Open PLC
ISaGRAF Target Software

OPERATION MANUAL
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.

© OMRON, 1998
All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form, or by any means, mechanical, electronic, photocopying, recording, or otherwise, without the prior written permission of OMRON.

No patent liability is assumed with respect to the use of the information contained herein. Moreover, because OMRON is constantly striving to improve its high-quality products, the information contained in this manual is subject to change without notice. Every precaution has been taken in the preparation of this manual. Nevertheless, OMRON assumes no responsibility for errors or omissions. Neither is any liability assumed for damages resulting from the use of the information contained in this publication.
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.
# TABLE OF CONTENTS

**PRECAUTIONS** ................................................................. vii
  1 Intended Audience ......................................................... viii
  2 General Precautions ...................................................... viii
  3 Safety Precautions ........................................................ viii
  4 Operating Environment Precautions ..................................... viii
  5 Application Precautions .................................................. ix
  6 EC Directives ............................................................... xi

**SECTION 1 – Features and System Configuration** ................. 1
  1-1 Features ................................................................. 2
  1-2 System Configuration .................................................. 3

**SECTION 2 – Components** .................................................. 5
  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

**SECTION 3 – Preparing for Operation: Overview** .................. 11

**SECTION 4 – Setup** .......................................................... 13
  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
    4-2-1 Installation and Operation of ISaGRAF Target Software ... 19
    4-2-2 C200PC-CPU15-G (-V1) System Settings ..................... 20
  4-3 Mounting to the Backplane ......................................... 21

**SECTION 5 – Installation** .................................................. 23
  5-1 Installation Summary .................................................. 24
  5-2 ISaGRAF Workbench Installation ..................................... 24
  5-3 ISaGRAF Target Software Installation ............................. 24
    5-3-1 Outline ............................................................ 24
    5-3-2 Cable Connections and System DIP Switch Settings ......... 25
    5-3-3 Terminal Software Settings ..................................... 25
    5-3-4 File Transfer ..................................................... 25
    5-3-5 Restarting the Open PLC ....................................... 26
  5-4 Installation of OMRON Utilities ..................................... 26

**SECTION 6 – ISaGRAF Operation** ........................................ 31
  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
    6-3-2 Operation Procedure ............................................ 40
    6-3-3 Starting the ISaGRAF Workbench ................................ 41
    6-3-4 Creating a New Project ......................................... 41
    6-3-5 Creating a New Program ....................................... 42
# Table of contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-3-6</td>
<td>Registering Variables in Dictionaries</td>
<td>42</td>
</tr>
<tr>
<td>6-3-7</td>
<td>Connecting I/O</td>
<td>45</td>
</tr>
<tr>
<td>6-3-8</td>
<td>Programming</td>
<td>51</td>
</tr>
<tr>
<td>6-3-9</td>
<td>Compiler Option Settings and Generation of Application Code</td>
<td>60</td>
</tr>
<tr>
<td>6-3-10</td>
<td>Simulation</td>
<td>62</td>
</tr>
<tr>
<td>6-3-11</td>
<td>Downloading and Executing the Application Code</td>
<td>63</td>
</tr>
<tr>
<td>6-4</td>
<td>Backing Up and Restoring Projects</td>
<td>65</td>
</tr>
<tr>
<td>SECTION 7 – OMRON Utilities</td>
<td></td>
<td>69</td>
</tr>
<tr>
<td>7-1</td>
<td>OMRON Utilities</td>
<td>70</td>
</tr>
<tr>
<td>7-1-1</td>
<td>Outline</td>
<td>70</td>
</tr>
<tr>
<td>7-1-2</td>
<td>Starting and Exiting OMRON Utilities</td>
<td>70</td>
</tr>
<tr>
<td>7-2</td>
<td>Open PLC Clock Settings</td>
<td>72</td>
</tr>
<tr>
<td>7-3</td>
<td>Data Monitor</td>
<td>72</td>
</tr>
<tr>
<td>7-3-1</td>
<td>Data Monitor</td>
<td>72</td>
</tr>
<tr>
<td>7-3-2</td>
<td>Using the Data Monitor</td>
<td>73</td>
</tr>
<tr>
<td>7-4</td>
<td>Saving and Loading IOM Data</td>
<td>74</td>
</tr>
<tr>
<td>SECTION 8 – Cycle Time</td>
<td></td>
<td>77</td>
</tr>
<tr>
<td>8-1</td>
<td>Cycle Time and I/O Refreshes</td>
<td>78</td>
</tr>
<tr>
<td>8-2</td>
<td>Output Response Time</td>
<td>78</td>
</tr>
<tr>
<td>8-3</td>
<td>Input Response Time</td>
<td>79</td>
</tr>
<tr>
<td>SECTION 9 – PC Card Board</td>
<td></td>
<td>81</td>
</tr>
<tr>
<td>9-1</td>
<td>Outline</td>
<td>82</td>
</tr>
<tr>
<td>9-2</td>
<td>Mounting PC Card Boards and PC Cards</td>
<td>83</td>
</tr>
<tr>
<td>9-2-1</td>
<td>Mounting PC Card Boards</td>
<td>83</td>
</tr>
<tr>
<td>9-2-2</td>
<td>Mounting and Removing PC Cards</td>
<td>84</td>
</tr>
<tr>
<td>9-3</td>
<td>Editing CONFIG.SYS</td>
<td>87</td>
</tr>
<tr>
<td>9-4</td>
<td>Boot Drive Settings</td>
<td>88</td>
</tr>
<tr>
<td>SECTION 10 – Maintenance</td>
<td></td>
<td>89</td>
</tr>
<tr>
<td>10-1</td>
<td>Replacing the Battery</td>
<td>90</td>
</tr>
<tr>
<td>10-2</td>
<td>Replacing the Fan Unit or Fans</td>
<td>91</td>
</tr>
<tr>
<td>10-2-1</td>
<td>Replacing the Fan Unit</td>
<td>91</td>
</tr>
<tr>
<td>10-2-2</td>
<td>Mounting and Removing Fans</td>
<td>92</td>
</tr>
<tr>
<td>SECTION 11 – Troubleshooting</td>
<td></td>
<td>95</td>
</tr>
<tr>
<td>11-1</td>
<td>Troubleshooting</td>
<td>96</td>
</tr>
<tr>
<td>11-1-1</td>
<td>ISaGRAF Errors</td>
<td>96</td>
</tr>
<tr>
<td>11-1-2</td>
<td>Hardware Errors</td>
<td>96</td>
</tr>
<tr>
<td>11-2</td>
<td>Indicators</td>
<td>97</td>
</tr>
<tr>
<td>11-3</td>
<td>ISaGRAF Error Codes</td>
<td>98</td>
</tr>
<tr>
<td>Appendix</td>
<td></td>
<td>99</td>
</tr>
<tr>
<td>A –</td>
<td>Specifications</td>
<td>99</td>
</tr>
<tr>
<td>B –</td>
<td>Connector Specifications</td>
<td>103</td>
</tr>
<tr>
<td>C –</td>
<td>Using the I/O Registers</td>
<td>109</td>
</tr>
<tr>
<td>D –</td>
<td>Recommended Peripheral Devices</td>
<td>111</td>
</tr>
<tr>
<td>E –</td>
<td>Differences from Standard ISaGRAF DOS Target Software</td>
<td>113</td>
</tr>
<tr>
<td>F –</td>
<td>Different Indication of Word Addresses (Bit Addresses)</td>
<td>115</td>
</tr>
<tr>
<td>G –</td>
<td>License Agreement</td>
<td>117</td>
</tr>
<tr>
<td>Index</td>
<td></td>
<td>121</td>
</tr>
<tr>
<td>Revision History</td>
<td></td>
<td>125</td>
</tr>
</tbody>
</table>
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.

1 Intended Audience ................................................................. viii
2 General Precautions ............................................................. viii
3 Safety Precautions .............................................................. viii
4 Operating Environment Precautions ..................................... viii
5 Application Precautions ....................................................... ix
6 EC Directives ................................................................. xi
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. 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

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

- 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](image)

Main Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>CPU</th>
<th>Main memory</th>
<th>VGA board</th>
<th>Printer port</th>
</tr>
</thead>
<tbody>
<tr>
<td>C200PC-CPU01-R</td>
<td>486DX2-50MHz</td>
<td>4 MB</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>C200PC-CPU01-R-V1</td>
<td>Am486DX2-66MHz</td>
<td>16 MB</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

Note Refer to Section 4 Setup for detailed specifications.

C200PC-CPU15-G Open PLC CPU Unit

![C200PC-CPU15-G(-V1) Open PLC CPU Unit](image)

Main Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>CPU</th>
<th>Main memory</th>
<th>VGA board</th>
<th>Printer port</th>
</tr>
</thead>
<tbody>
<tr>
<td>C200PC-CPU15-G</td>
<td>486DX4-100MHz</td>
<td>36 MB</td>
<td>Included</td>
<td>Included</td>
</tr>
<tr>
<td>C200PC-CPU15-G-V1</td>
<td>Am586X86-133MHz</td>
<td>32 MB</td>
<td>Included</td>
<td>Included</td>
</tr>
</tbody>
</table>

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-BC031 3-slot Open PLC Backplane](image)

**C200PC-BC081 8-slot Open PLC Backplane**

![C200PC-BC081 8-slot Open PLC Backplane](image)
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.
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

<table>
<thead>
<tr>
<th>Model</th>
<th>Power supply voltage</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>C200HW-PA204</td>
<td>100 to 120 VAC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>200 to 240 VAC</td>
<td></td>
</tr>
<tr>
<td>C200HW-PA204S</td>
<td>100 to 120 VAC</td>
<td>With 24-VDC service power supply.</td>
</tr>
<tr>
<td></td>
<td>200 to 240 VAC</td>
<td></td>
</tr>
<tr>
<td>C200HW-PA204R</td>
<td>100 to 120 VAC</td>
<td>With RUN output contacts.</td>
</tr>
<tr>
<td></td>
<td>200 to 240 VAC</td>
<td></td>
</tr>
<tr>
<td>C200HW-PD024</td>
<td>24 VDC</td>
<td></td>
</tr>
</tbody>
</table>

### I/O Backplanes

<table>
<thead>
<tr>
<th>Model</th>
<th>No. of I/O slots</th>
</tr>
</thead>
<tbody>
<tr>
<td>C200HW-BI031</td>
<td>3</td>
</tr>
<tr>
<td>C200HW-BI051</td>
<td>5</td>
</tr>
<tr>
<td>C200HW-BI081</td>
<td>8</td>
</tr>
<tr>
<td>C200HW-BI101</td>
<td>10</td>
</tr>
</tbody>
</table>

### I/O Connecting Cables

<table>
<thead>
<tr>
<th>Model</th>
<th>Cable length</th>
</tr>
</thead>
<tbody>
<tr>
<td>C200H-CN311</td>
<td>30 cm</td>
</tr>
<tr>
<td>C200H-CN711</td>
<td>70 cm</td>
</tr>
<tr>
<td>C200H-CN221</td>
<td>2 m</td>
</tr>
<tr>
<td>C200H-CN521</td>
<td>5 m</td>
</tr>
<tr>
<td>C200H-CN131</td>
<td>10 m</td>
</tr>
</tbody>
</table>

Note The maximum cable length is 12 m.
### I/O Units

<table>
<thead>
<tr>
<th>Name</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC Input Units</td>
<td>C200H-IA</td>
</tr>
<tr>
<td>DC Input Units</td>
<td>C200H-ID</td>
</tr>
<tr>
<td>AC/DC Input Units</td>
<td>C200H-IM</td>
</tr>
<tr>
<td>Relay Output Units</td>
<td>C200H-OC</td>
</tr>
<tr>
<td>Triac Output Units</td>
<td>C200H-OA</td>
</tr>
<tr>
<td>Transistor Output Units</td>
<td>C200H-OD</td>
</tr>
<tr>
<td>Analog Timer Unit</td>
<td>C200H-TM001</td>
</tr>
</tbody>
</table>

### B7A Interface Units

<table>
<thead>
<tr>
<th>Name</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal B7A Interface Units</td>
<td>C200H-B7A</td>
</tr>
<tr>
<td>Group-2 B7A Interface Units</td>
<td>C200H-B7A</td>
</tr>
</tbody>
</table>

### High-density I/O Units

<table>
<thead>
<tr>
<th>Name</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group-2 High-density I/O Units</td>
<td>C200H-ID, C200H-OD</td>
</tr>
<tr>
<td>High-density I/O Unit classified as Special I/O Units</td>
<td>C200H-ID, C200H-OD, C200H-MD</td>
</tr>
</tbody>
</table>

### Special I/O Units

<table>
<thead>
<tr>
<th>Name</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature Control Units</td>
<td>C200H-TC</td>
</tr>
<tr>
<td>Heat/Cool Temperature Control Units</td>
<td>C200H-TV</td>
</tr>
<tr>
<td>Temperature Sensor Units</td>
<td>C200H-TS</td>
</tr>
<tr>
<td>PID Control Units</td>
<td>C200H-PID</td>
</tr>
<tr>
<td>Cam Positioner Unit</td>
<td>C200H-CP114</td>
</tr>
<tr>
<td>Analog Input Units</td>
<td>C200H-AD</td>
</tr>
<tr>
<td>Analog Output Units</td>
<td>C200H-DA</td>
</tr>
<tr>
<td>Motion Control Unit</td>
<td>C200H-MC221</td>
</tr>
<tr>
<td>Position Control Units</td>
<td>C200H-NC</td>
</tr>
<tr>
<td>ID Sensor Units</td>
<td>C200H-IDS</td>
</tr>
<tr>
<td>Voice Unit</td>
<td>C200H-OV001</td>
</tr>
<tr>
<td>Fuzzy Logic Units</td>
<td>C200H-FZ001</td>
</tr>
</tbody>
</table>

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

### Communications Units

<table>
<thead>
<tr>
<th>Name</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Host Link Units</td>
<td>C200H-LK</td>
</tr>
<tr>
<td>CompoBus/D Master Unit</td>
<td>C200HW-DRM21-V1</td>
</tr>
<tr>
<td>CompoBus/S Master Unit</td>
<td>C200HW-SRM21</td>
</tr>
<tr>
<td>Remote I/O Master Units</td>
<td>C200H-RM</td>
</tr>
<tr>
<td>PC Link Unit</td>
<td>C200H-LK401</td>
</tr>
</tbody>
</table>
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:

<table>
<thead>
<tr>
<th>Section</th>
<th>Procedure</th>
</tr>
</thead>
</table>
| 4       | **Set Up the Open PLC.**  
Mount the Open PLC CPU Unit to the Open PLC Backplane.  
Refer to *Section 9 PC Card Board* when using a PC Card Board. |
| 5-2     | **Install the ISaGRAF Workbench.**  
Install the ISaGRAF Workbench (programming tool made by CJ International) on the personal computer. |
| 5-3     | **Install the ISaGRAF Target Software.**  
Install the ISaGRAF Target Software (Software PLC) on the Open PLC. |
| 5-4     | **Install the OMRON Utilities.**  
Install I/O Boards and I/O equipment device drivers, as well as the OMRON ISaGRAF Workbench expansion utilities. |
| 6       | **Create a Project.**  
Use the ISaGRAF Workbench on the personal computer to create a project for the Open PLC. The order for creating the project is as follows:  
- Start the ISaGRAF Workbench.  
- Create a project.  
- Register entries in the dictionaries.  
- Connect I/O.  
- Create the program.  
- Generate the application code.  
- Run a simulation. |
| 6-3     | **Download and Run the Project.**  
Generate the application code from the project and download it to the Open PLC. The project will automatically run once the download has been completed. |
This section describes the name and function of each part of an Open PLC, and describes how to set up an Open PLC.

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-1</td>
<td>Component Names and Functions</td>
<td>14</td>
</tr>
<tr>
<td>4-1-1</td>
<td>Front Panel</td>
<td>14</td>
</tr>
<tr>
<td>4-1-2</td>
<td>Rear Panel</td>
<td>15</td>
</tr>
<tr>
<td>4-1-3</td>
<td>Indicators</td>
<td>16</td>
</tr>
<tr>
<td>4-2</td>
<td>Hardware Settings</td>
<td>19</td>
</tr>
<tr>
<td>4-2-1</td>
<td>Installation and Operation of ISaGRAF Target Software</td>
<td>19</td>
</tr>
<tr>
<td>4-2-2</td>
<td>C200PC-CPU15-G (-V1) System Settings</td>
<td>20</td>
</tr>
<tr>
<td>4-3</td>
<td>Mounting to the Backplane</td>
<td>21</td>
</tr>
</tbody>
</table>
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

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

C200PC-CPU15-G(-V1) CPU Unit

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

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

<table>
<thead>
<tr>
<th>Label</th>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU RUN</td>
<td>Green</td>
<td>Lit during normal PLC operation.</td>
</tr>
<tr>
<td>SYS ERR</td>
<td>Red</td>
<td>Lit when an error occurs.</td>
</tr>
<tr>
<td>COM1</td>
<td>Orange</td>
<td>Flashes when communicating with devices connected to serial communications port 1 (COM1).</td>
</tr>
<tr>
<td>COM2</td>
<td>Orange</td>
<td>Flashes when communicating with devices connected to serial communications port 2 (COM2).</td>
</tr>
</tbody>
</table>
Indicator Section 2

<table>
<thead>
<tr>
<th>Display Item</th>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/O RUN</td>
<td>Green</td>
<td>Lit when ISaGRAF user program is being executed.</td>
</tr>
<tr>
<td>ERR</td>
<td>Red</td>
<td>Flashes when nonfatal error is detected through diagnosis.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>INH</td>
<td>Orange</td>
<td>Lit when the Output OFF Bit is ON. All outputs from the Output Unit will be OFF when this indicator is ON.</td>
</tr>
<tr>
<td>COMM</td>
<td>Orange</td>
<td>For future expansion.</td>
</tr>
</tbody>
</table>
Indicator Section 3

<table>
<thead>
<tr>
<th>Display Item</th>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED1</td>
<td>Orange</td>
<td>Used with the user program. Refer to Using the I/O Registers in Appendix C.</td>
</tr>
<tr>
<td>LED2</td>
<td>Orange</td>
<td></td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Running ISaGRAF Target Software</td>
<td>Pin 9</td>
</tr>
<tr>
<td></td>
<td>Pin 8</td>
</tr>
<tr>
<td></td>
<td>Pin 7</td>
</tr>
</tbody>
</table>

| Installing ISaGRAF Target Software using COM1 | Pin 9 |
|                                              | Pin 8 |
|                                              | Pin 7 |

| Installing ISaGRAF Target Software using COM2 | Pin 9 |
|                                              | Pin 8 |
|                                              | Pin 7 |

- 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.
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.

<table>
<thead>
<tr>
<th>Pin 7</th>
<th>Pin 8</th>
<th>Standard I/O device</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>None</td>
<td>---</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
<td>COM1</td>
<td>9,600 bps, 8-bit data, no parity, 1 stop bit</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>COM2</td>
<td>9,600 bps, 8-bit data, no parity, 1 stop bit</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>Keyboard + VGA monitor</td>
<td>---</td>
</tr>
</tbody>
</table>

**Startup Settings**

The startup method is set on pin 4.

<table>
<thead>
<tr>
<th>Pin 4</th>
<th>Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>Starts internal MS-DOS.</td>
</tr>
<tr>
<td>ON</td>
<td>Starts OS from PCMCIA card.</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Pin 6</th>
<th>Settings</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>-</td>
<td>Retains current settings.</td>
</tr>
<tr>
<td>ON</td>
<td>FDD enabled</td>
<td>3.5 inch, 1.44 MB (A and B)</td>
</tr>
</tbody>
</table>

**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. 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.)

<table>
<thead>
<tr>
<th>Pin 9</th>
<th>Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>Configuration enabled.</td>
</tr>
<tr>
<td>ON</td>
<td>Configuration disabled.</td>
</tr>
</tbody>
</table>

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.
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.
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.

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-1</td>
<td>Installation Summary</td>
<td>24</td>
</tr>
<tr>
<td>5-2</td>
<td>ISaGRAF Workbench Installation</td>
<td>24</td>
</tr>
<tr>
<td>5-3</td>
<td>ISaGRAF Target Software Installation</td>
<td>24</td>
</tr>
<tr>
<td>5-3-1</td>
<td>Outline</td>
<td>24</td>
</tr>
<tr>
<td>5-3-2</td>
<td>Cable Connections and System DIP Switch Settings</td>
<td>25</td>
</tr>
<tr>
<td>5-3-3</td>
<td>Terminal Software Settings</td>
<td>25</td>
</tr>
<tr>
<td>5-3-4</td>
<td>File Transfer</td>
<td>25</td>
</tr>
<tr>
<td>5-3-5</td>
<td>Restarting the Open PLC</td>
<td>26</td>
</tr>
<tr>
<td>5-4</td>
<td>Installation of OMRON Utilities</td>
<td>26</td>
</tr>
</tbody>
</table>
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.

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

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:

1. Connect cable and set the system DIP switch.
3. Transfer files.
4. Restart Open PLC (edit AUTOEXEC.BAT, change system DIP switch settings, and restart).
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.

![Diagram of cable connections](image)

<table>
<thead>
<tr>
<th>C200PC-CPU01-R(-V1) or C200PC-CPU15-G(-V1) CPU Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS-232C Cross Cable (XWZ-200V, XWZ-500V, or commercial product)</td>
</tr>
<tr>
<td>Personal computer (IBM PC/AT or compatible) + Terminal Software</td>
</tr>
</tbody>
</table>

**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:\>FTRANS /R /Z /F

   - **COM2 Connection**
     
     C:\>FTRANS /R /Z /COM2 /F

   **Note** Input “FTRANS /?” 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.
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. Insert into the floppy disk drive “Install Disk (1)” supplied with the ISaGRAF Target Software.

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. 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

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

3. 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 ISa-
   GRAF Workbench has been installed.

   ![Setup dialog box]

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 com-
     pleted.

   ![Information dialog box]

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-Li-
   brary** 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:sawin\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
   6-3-2 Operation Procedure ............................................. 40
   6-3-3 Starting the ISaGRAF Workbench ............................... 41
   6-3-4 Creating a New Project .......................................... 41
   6-3-5 Creating a New Program ......................................... 42
   6-3-6 Registering Variables in Dictionaries ......................... 42
   6-3-7 Connecting I/O .................................................. 45
   6-3-8 Programming ..................................................... 51
   6-3-9 Compiler Option Settings and Generation of Application Code .. 60
   6-3-10 Simulation ...................................................... 62
   6-3-11 Downloading and Executing the Application Code .......... 63
6-4 Backing Up and Restoring Projects ................................. 65
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.

1. Start the ISaGRAF Workbench.
2. Create a New Project.
3. Create a New Program.
4. Register Variables in Dictionaries.
   In ISaGRAF, all bit and word data are stored using variables. These variables are stored for each project in tables called dictionaries.
5. Connect I/O.
   Assign the registered variables to I/O using OMRON I/O Boards or Equipment. Refer to 6-2 OMRON I/O Boards and I/O Equipment for information on OMRON I/O Boards and I/O Equipment.
6. Program the PLC.
   Write the program using one of the five following languages: SFC, LD, IL, ST, or FB.
7. Generate the Application Code.
   Select ISA86M: TIC code for Intel under Compiler Options under Make to create an object code for the Open PLC.
8. Run a Simulation.
   Check the program operation by running a simulation of the project on the personal computer.
9. Download and Execute the Program.
   The program will be executed immediately after it has been downloaded to the Open PLC.
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.

<table>
<thead>
<tr>
<th>Area</th>
<th>Range</th>
<th>OMRON I/O Board and I/O Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core I/O Area</td>
<td>0 to 511</td>
<td>I/O Board for Core I/O (c200ci16, etc.) and I/O Equipment (c200cm32, c200cm64)</td>
</tr>
<tr>
<td>Auxiliary Relay Area (AR)</td>
<td>0 to 27</td>
<td>I/O Equipment (c200ar)</td>
</tr>
<tr>
<td>Holding Relay Area (HR)</td>
<td>0 to 99</td>
<td>I/O Equipment (c200hr)</td>
</tr>
<tr>
<td>Link Relay Area (LR)</td>
<td>0 to 63</td>
<td>I/O Equipment (c200lr)</td>
</tr>
<tr>
<td>Data Memory Area (DM)</td>
<td>0 to 6143</td>
<td>I/O Equipment (c200dm)</td>
</tr>
<tr>
<td>Special I/O Unit Area</td>
<td>100 to 199</td>
<td>I/O Equipment (c200hf)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Name</th>
<th>Data type</th>
<th>I/O points</th>
<th>Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>c200ci16</td>
<td>Boolean</td>
<td>16</td>
<td>Inputs</td>
</tr>
<tr>
<td>c200co16</td>
<td>Boolean</td>
<td>16</td>
<td>Outputs</td>
</tr>
<tr>
<td>c200ci32</td>
<td>Boolean</td>
<td>32</td>
<td>Inputs</td>
</tr>
<tr>
<td>c200co32</td>
<td>Boolean</td>
<td>32</td>
<td>Outputs</td>
</tr>
<tr>
<td>c200ci64</td>
<td>Boolean</td>
<td>64</td>
<td>Inputs</td>
</tr>
<tr>
<td>c200co64</td>
<td>Boolean</td>
<td>64</td>
<td>Outputs</td>
</tr>
<tr>
<td>c200i128</td>
<td>Boolean</td>
<td>128</td>
<td>Inputs</td>
</tr>
<tr>
<td>c200o128</td>
<td>Boolean</td>
<td>128</td>
<td>Outputs</td>
</tr>
</tbody>
</table>
### I/O Equipment

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

**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.

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

### 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**

<table>
<thead>
<tr>
<th>Name</th>
<th>Data type</th>
<th>No. of I/O</th>
<th>Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>c200bi16</td>
<td>Boolean</td>
<td>16</td>
<td>Inputs</td>
</tr>
<tr>
<td>c200bo16</td>
<td>Boolean</td>
<td>16</td>
<td>Outputs</td>
</tr>
<tr>
<td>c200wi1</td>
<td>Integer (word)</td>
<td>1</td>
<td>Inputs</td>
</tr>
<tr>
<td>c200wo1</td>
<td>Integer (word)</td>
<td>1</td>
<td>Outputs</td>
</tr>
</tbody>
</table>

**Using Basic I/O Boards**

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.

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

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**.

![I/O Board parameter dialog box]

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**

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Mode</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lamp 1</td>
<td>Input</td>
<td>True</td>
<td>Lamp 1</td>
</tr>
<tr>
<td>Lamp 2</td>
<td>Input</td>
<td>True</td>
<td>Lamp 2</td>
</tr>
<tr>
<td>Lamp 3</td>
<td>Input</td>
<td>True</td>
<td>Lamp 3</td>
</tr>
<tr>
<td>Lamp 4</td>
<td>Input</td>
<td>True</td>
<td>Lamp 4</td>
</tr>
</tbody>
</table>
Integer and Real Number Variables

![Image of Integer and Real Number Variables](image)

Timer Variables

![Image of Timer Variables](image)

OMRON I/O Boards and I/O Equipment Used

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

<table>
<thead>
<tr>
<th>Name</th>
<th>Area</th>
<th>I/O points</th>
<th>Data type</th>
<th>Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>c200ci16</td>
<td>Core I/O</td>
<td>16</td>
<td>Boolean</td>
<td>Inputs</td>
</tr>
<tr>
<td>c200co16</td>
<td>Core I/O</td>
<td>16</td>
<td>Boolean</td>
<td>Outputs</td>
</tr>
<tr>
<td>c200hf</td>
<td>Special I/O Unit</td>
<td>10 words</td>
<td>Integer</td>
<td>Inputs</td>
</tr>
</tbody>
</table>
6-3-2 Operation Procedure

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

1. Start the ISaGRAF Workbench.
2. Create a new project.
3. Create a new program.
4. Register variables in the dictionaries.
5. Connect I/O.
6. Program the PLC.
7. Generate the application code.
8. Run a simulation.
9. Download and run the project.
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.

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Attribute</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>in_1</td>
<td>Input</td>
<td>Input 1</td>
</tr>
<tr>
<td>lamp1</td>
<td>Output</td>
<td>Lamp 1</td>
</tr>
<tr>
<td>lamp2</td>
<td>Output</td>
<td>Lamp 2</td>
</tr>
<tr>
<td>lamp3</td>
<td>Output</td>
<td>Lamp 3</td>
</tr>
<tr>
<td>lamp4</td>
<td>Output</td>
<td>Lamp 4</td>
</tr>
</tbody>
</table>

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

3. First, input variable in_1.
   - Name: in_1
   - Comment: Input 1
   - Attribute: Input

4. Click Store. The variable input in the previous step will be shown in the Global Booleans Window.

5. Double-click on the line below the variable. The Boolean Variable Dialog Box will be displayed.

6. 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:

7. Select Save under File.

The following integer variables are registered.

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Attribute</th>
<th>Format</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>analogIN1</td>
<td>Input</td>
<td>Integer (standard)</td>
<td>Analog Input 1</td>
</tr>
<tr>
<td>analogOUT1</td>
<td>Output</td>
<td>Integer (standard)</td>
<td>Analog Output 1</td>
</tr>
</tbody>
</table>

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 \texttt{analogIN1} as follows:

![Image of Analog Input Variable Configuration]

4. Click \texttt{Store}.

5. Input the variable \texttt{analogOUT1} and click \texttt{Store}.
   The data will be displayed as follows:

![Image of Analog Output Variable Configuration]

6. Select \texttt{Save} under \texttt{File}.
   The following timer variable is registered.

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Attribute</th>
<th>Default</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>time_lag</td>
<td>Internal</td>
<td>#500 ms</td>
<td>LED time lag</td>
</tr>
</tbody>
</table>

\textbf{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 \texttt{time\_lag} as follows:

![Image of Timer Variable Configuration]
4. Click Store. The data will be displayed as follows:

![Data display]

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.

<table>
<thead>
<tr>
<th>Name</th>
<th>Area</th>
<th>Assigned word</th>
<th>Allocated variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>c200ci16</td>
<td>Core I/O</td>
<td>0</td>
<td>in_1</td>
</tr>
<tr>
<td>c200co16</td>
<td>Core I/O</td>
<td>1</td>
<td>lamp1 to lamp4</td>
</tr>
<tr>
<td>c200hf</td>
<td>Special I/O Unit</td>
<td>100 (unit number 0)</td>
<td>analogIN1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>110 (unit number 1)</td>
<td>analogOUT1</td>
</tr>
</tbody>
</table>

#### Connecting c200ci16

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.

![I/O Connection Window]
2. Double-click on slot 0. The Board/Equipment Dialog Box will be displayed.

3. 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.
4. 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

![Connect I/O channel #1 dialog box](image)

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

5. Click **Connect**.

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

![Connect I/O channel dialog box](image)

6. Click **Close** in the Connect I/O Channel Dialog Box.

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

**Connecting c200co16**

1. 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.

2. Select **c200co16** and click **OK**. c200co16 will be recorded in the slot as shown below.

![c200co16 connection](image)
3. Double-click on \( ch = 0 \) on the right of the window. The dialog box for I/O board parameters will be displayed.

![I/O Board parameter dialog box]

4. Input 1 and click **OK**. The display will read \( ch = 1 \). c200co16 has now been allocated to word 1.

5. 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.

![Connect I/O channel #1 dialog box]

6. Select **lamp1** and click **Connect**. The variable **lamp1** is now allocated to bit 0 of word 1.

7. By subsequently clicking **Connect**, lamps 2 to 4 will be allocated to bits 1 to 3 of word 1.

8. Click **Close**. The display will be as follows:

![I/O Connection Window]

9. 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.

![Select board/equipment dialog box](image1)

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

![c200hf registered in slot](image2)

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

![c2hfi10 input](image3)

**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`.

   ![Connect I/O channel #2](image)

   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:

   ![I/O Board parameter](image)

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**.

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. 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. Click the Transition button in the SFC Program Window. The cursor will change as follows:
2. Click on the position just below the initial step. The transition will be added as shown below, and the cursor for steps will appear.

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

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

5. Click the **Jump to a step** button.

6. 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:

![Diagram showing a sequence of steps with a comment field]

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

![Dialog box for inputting initial step]

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

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

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

   \[
   \text{analogOUT1:=analogIN1+10;}
   \]

   **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.
   
   ![Diagram of GT1 - Lamp start condition]
   
   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.

![Select variable dialog box]

f) Select \texttt{in\_1} and click OK.

![Programming window]

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

![Program display]

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 \texttt{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: \texttt{lamp1;}
d) Close the window.

```
1

Initial step
ACTION (NO):
  analogOUT := analog N1+10;
END ACTION;
```

```
1

Lamp start condition

Lamp 1 ON
```

```
Lamp 1 ON
```

```
Lamp 1 ON
```

```
2

1

Lamp start condition

Lamp 1 ON
```

```
2

Lamp 1 ON
```

```
2

Time lag
```

```
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.

```
1

Lamp start condition

Lamp 1 ON
```

```
2

Lamp 1 ON
```

```
2

Time lag
```

```
gs2.t > time_lag;
```
i) Use the same procedure as outlined above to input the actions for step 3 to transition 5, as shown below.

```
3
  Lamp 2 ON
  lamp2;

Time lag
  ≥  time_lag

3
  Lamp 3 ON
  lamp3;

Time lag
  ≥  time_lag

4
  Lamp 4 ON
  lamp4;

Time lag
  ≥  time_lag

5
```

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.)
Creating a Project

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

![Code generation parameters dialog box]

- 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.


3. Click OK. The following confirmation message will be displayed.

![Confirmation message]

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.

![Code Generator dialog box]

2. Click Exit.
Creating a Project

6-3 Section

Creating a Project

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. 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.

- Turn ON the lamp start condition.
The indicators (bits 0 to 3 in word 1) will turn ON and OFF in order.

- Turn OFF the lamp start condition.
The indicators will stop flashing.

- Input “5” to input 1 (word 101) of the Analog Input Unit.
Output 1 (word 110) of the Analog Output Unit will be 15.

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.
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. 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.

![Download Dialog Box](image)

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.

![Application Execution Window](image)

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

   **Example**

   ![Debug Window](image)

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

   ![Confirmation Dialog Box](image)
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. Select Start from the taskbar, then Programs, ISaGRAF 3.2, and Archive. The Archive Manager window will be displayed.

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

![OMRON Utility dialog box]

**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.

![OMRON Utility](image)

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.

<table>
<thead>
<tr>
<th>Area</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/O Bit Area</td>
<td>000 to 511</td>
</tr>
<tr>
<td>Auxiliary Relay Area</td>
<td>AR 00 to AR 27</td>
</tr>
<tr>
<td>Holding Relay Area</td>
<td>HR 00 to HR 99</td>
</tr>
<tr>
<td>Link Relay Area</td>
<td>LR 00 to LR 63</td>
</tr>
<tr>
<td>Data Memory Area</td>
<td>DM 0000 to DM 6143</td>
</tr>
</tbody>
</table>

**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. 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.

![](image)

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. Click the **Save/Open** tab in the OMRON Utility Dialog Box. The following will be displayed.

![Image of OMRON Utility Dialog Box]

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.
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.

- **Program execution time**
- **I/O Refresh time**
- **I/O Refresh preparation time**

### 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 µs x 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.

- **I/O Refresh complete**
- **Real I/O output**
- 50 µs
- **Transmission delay time due to the Unit (B)**
- **Differs according to I/O configuration (A)**

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:

- Real I/O input
- Ready to read
- Transmission delay time due to the Unit (same as output response B.)
- Differs according to I/O configuration (same as output response A.)
- Read during the next I/O refresh time.

1.22 ms
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
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**

1. Mount the PC Card Board.
2. Edit CONFIG.SYS using Terminal Software on a personal computer.
3. Restart the Open PLC.

**Component Names and Functions**

**Indicators**
- **CARD 1**
  - Color: Orange
  - Meaning: Accessing PC Card socket 1
- **CARD 2**
  - Color: Orange
  - Meaning: Accessing PC Card socket 2

**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**

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Color</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARD 1</td>
<td>Orange</td>
<td>Accessing PC Card socket 1</td>
</tr>
<tr>
<td>CARD 2</td>
<td>Orange</td>
<td>Accessing PC Card socket 2</td>
</tr>
</tbody>
</table>
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.

![Diagram of PC Card (Type I, II, or III) with connector width specifications]

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

\[
I_{5V} \text{ (1 slot)} \leq 0.5 \text{ A}, \quad I_{12V} \text{ (1 slot)} \leq 0.1 \text{ A} \\
I_{5V} \text{ (2 slots)} + 3.4 \times I_{12V} \text{ (2 slots)} \leq 1.0 \text{ A}
\]
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. 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. 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. 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.

<table>
<thead>
<tr>
<th>Pin 4</th>
<th>C: (boot drive)</th>
<th>D:</th>
<th>E:</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>Internal flash disk</td>
<td>PC card slot 1</td>
<td>PC card slot 2</td>
</tr>
<tr>
<td>ON</td>
<td>PC card slot 1</td>
<td>Internal flash disk</td>
<td>PC card slot 2</td>
</tr>
</tbody>
</table>

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.
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.

<table>
<thead>
<tr>
<th>Effective battery life</th>
<th>Memory backup time when Unit not in use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Guaranteed</td>
</tr>
<tr>
<td>5 years</td>
<td>10,000 hours (approx. 1 year)</td>
</tr>
</tbody>
</table>

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. 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. 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. 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.
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

<table>
<thead>
<tr>
<th>Error</th>
<th>Probable cause and correction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannot use the ISaGRAF Workbench in Windows NT. Communication is interrupted when DEBUG mode is entered.</td>
<td>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.</td>
</tr>
<tr>
<td>[WS001]</td>
<td></td>
</tr>
<tr>
<td>NT=1 Add this line</td>
<td></td>
</tr>
<tr>
<td>Isa=C:\ISAWIN</td>
<td></td>
</tr>
<tr>
<td>IsaExe=C:\ISAWIN\EXE</td>
<td></td>
</tr>
<tr>
<td>IsaApl=C:\ISAWIN\APL</td>
<td></td>
</tr>
<tr>
<td>IsaTmp=C:\ISAWIN\TMP</td>
<td></td>
</tr>
<tr>
<td>Communication is interrupted when DEBUG mode is entered.</td>
<td>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.</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Check the COM port number in the communications settings of the Workbench. Check that the correct cable is being used.</td>
<td></td>
</tr>
<tr>
<td>When generating the application code, check that ISA86M:TIC code for Intel has been selected from Compiler options under Code Generation.</td>
<td></td>
</tr>
<tr>
<td>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:\DEL ISA11.</td>
<td></td>
</tr>
<tr>
<td>Cannot upload.</td>
<td>The file cannot be uploaded if the upload information was not added when the file was downloaded.</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Cannot write to variables.</td>
<td>An Input Unit or a read-only area has been specified in the I/O Board connections.</td>
</tr>
<tr>
<td>I/O is not refreshed or the wrong bits are output.</td>
<td>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 Appendix F Different Indication of Word Addresses (Bit Addresses).</td>
</tr>
<tr>
<td>Cannot simulate.</td>
<td>Check that SIMULATE: Workbench Simulator has been selected from Compiler options under Code Generation.</td>
</tr>
<tr>
<td>Cannot use PCMCIA Card.</td>
<td>Check that CONFIG.SYS has been changed. Check that the C200PC-PCM01 has been correctly inserted. Some cards need device drivers.</td>
</tr>
<tr>
<td>No video output for C200PC-CPU15-G(-V1).</td>
<td>The system DIP switch settings are incorrect. Turn ON pins 7 and 8.</td>
</tr>
</tbody>
</table>

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

11-1-2 Hardware Errors

<table>
<thead>
<tr>
<th>Error</th>
<th>Probable cause and correction</th>
</tr>
</thead>
</table>
11-2 Indicators

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU RUN</td>
<td>BIOS initialization has been completed. If the indicator does not light when the power is turned ON, the following causes are possible. 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.</td>
</tr>
<tr>
<td>SYS ERR</td>
<td>Turns ON for abnormal temperature increases. Stops the output and CPU Unit. Reset the power supply to restart. This indicator will operate only when the Open PLC is started with the built-in OS.</td>
</tr>
<tr>
<td>COM1, COM2</td>
<td>Flashes during communications.</td>
</tr>
<tr>
<td>I/O RUN</td>
<td>Lights when the ISaGRAF user program is running.</td>
</tr>
<tr>
<td>ERR</td>
<td>Flashes when a non-fatal error occurs. Turns ON when a fatal error occurs. Remove the cause of the error and start the ISaGRAF user program. The error will automatically be cleared when the program is started.</td>
</tr>
<tr>
<td>INH</td>
<td>Turns ON when outputs are disabled. Turn OFF the Output OFF Bit (25215).</td>
</tr>
<tr>
<td>COMM</td>
<td>Flashes when the communications port for the Host Link is being used. This port is not normally used.</td>
</tr>
</tbody>
</table>

**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.

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

- 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

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

**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.

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

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

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

### External Dimensions

*Open PLC*

![Diagram of the Open PLC with dimensions](image)

(Unit: mm)
Appendix A

Specifications

 ASIC Backplanes

<table>
<thead>
<tr>
<th>Item</th>
<th>Model</th>
<th>W</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Backplanes</td>
<td>C200PC-BC031</td>
<td>330</td>
</tr>
<tr>
<td></td>
<td>C200PC-BC081</td>
<td>505</td>
</tr>
</tbody>
</table>
Appendix A
Specifications

Mounting Height

Approx. 250 (Depends on the gender changer size.)

Ensure sufficient space for replacing the Fan Unit.

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

Appendix A

Mounting Dimensions

![Mounting Dimensions Diagram]

<table>
<thead>
<tr>
<th>Item</th>
<th>Model</th>
<th>A</th>
<th>W</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Backplanes</td>
<td>C200PC-BC031</td>
<td>316</td>
<td>330</td>
</tr>
<tr>
<td></td>
<td>C200PC-BC081</td>
<td>491</td>
<td>505</td>
</tr>
</tbody>
</table>

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

**Characteristics**

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/O bits</td>
<td>640 points (00000 to 02915, 30000 to 30915)</td>
</tr>
<tr>
<td>Work bits</td>
<td>6464 points (03000 to 23115, 31000 to 51115)</td>
</tr>
<tr>
<td>SR bits</td>
<td>1080 points (23200 to 25507, 25600 to 29915)</td>
</tr>
<tr>
<td>TR bits</td>
<td>8 points (TR 0 to TR 7)</td>
</tr>
<tr>
<td>HR bits</td>
<td>1600 points (HR 0000 to HR 9915)</td>
</tr>
<tr>
<td>AR bits</td>
<td>448 points (AR 0000 to AR 2715)</td>
</tr>
<tr>
<td>LR bits</td>
<td>1024 points (LR 0000 to LR 6315)</td>
</tr>
<tr>
<td>Timer/counter Area</td>
<td>512 points (TIM/CNT 000 to TIM/CNT 511)</td>
</tr>
<tr>
<td>DM Area</td>
<td>6,144 words (DM 0000 to DM 6143)</td>
</tr>
<tr>
<td>Power interruption backup areas</td>
<td>Holds the contents of Holding Relay (HR), Auxiliary Relay (AR), Counter (CNT), Data Memory (DM), and clock (RTC) Areas.</td>
</tr>
<tr>
<td>Memory backup period</td>
<td>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.</td>
</tr>
<tr>
<td>Self-diagnosis functions</td>
<td>I/O verification errors, memory errors, battery errors, I/O bus errors, remote I/O errors, other errors.</td>
</tr>
</tbody>
</table>

**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**

<table>
<thead>
<tr>
<th>I/O points</th>
<th>No. of Expansion I/O Racks</th>
<th>No. of High-density I/O Units (Group-2 Units)</th>
<th>No. of Special I/O Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>848</td>
<td>2</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>
Appendix B
Connector Specifications

Serial Communications Interface

COM1 Connector Signal Assignments

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0V</td>
</tr>
<tr>
<td>2</td>
<td>RD (RXD)</td>
</tr>
<tr>
<td>3</td>
<td>TD (TXD)</td>
</tr>
</tbody>
</table>

• Recommended Cable for COM 1 (OMRON)
ES100-CT023-202 (D-sub 9-pin female connector, for IBM PC/AT or compatible)

COM2 Signal Assignments

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

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

• 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

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

Appendix B

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

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal</th>
<th>Name</th>
<th>Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DATA</td>
<td>Data</td>
<td>I/O</td>
</tr>
<tr>
<td>2</td>
<td>---</td>
<td>Not used.</td>
<td>---</td>
</tr>
<tr>
<td>3</td>
<td>SG (GND)</td>
<td>Signal ground</td>
<td>---</td>
</tr>
<tr>
<td>4</td>
<td>+5 V</td>
<td>---</td>
<td>Output</td>
</tr>
<tr>
<td>5</td>
<td>CLK</td>
<td>Clock</td>
<td>I/O</td>
</tr>
<tr>
<td>6</td>
<td>---</td>
<td>Not used.</td>
<td>---</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal abbreviation</th>
<th>Name</th>
<th>Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MSDAT</td>
<td>Data</td>
<td>I/O</td>
</tr>
<tr>
<td>2</td>
<td>---</td>
<td>Not used.</td>
<td>---</td>
</tr>
<tr>
<td>3</td>
<td>SG (GND)</td>
<td>Signal ground</td>
<td>---</td>
</tr>
<tr>
<td>4</td>
<td>+5 V</td>
<td>---</td>
<td>Output</td>
</tr>
<tr>
<td>5</td>
<td>MSCLK</td>
<td>Clock</td>
<td>I/O</td>
</tr>
<tr>
<td>6</td>
<td>---</td>
<td>Not used.</td>
<td>---</td>
</tr>
</tbody>
</table>

**Note** Signal direction refers to the I/O to and from the Open PLC.
## Connector Specifications

### Appendix B

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

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

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

---

**LPT /FDD connector**

**FDD/LPT connector**

Set this selector to LPT when using a printer.

**Front view of Open PLC**
(D-sub 25-pin female)
### Floppy Disk Drive Interface Signal Assignments

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

### 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**

![Diagram of connection method]

- To floppy disk drive
- Floppy disk interface cable
- D-sub 25-pin male
- D-sub 25-pin female
- To LPT/FDD connector of Open PLC
- Gender changer

• **Supported Floppy Disks**

The following floppy disks can be used.

<table>
<thead>
<tr>
<th>Drive</th>
<th>Usable disks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive A</td>
<td>1.44 MB, 2HD</td>
</tr>
<tr>
<td></td>
<td>720 KB, 2DD</td>
</tr>
<tr>
<td>Drive B</td>
<td>1.44 MB, 2HD</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Address</th>
<th>Read/write</th>
<th>Register</th>
</tr>
</thead>
<tbody>
<tr>
<td>390H</td>
<td>Read/write</td>
<td>Do not use.</td>
</tr>
<tr>
<td>391H</td>
<td>Read</td>
<td>Do not use.</td>
</tr>
<tr>
<td>391H</td>
<td>Write</td>
<td>Do not use.</td>
</tr>
<tr>
<td>392H</td>
<td>Read</td>
<td>DIP switch register.</td>
</tr>
<tr>
<td>392H</td>
<td>Write</td>
<td>Do not use.</td>
</tr>
<tr>
<td>393H</td>
<td>Read/write</td>
<td>LED/ temperature detection register.</td>
</tr>
</tbody>
</table>

The register details are shown below.

**DIP Switch Register**

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

<table>
<thead>
<tr>
<th>Address</th>
<th>Read/write</th>
<th>Register</th>
</tr>
</thead>
<tbody>
<tr>
<td>392h</td>
<td>read</td>
<td>D7: --- SW10 SW9 SW8 SW7 SW6 SW5 SW4</td>
</tr>
</tbody>
</table>

Not used. DIP switch pins

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.

<table>
<thead>
<tr>
<th>Address</th>
<th>Read/write</th>
<th>HOT</th>
<th>---</th>
<th>---</th>
<th>---</th>
<th>LED2</th>
<th>LED1</th>
<th>SYS ERR</th>
<th>CPU RUN</th>
<th>R</th>
<th>---</th>
<th>---</th>
<th>---</th>
<th>R/W</th>
<th>R/W</th>
<th>R/W</th>
<th>R/W</th>
</tr>
</thead>
<tbody>
<tr>
<td>393h</td>
<td>read/write</td>
<td>HOT</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>LED2</td>
<td>LED1</td>
<td>SYS ERR</td>
<td>CPU RUN</td>
<td>R</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>R/W</td>
<td>R/W</td>
<td>R/W</td>
<td>R/W</td>
</tr>
</tbody>
</table>

- **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.

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

**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.
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.
   • Software Transfer. You may permanently transfer all of your rights under this EULA only as part of a sale or transfer of the SYSTEM, provided you retain no copies, you transfer all of the SOFTWARE (including all component parts, the media, any upgrades or backup copies, and this EULA, and if applicable, the Certificate(s) of Authenticity), and the recipient agrees to the terms of this EULA. If the SOFTWARE is an upgrade, any transfer must include all prior versions of the SOFTWARE.
Appendix G

License Agreement

118

• Termination. Without prejudice to any other rights, Manufacturer or MS may terminate this EULA if you fail to comply with the terms and conditions of this EULA. In such event, you must destroy all copies of the SOFTWARE and all of its component parts.

• Single EULA. The package for the SOFTWARE may contain multiple versions of this EULA, such as multiple translations and/or multiple media versions (e.g., in the user documentation and in the software). In this case, you are only licensed to use one (1) copy of the SOFTWARE PRODUCT.

• Export Restrictions. You agree that you will not export or re-export the SOFTWARE to any country, person, entity or end user subject to U.S. export restrictions. You specifically agree not to export or re-export the SOFTWARE (i) to any country to which the U.S. has embargoed or restricted the export of goods or services, which currently include, but are not necessarily limited to Cuba, Iran, Iraq, Libya, North Korea, Sudan and Syria, or to any national of any such country, wherever located, who intends to transmit or transport the products back to such country; (ii) to an end user you know or have reason to know will utilize the SOFTWARE in the design, development or production of nuclear, chemical or biological weapons; or (iii) to any end-user who has been prohibited from participating in U.S. export transactions by any federal agency of the U.S. government.

3. UPGRADES AND RECOVERY MEDIA.

• If the SOFTWARE is provided by Manufacturer on media separate from the SYSTEM and is labeled “For Upgrade Purposes Only” (“Upgrade SOFTWARE”), you may install one copy of the Upgrade SOFTWARE onto the SYSTEM as a replacement copy for the SOFTWARE originally installed on the SYSTEM and use it in accordance with Section 1 of this EULA. You may also install additional copies of the Upgrade SOFTWARE as replacement copies onto additional SYSTEMS which are the same brand and model as the SYSTEM and contain a duly licensed copy of the same version and language release of the SOFTWARE (“ADDITIONAL SYSTEMS”), provided that (1) Manufacturer has supplied a corresponding serialized sticker for each additional copy of the Upgrade SOFTWARE, and (2) you affix a serialized sticker per Manufacturer’s instructions for each unit of Upgrade SOFTWARE you install.

• If the SOFTWARE is provided by Manufacturer on separate media and labeled “Recovery Media” (“Recovery Media”), you may not make a copy of the SOFTWARE as described in Section 1 for archival purposes. Instead, you may use the Recovery Media solely to restore or reinstall the same version and language release of the SOFTWARE as originally installed on the SYSTEM and thereafter use the SOFTWARE as restored or reinstalled in accordance with Section 1 of this EULA. A single unit of Recovery Media may be used by you to restore or reinstall the SOFTWARE on ADDITIONAL SYSTEMS.

4. COPYRIGHT. All title and copyrights in and to the SOFTWARE (including but not limited to any images, photographs, animations, video, audio, music, text and “applets,” incorporated into the SOFTWARE), the accompanying printed materials, and any copies of the SOFTWARE, are owned by MS or its suppliers (including Microsoft Corporation). You may not copy the printed materials accompanying the SOFTWARE. All rights not specifically granted under this EULA are reserved by MS and its suppliers (including Microsoft Corporation).

5. PRODUCT SUPPORT. Product support for the SOFTWARE is not provided by MS, its parent corporation, Microsoft Corporation, or their affiliates or subsidiaries. For product support, please refer to Manufacturer’s support number provided in the documentation for the SYSTEM. Should you have any questions concerning this EULA, or if you desire to contact Manufacturer for any other reason, please refer to the address provided in the documentation for the SYSTEM.

6. LIMITED WARRANTY.

• Limited Warranty. Manufacturer warrants that the SOFTWARE will perform substantially in accordance with the accompanying written materials for a period of ninety (90) days from the date of receipt. Any implied warranties on the SOFTWARE are limited to ninety (90) days. Some states/jurisdictions do not allow limitations on duration of an implied warranty, so the above limitation may not apply to you.

• Customer Remedies. Manufacturer’s and its suppliers’ entire liability and your exclusive remedy shall be, at Manufacturer’s option, either (a) return of the price paid, or (b) repair or replacement of the SOFTWARE that does not meet the above Limited Warranty and which is returned to Manufacturer with a copy of your receipt. This Limited Warranty is void if failure of the SOFTWARE has resulted from accident, abuse, or misapplication. Any replacement SOFTWARE will be warranted for the remainder of the original warranty period or thirty (30) days, whichever is longer.
• No Other Warranties. EXCEPT AS EXPRESSLY PROVIDED IN THE LIMITED WARRANTY SECTION ABOVE, THE SOFTWARE IS PROVIDED TO THE END USER “AS IS” WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY, AND/OR FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK OF THE QUALITY AND PERFORMANCE OF THE SOFTWARE IS WITH YOU.

• No Liability for Consequential Damages. MANUFACTURER OR MANUFACTURER’S SUPPLIERS, INCLUDING MS AND ITS SUPPLIERS, SHALL NOT BE HELD TO ANY LIABILITY FOR ANY DAMAGES SUFFERED OR INCURRED BY THE END USER (INCLUDING, BUT NOT LIMITED TO, GENERAL, SPECIAL, CONSEQUENTIAL OR INCIDENTAL DAMAGES INCLUDING DAMAGES FOR LOSS OF BUSINESS PROFITS, BUSINESS INTERRUPTION, LOSS OF BUSINESS INFORMATION AND THE LIKE), ARISING FROM OR IN CONNECTION WITH THE DELIVERY, USE OR PERFORMANCE OF THE SOFTWARE.

7. NOTE ON JAVA SUPPORT. THE SOFTWARE PRODUCT MAY CONTAIN SUPPORT FOR PROGRAMS WRITTEN IN JAVA. JAVA TECHNOLOGY IS NOT FAULT TOLERANT AND IS NOT DESIGNED, MANUFACTURED, OR INTENDED FOR USE OR RESALE AS ON-LINE CONTROL EQUIPMENT IN HAZARDOUS ENVIRONMENTS REQUIRING FAIL-SAFE PERFORMANCE, SUCH AS IN THE OPERATION OF NUCLEAR FACILITIES, AIRCRAFT NAVIGATION OR COMMUNICATION SYSTEMS, AIR TRAFFIC CONTROL, DIRECT LIFE SUPPORT MACHINES, OR WEAPONS SYSTEMS, IN WHICH THE FAILURE OF JAVA TECHNOLOGY COULD LEAD DIRECTLY TO DEATH, PERSONAL INJURY, OR SEVERE PHYSICAL OR ENVIRONMENTAL DAMAGE.

If you acquired this EULA in the United States, this EULA is governed by the laws of the State of Washington. If you acquired this EULA in Canada, this EULA is governed by the laws of the Province of Ontario, Canada. Each of the parties hereto irrevocably attorns to the jurisdiction of the courts of the Province of Ontario and further agrees to commence any litigation which may arise hereunder in the courts located in the Judicial District of York, Province of Ontario.

If this EULA was acquired outside the United States, then local law may apply.

Should you have any questions concerning this EULA, please contact the Manufacturer of your SYSTEM.

U.S. GOVERNMENT RESTRICTED RIGHTS

The SOFTWARE and documentation are provided with RESTRICTED RIGHTS. Use, duplication, or disclosure by the Government is subject to restrictions as set forth in subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.227-7013 or subparagraphs (c)(1) and (2) of the Commercial Computer Software-Restricted Rights at 48 CFR 52.227-19, as applicable. Manufacturer is Microsoft Corporation/One Microsoft Way/Redmond, WA 98052-6399.
Index

A
actions, inputting, 55
application code
downloading and executing, 63
generating, 60
AUTOEXEC.BAT, editing, 26

B
B7A Interface Units, C200H, 10
Backplanes, 7
C200H, 9
mounting Open PLC, 21
specifications, 100
batteries, 90
See also peripheral devices
boolean variables. See variables
boot drives, settings. See system, settings

C
C200H Units. See Units, C200H
C200PC-CPU15-G
errors, 96
specifications
FDD interface, 107
keyboard interface, 105
mouse interface, 105
printer interface, 106
VGA interface, 104
system settings, 20
cables
See also peripheral devices
C200H, 9
connection, 25
FDD cable, 107
clock. See utilities
code. See application code
communications units, C200H, 10
compiler options, settings, 60
components, 5
Backplane, 7
CPU Units, 6
front panel, 14
indicators, 16
ISaGRAF Target Software, 8
names and functions, 14
PC Card Boards, 9
rear panel, 15
CONFIG.SYS, editing, 87
CPU Units, 6, 14
cycle time, 77

D
data, IOM data, saving and loading, 74
Data Monitor. See utilities
dictionaries, 33, 38
registering variables, 33, 42
DIP Switch
register. See registers
settings. See system, settings

E
editing
AUTOEXEC.BAT, 26
CONFIG.SYS, 87
expansion utilities. See utilities

F
Fan Units, 91
fans, 92
See also peripheral devices
FDD
See also peripheral devices
connecting cable, 107
floppy disks, 108
features, 2
file transfer, 25

I
I/O Boards
changing parameters, 35
connecting, 45
installation. See installation, OMRON utilities
models, 34, 39
operation, overview, 32
outline, 34
I/O Equipment
connecting, 45
models, 39
models used, 35
operation, overview, 32
outline, 34
I/O refreshes, 78
I/O registers. See registers
I/O Units, C200H, 10
indicators, 16
errors, 97
register. See registers
input
inputting actions, 55
response time, 79
installation, 23
OMRON utilities, 26
summary, 24
integer variables. See variables
IOM data. See data
ISaGRAF Target Software, 8
differences from standard, 113
errors, 96
error codes, 98
hardware settings, 19
installation, outline, 24
ISaGRAF Workbench, 24
operation, overview, 32
starting, 41
Index

word addresses, 115

K
keyboard. See peripheral devices

L
license agreement, 117

M
maintenance, 89
mounting
fans, 93
Open PLC to Backplane, 21
PC Card Boards, 83
PC Cards, 84
specifications, 101
mouse. See peripheral devices

O
operation
basic, 31
ISaGRAF Workbench, 32
procedure, 40
overview, 11
output, response time, 78

P
PC Card Boards, 9, 81
mounting, 83
outline, 82
PC Cards
errors, 96
mounting, 84
removing, 87
slots, 85
peripheral devices, 111
power supply, C200H Units. See Units
precautions, general, vii
programs
creating, 42, 51
simulation, 62
projects
backing up and restoring, 65
creating, 37, 41
dictionaries, 38
programming, 37, 51

R
registers, 109

S
settings. See system, settings
setup, 13
overview, 11
SFC program window, opening, 51
specifications
connectors, 103
external dimensions, 99
FDD interface, 107
general, 99, 102
keyboard interface, 105
maximum I/O numbers, 102
mounting, 101
mouse interface, 105
printer interface, 106
serial communications interface, 103
VGA interface, 104
steps, notation, 52
system
configuration, 3
settings, 19
boot drives, 88
compiler options, 60
DIP Switch, 25
Terminal Software, 25

T
Terminal Software, settings. See system, settings
timer variables. See variables
transitions, notation, 52
troubleshooting, 95
connections, 65

U
Units, applicable C200H Units, 9
utilities, 69
Data Monitor, 72
Open PLC Clock, 72
outline, 70
starting and exiting, 70

V
variables, registering, 42
Revision History

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

Cat. No. W338-E1-3

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

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