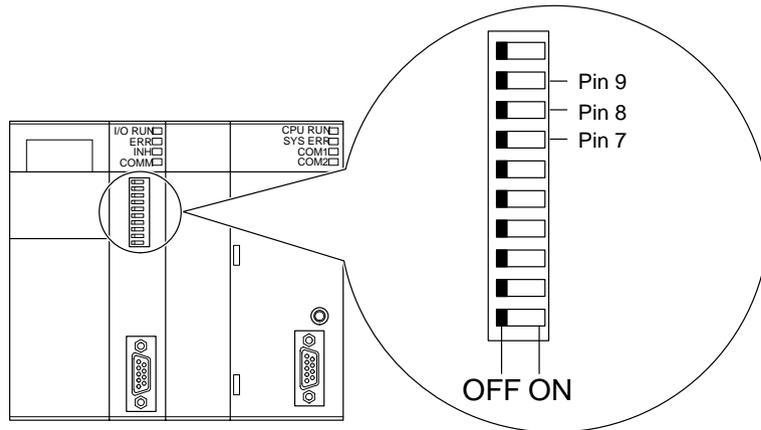
Note Refer to 9-1 Outline for PC Card Board indicators.

4-2 Hardware Settings

The system settings for the Open PLC are made using the system DIP switch described in this section.

4-2-1 Installation and Operation of ISaGRAF Target Software

These settings are the same for both the C200PC-CPU01-R(-V1) and C200PC-CPU15-G(-V1) CPU Units. The Open PLC system settings are made using pins 7, 8, and 9.



Use the following settings:

Purpose	Settings
Running ISaGRAF Target Software	
Installing ISaGRAF Target Software using COM1	
Installing ISaGRAF Target Software using COM2	

- Pins 1 to 6, and 10 on the C200PC-CPU01-R(-V1) CPU Unit are reserved. Leave these pins turned OFF.
- Refer to the next section, *4-2-2 C200PC-CPU15-G(-V1) System Settings*, for other system settings for the C200PC-CPU15-G(-V1) CPU Unit.

Note When system DIP switch settings have been changed, the Unit will reset automatically the next time it is started to change the internal settings.

4-2-2 C200PC-CPU15-G (-V1) System Settings

The system settings shown below can be made for the C200PC-CPU15-G(-V1) CPU Unit in addition to those outlined in the last section.

- Standard I/O setting
- Startup method
- Floppy disk drive enable setting
- Configuration disable

Each of these settings is explained in this section.

Standard I/O Setting

The standard I/O setting is made on pins 7 and 8.

Pin 7	Pin 8	Standard I/O device	Remarks
OFF	OFF	None	---
OFF	ON	COM1	9,600 bps, 8-bit data, no parity, 1 stop bit
ON	OFF	COM2	9,600 bps, 8-bit data, no parity, 1 stop bit
ON	ON	Keyboard + VGA monitor	---

Startup Settings

The startup method is set on pin 4.

Pin 4	Settings
OFF	Starts internal MS-DOS.
ON	Starts OS from PCMCIA card.

Refer to *9-4 Boot Drive Settings* for drive configurations.

Floppy Disk Drive Enable Setting

Enable the setting for floppy disk drives on CMOS RAM by turning ON pin 6. This setting is for both the A and B drives. By using pin 6, the setting for floppy disk drives on CMOS RAM can be enabled/disabled without starting the BIOS setup.

The drives are for 3.5-inch, 1.44-MB floppy disks. The contents of CMOS RAM does not change when pin 6 is turned OFF and the current setting is retained.

Pin 6	Settings	Remarks
OFF	-	Retains current settings.
ON	FDD enabled	3.5 inch, 1.44 MB (A and B)

Floppy Disk Drive Settings

Make the settings for the floppy disk drives by starting the internal MS-DOS on the Open PLC, and using FDDSETP.EXE. The settings will be enabled when pin 6 is OFF.

- 1, 2, 3...**
1. Connect to the Open PLC using terminal software (e.g., Hyperterminal.)
 2. Turn OFF pin 4 and turn ON pin 9 on the Open PLC system DIP switch.
 3. Restart the Open PLC. A prompt (C:/>) will appear on the terminal screen if the internal MS-DOS has started correctly.
 4. Change the settings after inputting **FDDSETP** and pressing Enter.
Example: The following example shows setting A drive to 720 KB and B drive to 1.44 MB.

```
C:\FDDSETP
FDDSETUP Ver 2.00
Current FDD type
Disk-A:1.44MB drive
```

```
Disk-B:1.44MB drive

0 .... No drive
1 .... 720KB
2 .... 1.44MB
Input drive new type(Return only is no change)
A: ?1
B: ?2

C:\>
```

5. Restart the Open PLC.

- Note**
1. The B drive does not accept 720-KB floppy disks.
 2. Setting changes will not become effective if pin 6 is ON, even if setting changes are made using FDDSETP.EXE.
 3. If pin 6 is set to ON and the system disk is inserted into the floppy disk drive, the floppy disk drive will take priority over the internal MS-DOS and PCMCIA card.

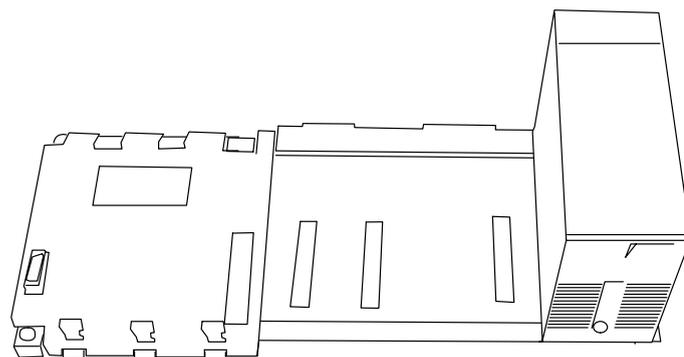
Disabling the Configuration

If pin 9 is turned ON, the internal MS-DOS on the Open PLC will start without processing CONFIG.SYS or AUTOEXEC.BAT. Be sure to turn OFF pin 9 when using other operating systems. (This pin will be disabled if standard I/O is not available.)

Pin 9	Settings
OFF	Configuration enabled.
ON	Configuration disabled.

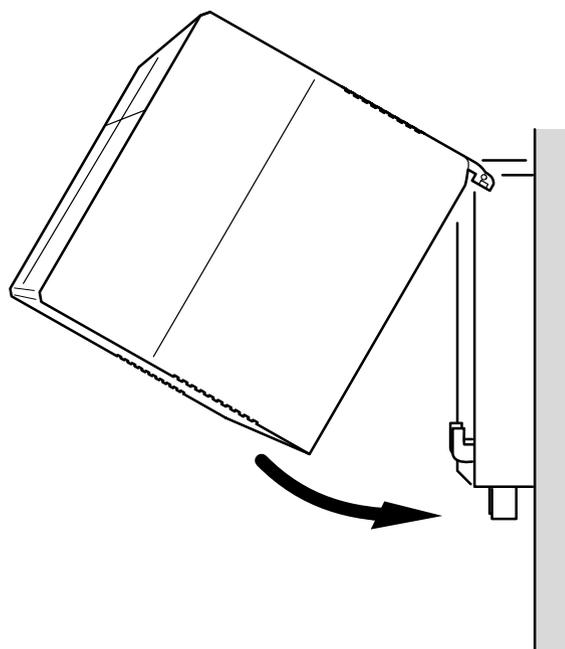
4-3 Mounting to the Backplane

This section describes how to mount the Open PLC to the Open PLC Backplane. The Open PLC CPU Unit is mounted to the left of the Power Supply Unit.

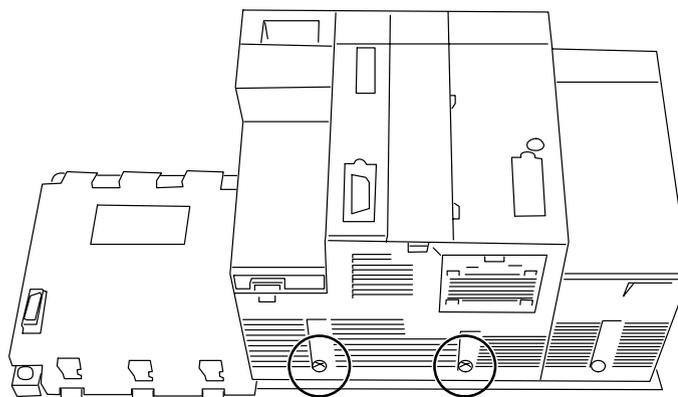


CPU Unit mounting slot

- 1, 2, 3... 1. Hook the upper back side of the Open PLC CPU Unit to the Backplane as shown in the following diagram.



2. Rotate the CPU Unit downward and insert the connector on the back of the CPU Unit securely into the connector on the Open PLC Backplane.
3. Tighten the two screws to secure the CPU Unit to the Open PLC Backplane.



SECTION 5

Installation

This section describes the installation procedures for ISaGRAF Target Software and OMRON Utilities (including I/O Boards), connecting the cable between the personal computer and the Open PLC, and setting the Open PLC system DIP switch.

5-1	Installation Summary	24
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5-3	ISaGRAF Target Software Installation	24
5-3-1	Outline	24
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5-3-4	File Transfer	25
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5-1 Installation Summary

The following software must be installed before the Open PLC can be used.
Refer to the relevant sections and install each of the following pieces of software.

Installation item	Details	Install to	Section
ISaGRAF Workbench	Programming tool	Personal computer	5-2
ISaGRAF Target Software	Software PLC (Runtime)	Open PLC	5-3
I/O Boards and I/O equipment	Device drivers	Personal computer	5-4
OMRON utilities	OMRON utilities used with the ISaGRAF Workbench	Personal computer	5-4

5-2 ISaGRAF Workbench Installation

Refer to the manual for the ISaGRAF Workbench when installing the ISaGRAF Workbench.

Note The ISaGRAF Workbench (made by CJ International) is required to use the ISaGRAF Target Software. Please be sure you have the ISaGRAF Workbench.

5-3 ISaGRAF Target Software Installation

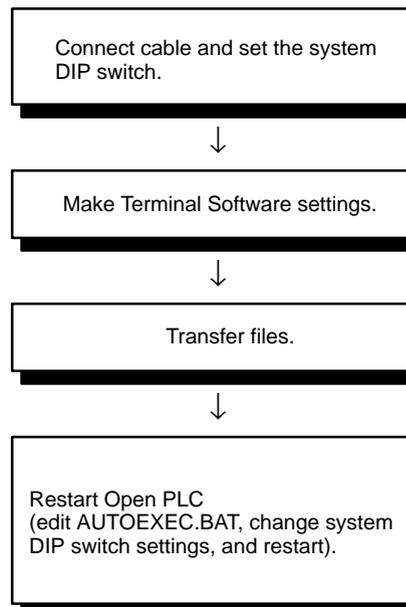
This section explains the installation procedure for ISaGRAF Target Software.

5-3-1 Outline

The following personal computer and connection cable are required to install the ISaGRAF Target Software in the Open PLC.

- IBM PC/AT or compatible personal computer needed to operate Terminal Software (e.g., Hyperterminal) that can use Z modem protocol.
- RS-232C Cross Cable for COM2 (XW2Z-200V/500V or commercial product) or COM1 Special Cable (ES100-CT023-202.)
- The ISaGRAF Target Software files are in the TARGET directory of the "Install Disk (2)."

Install the ISaGRAF Target Software in the following order:



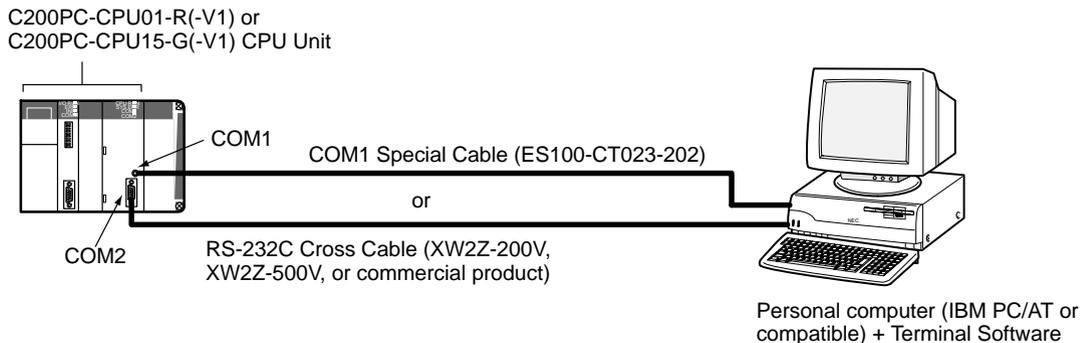
5-3-2 Cable Connections and System DIP Switch Settings

This section explains how to connect the cable to the personal computer and the Open PLC, and how to make the Open PLC system DIP switch settings.

Note Make sure the power supply to the personal computer and the Open PLC are OFF before connecting the cable or making the system DIP switch settings.

Connecting the Cable

- 1, 2, 3... 1. First, determine the communications port on the Open PLC to be used for installation (COM1 or COM2.)
2. Connect the COM1 or COM2 port on the Open PLC to the communications port on the personal computer using a COM1 Special Cable or an RS-232C Cross Cable.



System DIP Switch Settings

Turn ON the system DIP switch pins 8 and 9 if connecting the cable to COM1 on the Open PLC. Turn ON pins 7 and 9 if connecting the cable to COM2.

Refer to 4-2 *Hardware Settings* for details on system DIP switch settings.

5-3-3 Terminal Software Settings

Start the Terminal Software (e.g., Hyperterminal) at the following settings:
9,600 bps, 8-bit data, no parity, 1 stop bit, XON/XOFF control enabled

5-3-4 File Transfer

- 1, 2, 3... 1. Turn ON the power to the Open PLC. After a short wait, a prompt will appear on the terminal screen.

```
C:\>
```

2. Input the following and press the Enter Key using the personal computer Terminal Software.

- COM1 Connection

```
C:\>F'TRANS . /R /Z /F
```

- COM2 Connection

```
C:\>F'TRANS . /R /Z /COM2 /F
```

Note Input "F'TRANS /?" and press the Enter Key. A help message will be displayed.

3. Insert the "Install Disk (2)" into the floppy disk drive.
4. Transfer the following files from the personal computer to the Open PLC using Z modem file transfer in the Terminal Software. Some Terminal Software will automatically execute the transfer program.

Note When transmitting data using the Hyperterminal, select **Transfer** and **Send File**, and then specify the following files under the **Send File** window.

```
A:\TARGET\ISA_OM.EXE
A:\TARGET\AUTOEXEC.C1
A:\TARGET\AUTOEXEC.C2
```

Note Only one file at a time can be sent using the FTRANS command. Once the transfer of one file has been completed, start the procedure from step 2 to transfer the next file.

5-3-5 Restarting the Open PLC

After all files have been transferred, perform the following operations to edit AUTOEXEC.BAT, set the system DIP switches, and restart the Open PLC.

- 1, 2, 3...** 1. Input the following and input the Enter Key using Terminal Software to edit AUTOEXEC.BAT.

- COM1 Connection

```
C:\>COPY AUTOEXEC.C1 AUTOEXEC.BAT
```

- COM2 Connection

```
C:\>COPY AUTOEXEC.C2 AUTOEXEC.BAT
```

2. Restart the Open PLC after turning OFF all the system DIP switch pins. When the Open PLC is started, it will be in standby mode waiting for a program to be downloaded from the ISaGRAF Workbench. Only the CPU RUN indicator will be lit.

5-4 Installation of OMRON Utilities

The OMRON expansion utilities and I/O Boards (device drivers) that will be used on the ISaGRAF Workbench must be installed. The I/O Boards are included with the OMRON utilities.

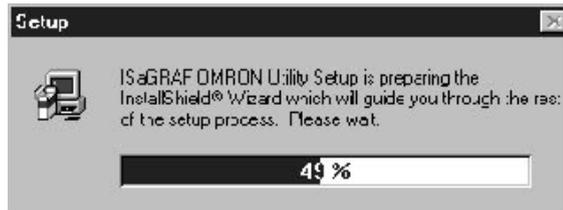
Note Be sure to install the ISaGRAF Workbench first. The OMRON utilities and I/O Boards cannot be installed if the ISaGRAF Workbench has not been installed.

- 1, 2, 3...** 1. Insert into the floppy disk drive "Install Disk (1)" supplied with the ISaGRAF Target Software.

- Open **My Computer** and then open the floppy disk. The following window will be displayed.



- Double-click on **Setup.exe**. The following window will be displayed.

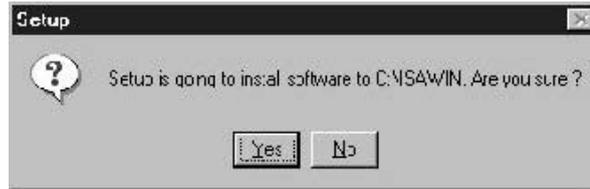


The following dialog box will be displayed after a short pause.



4. Click **Next**.

The following dialog box will be displayed to confirm installation if the ISaGRAF Workbench has been installed.

5. Click **Yes**.

- The OMRON utilities will be installed.
- According to the screen instructions, insert the "Install Disk (2)" and click **OK**.
The I/O Boards will be installed at the same time. (If I/O Boards already exist, overwrite them.)
- Click **No** to abort the installation.
- The following dialog box will be displayed once installation has been completed.

6. Click **OK**.

This completes the installation of the OMRON utilities.

When uninstalling the OMRON utilities, delete the OMRON utilities using **Add/Remove Programs** on the control panel and then delete the next file.

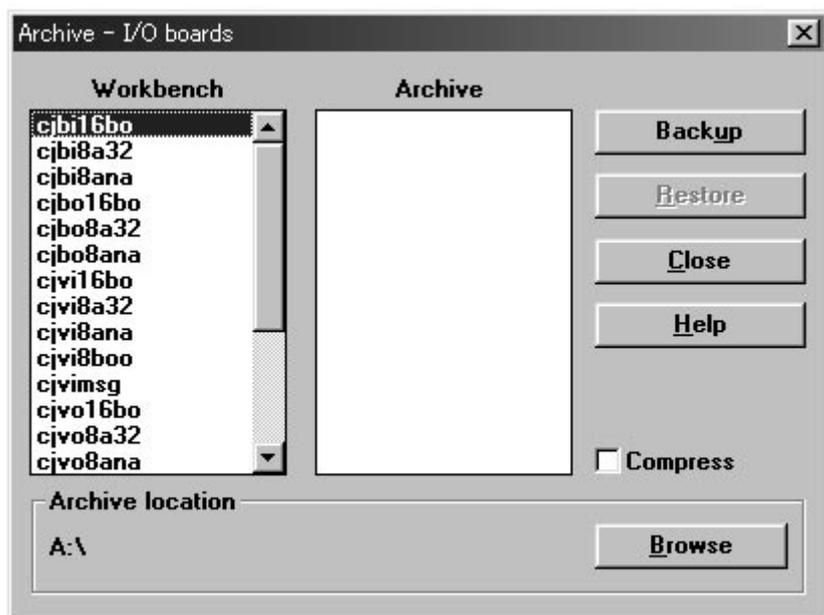
Install directory\Isawin\Com\Isa.mnu

When using Windows 98, proceed in the following way.

7. Select **Start/Program/ISaGRAF 3.3/Library** and start the **ISaGRAF-Library** window.
8. In the **ISaGRAF-Library** window, select **File/Other Library/I/O Board**.

9. Select **Tool/Archive**.

The following **Archive-I/O boards** dialog box will be displayed.

10. Click on the **List** button, then change the archive directory to "C:\isawin\ark", and click **OK**.

The screen will return to the **Archive-I/O boards** dialog box.

11. Select all the I/O boards on the **Archive** side and then click on the **Restore** button. All the I/O boards will be copied to the **Workbench** side.

SECTION 6

ISaGRAF Operation

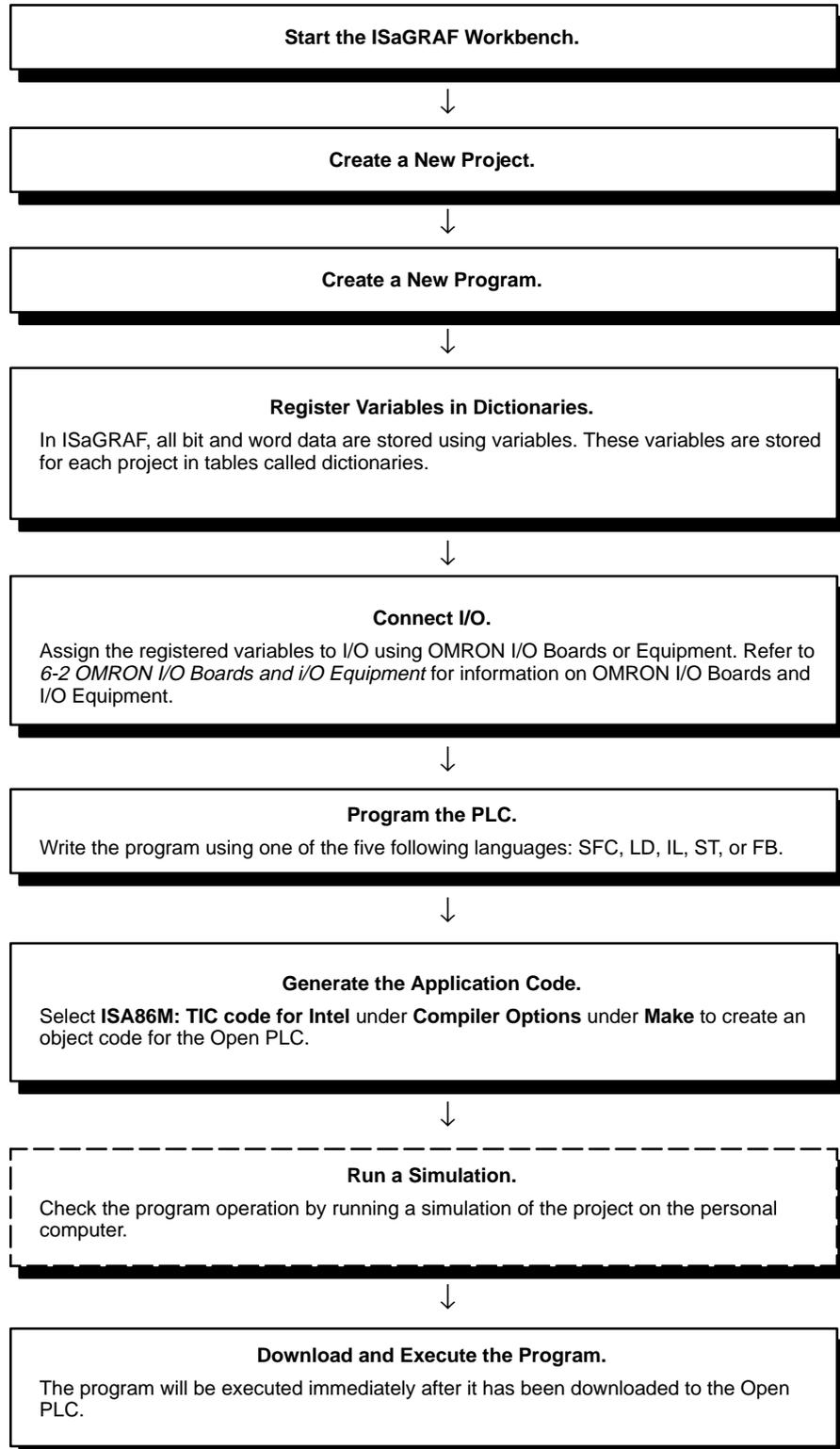
This section explains the basic operation of the ISaGRAF Workbench and OMRON I/O Boards (device drivers), and I/O equipment (drivers for multiple I/O Boards). Refer to the ISaGRAF Workbench operation manual for details on the ISaGRAF Workbench.

6-1	Outline	32
6-2	OMRON I/O Boards and I/O Equipment	34
6-2-1	Outline	34
6-2-2	List of OMRON I/O Boards and I/O Equipment	34
6-2-3	Changing I/O Parameters and Word Allocations	35
6-3	Creating a Project	37
6-3-1	The Project	37
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6-3-5	Creating a New Program	42
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6-1 Outline

This section explains the basic operation of the ISaGRAF Workbench and OMRON I/O Boards (device drivers), and I/O Equipment (device drivers that combine multiple I/O Boards). Refer to the ISaGRAF Workbench operation manual and the online documentation for details on the ISaGRAF Workbench, I/O Boards, and I/O Equipment.

The following illustration shows the procedure from creating a new project on the personal computer using the ISaGRAF Workbench through the execution of that project on the Open PLC. Each operation is explained in 6-3 *Creating Projects*.



6-2 OMRON I/O Boards and I/O Equipment

6-2-1 Outline

The I/O Board is a driver to connect the variables and the real I/O. "I/O Equipment" is a driver that combines multiple I/O Boards.

In this manual, all the memory areas shown in the following table are indicated as real I/O.

The OMRON I/O Board and I/O Equipment must be installed when installing the OMRON utilities before the set variables and the real I/O can be connected on the ISaGRAF Workbench. Refer to 5-4 *Installation of OMRON Utilities* for installation methods.

The IOM allocations for the OMRON I/O Board and I/O Equipment are the same as for the C200HX/HG/HE PLCs.

Area	Range	OMRON I/O Board and I/O Equipment
Core I/O Area	0 to 511	I/O Board for Core I/O (c200c□□□□) and I/O Equipment (c200cm32, c200cm64)
Auxiliary Relay Area (AR)	0 to 27	I/O Equipment(c200ar)
Holding Relay Area (HR)	0 to 99	I/O Equipment (c200hr)
Link Relay Area (LR)	0 to 63	I/O Equipment (c200lr)
Data Memory Area (DM)	0 to 6143	I/O Equipment (c200dm)
Special I/O Unit Area	100 to 199	I/O Equipment (c200hf)

6-2-2 List of OMRON I/O Boards and I/O Equipment

The following OMRON I/O Boards and I/O Equipment are available.

I/O Boards for Basic I/O

Name	Data type	I/O points	Direction
c200ci16	Boolean	16	Inputs
c200co16	Boolean	16	Outputs
c200ci32	Boolean	32	Inputs
c200co32	Boolean	32	Outputs
c200ci64	Boolean	64	Inputs
c200co64	Boolean	64	Outputs
c200i128	Boolean	128	Inputs
c200o128	Boolean	128	Outputs

I/O Equipment

Name	Area used	Data type	I/O points	Direction
c200cm32	Core I/O Area	Boolean	16	Inputs
		Boolean	16	Outputs
c200cm64	Core I/O Area	Boolean	32	Inputs
		Boolean	32	Outputs
c200ar	Auxiliary Relay Area	Boolean	16	Inputs
		Boolean	16	Outputs
c200hr	Holding Relay Area	Boolean	16	Inputs
		Boolean	16	Outputs
c200lr	Link Relay Area	Boolean	16	Inputs
		Boolean	16	Outputs
c200dm	Data Memory Area	Integer (word)	1	Inputs
		Integer (word)	1	Outputs
c200hf	Special I/O Unit Area	Integer (word)	10	Inputs
		Integer (word)	10	Outputs

- Note**
1. The timer, counter, and temporary variables use ISaGRAF internal variables.
 2. c200hf I/O Equipment unit numbers for Special I/O Units are set from 00 to 09. Numbers 10(A) to 15(F) are not used. The word allocations for each unit number for Special I/O Units are shown in the following table. Unit numbers are set under the I/O Equipment machine parameter.

Machine	Unit number	PLC words
0	0	100 to 109
1	1	110 to 119
2	2	120 to 129
3	3	130 to 139
4	4	140 to 149
5	5	150 to 159
6	6	160 to 169
7	7	170 to 179
8	8	180 to 189
9	9	190 to 199

6-2-3 Changing I/O Parameters and Word Allocations

The Basic I/O Board parameters shown in the following table can be changed, and the real I/O can be assigned.

Basic I/O Boards

Name	Data type	No. of I/O	Direction
c200bi16	Boolean	16	Inputs
c200bo16	Boolean	16	Outputs
c200wi1	Integer (word)	1	Inputs
c200wo1	Integer (word)	1	Outputs

Using Basic I/O Boards

- 1, 2, 3... 1. Select the I/O Board according to the data type of the area being used and the I/O direction.
2. Set the I/O Board type to between 1 and 6, according to the area being used.

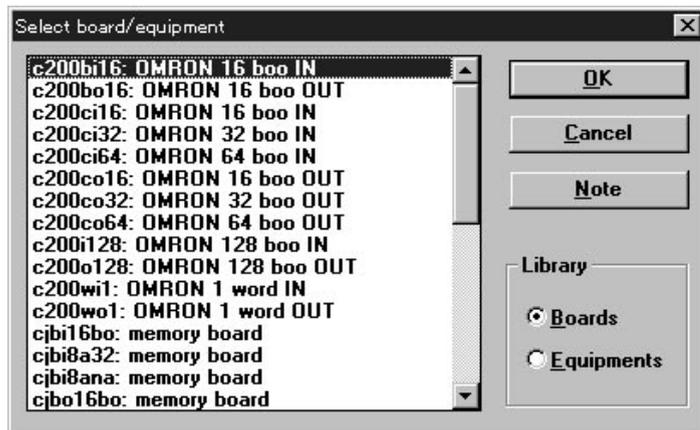
3. Set the words to be used. Refer to the following table for the possible ranges for each area.

Area	Data type	Type	Range
Core I/O Area	Boolean	1	000 to 511
Auxiliary Relay Area (AR)	Boolean	2	000 to 027
Holding Relay Area (HR)	Boolean	3	000 to 099
Link Relay Area (LR)	Boolean	4	000 to 063
Data Memory Area (DM)	Integer (word)	5	0000 to 6143
Special I/O Unit Area	Integer (word)	6	100 to 199

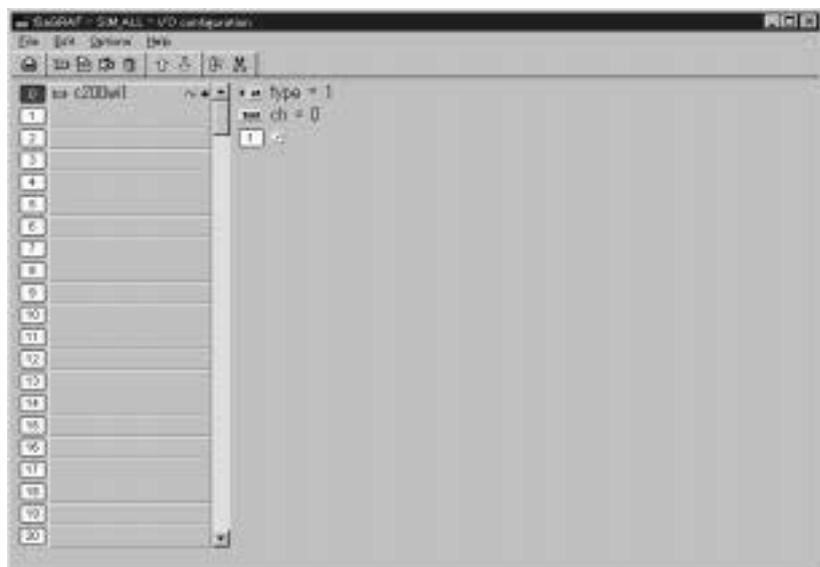
**Example:
Basic I/O Board Use**

This example shows how to change the I/O Board parameters when address 0010 in the DM area is used for input. Refer to 6-3 *Creating Projects* and the ISaGRAF Workbench operation manual for details on connecting I/O.

- 1, 2, 3... 1. Double-click an empty slot in the I/O Connection Window. The Select Board/Equipment Dialog Box will be displayed.



2. Select **c200wi1** and click **OK**. c200wi1 will be recorded in the slot as shown in the following diagram.



3. Double-click the field **type = 1**.



4. The Data Memory Area is to be used, so input **5** and click **OK**. "Type = 5" will be displayed.
5. Double-click on the field **ch = 0**. The I/O Board Parameter Dialog Box will be displayed.

Note The abbreviation "Ch" or "ch," which appears in some displays and on some OMRON products, often means "word" and may be abbreviated "Wd" in documentation in this sense.

Example: ch 2000 = word 2000

6. Input **10**, and click **OK**. "ch = 10" will be displayed.



This completes changing the I/O Board parameters.

6-3 Creating a Project

This section uses the following project example to explain the basic method for creating an Open PLC project. Refer to the the ISaGRAF Workbench operation manual and the online documentation for details on how to operate the ISaGRAF Workbench.

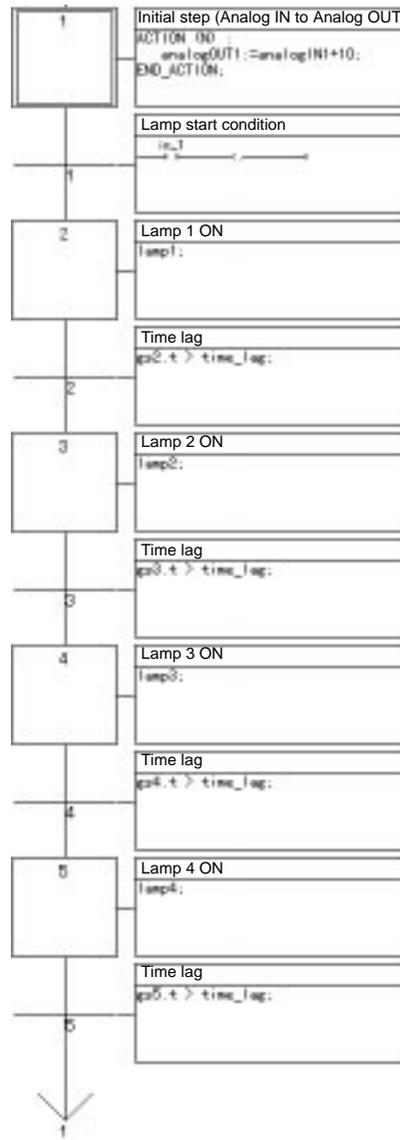
6-3-1 The Project

Programming

Create the following SFC program as an example. The following two types of operations are performed by this program.

- The program will read data from an Analog Input Unit, add 10 to the value obtained and transfer it to an Analog Output Unit.

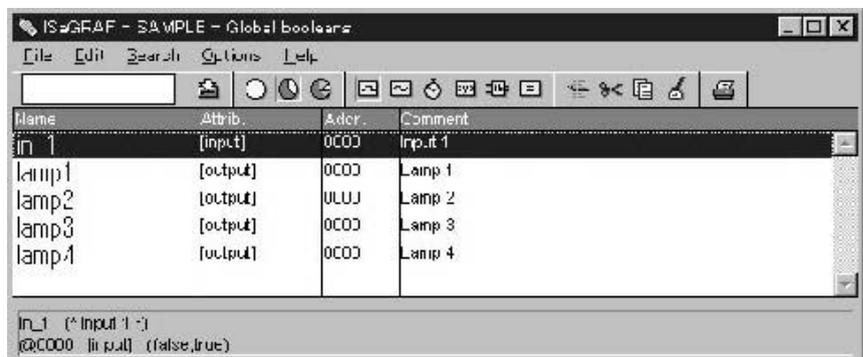
- Lamps 1 to 4 will turn ON and OFF in order when the start condition (in_1) turns ON.



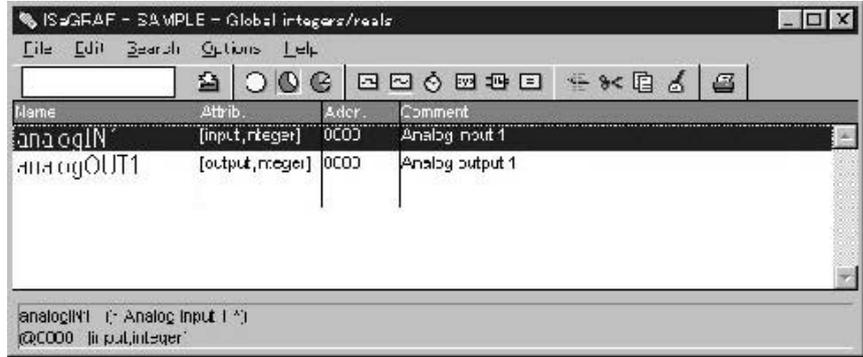
Dictionaries

The following three types of dictionaries are registered.

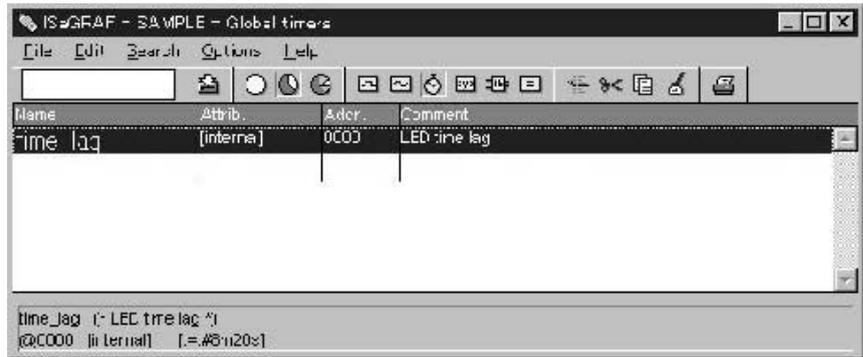
Boolean Variables



Integer and Real Number Variables



Timer Variables



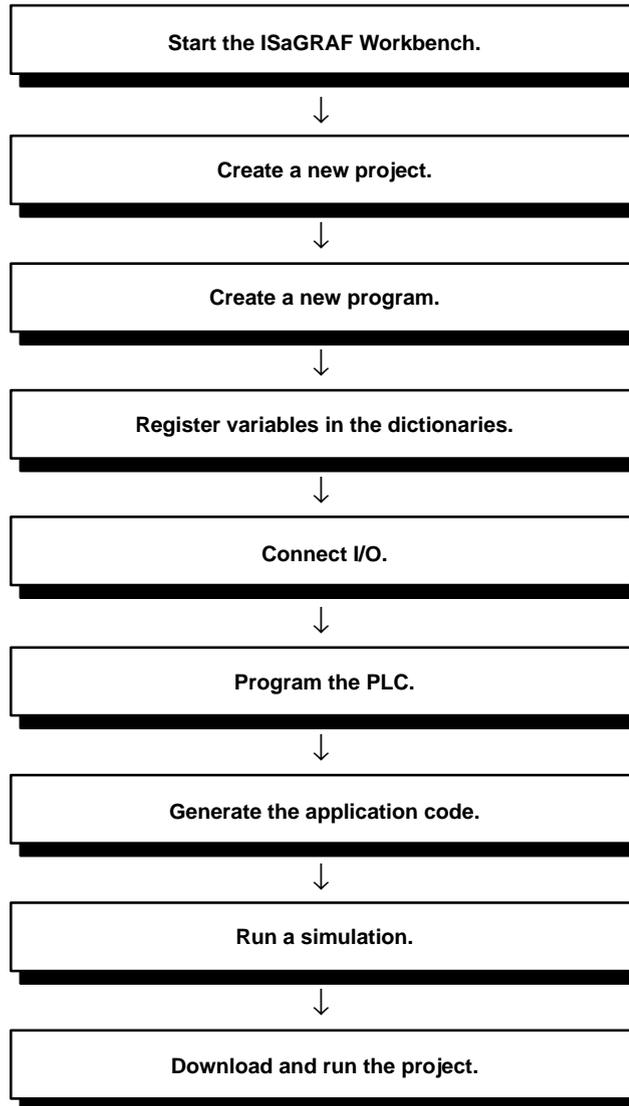
OMRON I/O Boards and I/O Equipment Used

The following three I/O Boards and I/O Equipment are used.

Name	Area	I/O points	Data type	Direction
c200ci16	Core I/O	16	Boolean	Inputs
c200co16	Core I/O	16	Boolean	Outputs
c200hf	Special I/O Unit	10 words	Integer	Inputs

6-3-2 Operation Procedure

Create a project and execute that project on the Open PLC using the following steps.



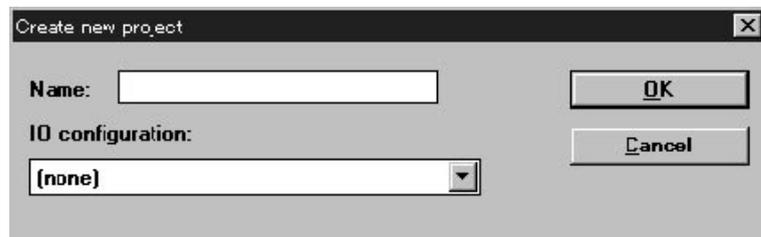
6-3-3 Starting the ISaGRAF Workbench

- 1, 2, 3... 1. Select **Start** from the taskbar, then **Programs, ISaGRAF 3.2,** and **Projects.** The ISaGRAF Workbench will start and the following Project Management Window will be displayed.



6-3-4 Creating a New Project

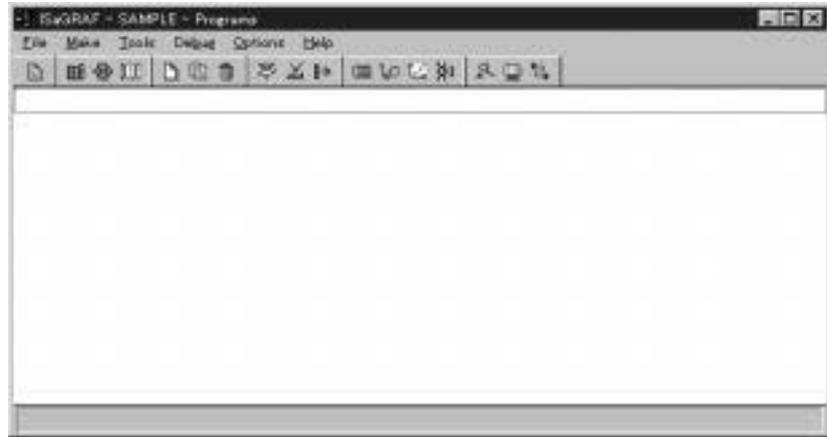
- 1, 2, 3... 1. Select **New project** under the File menu in the Project Management Window. The Create New Project Dialog Box will be displayed.



2. Input the project name and click **OK**. Input **SAMPLE** for this example.
- Leave **I/O Configuration** set to **None**.
 - The project called **sample** will be added to the Project Management Window. The name will be displayed in lowercase even if originally entered in uppercase.

6-3-5 Creating a New Program

- 1, 2, 3... 1. Double-click on the **sample** project in the Project Management Window. The Programs Window will be displayed.



6-3-6 Registering Variables in Dictionaries

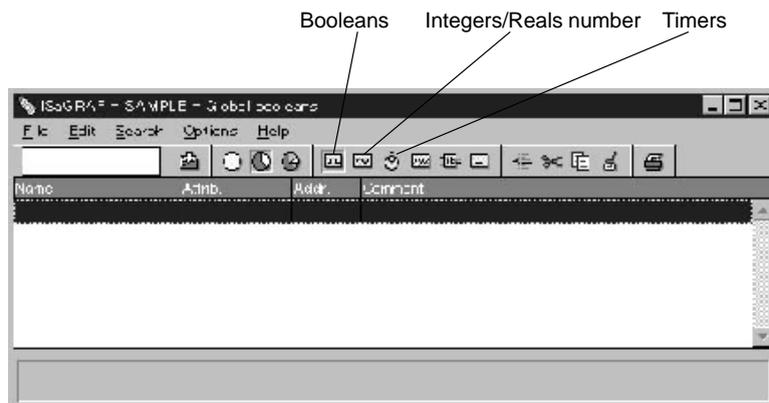
Register the variables used in the program. The Boolean, integer, and timer variables are registered in the different dictionaries.

Registering Boolean Variables

The following Boolean variables are registered.

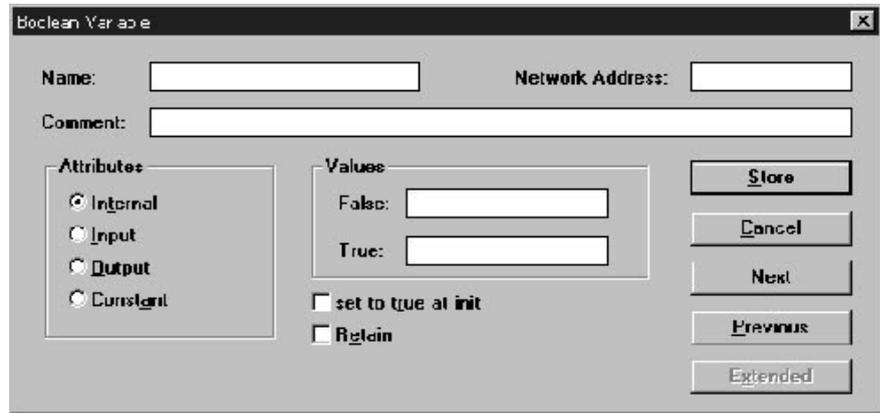
Variable name	Attribute	Comments
in_1	Input	Input 1
lamp1	Output	Lamp 1
lamp2	Output	Lamp 2
lamp3	Output	Lamp 3
lamp4	Output	Lamp 4

- 1, 2, 3... 1. Select **Dictionary** from the File Menu in the Programs Window. The Global Booleans Window will be displayed.

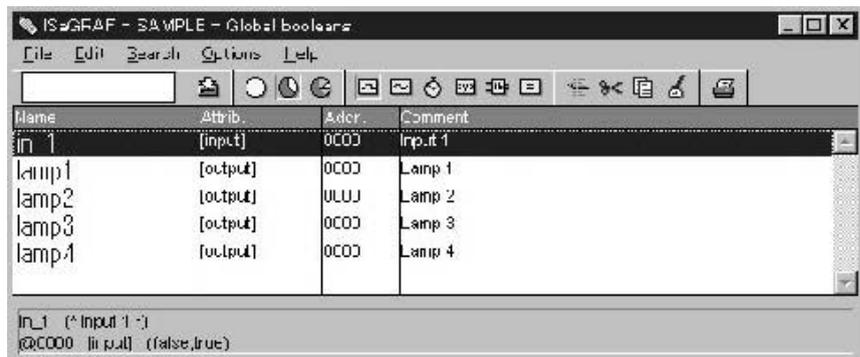


If a different data registration window is displayed, click the Booleans icon.

- Double-click the highlighted field. The Boolean Variable Dialog Box will be displayed.



- First, input variable **in_1**.
 Name: in_1
 Comment: Input 1
 Attribute: Input
- Click **Store**. The variable input in the previous step will be shown in the Global Booleans Window.
- Double-click on the line below the variable. The Boolean Variable Dialog Box will be displayed.
- Input the data for lamp 1 to lamp 4.
 - Be sure to set the attributes to output.
 - You can copy and paste in the Global Booleans Window and then edit to simplify inputting consecutive variables, such as for lamps 1 to 4.
 If all inputs are correct, the variables should be displayed as follows:



- Select **Save** under **File**.

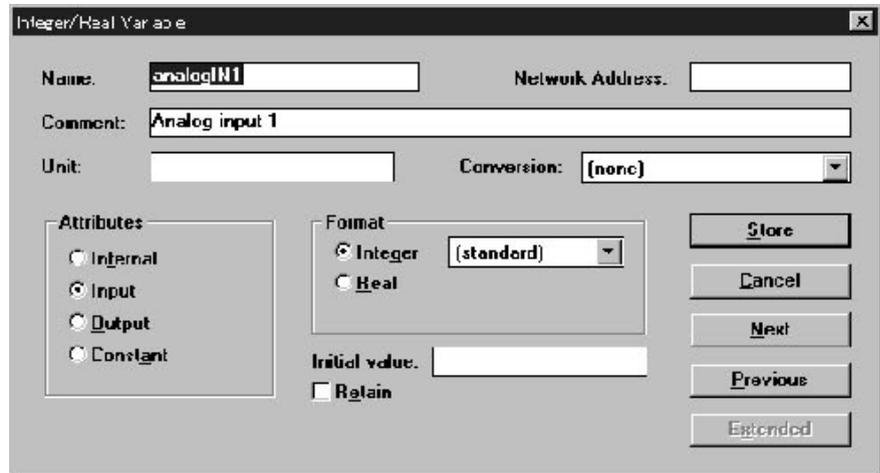
Registering Integer Variables

The following integer variables are registered.

Variable name	Attribute	Format	Comments
analogIN1	Input	Integer (standard)	Analog Input 1
analogOUT1	Output	Integer (standard)	Analog Output 1

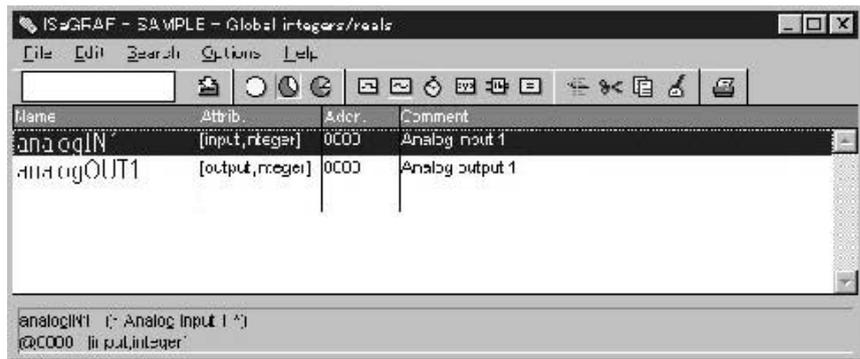
- 1, 2, 3... 1. Click the integers/reals number icon in the Global Booleans Window. The Global Integers/Reals Window will be displayed.
2. Double-click the highlighted field. The Integer/Real Variable Dialog Box will be displayed.

3. Input the variable **analogIN1** as follows:



4. Click **Store**.

5. Input the variable **analogOUT1** and click **Store**.
The data will be displayed as follows:



6. Select **Save** under **File**.

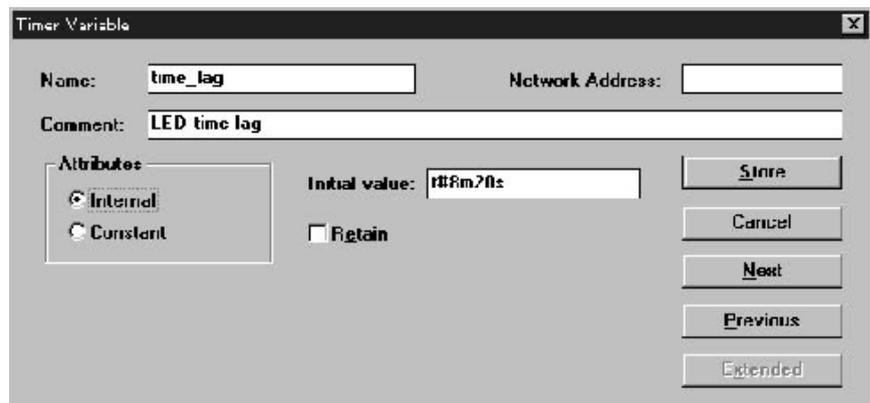
The following timer variable is registered.

Variable name	Attribute	Default	Comments
time_lag	Internal	t#500 ms	LED time lag

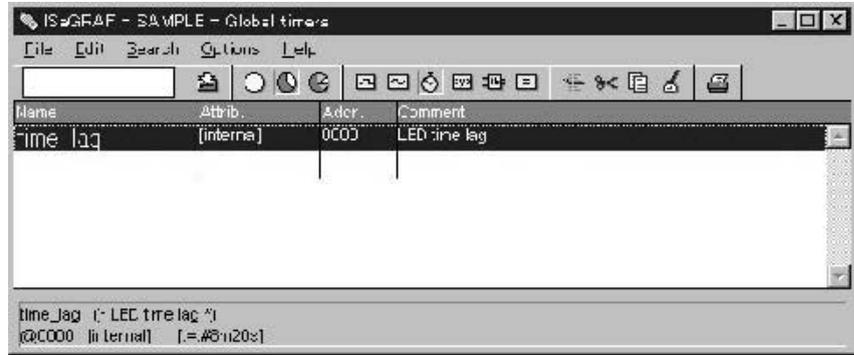
Registering Timer Variables

1, 2, 3...

1. Click the timers icon in the Global Integers/Reals Variable Window. The Global Timers Window will be displayed.
2. Double-click the highlighted field. The Timer Variable Dialog Box will be displayed.
3. Input the variable **time_lag** as follows:



4. Click **Store**. The data will be displayed as follows:



5. Select **Save** under **File**.

This completes registering variables in the dictionaries.

6-3-7 Connecting I/O

Assign the registered variables with the real I/O (OMRON I/O Boards and I/O Equipment). Refer to 6-2 *OMRON I/O Boards and I/O Equipment* for details on OMRON I/O Boards and I/O Equipment.

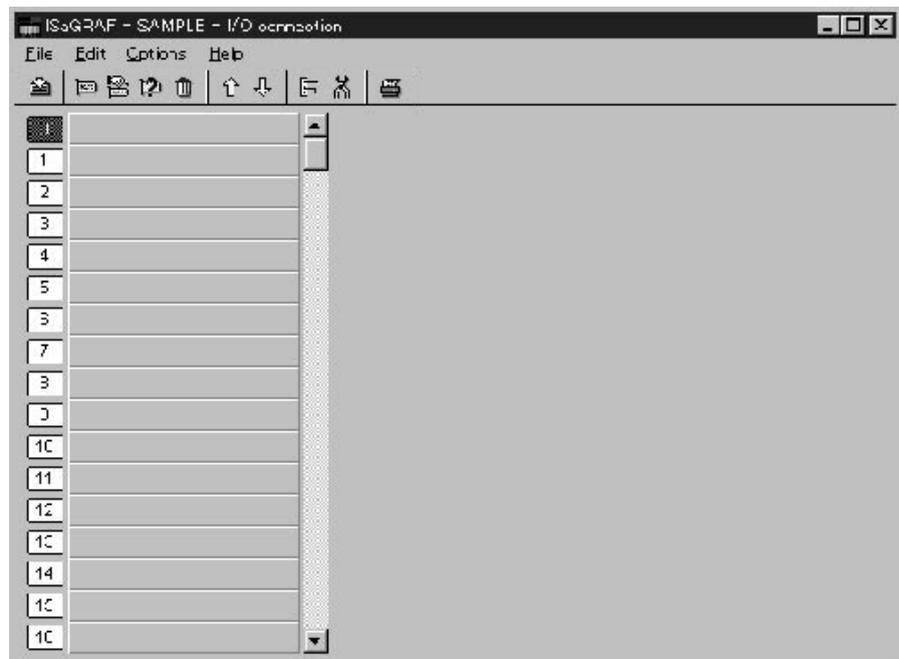
Connect the following OMRON I/O Boards and I/O Equipment to the variables registered in the previous section.

Name	Area	Assigned word	Allocated variables
c200ci16	Core I/O	0	in_1
c200co16	Core I/O	1	lamp1 to lamp4
c200hf	Special I/O Unit	100 (unit number 0)	analogIN1
		110 (unit number 1)	analogOUT1

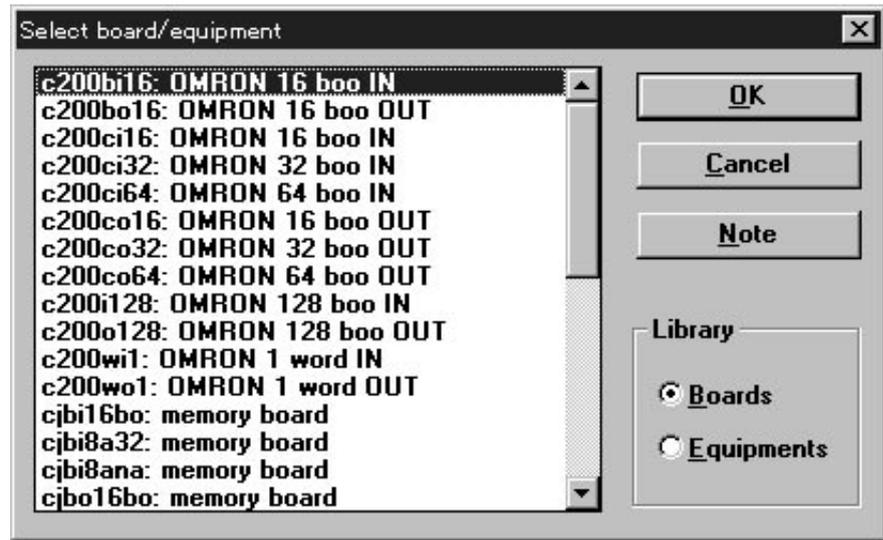
Connecting c200ci16

1, 2, 3...

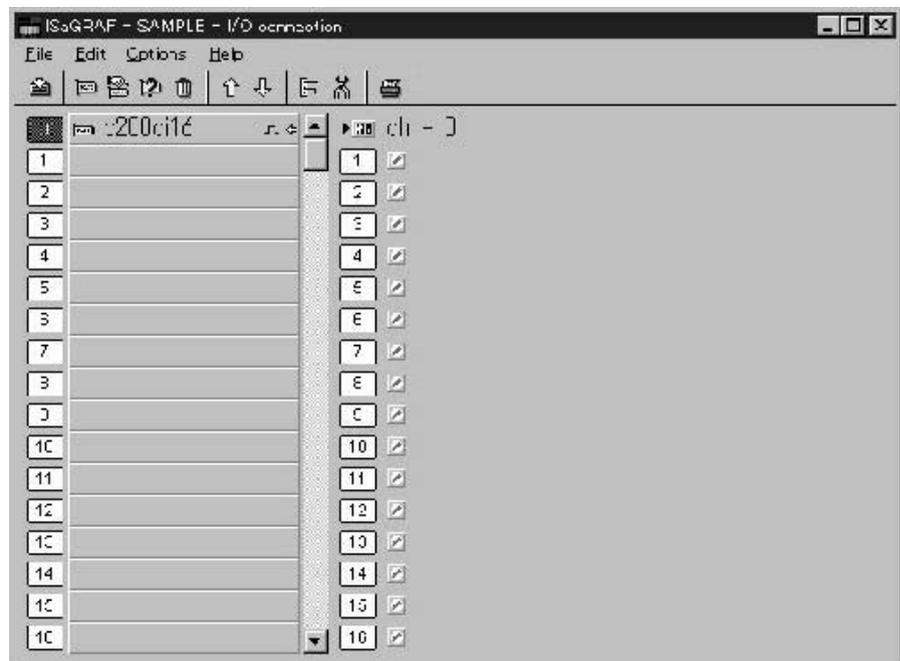
1. Select **I/O Connection** from the Tools menu in the Programs Window. Alternatively, select **I/O Connection** from the File Menu in a variable registration window. The I/O Connection Window will be displayed.



- Double-click on slot 0.
The Board/Equipment Dialog Box will be displayed.



- Select **c200ci16** and click **OK**. c200ci16 will be registered to the slot as shown below.

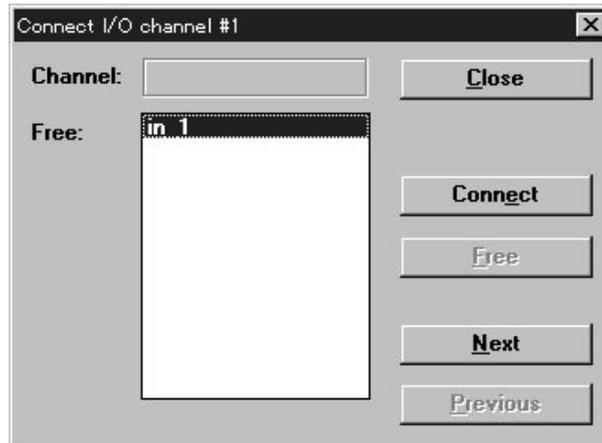


Note The default word addresses (bit addresses) for connecting the I/O of the ISaGRAF Workbench do not correspond to those of the OMRON PLC. Refer to *Appendix F Different Indication of Word Addresses (Bit Addresses)* to match these addresses with those of the OMRON PLC.

- Double-click on slot 1 (bit 0 of word 0) on the right of the window. The following dialog box will be displayed. The Boolean input variable registered in the dictionary will be displayed.

Note The abbreviation “Ch” or “ch,” which appears in some displays and on some OMRON products, often means “word” and may be abbreviated “Wd” in documentation in this sense.

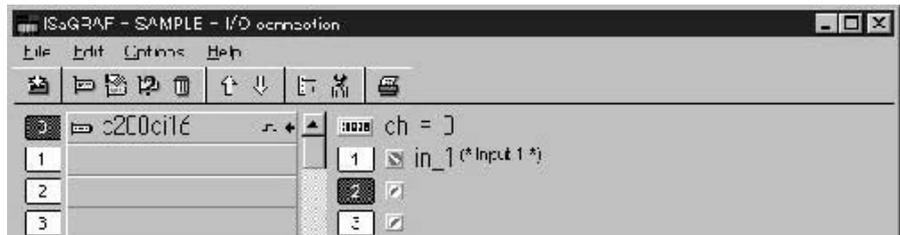
Example: ch 2000 = word 2000



Note The display will be blank if no variables have been registered (saved) in the dictionary.

- Click **Connect**.

Here, the **in_1** variable has been allocated to bit 0 of word 0 and will be displayed as follows:

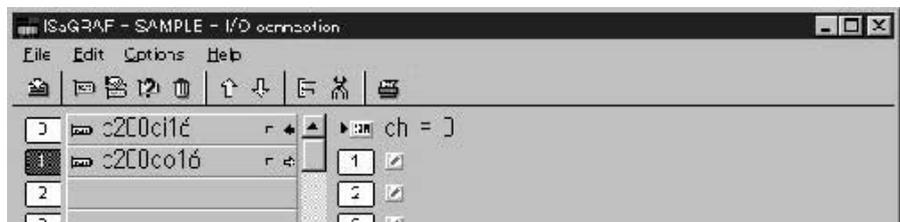


- Click **Close** in the Connect I/O Channel Dialog Box.
- Select **Save** under **File**. (When consecutively connecting I/O, repeat this saving operation after all registration processing has been completed.)

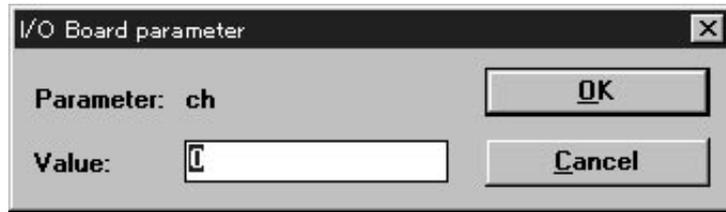
Connecting c200co16

1, 2, 3...

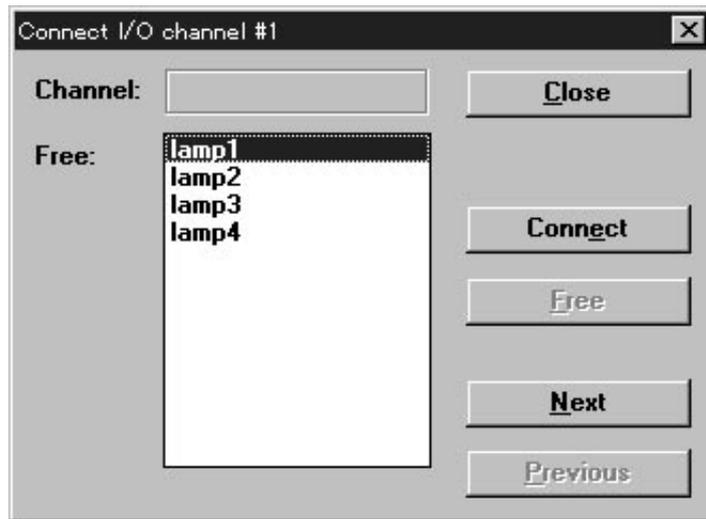
- Double-click on slot 1 in the I/O Connection Window. The same Board/Equipment Dialog Box as shown in step 2 will be displayed.
- Select **c200co16** and click **OK**. c200co16 will be recorded in the slot as shown below.



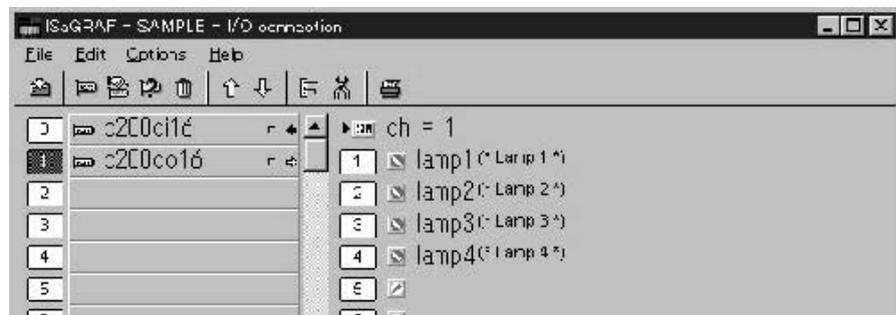
- Double-click on **ch = 0** on the right of the window. The dialog box for I/O board parameters will be displayed.



- Input 1 and click **OK**. The display will read **ch = 1**. c200co16 has now been allocated to word 1.
- Double-click on slot 1 (bit 0 of word 1) on the right of the window. The following dialog box will be displayed. The Boolean input variables registered in the dictionary will be displayed.



- Select **lamp1** and click **Connect**. The variable **lamp1** is now allocated to bit 0 of word 1.
- By subsequently clicking **Connect**, lamps 2 to 4 will be allocated to bits 1 to 3 of word 1.
- Click **Close**. The display will be as follows:



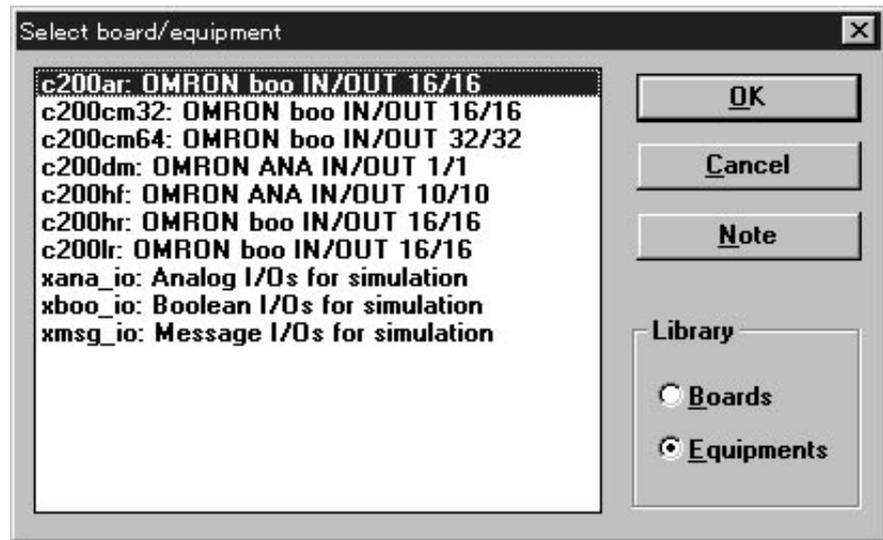
- Select **Save** under **File**. (When consecutively connecting I/O, repeat this saving operation after all registration processing has been completed.)

Connecting c200hf

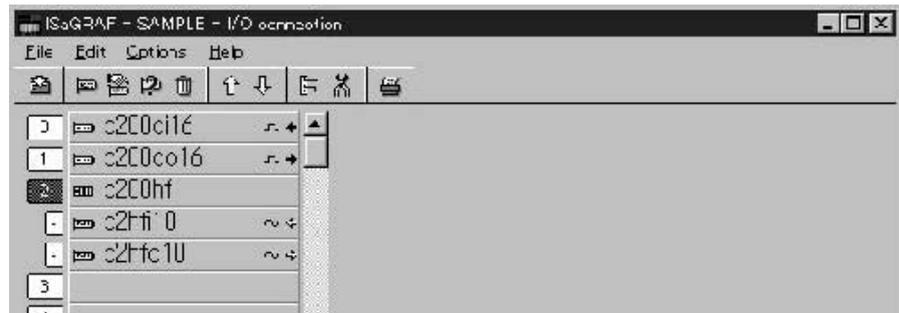
The c200hf I/O Equipment is a driver that combines two I/O Boards. Connect c200hf to the variables **analogIN1** and **analogOUT1**.

- 1, 2, 3... 1. Double-click slot 2 in the I/O Connection Window. The Board/Equipment Dialog Box will be displayed.

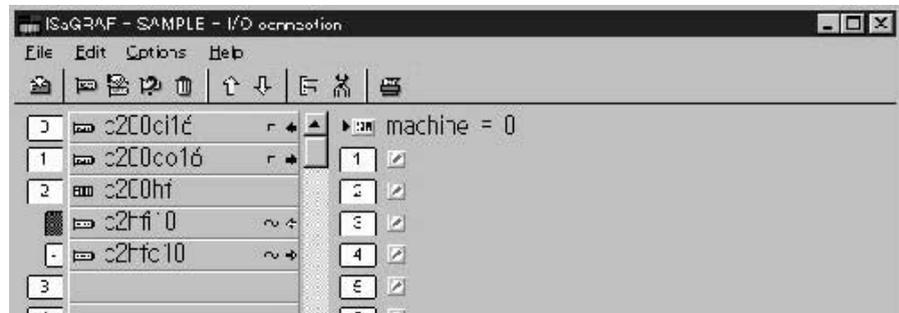
2. Select **Equipments** in the Library Field in the Board/Equipment Dialog Box. A list of the I/O Equipment will be displayed.



3. Select **c200hf** and click **OK**. c200hf will be registered in a slot as shown below.



4. Set the inputs first. Double-click **c2hfi10** in slot 2. The display will be as follows:

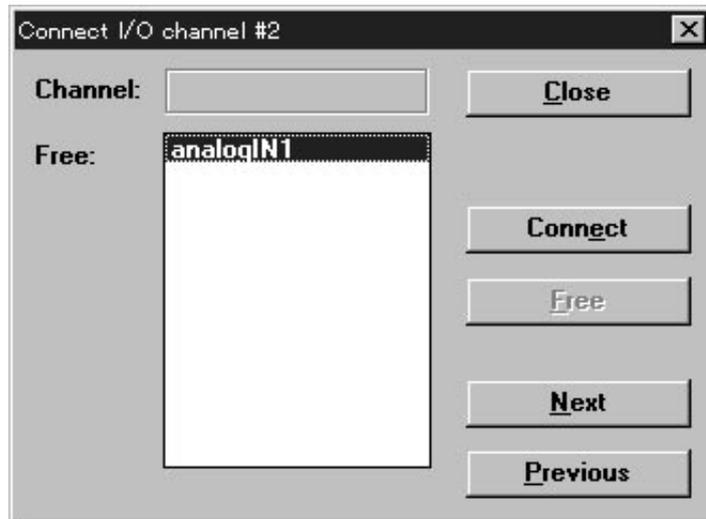


Note machine = 0 indicates that the unit number is 0 (words 100 to 109.)

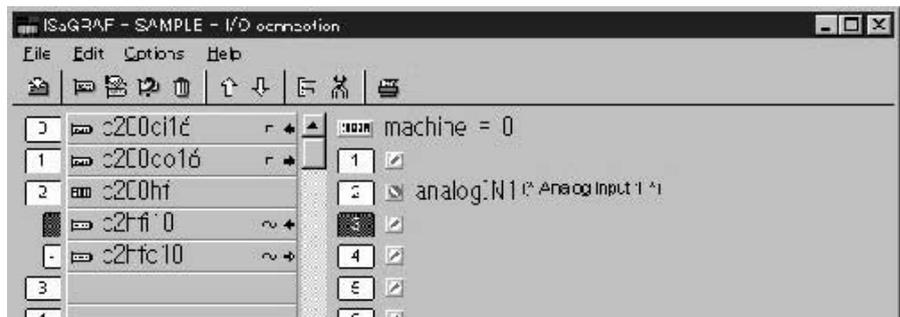
5. Double-click slot 2 (word 101 position) on the right of the window.

Note Input 1 for the C200H Analog Input Unit is allocated to word N + 1. The allocation in this example is to word 101.

The following dialog box will be displayed. The integer input variables registered in the dictionary will be displayed.

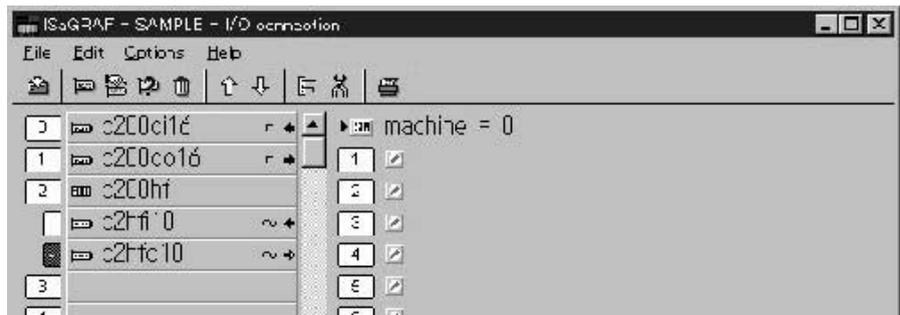


6. Select **analogIN1**, click **Connect**, and then **Close**.



The **analogIN1** variable has been allocated to word 101.

7. Set the outputs next. Double-click **c2hfo10** at slot 2. The display will be as follows:



8. Double-click on **machine = 0** on the right of the window. The dialog box for unit number designation will be displayed.

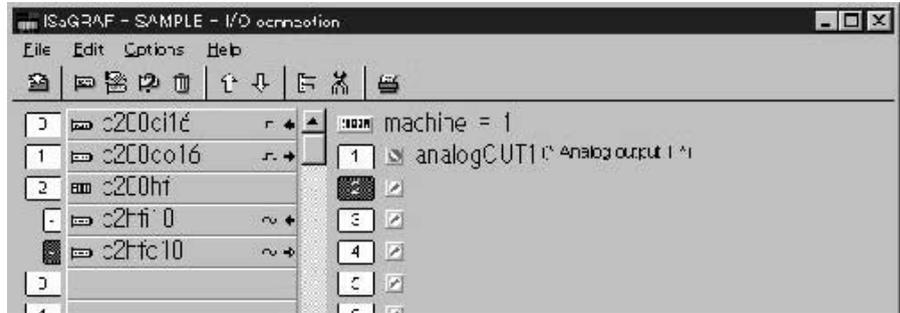


9. Input **1** and click **OK**. "Machine = 1" will be displayed. This indicates a unit number of 1 (words 110 to 119)
10. Double-click slot 1 (for word 110) on the right of the window.

Note Output 1 for the C200H Analog Output Unit is word N and is allocated to word 110 in this example.

The integer output variables registered in the dictionary will be displayed.

11. Select **analogOUT1**, click **Connect**, and then click **Close**.



The variable **analogOUT1** has been allocated to word 110.

12. Select **Save** under **File**.

This concludes the I/O connections for the sample project.

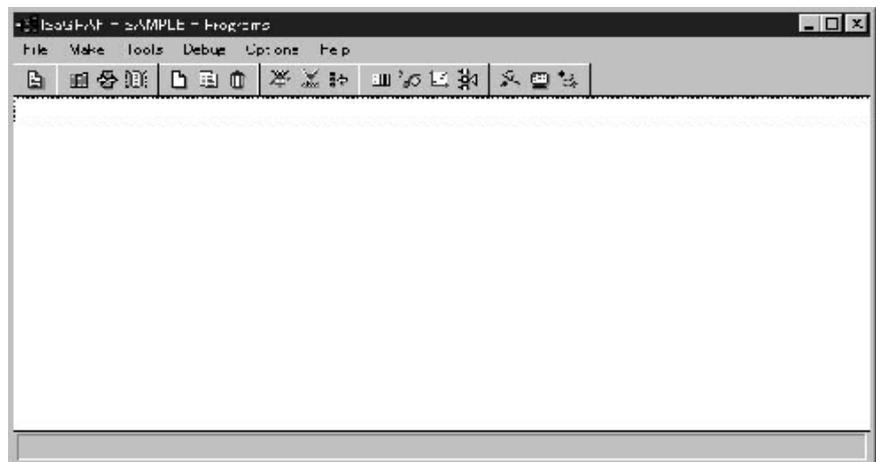
13. Select **Exit** under **File** to complete I/O connections.

6-3-8 Programming

The sample program shown on page 38 will be created here. Refer to the sample program while performing the following operations.

Opening the SFC Program Window

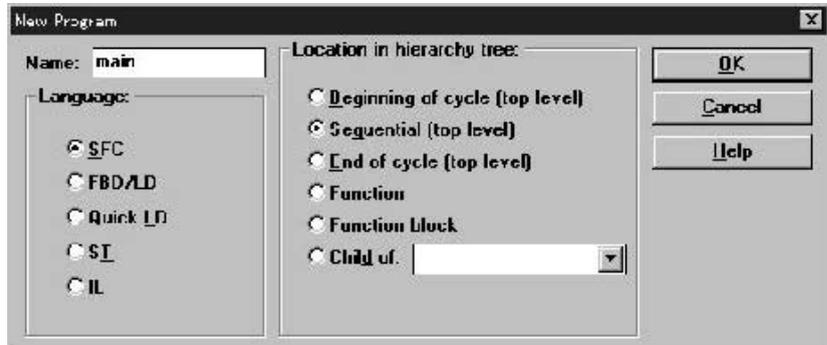
- 1, 2, 3... 1. Double-click on **sample** project in the Project Management window. The Programs Window will be displayed.



2. Select **New** under **File**. The New Programs Dialog Box will be displayed.

The following settings are made in this example.

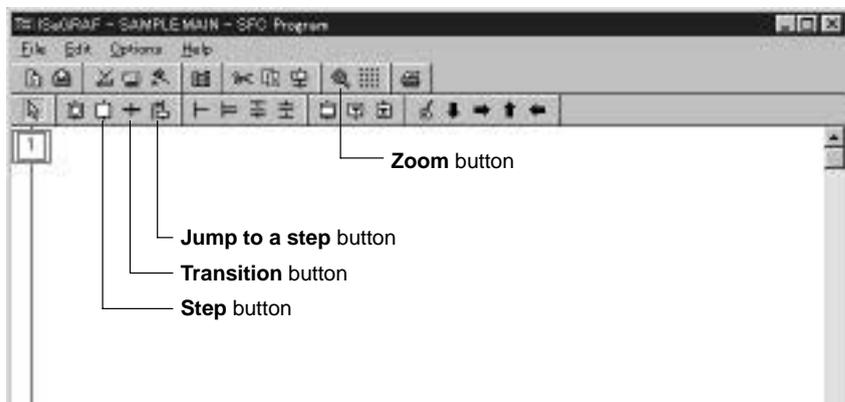
- Name: main
- Language: SFC
- Location: Sequential (top level)



3. Click **OK**. The program called “main” will be added to the Programs Window.



4. Double-click **main**. The following SFC Program Window will be displayed.



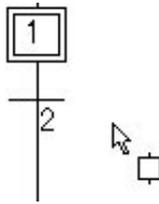
Transition and Step Notation

1, 2, 3...

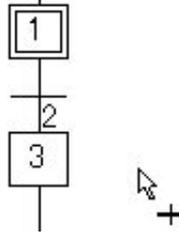
1. Click the **Transition** button in the SFC Program Window. The cursor will change as follows:



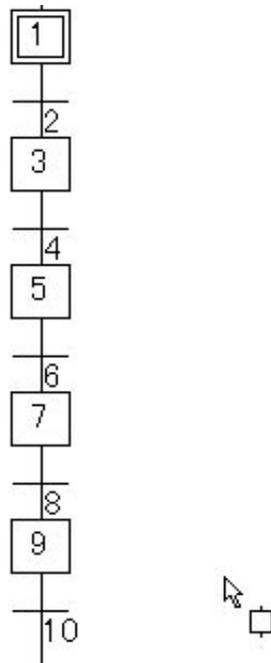
- Click on the position just below the initial step. The transition will be added as shown below, and the cursor for steps will appear.



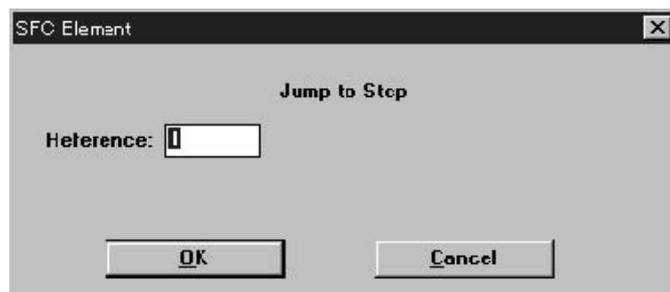
- Click on the position just below the transition. The step will be added as shown below, and the cursor for transitions will appear.



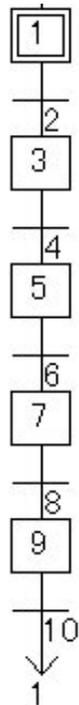
- Click in order until the screen matches the following diagram.



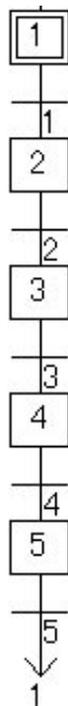
- Click the **Jump to a step** button.
- Click the bottom of transition 10. The following dialog box will be displayed.



7. Click **OK**. A jump to step 1 (initial step) will be displayed.



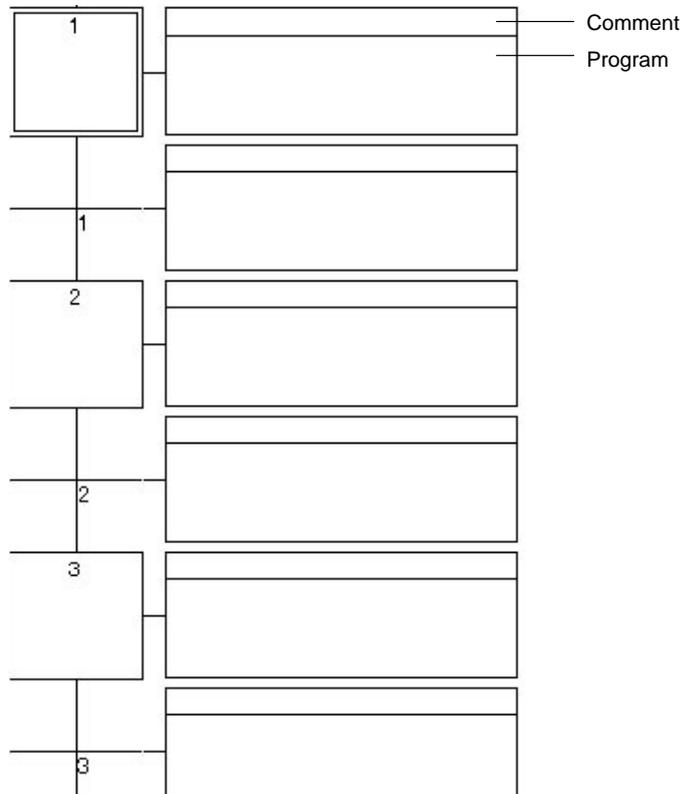
8. Select **Renumber** in the Edit menu. The display will change as follows:



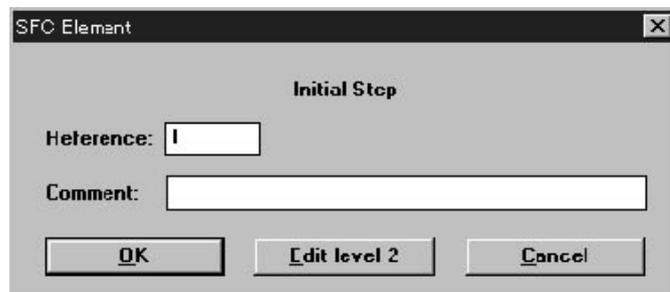
The step and transition numbers will correspond if the numbers are replaced. This makes the program easier to understand.

Inputting Actions

- 1, 2, 3... 1. Click **Zoom** several times to display the following:



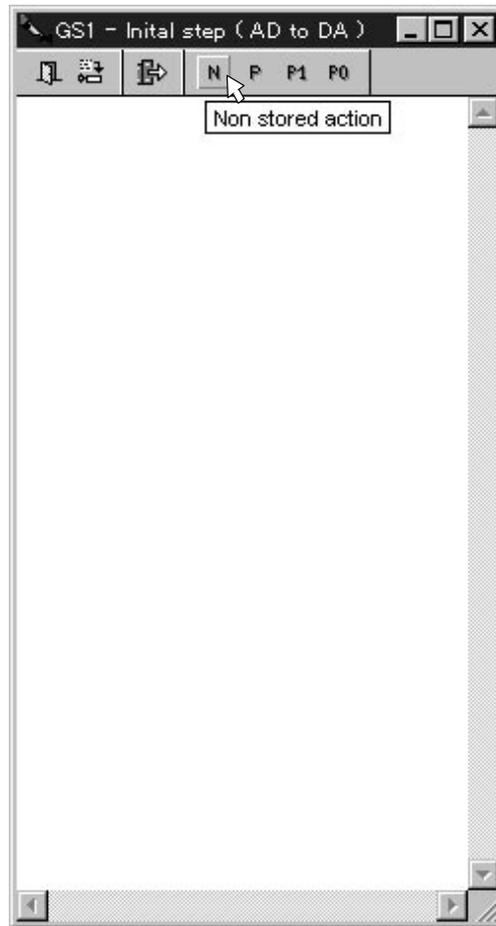
2. Double-click the comment position shown in step 1. The following dialog box will be displayed.



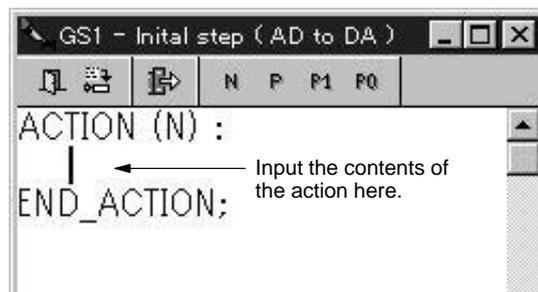
Note This dialog box can also be displayed if a step or transition is double-clicked. The dialog box can be displayed regardless of the zoom specifications of the SFC Program Window.

3. Input **Initial step (Analog IN to Analog OUT)** in the comments field. (The comment is optional.)

- Click **Edit level 2**. Alternatively, double-click the program position after closing the dialog box. The following window for programming will be displayed.



- Click the **N** (Non stored action=normal action) button. The following will be displayed.

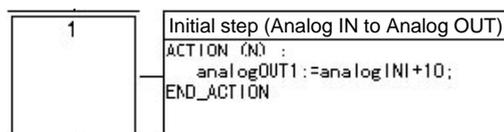


- Input the following in ST for this example, and close the window.

```
analogOUT1:=analogIN1+10;
```

Note Be sure to distinguish between colons and semicolons.

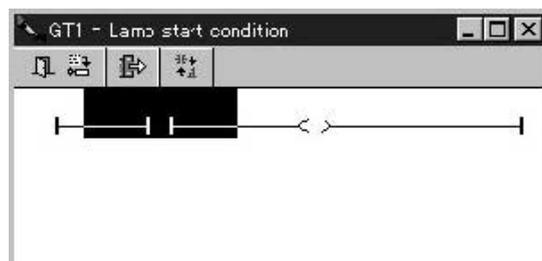
The display will be as follows:



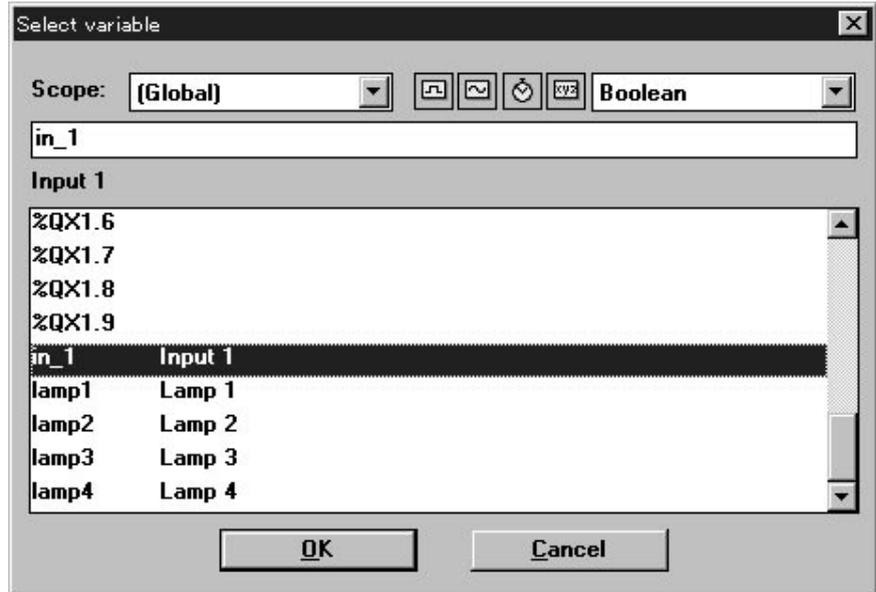
7. Input the comment and action for transition 1. Use the following steps.
 - a) Input the comment "Lamp start condition" using the procedure outlined in steps 2 and 3.
 - b) Display the window for programming using the same procedure as step 4.
 - c) Click the select language (ST/LD) button shown below. Icons for the ladder symbols will be displayed in the lower section of the window.



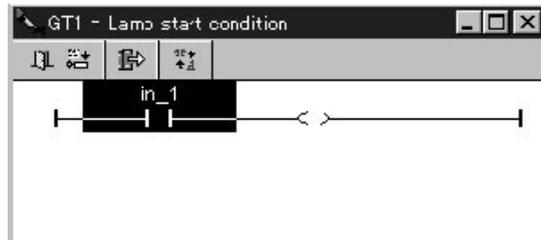
- d) Click the parts icon located on the left. Alternatively, press **F2**.



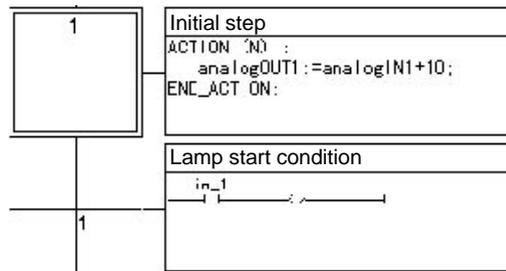
- e) Double-click the highlighted input bit. The Select Variable Dialog Box will be displayed.



- f) Select **in_1** and click **OK**.

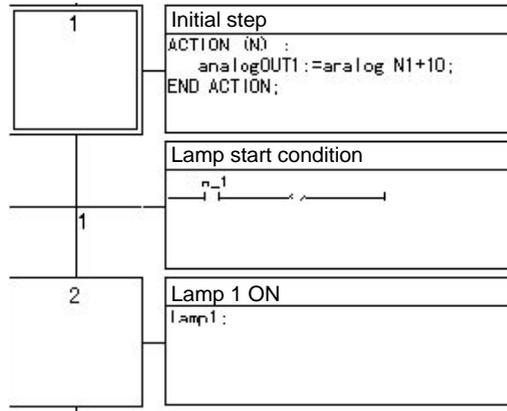


- g) Close the programming window. The display will be as follows:



- 8. Input actions for step 2 to transition 5. Use the following steps.
 - a) Repeat steps 2 and 3 of this procedure to input the comment **lamp1 ON** for SFC step 2.
 - b) Use the same operation as step 4 of this procedure to display the window for programming SFC step 2.
 - c) In this example, the output variable will be input in ST. Input as follows:
lamp1;

d) Close the window.

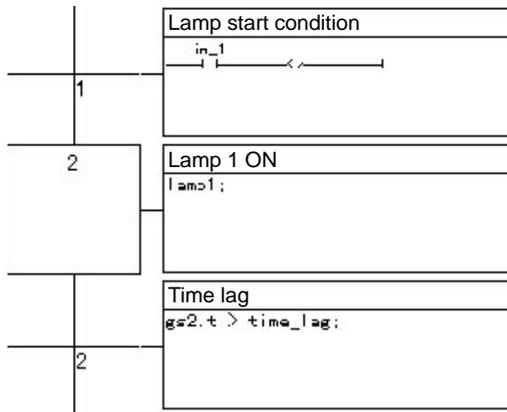


- e) Use the same procedures as steps 2 and 3 of this procedure to input the comment **Timelag** for transition 2.
- f) Use the same procedure as in step 4 to display the window for programming transition 2.
- g) Input the following in ST for this example:

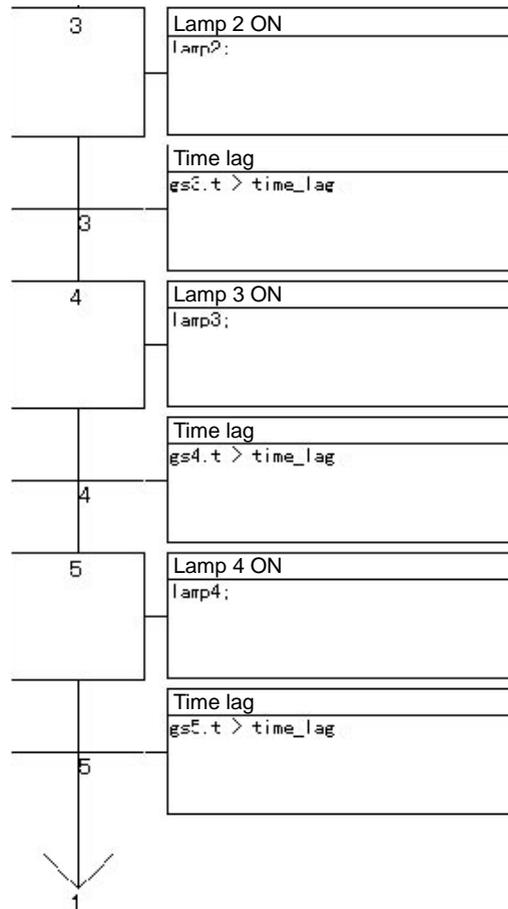
```
gs2.t>time_lag;
```

This condition is “If the time specified by time_lag has passed after step 2 becomes active.”

h) Close the window for programming.



- i) Use the same procedure as outlined above to input the actions for step 3 to transition 5, as shown below.



- j) Save the program once the above inputs are made.
The sample program is now finished.

6-3-9 Compiler Option Settings and Generation of Application Code

Generate the application code that can be executed on the Open PLC or Workbench Simulator. Once the application code is generated, the project will automatically be verified.

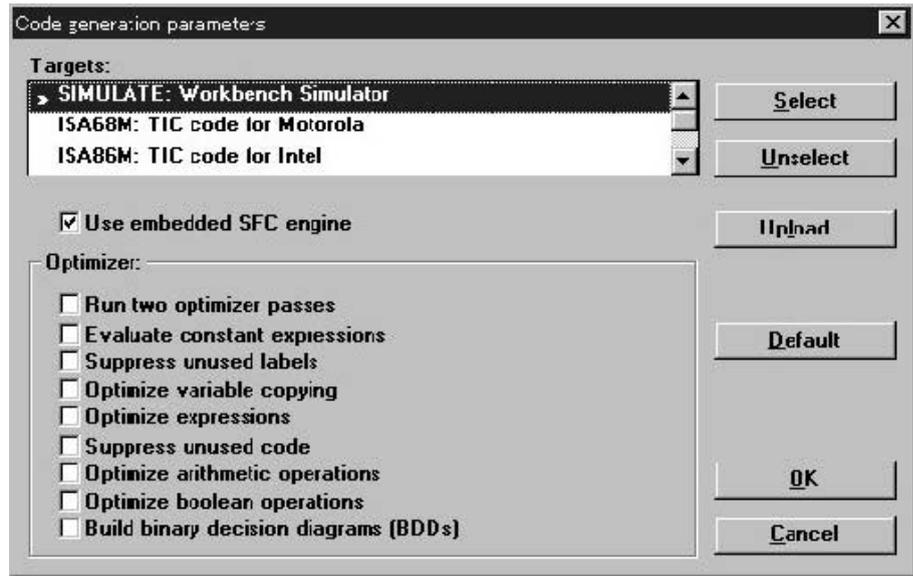
Note Be sure to make the compiler option settings before generating the application code.

Compiler Option Settings

The following two compiler options need to be selected to generate code that can be executed on the Open PLC or Workbench Simulator.

- SIMULATE: Workbench Simulator (for Workbench Simulator.)
- ISA86M: TIC code for Intel (for Open PLC.)

- 1, 2, 3... 1. Select **Compiler options** under **Make** in the Programs Window. The Code Generation Parameters Dialog Box will be displayed.



- A mark will appear next to the selected options.
 - Only the compiler option for the Workbench Simulator (SIMULATE: Workbench Simulator) is selected in this example.
2. Double-click **ISA86M: TIC code for Intel**. The mark will appear before ISA86M: TIC code for Intel.
 3. Click **OK**. The following confirmation message will be displayed.



4. Click **OK**.

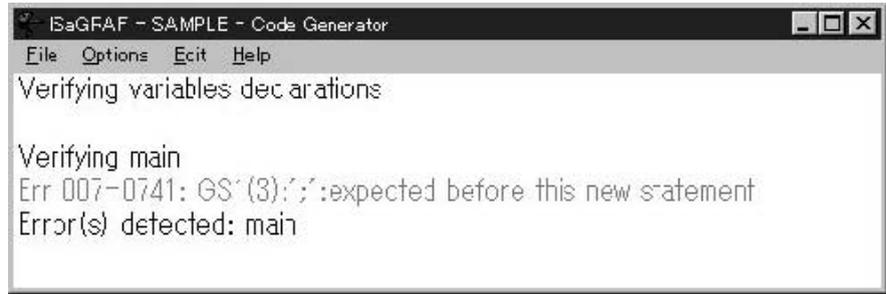
Generating the Application Code

- 1, 2, 3... 1. Select **Make application** under **Make** in the Programs Window. The following dialog box will be displayed if code is generated normally.



2. Click **Exit**.

Note When an error is detected, the details will be displayed as shown below. (The details will appear in red on the screen.)



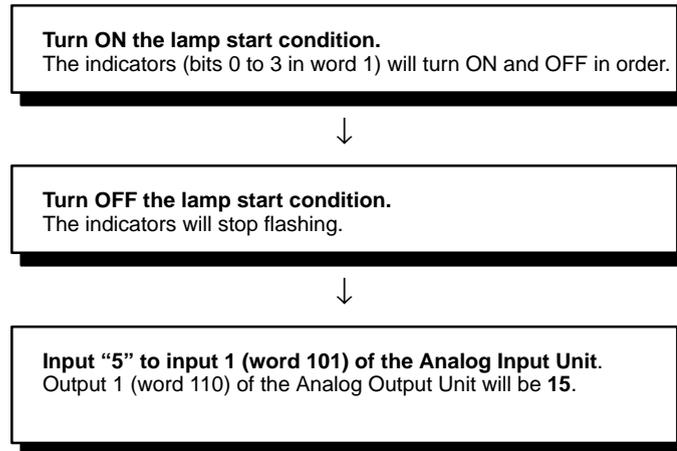
The location of the program error will be displayed if the area displayed in red is double-clicked. Once the error is removed, select **Make application** under **Make** once more.

6-3-10 Simulation

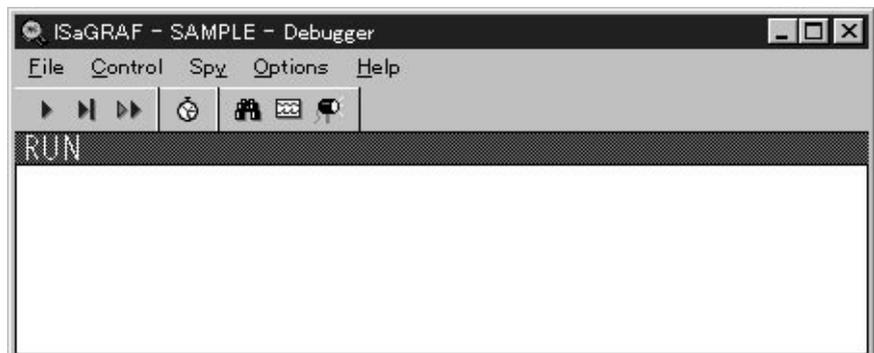
Run the simulation of the sample program created and check program execution.

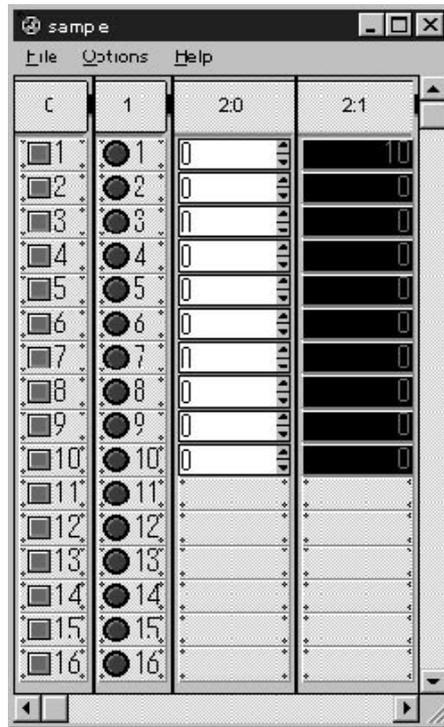
Note The simulation cannot be executed if no code has been generated for the Workbench Simulator. Refer to 6-3-9 *Compiler Option Settings and Generation of Application Code* for code generation methods.

In this example, execute the simulation using the following procedure.



- 1, 2, 3... 1. Select **Simulate** under **Debug** in the Programs Window. Alternatively, select **Simulate** under **File** in the SFC Program Window. The Debugger and Workbench Simulator will be displayed.





2. Click the first button for slot 0. This button represents bit 0 of word 0, which is the lamp start condition. The lamp start condition will turn ON, and lamps 1 to 4 for slot 1 (bits 0 to 3 of word 1) will turn ON and OFF in order.
3. Click the first button for slot 0 again. The lamp start condition will turn OFF, and the slot 1 indicators will stop flashing.
4. Input 5 for the second input of slot 2:0. This input corresponds to word 101, which is allocated to input 1 for the Analog Input Unit. The first output of slot 2:1 will change to indicate 15. This output corresponds to word 110, which is allocated to output 1 of the Analog Output Unit.

6-3-11 Downloading and Executing the Application Code

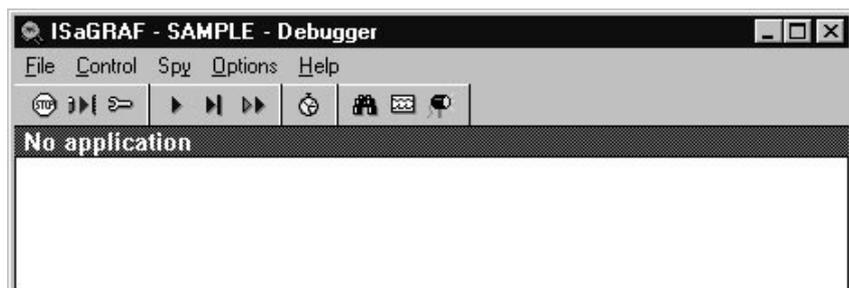
Download the application code to the Open PLC. The program will automatically be executed.

Caution Check the user program for proper execution before actually running it on the Unit. Not checking the program may result in unexpected operation.

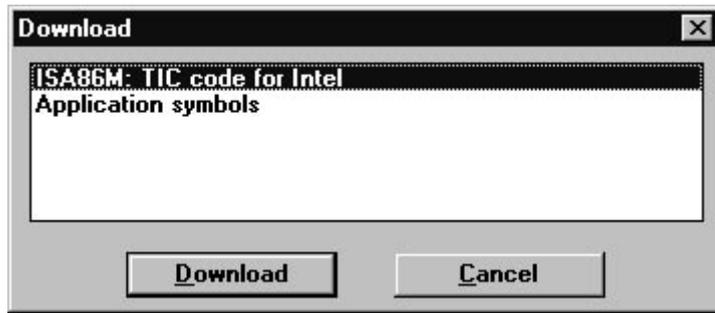
Note Refer to the last part of this section under *Trouble with Connections* if proper connection with the Open PLC cannot be made.

When No Application is Being Executed

- 1, 2, 3... 1. Select **Debug** under **Debug** in the Programs Window. The Debugger Window will be displayed.



2. Select **Download** under **File** in the Debugger Window. The following Download Dialog Box will be displayed.



3. Click **Download**. The application code will be downloaded. The following window will be displayed once the download has been completed, and the application will be automatically executed.

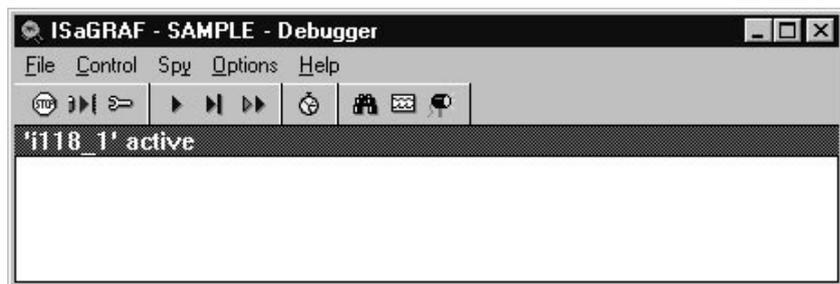


When Another Application is Being Executed

Any other applications being executed on the ISaGRAF Target need to be terminated before the new application can be downloaded. The procedure is given below.

- 1, 2, 3... 1. Select **Debug** under **Debug** in the Programs Window. Any applications currently being executed will be displayed as follows:

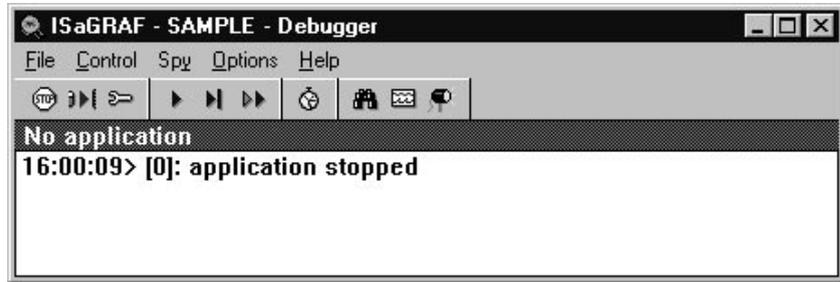
Example



2. Select **Stop application** under **File**. A confirmation dialog box will be displayed.



3. Click **Yes**. The application will be stopped and the display will be as follows:



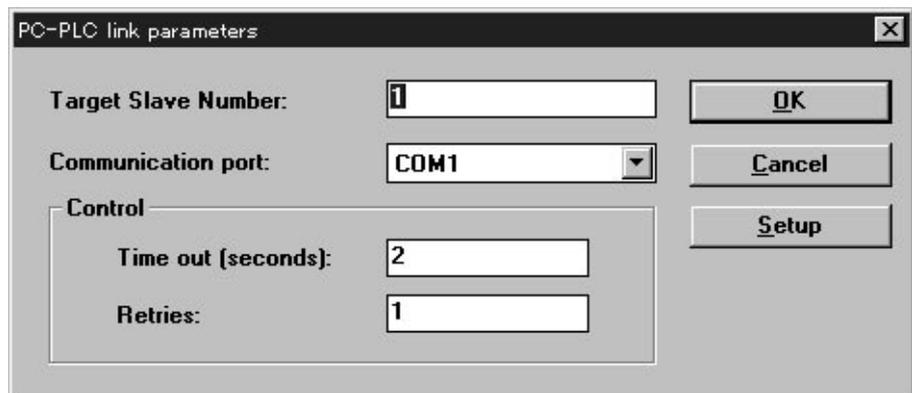
4. Download the new application.

Trouble with Connections

Confirm the link settings shown below if connection cannot be made with the ISaGRAF Target.

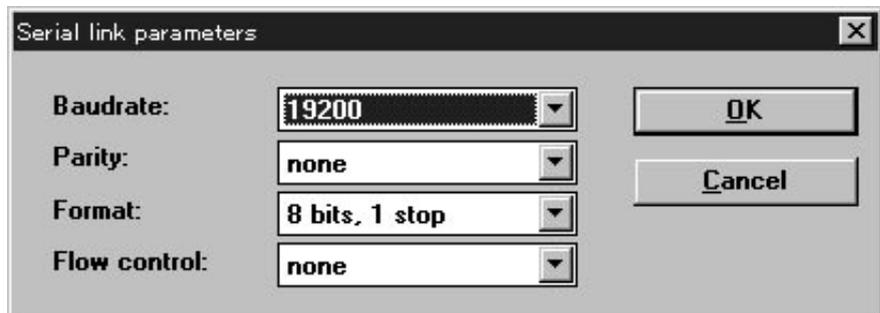
1, 2, 3...

1. Select **Link setup** under **Debug** in the Programs Window. The PC-PLC Link Parameters Dialog Box will be displayed.



2. Check the COM port being used on the personal computer, and change the communication port setting if it is incorrect.

3. Click **Setup**. The Serial Link Parameters Dialog Box will be displayed.



4. Check that the communications parameters are correct and make any necessary changes.

5. Once the settings have been completed, click **OK**. The display will return to the PC-PLC Link Parameters Dialog Box.

6. Click **OK**.

6-4 Backing Up and Restoring Projects

Use the Archive Manager to backup projects on a floppy or other disk and to restore projects saved to disk.

Use the Archive Manager to back up and restore the project components, such as the I/O Boards, I/O Equipment, Functions, and Function Blocks. Refer to the ISaGRAF Workbench operation manual for details.

Note Projects are not copied using normal File copying methods in Windows. Be sure to use the Archive Manager.

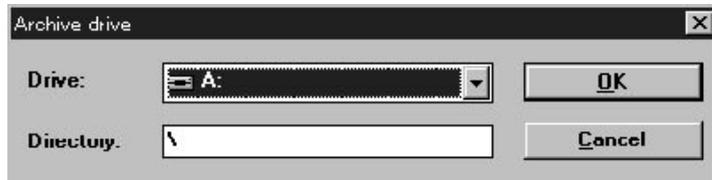
The procedure to backup and restore copies of projects is as follows:

- 1, 2, 3... 1. Select **Start** from the taskbar, then **Programs, ISaGRAF 3.2, and Archive**. The Archive Manager window will be displayed.

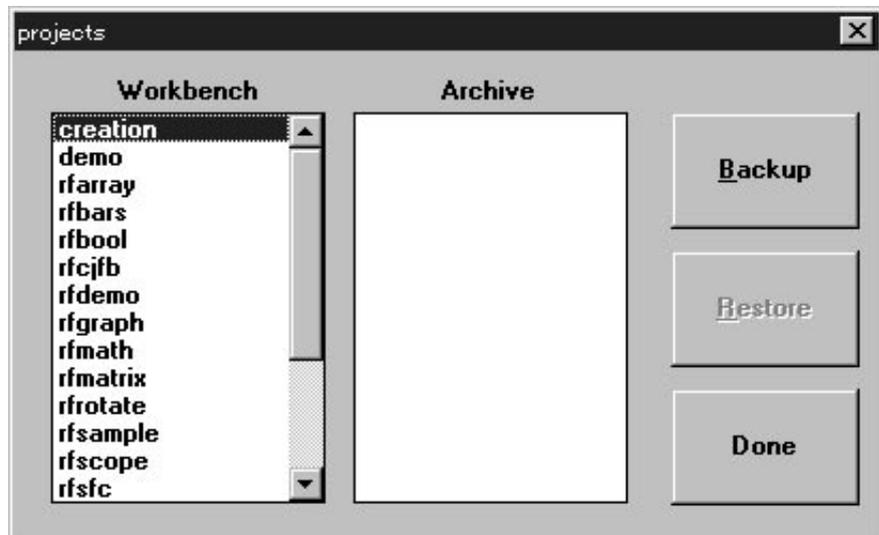


Note The **Archive Manager** can also be started from **File\Archive** under the Project Management window of the ISaGRAF.

2. Select **Disk drive** under **Options**. The Archive Drive Dialog Box will be displayed.



3. Select the drive and directory to backup or restore and click **OK**. (The default is the A drive root directory.) The display will return to the Archive Manager window.
4. Select **Projects** under **File**. The following dialog box will be displayed.



- The projects saved on the ISaGRAF Workbench will be displayed in the Workbench listbox (left window.)
- The compressed projects in the directory specified in step 3 will be displayed in the Archive list box (right window.)

Note To back up or restore project components such as the I/O Board or Functions, select a command under **File**.

5. To back up a project, select the project from the Workbench listbox and click **Backup**. To restore a project, select the project from the Archive listbox, and click **Restore**.

SECTION 7

OMRON Utilities

This section explains how to use the OMRON utilities, which provide expansion functions for the ISaGRAF Workbench

7-1	OMRON Utilities	70
7-1-1	Outline	70
7-1-2	Starting and Exiting OMRON Utilities	70
7-2	Open PLC Clock Settings	72
7-3	Data Monitor	72
7-3-1	Data Monitor	72
7-3-2	Using the Data Monitor	73
7-4	Saving and Loading IOM Data	74

7-1 OMRON Utilities

7-1-1 Outline

OMRON utilities provide expansion functions for the ISaGRAF Workbench. These facilities are started from the ISaGRAF Workbench menu.

OMRON utilities have the functions shown below.

Open PLC Clock

The Open PLC date and time can be displayed and set. An explanation of this function can be found in *7-2 Open PLC Clock Settings*.

Data Monitor

The Data Monitor is used to monitor and edit the IOM areas. Refer to *7-3 Data Monitor* for details. This function is used to edit the IOM areas without using ISaGRAF variables when the application is stopped.

Saving and Loading Data

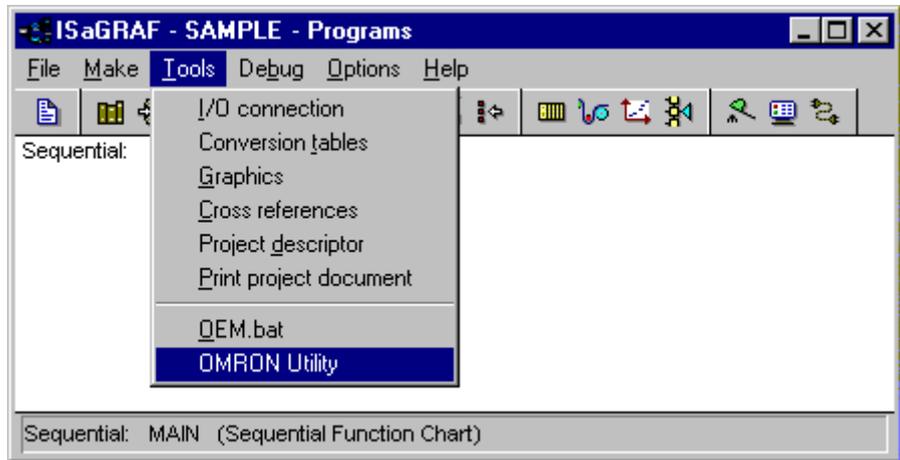
IOM data can be saved and loaded. Refer to *7-4 Saving and Loading IOM Data* for details.

7-1-2 Starting and Exiting OMRON Utilities

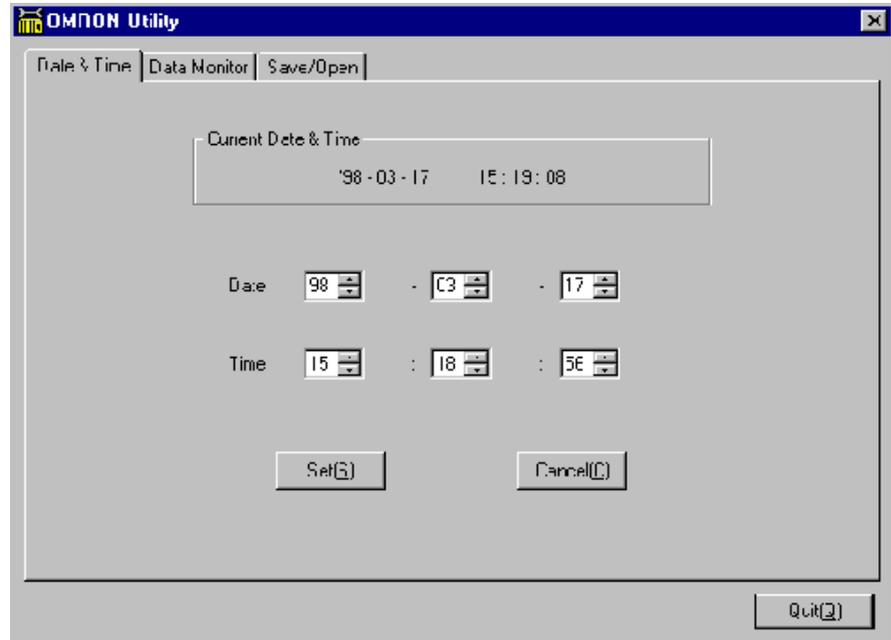
This section explains how to start and exit OMRON utilities. Refer to *5-4 Installing OMRON Utilities* for installation instructions if the OMRON utilities have not been installed.

Startup

Select **OMRON Utility** from the ISaGRAF Workbench Tools Menu.



The following OMRON Utility dialog box will be displayed.



Note The following processing is performed when an OMRON utility is started:

- The serial communications port is initialized according to the communications parameter settings.
- The ISaGRAF Target is communicated with and the mode of ISaGRAF Target is checked. The utility software cannot be used while an application is running. If an application is running, a message will be displayed saying that an application is running and asking if you want to close the application.

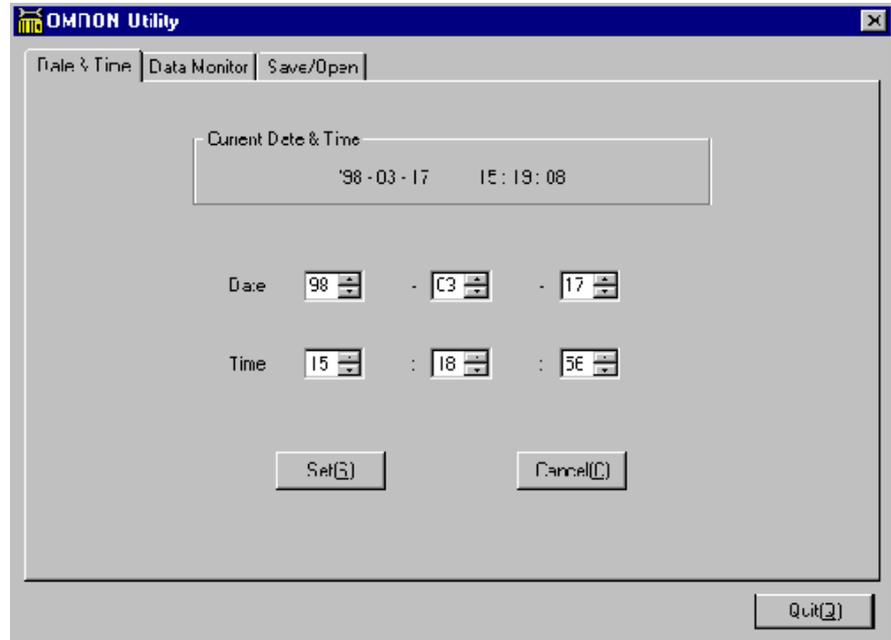
Exit

Click **Quit** in the OMRON Utility dialog box. The dialog box will close.

7-2 Open PLC Clock Settings

This section explains the Open PLC clock display and settings.

- 1, 2, 3... 1. Click the **Date & Time** tab in the OMRON Utility dialog box.



The Current Date & Time will display the date and time on the Open PLC clock.

2. Set the Date and Time.
 3. Click **Set**. The date and time will be set for the Open PLC clock. The settings made in step 2 will not be recorded if **Cancel** is clicked.

7-3 Data Monitor

7-3-1 Data Monitor

The IOM areas shown below can be monitored and edited by using one of the OMRON utilities, the Data Monitor. The Data Monitor is used for editing the IOM areas without using ISaGRAF variables.

Area	Range
I/O Bit Area	000 to 511
Auxiliary Relay Area	AR 00 to AR 27
Holding Relay Area	HR 00 to HR 99
Link Relay Area	LR 00 to LR 63
Data Memory Area	DM 0000 to DM 6143

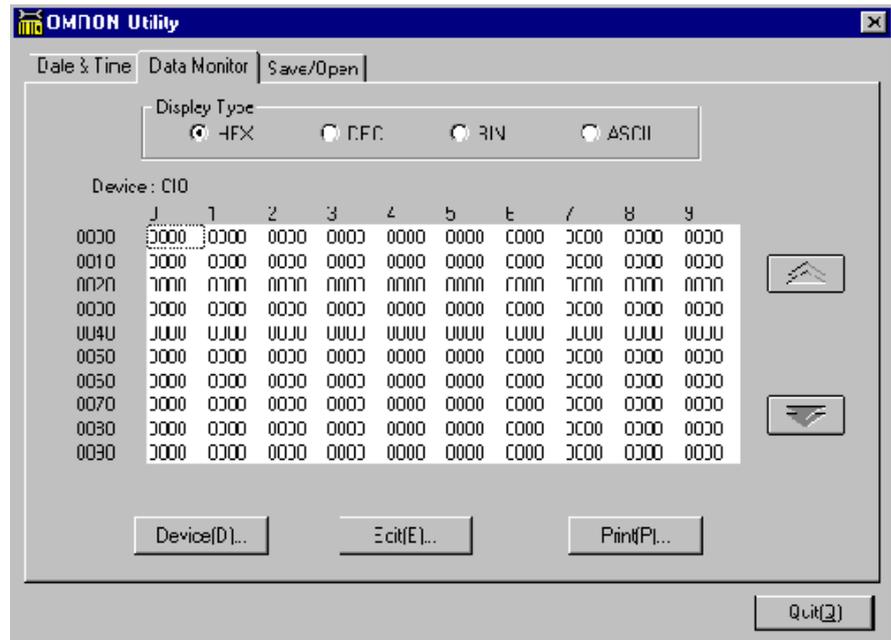
Note The memory allocations are the same as for the C200HX/HG/HE PLCs.

Note The Data Monitor cannot be used when an application is running.

7-3-2 Using the Data Monitor

Initialization Screen

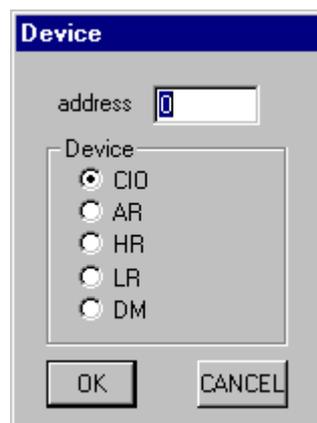
Click the **Data Monitor** tab in the OMRON Utility dialog box. The following Data Monitor Screen will be displayed.



- The contents of all I/O words are displayed in hexadecimal by default.
- Click the up and down buttons to increase or decrease the displayed words by 100 word units.
- Use the horizontal scroll bar to scroll the displayed words (0 to 9.)
- The display type can be selected from hexadecimal, decimal, binary, and ASCII in the Display Type Field.
- Click **Print** to display the Print Dialog Box.

Switching Display Areas

- 1, 2, 3... 1. Click **Device** in the Data Monitor. The Device Dialog Box will be displayed.

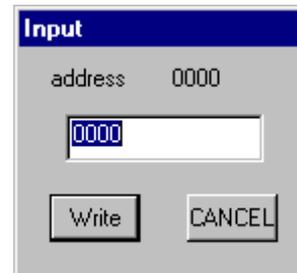


2. Set the area, set the address of the first word (10-word units) to be displayed or edited, and click **OK**.
 - Data from the specified area and specified first word will be displayed.
 - The last digit of the first word address will be set to 0 automatically, and the data will be displayed from there. For example, if 235 is input as the first word, the display will be from 230.

- If **Cancel** is clicked, the settings will not be saved and the dialog box will close.

Editing Data

- 1, 2, 3... 1. Using the Data Monitor, display the address for which data is to be changed. Click on the data.
2. Click **Edit**.
The Input Dialog Box will be displayed.



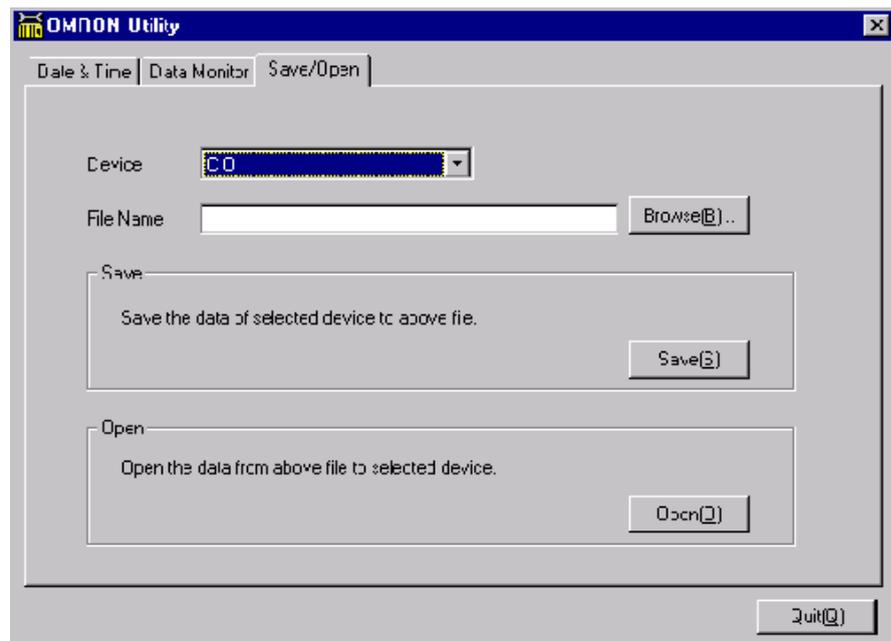
3. Input the new value, and click **Write**.
 - The contents will be updated.
 - If **Cancel** is clicked, the settings will not be saved and the dialog box will close.

7-4 Saving and Loading IOM Data

Data can be saved and loaded for each of the memory areas: I/O, Auxiliary Relay (AR), Holding Relay (HR), Link Relay (LR), and Data Memory (DM).

This section explains how to perform these operations.

- 1, 2, 3... 1. Click the **Save/Open** tab in the OMRON Utility Dialog Box. The following will be displayed.



2. In the **Device** selection box, select the area to be saved or loaded. The area selected in the Data Monitor will be the default.
3. Input the path and file name in **File Name**. The path and file name can be specified by clicking **Browse** and selecting the file in the dialog box.

4. Click either **Save** or **Open**.
 - If a file with the same name already exists when saving data, a message to confirm that the file is to be overwritten will be displayed. Click **OK** to overwrite the existing file. All words in the selected area will be saved in the CVS text format.
 - If **Open** is clicked, a confirmation message will be displayed. Click **OK** to open the data.

SECTION 8

Cycle Time

This section explains the methods for calculating cycle times and processing speeds for Open PLCs.

8-1	Cycle Time and I/O Refreshes	78
8-2	Output Response Time	78
8-3	Input Response Time	79

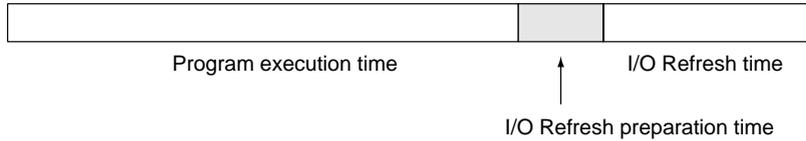
8-1 Cycle Time and I/O Refreshes

The cycle time is displayed in the Debugger Window on the ISaGRAF Workbench. The methods for calculating the preparation time and the execution time for I/O refreshes are outlined below.

Cycle time (read from the ISaGRAF Workbench)



Overseeing time is required during DEBUG communications of a maximum of 3 ms at 19.2 Kbps, and a maximum of 5 ms at 9,600 bps.



Maximum I/O Refresh Preparation Time

The maximum I/O refresh preparation time changes depending on I/O configuration. Calculate the maximum I/O refresh preparation time by adding 1 ms to the time calculated for 1 cycle for the C200HX/HG/HE PLCs. The time will thus be output response A + 1.27 ms + 1 ms. (Refer to the next section 8-2 *Output Response Time* for information on output response A.)

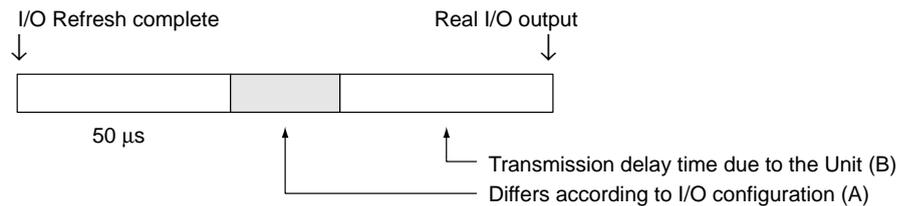
Maximum I/O Refresh Time

The maximum I/O refresh time changes depending on the specified number of I/O words.

Calculate as $25 \mu\text{s} \times \text{no. of words}$.

8-2 Output Response Time

The method for calculating the output response time (the time required until real I/O is output after the I/O refresh is completed) is shown below.

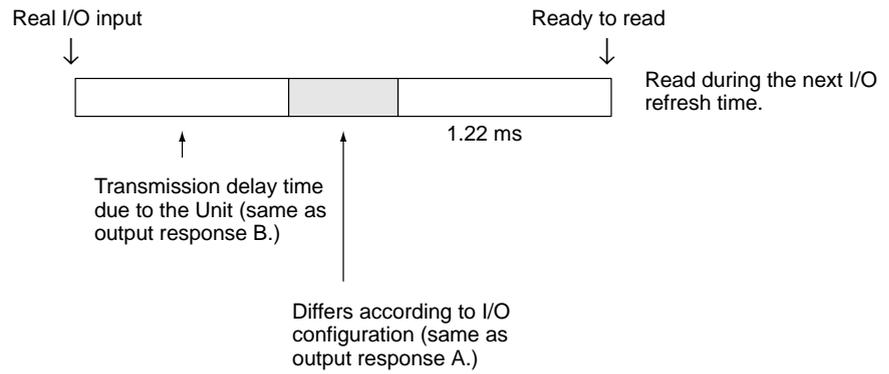


A: The I/O refresh time calculations are the same as for the C200HX/HG/HE PLCs. Refer to the *C200HX/HG/HE Operation Manual (W303)* for details.

B: Refer to information on I/O refresh times for typical Special I/O Units in the *C200HX/HG/HE Operation Manual (W303)*.

8-3 Input Response Time

The Input response time (the time required to read the data after real I/O input) is as follows:



SECTION 9

PC Card Board

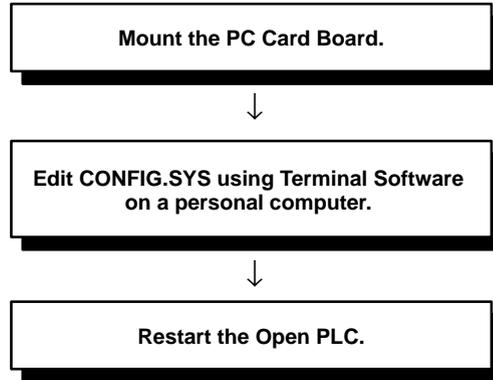
This section explains how to mount and set the optional PC Card Board.

9-1	Outline	82
9-2	Mounting PC Card Boards and PC Cards	83
	9-2-1 Mounting PC Card Boards	83
	9-2-2 Mounting and Removing PC Cards	84
9-3	Editing CONFIG.SYS	87
9-4	Boot Drive Settings	88

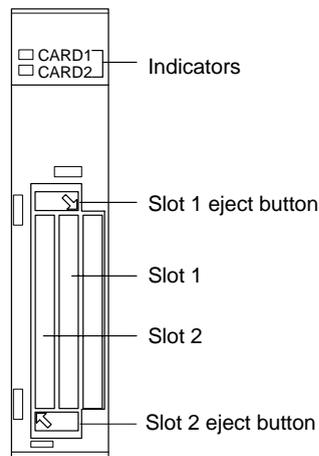
9-1 Outline

Commercially available ATA flash cards or ATA hard disk cards can be used if a C200PC-PCM01 PC Card Board is mounted to the Open PLC. By setting the system DIP switch, the ATA flash card or ATA hard disk card can be used as a boot drive. Refer to *9-4 Boot Drive Settings* for setting methods.

Procedure



Component Names and Functions



Applicable PC Cards

Use the following PC cards: Type I, II, or III ATA flash cards or ATA hard disk cards. Only one Type III card can be mounted, but two Type I or II cards can be mounted.

Indicators

Indicators	Color	Meaning
CARD 1	Orange	Accessing PC Card socket 1
CARD 2	Orange	Accessing PC Card socket 2

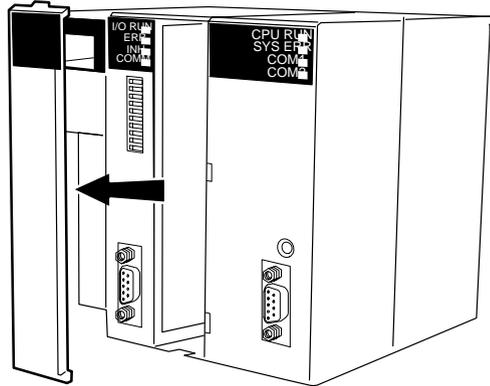
9-2 Mounting PC Card Boards and PC Cards

This section describes procedures for mounting PC Card Boards and for installing/removing PC cards.

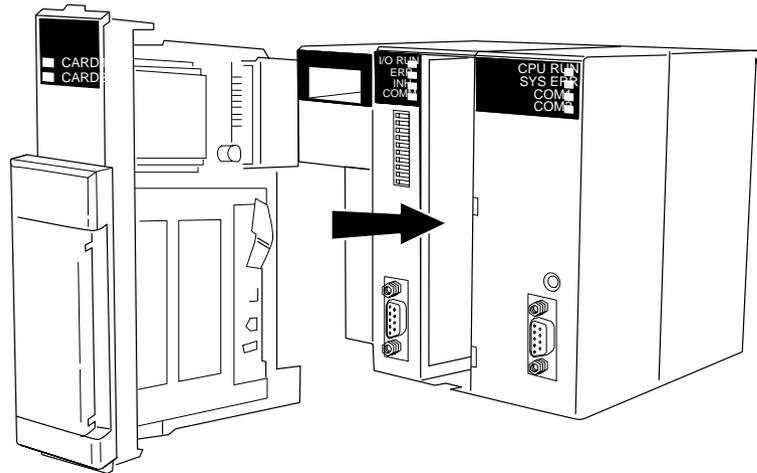
9-2-1 Mounting PC Card Boards

Mount a PC Card Board in the Open PLC CPU Unit

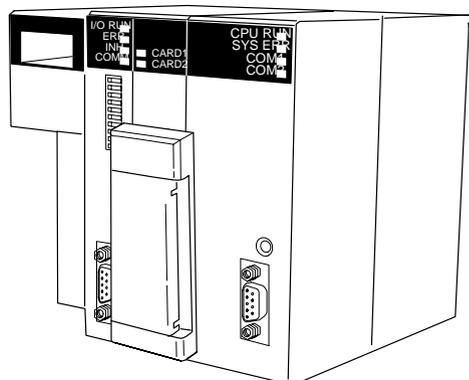
- 1, 2, 3... 1. Turn OFF the power to the Open PLC. Remove the option slot cover.



2. Insert the PC Card Board into the Open PLC CPU Unit.



3. Firmly insert the PC Card Board into the Open PLC connector. Press firmly until the hooks on the front of the PC Card Board lock in place.

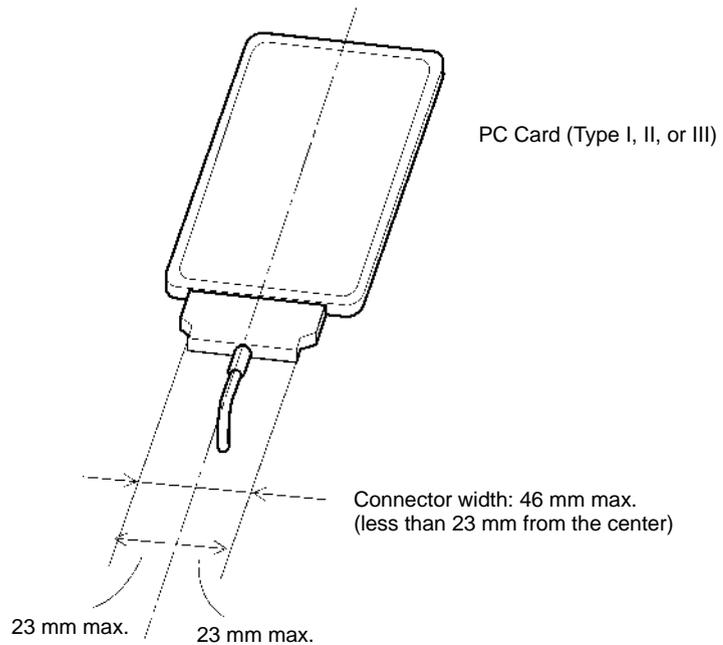


9-2-2 Mounting and Removing PC Cards

Mount a PC card into the PC card slot according to the following procedures.

PC Cards

Note When using PC cards with I/O connectors, make sure that the connector width is no more than 46 mm (less than 23 mm from the PC Card center to the edge of the connector as shown below). If the connector width is larger than 46 mm, the PC card slot cover cannot be attached.

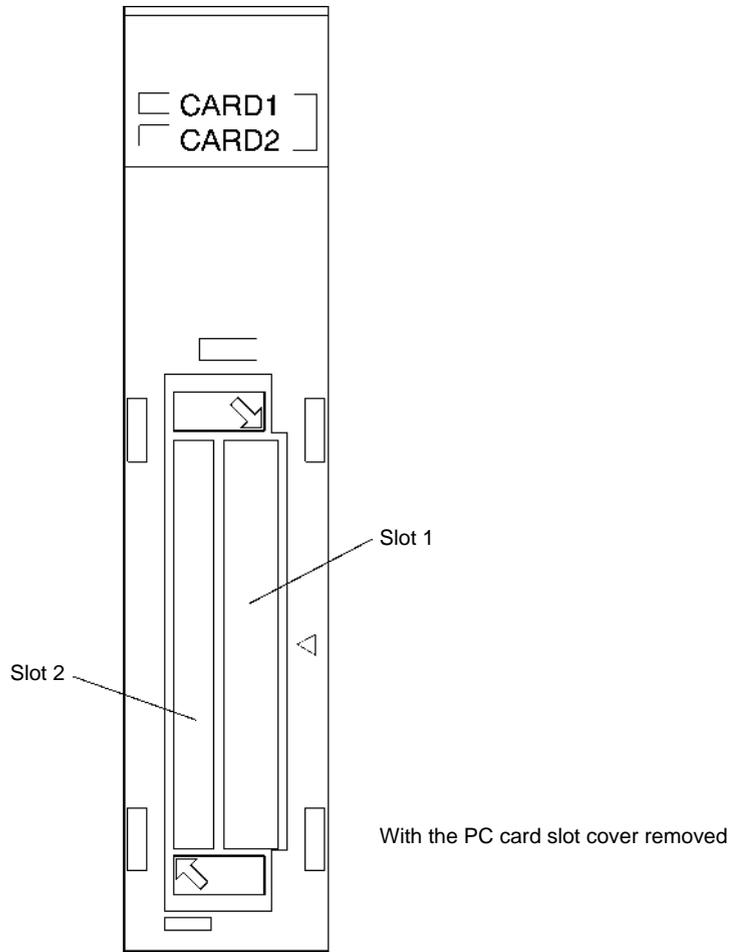


Note Use PC cards that fall within the following ranges of current consumption.

$$I_{5V} (1 \text{ slot}) \leq 0.5 \text{ A}, I_{12V} (1 \text{ slot}) \leq 0.1 \text{ A}$$

$$I_{5V} (2 \text{ slots}) + 3.4 \times I_{12V} (2 \text{ slots}) \leq 1.0 \text{ A}$$

PC Card Slots



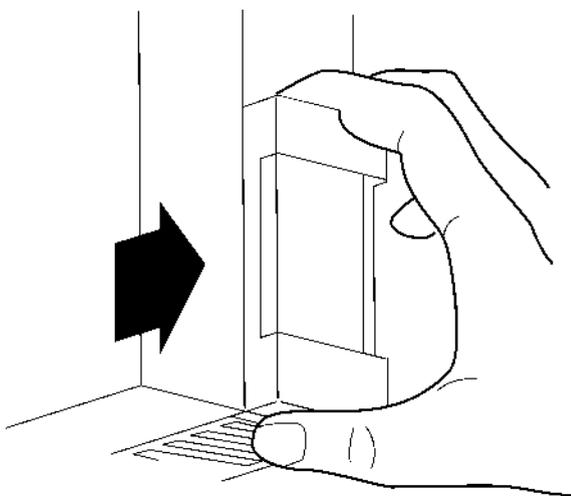
Slot 1: A Type I, II, or III PC card can be mounted in this slot.

Slot 2: A Type I,II, or III PC card can be mounted in this slot. If, however, a PC card is mounted in slot 1, a Type III PC card cannot be mounted in slot 2.

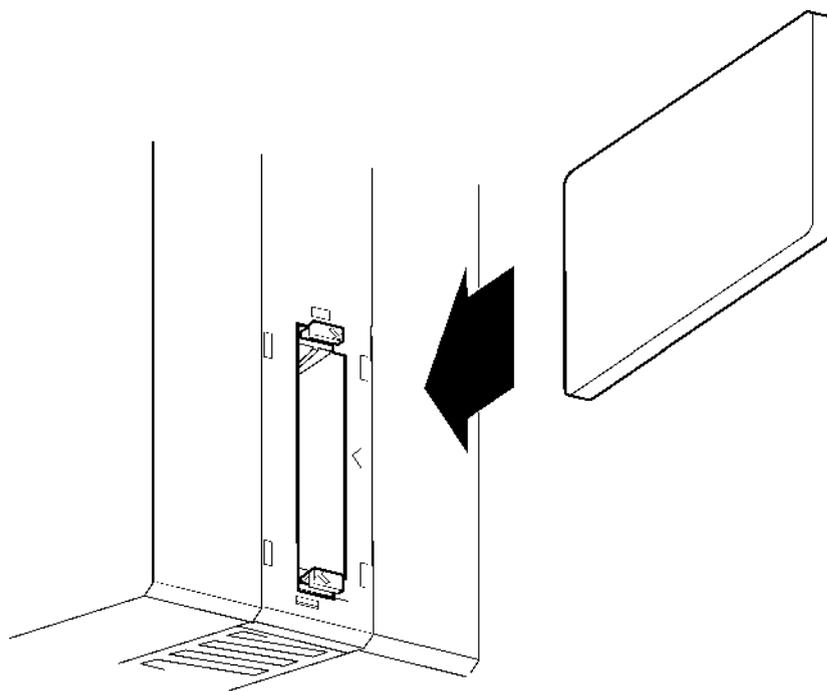
Note Always use the same type of card in each slot. If a different type of card is mounted in the same slot, an error will occasionally occur depending on the type of the card. If an error occurs, stop accessing the new card, replace with the previous card, access the card using the DIR command, replace with a new card again, and then check its operation.

Mounting PC Cards

- 1, 2, 3... 1. Remove the PC card slot cover as shown below.



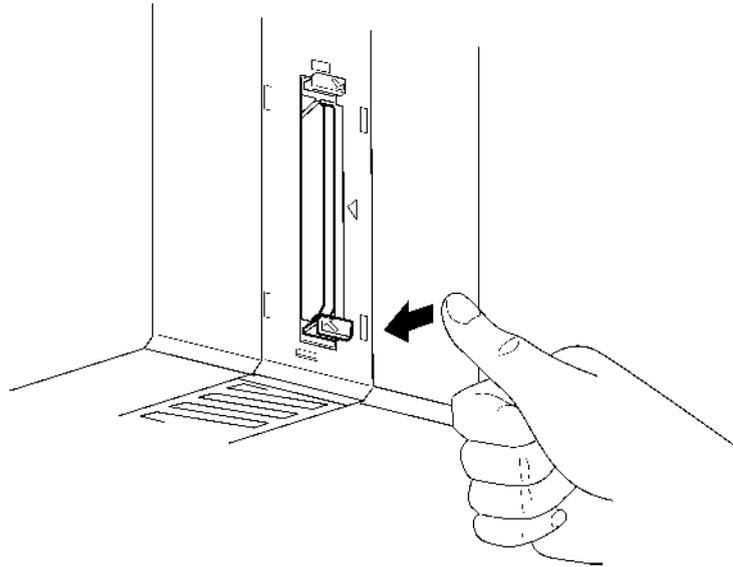
2. Mount a PC card into the PC card slot. Push it in until it is firmly locked in place.



3. Mount the PC card slot cover.

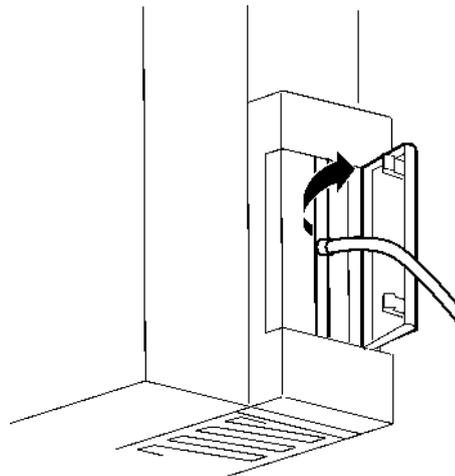
Removing PC Cards

- 1, 2, 3... 1. Remove the PC card slot cover.
2. Press the eject button as shown below.



3. Mount the PC card slot cover.

Note When using a modem card or LAN card, a cable needs to be connected to the PC card. When using either of them, pull out the cable from the PC card cable port.



9-3 Editing CONFIG.SYS

The Open PLC CONFIG.SYS file must be edited before the PC Card Board can be used. The following personal computer and connection cable are required to edit the CONFIG.SYS file.

- IBM PC/AT or compatible personal computer operating ANSI Terminal Software
- RS-232C Cross Cable for COM2 (XW2Z-200 V/500 V or commercial product), or a COM1 Special Cable (ES100-CT023-202)

- 1, 2, 3... 1. Connect the COM1 or COM2 port on the Open PLC CPU Unit to a COM port on the personal computer using the COM1 Special Cable or the RS-232C Cross Cable. (Refer to 4-1 *Component Names and Functions* for information on Open PLC COM1 and COM2 ports.)

2. If the cable is connected to the COM1 port, turn ON system DIP switch pins 8 and 9. If the cable is connected to the COM2 port, turn ON pins 7 and 9.
3. Start the terminal software under the following conditions: 9,600 bps, 8-bit data, no parity, 1 stop bit.
4. Turn ON the power supply to the Open PLC CPU Unit. The MS-DOS prompt will appear.
5. Input the following:

```
C:\>COPY CONFIG.PCM CONFIG.SYS
```

The following confirmation message will appear.

```
Overwrite CONFIG.SYS (Yes/No/All)?
```

6. Input **Y** and press **Enter**. The CONFIG.SYS file will be changed.
7. Turn OFF pin 9 of the system DIP switch and restart the Open PLC. Slot 1 will be allocated to D drive, and slot 2 will be allocated to E drive if pin 4 on the system DIP switch is turned OFF.
8. Insert an ATA flash card or an ATA hard disk card into the PC Card slot.

Note To restore the original CONFIG.SYS file (settings for no PC card), input the following at step 5 in the above procedure, and restart the Open PLC.

```
C:\>COPY CONFIG.ORG CONFIG.SYS
```

An error will occur when installing the device driver if the CONFIG.SYS file is changed and no PC Card Board is mounted to the Open PLC. MS-DOS will not start unless confirmation is made from the keyboard.

9-4 Boot Drive Settings

The following boot drives and drive configurations are set by setting system DIP switch pin 4.

Pin 4	C: (boot drive)	D:	E:
OFF	Internal flash disk	PC card slot 1	PC card slot 2
ON	PC card slot 1	Internal flash disk	PC card slot 2

Set the system DIP switch and restart the Open PLC to change the boot drive.

PC Cards Usable as Boot Drives

Only ATA flash cards or ATA hard disks can start the OS.

Note When starting the OS using the PC card, do not remove the PC card until the OS is shut down. Removing the PC card before the OS is shut down may result in hang-up or malfunction. Once the PC card is removed before the OS is shut down, any access to that PC card will not be allowed even if it is mounted again.

Note Starting the OS when Pin 4 is ON

- The system will start from the internal flash disk if there is no PC Card Board.
- The system will start from the internal flash disk if no PC card has been inserted.
- If there is no OS on the PC card, a “Non-system disk or disk error” will occur and the Open PLC will not start.

SECTION 10

Maintenance

This section explains how to replace the fan and backup batteries.

10-1	Replacing the Battery	90
10-2	Replacing the Fan Unit or Fans	91
10-2-1	Replacing the Fan Unit	91
10-2-2	Mounting and Removing Fans	92

10-1 Replacing the Battery

The backup battery for flash memory should be replaced periodically to prevent battery errors.

Battery Life

The effective battery life is 5 years regardless of how long the Unit is turned ON. Ambient temperature has a large impact on the memory backup time when the Unit is not in use. The memory backup time is greatly reduced if the ambient temperature is high. The relationship between the guaranteed and actual memory backup time, and the ambient temperature when the Unit is not in use, is shown in the following table.

Effective battery life	Memory backup time when Unit not in use	
	Guaranteed	Actual
5 years	10,000 hours (approx. 1 year)	43,000 hours (approx. 5 years)

Guaranteed time: Memory backup time with no power to the Unit at an ambient temperature of 55°C.

Actual time: Memory backup time with no power to the Unit at an ambient temperature of 25°C.

Battery Model

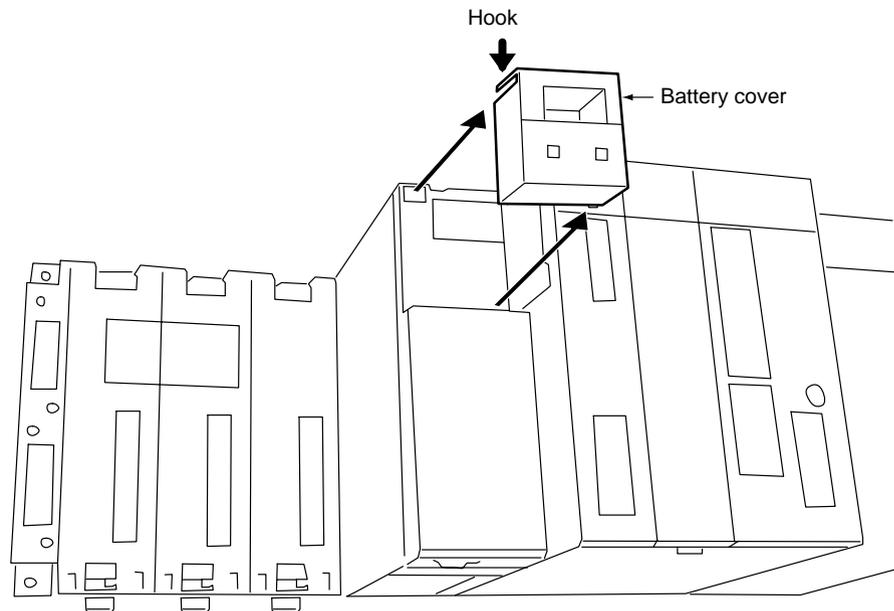
A C500-BAT08 Battery Set can be used.

Replacing the Battery

Replace the battery using the following procedure. Complete the process within 5 minutes, otherwise clock data, settings data, and internal memory data may be lost.

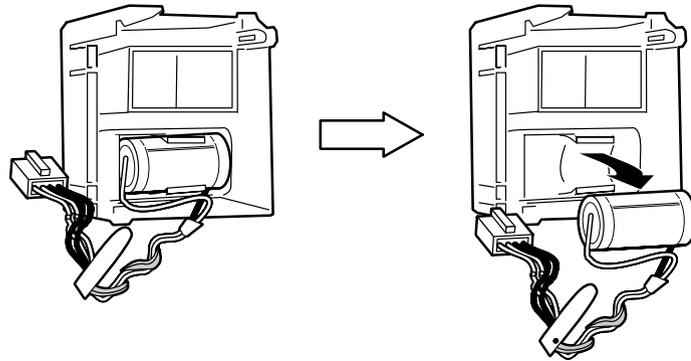
- 1, 2, 3... 1. Turn OFF the power supply to the Open PLC CPU Unit.
2. Lift up the hook on the top left of the battery cover, and remove the cover.

Note Pull the cover carefully because the battery is secured to the cover, and cables and a connector are connected to the battery.



3. Remove the connector to the old battery.

4. Remove the old battery from the battery holder on the battery cover.



- 5. Fit the new battery in the holder.
- 6. Attach the connector for the new battery.
- 7. Replace the battery cover.

Note The following actions may cause fire, eruption, or leakage of the battery. Do not do any of the following.

- Short the positive and negative terminals.
- Recharge the battery.
- Dismantle the battery.
- Heat the battery or throw it into fire.

10-2 Replacing the Fan Unit or Fans

This section describes procedures for replacing the Fan Unit or individual fans. Remove the fan when operating the C200PC-CPU01-R(-V1) without a fan.

10-2-1 Replacing the Fan Unit

Fan Life

Fan life is approximately 1 year. Replace the Fan Unit before the end of its life. It must be noted that the fan life varies depending on the ambient temperature.

Caution Periodically replace the fan. A broken fan may result in malfunction or burning.

- Note**
- 1. Do not remove the Fan Unit while power is being supplied.
 - 2. Periodically check whether the air filter in the Fan Unit's air intake port has become dirty or clogged. For removing the air filters, refer to the following section.

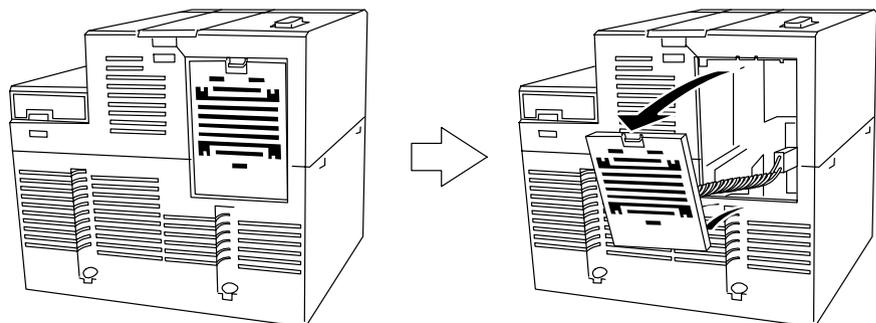
Fan Unit Model

Use the C200PC-FAN01 Fan Unit.

Procedure

Note Be sure to turn OFF the power supply to the Open PLC CPU Unit before replacing the Fan Unit.

- 1, 2, 3...**
- 1. Turn OFF the power to the Open PLC CPU Unit.
 - 2. Lift up the hook on the top of the Fan Unit, and remove the old Fan Unit.



3. Remove the connector.
4. Attach the connector for the new Fan Unit.
5. Attach the new Fan Unit to the Open PLC CPU Unit.

10-2-2 Mounting and Removing Fans

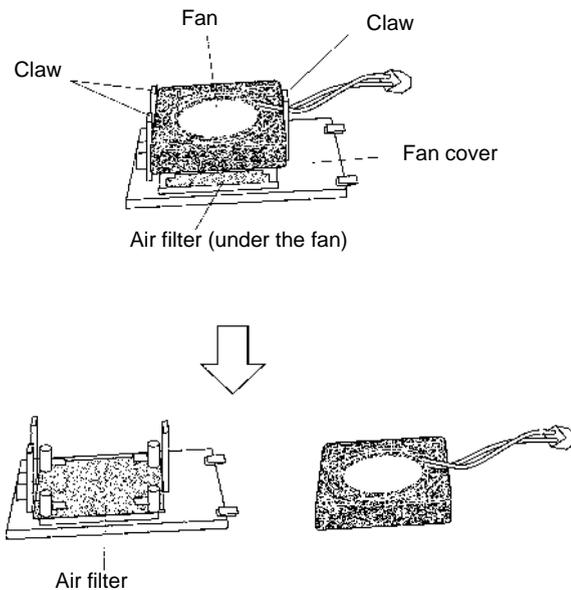
The C200PC-CPU01-R(-V1) operates without the fan provided that the ambient temperature range be between 0 and 50°C. Mount or remove the fan from the C200PC-CPU01-R(-V1) according to the following procedures.

Refer also to the following procedures when checking or cleaning the air filter.

- Note**
1. Carry out work only after turning OFF the power supply to the Open PLC.
 2. Do not remove the fan if the operating ambient temperature exceeds 50°C.
 3. Do not remove the fan from the C200PC-CPU15-G(-V1).

Removing the Fan

- 1, 2, 3...**
1. Remove the Fan Unit from the Open PLC according to the procedures in the previous section.
 2. While pressing down on the 3 claws shown below, remove the fan from the fan cover.



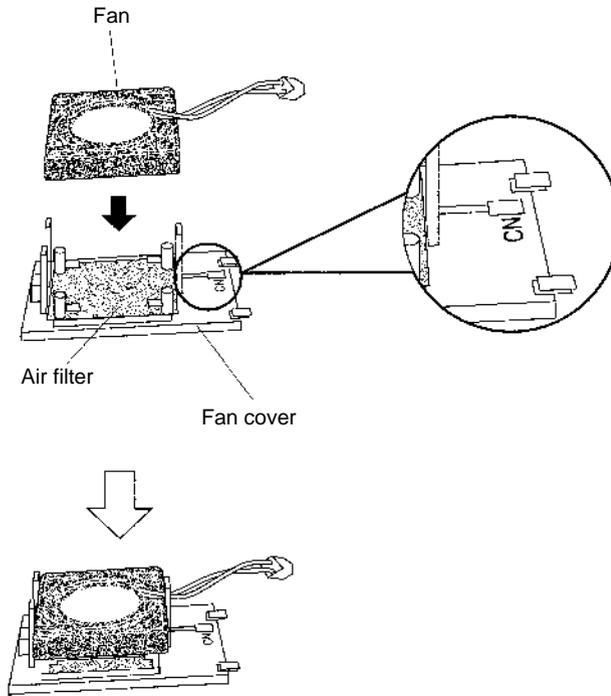
3. Remove the air filter from the fan cover.
4. Mount the fan cover on the Open PLC.

- Note**
1. When removing the fan from the fan cover, be sure to remove the air filter as well.
 2. Properly store the removed fan and air filter until they are mounted back on the Open PLC.

Mounting the Fan

Mount the fan on the fan cover according to the following procedures when putting it back on after removing it from the fan cover.

- 1, 2, 3... 1. Mount the air filter to the fan cover.
- 2. Mount the fan to the fan cover while paying attention to the fan orientation. As shown below, set the fan so that the fan cable and connector are placed at locations shown on the fan cover.



SECTION 11

Troubleshooting

This section provides information on error indications and OMRON error codes

11-1	Troubleshooting	96
11-1-1	ISaGRAF Errors	96
11-1-2	Hardware Errors	96
11-2	Indicators	97
11-3	ISaGRAF Error Codes	98

11-1 Troubleshooting

This section describes the probable causes and corrections for errors that occur during Open PLC operation.

11-1-1 ISaGRAF Errors

Error	Probable cause and correction
Cannot use the ISaGRAF Workbench in Windows NT. Communication is interrupted when DEBUG mode is entered.	Change as shown below the WS001 section of the isa.ini file located in the Exe directory under the directory where ISaGRAF has been installed. Refer to the ISaGRAF Workbench operation manual for details. <pre>[WS001] NT=1 Add this line Isa=C:\ISAWIN IsaExe=C:\ISAWIN\EXE IsaApl=C:\ISAWIN\APL IsaTmp=C:\ISAWIN\TMP</pre>
Communication is interrupted when DEBUG mode is entered.	The communications parameters are incorrect. Check that the communications parameters of the Workbench are set to the following: 19,200 bps, 8-bit data, no parity, 1 stop bit. An incorrect COM port has been specified. Check that the appropriate parameters were set for the COM port for the Workbench when the target software was installed. Check the COM port number in the communications settings of the Workbench. Check that the correct cable is being used. When generating the application code, check that ISA86M:TIC code for Intel has been selected from Compiler options under Code Generation. Check that the system DIP switch pins have been set correctly. All system DIP switch pins should be set to OFF when using the ISaGRAF Workbench. Delete the downloaded user program, and transfer the program again. Start the Open PLC at the same settings as when it was installed, and delete C:ISA11 . Input C:IDEL ISA11 .
Cannot upload.	The file cannot be uploaded if the upload information was not added when the file was downloaded. The communications parameters are incorrect. Check that the parameters are set to the following: 19,200 bps, 8-bit data, no parity, 1 stop bit, no flow control.
I/O is not refreshed or the wrong bits are output.	Check that the I/O Board connections were correct when the program was created. Be sure the variables for I/O are not set as internal variables. Refer to <i>Appendix F Different Indication of Word Addresses (Bit Addresses)</i> .
Cannot simulate.	Check that SIMULATE: Workbench Simulator has been selected from Compiler options under Code Generation.
Cannot write to variables.	An Input Unit or a read-only area has been specified in the I/O Board connections.

Note Refer to 11-3 *ISaGRAF Error Codes* for information on ISaGRAF error codes.

11-1-2 Hardware Errors

Cannot use PCMCIA Card.	Check that CONFIG.SYS has been changed. Check that the C200PC-PCM01 has been correctly inserted. Some cards need device drivers.
No video output for C200PC-CPU15-G(-V1).	The system DIP switch settings are incorrect. Turn ON pins 7 and 8.

11-2 Indicators

Indicators	Meaning
CPU RUN	<p>BIOS initialization has been completed.</p> <p>If the indicator does not light when the power is turned ON, the following causes are possible.</p> <ol style="list-style-type: none"> 1. The system DIP switch settings are incorrect. Turn OFF all switches and restart. 2. If the indicators still do not turn ON, the hardware may be malfunctioning.
SYS ERR	<p>Turns ON for abnormal temperature increases. Stops the output and CPU Unit. Reset the power supply to restart.</p> <p>This indicator will operate only when the Open PLC is started with the built-in OS.</p>
COM1, COM2	Flashes during communications.
I/O RUN	Lights when the ISaGRAF user program is running.
ERR	<p>Flashes when a non-fatal error occurs.</p> <p>Turns ON when a fatal error occurs.</p> <p>Remove the cause of the error and start the ISaGRAF user program. The error will automatically be cleared when the program is started.</p>
INH	<p>Turns ON when outputs are disabled.</p> <p>Turn OFF the Output OFF Bit (25215).</p>
COMM	Flashes when the communications port for the Host Link is being used. This port is not normally used.

Note The SYS ERR and I/O RUN indicators can be turned ON from the program. The indicators, therefore, have the meanings outlined above only when the built-in OS is used for the C200PC-CPU15-G(-V1).

11-3 ISaGRAF Error Codes

The following OMRON error codes (OEM error codes) have been added to the standard ISaGRAF DOS Target error codes.

Error		Error code
Fatal error.	Memory error	302
	I/O bus error	304
	Too many I/O Units	305
	I/O settings error	306
Non-fatal error.	I/O verification error	307
	Battery error	308
	Special I/O Unit error	309
	Remote I/O error	310
I/O Board error	---	320 to 323 (see note 1)
Other error	---	330 (see note 2)

- Error codes are not displayed on the Workbench. The error codes are displayed when the Terminal Software is connected.
- Errors will be cleared when the ISaGRAF program is started. Refer to the *C200HX/C200HG/C200HE Operation Manual (W303)* and remove the cause of the errors. Operate the ISaGRAF program only after removing the causes.

- Note**
1. The I/O Board parameters are incorrect, or the I/O Board is incorrect. Reinstall the I/O Board.
 2. If an "Other error" occurs, initialize the Open PLC and the I/O Memory using the following procedure:
 Input **C:\>PLC INIT**
 Input **C:\>PLC ECLR**
 Restart the Open PLC.

Appendix A Specifications

General Specifications

Item	Specification			
	C200PC-CPU01-R(-V1)		C200PC-CPU15-G(-V1)	
Current consumption (see note 1)	0.75 A	1.1 A (-V1)	1.7 A	1.8 A (-V1)
Ambient temperature	With fan: 0 to 55°C Without fan: 0 to 50°C		0 to 50°C A fan is required.	
External dimensions	141 x 130 x 125 mm (W x H x D)			
Mass (see note 2)	0.7 kg max.		0.8 kg max.	

Note Specifications other than those listed above are the same as for the C200HX/HG/HE PLCs. Refer to the *C200HX/C200HG/C200HE Installation Guide (W302)*.

Note 1. Use PC cards that fall within the following ranges of current consumption.

$$I_{5V} (1 \text{ slot}) \leq 0.5 \text{ A}, I_{12V} (1 \text{ slot}) \leq 0.1 \text{ A}$$

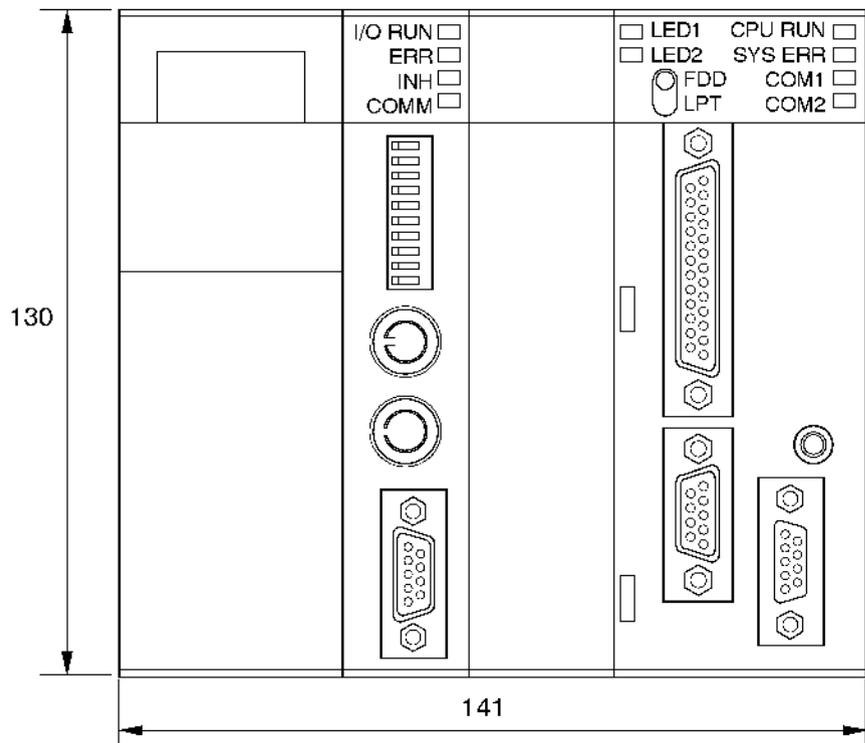
$$I_{5V} (2 \text{ slots}) + 3.4 \times I_{12V} (2 \text{ slots}) \leq 1.0 \text{ A}$$

2. The weight of the PC Card Board is 0.15 kg max.

External Dimensions

× Open PLC

(Unit: mm)

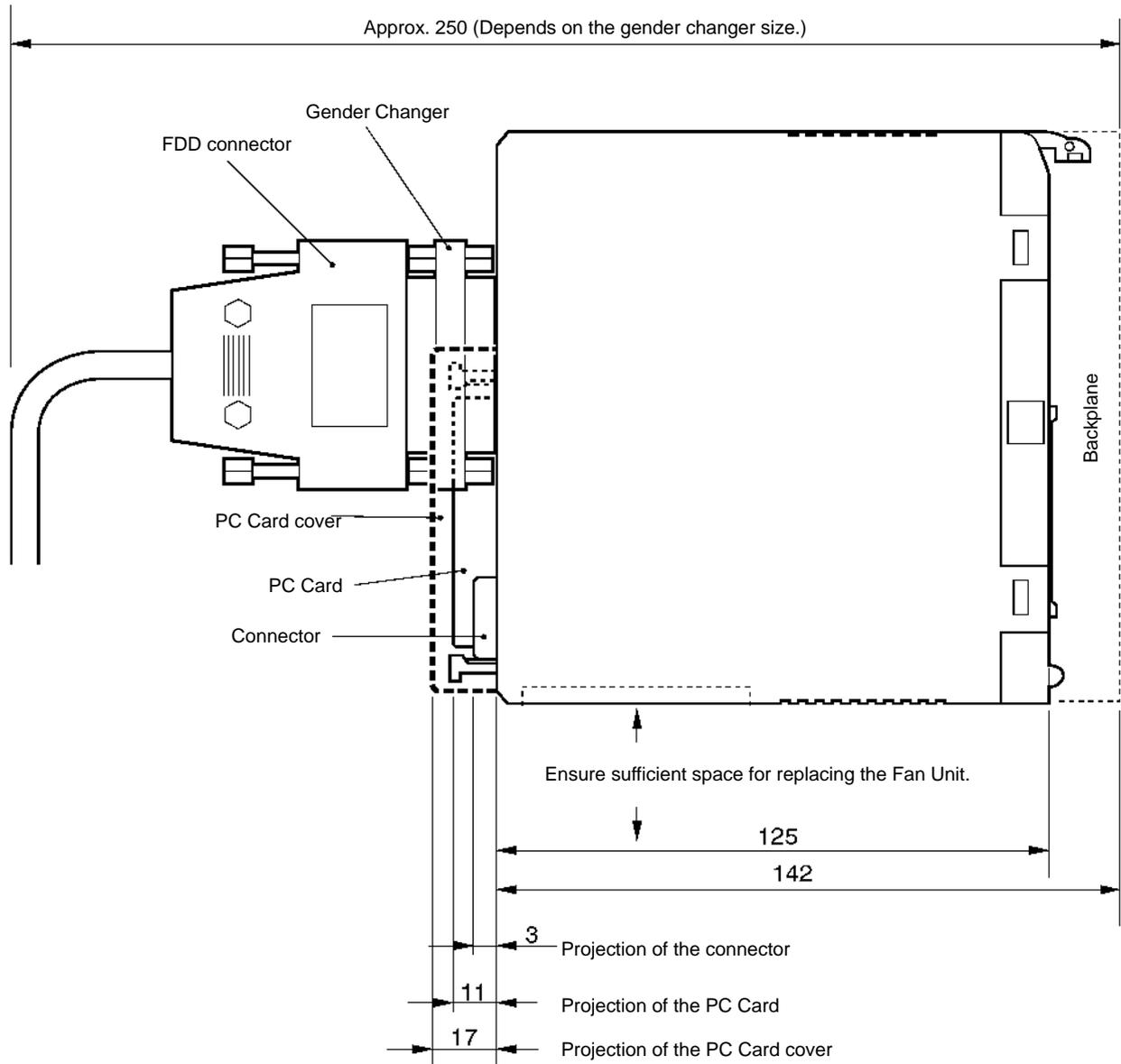


x Backplanes



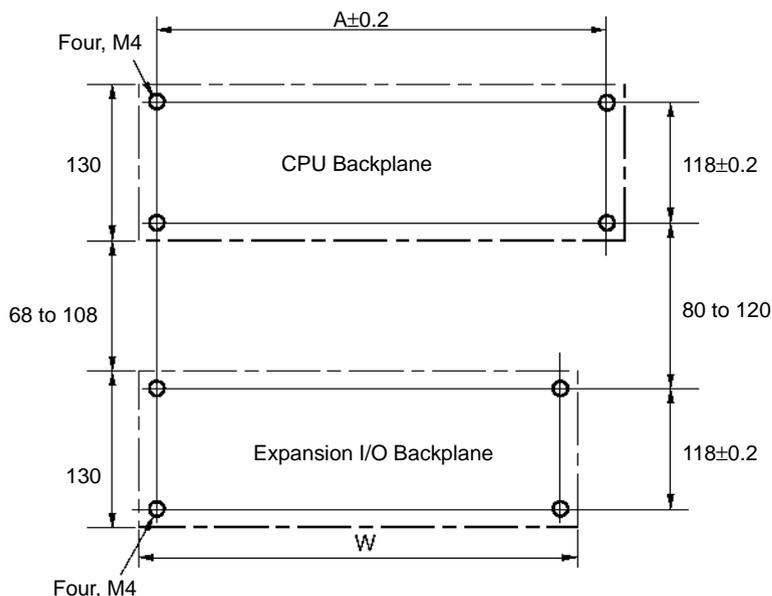
Item	Model	W
CPU Backplanes	C200PC-BC031	330
	C200PC-BC081	505

Mounting Height



Note When routing an I/O cable from the PC card, take the dimensions of the connector and cable into consideration.

Mounting Dimensions



Item	Model	A	W
CPU Backplanes	C200PC-BC031	316	330
	C200PC-BC081	491	505

Note For the Expansion I/O Backplanes, refer to the *C200HX/HG/HE Programmable Controllers Installation Guide (W302)*.

Characteristics

Item	Specifications
I/O bits	640 points (00000 to 02915, 30000 to 30915)
Work bits	6464 points (03000 to 23115, 31000 to 51115)
SR bits	1080 points (23200 to 25507, 25600 to 29915)
TR bits	8 points (TR 0 to TR 7)
HR bits	1600 points (HR 0000 to HR 9915)
AR bits	448 points (AR 0000 to AR 2715)
LR bits	1024 points (LR 0000 to LR 6315)
Timer/counter Area	512 points (TIM/CNT 000 to TIM/CNT 511)
DM Area	6,144 words (DM 0000 to DM 6143)
Power interruption backup areas	Holds the contents of Holding Relay (HR), Auxiliary Relay (AR), Counter (CNT), Data Memory (DM), and clock (RTC) Areas.
Memory backup period	Battery life is five years at 25°C. The life will be reduced if the ambient temperature is higher than 25°C. Replace the battery within a week of the battery error indicator (ALARM) turning ON. Insert the new battery within 5 minutes of removing the old one.
Self-diagnosis functions	I/O verification errors, memory errors, battery errors, I/O bus errors, remote I/O errors, other errors.

Note The allocation of the above areas are the same as for the C200HX/HG/HE PLCs. Refer to the *C200HX/C200HG/C200HE Operation Manual (W303)*.

Maximum I/O Numbers

I/O points	No. of Expansion I/O Racks	No. of High-density I/O Units (Group-2 Units)	No. of Special I/O Units
848	2	10	10

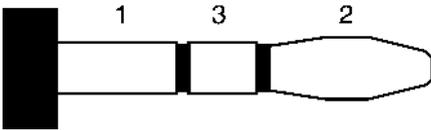
Appendix B

Connector Specifications

Serial Communications Interface

COM1 Connector Signal Assignments

Pin No.	Signal
1	0V
2	RD (RXD)
3	TD (TXD)



- **Recommended Cable for COM 1 (OMRON)**

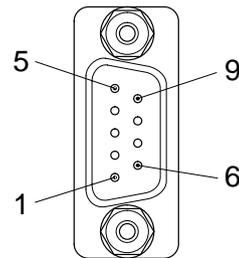
ES100-CT023-202 (D-sub 9-pin female connector, for IBM PC/AT or compatible)

COM2 Signal Assignments

Pin No.	Signal abbreviation	Signal name	Direction
1	CD	Carrier detector	Input
2	RD (RXD)	Receive data	Input
3	SD (TXD)	Send data	Output
4	ER (DTR)	Data terminal ready	Output
5	SG (GND)	Signal ground	---
6	DR (DSR)	Data set ready	Input
7	RS (RTS)	Request send	Output
8	CS (CTS)	Can send	Input
9	CI (RI)	Call indicator	Input

Note Signal direction refers to the I/O to and from the Open PLC.

Open PLC connector



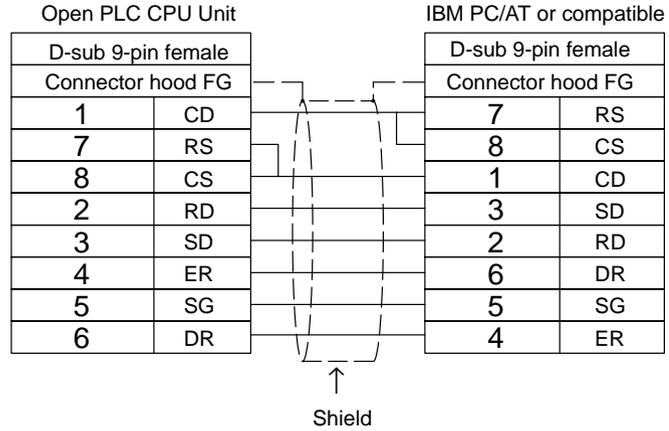
(D-sub 9-pin male)

- **Recommended Cables (OMRON Product)**

XW2Z-200V (D-sub 9-pin male connector, 2 m)

XW2Z-500V (D-sub 9-pin male connector, 5 m)

• Connections

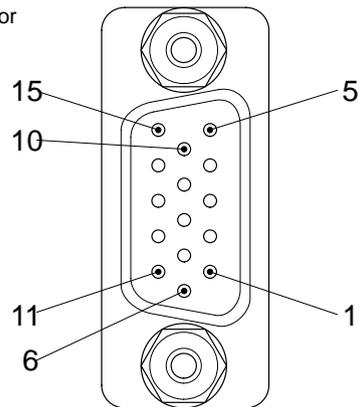


VGA Interface (C200PC-CPU15-G(-V1))

VGA Connector Signal Assignments

Pin No.	Signal abbreviation	Signal name	Direction
1	R	Red Video	Output
2	G	Green Video	Output
3	B	Blue Video	Output
4	---	NC	---
5	FG	Safety Ground	---
6	RG	Red Ground (analog video signal)	---
7	GG	Green Ground (analog video signal)	---
8	BG	Blue Ground (analog video signal)	---
9	---	NC	---
10	FG	Safety Ground	---
11	---	NC	---
12	---	NC	---
13	HSYNC	Horizontal Sync	Output
14	VSYNC	Vertical Sync	Output
15	---	NC	---

VGA connector

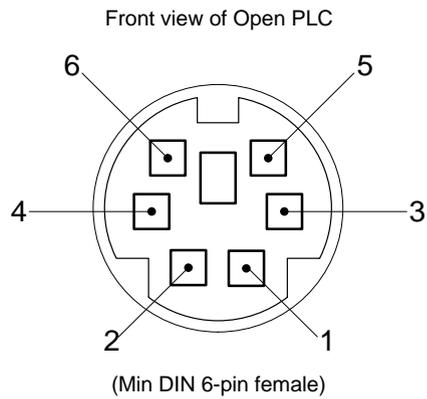


(Shrink D-sub 15-pin female)

Keyboard Interface (C200PC-CPU15-G(-V1))

Pin No.	Signal	Name	Direction
1	DATA	Data	I/O
2	---	Not used.	---
3	SG (GND)	Signal ground	---
4	+5 V	---	Output
5	CLK	Clock	I/O
6	---	Not used.	---

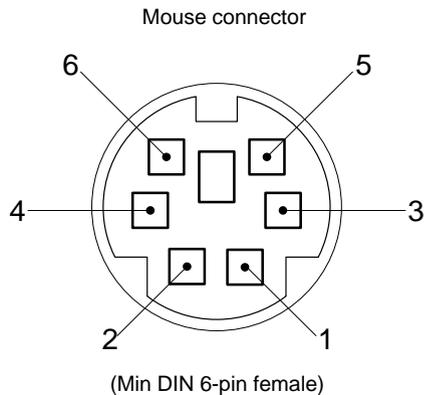
Note Signal direction refers to the I/O to and from the Open PLC.



Mouse Interface (C200PC-CPU15-G(-V1))

Pin No.	Signal abbreviation	Name	Direction
1	MSDAT	Data	I/O
2	---	Not used.	---
3	SG (GND)	Signal ground	---
4	+5 V		Output
5	MSCLK	Clock	I/O
6	---	Not used.	---

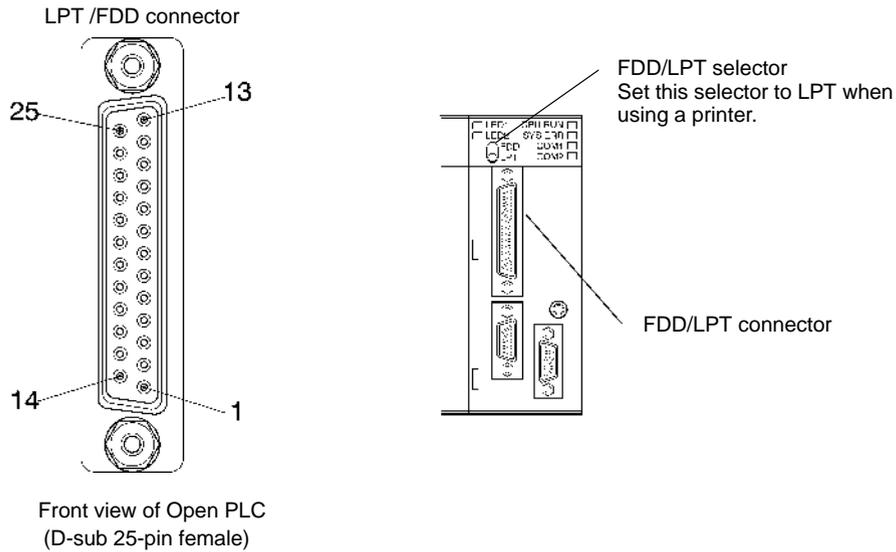
Note Signal direction refers to the I/O to and from the Open PLC.



Printer Interface (C200PC-CPU15-G(-V1))

Pin No.	Signal abbreviation	Name	Direction
1	STROBE	Strobe	Output
2	DATA0	Send data	Output
3	DATA1		
4	DATA2		
5	DATA3		
6	DATA4		
7	DATA5		
8	DATA6		
9	DATA7		
10	ACK	Acknowledge	Input
11	BUSY	Busy	Input
12	PE	Paper out	Input
13	SLCT	Select	Input
14	AUTOFD	Autofeed	Output
15	ERR	Error	Input
16	INIT	Initialization	Output
17	SLCTIN	Select IN	Output
18 to 25	SG (GND)	Signal ground	---

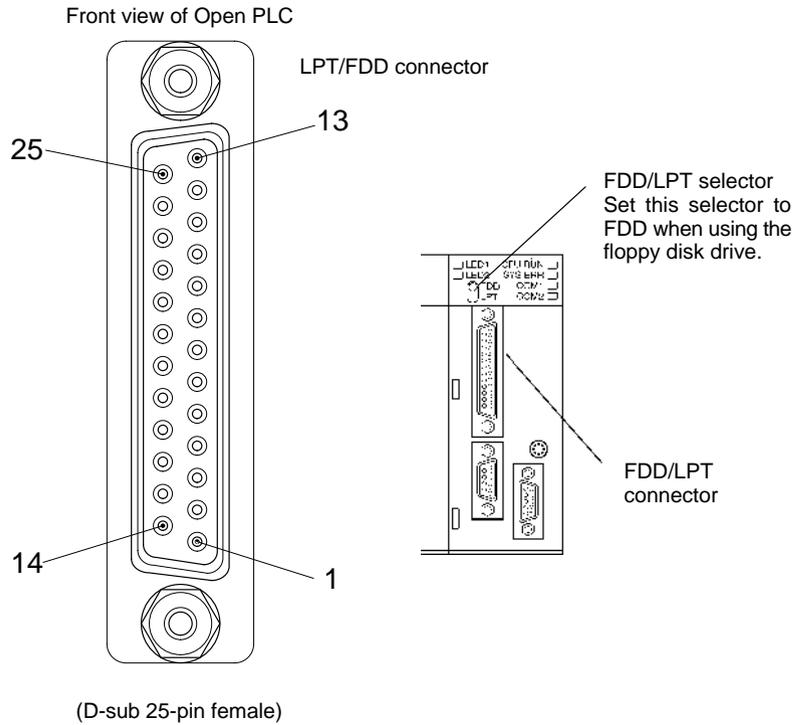
Note Signal direction refers to the I/O to and from the Open PLC.



Floppy Disk Drive Interface (C200PC-CPU15-G(-V1))

Floppy Disk Drive Interface Signal Assignments

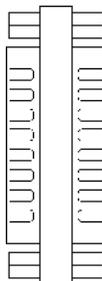
Pin No.	Name
1	MODE
2	INDEX*
3	TRK0*
4	WPRT*
5	FDRD*
6	DSCHG*
7	NC
8	FDA*
9	MONA*
10	FDB
11	MONB*
12	WRDT*
13	FDWE*
14	NC
15	SIDE*
16	DIRC*
17	STEP*
18	GND
19	GND
20	GND
21	GND
22	GND
23	GND
24	GND
25	GND



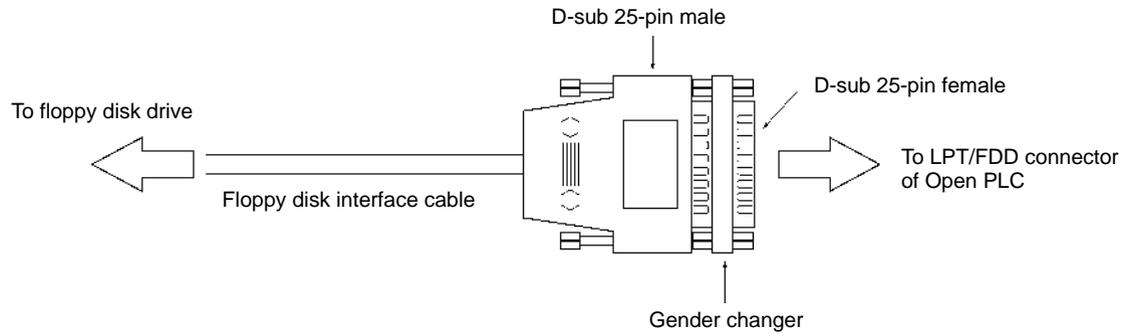
Connecting the Floppy Disk Drive Cable

Use the cable supplied with the CV500-FDD01/02 FDD Unit. The CV500-FDD01/02 Floppy Disk Drive Interface has a D-sub 25-pin male connector, and the cable is D-sub 25-pin female-to-female cable.

The Open PLC has a D-sub 25-pin female LPT/FDD connector. To use the enclosed cable, use a D-sub 25-pin male-to-male gender changer (to change from female to male).



• Connection Method



• Supported Floppy Disks

The following floppy disks can be used.

Drive	Usable disks
Drive A	1.44 MB, 2HD 720 KB, 2DD
Drive B	1.44 MB, 2HD

Appendix C

Using the I/O Registers

This section explains how to use the registers mapped in the IBM PC/AT or compatible I/O areas.

I/O Registers

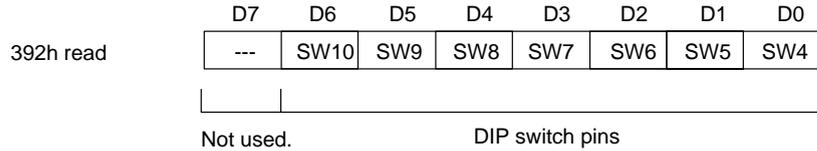
The registers are mapped as shown in the following table.

Address	Read/write	Register
390H	Read/write	Do not use.
391H	Read	Do not use.
391H	Write	Do not use.
392H	Read	DIP switch register.
392H	Write	Do not use.
393H	Read/write	LED/ temperature detection register.

The register details are shown below.

DIP Switch Register

This register is used to read the DIP switch settings. D7 is not used.



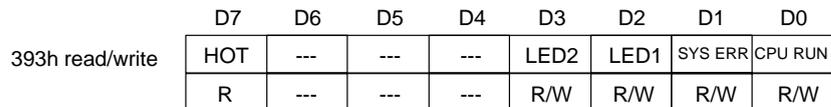
1: DIP switch pin OFF.

0: DIP switch pin ON.

The Open PLC has a total of ten DIP switch pins, but only seven pins can be read.

Indicator/ Temperature Detection Register

This register is used to light the Program Controllable indicators and for temperature detection. D6 to D4 are not used.



- **CPURUN, SYSERR, LED1, LED2**

The appropriate indicator is turned ON or OFF.

1: Indicator ON

0: Indicator OFF

- **HOT (Temperature Detection Bit)**

The indicator will turn ON if the internal Unit temperature exceeds the threshold value (approximately 80°C).

1: Temperature increase detected.

0: Normal

Appendix D

Recommended Peripheral Devices

This section lists the recommended peripheral devices for the Open PLC.

Device	Model	Specifications	Remarks
COM1 Special Cable	ES100-CT023-202	Mini-jack and D-sub 9-pin female connector	
COM2 cable	XW2Z-200V	D-sub 9-pin female connector, inch threads, 2 m	
	XW2Z-500V	D-sub 9-pin female connector, inch threads, 5 m	
Floppy disk drive	CV500-FDD01	3.5-inch FD1 drive	The gender changer listed below is required.
	CV500-FDD02	3.5-inch FD2 drive	
Gender changer for FD drive	Non-OMRON product	D-sub 25-pin female-to-male converter, inch threads	
Keyboard	PS/2 keyboard (non-OMRON product)	Mini DIN 6-pin	
Mouse	PS/2 mouse (non-OMRON product)	Mini DIN 6-pin	
Replacement fan	C200PC-FAN01	Fan, dust filter	
Replacement battery	C500-BAT08		

Note All products are OMRON products unless otherwise specified.

Appendix E

Differences from Standard ISaGRAF DOS Target Software

The following differences exist between C200PC-TG001-EF2 ISaGRAF Target Software and standard ISaGRAF DOS Target Software.

Non-standard Specifications

- Only the OMRON I/O Boards specified at installation can be used.
- The MODBUS protocol is not supported.
- No memory backup is provided for ISaGRAF variables during power failures. If DM is used, the data prior to the power failure will be maintained.
- Timer accuracy is 1 ms.
- The OPERATE command cannot be used with OMRON I/O Boards.
- Connection to Ethernet is not supported.

Precautions

- The Target Software must conform to ISaGRAF version 3.23.
- The maximum capacity of the ISaGRAF user program is 64 Kbytes. If the ISaGRAF version 3.23 upload function is used, the available area in the user program will be reduced because project information is included with the program data.

Appendix F

Different Indication of Word Addresses (Bit Addresses)

Word Addresses

The Workbench I/O connection word addresses and bit addresses do not correspond to those of OMRON PLCs such as C and CV-series PLCs. The default settings for the ISaGRAF Workbench show the first word (bit) starting from 1. All OMRON words (bits) start from 0.

Changing the First Word

Perform the following operation to change the address of the first word (I/O address) to zero.

Select **Numbering** under **Options** in the I/O connection window, and change **Channels** from 1 to 0 under **First number for**.

Note This setting will be applied to all projects.

Appendix G

License Agreement

TO OEM CUSTOMER SUBLICENSE AGREEMENT FOR DEDICATED SYSTEMS

END-USER LICENSE AGREEMENT FOR MICROSOFT SOFTWARE

IMPORTANT-READ CAREFULLY: This End-User License Agreement (“EULA”) is a legal agreement between you (either an individual or a single entity) and the manufacturer (“Manufacturer”) of the special purpose computing device (“SYSTEM”) you acquired which includes certain Microsoft software product(s) installed on the SYSTEM (“SOFTWARE PRODUCT” or “SOFTWARE”). The SOFTWARE includes computer software, the associated media, any printed materials, and any “online” or electronic documentation. By installing, copying or otherwise using the SOFTWARE, you agree to be bound by the terms of this EULA. If you do not agree to the terms of this EULA, Manufacturer and Microsoft Licensing, Inc. (“MS”) are unwilling to license the SOFTWARE to you. In such event, you may not use or copy the SOFTWARE, and you should promptly contact Manufacturer for instructions on return of the unused product(s) for a refund.

SOFTWARE LICENSE

The SOFTWARE is protected by copyright laws and international copyright treaties, as well as other intellectual property laws and treaties. The SOFTWARE is licensed, not sold.

- 1. GRANT OF LICENSE.** This EULA grants you the following rights:
 - **Software.** You may use the SOFTWARE as installed on the SYSTEM.
 - **Application Sharing.** The SOFTWARE may contain technology that enables applications to be shared between two or more SYSTEMS, even if an application is installed on only one of the SYSTEMS. You should consult your application license agreement or contact the application licensor to determine whether sharing the application is permitted by its licensor.
 - **Storage/Network Use.** If the SOFTWARE PRODUCT is installed on the SYSTEM over an internal network from a server, you must acquire and dedicate a license for the SOFTWARE PRODUCT for each SYSTEM on which the SOFTWARE PRODUCT is used or to which it is distributed. A license for the SOFTWARE PRODUCT may not be shared or used concurrently on different SYSTEMS.
 - **Back-up Copy.** If MANUFACTURER has not included a copy of the SOFTWARE on separate media with the SYSTEM, you may make a single copy of the SOFTWARE for use solely for archival purposes with the SYSTEM.
- 2. DESCRIPTION OF OTHER RIGHTS AND LIMITATIONS.**
 - **Limitations on Reverse Engineering, Decompilation and Disassembly.** You may not reverse engineer, decompile, or disassemble the SOFTWARE, except and only to the extent that such activity is expressly permitted by applicable law notwithstanding this limitation.
 - **Single SYSTEM.** The SOFTWARE is licensed with the SYSTEM as a single integrated product. The SOFTWARE may only be used with the SYSTEM.
 - **Rental.** You may not rent or lease the SOFTWARE.
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Revision History

A manual revision code appears as a suffix to the catalog number on the front cover of the manual.

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↑
Revision code

The following table outlines the changes made to the manual during each revision. Page numbers refer to the previous version.

Revision code	Date	Revised content
1	July 1998	Original production
2	April 1999	Pages 32, 94, 107: Minor corrections were made.
3	June 2001	Information on the C200PC-CPU01-R-V1 and CPU15-G-V1 added though the manual. In addition, the following change was made. Page 28: Installation procedures for Windows 98 added.