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NE01-CCPC1-□

NE Programmer Ver. 2.0

OPERATION MANUAL

OMRON

NE01-CCPC1-□
NE Programmer Ver. 2.0


Operation Manual


Produced August 2008


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. Additionally, there may be severe property damage.

 **WARNING** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. Additionally, there may be severe property damage.

 **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,” which appears in some displays and on some OMRON products, often means “word” and is abbreviated “Wd” in documentation in this sense.

The abbreviation “PLC” means Programmable Controller. “PC” is used, however, in some Programming Device displays to mean Programmable Controller.

Visual Aids

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

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

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

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Version Upgrade Guide

The following table lists the improvements made in the upgrade from NE Programmer version 1.7x version 2.00.

Upgrade	NE Programmer version 1.7x	NE Programmer version 2.00
<p>Note All of the upgrades apply only to the CJ2 CPU Units.</p> <p>Support for CJ2 CPU Units</p> <ul style="list-style-type: none"> • Added CJ2 USB/Serial Port to interface selections. • Enabled selecting CJ2 CPU Units: CJ2H-CPU64-EIP, CJ2H-CPU65-EIP, CJ2H-CPU66-EIP, CJ2H-CPU67-EIP, and CJ2H-CPU68-EIP. 	Not supported	Supported
<p>Support for 2-dimensional Array Variables</p> <p>In a CJ2 CPU Unit project, 2-dimensional array variables can be used in the following windows and lists.</p> <ul style="list-style-type: none"> • Variable Windows • Watch Window • Cross-reference Pop-up Window • Variable Used List 	Not supported	Supported
<p>Reduced Restrictions in Using Variables for Array Subscripts, Upgrade 1</p> <p>Variables can be specified for array subscripts in multi-level data structures (including members).</p>	Variables could be specified only for the last subscript in an array.	Variables can be specified for any subscript in an array.
<p>Reduced Restrictions in Using Variables for Array Subscripts, Upgrade 2</p> <p>Data structure members can be specified for array subscripts.</p>	Array variables could not be specified for elements.	Data structure members can be specified for array subscripts.
<p>Read Protection for Programs as One Logical POU Element</p> <p>A password can be set for a program to prevent reading the program without password verification.</p>	Read protection was possible only for function blocks.	Read protection is also possible for programs.
<p>Support for Converting Physical Address Inputs to Variables</p> <ul style="list-style-type: none"> • If a physical address is input directly into the Ladder Editor, a variable will be automatically created if a comment is also input. • If a variable is input or selected in the Ladder Editor and the Enter Key is pressed, a comment can be input in the same continuous operation. 	Not supported	Supported
<p>Expanded Variable Attributes</p> <ul style="list-style-type: none"> • The Network Variable attribute for global variables was changed to a Convert to Network Variable attribute and a Network I/O Variable attribute. • Items for the Convert to Network Variable attribute and a Network I/O Variable attribute were added to the following: Option settings for variables, Variable Editors, and printer output. 	Only a Network Variable attribute	A Convert to Network Variable attribute and a Network I/O Variable attribute
<p>Variables Used List, Improvement 1</p> <p>Comments were added to the Variables Used List and Cross-reference Report.</p>	No comments	Comments were added.
<p>Variables Used List, Improvement 2</p> <p>The Variables Used List was changed to a window so that it can be resized.</p>	Resizing was not possible.	Resizing is possible.
<p>Program Upload Protection</p> <p>A password can be set for uploading the configuration (all programming). Verification is necessary to upload the configuration from the CPU Unit.</p>	Not supported	Supported
<p>In the New Watch Item Dialog Box, external variables can be specified for automatic completion.</p>	Not supported	External variables can be specified for automatic completion.

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About this Manual:

This manual provides information required to use the NE Programmer Control and Network Support Software. The NE Programmer is an integrated programming environment used to program NE1S-series PLCs and CJ2 CPU Units.

Please read this manual and all related manuals listed in the following table and be sure you understand the information provided before attempting to use the NE Programmer.

Name	Cat. No.	Contents
NE Programmer Operation Manual (this manual)	Z918	Describes the operating procedures of the NE Programmer. Also describes programming and program elements, as well as differences and restrictions depending on the operating environment.
SYSMAC NE1S Series NE1S-CPU01 Programmable Controller Operation Manual	Z901	Provides an outlines of and describes the design, installation, maintenance, and other basic operations for the NE1S-series PLC. Also provides information on how to use the NE Programmer.
NE1S-CNS21U ControlNet Unit Operation Manual	Z902	Describes the use of the NE1S-series ControlNet Unit.
NE1S-DRM21U DeviceNet Unit Operation Manual	Z903	Describes the use of the NE1S-series DeviceNet Unit.
CS1W-EIP21/CJ1W-EIP21 CJ2H-CPU□□-EIP EtherNet/IP Unit Operation Manual	Z909	Describes the use of CS/CJ/NE1S-series EtherNet/IP Units.
CJ2 CPU Unit Hardware User's Manual	W472	Provides hardware information for the CJ2 CPU Units.
CJ2 CPU Unit Software User's Manual	W473	Provides software information for the CJ2 CPU Units.

This manual contains the following sections.

Precautions provide general precautions for using the NE Programmer and related devices.

Section 1 introduces the NE Programmer, provides NE Programmer specifications, and provides the basic operating procedure. It also outlines the differences between the NE1S and the CJ2 CPU Units.

Section 2 describes the structure of the programs.

Section 3 describes software installation.

Section 4 provides an outline of the operations and functions of the NE Programmer.

Section 5 provides details on programming.

Section 6 describes the configuration of the PLC system.

Section 7 provides the procedures for online operation.

The **Appendices** describe variable applications guidelines, structured text keywords, external variables, CIP message communications, the PLC Setup for CJ2 CPU Units, and Ethernet Settings.



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.

Read and Understand this Manual

Please read and understand this manual before using the product. Please consult your OMRON representative if you have any questions or comments.

Warranty and Limitations of Liability

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Disclaimers

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The software specifications and accessories may be changed at any time based on improvements or for other reasons.

EXTENT OF SERVICE

The license fee of the Software does not include service costs, such as dispatching technical staff.

ERRORS AND OMISSIONS

The information in this manual has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

PRECAUTIONS

This section provides general precautions for using the NE Programmer and related devices.

The information contained in this section is important for the safe and reliable application of the NE Programmer. You must read this section and understand the information contained before attempting to use the NE Programmer.

1	Intended Audience	xvi
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1 Intended Audience

This manual is intended for the following personnel, who must also have 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 Unit. 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** Provide safety measures in external circuits (i.e., not in the Programmable Controller), including the following items, to ensure safety in the system if an abnormality occurs due to malfunction of the PLC or another external factor affecting the PLC operation. Not doing so may result in serious accidents.

- Emergency stop circuits, interlock circuits, limit circuits, and similar safety measures must be provided in external control circuits.
- The PLC will turn OFF all outputs when its self-diagnosis function detects any error or when a severe failure alarm (FALS) instruction is executed. As a countermeasure for such errors, external safety measures must be provided to ensure safety in the system.
- The PLC outputs may remain ON or OFF due to deposition or burning of the output relays or destruction of the output transistors. As a countermeasure for such problems, external safety measures must be provided to ensure safety in the system.
- When the 24-V DC output (service power supply to the PLC) is overloaded or short-circuited, the voltage may drop and result in the outputs being turned OFF. As a countermeasure for such problems, external safety measures must be provided to ensure safety in the system.

-  **WARNING** 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. Serious accidents may result from abnormal operation if proper measures are not provided.
-  **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 editing or transferring a program, PLC Setup, I/O tables, I/O memory data, or parameter data to another node. Doing either of these without confirming safety may result in unexpected operation and injury.

4 Application Precautions

Observe the following precautions when using the NE Programmer.

- Do not turn OFF the power supply to the PLC or disconnect the cable when the NE Programmer is connected online to the PLC.
- Do not turn OFF the power supply to a Unit while data is being transferred. Particularly 1) never turn OFF the power to a PLC when the Memory Card is being accessed and 2) never remove the Memory Card while it is being accessed. To remove the Memory Card, first press the Memory Card power supply switch and wait for the BUSY indicator to turn OFF before removing the Memory Card. In the worst-case scenario, the Memory Card may become unusable if the power is turned OFF while the Memory Card is being accessed or the Memory Card is removed while it is being accessed.
- 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 (including changing the Startup Mode setting).
 - Force-setting/force-resetting any bit in memory.
 - Changing the present value of any word or any set value in memory.
 - Restoring the values of variables.
- Always clear the memory of a CJ2 CPU Unit before downloading programs, the PLC Setup, or the I/O tables from the NE Programmer. If the memory is not cleared before downloading the data, unexpected operation may occur in the controlled system.
- Check that the DIP switches and data memory (DM) are properly set before starting operation.
- Before actual operation, check the parameter settings and user program (such as the ladder program) for proper execution in trial operation. Always check the program before transferring it.
- 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.
- Confirm that a Compact Flash Card containing the correct contents is inserted before starting operation.
- Be sure to set the network connection settings and network parameters correctly.

- The BKUP indicator lights when data is being written to flash memory. Do not turn OFF the power supply to the CPU Unit when the BKUP indicator is lit. The data may not be written correctly.
- Set the startup mode only after confirming that the controlled facilities will not be adversely affected.
- Do not turn OFF the power supply to the CPU Unit while a Memory Card is being accessed.
- Do not remove a Memory Card while it is being accessed. Press the Memory Card power button and confirm that the BUSY indicator goes out before removing the Memory Card.
- The user program is stored in nonvolatile memory, and operation is possible even if the Battery voltage has dropped or a Battery is not installed. (Operation will not be stopped for a memory error.) Data in the DM and EM Areas, however, will not be stable without a Battery that is fully charged. If data from the DM or EM Areas is used to control outputs from the program, use the Battery Error Flag to control outputs or perform other measures to ensure safety.

SECTION 1

Introduction

This section introduces the NE Programmer, provides NE Programmer specifications, and provides the basic operating procedure. It also outlines the differences between the NE1S and the CJ2 CPU Units.

- 1-1 NE Programmer Introduction 2
 - 1-1-1 What Is the NE Programmer?..... 2
 - 1-1-2 NE Programmer Features 2
- 1-2 Specifications 4
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- 1-3 Basic Operating Procedure 5
- 1-4 Differences and Restrictions between NE1S-series CPU Units and CJ2 CPU Units 6
 - 1-4-1 Improvements in CJ2 CPU Units Compared with NE1S-series CPU Units 6
 - 1-4-2 Restrictions for CJ2 CPU Units Compared with NE1S-series CPU Units 8

1-1 NE Programmer Introduction

1-1-1 What Is the NE Programmer?

The NE Programmer is a programming tool that provides an integrated development environment for PLCs (i.e., Programmable Controllers) built with NE1S-series CPU Units and CJ2 CPU Units.

The NE Programmer can be used for the following CPU Units:

- NE1S-series CPU Units: NE1S-CPU01
- CJ2 CPU Units: CJ2H-CPU□□-EIP

The functions that can be used depend on the CPU Unit that is connected. For details, refer to *1-4 Differences and Restrictions between NE1S-series CPU Units and CJ2 CPU Units*.

1-1-2 NE Programmer Features

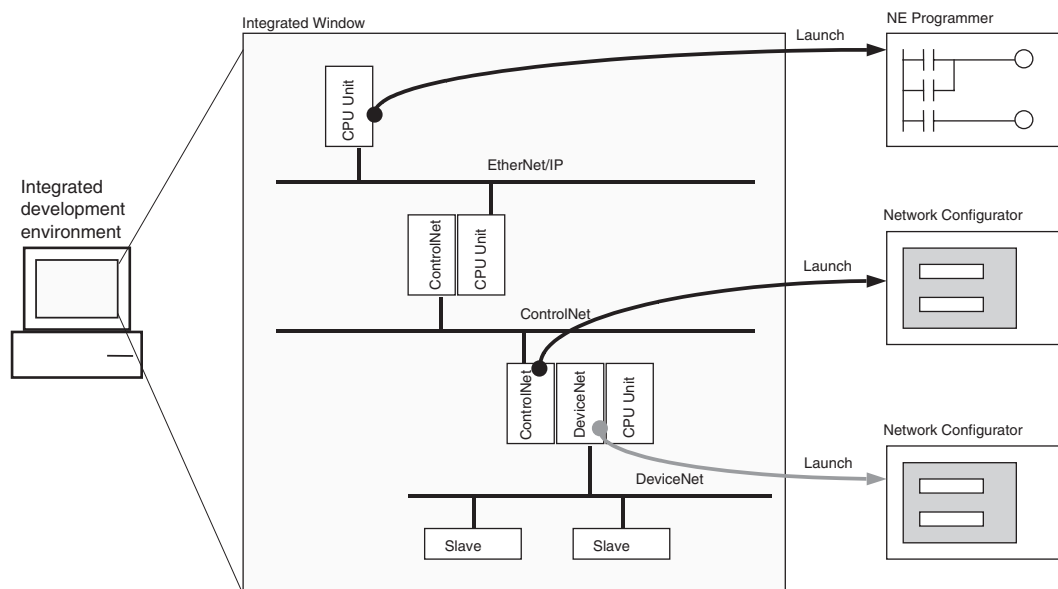
Flexible Connection Environment

You can connect the NE Programmer to an NE1S-series CPU Unit by using any of the following interfaces: USB, RS-232C, EtherNet/IP, ControlNet, or DeviceNet. (CIP communications is used for all these interfaces.)

You can also connect the NE Programmer to a CJ2 CPU Unit by using any of the following interfaces: USB, RS-232C, or EtherNet/IP. (CIP communications is used for all these interfaces.)

Integrated Development Environment

Each Programming Device can be started centrally from a window displaying the NE1S-series CPU Units connected through serial communications (USB and RS-232C), EtherNet/IP, ControlNet, and DeviceNet.



Note It is not possible to display three different network levels simultaneously on in the actual window.

Remote Programming/Monitoring from NE Programmer (Serial Connection)

The networks share the common CIP communications protocol, so that another NE1S-series CPU Unit in an EtherNet/IP, ControlNet, or DeviceNet network or a CJ2 CPU Unit on an EtherNet/IP network can be remotely programmed or monitored from NE Programmer Programming Software connected through a serial connection (USB or RS-232C).

Remote Programming/Monitoring from NE Programmer (EtherNet/IP or ControlNet Connection)

A computer running the NE Programmer Programming Software can also be connected directly to an EtherNet/IP or ControlNet network. In this case, another NE1S-series CPU Unit in an EtherNet/IP, ControlNet, or DeviceNet network can be remotely programmed or monitored from NE Programmer Programming Software connected through ControlNet

Directly Inputting Mnemonics in a Ladder Window

Instructions with text mnemonics such as LD, AND, and MOV can be entered directly by moving the cursor to the desired insertion point in the Ladder Programming Window and entering the mnemonic. Inputs and outputs can also be entered by selecting the input or output icon from the toolbar and advanced instructions can be entered by dragging and dropping the instruction from the instruction list.

Automatic Allocation of I/O Memory to Variables

Variables can be broadly divided into two categories: global variables that are shared within a PLC and local variables that are unique to a program or function block.

Physical memory addresses can be allocated to both global variables and local variables automatically with NE Programmer. The automatic allocation of I/O memory allows variables to be used in programming without dealing directly with the variables' addresses.

While it isn't necessary to deal with the variables' addresses, the user can manually specify the physical addresses of global variables if necessary.

Link from the Network Configurator

The NE Programmer can be started from the Network Configurator and data can be transferred between the two. Also, network variables registered with the NE Programmer can be shared with the Network Configurator. It is easy to make network settings using variable names in the Network Configurator by importing and exporting variables in the variable tables.

1-2 Specifications

1-2-1 NE Programmer Specifications

Item		Specifications
System requirements	Hardware	Computer: IBM PC/AT or compatible CPU: Pentium, 300 MHz minimum (Pentium, 1 GHz minimum recommended) Memory: 512 bytes minimum Hard disk: 200 Mbytes minimum free space Monitor: SVGA (800 x 600 pixels) or better CD-ROM drive: 1 minimum
	OS	Windows 2000, XP, or Vista *1
	Supported languages	Japanese and English
Method of connection to network	Board or card	3G8F7-DRM21: PCI Board 3G8F5-DRM21: ISA Board 3G8E2-DRM21: PCMCIA Card
	Serial connection (using gateway function from CIP to DeviceNet network)	Connection is made to a USB or RS-232C port on the CPU Unit of the PLC to which the DeviceNet Unit is mounted. Note (1) The Network Configurator can also be connected to a ControlNet or Ethernet network. (2) The NE1S-series USB driver does not support Windows Vista.
Connecting the NE Programmer using a Board or Card	Relation to network	The NE Programmer is allocated 1 node address.
	Number of NE Programmer nodes connected to network	1 per network
PLCs supported by NE Programmer		NE1S-series CPU Units: NE1S-CPU01 CJ-series CJ2 CPU Units: CJ2H-CPU□□-EIP
Main functions	Creating logical POUs	Instructions and function blocks Languages: Ladder diagrams or structured text (ST) as required
	Creating configurations	Tasks and global variables
	PLC system configuration	PLC Setup, Ethernet settings, build settings, I/O table settings
	Online operation	Automatic uploading (when using a serial connection), changing the connection target, creating I/O tables, uploading/downloading/comparing programs and other data, changing the operating mode, monitoring the program, force-setting and force-resetting bits, online editing, displaying errors, displaying the cycle time, tracing data, etc.

*1 System requirements for Windows Vista: CPU: Pentium, 1 GHz min.;
Memory: 1 GB

1-3 Basic Operating Procedure

This section describes the basic operating procedure and the relationship to the NE Programmer and the CPU Unit. The relationship and order is given for each step and setting.

1,2,3...

1. Installation

Set the DIP switches on the front of each Unit as required.
Mount the CPU Unit, Power Supply Unit, and other Units to the Backplane.
Install the Memory Card if required.

Note Refer to the operation manual for each Unit.

2. Wiring

Connect the power supply wiring, I/O wiring, and Programming Device (NE Programmer). Connect communications wiring as required.

Note Refer to the operation manual for each Unit for information on power supply wiring, I/O wiring, and the NE Programmer connection.

3. Initial Settings (Hardware)

Set the DIP switches and Rotary switches on the front of the CPU Unit and other Units.

Note Refer to the operation manual for each Unit.

4. Checking Initial Operation

Turn the power on after checking the power supply wiring and voltage.
Check the Power Supply Unit's POWER indicator.

5. Registering the I/O Table

Check the Units to verify that they are installed in the right slots. With the PLC in PROGRAM mode, register the I/O table from the Programming Device (NE Programmer). (Another method is to create the I/O table in NE Programmer and transfer it to the CPU Unit.)

Note Refer to *7-5 Online Operations for I/O Tables*.

6. PLC Setup Settings

With the PLC in PROGRAM mode, change the settings in the PLC Setup as necessary from the Programming Device (NE Programmer). (Another method is to change the PLC Setup in NE Programmer and transfer it to the CPU Unit.)

Note Refer to the operation manual for each Unit.

7. DM Area Settings for CPU Bus Units and Special I/O Units

a) Use a Programming Device (NE Programmer) to make any necessary settings in the parts of the DM Area that are allocated to Special I/O Units and CPU Bus Units.

b) Reset the power (ON → OFF → ON) or toggle the Restart Bit for each Unit.

Note Refer to the operation manual for each CPU Bus Unit or Special I/O Unit.

8. Writing the Program

Write the program with the NE Programmer.

9. Transferring the Program (NE Programmer Only)

With the PLC in PROGRAM mode, transfer the program from NE Programmer to the CPU Unit.

10. Testing Operation

a) Checking I/O Wiring

Output wiring	With the PLC in PROGRAM mode, force-set output bits and check the status of the corresponding outputs.
Input wiring	Activate sensors and switches and either check the status of the indicators on the Input Unit or check the status of the corresponding input bits with the Programming Device's Bit/Word Monitor operation.

b) Auxiliary Area Settings (As Required)

Check operation of special Auxiliary Area Settings such as the following:

Output OFF Bit	When necessary, turn ON the Output OFF Bit (A50015) from the program and test operation with the outputs forced OFF.
Hot Start Settings	When you want to start operation (switch to RUN mode) without changing the contents of I/O memory, turn ON the IOM Hold Bit (A50012).

c) Trial Operation

Test PLC operation by switching the PLC to MONITOR mode.

d) Monitoring and Debugging

Monitor operation from the Programming Device. Use functions such as force-setting/force-resetting bits, tracing, and online editing to debug the program.

Note Refer to *SECTION 7 Online Operation*.

11. Saving and Printing the Program

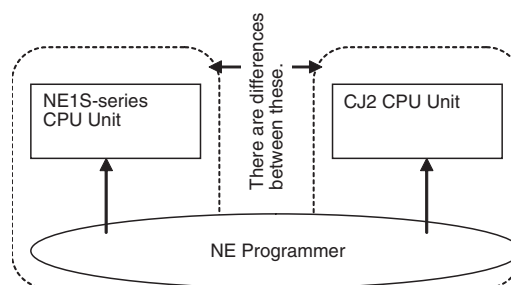
12. Running the Program

Switch the PLC to RUN mode to run the program.

1-4 Differences and Restrictions between NE1S-series CPU Units and CJ2 CPU Units

1-4-1 Improvements in CJ2 CPU Units Compared with NE1S-series CPU Units

There are differences between using the NE Programmer for a CJ2 CPU Unit in comparison to using it for an NE1S-series CPU Unit.



The following points are the main differences.

Support for Japanese Identifiers

Names in Japanese can be given to all types of identifiers in projects for the CJ2 CPU Unit. The term “identifier” refers to the following items.

- Data type names (structure names and structure member names)

- Variable names (including FBIO group names)
- Function block and instance names
- POU names (program names and configuration block names)
- Configuration names

Support for Two-dimensional Arrays

It is possible to input and display two-dimensional array variables. The Variable Editor, Edit Variables Dialog Box, and Watch Window all support two-dimensional variables.

Reduced Restrictions

The maximum number function block (FB) definitions and number of instances have been increased.

Item	Using the NE1S	Using the CJ2				
		CPU64-EIP	CPU65-EIP	CPU66-EIP	CPU67-EIP	CPU68-EIP
Maximum number of FBs instances	1,024	256	512	1,024	2,048	2,048
Area size for automatic variable allocation	8 banks	1 bank		4 banks	8 banks	

The maximum size of each variable (including array and structure) has been increased from 128 to 32,000 words.

Item	Using the NE1S	Using the CJ2
Size per variable (including structure)	128 words (256 bytes max.)	32,000 words (64 Kbytes max.)

The maximum number of array elements has been increased from 256 to 32,000 elements.

Item	Using the NE1S	Using the CJ2
Elements	1 to 255 elements	1 to 32,000 elements

The restriction on specifying variables as array subscripts has been removed.

Item	Using the NE1S	Using the CJ2
Specifying variables for array subscripts in multilevel arrays (including members)	A variable can be specified only for the rightmost array subscript.	Variables can be specified for array subscripts regardless of the position. Example: aaa[index0].bbb[index1].ccc[index2]
Specifying structure members for array subscripts	Array variables cannot be specified for elements.	Structure members can be specified for array subscripts. Example: aaa[str.member]

Read Protection

With the CJ2, it is possible to set read protection for program POU's.

Note With the NE1S it is possible to set protection only for function blocks.

Upload Protection

Password protection can be used for program uploading from the CPU Unit.

1-4-2 Restrictions for CJ2 CPU Units Compared with NE1S-series CPU Units

The following restrictions apply to CJ2 CPU Units in comparison to the NE1S-series CPU Units.

Item	Using the NE1S	Using the CJ2
Initial values for variables	Supported	Not supported
Change log	Supported	Not supported
SEND MAIL instruction (MLSND)	Supported	Not supported