




CX-Server PLC Tools

Release 3.1

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 in them. Failure to heed precautions can result in injury to people or damage to the product.

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

The abbreviation “PLC” means Programmable Logic Controller and is not used as an abbreviation for anything else.

Visual Aids

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

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

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



Represents a shortcut on the Toolbar to one of the options available on the menu of the same window.

Other manual conventions are as follows:

- Windows-based applications provide users with a number of different ways to perform one operation. These are normally: from the application menu bar; using icons on a Toolbar; using keyboard shortcuts; using the right-mouse button to display a context-sensitive menu; dragging and dropping. Whilst recognising this, the manual provides user instructions employing the Toolbar and right-mouse button only. Use of the application menu bar or keyboard shortcuts are only included if no such alternatives exist.
- Access to the CX-Server middleware is normally via other software applications, such as CX-Programmer or CX-Protocol. This is noted in the manual by the term “invoking application”.
- This manual refers to two distinct types of project: CX-Server projects and application projects. A CX-Server project is defined in this manual. An application project is defined by the software application invoking CX-Server.

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About this Manual

This manual describes the CX-Server application and its ability to control and monitor a range of OMRON PLCs. It does not provide detailed information concerning the PLCs themselves, for this information the commercial manual for the device must be consulted.

This manual contains the following chapters:

- ◆ **Chapter 1 Technical Specification.** This chapter describes CX-Server in general terms and introduces the user to the relationship between CX-Server and associated products. It also provides details of the operating environment, minimum configuration and installation procedures necessary for the satisfactory operation of CX-Server.
- ◆ **Chapter 2 PLC Memory Component.** This chapter describes the PLC Memory Component and its ability to allow the user to view, edit and monitor PLC Data Areas, bits and symbols.
- ◆ **Chapter 3 IO Table Component.** This chapter describes the IO Table Component and its ability to edit PLC IO Table and SIOU Settings on a PLC.
- ◆ **Chapter 4 PLC Setup Component.** This chapter describes the PLC Setup Component and the procedures involved in the configuration of PLC settings.
- ◆ **Chapter 5 Data Trace/Time Chart Monitor Component.** This chapter describes the Data Trace/Time Chart Monitor Component and the procedures involved when viewing Data Trace and Time Chart Monitoring information in either Histogram or Trend Graph mode.
- ◆ **Chapter 6 PLC Error Component.** This chapter describes the PLC Error Component and the procedures involved in reading and clearing PLC CPU errors, error log entries and messages.
- ◆ **Chapter 7 Memory Card Component.** This chapter describes the Memory Card Component and the procedures required to format, access and edit a PLCs memory card/compact flash and to transfer data between the computer or PLC and memory card/compact flash.
- ◆ **Chapter 8 CX-Net Network Configuration Tool.** This chapter describes the procedures for establishing communications between PLCs across a network and ensuring that information is routed correctly to the target devices.
- ◆ **Chapter 9 PLC Clock Tool.** This chapter describes the PLC Clock Tool and the procedures involved when adjusting the PLC clock.
- ◆ **Chapter 10 Data Links.** This chapter describes how the Data Link Editor enables a PLC to be configured so that it can participate in one, or more automatic data sharing schemes, over SYSMAC LINK and Controller Link networks, without the need for special programming.
- ◆ **Chapter 11 Routing Tables.** This chapter describes how Routing tables allow networked PLCs to be configured so that they can communicate with each other via gateways; across remote networks.
- ◆ **Appendix A Network Availability.** The tables in this appendix indicate the network available to each PLC device group. FinsGateway has no network availability and is not described.
- ◆ **Appendix B PLC Memory Area.** The tables in this appendix provide memory area details for each device group.
- ◆ **Appendix C Toolbars and Keyboard Shortcuts.** The tables in this appendix summarize the toolbars and keyboard shortcuts available from each component tool.

A *Glossary of Terms* and *Index* are also provided.

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CHAPTER 1

Technical Specification

This chapter describes the CX-Server PLC Tools software in general terms and introduces the user to the relationship between CX-Server PLC Tools and the associated products. It also provides details of the operating environment, minimum configuration and installation procedures necessary for the satisfactory operation of CX-Server PC Tools.

CX-Server PLC Tools Software

PLC Tools are a collection of utilities and programs that provide configuration and control for OMRON PLCs and Networks.

CX-Server PLC Tools consists of the following components:

- ◆ **PLC Memory** component. This component allows the user to view, edit and monitor either channels (words) or individual bits in areas of the PLC.
- ◆ **IO Table** component. This component retrieves and configures PLC rack and address data.
- ◆ **PLC Setup** component. This component retrieves and configures PLC setting data.
- ◆ **Data Trace/Time Chart Monitor** component. This component records and displays data obtained from the PLC's memory areas during program execution.
- ◆ **PLC Error** component. This component displays and manages PLC errors.
- ◆ **Memory Card** component. This component manages the file storage to and from PLC memory cards.
- ◆ **PLC-Clock** component. This component configures and displays the PLC clock.
- ◆ **Routing Table** component. This component manages the routing tables, which allow PLC internode communications.
- ◆ **DataLink Editor** component. This component allows configuration and modification of the datalink tables, which allows data to be transferred between PLCs without any other programming.
- ◆ **CX-Net Network Configuration** tool. This tool consists of a suite of programs allowing the management of Networks for OMRON PLCs.

CX-Server runs within the Microsoft Windows environment (Microsoft Windows 95 or later, or Microsoft Windows NT 4.0 or later) on standard IBM and compatible Pentium-based desktop PCs.

CX-Server PLC Tools utilities form part of other CX-Automation suite applications (CX-Programmer, CX-Server).

CX-Server PLC Tools have a close relationship with CX-Server Runtime which is the communications middleware software for OMRON PLCs. For further information see CX-Server Runtime manual.

About this Manual

This User Manual acts as a reference for CX-Server PLC Tools by describing its various concepts and abilities, and provides the basics of using its dialogs and supplied utilities.

Caution: This manual is referred to from other software applications that utilise CX-Server, for instance, CX-Programmer, CX-Protocol or SYSMAC-SCS. Subsequently, some topics contained in this user manual may not be relevant.

The CX-Server PLC Tools come with a context-sensitive online help system which is designed to complement this manual and to provide a quick reference at any point while using CX-Server PLC Tools when the manual is not to hand. This general help system uses a fast hypertext system which allows progressively detailed information about any topic to be obtained by selecting keywords within the descriptive text.

Throughout this manual it is assumed that the reader has a working knowledge of Microsoft Windows, and knows how to:

- ◆ use the keyboard and mouse;
- ◆ select options from Microsoft Windows menus;

- ◆ operate dialog boxes;
- ◆ locate, open and save data files;
- ◆ edit, cut and paste text;
- ◆ use the Microsoft Windows desktop environment.

If the installed version of Microsoft Windows has not been used before, it is recommended that the reader spends some time working with it using the Microsoft documentation before using the CX-Server PLC Tools.

CX-Server 3.1 PLC Tools: New Features

This version of the CX-Server PLC Tools offers significant functionality for communication with OMRON PLCs and management of their associated settings information.

The following list describes important features that are present in CX-Server 3.1 PLC Tools.

- ◆ The PLC Tools run under Microsoft Windows 95, 98, Millennium, 2000 or XP and NT4.0 with Service Pack 5 or later.
- ◆ The PLC Tools have support for the following communications connections:
- ◆ SYSMAC WAY, Toolbus (Peripheral port connection), Ethernet, Controller Link, SYSMAC LINK, SYSMAC NET (for Microsoft Windows NT only) and FinsGateway. New PLC support includes CS1-H, CJ1-H and CJ1-M PLCs.

System Requirements

The system requirements of CX-Server are the same as those of the CX-Programmer. Refer to page 3 in *Part 1: CX-Programmer* for details.

Communications Requirements

In order to use serial communication types SYSMAC WAY and Toolbus a RS232 connections via a standard serial port on the PC (COM1 etc.) or a RS422 connections to a 422 serial board is required.

When using SYSMAC LINK directly from a PC, a SYSMAC LINK network service board and FinsGateway version 3.12 must be installed.

To use SYSMAC NET directly from a PC, SYSMAC NET network service board and FinsGateway version 3.12 are required (Windows NT4 only).

When using Controller Link, a Controller Link network service board (wired or optical and FinsGateway version 3.12 are required.

In order to use an Ethernet net, an Ethernet card, Windows Sockets software and TCP/IP must be installed and correctly configured.

Refer to the appropriate hardware system manuals for detailed information about connecting and configuring these devices for the environment.

Note: If FINS Gateway is to be used with a CLK/SLK PCI board in the Windows 98 or 2000 operating system the appropriate drivers must be installed. These drivers can be found on the CX-Server CD under: CX-Server\WDM\CLK (PCI)\ or CX-Server\WDM\SLK (PCI)\.

Installation

CX-Server and CX-Server PLC Tools can be installed from the CX-One Package CD-ROM or the individual CX-Programmer CD-ROM. Refer to one of the following manuals for details.

- ◆ Installing from CX-One: Refer to the *CX-One Setup Manual*.
- ◆ Installing from the individual CX-Programmer CD-ROM: Refer to page 4 of *Part 1: CX-Programmer*.

Starting CX-Server PLC Tools

CX-Server PLC Tools components are normally accessed from the invoking application. However, a number of tools can be accessed stand-alone from the **Start** pushbutton on the Microsoft Windows taskbar.



CX-Net Network Configuration tool.

Help and How to Access it

The CX-Server PLC Tools come with a detailed context-sensitive help system. At any time while using the software, it is possible to get help on the particular point that is currently being worked on, or on general aspects of the CX-Server PLC Tools. This system is intended to complement the manual, by providing online reference to specific functions of the software and how to use them. The manual is designed to provide more tutorial information and discuss the various facilities offered by the CX-Server PLC Tools.

- ◆ Context-sensitive help;
- ◆ Help Index (available on the *Help* menu);
- ◆ Help Contents (available on the *Help* menu);
- ◆ About (available on the *Help* menu);
- ◆ Status Bar.

Help Topics

For any of the PLC Tools select the *Help Contents* option on the *Help* menu. The Help system provides a standard look-up dialog under the *Contents* tab showing the contents of the PLC Tools Help file. Click on an item to read the associated information.

Index

Use the following procedure to retrieve online help from the *Index* tab of the Help Topics dialog.

- 1, 2, 3...*
1. Select the *Help Index* option from the *Help* menu.
 2. Enter a text query into the first step field. The second step field is refreshed according to the query entered in the first step field.
 3. Select an entry in the second step field and select the **Display** pushbutton, or double-click on the index entry.
 4. If an entry is linked to two or more topics, the names of the topics are displayed in the Topics Found dialog. Select a topic and choose the **Display** pushbutton or double-click on the topic.

Find

Use the following procedure to retrieve on-line help from the *Find* tab of the Help Topics dialog.

- 1, 2, 3...*
1. Select the *Help Index* option from the *Help* menu.
 2. Select the *Find* tab.
 3. Enter a text query into the first step field. The second step field is refreshed according to the query entered in the first step field. Previous text queries can be retrieved by selecting from the drop-down list in the first step field.
 4. Select a word that matches the query – some words may be automatically selected. More than one word can be selected by pressing Shift and selecting another word to extend the selection, or by pressing Ctrl and selecting another word to add to the selection. The third step field is refreshed according to the word or words selected. The number of topics found are shown at the bottom of the dialog.
 5. Select a topic from the third step field and select the **Display** pushbutton, or double-click on the topic from the third step field. Select the **Clear** pushbutton to restart the find operation.

The Find operation can be enhanced by the use of the **Options** pushbutton and **Rebuild** push-button. Refer to *Microsoft Windows documentation* for further information.

Context-sensitive Help

The CX-Server PLC Tools support the use of context-sensitive help. The relevant online help topic is provided automatically by selecting the current area of the display responsible for carrying out those actions. Select the F1 function key to retrieve context-sensitive help. Some dialogs include a **Help** pushbutton when F1 cannot be accessed.

About CX-Server PLC Tools

Each CX-Server PLC Tools dialog contains an *About* option on the *Help* menu. The About dialog supplies technical reference information about that dialog such as version and copyright information. It also contains essential version number information that is required for obtaining technical support.

Use the following procedure to view the About CX-Server dialog.

1. Select *About* from the *Help* menu.
2. The About box is displayed. It provides a copyright statement and version number of the component or tool within CX-Server.

Status Bar

The Status Bar is displayed at the bottom of many of the CX-Server dialog and PLC Tool windows. It provides several helpful pieces of information while programming:

- ◆ *Instant Help*. A brief message appears in the Status Bar as menu commands and buttons are selected.
- ◆ *Online Status*. The online or offline status of the PLC. (i.e. connected to PLC or not).
- ◆ *PLC Mode*. When connected to a PLC, this shows the current PLC mode. Connection errors are also displayed here.
- ◆ *Connected PLC and CPU Type*. The currently connected PLC and associated CPU can always be referenced in the status bar.

The Status Bar can be enabled and disabled from many components and tools by selecting the *Status Bar* option from the *View* menu.

Technical Support

If the installation instructions for this application have been followed (refer to *Installation* in this Chapter), no difficulties should be encountered. However, if there is a problem, contact Customer Services.

If a problem occurs, check that it does not relate to a fault outside CX-Server or the PLC Tools. Check the following:

- ◆ The PC is working correctly.
- ◆ The PLC is working correctly.
- ◆ The communications system is set up correctly.
- ◆ The errors are cleared in the PLC.

When Customer Services need to be contacted, keep the details shown in the following table to hand. A clear and concise description of the problem is required, together with the exact text of any error messages.

Note: Use the About box to obtain the version number of the component.

Customer Services Required Information Table

Version number of CX-Server component or tool:	
Serial number of the software:	
Operating system and version number:	
Language of operating system:	
PLC type, model and CPU details:	
Type of communications in use:	
Serial Number	
Toolbus	
SYSMAC LINK	
SYSMAC NET	
Device Net	
Controller Link	
Ethernet	
Nature of the problem:	
Steps taken to reproduce problem:	
Other comments:	

CHAPTER 2

PLC Memory Component

This chapter describes the PLC Memory component and its ability to allow the user to view, edit and monitor either channels (words) or individual bits in areas of the PLC.


The PLC Memory component allows viewing, editing and monitoring of PLC memory areas, monitoring and forcing of bit addresses and symbols and forced status information.

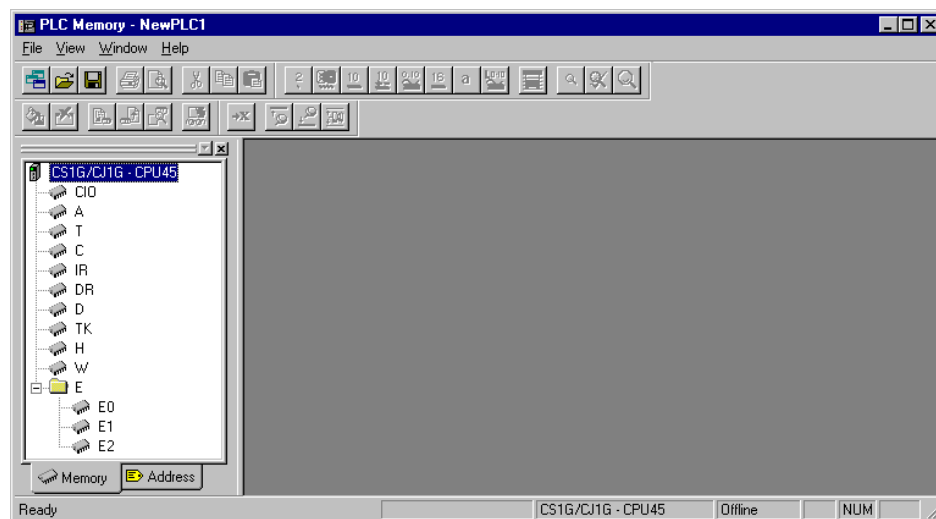
The PLC Memory component displays the values of the memory area being accessed within the PLC. Areas to be monitored are selected from the memory area workspace. The address workspace shows individual bits, individual channel symbols and forced status information by selecting or entering specific PLC addresses or symbol names. The current values of these areas are displayed in the PLC Memory component. There are no values displayed when the PLC is offline.

The PLC Memory component can be forced to stay as the top window by selecting *Always on top* from the *View* menu.


For moving, resizing, tiling, maximising, minimising and closing windows, refer to Microsoft Windows online help for further information.


Access to the PLC Memory component is from the invoking application.

-  To close the PLC Memory window, select the **Close** button in the title bar.



The left pane, known as the Data Area Workspace, displays the current PLC in terms of its data areas and addresses. The data areas that form part of the PLC memory differ depending on the PLC type. The status bar provides instant help, displays the PLC and CPU type and describes the operating mode of the PLC.

-  To expand the hierarchy in the left pane, select this icon.

-  To collapse the hierarchy in the left pane, select this icon.



To view the content of a particular branch in the hierarchy, double-click on the item in the Data Area Workspace: a window is displayed within the PLC memory component. The associated icon in the Data Area Workspace changes to denote that a window has been opened. Multiple windows can be opened at the same time.



- Select the **Close** button in the window's title bar to close the window.



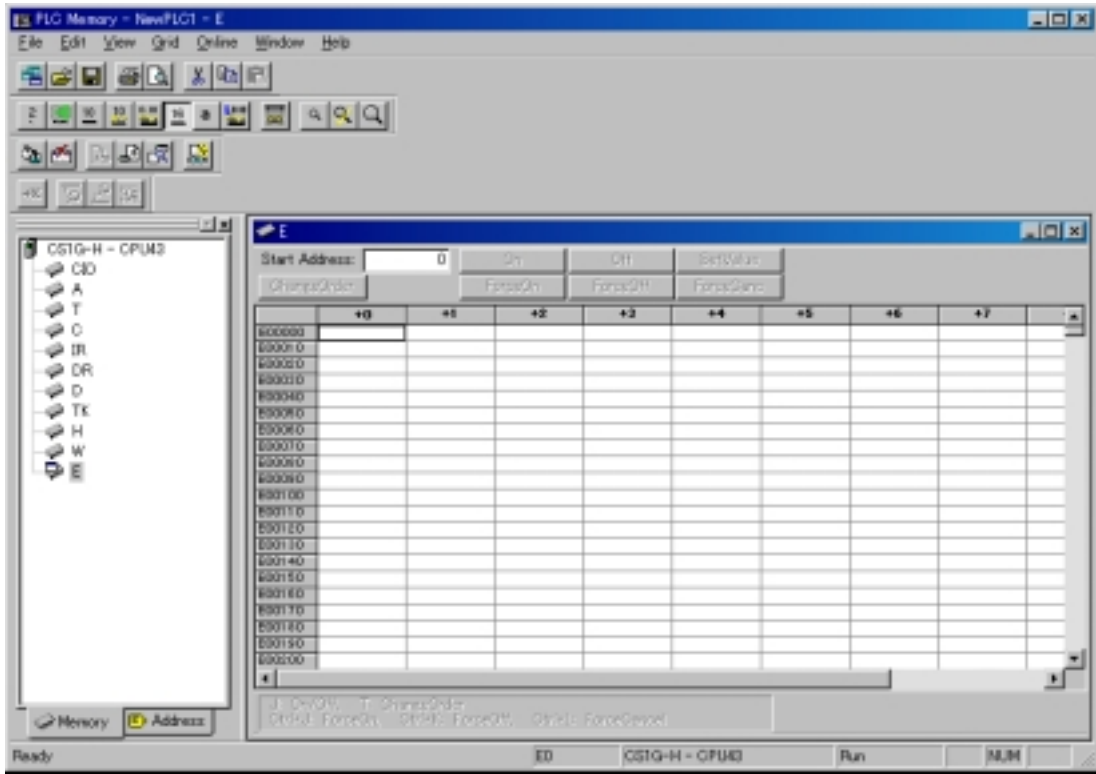
- Columns can be resized using the **Resize Column** button from the toolbar to fit the visible display area. These options are useful when changing data format, for instance to Binary.

The display of the Data Area Workspace can be controlled by selecting Data Area Workspace from the View menu.

The toolbar and status bar can both be turned on or off. Select *Status Bar* from the *View* menu to control the display of the status bar. Select *Toolbar* from the *View* menu to control the display of the PLC Memory toolbar.

PLC Data Area

The *Memory* tab of the PLC Memory component allows monitoring and editing of complete memory areas as channel data.



When the content of a memory area is opened, a window is displayed. It is possible to Zoom in and out of the window by selecting the **Zoom In** button or **Zoom Out** button from the toolbar. Select the **Restore Zoom/Zoom to Fit** button from the toolbar to return the window to the original zoom setting.

Editing Data

Data can be entered or amended in the data area displayed provided the associated PLC or memory area allows read/write operations. Use the following procedure to edit data in the *Memory* tab.

- 1, 2, 3... 1. Double-click on the required data area name in the *Memory* tab of the Data Area Workspace to open it. A window containing a grid representing that data area is opened.
2. Select an appropriate format for the data to be entered from the associated button from the toolbar: **Binary**, **Binary Coded Decimal**, **Decimal**, **Signed Decimal**, **Floating Point**, **Hexadecimal**, **Double Floating Point** or **Text**.
3. Type in valid values directly into the cells and press Return.



Note: Once a format has been selected a keyboard filter is applied so that non-valid keystrokes are ignored.

When in either Debug mode (for CV-series PLCs only) or Monitor mode: it is not possible to edit a read-only value.

PC to PLC Communications

The PLC Memory component permits the transfer of data to and from the PLC and allows comparisons to be made between data stored on the computer and the PLC. Use the following procedure to retrieve data from the PLC.

- 1, 2, 3... 1. Ensure the PLC is online before activating the PLC Memory component.
2. Open a data area by double-clicking a data area from the Data Area Workspace in the *Memory* tab.





3. Select the **Transfer from PLC** button from the toolbar to read information from the PLC.
4. The Transfer from PLC dialog is displayed. Transfer can be performed on the memory areas that have been opened in the PLC Memory component. Select the associated setting to monitor that area.
5. Select the *Visible Area Only* option to transfer the area visible to the window, the *Selection* option to transfer the area highlighted by the cursor or the *All* option to transfer all of the selected memory area from the PLC. Alternatively, use the **Select All** pushbutton to transfer all opened memory areas from the PLC.
6. Select the **Upload** pushbutton to accept the settings or the **Cancel** pushbutton to abort the operation.

Note: By clicking an associated data area's settings in its greyed state, the PLC Memory component automatically identifies the data area words to be monitored.

Use the following procedure to write data back to the PLC.

- 1, 2, 3...**
1. Ensure the PLC is online before activating the PLC Memory component.
 2. Open a data area by double-clicking a data area from the Data Area Workspace in the *Memory* tab.



3. Select the **Transfer to PLC** button from the toolbar to transfer information to the PLC.
4. The Transfer to PLC dialog is displayed. Transfer can be performed on the memory areas that have been opened in the PLC Memory component. Select the associated setting to monitor that area.
5. Select the *Visible Area Only* option to transfer the area visible to the window, the *Selection* option to transfer the area highlighted by the cursor or the *All* option to transfer all of the selected memory area to the PLC. Alternatively, use the **Select All** pushbutton to transfer all opened memory areas to the PLC.
6. Select the **Download** pushbutton to accept the settings or the **Cancel** pushbutton to abort the operation.

Note: By clicking an associated data area's settings in its greyed state, the PLC Memory component automatically identifies the data area words to be monitored.

The PLC Memory component allows the values stored on the PLC and the current displayed values to be compared. Use the following procedure to compare PLC and PC values.

- 1, 2, 3...**
1. Ensure the PLC is online before activating the PLC Memory component.
 2. Select the **Compare with PLC** button from the toolbar to compare information between the PC and the PLC.
 3. The Compare with PLC dialog is displayed. Comparisons can be performed on the memory areas that have been opened in the PLC Memory component. Select the associated setting to compare that area.
 4. Select the *Visible Area Only* option to compare the area visible to the window, the *Selection* option to compare the area highlighted by the cursor, or the *All* option to compare all of the selected memory area to the PLC. Alternatively, use the **Select All** pushbutton to compare all opened memory areas.
 5. Select the **Compare** pushbutton to accept the settings or the **Cancel** pushbutton to abort the operation.

Whilst comparing, all values resident on the PLC that are different to those on the PC are annotated in brackets. Further editing to the data area causes further differences between PC and PLC versions, and these are also annotated.

Timer/Counter Memory areas

Whether online or offline the PLC Memory component enables the data in the Timer (TIM) and Counter (CNT) memory areas to be formatted using either Binary Coded Decimal (BCD), Hexadecimal or Decimal data types.

When an Online transfer to PLC operation is executed, the PLC Memory Component will read the TIM/CNT mode setting from the PLC. If the TIM/CNT mode is set to BCD, then the command will be actioned only if the current

data type is also BCD. If the data type is not BCD, then a warning message will be displayed, and the command will be aborted.


If the TIM/CNT mode is set to Binary, the command will only be actioned if the current data type is Decimal or Hexadecimal. If the current data is neither Decimal or Hexadecimal, then a warning message will be displayed, and the command will be aborted.

When an Online Transfer from a PLC, Compare or Monitor operation is executed, the PLC Memory Component will read the data from the PLC and display it in the currently selected data format. If the data can not be displayed in the currently selected format, then an error message will be displayed.

Note: The Timer (TIM) and Counter (CNT) memory areas are only available in the following PLCs: CS1G-H, CS1H-H, CJ1G-H, CJ1H-H, CJ1M, and CP1H.

Monitoring Data

Use the following procedure to monitor the data in PLC memory:

- 1, 2, 3... 1. Ensure the PLC is online before activating the PLC Memory component.
-  2. Select the **Monitor** button from the toolbar to monitor the PLC.
3. The Monitor dialog is displayed. Monitoring can be performed on the memory areas that have been opened in the PLC Memory component. Select the associated setting to monitor that area.
4. Select the *Visible Area Only* option to monitor the area visible to the window or the *Selection* option to monitor the area highlighted by the cursor.
5. Select the **Monitor** pushbutton to accept the settings or the **Cancel** pushbutton to abort the operation.

Once monitoring, all changes to the data area are viewed. By navigating around the data area window, the visible area of the monitoring set by the *Visible Area Only* option changes to compensate.

Note 1: In the PLC Memory Window, individual values (cells) can be selected and the following operations can be performed to change present values during monitoring.

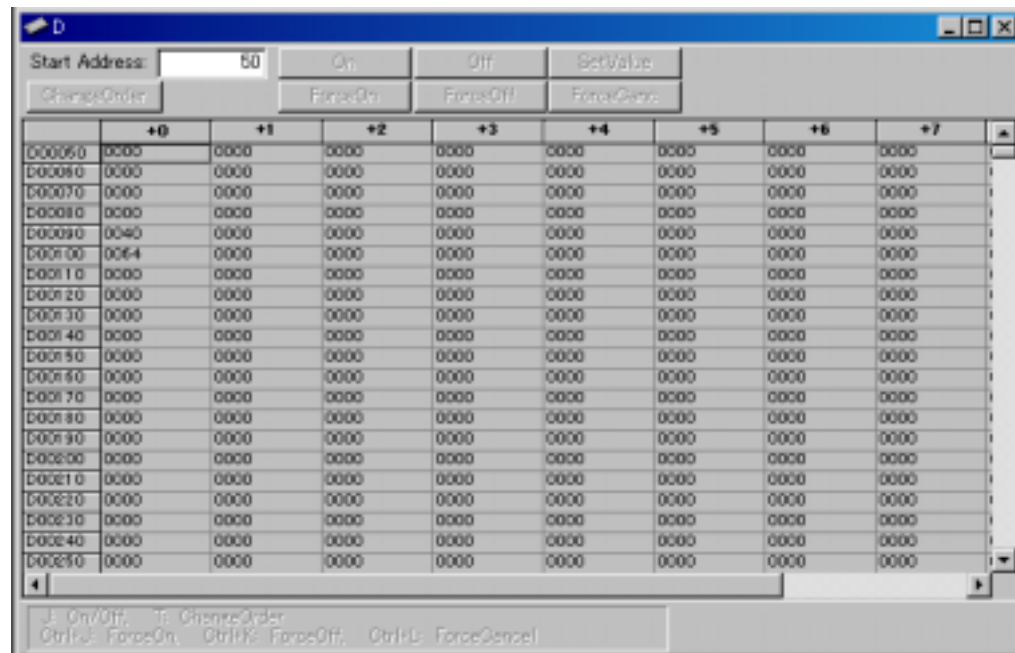
- For BIN (binary) displays, click the On, Off, ForceOn, ForceOff, ForceCanc, SetValue button to change the value of a bit.

The value can also be changed by right-clicking and then selecting Force | On, Force | Off, Force | Cancel, or Set | On, Set | Off, Set | Value from the pop-up menu.

- For other displays (e.g., decimal, BCD, or HEX), click the **SetValue** button to change the present value.

The present value can also be changed by right-clicking and then selecting **Set | Value** from the pop-up menu.

Note 2: Continuous addresses can be monitored in the PLC Memory window by specifying the start address to be monitored. Set the start address in the Start Address field shown below and the display in the window will jump to the specified address for monitoring.



- In the **PLC Memory** window, both individual bits for each word and the hexadecimal value of the word can be monitored at the same time if the display format is set to BIN (binary).

Clearing and Filling Data Areas



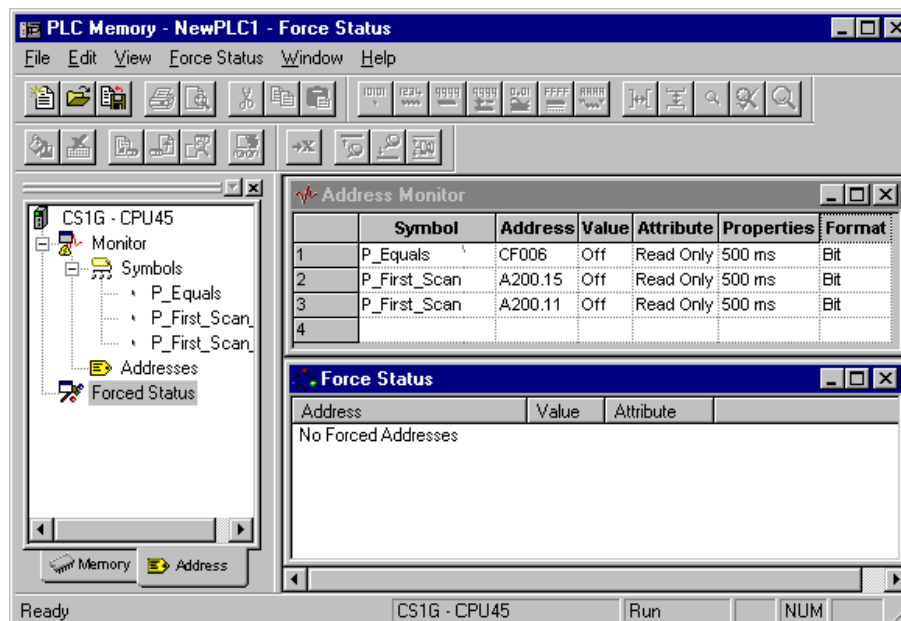
A whole data area can be cleared by clicking on the **Clear Data Area** button from the toolbar.

A whole data area can be populated with a particular value. Use the following procedure to fill a data area with a single value.

1. Open a data area by double-clicking a data area from the Data Area Workspace in the *Memory* tab.
2. Select the **Fill Data Area** button from the toolbar. The **Fill Data Area** dialog is displayed.
3. The Fill operation can be performed on the memory areas that have been opened in the PLC Memory component. Select the associated setting to fill that area.
4. Supply the value in the *Value* field.
5. Select the appropriate *Fill Range* option, either *All*, *Visible Area Only* or the selection currently highlighted by the cursor.
6. Select a *Value* option, either *Binary*, *Binary Coded Decimal*, *Decimal*, *Signed Decimal* or *Hexadecimal*.
7. If required, select a *Set Status Value* setting and the appropriate *On* or *Off* option.
8. Select the **Fill** pushbutton to accept the settings or the **Cancel** pushbutton to abort the operation.

PLC Address Area

The *Address* tab of the PLC Memory dialog allows monitoring and forcing the status of individual bits.



Monitoring

Use the following to monitor an address or a symbol from an invoking application.

- 1, 2, 3... 1. Ensure the PLC is online before activating the PLC Memory component.
2. Click on the *Address* tab of the PLC Memory component.
3. Open the Monitor area by double-clicking the Monitor branch from the Data Area Workspace in the *Address* tab.
4. Enter an address in the *Address* field or select a Symbol to be retained from the invoking application:



- ◆ In a *Symbol* field, type in a Symbol name or select the **Browse** button to select a Symbol to be retained from the invoking application. The corresponding *Address* field automatically detects and contains the address associated with the Symbol.
- ◆ If a Symbol has not been selected, in an *Address* field, type in a direct word or bit address to monitor.

Note: Address notation for CS/CJ/CP-series PLCs and CV-series PLCs is, for instance 'D0', '0', 'E0.0' to monitor a word, '0.0', 'cf100' to monitor bits.



When monitoring starts, data from the PLC is displayed in the *Value* field, in the format specified in the *Format* field. The display format of the address or symbol to be monitored can be changed by selecting an appropriate button from the toolbar: **Binary**, **Binary Coded Decimal**, **Decimal**, **Signed Decimal**, **Hexadecimal** or **Text**.

Any special address information is shown in the *Attribute* field. The attribute of a bit can be forced. It is not possible to force bit addresses that are read-only. Use the following procedure to apply a forced setting.

- 1, 2, 3... 1. Ensure a bit is currently being monitored and is not read-only.
2. Select the *Attributes* setting for the bit.
3. Select the forced state of the bit. A bit can be forced on by selecting the **Force On** button from the toolbar. A bit can be forced off by selecting the **Force Off** button from the toolbar. Forced settings can be cancelled by selecting the **Force Cancel** button from the toolbar. Select the **Set Value** button from the toolbar to set a value to the attribute.



The update rate is shown in the *Properties* field.

Further rows can be inserted into the Address Monitor window by selecting *Insert* from the *Address* menu. Rows can be removed by selecting *Remove* from the *Address* menu. All rows can be removed by selecting *Remove All* from the *Address* menu.

Forced Settings

It is possible to specify the state of an address regardless of its actual (physical) state, this is particularly useful for testing certain conditions or rungs in a ladder program.

Once scanned, the Forced Status window displays the address, value and attributes for all forced bits.

It is not possible to force bit addresses that are read-only.

Displaying Forced Status

The forced status of bits can be retrieved from the PLC. Use the following procedure to retrieve the forced status of bits from the PLC.

- 1, 2, 3...**
1. Ensure the PLC is online before activating the PLC Memory component.
 2. Click on the *Address* tab of the PLC Memory component.
 3. Click the right-mouse button on the *Forced Status* branch and select *Scan Forced Status*. All bit areas in the PLC are scanned to find all forced bits (Forced On and Forced Off). The Forced Status window is displayed showing all forced bits and their associated value and attributes.

Copying a Forced Bit

A forced bit can be copied from the Force Status window to the Address Monitor window. Use the following procedure to copy a forced bit.

- 1, 2, 3...**
1. Ensure the PLC is online before activating the PLC Memory component.
 2. Click on the *Address* tab of the PLC Memory component.
 3. Open the Forced Status area by double-clicking the Forced Status branch from the Data Area Workspace in the *Address* tab.
 4. Select the address to be copied with the right-mouse button in the Forced Status window and select *Copy to Symbol Monitor Address*.

Clearing Forced Bits

All forced bits can be cleared. Use the following procedure to clear forced bits.

Caution: This operation will clear all forced bits in the PLC.

- 1, 2, 3...**
1. Ensure the PLC is online before activating the PLC Memory component.
 2. Click on the *Address* tab of the PLC Memory component.
 3. Open the Forced Status area by double-clicking the Forced Status branch from the Data Area Workspace in the *Address* tab.
 4. Click the right-mouse button in the Forced Status window and select *Clear All Forced Addresses*.
 5. Select the **Yes** pushbutton to confirm the operation.

Updating the Forced Status Window

Use the following procedure to refresh the Force Status window.

- 1, 2, 3...**
1. Ensure the PLC is online before activating the PLC Memory component.
 2. Click on the *Address* tab of the PLC Memory component.
 3. Open the Forced Status area by double-clicking the Forced Status branch from the Data Area Workspace in the *Address* tab.
 4. Click the right-mouse button in the Forced Status window and select *Refresh*.

PLC Memory Management

A number of features of the PLC Memory Component are common to both the *Memory* tab and *Address* tab.

PLC Memory component files can be saved to the CX-Server project. Use the following procedure to save PLC Memory component details to the CX-Server project.

- 1, 2, 3...**
1. Select the **Save in Project** button from the toolbar. The Save dialog is displayed.
 2. Select the required data areas to include in the file from the *Areas to Save:* field.
 3. Enter a comment in the *File Comment* field.
 4. Select the **OK** pushbutton to proceed.



PLC Memory component files can be saved via a standard File Save dialog. Use the following procedure to save a PLC Memory component file.

- 1, 2, 3...**
1. Select *Save to File* from the *File* menu. The Save dialog is displayed.
 2. The Save dialog is displayed. Select the required data areas to include in the file from the *Areas to Save:* field.
 3. Enter a comment in the *File Comment* field.
 4. Select the **OK** pushbutton to proceed.
 5. A standard File Save dialog is displayed. Enter a file name in the *File name* field and select the **Save** pushbutton. PLC Memory files have a .MEM extension.

Information saved to a file can be supplemented with header information set as a preference. Refer to *Chapter 2 - PLC Memory Component* for details of setting header information to a file.

PLC Memory component files can be retrieved via a standard File Open dialog. Use the following procedure to open a PLC Memory component file.

- 1, 2, 3...**
1. Select the **Open File** button from the toolbar to open a PLC Memory component file. A confirmation message box may appear if the file is already open. Select the **Yes** pushbutton to save the currently open details. Select the **No** pushbutton to discard the currently open details. Select the **Cancel** pushbutton to abort the operation.
 2. A standard File Open dialog is displayed. Select a file from the Open PLC Memory File dialog, followed by the **Open** pushbutton. PLC Memory files have a .MEM extension.



PLC Memory component data can be printed. Use the following procedure to print details.

- 1, 2, 3...**
1. Open the Address Monitor window from the *Address* tab or a data area window from the *Memory* tab.



2. Select the **Print Preview** button from the toolbar. A preview window is displayed.
3. Select the appropriate pushbutton to view the printout.
 - ◆ Select the **Next Page** pushbutton to view the next page of the printout;
 - ◆ Select the **Prev Page** pushbutton to view the next page of the printout;
 - ◆ Select the **Two Page** pushbutton to view two pages of the printout at once;
 - ◆ Select the **Zoom In** pushbutton to zoom in to the page;
 - ◆ Select the **Zoom Out** pushbutton to zoom out from the page;
 - ◆ Select the **Print** pushbutton to print from the preview.
 - ◆ Select the **Close** pushbutton to close the preview window.



4. Select the **Print** button from the toolbar. A standard Print dialog is displayed.
5. Set up the required printer settings. Select the **OK** pushbutton to print the PLC Memory details or the **Cancel** pushbutton to abort the operation.

Note: Printer specific settings can be applied prior to printing the PLC Memory details, by selecting *Print Setup* from the *File* menu.

Use the following procedure to copy or move information from or in the PLC Memory component.

- 1, 2, 3...**
1. Select an item or items in a window.



2. Select the **Copy** button from the toolbar to copy the item, or the **Cut** button from the toolbar to move the item.
3. Select an area to move the items to, for instance copying data area values into another data area.



4. Select the **Paste** button from the toolbar to paste the item. A Paste operation can be performed several times without copying again.

PLC Memory Preferences

PLC Memory component preferences permits the setting of display properties for data monitoring.

The *Display* tab defines the preferred display format. Use the following procedure to change the display format preference:

- 1, 2, 3...**
1. Select the *Preferences* option from the *View* menu.
 2. Select the appropriate word display format option, either *Binary*, *Binary Coded Decimal*, *Decimal*, *Signed Decimal*, *Floating Point*, *Hexadecimal*, *Double Floating Point* or *Text*.
 3. Select the appropriate bit display format option, either *Text* or *Numeric*.
 4. If required, select the appropriate font using the **Change Font** pushbutton.
 5. Select the **OK** pushbutton to accept the settings or the **Cancel** pushbutton to abort the operation.

The *Monitoring* tab allows the monitor update interval preference to be amended. Use the following procedure to change the monitor update interval preference.

- 1, 2, 3...**
1. Select the *Preferences* option from the *View* menu.
 2. Select the *Monitoring* tab.
 3. Select a *Monitor Update Interval* and an associated *Unit* from the fields.
 4. Select the **OK** pushbutton to accept the settings or the **Cancel** pushbutton to abort the operation.

The *General* tab permits the setting of general preferences. Use the following procedure to change the general preferences.

- 1, 2, 3...**
1. Select the *Preferences* option from the *View* menu.
 2. Select the *General* tab.
 3. Select the *Automatically Resize Column Widths* option to ensure that all values remain visible within the data area window irrespective of their display format. It is best practise for this option to be set OFF when monitoring large data areas.
 4. Select the *Prompt Before Closing an Active Monitor Window* option if confirmation is required before closing a data area window that is being monitored.
 5. Select the *Beep on Invalid Input* option to receive an audible beep when an invalid input to the PLC Memory component has been made.
 6. Select the *Fast Window Update* option to reduce the affect of flickering when monitoring.
 7. Select the **OK** pushbutton to accept the settings or the **Cancel** pushbutton to abort the operation.

The *File* tab permits the setting of header information into PLC memory component files. Use the following procedure to change the file information.

- 1, 2, 3...**
1. Select the *Preferences* option from the *View* menu.
 2. Select the *File* tab.
 3. Insert a file name in the *File Name* field.
 4. Insert a comment in the *Comment* field.
 5. Select the **OK** pushbutton to accept the settings or the **Cancel** pushbutton to abort the operation.

CHAPTER 3

IO Table Component

This chapter describes the IO Table component available to C-series, CV-series, CS/CJ series PLCs and its ability to create, retrieve and edit a configured PLC's rack and address data.

The IO Table component allows configuration of racks, slots and units within a PLC, using available hardware as reference. Within a PLC there are three versions of an IO Table, all of which should ideally have the same contents. IO Table component editing allows manipulation of the internal version of the table, and modification of the PLC's view of how the hardware is configured. The three versions are:

- ◆ *Actual IO Table.* The real hardware configuration of the PLC units and slots on power-up.
- ◆ *Registered IO Table.* The internal PLC table: this is the one used by the PLC when running, regardless of the state of the actual hardware. It can be read and, for C2000 PLCs, CV-series PLCs and CS/CJ series PLCs, written to by the CX-Server software.
- ◆ *CX-Server IO Table.* The IO configuration understood by CX-Server. It can be created and modified directly, independently from the PLC, and can be transferred with a program (for CV-series and CS/CJ series PLCs).

The Registered Table and CX-Server's table can be changed from the PC, but the actual configuration requires the physical manipulation of the PLC hardware. It is only possible to transfer the Registered IO Table in C2000, CV and CS/CJ series PLCs to the PLC. Editing of individual IO units in the Registered IO Table is only available in C1000H, C2000H, CS/CJ series and CV-series PLCs.

The IO Table component is displayed as a hierarchical structure. The IO Table view can be expanded to show entries for all Remote Terminals (RTs) and the IO. All possible racks and unit numbers for the active PLC are displayed although these may not all be in use. An address and IO string are displayed against each rack slot or unit; this is used to indicate the input and output characteristics of the unit.

The status bar displays the selected PLC and CPU type, and the current operating mode of the PLC.

When a Remote Terminal (RT) is added, it can be expanded to provide the Terminals view, showing entries for all slots on that remote rack.

Icons to the left of a rack indicate units fitted to expansion racks, SYSBUS/SYSBUS2 remote racks or IO Terminals. To view the content of the IO Table, double-click on a rack. The unit address is displayed in brackets for each slot.


For CV-series PLCs, SIOU units are shown on the IO Table tree as a separate rack. For CS/CJ series PLCs, SIOU units are all integrated into the main rack.

Whilst in online mode operations can be selected that affect the PLC, for instance creating an IO Table. These options are only available when the PLC is in the correct mode of operation for programming.

The IO Table component can be forced to be displayed in focus by selecting *Always on top* from the *Options* menu.

For moving, resizing, maximising, minimising and closing windows, refer to Microsoft Windows online help for further information.

Access to the IO Table component is from the invoking application or via the CX-Net Network Configuration Tool. Refer to *Chapter 8 - CX-Net Network Configuration Tool* for further details.

 To close the IO Table dialog, select the **Close** button in the title bar.

I/O Table Window Variations

CX-Programmer Versions 6.0 and later have the following two kinds of I/O Table Windows.

- 1, 2, 3...
1. I/O Table Window for the CS/CJ/CP Series (known as the CS/CJ/CP I/O Table Window)
 2. I/O Table Window for the C Series and CVM1/CV Series (known as the C/CV I/O Table Window)

Auto-selection of the I/O Table Window



The following table shows which I/O Table Window will be selected automatically, based on the PLC model and computer operating system.

PLC Series	PLC model	Computer's operating system	Selected I/O Table Window
CS/CJ/CP Series	CS1G/CJ1G, CS1H, CS1G-H, CS1H-H, CS1D-H, CS1D-S, CJ1G-H, CJ1H-H, or CJ1M	Windows OS other than Windows 95	1) CS/CJ/CP I/O Table Window
		Windows 95	2) C/CV I/O Table Window (See note.)
Series other than CS/CJ/CP	<p>C Series: C200H, C200HS, C200HX/HG/HE, C200HX-Z/HG-Z/HE-Z, C500, C1000H, or C2000H</p> <p>CVM1/CV Series: CVM1, CVM1-V2, CV1000, CV2000, or CV500 C2000H</p> <p>FQM1 Series: FQM1-CM001, FQM1-MMA21, or FQM1-MMP21</p>	Windows 95 or other Windows OS	

Note: With version 5.0 and earlier versions of the CX-Programmer, the C/CV I/O Table Window is always selected, regardless of the PLC model and operating system.

Distinguishing between the CS/CJ/CP and C/CV I/O Table Windows

The I/O Table Windows can be identified by the names in the project directory tree and the colors of icons, as shown in the following table.

I/O Table Window variation	Names in project directory tree	Colors of icons in project directory tree
1) CS/CJ/CP I/O Table Window	I/O Table and Unit Setup	 : Grey and yellow
2) C/CV I/O Table Window	I/O Table	 : Sky blue

I/O Table Window Functions

The following table describes the functions of the two I/O Table Windows.

I/O Table Window variation	Existing functions	New functions
1) CS/CJ/CP I/O Table Window	<p>Creating a registered I/O table (Displays Unit type, number of Units occupied, and number of I/O words occupied.)</p> <ul style="list-style-type: none"> • Software switch settings (See note 1.) • Unit settings (See note 1.) • Replace Unit online. • Display Unit production information. • Register/display Unit comment. • Register/display Unit profile. • Monitor Unit error log. <p>Note 1. The software switch settings and Unit settings are included in the Special I/O Unit and CPU Bus Unit parameter settings.</p>	<ul style="list-style-type: none"> • Special I/O Unit and CPU Bus Unit parameter settings • Specialized Support Tool startup function (See note 2.) • Display a Rack's current consumption (CS/CJ Series only) and Rack width (CJ Series only) • Monitor CPU DIP Switch settings online. <p>Note 2. When the CX-Programmer is installed from the CX-One.</p>
2) C/CV I/O Table Window	<p>Creating a registered I/O table (Displays Unit type, number of Units occupied, and number of I/O words occupied.)</p> <ul style="list-style-type: none"> • Software switch settings • CPU Bus Unit settings • Replace Unit online. • Display Unit production information. • Monitor Unit error log. • When editing the I/O table offline, words can be reserved by installing Dummy Units. 	None

Special I/O Unit and CPU Bus Unit Settings

One of the new CS/CJ/CP I/O Table Window functions sets the allocated DM area, allocated CIO area, and CPU Bus Unit Area (Ethernet Units only) for CS/CJ/CP-series Special I/O Units and CPU Bus Units without requiring the parameter addresses. (This function is supported by the CS/CJ/CP I/O Table Window only.) Even if new Special I/O Units and CPU Bus Units are purchased, the new Units parameters can be set just by installing the Unit's CPS (Component and network Profile Sheet), so it isn't necessary to upgrade the CX-Programmer.

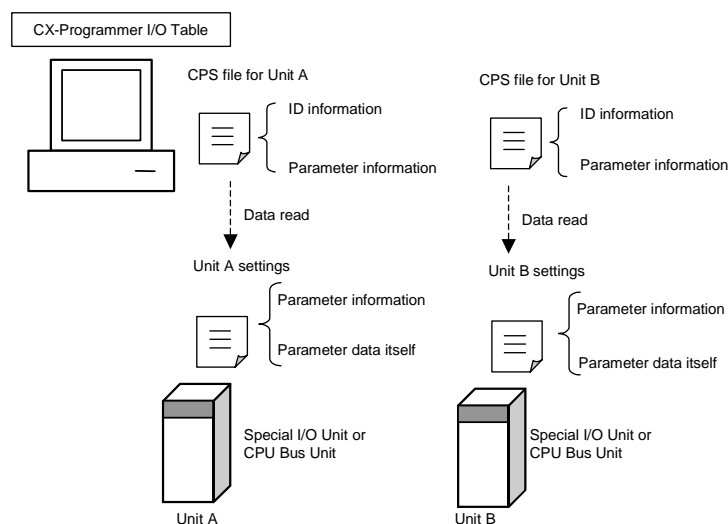
CPS File Overview

The term CPS is short for the "Component and network Profile Sheet", which is a CX-One file containing definition information for a CS/CJ/CP-series Unit or other component. The CPS files are provided in XML file format.

The CX-Programmer uses the information in the CPS files to identify CS/CJ/CP-series Units in the I/O Table. Special I/O Unit and CPU Bus Unit settings are also based on these CPS files.

The CPS files are composed of the following CS/CJ/CP-series Unit/Component information:

- ID information (such as the model number, name, Unit type, and Unit version)
- Parameter information (offset address, setting parameter name, and setting range or selection options)



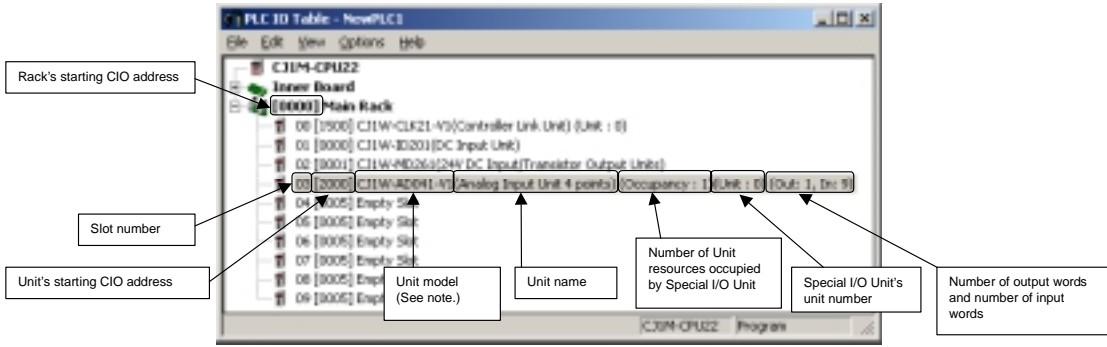
Specialized Tool Startup Overview (Supported when CX-Programmer Is Installed from CX-One)

The Specialized Tool Startup function is a new CS/CJ/CP I/O Table Window function that can start the Programming Support Tool specific to a particular Unit (Special I/O Unit or CPU Bus Unit) directly from the I/O Table Window. (This function is supported by the CS/CJ/CP I/O Table Window only.) This function is supported when the CX-Programmer or other Support Tool is installed from the CX-One. The appropriate Programming Support Tool can start with the necessary PLC model information, Unit type, and online/offline status information.

Displaying an I/O Table

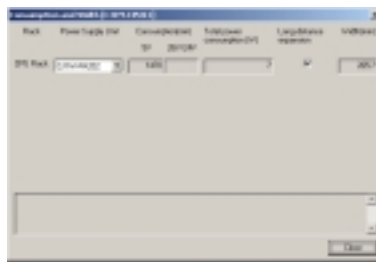
Displaying the CS/CJ/CP I/O Table Window

The CS/CJ/CP I/O Table Window is displayed when the PLC is a CS/CJ/CP-series PLC and the computer's operating system is a Windows OS more recent than Windows 95.

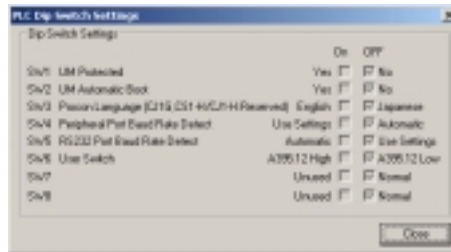


Note: The Unit model will be blank if there is no CPS file.
 The Unit model will also be blank when data for C200H Special I/O Units has been uploaded from the PLC (Transfer from PLC).

Note: In the CS/CJ I/O Table Window, the current consumption and width for each PLC Rack can be displayed as shown below by selecting *Options - Consumption and Width*.

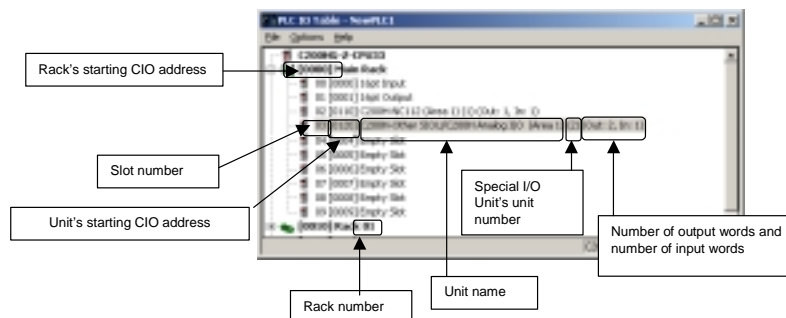


Online, the current status of the DIP switches on the target PLC (CPU Unit) can be checked by selecting *Options - DipSwitch Information*.



Displaying the C/CV I/O Table Window

The C/CV I/O Table Window is displayed when the PLC is not a CS/CJ/CP-series PLC or the computer's operating system is Windows 95.



Unit Settings

Settings for the CS/CJ/CP I/O Table Window

The CS/CJ/CP I/O Table Window is displayed when the PLC is a CS/CJ/CP-series PLC and the computer's operating system is a Windows OS more recent than Windows 95.

Creating an IO Table

Creation of an IO Table whilst connected to a PLC causes the Actual IO Table in the hardware to be written to the Registered IO Table. An IO Table can also be edited offline and stored to file, this method is usually employed when designing a PLC's IO Table.

To create an IO Table, select *Create* from the *Options* menu.

Slot Allocation

The following procedure shows how to edit the I/O table in the I/O Table Window.

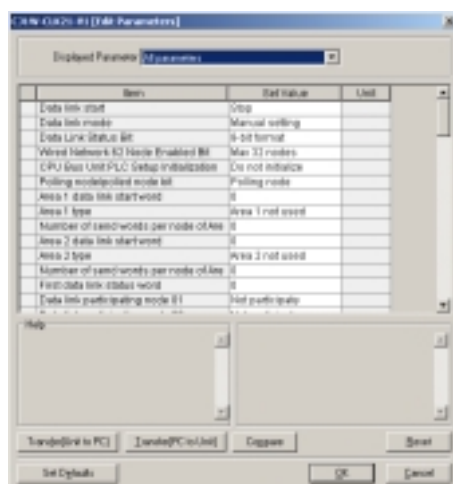
- 1, 2, 3... 1. Right-click the slot where the Unit will be allocated and select *Add Unit* (or just double-click the desired slot). The *Select Unit* Dialog Box will be displayed.
2. Select the desired Unit (Unit to be allocated) from the directory tree menu and click the OK Button.

Setting Parameters for CS/CJ/CP-series CPU Bus Units and Special I/O Units

After the I/O table has been created, the I/O table and Special I/O Unit/CPU Bus Unit parameters can be transferred from the PLC and edited in the computer, as shown in the following example.

- 1, 2, 3... 1. Connect the CX-Programmer online and open the I/O Table Window.
2. Select *Options – Transfer from the PLC* from the I/O Table Window's menu. The Transfer from the PLC Dialog Box will be displayed. At this point, the *I/O Table* and *SIO Unit Parameters* Options can be selected.
3. Select the options (check the boxes) for the data that you want to transfer and click the Transfer Button. In this case, both options have been selected. The I/O table and Unit parameters data will be transferred from the PLC and the transfer results will be displayed.
4. Check the transfer results and click the OK Button. The I/O table transferred from the PLC will be displayed.
5. To edit the parameters of a Special I/O Unit or CPU Bus Unit, select the Unit and either double-click the Unit or select *Edit – SIO Unit Parameters* from the menu. The selected Unit's Edit Parameters Dialog Box will be displayed.

In this case, a Controller Link Unit's Edit Parameters Dialog Box has been displayed to edit the Unit's CPU Bus Unit Allocation DM Settings.



6. Edit the parameters and, if necessary, click the Compare Button. If the Compare Button is clicked while the PLC is online, the software immediately checks whether the I/O table settings match the Unit settings (such as the allocated DM area and CIO area) actually in the PLC's CPU Unit.
If the contents do not match, the settings read from the actual Unit will be displayed in orange.
7. When you want to download the parameters set for each Unit to the PLC's CPU Unit, click the Download to Unit Button.
8. Click the Reset Button to enable the parameter settings that have been transferred.

Note 1: When Special I/O Unit or CPU Bus Unit settings are edited in the I/O Table Window, the parameters allocated in the DM Area or CPU Bus Unit Setup Area for the Unit are only transferred to the actual PLC when the **Transfer PC to Unit** Button is clicked in the Edit Parameters Dialog Box. They are not automatically enabled, i.e., the new parameter settings will not be used. Click the Reset Button to enable the parameter settings that have been transferred. When the Reset Button is clicked, however, unexpected operation may result. Always confirm system safety before clicking the Reset Button.

Note 2: When the CX-Programmer creates the Special I/O Unit or CPU Bus Unit settings in the I/O Table Window, it automatically uses the latest version of the CPS file that is available in the computer.

- If the actual Unit's version number is older than the latest CPS file in the computer, a warning will be displayed when the settings are downloaded to the Unit. A Dialog Box will ask whether to change the computer's settings.
In general, click the Yes Button to change the computer's settings. When the Yes Button is clicked, the Unit version in the computer's Unit settings will be changed to the actual Unit's version number. (If the No Button is clicked, the version number in the computer will be newer than the actual Unit's version number, and the newer version number will be displayed.)

- Similarly, if the actual Unit's version number is newer than the latest CPS file in the computer when the Unit's settings are transferred from the PLC to the computer, the computer's earlier Unit version number will be displayed. In this case, install the Unit's correct (newer) CPS file in the computer. For details, refer to *Installing a CPS File* below.

If the newer CPS File is not installed, the newer version's Unit settings cannot be set and only the older Unit settings (in the older CPS file) can be set.

Note 3: Storing the Parameter Settings Data File

- The data set in the Edit Parameters Dialog Box can be saved in a parameter settings file with a .xml filename extension. To save the parameter settings, right-click the desired Special I/O Unit or CPU Bus Unit in the I/O table and select *Save Parameters* from the pop-up menu.
- The saved parameter settings can also be read from a parameter settings file (.xml filename extension), but the settings must be for the same model Special I/O Unit or CPU Bus Unit.

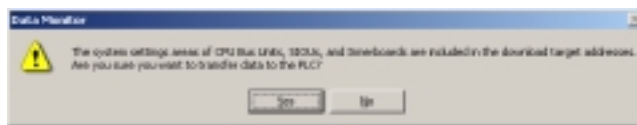
Note 4: Contents of Parameter Settings Data Files

The structure of a parameter settings data file is based on the parameter settings in the CPS file. Parameter settings data files contain the following data:

- Model number, Unit version number, unit number, rack number, and slot number
- Name of the original CPS file used to create the parameter settings data
- Parameter names and data

Note 5: When Special I/O Unit or CPU Unit settings are performed in the I/O Table Window and then transferred from the PLC Memory Window, the following warning will be displayed if the allocated DM Area/CIO Area addresses set for Special I/O Units or

CPU Bus Units in the I/O Table Window on the computer overlap with the PLC data table addresses.



Unless the CPU Bus Unit or Special I/O Unit settings have been previously transferred to the CPU Unit and the allocated DM Area/CIO Area data in the PLC data table for Special I/O Units or CPU Bus Units is to be overwritten, always click the No Button, shift the address, and repeat the transfer procedure.

Note 6: CPU Bus Unit and Special I/O Unit settings are not checked for logical consistency. Be very careful of the logical consistency of the overall settings when making any setting that affects other settings, e.g., settings that enable or disable other settings. Transfer the Special I/O Unit or CPU Bus Unit settings to the PLC and then start operation, being aware that any logical inconsistencies may produce unexpected operation. For example, if one setting selects either user settings or default settings and is set to use the default settings, it will not automatically change to enable user settings even if the related user settings are made. To use the user settings, they will have to be enabled manually and specifically in the setting that selects either user settings or default settings.

Note 7: If Create I/O Table is selected when setting Special I/O Units or CPU Bus Units in the I/O Table Window, the settings in the Special I/O Units or CPU Bus Units on the computer will be initialized. To maintain the same settings, save the Special I/O Unit or CPU Bus Unit settings to a file by right-clicking the Unit in the I/O table and selecting Save Parameters from the pop-up menu. Then, after creating the I/O tables, read the settings back from the file by right-clicking the Unit in the I/O table and selecting Load Parameters from the pop-up menu.

Installing a CPS File

CPS files are automatically installed in the following directory when CX-One or CX-Programmer is installed. A CPS file is created for each unit version of each Special I/O Unit and CPU Bus Unit.

Program Files\Common Files\Omron\Profiles\CPSFiles

The CX-Programmer uses the CPS File for the most recent unit version. If a backup indicates that a newer unit version exists, the newer version's CPS file must be installed. Use the following procedure to install the new CPU File.

- 1, 2, 3... 1. Select *File – CPS Install*. The Installation of Cps files Dialog Box will be displayed.
2. Specify the CPS file to be installed.
3. Restart the CX-Programmer.

Printing the I/O Table or Unit Parameter Settings

The following procedure explains how to print the I/O table or a parameter list of Special I/O Unit and CPU Bus Unit settings.

- 1, 2, 3... 1. Select the desired Special I/O Unit or CPU Bus Unit in the I/O table and select *File – Print* from the pop-up menu. The Print Dialog Box will be displayed.

Option

Function

I/O Table

Prints the I/O table.

Special Unit Settings

Prints a parameter list of the Special I/O Unit or CPU Bus Unit settings.

I/O Table + Special Unit Settings

Prints the I/O table and a parameter list of the Special I/O Unit or CPU Bus Unit settings.

2. Select the desired print option and click the OK Button. The Print Dialog Box will be displayed.
3. To preview a print job, select *File – Print Preview*, select the desired print option in the Print Dialog Box, and click the OK Button.

Note 1: When using Windows NT 4.0, the text characters may be altered in the I/O table's print preview. In this case, reinstall the most recent Windows NT 4.0 Service Pack.

Note 2: When making parameter settings for a Special I/O Unit or CPU Bus Unit in the I/O Table Window and transferring data from the PLC Memory Window, a warning will be displayed if the addresses in the transferred PLC data file overlap the allocated DM Area or allocated CIO Area addresses set for the Special I/O Unit or CPU Bus Unit in the computer's I/O Table Window.
Always click the No Button if you do not want to overwrite the actual PLC's (CPU Unit's) allocated DM Area or allocated CIO Area address data with the PLC data table data after the Unit settings data has been transferred to the PLC (CPU Unit). After cancelling the write operation, remove the PLC data table's allocated DM/allocated CIO area from the areas that will be transferred and then transfer the data again.

Settings for the C/CV Series I/O Table Window

The C/CV Series I/O Table Window is displayed when the PLC is not a CS/CJ/CP-series PLC or the computer's operating system is Windows 95.

Creating an IO Table

Creation of an IO Table whilst connected to a PLC causes the Actual IO Table in the hardware to be written to the Registered IO Table. An IO Table can also be edited offline and stored to file, this method is usually employed when designing a PLC's IO Table.

To create an IO Table, Select *Create* from the *Options* menu.

Slot Allocation

Use the following procedure to allocate a unit to a slot.

- 1, 2, 3... 1. Select an empty slot in the IO Table component.
2. Click the right-mouse button and select a unit. For Single and Multiple IO Units a secondary selection is required from the right-mouse button menu. The type of PLC series and individual rack configurations determine the units that can be installed and therefore the content of the right-mouse button menu. The types of unit that can be selected are described in following paragraphs.

Slots can also be allocated by transferring the rack information from the PLC. Refer to *IO Table Component* in this chapter for information regarding transferring IO Table information from the PLC.

For CS/CJ/CP series PLCs, the IO fields for racks, slots and units information can be edited directly in the IO Table tree.

Only those units in the Registered IO Table for CS/CJ/CP series PLCs, C200H (including C200HS/X/G/E) PLCs and CV/CVM1-series PLCs can be edited.

Note: Any slots allocated must be verified to ensure that the Real IO Table has been setup up correctly.

Single and Multiple Units

Points with an IO Type of Input, Output or Input/Output can be applied to the IO Table component. Each point contains a name and an address indicating its position in PLC memory. The information contained within a point can be read or updated by the controlling system and its status and content stored in the system's database. An application accesses this point data by establishing a link between the application and the database. A point can have the same address as another and any comment entered against this address applies to all points at that location.

All PLC series support 8-point, 16-point, 32-point and 64-point Units. CV-series PLCs and CS/CJ/CP-series PLCs also support 128-point and 256-point Units.

Refer to the Run Time manual for an introduction to points.

Counters, Position Controller, Numerical Control and ASCII Units

Use the following procedure to apply unit settings to Counters, Position Controllers, Numerical Control and ASCII units.

- 1, 2, 3... 1. Allocate a slot to be a Counter unit, Position Controller unit, Numerical Control unit or ASCII unit. The Enter SIOU Details dialog is displayed.
2. Enter valid settings for the *Unit Number* field, *Address per Unit* field, *Input Words* field and *Output Words* field. Valid settings exclude those settings that have already been used.
3. Select the **OK** pushbutton to complete the operation or the **Cancel** pushbutton to abort the operation.

Additionally for Counters, Numerical Control and ASCII units, for CV-series PLCs and CS/CJ/CP series PLCs, the CIO and DM Address range need to be specified; refer to *Chapter 3 - Software Switches* for further information.

Interrupt Units

Interrupt units are automatically assigned until the maximum number of units has been reached.

Sysmac-Bus Master Unit and Remote Terminals

If the *Sysmac-Bus Master* option is selected from the context menu, the hierarchy in the IO Table component can be further expanded to expose the Remote Terminals and IO Terminals that form part of the SYSMAC-BUS option. Use the following procedure to apply unit settings to Sysmac-Bus Master.

- 1, 2, 3... 1. Allocate a slot to be a Sysmac-Bus Master unit. The Enter RM Number dialog is displayed.
2. Select a unit number from the *Unit Number* field, either 0 or 1.
3. Select the **OK** pushbutton to complete the operation or the **Cancel** pushbutton to abort the operation.

The Sysmac-Bus Master unit provides two types of slave units that can be applied to the slave rack in the same manner as a normal rack:

- ◆ C500H Remote Terminal (RT);
- ◆ C200H Remote Terminal (RT).

Any units on the slave racks or other Remote IO Units connected to the master are allocated IO words according to the slot where the master is located.

For C1000H and C2000H PLCs, Word multipliers are required to set the base address of IO Terminals on each SYSMAC-BUS Remote Master.

SIOU/Communications Units

SIOU/Communications Units can only be set up for CV-series PLCs and CS/CJ/CP series PLCs.

For CV-series PLCs SIOU/Communications Units the following Unit Setup and Software Switches setup can be performed:

- ◆ Basic (Software Switches setup only);
- ◆ DeviceNet Master (Software Switches setup only);
- ◆ Controller Link;
- ◆ Ethernet;
- ◆ Host Link;
- ◆ ISA Board Unit (Software Switches setup only);
- ◆ ME-Net (Software Switches setup only);
- ◆ Mini-map (Software Switches setup only);
- ◆ M-Net (Software Switches setup only);
- ◆ Motion Controller (Software Switches setup only);
- ◆ PC (Software Switches setup only);
- ◆ Syslink;
- ◆ Sysmac-Bus Master;
- ◆ SysNet.

For CS/CJ series PLCs SIOU/Communications Units the following Unit Setup and Software Switches setup can be performed:

- ◆ Controller Link Unit;
- ◆ Device Net and Open Network controllers;
- ◆ Ethernet Unit;
- ◆ Serial Communications Unit (Software Switches setup only).

Most of the settings for SIOU/Communications Units should have been set via the PLC setup component. Refer to *Chapter 4 - PLC Setup Component* for further details.

Refer to *Chapter 3 - Unit Setup and Software Switches* for further information.

Caution: Setup to SIOUs that have already been registered should be applied carefully.

Verifying Correct Configuration

If a change is made to the IO configuration that affects a type of IO word or the number of words required by a unit, for instance adding or removing units, an IO verification error occurs. Select *Verify* from the *Options* menu to ensure that an IO verification error has not occurred. If an error has occurred, use the procedures explained in Chapter 3 - Creating an IO Table, Chapter 3 - Slot Allocation and Chapter 3 - Transfer an IO Table to rectify any error.

Unit Setup

The Unit Setup for a selected rack IO option can be edited for CV-series and CS/CJ/CP series PLCs only. For C-series PLCs, refer to *Chapter 8 - CX-Net Network Configuration Tool*. Use the following procedure to edit the Unit Setup.

- 1, 2, 3...**
1. Highlight the rack/unit in the IO Table tree.
 2. Click the right-mouse button and select *Unit Setup*.
 3. Set the required unit setup options for the specified rack/unit.

Note: The availability of the *Unit Setup* option depends on the rack/unit selected. The SIOUs attached to a PLC are shown in the IO Table component.

The PLC Communications Unit Setup dialog allows both the system and software switch memory areas associated with a mounted Special Input/Output unit (SIOU) to be configured.

Software Switches

The Software Switch settings for a selected rack IO option can be edited for CV-series and CS/CJ/CP series PLCs.

For CV-series PLCs, the Software Switch settings appear in the IO Table tree as *SIOU Units*. For CS/CJ/CP series PLCs, the Software Switch settings appear in the IO Table tree as part of the Main Rack information.

The dialog which is presented for software switch setup depends upon the type of the SIOU and allows the software switch memory area associated with a mounted SIOU to be configured. Software switches provide status information on each SIO unit on the PLC.

Note: It is also possible to edit the Inner Board software switches for the CS/CJ series PLC if fitted by selecting *Inner Board Software Switches* option from the PLC's context menu.

The Software Switch dialog is displayed allowing the network unit system memory area to be configured and transferred to the PLC. Software switches can be defined for the following:

- ◆ *SYSMAC LINK*. Allows set up of Data Link (on/off) and Internode Test (on/off) and setting of response monitor time;
- ◆ *SYSMAC NET*. Allows set up of Data Link (on/off) and Internode Test; (on/off);
- ◆ *Ethernet*. Allows set up of Internode Test (on/off) and setting of response monitor time.
- ◆ *Controller Link*. Allows the polling status of the node to be set (whether it is a polling or polled unit) and whether to clear the Controller Link unit EPROM.

Use the following procedure to edit the Software Switch Setup.

- 1, 2, 3...**
1. Highlight the rack/unit in the IO Table tree.
 2. Click the right-mouse button and select *Software Switches*.
 3. Set the required software switch setup options for the specified rack/unit.

General

The *General* tab of the Software Switches dialog provides the complete software switches settings for a Basic unit, PC unit, Mini-map unit, Host Link unit, Motion Control unit, ME-Net unit, DeviceNet Master unit and ISO Baud unit. It also serves as partial software switches settings for other units.

- 1, 2, 3...**
1. Access the Software Switch dialog for an appropriate rack/unit.
 2. Set the required CIO and DM area address in the *CIO Address* field and *DM Address* field.

Data Link Area

The *Data Link* tab is used to control whether Data Link is generated automatically or by a specific Data Link table for SYSMAC LINK, SYSMAC NET and Controller Link. This setup is only used if the Node Type is Master. The list box at the bottom of the chapter is only used when Data Link is set to one of the automatic options (i.e. not specific).

- 1, 2, 3...**
1. Select *Transfer from PLC* from the *Options* menu to transfer the current system area settings from the unit.
 2. Select the required unit and click the right-mouse button. Select the *Software Switches* setting.
 3. Adjust the settings as required.
 4. Select *Transfer to PLC* from the *Options* menu to transfer the network parameters to the unit.
 5. Select the *Reset Unit* setting to restart the unit - the written settings are activated in the unit.

Note: If the unit which is being set is the one on which the current communication to the PLC is being made, the PLC needs to be closed and opened before communications can continue.

Ethernet

The Ethernet setup differs from SYSMAC LINK, SYSMAC NET and Controller Link by not having a Data Link Area setup and by having two further dialog boxes, the IP Address Table and IP Router Table. This particular interface requires that each device attached to the network has an IP address, and that routing information for directing data across the network is also included (where necessary); such address information ensures that data is transmitted correctly between two nodes.

Note: Table information is only used if the *IP Address Conv.* Method radio button is not set to *Auto*.

The File Transfer Protocol (FTP) allows access to a file card on the PLC. If a FTP login name and password are entered then these are used to start an FTP session. For more information, refer to the Ethernet User's Manual.

The IP Address Table dialog allows the IP address of a network node to be entered.

- 1, 2, 3... 1. Select the Ethernet Unit from the IO Table and click the right-mouse button.
2. Select the *Unit Setup* option.
3. Click on the *Insert* pushbutton.
4. Enter the IP Address for the node in the *IP Address* field; each of the four fields must take a value in the range 0 to 255.
5. Select the **OK** pushbutton to proceed.
6. Click on the **Delete** pushbutton to remove the address from the table.
7. Select *Transfer from PLC* from the *Options* menu to write the changes back to the table.

The IP Router Table establishes communications between different networks by maintaining the IP address for each interface and is created by clicking on the **Insert** pushbutton above the IP Router table dialog. Procedures are the same as for the IP Address Table described above.

Syslink Unit and Controller Link Specific Settings

A Syslink unit Software Switches dialog includes a *General* tab and *Data Link* tab described previously.

The *Error Information* tab provides read-only information regarding the errors that the PLC can detect and raise an error flag.

The *Network Status* tab provides network status information. It also activates the PLC to perform internode tests. Select the *Start* option to set the PLC to check for errors and report them. Select the *Stop* option to stop the PLC from detecting errors. The *Network Node List* field lists the network nodes and whether they are participating in the network operations.

Sysmac-Bus2 Unit Specific Settings

A Sysmac-Bus2 unit Software Switches dialog includes a *General* tab described previously.

The *Slave* tab provides specific status information to the Sysmac-Bus2 unit. There are various types of slave that may be connected to a Remote IO Master unit. These slaves include IO Terminals, Programmable Displays and Remote IO Slave units.

To view the slaves connected for a group, select the Group required from the field at the top of the *Slaves* tab. The remainder of the *Slaves* tab displays the Node and Status for each category.

If the hierarchy of the IO Table has been expanded, the three groups can be populated with other units:

- ◆ Group 1. 16-point and 32-point IO units.
- ◆ Group 2. 16-point, 32-point, 64-point and 128-point IO units and 256-point dummy.
- ◆ Group 3. 58M Remote Terminal, 54MH Remote Terminal and 122M Remote Terminal.

Serial Communications Unit Specific Settings

Serial Communications unit specific software switches settings can only be set for CS/CJ/CP series PLCs.

A Serial Communications unit Software Switches dialog includes a *General* tab described previously.

The *Port 1* tab and *Port 2* tab are identical. Settings can be specified for the *Format* field, *Mode* field and *Hardware* field.

Displaying Unit Error Log in the IO Table

By selecting a CPU Bus Unit or Special IO Unit in the IO table tree and clicking the right mouse button to select the Unit Error Log Menu, the error log for the selected Unit can be displayed (CX-Programmer Ver. 4.0 or later).

IO Table Management

Changes made to an IO Table can be done by simply editing particular fields in the table. Basic information can be changed by displaying the configuration, selecting the rack or unit that needs to be changed and editing or selecting the new IO address or configuration information.

All slot allocations in the IO Table can be cleared. Select *Clear* from the *Options* menu.

An IO Table unit in the PLC's Registered IO Table in the PLC can be deleted. Use the following procedure to delete an IO Table Unit.

- 1, 2, 3... 1. Highlight the rack/unit in the IO Table to be deleted.
2. Click the right-mouse button and select *Delete*.

The CX-Server IO Table component can be examined to determine if it has a valid configuration. To check an IO Table, select the *Check* option from the *Options* menu. A message is displayed indicating whether the operation was successful or not.

The CX-Server IO Table component can compare the local IO Table on the PC with the CX-Server project settings and displays any differences or errors. Select the *Compare with Project* option from the *Options* menu.

PC to PLC Communications

The IO Table component permits the transferring of data to and from the PLC and allows comparisons to be made between data stored on the PC and the PLC.

Note: If the CX-Programmer is Ver. 6.0 or later and the PLC is a CS/CJ/CP-series PLC, the Special I/O Unit and CPU Bus Unit parameter settings can be transferred as well as the I/O table.

Transfer an IO Table from a PLC

The *Transfer from PLC* option loads the Registered Table into the CX-Server IO Table, replacing the currently displayed setup. The IO Table can also be part of a general transfer which may, for example, include transferring program and memory data from the PLC. Use the following procedure to transfer an IO Table from the PLC.

- 1, 2, 3... 1. Ensure the PLC is online before activating the IO Table component.
2. Select *Transfer from PLC* from the *Options* menu to transfer an IO Table from the PLC.

The IO Table component is refreshed with the details from the PLC.

Note: If only I/O Table is selected and only the I/O tables are uploaded from the actual PLC to the computer, the settings in the Special I/O Units or CPU Bus Units on the computer will be initialized. To maintain the same settings, save the Special I/O Unit or CPU Bus Unit settings to a file by right-clicking the Unit in the I/O table and selecting *Save Parameters* from the pop-up menu. Then, after uploading the I/O tables, read the settings back from the file by right-clicking the Unit in the I/O table and selecting *Load Parameters* from the pop-up menu.

Transfer an IO Table to a PLC

The *Transfer to PLC* option loads the CX-Server IO Table into the Registered Table: this is only available to C2000, CV and CS1-series PLCs. The table can be transferred to the PLC at any time (when the PLC is online) but the operation can be delayed until other configuration settings have been made and then the complete configuration can be transferred to the PLC via the PLC Setup component. Use the following procedure to transfer an IO Table to the PLC.

- 1, 2, 3... 1. Ensure the PLC is online before activating the IO Table component.
2. Select *Transfer to PLC* from the *Options* menu to transfer an IO Table to the PLC.

Note: If the PLC Setup area is either written to the PLC or to the IO Table area the PLC may need to be powered down and powered up in order for settings take effect. If the settings need to be changed without switching off the PLC, write the PLC Setup data first, then either generate or write the IO Table. Refer to *Chapter 4 - PLC Setup Component*.

Comparing an IO Table

The Registered IO Table can be compared with the CX-Server IO Table and displays any differences. This option is helpful to confirm that a table that has been set up in CX-Server and has been transferred to the PLC, agrees with how the hardware is set up. Use the following procedure to compare a Registered IO Table with the CX-Server IO Table.

- 1, 2, 3... 1. Ensure the PLC is online before activating the IO Table component.
2. Select *Compare with PLC* from the *Options* menu.

Any differences (if any) are displayed in the IO Table component.

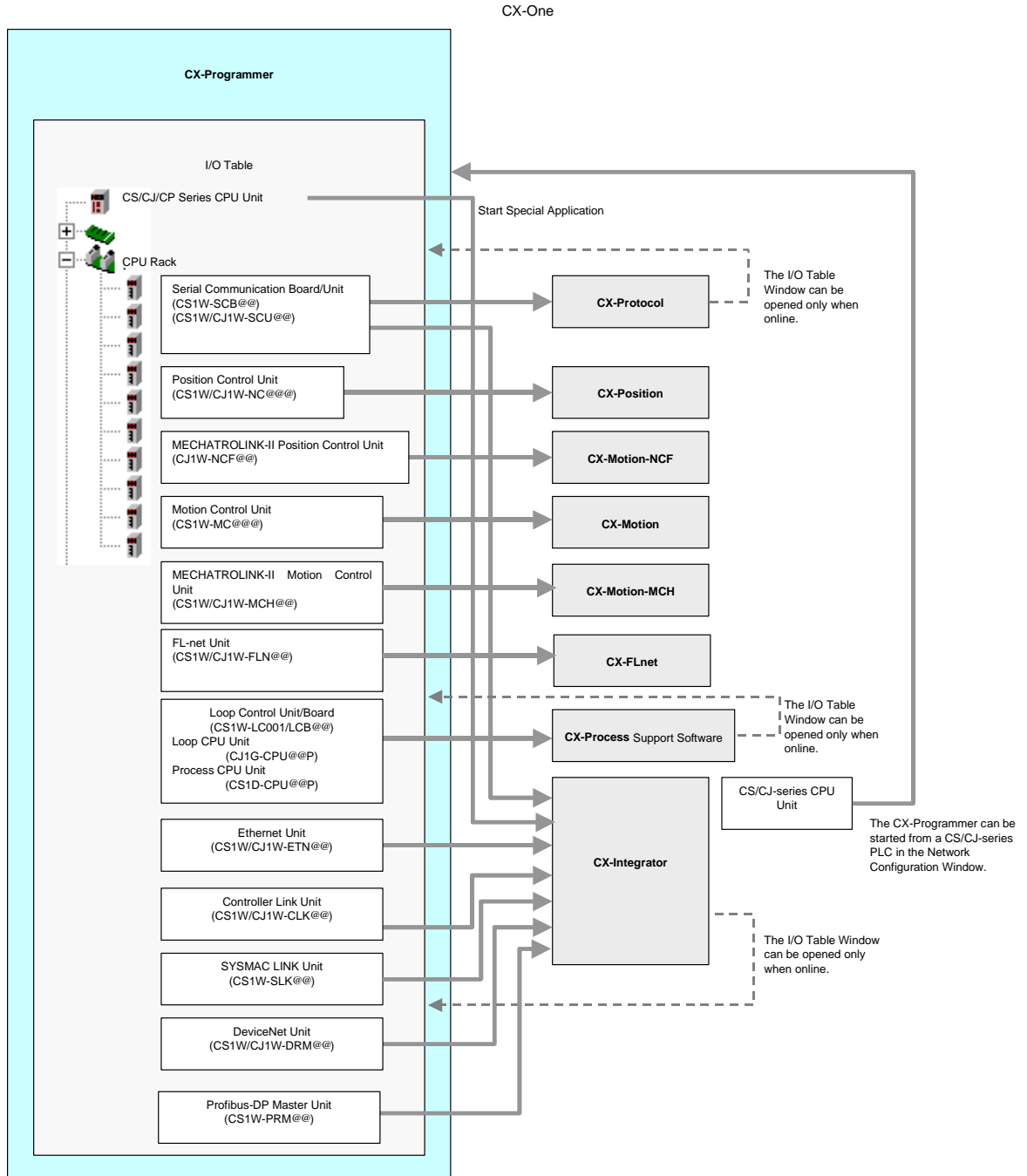
Starting Specialized Support Tools

Starting Specialized Programming Support Tools (Supported When Support Tools Were Installed from CX-One)

When the CX-Programmer and other Programming Support Tools have been installed from the CX-One, the Programming Support Tool specific to a particular Unit (Special I/O Unit or CPU Bus Unit) can be started directly from the CS/CJ/CP I/O Table Window by right-clicking the desired Unit in the I/O table and selecting ***Start Special Application*** from the pop-up menu.

- ◆ If the Unit is right-clicked in the I/O table and ***Start Special Application - Start with Settings Inherited*** is selected, the PLC model information, Unit model, and online/offline status information will be passed to the Programming Support Tool automatically when it starts.
- ◆ If the Unit is right-clicked in the I/O table and ***Start Special Application - Start Only*** is selected, the Programming Support Tool will be started in the same way as it is from the Windows Start Menu.

The following diagram shows how each Programming Tool can be started and how the I/O Table Window can be opened from the Programming Tool.



Note: With some of the Programming Tools (CX-Integrator, CX-Protocol, and CX-Process Tool), the I/O Table Window can be opened from the Programming Tool as shown by the dotted lines above, but only when the PLC is online.

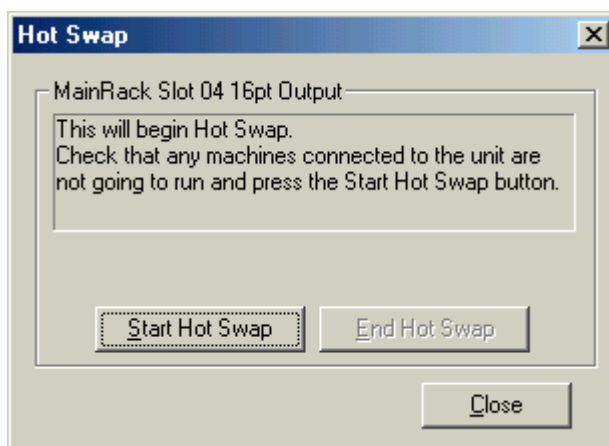
PLC Specific Features

A number of features specific to types of PLC are described in the following paragraphs.

Hot Swapping

Hot swapping is permitted for C1000H/C2000H PLCs and allows modules to be changed without having to power down. The modules swapped must be identical. To Hot Swap, select the *Hot Swap* option from the *Options* menu.

Note: With a CS1D or CVM1D CPU Unit, hot swapping (i.e., online replacement) is possible during operation for Basic I/O Units and, for the CS1D, Special I/O Units and CPU Bus Units as well. Open the I/O tables for the project, select the Unit to be replaced, and select Hot Swap from the Options menu. Click the Start Hot Swap button, remove the old Unit, mount the new Unit and click the End Hot Swap button. Perform this operation for each Unit to be replaced.



Note: Online replacement is possible for a CS1D or CVM1D CPU Unit in any operating mode. Use the following settings in the Change PLC dialog box.

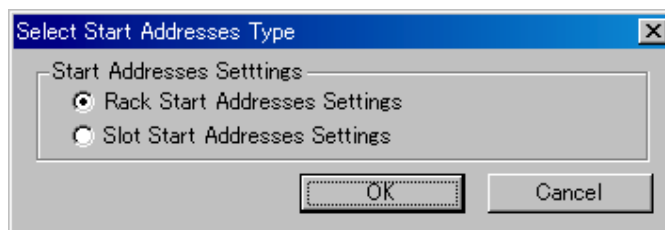
CPU Unit being used	PLC type selection list	CPU Unit model
CS1D	CS1H-H	CPU65 or CPU67
CVM1D	CVM1-V2	CPU21

Setting Rack Start Addresses

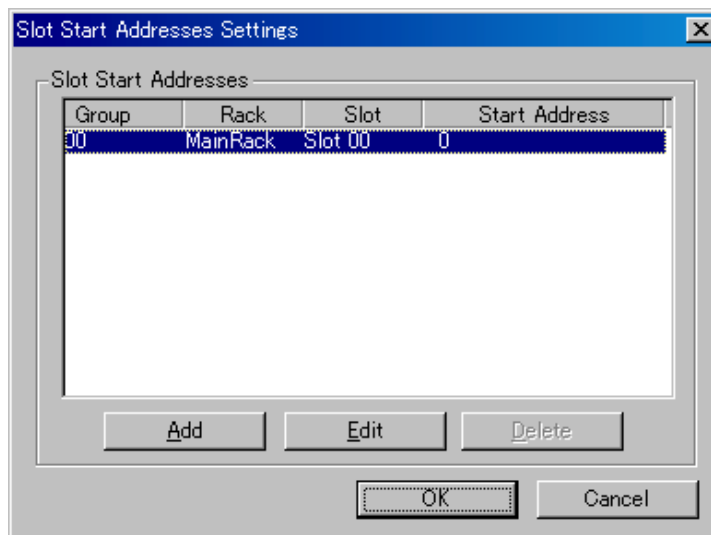
This option is only available to CV-series PLCs and CS1-series PLCs. Use the following procedure to set Rack Start Addresses.

- 1, 2, 3... 1. Select *Rack Start Addresses* from the *Option* menu. The Rack Start Addresses dialog box is displayed.
2. Enter the addresses for each rack as required. Select the **OK** pushbutton to accept the settings or select the **Cancel** pushbutton to abort the operation.

Note: 1. For CS1-H, CJ1-H, CJ1M, and CS1D CPU Units in the CS- and CJ-series PLCs, select *Options | Rack/Slot Start Address* and the following dialog box will appear.



Note: 2. Select *Slot Start Address Settings* and click the OK button. The Slot Start Addresses Settings dialog box shown below will appear.



- Note:** 3. The start address for a Rack and slot number can be specified. This can be used, for example, to allocate fixed addresses to Input Units and Output Units. Note: The start address information set for Racks and slots can be downloaded and uploaded for the CPU Unit.
4. For CS/CJ-series CPU Unit Ver. 2.0 or later with CX-Programmer Ver. 4.0 or later, up to 64 sets of rack/slot numbers and start addresses can be set.

Units Profile Information

For CS1-series PLCs, SIOU's, CPU SIOU's and other units, unit manufacturing information can be retrieved, the data read and comments saved against each unit to a Compact Flash disk when fitted. Use the following procedure to view the unit manufacturing details:

- 1, 2, 3... 1. Highlight the PLC name and click the right-mouse button.
2. Select *Unit Manufacturing Information* and then either *CPU Unit* or *Inner Board*

Note: An error is displayed if the unit does not support manufacturing information. The unit version for CS/CJ/CP-series Units can be checked in the *Unit Manufacturing Information* (CX-Programmer Ver.4.0 or later only).

CHAPTER 4

PLC Setup Component

This chapter describes the PLC Setup component and the procedures involved in changing a PLC's settings both offline and online.

The PLC Setup component allows the PLC settings to be entered for individual C-series PLCs, CV-series PLCs or CS1 PLCs. More than one PLC Setup component can be opened at any one time allowing a number of PLCs to be configured simultaneously.

Once a PLC has been defined in a project in terms of name, device type and network type, changing various settings allows the PLC behavior to be altered. Options can also be selected to check the PLC is functioning correctly.

The tabbed PLC settings component shows only options available for the selected PLC. Some options will be greyed out in instances where they are not applicable to the PLCs current state.

The status bar displays the PLC and CPU type and the operational mode of the PLC.


Note: When configuring a PLC it is advisable to have the PLC operational manual available for reference. A warning is displayed before any changes are made to a PLC's current state. This gives the option of cancelling the procedure.

Note: The information provided in this chapter is not definitive because of the wide variety of PLCs and their differing nature - even within the same PLC series. Consult the relevant PLC operating manual for specific PLC settings information.

The PLC Setup component can be forced to stay as the top window by selecting the *Always on top* option from the *Options* menu.

For Moving, resizing, maximising, minimising and closing windows, refer to Microsoft Windows online help.

Access to the PLC Setup component is from the invoking application and also via the CX-Net Network Configuration Tool, refer to *Chapter 8 - CX-Net Network Configuration Tool* for further information.

 To close the PLC Setup dialog, select the **Close** button in the title bar.

CS/CJ/CP-Series PLC Settings

The following paragraphs describe the features of the PLC Setup component associated with CS/CJ/CP-series PLCs. Refer to *Chapter 4 - PC to PLC Communications* for details of transferring PLC setup information to and from the PLC.

The common *Set Default* option resets PLC Setup component values to the default settings.

PLC Startup

The *PLC Startup* tab of the PLC Setup component allows certain PLC settings to be made which always take effect on startup (until they are explicitly altered). Use the following procedure to apply settings in the *PLC Startup* tab.

Startup Hold

The Hold area in the PLC's Work Area Memory retains the status when either the operating mode is changed, power is interrupted or the PLC operation is stopped. You can select one or all the following options for the hold area to retain.

- 1, 2, 3...*
1. *Force Status Hold Bit* - Specifies that the status of the forced status hold bit is to be maintained (ticked) or reset to OFF when power is next turned on.
 2. *IOM Hold Bit* - Specifies that the status of the IOM hold bit is to be maintained (ticked) or reset to OFF when power is next turned on.

Mode

This selects the default PLC operation mode when the PLC is powered on:

- ◆ **Program** - Select this for online programming when the PLC is powered on.
- ◆ **Monitor** - Select this to start monitoring the running program when the PLC is powered on.

- ◆ **Run** - Select this to run the PLC's program when the PLC is powered on.
- ◆ **Use Programming Console** - This is the default setting that allows you to select the operating mode when online.

In addition to the above, the following settings are available for CJ1-H, CS1-H, and CP1H PLCs.

Execution Settings

For the CJ1-H, CS1-H, and CP1H PLCs series PLCs set the *Execution Setting* options as appropriate.

- 1, 2, 3...**
1. *Run program when initialize unit/board*. Check the tick box to select this option.
 2. *Service for units when Inner Board recognition*. Check the tick box to select this option.

Settings

The *Settings* tab of the PLC Setup component allows execution processes and controls to be defined and EM allocation to be enabled.

Note: For CS1-H, CJ1-H, and CP1H PLCs only, this tab is called CPU Settings.

Execute Process

Use the following procedure to apply Execute Process settings.

- 1, 2, 3...**
1. *Low Battery Enabled* - Select (tick) this option to flag when CPU Unit battery errors are detected.
 2. *Interrupt Task Enabled* - When this option is selected interrupt task errors will be detected.
 3. *Stop CPU Error Enabled* - Select this option to determine if instruction errors (instruction processing errors (ER) and illegal access errors (AER)) are to be treated as non-fatal or fatal errors.
 4. *Don't register FAL to error log* - Select this option (tick) to stop registering FAL to error log.

Memory Allocation

CS/CJ-series PLCs can select either Memory Card or EM (Expansion Memory) specified file area. Each time EM is selected, the EM is reformatted automatically.

To use EM rather than Memory Card, select the *EM File Setting enabled* setting and enter the *EM Start File No.* CS/CJ-series PLCs can use EM as file memory, either as or as well as Compact Flash disk. When transferred to the PLC, EM is formatted.

In addition to the above, the following settings are also available for CJ1-H and CS1-H PLCs.

Background Execution

- 1, 2, 3...**
1. *Table data process instructions*. Check the tick box enable Table data process instructions.
 2. *String data process instructions* - Select (tick) this option to enable String data process instructions.
 3. *Data shift process instructions* - Select (tick) this option to enable Data shift process instructions.
 4. *Com port number* - Enter a number between 1 and 7 inclusive, to set the Com port you wish to connect by.
Caution: Entering a com port number higher than the number of ports actually available will prevent future connections to that PLC.

Timings

The *PLC Timings* tab of the PLC Setup component allows cycle, interrupt and event timings to be defined. Use the following procedure when applying settings in the *PLC Timings* tab for standard CS/CJ/CP-series PLCs. When setting the timings for other PLC types follow the on-screen instructions.

- 1, 2, 3...**
1. Check the *Watch Cycle Time* setting and set the watch cycle time if enabled for the PLC; the default is 0 ms.
 2. Deselect the *Set Time to all Events* setting to enter a time period for all event processes; this is entered as a percentage of the total cycle time.

3. Check the *Power Off Interrupt* setting, and set if enabled for the PLC; the default is 0ms.
4. Set the *Cycle Time* setting to define the time interval for cycles.
5. Set the *Scheduled Interrupt Interval* setting to schedule interrupts to occur at regular intervals; either every 10 ms or a specific value can be set.

SIOU Refresh

The *SIOU Refresh* tab of the PLC Setup component allows SIOU Status to be enabled. Check the required *Enable SIOU Status* setting for each SIOU in the field.

Unit Settings

The *Unit Settings* tab of the PLC Setup component allows timings for the individual rack slots associated with the PLC to be set. Select the required slot(s) from the rack field and the required unit setting; the default is 8 ms.

Host Link Port

The *Host Link Port* tab of the PLC Setup component defines the protocol which allows transferring data between the PLC and the host PC. The default settings may be used or an alternative communications protocol defined. Some of the options may not be applicable depending on the device type selected. Use the following procedure to apply settings in the *Host Link Port* tab.

- 1, 2, 3...**
1. The *Port Settings* default is 9,600 bps, 1 start bit, 7-bit data, 2 stop bits and Even parity. Customised port settings can be entered by deselecting the *Default* setting.
 2. Select the *CTS Control* setting to enable use of CTS.
 3. Set the *Unit Number* setting for the selected PLC.
 4. Set the *Delay* value; a pre-set transmission delay in the range 0000 to 9999 (for BCD this is in 10 ms units).

The following entries cannot be amended:

- ◆ *Link Words*. These word addresses are fixed at LR00 to LR63 (or bit addresses from LR0000 to LR6315).
- ◆ *Start Code* and *End Code*. The message start and end codes.
- ◆ *NT Link Max*.

Peripheral Port

The *Peripheral Port* tab of the PLC Setup component defines the connection between the PC and PLC. The default settings may be used or an alternative communications protocol defined. Use the following procedure to apply settings in the *Peripheral Port* tab.

- 1, 2, 3...**
1. The *Port Settings* default to 9600 bps, 1 start bit, 7-bit data, 2 stop bits and Even parity. Customised port settings can be entered by deselecting the *Default* setting.
 2. Set the *Unit Number* setting for the selected PLC.

The *NT Link Max* setting cannot be amended.

Peripheral Service

Note that this tab is only available for the CS1-H and CJ1-H PLCs (CS1G-H, CS1H-H, CJ1G-H and CJ1H-H).

The tabbed dialog is split into three sections as follows:

Sync/Async Comms

Execution Mode - The default for this option is Not Specified, and as such means that all other parts are disabled except for Set time to all events.

Select one option from the list to set the execution mode. Choosing Not Specified will disable all the options within the Peripheral Service dialog, except for 'Set time to all events'. Not Specified is the only way of setting the Peripheral Service Execution Time to zero.

If Peripheral Service is chosen, editing Peripheral Service Execution Time is possible, and the system sets the default to 0.1. See also Instruction Processing (Peripheral Service Execution Time).

Specifying Asynchronous will disable the same options as Not Specified, and set the Execution mode to Asynchronous processing. Synchronous likewise sets the Execution Mode to Synchronous processing.

Peripheral Service Mode

Instruction Execution Time - A value within and including the range of 5 to 255 or 0 can be entered as a valid setting.

Peripheral Service Execution Time - A value within and including 0.1 to 25.5 can be entered as a valid setting. For more information on when this option is available, see Sync/Async Comms, Execution Mode, above.

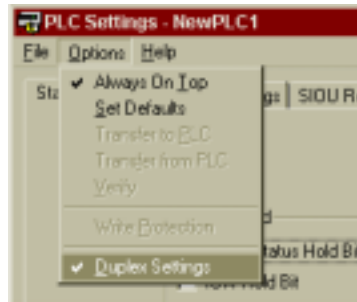
Target Unit (1, 2, 3, 4, 5) and SIOU - The default for this setting is Not Specified. There are five possible options for this setting. After Not Specified, the next option is CPU SIOU. If this option is selected, the SIOU number should be entered in the box to the right marked 'SIOU'. The next option is SIOU, and likewise with the CPU SIOU option, the SIOU number should be entered in the box to the right marked 'SIOU'. The three remaining options allow either the Inner Board, Host Link Port or Peripheral Port to be set as the 'Target Unit'.

Set time to all events

Set time to all events (default 4%) - By ticking the checkbox, the default as stated above will be set. If the checkbox is not ticked, then a value between 0 and 255 inclusive can be entered, making a maximum setting of 25.5 (255 *0.1). This option is found in the Timings tab for all other CS/CJ-series PLCs.

Duplex Settings

The Duplex Setting tab is activated by selecting the Duplex Settings option from the PLC Settings Options menu.



With this option checked, use the Tabs scroll buttons to scroll to the right and click on the Duplex Settings tab to bring it to the front. The options in this dialog can now be set to provide the appropriate communications setup within the selected Communications Units. The dialog is divided into five sections as follows:

Note: The Duplex Setting tab is available for CS1H-H 65 & 67 PLCs but is only applicable to the CS1D series PLCs.

Operation Settings

Run under Duplex Initial – This option should be selected if it is required to run two Units in parallel with Duplex Initial execution. Note that this setting only takes effect at startup or at the start of an operation. It cannot be changed during an operation.

Return Automatically – Select this option when it is required to execute a process that returns to Duplex Operation automatically.

Communications Unit Duplex Setting

From the list of Communications Units select those that are to be run in duplex mode. If more than one Unit is set to duplex mode the options selected will be applied to each Unit. It is not possible to set different options for different Communications Units. To execute the Communication Duplex operation an IO table must be created or transferred. Note that this setting only takes effect at startup or at the start of an operation. It cannot be changed during an operation.

Hot Swap

Allow Plural Units - Selecting this option enables Units operating in Parallel or Duplex mode to be replaced while online. The Units, which can be exchanged while online are, Basic IO Units, SIOUs, and CPU SIOUs of the CS-Series PLCs. Note that this option can be selected while online.

STB Serial Settings

Allow STB-COMM – Selecting this option will enable the Host Link Port of the Standby CPU. This option should not be selected if it is required to continue with communications when changing from Duplex operation to Standby operation.

CPU Unit Duplex Transfer Settings

Transfer Program – This option should be selected if it is required to skip the Transferring Program area at Duplex Initial operation after exchanging CPU units, (Verify will be executed). If programs can be matched beforehand, use this setting to reduce the Duplex Initial Operation time.

EM Division Transmission – This option should be selected when it is required to transfer Duplex Initial data in specified EM sizes. If the option is not selected the complete EM area will be transferred at once. Note that this may cause the cycle time to be expanded for a short time.

Division Size – If the EM Division Transmission option has been selected the value entered for the division size will determine the size of the EM area to transfer. Note that this setting only takes effect at startup or at the start of an operation. It cannot be changed during an operation.

Transfer Parameter Area of Inner board – Select this option when it is required to transfer the Parameter Area of the inner board between Units.

Transfer Variable Area of Inner board – Select this option when it is required to transfer the Variable Area of the inner board between Units.

CV-Series PLC Settings

The following paragraphs describe the features of the PLC Setup component associated with CV-series PLCs. Refer to *Chapter 4 - PC to PLC Communications* for details of transferring PLC setup information to and from the PLC.

The common *Set Default* option resets PLC Setup component values to the default settings.

PLC Startup

The *PLC Startup* tab of the PLC Setup component allows certain PLC settings to be made which always takes effect on startup (until they are explicitly altered). Some of the options may not be applicable depending on the device type selected. Use the following procedure to apply settings in the *PLC Startup* tab.

- 1, 2, 3...
 1. The status of the *Force Status Hold* setting, *IOM Hold Bit* setting and *Restart Continuation Bit* setting in the Startup Hold area of the PLC's Work Area memory can be set so that they are either maintained or reset to OFF on power up.
 2. When power is restored after an interruption, the *IO Bits* setting and *Power-On Status* setting must be selected and the PLC startup mode must be set to *Run* or *Monitor*.
 3. Set the *Mode* setting to either *Program*, *Monitor*, *Run*, *Debug* or *Use Programming Console*. The default mode is *Program*.
 4. Set the *Display Mode* setting. The 7-segment display of the IO Interface units, IO Control unit and SYSMAC BUS/2 Remote IO Slave units can be set to one of three modes. The mode is indicated by the position of the decimal point.
 - ◆ Mode 1. Displays the first IO word allocated to the rack (000 indicates an error). This is the default mode.
 - ◆ Mode 2. Displays the CPU operating status (A or -) and error status (E, F or -), peripheral connection and rack number.
 - ◆ Mode 3. Displays a 4-character message when the IODP (189) instruction is executed in the unit's program.
 5. Check the *Automatically Transfer User Program* setting to automatically transfer the user program from one of the PLCs memory cards when the PLC starts-up.
 6. Check the *Display modes at startup* setting to display all selected modes on startup.

Error Log

The *Error Log* tab permits certain settings to be applied to error logging. Either Data Memory (DM) or Extended Memory (EM) areas can be selected to hold the PLC's Error Log. Refer to *Chapter 6 - PLC Error Component* for a description of the Error Log. Use the following procedure to apply settings in the *Error Log* tab.

- 1, 2, 3...
1. Check the *Enable Error Log* setting to enable error logging. If this is not selected, the default log auxiliary memory is assigned.
 2. Enter the *Start Address* setting for the error log. This is only enabled if the *Enable Error Log* setting has been selected.
 3. Enter the *EM Bank Number* setting if the Error Log is to be stored on an installed Extended Memory Card. The *Start Address* setting needs to be set to the relevant area of EM. This is only enabled if the *Enable Error Log* setting has been selected.
 4. Enter the *Number of Records* setting for the number of records to be held in the PLC Error component.

Note: An Error Log in the Auxiliary Area (words A100-A199 for CV1000) can contain up to 20 error records. To increase the size of the log (to 2047 records), move it to either the DM or EM areas.

Execution Controls

Instructions can be executed and peripheral servicing performed by either using:

- ◆ Event driven (asynchronous) processing mode. The peripheral servicing process interrupts the execution process cycle by sending IO refresh requests.

or

- ◆ Synchronised processing mode. The execution and peripheral servicing processes wait for each other to complete the task in hand.

Consult the PLC operational manual for details when defining the execution controls. Use the following procedure to apply settings in the *Execution Controls* tab.

- 1, 2, 3...
1. An operand can be indirectly addressed via the DM area in either Binary or BCD. Select the *Binary* setting or the *BCD* setting as required.
 2. Set the *Step Timer* setting for the SFC step instructions. The default is 0.1 s.

Note: For CV1000, CV2000 and CVM1/CPU21-EV2 PLCs, EM can be used for indirect addressing of an operand.

Note: The *Step Timer* setting is not available to CVM1 PLCs.

Execution Controls 1

Use the following procedure to apply settings.

- 1, 2, 3...
1. Check the *Measure CPU-Bus Unit Cycle* setting for the CPU to measure the service cycle.
 2. Check the *Detect Low Battery* setting to flag PLC and Memory Card low battery.
 3. Check the *CPU standby on initialisation of bus units* setting to ensure the CPU remains in standby until SYSMAC BUS/2 terminators are detected. If this is not checked, PLC operation begins regardless of the presence of terminators.
 4. Check the *Error on power off interrupts* setting to ignore a momentary power interruption (and not generate an error) or leave unchecked to generate an error on power off.

Execution Controls 2

Check the following settings as required.

- ◆ The Duplication action error setting.
- ◆ The Multiple JMP000 use setting.
- ◆ The Run program on IO verify error setting.
- ◆ The Startup trace setting.
- ◆ The Nest IO interrupts setting.
- ◆ The IO Interrupt setting.

Host Link Port

The *Host Link Port* tab of the PLC Setup component defines the protocol which allows transferring data between the PLC and the host PC. The default settings may be used or an alternative communications protocol defined.

Use the following procedure to apply settings in the *Host Link Port* tab.

- 1, 2, 3...**
1. The *Port Settings* default to 9600 bps, 1 start bit, 7-bit data, 2 stop bits and Even parity.
 2. Select a *Unit Number* setting for the Host Link port setting. This has a maximum value of 31.

IO Refresh

The *IO Refresh* tab of the PLC Setup component allows the specification of refreshes and their definition as either timed or immediate refreshes. Some of the options may not be applicable depending on the device type selected.

Use the following procedure to apply settings in the *IO Refresh* tab.

- 1, 2, 3...**
1. Check the *Zero-cross* setting to ensure output devices accurately switch on/off high power devices when minimum current is flowing (when the AC power supply crosses zero).
 2. Check the *Cyclic* setting to generate a cyclic refresh at the end of program execution.
 3. Check the *Scheduled* setting to specify a time interval between interrupt refreshes. This is in the range 0 ms to 120 ms.
 4. Check the *Immediate Refresh* setting to allow program instructions to be set to interrupt for immediate refreshing. The *Scheduled refresh* setting must be set to 00 ms.

Note: Scheduled refreshing is not available if the PLC is set for synchronous operation.

Address Enable

The *Address Enable* tab of the PLC Setup component allows addresses to be entered for selected local racks. Some of the options may not be applicable depending on the device type selected. Use the following procedure to apply settings in the *Address Enable* tab.

- 1, 2, 3...**
1. Enter an address for each required *Local rack* setting. The first word can be set between 0 and 511. Word allocations must not overlap. The default for the CPU rack is zero. If word allocations overlap, they are ignored and the address returns to zero. Racks selected without a designated first word is allocated words automatically beginning from CIO 0000.
 2. Enter the *Group 1* and *Group 2* values. This is the first word between CIO 0000 and CIO 0999 for each SYSMAC BUS/2 Group 1 and 2 Masters.
 3. Enter the *Group 3* values. These are the first word for each SYSMAC BUS/2 Group 3 Slave between CIO 0000 and CIO 0999 for each SYSMAC BUS/2 Group 1 and 2 Masters and the first word for each SYSMAC BUS/2 Slave rack between CIO 0000 and CIO 2555.
 4. Enter the *RT Terminals*, *SIOU* and *IO terminals* addresses as required.

Note: Each group (Group 1, 2 and 3) has pre-set values assigned as a default. Group 1 and Group 2 supports 32 and 16 IO units respectively. Group 3 is reserved for racks and supports eight racks, each of which supports eleven slots.

PLC Timings

The *PLC Timings* tab of the PLC Setup component allows cycle, interrupt and event times to be set. Use the following procedure to apply settings in the *PLC Timings* tab.

- 1, 2, 3...**
1. Check the *Watch Cycle Time* setting and set the watch cycle time if enabled for the PLC; the default is 1000 ms.
 2. Check the *Power Off Interrupt* setting, and set if enabled for the PLC; the default is 0 ms.
 3. Set the *Cycle Time* setting to define the time interval for cycles.
 4. Set the *Scheduled Interrupt Interval* setting to schedule interrupts to occur at regular intervals; either every 10 ms or a specific value can be set.

Hold

The *Hold* tab of the PLC Setup component allows the Hold area of the PLC's Work Area memory to be defined. Use the following procedure to apply settings in the *Hold* tab.

- 1, 2, 3...
1. Check the *Enable Hold Area* setting to enable the Hold area and select its *Start* and *End Address* settings.
 2. Check the required racks from the *CPU* field.
 3. Check the required Sysbus/2 remote master from the *Sysbus/2 Remote Master* field.
 4. Check the required Sysbus remote master from the *Sysbus Remote Master* field.

C-Series PLC Settings

The following paragraphs describe the features of the PLC Setup component associated with C-series PLCs. Refer to *Chapter 4 - PC to PLC Communications* for details of transferring PLC setup information to and from the PLC.

The common *Set Default* option resets PLC Setup component values to the default settings.

PLC Startup

The *PLC Startup* tab of the PLC Setup component allows certain PLC settings to be made which always take effect on startup (until they are explicitly altered). Use the following procedure to apply settings in the *PLC Startup* tab.

Mode

This option selects the default PLC operation mode when the PLC is powered on.

- 1, 2, 3...
1. *Program* – Select this for online programming when the PLC is powered on.
 2. *Monitor* – Select this to start monitoring the running program when the PLC is powered on.
 3. *Run* – Select this to run the PLC's program when the PLC is powered on.
 4. *Pre-Powerdown mode* – In this mode the PLC uses the operating mode last used before the power was turned off.
 5. *Use Programming Console* – This is the default setting that allows you to select the operating mode when online.

SIOU

The SIOU Area DM settings are highly PLC specific and are dependent upon PLC selected and the SIOU mode. Refer to the online help for detailed information.

IOM

This option specifies that the status of the IOM hold bit is to be *reset* to OFF (ticked) or *maintained* when power is next turned on.

Forced Status

This option specifies that the status of the forced status hold bit is to be *reset* to OFF (ticked) or *maintained* when power is next turned on.

Console Language

Select the Console language to either English or Japanese as appropriate (CPM1/1A only).

Expansion Instructions

Set to either Default or User Settings. This option is only available for SRM1, CPM2* PLCs.

CompoBus/S Devices (CPM2*-S*)

Select the Maximum number of CompoBus and S Devices to either 16 or 32.

Communications Mode (CPM2*-S*)

Sets the communications mode to either High-Speed or Long-distance.

Memory Error on Capacitor Failure

Select this option if a memory error on capacitor failure is to be recorded.

Cycle Time

The *Cycle Time* tab of the PLC Setup component allows the total cycle time for the CPU unit to be defined. This period is the time taken to complete monitoring, program execution and IO port servicing. Use the following procedure to apply settings in the *Cycle Time* tab.

- 1, 2, 3...
1. *Cycle Monitor Time* setting. This option sets the time allowed for the CPU unit to cycle through the type of operations indicated above. If it is exceeded, an error is generated and the CPU unit is stopped.
 2. *Cycle Time* setting. Use this option to define a minimum cycle time by selecting a time period in the range 1 to 9,999 ms. The default is *Variable* (with the CPU calculating the cycle time in each cycle).
 3. *Servicing Time* setting. This option allows the percentage of the defined cycle time which can be used to service a port to be set. It can be set for the Peripheral Port, RS232C Port, Comms Port A and Comms Port B.

Note: The *Cycle Time* setting is ignored if the *Cycle Monitor Time* setting is longer and vice versa (provided a minimum time has been defined). The CPU unit waits until the longer of the two time periods has elapsed before starting the next cycle.

Interrupt/Refresh

The *Interrupt/Refresh* tab of the PLC Setup component allows certain PLCs to interrupt the main program by input and scheduled interrupts in order to call a subroutine. Use the following procedure to apply settings in the *Interrupt/Refresh* tab.

- 1, 2, 3...
1. *Interrupt Response* - Set the interrupt mode to *High Speed* to interrupt immediately or to *Normal* to wait for the current process to complete.
 2. *SIOU Refresh* setting - This option must be set to *Disable Refresh* when the *Interrupt Response* setting is set to *High Speed* (if the *Disable Refresh* setting has been set and the *Interrupt Response* is set to *Normal*, the *Disable Refresh* setting is ignored).
 3. *Schedule Interrupt Unit* setting - These are interrupts for which you can select regular intervals of either a fixed 10ms duration or Set in increments of 1 ms.
 4. *SIOU Cyclic Refresh* setting - Set the *SIOU Cyclic Refresh* setting if required. An SIOU Cyclic Refresh Unit(s) must be specified if an SIOU refresh setting has been made.

The CQM1 PLCs support input and scheduled interrupts to stop the main program to run a subroutine.

The following Interrupt/Refresh options are available with the CQM1H.

5. *Interrupt Enable* – This option allows you to set the various IR value interrupts to either: Normal (default), Interrupt or Quick.
6. *Input Constant* - This option allows you to set the input constant of IR000 Bits. Select the value in milliseconds as appropriate.
7. *Pulse Output 0/1 Unit* – Set the output pulse 0 and 1 to either Relative or Absolute.

Port Settings

The *Peripheral Port*, *Comms Board A*, *Comms Board B* and *Host Link Port* tabs of the PLC Setup component defines the settings for the connection between the PC and PLC. The default settings may be used or an alternative communications protocol defined. Use the following procedure to apply settings.

- 1, 2, 3...
1. The *Port Settings* are set to 9600 bps, 1 start bit, 7-bit data, 2 stop bits and Even parity. Customised port settings can be entered by deselecting the *Default* setting. The *Mode* setting can be set to one of the following connection types:

- ◆ PC.
 - ◆ *Hostlink 1 to n*. Multiple PLC RS422/485 connections to the PC.
 - ◆ *RS232C*. Single PLC RS232 connection to a printer or from a reader.
 - ◆ *1-to-1 Link Slave*. Sets PLC as slave in an RS232 PLC to PLC connection.
 - ◆ *1-to-1 Link Master*. Sets PLC as master in an RS232 PLC to PLC connection.
 - ◆ *NT Link 1:1*. For using NT link commands in an RS232 PLC to PT (Programmable Terminal) connection.
 - ◆ *NT Link 1:n*. For using NT link commands in an PLC to RS422/485 multi-PT connection.
 - ◆ *Protocol Macro 1:1*. Single PLC RS232 to device connection.
 - ◆ *Protocol Macro 1:n*. PLC to RS422/485 multi-device connections.
2. Select the *CTS Control* setting to enable use of the CTS line on the PLC.
 3. Set the *Unit Number* setting for the selected PLC.
 4. Set the *Delay* setting; a pre-set transmission delay in the range 0000 to 9999 (for BCD this is in 10ms units).

The following entries cannot be amended:

- ◆ *Link Words*. These word addresses are fixed at LR00 to LR63 (or bit addresses from LR0000 to LR6315).
- ◆ *Start Code* and *End Code*. The message start and end codes.
- ◆ *NT Link Max*.

Error Settings

The *Error Settings* tab of the PLC Setup component defaults to the detection and reporting of long cycle times, interrupt errors and low battery condition. Use the following procedure to apply settings in the *Error Settings* tab.

- 1, 2, 3...
1. *Cycle Time* - Check the *Do not detect long cycles* option to stop detection and reporting of long cycles.
 2. *Styles* - Check the *Do not store records* option if records are not to be stored.
 3. *Battery* - Check the *Do not detect low battery* option if low battery condition is not to be reported on.

High Speed Counters

The CQM1H-CTB41 high-speed counter board is an Inner Board applicable to units CPU51 and CPU61. A maximum of two boards can be mounted simultaneously in slots 1 & 2 of the PLC. The high-speed counter board counts high-speed pulses from 50 to 500 kHz entering through ports 1 to 4. It performs tasks according to the number of pulses counted.

When the present value of the high-speed counter matches a specified target value or lies within a specified range, the bit pattern specified in the comparison table is stored in internal output bits and external output bits. A bit pattern can be set for each comparison result and the external output bits can be output through an external output terminal.

Up to four external outputs can be produced when either the target value is matched or a range comparison condition is satisfied. The high-speed counter board does not provide high-speed counter interrupts, it simply compares the present value to target values or comparison ranges and produces internal and external bit outputs.

CPM1/CPM1A PLCs have a high-speed counter function that can be used in incrementing mode or up/down mode. The high-speed counter can be combined with input interrupts to perform target value control or zone comparison control that is not affected by the PLCs cycle time. High-speed counter signals can be input to CPU bits 00000 through 00002. In incrementing mode, input 00001 can be used as a regular input.

High Speed Counter/Synchronised Pulse Control

Select the appropriate option to determine the parameters of the high speed counter. If the option 'Don't use either function' is selected the counter is disabled and the Counter Reset and Counter Mode option are disabled.

Counter Reset

Select the counter reset mode of operation, either Z phase and software reset or Software reset only.

Counter Mode

Select the appropriate option to determine the counters mode of operation.

Device Net

I/O Link Refresh Area

Note: This tab is only available for the CPM2*-S* PLCs.

- 1, 2, 3...*
1. *Standard* - Select this button to set the standard/default settings for the I/O Refresh Area.
 2. *Custom* - Select this button to make your own settings.
 3. *Write*: These setting are the same as Read, but without the option of selecting the 'AR' memory area.
 - ◆ *Area* - This option defaults to IR area 1, but can be set to IR area 2, DM area, LR area or HR area.
 - ◆ *Address* - This is the beginning address number.
 - ◆ *Size* - The default is 0. However, if the size is 0 for Write, then the size for Read must be 1, or vice versa. Any custom setting's maximum value is determined by what the Area and Address values before it were set to. For example, if IR area 1 is selected, and the maximum address is specified (in this case max = 49), then the maximum size is 1. (The size value is specified in Words).
 4. *Read*: These setting are the same as Write, but with the additional option of being able to selecting the 'AR' memory area for reading.
 - ◆ *Area* - This option defaults to IR area 1, but can be set to IR area 2, DM area, LR area or HR area.
 - ◆ *Address* - This is the beginning address number.
 - ◆ *Size* - The default is 0. However, if the size is 0 for Write, then the size for Read must be 1, or vice versa. Any custom setting's maximum value is determined by what the Area and Address values before it were set to. For example, if IR area 1 is selected, and the maximum address is specified (in this case max = 49), then the maximum size is 1. (The size value is specified in Words).

PLC Status

These options determine the status of the PLC.

Append PLC Status on top of IN data - Select this button to Append PLC Status on top of IN data, or choose 'Do not append PLC Status'.

Do not append PLC Status - Select this button to not append PLC Status on top of IN data, or choose 'Append PLC Status on top of IN data'.

PC to PLC Communications

The PLC Setup component permits the transferring of data to and from the PLC and allows comparisons to be made between data stored on the PC and the PLC.

Uploading PLC Settings

The *Transfer from PLC* option loads the settings from the PLC into the PLC Setup component. Use the following procedure to upload PLC settings.

- 1, 2, 3...*
1. Ensure the PLC is online before activating the PLC Setup component.
 2. Select *Transfer from PLC* from the *Options* menu. A confirmatory dialog is displayed.

The PLC Setup component is refreshed with the details from the PLC.

Downloading PLC Settings

The *Transfer to PLC* option loads the settings to the PLC. Use the following procedure to download an IO Table.

- 1, 2, 3...*
1. Ensure the PLC is online before activating the PLC Setup component.
 2. Select *Transfer to PLC* from the *Options* menu. A confirmatory dialog is displayed.

Comparing PLC Settings

The *Verify* option compares the settings on the PLC with those on the PLC. This option is helpful to confirm that a table that has been set up in CX-Server and has been downloaded to the PLC, agrees with how the hardware is set up. Use the following procedure to compare PLC settings.

- 1, 2, 3... 1. Ensure the PLC is online before activating the IO Table component.
2. Select *Verify* from the *Options* menu.

Any differences (if any) are displayed in the PLC Setup component.

CHAPTER 5

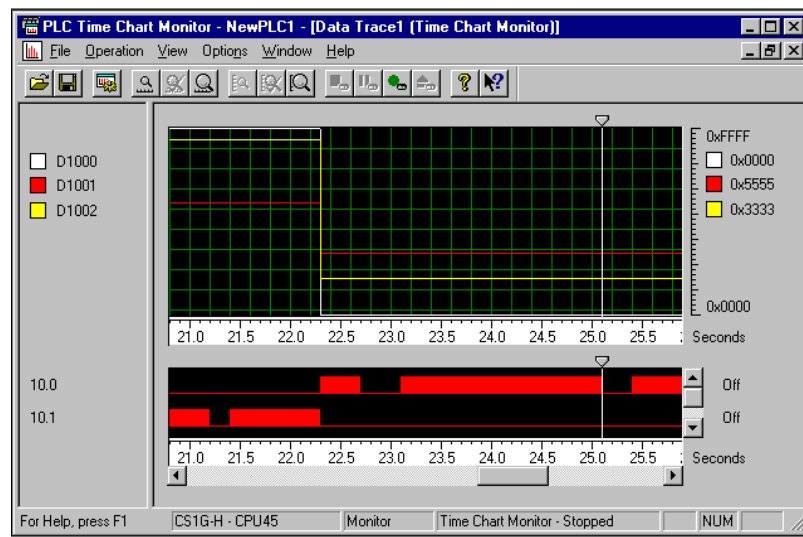
Data Trace/Time Chart Monitor Component

This chapter describes the Data Trace/Time Chart Monitor component and its ability to display either the PLCs uploaded data trace buffer or monitored data obtained from the PLC's memory areas during program execution.

Data held in a PLC's memory areas can be monitored and traced during program execution. When displayed, this information provides a valuable tool for analysing the program's performance.

The Data Trace/Time Chart Monitor component has two separate modes of operation:

- ◆ *Data Trace.* The PLC can be configured to trace a number of channels and bits and can sample these when a trigger condition is activated. When the PLC trace buffer is full or the user stops the trace, the trace buffer can be uploaded and viewed – the trace however, is complete. Values do not change on the screen, all sampling is achieved in the PLC and displayed when finished.
- ◆ *Time Chart Monitor.* A number of channels and bits can be configured and monitored online. The changing values are displayed in the monitoring view as either a trend graph or histogram. A trigger condition can also be set which resets the sampled amount of data. Monitoring continues until stopped by the user.



With the CX-Programmer version 6.0 and later versions, data collected by the Data Trace and Time Chart Monitor functions can be saved in standard CSV files (with .csv filename extension). The data saved in standard CSV files can be analysed and printed in programs such as Microsoft Excel.

The status bar provides instant help, the PLC and CPU type, the current operating mode of the PLC and the status of the Data Trace/Time Chart Monitor component.

The Toolbar and status bar can both be turned on or off. Select *Status Bar* from the *View* menu to control the display of the status bar. Select *Toolbar* from the *View* menu to control the display of the Data Trace/Time Chart Monitor toolbar.

The Data Trace/Time Chart Monitor component can be forced to stay as the top window by selecting the *Always on top* option from the *Options* menu.

For moving, resizing, maximising, minimising and closing windows, refer to Microsoft Windows online help.

Access to the Data Trace/Time Chart Monitor dialog is from the invoking application.

- ✘ To close the Data Trace/Time Chart Monitor dialog, select the **Close** button in the title bar.

Sampling Ranges

The following paragraphs discuss sampling ranges specific to PLC series.

CS/CJ-series PLC Sampling Range

The CS/CJ-series PLC can trace a maximum of 31 bits and 6 words and performs data tracing using one of the following methods:

- ◆ *Setting a timer interval.* The trace can be performed in increments of 5ms during a 5-2550 ms cycle. To sample data only once each cycle, set the interval to 0 ms.
- ◆ *Including the TRSM (170) instruction in the PLC's program.* This instruction identifies the points in program execution where specified data is to be stored in Trace Memory. The timer interval must be set to 'TRSM'.

Note: The buffer for Data Trace is 4K words.

CV-series PLC Sampling Range

The CV-series PLC can trace a maximum of 12 bits and 3 words and performs data tracing using one of the following methods:

- ◆ *Setting a timer interval.* The trace can be performed in increments of 5 ms during a 5-2550 ms cycle.
- ◆ *Including the TRSM(170) instruction in the PLC's program.* This instruction identifies the points in program execution where specified data is to be stored in Trace Memory. The timer interval must be set to 'TRSM'.

C-series PLC Sampling Range

The C-series PLC can trace a maximum of 12 bits and 3 words and performs data tracing using one of the following methods:

- ◆ *Setting a timer interval.* A Data Trace can be performed at regular, independent intervals by setting a timer interval from the peripheral device.
- ◆ *Including the TRSM(45) instruction in the PLC's program.* This instruction identifies the points in program execution where specified data is to be stored in Trace Memory.

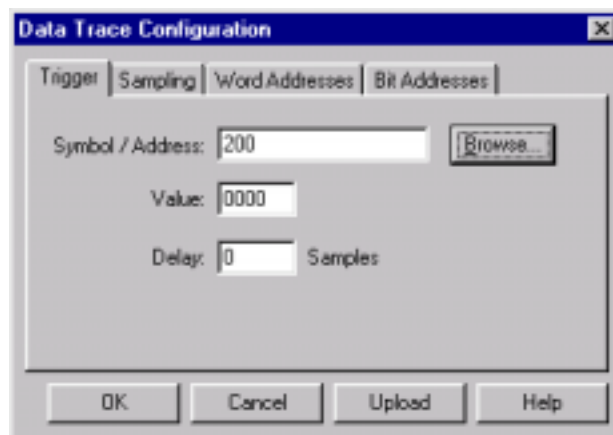
Note: Data Tracing cannot be performed from a Programming Console.

Setting Monitoring Conditions

The Data Trace or Time Chart Monitor must be activated before the settings can be configured. To select Data Trace or Time Chart Monitoring mode, select the *Mode* option from the *Operation* menu followed by either *Data Trace* or *Time Chart Monitor*.

Note: The mode of the Data Trace/Time Chart monitor component is identified prior to activation from the invoking application.

The Time Chart Monitor/Data Trace Configuration dialog allows the conditions for the Data Trace or Time Chart Monitor to be set, i.e. specifying the data to be monitored, the intervals at which this is to occur and the trigger conditions.



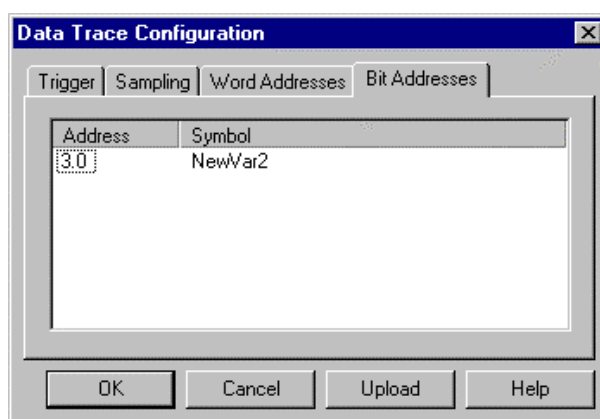
Use the following procedure to set conditions for the Data Trace or Time Chart Monitor modes.

1. Select the **Configure Trace/Time Chart** button from the toolbar.



2. Set the trigger condition that causes the data trace to start by selecting a *Symbol/Address* and *Value* on the *Trigger* tab. Use the **Browse** pushbutton to insert a known symbol from the invoking application. If a bit address is selected, the trigger is based on a falling or rising edge as opposed to a particular value for a word address: the *Value* field changes to the *Edge* field.
3. For Time Chart Monitor only, establish the sampling time and *Buffer Size* on the *Sampling* tab.
4. Apply a delay value in the *Delay* field. A negative value in this field advances the start of the trace before the trigger condition by the supplied interval value. A positive value in this field delays the trace after the trigger condition by the supplied value in sampling.
5. Select the *Word Addresses* field on the *Word Addresses* tab and/or *Bit Addresses* on the *Bit Addresses* tab) to be monitored.
6. Once all conditions have been set as required, click the **OK** pushbutton. Select the **Cancel** pushbutton to abort the configuration operation.

Use the following procedure to select the Word addresses or Bit addresses. It is possible to set only word addresses, bit addresses, or a mix of both.



- 1, 2, 3... 1. Select a free area in the Address or Symbol columns with the right-mouse button and click *New*. The Address Selection dialog is displayed.
2. Insert an address in the *Address/Symbol* field, or select the **Browse** pushbutton to locate a symbol from the invoking application.
3. Click the **OK** pushbutton in the Address Selection dialog to accept the settings or select the **Cancel** pushbutton to abort the operation. The address or symbol is displayed in the Data Trace Configuration dialog. Multiple addresses or symbols can be applied.
4. To delete an existing address or symbol, select an address or symbol with the right-mouse button and click *Delete*.

When in the Data Trace mode of operation, the data trace configuration in the PLC can be uploaded and viewed/edited for re-use. Select the **Upload** pushbutton from the Data Trace Configuration dialog.

Managing the Data Trace/Time Chart Monitor

Use the following functions to manage the Data Trace or Time Chart Monitor.



Select the **Execute** button from the toolbar to execute a data trace/time chart monitor.



Select the **Trigger** button from the toolbar to set the trigger condition so that execution will end normally.



Select the **Stop** button from the toolbar to stop a data trace/time chart monitor.



Select the **Read** button from the toolbar to upload the data trace. This may take a few moments; the status of the Read function can be verified by the information supplied in the status bar. The **Read** button is not used for the Time Chart Monitor mode of operation.

Saving Data Trace Settings

Results data collected by the Data Trace and Time Chart Monitor functions can be saved as special CX-Programmer data files (.cdt filename extension) or standard CSV files (.csv filename extension).

- ◆ Saving Data in a CX-Programmer Data File
To save the data in a special CX-Programmer data file (.cdt filename extension), select *File – Save* or *File – Save As*.
- ◆ Saving Data in a CSV File
To save the data in a standard CSV file, select *File – Save CSV*.

Retrieving Data Trace/Time Monitor Settings

Data Traces can be stored on file and retrieved for later analysis. Settings may be retrieved from a project from an invoking application. Select the *Open* option from the *File* menu. A standard open window is displayed.

Data Trace/Time Chart Monitoring component files can be retrieved via a standard File Open dialog. Use the following procedure to open a Data Trace/Time Chart Monitoring component file.

- 1, 2, 3...
1. Select the **Open File** button from the toolbar to open a Data Trace file.
 2. A standard File Open dialog is displayed. Select a file from the Open dialog, followed by the **Open** pushbutton. PLC Memory files have a .CDT extension.

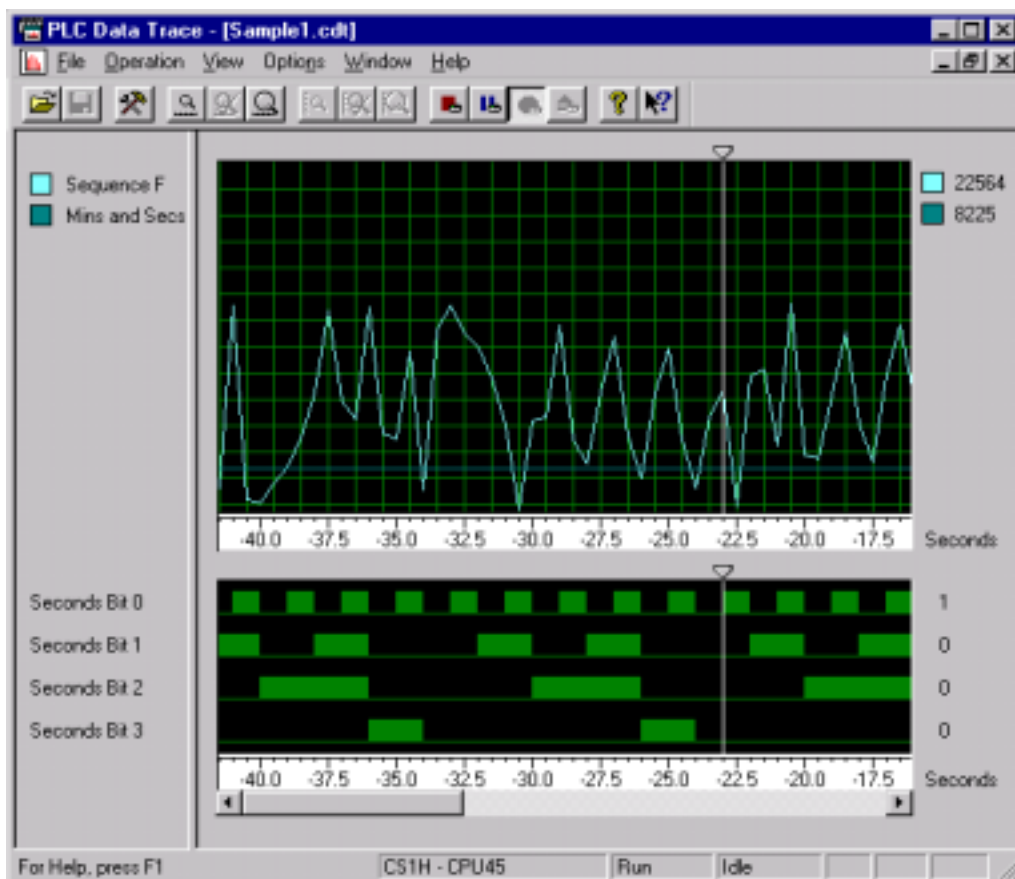


Note: It is possible to open a file type that is not applicable to the current mode, e.g. opening a Data Trace file when in Time Chart Mode.


- To close a currently open file, select the **Close** button from the file's title bar. Recently opened files can be directly selected for opening via the *File* menu.

Displaying a Data Trace/Time Chart







Once uploaded, the Data Trace/Time Chart Monitor component is populated with the required details.



The top graph illustrates the word addresses or symbols. The bottom graph illustrates the bit addresses or symbols. Each word address is colour coded. The word and bit addresses are listed in the left pane; the splitter bar can be moved by placing the mouse cursor over the splitter bar and dragging it to its new position to show more or less of the displayed numbers.

-  The slider position, used to analyze the data returned by the data trace, can be moved by placing the mouse cursor over the graph slider and dragging it to its new position. Both sliders can be moved together by selecting *Synchronise Cursors* from the *View* menu. When moving the slider, it snaps to the sampled intervals. Moving and holding the slider left and right scrolls the view window left and right.

The Data Trace/Time Chart Monitor component permits the zooming and scaling of the Data Trace/Time Chart view. Use the following procedure to zoom and scale the Data Trace/Time Chart view.

-  Select the **Zoom In** button from the toolbar to zoom in on the word graph.
-  Select the **Zoom Out** button from the toolbar to zoom out from the word graph.
-  Select the **Restore Zoom** button from the toolbar to return the graph to the original view.
-  Select the **Scale In** button from the toolbar to zoom in on a particular graph against the vertical axis.
-  Select the **Scale Out** button from the toolbar to zoom out from a particular graph against the vertical axis.
-  Select the **Restore Scale** button from the toolbar to return the graph to the original scale.

This can be modified to switch between Histogram and Trend Graph when in Word Display Mode or to switch between Outline and Block when in Bit Display Mode. Use the following procedure to switch display modes.

- 1, 2, 3... 1. Select the *Word Display Mode* option or the *Bit Display Mode* option from the *Options* menu.
2. For Word Display Mode, select either *Histogram* or *Trend Graph*.
3. For Bit Display Mode, select either *Block* or *Outline*.

The Word values shown on the screen can be displayed in one of four formats:

- ◆ Binary;
- ◆ Decimal;
- ◆ Signed Decimal;
- ◆ Hexadecimal.

Use the following procedure to select a Bit value format.

- 1, 2, 3... 1. Select Word Value Format from the Options menu.
2. Select either Binary, Decimal, Signed Decimal or Hexadecimal.

The Bit values shown on the screen can be displayed in one of two formats:

- ◆ Boolean (1 or 0);
- ◆ Text (On or Off).

Use the following procedure to select a Bit value format.

- 1, 2, 3... 1. Select *Bit Value Format* from the *Options* menu.
2. Select either *Boolean* or *Text*.

The Data Trace/Time Chart view can be toggled to display either PLC addresses or symbol names. Select the *Options* menu and then *Show Symbol Names*. If a symbol name is not available then the PLC address is shown.

The colours associated with the Data Trace/Time Chart view can be customised. Use the following procedure to change the colours on the Data Trace/Time Chart view.

- 1, 2, 3... 1. Select *Colours* from the *Options* menu. The Trace Colour Selection dialog is displayed.
2. Select a **Change** pushbutton associated with a colour to be applied to a Word or Bit address. A standard Microsoft Windows Colour dialog is displayed.

3. Select a colour from the Colour dialog and click the **OK** pushbutton. Select the **Cancel** pushbutton from the Colour dialog to abort the operation.
4. If required, Select a **Change** pushbutton for another colour and repeat step 3.
5. Select the **Apply** pushbutton from the Trace Colour Selection dialog to apply the change colour settings. Select the **OK** pushbutton to apply the change colour settings and close the dialog. Select the **Cancel** pushbutton to abort the operation.

The display of the Data Trace or Time Chart Monitor can be further refined by displaying a grid over the window. Select *Grid* from the *Options* menu to control the display of the grid.

Any symbol names inherited from the invoking application can be displayed on Data Trace or Time Chart Monitor by selecting *Show Symbol Names* from the *Options* menu.

SYSWIN Data Trace and Time Chart Monitor Files

SYSWIN 3.x Data Trace Files (*.SDT) and Time Chart monitoring files (*.STC) can be opened directly into CX-Server. Use the following procedure to import these files:

- 1, 2, 3...**
1. Select the **Open** button from the toolbar. The Open dialog is displayed.
 2. Select an alternative file type from the Files of Type field, either SYSWIN version 3 Data Trace Files (.SDT) or SYSWIN version 3 Time Chart Monitor Files (.SDC).
 3. Select a file to open.
 4. Select the **Open** pushbutton to import the file. Select the **Cancel** pushbutton to abort the operation.



CHAPTER 6

PLC Error Component

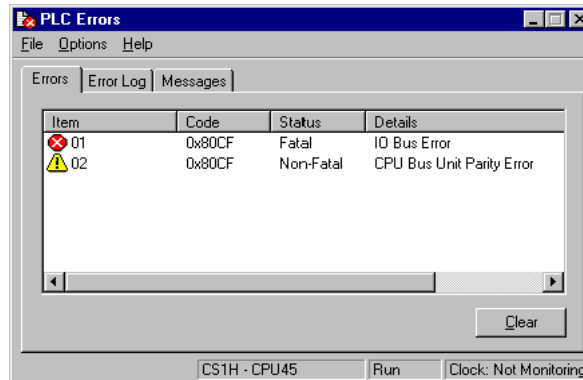
This chapter describes the PLC Error component and its ability to display and clear PLC errors, the PLC Error Log and messages.

The PLC Error component is only available when the PLC is online.

The PLC Error component provides a view of current errors occurring in the PLC's CPU and allows them to be cleared when the cause of the PLC error has been removed (providing the PLC is in the correct mode). Errors occurring are also written to the PLC Error Log and displayed in the PLC Error component automatically although, if set to Manual Refresh, the error history is only updated when the **Refresh** button is selected.

Messages are displayed when a user-defined MSG instruction in the ladder program is encountered; these messages may have been defined as part of an error trap or to provide more general information. Messages may also be generated by the system in certain circumstances.

When a number of errors have occurred on the PLC, the most serious error is displayed automatically. For detailed information concerning a PLC error, refer to the relevant PLC manual.



The status bar displays the connected device and PLC mode and the PLC Clock (if one is present and clock monitoring has been enabled from the *Options* menu).

- ◆ The Error Log is always available for CV and CS1/CJ1-series PLCs but can be selectively enabled or disabled for C-series PLCs.

The PLC Error component can be forced to stay as the top window by selecting the *Settings* option from the *Options* menu and checking the *Always on Top* setting on the *General* tab.

Access to the PLC Error component is from the invoking application. If a serious error has occurred, the PLC Error component is displayed automatically.

- ✘ To close the PLC Errors dialog, select the **Close** button in the title bar.

Errors

The *Errors* tab of the PLC Error component displays the current error status of the PLC, when an error is detected in the PLC it is shown with the item identifier, code position, error status level and error details. The icon next to the item number indicates the type of error detected and reflects the error status in the *Status* column.

Errors may be cleared but this is dependent upon removal of the cause of the error in the PLC and the PLC's operating mode.

When the PLC is in Program Mode, all errors can be cleared; when in Monitor mode, only the last error can be cleared. It is not always possible to clear an error when the PLC is in Run mode; in this instance, a dialog is displayed which allows an attempt to be made at clearing the error. Providing the cause of the error has been rectified, the error can be cleared, although the PLC mode may need to be switched to achieve this.

Use the following procedure to clear errors.

1. Select the *Errors* tab in the PLC Error component.
2. Select the **Clear All** pushbutton.

There are three types of errors that can be recorded.



Fatal error: Program execution is halted and the PLC error indicator is constantly illuminated.



Warning error (non-fatal): The PLC error indicator flashes.



No errors: PLC is operating normally.

Note: The user program, Parameter Area, and I/O Memory in the CPU Unit can be cleared to initialize the CPU Unit by selecting *Clear All Memory Areas* from the Options menu of the PLC Errors dialog box.

Error Log

The *Error Log* tab of the PLC Error component displays the error history of the associated PLC including entry number, date and time of occurrence (if date and time stamping is supported by the PLC), code position and error details. The icon shown against the Entry number indicates the error status (unlike the *Errors* tab, there is no Status column).

Use the following procedure to clear the Error Log.

- 1, 2, 3...*
1. Select the *Error Log* tab in the PLC Error component.
 2. Select the **Clear All** pushbutton.

Note: The Error Log cannot be cleared in Run mode.

There are three types of Error Log entries recorded.



Fatal Error Log entry. Program execution is halted by this error occurrence.



Warning Error Log (non-fatal) entry.



No Error Log entries.

The maximum number of Error Log entries allowed by the PLC is displayed beneath the Error Log.

Note: With the CX-One Ver 1.1 (CX-Programmer Ver. 6.1) and later versions, the error log displayed in the PLC error window's Error Log Tab can be saved as a CSV file by clicking the **Save** Button. The saved data can be analyzed or printed later with programs such as MS Excel.

Messages

The *Messages* tab of the PLC Error component displays the messages set by a ladder program. These are user-defined messages which have been inserted into the PLC program, they do not have to be error messages. Messages can either be selectively cleared or all cleared at the same time.

Use the following procedure to clear a message.

- 1, 2, 3...*
1. Select the *Messages* tab in the PLC Error component.
 2. Highlight the message to be cleared and select the **Clear** pushbutton. Alternatively, select the **Clear All** pushbutton or remove a selection by keeping the [SHIFT] key depressed when highlighting messages.

Error Log Settings

The Error Log Options dialog allows the Error Log to be activated, time monitoring to be set and automatic update of the Error Log to be performed. When the component is initially opened, it activates settings saved previously.

Time Monitoring

Some PLC types support a clock which can also be monitored. Use the following procedure to invoke time monitoring against the PLC Clock.

- 1, 2, 3...*
1. Select the *Settings* option from the *Options* menu.
 2. Select the *Clock* tab.
 3. Check the *Monitor the PLC Clock* setting. The current clock time from the PLC is then displayed in the status bar so the user can verify the current time against the error log entries.
 4. Select the **Apply** pushbutton to activate the settings. Select the **OK** pushbutton to apply the settings and close the dialog. Select the **Cancel** pushbutton to abort the operation.

Note: Where PLCs do not support a clock, 'No Clock' is displayed in the Status Bar and the information on the *Clock* tab is greyed-out.

Manually Updating the Error Log

Manual refresh of the Error Log is useful if it is desired to prevent other users from clearing the displayed error history. Use the following procedure to enable manual refresh of the error log.

- 1, 2, 3...*
1. Select the *Settings* option from the *Options* menu.
 2. Select the *Error Log* tab.
 3. Check the *Update Error Log Entries Automatically* setting. If not checked, a **Refresh** pushbutton is displayed next to the **Clear** pushbutton to manually refresh the Error Log content (in the PLC Error component).
 4. Select the **Apply** pushbutton to activate the settings. Select the **OK** pushbutton to apply the settings and close the dialog. Select the **Cancel** pushbutton to abort the operation.

Use the following procedure to refresh the Error Log automatically.

- 1, 2, 3...*
1. Select the *Settings* option from the *Options* menu.
 2. Select the *Error Log* tab.
 3. Deselect the *Update Error Log Entries Automatically* setting.
 4. Select the **Apply** pushbutton to activate the settings. Select the **OK** pushbutton to apply the settings and close the dialog. Select the **Cancel** pushbutton to abort the operation.

Customising the Layout of the Error Log

Some PLCs do not support time stamps, date stamps or clocks. The layout of the Error Log can be changed to remove the time and date columns as necessary and make the display more relevant to the PLC. Use the following procedure to customise the layout of the PLC Error component.

- 1, 2, 3...*
1. Select the *Settings* option from the *Options* menu.
 2. Select the *Error Log* tab.
 3. Error Log time and date information can be hidden from view by checking the *Hide Error Log Time Column* and the *Hide Error Log Date Column* settings.
 4. Select the **Apply** pushbutton to activate the settings. Select the **OK** pushbutton to apply the settings and close the dialog. Select the **Cancel** pushbutton to abort the operation.

Enabling and Disabling the Error Log

For C-series PLCs only, the error log can be enabled and disabled as required. Use the following procedure to enable or disable the error log.

- 1, 2, 3...*
1. Select the *Settings* option from the *Options* menu.
 2. Select the *Error Log* tab.
 3. Check the *Error Log Enabled* setting to manually monitor errors.
 4. Deselect the *Error Log Enabled* setting to stop monitoring errors.
 5. Select the **Apply** pushbutton to activate the settings. Select the **OK** pushbutton to apply the settings and close the dialog. Select the **Cancel** pushbutton to abort the operation.

Overwriting Error Log Entries

For C-series PLCs only, the overwrite mode depends upon the CPU type. It may either overwrite the last entry in the Error Log each time or cycle through the Error Log and start to overwrite it from the beginning. Overwriting is only performed when the maximum number of records in the Error Log has been reached. Again this is PLC dependent.

- 1, 2, 3... 1. Select the *Settings* option from the *Options* menu
2. Select the *Error Log* tab.
3. Check the *Error Log Overwrite Mode* setting to allow the PLC to overwrite Error Log entries.
4. Select the **Apply** pushbutton to activate the settings. Select the **OK** pushbutton to apply the settings and close the dialog. Select the **Cancel** pushbutton to abort the operation.

Displaying the Error Log

The PLC Error component can be set so that it is only activated when an error in the PLC actually occurs (providing it is already open); for example, if the PLC Error component has been minimised it automatically returns to full size as the top window when an error is generated in the PLC.

- 1, 2, 3... 1. Select the *Settings* option from the *Options* menu.
2. Select the *General* tab.
3. Check the *Activate only when Error detected* setting.

CHAPTER 7

Memory Card Component

This chapter describes the Memory Card component available to CV-series PLCs and CS/CJ-series PLCs and its ability to store and transfer data. File storage is achieved by a File memory card for a CV-series PLC and a Compact Flash or EM memory configured as ‘file memory’ for a CS1-series PLC.

Information can be transferred from the PLC to the memory card or from the memory card to the PLC. A saved program can be transferred from the memory card to the program area during operation. Extended PLC setup and program files can be automatically transferred at PLC startup if they are named *autoexec.std* and *autoexec.obj* respectively.

It is possible to run the Memory Card component whilst the PLC is offline.

The Memory Card component can be forced to be displayed in focus by selecting the *Always on top* option from the *Options* menu.

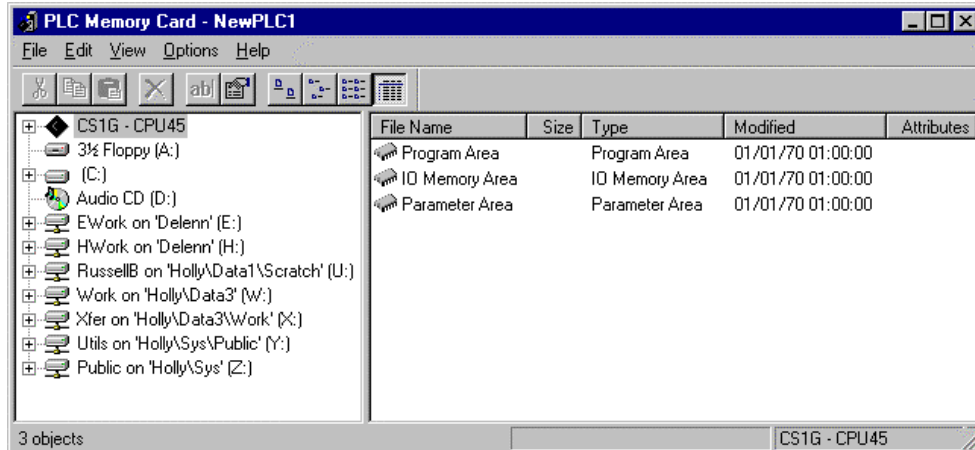
For moving, resizing, maximising, minimising and closing windows, refer to Microsoft Windows online help for further information.

Access to the Memory Card component is from the invoking application.

Memory Card Operation

The appearance and behavior of the Memory Card component is similar to Microsoft Windows Explorer. Differences between the Microsoft Windows Explorer exist within the Memory Card component when certain functions are accessed. Refer to Microsoft Windows Explorer help, part of the standard Microsoft Windows documentation for options and functions not described in this chapter but available within the Memory Card component.

Caution: Memory cards must be formatted prior to use.



The status bar provides instant help, the PLC and CPU type, and quick reference information describing how much space is available on a particular device for the selection in the left pane.

In addition to the devices and folders supported by the PC, the Memory Card component also displays the connected PLC device. In terms of the device/folder structure of Microsoft Windows Explorer, the PLC contains a Memory Card folder if available (i.e. if fitted), Program Area, IO Memory Area and Parameter Area. For a CS/CJ-series PLC, a Memory Card folder can contain subfolders.

Note: In order to view or execute on the PLC a file from the memory card, the file must be copied back to the PC folder. Double clicking on the files in the list has no action associated with it since files cannot be opened across the communications connected to the PLC.

A memory card can be displayed for each connected PLC and allows their contents to be moved between destinations. The operation is aborted if there is not enough space. Snapshots of PLC Memory areas can be taken by transferring information from the Program Area, IO Memory Area or Parameter area to the Memory Card folder.

For CV-series PLCs memory cards can be either RAM, EPROM, or EEPROM. EPROM and EEPROM cards can only be written to using the Memory Card Writer.

For CS1-series PLCs memory cards can be either Compact Flash disk or configured EM memory.

There are three ways in which memory cards can be accessed:

- ◆ They can be read from/written to during an online operation using programming software;
- ◆ By instruction via a program in the PLC;
- ◆ Using the Memory Card component;

Refer to the associated PLC manual for further information.

The Memory Card component automatically detects whether the memory card is in place or not. An error message is displayed if it is detected that the memory card has been removed whilst the Memory Card component is active.

Files held on the memory card can be compared with data in the PLC. File formats can be one of four types:

- ◆ .LDP indicates partial program area files;
- ◆ .OBJ indicates full program area files;
- ◆ .STD indicates PLC setup area files;
- ◆ .IOM indicates any other type of file.


The CS/CJ-series PLC also supports the configuration of EM memory as file memory. Providing the *EM Table Setting Enabled* option from the *Settings* menu is set within the PLC Setup component whilst in Program mode. Refer to *Chapter 4 - PLC Setup Component* for further details.


A fitted memory card on CV-series PLCs or Compact Flash card on CS/CJ-series PLCs must be formatted to be used as a file storage device. Setting a CS1-series PLC as file memory in the PLC Setup component automatically formats EM file memory for use in the Memory Card component.

Memory Card Display

The Memory Card component can be manipulated in the same manner as most Microsoft Windows displays to control what is displayed; for example, expansion of the file storage hierarchy.

The left pane displays the content, in terms of Devices, Networks and Points.

 To expand the hierarchy in the left pane, select this icon.

 To collapse the hierarchy in the left pane, select this icon.

To view the content of a particular branch in the hierarchy, double-click on the item in the left pane.



Select the **Large** Icons button from the toolbar to display the content of the right pane as large icons.



Select the **Small** Icons button from the toolbar to display the content of the right pane as small icons.



Select the **List** button from the toolbar to display the content of the right pane as a list.



Select the **Details** button from the toolbar to display the content of the right pane with associated details.

Use the following procedure to copy or move information from or in the PLC Memory component.

- 1, 2, 3...**
1. Select an item, or items, in a window. More than one item can be selected by pressing Shift and selecting another item to extend the selection, or by pressing Ctrl and selecting another item to add to the selection.



2. Select the **Copy** button from the toolbar to copy the item, or the **Cut** button from the toolbar to move the item.

3. Select an area to move the items to, for instance copying data area values into another data area.



4. Select the **Paste** button from the toolbar to paste the item. A Paste operation can be performed several times without copying again.

A file or label (if at top level) can be renamed. Use the following procedure to rename memory card data.

1, 2, 3...



1. Highlight the required document or folder.
2. Select the **Rename** button from the toolbar. The document/folder name can now accept input. Enter the new name and press Return.

A file or folder can be deleted. Use the following procedure to delete a file or folder.

1, 2, 3...



1. Highlight the required document or folder.
2. Select the **Delete** button from the toolbar. A Confirm Folder Delete dialog is displayed.
3. Select the **Yes** pushbutton to continue with the deletion or the **No** pushbutton to abort the operation.

The Toolbar and status bar can both be turned on or off. Select *Status Bar* from the *View* menu to control the display of the status bar. Select *Toolbar* from the *View* menu to control the display of the PLC Memory toolbar.

If the display of a PLC device takes a few moments to refresh, ensure the *Auto Refresh PLC View* option from the *Options* menu is turned off. This then allows the PLC to be refreshed manually by selecting *Refresh* from the *View* menu.

Extended PLC setup and program files can be transferred to the Memory Card as autoexec files so they can be automatically transferred at PLC startup. Select the *Transfer as AutoExec Files* from the *Options* menu.

Memory Card Properties

Use the following procedure to view memory card properties.

1, 2, 3...



1. Highlight the required document or folder. Multiple devices, folders and files can be selected if required.
2. Select the **Properties** button from the toolbar.
3. View the details. Some options may be amended, for instance the read-only attribute for a file; in this instance, amend settings as appropriate. Select the **OK** pushbutton to complete the operation or the **Cancel** pushbutton to abort the operation.

Transferring Data between the PLC and Memory Card

Use the following procedure to transfer data between the PLC and memory card.

1, 2, 3...

1. Select the Files on the PLC to be copied and click the right-mouse button.
2. Select *Transfer To* option followed by either *Memory Card* or *EM File Area*.

Possible Memory Card Errors

The following list provides a brief overview of the possible errors that could arise with the memory card when operating in Program Mode. Refer to the associated PLC manual for further information.

- ◆ The PLC Program is protected and cannot be written to;
- ◆ The file card does not contain enough free space to transfer the PLC data required;
- ◆ The source file name specified to transfer data from does not exist;
- ◆ The file on device already exists;
- ◆ The file device is read only and cannot be written to;
- ◆ The file device does not exist, insert the memory card;
- ◆ Cannot transfer data from the file device to the PLC's area when the PLC is in Run mode;
- ◆ To transfer data from the file device to the PLC's IO area, the PLC must be in Program mode;
- ◆ The data cannot be transferred to the PLC as the PLC is password protected or access rights have not been granted.

Note: With the CX-One Ver 1.1 (CX-Programmer Ver. 6.1) and later versions, the following functions can be executed if the PLC model is set to *CP1H*.

1, 2, 3... 1. Memory Cassette Transfer function

Data can be transferred and verified between the Memory Cassette and CP1H CPU Unit.

◆ Applicable Data

The following table lists the kinds of data that can be selected for transfer/verification.

Applicable data
Program, parameters, Data Memory, variable tables, comments, program index, and Data Memory initial values

◆ Procedure

Select **PLC – Edit – Memory Cassette/DM** and click the **Transfer to Memory Cassette**, **Transfer to PLC**, or **Verify All Areas** Button.

2. Data Memory to Flash Memory Backup function

All of the Data Memory in the CP1H CPU Unit's internal RAM can be backed up as DM initial values in the CPU Unit's internal flash memory. The backed up data is known as Backup DM (DM initial values).

◆ Procedure

Select **PLC – Edit – Memory Cassette/DM** and click the **Backup** Button in the *Backup to Flash Memory* Field.

CHAPTER 8

CX-Server Network Configuration Tool (CX-Net)

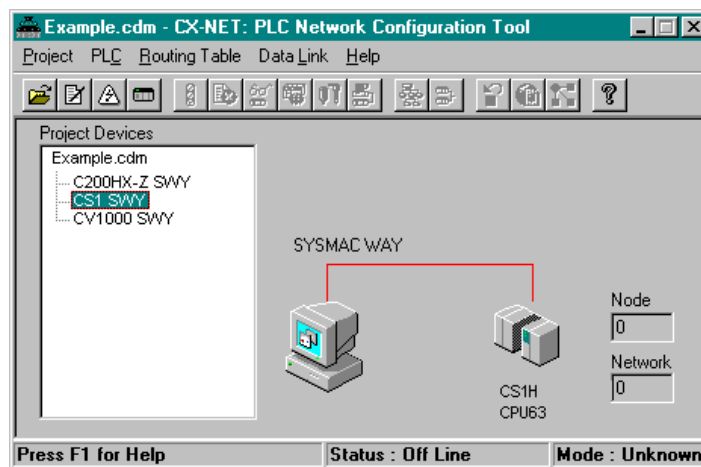
This chapter describes the CX-Server (CX-Net) Network Configuration tool, the procedures for establishing communications to PLCs for direct and gateway connections. The Network Configuration Tool hosts tools that assist in the creation and editing of local and network Routing Tables and the creation and editing of Data Link Tables.

To successfully establish communications between CX-Server and a network PLC, an intermediary or gateway PLC has to contain a valid Routing table to allow the correct routing of packets. The CX-Net Network Configuration tool allows communications to PLCs with a CX-Server project and configuration of the PLC. The CX-Net Network Configuration tool allows the following:

- ◆ Hosts the Routing Table editor to provide routing table support at a network level, enabling PLCs to act as gateways across networks;
- ◆ Hosts the Data Link table editor to provide Data Link table support at a network level;
- ◆ Setup of PLC devices and their communication units;
- ◆ Network diagnostics;
- ◆ Control of Data Link operation.

Note: The availability, format and content of the facilities within the CX-Net Network Configuration tool depend upon the device type of the PLC being considered (C-series, CS1-series or CV-series) and the network to which that PLC is connected (SYSMAC LINK, SYSMAC NET, Ethernet or Controller Link).

Refer to the specific OMRON System and Operation manuals for details of the operation of the various network units and their available settings and options.



The status bar provides instant help, the status of the current connection and the operating mode of the PLC.

When the CX-Net is initially loaded, the *Project Devices* field is empty. Opening or creating a CX-Server project populates the *Project Devices* list with all the devices in that CX-Server project. Selecting each device in turn causes the right-hand side of the dialog to display a graphical representation of that connection (either direct or through a gateway connection), together with node and network information.

Note: Offline connections are shown as a red line whilst for online connections this changes to green. Other aspects also change when online, refer to *Chapter 8 - Opening a PLC* for further information.

Any operations (e.g. network unit setup, Data Link and routing table editing) which are carried out affect the physical connection PLC which is currently connected, *not* the CX-Server project PLC.

Routing Tables contain the information necessary to allow communications between different networks including local and remote network address details; they are held in a specific area of PLC memory. Refer to *Chapter 11* - for information regarding Routing Tables.

CS/CJ/CP-series PLCs linked to either a Controller Link or Ethernet network also use FINS routing tables.

CV-series PLCs also have routing tables which, unlike the C-series, are not dependent upon the networks (SYSMAC LINK, SYSMAC NET or Ethernet or Controller Link) to which they are connected. These tables are known as FINS routing tables. A direct connection is known as a Local Routing Table. A network connection is known as a Network Routing Table.

C-series PLCs linked to a SYSMAC LINK network are unable to communicate with a different network and therefore do not have a routing table; however, C-series PLCs linked to a SYSMAC NET or Controller Link network do have this capability and so have an associated routing table. These tables are known as SYSMAC NET and FINS routing tables respectively.

Data Link Tables provide a means of allowing a network of devices to share information. The manner in which this information is distributed in a system depends upon the network to which the table relates. The SYSMAC NET network contains one node acting as the 'parent' node or Data Link server (containing the Data Link table), unlike the SYSMAC LINK network where a copy of the Data Link table is sent to all nodes on that network. The Controller Link network operates in a similar manner to SYSMAC LINK except that the network is split into two areas with each node being associated with one or other of these areas. Data is then copied to each node in the related area. Refer to *Chapter 10 - Data Links* for further information regarding Data Link Tables.

For moving, resizing, maximising, minimising and closing windows, refer to Microsoft Windows online help for further information.

Access to the CX-Net Network Configuration tool is either from the invoking application or from the **Start** pushbutton on the Microsoft Windows taskbar.

 To close the CX-Net Network Configuration tool, select the Close button in the title bar.

CX-Net and CX-Server Projects

All device information is contained within a CX-Server project file. Once the file has been opened, the PLCs listed in that CX-Server project can be opened and the devices on their networks manipulated. CX-Server projects can be manipulated from the CX-Net Network Configuration tool.

Creating a New CX-Server Project


A new CX-Server project can be created from the CX-Net Network Configuration tool. Use the following procedure to create a new CX-Server project.

- 1, 2, 3... 1. Select *New* from the *Project* Menu. The Create Project dialog is displayed.
2. The CX-Server project must be saved before it can be edited. Enter a file name in the *File name* field. An existing CX-Server project can be overwritten by selecting a .CDM file displayed in the Create project dialog.
3. Select the **Save** pushbutton to save the new project or the **Cancel** pushbutton to abort the operation. CX-Server files have a .CDM extension.

Opening an Existing CX-Server Project

CX-Server project files can be retrieved using a standard File Open dialog. To close a currently open file, create a new CX-Server project or select **Close** from the Project menu.

Use the following procedure to open a CX-Server project file.

- 1, 2, 3... 1. Select the **Open** button from the toolbar to open a CX-Server project file.
-  2. A standard File Open dialog is displayed. Select a file from the Open dialog, followed by the **Open** pushbutton. PLC Memory files have a .CDM extension.

A list of the most recently opened CX-Server project files is displayed in the *Project* menu.

Note: Select Save As from the Project menu to save a project open in CX-Net under any desired name.

Adding a Device

To add a device to a CX-Server project, select the *Add Device* option from the *Project* menu. The Add PLC dialog is displayed. The Add PLC dialog is identical to the Change PLC dialog.

To change a device within a CX-Server project, select the *Change Device* option from the *Project* menu. The Change PLC dialog is displayed.

Editing a Device List

The Device List dialog, (see Runtime User manual) can be used to change the settings of the PLCs in the currently opened CX-Server project, and to add new PLCs.

The CX-Server project Device List can only be edited when a device is not currently open – the option is disabled when a connection is active.





Select the **Edit Project** button from the toolbar to edit a CX-Server project, or select the Edit option from the Project menu.

PLC Settings

The *PLC* menu contains options that operate on a single PLC device within the open CX-Server project, including the setup of its units. It also contains the options for opening and closing a PLC device.

Opening a PLC

A PLC can be opened for communications once the associated CX-Server project file has been opened. Use the following procedure to open a PLC.

- 1, 2, 3...  1. Select a device from the *PLC Devices* list. If required, add a device to the CX-Server project by selecting *Add Device* from the *Project* menu and edit the CX-Server project by selecting the **Edit Project** button from the toolbar.
-  2. Select the **Open / Project Device** button from the toolbar.

Note: The *Open* option does *not* become available until a device name has been selected from the Project Devices list.

It may take several seconds to establish a connection. If a connection cannot be made with the PLC's settings, then a message appears showing this. In this case it may be necessary to change the PLC's settings before trying again, or checking that the physical connection (e.g. wiring) is possible.

For SYSMAC LINK end connections a new *SYSMAC LINK* menu is added allowing specific SYSMAC LINK network operation.

For Controller Link end connections a new *Controller Link* menu is added allowing specific Controller Link network operation.

When a physical connection has been made the status of the PLC in the status bar changes to *Online* with the current mode of the PLC. The connection lines change colour to green to also denote the PLC is online. In addition, the *actual* values for *Node* and *Network* are displayed, together with details of the device actually connected (rather than what is defined in the CX-Server project for that setting). When a connection is made to an Ethernet network the Node box changes to a drop-down list, allowing the node to be changed in order to connect to a new PLC. If a node is selected but there is nothing there, then no information is shown. Returning to offline operation causes a return to the original (CX-Server project) configuration settings in the *Node* and *Network* fields.

Upon connection, certain menu options are made available, depending upon the connection type.

The current operating mode (Run) of the connected PLC is shown in the status bar of the tool – when making a connection, or when a connection is broken, the mode indicator shows *Unknown*. The indicator shows *Run*, *Stop* or *Monitor* when a connection is properly completed. CV-series PLCs also support a *Debug* mode. This mode indicator changes whenever a change is made in the operating mode of the PLC.

Note: The mode in which the PLC runs on startup is set in the PLC Setup Component, refer to *Chapter 4 - PLC Setup Component*.

Closing a PLC



The **Open / Project Device** button on the toolbar acts as a toggle switch. To close a device, simply reselect the **Open / Project Device** button on the toolbar (i.e. when the menu option shows a tick against it and the toolbar button is depressed).

When the device is closed, the details displayed in the *Connection* part of the CX-Net Network Configuration tool are removed.

Configuring a PLC's System Settings

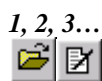


The PLC Setup Component can be selected to define the settings which govern the PLC's behavior; for example, connection mode. Select the **Configure PLC System Settings** button from the toolbar. Refer to *Chapter 4 - PLC Setup Component* for further information. Alternatively, select PLC Setup from the PLC menu.

Scanning for PLC Connections

A serial scan can be performed which searches all PC COM ports to see if there are any currently attached PLCs and, if found, what communication settings are being employed by those PLCs. This procedure is useful when the configuration of the PLCs communication settings (i.e. baud rate) are unknown. Device information from the results of the scan can then be copied into the CX-Server project, if required. Refer to *Chapter 8 - Dragging Device Information into a CX-Server Project*.

When the Scan Serial Ports for PLCs dialog is first displayed, it shows the results of the last scan to be performed until the **Refresh** pushbutton has been clicked. Use the following procedure to scan for PLC connections.



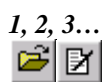
1. Open a CX-Server project by selecting the **Open** button from the toolbar or create a new project. If required, add a device to the CX-Server project by selecting *Add Device* from the *Project* menu and edit the CX-Server project by selecting the **Edit Project** button from the toolbar.
2. Select *Scan Serial Ports for PLCs* from the *Project* menu. The Scan Serial Ports for PLCs dialog is displayed.
3. Select either individual ports or select the **Select All** pushbutton to scan all ports from the *Available Ports* field.
4. Select either individual baud rates or select the **Select All** pushbutton to scan all baud rates from the *Baud Rates* field.
5. Select either individual cable types or select the **Select All** pushbutton to scan all cable types from the *Cable types* field.
6. Select the **Next** pushbutton; the Scan Serial Ports For PLCs dialog starts the scan. The *Status* field indicates the current progress. On completion, all currently connected PLCs are listed in the *Drag and Drop Device Units* field.

Note: If changes are made to PLC connections after a scan has been made, select the Refresh pushbutton to update the displayed list.

Dragging Device Information into a CX-Server Project

The scan operation described in Chapter 8 - Scanning for PLC Connections, picks up device information from the physically connected serial port devices. Once a scan has been performed, the Scan Serial Ports for PLCs dialog can remain open alongside the CX-Net Network Configuration tool. Dragging a device or network unit from the *Drag & Drop Device Units* field into the *Project Device* field in the CX-Net Network Configuration tool allows this device information to be added into the CX-Server project.

Use the following procedure to utilise a convenient shortcut for entering PLC details into a CX-Server project.



1. Open a CX-Server project by selecting the **Open** button from the toolbar or create a new project. If required, add a device to the CX-Server project by selecting *Add Device* from the *Project* menu and edit the CX-Server project by selecting the **Edit Project** button from the toolbar.
2. Perform a scan by selecting *Scan Serial Ports for PLCs* from the *Project* menu.
3. Select the required device in the *Drag and Drop Device Units* field.
4. Drag the device across to the *Project Devices* field in the CX-Net Network Configuration tool.

Displaying PLC Device Information



The PLC Device Information dialog displays the selected CX-Server project PLC's device and connection details. To display PLC device information, select the **Display PLC Information**

button from the toolbar, or select the Information command from the PLC menu.

Setting the PLC Mode

The main window of the CX-Net Network Configuration tool shows the current operating mode of the connected PLC. The PLC Set Mode dialog allows this to be changed. The run modes available to a PLC depend upon the PLC device type. Use the following procedure to set the PLC Mode.

- 1, 2, 3...**
1. Open a CX-Server project by selecting the **Open** button from the toolbar or create a new project. If required, add a device to the CX-Server project by selecting *Add Device* from the *Project* menu and edit the CX-Server project by selecting the **Edit Project** button from the toolbar.
 2. Select the **Open / Project Device** button from the toolbar to open connections to the device.
 3. Select the **Set PLC Operating Mode** button from the toolbar or select the Set Mode command from the PLC menu.
 4. Click on the required *Operating Mode* setting. Select the **Set** pushbutton. A confirmation dialog appears – confirm the operation.
 5. Select the **Close** pushbutton to remove the dialog.

Clearing PLC Errors



Errors, error logs and messages generated by a PLC can be examined and cleared (if possible) via the PLC Error Component. Select the **Display PLC Error Status** button on the toolbar or, select the PLC Error Status command from the PLC menu. Refer to *Chapter 6 - PLC Error Component* for more information.

Creating an IO Table



The PLCs IO Table can also be manipulated by the CX-Net Network Configuration tool by activating the IO Table component. The IO Table allows Unit Setup and Software Switch setup of SIOU units as well as IO configuration and creation. Before editing the PLCs IO Table it must be transferred from the PLC into the IO Table component. Select the **Configure IO Table** button from the toolbar or select the I/O table Setup command from the PLC menu. Refer to *Chapter 3 - IO Table Component* for further details. Use the following procedure to activate the IO Table component.

Displaying the PLC Unit Status

The *Unit Status* option is only available for those nodes where the end connection to the PLC is either SYSMAC LINK, SYSMAC NET, Ethernet or Controller Link; in each instance the type of information displayed differs but the pushbuttons available are identical.

- ◆ SYSMAC LINK. Displays Communications Test, Line Status, Data Link Status, Controller Errors, Backup Status Errors, Error Status, Error Log, Status, Error Details;
- ◆ SYSMAC NET. Displays Data Link Status, Operating Status, Errors;
- ◆ Ethernet. Displays General Status, Error Flags and Error Logs;
- ◆ Controller Link. Displays Data Link Status, nodes, Errors and Error Logs.

The information displayed is for viewing only. However, the Error Log can be cleared. Use the following procedure to display the PLC Unit Status.

- 1, 2, 3...**
1. Open a CX-Server project by selecting the **Open** button from the toolbar or create a new project. If required, add a device to the CX-Server project by selecting *Add Device* from the *Project* menu and edit the CX-Server project by selecting the **Edit Project** button from the toolbar.
 2. Select the **Open/Close Project Device PLC** button from the toolbar to open connections to the device.
 3. Select the **Show Unit Status** button from the toolbar or select Unit Status from the PLC menu.
 4. Select the **Clear Log** pushbutton to delete the entries in the error log.

5. Select the **Close** pushbutton to remove the dialog.

Note: Unit status and error log data for Communications Units (e.g., Controller Link Units and SYSMAC LINK Units) can be written to files in CSV format. Click the Save button in the PLC Unit Status dialog box and the Save As dialog box will appear. Select the CSV format and the folder in which to save, input the file name, and click the Save button. The status of the Communications Unit and the error log data will be saved in a CSV file. This function allows network errors to be analysed from CSV files.

Note: With a C-series PLCs, the error log for a Communications Unit (e.g., Controller Link Unit or SYSMAC LINK Unit) can be saved using PLC | Unit Status/Error Log.

Testing the Network Connection

Once network connections have been created, the network should be tested to ensure that all nodes are responding properly. The following tests are available:

- ◆ *Internode Echo-Back Test.* This test checks the condition of a number of specific network and node address and whether communications can be established;
- ◆ *Broadcast Nodes Test.* This test examines all nodes on the network and is available for Ethernet, Controller Link and SYSMAC LINK only. This test may take some time for an Ethernet network which is not subject to the same size restrictions as Controller Link and SYSMAC LINK. The results show all nodes found and the PLC type if possible;
- ◆ *Ping Node Test.* Allows echo testing of a specific TCP IP address.



Select the required test from the associated button in the toolbar, either the **Echo Back Test** button, the **Broadcast Test** button or the **Ping Test** button.

Communications Unit Setup



The **Configure Communications Unit** button from the toolbar is used for SYSMAC LINK, SYSMAC NET and Controller Link setup options on SIOU units for C-series PLCs. These options only describe settings that cannot be accessed via the IO Table component.

For CS1-series PLCs and CV-series PLCs, the setup allows SYSMAC NET, SYSMAC LINK and Controller Link setup. This information is defined via the IO Table component; refer to *Chapter 3 - IO Table Component* for further information.

Select a unit type from the *Unit Type* field. If provided, select the **Setup** pushbutton to further configure communications setup. Select the **Close** pushbutton to close the dialog.

SYSMAC LINK Settings

The *SYSMAC LINK* menu only appears when the end connection is the SYSMAC LINK network. It allows settings specific to a SYSMAC LINK network to be made.

Network Status

The SYSMAC LINK Network Status dialog shows the nodes present on the network. It also indicates the controlling server node. Use the following procedure to setup SYSMAC LINK Network Status settings.

- 1, 2, 3... 1. Select the *Network Status* option from the *SYSMAC LINK* menu.
2. Select the **Close** pushbutton to remove the dialog.

Network Settings

The Network Settings dialog allows parameter settings for a SYSMAC LINK network to be defined; this includes the maximum number of nodes on a network, the maximum number of polling units per communications cycle, and the maximum number of frames per communications cycle.

On entry, this dialog displays the last parameters entered for a selected network. Use the following procedure to setup SYSMAC LINK Network Settings.

- 1, 2, 3... 1. Select the *Network Setup* option from the *SYSMAC LINK* menu.

2. Adjust the settings as required (or select the **New** pushbutton to return to the default values for the network).
3. Select the **Write** pushbutton to download the network parameters to the SYSMAC LINK network controller. Note that this is only possible when the connected node is the polling (server) node – otherwise the **Write** pushbutton is disabled. The status display indicates whether the write operation was successful.
4. Select the **Close** pushbutton to remove the dialog.

Controller Link Settings

The *Controller Link* menu only appears when the end connection is the Controller Link network. It allows settings specific to a Controller Link network to be made.

Network Status

The Controller Link Network Status dialog shows the nodes present on the network. It also indicates the controlling server node. Use the following procedure to setup Controller Link Network Status settings.

- 1, 2, 3...*
1. Select the *Network Status* option from the *Controller Link* menu.
 2. Select the **Close** pushbutton to remove the dialog.

Network Settings

The Network Setup dialog allows parameter settings for a Controller Link network to be defined; this includes the maximum number of nodes on a network, the maximum number of polling units per communications cycle, and the maximum number of frames per communications cycle.

On entry, this dialog displays the last parameters entered for a selected network. Use the following procedure to setup Controller Link Network Setup settings.

- 1, 2, 3...*
1. Select the *Network Setup* option from the *Controller Link* menu.
 2. Adjust the settings as required (or select the **New** pushbutton to return to the default values for the network).
 3. Select the **Write** pushbutton to download the network parameters to the SYSMAC LINK network controller. Note that this is only possible when the connected node is the polling (server) node – otherwise the **Write** pushbutton is disabled. The status display indicates whether the write operation was successful.
 4. Select the **Close** pushbutton to remove the dialog.

Routing Tables

Routing tables allow networked PLCs to be configured so that they can communicate with each other via gateways; across remote networks. These tables contain the network and unit number information required. It is only necessary to set up routing tables if the end connection PLC is not a direct connection, i.e. using another PLC as a gateway connection. The routing table is held within the PLC(s) which acts as the gateway device. Different types of PLC and networks have different capabilities for routing.

For details about using routing tables refer to *Chapter 11 – Routing Tables*.

Data Link

Data Link tables allow a PLC to be configured so that it can participate in one or more automatic data sharing schemes, over SYSMAC LINK, SYSMAC NET and Controller Link networks, without the need for special programming. Words of IO and DM can be set aside for use as data link words, which are allocated to various nodes in the network. Limits on the amount of data and number of nodes varies with the type of network and the type of PLC. The allocation of words to nodes is defined by two or more Data Link tables.

Data can only be shared on a single physical network. A gateway cannot be used to pass information from one network to another.

SYSMAC NET data links can be configured so that both C-Series and CV-Series PLCs can share data. However, it is a limitation that in these mixed configurations, the master must be a C-Series PLC. There are no such restrictions on a SYSMAC LINK or Controller Link network.

The Data Link menu includes options to setup the SYSMAC NET, SYSMAC LINK and Controller Link Data Links.

The DataLinks Editor is used to configure SYSMAC LINK and Controller Link data links, Refer to *Chapter 10 – Data Links*.

A separate datalink editor is utilised for configuration of SYSMAC NET datalinks, Refer to *Chapter 8 - Offline SYSMAC NET Data Link Editor* for further details.

Data Link Setup


The Data Link Setup dialog varies in title and content according to the type of network connected to the current PLC; however, the pushbutton functions on each dialog are the same.

The dialog lists the contents of the Data Link table associated with the PLC; initially the Data Link table displayed is empty, or set to zero, until a table has been opened or read.

SYSMAC NET Data Link Setup

The setup dialog first needs to know whether the Data Link table is written for CV-Series or C-Series PLC type SYSMAC NET this information is requested using the SYSMAC NET Table Type dialog.

Use the following procedure to setup the SYSMAC NET Data Link.

- 1, 2, 3... 1. Select the **Online Edit Data Link** button from the toolbar.
-  2. Select a setting to indicate the type of SYSMAC NET which is used in the Data Link.
3. Select the **OK** pushbutton to continue (the Data Link Setup dialog is displayed), or the **Cancel** pushbutton to abort the operation.

Opening a Table

Use the following procedure to open a table.

- 1, 2, 3... 1. Select the **Open** pushbutton to open a Data Link table from disk (alternatively select the **Read** pushbutton to view the table in the PLC).
2. Select the appropriate table and select the **OK** pushbutton.
3. The Data Link Setup dialog is now populated with the contents of the Data Link file.
4. Select the **Write** pushbutton to transfer the table to the PLC.
5. Select the **Verify** pushbutton to compare the contents in the dialog with those in the PLC.

Note: Data Link tables have a '.SL3' (SYSMAC LINK), '.SN3' (SYSMAC NET) or '.CL3' (Controller Link) filename extension.

Editing a Table

To edit the displayed Data Link table, click on the **Edit** pushbutton; the associated offline table editor is used, refer to *Chapter 10 – for SYSMAC LINK / Controller Link Data Link Editor and Chapter 8 - Offline SYSMAC NET Data Link Editor* for further details.

Updating Table Status

After an editing session using the offline editor (i.e. after pressing the **Edit** pushbutton), the dialog can be updated using the **Update** pushbutton.

Saving a Table

The Save As dialog allows the displayed table to be saved to disk with a given name. Use the following procedure to save a table.

- 1, 2, 3... 1. Click on the Save As pushbutton in the Data Link Setup dialog. The Save As dialog is displayed.
2. Enter the new file name for the data link table (ensure that the file type is correct) in the File name field.

3. Either select the **Save** pushbutton to save the new file and return to the previous dialog or select the **Cancel** to abort the operation.

Deleting a Table in a PLC

The current Data Link table held in the PLC can be deleted by selecting the **Delete** pushbutton.

Viewing Table Information

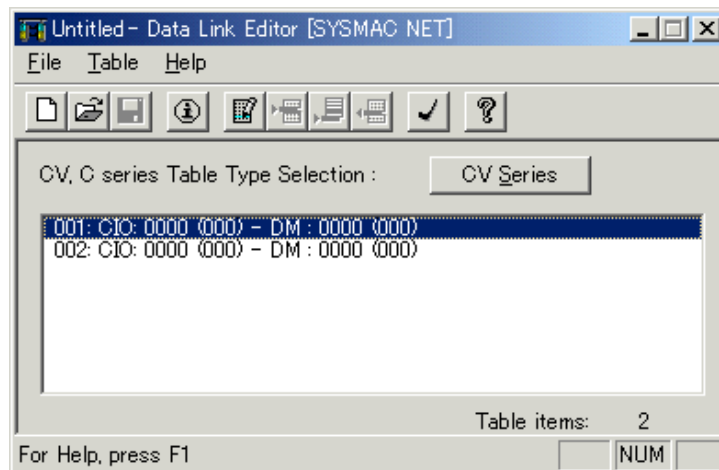
The Table Information dialog displays basic information relating to the selected Data Link table indicating the author, associated network and file name. The information displayed on this screen cannot be edited whilst online. Use the following procedure to view table information.

- 1, 2, 3... 1. Select the **Info** pushbutton on the Data Link Setup dialog.
2. Select the **Close** pushbutton to remove the dialog from the screen. The Data Link Table dialog is redisplayed.

Select the **New** pushbutton in the dialog to clear the dialog information.

Offline SYSMAC NET Data Link Editor

The SYSMAC NET Data Link Table Editor is available to both CV-series and C-series PLCs linked to a SYSMAC NET unit.



The status bar provides instant help.



Access to the SYSMAC NET Data Link Editor dialog is achieved in a number of ways:

- ◆ From the CX-Net Network Configuration tool. Select Editor from the Data Link menu. The Select New File type dialog is displayed. Select the SYSMAC NET file type from the File Type field and select the OK pushbutton.
- ◆ From the Data Link Setup dialog. Select the Edit pushbutton.
- ◆ From the Start pushbutton in the Microsoft Windows taskbar. The Select New File type dialog is displayed. Select the SYSMAC NET file type from the *File Type* field and select the **OK** pushbutton.

Creating and Editing a SYSMAC NET Data Link Table Item

Use the following procedure to creates SYSMAC NET Data Link Table Item.

- 1, 2, 3... 1. Select the **New** button from the toolbar in the SYSMAC NET Data Link Table Editor dialog.
2. Select the *Insert Table Item* option from the *Table* menu. Address information can also be edited by double-clicking on the required node.

The Add SYSMAC NET Data Link Table Item dialog allows the memory area at the node to be configured. Use the following procedure to configure the node.

- 1, 2, 3... 1. Enter the node number in the *Node No* field; this must be in the range 1 to 126. /verify where

2. Enter the memory size; this must be in the range 0 to 127.
3. Select the **OK** pushbutton to redisplay the Data Link Table Editor.

Note: The above example applies to CV-Series, but C-Series operates in exactly the same manner although the information displayed differs slightly.



To edit a Data Link table, double-click on a table item or select the **Edit Table Item** button from the toolbar; the Edit Data Link Table dialog is displayed (this is identical to the Add Data Link Table Item dialog shown above).

Deleting an Item from the SYSMAC NET Data Link Table

Use the following procedure to delete an item from the SYSMAC NET Data Link Table.

- 1, 2, 3... 1. Select the node to delete an item and select the **Delete Item** button from the toolbar.
2. A confirmation dialog is displayed. Select the **Yes** pushbutton to confirm the deletion of the item. Select the **No** pushbutton to abort the operation.



Opening an Existing SYSMAC NET Data Link Table

Use the following procedure to open an existing SYSMAC NET Data Link Table.

- 1, 2, 3... 1. To open a table from disk, select the **Open** button from the toolbar in the Data Link Editor dialog. A standard File Open dialog is displayed.
2. Select a file from the Open dialog and select the **Open** pushbutton. The SYSMAC NET Data Link Table Editor is automatically populated with the contents of the selected file.



Note: SYSMAC NET Data Link table files are identified by the '.SM3' extension.

Logical Error Checking



The SYSMAC NET Data Link Table Check dialog displays any errors resulting from validation of the address details entered in the table; it is identical in appearance to the SYSMAC LINK Data Link Table Check dialog shown earlier and is obtained in the same way.

Old Format Tables

Data Link tables were previously held in '.SNT' and '.SN2' file format. The File Open dialog allows these file types to be opened in the CX-Net Network Configuration tool. Use the following procedure to open '.SNT' and '.SN2' formatted files.

- 1, 2, 3... 1. Select the *Add (old)* option from the *Table* menu in the SYSMAC NET Data Link Table Editor dialog.
2. Select a file from the Open dialog and select the **Open** pushbutton.

Table Information




The Data Link Table Information dialog allows the recording of comments against a particular table and is the same both in operation and appearance, as that for the routing table comments described earlier.

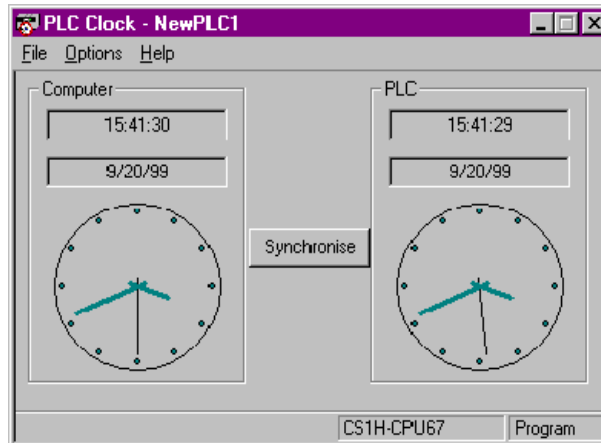
CHAPTER 9

PLC Clock Tool

The PLC Clock tool provides a facility to monitor and set the PLC Clock and synchronise the PLC clock to the PC clock.

The PLC Clock tool dialog can be set so that it remains 'on top' and is not obscured by other windows by clicking the right mouse button in the task bar and selecting the *Always on Top* option.

 To close the PLC Clock dialog, select the **Close** button in the title bar.



The PLC Clock tool displays two clock images that represent the time for the computer (PC) on the left and the PLC on the right. The time and date are also represented in a digital format for both the computer and the PLC.

The times for both the Computer and the PLC are updated once a second.

A *synchronise* button is located centrally between the two clock images. This button once pressed, will synchronise the PLC clock to the computer clock. The same effect can also be evoked from the *Options – Synchronise Clocks* menu.

The *File* menu allows the PLC Clock tool to be closed by use of the *Exit* menu item.

The *Options – Set PLC Clock* allows the time and date within the PLC to be set.

If the PLC Clock window is minimised the PLC clock time will be displayed in digital format in the task bar.

CHAPTER 10

Data Links

What Are Data Links?

Overview

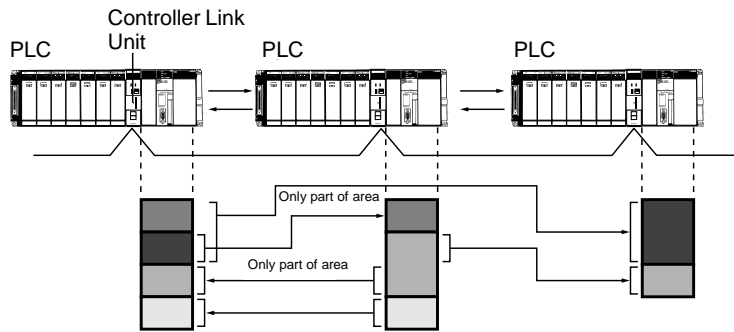
Data links automatically exchange data in preset areas between nodes (PLCs and/or computers) on a network. Settings can be made either manually or automatically.

CX-Net operations can be used for all operations from setting up the PLC network to controlling data exchange.

Manual Settings

Manual settings enable more flexible allocations, including the send size for each node, the sequence of nodes for sending and receiving, and the setting of nodes for sending only or receiving only. Use manual settings to create flexible data links to meet the requirements of the individual system (e.g., efficient utilization of memory, restrictions on allocated addresses, etc.).

Data link tables (i.e., tables that define data link area allocations) are generated by CX-Net or network support software (such as Controller Link Support Software), and sent to all nodes for use.



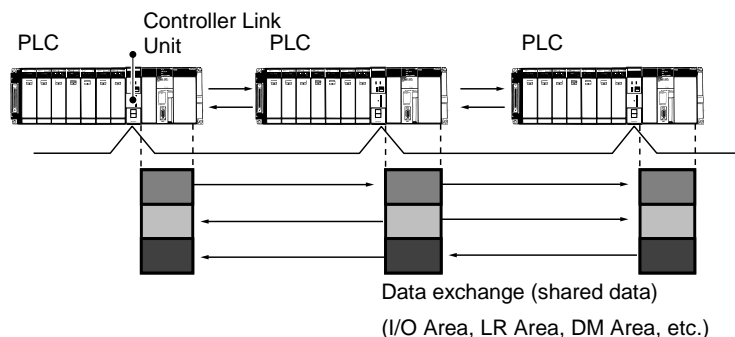
Note: The following table provides a general comparison of manual setup between Controller Link and SYSMAC LINK.

Item	Controller Link	SYSMAC LINK
Node sequence	Free	
Send size	Can be specified.	
Receive-only nodes	Supported	Supported (Reception only is enabled by setting the send area size at the local node to 0.)
Send-only nodes	Supported	
Memory area	Can be specified.	Cannot be specified. Fixed as follows: CS/CJ/CV Series: Area 1: CIO; Area 2: DM C Series: Area 1: LR; Area 2: DM
Receive size	Can be specified.	All or none
Reception offset (reception from start address + specified number of words)	Can be specified.	No (From start address only)
Communications cycle time	Cannot be set.	Can be set.

Automatic Settings

Automatic settings can be used for simple data exchanges involving fixed allocations, when all nodes are set for the same send size and the same data is to be shared among all nodes in order of node address.

Using a Programming Device (such as the CX-Programmer or a Programming Console), set the data exchange method in the DM parameter area of the startup node.



Note: The following table provides a general comparison of automatic setup between Controller Link and SYSMAC Link.

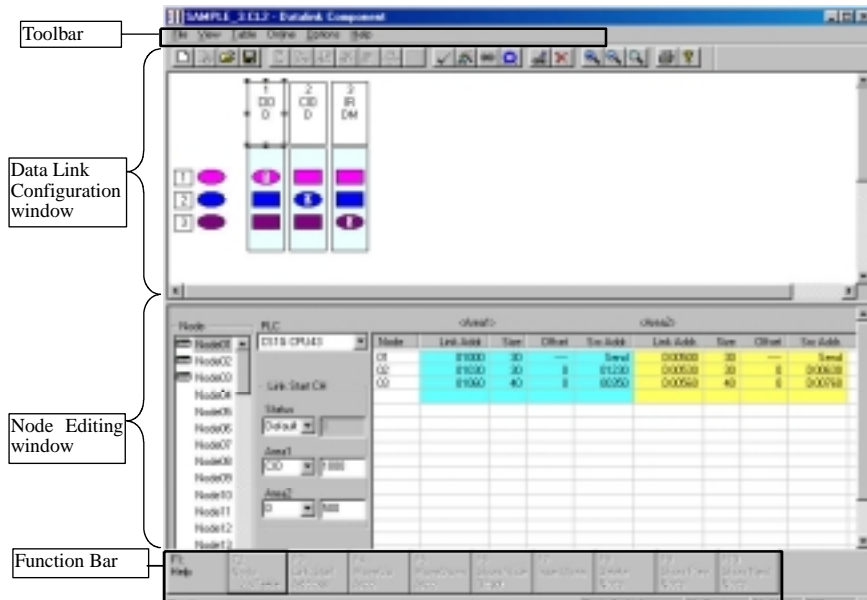
Item	Controller Link	SYSMAC LINK
Node sequence	Fixed at ascending order.	
Receive-only nodes	Not supported.	
Send-only nodes	Not supported.	
Memory area	Can be specified. (Area 1: CIO Area or LR Area; Area 2: DM Area or EM Area)	Cannot be specified. Fixed as follows: CS/CJ/CV Series: Area 1: CIO; Area 2: DM C Series: Area 1: LR; Area 2: DM
Start address	Can be specified.	Cannot be specified.
Send size	Same size for all nodes can be specified.	Same size for all nodes can be selected from specific patterns.

This section describes how to perform Controller Link and SYSMAC LINK operations from creating data link tables to starting up the data links.

User Interface Overview

Datalink Component

The following illustration shows the window used when constructing Controller Link or SYSMAC LINK data links manually.

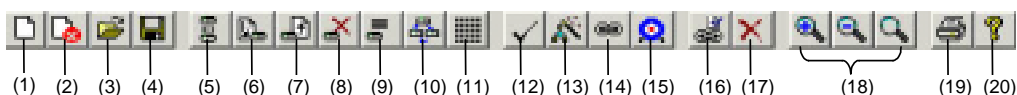


Data Link Component Menu

Menu	Sub-menus/Commands	Function	
File	New	Creates new data link tables.	
	Open		Opens data link tables, Files with any of the file name extensions shown below can be opened. When a file is opened, the proper editor starts up.
		Controller Link	<ul style="list-style-type: none"> ◆ cl2 – CX-Net Controller Link/CLKSS data link tables ◆ cl3 – CX-Net Controller Link data link tables ◆ clk – CLKSS data link tables ◆ csv – CX-Net Controller Link data link tables (tab-delineated text file)
		SYSMAC LINK	<ul style="list-style-type: none"> ◆ .sl3 – SYSMAC LINK data link tables ◆ .slk – SYSMAC LINK data link tables for SYSMAC Support Software ◆ .csv – SYSMAC LINK data link tables (tab-delineated text file)
	Save	Saves the data link tables that are being edited.	
	Save As		Saves data link tables, Files with any of the file name extensions shown below can be saved.
		Controller Link	<ul style="list-style-type: none"> ◆ .cl2 – CX-Net Controller Link/CLKSS data link tables ◆ .cl3 – CX-Net Controller Link data link tables ◆ .clk – CLKSS data link tables ◆ .csv – CX-Net Controller Link data link tables (tab-delineated text file)
		SYSMAC LINK	<ul style="list-style-type: none"> ◆ .sl3 – CX-Net SYSMAC LINK data link tables ◆ .csv – CX-Net SYSMAC LINK data link tables (tab-delineated text file)
	Print	Prints data link information.	
	Print Preview	Previews the data to be printed.	

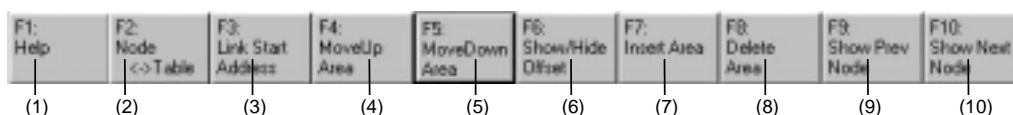
Menu	Sub-menus/Commands	Function
	Exit	Exits the Datalink Component window.
View	Move Right	Moves the cursor to the right in the Data Link Configuration window.
	Move Left	Moves the cursor to the left in the Data Link Configuration window.
	Move Up	Moves the cursor up in the Data Link Configuration window.
	Move Down	Moves the cursor down in the Data Link Configuration window.
	Change Window	Changes the active window.
	Zoom Out	Zooms out from within the Data Link Configuration window.
	Zoom In	Zooms in within the Data Link Configuration window.
	Zoom Original	Returns the Data Link Configuration window to its initial scale.
	Show in List	Shows the Data Link Area settings in list format.
	Show in Table	Shows the Data Link Area settings in table format.
	Show Func Bar	Shows function key guides at the bottom of the Datalink Component window. (Enabled for table format only.)
Show Offset	Shows the specified offset value on the Node Editing window.	
Table	Wizard	Executes the Datalink Wizard.
	Add Source Link	Adds a node to the data links.
	Add Destination	Adds the receive area of a participating node to the data links.
	Delete	Deletes nodes.
	Validate Table	Checks data link tables.
	Table Information	Edits data link table information.
	Show Node List	Displays a list of nodes.
	Redraw	Resets colored displays.
Online	Transfer from PLC	Uploads online data link tables to the computer.
	Transfer to PLC	Downloads online data link tables from the computer to a PLC.
	Verify Node	Compares data link tables generated by CX-Net with data link tables stored in the PLC. If they do not match, a error dialog box is displayed.
	Data Link Operation/Status	Displays the operation and data link status of manually set data links.
	Automatic Data Link Setup	Sets parameters for automatically set data links, and transfers them to the startup node.
	Set All Nodes for Network Operation	Executes transfer, verify, and delete operations for all nodes.
	Show All Network Nodes	Reads data link tables from all nodes.
	Delete	Deletes data link tables.
Options	Cycle Time	Sets the communications cycle time (for SYSMAC LINK data link tables only).
Help		Displays help.

Toolbar



No.	Icon	Function		
(1)	New	Creates new data link tables.		
(2)	Show All Network Nodes	Shows all nodes in the network.		
(3)	Open	Opens a data link tables, Files with any of the file name extensions shown below can be opened. When a file is opened, the proper editor starts up.		
		<table border="1"> <tr> <td>Controller Link</td> <td>.cl2 – CX-Net Controller Link/CLKSS data link tables .cl3 – CX-Net Controller Link data link tables .clk – CLKSS data link tables .csv – CX-Net Controller Link data link tables (tab-delimited text file)</td> </tr> <tr> <td>SYSMAC LINK</td> <td>.sl3 – SYSMAC LINK data link tables .slk – SYSMAC LINK data link tables for SYSMAC Support Software .csv – SYSMAC LINK data link tables (tab-delimited text file)</td> </tr> </table>	Controller Link	.cl2 – CX-Net Controller Link/CLKSS data link tables .cl3 – CX-Net Controller Link data link tables .clk – CLKSS data link tables .csv – CX-Net Controller Link data link tables (tab-delimited text file)
Controller Link	.cl2 – CX-Net Controller Link/CLKSS data link tables .cl3 – CX-Net Controller Link data link tables .clk – CLKSS data link tables .csv – CX-Net Controller Link data link tables (tab-delimited text file)			
SYSMAC LINK	.sl3 – SYSMAC LINK data link tables .slk – SYSMAC LINK data link tables for SYSMAC Support Software .csv – SYSMAC LINK data link tables (tab-delimited text file)			
(4)	Save	Saves the data link tables that are being edited.		
(5)	Toggle Network/Single Node Operation	Specifies either all nodes or a single node for data transfers.		
(6)	Transfer to PLC	Downloads online data link tables from the computer to a PLC.		
(7)	Transfer from PLC	Uploads online data link tables to the computer.		
(8)	Delete	Deletes data link tables.		
(9)	Verify Node	Compares data link tables generated by CX-Net with data link tables stored in the PLC. If they do not match, a error dialog box is displayed.		
(10)	Data Link Operation/Status	Displays the operation and data link status of manually set data links.		
(11)	Automatic Data Link Setup	Sets parameters for automatically set data links, and transfers them to the startup node.		
(12)	Validate Table	Checks data link tables.		
(13)	Wizard	Executes the Datalink Wizard.		
(14)	Add Source Link	Adds a node to the data links.		
(15)	Add Destination	Adds the receive area of a participating node to the data links.		
(16)	Set Source or Destination Link Area Properties	Displays the Node Settings dialog box. This dialog box is used to modify the node properties.		
(17)	Delete Link Destination Service Area	Deletes nodes selected in the Data Link Configuration window, or deletes a receive area.		
(18)	Zoom In/Zoom Out/Zoom Original	Zooms the Data Link Configuration window in or out, or returns it to the initial scale.		
(19)	Print	Prints data link information.		
(20)	Help	Displays help.		

Function Bar



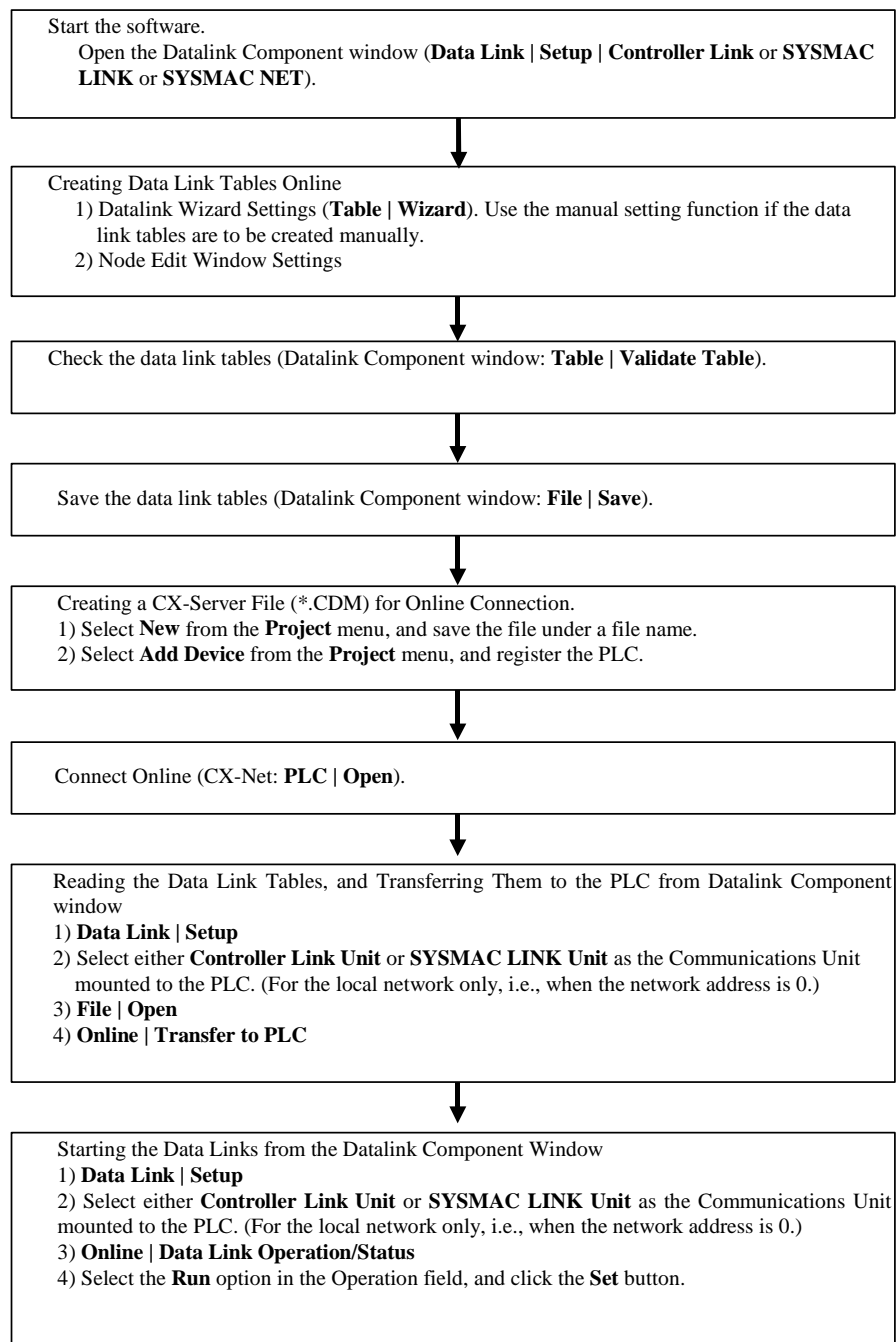
No.	Icon	Function
(1)	F1: Help	Displays help.
(2)	F2: Node<->Table	Moves the focus between nodes and tables.
(3)	F3: Link Start Address	Moves the focus between settings for the link start addresses (status, Area 1, Area 2).
(4)	F4: Move Up Area	Moves a node up the node refresh sequence.
(5)	F5: Move Down Area	Moves a node down the node refresh sequence.
(6)	F6: Show/Hide Offset	Shows or hides the offset for the node being displayed.
(7)	F7: Insert Area	Inserts a new receive area (new node).
(8)	F8: Delete Node	Deletes a node or communications area. To delete a node or link area from a node list, select the item from the list and then click F8: Delete Node . To delete a node or link area from a table, select the item from the table and then click F8: Delete Node .
(9)	F9: Show Prev Node	Shows the previous node.
(10)	F10: Show Next Node	Shows the next node.

Manually Setting Data Links

Follow the procedure described below to create data link tables manually for Controller Link or SYSMAC LINK data links.

Note: There is no need to create a data link tables when data links are set automatically. For details on automatic setup, refer to Automatically Set Data Links.

Procedure through Data Link Startup



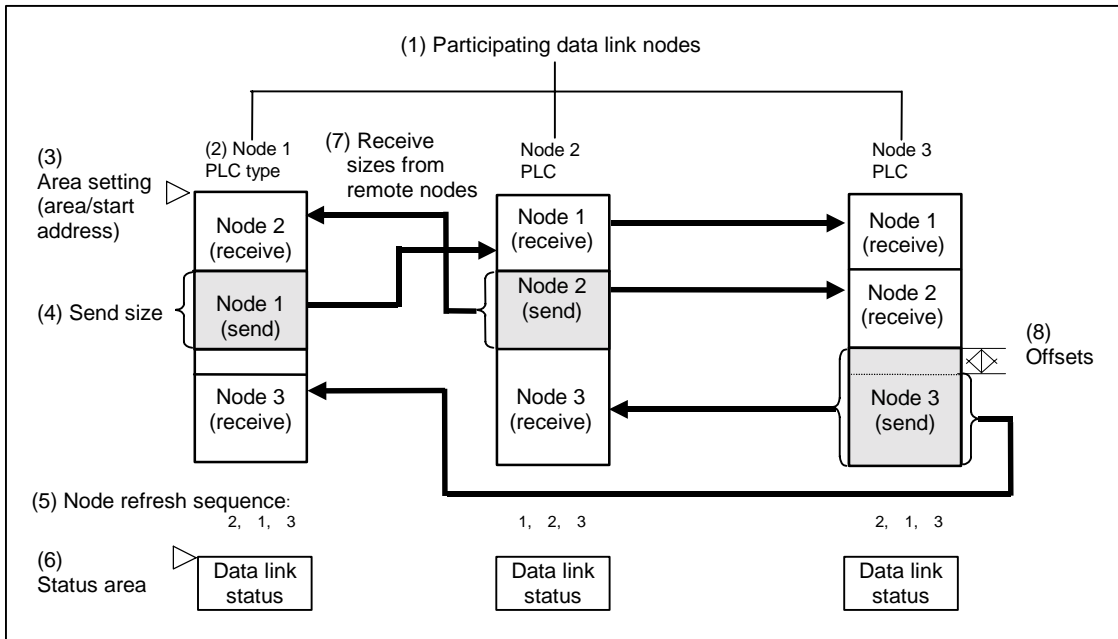
Reference: Create data link tables manually when any of the following conditions is present:

- 1 The send area size differs for nodes participating in the data link.
- 2 The sequence of send nodes differs from the sequence of node addresses.
- 3 There are nodes that receive only part of the send data (Controller Link only).
- 4 There are nodes that receive data with an offset specified (Controller Link only).
- 5 There are nodes that do not send data (Controller Link only).
- 6 There are nodes that do not receive data.

Creating Data Link Tables

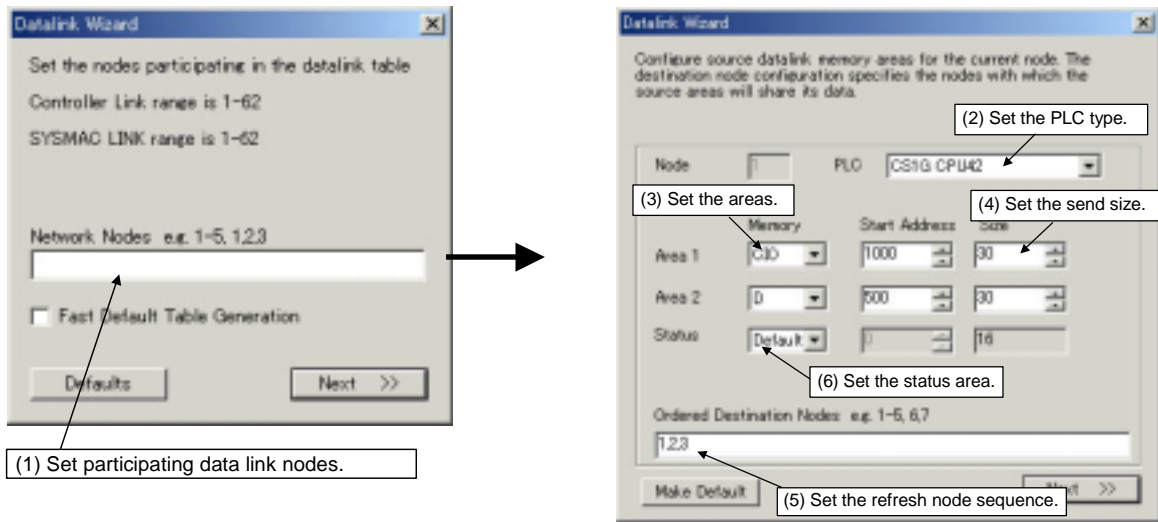
Create a data link table for each node registered in the CX-Server file that is read.

Make the settings for (1) to (8) below.



To create a data link table, make the following settings in order.

1 Datalink Wizard Settings



2 Node Editing Window Settings

(7) Set receive sizes from remote nodes.

Node	Link Addr.	Size	Offset	Src Addr.
01	01000	30	----	Send
02	01030	30	0	01230
03	01060	40	0	00350

(8) Set offsets.

Note 1: It is possible to add or delete nodes from the participating data link nodes (1) using the Datalink Wizard.

Add	Adding nodes	Select Table Add Source Link .
	Adding link words	Select Table Add Destination .
Delete	Deleting specified nodes or link areas	Select the node from the node list, and then click F8: Delete Node .
	Deleting link areas from specified nodes	Select the node from the table, and then click F8: Delete Node .

Note 2: It is possible to change the following items set by the Datalink Wizard for each node: (2) PLC type, (3) Area (memory area and start address), (4) Send size, (5) Node refresh sequence (see note 3), and (6) Status area.

Note 3: The node refresh sequence is set using F4: Move Up Area and F5: Move Down Area.

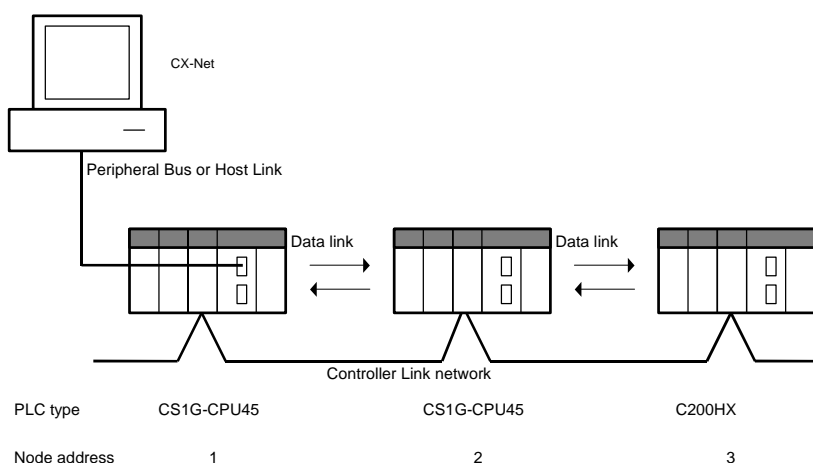
Reference: The operations differ for Controller Link and SYSMAC LINK when creating data links. The following table shows the points on which the manually set data link functions are different.

Function	Controller Link	SYSMAC LINK
(1) Offset setting	Supported	Not supported
(2) Receive size setting	Supported	Not supported. (It is only possible to specify whether all of none of the data sent is to be received.)
(3) Memory area	Area 1: Can be selected. Area 2: Can be selected. (CIO, LR, DM, EM, etc., according to PLC type)	Area 1: CIO Area 2: DM (Fixed.)
(4) Communications cycle time setting	Not supported	Supported

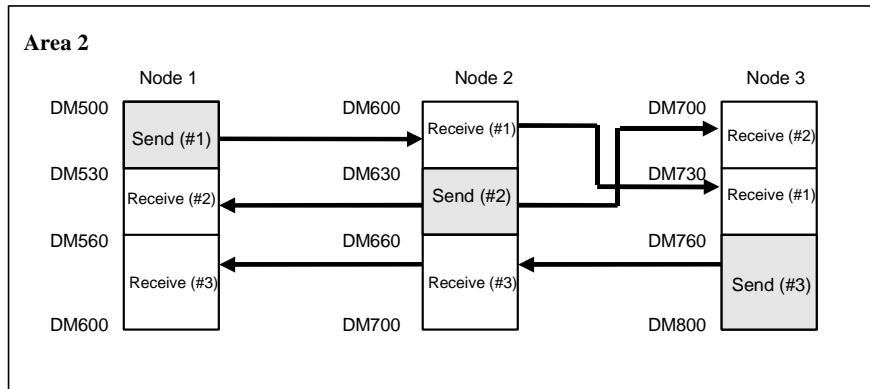
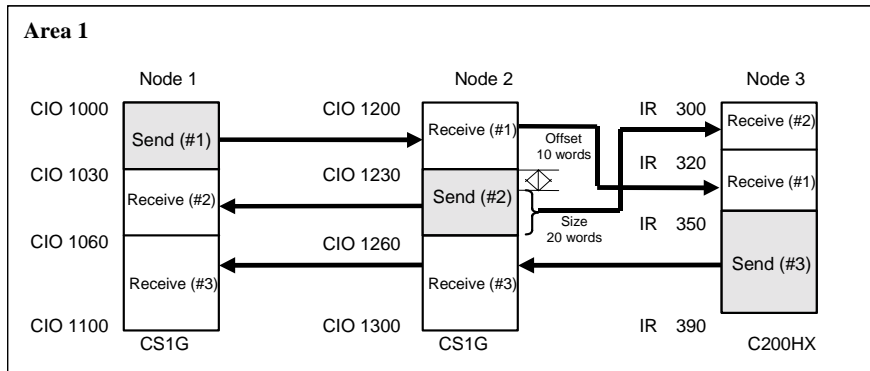
These four differences apply even to data link setup operations using the CX-Net. Aside from these points, other operations are basically the same.

System Configuration Example

The procedure is described below, from data link creation through startup, taking a Controller Link data link system as an example.



Data Link Setup Example



The refresh sequence for nodes 1 and 2 is as follows: #1, #2, #3. For node 3, the order is #2, #1, #3. Node address 03 does not receive all of the data sent from node address 02. Rather, data from the 20 words (CIO 1240 to CIO 1259) beginning from the start address +10 words (i.e., the offset) is received in IR 300 to IR 319. Other data is received with no offset.

Creating Data Link Tables Offline

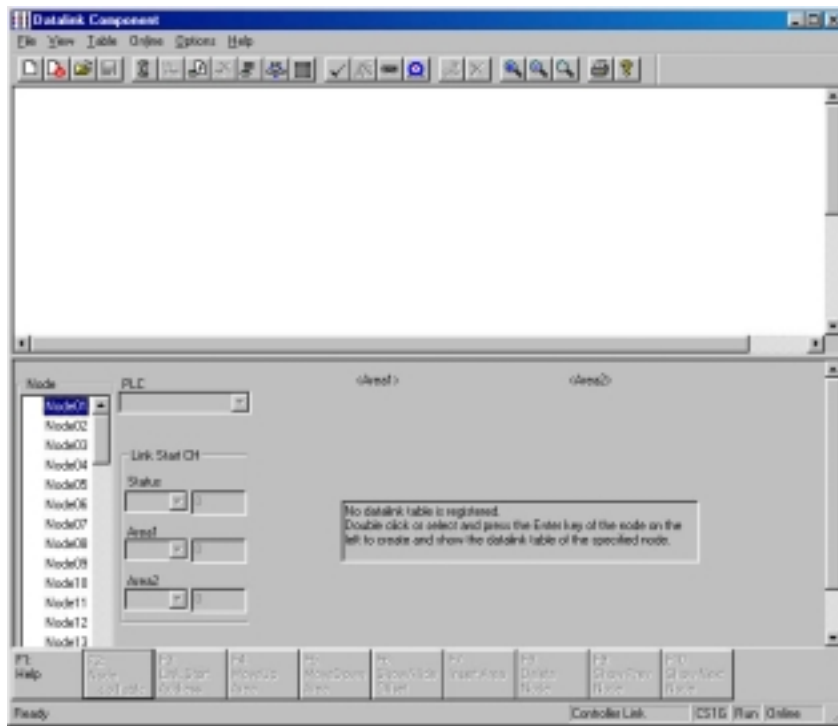
First create manually set data link tables offline.

Datalink Wizard Operations

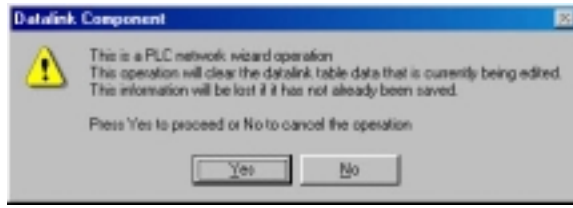
- 1 While offline, select **Setup** from the **Data Link** menu in CX-Net. The Data Link dialog box will be displayed.



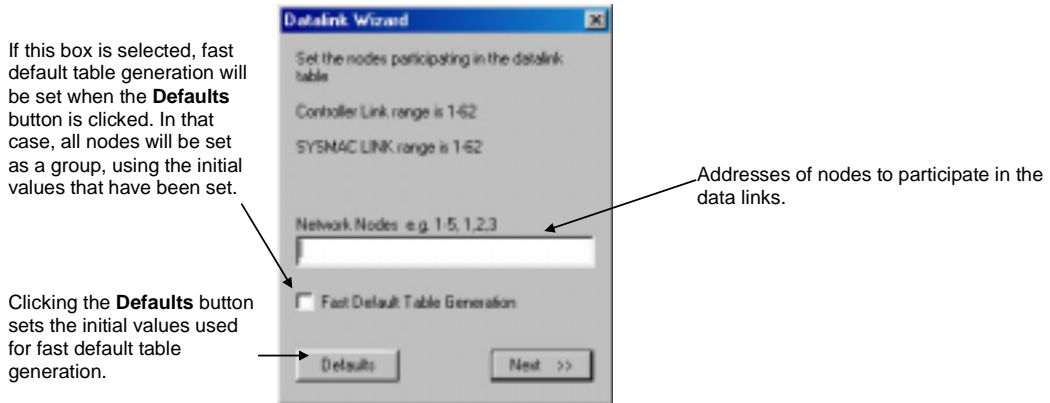
- 2 Select either **Controller Link** or **SYSMAC LINK**, and then click the **OK** button. The Datalink Component window will be displayed.



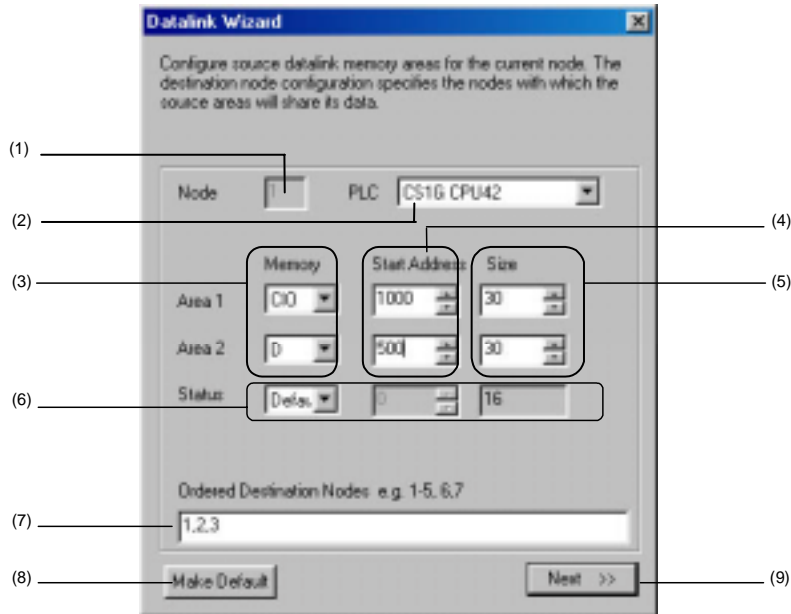
- 3 Select **Table | Wizard**. If data link tables have already been input, the following dialog box will be displayed. (It will not be displayed if these are the first data link tables being created.)



- 4 Click the **Yes** button. The Datalink Wizard dialog box will be displayed for setting the participating data link nodes.



- 5 Set the addresses of the nodes that are to participate in the data links. In this case, input 1-3 to set node addresses 01 to 03. (To set node addresses 01, 02, and 04, for example, input 1,2,4.)
- 6 Click the **Next** button or press the **Enter** key. The following dialog box will be displayed.



No.	Item	Function
(1)	Node	Displays node number to set.
(2)	PLC	Sets the PLC type.
(3)	Memory area	Area 1 memory area
		Area 2 memory area

No.	Item	Function
(4)	Start Address	Area 1 start address
		Area 2 start address
(5)	Size	Area 1 local node send size (in words)
		Area 2 local node send size (in words)
(6)	Status	Data link status memory area (See note.)
(7)	Ordered Destination Nodes	<p>Node Refresh Sequence</p> <p>Beginning with the data link start address above, specify which nodes are to have data refreshed at the local node address and the order in which data is to be refreshed (i.e., the node refresh sequence). This order will be the same for Area 1 and Area 2.</p> <p>(For the local node address, data is sent from the local node area. For a remote node address, data is received from the remote node address to the local area.)</p> <p>Note: • The local node must be included in the refresh nodes.</p> <ul style="list-style-type: none"> • If the address of any node participating in the data links is not entered here, data will not be received from that node. <p>Example: If 1, 2, 3 is input, node addresses 1, 2, and 3 will be allocated in order, beginning with the start address.</p>
(8)	Make Default	Click this button to make the values set for the above items the default values for new data link settings.
(9)	Next >>	Click to proceed to the next dialog box.

Note: The default setting for data link status depends on the PLC being used. For details, refer to the *Controller Link Units Operation Manual (W309)*.

PLC	Data link status																								
CS/CJ Series CVM1/CV Series	<p>The data link status is contained in the 16 words (fixed) from CIO 1500 +25 × unit number + 7 to 22 in the CPU Bus Unit Area.</p> <table border="1"> <tr> <td></td> <td>15</td> <td>8</td> <td>7</td> <td>0</td> </tr> <tr> <td>+7 words</td> <td>Node 2</td> <td></td> <td>Node 1</td> <td></td> </tr> <tr> <td>...</td> <td>...</td> <td></td> <td>...</td> <td></td> </tr> <tr> <td>+22 words</td> <td>Node 32</td> <td></td> <td>Node 31</td> <td></td> </tr> </table>		15	8	7	0	+7 words	Node 2		Node 1			+22 words	Node 32		Node 31					
	15	8	7	0																					
+7 words	Node 2		Node 1																						
...																						
+22 words	Node 32		Node 31																						
C200HX/HG/HE	<p>The data link status for node addresses 1 to 6 only is contained in the words from SR 239 to SR 241, and SR 241 to SR 245.</p> <table border="1"> <tr> <td>Network 0</td> <td>Network 1</td> <td>15</td> <td>8</td> <td>7</td> <td>0</td> </tr> <tr> <td>SR 239</td> <td>SR 243</td> <td>Node 2</td> <td></td> <td>Node 1</td> <td></td> </tr> <tr> <td>SR 240</td> <td>SR 244</td> <td>Node 4</td> <td></td> <td>Node 3</td> <td></td> </tr> <tr> <td>SR 241</td> <td>SR 245</td> <td>Node 6</td> <td></td> <td>Node 5</td> <td></td> </tr> </table>	Network 0	Network 1	15	8	7	0	SR 239	SR 243	Node 2		Node 1		SR 240	SR 244	Node 4		Node 3		SR 241	SR 245	Node 6		Node 5	
Network 0	Network 1	15	8	7	0																				
SR 239	SR 243	Node 2		Node 1																					
SR 240	SR 244	Node 4		Node 3																					
SR 241	SR 245	Node 6		Node 5																					
CQM1H Series	<p>The data link status for node addresses 1 to 6 only is contained in the words from IR 91 to IR 93.</p> <table border="1"> <tr> <td></td> <td>15</td> <td>8</td> <td>7</td> <td>0</td> </tr> <tr> <td>IR 91</td> <td>Node 2</td> <td></td> <td>Node 1</td> <td></td> </tr> <tr> <td>IR 92</td> <td>Node 4</td> <td></td> <td>Node 3</td> <td></td> </tr> <tr> <td>IR 93</td> <td>Node 6</td> <td></td> <td>Node 5</td> <td></td> </tr> </table>		15	8	7	0	IR 91	Node 2		Node 1		IR 92	Node 4		Node 3		IR 93	Node 6		Node 5					
	15	8	7	0																					
IR 91	Node 2		Node 1																						
IR 92	Node 4		Node 3																						
IR 93	Node 6		Node 5																						

7 Set node address 01 as shown in the following table, and then click the **Next** button or press the **Enter** key. Set node addresses 02 and 03 in the same way.

Item		Data set	Description
Node address		1	–
PLC type		CS1G-CPU45	–
Area 1	Memory area	CIO	Sets CIO 1000 as the data link start address for the Area 1 local node.
	Start address	1000	
	Send size	30	Sets 30 words as the send size (unit: words) for the Area 1 local node.
Area 2	Memory area	D	Sets D00500 as the data link start address for the Area 2 local node.
	Start address	500	
	Send size	30	Sets 30 words as the send size (unit: words) for the Area 2 local node.

Item		Data set	Description
Ordered destination nodes		1, 2, 3	Specifies the node refresh sequence. Beginning with the start addresses, nodes 01, 02, and 03 are set in order. (The local node address is 1, so transmission is first, followed by reception from node 02, and finally reception from node 03.)
Status	Memory area	CIO	Sets CIO 1100 as the data link status start address.
	Start address	1100	

8 Set node address 02 as shown in the following table.

Item		Data set	Description
Node address		2	–
PLC type		CS1G-CPU45	–
Area 1	Memory area	CIO	Sets CIO 1200 as the data link start address for the Area 1 local node.
	Start address	1200	
	Send size	30	Sets 30 words as the send size (unit: words) for the Area 1 local node.
Area 2	Memory area	D	Sets D00600 as the data link start address for the Area 2 local node.
	Start address	600	
	Send size	30	Sets 30 words as the send size (unit: words) for the Area 2 local node.
Ordered destination nodes		1, 2, 3	Specifies the node refresh sequence. Beginning with the start addresses, nodes 01, 02, and 03 are set in order. (Reception from node 01 is first, followed by transmission from the local node, and finally reception from node 03.)
Data link status start address	Memory area	CIO	Sets CIO 1300 as the data link status start address.
	Start address	1300	

9 Set node address 03 as shown in the following table, and then click the **Next** button or press the **Enter** key.

Item		Data set	Description
Node address		3	–
PLC type		C200HX	–
Area 1	Memory area	IR	Sets IR 300 as the data link start address for the Area 1 local node.
	Start address	300	
	Send size	40	Sets 40 words as the send size (unit: words) for the Area 1 local node.
Area 2	Memory area	DM	Sets DM 700 as the data link start address for the Area 2 local node.
	Start address	700	
	Send size	40	Sets 40 words as the send size (unit: words) for the Area 2 local node.
Ordered destination nodes		2, 1, 3	Specifies the node refresh sequence. Beginning with the start addresses, nodes 02, 01, and 03 are set in order. (Reception from node 02 is first, followed by reception from node 01, and finally transmission from the local node address.)
Data link status start address	Memory area	LR	Sets LR0 as the data link status start address.
	Start address	0	

Reference: Fast Datalink Wizard Settings

It is possible to generate a table with all nodes set for the same PLC type and the same areas (using Fast Default Table Generation), and then to modify individual nodes in the Node Editing window as required.

Make the settings as follows:

- 1 Click the **Defaults** button and then set the default values in the following dialog box.



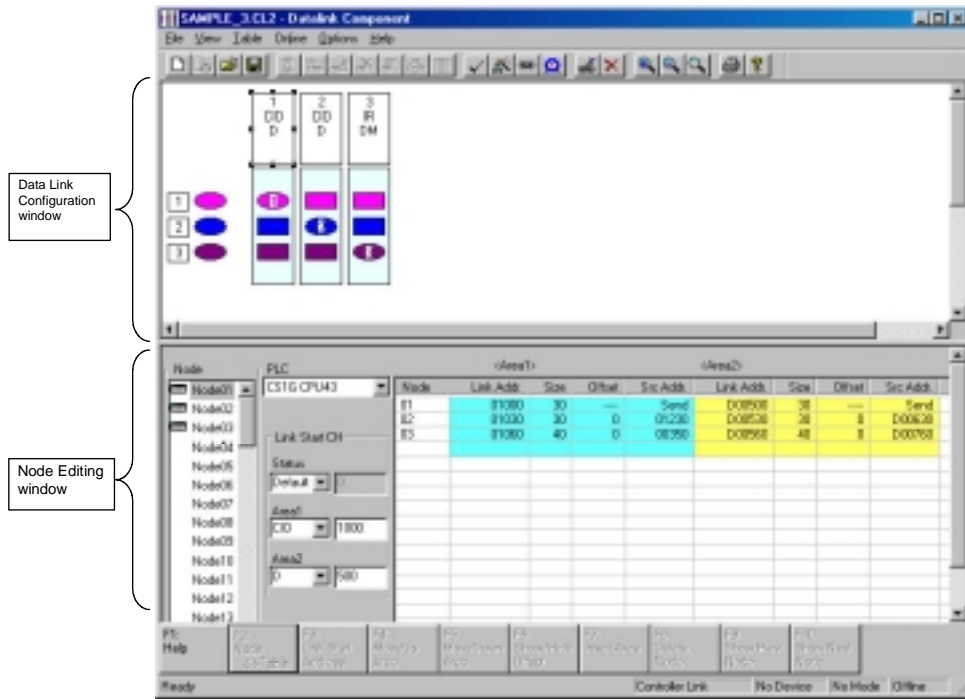
- 2 Select the **Fast Default Table Generation** option, and then click the **Next** button or press the Enter key.

The settings for all participating nodes will be generated at the above default values.

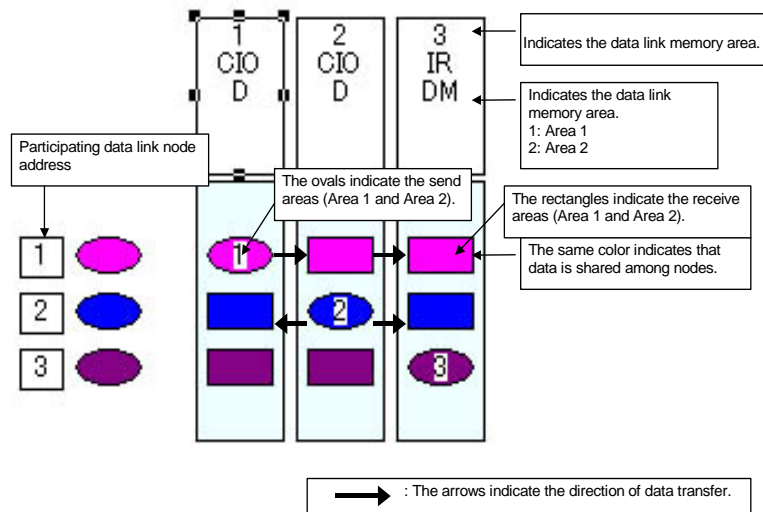
- ◆ PLC type
- ◆ Memory area, data link start address, communications data size
- ◆ Status memory area

Node Editing Window Settings

10 The following Datalink Component window will be displayed.



Data Link Configuration Window



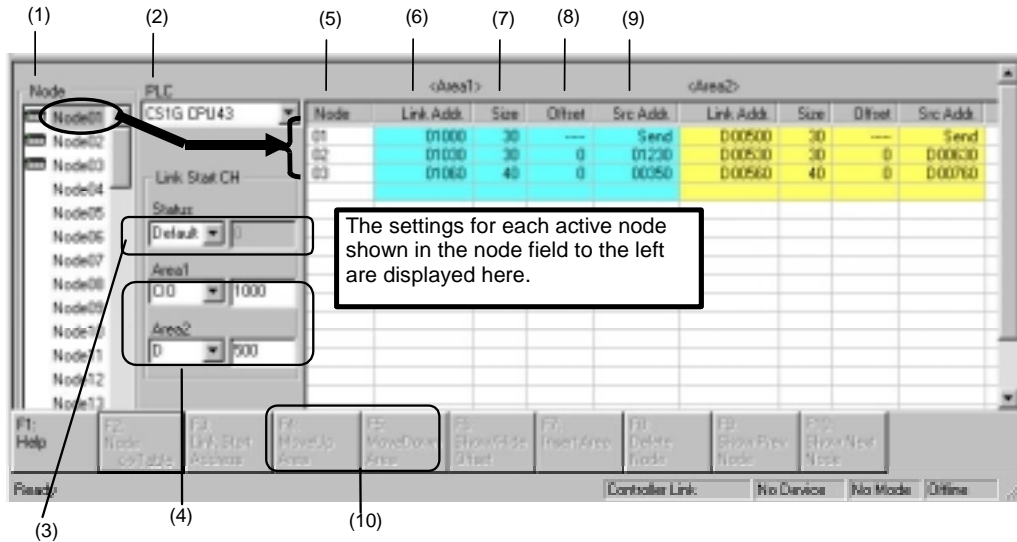
Send areas are indicated by ovals in order of the addresses of nodes participating in the data links. The same color indicates that data is shared among nodes. Therefore, with the number of participating nodes represented by n, one oval and n-1 rectangles are shown for each node.

This window can be used to check the data sent and received between nodes.

Node Editing Window Settings

Set the data link details for each node (i.e., send size, receive size, reception offset) in the Node Editing window.

Note: The Node Edit window appears in table format by default, as shown below. To convert it back into the earlier list format, select View | Show in List.



No.	Name	Description
(1)	Node	Selects the address of the node to be edited. The settings for an active node (selected with <input type="checkbox"/>) are displayed to the right.
(2)	PLC	The PLC type set by the Datalink Wizard is displayed and can be changed here.
(3)	Status	The status memory area and start address set by the Datalink Wizard are displayed and can be changed here.
(4)	Area 1/Area 2	The Area 1 and Area 2 classifications and start addresses set by the Datalink Wizard are displayed and can be changed here.
(5)	Node (Display only. Order can be changed.)	<ul style="list-style-type: none"> Node addresses are displayed from top to bottom, in order of node refreshing at the local node (in order of allocated node address). To change the refresh sequence set by the Datalink Wizard, click either F4: Move Up Area or F5: Move Down Area in the Function Bar, or press the corresponding Function key.
(6)	Link Addr. (Automatic display)	<ul style="list-style-type: none"> For the local node send area, the start address of the data sent from the local node is automatically displayed. For the receive area from remote nodes, the local node start address for storing data received from remote nodes is automatically displayed.
(7)	Size (Setting/Display)	<ul style="list-style-type: none"> For the local node send area, the send size set by the Datalink Wizard is displayed and can be changed here. For the receive area from remote nodes, the receive size from remote nodes is set here in word units. (It can only be set here.) The default is the entire send size from remote nodes.
(8)	Offset (Setting/Display)	The reception offset from the source start address displayed at "Src. Addr." is set here. (The default is 0.)
(9)	Src. Addr. (Automatic display)	<ul style="list-style-type: none"> For the local node send area, "Send" is automatically displayed. For the receive area from a remote node, the remote node's source start address (the value before the offset) is automatically displayed.
(10)	F4: Move Up Area F5: Move Down Area	Changes the node refresh sequence.

Node Editing Window (Edited Node Address: Node 01)

Node	Link Addr.	Size	Offset	Src Addr.
03	01000	20	0	D00000
01	01020	30	----	Send
02	01050	40	0	00200

Address at local node (points to Link Addr. column)

Address at remote node (points to Src Addr. column)

Indicates that the node refresh sequence at the local node (node 01) is 03 to 01 (local node) to 02.

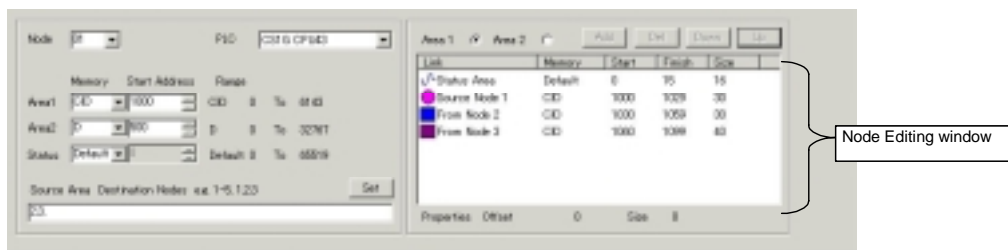
Function

(1) Indicates that 20 words (D00000 to D00019) from a remote node (node 03) are received into the area starting from CIO 01000 (i.e., CIO 01000 to CIO 01019) at the local node (node 01).

(2) Indicates that 30 words starting from CIO 01020 (i.e., CIO 01020 to CIO 01049) from the local node (node 01) are sent to a remote node.

(3) Indicates that 40 words (CIO 00200 to CIO 00239) from a remote node (node 02) are received into the area starting from CIO 01050 (i.e., CIO 01050 to CIO 01089) at the local node (node 01).

Reference: It is also possible to display the Node Editing window in list format, as before. Select **View | Show in List** from the menu. The change will go into effect the next time the window is opened.





Setting Size (Send or Receive) and Offset

- ◆ The send size can be set for the local node row by double-clicking in the Size cell. (The default is the size set by the Datalink Wizard.) For remote node rows, the receive size can be set. (The default is the entire send size from remote nodes.)
- ◆ The reception offset can be set by double-clicking the Offset cell. (The default is 0.)

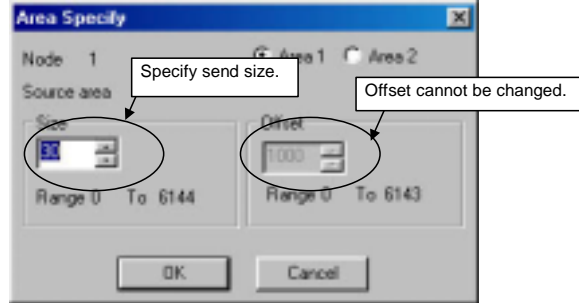
Node	Link Addr.	Size	Offset	Src Addr.
01	01000	30	0	Send
02	01030	40	0	01230
03	01060	40	0	00350

Size and offset can be set. (points to Size and Offset cells)

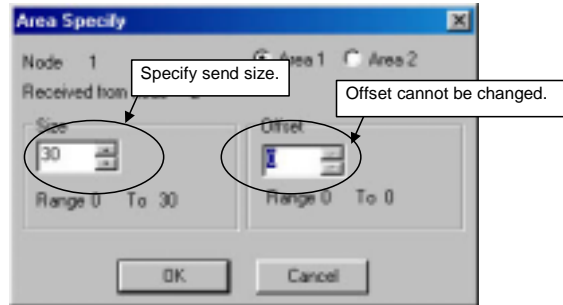
Automatically displayed. (points to the 'Send' text in the Src Addr. cell)

Reference: Size modifications and offsets can be set in the Area Specify dialog box that is displayed by double-clicking on the data link configuration icon (oval for send area  or rectangular for receive area .

Area Specify Dialog Box (Send Area)



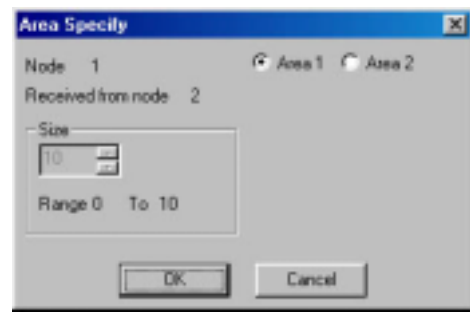
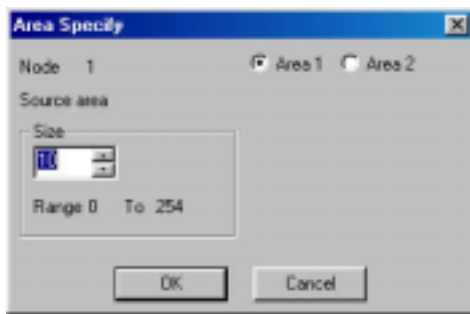
Area Specify Dialog Box (Receive Area)



Note: With SYSMAC LINK, the send size can be set, but the receive size and the reception offset cannot. Therefore, the Area Specify dialog boxes are as shown in the following example diagrams.

- Send Area
Can be set.

- Receive Area
Cannot be set.



Changing Node Refresh Sequences

The node refresh sequence set for each node by the Datalink Wizard can be changed in the Node Editing window. In the Node Editing window, select the node for which the refresh sequence is to be changed.

Node	Link Addr.	Size	Offset	Src Addr.
01	01000	30	----	Send
02	01030	30	0	01230
03	01060	40	0	00350

F5: Move Down Area

Change the node refresh sequence by either clicking F4: Move Up Area or F5: Move Down Area in the Function Bar, or pressing the F4 or F5 function keys.

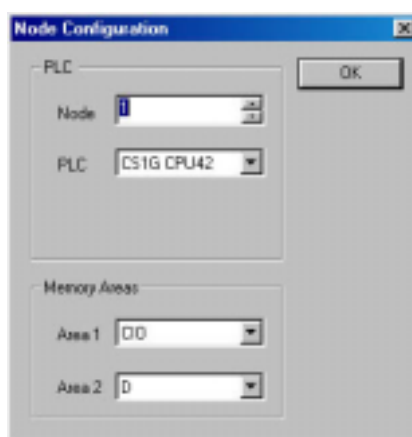
Node	Link Addr.	Size	Offset	Src Addr.
01	01000	30	----	Send
03	01030	40	0	00350
02	01070	30	0	01230

Reference: The node refresh sequence for individual nodes cannot be checked in the Data Link Configuration window. Node refresh sequence checking and changes must be performed in the Node Editing window.

Adding Participating Nodes to Data Links

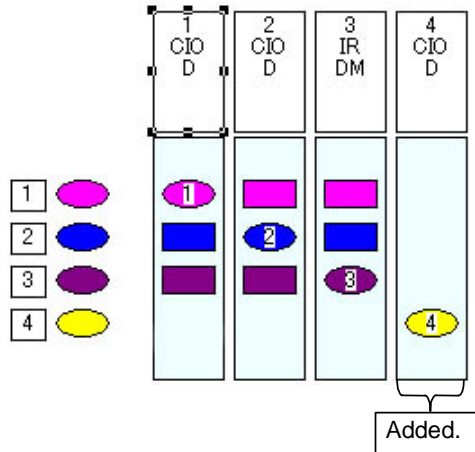
In the Node Editing window, it is possible to add nodes aside from the participating nodes set by the Datalink Wizard's Network Nodes setting.

The following window is displayed by selecting **Table | Add Source Node** from the Datalink Component menu or by clicking the  button in the Toolbar.



Specify the node address, PLC type, and the Area 1 and Area 2 memory areas, and then click the **OK** button.


The node will be added.



Deleting Nodes Added to the Data Links

Select the node to be deleted from the Node Editing window.

Delete the node by clicking the **F8: Delete Node** button in the Function Bar.

Caution: If the node is deleted by clicking the  button in the Toolbar, the deletion will be executed immediately.

Setting to Not Receive Data

Set the receive size to 0 in the Node Editing window.

<Area1>				
Node	Link Addr.	Size	Offset	Src Addr.
01	01000	30	----	Send
02	01030	0	0	01230
03	01060	40	0	00350

Setting to Not Send Data

Set the send size to 0 in the Node Editing window.

<Area1>				
Node	Link Addr.	Size	Offset	Src Addr.
01	01000	0	----	Send
02	01030	30	0	01230
03	01060	40	0	00350

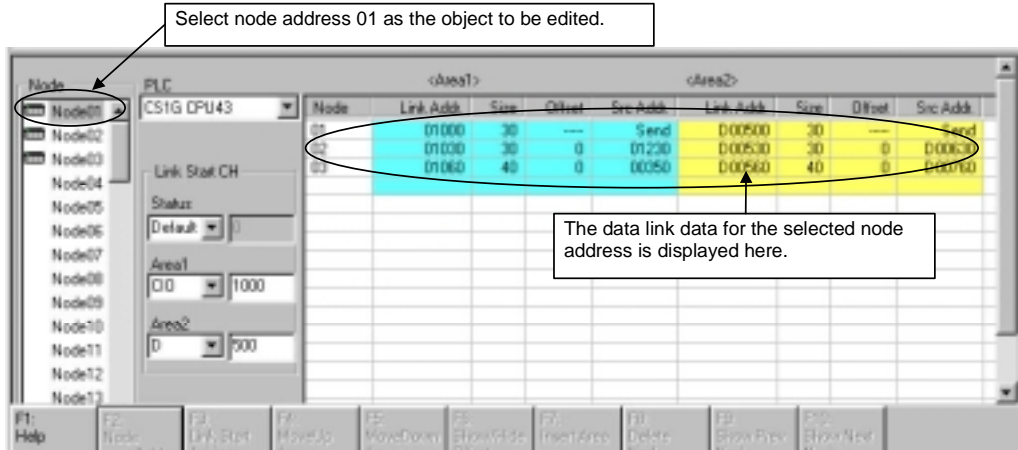
Procedure Using Setup Example

Set Area 1 for each node, based on the data link setup example in the example system configuration.

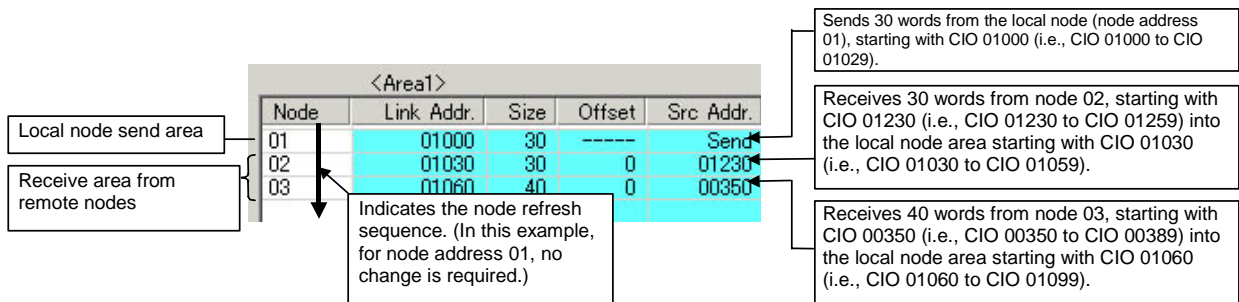
Note: The receive size and reception offset can only be set for Controller Link, and not for SYSMAC LINK.

Setting Node Address 01

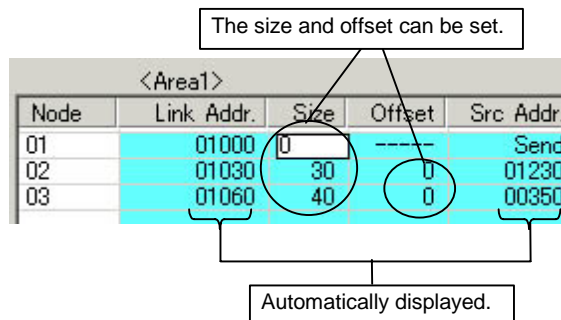
- 1 Select node address 01 from the node address list on the left. Node 01 will be highlighted.



The data link table for node address 01, the node to be edited, is displayed as a list in the Node Editing window on the right.



Reference: With node address 01, the node refresh sequence matches the default (order of addresses), so no change is required.
 With node address 01, the size and offset are both automatically displayed as the defaults, so no changes are required.



- 2 With node address 01, the node refresh sequence matches the default (order of addresses), so no change is required.
 With node address 01, the size and offset are both automatically displayed as the defaults, so no changes are required.
 Settings for area 2 are made using the same method.

Setting Node Address 02

Node address 02 is set in the same way as node address 01.

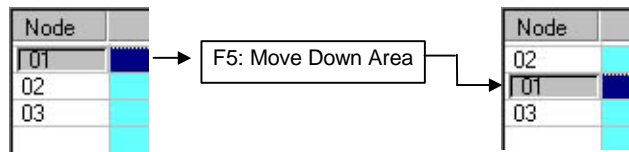
Node	Link Addr.	Size	Offset	Src Addr.
01	01200	30	0	01000
02	01230	30	----	Send
03	01260	10	0	00350

Local node send area (points to Node 01)
Receive area from remote nodes (points to Node 02 and 03)

Setting Node Address 03 (Setting an Offset)

For node address 03, the procedure for setting the node refresh sequence and the offset is as follows:

- 1 Select node address 03 from the node address list on the left.
- 2 With node address 03, the node refresh sequence does not match the default, so the order of addresses must be changed. Change the node refresh sequence by either clicking F4: Move Up Area or F5: Move Down Area in the Function Bar, or pressing the F4 or F5 function keys.



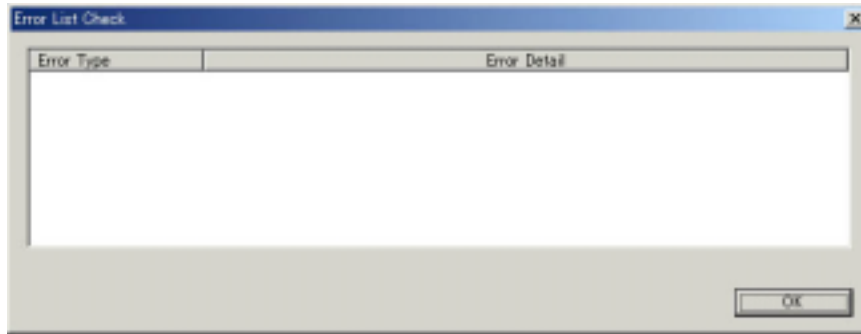
- 3 Double-click on the Offset cell, and input the data size to be offset. In this example, set the offset size to 10 words.

<Area1>				
Node	Link Addr.	Size	Offset	Src Addr.
01	00300	20	10	01000
02	00320	30	0	01230
03	00350	40	----	Send

With this setting, 20 words sent from node 01 will be received, starting from CIO 1000, and with an offset of 10 words (i.e., CIO 1010 to CIO 1030).

Checking Data Link Tables

- 1 Select **Table | Validate Table** in the Data Link Editor (Controller Link or SYSMAC LINK). The results of the check will be displayed as shown in the following illustration.



Printing Data Link Tables

Follow the procedure below to print data link tables that have been generated.

- 1 Select **File | Print** in the Data Link Editor (Controller Link or SYSMAC LINK).

Printing Example:

<< Controller Link Datalink Informat

Node Information

Node	Number of Links	Area 1 Link Words	Area 2 Link Words	Node	Number of Links	Area 1 Link Words	Area 2 Link Words
01	3	100	100	32			
02	3	70	100	33			
03	3	90	100	34			
04				35			
05				36			
06				37			
07				38			
08				39			
09				40			
10				41			
11				42			
12				43			
13				44			
14				45			
15				46			
16				47			
17				48			
18				49			
19				50			
20				51			
21				52			
22				53			
23				54			
24				55			
25				56			
26				57			
27				58			
28				59			
29				60			
30				61			
31				62			

Node [1] PLC Type [CS1G CPU43] Number of Links [3] Status Start Address [Default : 0]

Node	< Area 1 > Start Address [CIO : 1000]			< Area 2 > Start Address [D : 500]		
	Link AddressSize	Source Address	Offset	Link AddressSize	Source Address	Offset
1	CIO : 1000	30	Send Area	D : 500	30	Send Area
2	CIO : 1030	30	CIO : 1230	D : 530	30	D : 630
3	CIO : 1060	40	IR : 350	D : 560	40	IM : 760

Node [2] PLC Type [CS1G CPU43] Number of Links [3] Status Start Address [Default : 0]

Node	< Area 1 > Start Address [CIO : 1200]			< Area 2 > Start Address [D : 600]		
	Link AddressSize	Source Address	Offset	Link AddressSize	Source Address	Offset
1	CIO : 1200	30	CIO : 1000	D : 600	30	D : 500
2	CIO : 1230	30	Send Area	D : 630	30	Send Area
3	CIO : 1260	10	IR : 350	D : 660	40	IM : 760

Node [3] PLC Type [C200HX] Number of Links [3] Status Start Address [IM : 0]

Node	< Area 1 > Start Address [IR : 300]			< Area 2 > Start Address [IM : 700]		
	Link AddressSize	Source Address	Offset	Link AddressSize	Source Address	Offset
1	IR : 300	20	CIO : 1010	IM : 700	30	D : 500
2	IR : 320	30	CIO : 1230	IM : 730	30	D : 630
3	IR : 350	40	Send Area	IM : 760	40	Send Area

Saving Data Link Tables

Follow the procedure below to save data link tables that have been generated. Data link tables are saved with a .cl3 file name extension as the default. It is also possible to save them in .csv format.

- 1 Select **File | Save As** in the Data Link Editor (Controller Link or SYSMAC LINK). The Save As dialog box will be displayed.
- 2 Input the file name (“Sample” in this example), and specify the location where the file is to be saved. Then click the **Save** button. The data will be saved to a file with a .cl3 extension added to the file name (i.e., “Sample.cl3” in this case).

Creating, Reading, and Writing CSV Files (Saving)

Creating CSV Files

Based on the CSV-format template file (Sample1.csv) provided with this software, it is possible to create files in CSV format for data link tables created manually using spreadsheet software (such as MS Excel).

Including the Sample1.csv file, there are three types of files provided as reference material. The other two, in addition to Sample1.csv, are Sample1.xls (which describes tags and data), and Sample1.cl2 (data link table file format).

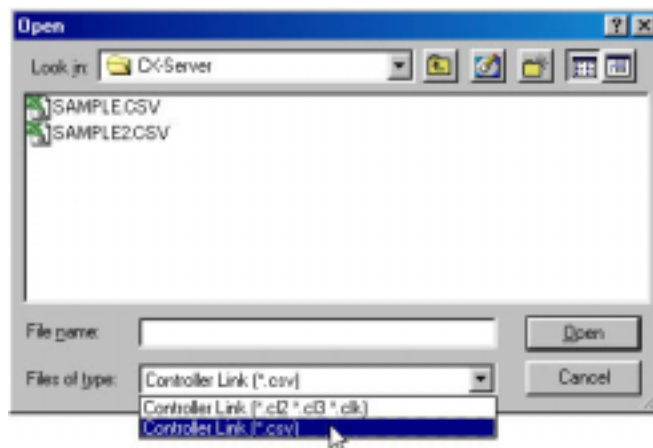
(Sample1.xls window)

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	<net-param>												
2	<network-type>	03.E											
3	<cycle-time>												
4	<auth-loc>												
5	<int-reset-loc>												
6	<conn-res-loc>												
7	</net-param>												
8	<node-param>												
9	<node>		1				2				3		
10	<cpu>												
11	<cpu-type>		CPU2				CPU2				CPU2		
12	<status-start-type>		Default				Default				Default		
13	<status-start-cho>												
14	</node-param>												
15	<area1>												
16	<start-type>												
17	<start-cho>		18				29				95		
18	<link-area>		15	20	0	1	20	15	0	3	95	30	0
19	<link-area>		15	30	0	2	21	20	0	1	95	15	0
20	<link-area>		15	15	0	3	20	30	0	2	95	20	0
21	</area1>												
22	<area2>												
23	<start-type>		0				0				0		
24	<start-cho>		1818				1820				1818		
25	<link-area>		00008	20	0	1	00008	15	0	3	00080	30	0
26	<link-area>		00008	30	0	2	00008	20	0	1	00080	15	0
27	<link-area>		00008	15	0	3	00008	30	0	2	00080	20	0
28	</area2>												

Reading CSV Files

Files in CSV format can be read to data link tables.

- 1 Select **Controller Link** or **SYSMAC LINK** in the main CX-Net window (**Data Link | Setup** in the CX-Net PLC Network Configuration Tool dialog box). The Datalink Component dialog box will be displayed.
- 2 Select **Open** from the **File** menu, and then select *.csv from the File of Type field.



Writing CSV Files (Saving)

Once data link tables have been created, they can be written to CSV-format files.

- 1 Select **Save As** from the **File** menu in the Datalink Component dialog box, and then select *.csv from the File of Type field.

The following illustration provides an example of a written CSV file.

Row	Tag Name	Value
1	<net-param>	
2	<network-type>	SLK
3	<cycletime>	0
4	<author>	
5	<information>	
6	<comment>	
7	</net-param>	
8	<node-param>	
9	<node>	
10	<start-type>	
11	<start-cycletime>	
12	<start-cycletime>	
13	</node-param>	
14	<area1>	
15	<start-type>	
16	<start-cycletime>	
17	<start-cycletime>	
18	<start-cycletime>	
19	<start-cycletime>	
20	<start-cycletime>	
21	</area1>	
22	<area2>	
23	<start-type>	
24	<start-cycletime>	
25	<start-cycletime>	
26	</area2>	

Note: When displayed by spreadsheet software (such as MS Excel).

Types of Data Written to CSV Files

	Tag name	Description	Set value
(1)	<net-param>		
	<network-type>	The network type (CLK/SLK).	CLK network: CLK SLK network: SLK
	<cycletime>	The communications cycle time.	5 to 255. Enabled only when <network-type> is set to SLK, and ignored when <network-type> is set to CLK. An error will be generated if an out-of-range value is set when a file is loaded.
	<author>	The name of the author SLK: (Table information) author	Set any text string (with up to 30 characters). Enabled only when <network-type> is set to SLK.
	<information> (Title or node information)	Input file information. CLK: Node information SLK: (Table information) title	Set any text string (with up to 30 characters).
	<comment>	Comment. SLK: (Table information) comment	Set any text string (with up to 255 characters). Enabled only when <network-type> is set to SLK, and ignored when <network-type> is set to CLK.

	Tag name		Description	Set value
(2)	<node-param>	<node> (Node No.)	The node No. for the link.	1 to 62. An error will be generated if an out-of-range value is set when a file is loaded.
		<cpu> (PLC type)	The PLC type for the node.	CS1G, CS1G-H, CS1H, CS1H-H, CJ1G, CJ1G-H, CJ1H-H, CJ1M, CS1D-H, CS1D-S, CV500, CV1000, CV2000, CVM1, CVM1-V2, CQM1H, C200HE, C200HE-Z, C200HG, C200HG-Z, C200HX, C200HX-Z, NSB, CS/CJ/CP
		<cpu-type> (CPU model)	The CPU model for the node.	CS1G: CPU42, CPU43, CPU44, CPU45 CS1G-H: CPU42, CPU43, CPU44, CPU45 CS1H: CPU63, CPU64, CPU65, CPU66, CPU67 CS1H-H: CPU63, CPU64, CPU65, CPU66, CPU67 CS1G/CJ1G: CPU44, CPU45 CJ1G-H: CPU42, CPU43, CPU44, CPU45 CJ1H-H: CPU65, CPU66, CPU67 CJ1M, CP1H: Not specified. CS1D-H: CPU65, CPU67 CS1D-S: CPU42, CPU44, CPU65, CPU67 CV500: Not specified. CV1000: Not specified. CV2000: Not specified. CVM1: CPU01, CPU11, CPU21 CVM1-V2: Not specified. CQM1H: CPU51, CPU61 C200HE: Not specified. C200HE-Z: Not specified. C200HG: Not specified. C200HG-Z: Not specified. C200HX: Not specified. C200HX-Z: Not specified. C200HX-Z: CPU65, CPU85 NSB: Not specified.
		<status-start-type> (Status start address, memory area)	The status start address and the memory area.	Any of the following memory areas can be specified, regardless of the PLC type. Initial value: Default (See note.) CIO: Blank, CIO, or IR DM: D or DM LR: L or LR EM: E + Bank No. HR: H or HR AR: A or AR T/C: T/C Note: Data link status is stored in the default area. For details, refer to the Unit's operation manual.
	<status-start-ch> (Status area start address)	The start address for the status area.	The range differs depending on the status area type.	

	Tag name		Description		Set value
(3)	<area1>	<start-type> (Link Area 1 type)	Specify the area type for Link Area 1.		Same as for status area type.
		<start-ch> (Link Area 1 start address)	The beginning word for Link Area 1.		Same as for status area start address.
	<link-area>	Node No.	Node address	The node address for linking at Link Area 1.	1 to 62
		Link start address	Link word	The beginning link word for Link Area 1.	Set the link start address + link size for the above link node.
		Link size	Size (Unit: words)	The link size for Link Area 1.	Set any value.
Offset size	Offset	The offset size for Link Area 1.	Set any value. If no offset is required, set 0.		
(4)	<area2>	<start-type> (Link Area 2 type)	The area type for Link Area 2.		Same as for status area type.
		<start-ch> (Link Area 2 start address)	The beginning word for Link Area 2.		Same as for status area start address.
	<link-area>	Node No.	Node address	The node address for linking at Link Area 2.	1 to 62
		Link start address	Link word	The beginning link word for Link Area 2.	Set the link start address + link size for the above link node.
		Link size	Size (Unit: words)	The link size for Link Area 2.	Set any value.
Offset size	Offset	The offset size for Link Area 2.	Set any value. If no offset is required, set 0.		

An example text data configuration for a CSV file is shown below.

```

<net-param>
<network-type>,SLK
<cycle time>,0
<author>,
<information>,
<comment>,
</net-param>
<node-param>
<node>,,1,,,2,,,3,,,
<cpu>,,CS/CJ,,,CS/CJ,,,CS/CJ,,,
<status-start-type>,,,,,,,,,
<status-start-ch>,,00000,,,00000,,,00000,,,
</node-param>
<area1>
<start-type>,,,,,,,,,
<start-ch>,,00000,,,01200,,,00300,,,
<link-area>,,1,01000,30,,1,01200,30,,1,00300,30,
<link-area>,,2,01030,30,,2,01230,30,,2,00330,30,
<link-area>,,3,01060,10,,3,01260,10,,3,00360,10,
</area1>
<area2>
<start-type>,,D,,,D,,,D,,,
<start-ch>,,00500,,,00600,,,00700,,,
<link-area>,,1,D00500,30,,1,D00600,30,,1,D00700,30,
<link-area>,,2,D00530,30,,2,D00630,30,,2,D00730,30,
<link-area>,,3,D00560,40,,3,D00660,40,,3,D00760,40,
</area2>

```

Note: Commas are used for delineation. (They are added when there are blank cells.)

Connecting Online

After the PLC has been registered, select either of the following types of registered PLCs for connecting online, depending on the CX-Net function used.

- 1) PLCs registered for direct connection
- 2) PLCs registered as nodes on a network

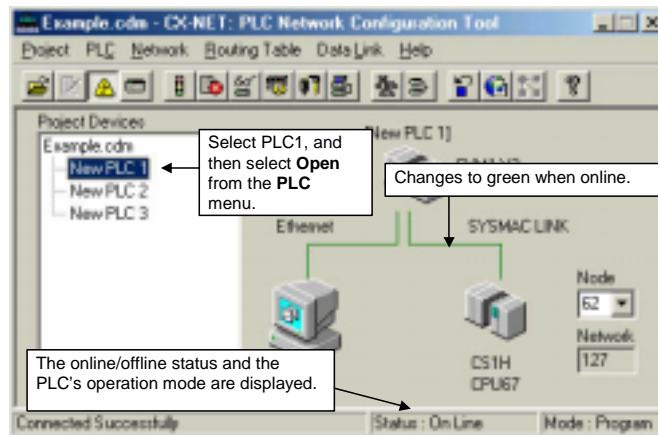
CX-Net function		PLC registered for online connection	
		(1) PLC registered for direct connection (node address 0)	(2) PLC registered as node on a network (node address 01 or higher)
Data link table transfer	Controller Link	Not supported. (See note.)	Supported
	SYSMAC LINK	Not supported. (See note.)	Supported
	SYSMAC NET	Supported	Not supported.

Note: If there is a routing table, node address 0 is possible.

When transferring Controller Link or SYSMAC LINK data link tables, therefore, online connection is required for PLCs registered as nodes on a network.

Example: Connecting PLC1 (Registered as a Node on a Network) Online

- 1 In the CX-Net project workspace, select the PLC to be connected online.
- 2 In the project workspace, select **PLC1**, and then select **Open** from the **PLC** menu. PLC1 will be connected online, and the display will change as follows:



To go back offline, again select **Open** from the **PLC** menu.

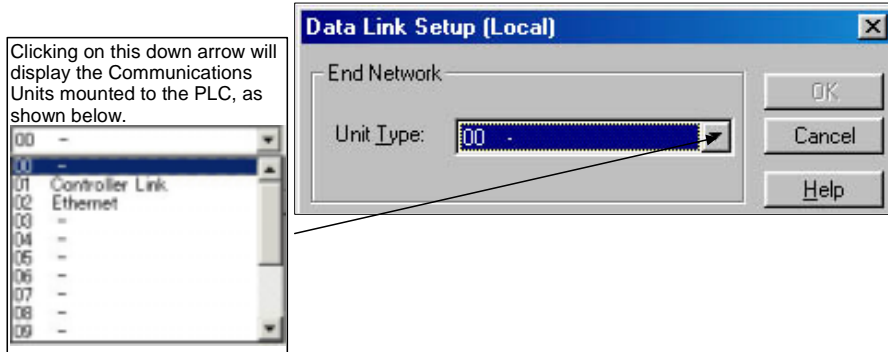
Reading and Transferring Data Link Tables

After a data link table has been created, follow the procedure below for reading it and transferring it to all nodes participating in the data links.

Reading the Data Link Table

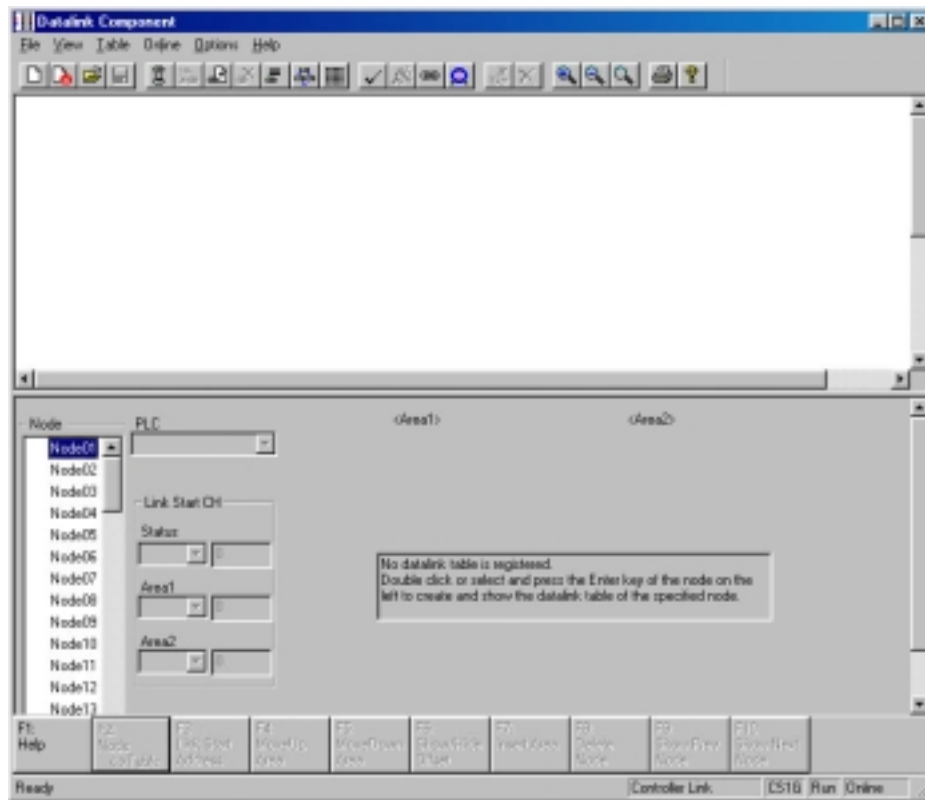
- 1 Select **Data Link | Setup** from the CX-Net.

The Data Link Setup dialog box will be displayed. (For local network only, i.e., when network address is 0.)



- 2 Select **Controller Link** or **SYSMAC LINK**, and then click the **OK** button.

Either the Datalink Component (Controller Link) or Datalink Component (SYSMAC LINK) window will be displayed.

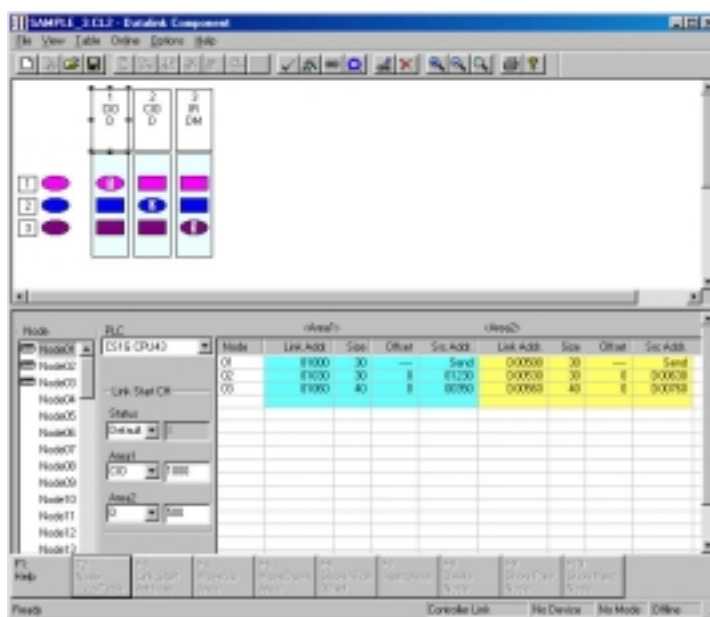


- 3 Select **File | Open**.

The Open dialog box will be displayed.

- 4 Select the data link table file (Sample.cl3 in this example,) and then click the Open button.

The data link tables will be read as shown below.

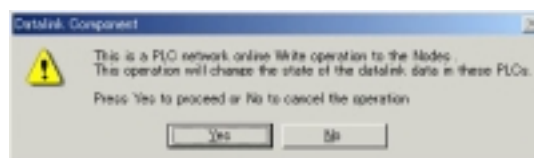


Note: Before selecting Data Link Setup, make sure that the PLC can be connected online.

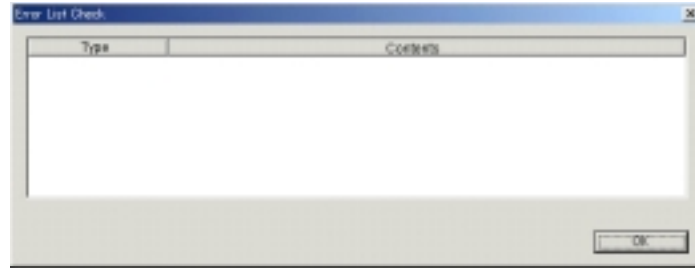
Transferring the Data Link Table

Transferring to All Nodes on the Network

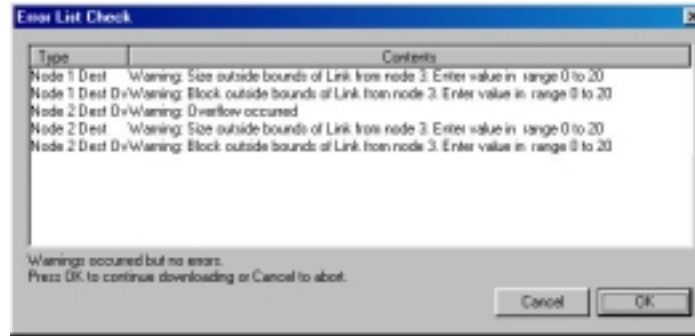
- 1 Select **Set All Nodes for Network Operation** from the Datalink Component's Online menu. Selecting this operation allows the data link tables to be transferred simultaneously to multiple PLCs.
- 2 Select **Online | Transfer to PLC**. The following dialog box will be displayed.



- 3 Click the **Yes** button.
- 4 An error list will be displayed.



- 5 The data link tables will be transferred.
- 6 The transfer results will be displayed.



Note: As long as all the data link tables can be transferred to all of the PLCs attempted, Set All Nodes for Network Operation can be selected to transfer the data link tables simultaneously to multiple PLCs. If there are any PLCs with the power turned OFF, or with disconnected cables, use the following method to transfer the data link table to one PLC at a time.

- Note:**
- CX-Programmer (CX-Net) Ver. 3.2 or later is required to use the Controller Link Support Board as a Network Support Board (NSB).
 - When using a SYSMAC Link Support Board or CX-Programmer (CX-Net) Ver. 3.1 or earlier, data link tables can be transferred only to a single Network Support Board (NSB) node. Always use the following method to transfer data link tables to all the nodes on the network.
 1. Use the mouse to select any node other than the Network Support Board in the Data Link Configuration window or the Node Editing window of the Datalink Component window.
 2. Select **Set All Nodes for Network Operation** from the Online menu in the Data Component window.
 3. Select **Transfer to PLC** from the Online menu.
 4. The data link tables are transferred after the check is completed.

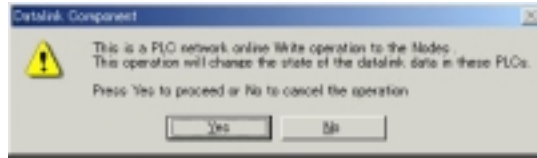
Transferring to Individual Nodes on the Network

- 1 Select the transfer destination node address from the Node list in the Datalink Component.



Make sure that **Set All Nodes for Network Operation** is not selected in the Online menu.

- 2 Select **Online | Transfer to PLC**. The following dialog box will be displayed.



- 3 Click the **Yes** button.
- 4 An error list will be displayed.
- 5 The data link tables will be transferred.
- 6 The transfer results will be displayed.

Starting and Stopping Data Links (Including Status Displays)

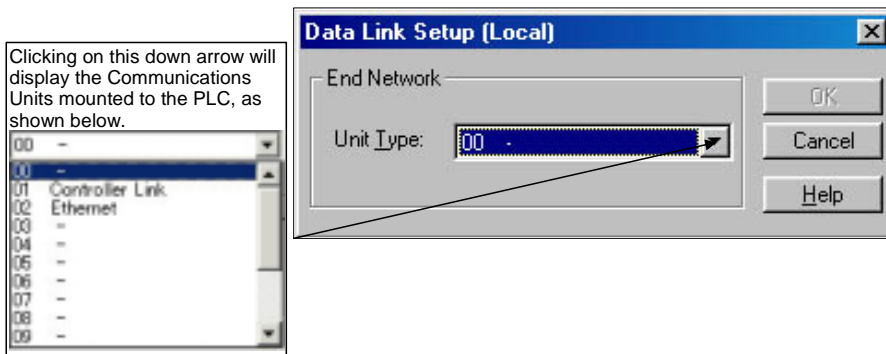
Before performing the operations described below, connect online to a node where the data link table has been transferred. As long as the data link table is stored there, data link starting and stopping can be executed from any node.

Note: When starting data links with manual setup, the data link mode for the startup node must be set to manual.

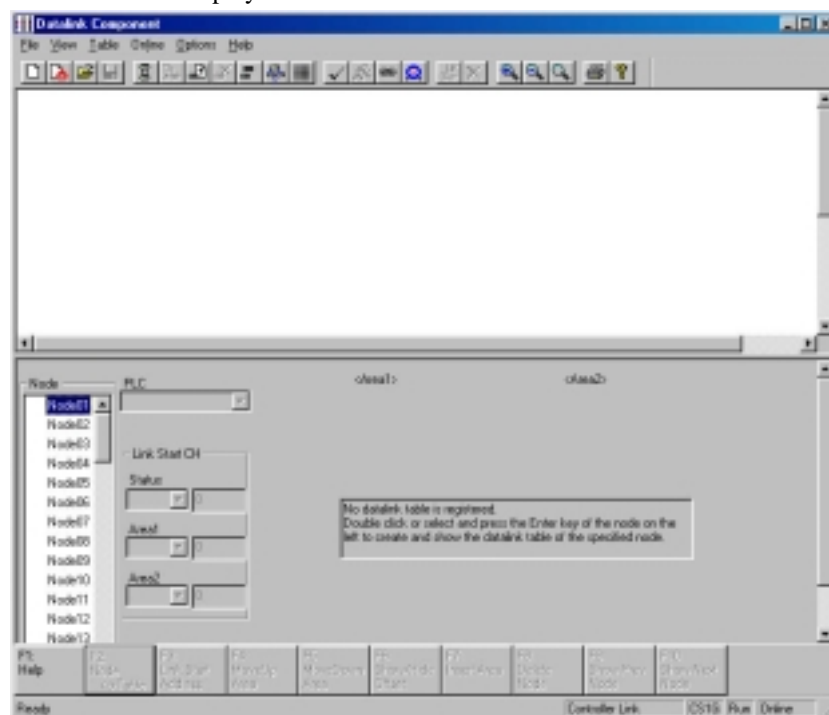
Starting Data Links

- 1 Select **Data Link | Setup** from the CX-Net.

The Data Link Setup dialog box will be displayed. (For local network only, i.e., when network address is 0.)

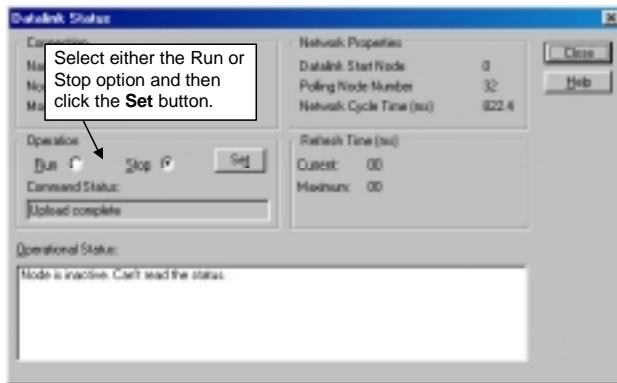


- 2 Select **Controller Link** or **SYSMAC LINK**, and then click the **OK** button. Either the Datalink Component (Controller Link) or Datalink Component (SYSMAC LINK) window will be displayed.

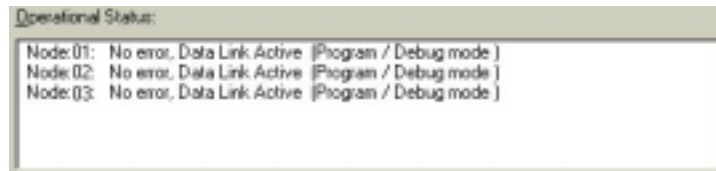


- 3 Select Datalink Operation/Status from the Online menu.

The Datalink Status dialog box will be displayed. As shown below, the status of various items is displayed. The communications cycle time and refresh cycle time are updated only when this window is opened or when the PLC operating status is changed.



- 4 Select the **Run** option in the **Operation** field.
 - 5 Click the **Set** button.
- The data links will start, and the Operational Status box will be displayed.



- Note:**
- The data link mode (manual/automatic) and data link operation are determined by the data link setup at the startup node. With manual setting the links, it is necessary to set, for the startup node, the data link table and the data link mode (manual setting) in the DM parameter area. If these are not set correctly, the data links will not start.
 - Check the following points before starting the data links.
 With manual setting, the appropriate data link table must be set for each node executing the data links. Data link tables must be deleted for nodes that are not participating in the data links. Also, even when the correct data link tables are set, make sure that there will be no effect on the equipment before starting or stopping the data links.

Stopping Data Links

- 1 Click the **Stop** option in the **Operation** field of the Datalink Status dialog box.
- 2 Click the **Set** button.
 The data links will be stopped.

Automatically Set Data Links

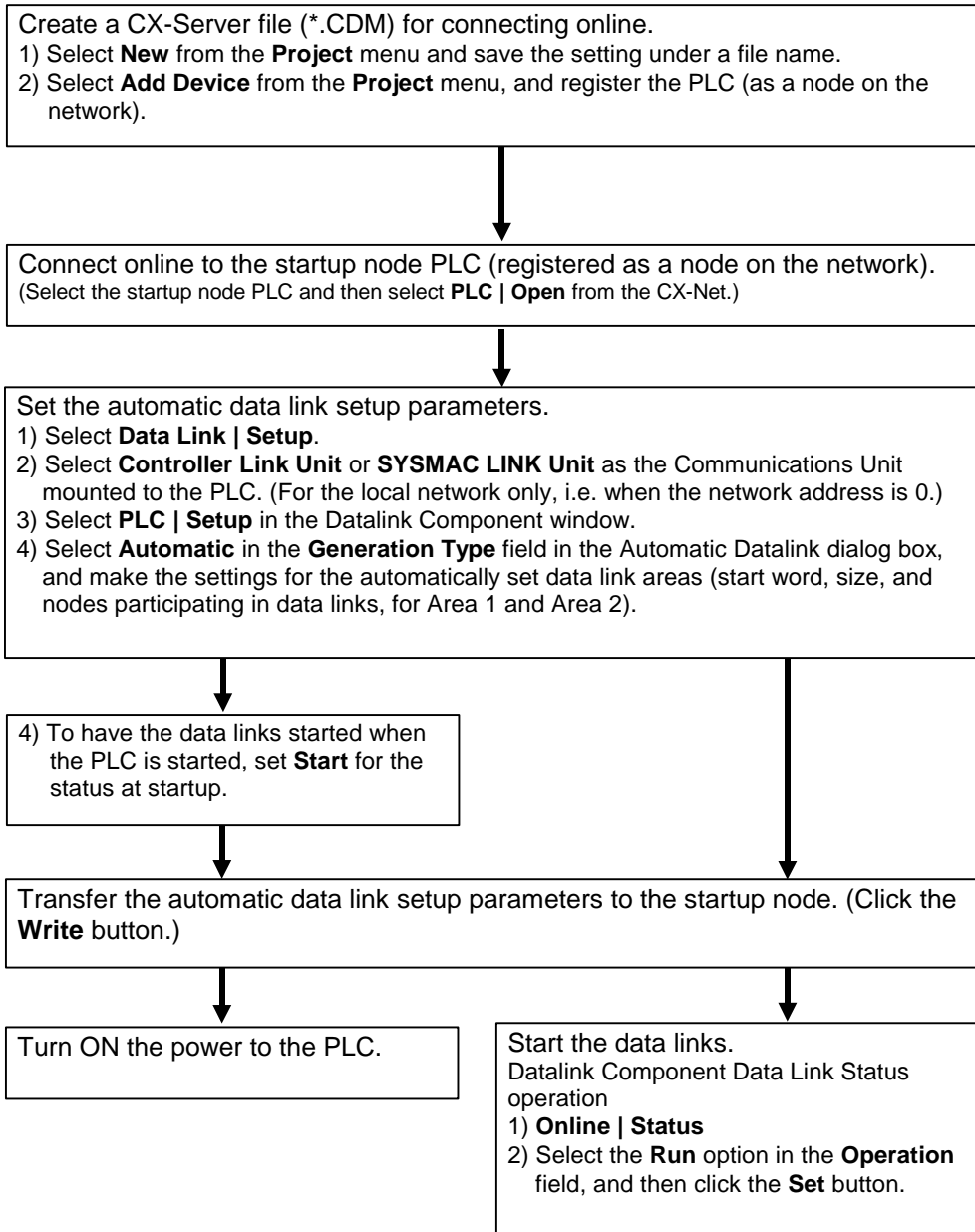
This section explains how to make the settings for automatically set data links.

Make the settings in the Automatic Datalink (Controller Link) or Automatic Datalink (SYSMAC LINK) dialog box.

First make the settings for data link operation at PLC startup, and for the automatic data link setup parameters, and then transfer the data to the startup node.

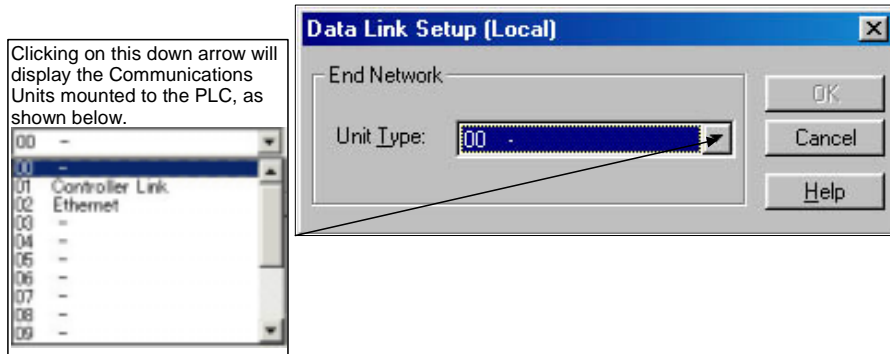
When using automatically set data links, there is no need to create data link tables with the Data Link Editor.

Procedure Through Data Link Startup

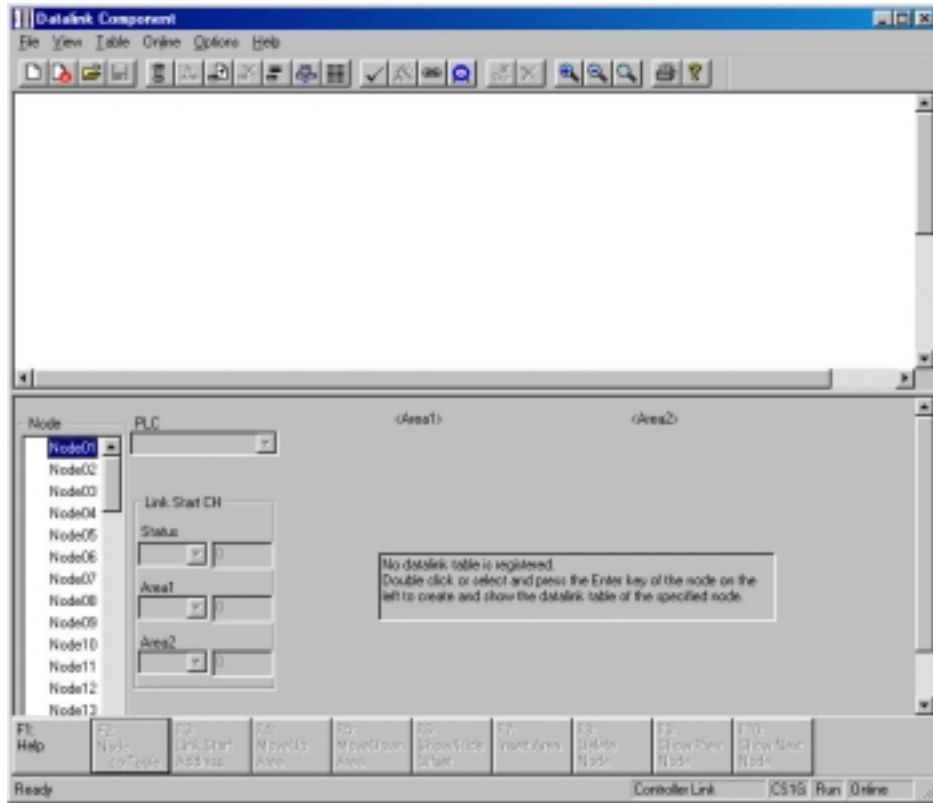


Controller Link Automatic Setup

- 1 Before executing the following operations, connect online to the PLC that is serving as the startup node.
- 2 Select **Data Link | Setup** from the CX-Net. (For local network only, i.e., when network address is 0.)



- 3 Select **Controller Link**, and then click the **OK** button. The Datalink Component (Controller Link) window will be displayed.



- 4 Select Automatic Datalink Setup from the Online menu. The Automatic Datalink (Controller Link) dialog box will be displayed.

◆ Controller Link

Select **Automatic**. (If **Manual** is selected, data link tables created by the user will be used.)

If **Automatic** is selected, data link parameters can be set.

When **Read** or **Write** is executed, the results are displayed here.

Reads settings data from the PLC.

Transfers settings data to the PLC.

Select **Start** in order to have data links start when the PLC is started.

5 Select **Start** or **Stop** in the **Power Up Run State** field.

Note: Selecting **Start** causes the data links to start when the PLC is powered up, without having to perform any other data link startup operation.

When **Automatic** is selected, the automatic data link setup parameters can be set, as shown below.

◆ Controller Link

Make the settings for Area 1. Set the area for executing the data links, the start word, and the size.

Make the settings for Area 2. Set the area for executing the data links, the start word, and the size.

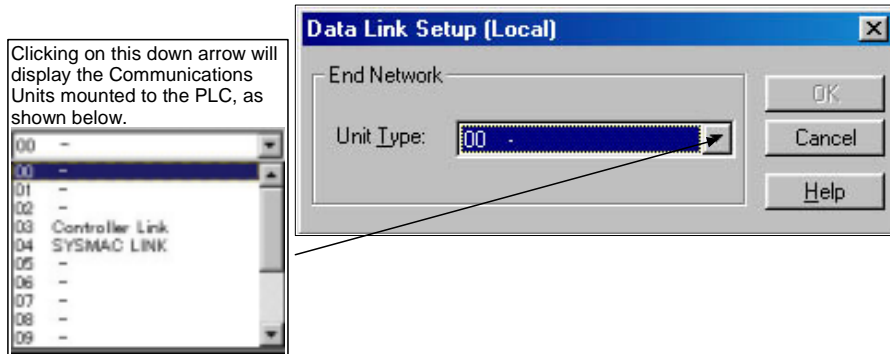
Set the status start word.

Set the nodes participating in the data links.

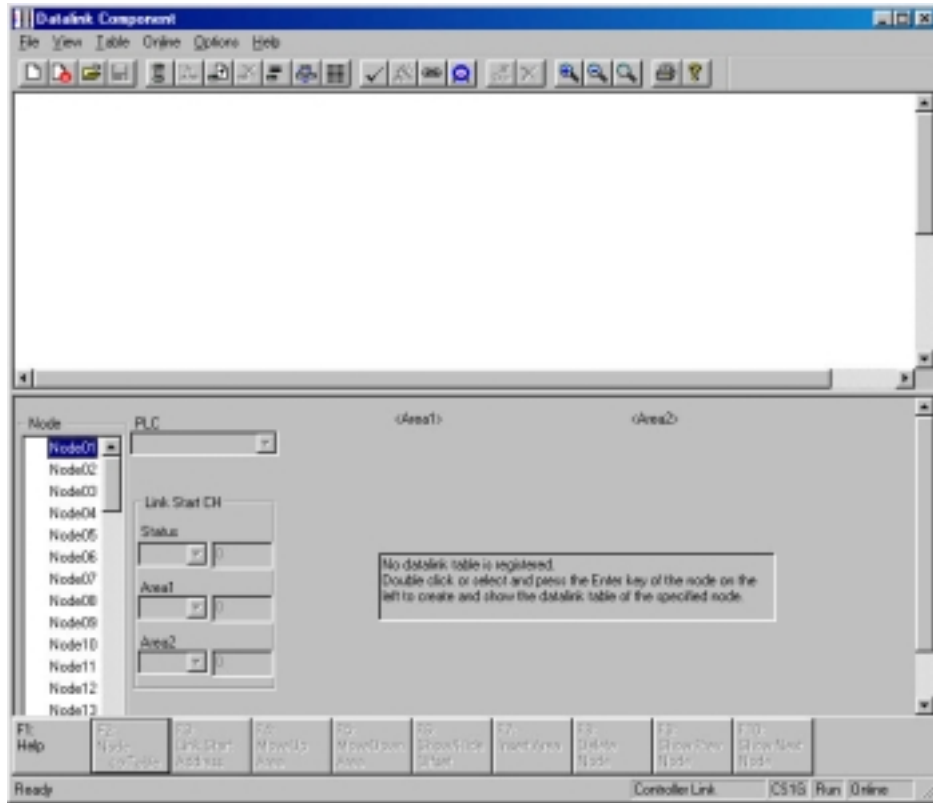
7 Set the automatic data link setup parameters.

SYSMAC LINK Automatic Setup

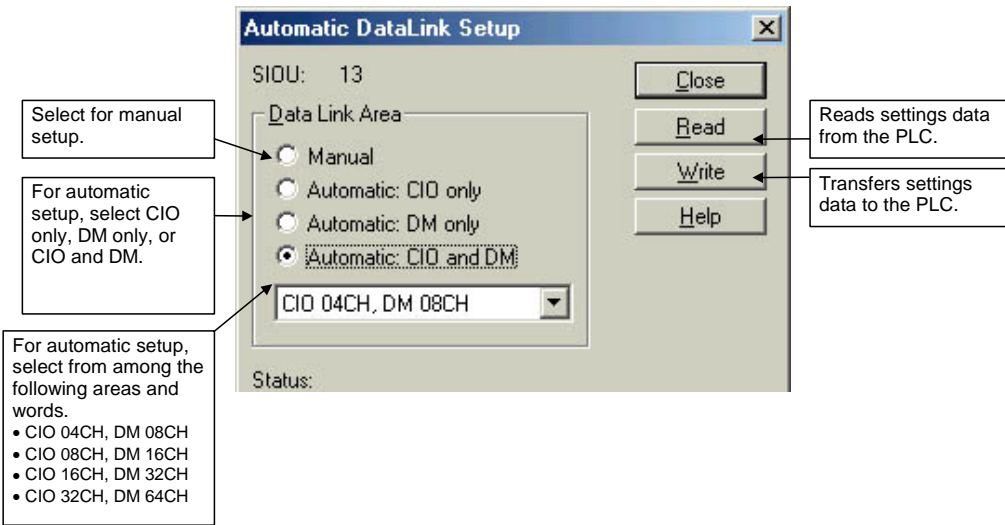
- 1 Before executing the following operations, connect online to the PLC that is serving as the startup node.
- 2 Select **Data Link | Setup** from the CX-Net. (For local network only, i.e., when network address is 0.)



- 3 Select **SYSMAC LINK**, and then click the **OK** button.
The Datalink Component (SYSMAC LINK) window will be displayed.



- 4 Select Automatic Datalink Setup from the Online menu.
The Automatic Datalink (SYSMAC LINK) dialog box will be displayed.



- 5 Select the memory area for automatic setup (CIO Area only, DM Area only, or CIO and DM Areas), and select the area and word settings from the following list.

Reference

Word Allocations for SYSMAC LINK Automatic Setup (Example: CS/CJ Series, CVM1/CV Series)

CIO Area (words)	DM Area (words)	Area and word settings			
		CIO: 4 words DM: 8 words	CIO: 8 words DM: 16 words	CIO: 16 words DM: 32 words	CIO: 32 words DM: 64 words
CIO 1000 to CIO 1003	D00000 to D00007	#1	#1	31	#1
CIO 1004 to CIO 1007	D00008 to D00015	#2			
CIO 1008 to CIO 1011	D00016 to D00023	#3	#2		
CIO 1012 to CIO 1015	D00024 to D00031	#4			
CIO 1016 to CIO 1019	D00032 to D00039	#5	#3	#2	
CIO 1020 to CIO 1023	D00040 to D00047	#6			
CIO 1024 to CIO 1027	D00048 to D00055	#7	#4		
CIO 1028 to CIO 1031	D00056 to D00063	#8			
CIO 1032 to CIO 1035	D00064 to D00071	#9	#5	#3	#2
CIO 1036 to CIO 1039	D00072 to D00079	#10			
CIO 1040 to CIO 1043	D00080 to D00087	#11	#6		
CIO 1044 to CIO 1047	D00088 to D00095	#12			
CIO 1048 to CIO 1051	D00096 to D00103	#13	#7	#4	
CIO 1052 to CIO 1055	D00104 to D00111	#14			
CIO 1056 to CIO 1059	D00112 to D00119	#15	#8		
CIO 1060 to CIO 1063	D00120 to D00127	#16			

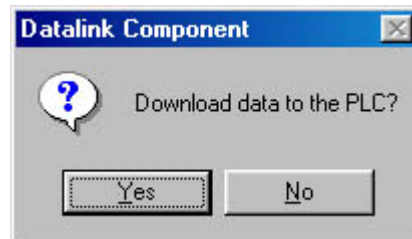
Transferring Automatic Data Link Setup Parameters to the Startup Node

The automatic data link parameters that have been set are then sent to the connected startup node PLC. It is also possible to read the automatic data link parameters that have been set for the PLC.

Transferring Data to the Startup Node PLC

- 1 Click the **Write** button in either the Automatic Datalink (Controller Link) or the Automatic Datalink Setup dialog box.

The following dialog box will be displayed for confirmation.



- 2 Click the **Yes** button.

The set data will be transferred to the startup node PLC.

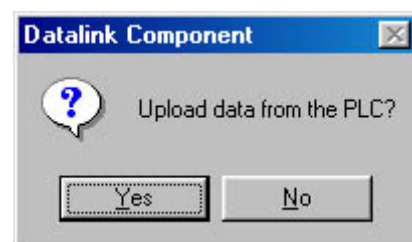
- Note:**
- The data link mode (manual/automatic) and data link operation are determined by the data link setup at the startup node. With automatic setup, it is necessary to set, for the startup node, the data link mode (automatic) and the number of data link words in the Automatic Datalink Setup dialog box. If these are not set correctly, the data links will not start.
 - Before starting the data links with automatic setup, make sure that the correct automatic data link setup parameters are set for the data link startup node. If incorrect automatic data link setup parameters are set, it may cause the equipment to operate unpredictably. Even when the correct parameters are set, make sure that there will be no adverse effect on the equipment before starting or stopping the data links.

Reading Data from the Startup Node

Perform this operation to check or change settings.

- 1 Click the **Read** button in either the Automatic Datalink (Controller Link) or the Automatic Datalink Setup dialog box.

The following dialog box will be displayed for confirmation.



- 2 Click the **Yes** button.

The set data will be transferred from the PLC and displayed at the Automatic Datalink (Controller Link) or the Automatic Datalink Setup dialog box.

Monitoring Data Link Status

Monitoring Data Link Status, Such as Communications Cycle Time

- 1 Select the startup node PLC in the Project workspace.
- 2 Select **Open** from the **PLC** menu to connect online.
- 3 Select Data Link | Setup.
- 4 Select **Controller Link** or **SYSMAC LINK**, and then click the **OK** button. The Datalink Component dialog box will be displayed.
- 5 Select **Online** and then **Datalink Operation/Status**. The Data Link Status dialog box will be displayed.
- 6 The following items will be displayed in the Network Properties field:
 Data link start word, polling node number, communications cycle time, and data link refresh cycle time PV/maximum value.
 The following items will be displayed in the Operational Status field for each node:
 CPU Unit error status, data link operation status, CPU unit operation mode, and communications status

Monitoring Data Link Status and Network Error Status from CX-Net

- 1 While online, open the I/O table window and select either **Controller Link** or **SYSMAC LINK**. Right-click and select the software switch.
- 2 The following items can be monitored for a particular Controller Link Unit.

Tag name	Contents
General	Displays the words allocated in the CIO and DM Areas.
Error Information	Network parameter errors, data link table errors, routing table errors, PLC setup errors, EEPROM write errors, node address duplication errors, network parameter verification errors, communications controller transmission errors, communications controller errors, and error log
Data Link	Startup node address, polling node address, and local node data link participation status Data link status as seen from each node (PLC operation status, PLC errors, communications errors, data link participation status, offset errors, and reception area insufficient or surplus space)
Network Status	Network participation status for each node
Status	Termination resistance status, power ON status

The following items can be monitored for a particular SYSMAC LINK Unit.

Tag name	Contents
General	Displays the words allocated in the CIO and DM Areas.
Error Information	Data link errors, node setting errors, routing table errors, communications controller errors, communications setting errors, data verification errors, duplicate No. errors, parameter errors, error logs, and EPROM write errors
Network Status	Local node address, local network address, polling node local address, unit number, power supply, internode test, and network node address
Data Link	Data link status (PLC operation status, PLC errors, communications errors, data link participation status, offset errors, and reception area insufficient space or surplus space)
Internode Test (Parameters) (See note.)	Test beginning and end, test destination node address, test destination network address, number of bytes sent, and response monitor timer values
Internode Test (Results) (See note.)	Test destination address, test destination network address, number of bytes sent, response monitor timer values, number of resend errors, number of non-responses, number of frame overruns, number of tests, number of errors, number of token timeouts, number of relay node routing failures, number of local node routing failures, routing error MRES, routing error node address, number of times local node failed to participate, number of times data did not match, number of times test destination node busy, routing error SRES, routing error network address, and test status

Note: Supported for CVM1 and CV-series SYSMAC LINK Units only.

CHAPTER 11

Routing Tables

Routing tables allow networked PLCs to be configured so that they can communicate with each other via gateways; across remote networks. The routing tables contain the network, unit number information required. It is only necessary to set up routing tables if the end connection PLC is not a direct connection, i.e. using another PLC as a gateway connection. The routing table is held within the PLC(s) which acts as the gateway device. Different types of PLC and networks have different capabilities for routing.

PLC	Network	Routing Table
C-series	SYSMAC LINK	N/A
C-series	SYSMAC NET	C-SYSMAC NET
C-series	Controller Link	FINS
C-series	Ethernet	N/A
CV-series	SYSMAC LINK, SYSMAC NET, Ethernet or Controller Link	FINS
CS1-series	SYSMAC LINK, Device Net, Controller Link or Ethernet	FINS
CJ1-series	SYSMAC LINK, Device Net, Controller Link or Ethernet	FINS

The *Routing Table* menus are accessed from the PLC Network Configuration Tool dialog and contain options allowing the editing and setup of routing tables both offline and online. The routing tables which are being used in a network, can be viewed online.

Different online Routing Table Setup dialogs are used, depending upon the protocol associated with the routing table. The way in which they are displayed and operate is similar in each case.

The PLC Network Configuration Tool dialog, visually displays the structure of the routing table associated with the PLC (including the destination node and network gateway employed in directing data across the network). Initially the visual representation of the routing table is empty, or set to zero, until a routing table file has been opened. An overview of the routing table can also be viewed and edited in a graphical or tabular format.

Opening an existing Routing Table

Use the following procedure to open an existing routing table in a project.

- 1, 2, 3... 1. Open the PLC Network Configuration Tool dialog from the Routing Table menu, select **Editor**, and then the type of table.
2. From the Routing Table File menu select **Open Routing Table File**.
3. From the list of possible files, select the file to be opened.

The following procedure can also be used as a shortcut to opening an existing routing table.

- 1, 2, 3... 1. Open the PLC Network Configuration Tool dialog and from the Project menu options select **Open**.
2. In the Open Project dialog select the File Type as **All Files(*.*)**
3. In the Open Project dialog select the appropriate device type and click the **Open** button.
4. From the list in the **Project Devices** window select the network to be opened.
5. From the Routing Table menu, select **Editor** and then the required network type.

Note: Routing tables have an '.RT2' (SYSMAC NET), '.RTG' for FinsLocal or '.RT3' (FINS) Network filename extension.

Creating a new Routing Table

Use the following procedure to create a new routing table within a project.

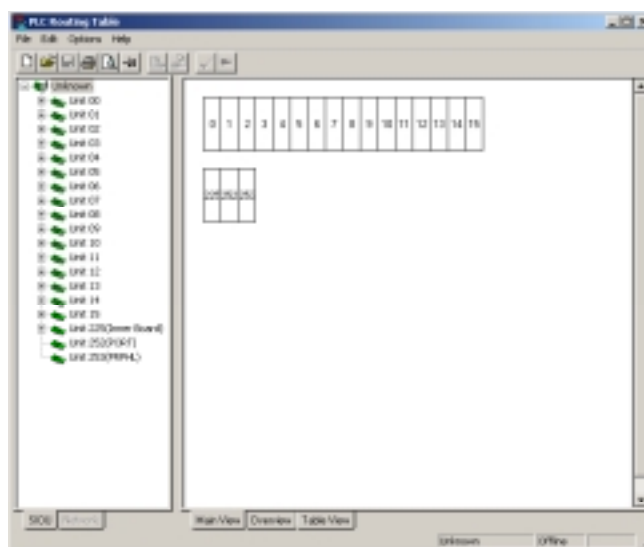
- 1, 2, 3... 1. Open the PLC Network Configuration Tool dialog from the Project menu options and select **New**.

2. In the Create Project dialog enter a file name for the new table, navigate to the folder where the file is to be saved and click the **Save** button.
3. From the PLC Network Configuration Tool Project menu select **Add Device**.
4. In the Add PLC dialog Enter a Device Name and select a Device Type and Network Type from the dropdown menu. And click **OK**.
5. From the PLC Network Configuration Tool click on the device name in the Project Device window.
6. From the Routing Table menu, select **Editor** and then the required network type.

Adding a Local Network

Use the following procedure to add a local network to a routing table.

- 1, 2, 3...*
1. Open the PLC Routing Table window and select the SIOU tab in the left hand pane and the Main View tab in the right hand pane.



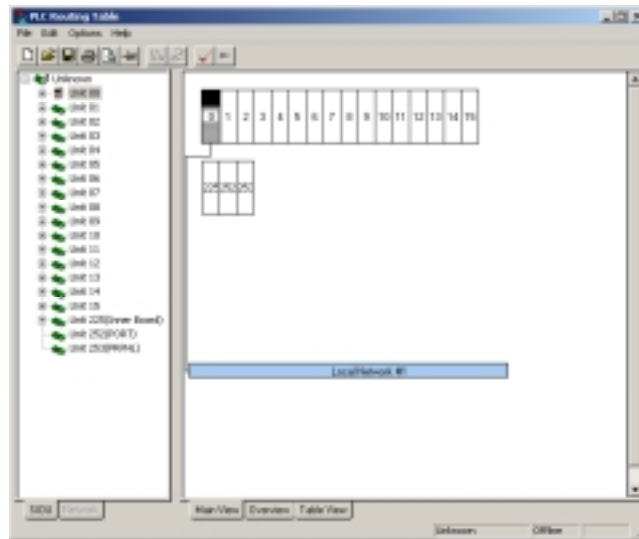
2. Select the Unit from the SIOU list to which the local network is to be added then right click on the that unit and select the *Insert CPU SIOU* option.
3. From the Enter SIOU Details dialog enter the:
 - Local Network Number.** This is the ID number that uniquely identifies the local network in the routing table. Each new network must be given a unique ID number in the range of 1 to 127.
 - Local Network Type.** Select the type of local network from the drop down menu. The network type selected will be displayed in the diagram.
4. Click **OK** to close the SIOU dialog and add the local network to the selected unit.

Note: The serial port of the CPU Unit and the serial port of the Serial Communications Board/Unit (unit version 1.2 or later) are displayed in the Unit directory in the SIOU Tab on the left. Right-click and select *Insert CPU SIOU* to set the local network address in the serial port and register in the local network table. The serial port's unit number as a CPU Bus Unit or Special I/O Unit are automatically allocated and cannot be changed. The Unit and the Unit's serial port cannot be registered in the local network table at the same time.

Adding a Remote Network

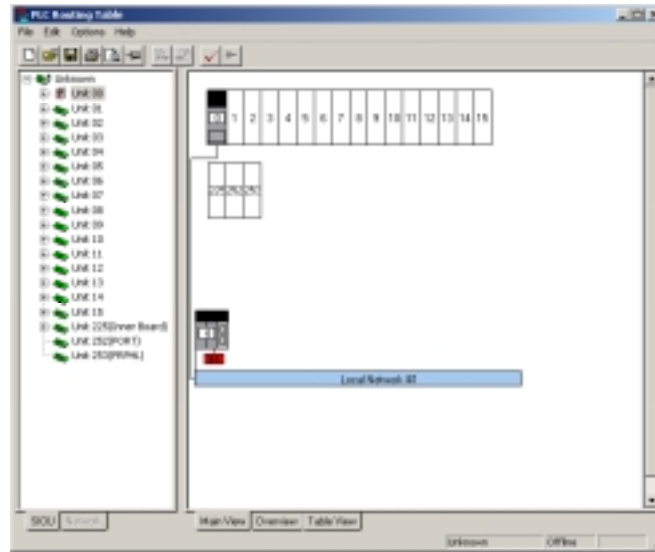
Use the following procedure to add a remote connection to a local network.

- 1, 2, 3... 1. Open the PLC Routing Table dialog and select the SIOU tab in the left hand pane and the Main View tab in the right hand pane.
2. With the cursor positioned over the local network click the right mouse button.



3. From the pop up menu select the **Add connection to Remote Network** option. (selecting the Change Local Network option enables the local network number to be changed).
4. In the Enter Relay Node Details dialog enter the:
 - Relay node number.** This is the ID number of the relay node. Relay Nodes can be given any ID number in the range 1 to 254.
 - Remote Network number.** This is the ID number that will uniquely identify the remote connection. Each new remote connection must be given a unique ID number in the range 1 to 127.

Note that a remote network can not be given the same ID number as an existing Local Network.
5. Click **OK**. This will add the remote connection with the specified ID number (shown in red) to the Local Network. A maximum of 20 remote connections can be added to a network.
6. Finally from the Options menu check the table for Errors



Editing the Routing Table

Open the appropriate routing table from the Network Configuration Tool dialog then use the following procedure to edit the table.

- 1, 2, 3... 1. Local Network:
 - ◆ In the Routing Table dialog right click on the Unit to be edited and select the appropriate option from the pop up menu.
 - ◆ To save the changes select the Save option from the File menu
2. Relay Node:
 - ◆ Right click on the Relay node and select the appropriate option from the pop up menu.
3. Remote Network:
 - ◆ Right click on the remote network and select the appropriate option from the pop up menu.

Error Checking

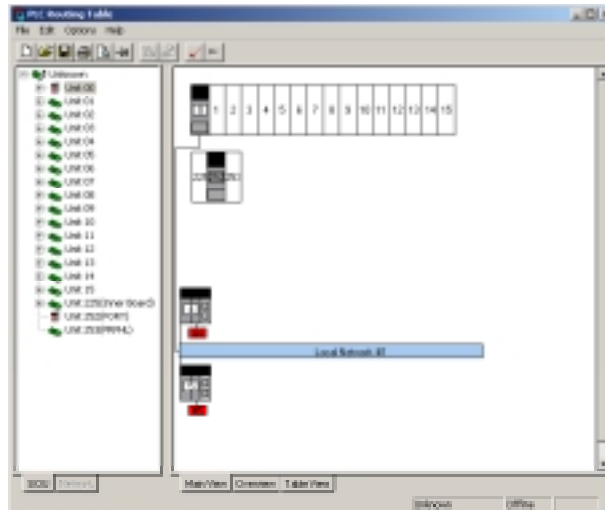
Use the following procedure to view any validation errors.





- 1, 2, 3... 1. Either:
 - ◆ Select **Check routing table for errors** from the Edit menu in the Routing Table Editor dialog box.
- Or
 - ◆ Click the ✓ in the toolbar. A message box will be displayed indicating success or failure.

Additional Features

The Network View Screen

The Network tree view is used to display the nodes on the locally connected network and is only available when the local connection network is an OMRON proprietary network, such as a Controller Link, Sysmac link, Sysmac Net or SYSWAY.



-  This icon is used to indicate that a node is present at this node number.
-  This icon is used to indicate that node is not present at this node number.
-  This icon is used to represent the currently selected node.
-  This icon is used to indicate that a node is present at this node number but there are errors reading the routing table.

The Overview Screen

Selecting the Overview tab will show all the routing tables in an graphical format. The relay node numbers are shown in the whites boxes and the remote network numbers in the red boxes. The numbers on the right are the Local Network numbers.

Note that the tables can not be edited in this view.

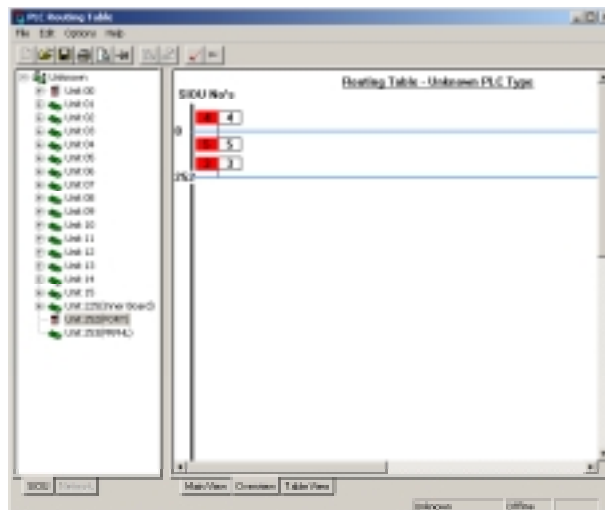
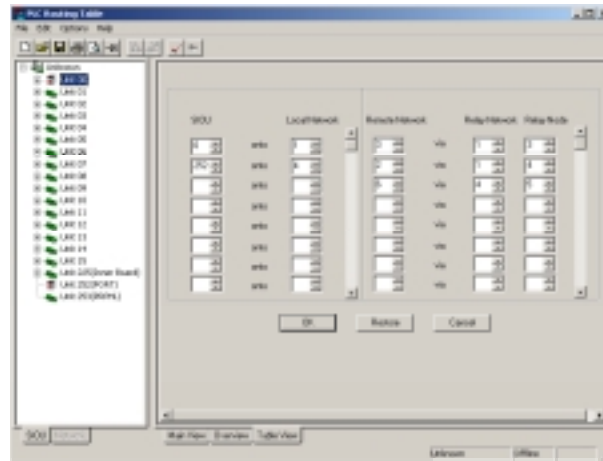


Table View Screen

The Table View screen provides a method of setting the routing table by means of a tabular view.



The screen is comprised of two main sections:

- ◆ The local settings (Left hand side)
- ◆ The remote settings (right hand side)

The local settings section allows a series of entries for the SIOU (Special Input/Output Unit) and it's corresponding Local Network number.

The remote settings section allows a series of entries for the Remote Network number, it's corresponding Relay Network number and it's corresponding Relay Node number.

The slider control to the right of each section can be used to bring any more than the eight entries into view if so required.

Each of the data entry fields have their own individual set of spin buttons, which when pressed will increment or decrement the value. The number can also be entered normally using the number keypad on the user keyboard.

Three control buttons can be found at the bottom of the screen:

- ◆ **Ok** button: Once all data entry has been completed, selecting the 'Ok' button will check the table entries for errors. If the check fails, an error description dialog will be displayed. If the check does not detect any errors the Main Screen will be displayed.
- ◆ **Restore** button: If during data entry, the user wished to revert back to the table state that was in effect before the Table View was displayed; The user should select the Restore button.
- ◆ **Cancel** button: This button will cancel any changes made whilst the Table View was being displayed and then display the Main View screen.

Note: For CS/CJ-series PLC of Ver. 2.0 or CP-series PLC or later with CX-Programmer Ver. 4.0 or later, FINS commands can be used to access nodes up to eight network levels away, including the local network.

Gateway Counter Settings

Gateway Counter Framework

When sending FINS commands or returning FINS responses in a FINS network, the GCT (Gateway counter: Permissible number of times a network bridge can be crossed) is set in the FINS header of the FINS command frame. When the FINS response is received, the GCT is automatically reduced by the number of network levels that were accessed. Therefore, the GCT setting corresponds to the number of network levels that can be accessed, as follows:

- GCT = 02 hex: Access to up to three network levels away.
- GCT = 07 hex: Access to up to eight network levels away (the network configuration, however, must use PLCs for which the Gateway counter (GCT) is set to 07 hex).

Gateway Counter Setting

When using CX-Programmer Ver.5.0 or later, the GCT (Gateway counter) value contained in the FINS header can be set under *Set Gateway Counter* in the Routing Table Dialog Box.

Note: CX-Programmer Ver.4.0 or earlier do not provide the GCT (Gateway counter) setting option.

Setting the Gateway Counter Value for Each PLC

The GCT value setting range depends on the CPU Unit being used, as follows:

- CS/CJ-series CPU Unit Ver. 3.0 or CP-series CPU Unit
The GCT (Gateway counter) value can be set to 02 hex or 07 hex.
Set the GCT value under *Set Gateway Counter* during routing table setup using the following procedure.

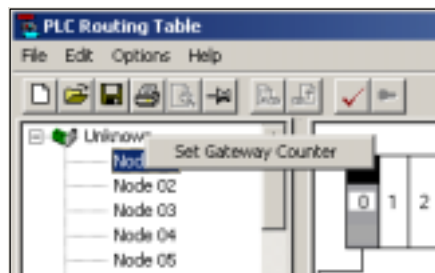
1. Setting the Gateway Counter Offline:

Open the PLC Routing Table window, select the Unit Tab in the directory list, and then right-click the icon for the local PLC node.



Setting the Gateway Count Online:

Open the PLC Routing Table window, select the Network Tab in the directory list, and then right-click the icon for a PLC node in the network.



The following Gateway Counter Setting Dialog Box will be displayed.

2. Select either *Standard* or *Expand(7)*, and then click the OK Button.



Standard: Communications across up to three network levels (GCT = 02 hex)

Expand(7): Communications across up to eight network levels (GCT = 07 hex)

The GCT value will be displayed in the Main View, Overview, and Table View Screens.

Main View	Overview	Table View

- CS/CJ-series CPU Units with Unit Ver. 2.0 or CP-series CPU Units
The GCT (Gateway counter) is always 07 hex. The number of network levels that can be accessed is always a maximum of eight network levels and cannot be set to a maximum of three network levels.
When CX-Programmer (CX-Net) Ver.5.0 or later is used, the *Standard* and *Expand(7)* options in the Gateway Counter Setting Dialog Box in the Routing Table Setup are both ignored. When routing

tables are transferred to a CS/CJ-series CPU Unit with unit Ver. 2.0 or CP-series CPU Unit, the GCT (Gateway counter) is always 07 hex, and therefore uses the *Expand* mode.

- Pre-Ver. 2.0 CS/CJ-series CPU Units and CVM1/CV-series CPU Units

The GCT (Gateway counter) is always 02 hex. Therefore, access to a maximum of three network levels away is possible.

When CX-Programmer (CX-Net) Ver.5.0 or later is used, always select the *Standard* option in the Gateway Counter Setting Dialog Box during the routing table setup. If *Expand(7)* is selected, the routing tables cannot be transferred.

Transferring a Routing Table to a PLC

Once a routing table has been created or edited, the routing table may be transferred to the PLC using the following steps:

- 1, 2, 3... 1. If the Network Configuration Tool is 'on-line' to a PLC, skip to 4.
2. Save the current routing table using the Routing Table Edit menu: **File – Save Routing Table**. (Add Author and comment if required).
3. Go 'on-line' to the PLC. See section 10 – The Network Configuration Tool for details of this operation.
4. From the CX-Net menu select: **Routing Table - Setup**
5. From the Routing Table menu select: **File – Open Routing Table**.
6. Select the previously created filename and select open. Or, alternatively the routing table can be created.
7. From the Routing Table Editor menu select: **Options – Transfer to PLC**.

Transferring a Routing table from a PLC

The routing table held within a PLC may be transferred from the PLC using the following steps:

- 1, 2, 3... 1. Go 'on-line' to the PLC. See section 10 – The Network Configuration Tool for details of this operation.
2. From the CX-Net menu select: **Routing Table - Setup**
3. From the Routing Table Editor menu select: **Options – Transfer from PLC**.
4. The routing table may then be saved to file by: From the Routing Table menu select: **File – Save Routing Table**.
5. Enter a suitable filename and select Save.

APPENDIX A

Network Availability

The following tables indicate the network available to each PLC device group. FinsGateway has no network availability and is not described

Note: Modem connection is also available by Toolbus or SYSMAC WAY if a Modem device has been configured in Microsoft Windows. Any device supporting Toolbus or SYSMAC WAY also supports Modem connections. Refer to standard Microsoft Windows documentation for details on configuring a Modem device.

Note: Where DeviceNet is indicated as an available network type for a given PLC, direct connection from a PC is not possible (No NSB support). Instead, connect via a Serial Port (COM1 etc.), or an another network type.

C**H Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
C20H	Yes	-	-	-	-	-	-
C28H	Yes	-	-	-	-	-	-
C40H	Yes	-	-	-	-	-	-
C60H	Yes	-	-	-	-	-	-

C**K Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
C20K	Yes	-	-	-	-	-	-
C28K	Yes	-	-	-	-	-	-
C40K	Yes	-	-	-	-	-	-
C60K	Yes	-	-	-	-	-	-

C**P Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
C20P	Yes	-	-	-	-	-	-
C28P	Yes	-	-	-	-	-	-
C40P	Yes	-	-	-	-	-	-
C60P	Yes	-	-	-	-	-	-

C1000H Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU01	Yes	-	Yes	Yes	-	-	-

C20 Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
C20	Yes	-	-	-	-	-	-

C2000H Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU01	Yes	-	Yes	Yes	-	-	-
C2000	Yes	-	Yes	-	-	-	-

C200H Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU01	Yes	-	-	-	-	-	-
CPU02	Yes	-	-	-	-	-	-
CPU03	Yes	-	-	-	-	-	-
CPU21	Yes	-	-	-	-	-	-
CPU21	Yes	-	-	-	-	-	-
CPU22	Yes	-	-	-	-	-	-
CPU23	Yes	-	-	-	-	-	-
CPU11	Yes	-	Yes	Yes	-	-	-
CPU31	Yes	-	Yes	Yes	-	-	-

C200HE Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU11	-	Yes	-	-	-	-	-
CPU32	-	Yes	Yes	Yes	Yes	Yes	-
CPU42	Yes	Yes	Yes	Yes	Yes	Yes	-

C200HE-Z Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU11	Yes	Yes	-	-	-	-	-
CPU32	Yes	Yes	Yes	Yes	Yes	Yes	-
CPU42	Yes	Yes	Yes	Yes	Yes	Yes	-

C200HG Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU33	Yes	Yes	Yes	Yes	Yes	Yes	-
CPU43	Yes	Yes	Yes	Yes	Yes	Yes	-
CPU53	Yes	Yes	Yes	Yes	Yes	Yes	-
CPU63	Yes	Yes	Yes	Yes	Yes	Yes	-

C200HG-Z Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU33	Yes	Yes	Yes	Yes	Yes	Yes	-
CPU43	Yes	Yes	Yes	Yes	Yes	Yes	-
CPU53	Yes	Yes	Yes	Yes	Yes	Yes	-
CPU63	Yes	Yes	Yes	Yes	Yes	Yes	-

C200HS Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU01	Yes	Yes	-	-	-	-	-
CPU03	Yes	Yes	-	-	-	-	-
CPU11	Yes	Yes	Yes	Yes	-	-	-
CPU13	Yes	Yes	Yes	Yes	-	-	-

C200HX Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU34	-	Yes	Yes	Yes	Yes	Yes	-
CPU44	Yes	Yes	Yes	Yes	Yes	Yes	-
CPU54	-	Yes	Yes	Yes	Yes	Yes	-
CPU64	Yes	Yes	Yes	Yes	Yes	Yes	-

C200HX-Z Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU34	Yes	Yes	Yes	Yes	Yes	Yes	-
CPU44	Yes	Yes	Yes	Yes	Yes	Yes	-
CPU54	Yes	Yes	Yes	Yes	Yes	Yes	-
CPU64	Yes	Yes	Yes	Yes	Yes	Yes	-

C500 Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
C500	Yes	-	Yes	-	-	-	-
C250	Yes	-	-	-	-	-	-
C120	Yes	-	-	-	-	-	-
C50	Yes	-	-	-	-	-	-

CJ1G Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU45	Yes	Yes	-	-	Yes	Yes	Yes
CPU44	Yes	Yes	-	-	Yes	Yes	Yes

CJ1G-H Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU45	Yes	Yes	-	-	Yes	Yes	Yes
CPU44	Yes	Yes	-	-	Yes	Yes	Yes
CPU43	Yes	Yes	-	-	Yes	Yes	Yes
CPU42	Yes	Yes	-	-	Yes	Yes	Yes

CJ1H-H Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU66	Yes	Yes	-	Yes	Yes	Yes	Yes
CPU65	Yes	Yes	-	Yes	Yes	Yes	Yes

CJ1M Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU12	Yes	Yes	-	-	Yes	Yes	Yes
CPU13	Yes	Yes	-	-	Yes	Yes	Yes
CPU22	Yes	Yes	-	-	Yes	Yes	Yes
CPU23	Yes	Yes	-	-	Yes	Yes	Yes

NSJ Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
G5D	Yes	Yes	-	-	Yes	Yes	Yes

CPM1 (CPM1A/CPM2*) Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU10	Yes	Yes	-	-	-	-	-
CPU20	Yes	Yes	-	-	-	-	-
CPU30	Yes	Yes	-	-	-	-	-

CPM2*-S* Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
N/A	Yes	Yes	-	-	-	-	Yes

CQM1 Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU11	Yes	Yes	-	-	-	-	-
CPU21	Yes	Yes	-	-	-	-	-
CPU41	Yes	Yes	-	-	-	-	-
CPU42	Yes	Yes	-	-	-	-	-
CPU43	Yes	Yes	-	-	-	-	-
CPU44	Yes	Yes	-	-	-	-	-

CQM1H Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU11	Yes	Yes	-	-	-	-	-
CPU21	Yes	Yes	-	-	-	-	-
CPU51	Yes	Yes	-	-	Yes	-	-
CPU61	Yes	Yes	-	-	Yes	-	-

CS1G/CS1G-H Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU45	Yes	Yes	-	Yes	Yes	Yes	Yes
CPU44	Yes	Yes	-	Yes	Yes	Yes	Yes
CPU43	Yes	Yes	-	Yes	Yes	Yes	Yes
CPU42	Yes	Yes	-	Yes	Yes	Yes	Yes

CS1H/CS1H-H Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU67	Yes	Yes	-	Yes	Yes	Yes	Yes
CPU66	Yes	Yes	-	Yes	Yes	Yes	Yes
CPU65	Yes	Yes	-	Yes	Yes	Yes	Yes
CPU64	Yes	Yes	-	Yes	Yes	Yes	Yes
CPU63	Yes	Yes	-	Yes	Yes	Yes	Yes

IDSC Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
C01	Yes	Yes	-	-	-	-	-
C02	Yes	Yes	-	-	-	-	-

SRM1 – SRM1 V2 Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
C01	Yes	Yes	-	-	-	-	-
C02	Yes	Yes	-	-	-	-	-

CV1000 Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU01	Yes	Yes	Yes	Yes	Yes	Yes	-

CV2000 Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU01	Yes	Yes	Yes	Yes	Yes	Yes	-

CV500 Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU01	Yes	Yes	Yes	Yes	Yes	Yes	-

CVM1 Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU01	Yes	Yes	Yes	Yes	Yes	Yes	-
CPU11	Yes	Yes	Yes	Yes	Yes	Yes	-

CVM1-V2 Device Group

Device Type	SYSMAC WAY	Toolbus	SYSMAC NET	SYSMAC LINK	Controller Link	Ethernet	Device Net
CPU01	Yes	Yes	Yes	Yes	Yes	Yes	-
CPU11	Yes	Yes	Yes	Yes	Yes	Yes	-
CPU21	Yes	Yes	Yes	Yes	Yes	Yes	-

APPENDIX B

PLC Memory Areas

The following tables provide memory area details for each device group.

Some tables indicate special addresses. These can be as follows:

- ◆ *CLOCK*. This allows reading/writing of a PLC's real-time clock.
- ◆ *BANKNO*. This allows reading/writing of a PLC's extended memory bank number.
- ◆ *MODE*. This allows reading/writing of a PLC's run-mode.

C**H Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	27	Yes	Yes	Yes	F C
TC	0	511	Present Value	Status	Yes	F C
DM	0	1999	Yes	No	Yes	
HR	0	99	Yes	Yes	Yes	F C
IR (opt)	0	252	Yes	Yes	Yes	F C
IR (opt)	253	255 (bit 7)	Yes	Yes	No	
LR	0	63	Yes	Yes	Yes	F C
SR (opt)	247	252	Yes	Yes	Yes	F C
SR (opt)	253	255 (bit 7)	Yes	Yes	No	
TR	0	0 (bit 7)	No	Yes	No	

Special addresses CLOCK, MODE.

C**K Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
TC	0	47	Present Value	Status	Yes	F C
DM	0	63	Yes	No	Yes	
HR	0	9	Yes	Yes	Yes	F C
IR (opt)	0	18 (bit 7)	Yes	Yes	Yes	F C
SR (opt)	18 (bit 8)	19 (bit 7)	No	Yes	No	
TR	0	0 (bit 7)	No	Yes	No	

C**P Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
TC	0	47	Present Value	Status	Yes	F C
DM	0	63	Yes	No	Yes	
HR	0	9	Yes	Yes	Yes	F C
IR (opt)	0	18 (bit 7)	Yes	Yes	Yes	F C
SR (opt)	18 (bit 8)	19 (bit 7)	No	Yes	No	
TR	0	0 (bit 7)	No	Yes	No	

C1000H Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	27	Yes	Yes	Yes	F C
TC	0	511	Present Value	Status	Yes	F C
DM	0	4095	Yes	No	Yes	
HR	0	99	Yes	Yes	Yes	F C
IR (opt)	0	236	Yes	Yes	Yes	F C
LR	0	63	Yes	Yes	Yes	F C
SR (opt)	237	252	Yes	Yes	Yes	F C
SR (opt)	253	255 (bit 7)	Yes	Yes	No	
TR	0	0 (bit 7)	No	Yes	No	

Special addresses: MODE.

C20 Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
TC	0	47	Present Value	Status	Yes	F C
HR	0	9	Yes	Yes	Yes	F C
IR (opt)	0	18 (bit 7)	Yes	Yes	Yes	F C
SR (opt)	18 (bit 8)	19 (bit 7)	No	Yes	No	
TR	0	0 (bit 7)	No	Yes	No	

C2000H Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	27	Yes	Yes	Yes	F C
TC	0	511	Present Value	Status	Yes	F C
DM	0	6655	Yes	No	Yes	
HR	0	99	Yes	Yes	Yes	F C
IR (opt)	0	236	Yes	Yes	Yes	F C
LR	0	63	Yes	Yes	Yes	F C
SR (opt)	237	252	Yes	Yes	Yes	F C
SR (opt)	253	255 (bit 7)	Yes	Yes	No	
TR	0	0 (bit 7)	No	Yes	No	

Special addresses: MODE.

C200H Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	27	Yes	Yes	Yes	F C
DM	0	1999	Yes	No	Yes	
HR	0	99	Yes	Yes	Yes	F C
IR (opt)	0	235	Yes	Yes	Yes	F C
LR	0	63	Yes	Yes	Yes	F C
SR (opt)	236	252	Yes	Yes	Yes	F C

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
SR (opt)	253	255 (bit 7)	Yes	Yes	No	
TR	0	0 (bit 7)	No	Yes	No	
TC	0	511	Present Value	Status	Yes	F C

Special addresses: CLOCK, MODE.

C200HE Device Group

General Memory Areas

Memory Areas for any CPU.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	27	Yes	Yes	Yes	F C
DM	0	4095	Yes	No	Yes	
DM	6000	6655	Yes	No	Yes	
HR	0	99	Yes	Yes	Yes	F C
IR (opt)	0	235	Yes	Yes	Yes	F C
IR (opt)	300	511	Yes	Yes	Yes	F C
LR	0	63	Yes	Yes	Yes	F C
SR (opt)	236	252	Yes	Yes	Yes	F C
SR (opt)	253	255 (bit 7)	Yes	Yes	No	
SR (opt)	256	299	Yes	Yes	Yes	FC
TR	0	0 (bit 7)	No	Yes	No	
SR (opt)	256	299	Yes	Yes	Yes	F C
TC	0	511	Present Value	Status	Yes	F C

CPU 32/42 Memory Areas

Memory Areas in addition to general memory areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
DM	4096	5999	Yes	No	Yes	

Special addresses: CLOCK, MODE.

C200HE-Z Device Group

General Memory Areas

Memory Areas for any CPU.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	27	Yes	Yes	Yes	F C
DM	0	4095	Yes	No	Yes	
DM	6000	6655	Yes	No	Yes	
HR	0	99	Yes	Yes	Yes	F C
IR (opt)	0	235	Yes	Yes	Yes	F C
IR (opt)	300	511	Yes	Yes	Yes	F C
LR	0	63	Yes	Yes	Yes	F C
SR (opt)	236	252	Yes	Yes	Yes	F C
SR (opt)	253	255 (bit 7)	Yes	Yes	No	
SR (opt)	256	299	Yes	Yes	Yes	FC
TR	0	0 (bit 7)	No	Yes	No	
SR (opt)	256	299	Yes	Yes	Yes	F C
TC	0	511	Present Value	Status	Yes	F C

CPU 32/42 Device Group

Memory Areas in addition to general memory areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
DM	4096	5999	Yes	No	Yes	

Special addresses: CLOCK, MODE.

C200HG Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	27	Yes	Yes	Yes	F C
DM	0	6655	Yes	No	Yes	
HR	0	99	Yes	Yes	Yes	F C
IR (opt)	0	235	Yes	Yes	Yes	F C
IR (opt)	300	511	Yes	Yes	Yes	F C
LR	0	63	Yes	Yes	Yes	F C
SR (opt)	236	252	Yes	Yes	Yes	F C
SR (opt)	253	255 (bit 7)	Yes	Yes	No	
SR (opt)	256	299	Yes	Yes	Yes	F C
TR	0	0 (bit 7)	No	Yes	No	
TC	0	511	Present Value	Status	Yes	F C
EM	0	6143 * 1	Yes	No	Yes	-n

Special addresses: CLOCK, MODE, BANKNO.

C200HG-Z Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	27	Yes	Yes	Yes	F C
DM	0	6655	Yes	No	Yes	
HR	0	99	Yes	Yes	Yes	F C
IR (opt)	0	235	Yes	Yes	Yes	F C
IR (opt)	300	511	Yes	Yes	Yes	F C
LR	0	63	Yes	Yes	Yes	F C
SR (opt)	236	252	Yes	Yes	Yes	F C
SR (opt)	253	255 (bit 7)	Yes	Yes	No	
SR (opt)	256	299	Yes	Yes	Yes	F C
TR	0	0 (bit 7)	No	Yes	No	
TC	0	511	Present Value	Status	Yes	F C
EM	0	6143 * 1	Yes	No	Yes	-n

Special addresses: CLOCK, MODE, BANKNO.

C200HS Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	27	Yes	Yes	Yes	F C
DM	0	6655	Yes	No	Yes	
HR	0	99	Yes	Yes	Yes	F C
IR (opt)	0	235	Yes	Yes	Yes	F C
IR (opt)	300	511	Yes	Yes	Yes	F C
LR	0	63	Yes	Yes	Yes	F C
SR (opt)	236	252	Yes	Yes	Yes	F C
SR (opt)	253	255 (bit 7)	Yes	Yes	No	
SR (opt)	256	299	Yes	Yes	Yes	F C
TC	0	511	Present Value	Status	Yes	F C
TR	0	0 (bit 7)	No	Yes	No	

Special addresses: CLOCK, MODE.

C200HX Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	27	Yes	Yes	Yes	F C
DM	0	6655	Yes	No	Yes	
HR	0	99	Yes	Yes	Yes	F C
IR (opt)	0	235	Yes	Yes	Yes	F C
IR (opt)	300	511	Yes	Yes	Yes	F C
LR	0	63	Yes	Yes	Yes	F C
SR (opt)	236	252	Yes	Yes	Yes	F C
SR (opt)	253	255 (bit 7)	Yes	Yes	No	
SR (opt)	256	299	Yes	Yes	Yes	F C
TR	0	0 (bit 7)	No	Yes	No	
TC	0	511	Present Value	Status	Yes	F C
EM	0	6143 * 3	Yes	No	Yes	-n

Special addresses: CLOCK, MODE, BANKNO.

C200HX-Z Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	27	Yes	Yes	Yes	F C
DM	0	6655	Yes	No	Yes	
HR	0	99	Yes	Yes	Yes	F C
IR (opt)	0	235	Yes	Yes	Yes	F C
IR (opt)	300	511	Yes	Yes	Yes	F C
LR	0	63	Yes	Yes	Yes	F C
SR (opt)	236	252	Yes	Yes	Yes	F C
SR (opt)	253	255 (bit 7)	Yes	Yes	No	
SR (opt)	256	299	Yes	Yes	Yes	F C
TR	0	0 (bit 7)	No	Yes	No	
TC	0	511	Present Value	Status	Yes	F C

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
EM	0	6143 * 3	Yes	No	Yes	-n

CPU 65 Memory Areas

Memory Areas in addition to general memory areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
EM	0	6143 * 8	Yes	No	Yes	-n

CPU 85 Memory Areas

Memory Areas in addition to general memory areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
EM	0	6143 * 16	Yes	No	Yes	-n

Special addresses: CLOCK, MODE, BANKNO.

C500 Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
TC	0	127	Present Value	Status	Yes	F C
DM	0	511	Yes	No	Yes	
HR	0	31	Yes	Yes	Yes	F C
IR (opt)	0	57	Yes	Yes	Yes	F C
LR	0	31	Yes	Yes	Yes	F C
SR (opt)	58	60	Yes	Yes	Yes	F C
SR (opt)	61	63 (bit 7)	Yes	Yes	No	
TR	0	0 (bit 7)	No	Yes	No	

CJ1G Device Group

General Memory Areas

General Memory Areas for all CPUs 44 and 45.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
IR	0	15	Yes (double)	No	Yes	
DR	0	15	Yes	No	Yes	f c
TK	0	31	Status	Yes	No	
A	0	447	Yes	Yes	No	
A	448	959	Yes	Yes	Yes	f c
H	0	511	Yes	Yes	Yes	
W	0	511	Yes	Yes	Yes	
CIO(opt)	0	6143	Yes	Yes	Yes	f c
T	0	4095	Present Value	Status	Yes	F C
C	0	4095	Present Value	Status	Yes	F C

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
D	0	32767	Yes	No	Yes	
CF	0	11	No	Yes	No	
CF	100	104	No	Yes	No	
CF	113	114	No	Yes	No	

CPU 44 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767 * 1	Yes	No	Yes	-n

CPU 45 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767 * 3	Yes	No	Yes	-n

Special addresses: (all CPUs): CLOCK, MODE.
(CPU 44/45): BANKNO.

CJ1G-H Device Group

General Memory Areas

General Memory Areas for all CPUs 42, 43, 44 and 45.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
IR	0	15	Yes (double)	No	Yes	
DR	0	15	Yes	No	Yes	f c
TK	0	31	Status	Yes	No	
A	0	447	Yes	Yes	No	
A	448	959	Yes	Yes	Yes	f c
H	0	511	Yes	Yes	Yes	
W	0	511	Yes	Yes	Yes	
CIO(opt)	0	6143	Yes	Yes	Yes	f c
T	0	4095	Present Value	Status	Yes	F C
C	0	4095	Present Value	Status	Yes	F C
D	0	32767	Yes	No	Yes	
CF	0	11	No	Yes	No	
CF	100	104	No	Yes	No	
CF	113	114	No	Yes	No	

CPU 42 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767 * 1	Yes	No	Yes	-n

CPU 43 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767 * 1	Yes	No	Yes	-n

CPU 44 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767 * 1	Yes	No	Yes	-n

CPU 45 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767 * 3	Yes	No	Yes	-n

Special addresses: (all CPUs): CLOCK, MODE.
(CPU 44/45): BANKNO.

CJ1H-H Device Group

General Memory Areas

General Memory Areas for CPUs 65 and 66.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
CIO(opt)	0	6143	Yes	Yes	Yes	fc
DR	0	15	Yes	No	Yes	fc
TK	0	31	Status	Yes	No	
A	0	447	Yes	Yes	No	
A	448	959	Yes	Yes	Yes	fc
H	0	511	Yes	Yes	Yes	fc
W	0	511	Yes	Yes	Yes	
T	0	4095	Present Value	Status	Yes	FC
C	0	4095	Present Value	Status	Yes	FC
D	0	32767	Yes	No	Yes	
IR	0	15	Yes (double)	No	Yes	
CF	0	11	No	Yes	No	
CF	100	104	No	Yes	No	
CF	113	114	No	Yes	No	

CPU 65 Memory Areas

Memory Areas in addition to General Memory Areas

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767*3	Yes	No	Yes	-n

CPU 66 Memory Areas

Memory Areas in addition to General Memory Areas

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767*7	Yes	No	Yes	-n

CJ1M and CP1H Device Group

General Memory Areas

General Memory Areas for all CPUs 12, 13, 22 and 23.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
IR	0	15	Yes (double)	No	Yes	
DR	0	15	Yes	No	Yes	f c
TK	0	31	Status	Yes	No	
A	0	447	Yes	Yes	No	
A	448	959	Yes	Yes	Yes	f c
H	0	511	Yes	Yes	Yes	
W	0	511	Yes	Yes	Yes	
CIO(opt)	0	6143	Yes	Yes	Yes	f c
T	0	4095	Present Value	Status	Yes	F C
C	0	4095	Present Value	Status	Yes	F C
D	0	32767	Yes	No	Yes	
CF	0	11	No	Yes	No	
CF	100	104	No	Yes	No	
CF	113	114	No	Yes	No	

CPM1 (CPM1A) Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	15	Yes	Yes	Yes	F C
DM	0	1023	Yes	No	Yes	
DM	6144	6655	Yes	No	Yes	
HR	0	19	Yes	Yes	Yes	F C
IR (opt)	0	19	Yes	Yes	Yes	F C
IR (opt)	200	231	Yes	Yes	Yes	F C
LR	0	15	Yes	Yes	Yes	F C
SR (opt)	232	252	Yes	Yes	Yes	F C
TR	0	0 (bit 7)	No	Yes	No	
TC	0	127	Present Value	Status	Yes	F C

Special addresses: MODE.

CPM2*/CPM2*-S* Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	23	Yes	Yes	Yes	F C
DM	0	2047	Yes	No	Yes	
DM	6144	6599	Yes	No	Yes	
DM	6600	6655	Yes	No	No	
HR	0	19	Yes	Yes	Yes	F C
IR (opt)	0	49	Yes	Yes	Yes	F C
IR (opt)	200	227	Yes	Yes	Yes	F C
LR	0	15	Yes	Yes	Yes	F C
SR (opt)	228	252	Yes	Yes	Yes	F C
SR(opt)	253	255	Yes	Yes	No	
TR	0	0 (bit 7)	No	Yes	No	
TC	0	127	Present Value	Status	Yes	F C

Special addresses: MODE.

CQM1 Device Group

Memory Areas

Memory Areas for all CPUs.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	27	Yes	Yes	Yes	F C
DM	0	1023	Yes	No	Yes	
DM	6144	6655	Yes	No	Yes	
HR	0	99	Yes	Yes	Yes	F C
IR (opt)	0	243	Yes	Yes	Yes	F C
LR	0	63	Yes	Yes	Yes	F C
SR (opt)	244	252	Yes	Yes	Yes	F C
SR (opt)	253	255 (bit 7)	Yes	Yes	No	
TR	0	0 (bit 7)	No	Yes	No	
TC	0	511	Present Value	Status	Yes	F C

CPU 41/42/43/44/45 Memory Areas

Memory Areas in addition to general memory areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
DM	1024	6143	Yes	No	Yes	

Special addresses: CLOCK, MODE.

CQM1H Device Group

Memory Areas

Memory Areas for all CPUs.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	27	Yes	Yes	Yes	F C
HR	0	99	Yes	Yes	Yes	F C
IR (opt)	0	243	Yes	Yes	Yes	F C
LR	0	63	Yes	Yes	Yes	F C
SR (opt)	244	252	Yes	Yes	Yes	F C
SR (opt)	253	255 (bit 7)	Yes	Yes	No	
TR	0	0 (bit 7)	No	Yes	No	
TC	0	511	Present Value	Status	Yes	F C

CPU 11/21 Memory Areas

Memory Areas in addition to general memory areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
DM	0	3071	Yes	No	Yes	
DM	6144	6655	Yes	No	Yes	

Special addresses: CLOCK, MODE.

CPU 51 Memory Areas

Memory Areas in addition to general memory areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
DM	0	6655	Yes	No	Yes	

Special addresses: CLOCK, MODE.

CPU 61 Memory Areas

Memory Areas in addition to general memory areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
DM	0	6655	Yes	No	Yes	
EM	0	6143 * 1	Yes	No	Yes	

Special addresses: CLOCK, MODE.

CS1G Device Group

General Memory Areas

General Memory Areas for all CPUs 42, 43, 44 and 45.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
IR	0	15	Yes (double)	No	Yes	

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
DR	0	15	Yes	No	Yes	f c
TK	0	31	Status	Yes	No	
A	0	447	Yes	Yes	No	
A	448	959	Yes	Yes	Yes	f c
H	0	511	Yes	Yes	Yes	
W	0	511	Yes	Yes	Yes	
CIO(opt)	0	6143	Yes	Yes	Yes	f c
T	0	4095	Present Value	Status	Yes	F C
C	0	4095	Present Value	Status	Yes	F C
D	0	32767	Yes	No	Yes	
CF	0	11	No	Yes	No	
CF	100	104	No	Yes	No	
CF	113	114	No	Yes	No	

CPU 44 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767 * 1	Yes	No	Yes	-n

CPU 45 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767 * 3	Yes	No	Yes	-n

Special addresses: (all CPUs): CLOCK, MODE.
(CPU 44/45): BANKNO.

CS1G-H Device Group

General Memory Areas

General Memory Areas for all CPU 42, 42, 44 and 45

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
CIO(opt)	0	6143	Yes	Yes	Yes	f c
DR	0	15	Yes	No	Yes	f c
TK	0	31	Status	Yes	No	
A	0	447	Yes	Yes	No	
A	448	959	Yes	Yes	Yes	f
H	0	511	Yes	Yes	Yes	FC
W	0	511	Yes	Yes	Yes	
T	0	4095	Present Value	Status	Yes	FC
C	0	4095	Present Value	Status	Yes	FC
D	0	32767	Yes	No	Yes	
IR	0	15	Yes (double)	No	Yes	
CF	0	11	No	Yes	No	
CF	100	104	No	Yes	No	
CF	113	114	No	Yes	No	

CPU 42 Memory Areas

Memory Areas in addition to General Memory Areas

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767*1	Yes	No	Yes	-n

CPU 43 Memory Areas

Memory Areas in addition to General Memory Areas

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767*1	Yes	No	Yes	-n

CPU 44 Memory Areas

Memory Areas in addition to General Memory Areas

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767*1	Yes	No	Yes	-n

CPU 45 Memory Areas

Memory Areas in addition to General Memory Areas

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767*3	Yes	No	Yes	-n

CS1H Device Group

General Memory Areas

General Memory Areas for all CPUs 63, 64, 65, 66 and 67.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
IR	0	15	Yes (double)	No	Yes	
DR	0	15	Yes	No	Yes	f c
TK	0	31	Status	Yes	No	
A	0	447	Yes	Yes	No	
A	448	959	Yes	Yes	Yes	f c
H	0	511	Yes	Yes	Yes	
W	0	511	Yes	Yes	Yes	
CIO(opt)	0	6143	Yes	Yes	Yes	f c
T	0	4095	Present Value	Status	Yes	F C
C	0	4095	Present Value	Status	Yes	F C
D	0	32767	Yes	No	Yes	
CF	0	11	No	Yes	No	
CF	100	104	No	Yes	No	
CF	113	114	No	Yes	No	

CPU 64 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767 * 1	Yes	No	Yes	-n

CPU 65 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767 * 3	Yes	No	Yes	-n

CPU 66 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767 * 7	Yes	No	Yes	-n

CPU 67 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32765 * 13	Yes	No	Yes	-n

Special addresses: (all CPUs): CLOCK, MODE.
(CPU 64/65/66/67): BANKNO.

CS1H-H Device Group

General Memory Areas

General Memory Areas for all CPU 63, 64, 65, 66 and 67

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
CIO(opt)	0	6143	Yes	Yes	Yes	fc
DR	0	15	Yes	No	Yes	fc
TK	0	31	Status	Yes	No	
A	0	447	Yes	Yes	No	
A	448	959	Yes	Yes	Yes	fc
H	0	511	Yes	Yes	Yes	fc
W	0	511	Yes	Yes	Yes	
T	0	4095	Present Value	Status	Yes	FC
C	0	4095	Present Value	Status	Yes	FC
D	0	32767	Yes	No	Yes	
IR	0	15	Yes (double)	No	Yes	
CF	0	11	No	Yes	No	
CF	100	104	No	Yes	No	
CF	113	114	No	Yes	No	

CPU 63 Memory Areas

Memory Areas in addition to General Memory Areas

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767*1	Yes	No	Yes	-n

CPU 64 Memory Areas

Memory Areas in addition to General Memory Areas

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767*1	Yes	No	Yes	-n

CPU 65 Memory Areas

Memory Areas in addition to General Memory Areas

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767*3	Yes	No	Yes	-n

CPU 66 Memory Areas

Memory Areas in addition to General Memory Areas

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767*7	Yes	No	Yes	-n

CPU 67 Memory Areas

Memory Areas in addition to General Memory Areas

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
E	0	32767*13	Yes	No	Yes	-n

IDSC Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	27	Yes	Yes	Yes	F C
DM	0	1023	Yes	No	Yes	
DM	6144	6655	Yes	No	Yes	
HR	0	99	Yes	Yes	Yes	F C
IR (opt)	0	243	Yes	Yes	Yes	F C
LR	0	63	Yes	Yes	Yes	F C
SR (opt)	244	252	Yes	Yes	Yes	F C
SR (opt)	253	255 (bit 7)	Yes	Yes	No	
TR	0	0 (bit 7)	No	Yes	No	
TC	0	511	Present Value	Status	Yes	F C

Special addresses: CLOCK, MODE.

SRM1 Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	15	Yes	Yes	Yes	F C
DM	0	2047	Yes	No	Yes	
DM	6144	6655	Yes	No	Yes	
HR	0	19	Yes	Yes	Yes	F C
IR (opt)	0	23	Yes	Yes	Yes	F C
IR (opt)	200	252	Yes	Yes	Yes	F C
LR	0	15	Yes	Yes	Yes	F C
SR (opt)	232	252	Yes	Yes	Yes	F C
SR (opt)	253	255 (bit 7)	Yes	Yes	No	
TR	0	0 (bit 7)	No	Yes	No	
TC	0	127	Present Value	Status	Yes	F C

Special addresses: MODE.

SRM1 V2 Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
AR	0	15	Yes	Yes	Yes	F C
C	0	127	Yes	Yes	Yes	F C
DM	0	2047	Yes	No	Yes	
DM	6144	6655	Yes	No	Yes	
HR	0	19	Yes	Yes	Yes	F C
IR	0	23	Yes	Yes	Yes	F C
IR	200	239	Yes	Yes	Yes	F C
LR	0	15	Yes	Yes	Yes	F C
SR	240	253	Yes	Yes	Yes	F C
SR	253	254	Yes	Yes	No	
SR	254	255	Yes	Yes	No	
TR	0	0 (bit 7)	No	Yes	No	
TC	0	127	Present Value	Status	Yes	F C

Special addresses: MODE.

CV1000 Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
A	0	255	Yes	Yes	Yes	F C
A	256	511	Yes	Yes	No	
AC	0	2047	No	Yes	No	
C	0	1023	Present Value	Status	Yes	F C
CIO (opt)	0	2555	Yes	Yes	Yes	F C
D	0	24575	Yes	No	Yes	
DR	0	2	Yes	No	Yes	
G	0	255	Yes	Yes	Yes	F C
IR	0	2	Yes	No	Yes	
ST	0	1023	Yes	Yes	Yes	
T	0	1023	Present Value	Status	Yes	F C

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
TN	0	1023	No	Yes	Yes	F C
TR	0	0 (bit 7)	No	Yes	Yes	F C
E	0	32765 * 2/4/8	Yes	No	Yes	- n

Special addresses: BANKNO, CLOCK, MODE.

CV2000 Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
A	0	255	Yes	Yes	Yes	F C
A	256	511	Yes	Yes	No	
AC	0	2047	No	Yes	No	
C	0	1023	Present Value	Status	Yes	F C
CIO (opt)	0	2555	Yes	Yes	Yes	F C
D	0	24575	Yes	No	Yes	
DR	0	2	Yes	No	Yes	
G	0	255	Yes	Yes	Yes	F C
IR	0	2	Yes	No	Yes	
ST	0	1023	Yes	Yes	Yes	
T	0	1023	Present Value	Status	Yes	F C
TN	0	1023	No	Yes	Yes	F C
TR	0	0 (bit 7)	No	Yes	Yes	F C
E	0	32765 * 2/4/8	Yes	No	Yes	- n

Special addresses: BANKNO, CLOCK, MODE.

CV500 Device Group

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
A	0	255	Yes	Yes	Yes	F C
A	256	511	Yes	Yes	No	
AC	0	1023	No	Yes	No	
C	0	511	Present Value	Status	Yes	F C
CIO (opt)	0	2555	Yes	Yes	Yes	F C
D	0	8191	Yes	No	Yes	
DR	0	2	Yes	No	Yes	
G	0	255	Yes	Yes	Yes	F C
IR	0	2	Yes	No	Yes	
ST	0	511	Yes	Yes	Yes	F C
T	0	511	Present Value	Status	Yes	F C
TN	0	511	No	Yes	Yes	F C
TR	0	0 (bit 7)	No	Yes	Yes	F C

Special addresses: MODE, CLOCK

CVM1 Device Group

General Memory Areas

Memory Areas for any CPU.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
A	0	255	Yes	Yes	Yes	F C
A	256	511	Yes	Yes	No	
DR	0	2	Yes	No	Yes	
CIO (opt)	0	2555	Yes	Yes	Yes	F C
G	0	255	Yes	Yes	Yes	F C
IR	0	2	Yes	No	Yes	
TR	0	0 (bit 7)	No	Yes	Yes	F C

CPU 01 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
C	0	511	Present Value	Status	Yes	F C
D	0	8191	Yes	No	Yes	
T	0	511	Present Value	Status	Yes	F C

CPU 11 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
C	0	1023	Present Value	Status	Yes	F C
D	0	24575	Yes	No	Yes	
T	0	1023	Present Value	Status	Yes	F C

Special addresses: (all CPUs): CLOCK, MODE.

CVM1-V2 Device Group

General Memory Areas

Memory Areas for any CPU.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
A	0	255	Yes	Yes	Yes	F C
A	256	511	Yes	Yes	No	
DR	0	2	Yes	No	Yes	
CIO (opt)	0	2555	Yes	Yes	Yes	F C
G	0	255	Yes	Yes	Yes	F C
IR	0	2	Yes	No	Yes	
TR	0	0 (bit 7)	No	Yes	Yes	F C

CPU 01 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
C	0	511	Present Value	Status	Yes	F C
D	0	8191	Yes	No	Yes	
T	0	511	Present Value	Status	Yes	F C

CPU 11 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
C	0	1023	Present Value	Status	Yes	F C
D	0	24575	Yes	No	Yes	
T	0	1023	Present Value	Status	Yes	F C

CPU 21 Memory Areas

Memory Areas in addition to General Memory Areas.

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
C	0	1023	Present Value	Status	Yes	F C
D	0	24575	Yes	No	Yes	
T	0	1023	Present Value	Status	Yes	F C
E	0	32765 * 2/4/8	Yes	No	Yes	-n

Special addresses: (all CPUs): CLOCK,
 (CPU 21): MODE,
 BANKNO.

FinsGateway CPU Unit

Prefix	Start Channel	End Channel	Word Addressing	Bit Addressing	Read Write	Modifiers
CIO(opt)	0	32767	Yes	Yes	Yes	
D	0	32767	Yes	No	Yes	

APPENDIX C

Toolbars and Keyboard Shortcuts

The following tables summarise the toolbars and keyboard shortcuts available from each component and tool. The F1 function key is common across all components and tools and provides context help.

Toolbars



- Open
- Open File
- Save in Project
- Print
- Print Preview
- Cut
- Copy
- Past



- Fill Data Area
- Clear Data Area
- Transfer to PLC
- Transfer from PLC
- Compare with PLC
- Monitor



- Binary
- Binary Coded Decimal
- Decimal
- Signed Decimal
- Floating Point
- Hexadecimal
- Text
- LReal
- Double Word
- Quad Word
- Resize Column
- Zoom Out
- Restore Zoom
- Zoom In



- Set Value
- Force On
- Force Off
- Clear Force Status

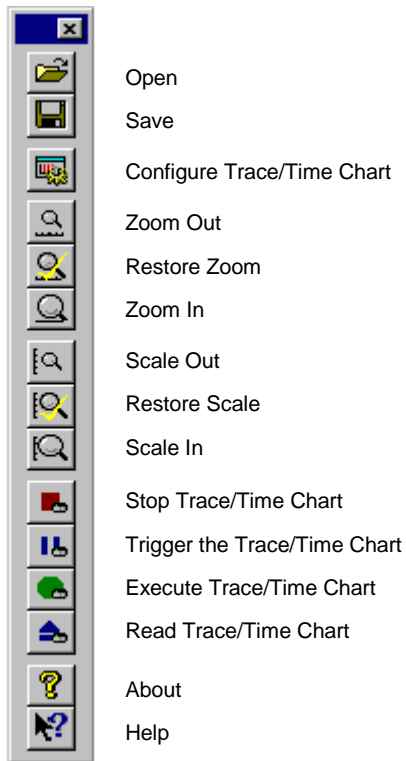
Keyboard Shortcuts

- Ctrl+O..... Open
- Ctrl+S..... Save in Project
- Ctrl+P..... Print
- Ctrl+X..... Cut
- Ctrl+C..... Copy
- Ctrl+V..... Paste
- Ctrl+PgUp..... Zoom In
- Ctrl+PgDn..... Zoom Out

- Alt+B..... Binary
- Alt+C..... Binary Coded Decimal
- Alt+D..... Decimal
- Alt+S..... Signed Decimal
- Alt+O..... Double Word
- Alt+Q..... Quad Word
- Alt+P..... Floating Point
- Alt+H..... Hexadecimal
- Alt+T..... Text
- Alt+L..... Real

Data Trace/Time Chart Monitor Component

Toolbars



Keyboard Shortcuts

Ctrl+O..... Open
Ctrl+PgUp..... Zoom In
Ctrl+PgDn..... Zoom Out

Memory Card Component

Toolbars



- Cut
- Copy
- Paste
- Delete
- Rename
- Properties
- Large Icons
- Small Icons
- List
- Details

Keyboard Shortcuts

- Ctrl+X Cut
- Ctrl+C Copy
- Ctrl+V Paste
- Ctrl+A Select All
- F5 Refresh device

CX-Net Network Configuration Tool

Toolbars



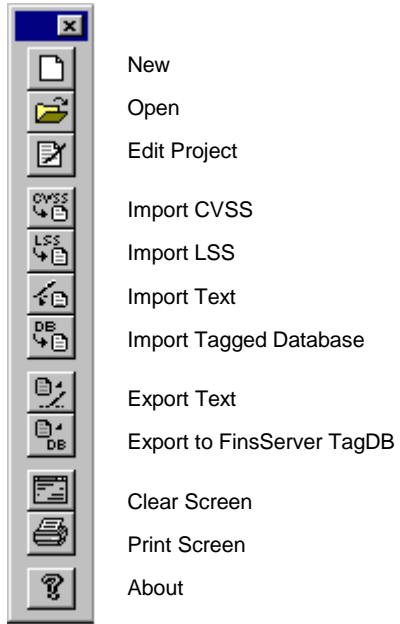
- Open Project
- Edit Project
- Open/Close Project Device PLC
- Display PLC Information
- Set PLC Operating Mode
- Display PLC Error Status
- Show Unit Status
- Configure PLC System Settings
- Configure IO Table
- Configure C-Series Comms. Units
- Online Edit Routing Table
- Online Edit Data Link
- Echo Back Test
- Broadcast Test
- Ping Test
- About

Keyboard Shortcuts

- Ctrl+N New
- Ctrl+O Open
- Ctrl+S Save
- Return Edit Item
- Insert Insert Item
- Delete Delete Item

Import/Export Tool

Toolbars

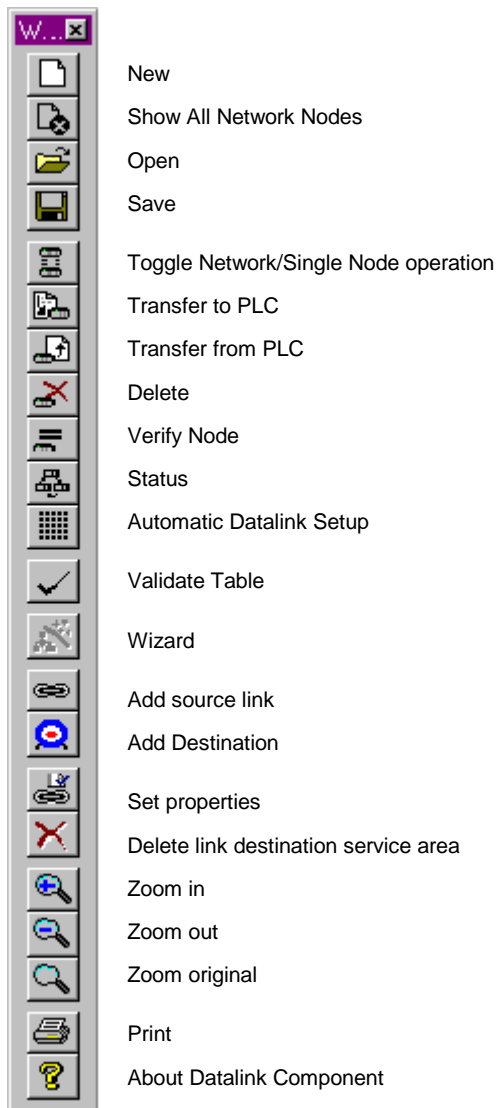


Keyboard shortcuts

Ctrl+N	New
Ctrl+O	Open
Ctrl+E	Edit Project
Ctrl+C	Import CVSS
Ctrl+L	Import LSS
Ctrl+T	Import Text
Ctrl+V	Import from FinsGateway
Alt+T	Export Text
Alt+V	Export to FinsGateway TagDB
Ctrl+R	Clear screen
Ctrl+P	Print screen

Data Link Editor

Toolbars

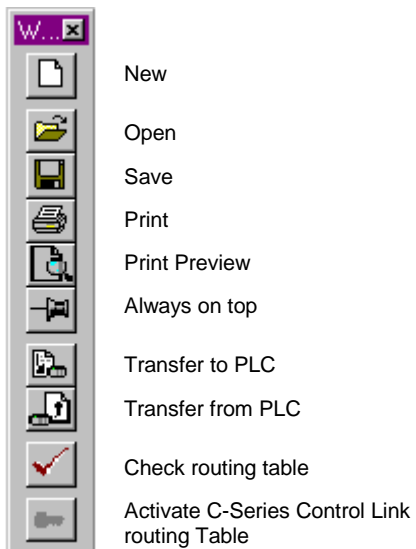


Keyboard Shortcuts

- Ctrl+N New
- Ctrl+O Open
- Ctrl+S Save
- Ctrl+P Print
- Ctrl+<space.... Change Window

Routing Table Editor

Toolbars



Keyboard Shortcuts

Ctrl+P Print

GLOSSARY OF TERMS

Actual IO Table	The real hardware configuration of the PLC units and slots on power-up.
Address	A location in memory where data or programs are stored. It can also identify a location of a node on a network.
Application	A software program that accomplishes a specific task. Examples of applications are CX-Server, CX-Programmer, CX-Protocol and Microsoft Excel.
ASCII	American Standard Code for Information Interchange.
Auxiliary Area	An area of PLC memory which normally contains transmission Counters, flags and control bits. It also retains the status of the device during power failure.
Baud rate	The speed of data transmission in terms of the number of bits per second that are being sent.
BCD	Binary Coded Decimal.
Binary Coded Decimal	A data format supported by CX-Server.
Binary	A data format supported by CX-Server. A number system format to the base 2, i.e. employing the digits 0 and 1.
Bit	A digit used in binary notation which can take the value 0 or 1. The value of a bit, or combination of bits, can represent the status of a device or can be used in programming.
Boolean	A type of point or symbol where the value can be one of two states. Essentially the two states are '0' and '1', but these states can be assigned a meaningful designation.
Bridge	A device connecting local area networks of similar architectures together.
Broadcast address	An address held in common by all nodes on a network to which the same data is transmitted simultaneously.
Bus	A communications path along which data can be transmitted or received between the units connected to it.
Central Processing Unit	The part of the PLC which can store programs and data, execute the instructions in program, and process input and output signals in order to communicate with other, external, devices.
Clipboard	An area within the windows environment where data can be stored temporarily or transferred between applications.
Command modifier	An optional part of an address string indicating the modification to be performed on the data at that address (within PLC memory) when it is accessed.
Common link parameter	The common words used by all PLCs in a Data Link (within a SYSMAC LINK system).
Compact Flash	A type of memory card fitted to a PLC.
Components	CX-Server is made up of six components accessible from an invoking application.
Control bit	A bit assigned a controlling role in the functioning of a device; its status is set via a program to achieve this function.
Controller Link	A network that can send and receive large data packets flexibly and easily among the OMRON PLCs.
Counter area	An area of PLC memory containing program counters and their related completion flags.
Counter	An area of memory reserved for the purposes of counting the number of times an event has occurred.
CPU bus link area	An area of PLC memory allocated to the CPU bus unit.
CPU type	The type of CPU available to a specific device, the amount of memory available to a PLC varies according to the CPU involved.
CPU	Central Processing Unit.
CS-series	Indicates either a CS1G-H, CS1H-H, CS1D-S, or CS1D-H.
CJ-series	Indicates either a CJ1G-H, CJ1H-H, or CJ1M.

C-Series	Indicates any one of the following types of PLC: C2000H, C200H, C200HE, C200HE-Z, C200HG, C200HE-Z, C200HS, C200HX, C200HX-Z, C1000H, C**H, C**K, C**P, CQM1, C500, C120, C20, CPM1 (CPM1A/CPM2*).
CV-Series	Indicates any one of the following types of PLC: CVM1, CVM1-V2, CV500, CV1000 or CV2000. When using SYSMAC NET, CV series PLCs can operate in either CV mode (where the datagrams contain FINS commands) or C mode (where the datagrams contain C SYSNET commands).
CVSS	A file format supported by the CX-Server Import tool. CVSS has several file types which have different information contained in them.
CX-Net Network Configuration tool	This CX-Server tool consists of a suite of programs allowing the management of Routing Tables and Data Link Tables in OMRON PLCs.
CX-Server	An advanced communications management system for OMRON PLCs providing facilities for software to maintain PLC device and address information and to communicate with OMRON PLCs and their supported network types.
CX-Server Project	A definition of an OMRON PLC network configuration. It identifies all devices and networks within a particular configuration including the areas of PLC memory (points) that can be read from or written to.
Cycle time	The time interval between read/write cycles at a network node.
Data area	An area of PLC memory allocated to the storage of data (not programs).
Data bits	Bits representing each character to be transmitted.
Data link	A software connection establishing common data areas between PLCs on a network allowing data to be between these devices.
Data Link Editor	The data Link Editor allows a PLC to be configured so that it can participate in one, or more automatic data sharing schemes, over Sysmac Link and Controller Link networks, without the need for special programming.
Data link table	A table of the common data memory areas used by the PLCs in a Data Link.
Data location	An area of memory identified by an address.
Data memory	An area of PLC memory holding only word data.
Data Trace/Time Chart Monitor component	This CX-Server component displays data obtained from the PLC's memory areas during program execution.
Datagram	A packet of information which can be transmitted across a network containing routing information plus data.
DDE	Dynamic Data Exchange. A channel through which correctly prepared programs can actively exchange data and control other applications within Microsoft Windows. CX-Server, through the use of the DDE Manager tool, allows extensive use of DDE functionality. See also Item, Server, server application and Topic.
DDE management library	A dynamic link library within Windows which allows dynamic data exchange to be employed.
DDE Manager tool	A CX-Server tool for transferring data between PLCs and a client application using DDE, for example Microsoft Excel.
DDEML	Dynamic Data Exchange Management Library.
Debug mode	A mode of PLC operation during which any errors arising from the currently active program will be flagged. For CV-series PLC only.
Decimal	A data format supported by CX-Server.
Default	A value automatically set by a program in the absence of user input or on initial entry to an application; such values can be overwritten.
Destination network address	The address of the network to which data is directed.
Destination node number	The number identifying the destination node.

Destination node	The node (and therefore device) where transmitted data is to be placed.
Device group	A class of devices which share similar properties, each group can be sub-divided into device types.
Device type	A type of OMRON PLC.
Device	A type of OMRON automation device, either a PLC, Temperature Controller, Memory Card Writer or PROM Writer.
Dialog	A window asking for some form of response from the user, usually in the form of either entering requested information, selecting displayed data, or confirming an operation.
DLL	Dynamic Link Library. A program file that although cannot be run stand-alone as an executable, can be utilised by one or more applications or programs as a common service. DLL files have a *.DLL extension. DLL's comprise a number of stand-alone functions.
Double Floating Point	Double Floating Point (LREAL) type is as the IEEE754 Double precision (1.7E +308/-307) as defined by Microsoft®.
Download	Refer to Transfer to PLC.
Drag	The act of moving an item on the screen by selecting it with the mouse, and keeping the mouse button depressed, moving the mouse until the item has reached the required location. The mouse button is then released.
Driver	The software which controls the communications between a computer and PLC, translating any information passed between them into a format that the receiving Device can understand.
Dynamic Data Exchange	The method of transferring data (and possibly instructions) between applications via the establishment of reference links between them.
Echo test	The reflection of a signal along a communications channel in order to check the accuracy of data transmission by comparing the received data against the original data at the sending end.
EEPROM	Electrically Erasable Programmable Read Only Memory.
Elements	The number of address units which start at a specified data location.
End Connection	The final communication link between computer and PLC, or in the case of a Network configuration, gateway PLC to PLC.
End network address	The address of the destination network to which communications are directed.
Error status	An indication of an error condition found in a system.
Ethernet	A 10 MB baseband local area network with each Device attached to the network having equal status and therefore the ability to transmit as, and when, required (provided the line isn't busy).
Even parity	The number of 1s in a data transmission is even.
Event frame	A structure, predetermined by a protocol, containing specific fields for the transmission of data.
Exclusive mode	PLC mode which allows an application exclusive access to the Device.
Expansion memory	The memory available to a CPU in addition to conventional memory.
File memory	An area of CPU memory allocated to the storage of data.
File Transfer Protocol	Protocol for transferring files between host computers.
FINS	Factory Intelligent Network Service.
FinsGateway	An OMRON communication type supported by CX-Server.
Flag	An indicator representing the condition of a process, data area or Device.
Floating Point	A data format supported by CX-Server.
Folder	A structure which organises the files in computer memory or on disk. Also known as a 'directory'.
Frame length	The waiting time before data is transmitted across the network
FTP	File Protocol Transfer.

Gateway device	A Device connecting two networks of different architectures together.
Gateway network address	The address of a network acting as a gateway.
Gateway PLC	A PLC which acts as a link to another network.
Group	A sub-directory within a CX-Server project hierarchy which contains points and/or further (subsidiary) groups.
GUI	Graphical User Interface. Part of a program that interacts with the user and takes full advantage of the graphics displays of computers. A GUI employs pull-down menus and dialog boxes for ease of use. Like all Microsoft Windows based applications, CX-Server has a GUI for each component and tool.
Hard disk	A disk permanently mounted on its drive.
Hexadecimal	A data format supported by CX-Server.
Hierarchy	The structure of a CX-Server project from the root directory down through any sub-directories (groups) to individual points contained within those groups.
High Link	A network driver.
Host computer	A computer responsible for data management and for overall control of the system. Programs and data are downloaded to a PLC from the host computer.
Host link system	A system comprising one or more host computers connected to one or more PLCs by host link units; these units facilitate the transfer of data between the PLC(s) and the host computer.
Host link unit	The interface between a PLC and a host computer.
Icon	Pictorial representations of computer resources and functions. Many icons are used by CX-Server components and tools as part of the GUI.
IDSC device type	An OMRON PLC device supported by CX-Server.
Import tool	This CX-Server tool is used for addresses and PLCs defined using the CVSS and LSS products.
Input bit data area	An area of PLC memory containing the status of an input Device.
Input bit	The location within memory indicating the status of an input.
Input device	A Device which sends signals to a PLC.
Input	The signal sent to a PLC from an external device.
Instruction	A statement indicating an operation to be performed and identifies any data involved in this operation.
Intel Hex	A PLC device also known as a PROM Writer.
Interface	Hardware or software employed to link the elements within a system, including networks, programs and computers.
Internal data type	The format of the data held at an address in PLC memory; for example, bit or signed character binary.
Internode test	An echo test performed to check the condition of a PLC on a network node.
Invoking application	An application such as CX-Programmer and CX-Protocol that utilises components and tools belonging to CX-Server.
IO bit	A bit which can hold data entered into, or received from, the system.
IO Table component	This CX-Server component retrieves configured PLCs rack and address data.
IO type	Input /Output type. An attribute of a point or symbol that defines the origin and destination of the data for that point or symbol. The data can originate (be input from) and is destined (is output to) to the internal computer memory, PLC or DDE target application.
IO	Input /Output.
IP address table	A table containing the IP addresses for all the devices on the Ethernet.
IP address	An address for a device on the Ethernet.
IP router table	A table containing the addresses for each interface on a network.

IP	Internet Protocol.
Item	A unique name for a data item within a topic.
LAN	Local Area Network.
Link Relay Area	A common data area allowing the transfer of data between PLCs connected by a Data Link; the information held in this area in the memory of each PLC is identical.
Link system	A system that links PLCs together.
Link unit	A unit which connects a device to the network.
Link	A connection between two units established either by software or a hardware device.
Load	Placing a program or data into an area of computer or PLC memory.
Local area network	A network located within a limited area (normally the user's premises).
Local network address	The address of the network to which a PLC is connected.
Local network number	The number of the unit connecting the PLC to the network.
Local table	A table containing the details of the networks to which a PLC belongs.
LREAL	LREAL (Double Floating Point) type is as the IEEE754 Double precision (1.7E+308/-307) as defined by Microsoft®.
LSS	A file format supported by the CX-Server Import tool.
Mailbox	A communications protocol.
Mark parity	The parity bit is always set to 1.
Master	A controlling device which sends data and/or instructions to a slave device.
Mb	Megabytes – A means of defining computer memory size.
Memory area	Addressable area of storage space in a device.
Memory Card component	This CX-Server component manages the file storage to and from PLC memory cards.
Memory Card Writer	A device which writes data to a memory card.
Memory card	A data storage medium which can hold both programs and data.
MHz	Megahertz.
Micro host link	A link to a 'micro' device acting as a host.
Microsoft Excel	A spreadsheet application.
Microsoft Windows Explorer	A file handling application part of the Microsoft Windows suite.
Microsoft Windows	A windowing environment that is noted for its GUI, and for features such as multiple typefaces, desk accessories (such as a clock, calculator, calendar and notepad), and the capability of moving text and graphics from one application to another via a clipboard. CX-Server runs only under Microsoft Windows. DDE functions communicating with other applications supported by CX-Server use Microsoft Windows as a basis.
Modem	A device with the ability to convert digital data from a computer into analogue form and transmit it over a telecommunications line and also to convert received analogue signals into digital form.
Monitor mode	A PLC operational mode which allows the device, during normal execution, to review the condition of the Data Link (including the PLCs/nodes on that link).
<i>n</i>	A variable number.
Native data format	The format in which data is handled by a communications protocol; for example, ASCII or binary.
Network bridge	A unit that connects two or more networks together.
Network parameters	Network settings including information such as the maximum number of nodes permitted on a network and the waiting times between transmissions.
Network Service Board	An interface which connects devices (not PLCs) to the network.
Network	1. Part of the PLC configuration, based on the device type. The number of Networks available is dependant on the device type.

	<p>2. A number of computers linked together with a central processing point known as a Server which is accessible to all computers. Networks affect CX-Server in that further Network associated options are available if the computer is Network connected.</p>
Node number	Number identifying the device located at a particular node on the network. The number can be between 1 and 126, the maximum number of nodes available on an OMRON network.
Node	A position at which a device can be located on the network, consisting of a link unit mounted to a device or PLC which in turn interfaces with a peripheral device or a computer.
NSB	Network Service Board.
Odd parity	The number of 1s in a data transmission is odd.
Offline	The status of a device when it is not being controlled by a computer (although it may be physically connected to it).
OLE	Object Linking and Embedding. Used to transfer and share information between Microsoft Windows based applications and accessories.
Online	The status of a device when it is under the direct control of a computer.
Output Bit data area	An area of PLC memory reserved for output bits.
Output bit	The location within memory indicating the status of an output device.
Output device	A device which receives signals from a PLC.
Output	The signal sent from a PLC to an external device.
Packet	A unit of information transmitted across the network containing source and destination address information together with the actual data.
Parity bit	A bit transmitted with a packet of data indicating the type of parity check to be performed.
Parity	A type of validation check performed on transmitted information; data can be tested for either even, odd, none, mark or space parity. The type of parity check involved is indicated by the status of the parity bit.
Path	The location of a file including the drive, directory name plus any subdirectories and the file name together with its associated extension.
Peripheral	A device which aids system operation rather than being central to its functioning.
Performance Monitor tool	A CX-Server tool for monitoring communications throughput and for displaying CX-Server's current performance level (i.e. a check to see if CX-Server is becoming overloaded).
Ping test	A standard Ethernet communications test.
PLC	Programmable Logic Controller.
PLC Clock tool	The PLC Clock Tool provides a facility to monitor and set the PLC clock and synchronise the PLC clock to the PC clock.
PLC Error component	This CX-Server component displays and manages PLC errors.
PLC Memory component	This CX-Server component allows the user to view, edit and monitor either channels (words) or individual bits in areas of the PLC.
PLC Setup component	This CX-Server component permits the configuration of PLC settings.
Point	A point is used to hold a value of a predefined type - Boolean, Integer, Text, etc. The contents of a point may be controlled by an object or I/O mechanism such as DDE. The contents of a point may control the action or appearance of an object, or be used for output via an I/O mechanism.
Polling	Interrogating a device to check its operational status or whether it is ready to send or receive data.
Port	A device connection point allowing data entry and exit.
Program	A set of instructions which are performed by a computer or PLC.

Program memory	An area of PLC memory reserved for the storage of programs.
Program mode	PLC mode of operation during which the device can be programmed.
Programmable Read Only Memory	An area of memory which can be updated with programs and data only once after manufacture; once this area has been written to, it can only be read, not modified.
Project	OMRON configuration file inherited from the invoking application. Refer also to CX-Server Project.
PROM writer	A device which writes the programs and data into PROM.
PROM	Programmable Read Only Memory.
Protocol	A set of rules governing the transmission of data.
PSTN	Public Switched Telephone Network.
Public Switched Telephone Network	A communications network carrying voice and data communications over switched lines.
Rack	The apparatus to which a unit is fixed.
RAM	Random Access Memory.
Read mode	PLC mode which allows data from the PLC to be read but not modified.
Read/write mode	PLC mode which allows data to be read from and written to the device.
Refresh parameter table	A table identifying the words in a Data Link to be refreshed for an individual PLC.
Registered IO Table	The internal PLC table: this is the one used by the PLC when running, regardless of the state of the actual hardware. It can be read and, for CV-series PLCs, written to by the CX-Server software.
Relay network address	The end network address which a PLC communicates.
Relay node number	The number of the network node through which a transmission must pass to reach another network.
Relay table	A table containing the relay network addresses, node numbers and end network addresses used within a FINS system.
Remote network	A network beyond the LAN to which access must be gained through a gateway or bridge.
Remote Terminals	Further units that can be supported by CX-Server via the Sysmac-Bus Master unit
Reset	Turning a bit or signal OFF or changing it to its set value or to zero.
Root	The highest level of a directory.
Root group	The highest level group in a CX-Server project.
Rotary switch	Indicates the method of calling a device by generating a series of pulses.
Routing table	A table containing the information necessary to allow communications between different networks including local and gateway network address details.
Routing	The direction of data across a network from its source to its destination.
RS232	Industrial interface standard for serial communications.
RS422	Industrial interface standard for serial communications employing balanced line circuits.
RTs	Remote Terminals.
Run Mode	PLC mode of operation during which device information is typically read-only.
Serial Connection	A direct connection between computer and PLC.
Server application	An application that can be used to view or interact with. Refer also to DDE and OLE.
Server	1. Server is used in DDE functions to contain a link to an outside application. Using DDE functions, CX-Server allows the manipulation of an outside application as specified as the Server.

	Refer also to Server application.
	2. A Server is the central processing point of a Network which is accessible to all computers. Networks affect CX-Server in that further associated options are available if the computer Network is connected.
Signed Decimal	A data format supported by CX-Server.
SIOU	Special Input /Output Unit.
Slave	A device which receives data or instructions from a master device.
Slots	Free areas within a rack to which units can be fixed.
Software switches	Areas of memory employed by an SIO unit used to set operating parameters (similar in manner to a hardware switch).
Space parity	The parity bit is always set to 0.
Special Input /Output Unit	A unit designed for a specific purpose.
SRM1 device type	An OMRON PLC device supported by CX-Server.
Step Area	An area of PLC memory containing a flag indicating the status of steps used within a program.
Stop bits	Bits indicating the end of transmission of each set of data bits; normally one or two bits, they indicate the delay time between sending successive characters down the line.
Symbol	An address that has been given a name to make the address information more flexible. Symbols are inherited by CX-Server by the invoking application.
SYSMAC LINK	OMRON high speed industrial network (either co-axial or fibre optic).
SYSMAC NET	OMRON high speed optical LAN which can be of type C SYSMAC NET or CV SYSMAC NET.
SYSMAC WAY	OMRON network.
System area	An area of memory used for controlling and managing a unit.
System configuration	An arrangement of units, for example network, computers and PLCs.
Tagged database	A file format supported by the CX-Server Import tool. The Tagged database is also an export format of the CX-Server Import tool.
TAPI	Telephony Application Programming Interface.
Target PLC	The PLC to which information or instructions are directed.
Taskbar	An integral part of Microsoft Windows which allows Microsoft Windows based applications to be started. CX-Server tools are run from the Taskbar.
TCP/IP	Transmission Control Protocol/Internet Protocol.
Temperature Controller	An OMRON device.
Temporary Relay Area	An area of PLC memory containing instructions which can be loaded at a later point for use with other instructions.
Text	1. A file format supported by the CX-Server Import tool. The Text is also an export format of the CX-Server Import tool. 2. A data format supported by CX-Server.
Timer area	An area of PLC memory containing program timers and their related completion flags.
Toolbus	A network, either C-Toolbus or CV-Toolbus, allowing communications with a device via the serial COM port of a personal computer (in a similar manner to SYSMAC WAY). Data is transmitted along the network in binary format.
Tools	CX-Server is made up of four tools.
Topic	The name of an aspect of a service application which identifies where a reference link is to be incorporated; for example, within Excel the topic would be the name of the worksheet to be used.
Transceiver	A device which can receive and transmit data.
Transfer from PLC	The transfer of a program or data to a host (either a computer or a programming device) from a lower-level (or slave) device.

Transfer to PLC	The transfer of a program or data from a host (either a computer or a programming device) to a lower-level (or slave) device.
Transition Area	Contains flags indicating when a transition is ON or OFF
Transmitter	A device which sends out signals.
UDP	User Datagram Protocol.
Unit number	A number identifying an individual component of an OMRON PLC system configuration.
Units	A component of an OMRON PLC system configuration.
Unknown	The operating mode of a PLC that cannot be connected to.
Upload	See Transfer from PLC.
User Datagram Protocol	Protocol which directs information across a network to port numbers rather than to IP addresses.
Word	A 16 bit unit of data memory.

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