

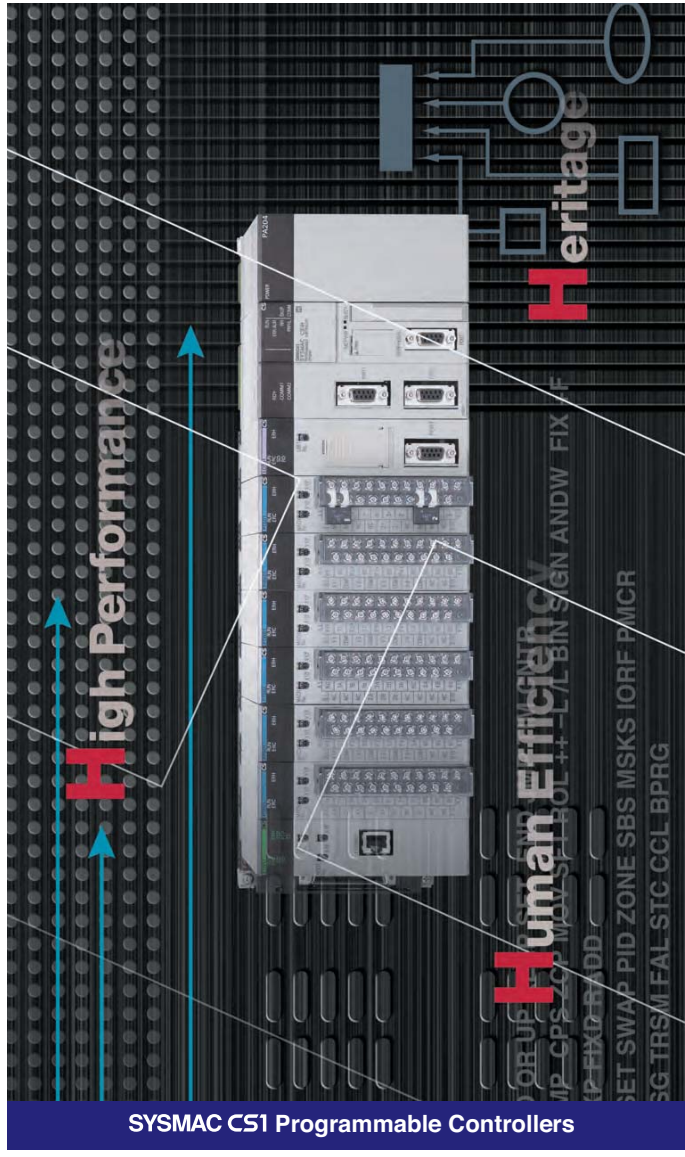
# OMRON

# SYSMAC CS1

Programmable Controllers



From Machine Control to Information Management –  
Multiple-application Controllers with a Wide Range of Functions



SYSMAC CS1 Programmable Controllers

OMRON

Note: Do not use this document to operate the Unit.

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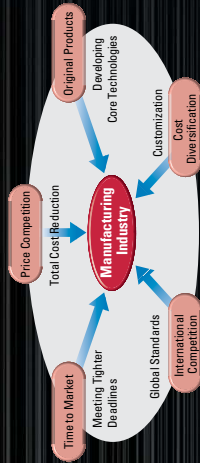
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# The popular SYSMAC CS1 is better than ever – finely tuned to allow new levels of control.



The current climate of ever-intensifying competition has created a large number of different needs for manufacturing industries around the world. To meet these needs, OMRON has made further improvements to its SYSMAC CS1 PLCs, which have been used successfully in thousands of systems, to deliver even greater performance. With an "H" for Hyper Controller, the new PLCs boast the highest standards in performance, functionality, and expandability.

## High Performance

In order to create facilities that have the production capability to withstand sudden changes in demand, or to create machinery that is easily distinguished from that created by market competitors, a top-speed controller that can deliver the performance required to support these needs is required. The SYSMAC CS1 PLCs have been equipped with the highest I/O responsiveness and data control functionality to significantly reduce processing time and to control machinery movement with greater precision.

## Human Efficiency

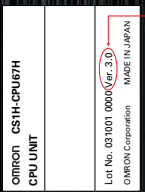
In order to allow easier development of complex programs, in addition to an integrated Windows-based development environment, the new PLCs are equipped with a variety of instructions. Structured programming functionality has been improved to allow programs to be reused with greater efficiency and thereby reduce labor requirements and cut costs.

## Heritage

The know-how that our customers have accumulated through the years forms the core of their competitive strength. At OMRON, we believe in enhancing this know-how to the utmost. The key to doing this is 100% upward compatibility. CS1 PLCs allow existing Units and programs to be used without any changes.



**Unit Versions**  
Unit versions have been introduced to control differ-ences in functions fea-tured by CPU Units that are the result of version upgrades. The unit version is marked on the nameplates of products subject to version control, as shown in the diagram.



This catalog contains information required to select products and is not intended to provide preliminary information. Refer to relevant operation manuals for all preliminary information.  
Programmable Controllers are abbreviated as "PLC" in this catalog. The term "personal computers" is fully written out, and not abbreviated.

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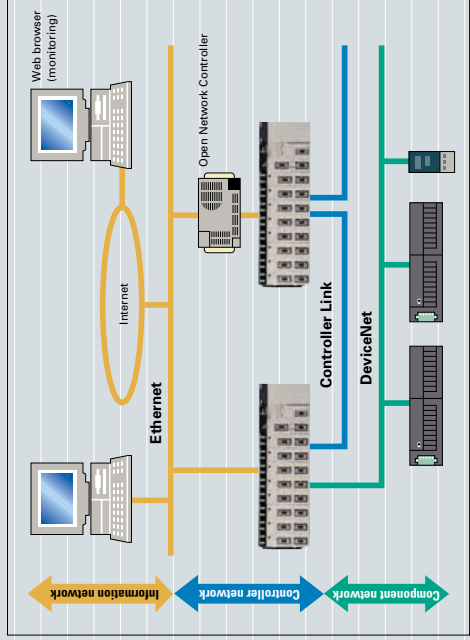
# The evolution of the SYSMAC CS1 is accelerating advances in the production site.



CP12-13

## 4 Seamless Networking

The CS1 supports message communications across three network levels, from information networks down to component networks, allowing greater on-site information management. Remote monitoring of installations is also possible using Web functions via the Internet.



CP6-7

## 1 Ultimate Performance

Further improvements to instruction execution efficiency, the core of overall PLC performance, enable the highest speeds in the industry. This allows the optimization of processing time and accuracy.

- Cycle time (example) **38 Ksteps/ms** (Ratio of basic instructions to special instructions = 1:1)
- LD instruction processing speed **0.02 μs (min.)**
- Large capacity I/O points: **5120 max.**  
Program capacity: **250 Ksteps max.**  
DM capacity: **498 KW max.**
- Peripheral servicing responsiveness **More than 2 times faster than previous models**

CP8-9

## 2 Instructions That Fit the Application

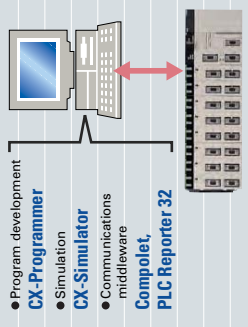
These PLCs have a variety of special instructions that allow their operation to suit the application. High-precision control can be achieved without complex programs.

- High-precision Positioning **Double-precision floating-point instructions**
- Automatic Adjustment of PID Constants
- PID instructions with **autotuning**
- Program Simplification **Set and reset instructions for DM/EM Area bits**
- Error Generation for Debugging **Failure diagnosis instructions**
- High-resolution Approximation **APR instruction**
- Workpiece Information Control for Conveyor Systems **Table data processing instructions for stacks**

CP10-11

## 3 Integrated Development Environment and Middleware

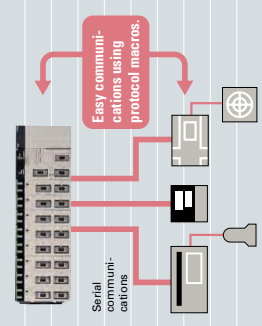
Powerful software packages are available for program development, simulation, and communications. Develop more efficient value-added systems in the time allowed.



CP14-15

## 5 Easier Connection to Peripheral Devices

Up to 35 peripheral devices can be connected to a CS1 PLC via serial communications. Data can be exchanged with peripheral devices easily using the protocol macro function, eliminating the need for time-consuming communications programs.



CP16-19

## 6 Inheritance and Maintenance

The new PLCs have complete upward compatibility with existing CS1 systems. Facilities performance can be upgraded simply by replacing the CPU Unit (see note). Also, features such as battery-free operation ensure greater convenience for maintenance and operation.

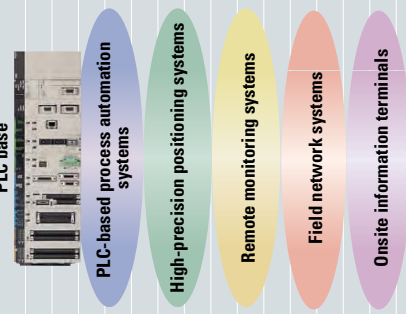


Note: When replacing a CPU Unit with a different model, always test the system to confirm that it has not been adversely affected.

CP20-29

## 7 PLC-based System Expansion

A variety of system expansions based on CS1 PLCs, such as PLC-based process automation systems, high-precision positioning systems, and remote monitoring systems are possible.



# Use the improved SYSMAC CS1 PLCs to scale advanced systems to the optimum size.

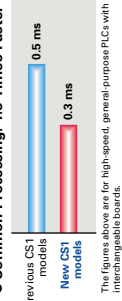
The evolution of the SYSMAC CS1 is accelerating advances in the production site.



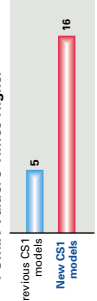
## Faster Instruction Execution and Faster Overall Performance

In addition to further improvements to the instruction execution engine, which is the core of overall PLC performance, the high-speed RISC chip has been upgraded to realize the fastest instruction execution performance in

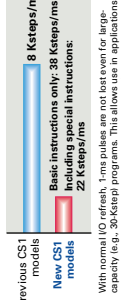
- **Common Processing: 1.6 Times Faster**



- **PCMIX Value: 3 Times Higher**

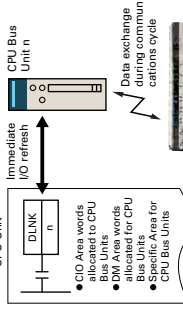


- **Cycle Time: 2.5 to 4.8 Times Shorter** (Cycle time for 128 inputs and 128 outputs)



## Improved Refresh Performance, and Protocol Macros

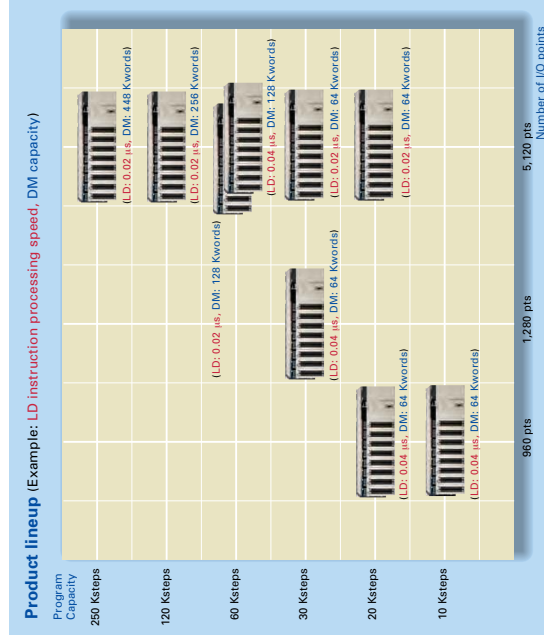
In the past, I/O refresh processing with the CPU Bus Unit only occurred during I/O refresh after instructions were



Unit name	Refresh function
Controller Link Unit	Data links
DeviceNet Unit	Remote I/O
Serial Communications Unit	Protocol macros
Ethernet Unit	Socket service based on manipulation of specific bits.

## Wide Lineup Makes It Easy to Build the Optimum System

A total of nine CPU Unit models provide for a wide range of applications, from small-scale systems to large. The lineup also includes Memory Cards, Serial Communications Boards, and a wide selection of Special I/O Units that can be used with any CPU Units to flexibly build the system that meets the requirements.



## Remote I/O Communications, and Protocol Macros

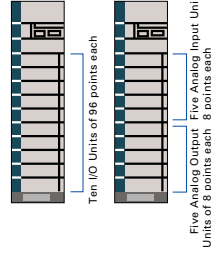
executed. With the new CS1, however, I/O can be refreshed immediately by using the DLINK instruction. Immediate refreshing for processes peculiar to the CPU Bus Unit, such as for data links and DeviceNet remote I/O communications, and for allocated I/O Area/DM Area words when instructions are executed, means greater refresh responsiveness for CPU Bus Units.

## Large Capacity CPU Units for Greater Component Control Power

The CS1 CPU Units boast amazing capacity with up to 5,120 I/O points, 250 Ksteps of programming, 448 Kwords of data memory (including expanded data memory) and 4,096 timers/counters each. With a large programming capacity, CS1 PLCs are not only ideal for large-scale systems but easily handle value-added applications and other advanced data processing.

## Control Up to 960 Points with Units Mounted to the CPU Rack

The CS1 provides a high level of space efficiency. As many as 960 I/O points can be controlled by simply mounting ten Basic I/O Units, with 96 I/O points each, to the CPU Rack. Alternatively, as many as 80 analog I/O points can be used by mounting five Analog Input Units and five Analog Output Units.



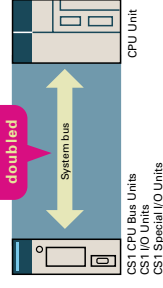
## Two Series of Expansion Racks Up to 50 m Long for Long-distance Expansion with Up to 72 Units and 7 Racks

With an expansion capacity of up to 80 Units and 7 Racks over a distance of 12 meters, the CS1 can meet large-scale control needs. Alternatively, an I/O Control Unit and I/O Interface Units can be used to connect two series of CS1 Long-distance Expansion Racks extending up to 50 m each and containing a total of up to 72 Units, and 7 Racks. CS1 Basic I/O Units, CS1 Special I/O Units, and CS1 CPU Bus Units can be mounted anywhere on the Racks and programmed without being concerned about special remote programming requirements.

Note: CS104 Units can only be mounted on the Longy distance Expansion Racks.

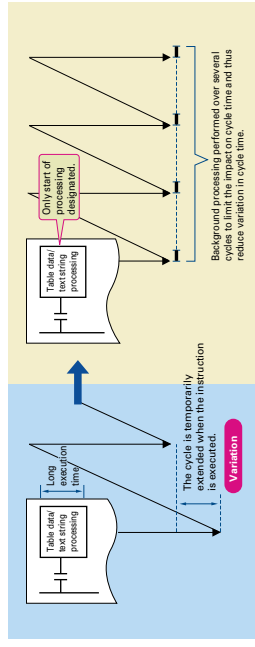
## System Bus Baud Rate Doubled

The data transfer rate between the CPU Unit and certain Units has been doubled to further improve total system performance.



## Reduced Variation in Cycle Time During Data Processing

multiple cycles to minimize variations in cycle time and maintain stable I/O response.



The evolution of

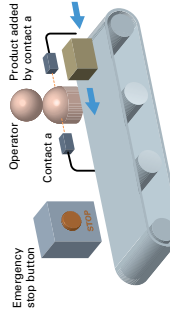
the SYSMAC CS1 is

accelerating advances in  
the production site.



## Nested Interlocks (for CPU Unit Ver. 2.0 or Later)

Although strictly speaking the present interlock instructions do not allow nesting, applications can be created to include combination of complete and partial interlock conditions that achieve nested interlocks.

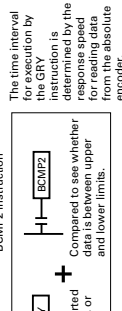
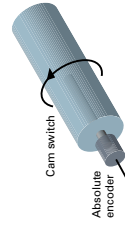


Support Software clearly shows the interlock status.

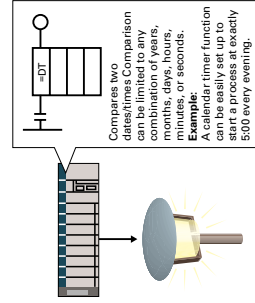


- (1) Conveyor operates ON when operator is present and products are supplied.
- (2) When the emergency stop button is pressed, the conveyor and product addition both stop.

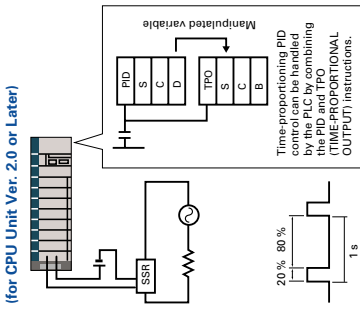
## Easy Cam Switch Control with Ladder Instructions (for CPU Unit Ver. 2.0 or Later)



## Easy Calendar Timer Function (for CPU Unit Ver. 2.0 or Later)

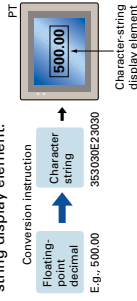


## TIME-PROPORTIONAL OUTPUT (TPO) INSTRUCTION (for CPU Unit Ver. 2.0 or Later)



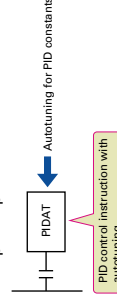
## Convert Between Floating-point Decimal and Character Strings

The new CS1 can convert floating-point decimal (real numbers) to character strings (ASCII) for display on a PT (operator interface). The data can be displayed on the PT as a character-string display element.



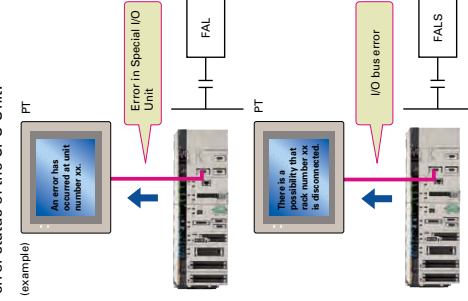
## PID Autotuning

The new CS1 can autotune PID constants with a PID control instruction. The limit cycle method is used for autotuning, so the tuning is completed quickly. This is particularly effective for multiple-loop PID control.



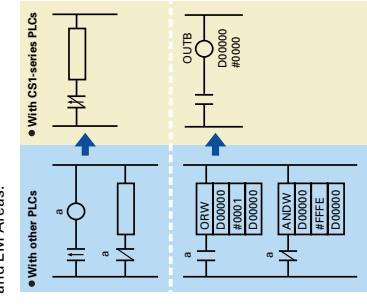
## Error Status Generation for Debugging

A specified error status can be simulated by executing the diagnostic instructions (FAL/FALS). With the new CS1, debugging is simple for applications that display messages on a PT or other display device based on the error status of the CPU Unit.



## Simpler Ladder Programs

Ladder programs that use a lot of basic instructions can be simplified using differentiation instructions LD NOT, AND NOT, and OR NOT, and instructions that access bits in the DM and EM Areas.



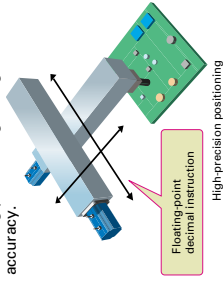
## Binary Set Values for Timer/Counter Instructions

The SV for a timer or counter instruction can be specified using either BCD or binary. Using binary SV enables longer timers and higher-value counters.

Examples: Timer/Counter Instructions  
TIM (BCD): 0 to 999.0 s  
TIMX (550) (binary) 0 to 6553.5 s  
CNT (BCD): 0 to 999 counts  
CNTX (546) (binary) 0 to 65,535 counts  
Applicable Timer/Counter Instructions  
TIMER: TIMX (550)  
COUNTER: CNTX (546)  
HIGH-SPEED TIMER: TIMHX (551)  
ONE-MS TIMER: TMHXY (552)  
ACCUMULATIVE TIMER: TTIMX (555)  
LONG TIMER: TIMLX (553)  
MULTI-OUTPUT TIMER: MTIMX (554)  
REVERSIBLE COUNTER: CNTRX (548)  
RESET TIMER/COUNTER: CNRX (547)

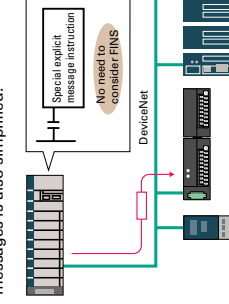
## Highly Accurate Positioning with XY Tables

The new CS1 has many double-precision processing instructions for floating-point decimal operations, enabling positioning with greater accuracy.



## Easy Reading of Maintenance Data via DeviceNet

The addition of special explicit message instructions makes it easy to send explicit messages without having to consider FINS commands. Transferring data among PLCs with explicit messages is also simplified.



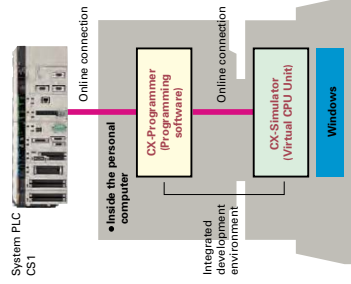
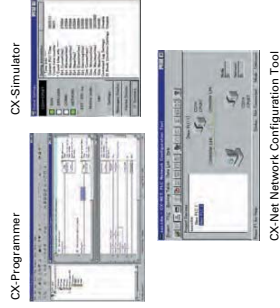


The evolution of the SYSMAC CS1 is accelerating advances in the production site.

## 3

### Improved Support Software for an Integrated Windows-based Development Environment

More efficient design and development using the CX-Programmer for programming and network configuration, and CX-Simulator for operation simulation.



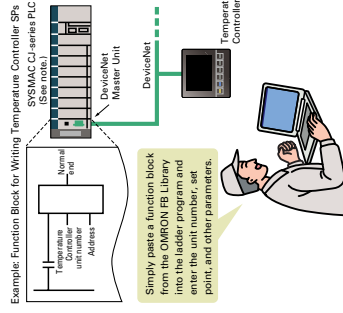
### CX-Programmer

#### NEW OMRON FB Library (Unit Ver. 3.0 or later)

The OMRON FB library provides function blocks for setting SPs, reading PVs, and reading/writing RUN/STOP status and other Temperature Controller parameters. The programmer simply pastes function blocks from the OMRON FB Library into the ladder program. The desired functions can be utilized simply by inputting the Temperature Controller unit number and address.

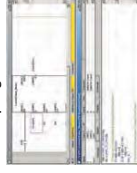
#### What is the OMRON FB Library?

The OMRON FB Library is a set of functional objects for ladder programming for OMRON CS1-series PLCs. By pasting the function blocks from the OMRON FB Library into a ladder program, the program interface for different control devices is easily completed. This reduces the time for program development, and, at the same time, improves product quality through standardization.



#### NEW The Structured Text (ST) Language Enables Trigonometric Functions and other Arithmetic Processes (Unit Ver. 3.0 or later)

In addition to ladder programming, function block logic can be written in ST, which conforms to IEC61131-3. With ST, arithmetic processing is also possible, including processing of absolute values, square roots, logarithms, and trigonometric functions (SIN, COS, and TAN). Processing difficult to achieve in ladder programs becomes easy to write.

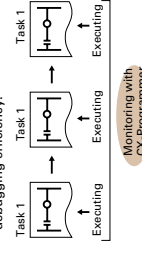


NEW CX-Programmer Ver. 5.0 or higher is required.

### Enhanced Efficiency for Program Development Teams (for CPU Unit Ver. 2.0 or Later)

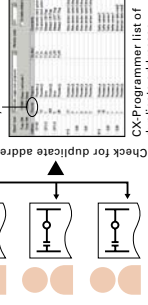
Multiple programmers will enjoy better efficiency when working on task-based programs, thanks to automatic checking for address duplication among tasks, downloading and uploading in task units, and easy monitoring of task operating status.

- The execution status of each task can be monitored with CX-Programmer to improve debugging efficiency.

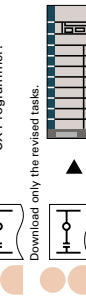


- Checking for address duplication among tasks developed by multiple programmers is automatically executed with the cross reference report of CX-Programmer.

The report shows that this address is used in the program in the right window many times it is used.



- When development is done by several people, only the tasks that have been revised need to be downloaded from CX-Programmer.



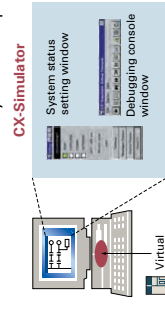
### Copy and Paste between Spreadsheets and Symbol Tables

You can use your favorite spreadsheet application to prepare an allocation table with symbol names, addresses, and I/O comments, then copy and paste it into a symbol table, and also do the reverse. This greatly improves programming productivity.

### CX-Simulator

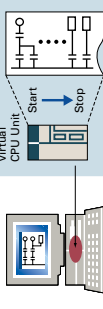
#### Programs Can Be Executed, Monitored, and Debugged without an Actual PLC

The CX-Simulator Software simulates ladder execution of the new CS1 CPU Unit on a computer. Online functions, such as monitoring of I/O bit status, monitoring of I/O memory present values, forced set/reset, differential monitoring, data tracing, and online editing, can be performed by connecting to the virtual CPU Unit on the computer from the CX-Programmer using the CX-Simulator. This reduces the total lead time to machine or system startup.

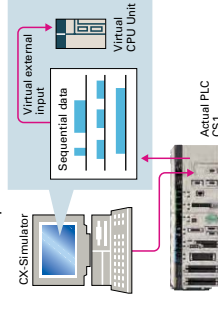


#### Data Logging On-site and Operation Verification in the Office

Sequential data from I/O memory in the actual PLC can be obtained and saved as a data recreation file (CSV format). On-site PLC ladder execution can be recreated on a computer by inputting



this data to the CX-Simulator as virtual external input data.



#### Comprehensive Debugging Functions Including Ladder Step Execution and Break Points

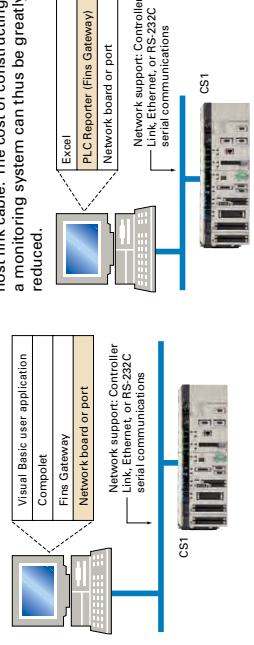
The new CS1 has comprehensive debugging functions, including ladder step execution (execution by instruction), I/O break settings, break point setting. This enables more detailed debugging without using an actual PLC. Interrupt tasks can be simulated, enabling more realistic debugging.

#### Middleware to Support PLC-centered System Construction

Easy development of user applications for communications with the new CS1.

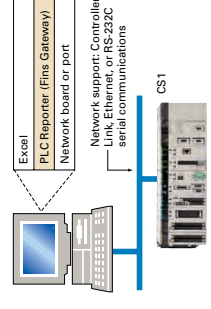
#### NEW SYSMAC Compolet: Accessing the CS1 with Visual Basic

Use SYSMAC Compolet for communications with OMRON PLCs to greatly reduce development time of user applications for CS1 I/O memory read and write, forced set/reset, and FINS message communications using Visual Basic.



#### NEW PLC Reporter 32: Add-on Software for Accessing the New CS1 Using Excel

Use PLC Reporter 32 to automatically collect specific CS1 I/O memory data into Excel 97 or Excel 2000 cells without special programming. Basically, a system can be constructed with a computer, PLC Reporter 32, Excel, and a host link cable. The cost of constructing a monitoring system can thus be greatly reduced.



# Further improvements to communications functions. Seamless networks increase production site transparency.

The evolution of the SYSMAC CS1 is accelerating advances in the production site.

## 4

### The Solution for Communicating across Network Levels

The SYSMAC CS1 enables FINS message communications across a maximum of eight levels (See note) (using CX-Programmer Ver. 4.0 or higher) in comparison with three levels in previous OMRON systems. Expansion up to eight levels lets you build a seamless communications system for sending FINS messages across multiple levels of Ethernet and Controller Link networks.  
 Note: For CPU Unit Ver. 2.0 or later.

### A Wide Range of Systems, from Small-scale to Large

OMRON offers a full lineup of reliable PLCs including the "flagship" CS1 Series, and ranging from the small-scale COM1H to the large-scale CV Series. The CS1 Series meets the needs not only of small-scale to large-scale systems, but of distributed systems as well. This allows the construction of the optimum system for the scale and applications of the production site.

### Flexible System Building Based on the DeviceNet

The CS1 Series supports the worldwide multivendor bus standard, DeviceNet. Component connections in a multivendor environment are greatly enhanced by connecting to up to 64 nodes for a wide range of FA applications, and by device profiles and configurator tools that ensure high reliability and easy maintenance. Production systems can be configured even more flexibly by incorporating products such as the MULTIPLE I/O TERMINAL.

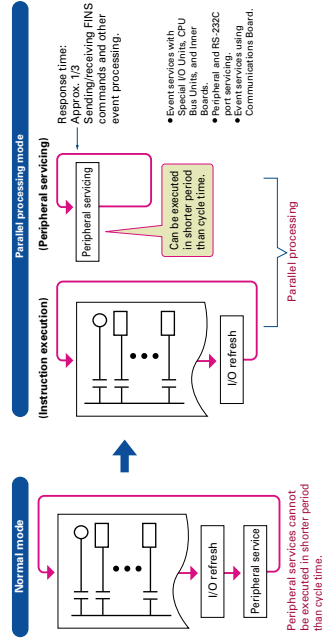
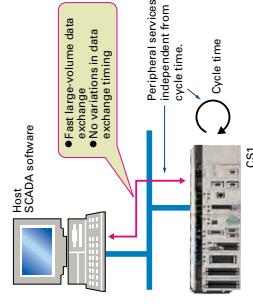
### Functions for Better Ethernet Support

Ethernet is becoming an increasingly important standard for information networks. Up to eight socket interfaces for TCP/IP and UDP/IP are supported, in addition to FINS messages, FTP file transfers, and mail notification, so that production management can now be organically linked with the production site.

### High Event Responsiveness and High-speed Instruction Execution

The new CS1 has an operating mode that allows parallel processing for program execution and peripheral services. This has the following benefits.

- Fast exchange with host computers of large amounts of data, without dependence on the program capacity of the new CS1.
- Smooth refreshing of data exchanged with SCADA software without variations in timing.
- Cycle time not affected if communications traffic or networks increase when expanding facilities in the future.

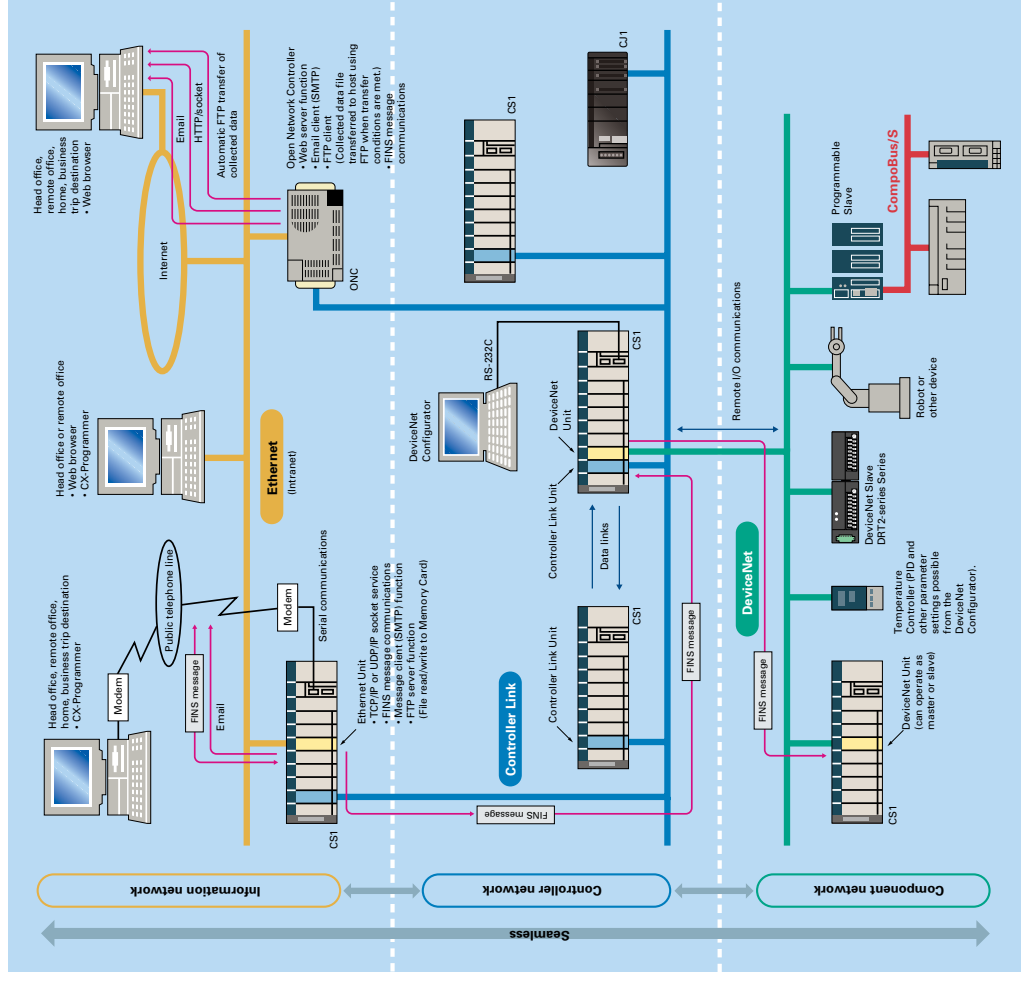


### Add a Redundant Optical Ring to Your Controller Link Communications

A redundant network configuration will keep communications flowing over the duplicate ring-shaped path in the event of a broken optical fiber, preventing system malfunction.

### Remote Monitoring via the Web

Connecting via an ONC enables remote monitoring from a Web browser with a user-defined Web application (using Web Tool Kit). It is also possible to automatically collect data on a Memory Card mounted to an ONC and automatically transfer data to the host PLC (using Data Collection/Distribution Software).



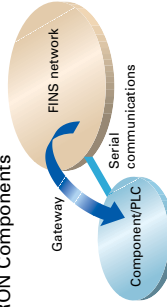
The evolution of the SYSMAC CS1 is accelerating advances in the production site.



## NEW Serial Gateway (CPU Unit Ver. 3.0 or later) Truly Seamless Incorporation of OMRON Components and Other Devices into Networks

When the CPU Unit (Ver. 3.0 or later) or Serial Communications Board or Serial Communications Unit (Ver. 1.2 or later) receive a FINS command containing a CompoWay/F command (see note 1) via network or serial communications, the command is automatically converted to a protocol suitable for the message and forwarded using serial communications.

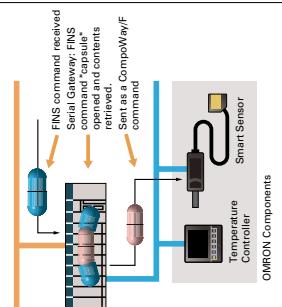
- CompoWay/F (See note 2.)
- Host Link FINS (Possible only with Serial Communications Boards or Serial Communications Units Ver. 1.2 or later)



**Note 1:** FINS Abbreviation for Factory Interface Network Service. A message and system message services common to OMRON products. FINS is used to send across up to 8 network levels, including serial communications paths using a serial gateway. (Possible only with C5CJ-series CPU Unit Ver. 2.0 or later.)

**Note 2:** CompoWay/F CompoWay/F is an integrated communications protocol that is used for peripheral communications. It is used by Temperature Controllers, Digital Panel Meters, Timer/Counters, Smart Sensors, Cam Positioners, Safety Controllers, etc. (as of July 2004).

- **Serial Gateway System (Reference)** When CompoWay/F commands are enclosed in FINS commands and sent to Serial Communications Boards or Serial Communications Units (Ver. 1.2) or serial ports on CPU Unit Ver. 3.0, the enclosed CompoWay/F command is retrieved using a Serial Gateway Function and sent as a CompoWay/F command.

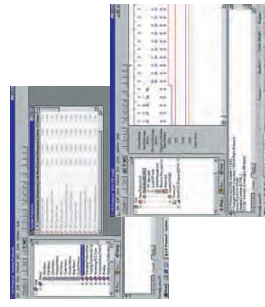


## More Ports for Even More Serial Device Connections

Protocol macros make it easy to create serial communications protocols (communications frames, error checks, retries, error processing, etc.) to match those of remote communications devices. Multiple ports are provided for this function. Each PLC supports up to 16 Serial Communications Units (32 ports total) and one Serial Communications Board (with 2 ports). This makes it possible to connect up to 34 devices with serial communications at a speed of 38.4 Kbps. Message length has been increased from 256 to 1,000 bytes to give communications more power than ever before.

## Windows-based Software Simplifies Serial Device Connections

Protocol macros for Serial Communications Units and Boards can be created using the CX-Protocol, thus enabling message tracing and greatly reducing the time involved in connecting various serial devices.



## Enhanced Protocol Macro Functionality (Serial Communications Units/Boards with Ver. 1.2 or later)

- Baud rate increased from 38,400 bps to 57,600 bps for faster communications.
- Standard system protocol added for greater connectivity with components and PLCs.
  - CompoWay/F Master
  - Host Link Master functions
  - Mitsubishi Computer Link Master

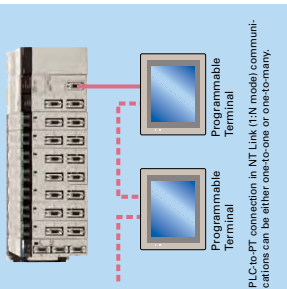
## Wide Range of Applicable Protocols Allows for High Value-added Programs

The CS1 Series supports a wide range of serial communications protocols, such as Host Link, no-protocol, NT Link, peripheral bus, and more. These allow for high value-added programs such as MMI, communications, and data processing.

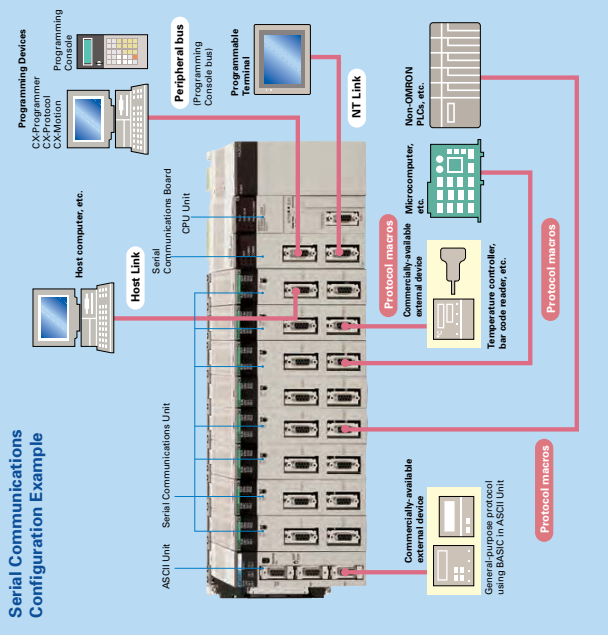
## The Fastest Communications in the Industry with High-speed NT Links

Combine with one of the NS Series Programmable Terminals (NS5, NS10, or NS12) to enable connecting High-speed NT Links. Using NT Link terminology together with a communications speed of 115 Kbps provides high-speed response.

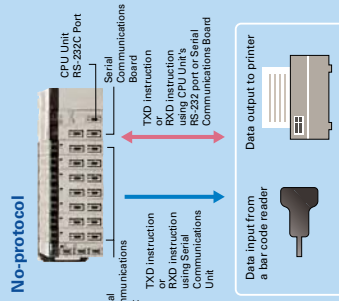
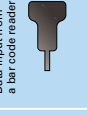
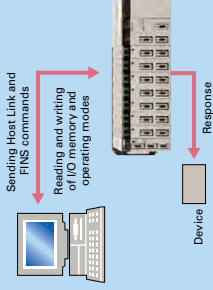
## NT Links (1:N Mode)



PLC-to-PT connection in NT Link (1:N mode) communications can be either one-to-one or one-to-many.



## Host Links



- Supports No-protocol Communications** (Serial Communications Units/Boards with Ver. 1.2 or later)
- No-protocol communications supported for Serial Communications Units and Serial Communications Boards
  - This mode enables components to be connected to multiple communications ports using no-protocol communications.
  - Serial port I/O instructions executable using the CX-Protocol
  - Serial Communications Units and Serial Communications Boards (TXDU, TXDU, TXD, and RXDU) are supported for CPU Units with Ver. 3.0 or later.



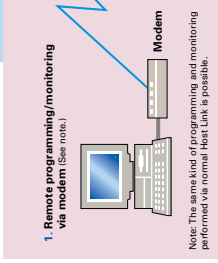
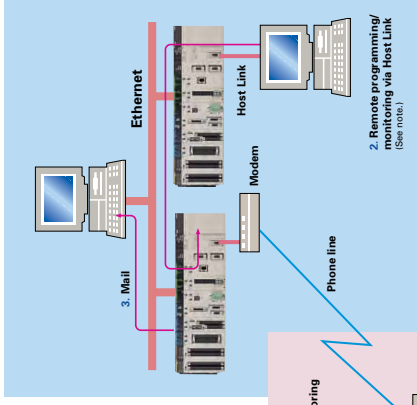
# Advanced management and resource inherent maintenance and operation.

The evolution of the SYSMAC CS1 is accelerating advances in the production site.



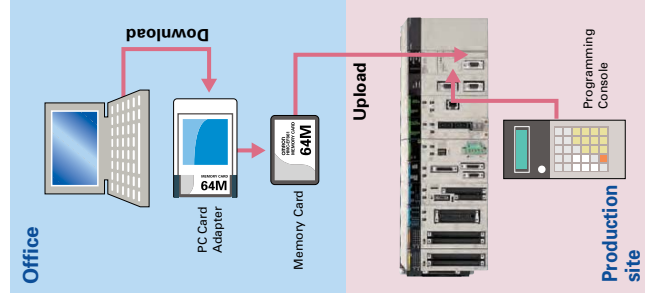
## Remote Maintenance

1. Program or monitor a remote PLC via a modem connection.
2. Program or monitor a network PLC via a Host Link connection.
3. Send e-mail for errors from PLCs connected to Ethernet.



## Memory Cards for Data File Management

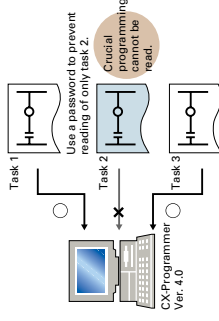
User programs, I/O memory, or system parameters can be converted to Windows-based files and stored in Memory Cards or in EM file memory in the CPU Unit. It is also possible to automatically read the user program and other data from the Memory Card to the CPU Unit at startup, replacing ROM operation. Change programs on-site using only a Memory Card and Programming Console, or use Memory Cards to store symbol tables or I/O comments. Connecting a Programming Device allows monitoring operations with ladder programs with comments. It is also possible to save and read data such as DM data to a Memory Card during operation, and the Memory Cards are ideal for operations such as saving quality data and reading recipes.



# tance providing powerful support for

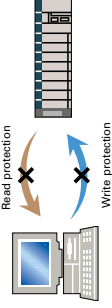
## Boost Program Security by Keeping Part of it Hidden

(for CPU Unit Ver. 2.0 or Later)  
You can prevent access to special tasks by requiring the user to have a password to read them.



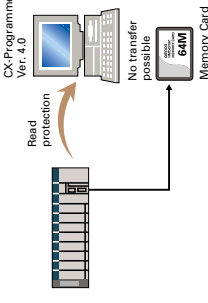
This allows you to hide crucial parts of the program.

By applying write protection, you can also prevent a user from inadvertently writing over the hidden part of the program. This provides additional protection for your program.



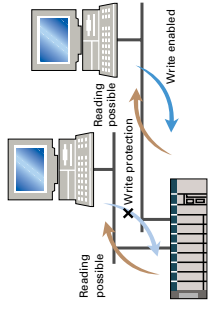
## Prevent Information Leaks from PLCs

(for CPU Unit Ver. 2.0 or Later)  
In addition to applying read protection functions to the user program area and tasks, you can also protect against the transfer of user programs to a Memory Card. This prevents leaks of proprietary information by completely protecting against the reading of programs inside the PLC.



## Write Protection from a Specific Node over the Network

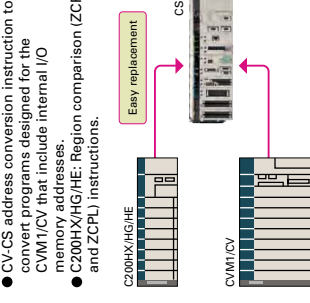
(for CPU Unit Ver. 2.0 or Later)  
You can now stop specific nodes from writing over the network. By preventing unintentionally writes to the PLC while monitoring data over the network, you can prevent potential problems.



## Easy Replacement of Existing Models

Programs designed for existing models (C200HX/HG/HE, CVM1, or CV-series PLCs) using the CX-Programmer can be converted for use with the new CS1. The following functions are available to make the conversion to the new CS1 even easier.

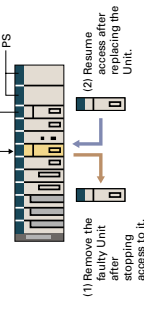
- CV-CS address conversion instruction to convert programs designed for the CVM1/CV that include internal I/O memory addresses.
- C200HX/HG/HE: Region comparison (ZCP and ZCPU) instructions.



## Replace Malfunctioning Units without Turning OFF the Power (Online Unit Replacement)

When an I/O Unit, a Special I/O Unit, or a CPU Bus Unit is malfunctioning, it is now possible to replace the faulty Unit while the system continues operating. This is particularly effective for systems that cannot be stopped when a problem has occurred in another part of the system.

(This function requires a CS1D-CPU/CS CPU Unit, a CS1D-BC02 or CS1D-B032 Backplane, and a CS1D-PA207R or CS1D-PD024 Power Supply Unit.)



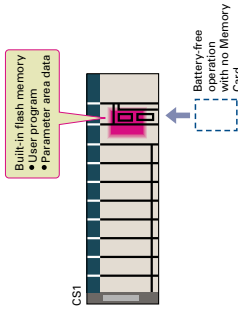
- (1) Remove the faulty Unit after stopping access to it.
- (2) Resume access after replacing the Unit.

## Store All I/O Comments, Symbol Names, Rung Comments, and Other Information in CPU Unit Comment Memory

(Unit Ver. 3.0 or later)  
When downloading projects, the Memory Card, EM file memory, or comment memory (in the CPU Unit's flash memory) can be selected as the transfer destination for I/O comments, symbol names, rung comments, and other data. This enables data such as I/O comments, symbol names, and rung comments to be stored in the CPU

Unit's internal comment memory when a Memory Card or EM file memory are both not available. (PLC models: CS/CJ-series with unit version 3.0 or later only.)

**NEW** CX-Programmer Ver. 5.0 or higher required.



# The CS1 Duplex System Boosts the Reliability of Facilities and Equipment

The evolution of the SYSMAC CS1 is accelerating advances in the production site.



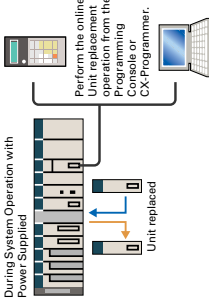
## Duplex-CPU System



### Hot Standby System Adopted for CPU Unit Duplexing

- When a problem occurs in the CPU Unit, the system instantly switches control to the other CPU Unit, enabling continuous operation with minimal effect on the system.
- Because there is no need for special duplex programming, the design process is simple and design steps are reduced.

The system can also be configured with only one each of the CPU, Power Supply, and Communications Units. In this case, the Duplex Unit must be used even when using only one each of the CPU, Power Supply, and Communications Units.)

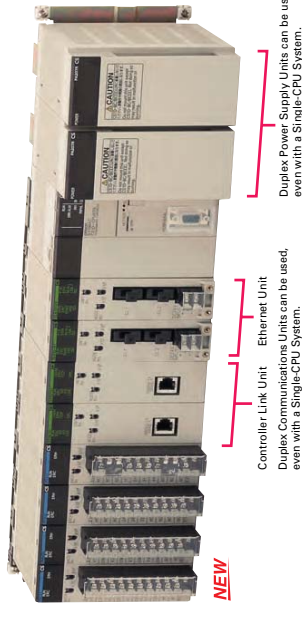


### Online Unit Replacement

With either a Duplex-CPU or Single-CPU CS1D System, Basic I/O Units, Special I/O Units, and CPU Bus Units can be replaced online while the system continues operation. Although operation will stop for the Unit being replaced, all other Units will continue operation.

During System Operation with Power-Supplied

## Single-CPU System



### Duplex operation is possible for any or all of the following: CPU Units, Power Supply Units, and Communications Units.

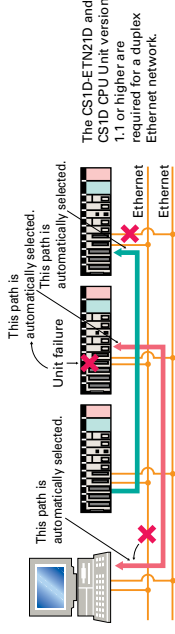
Use duplex operation for the CPU Unit, power supply, or communications depending on system requirements for reliability, costs, and functionality. For example, use duplex operation for all of these for systems that must never go

# Reliability of

## Increase the Reliability of Information with Duplex Networks

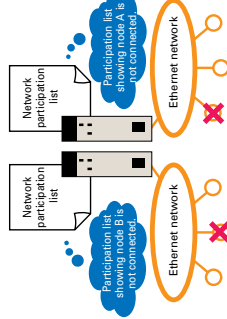
### Duplex Ethernet for Greater Information Network Reliability NEW

With redundant networks and Communications Units, communications will continue even if a network line is broken or one of the Communications Units fails. The communications path is automatically selected for each communications process (as opposed to switching the entire line), to enable creating a highly reliable network even against a network line broken in more than one location.



### Monitor Connection Status to an Ethernet Network NEW

The connection status for each line is stored in the CIO A area words allocated in the CPU Unit. This enables the ladder program or host to quickly detect faulty nodes or lines to make maintenance easier.

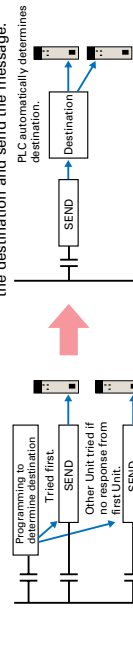


## Program without Being Concerned with Duplex Operation

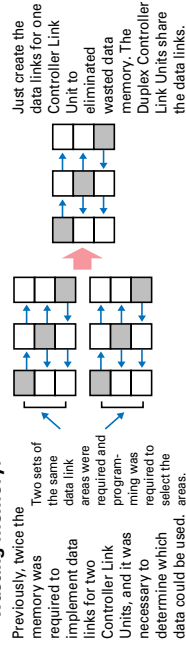
No special programming is required to use duplex communications with the CS1D, making it simple to design programs for duplex systems.

- The complex programming required in previous applications for duplex communications with Ethernet is eliminated.

Previously it was necessary to program operation for both Ethernet Units.



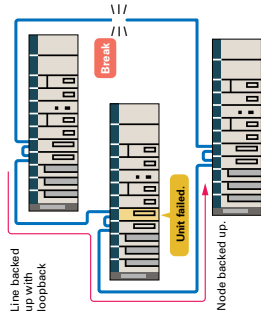
- Controller Link networks enable allocating data link areas without wasting memory.



### Duplex Networks between PLCs with Controller Link

Even if one Unit fails, the other Unit will back it up and continue communications. Even if a line breaks, a loopback will be used to maintain the network.

Either the CS1W-CLK12-V1 or CS1W-CLK2-V1 is required for a Duplex Controller Link network.



### Initial and maintenance costs are reduced.

### Allows effective use of software assets.

The same support software can be used in systems combining the CS1 and CJ1 Series, and all software programs and data are compatible. Their application and reuse are extremely easy. There is also no need for ladder programs for duplexing. This means that when converting an existing system to a Duplex System, there is almost no need to revise ladder programs.

### Complete compatibility among Units.

The CS1D Duplex System is fully compatible with the I/O Units of the entire CS Series. Accordingly, the same Units and materials can be used for restoring the system and conducting maintenance. There is no need to purchase different Units and materials for each system, making the CS1D Duplex System highly economical. (C200H Series, however, cannot be used with CS1D PLCs. Refer to user documentation for details.)