

SYSMAC CS/CJ Series

CS1G/H-CPU□□H

CS1G/H-CPU□□-E

CS1W-SCB21/41

CS1W-SCU21

CJ1G/H-CPU□□H

CJ1G-CPU□□

CJ1W-SCU41

Communications Commands




Reference Manual

Revised October 2001

Notice:

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

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

-  **DANGER** Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
-  **WARNING** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
-  **Caution** Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

OMRON Product References

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

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

The abbreviation “PC” means Programmable 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.

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

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

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About this Manual:

This manual describes the C-series (Host Link) and FINS communications commands used with CS/CJ-series Programmable Controllers (PCs) and includes the sections described below.

Please read this manual and all related manuals listed in the following table and be sure you understand information provided before attempting to design or implement communications for CS/CJ-series PCs.

Name	Cat. No.	Contents
SYSMAC CS/CJ Series CS1G/H-CPU□□-EV1, CS1G/H-CPU□□H, CJ1G-CPU□□, CJ1G/H-CPU□□H, CS1W-SCB21/41, CS1W-SCU21, CJ1W-SCU41 Communications Commands Reference Manual	W342	Describes the C-series (Host Link) and FINS communications commands used with CS/CJ-series PCs. (This manual)
SYSMAC CS/CJ Series CS1G/H-CPU□□-EV1, CS1G/H-CPU□□H, CJ1G-CPU□□, CJ1G/H-CPU□□H Programmable Controllers Instructions Reference Manual	W340	Describes the ladder diagram programming instructions supported by CS/CJ-series PCs.
SYSMAC CS/CJ Series CS1G/H-CPU□□-EV1, CS1G/H-CPU□□H, CJ1G-CPU□□, CJ1G/H-CPU□□H Programmable Controllers Programming Manual	W394	This manual describes programming and other methods to use the functions of the CS/CJ-series PCs.
SYSMAC CS Series CS1G/H-CPU□□-EV1, CS1G/H-CPU□□H Programmable Controllers Operation Manual	W339	Provides an outlines of and describes the design, installation, maintenance, and other basic operations for the CS-series PCs.
SYSMAC CJ Series CJ1G-CPU□□, CJ1G/H-CPU□□H Programmable Controllers Operation Manual	W393	Provides an outlines of and describes the design, installation, maintenance, and other basic operations for the CJ-series PCs.
SYSMAC CS/CJ Series CQM1H-PRO01-E, C200H-PRO27-E, CQM1-PRO01-E Programming Consoles Operation Manual	W341	Provides information on how to program and operate CS/CJ-series PCs using a Programming Console.
SYSMAC WS02-CXP□□-E CX-Programmer User Manual	W361	Provide information on how to use the CX-Programmer, a programming device that supports the CS/CJ-series PCs, and the CX-Net contained within CX-Programmer.
SYSMAC WS02-CXP□□-E CX-Server User Manual	W362	
SYSMAC CS/CJ Series CS1W-SCB21/41, CS1W-SCU21, CJ1W-SCU41 Serial Communications Boards/Units Operation Manual	W336	Describes the use of Serial Communications Unit and Boards to perform serial communications with external devices, including the usage of standard system protocols for OMRON products.
SYSMAC WS02-PSTC1-E CX-Protocol Operation Manual	W344	Describes the use of the CX-Protocol to create protocol macros as communications sequences to communicate with external devices.
SYSMAC CS/CJ Series CJ1W-ETN01/ENT11, CJ1W-ETN11 Ethernet Unit Operation Manual	W343	Describes the installation and operation of CJ1W-ETN01, CJ1W-ENT11, and CJ1W-ETN11 Ethernet Units.

About this Manual (Continued):

Section 1 introduces the C-mode commands and FINS commands, and explains the relationship between them.

Section 2 provides an overview of C-mode commands.

Section 3 provides an overview of FINS commands.

Section 4 provides detailed descriptions of the C-mode commands.

Section 5 provides detailed descriptions of the FINS commands.



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

PRECAUTIONS

This section provides general precautions for using the CS/CJ-series Programmable Controllers (PCs) and related devices.

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

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1 Intended Audience

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

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


2 General Precautions

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


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

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


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







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

3 Safety Precautions




 **WARNING** The CPU Unit refreshes I/O even when the program is stopped (i.e., even in PROGRAM mode). Confirm safety thoroughly in advance before changing the status of any part of memory allocated to I/O Units, Special I/O Units, or CPU Bus Units. Any changes to the data allocated to any Unit may result in unexpected operation of the loads connected to the Unit. Any of the following operation may result in changes to memory status.

- Transferring I/O memory data to the CPU Unit from a Programming Device.
- Changing present values in memory from a Programming Device.
- Force-setting/-resetting bits from a Programming Device.
- Transferring I/O memory files from a Memory Card or EM file memory to the CPU Unit.
- Transferring I/O memory from a host computer or from another PC on a network.

 **WARNING** Do not attempt to take any Unit apart while the power is being supplied. Doing so may result in electric shock.

-  **WARNING** Do not touch any of the terminals or terminal blocks while the power is being supplied. Doing so may result in electric shock.
-  **WARNING** Do not attempt to disassemble, repair, or modify any Units. Any attempt to do so may result in malfunction, fire, or electric shock.
-  **WARNING** Do not touch the Power Supply Unit while power is being supplied or immediately after power has been turned OFF. Doing so may result in electric shock.
-  **Caution** Execute online edit only after confirming that no adverse effects will be caused by extending the cycle time. Otherwise, the input signals may not be readable.
-  **Caution** Confirm safety at the destination node before transferring a program to another node or changing contents of the I/O memory area. Doing either of these without confirming safety may result in injury.
-  **Caution** Tighten the screws on the terminal block of the AC Power Supply Unit to the torque specified in the operation manual. Loose screws may result in burning or malfunction.


4 Operating Environment Precautions

-  **Caution** Do not operate the control system in the following places:
- Locations subject to direct sunlight.
 - Locations subject to temperatures or humidity outside the range specified in the specifications.
 - Locations subject to condensation as the result of severe changes in temperature.
 - Locations subject to corrosive or flammable gases.
 - Locations subject to dust (especially iron dust) or salts.
 - Locations subject to exposure to water, oil, or chemicals.
 - Locations subject to shock or vibration.
-  **Caution** Take appropriate and sufficient countermeasures when installing systems in the following locations:
- Locations subject to static electricity or other forms of noise.
 - Locations subject to strong electromagnetic fields.
 - Locations subject to possible exposure to radioactivity.
 - Locations close to power supplies.
-  **Caution** The operating environment of the PC System can have a large effect on the longevity and reliability of the system. Improper operating environments can lead to malfunction, failure, and other unforeseeable problems with the PC System. Be sure that the operating environment is within the specified conditions at installation and remains within the specified conditions during the life of the system.


5 Application Precautions

Observe the following precautions when using the PC System.

- You must use the CX-Programmer (programming software that runs on Windows) if you need to program more than one task. A Programming Console can be used to program only one cyclic task plus interrupt tasks. A Programming Console can, however, be used to edit multitask programs originally created with the CX-Programmer.

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

- Always connect to a class-3 ground (to 100 Ω or less) when installing the Units. Not connecting to a class-3 ground may result in electric shock.
- A class-3 ground (to 100 Ω or less) must be installed when shorting the GR and LG terminals on the Power Supply Unit.
- Always turn OFF the power supply to the PC before attempting any of the following. Not turning OFF the power supply may result in malfunction or electric shock.
 - Mounting or dismounting Power Supply Units, I/O Units, CPU Units, Inner Boards, or any other Units.
 - Assembling the Units.
 - Setting DIP switches or rotary switches.
 - Connecting cables or wiring the system.
 - Connecting or disconnecting the connectors.

 **Caution** Failure to abide by the following precautions could lead to faulty operation of the PC or the system, or could damage the PC or PC Units. Always heed these precautions.

- When using a CS-series CS1 CPU Unit for the first time, install the CS1W-BAT01 Battery provided with the Unit and clear all memory areas from a Programming Device before starting to program. (Not required for CJ-series CPU Units.)
- When using the internal clock for a CS-series CS1 CPU Unit, turn ON power after installing the battery and set the clock from a Programming Device or using the DATE(735) instruction. The clock will not start until the time has been set. (Not required for CJ-series CPU Units.)
- Always turn ON power to the PC before turning ON power to the control system. If the PC power supply is turned ON after the control power supply, temporary errors may result in control system signals because the output terminals on DC Output Units and other Units will momentarily turn ON when power is turned ON to the PC.
- Fail-safe measures must be taken by the customer to ensure safety in the event that outputs from Output Units remain ON as a result of internal circuit failures, which can occur in relays, transistors, and other elements.
- Fail-safe measures must be taken by the customer to ensure safety in the event of incorrect, missing, or abnormal signals caused by broken signal lines, momentary power interruptions, or other causes.

- Interlock circuits, limit circuits, and similar safety measures in external circuits (i.e., not in the Programmable Controller) must be provided by the customer.
- Do not turn OFF the power supply to the PC when data is being transferred. In particular, do not turn OFF the power supply when reading or writing a Memory Card. Also, do not remove the Memory Card when the BUSY indicator is lit. To remove a Memory Card, first press the memory card power supply switch and then wait for the BUSY indicator to go out before removing the Memory Card.
- If the I/O Hold Bit is turned ON, the outputs from the PC will not be turned OFF and will maintain their previous status when the PC is switched from RUN or MONITOR mode to PROGRAM mode. Make sure that the external loads will not produce dangerous conditions when this occurs. (When operation stops for a fatal error, including those produced with the FALS(007) instruction, all outputs from Output Unit will be turned OFF and only the internal output status will be maintained.)
- When supplying power at 200 to 240 VAC for CS-series PCs, always remove the metal jumper from the voltage selector terminals. The product will be destroyed if 200 to 240 VAC is supplied while the metal jumper is attached.
- Always use the power supply voltages specified in the operation manuals. An incorrect voltage may result in malfunction or burning.
- Take appropriate measures to ensure that the specified power with the rated voltage and frequency is supplied. Be particularly careful in places where the power supply is unstable. An incorrect power supply may result in malfunction.
- Install external breakers and take other safety measures against short-circuiting in external wiring. Insufficient safety measures against short-circuiting may result in burning.
- Do not apply voltages to the Input Units in excess of the rated input voltage. Excess voltages may result in burning.
- Do not apply voltages or connect loads to the Output Units in excess of the maximum switching capacity. Excess voltage or loads may result in burning.
- Disconnect the functional ground terminal when performing withstand voltage tests. Not disconnecting the functional ground terminal may result in burning.
- Install the Units properly as specified in the operation manuals. Improper installation of the Units may result in malfunction.
- Be sure that all the mounting screws, terminal screws, and cable connector screws are tightened to the torque specified in the relevant manuals. Incorrect tightening torque may result in malfunction.
- Leave the label attached to the Unit when wiring. Removing the label may result in malfunction if foreign matter enters the Unit.
- Remove the label after the completion of wiring to ensure proper heat dissipation. Leaving the label attached may result in malfunction.
- Use crimp terminals for wiring. Do not connect bare stranded wires directly to terminals. Connection of bare stranded wires may result in burning.
- Wire all connections correctly.
- Double-check all wiring and switch settings before turning ON the power supply. Incorrect wiring may result in burning.

- Mount Units only after checking terminal blocks and connectors completely.
- Be sure that the terminal blocks, Memory Units, expansion cables, and other items with locking devices are properly locked into place. Improper locking may result in malfunction.
- Check switch settings, the contents of the DM Area, and other preparations before starting operation. Starting operation without the proper settings or data may result in an unexpected operation.
- Check the user program for proper execution before actually running it on the Unit. Not checking the program may result in an unexpected operation.
- Confirm that no adverse effect will occur in the system before attempting any of the following. Not doing so may result in an unexpected operation.
 - Changing the operating mode of the PC.
 - Force-setting/force-resetting any bit in memory.
 - Changing the present value of any word or any set value in memory.
- After replacing a CPU Unit, resume operation only after transferring to the new CPU Unit the contents of the DM Area, HR Area, and other data required for resuming operation. Not doing so may result in an unexpected operation.
- Do not pull on the cables or bend the cables beyond their natural limit. Doing either of these may break the cables.
- Do not place objects on top of the cables or other wiring lines. Doing so may break the cables.
- When replacing parts, be sure to confirm that the rating of a new part is correct. Not doing so may result in malfunction or burning.
- Before touching a Unit, be sure to first touch a grounded metallic object in order to discharge any static built-up. Not doing so may result in malfunction or damage.
- When transporting or storing circuit boards, cover them in antistatic material to protect them from static electricity and maintain the proper storage temperature to protect the LSIs, ICs, and other components.
- Do not touch circuit boards or the components mounted to them with your bare hands. There are sharp leads and other parts on the boards that may cause injury if handled improperly.

SECTION 1
Introduction

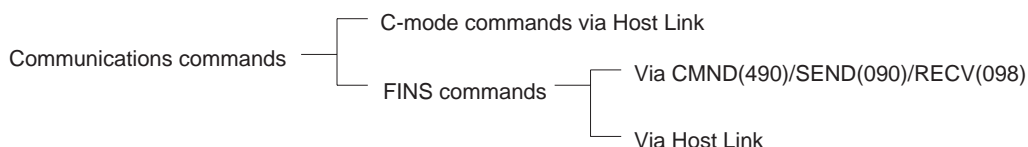
This section introduces the C-mode commands and FINS commands, and explains the relationship between them.

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1-1 Overview of Communications Commands

Communications Commands Addressed to CS/CJ-series PCs

A CS/CJ-series CPU Unit can receive the following communications commands.



C-mode Commands

C-mode commands are specialized Host Link communications commands. They are issued by a host computer and sent to a CPU Unit. The devices that can be connected for serial communications are the CPU Unit, a Serial Communications Unit, and a Serial Communications Board.

FINS Commands

FINS commands are message service communications commands. They do not depend on a particular transmission path. They can be used for communications on various networks (Controller Link, Ethernet, etc.) and for serial communications (Host Link). They can be issued from a CPU Unit, Special I/O Unit, or host computer, and they can also be sent to any of these. The specific commands that can be sent depend on the destination.

This manual explains commands sent to CS/CJ-series CPU Units, when the commands are issued from a CPU Unit or a host computer connected by Host Link.

Note When the source of the commands is a CPU Unit, the FINS commands are sent by means of CMND(490)/SEND(090)/RECV(098). When the source is a host computer, the FINS commands are issued using Host Link protocol.

1-2 C-mode Commands

The following table lists the C-mode (Host Link) commands. For details, refer to *SECTION 4 C-mode Commands*.

Type	Header code	Name	Function
I/O memory reading	RR	CIO AREA READ	Reads the specified number of words beginning with the designated CIO word.
	RL	LR AREA READ	Reads the specified number of words beginning with the designated LR word.
	RH	HR AREA READ	Reads the specified number of words beginning with the designated HR word.
	RC	TIMER/COUNTER PV READ	Reads the specified number of words of the timer/counter PV beginning with the designated word.
	RG	TIMER/COUNTER STATUS READ	Reads the specified number of words of the timer/counter status beginning with the designated word.
	RD	DM AREA READ	Reads the specified number of words beginning with the designated DM word.
	RJ	AR AREA READ	Reads the specified number of words beginning with the designated AR word.
	RE	EM AREA READ	Reads the specified number of words beginning with the designated EM word.

Type	Header code	Name	Function
I/O memory writing	WR	CIO AREA WRITE	Writes the specified data in word units beginning with the designated CIO word.
	WL	LR AREA WRITE	Writes the specified data in word units beginning with the designated LR word.
	WH	HR AREA WRITE	Writes the specified data in word units beginning with the designated HR word.
	WC	TIMER/COUNTER PV WRITE	Writes the specified timer/counter PV data in word units beginning with the designated word.
	WD	DM AREA WRITE	Writes the specified data in word units beginning with the designated DM word.
	WJ	AR AREA WRITE	Writes the specified data in word units beginning with the designated AR word.
	WE	EM AREA WRITE	Writes the specified data in word units beginning with the designated EM word.
Timer/counter SV reading	R#	TIMER/COUNTER SV READ 1	Reads in four digits BCD the constant SV that is written as an operand of the designated timer/counter instruction.
	R\$	TIMER/COUNTER SV READ 2	Finds the specified timer/counter instruction, beginning with the designated program address, and reads the constant SV in four digits or the word in which the SV is stored.
	R%	TIMER/COUNTER SV READ 3	Finds the specified timer/counter instruction, beginning with the designated program address, and reads the constant SV in four digits (BCD) or the word in which the SV is stored.
Timer/counter SV changing	W#	TIMER/COUNTER SV CHANGE 1	Changes the SV of the specified timer/counter instruction to a new constant SV.
	W\$	TIMER/COUNTER SV CHANGE 2	Finds the specified timer/counter instruction, beginning with the designated program address in the user program, and changes the constant SV in four digits (BCD) or the word in which the SV is stored to a new constant SV or storage word.
	W%	TIMER/COUNTER SV CHANGE 3	Finds the specified timer/counter instruction, beginning with the designated program address in the user program, and changes the constant SV in four digits (BCD) or the word in which the SV is stored to a new constant SV or storage word.
CPU Unit status	MS	STATUS READ	Reads the CPU Unit's operating conditions (operating mode, forced set/reset status, and fatal errors).
	SC	STATUS CHANGE	Changes the CPU Unit's operating mode.
	MF	ERROR READ	Reads the CPU Unit's error information (i.e., all fatal or non-fatal errors currently in effect).
Forced set/reset	KS	FORCED SET	Forcibly sets one designated bit.
	KR	FORCED RESET	Forcibly resets one designated bit.
	FK	MULTIPLE FORCED SET/RESET	Forcibly sets/resets/cancels multiple designated bits.
	KC	FORCED SET/RESET CANCEL	Cancels all forced set/reset status.
PC model code reading	MM	PC MODEL READ	Reads the model code of the CPU Unit.
Testing	TS	TEST	Returns, just as it is, a single block that was sent from the host computer.

Type	Header code	Name	Function
Program area accessing	RP	PROGRAM READ	Reads, in one batch, the contents of the CPU Unit's user program at the machine language (object) level.
	WP	PROGRAM WRITE	Writes into the CPU Unit's user program area the machine language (object) sent from the host computer.
I/O table creation	MI	I/O TABLE CREATE	Creates an I/O table with the contents of the actual I/O configuration.
I/O memory area registration and reading	QQMR	REGISTER I/O MEMORY	Registers the I/O memory words or bits that are to be read.
	QQIR	READ I/O MEMORY	Reads the registered I/O memory words/bits all at once.
Host Link communications processing	XZ	ABORT (command only)	Aborts the operation being performed by a Host Link command, and then returns to the initial status.
	**	INITIALIZE (command only)	Initializes the transfer control procedures for all Host Link Units.
	IC	Undefined command (response only)	This is the response when the command header code cannot be decoded.

1-3 FINS Commands

The following table lists the FINS commands. For details, refer to *SECTION 5 FINS Commands*.

Type	Command code		Name	Function
	MR	SR		
I/O memory area access	01	01	MEMORY AREA READ	Reads the contents of consecutive I/O memory area words.
	01	02	MEMORY AREA WRITE	Writes the contents of consecutive I/O memory area words.
	01	03	MEMORY AREA FILL	Writes the same data to the specified range of I/O memory area words.
	01	04	MULTIPLE MEMORY AREA READ	Reads the contents of specified non-consecutive I/O memory area words.
	01	05	MEMORY AREA TRANSFER	Copies the contents of consecutive I/O memory area words to another I/O memory area.
Parameter area access	02	01	PARAMETER AREA READ	Reads the contents of consecutive parameter area words.
	02	02	PARAMETER AREA WRITE	Writes the contents of consecutive parameter area words.
	02	03	PARAMETER AREA FILL (CLEAR)	Clears the specified range of parameter area words.
Program area access	03	06	PROGRAM AREA READ	Reads the UM (User Memory) area.
	03	07	PROGRAM AREA WRITE	Writes to the UM (User Memory) area.
	03	08	PROGRAM AREA CLEAR	Clears a specified range of the UM (User Memory) area.
Operating mode changes	04	01	RUN	Changes the CPU Unit's operating mode to RUN or MONITOR.
	04	02	STOP	Changes the CPU Unit's operating mode to PROGRAM.
Machine configuration reading	05	01	CPU UNIT DATA READ	Reads CPU Unit data.
	05	02	CONNECTION DATA READ	Reads the model numbers of the device corresponding to addresses.

Type	Command code		Name	Function
	MR	SR		
Status reading	06	01	CPU UNIT STATUS READ	Reads the status of the CPU Unit.
	06	20	CYCLE TIME READ	Reads the maximum, minimum, and average cycle time.
Time data access	07	01	CLOCK READ	Reads the present year, month, date, minute, second, and day of the week.
	07	02	CLOCK WRITE	Changes the present year, month, date, minute, second, or day of the week.
Message display	09	20	MESSAGE READ/CLEAR	Reads and clears messages, and reads FAL/FALS messages.
Access rights	0C	01	ACCESS RIGHT ACQUIRE	Acquires the access right as long as no other device holds it.
	0C	02	ACCESS RIGHT FORCED ACQUIRE	Acquires the access right even if another device already holds it.
	0C	03	ACCESS RIGHT RELEASE	Releases the access right that has been acquire.
Error log	21	01	ERROR CLEAR	Clears errors or error messages.
	21	02	ERROR LOG READ	Reads the error log.
	21	03	ERROR LOG CLEAR	Clears all error log records.
File memory	22	01	FILE NAME READ	Reads file device data.
	22	02	SINGLE FILE READ	Reads a specified length of file data from a specified position within a single file.
	22	03	SINGLE FILE WRITE	Writes a specified length of file data from a specified position within a single file.
	22	04	FILE MEMORY FORMAT	Formats (initializes) the file device.
	22	05	FILE DELETE	Deletes specified files stored in the file device.
	22	07	FILE COPY	Copies files from one file device to another file device in the same system.
	22	08	FILE NAME CHANGE	Changes a file name.
	22	0A	MEMORY AREA-FILE TRANSFER	Transfers or compares data between the I/O memory area and the file device.
	22	0B	PARAMETER AREA-FILE TRANSFER	Transfers or compares data between the parameter area and the file device.
	22	0C	PROGRAM AREA-FILE TRANSFER	Transfers or compares data between the UM (User Memory) area and the file device.
Debugging	22	15	DIRECTORY CREATE/DELETE	Creates or deletes a directory.
	23	01	FORCED SET/RESET	Force-sets or force-resets bits, or releases force-set status.
	23	02	FORCED SET/RESET CANCEL	Cancels all bits that have been force-set or force-reset.

SECTION 2

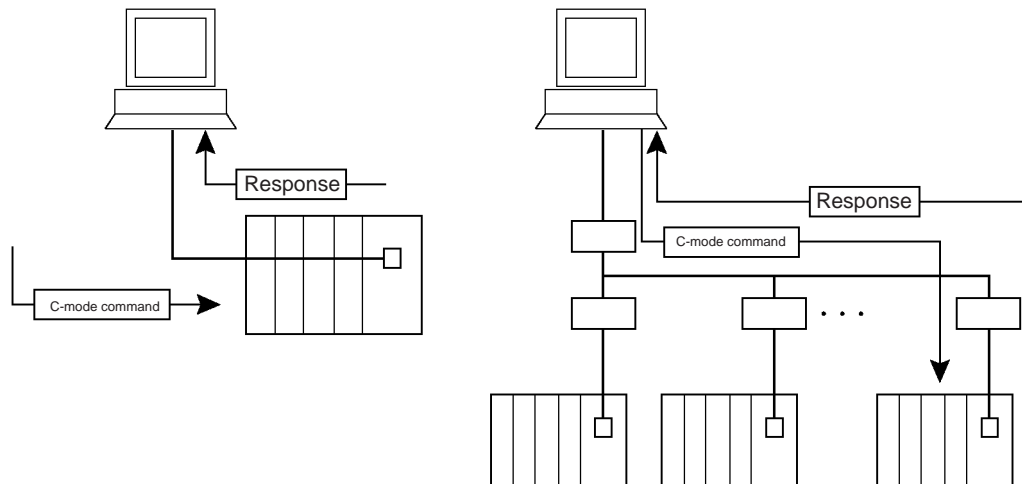
Overview of C-mode Commands

This section provides an overview of C-mode (Host Link) commands.

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2-1 C-mode Commands

C-mode (Host Link) commands form a command/response system for serial communications (Host Link Mode) to perform various control operations between a CPU Unit and a host computer directly connected to it. These operations include reading from and writing to I/O memory, changing operating modes, executing forced set and forced reset operations, and so on.



Unlike FINS commands, C-mode commands can only be addressed to a CPU Unit, and they cannot be used for message service outside of the local network. They cannot be used for functions such as file operations.

C-mode (Host Link) commands can be sent from a host computer connected to a CS/CJ-series Host Link Unit. Up to 32 PCs (Host Link Units) can be connected to a single host computer. For identification, each Host Link Unit is assigned a unit number from 0 to 31.

The length of a single unit of a command or response exchange is called a "frame." A single frame contains a maximum of 131 characters of data. Characters are sent and received as ASCII.

Note For a CS/CJ-series PC, a "Host Link Unit" can be the CPU Unit, a Serial Communications Unit, or a Serial Communications Board.

A maximum of 30 words of data can be transferred for the first command frame and a maximum of 31 words of data can be transferred for other command frames when reading or writing word data in I/O memory. When reading/writing more than 30 words of data, the data transfer will be processed in multiple transmissions, with 30 words in the first and up to 31 words in each of the following transmissions until the number of words set in the command has been processed.

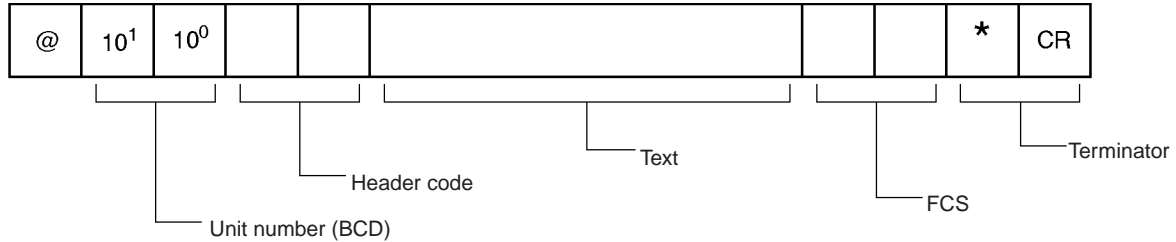
The frame formats for Host Link commands sent from a host computer and responses returned by the PC receiving the commands are explained in the following section.

2-2 Command/Response Formats

Single-frame Commands

If a command is not more than 131 characters long, communications can be completed by sending a single command frame. This is called a “single-frame command.”

Command Frame Format

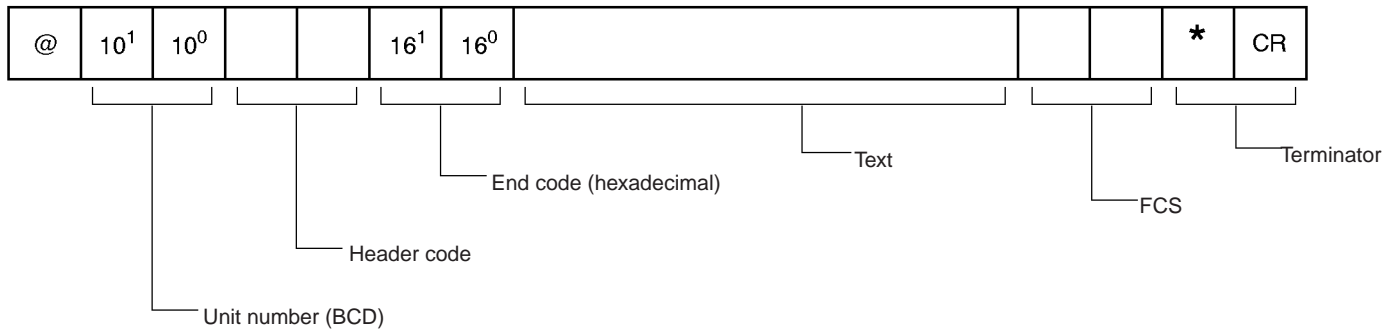


- **@:** Must be attached at the beginning of the command.
- **Unit number:** Set in BCD from 0 to 31 for each Host Link Unit.
- **Header code:** Specified in two characters.
- **Text:** Set parameters corresponding to command code.
- **FCS:** Calculate 2-character FCS (frame check sequence) at host computer. For details on calculating FCS, refer to *FCS Calculations* later in this section.
- **Terminator:** Set “*” and CR (CHR\$(13)) as two characters to indicate the end of the command.

Single-frame Response

If a response is not more than 131 characters long, the communications can be completed by returning one response frame. This is called a “single-frame response.”

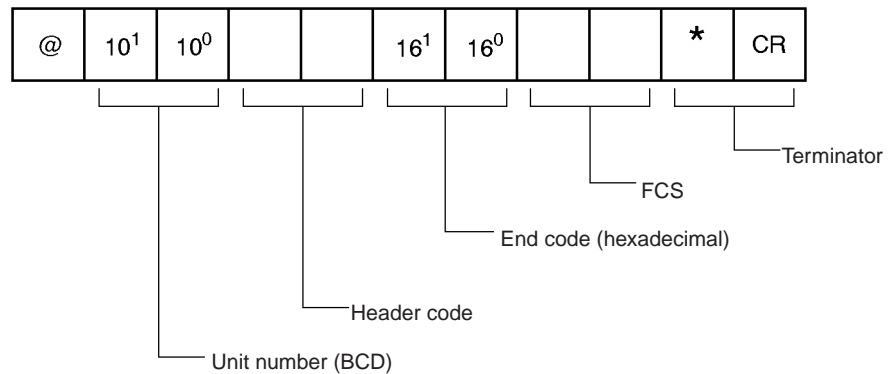
Response Frame Format



- **@:** Must be attached at the beginning of the response.
- **Unit number:** Set in BCD from 0 to 31 for each Host Link Unit.
- **Header code:** The command code that was received is returned.
- **End code:** The results (error status, etc.) of command execution is returned.
- **Text:** Returned only if there is read data.
- **FCS:** The 2-character FCS (frame check sequence) is returned.
- **Terminator:** Two characters indicating the end of the command, “*” and CR (CHR\$(13)), are returned.

Error Response Formant

If a reception error or an error in executing the command occurs, a response is returned with no text.

**Partitioned Commands**

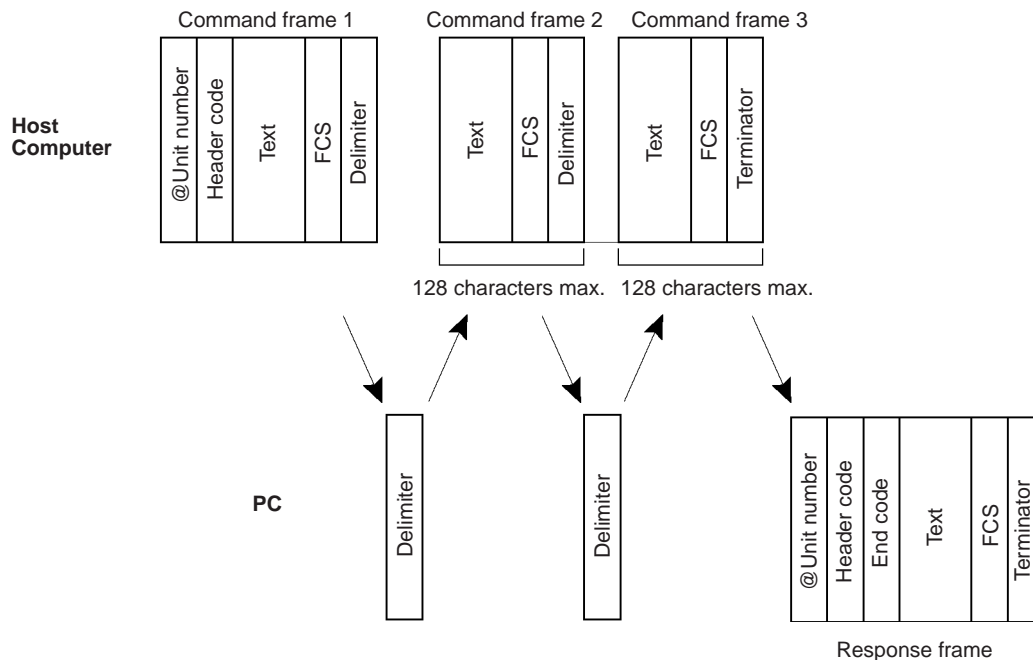
If a command is longer than 131 characters, the command's text is partitioned by sending a delimiter [CR code, CHR\$(13)] instead of a terminator at the end of each command frame until the last one. A terminator is sent at the end of the last frame. The procedure is given below for three command frames.

Note When sending command frames for writing (WR, WL, WC, WD, etc.), be careful not to partition into separate frames data that is to be written into the same word.

1,2,3...

1. From the host computer, attach a delimiter (CR) at the end of command frame 1 and send the frame.
2. When the PC receives this delimiter (CR), it will return only a delimiter (CR) to the host computer.
3. From the host computer, attach a delimiter (CR) at the end of command frame 2 and send the frame.
4. When the PC receives this delimiter (CR), it will return only a delimiter (CR) to the host computer.
5. From the host computer, attach a terminator (*CR) at the end of command frame 3 and send the frame.
6. When the PC receives this terminator (*CR), it will return the response format with a terminator (*CR) attached to the end.

The following diagram shows the command format when there are more than 131 characters.



Note A “delimiter” is a CR code [CHR\$(13)] sent as a single character to indicate the middle of a command or response.

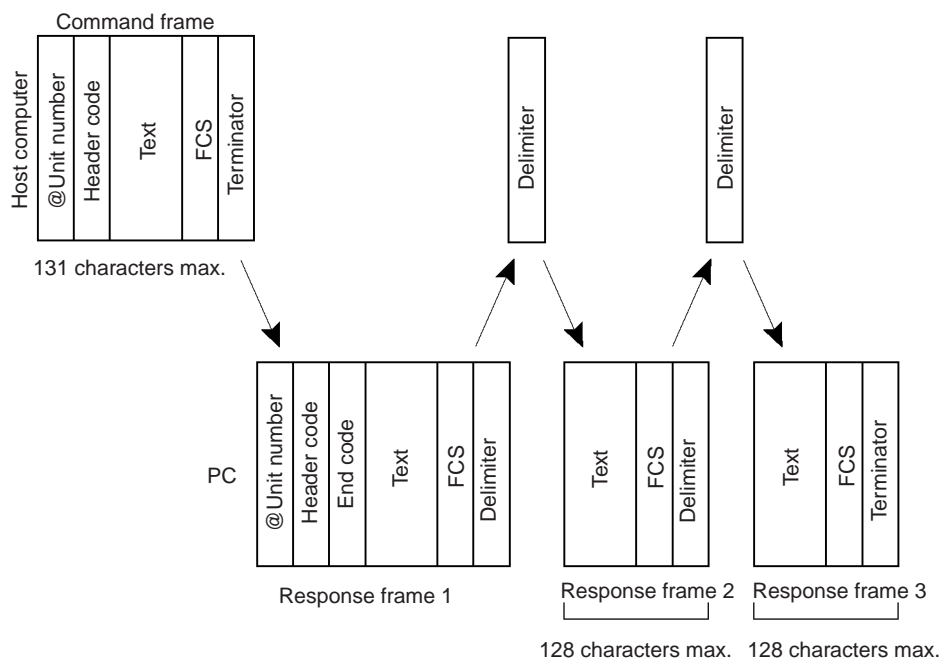
Partitioned Responses

If a response is more than 131 characters long, the response from the PC is partitioned by returning a delimiter (CR code, CHR\$(13)) instead of a terminator at the end of each frame until the last one. A terminator is returned at the end of the last frame.

In the following example procedure, the response is partitioned into three frames.

- 1,2,3...**
1. When the PC receives the command frame from the host computer, it returns response frame 1 with a delimiter (CR) at the end to the host computer.
 2. Only a delimiter (CR) is sent from the host computer to the PC.
 3. When the PC receives this delimiter (CR), it returns response frame 2 with a delimiter (CR) at the end to the host computer.
 4. Only a delimiter (CR) is sent from the host computer to the PC.
 5. When the PC receives this delimiter (CR), it returns response frame 3 with a terminator (*CR) at the end to the host computer.

The following diagram shows the response format when there are more than 131 characters.

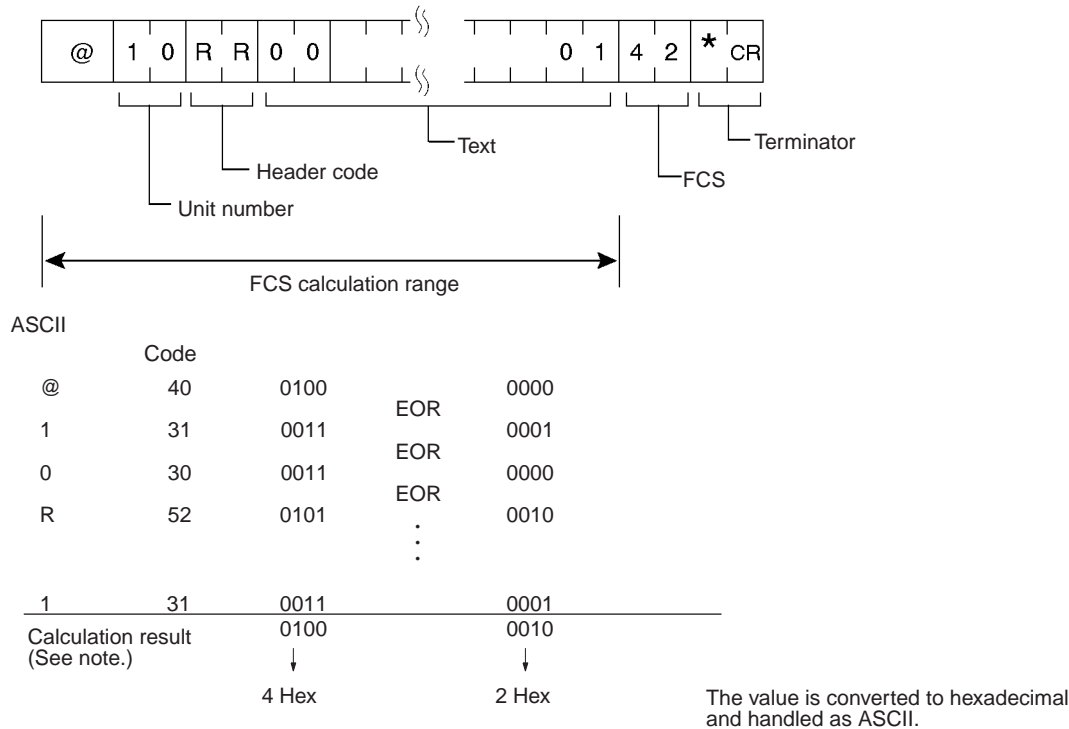


- Note**
1. Frames in partitioned commands or responses must have not more than 128 characters including the delimiter/terminator.
 2. Delimiters from the host computer are detected by the presence of a CR code. The delimiter will be detected even if there is data in front of it.

FCS Calculations

The PC calculates the FCS (Frame Check Sequence) value for each command frame it receives, and it checks for errors by comparing that value with the FCS value sent with the command frame. The host computer must calculate the FCS value when sending a command frame.

Also, when checking for errors in response frames, the host computer must calculate the FCS value for each response frame it receives and compare that value to the FCS value sent in the response frame.



Note The FCS is an 8-bit value converted into two ASCII characters. The 8-bit value is the result of an exclusive OR sequentially performed between each character in a transmission, from the first character in the frame to the last character of the text in that frame. Non-ASCII data, however, may sometimes be sent in the text data. If the data length is 7 bits, the leftmost bit of each character is masked before the FCS is calculated.

2-3 Application Example

Sending a Host Link Command from a Host Computer

In this example program, a Host Link command is sent from a host computer and a response is received.

```

10 'CS1 SAMPLE PROGRAM FOR EXCEPTION
20 CLOSE
30 CLS
40 OPEN "COM:E73"AS#1
50 *KEYIIN
60 INPUT "DATA-",S
70 IF S$="" THEN GOTO 190
80 PRINT "SEND DATA=";S$
90 ST$=S$
100 INPUT "SEND OK? Y or N?=",BS
110 IF B$="Y" THEN GOTO 130 ELSE GOTO *KEYIN
120 S$=ST$
130 PRINT #T,S$           Sends command to PC.
140 INPUT #1,R$           Receives command from PC.
150 PRINT "RECV DATA=";R$
160 IF MID$(R$,4,2)="EX" THEN GOTO 210   Identifies command.
170 IF RIGHT$(R$,1)<>"*" THEN S$="":GOTO 130
180 GOTO *KEYIN
190 CLOSE 1
200 END
210 PRINT "EXCEPTION!!DATA"
220 GOTO 140

```

Explanation

- 1,2,3...**
1. The host computer's transmission/reception program is started up, and the Host Link command is input.
 2. The Host Link command that was input is sent to the PC, and the data that is received is displayed on the screen.

Note The example program up to this point does not include an error processing routine in case reception is not normal (e.g., if there is no FCS). Include error processing routines when creating an actual program.

```

400 *FCSCHK
410 L=LEN(RESPONSE$)           Transmission/reception data
420 Q=0:FCCK$=""
430 A$=RIGHT$(RESPONSE$,1)
440 PRINT RESPONSE$,A$,L
450 IF A$="*" THEN LENG=LEN(RESPONSE$)-3
    ELSE LENG=LEN(RESPONSE$)-2
460 FCSP$=MID$(RESPONSE$,LENG+1,2)   FCS data that is received
470 FOR I=1 TO LENG                 Number of characters in FCS calculation
480 Q=ASC(MID$(RESPONSE$,I,1))XOR Q
490 NEXT I
500 FCSD$=HEX$(Q)
510 IF LEN(FCSD$) =1 THEN FCSD$="0"+FCSD$   FCS calculation result
520 IF FCSD$<>FCSP$ THEN FCCK$="ERR"
530 PRINT "FCSD$=";FCSD$,"FCSP$=";FCSP$,"FCCK$=";FCCK$
    Normal FCS reception: " " (space); abnormal FCS reception: "ERR"
540 RETURN

```


2-4 Precautions in Using Programs from Previous PC Models

2-4-1 Using Host Computer Programs Written for C-series Host Link Units

Number of Words per Frame

The numbers of words of text in each frame when using the following commands to read I/O memory are different for C-series Host Link Units and CS/CJ-series Units. The C-series Host Link Units will handle 29 words in the first frame and 30 words in following frames, but CS/CJ-series Units will handle 30 words in the first frame and 31 words in following frames.

Header code	Name
RR	CIO AREA READ
RL	LR AREA READ
RH	HR AREA READ
RC	TIMER/COUNTER PV READ
RG	TIMER/COUNTER STATUS READ Note: With the RG command, the number of words per frame is different to that for other C-mode commands. For details refer to <i>Words per Frame for C-mode RG Command</i> below.
RD	DM AREA READ
RJ	AR AREA READ

The differences in the length of data read with each frame can cause host computer programs previously used with C-series Host Link Unit to not work correctly with CS/CJ-series Units. Check the operations of the host computer programs and correct them if necessary.

Words per Frame for C-mode Commands (Except RG Command)

Units	C Series	CS/CJ Series	CVM1 and CV Series	Data words per frame	
				1st frame	Other frames
C-series Host Link Units	C200H- LK101/LK201/ LK202 Host Link Units C500-LK103/LK203 Host Link Units 3G2A5-LK101/LK201 Host Link Units 3G2A6- LK101/LK201/ LK202 Host Link Units	---	---	29 words	30 words
Other Boards and Units	SRM1 built-in ports CPM1 built-in ports CPM1A built-in ports CQM1-CPU□□ built-in ports C200HS-CPU□□ built- in ports C200HX/HG/HE- CPU□□ built-in ports C200HW-COM□□ Communications Board ports	CS1G/H-CPU□□H built-in ports CS1G/H-CPU□□ built- in ports CJ1G/H-CPU□□H built-in ports CJ1G-CPU□□ built-in ports CS1W-SCB21/41 Serial Communica- tions Board ports CS1W-SCU21 Serial Communications Unit ports CJ1W-SCU41 Serial Communications Unit ports	CVM1-CPU□□ built-in ports CV-CPU□□ built-in ports CV500-LK201 Host Link Unit	30 words	31 words

Words per Frame for C-mode RG Command

Units	C Series	CS/CJ Series	CVM1 and CV Series	Data words per frame	
				1st frame	Other frames
C-series Host Link Units	C200H- LK101/LK201/ LK202 Host Link Units	---	---	89 words	60 words
	C500-LK103/LK203 Host Link Units 3G2A5-LK101/LK201 Host Link Units 3G2A6- LK101/LK201/ LK202 Host Link Units	---	---	89 words	89 words
Other Boards and Units	SRM1 built-in ports CPM1 built-in ports CPM1A built-in ports CQM1-CPU□□ built-in ports CQM1H-CPU□□ built- in ports CQM1H-SCB□□ built- in ports C200HX/HG/HE- CPU□□ built-in ports C200HW-COM□□ Communications Board ports	CS1G/H-CPU□□H built-in ports CS1G/H-CPU□□ built- in ports CJ1G/H-CPU□□H built-in ports CJ1G-CPU□□ built-in ports CS1W-SCB21/41 Serial Communica- tions Board ports CS1W-SCU21 Serial Communications Unit ports CJ1W-SCU41 Serial Communications Unit ports	CVM1-CPU□□ built-in ports CV-CPU□□ built-in ports CV500-LK201 Host Link Unit	121 words	125 words

Note The number of words per frame will be different in the following cases.

With CS/CJ-series CPU Unit built-in ports, CS/CJ-series Serial Communications Units/Boards, C200HX/HG/HE CPU Unit built-in ports, or C200HS CPU Unit built-in ports, when 246 words of timer or counter completion flags are read, response is returned as shown in the following table.

1st frame	2nd frame	3rd frame
121 words	124 words	1 word

The frame one before the last frame contains 124 words and the last frame contains 1 word. This also applies when the number of words is 246 + a multiple of 125 (i.e., 371 words, 496 words, 621 words, etc.).

With CS/CJ-series Unit built-in ports, when 121 words of timer or counter completion flags are read, response is returned as shown in the following table.

1st frame	2nd frame
120 words	1 word

With CVM1 and CV-series CPU Unit built-in ports or CVM1/CV-series Host Link Units, when 121 or 246 words of timer or counter completion flags are read, response is returned as shown in the following table.

Number of Words = 121

1st frame	2nd frame
121 words	0 words (terminator only)

Number of Words = 246

1st frame	2nd frame	3rd frame
121 words	125 words	0 words (terminator only)

The frame one before the last frame contains 125 words and the last frame contains the terminator only. This also applies when the number of words is 246 + a multiple of 125 (i.e., 371 words, 496 words, 621 words, etc.). For responses containing the terminator only, "00*CR" (00 = FCS, CR = carriage return) is returned.

Response Format for MS Command

With the MS command (STATUS READ), the response data format when using CVM1 or CV-series built-in ports or Host Link Units, is different to the response data format for other Units.

With CVM1 or CV-series built-in ports or Host Link Units, if FAL/FALS is not executed, spaces (ASCII 20) will be added to the response data. For other Units, FAL/FALS message data will added to response data only if FAL/FALS is executed.

2-4-2 C-mode Command Support

Use the following table as reference when reusing programs for host computers.

- If a command is not supported for the new model of PC, consider using another C-mode or FINS command.
- Even if the command is supported, differences may exist in the data sizes that can be processed or in the meaning of the values if the models or Series vary.
- Refer to the applicable operation manuals for details.

Note Refer to information on the previous page for commands with “Caution” in the *Frame data size* column.

Frame data size	Header code	Name	CS/CJ Series	C Series										CVM1 and CV Series		
				C200HE /HG/HX	C200HS	C120	C200H C200HS C200HE/ HG/HX	C500	C1000H C2000H	C500F	C1000HF	CQM1	SRM1 CPM1 CPM1A			
				CPU Unit or Serial Communications Board or Unit	CPU Unit or Communications Board	CPU Unit	C120 (3G2A6) Host Link Unit	C200H Host Link Unit	C500 (3G2A5) Host Link Unit			CPU Unit	CPU Unit	CPU Unit	CPU Unit	CV500 Host Link Unit
				--	--	--	--	--	--	--	--	--	--	None or V1	V2	--
Caution	RR	CIO AREA READ	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Caution	RL	LR AREA READ	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No
Caution	RH	HR AREA READ	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No
Caution	RC	TIMER/ COUNTER PV READ	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Caution	RG	TIMER/ COUNTER STATUS READ	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Caution	RD	DM AREA READ	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Caution	RJ	AR AREA READ	Yes	Yes	Yes	No	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
OK	RE	EM AREA READ	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No
NA	RX	FILE MEMORY DELUXE READ	No	No	No	No	No	No	Yes	No	Yes	No	No	No	No	No
NA	RF	FILE MEMORY READ	No	No	No	No	No	No	Yes	No	Yes	No	No	No	No	No
NA	CR	DM AREA READ (FIXED)	No	No	No	No	No	No	Yes	No	Yes	No	No	No	Yes	No
NA	GM	DM SIZE CHANGE	No	No	No	No	No	No	No	Yes	Yes	No	No	No	No	No
Caution	WR	CIO AREA WRITE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Caution	WL	LR AREA WRITE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No
Caution	WH	HR AREA WRITE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No
Caution	WC	TIMER/ COUNTER PV WRITE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Caution	WD	DM AREA WRITE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Frame data size	Header code	Name	CS/CJ Series	C Series										CVM1 and CV Series		
				C200HE /HG/HX	C200HS	C120	C200H C200HS C200HE/ HG/HX	C500	C1000H C2000H	C500F	C1000HF	CQM1	SRM1 CPM1 CPM1A			
			CPU Unit or Serial Communications Board or Unit	CPU Unit or Communications Board	CPU Unit	C120 (3G2A6) Host Link Unit	C200H Host Link Unit	C500 (3G2A5) Host Link Unit				CPU Unit	CPU Unit	CPU Unit	CPU Unit	CV500 Host Link Unit
Cau- tion	WJ	AR AREA WRITE	Yes	Yes	Yes	No	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
OK	WE	EM AREA WRITE	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No
NA	R#	TIMER/ COUNTER SV READ 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No
NA	R\$	TIMER/ COUNTER SV READ 2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No
NA	R%	TIMER/ COUNTER SV READ 3	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No
NA	W#	TIMER/ COUNTER SV CHANGE 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No
NA	W\$	TIMER/ COUNTER SV CHANGE 2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No
NA	W%	TIMER/ COUNTER SV CHANGE 3	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No
NA	MS	STATUS READ	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NA	SC	STATUS CHANGE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NA	MF	ERROR READ	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NA	KS	FORCED SET	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NA	KR	FORCED RESET	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NA	FK	MULTIPLE FORCED SET/ RESET	Yes	Yes	Yes	No	Yes	No	No	No	No	Yes	Yes	No	Yes	No
NA	FR	MULTIPLE FORCED SET/ RESET STA- TUS READ	No	Yes	Yes	No	Yes	No	No	No	No	No	No	No	No	No
NA	KC	FORCED SET/ RESET CAN- CEL	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NA	MM	PC MODEL READ	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NA	TS	TEST	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NA	RP	PROGRAM READ	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NA	WP	PROGRAM WRITE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NA	MI	I/O TABLE CREATE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes
NA	QQMR/ QQIR	REGISTER/ READ I/O MEMORY	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NA	XZ	ABORT (com- mand only)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NA	**	INITIALIZE (command only)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Frame data size	Header code	Name	CS/CJ Series	C Series										CVM1 and CV Series		
				C200HE /HG/HX	C200HS	C120	C200H C200HS C200HE/ HG/HX	C500	C1000H C2000H	C500F	C1000HF	CQM1	SRM1 CPM1 CPM1A			
			CPU Unit or Serial Communications Board or Unit	CPU Unit or Communications Board	CPU Unit	C120 (3G2A6) Host Link Unit	C200H Host Link Unit	C500 (3G2A5) Host Link Unit				CPU Unit	CPU Unit	CPU Unit	CPU Unit	CV500 Host Link Unit
			---	---	---	---	---	---				---	---	None or V1	V2	---
NA	IC	Undefined command (response only)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NA	EX	TXD RESPONSE (response only)	No	Yes	No	No	No	No	No	No	No	No	No	No	No	No
NA	FA	FINS MESSAGE	Yes	No	No	No	No	No	No	No	No	No	No	Yes	Yes	Yes
NA	OF	FINS MESSAGE (slave-initiated)	Yes	No	No	No	No	No	No	No	No	No	No	Yes	Yes	Yes

Note The response data format for the MS command (STATUS READ) when using CVM1 or CV-series built-in ports or Host Link Units, is different to the response data format for other Units. For details, refer to 4-3-23 STATUS READ – MS.

Manuals for Host Link Operations

PC	Product		Model (suffixes omitted)	Manual type	Catalog No.
CS/CJ Series	Communications commands (C-mode and FINS)	CPU Unit	CS1G/H-CPU□□H CS1G/H-CPU□□ CJ1G/H-CPU□□H CJ1G-CPU□□	Reference Manual	W342-E1
		Serial Communications Unit/Board	CS1W-SCB21/41 CS1W-SCU21 CJ1W-SCU41		
	Serial Communications Unit/Board		CS1W-SCB21/41 CS1W-SCU21 CJ1W-SCU41	Operation Manual	W336-E1
C200HX/HG/HE	CPU Unit		C200HX/HG/HE-CPU□□	Operation Manual	W303-E1
			C200HX/HG/HE-CPU□□-Z	Operation Manual	W322-E1
C200HS	CPU Unit		C200HS-CPU□□	Operation Manual	W235-E1
C Series	Host Link Units		C200H-LK101/201/202 C500-LK201/203 3G2A5-LK101/103 3G2A6-LK101/201/202	System Manual	W143-E1
CQM1	CPU Unit		CQM1-CPU□□	Programming Manual	W228-E1
CPM1	CPU Unit		CPM1-□□□□□	Operation Manual	W262-E1
CPM1A	CPU Unit		CPM1A-□□□□□	Operation Manual	W317-E1
SRM1	CPU Unit		SRM1-C□□	Operation Manual	W318-E1
CVM1 and CV Series	CPU Unit		CVM1/CV-CPU□□	Operation Manual	W205-E1
	Host Link Unit		CV500-LK201		

SECTION 3

Overview of FINS Commands

This section provides an overview of FINS commands.

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3-1 FINS Commands

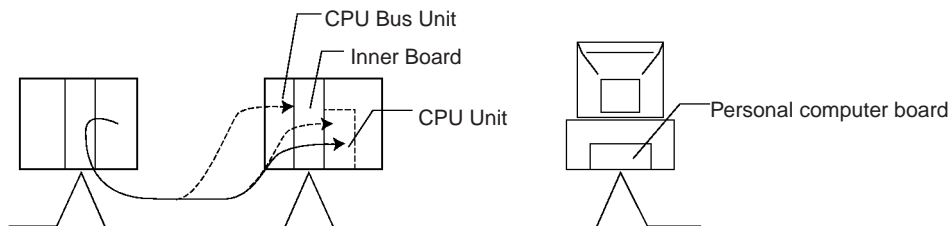
FINS commands form a command system for message services across different OMRON networks. They can be used for various control operations, such as sending and receiving data, changing operating modes, executing forced set and forced reset operations, performing file operations, and so on. FINS commands make it possible to freely communicate with Units in various networks and on CPU Racks by simply specifying the network, node, and unit.

FINS commands have the following features:

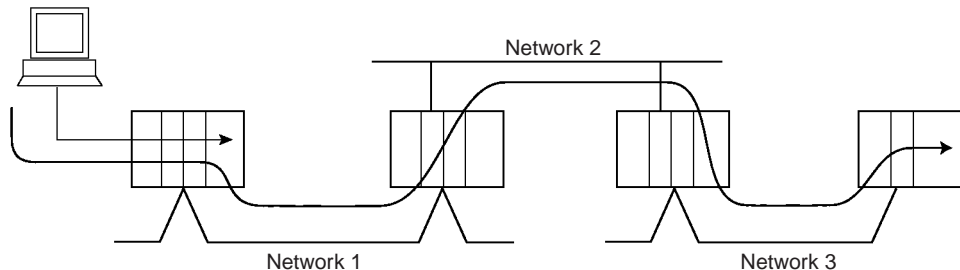
- 1,2,3...**
1. They are defined in the application level and do not depend on lower levels (i.e., the physical and data link levels). This allows them to be used across a variety of networks and CPU buses. Specifically, they can be used with Ethernet, Controller Link, and Host Link networks, and between CPU Units and CPU Bus Units.

Note FINS commands can be sent with UDP/IP headers when using Ethernet and with Host Link command headers when using Host Link.

2. FINS commands can be used to access various kinds of devices besides CPU Units. Devices such as CPU Units, CPU Bus Units, personal computers (boards), and Inner Boards can be identified and specified by their unit addresses.



3. FINS commands support network relay operations, so they can pass through a network hierarchy to access devices on up to three network levels (including the local network).



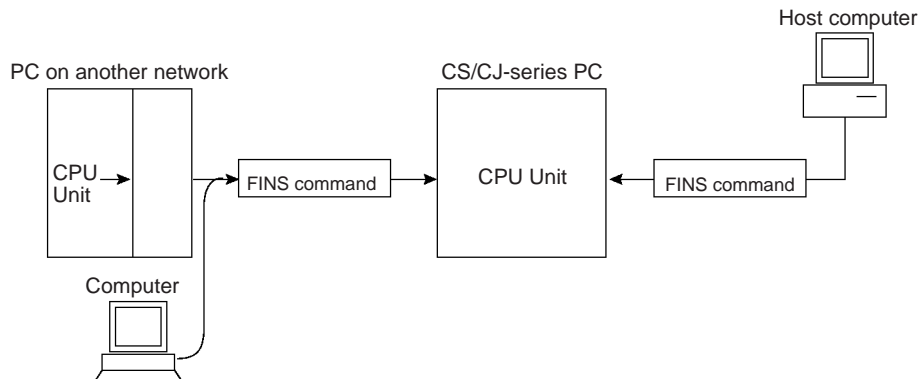
Types of FINS Commands

There are basically two kinds of FINS commands: Those addressed to CPU Units and those addressed to CPU Bus Units. Among FINS commands for CPU Units, there are commands addressed to the various models of CPU Unit, such as the CS/CJ-series CPU Units, CV-series CPU Units, C200HX/HG/HE CPU Units, and so on. The basic code system is the same, but the detailed specifications vary according to the CPU Unit.

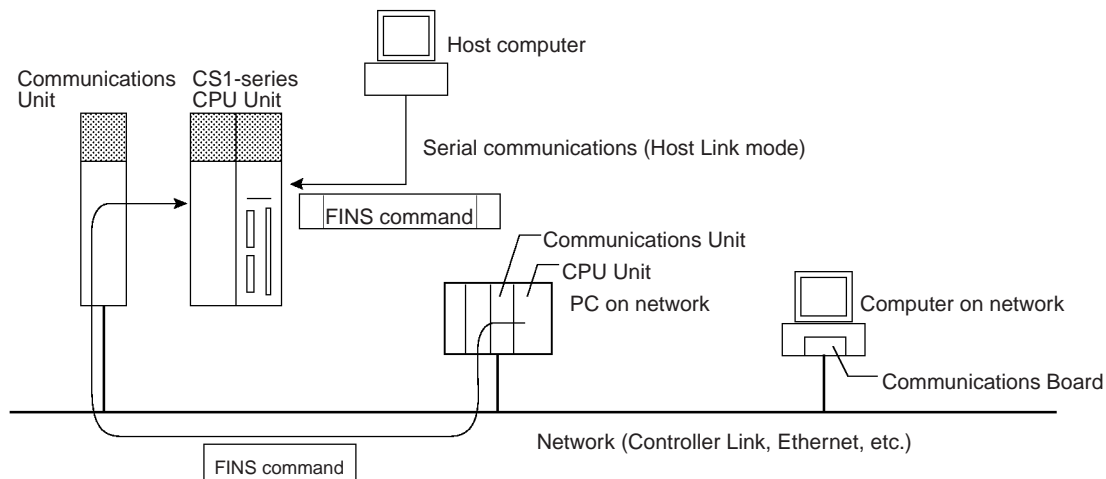
Among FINS commands for CPU Bus Units, there are commands addressed to Controller Link Units, to CompoBus/D Master Units, to Ethernet Units, and so on.

FINS Commands Addressed to CS/CJ- series CPU Units

CS/CJ-series CPU Units can receive FINS commands from a PC (CS/CJ, CVM1/CV, or C200HX/HG/HE(-Z) CPU Unit) or computer on another network or from a host computer connected directly to the local network.



- 1,2,3...**
1. A FINS command sent from a PC or computer on another network is transmitted to the CPU Unit from the Backplane of the CPU Rack, via a Communications Unit (Controller Link Unit, Ethernet Unit, etc.)
 2. FINS commands sent from a host computer to a CPU Unit are sent with a Host Link header code and a terminator (as in the Host Link communications mode).



The FINS commands available for CS/CJ-series CPU Units fall into the following broad categories. (Refer to the relative operation manuals for FINS commands addressed to other Units and Boards.)

- I/O memory area reading and writing
- Parameter area reading and writing
- Program area reading and writing
- Operating mode changes
- Machine configuration reading
- CPU Unit status reading
- Time data access
- Message reading and clearing
- Access rights acquisition and release
- Error log reading and clearing
- File operations
- Forced set/reset

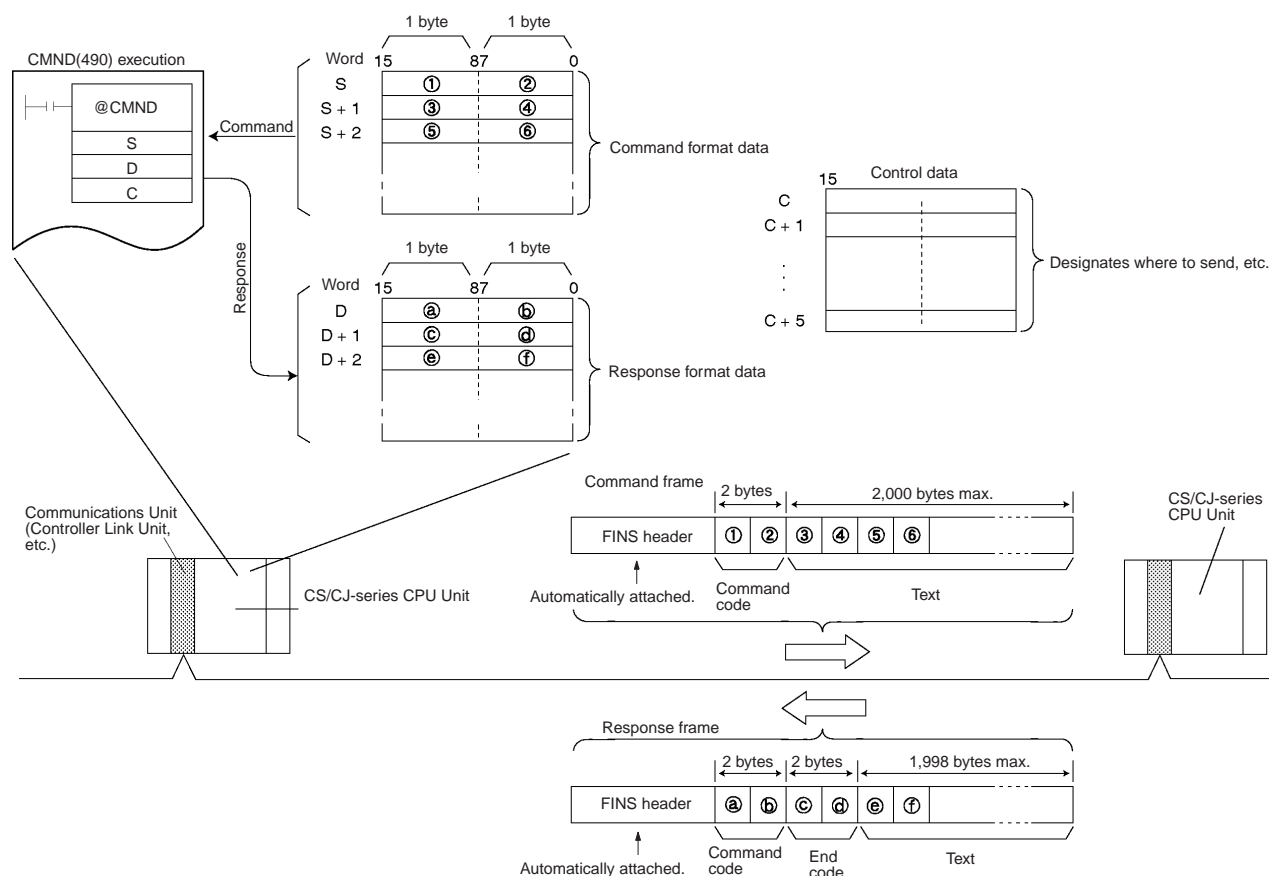
3-2 Using FINS Commands

FINS commands for CPU Units can be used by means of either CMND(490) or Host Link communications.

3-2-1 CMND(490)

FINS commands can be sent to a CS/CJ-series CPU Unit by executing CMND(490) in the program of another PC (CPU Unit) on the network. The basic procedure is as follows:

- 1,2,3... 1. Store the command format of the FINS command (i.e., the command data) in an I/O memory area, such as the DM area.
2. In the same way, store the control data (number of bytes of transmission data, destination address, etc.) in an I/O memory area, such as the DM area.
3. Designate S (first command word), D (first response word), and C (first control word) for the CMND(490) operands, and execute the instruction.
4. When the FINS response is returned from the destination node (a CS/CJ-series CPU Unit), the data will be stored according to the response format beginning at the first response word.



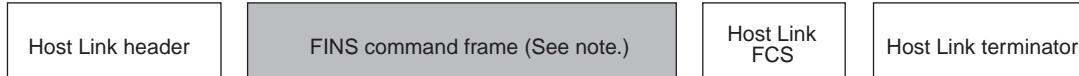
Note FINS commands and responses are handled as binary data, and data is sent and received in binary format. (Host Link communications, however, are basically in ASCII.)

3-2-2 Host Link Communications

With Host Link communications, a FINS command frame with a Host Link header and a terminator is sent from a host computer to a CS/CJ-series CPU Unit. The basic frame formats are shown below.

Note Host Link communications handle ASCII data, so data is sent and received in ASCII. For that reason, FINS command and response frames must also be sent and received in ASCII when they are handled using Host Link communications.

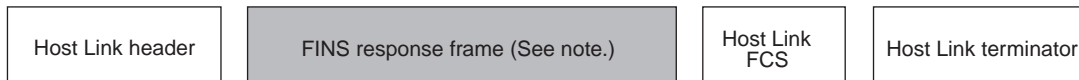
Command Frame



Note A FINS command frame also consists of the destination node address, the source node address, and other FINS command format data.

The CS/CJ-series CPU Unit that receives the command will return the following response frame to the host computer.

Response Frame



Note A FINS response frame also consists of the contents set (e.g., requested) at the time of transmission and the FINS command response format data.

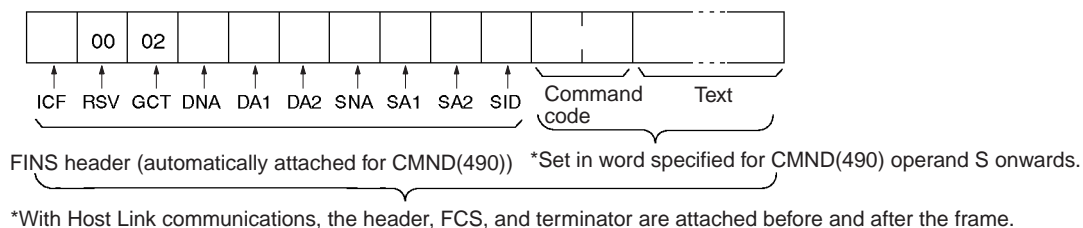
It is also possible to send a FINS command frame with a Host Link header and terminator from a CS/CJ-series CPU Unit to a host computer connected by Host Link System (unsolicited communications initiated by a slave).

3-3 FINS Command and Response Frames

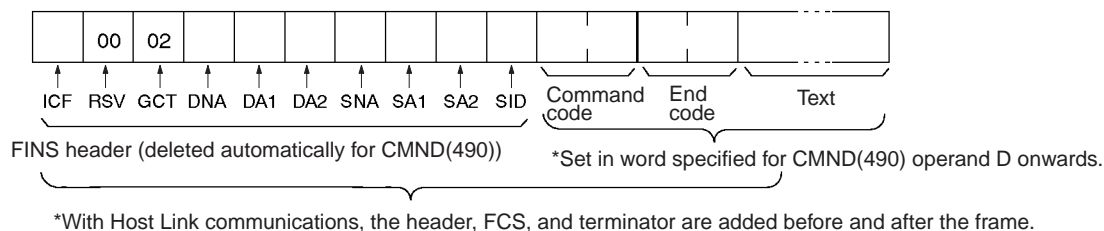
If the data from the command code onwards is set in the words specified with S when a FINS command is sent by means of CMND(490), a FINS header will be generated automatically and attached, and the FINS command frame will be sent. When the FINS response frame is received, the FINS header will be automatically removed and the response data from the command code onwards will be stored as specified in the words specified with operand D.

When a FINS command is sent by Host Link communications, the header is attached before the FINS frame, and the FCS and terminator are attached after it.

3-3-1 FINS Command Frame Configuration



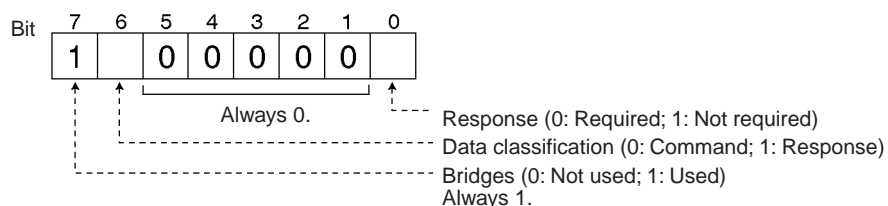
3-3-2 FINS Response Frame Configuration



3-3-3 Individual Items in Command/Response Frames

ICF

The ICF (Information Control Field) is configured as shown in the following diagram.



RSV

RSV (Reserved) is always 00.

GCT

GCT (Gateway Count: Number of Bridges Passed Through) is always 02.

DNA

Destination network address. Specify within the following ranges.

00: Local network

01 to 7F: Remote network address (decimal: 1 to 127)

DA1

Destination node address. Specify within the following ranges.

00: Internal communications in PC

01 to 20: Node address in Controller Link Network (1 to 32 decimal)

FF: Broadcast transmission

DA2

Destination unit address. Specify within the following ranges.

00: CPU Unit

FE: Controller Link Unit or Ethernet Unit connected to network

10 to 1F: CPU Bus Unit

E1: Inner Board

SNA

Source network address. Specify within the following ranges.

00: Local network

01 to 7F: Remote network (1 to 127 decimal)

SA1

Source node address. Specify within the following ranges.

00: Internal communications in PC

01 to 20: Node address in Controller Link Network (1 to 32 decimal)

SA2

Source unit address. Specify within the following ranges.

00: CPU Unit

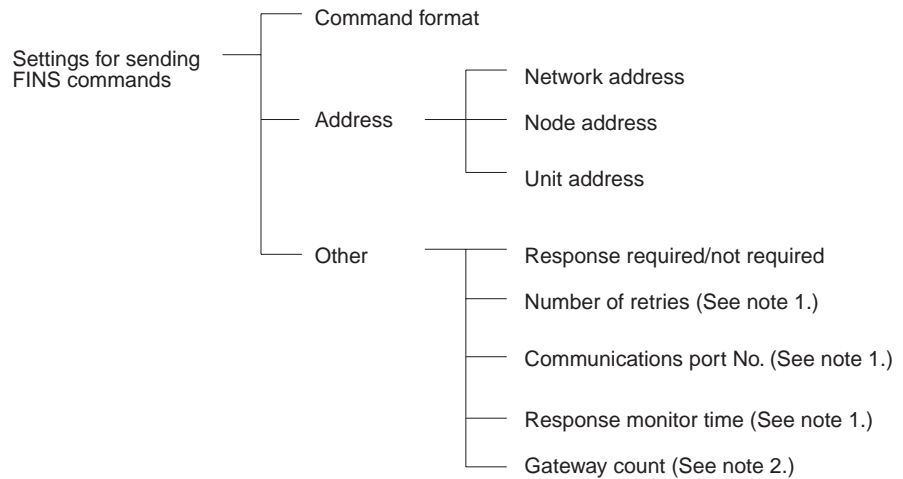
10 to 1F: CPU Bus Unit

SID

Service ID. Used to identify the process generating the transmission. Set the SID to any number between 00 and FF

- Note**
1. The unit address for a CPU Bus Unit is 10 (hexadecimal) plus the unit number set on the front panel of the CPU Bus Unit.
 2. Refer to 3-4-2 *Addresses in FINS Commands* for information on unit addresses and other addresses used in FINS commands.

3-4 Settings for Sending FINS Commands



- Note**
1. Set these as operands when executing CMND(490).
 2. Do not set the gateway count when using CMND(490).

3-4-1 FINS Command and Response Formats

Command Format

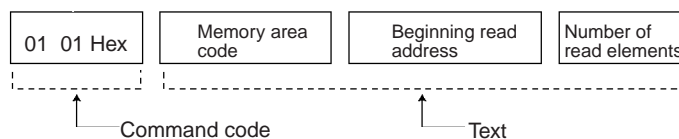
As shown below, the command format basically consists of the command code (four digits hexadecimal) and parameters (text).

Command code (See note.)
4 digits hexadecimal
(2 bytes)

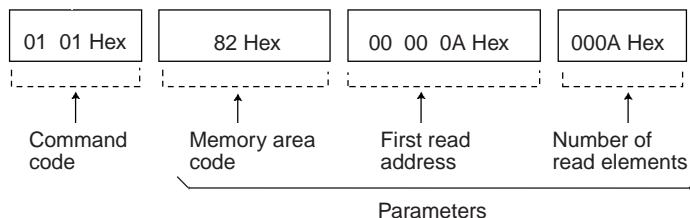
Text (Various kinds of data)
The length depends on the command code.

- Note** The command code is a 2-byte code that expresses the content of the command. A FINS command must begin with a 2-byte command code. If there is also text, it is added after the command code.

Example: Command for Reading I/O Memory

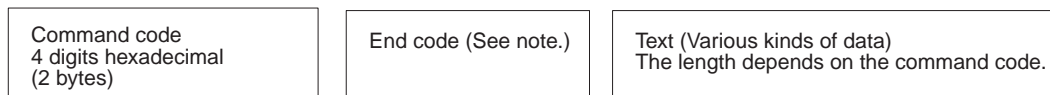


The following data would read 10 words starting from D00010.



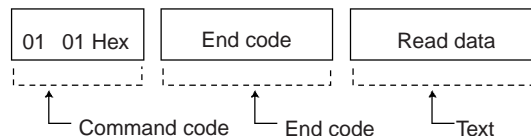
Response Format

As shown below, the response format basically consists of the command code (four digits hexadecimal), end code, and parameters (text).

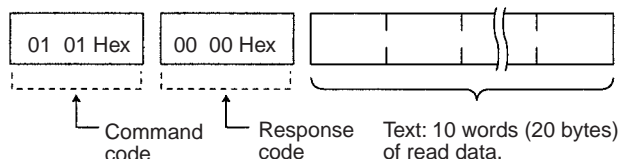


Note The end code is a 2-byte code that shows the command execution result. (The first byte shows the general category, and the second byte shows the detailed results.)

Example: Response from Reading I/O Memory



Actual response data would be as follows:



3-4-2 Addresses in FINS Commands

FINS commands are transmitted across networks and to various devices (via network nodes). Designate the addresses as follows:

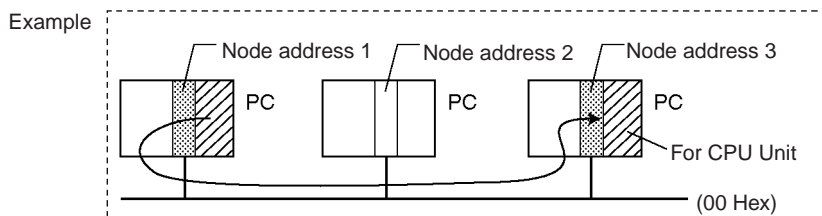
- Designate the device from which the command is to be sent, the network that the device is on, and the node through which the command is to transit.
- Designate the device to which the command is to be sent, the network the device is on, and the node through which command is to transit.

Addresses must be provided for the network, node, and device (unit) to identify them. FINS commands include these addresses (the transmission source and destination addresses) in the command/response frames.

Addresses for FINS Commands

Address	Values	Designation method	
		CMND(490) operand designation	Designation in frame when frame is created
Network address	1 to 127 (01 to 7F Hex) Local node address: 00 Hex	Yes	Yes
Node address	Internal Communications in PC: 00 Hex For Ethernet Unit: 01 to 7F Hex (1 to 126) For Controller Link: 01 to 20 Hex (1 to 32)	Yes	Yes
Unit address	<ul style="list-style-type: none"> •CPU Unit: 00 Hex •CPU Bus Unit: Unit No.+ 10 Hex •Special I/O Unit: Unit No.+ 20 Hex •Inner Board: E1 Hex •Computer: 01 Hex •Unit connected to network: FE Hex 	Yes	Yes

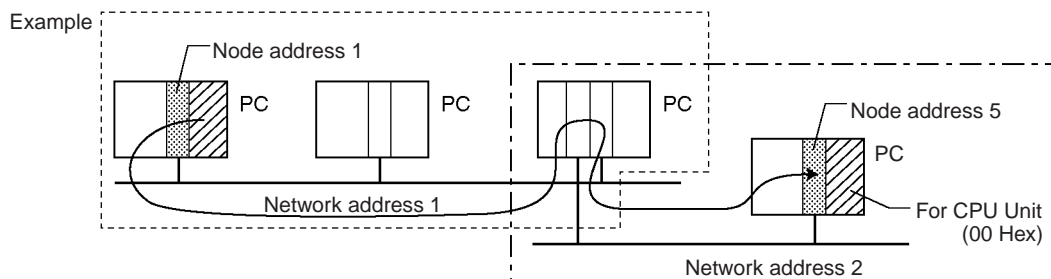
Devices on the Same Network



Address	Source address (See note 1.)		Destination address (See note 2.)	
	FINS command symbol	Example value	FINS command symbol	Example value
Network address	SNA	00 Hex	DNA	00 Hex
Node address	SA1	01 Hex	DA1	03 Hex
Unit address	SA2	00 Hex	DA2	00 Hex

- Note**
1. The transmission source address will be automatically incorporated into the frame if the FINS command is sent with CMND(490). If sending the FINS command by Host Link communications, then put the source address in the message.
 2. Set the transmission destination address in the control code (C) operand if sending the FINS command with CMND(490). If sending the FINS command by Host Link communications, then put the destination address in the message.

Devices on Different Networks



Address level	Source address (See note 1.)		Destination address (See note 2.)	
	FINS command symbol	Example value	FINS command symbol	Example value
Network address	SNA	01 Hex	DNA	02 Hex
Node address	SA1	01 Hex	DA1	05 Hex
Unit address	SA2	00 Hex	DA2	00 Hex

- Note**
1. The transmission source address will be automatically incorporated into the frame if the FINS command is sent with CMND(490). If sending the FINS command by Host Link communications, then put the source address in the message.
 2. Set the transmission destination address in the control code (C) operand if sending the FINS command with CMND(490). If sending the FINS command by Host Link communications, then put the destination address in the message.

Unit Addresses

Set the unit address for the following purposes:

- To identify the Unit when there is more than one device connected at the same node on a network.
- To identify the type of device (CPU Unit, CPU Bus Unit, etc.) at the destination.

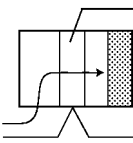
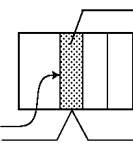
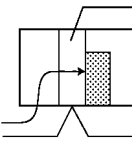
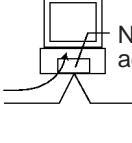
Note The meanings of FINS commands will vary depending on the Unit at the destination even when the commands have the same command code. This is why the Unit at the destination must be identified by the unit address.

Unit addresses are as follows:

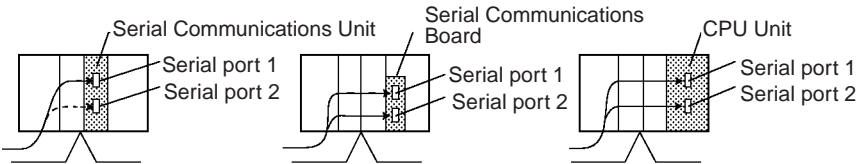
- CPU Unit: 00 Hex
- CPU Bus Unit: Unit number + 10 Hex
- Special I/O Unit:
Unit number + 20 Hex
- Serial Communications Board:
E1 Hex (CS Series only)
- Computer: 01 Hex

- Communications Unit with the specified node address connected to network with the specified network address (Controller Link or Ethernet):

FE Hex

Unit address	00 Hex	Unit No. + 10 Hex	E1 Hex	01 Hex
Contents				

Note It is also possible to set the serial port (No. 1 to 4) for the destination device. (No. 0 indicates the device itself.)



Unit Addresses for Computers Connected to Serial Ports

The unit addresses for host computers connected to a CS/CJ serial port (e.g., on a CPU Unit, Serial Communications Unit, or Serial Communications Board) are shown in the following table.

Unit/Board	Serial port 1	Serial port 2
CPU Unit	FC Hex	FD Hex
Serial Communications Board	E4 Hex	E5 Hex
Serial Communications Unit	80 Hex + 04 Hex x unit number	81 Hex + 04 Hex x unit number

For the SEND, RECV, and CMND instructions, the CPU Unit will add the proper unit address based on the unit address of the Unit/Board and the specified serial port. It is not necessary to consider these addresses in the ladder-diagram program.

Summary of Addresses

The three addresses used in FINS commands can be summarized as follows (refer to the following diagram):

Network Address

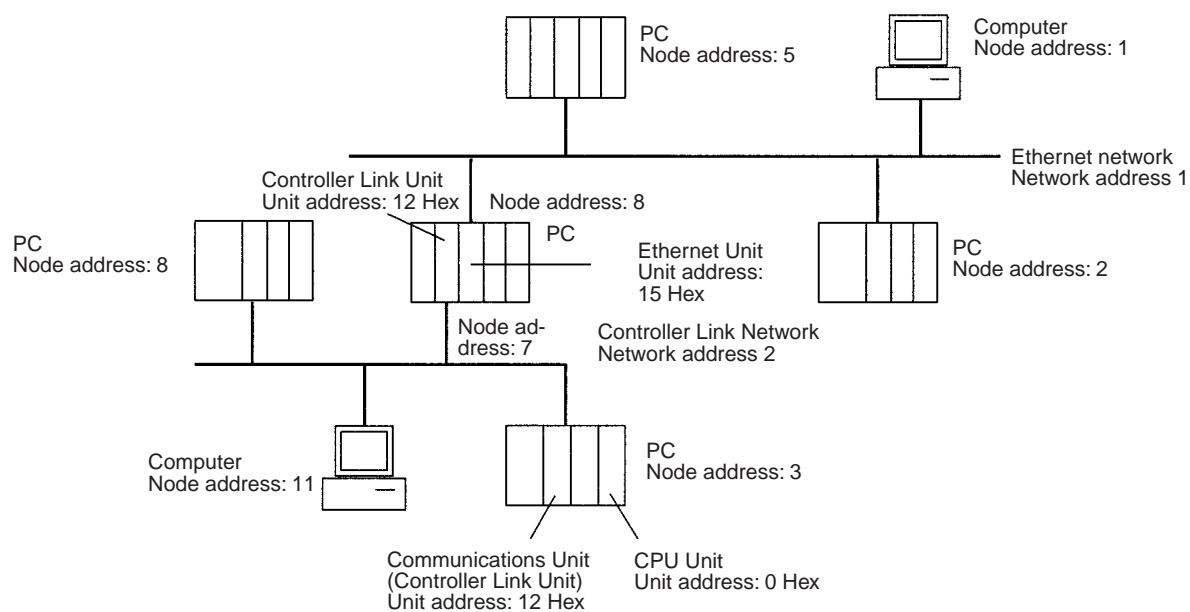
An address that identifies the entire network. All nodes on the same network have the same network address.

Node Address

An address that identifies an individual node on a network, such as a PC or host computer.

Unit Address

For a PC, an address that identifies the specific Unit that is participating in the communication in the PC. For a host computer, an address that identifies the specific application that is participating in the communication in the computer.



3-4-3 Other FINS Command Settings

Aside from the addresses, the following data must be set.

Setting	Content	Values	Designation method	
			CMND(490) operand designation	Designation in frame when frame is created
Number of retries	Number of times to retry sending the command.	0 to F Hex (0 to 15 times)	Yes	No
Port No.	Logical communications port. CS/CJ-series CPU Units have 8 communications ports, so 8 communications commands can be executed simultaneously. To execute 9 or more commands, simultaneously, it is necessary to set up exclusive control.	0 to 7 Hex	Yes	No
Serial port No.	Specifies the number of the serial port of the Unit with Host Link capabilities.	0: Unit/Board 1: Serial port 1 for Serial Communications Board/Unit or Peripheral port for CPU Unit 2: Serial port 2 for Serial Communications Board/Unit or RS-232C port for CPU Unit	Yes	No
Response monitor time	Monitors the time it takes to return a response. If a response is not returned within the designated time, a response timeout is generated.	0001 to FFFF Hex (0.1 to 6,553.5 seconds)	Yes	No
Response required/ not required (ICF bit 0)	Designates whether or not a response is required.	0 or 1 (bit)	Yes	Yes
Gateway count	Designates the number of networks that can be accessed.	Always 02 Hex (2 times).	No	Yes

Note Unit address are fixed for Units and Boards, as well as for serial ports. For the SEND(090), RECV(098), and CMND(490) instructions, the CPU Unit will add the proper unit address based on the unit address of the Unit/Board and the specified serial port. It is not necessary to consider these addresses in the ladder-diagram program.

Serial Port 1:

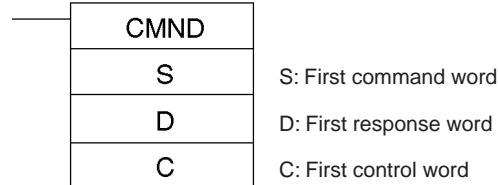
80 Hex + 04 Hex x unit number for Serial Communications Units, E4 Hex for Serial Communications Boards, and FC Hex for the peripheral port on the CPU Unit.

Serial Port 2:

81 Hex + 04 Hex x unit number for Serial Communications Units, E5 Hex for Serial Communications Boards, and FD Hex for the RS-232C port on the CPU Unit.

3-4-4 CMND(490) Setting Example

The designated number of bytes of FINS command data from the first command word designated by operand S is sent to the designated unit address via the node address on the network address designated by operand C, and the response is stored for the number of bytes of data received starting from D.

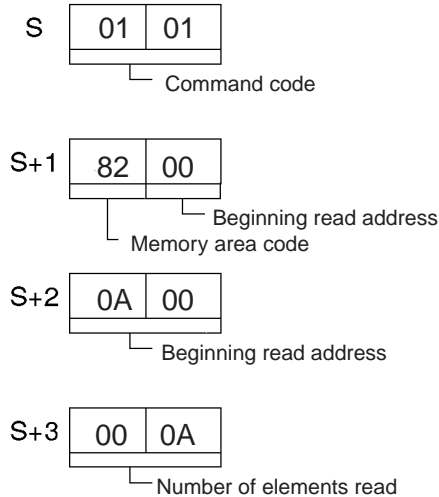


In this example, a command (MEMORY AREA READ: 0101 Hex) for reading D00010 to D00019 of the PC at node 02 is sent using CMND(490).

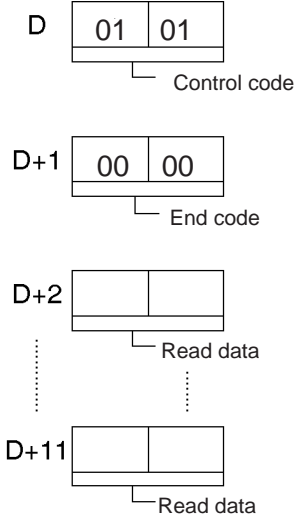
D00010: Memory area code (82 Hex), address 000A00

Number of elements read: 10 = 0A Hex

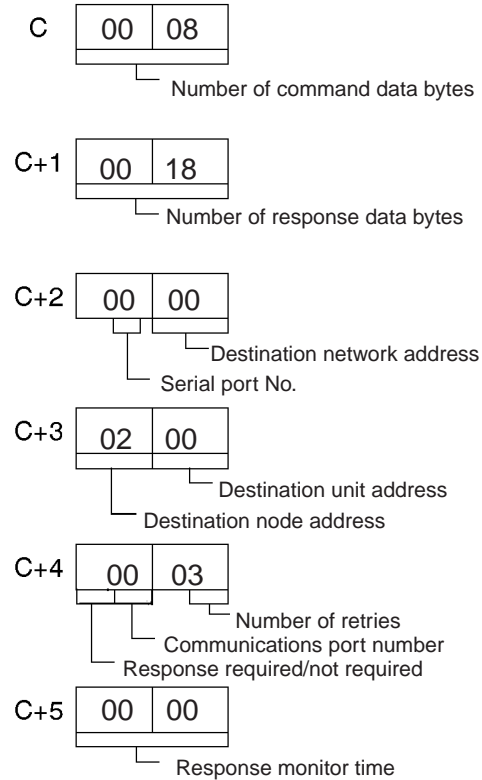
S: First command word



D: First response word



C: First control word



3-5 FINS Commands with Host Link Protocol

FINS commands can be sent and received using the Host Link protocol between interconnected host computers and PCs.

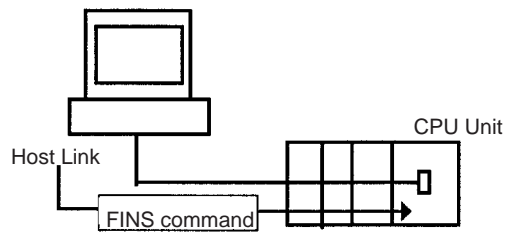
3-5-1 Connection Configurations

One of the following two methods can be used to send and receive FINS commands using the Host Link protocol.

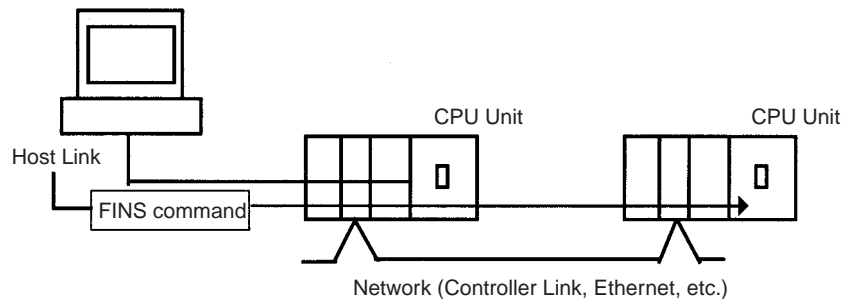
Sending from a Computer to a CPU Unit

Note The host computer can be connected to the peripheral port or RS-232C port on the CPU Unit or to a serial ports on a Serial Communications Unit/Board. The Host Link protocol must be used regardless of the point of connection.

CPU Unit Directly Connected to Host Computer



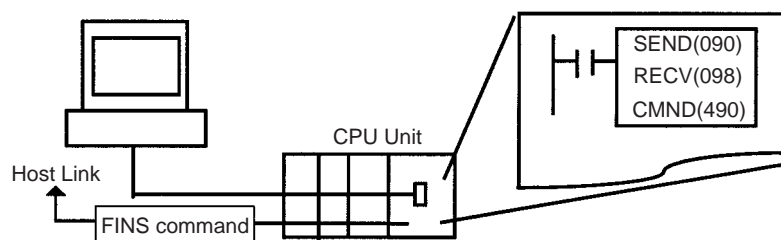
CPU Units on a Network



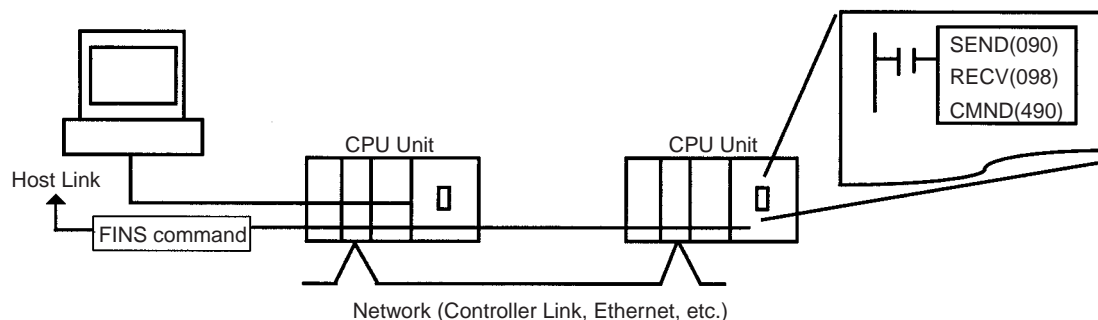
Sending from a CPU Unit to a Computer (Slave Initiation)

Note The host computer can be connected to the peripheral port or RS-232C port on the CPU Unit or to a serial ports on a Serial Communications Unit/Board. The Host Link protocol must be used regardless of the point of connection.

CPU Unit Directly Connected to Host Computer



CPU Unit Directly Connected to Host Computer on a Network



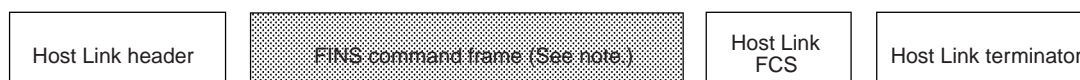
Note Host Link communications handle ASCII data, so data is sent and received in ASCII. Hexadecimal values in FINS command and response frames must, therefore, also be sent and received in ASCII when they are handled using Host Link communications.

3-5-2 Overview of Command and Response Frames

When FINS commands and responses are sent or received using Host Link communications, the frame must be preceded by a Host Link header and followed by a Host Link FCS and terminator as shown below.

Command Frame

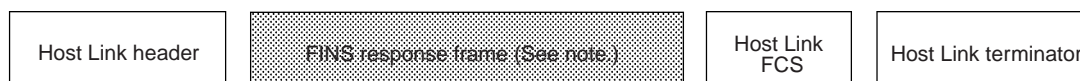
Use the following format to send FINS command frames.



Note A FINS command frame also consists of the response wait time, the destination node address, the source node address, and other FINS command format data.

Response Frame

The CS/CJ-series CPU Unit that receives the command will return the following response frame to the host computer.



Note A FINS response frame also consists of the contents set at the time of transmission and the FINS command response format data.

3-5-3 Sending Commands from the Computer to the CPU Unit

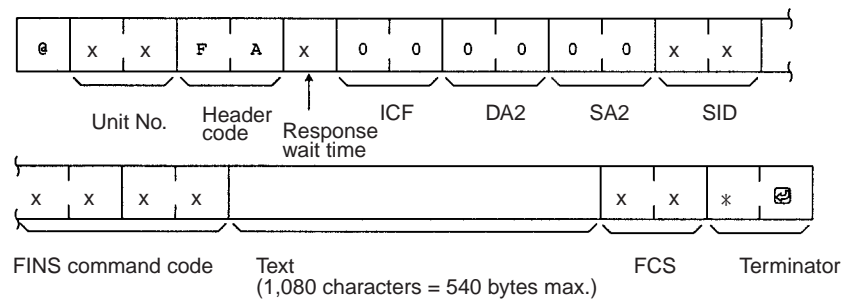
Command Format from Host Computer

Use the following command format to send FINS commands from the host computer to the CPU Unit.

Note The length of the command must be not more than 1,114 characters. FINS commands cannot be partitioned into separate frames for sending.

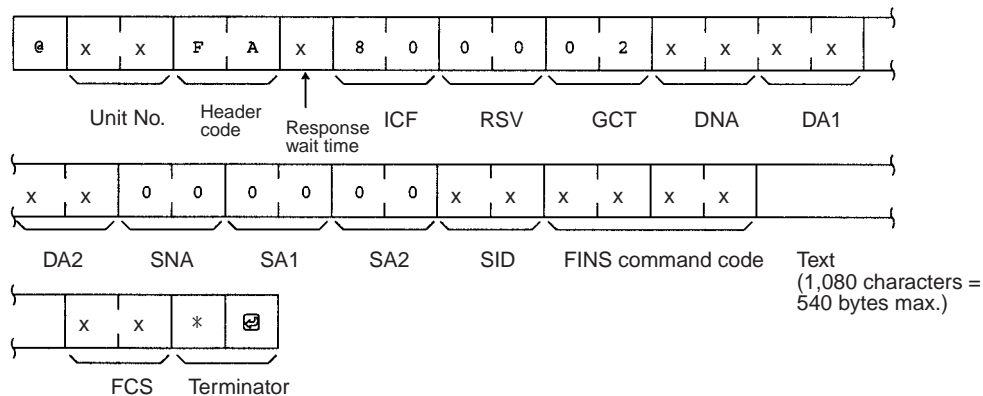
Sending Commands to a CPU Unit Directly Connected to the Host Computer

Note The following format is also applicable for a host computer connected to a Serial Communications Board or a Serial Communications Unit.



Sending Commands to a CPU Unit on a Network

Note The following format can also be used to send FINS commands to a CPU Unit connected to the host computer.



Host Link Settings

@

The @ symbol must be attached to the beginning of the command.

Unit Number

The unit number set is that of the destination CPU Unit connected to the host computer. When the host computer is connected to a CPU Unit, the unit number is designated in the PC Setup.

When the host computer is connected to a Serial Communications Board or a Serial Communications Unit, the unit number is the designated in the Setup for the Board or Unit.

Header Code

The header code distinguishes between different types of commands. Set "FA" (ASCII: 46, 41) when using FINS commands.

Response Wait Time

The response wait time sets the time from when the CPU Unit receives a command block until it starts to return a response. It can be set from 0 to F in hexadecimal, in units of 10 ms.

Example:

If F(15) is set, the response will begin to be returned 150 ms (15×10 ms) after the command block was received.

ICF (Information Control Field)

Specifies whether or not there are network relays. Set "80" (ASCII: 38,30)

when sending an FINS command to a CPU Unit on a network. Set "00" (ASCII: 30,30) when sending to a CPU Unit connected directly to the host computer.

RSV (Reserved)

Set "00" (ASCII: 30,30). Setting RSV is required only when sending to a CPU Unit on a network.

GCT (Gateway Count)

This is the number of networks through which the transmission can be relayed. Set "02" (ASCII: 30,32). Setting GCT is required only when sending to a CPU Unit on a network.

DNA, DA1, DA2

Set the destination network, node, and unit addresses.

DNA (Destination Network Address)

Set between 00 and 7F Hex (0 and 127 decimal). Setting DNA is required only when sending to a CPU Unit on a network.

DA1 (Destination Node Address)

Set within the following ranges. Setting DA1 is required only when sending to a CPU Unit on a network.

Ethernet Unit:	01 to 7E Hex (1 to 126 decimal)
Controller Link Unit:	01 to 20 Hex (1 to 32 decimal)
SYSMAC NET:	01 to 7E Hex (1 to 126 decimal)
SYSMAC LINK:	01 to 3E Hex (1 to 62 decimal)

DA2 (Destination Unit Address)

Refer to 3-4-2 *Addresses in FINS Commands* for details on unit addresses.

In Host Link mode, it is assumed that the destination unit is the CPU Unit, so set "00" (ASCII: 30, 30).

SNA (Source Network Address), SA1 (Source Node Address)

Set the source network and node addresses. Set both to "00" (ASCII: 30, 30) regardless of whether or not there is a network relay.

Setting SNA and SN1 is required only when sending to a CPU Unit on a network.

SA2 (Source Unit Address)

Set the unit address of the Unit physically connected to the host computer. The setting changes depending on the connected Unit.

When connected to the CPU Unit, Serial Communications Board, or a Serial Communications Unit, set "00" to indicate the CPU Unit (ASCII: 30, 30).

SID (Source ID)

The SID is used as a counter when resending. It should normally be set to "00" (ASCII: 30, 30).

Command Code, Text

Set the command code and text according to the FINS command and response formats.

FCS (Frame Check Sequence)

Set a 2-character FCS. Refer to *FCS Calculations* under 2-2 *Command/Response Formats* for the FCS calculation method.

Terminator

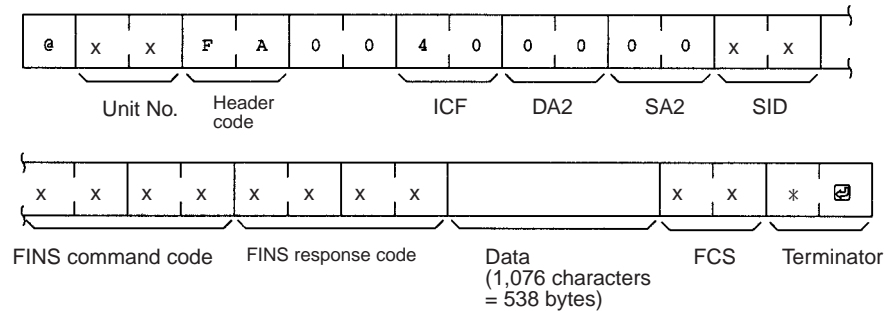
The terminator is a required delimiter at the end of a command. Set the terminator to *CR (ASCII: 2A, 0D).

Response Format from a CPU Unit

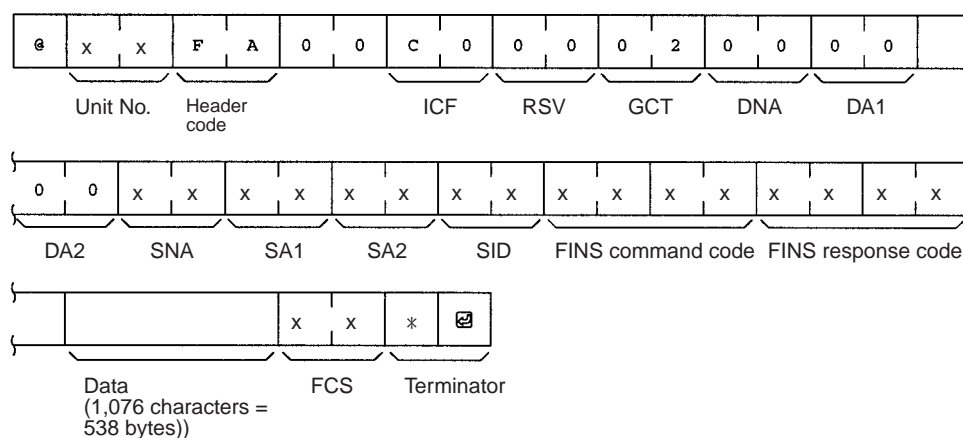
The following response format is used to return responses from the CPU Unit to the host computer.

Note The length of the response must be not more than 1,115 characters. Of this, the response data without the response code is 1,076 characters (538 bytes).

Responses from a CPU Unit Directly Connected to the Host Computer



Responses from a CPU Unit on a Network



Host Link Settings

@

The @ symbol must be attached to the beginning of the response.

Unit Number and Header Code

The same unit number and header code specified in the FINS command that was received will be returned.

ICF (Information Control Field)

For a CPU Unit on a network, "C0" (ASCII: 43, 30) will be returned. For a CPU Unit connected directly to the host computer, "40" (ASCII: 34,30) will be returned.

RSV (Reserved)

This section is reserved for the system. Set "00" (ASCII: 30,30).

GCT (Gateway Count)

The same GCT that was specified in the command that was received will be returned. Setting GCT is required in the response format only from a CPU Unit on a network.

DNA (Destination Network Address), DA1 (Destination Node Address), DA2 (Destination Unit Address)

The same contents specified for SNA, SA1, and SA2 in the command that was received will be returned.

Setting DNA and DA1 is required for response formats only from a CPU Unit on a network.

SNA (Source Network Address), SA1 (Source Node Address), SA2 (Source Unit Address)

The same contents specified for DNA, DA1, and DA2 in the command that was received will be returned.

Setting SNA and SN1 is required for response formats only from a CPU Unit on a network.

SID (Source ID)

The SID that was specified in the command that was received will be returned.

Command Code, Response Code, Text

The command code, response code, and text corresponding to the FINS command and response formats will be returned.

FCS (Frame Check Sequence)

A 2-character FCS will be returned. Refer to *FCS Calculations* under 2-2 *Command/Response Formats* for the FCS calculation method.

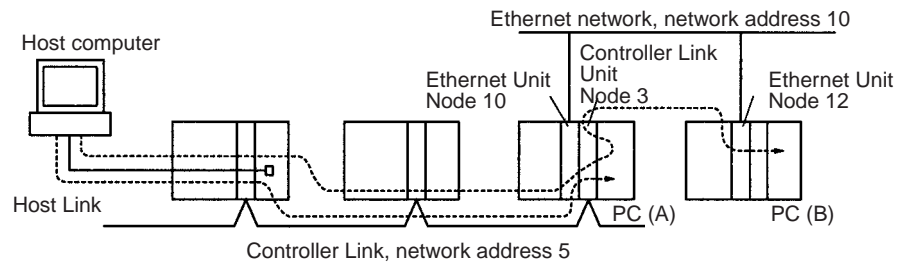
Terminator

The terminator is a required delimiter at the end of a command. The terminator *CR (ASCII: 2A, 0D) will be returned.

Example: FINS Command Settings for Sending to CPU Unit on a Network

With Host Link communications, FINS command transmissions and receptions are handled in ASCII, so hexadecimal values in FINS command frames must be sent as ASCII. For example, the hexadecimal value "0" would be "30 Hex" in ASCII, and the hexadecimal value "A" would be "41 Hex" in ASCII.

The destination network address, node address, and unit number address are explained using the following network as an example.



Sending a Command from a Host Computer to PC (A)

The following addresses are specified to the CPU Unit at network address 5, node address 3:

Destination network address (DNA): 05 (30, 35)

Destination node address (DA1): 03 (30, 33)

Destination unit address (DA2): 00 (30, 30)

(Command addressed to CPU Unit)

Sending a Command from a Host Computer to PC (B)

The following addresses are specified to the CPU Unit at network address 10, node address 12:

Destination network address (DNA): 0A (30, 41)

Destination node address (DA1): 0C (30, 43)

Destination unit address (DA2): 00 (30, 30)

(Command addressed to CPU Unit)

3-5-4 Sending FINS Commands to the Host Computer from the CPU Unit

With normal Host Link communications, FINS commands are sent from the host computer to the CPU Unit. Commands can also be sent, however, from the CPU Unit to the host computer. Any FINS command can be sent to the host computer using SEND(090), which sends CPU Unit data to the host computer, RECV(098), which receives data from the host computer, or CMND(490).

Slave-initiated communications allows the host computer to be notified (unsolicited communications) when an error is generated, for example, on a production line controlled by a CPU Unit. Since the host computer no longer needs to regularly communicate with the CPU Unit, the load on the host computer is reduced.

When an Ethernet Unit or Controller Link Unit are mounted to the Backplane of the CPU Unit, commands can be sent to the host computer from a CPU Unit on a network on another level (up to three network levels).

Note In principle, send commands to the host computer only when one host computer is connected to one CPU Unit. If more than one CPU Unit is connected to the host computer, the commands may collide with each other and prevent normal communications. Create a program that will exclusively control commands that are being sent to a host computer to which multiple CPU Units are connected.

Considerations when Sending Commands from a CPU Unit

Consider the following items when using instructions (SEND(090), RECV(098), and CMND (490)) to send commands from the CPU Unit.

- 1,2,3...** 1. SEND(090), RECV(098), and CMND (490) executed by the CPU Unit are converted to the same format for FINS commands that are sent to CPU Units on networks.
2. A program must be created to process the commands received by the host computer.
3. When instructions (SEND(090), RECV(098), and CMND (490)) are executed in a CPU Unit, some of the control data settings will be different. Refer to the relevant instruction specifications.

3-5-5 Sending Commands from the CPU Unit

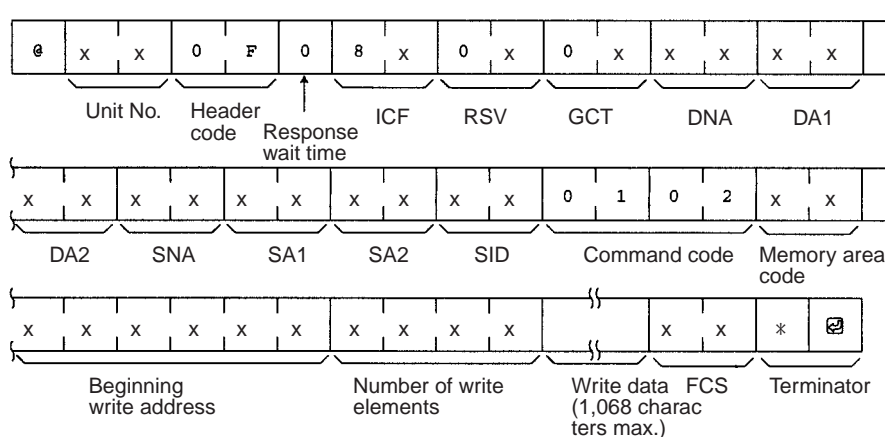
When controls are being implemented by sending commands from the local CPU Unit or another CPU Unit on a network to a host computer, three instructions can be used in the user program: SEND(090), RECV(098), and CMND(490).

Send(090)

Memory area data can be sent from the CPU Unit to the host computer by using SEND(090).

Command Format Received by the Host Computer

The FINS command transmitted to the host computer when SEND(090) is executed is MEMORY AREA WRITE (command code 0102). The command format received by the host computer is as shown in the following diagram. Refer to *MEMORY AREA WRITE: 0102* in *Section 5 FINS Commands* for details.



Control Words

Control data must be set before SEND(090) is executed. The control data is written in the following format, starting from the first control word.

Word	Bits 00 to 07	Bits 08 to 15
C	Number of send words	
C+1	Destination network address	Bits 08 to 10: Serial port number
C+2	Destination unit address	Destination node address
C+3	Bits 00 to 03: No. of retries	Bits 08 to 10: Comm. port number Bit 15: Response setting
C+4	Response monitor time (unit: 0.1 s)	

Number of Send Words

Set the total number of words of data to be transferred to the host computer.

Serial Port Number

Set the serial port number to which the host computer is connected.

Destination Network Address

Set the network address of the destination node. Set "00" to send communications within the local network.

Destination Node Address

Set the node address of the destination node. Set "00" when transmitting within the local PC.

Destination Unit Address

Set the unit address of the Unit to which the host computer is connected.

Response Setting

Normally this bit is set to 0 to require a response. When a response is not required, set this bit to 1.

Communications Port Number

Set the port number in the CPU Unit which will transmit SEND(090).

Number of Retries

Set the maximum number of times SEND(090) is to be resent if no response is returned.

Response Monitor Time

If the Response Setting is set to require a response, set the response monitor time.

Control Word Settings

The setting range for each item is shown on the following table.

Item	Setting
Number of send words	0001 to 010B (1 to 267 words)
Serial port number	00: CPU Unit/ Inner Board/CPU Bus Unit 01: Port 1 02: Port 2
Destination network address	00: Local network 01 to 7F: Network address (1 to 127)
Destination node address	00: Internal communications in PC 01 to 7F: Node address (1 to 126) for Ethernet Unit 01 to 20: Node address (1 to 32) for Controller Link
Destination unit address	I0 to 1F: Host Link Unit (Unit No. 0 to 15)
Response setting	0: Required 1: Not required
Communications port number	0 to 7 (0 to 7)
Number of retries	0 to F (0 to 15)
Response monitor time	0000: Default 0001 to FFFF: 0.1 to 6,553.5 s (unit 0.1 s)

Note To execute SEND(090) normally, programming needs to be written to process the data received by the host computer and return the proper response.

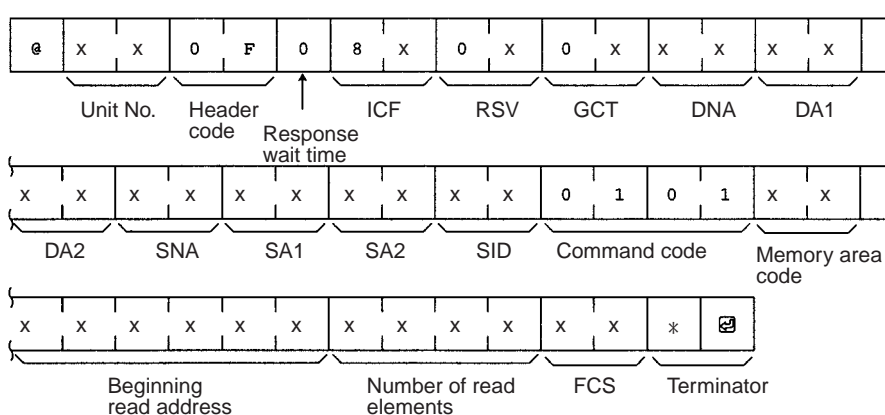
RECV(098)

By using RECV(098), data from the host computer can be written to a memory area in the CPU Unit.

Command Format Received by the Host Computer

The FINS command transmitted to the host computer when RECV(098) is executed is MEMORY AREA READ (command code 0101). The command format received by the host computer is shown in the following diagram.

Refer to *MEMORY AREA READ: 0101* in *Section 5 FINS Commands* for details



Control Words

Control data must be set before RECV(098) is executed. The control data is written in the following format, starting from the first control word.

Word	Bits 00 to 07	Bits 08 to 15
C	Number of read words	
C+1	Destination network address	Bits 08 to 10: Serial port number
C+2	Destination unit address	Destination node address
C+3	Bits 00 to 03: No. of retries	Bits 08 to 10: Comm. port number
C+4	Response monitor time (unit: 0.1 s)	

Number of Read Words

Set the total number of words of data to be read from the host computer.

Serial Port Number

Set the serial port number to which the host computer is connected.

Destination Network Address

Set the network address of the destination node (i.e., the computer). Set "00" to send communications within the local network.

Destination Node Address

Set the node address of the destination node (i.e., the computer). Set "00" when transmitting within the local PC.

Destination Unit Address

Set the unit address of the Unit to which the host computer is connected.

Communications Port Number

Set the port number in the CPU Unit which will transmit RECV(098).

Number of Retries

Set the maximum number of times RECV(098) is to be resent if no response is returned.

Response Monitor Time

Set the time to wait for a response

Control Word Settings

The setting range for each item is shown on the following table.

Item	Setting
Number of read words	0001 to 010D (1 to 269 words)
Serial port number	00: CPU Unit, Inner Board, CPU Bus Unit 01: Port 1 02: Port 2
Destination network address	00: Local network 01 to 7F: Network address (1 to 127)
Destination node address	00: Internal communications in PC 01 to 7E: Node address (1 to 126) for Ethernet Unit 01 to 20: Node address (1 to 32) for Controller Link
Destination unit address	10 to 1F: Host Link Unit (Unit No. 0 to 15)
Response required/not required	0: Response required 1: Response not required
Communications port number	0 to 7 (0 to 7)

Item	Setting
Number of retries	0 to F (0 to 15)
Response monitor time	0000: Default 0001 to FFFF: 0.1 to 6,553.5 s (unit 0.1 s)

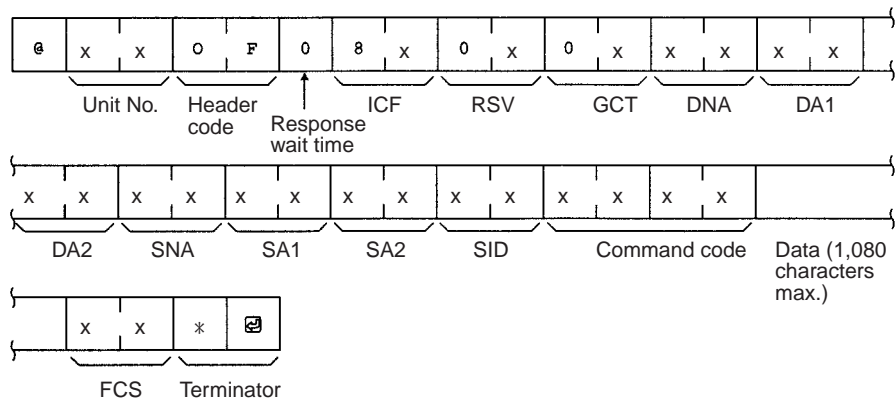
Note To execute RECV(098) normally, programming needs to be written to process the command received by the host computer and return the proper data.

CMND(490)

By using CMND(490), controls can be implemented by sending FINS commands to the host computer.

Command Format Received by the Host Computer

CMND(490) can be used to send any FINS command to the host computer. The command format received by the host computer is shown in the following diagram.



Control Words

Control data must be set before CMND(490) is executed. The control data is written in the following format, starting from the first control word.

Word	Bits 00 to 07	Bits 08 to 15
C	Number of bytes of command data	
C+1	Number of bytes of response data	
C+2	Destination network address	Bits 08 to 10: Serial port number
C+3	Destination unit address	Destination node address
C+4	Bits 00 to 03: No. of retries	Bits 08 to 10: Comm. port number Bits 15: Response setting
C+5	Response monitor time	

Number of Bytes of Command Data

Set the number of bytes of command data (including the command code) that are stored from the first command word.

Number of Bytes of Response Data

Set the number of bytes of response data (including command code and end code) that are stored from the first response word.

Serial Port Number

Set the serial port number to which the host computer is connected.

Destination Network Address

Set the network address of the destination node (i.e., the computer). Set "00" to send communications within the local network.

Destination Node Address

Set the node address of the destination node (i.e., the computer). Set "00" when transmitting within the local PC.

Destination Unit Address

Set the unit address of the Unit to which the host computer is connected.

Response Setting

Normally this bit is set to 0 to require a response. When a response is not required, set this bit to 1.

Communications Port Number

Set the port number in the CPU Unit which will transmit CMND(490).

Number of Retries

Set the maximum number of times CMND(490) is to be resent if no response is returned.

Response Monitor Time

If the Response Setting is set to require a response, set the response monitor time.

Note If response data longer than that set in the Number of Bytes of Response Data is returned, all extra response data will not be stored. If response data shorter than that set in the Number of Bytes of Response Data is returned, the response data will be stored, and the remaining area will stay at its previous values.

Control Word Settings

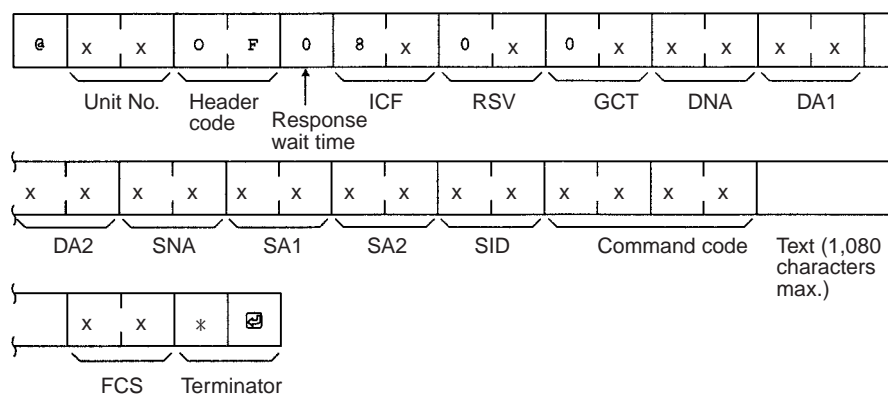
The setting range for each item is shown on the following table.

Item	Setting
Number of bytes of command data	0002 to 021E (2 to 542 bytes)
Number of bytes of response data	0002 to 021E (2 to 542 bytes)
Serial port number	00: CPU Unit, Inner Board, CPU Bus Unit 01: Port 1 02: Port 2
Destination network address	00: Local network 01 to 7F: Network address (1 to 127)
Destination node address	00: Internal communications in PC 01 to 7E: Node address (1 to 126) for Ethernet Unit 01 to 20: Node address (1 to 32) for Controller Link
Destination unit address	10 to 1F: Host Link Unit (Unit No. 0 to 15)
Response setting	0: Required 1: Not required
Communications port number	0 to 7 (0 to 7)
Number of retries	0 to F (0 to 15)
Response monitor time	0000: Default (2 s) 0001 to FFFF: 0.1 to 6,553.5 s (unit: 0.1 s)

Note To execute CMND(490) normally, programming needs to be written to process the command received by the host computer and return the proper response.

3-5-6 Command Format Received by the Host Computer

FINS commands sent to the host computer are received at the host computer in the format shown below.



Unit Number

The unit number of the host link port connected to the host computer is set.

Header Code

The header code in FINS commands sent to the host computer is always set to "OF" (ASCII: 4F, 46).

Response Wait Time

The response wait time in FINS commands sent to the host computer is fixed at to "0" (ASCII: 4F, 46).

ICF (Information Control Field)

Specifies whether or not a response is required.

Response required: "80" (ASCII: 38,30)

Response not required: "81" (ASCII: 38,31)

RSV (Reserved)

Always set to "00" (ASCII: 30,30) in commands sent to the host computer.

GCT (Gateway Count)

The number of networks through which the command is relayed subtracted from 2 is set.

Number of networks = 0: "02" (ASCII: 30,32)

Number of networks = 1: "01" (ASCII: 30,32)

Number of networks = 2: "00" (ASCII: 30,32)

DNA, DA1, DA2

The addresses for the Host Link Unit connected to the host computer are set.

DNA (Destination Network Address)

The network address (00 to 7F Hex) of the CPU Unit is set in hexadecimal.

DA1 (Destination Node Address)

The node address (01 to 7E Hex) of the CPU Unit is set in hexadecimal.

DA2 (Destination Unit Address)

The unit address of the Host Link port is set.

SNA, SA1, SA2

The addresses for the source node (e.g., PC, FA computer) are set.

SNA (Source Network Address)

The network address (00 to 7F Hex) of the source is set in hexadecimal.

SA1 (Source Node Address)

The node address (01 to 7E Hex) of the source is set in hexadecimal.

SA2 (Source Unit Address)

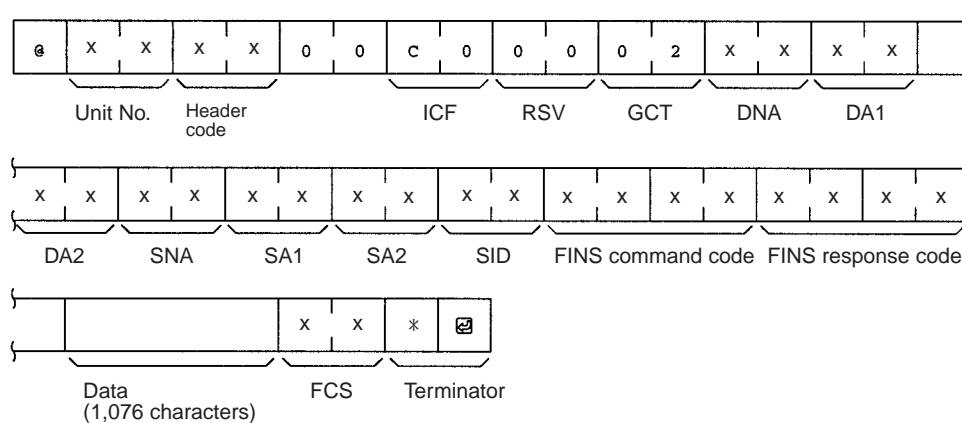
The unit address of the source is set.

SID (Source ID)

Automatically set by the CPU Unit using SEND(090), RECV(098), and CMND(490).

3-5-7 Response Format Returned by the Host Computer

Responses to FINS commands received by the host computer are returned in the format shown below.

**ICF (Information Control Field)**

"C0" (ASCII: 43, 30) will be returned.

RSV (Reserved)

"00" (ASCII: 30,30) is returned.

GCT (Gateway Count)

"02" (ASCII: 30,32) is returned.

DNA (Destination Network Address), DA1 (Destination Node Address), DA2 (Destination Unit Address)

The same contents specified for SNA, SA1, and SA2 in the command that was received will be returned.

SNA (Source Network Address), SA1 (Source Node Address), SA2 (Source Unit Address)

The same contents specified for DNA, DA1, and DA2 in the command that was received will be returned.

SID (Source ID)

The SID that was specified in the command that was received will be returned.

Command Code

The command code that was specified in the command that was received will be returned.

Note The length of the response cannot exceed 1,115 characters. Create responses so that the response data without the response code is less than 1,076 characters (538 bytes).

3-5-8 Flags for Network Communications

This section describes the flags in the Auxiliary Area that are used when executing SEND(090), RECV(098), and CMND(490).

Communications Port Enabled Flags

A Communications Port Enabled Flag turns ON when SEND(090), RECV(098), and CMND(490) can be executed. The Flag will turn OFF during execution of these commands and turn ON again when the command execution is completed. When creating the ladder diagram, use these Flags as input conditions when executing these instructions.

Word	Bit	Content
A202	08 to 15	Reserved
	07	Communications Port Enabled Flag, Port No. 7
	06	Communications Port Enabled Flag, Port No. 6
	05	Communications Port Enabled Flag, Port No. 5
	04	Communications Port Enabled Flag, Port No. 4
	03	Communications Port Enabled Flag, Port No. 3
	02	Communications Port Enabled Flag, Port No. 2
	01	Communications Port Enabled Flag, Port No. 1
	00	Communications Port Enabled Flag, Port No. 0

Communications Port Error Flags

A Communications Port Error Flag will turn ON in the following cases.

- When an error is generated during execution of SEND(090), RECV(098), or CMND(490).
- When an error response or retry error has been generated for the port.

These Flags will turn OFF when the corresponding Communications Port Enabled Flag is turned OFF at the start of operation or at the start of executing the SEND(090), RECV(098), or CMND(490).

Word	Bit	Content
A219	15 to 08	Reserved
	07	Communications Port Error Flag, Port No. 7
	06	Communications Port Error Flag, Port No. 6
	05	Communications Port Error Flag, Port No. 5
	04	Communications Port Error Flag, Port No. 4
	03	Communications Port Error Flag, Port No. 3
	02	Communications Port Error Flag, Port No. 2
	01	Communications Port Error Flag, Port No. 1
	00	Communications Port Error Flag, Port No. 0

Communications Port Completion Codes

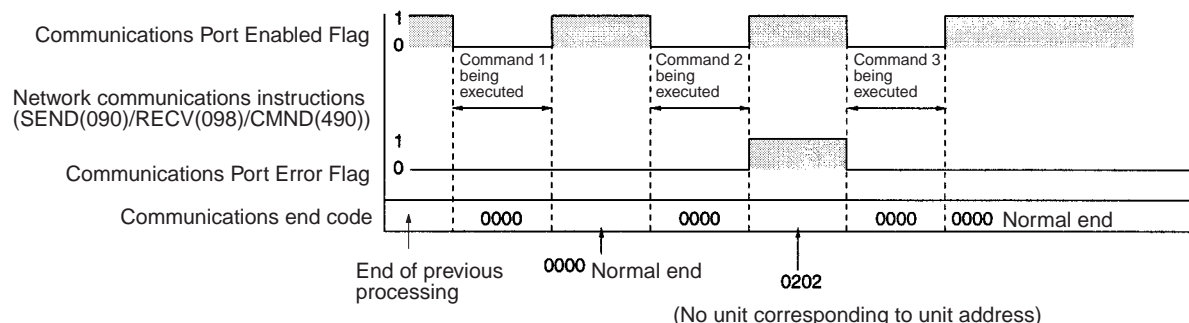
The Communication Port Completion Code words will contain the FINS end code after SEND(090), RECV(098), or CMND(490) has been executed.

If the Communications Port Enabled Flag turns OFF when operation is started or SEND(090), RECV(098), or CMND(490) are executed, the contents of these words will be cleared.

Word	Content
A203	Communications Port Completion Code, Port No. 0
A204	Communications Port Completion Code, Port No. 1
A205	Communications Port Completion Code, Port No. 2
A206	Communications Port Completion Code, Port No. 3
A207	Communications Port Completion Code, Port No. 4
A208	Communications Port Completion Code, Port No. 5

Word	Content
A209	Communications Port Completion Code, Port No. 6
A210	Communications Port Completion Code, Port No. 7
A211 to A218	Reserved

Flag Transitions

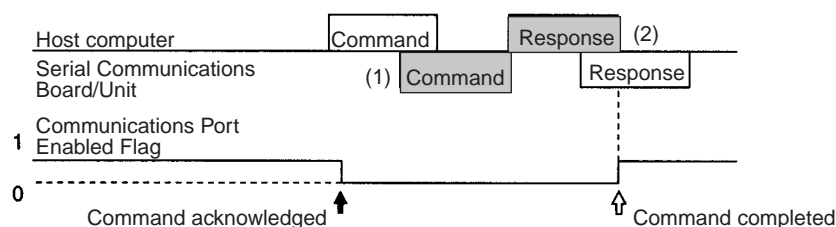


3-5-9 Timing of Commands to Host Computers

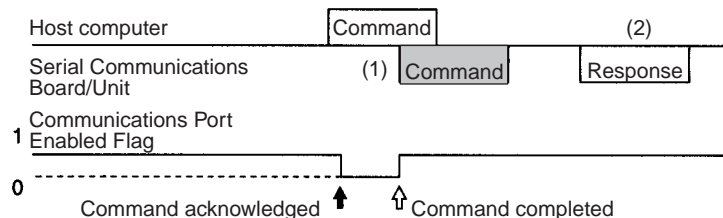
Commands sent to a host computer are transmitted with the timing shown below.

Data Received from Host Computer

Response Required



No Response Required

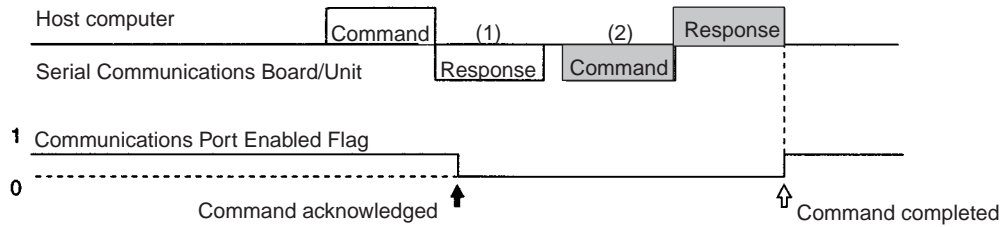


Command transmission to the host computer can commence even when the port is receiving a command from the host computer (1). The transmission of a response to the command from the host computer is postponed until the transmission of the command to the host computer is completed (2).

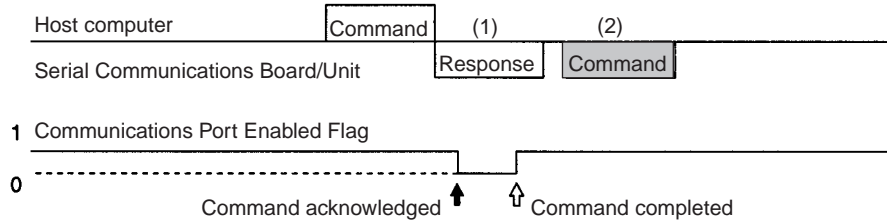
When a response is not required from the host computer, the Communications Port Enabled Flag will turn ON when the command to the host computer has passed from the CPU Unit to the port.

Host Computer Receiving Data

Response Required



No Response Required

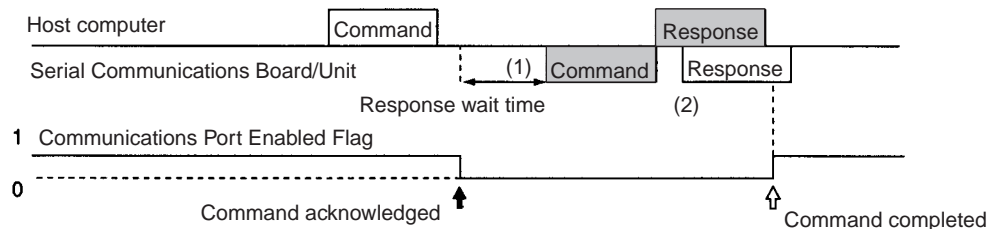


At (1) in the diagram, the response to a command sent from the host computer is being transmitted from the port. In this case, the command transmission to the host computer is postponed until the response transmission is completed (2).

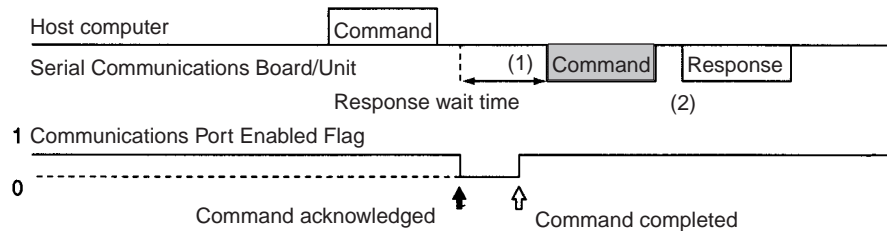
When a response is not required from the host computer, the Communications Port Enabled Flag will turn ON when the command to the host computer has passed from the CPU Unit to the port.

Response Wait Time

Response Required



No Response Required

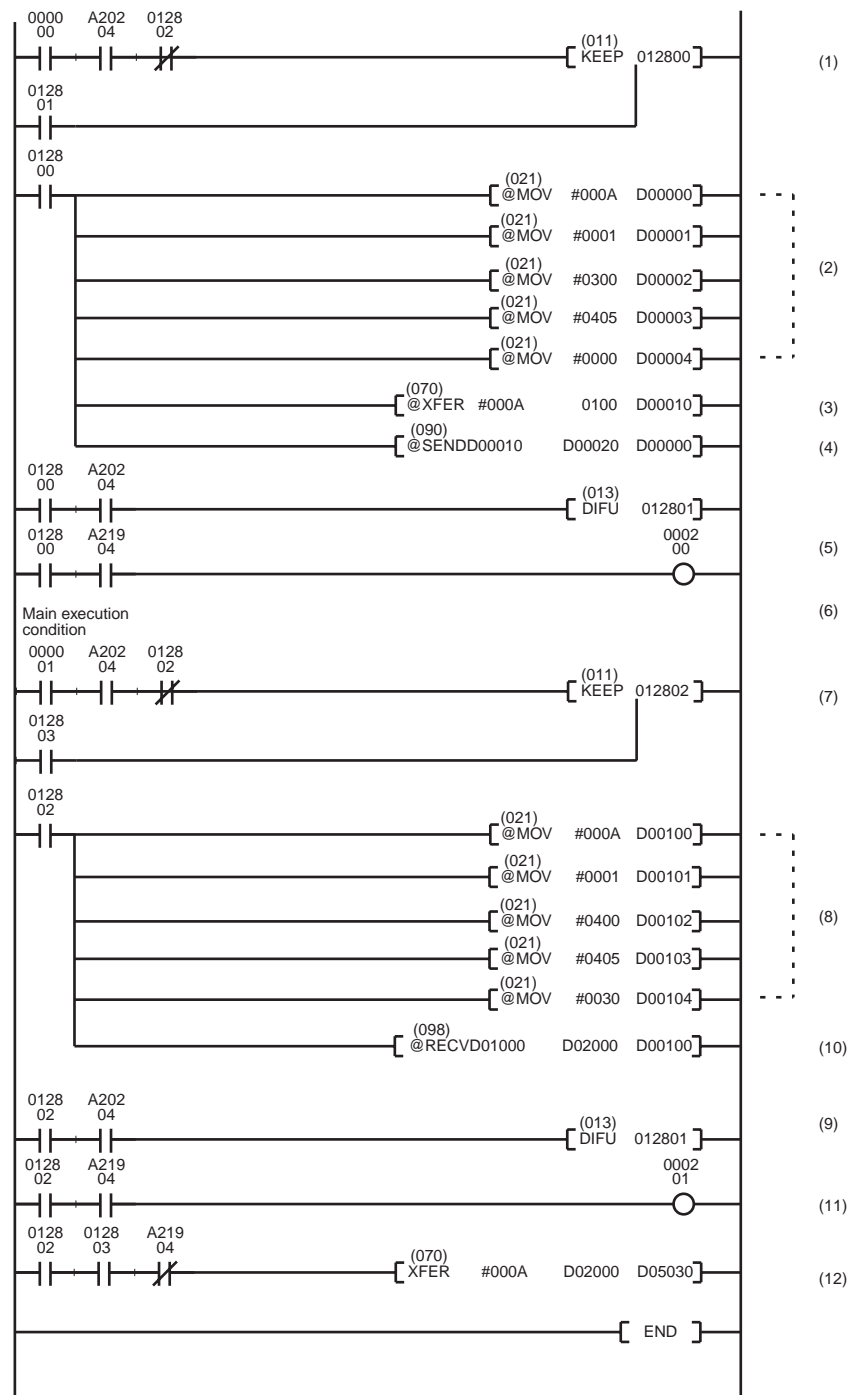


When response wait time has been set in the command format from the host computer, commands to the host computer will not be transmitted until the response time has elapsed (1). Transmission of responses to commands from

the host computer will be postponed until the command transmission to the host computer has been completed.

When a response is not required from the host computer, the Communications Port Enabled Flag will turn ON when the command to the host computer has passed from the CPU Unit to the port.

3-5-10 Programming Example



- 1,2,3...** 1. When the SEND(090)/RECV(098) Enabled Flag is ON, and the execution condition CIO 000000 is ON, execution of the instructions for network transmissions are started. CIO 012800 will remain ON from when SEND(090) is started until execution has been completed.

2. Set the control data.

D00000	00	0A	← Number of send words: 10
D00001	01	00	← Serial port 1 (peripheral port) Destination network address \$00 (B network)
D00002	00	00	← Destination node address \$00 (B node) Destination unit address \$00 (CPU Unit)
D00003	04	05	← Response required, Communications port No. 4 Number of retries: 5
D00004	00	00	← Response monitor time: 2 s (\$0000: Default)

3. Transmit Data Stored

Stores 10 words of data starting from CIO 0100 to D00010 and later.

4. Execute SEND(090).

5. When the instruction for network communications has been completed (A20204: ON), CIO 012801 will turn ON, and the instruction for sending on the network is completed.

6. Turns ON when an error is generated during execution of network communications.

7. When the Communications Port Enabled Flag is ON and execution condition CIO 000001 is ON, execution of the instruction for receiving via the network (RECV(098)) is started.

8. Set the control data.

D00100	00	0A	← Number of receive words: 10 Serial port 2
D00101	02	01	← Source network address \$01 Source node address \$04
D00102	04	00	← Source unit address \$01 (Inner Board) Response required, Communications port No. 4
D00103	04	05	← Number of retries: 5
D00104	00	30	← Response monitor time: 4.8 s (\$0030)

9. Execute RECV(098).

10. When the execution of network communications instructions has been completed (A20204: ON), CIO 012803 will turn ON, and the instruction for receiving via the network is completed.

11. Turns ON when an error is generated during execution of network communications.

12. Reception data processing

When there is no reception error, 10 words of data (starting from D02000) are stored from D05030 onwards.

Programming Example for Host Computer Side (BASIC): Send

```

10  '*****
20  '**** CS1W-SCU21 Serial Communications Unit ****
30  '**** Command to Host Computer (SEND(090)) ****
40  '**** Sample Send Program ****
50  '*****
60  '
70  '===== Initial Settings =====
80  CLOSE 1
90  ON ERROR GOTO *EROPE
100 DIM CHDATA$ (300)           : ' Data array declaration
110 OPEN "COM:E73" AS #1        : ' Opens port.
120 '
130 '===== Main Process =====
140 INPUT #1, COMMAND$          : ' Receives data from PC (line).

```

```

150 T$=LEFT$ (COMMAND$, LEN (COMMAND$) -3)           : ' Checks FCS.
160 GOSUB *FCS
170 IF FCS$<>MID$ (COMMAND$, LEN (COMMAND$) -2, 2) THEN ENDCODE$="1004":GOTO *RESPONSE
180 CMNDCODE$=MID$ (COMMAND$, 27, 4)                 : ' Checks command code.
190 IF CMNDCODE$<>"0102" THEN ENDCODE$="0401" :GOTO *RESPONSE
200 FOR I=0 TO VAL ("&H"+MID$ (COMMAND$, 39, 4) ) -1 : ' Sets No. of write elements.
210   CHDATA$ (I) =MID$(COMMAND$, 43+I*4, 4)
220   PRINT "Data";";";CHDATA$(I)
230 NEXT I
240 ENDCODE$="0000"                                   : ' Sets end code to "0000".
250 '=====
260 *RESPONSE                                         : ' Creates a response frame.
270 RSV$=MID$ (COMMAND$, 9, 2)                       : ' Returns received RSV, SID
280 DA$=MID$ (COMMAND$, 19, 6)                       : ' without change.
290 SA$=MID$ (COMMAND$, 13, 6)                       : ' Swaps DNA, DA1, DA2
300 SID$=MID$ (COMMAND$, 25, 2)                     : ' with SNA, SA1, and SA2.
310 T$="@000F00C0"+RSV$+"02"+DA$+SA$+SID$+CMNDCODE$+ENDCODE$
320 GOSUB *FCS
330 RESPONSE$=T$+FCS$+"*"
340 PRINT #1, RESPONSE$                             : ' Transmits data to PC (line).
350 GOTO 140
360 '
370 '===== FCS Calculation Subroutine =====
380 *FCS                                              : ' Adds FCS.
390 L=LEN (T$)
400 A=0
410 FOR J=1 TO L
420   TJ$=MID$ (T$, J, 1)
430   A+ASC (TJ$) XOR A
440 NEXT J
450 FCS$=HEX$ (A)
460 IF LEN (FCS$) =1 THEN FCS$="0"+FCS$
470 RETURN
480 '
490 '===== Error processing =====
500 *EROPE
510 PRINT "ERL=":ERL, "ERR":ERR
520 CLOSE 1
530 END

```

Programming Example for Host Computer Side (BASIC): Reception

```

10 '*****
20 '**** CS1W-SCU21 Serial Communications Unit ****
30 '**** Command to Host Computer (RECV(098)) ****
40 '**** Sample Reception Program ****
50 '*****
60 '
70 '===== Initial Settings =====
80 CLOSE 1
90 ON ERROR GOTO *EROPE
100 DIM CHDATA$ (300)                                : ' Data array declaration
110 CHDATA$ (0) ="0000":CHDATA$ (1) ="1111":CHDATA$ (2) ="2222"
120 CHDATA$ (3) ="3333":CHDATA$ (4) ="4444":CHDATA$ (5) ="5555"
130 OPEN "COM:E73" AS #1                              : ' Opens port.
140 '
150 '===== Main Process =====
160 RESPDATA$=""
170 INPUT #1, COMMAND$                                : ' Receives data from PC (line).
180 T$=LEFT$ (COMMAND$, LEN (COMMAND$) -3)           : ' Checks FCS.
190 GOSUB *FCS
200 IF FCS$<>MID$ (COMMAND$, LEN (COMMAND$) -2, 2) THEN ENDCODE$="1004":GOTO *RESPONSE
210 CMNDCODE$=MID$ (COMMAND$, 27, 4)                 : ' Checks command code.
220 IF CMNDCODE$<>"0101" THEN ENDCODE$="0401" :GOTO *RESPONSE
230 FOR I=0 TO VAL ("&H"+MID$ (COMMAND$, 39, 4) ) -1 : ' Sets No. of read elements.
240   RESPDATA$=RESPDATA$+CHDATA$ (I)
250 NEXT I
260 PRINT "Send data":RESPDATA$
270 ENDCODE$="0000"                                   : ' Sets end code to "0000".
280 '=====
290 *RESPONSE                                         : ' Creates a response frame.
300 RSV$=MID$ (COMMAND$, 9, 2)                       : ' Returns received RSV, SID
310 DA$=MID$ (COMMAND$, 19, 6)                       : ' without change.
320 SA$=MID$ (COMMAND$, 13, 6)                       : ' Swaps DNA, DA1, DA2
330 SID$=MID$ (COMMAND$, 25, 2)                     : ' with SNA, SA1, and SA2.

```

```

340 T$="@000F00C0"+RSV$+"02"+DA$+SA$+SID$+CMNDCODE$+ENDCODE$+RESPDATA$
350 GOSUB *FCS
360 RESPONSE$=T$+FCS$+"*"
370 PRINT #1, RESPONSE$           : ' Transmits data to PC (line) .
380 GOTO 160
390 '
400 '===== FCS Calculation Subroutine =====
410 *FCS                           : ' Adds FCS .
420 L=LEN (T$)
430 A=0
440 FOR J=1 TO L
450     TJ$=MID$ (T$, J, 1)
460     A+ASC (TJ$) XOR A
470 NEXT J
480 FCS$=HEX$ (A)
490 IF LEN (FCS$) =1 THEN FCS$="0"+FCS$
500 RETURN
510 '
520 '===== Error processing =====
530 *EROPE
540 PRINT "ERL=":ERL, "ERR":ERR
550 CLOSE 1
560 END

```

SECTION 4

C-mode Commands

This section provides detailed descriptions of the C-mode commands.

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4-1 C-mode Command List

The following table lists the C-mode commands (Host Link commands).

Type	Header code	Name	Function
I/O memory reading	RR	CIO AREA READ	Reads the specified number of words beginning with the designated CIO word.
	RL	LR AREA READ	Reads the specified number of words beginning with the designated LR word.
	RH	HR AREA READ	Reads the specified number of words beginning with the designated HR word.
	RC	TIMER/COUNTER PV READ	Reads the specified number of words of the timer/counter PV beginning with the designated word.
	RG	TIMER/COUNTER STATUS READ	Reads the specified number of words of the timer/counter status beginning with the designated word.
	RD	DM AREA READ	Reads the specified number of words beginning with the designated DM word.
	RJ	AR AREA READ	Reads the specified number of words beginning with the designated AR word.
	RE	EM AREA READ	Reads the specified number of words beginning with the designated EM word.
I/O memory writing	WR	CIO AREA WRITE	Writes the specified data in word units beginning with the designated CIO word.
	WL	LR AREA WRITE	Writes the specified data in word units beginning with the designated LR word.
	WH	HR AREA WRITE	Writes the specified data in word units beginning with the designated HR word.
	WC	TIMER/COUNTER PV WRITE	Writes the specified timer/counter PV data in word units beginning with the designated word.
	WD	DM AREA WRITE	Writes the specified data in word units beginning with the designated DM word.
	WJ	AR AREA WRITE	Writes the specified data in word units beginning with the designated AR word.
	WE	EM AREA WRITE	Writes the specified data in word units beginning with the designated EM word.
Timer/counter SV reading	R#	TIMER/COUNTER SV READ 1	Reads in four digits BCD the constant SV that is written as an operand of the designated timer/counter instruction.
	R\$	TIMER/COUNTER SV READ 2	Finds the specified timer/counter instruction, beginning with the designated program address, and reads the constant SV in four digits or the word in which the SV is stored.
	R%	TIMER/COUNTER SV READ 3	Finds the specified timer/counter instruction, beginning with the designated program address, and reads the constant SV in four digits (BCD) or the word in which the SV is stored.

Type	Header code	Name	Function
Timer/counter SV changing	W#	TIMER/COUNTER SV CHANGE 1	Changes the SV (timer/counter number S) of the specified timer/counter instruction to a new constant SV.
	W\$	TIMER/COUNTER SV CHANGE 2	Finds the specified timer/counter instruction, beginning with the designated program address in the user program, and changes the constant SV in four digits (BCD) or the word in which the SV is stored to a new constant SV or storage word.
	W%	TIMER/COUNTER SV CHANGE 3	Finds the specified timer/counter instruction, beginning with the designated program address in the user program, and changes the constant SV in four digits (BCD) or the word in which the SV is stored to a new constant SV or storage word.
CPU Unit status	MS	STATUS READ	Reads the CPU Unit's operating conditions (operating mode, forced set/reset status, and fatal errors).
	SC	STATUS CHANGE	Changes the CPU Unit's operating mode.
	MF	ERROR READ	Reads the CPU Unit's error information (i.e., all fatal or non-fatal errors currently in effect).
Forced set/reset	KS	FORCED SET	Forcibly sets one designated bit.
	KR	FORCED RESET	Forcibly resets one designated bit.
	FK	MULTIPLE FORCED SET/RESET	Forcibly sets/resets/cancels multiple designated bits.
	KC	FORCED SET/RESET CANCEL	Cancels all forced set/reset status.
PC model code reading	MM	PC MODEL READ	Reads the model code of the CPU Unit.
Testing	TS	TEST	Returns, just as it is, a single block that was sent from the host computer.
Program area accessing	RP	PROGRAM READ	Reads, in one batch, the contents of the CPU Unit's user program at the machine language (object) level.
	WP	PROGRAM WRITE	Writes into the CPU Unit's user program area the machine language (object) sent from the host computer.
I/O table creation	MI	I/O TABLE CREATE	Creates an I/O table with the contents of the actual I/O configuration.
I/O memory area registration and reading	QQMR	REGISTER I/O MEMORY	Registers the I/O memory words or bits that are to be read.
	QQIR	READ I/O MEMORY	Reads the registered I/O memory words/bits all at once.
Host Link communications processing	XZ	ABORT (command only)	Aborts the operation being performed by a Host Link command, and then returns to the initial status.
	**	INITIALIZE (command only)	Initializes the transfer control procedures for all Host Link Units.
	IC	Undefined command (response only)	This is the response when the command header code cannot be decoded.

C-mode Command Force Conditions

Header code	Name	Single-frame comm and	Multiple-frame command	Single-frame response	Multiple-frame response	RUN	MON	PRG	UM write protect	UM read protect
RR	CIO AREA READ	Valid	Not valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid
RL	LR AREA READ	Valid	Not valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid
RH	HR AREA READ	Valid	Not valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid
RC	PV READ	Valid	Not valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid

Header code	Name	Single-frame comm and	Multiple-frame command	Single-frame response	Multiple-frame response	RUN	MON	PRG	UM write protect	UM read protect
RG	TC STATUS READ	Valid	Not valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid
RD	DM AREA READ	Valid	Not valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid
RJ	AR AREA READ	Valid	Not valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid
RE	EM AREA READ	Valid	Not valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid
WR	CIO AREA WRITE	Valid	Valid	Valid	Not valid	Not valid	Valid	Valid	Valid	Valid
WL	LR AREA WRITE	Valid	Valid	Valid	Not valid	Not valid	Valid	Valid	Valid	Valid
WH	HR AREA WRITE	Valid	Valid	Valid	Not valid	Not valid	Valid	Valid	Valid	Valid
WC	PV WRITE	Valid	Valid	Valid	Not valid	Not valid	Valid	Valid	Valid	Valid
WD	DM AREA WRITE	Valid	Valid	Valid	Not valid	Not valid	Valid	Valid	Valid	Valid
WJ	AR AREA WRITE	Valid	Valid	Valid	Not valid	Not valid	Valid	Valid	Valid	Valid
WE	EM AREA WRITE	Valid	Valid	Valid	Not valid	Not valid	Valid	Valid	Valid	Valid
R#	SV READ 1	Valid	Not valid	Valid	Not valid	Valid	Valid	Valid	Valid	Not valid
R\$	SV READ 2	Valid	Not valid	Valid	Not valid	Valid	Valid	Valid	Valid	Not valid
R%	SV READ 3	Valid	Not valid	Valid	Not valid	Valid	Valid	Valid	Valid	Not valid
W#	SV CHANGE 1	Valid	Not valid	Valid	Not valid	Not valid	Valid	Valid	Not valid	Not valid
W\$	SV CHANGE 2	Valid	Not valid	Valid	Not valid	Not valid	Valid	Valid	Not valid	Not valid
W%	SV CHANGE 3	Valid	Not valid	Valid	Not valid	Not valid	Valid	Valid	Not valid	Not valid
MS	STATUS READ	Valid	Not valid	Valid	Not valid	Valid	Valid	Valid	Valid	Valid
SC	STATUS CHANGE	Valid	Not valid	Valid	Not valid	Valid	Valid	Valid	Valid	Valid
MF	ERROR READ	Valid	Not valid	Valid	Not valid	Valid	Valid	Valid	Valid	Valid
KS	FORCED SET	Valid	Not valid	Valid	Not valid	Not valid	Valid	Valid	Valid	Valid
KR	FORCED RESET	Valid	Not valid	Valid	Not valid	Not valid	Valid	Valid	Valid	Valid
FK	MULTIPLE FORCED SET/RESET	Valid	Not valid	Valid	Not valid	Not valid	Valid	Valid	Valid	Valid
KC	FORCED SET/RESET CANCEL	Valid	Not valid	Valid	Not valid	Not valid	Valid	Valid	Valid	Valid
MM	PC MODEL READ	Valid	Not valid	Valid	Not valid	Valid	Valid	Valid	Valid	Valid
TS	TEST	Valid	Not valid	Valid	Not valid	Valid	Valid	Valid	Valid	Valid
RP	PROGRAM READ	Valid	Not valid	Valid	Valid	Valid	Valid	Valid	Valid	Not valid
WP	PROGRAM WRITE	Valid	Valid	Valid	Not valid	Not valid	Not valid	Valid	Not valid	Valid
MI	I/O TABLE GENERATE	Valid	Not valid	Valid	Not valid	Not valid	Not valid	Valid	Not valid	Valid
QQMR	READ I/O MEMORY	Valid	Valid	Valid	Not valid	Valid	Valid	Valid	Valid	Valid

Header code	Name	Single-frame command	Multiple-frame command	Single-frame response	Multiple-frame response	RUN	MON	PRG	UM write protect	UM read protect
QQIR	REGISTER I/O MEMORY	Valid	Not valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid
XZ	ABORT (command only)	Valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid
**	INITIALIZE (command only)	Valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid
IC	Undefined command (response only)	Valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid

4-2 End Codes

End Code Summary

These are the response (end) codes that are returned in the response frame. When two or more errors occur, the end code for the first error will be returned.

End code	Contents	Probable cause	Corrective measures
00	Normal completion	No problem exists.	---
01	Not executable in RUN mode	The command that was sent cannot be executed when the PC is in RUN mode.	Check the relation between the command and the PC mode.
02	Not executable in MONITOR mode	The command that was sent cannot be executed when the PC is in MONITOR mode.	
03	UM write-protected	The PC's UM is write-protected.	Turn OFF pin 1 of the CPU Unit's DIP switch (SW1).
04	Address over	The program address setting in an read or write command is above the highest program address.	Check the program.
0B	Not executable in PROGRAM mode	The command that was sent cannot be executed when the PC is in PROGRAM mode.	This code is not currently used.
13	FCS error	The FCS is wrong.	Check the FCS calculation method. If there was influence from noise, transfer the command again.
14	Format error	The command format is wrong, or a command that cannot be divided has been divided, or the frame length is smaller than the minimum length for the applicable command.	Check the format and transfer the command again.
15	Entry number data error	The data is outside of the specified range or too long. Hexadecimal data has not been specified.	Correct the data and transfer the command again.
16	Command not supported	The operand specified in an SV Read or SV Change command does not exist in the program.	Check search data or the search starting point.
18	Frame length error	The maximum frame length of 131 bytes was exceeded. (If the frame exceeds 280 bytes, the Reception Overflow Flag will be turned ON and there will not be a response.)	Check the command and divide it into multiple frames if necessary.

End code	Contents	Probable cause	Corrective measures
19	Not executable	The read SV exceeded 9,999, or an I/O memory batch read was executed when items to read were not registered for composite command, or access right was not obtained.	Register items to read before attempting batch read, or obtain access right.
20	Could not create I/O table	Unrecognized Remote I/O Unit, too many I/O words, or word duplication used.	Check the Remote I/O System, the number of I/O words, and the words used.
21	Not executable due to CPU Unit CPU error (See note.)	The command cannot be executed because a CPU error has occurred in the CPU Unit.	Cycle the CPU Unit's power supply.
23	User memory protected	The UM is read-protected or write-protected.	Clear write-protection by setting pin 1 of the DIP switch on the front of the CPU Unit to OFF. Alternatively, clear the CPU Unit's password-protection using CX-Programmer.
A3	Aborted due to FCS error in transmission data	An FCS error occurred in the second or later frame, or there were two bytes or less of data in an intermediate or final frame for multiple writing.	Correct the command data and transfer the command again.
A4	Aborted due to format error in transmission data	The command format did not match the number of bytes in the second or later frame.	
A5	Aborted due to entry number data error in transmission data	There was an entry number data error in the second or later frame, a data length error, or data was not set in hexadecimal.	
A8	Aborted due to frame length error in transmission data	The length of the second and later frames exceeded the maximum of 128 bytes.	

Note Occurs only for a Serial Communications Unit/Board.

A response will not be received with some errors, regardless of the command. These errors are listed in the following table.

Error	PC operation
A command is received with eight bytes or less from the @ to the delimiter.	The initial command (4 bytes) executes the initial processing. Other commands are discarded.
Parity, overrun, or framing error during command reception. (Same even for commands address to other Units.)	The Communications Error Flag will be turned ON, an error code will be registered, and receptions will be reset. (The error will be cleared automatically if communications restart normally.)
A command is received that does not have the @ character at the beginning of the first frame.	The command is discarded.
Incorrect node number (Not a local unit, BCD, or over 31)	The command is discarded.
An LF code is received after the delimiter.	The LF code is discarded.

Command/End Code Table The following table shows which end codes can be returned for each C-mode command.

Header	Possible End Codes						Comments
RR	00	13	14	15	18	21	---
RL	00	13	14	15	18	21	---
RH	00	13	14	15	18	21	---
RC	00	13	14	15	18	21	---
RG	00	13	14	15	18	21	---
RD	00	13	14	15	18	21	---

Header	Possible End Codes													Comments					
RJ	00			13		14	15		18		21			---					
RE	00			13		14	15		18		21			---					
WR	00	01		13		14	15		18		21	A3	A4	A5	A8	---			
WL	00	01		13		14	15		18		21	A3	A4	A5	A8	---			
WH	00	01		13		14	15		18		21	A3	A4	A5	A8	---			
WC	00	01		13		14	15		18		21	A3	A4	A5	A8	---			
WD	00	01		13		14	15		18		27	A3	A4	A5	A8	---			
WJ	00	01		13		14	15		18		21	A3	A4	A5	A8	---			
WE	00	01		13		14	15		18		21	A3	A4	A5	A8	---			
R#	00			13		14	15	16	18		21	23				---			
R\$	00		04	13		14	15	16	18		21	23				---			
R%	00		04	13		14	15	16	18		21	23				---			
W#	00	01		04	13		14	15	16	18	19	21	23			---			
W\$	00	01		04	13		14	15	16	18	19	21	23			---			
W%	00	01		04	13		14	15	16	18	19	21	23			---			
MS	00			13		14			18		21					---			
SC	00			13		14	15		18	19	21					---			
MF	00	01	02		13		14	15		18	19	21				---			
KS	00	01			13		14	15		18		21				---			
KR	00	01			13		14	15		18		21				---			
FK	00	01			13		14	15		18		21				---			
KC	00	01			13		14	15		18		21				---			
MM	00				13		14			18		21				---			
TS					13		14			18		21				---			
RP	00				13		14			18	19	21	23			---			
WP	00	01	02		13		14	15		18	19	21	23	A3	A4	A5	A8	---	
MI	00	01	02	03		13		14		18	19	20					---		
QQMR	00					13		14	15		18		21		A3	A4	A5	A8	---
QQIR	00					13		14			18	19						---	
XZ																		No response	
**																		No response	
IC																		No end code	

4-3 C-mode Command Details

4-3-1 About this Section

With C-mode command and response formats, a single character is indicated by a single box. Each character is sent and received as a single byte in ASCII.

Execution Conditions

The *Execution Conditions* table at the beginning of the description of each command provides the following information.

Commands, Single

Single command frames are used when there are 131 characters or less.

Commands, Multiple

Tells whether the command can be split into multiple frames when there are more than 131 characters.

Responses, Single

Single response frames are used when there are 131 characters or less.

Responses, Multiple

Tells whether the response can be spit into multiple frames when there are more than 131 characters.

PC Modes, RUN

Tells if the CPU Unit will accept the command when the CPU Unit is in RUN mode.

PC Modes, MONITOR

Tells if the CPU Unit will accept the command when the CPU Unit is in MONITOR mode.

PC Modes, PROGRAM

Tells if the CPU Unit will accept the command when the CPU Unit is in PROGRAM mode.

UM Area, Write-protected

Tells if the CPU Unit will accept the command when the UM Area is write-protected using the DIP switch on the CPU Unit.

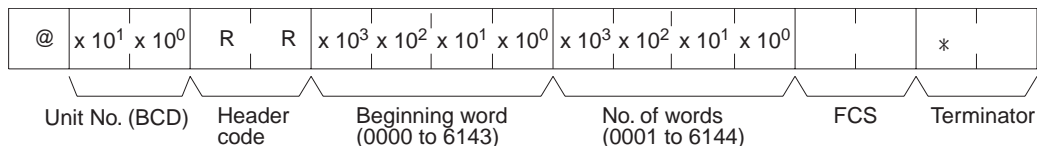
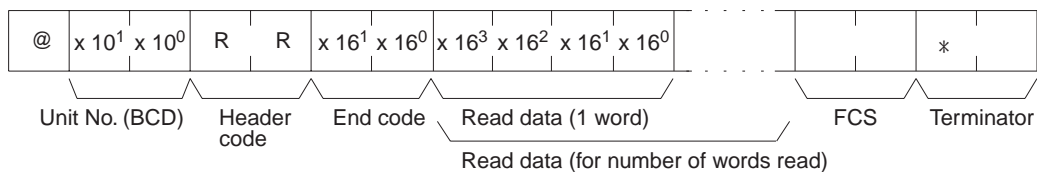
UM Area, Read-protected

Tells if the CPU Unit will accept the command when the UM Area is read-protected using a Programming Device.

- Note**
1. WR Area words cannot be read or written using C-mode commands.
 2. Timers 2048 to 4095 and counters 2048 to 4095 cannot be read or written and their SV cannot be read or written using C-mode commands.
 3. D10000 to D32767 and E10000 to E32767 cannot be read or written using C-mode commands.
 4. SV can be read and written only in cyclic task 0. Also, timer SV can be read and written only when the timer number is not indirectly addressed.

4-3-2 CIO AREA READ – – RR

Reads the contents of the specified number of CIO words starting from the specified word.

Command Format**Response Format****Limitations**

The text portion of the response's first frame can contain up to 30 words. If more than 30 words are read, the data will be returned in multiple frames.

In the second and later frames, the text portion of the response can contain up to 31 words.

The INITIALIZE and ABORT commands can be sent instead of the delimiter for multiple responses for this command. If other commands are sent, they will be treated as delimiters.

Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	No	OK	OK	OK	OK	OK	OK	OK

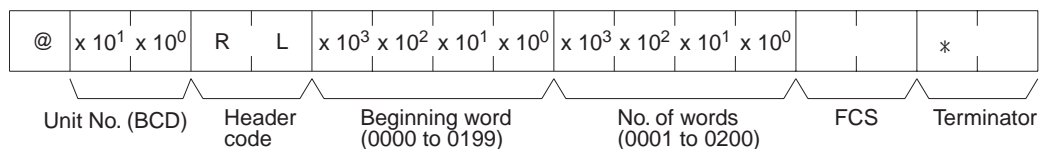
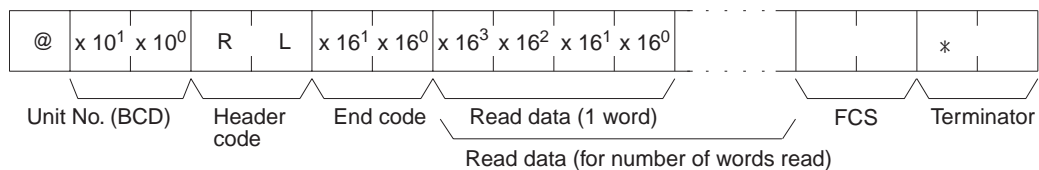
End Codes

An end code of 14 (format error) will be returned if the length of the command is incorrect and an end code of 15 (entry number data error) will be returned if the specified words exceed the data area boundaries, or are not specified in BCD, or if the number of words to read is 0.

End code (Hex)	Contents
00	Normal completion
13	FCS error
14	Format error
15	Entry number data error
18	Frame length error
21	Not executable due to CPU Unit CPU error.

4-3-3 LR AREA READ -- RL

Treats CIO 1000 to CIO 1199 as a data link area and reads the contents of the specified number of words starting from the specified word.

Command Format**Response Format****Limitations**

The text portion of the response's first frame can contain up to 30 words. If more than 30 words are read, the data will be returned in multiple frames.

In the second and later frames, the text portion of the response can contain up to 31 words.

The INITIALIZE and ABORT commands can be sent instead of the delimiter for multiple responses for this command. If other commands are sent, they will be treated as delimiters.

Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	No	OK	OK	OK	OK	OK	OK	OK

End Codes

An end code of 14 (format error) will be returned if the length of the command is incorrect and an end code of 15 (entry number data error) will be returned if

the specified words exceed the data area boundaries, or are not specified in BCD, or if the number of words to read is 0.

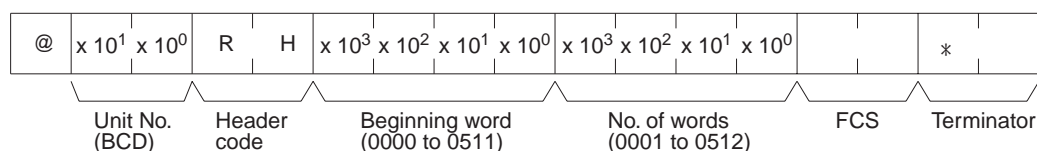
End code (Hex)	Contents
00	Normal completion
13	FCS error
14	Format error
15	Entry number data error
18	Frame length error
21	Not executable due to CPU Unit CPU error.

Note The command is provided for compatibility with previous models. We recommend using CIO AREA READ (RR) whenever possible.

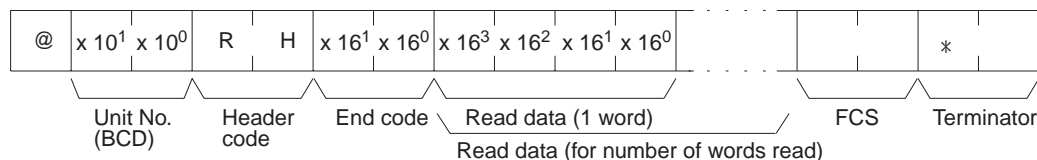
4-3-4 HR AREA READ – RH

Reads the contents of the specified number of HR words starting from the specified word.

Command Format



Response Format



Limitations

The text portion of the response's first frame can contain up to 30 words. If more than 30 words are read, the data will be returned in multiple frames.

In the second and later frames, the text portion of the response can contain up to 31 words.

The INITIALIZE and ABORT commands can be sent instead of the delimiter for multiple responses for this command. If other commands are sent, they will be treated as delimiters.

Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	No	OK	OK	OK	OK	OK	OK	OK

End Codes

An end code of 14 (format error) will be returned if the length of the command is incorrect and an end code of 15 (entry number data error) will be returned if the specified words exceed the data area boundaries, or are not specified in BCD, or if the number of words to read is 0.

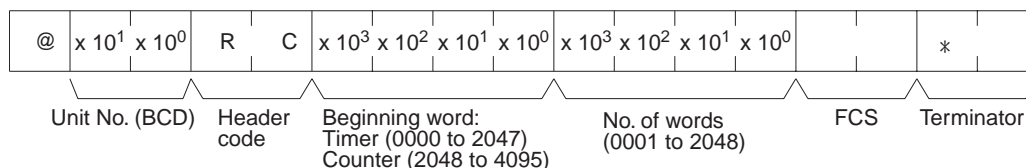
End code (Hex)	Contents
00	Normal completion
13	FCS error
14	Format error
15	Entry number data error

End code (Hex)	Contents
18	Frame length error
21	Not executable due to CPU Unit CPU error.

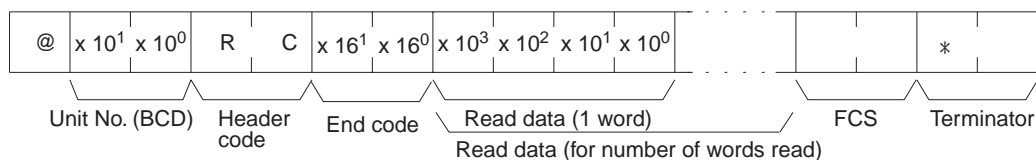
4-3-5 TIMER/COUNTER PV READ – – RC

Reads the contents of the specified number of timer/counter PVs (present values T0000 to T2047 or C0000 to C2047) starting from the specified timer/counter.

Command Format



Response Format



Limitations

The text portion of the response's first frame can contain up to 30 words. If more than 30 words are read, the data will be returned in multiple frames.

In the second and later frames, the text portion of the response can contain up to 31 words.

The INITIALIZE and ABORT commands can be sent instead of the delimiter for multiple responses for this command. If other commands are sent, they will be treated as delimiters.

Designate 0000 to 2047 for timers and 2048 to 4095 for counters (add 2048 to the actual counter number).

Timers T2048 to T4095 and counters T2048 to T4095 cannot be read.

Commands are divided among timers and counters for execution. If an attempt is made to designate across timers and counters, an end code of 15 (entry number data error) will be returned.

Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	No	OK	OK	OK	OK	OK	OK	OK

End Codes

An end code of 14 (format error) will be returned if the length of the command is incorrect and an end code of 15 (entry number data error) will be returned if the specified words exceed the data area boundaries, or are not specified in BCD, or if the number of words to read is 0.

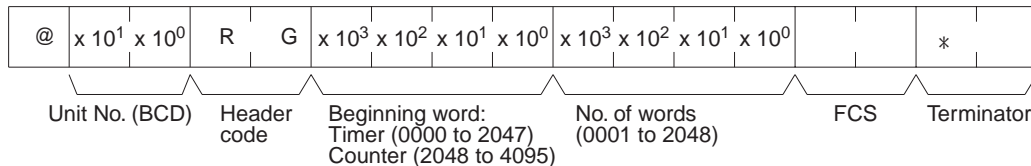
End code (Hex)	Contents
00	Normal completion
13	FCS error
14	Format error
15	Entry number data error

End code (Hex)	Contents
18	Frame length error
21	Not executable due to CPU Unit CPU error.

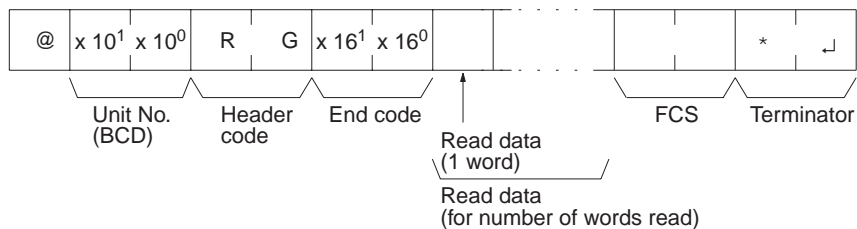
4-3-6 TIMER/COUNTER STATUS READ -- RG

Reads the ON/OFF status of the Completion Flags of the specified number of timers/counters starting from the designated word (T0000 to T2047 or C0000 to C2047).

Command Format



Response Format



Limitations

The number of words per frame for response data is different to that for C-series Units. For details refer to *2-4 Precautions in Using Programs from Previous PC Models*.

The text portion of the response's first frame can contain up to 121 words. If more than 121 words are read, the data will be returned in multiple frames.

In the second and later frames, the text portion of the response can contain up to 124 words.

The INITIALIZE and ABORT commands can be sent instead of the delimiter for multiple responses for this command. If other commands are sent, they will be treated as delimiters.

Designate 0000 to 2047 for timers and 2048 to 4095 for counters (add 2048 to the actual counter number).

Timers T2048 to T4095 and counters C2048 to C4095 cannot be read.

Commands are divided with regard to timers and counters. If an attempt is made to designate across timers and counters, an end code of 15 (entry number data error) will be returned.

Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	No	OK	OK	OK	OK	OK	OK	OK

End Codes

An end code of 14 (format error) will be returned if the length of the command is incorrect and an end code of 15 (entry number data error) will be returned if

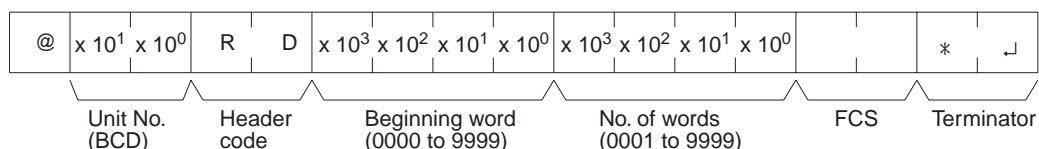
the specified words exceed the data area boundaries, or are not specified in BCD, or if the number of words to read is 0.

End code (Hex)	Contents
00	Normal completion
13	FCS error
14	Format error
15	Entry number data error
18	Frame length error
21	Not executable due to CPU Unit CPU error.

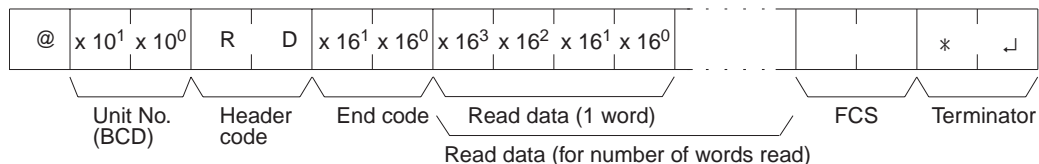
4-3-7 DM AREA READ -- RD

Reads the contents of the specified number of DM words starting from the specified word (D00000 to D09999).

Command Format



Response Format



Limitations

The DM Area is comprised of D00000 to D32767, but the range that can be read by this command is D00000 to D09999.

The text portion of the response's first frame can contain up to 30 words. If more than 30 words are read, the data will be returned in multiple frames.

In the second and later frames, the text portion of the response can contain up to 31 words.

The INITIALIZE and ABORT commands can be sent instead of the delimiter for multiple responses for this command. If other commands are sent, they will be treated as delimiters.

Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	No	OK	OK	OK	OK	OK	OK	OK

End Codes

An end code of 14 (format error) will be returned if the length of the command is incorrect and an end code of 15 (entry number data error) will be returned if the specified words exceed the data area boundaries, or are not specified in BCD, or if the number of words to read is 0.

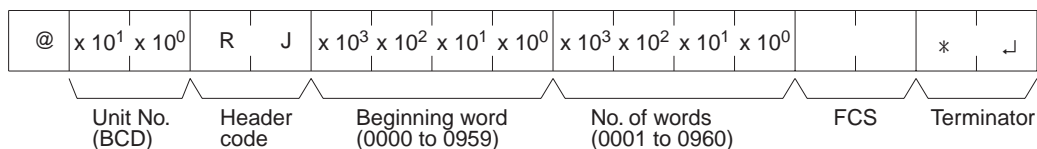
End code (Hex)	Contents
00	Normal completion
13	FCS error
14	Format error
15	Entry number data error

End code (Hex)	Contents
18	Frame length error
21	Not executable due to CPU Unit CPU error.

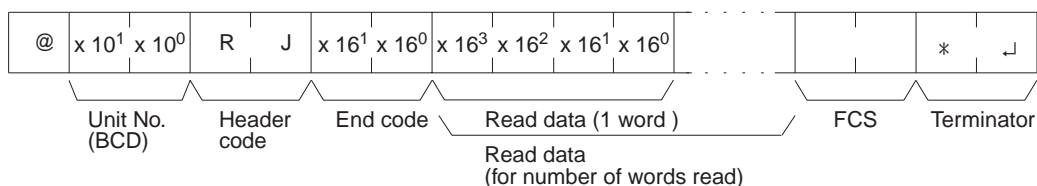
4-3-8 AR AREA READ -- RJ

Reads the contents of the specified number of Auxiliary Area words (A000 to A959) starting from the specified word.

Command Format



Response Format



Limitations

The text portion of the response's first frame can contain up to 30 words. If more than 30 words are read, the data will be returned in multiple frames.

In the second and later frames, the text portion of the response can contain up to 31 words.

The INITIALIZE and ABORT commands can be sent instead of the delimiter for multiple responses for this command. If other commands are sent, they will be treated as delimiters.

Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	No	OK	OK	OK	OK	OK	OK	OK

End Codes

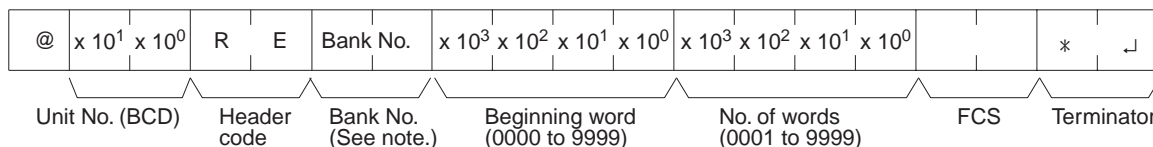
An end code of 14 (format error) will be returned if the length of the command is incorrect and an end code of 15 (entry number data error) will be returned if the specified words exceed the data area boundaries, or are not specified in BCD, or if the number of words to read is 0.

End code (Hex)	Contents
00	Normal completion
13	FCS error
14	Format error
15	Entry number data error
18	Frame length error
21	Not executable due to CPU Unit CPU error.

4-3-9 EM AREA READ – RE

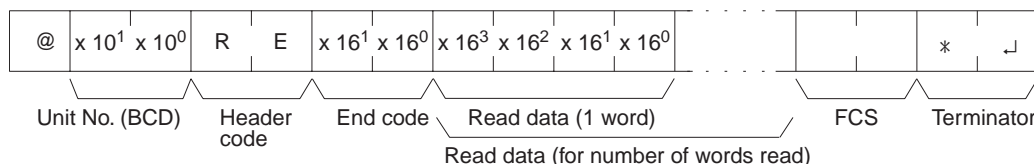
Reads the contents of the specified number of EM words (E00000 to E09999) starting from the specified word in the specified EM bank.

Command Format



Note Input 00, 01, or 0C to specify bank number 0, 1, or C. Input two spaces to specify the current bank.

Response Format



Limitations

A single bank of EM consists of E00000 to E32767, but the range that can be read by this command is E00000 to E09999.

The text portion of the response's first frame can contain up to 30 words. If more than 30 words are read, the data will be returned in multiple frames.

In the second and later frames, the text portion of the response can contain up to 31 words.

This command cannot be used to change the current bank number.

The INITIALIZE and ABORT commands can be sent instead of the delimiter for multiple responses for this command. If other commands are sent, they will be treated as delimiters.

Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	No	OK	OK	OK	OK	OK	OK	OK

End Codes

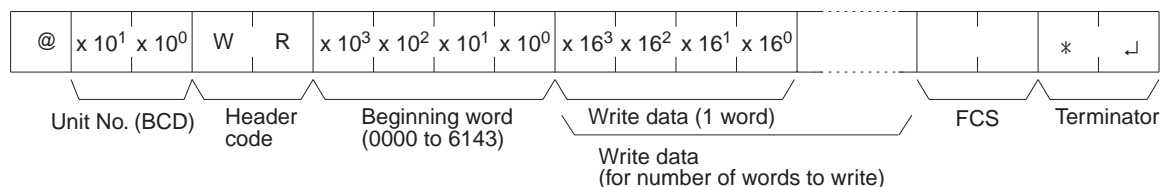
An end code of 14 (format error) will be returned if the length of the command is incorrect and an end code of 15 (entry number data error) will be returned if the specified words exceed the data area boundaries, the specified words are not specified in BCD, or an invalid bank number is specified. An end code of 15 will also be returned if there are no banks and file memory access is not possible, or if the number of words to read is 0.

End code (Hex)	Contents
00	Normal completion
13	FCS error
14	Format error
15	Entry number data error
18	Frame length error
21	Not executable due to CPU Unit CPU error.

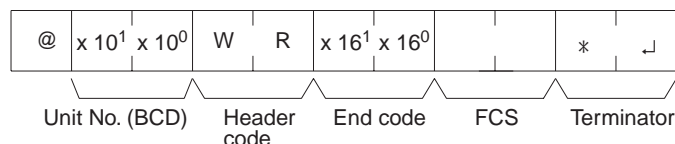
4-3-10 CIO AREA WRITE – – WR

Writes data to the CIO Area (CIO 0000 to CIO 6143) starting from the specified word. Writing is done in word units.

Command Format



Response Format



Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	OK	OK	No	No	OK	OK	OK	OK

End Codes

An end code of 14 (format error) will be returned if the length of the command is incorrect or the first word of write data is not in the first frame.

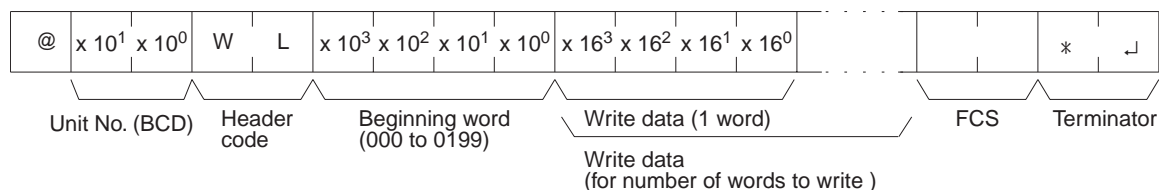
An end code of 15 (entry number data error) will be returned if the specified write data exceeds the data area boundaries, the beginning word is not specified in BCD, or the write data is not hexadecimal. (An end code of A5 will be returned instead of 15 for non-hexadecimal write data in multiple command frames.)

End code (Hex)	Contents
00	Normal completion
01	Not executable in RUN mode
13	FCS error
14	Format error
15	Entry number data error
18	Frame length error
21	Not executable due to CPU Unit CPU error.
A3	Aborted due to FCS error in transmit data
A4	Aborted due to format error in transmit data
A5	Aborted due to entry number data error in transmit data
A8	Aborted due to frame length error in transmit data

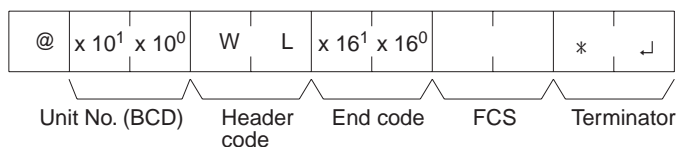
4-3-11 LR AREA WRITE – – WL

Writes data to the Link Area (CIO 1000 to CIO 1199) starting from the specified word. Writing is done in word units.

Command Format



Response Forma



Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	OK	OK	No	No	OK	OK	OK	OK

End Codes

An end code of 14 (format error) will be returned if the length of the command is incorrect.

An end code of 15 (entry number data error) will be returned if the specified write data exceeds the data area boundary, the beginning word is not specified in BCD, or the write data is not hexadecimal. (An end code of A5 will be returned instead of 15 for non-hexadecimal write data in multiple command frames.)

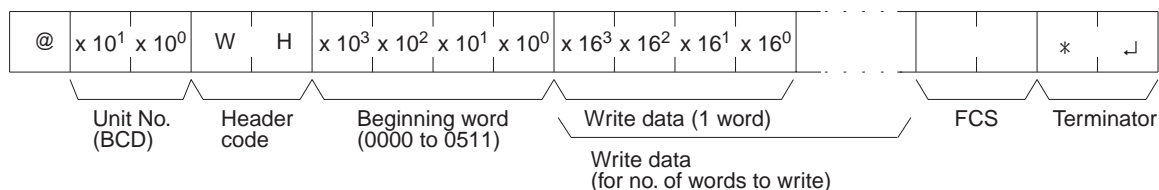
End code (Hex)	Contents
00	Normal completion
01	Not executable in RUN mode
13	FCS error
14	Format error
15	Entry number data error
18	Frame length error
21	Not executable due to CPU Unit CPU error.
A3	Aborted due to FCS error in transmit data
A4	Aborted due to format error in transmit data
A5	Aborted due to entry number data error in transmit data
A8	Aborted due to frame length error in transmit data

Note The command is provided for compatibility with previous models. We recommend using CIO AREA WRITE (WR) whenever possible.

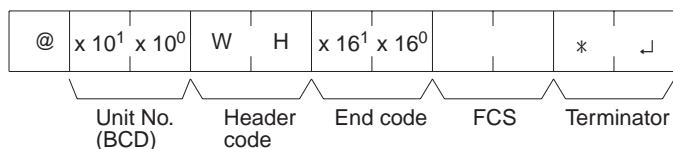
4-3-12 HR AREA WRITE – – WH

Writes data to the HR Area (H000 to H511) starting from the specified word. Writing is done in word units.

Command Format



Response Format



Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	OK	OK	No	No	OK	OK	OK	OK

End Codes

An end code of 14 (format error) will be returned if the length of the command is incorrect or the first word of write data is not in the first frame.

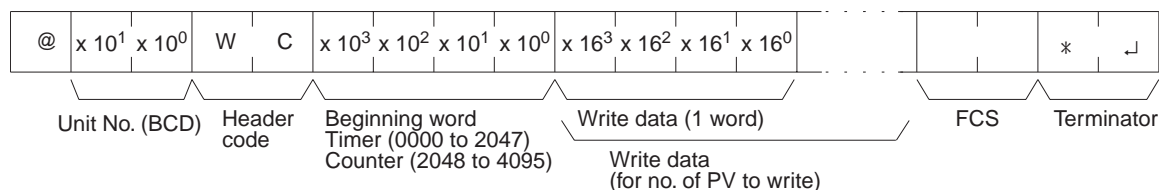
An end code of 15 (entry number data error) will be returned if the specified write data exceeds the data area boundary, the beginning word is not specified in BCD, or the write data is not hexadecimal. (An end code of A5 will be returned instead of 15 for non-hexadecimal write data in multiple command frames.)

End code (Hex)	Contents
00	Normal completion
01	Not executable in RUN mode
13	FCS error
14	Format error
15	Entry number data error
18	Frame length error
21	Not executable due to CPU Unit CPU error.
A3	Aborted due to FCS error in transmit data
A4	Aborted due to format error in transmit data
A5	Aborted due to entry number data error in transmit data
A8	Aborted due to frame length error in transmit data

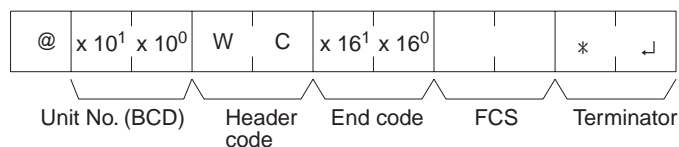
4-3-13 TIMER/COUNTER PV WRITE – – WC

Writes the PVs (present values T0000 to T2047 or C0000 to C2047) of timers/counters starting from the specified word.

Command Format



Response Format



Limitations

Commands are divided with regard to timers and counters. If an attempt is made to designate across timers and counters, an end code of 15 (entry number data error) will be returned.

Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	OK	OK	No	No	OK	OK	OK	OK

End Codes

An end code of 14 (format error) will be returned if the length of the command is incorrect.

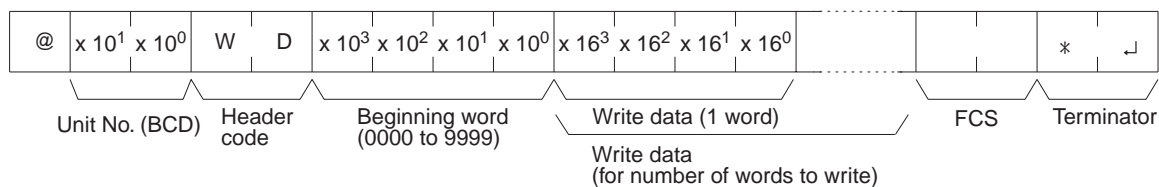
An end code of 15 (entry number data error) will be returned if the specified write data exceeds the data area boundary, the beginning word is not specified in BCD, or the write data is not hexadecimal. (An end code of A5 will be returned instead of 15 for non-hexadecimal write data in multiple command frames.)

End code (Hex)	Contents
00	Normal completion
01	Not executable in RUN mode
13	FCS error
14	Format error
15	Entry number data error
18	Frame length error
21	Not executable due to CPU Unit CPU error.
A3	Aborted due to FCS error in transmit data
A4	Aborted due to format error in transmit data
A5	Aborted due to entry number data error in transmit data
A8	Aborted due to frame length error in transmit data

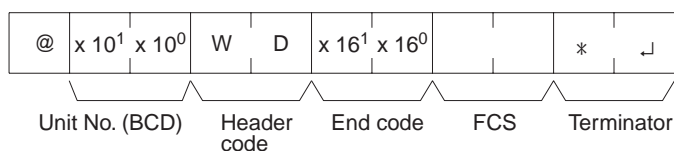
4-3-14 DM AREA WRITE – – WD

Writes data to the DM Area starting from the specified word (D00000 to D09999). Writing is done in word units.

Command Format



Response Format



Limitations

The DM Area is comprised of D00000 to D32767, but the range that can be read by this command is D00000 to D09999.

Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	OK	OK	No	No	OK	OK	OK	OK

End Codes

An end code of 14 (format error) will be returned if the length of the command is incorrect or the first word of write data is not in the first frame.

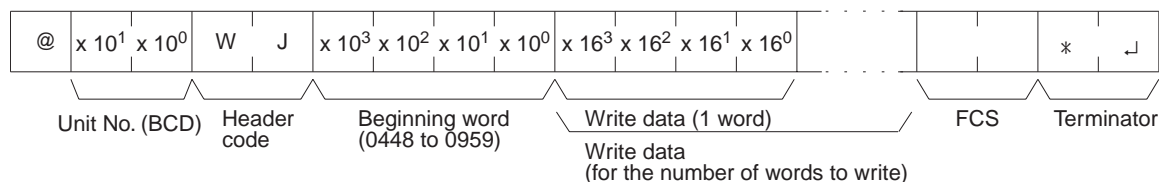
An end code of 15 (entry number data error) will be returned if the specified write data exceeds the data area boundary, the beginning word is not specified in BCD, or the write data is not hexadecimal. (An end code of A5 will be returned instead of 15 for non-hexadecimal write data in multiple command frames.)

End code (Hex)	Contents
00	Normal completion
01	Not executable in RUN mode
13	FCS error
14	Format error
15	Entry number data error
18	Frame length error
21	Not executable due to CPU Unit CPU error.
A3	Aborted due to FCS error in transmit data
A4	Aborted due to format error in transmit data
A5	Aborted due to entry number data error in transmit data
A8	Aborted due to frame length error in transmit data

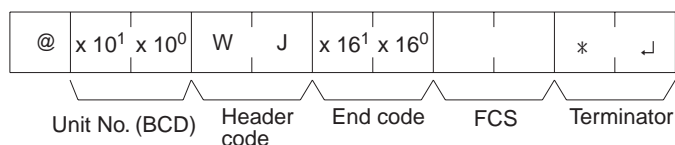
4-3-15 AR AREA WRITE – – WJ

Writes data to the Auxiliary Area (A448 to A959) starting from the specified word. Writing is done in word units.

Command Format



Response Format



Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	OK	OK	No	No	OK	OK	OK	OK

End Codes

An end code of 14 (format error) will be returned if the length of the command is incorrect or the first word of write data is not in the first frame.

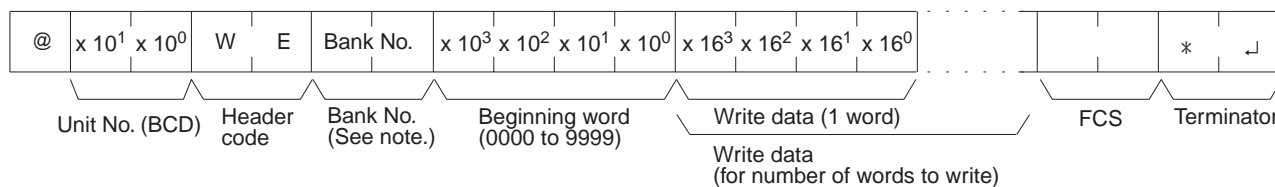
An end code of 15 (entry number data error) will be returned if the specified write data exceeds the data area boundary, the beginning word is not specified in BCD, or the write data is not hexadecimal. (An end code of A5 will be returned instead of 15 for non-hexadecimal write data in multiple command frames.)

End code (Hex)	Contents
00	Normal completion
01	Not executable in RUN mode
13	FCS error
14	Format error
15	Entry number data error
18	Frame length error
21	Not executable due to CPU Unit CPU error.
A3	Aborted due to FCS error in transmit data
A4	Aborted due to format error in transmit data
A5	Aborted due to entry number data error in transmit data
A8	Aborted due to frame length error in transmit data

4-3-16 EM AREA WRITE – WE

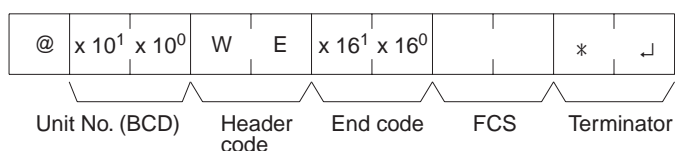
Writes data to the specified EM Area bank starting from the specified word (E00000 to E09999). Writing is done in word units.

Command Format



Note Input 00 to 0C to specify bank number 0 to C. Input two spaces to specify the current bank.

Response Format



Limitations

The range that can be designated is E0000 to E9999. A single bank of EM consists of E00000 to E32767, but the range that can be written by this command is E00000 to E09999.

Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	OK	OK	No	No	OK	OK	OK	OK

End Codes

An end code of 14 (format error) will be returned if the length of the command is incorrect or the first word of write data is not in the first frame.

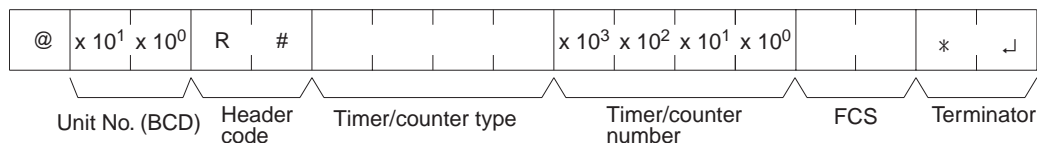
An end code of 15 (entry number data error) will be returned if the specified write data exceeds the data area boundary, the beginning word is not specified in BCD, or the write data is not hexadecimal. An end code of 15 will also be returned if there are no banks and file memory access is not possible. (An end code of A5 will be returned instead of 15 for non-hexadecimal write data in multiple command frames.)

End code (Hex)	Contents
00	Normal completion
01	Not executable in RUN mode
13	FCS error
14	Format error
15	Entry number data error
18	Frame length error
21	Not executable due to CPU Unit CPU error.
A3	Aborted due to FCS error in transmit data
A4	Aborted due to format error in transmit data
A5	Aborted due to entry number data error in transmit data
A8	Aborted due to frame length error in transmit data

4-3-17 TIMER/COUNTER SV READ 1 – R#

Reads the constant SV (4 digits BCD) written in the operands of designated timer/counter instructions from cyclic task 0. If there are multiple timer/counter instructions designated in cyclic task 0, TIMER/COUNTER SV READ 1 will read the SV of the designated instruction with the lowest program address.

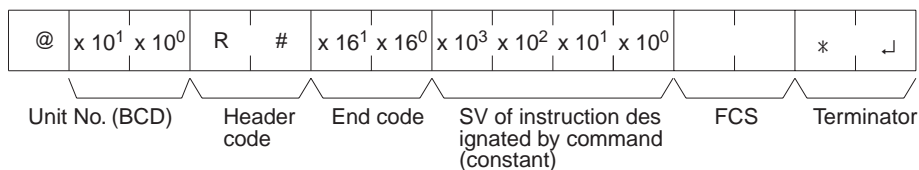
Command Format



Instruction name	Timer/counter type				Timer/counter number (BCD)
	Char-acter 1	Char-acter 2	Char-acter 3	Char-acter 4	
HIGH-SPEED COUNTER WAIT	T	M	H	W	0000 to 2047
TIMER WAIT	T	I	M	W	
COUNTER WAIT	C	N	T	W	
HIGH-SPEED TIMER	T	I	M	H	
TOTALIZING TIMER	T	T	I	M	
REVERSIBLE COUNTER	C	N	T	R	
TIMER	T	I	M	(SP)	
COUNTER	C	N	T	(SP)	

Note "SP" represents a space (20 Hex).

Response Format



Parameters

Timer/Counter Type (Command)

Designate in ASCII characters the type of TC instruction for reading the constant SV.

Timer Counter Number (Command)

Designate in four digits (BCD) the timer/counter number for reading the constant SV.

Limitations

Timers T2048 to T4095 and counters C2048 to C4095 cannot be read.

The second word of the instruction must be a constant.

If there are multiple relevant instructions in the UM Area, a search will be conducted from program address 0, and the first instruction found will be read.

SV can be read only from cyclic task 0.

Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	No	OK	No	OK	OK	OK	OK	No

End Codes

An end code of 14 (format error) will be returned if the length of the command is incorrect.

An end code of 15 (entry number data error) will be returned if the timer/counter type or timer/counter number is out of range (including hexadecimal data).

An end code of 16 (command not supported) will be returned if the specified instruction does not exist in the UM Area.

End code (Hex)	Contents
00	Normal completion
13	FCS error
14	Format error
15	Entry number data error
16	Command not supported
18	Frame length error
21	Not executable due to CPU Unit CPU error.
23	User memory protected

4-3-18 TIMER/COUNTER SV READ 2 – – R\$

From the specified program address onwards in cyclic task 0, TIMER/COUNTER SV READ 2 finds the specified timer/counter instruction and reads the 4-digit constant SV that is set or the word address where the SV is stored.

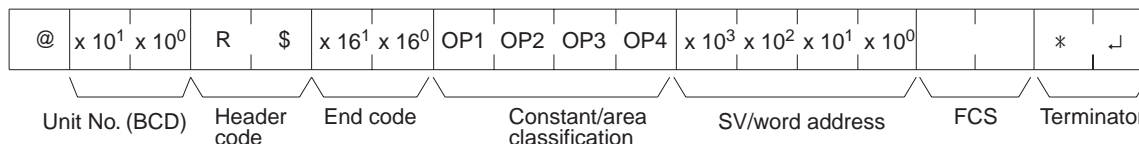
Command Format

@	x 10 ¹	x 10 ⁰	R	\$	x 10 ³	x 10 ²	x 10 ¹	x 10 ⁰	OP1	OP2	OP3	OP4	x 10 ³	x 10 ²	x 10 ¹	x 10 ⁰			*	↵
Unit No. (BCD)			Header code		Program address (BCD)				Timer/counter type				Timer/counter number (BCD)				FCS		Terminator	

Instruction name	Timer/counter type				Timer/counter number (BCD)
	Char-acter 1	Char-acter 2	Char-acter 3	Char-acter 4	
HIGH-SPEED COUNTER WAIT	T	M	H	W	0000 to 2047
TIMER WAIT	T	I	M	W	
COUNTER WAIT	C	N	T	W	
HIGH-SPEED TIMER	T	I	M	H	
TOTALIZING TIMER	T	T	I	M	
REVERSIBLE COUNTER	C	N	T	R	
TIMER	T	I	M	(SP)	
COUNTER	C	N	T	(SP)	

Note “SP” represents a space (20 Hex).

Response Format



Classification	Constant/area classification				SV or word address
	Character 1	Character 2	Character 3	Character 4	
Constant	C	O	N	(SP)	0000 to 9999
CIO	C	I	O	(SP)	0000 to 6143
AR	A	R	(SP)	(SP)	0000 to 0959
HR	H	R	(SP)	(SP)	0000 to 0511
WR	W	R	(SP)	(SP)	0000 to 0511
Timer	T	I	M	(SP)	0000 to 2047
Counter	C	N	T	(SP)	0000 to 2047
DM	D	M	(SP)	(SP)	0000 to 9999
DM (indirect)	D	M	*	(SP)	0000 to 9999
EM current bank	E	M	(SP)	(SP)	0000 to 9999
EM (indirect) current bank	E	M	*	(SP)	0000 to 9999
EM banks 0 to C	E	M	0 to C	(SP)	0000 to 9999
EM (indirect) banks 0 to C	E	M	0 to C	*	0000 to 9999
Data register	D	R	(SP)	(SP)	0000 to 0015
Index register (indirect)	,	I	R	(SP)	0000 to 0015

Note “SP” represents a space (20 Hex).

Parameters

Program Address (Command)

Designates the program address in four digits decimal (BCD) for beginning the search for the specified timer/counter.

Timer/Counter Type (Command)

Designate in ASCII characters the timer/counter instruction type for reading the constant SV or the word address in which it is stored.

Timer/Counter Number (Command)

Designate in four digits (BCD) the timer/counter instruction number for reading the constant SV or the word address in which it is stored. (Data register designation is not possible.)

Constant/Area Classification (Response)

The constant or I/O memory area classification is returned, in ASCII, to this parameter.

SV/Word Address (Response)

The constant SV or the word address in which it is stored is returned to this parameter.

Limitations

Timers T2048 to T4095 and counters C2048 to C4095 cannot be read.

The SV of the first timer/counter found after the designated program address will be read.

If the SV is outside of range for the timer/counter type or number, an end code of 16 (command not supported) will be returned.

If the SV is a DM or EM indirect address, only indirect BCD designations will be read and an end code of 16 (command not supported) will be returned if the indirect designation is not BCD.

SV can be read only from cyclic task 0.

Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	No	OK	No	OK	OK	OK	OK	No

End Codes

An end code of 14 (format error) will be returned if the length of the command is incorrect.

An end code of 15 (entry number data error) will be returned if the program address is not specified in BCD or the operand/SV parameters are incorrect.

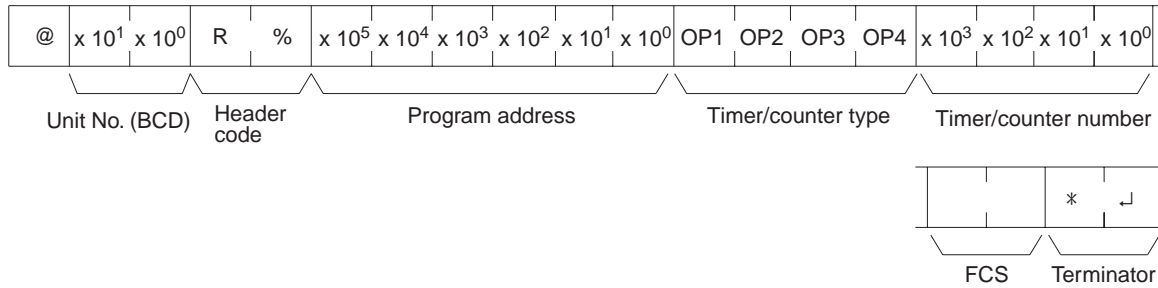
An end code of 16 (command not supported) will be returned if the specified instruction does not exist in the UM Area.

End code (Hex)	Contents
00	Normal completion
04	Address over
13	FCS error
14	Format error
15	Entry number data error
16	Command not supported
18	Frame length error
21	Not executable due to CPU Unit CPU error.
23	User memory protected

4-3-19 TIMER/COUNTER SV READ 3 – – R%

From the specified program address onwards in cyclic task 0, TIMER/COUNTER SV READ 3 finds the specified TC instruction and reads the constant SV that is set or the word address where the SV is stored. The SV that is read is a 4-digit decimal number (BCD).

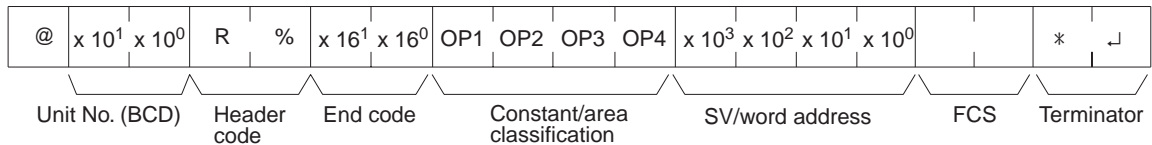
Command Format



Instruction name	Timer/counter type				Timer/counter number
	Character 1	Character 2	Character 3	Character 4	
HIGH-SPEED TIMER WAIT	T	M	H	W	0000 to 2047
TIMER WAIT	T	I	M	W	
COUNTER WAIT	C	N	T	W	
HIGH-SPEED TIMER	T	I	M	H	
TOTALIZING TIMER	T	T	I	M	
REVERSIBLE COUNTER	C	N	T	R	
TIMER	T	I	M	(SP)	
COUNTER	C	N	T	(SP)	

Note “SP” represents a space (20 Hex).

Response Format



Classification	Constant/area classification				Constant or word address
	Character 1	Character 2	Character 3	Character 4	
Constant	C	O	N	(SP)	0000 to 9999
CIO	C	I	O	(SP)	0000 to 6143
AR	A	R	(SP)	(SP)	0000 to 0959
HR	H	R	(SP)	(SP)	0000 to 0511
WR	W	R	(SP)	(SP)	0000 to 0511
Timer	T	I	M	(SP)	0000 to 2047
Counter	C	N	T	(SP)	0000 to 2047
DM	D	M	(SP)	(SP)	0000 to 9999
DM (indirect)	D	M	*	(SP)	0000 to 9999
EM current bank	E	M	(SP)	(SP)	0000 to 9999
EM (indirect) current bank	E	M	*	(SP)	0000 to 9999
EM banks 0 to C	E	M	0 to C	(SP)	0000 to 9999
EM (indirect) banks 0 to C	E	M	0 to C	*	0000 to 9999
Data register	D	R	(SP)	(SP)	0000 to 0015
Index register (indirect)	,	I	R	(SP)	0000 to 0015

Note “SP” represents a space (20 Hex).

Parameters

Program Address (Command)

Designates the program address in six digits decimal (BCD) for beginning the search for the specified timer/counter.

Timer/Counter Type (Command)

Designate the timer/counter instruction type for reading the constant SV or the word address in which it is stored.

Timer/Counter Number (Command)

Designate the timer/counter instruction number for reading the constant SV or the word address in which it is stored. (Index register designation is not possible.)

Constant/Area Classification (Response)

The constant or I/O memory area classification is returned, in ASCII, to this parameter.

SV/Word Address (Response)

The constant SV or the word address in which it is stored is returned to this parameter.

Limitations

Timers T2048 to T4095 and counters C2048 to C4095 cannot be read.

The SV of the first timer/counter found after the designated program address will be read.

If the SV is outside of range for the timer/counter type or number, an end code of 16 (command not supported) will be returned.

If the SV is a DM or EM indirect address, only indirect BCD designations will be read and an end code of 16 (command not supported) will be returned if the indirect designation is not BCD.

SV can be read only from cyclic task 0.

Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	No	OK	No	OK	OK	OK	OK	No

End Codes

An end code of 14 (format error) will be returned if the length of the command is incorrect.

An end code of 15 (entry number data error) will be returned if the program address is not specified in BCD, or if the timer/counter type or number is out of range (including hexadecimal data).

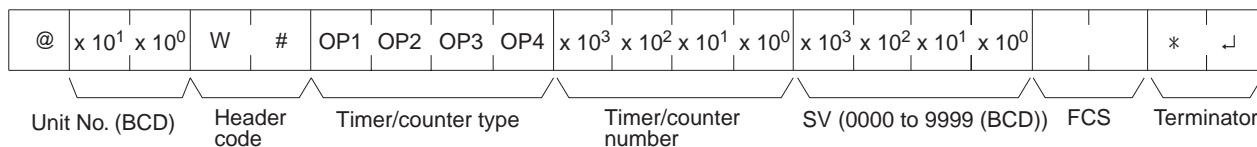
An end code of 16 (command not supported) will be returned if the specified instruction does not exist in the program.

End code (Hex)	Contents
00	Normal completion
04	Address over
13	FCS error
14	Format error
15	Entry number data error
16	Command not supported
18	Frame length error
21	Not executable due to CPU Unit CPU error.
23	User memory protected

4-3-20 TIMER/COUNTER SV CHANGE 1 – – W#

Changes the SV of the designated timer/counter instruction to a new constant SV.

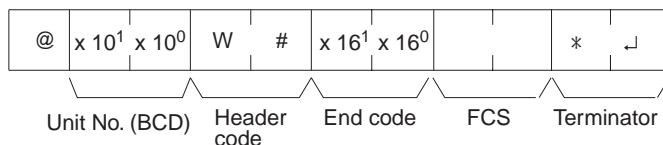
Command Format



Instruction name	Timer/counter type				Timer/counter number (BCD)
	Char-acter 1	Char-acter 2	Char-acter 3	Char-acter 4	
HIGH-SPEED TIMER WAIT	T	M	H	W	0000 to 2047
TIMER WAIT	T	I	M	W	
COUNTER WAIT	C	N	T	W	
HIGH-SPEED TIMER	T	I	M	H	
TOTALIZING TIMER	T	T	I	M	
REVERSIBLE COUNTER	C	N	T	R	
TIMER	T	I	M	(SP)	
COUNTER	C	N	T	(SP)	

Note “SP” represents a space (20 Hex).

Response Format



Parameters

Timer/Counter Type (Command)

Designate the timer/counter instruction type for changing the constant SV.

Timer/Counter Number (Command)

Designate in four digits BCD the timer/counter instruction number for changing the constant SV. (Index register designation is not possible.)

New Constant SV (Command)

Designate the new constant SV in four digits hexadecimal.

Limitations

Timers T2048 to T4095 and counters C2048 to C4095 cannot be read.

The command cannot be executed unless the SV is a constant.

If there are multiple relevant instructions in cyclic task 0, a search will be conducted from program address 0, and the first instruction found will be read.

The SV can be changed only in cyclic task 0.

If the SV is a DM or EM indirect address, only indirect BCD designations will be read and an end code of 16 (command not supported) will be returned if the indirect designation is not BCD.

Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	No	OK	No	No	OK	OK	No	No

End Codes

An end code of 14 (format error) will be returned if the length of the command is incorrect.

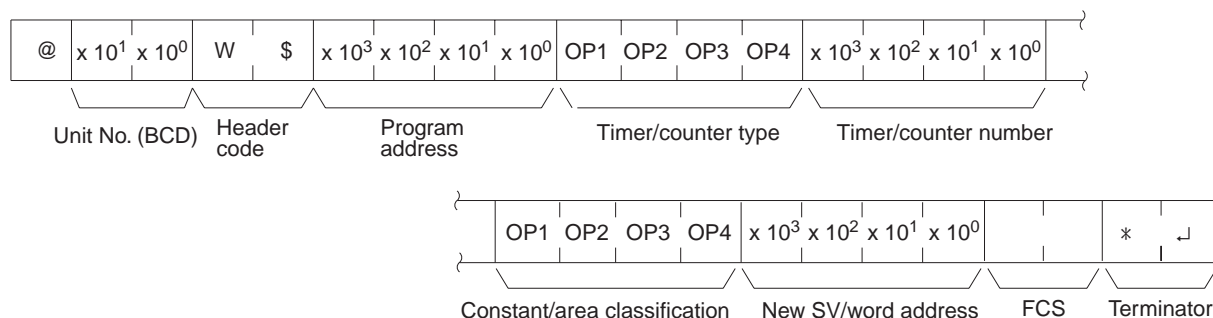
An end code of 15 (entry number data error) will be returned if the program address is not specified in BCD, or if the timer/counter type or number is out of range (including hexadecimal data).

An end code of 16 (command not supported) will be returned if the specified instruction does not exist in the UM Area.

End code (Hex)	Contents
00	Normal completion
01	Not executable in RUN mode
04	Address over
13	FCS error
14	Format error
15	Entry number data error
16	Command not supported
18	Frame length error
19	Not executable
21	Not executable due to CPU Unit CPU error.
23	User memory protected

4-3-21 TIMER/COUNTER SV CHANGE 2 – – W\$

From the specified program address onwards in cyclic task 0, TIMER/COUNTER SV CHANGE 2 finds the specified timer/counter instruction and changes the 4-digit constant SV (BCD) that is set, or the word address where the SV is stored, to a newly designated constant SV or storage word address.

Command Format

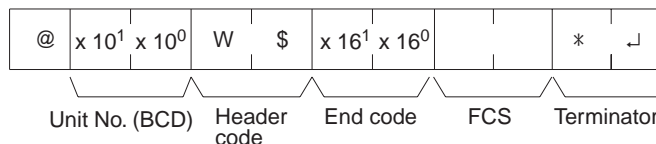
Instruction name	Timer/counter type				Timer/counter number
	Charac ter 1	Charac ter 2	Charac ter 3	Charac ter 4	
HIGH-SPEED TIMER WAIT	T	M	H	W	0000 to 2047
TIMER WAIT	T	I	M	W	
COUNTER WAIT	C	N	T	W	
HIGH-SPEED TIMER	T	I	M	H	
TOTALIZING TIMER	T	T	I	M	
REVERSIBLE COUNTER	C	N	T	R	
TIMER	T	I	M	(SP)	
COUNTER	C	N	T	(SP)	

Note “SP” represents a space (20 Hex).

Classification	Constant/area classification				SV or word address (BCD)
	Character 1	Character 2	Character 3	Character 4	
Constant	C	O	N	(SP)	0000 to 9999
CIO	C	I	O	(SP)	0000 to 6143
AR	A	R	(SP)	(SP)	0000 to 0959
HR	H	R	(SP)	(SP)	0000 to 0511
WR	W	R	(SP)	(SP)	0000 to 0511
Timer	T	I	M	(SP)	0000 to 2047
Counter	C	N	T	(SP)	0000 to 2047
DM	D	M	(SP)	(SP)	0000 to 9999
DM (indirect)	D	M	*	(SP)	0000 to 9999
EM current bank	E	M	(SP)	(SP)	0000 to 9999
EM (indirect) current bank	E	M	*	(SP)	0000 to 9999
EM banks 0 to C	E	M	0 to C	(SP)	0000 to 9999
EM (indirect) 0 to C	E	M	0 to C	*	0000 to 9999
Data register	D	R	(SP)	(SP)	0000 to 0015
Index register	,	I	R	(SP)	0000 to 0015

Note “SP” represents a space (20 Hex).

Response Format



Parameters

Program Address (Command)

Designate the program address in four digits decimal (BCD) for beginning the search for the specified timer/counter instruction.

Timer/Counter Type (Command)

Designate the timer/counter instruction type for changing the constant SV or the word address in which it is stored.

Timer/Counter Number (Command)

Designate the timer/counter instruction number for reading the constant SV. (Index register designation is not possible.) The range that can be designated is the same as for R#.

Constant/Area Classification (Command)

Designate the ASCII characters to express the new SV area classification or constant.

New SV/Word Address (Command)

Designate the newly set constant SV or the word address in which it is stored.

Limitations

Timers T2048 to T4095 and counters C2048 to C4095 cannot be read.

The SV of the first timer/counter found after the designated program address will be read.

If the SV is outside of range for the timer/counter type or number, an end code of 16 (command not supported) will be returned.

If the SV is a DM or EM indirect address, only indirect BCD designations will be read and an end code of 16 (command not supported) will be returned if the indirect designation is not BCD.

The SV can be changed only in cyclic task 0.

Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	No	OK	No	No	OK	OK	No	No

End Codes

An end code of 14 (format error) will be returned if the length of the command is incorrect.

An end code of 15 (entry number data error) will be returned if the program address is not BCD, or if the timer/counter type or number is out of range (including hexadecimal data).

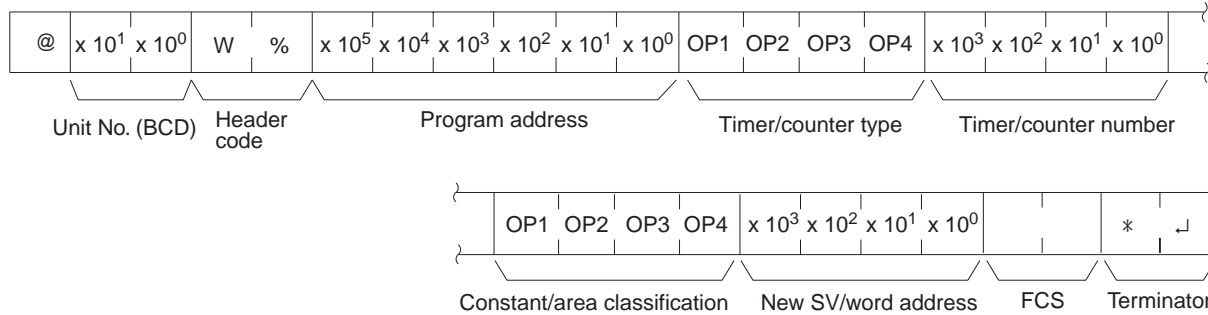
An end code of 16 (command not supported) will be returned if the specified instruction does not exist in the UM Area.

End code (Hex)	Contents
00	Normal completion
01	Not executable in RUN mode
04	Address over
13	FCS error
14	Format error
15	Entry number data error
16	Command not supported
18	Frame length error
19	Not executable
21	Not executable due to CPU Unit CPU error.
23	User memory protected

4-3-22 TIMER/COUNTER SV CHANGE 3 – – W%

From the specified program address onwards in cyclic task 0, TIMER/COUNTER SV CHANGE 3 finds the specified timer/counter instruction and changes the 4-digit constant SV (BCD) that is set, or the word address where the SV is stored, to a newly designated constant SV or storage word address.

Command Format



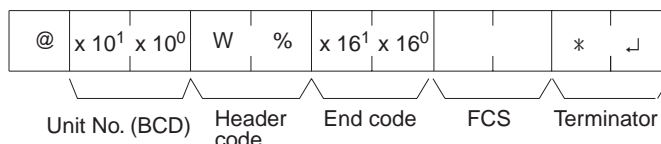
Instruction name	Timer/counter type				Timer/counter number
	Character 1	Character 2	Character 3	Character 4	
HIGH-SPEED TIMER WAIT	T	M	H	W	0000 to 2047
TIMER WAIT	T	I	M	W	
COUNTER WAIT	C	N	T	W	
HIGH-SPEED TIMER	T	I	M	H	
TOTALIZING TIMER	T	T	I	M	
REVERSIBLE COUNTER	C	N	T	R	
TIMER	T	I	M	(SP)	
COUNTER	C	N	T	(SP)	

Note “SP” represents a space (20 Hex).

Classification	Constant/area classification				SV or word address (BCD)
	Character 1	Character 2	Character 3	Character 4	
Constant	C	O	N	(SP)	0000 to 9999
CIO	C	I	O	(SP)	0000 to 6143
AR	A	R	(SP)	(SP)	0000 to 0959
HR	H	R	(SP)	(SP)	0000 to 0511
WR	W	R	(SP)	(SP)	0000 to 0511
Timer	T	I	M	(SP)	0000 to 2047
Counter	C	N	T	(SP)	0000 to 2047
DM	D	M	(SP)	(SP)	0000 to 9999
DM (indirect)	D	M	*	(SP)	0000 to 9999
EM current bank	E	M	(SP)	(SP)	0000 to 9999
EM (indirect) current bank	E	M	*	(SP)	0000 to 9999
EM banks 0 to C	E	M	0 to C	(SP)	0000 to 9999
EM (indirect) 0 to C	E	M	0 to C	*	0000 to 9999
Data register	D	R	(SP)	(SP)	0000 to 0015
Index register	,	I	R	(SP)	0000 to 0015

Note “SP” represents a space (20 Hex).

Response Format



Parameters

Program Address (Command)

Designate the program address in six digits decimal (BCD) for beginning the search for the specified timer/counter instruction.

Timer/Counter Type (Command)

Designate the timer/counter instruction type, in ASCII, for changing the constant SV or the word address in which it is stored.

Timer/Counter Number (Command)

Designate in four digits BCD the timer/counter instruction number for reading the constant SV. (Index register designation is not possible.)

Constant/Area Classification (Command)

Designate the ASCII characters to express the constant or area classification.

New SV/Word Address (Command)

Designate the newly set constant SV or the word address in which it is stored.

Limitations

Timers T2048 to T4095 and counters C2048 to C4095 cannot be changed.

If the SV is a DM or EM indirect address, only indirect BCD designations will be read and an end code of 16 (command not supported) will be returned if the indirect designation is not BCD.

The SV can be changed only in cyclic task 0.

Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	No	OK	No	No	OK	OK	No	No

End Codes

An end code of 14 (format error) will be returned if the length of the command is incorrect.

An end code of 15 (entry number data error) will be returned if the program address is not BCD, or if the timer/counter type or number is out of range (including hexadecimal data).

An end code of 15 (entry number data error) will be returned if a constant or area classification is out of range (including hexadecimal data).

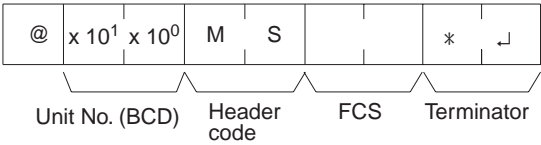
An end code of 16 (command not supported) will be returned if the specified instruction does not exist in the UM Area.

End code (Hex)	Contents
00	Normal completion
01	Not executable in RUN mode
04	Address over
13	FCS error
14	Format error
15	Entry number data error
16	Command not supported
18	Frame length error
19	Not executable
21	Not executable due to CPU Unit CPU error.
23	User memory protected

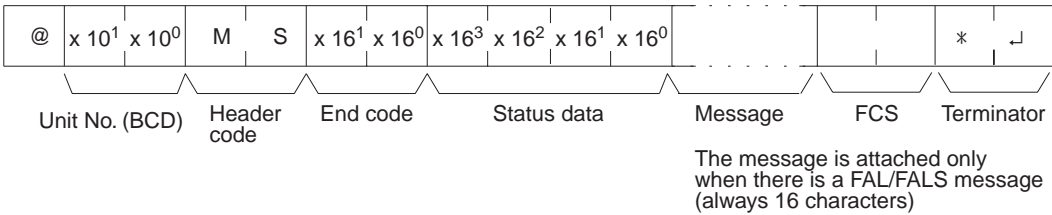
4-3-23 STATUS READ – – MS

Reads the operating conditions (status) of the CPU Unit.

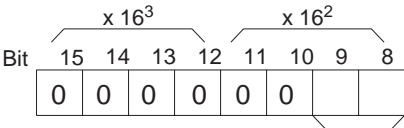
Command Format



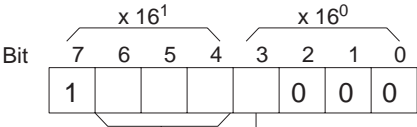
Response Format



“Status data” consists of four digits (two bytes) hexadecimal. The leftmost byte indicates the CPU Unit operation mode, and the rightmost byte indicates the size of the program area.



Bit		Operation mode
9	8	
0	0	PROGRAM mode
1	0	RUN mode
1	1	MONITOR mode



Bit			Program area
6	5	4	
0	0	1	10K steps
0	1	0	20K steps
0	1	1	30K steps
1	0	0	60K steps
1	0	1	120K steps
1	1	0	250K steps

1: UM not write-protected
0: UM write-protected

Parameters

Message (Response)

The message for any FAL/FALS occurring during command execution will be returned.

Limitations

RUN mode and MONITOR mode designations differ from those in STATUS WRITE.

Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	No	OK	No	OK	OK	OK	OK	OK

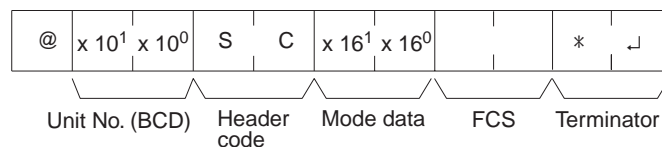
End Codes

An end code of 14 (format error) will be returned if the length of the command is incorrect.

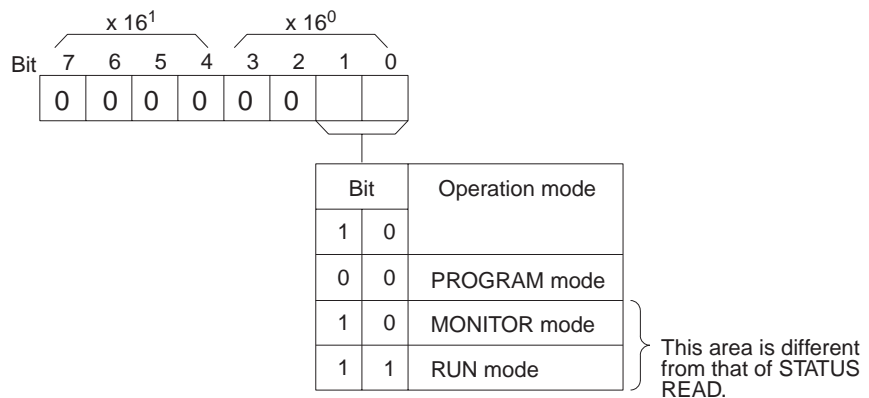
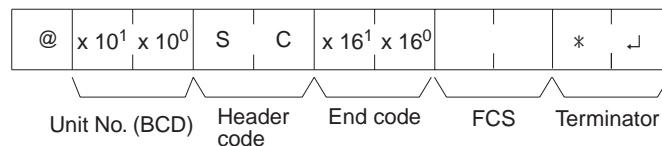
End code (Hex)	Contents
00	Normal completion
13	FCS error
14	Format error
18	Frame length error
21	Not executable due to CPU Unit CPU error.

4-3-24 STATUS CHANGE – – SC

Changes the CPU Unit operating mode.

Command Format

“Mode data” consists of two digits (one byte) hexadecimal. With the leftmost two bits, specify the CPU Unit operating mode. Set all of the remaining bits to “0.”

**Response Format****Limitations**

RUN mode and MONITOR mode designations differ from those in STATUS READ.

Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	No	OK	No	OK	OK	OK	OK	OK

End Codes

An end code of 14 (format error) will be returned if the length of the command is incorrect.

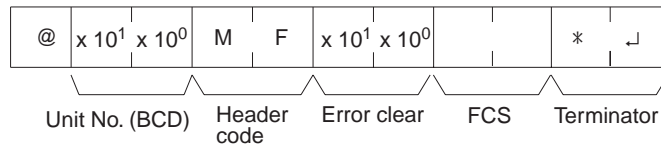
An end code of 15 (entry number data error) will be returned if the mode data is out of range.

End code (Hex)	Contents
00	Normal completion
13	FCS error
14	Format error
15	Entry number data error
18	Frame length error
19	Not executable
21	Not executable due to CPU Unit CPU error.

4-3-25 ERROR READ -- MF

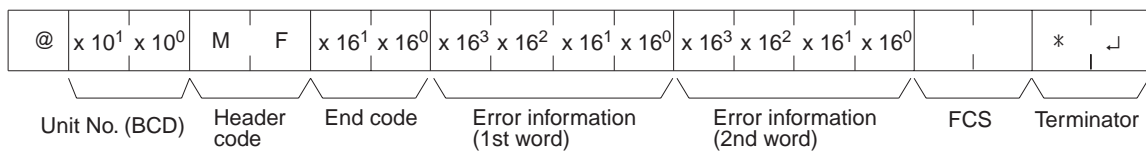
Reads CPU Unit error information.

Command Format

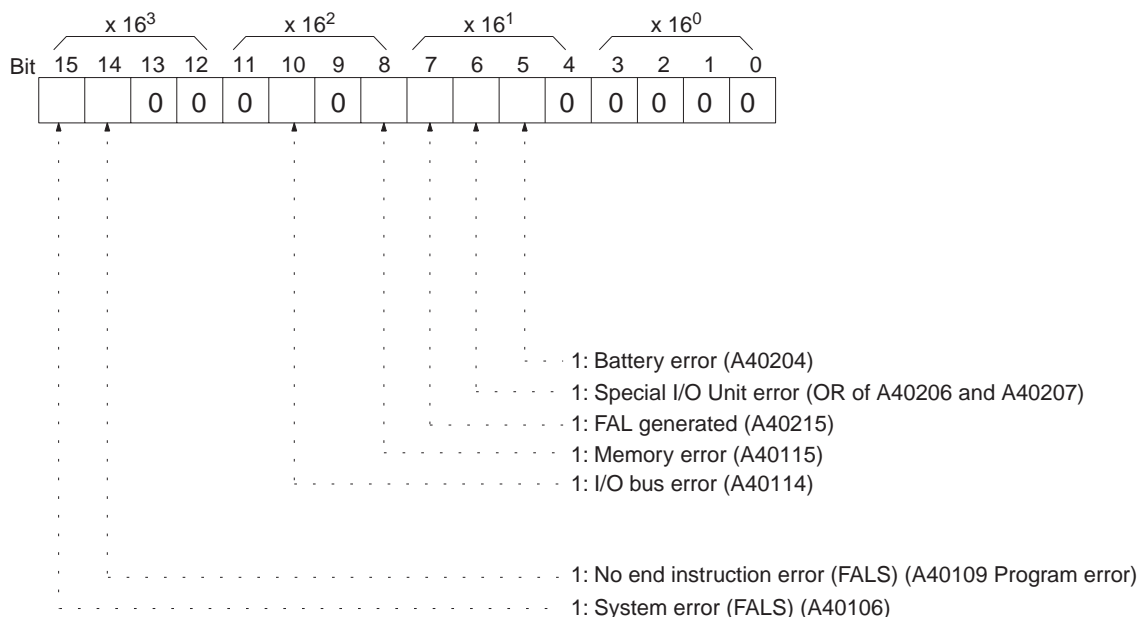


For the "error clear" parameter, specify 01 to clear errors and 00 to not clear errors (BCD).

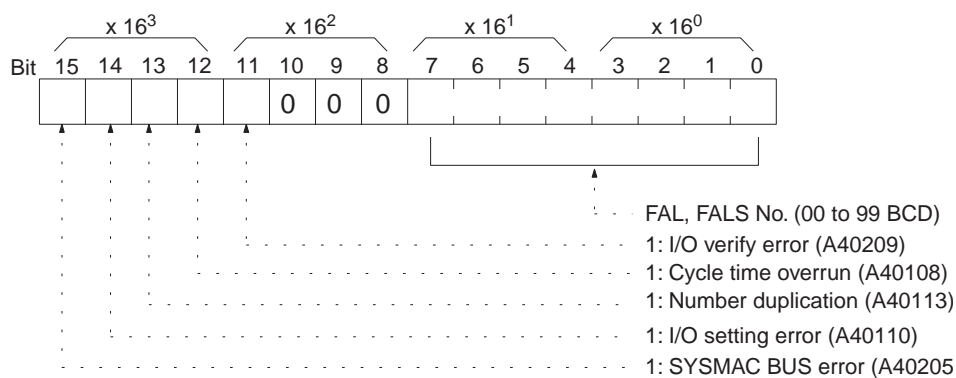
Response Format



1st word



2nd word

**Limitations**

Only FAL and FALS numbers 0 to 99 can be read. For numbers 100 to 511, FAL/FALS number 00 will be set.

Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	No	OK	No	OK	OK	OK	OK	OK

End Codes

An end code of 14 (format error) will be returned if the length of the command is incorrect.

An end code of 15 (entry number data error) will be returned if the error clear parameter is not set to 00 or 01.

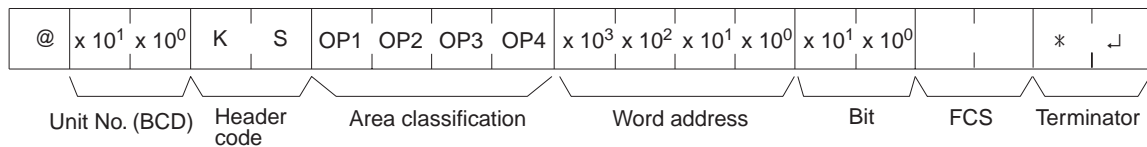
End code (Hex)	Contents
00	Normal completion
01	Not executable in RUN mode
02	Not executable in MONITOR mode
13	FCS error
14	Format error
15	Entry number data error
18	Frame length error

End code (Hex)	Contents
19	Not executable
21	Not executable due to CPU Unit CPU error.

4-3-26 FORCED SET – – KS

Force sets the operating status of operands. (Only one bit at a time can be force set.)

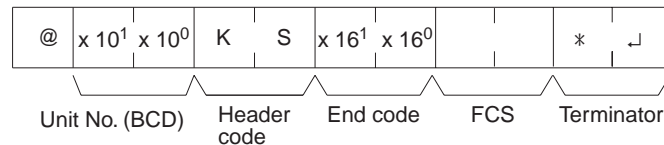
Command Format



Classification	Area classification				Word address	Bit
	Character 1	Character 2	Character 3	Character 4		
CIO	C	I	O	(SP)	0000 to 6143	00 to 15
LR	L	R	(SP)	(SP)	0000 to 0199	00 to 15
WR	W	R	(SP)	(SP)	0000 to 0511	00 to 15
HR	H	R	(SP)	(SP)	0000 to 0511	00 to 15
Timer	T	I	M	(SP)	0000 to 2047	Always 00
Counter	C	N	T	(SP)	0000 to 2047	Always 00

Note “SP” represents a space (20 Hex).

Response Format



Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	No	OK	No	No	OK	OK	OK	OK

End Codes

An end code of 14 (format error) will be returned if the length of the command is incorrect, or if the bit is designated as other than 00 by the TIM/CNT designation.

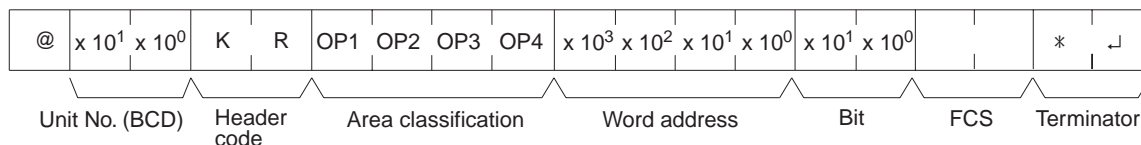
An end code of 15 (entry number data error) will be returned if the area classification, word address, or bit parameter setting is out of range (including hexadecimal data).

End code (Hex)	Contents
00	Normal completion
01	Not executable in RUN mode
13	FCS error
14	Format error
15	Entry number data error
18	Frame length error
21	Not executable due to CPU Unit CPU error.

4-3-27 FORCED RESET – – KR

Force resets the operating status of operands. (Only one bit at a time can be force set.)

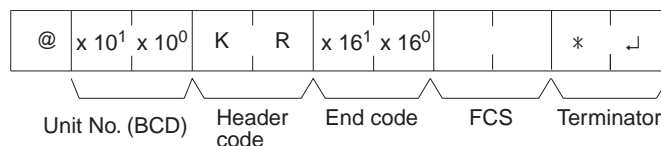
Command Format



Classification	Area classification				Word address	Bit
	Character 1	Character 2	Character 3	Character 4		
CIO	C	I	O	(SP)	0000 to 6143	00 to 15
LR	L	R	(SP)	(SP)	0000 to 0199	00 to 15
WR	W	R	(SP)	(SP)	0000 to 0511	00 to 15
HR	H	R	(SP)	(SP)	0000 to 0511	00 to 15
Timer	T	I	M	(SP)	0000 to 2047	Always 00
Counter	C	N	T	(SP)	0000 to 2047	Always 00

Note “SP” represents a space (20 Hex).

Response Format



Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	No	OK	No	No	OK	OK	OK	OK

End Codes

An end code of 14 (format error) will be returned if the length of the command is incorrect, or if the bit is designated as other than 00 by the TIM/CNT designation.

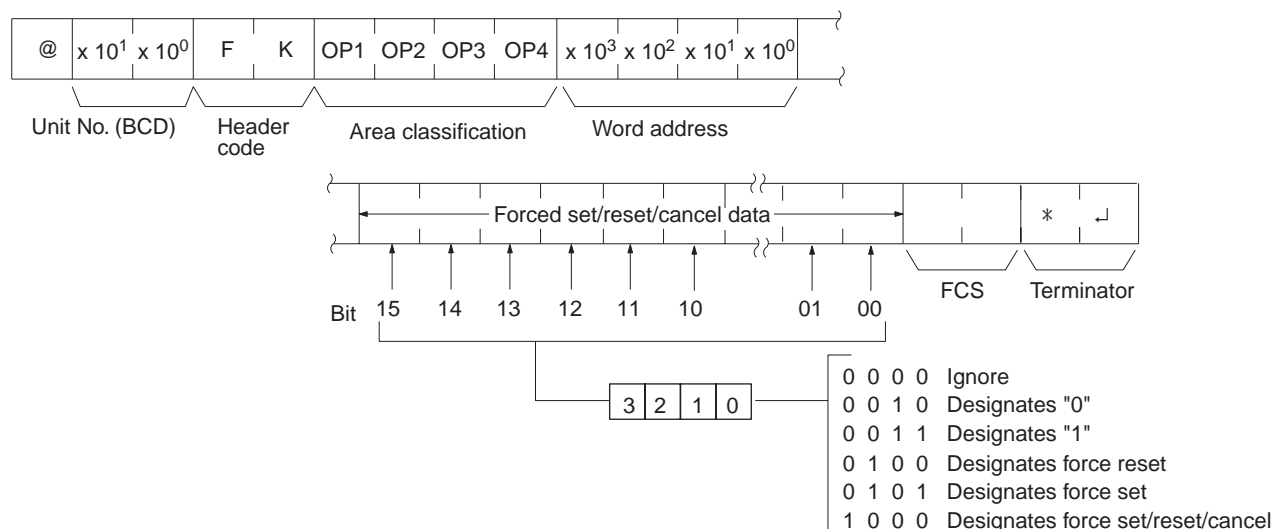
An end code of 15 (entry number data error) will be returned if the area classification, word address, or bit parameter setting is out of range (including hexadecimal data).

End code (Hex)	Contents
00	Normal completion
01	Not executable in RUN mode
13	FCS error
14	Format error
15	Entry number data error
18	Frame length error
21	Not executable due to CPU Unit CPU error.

4-3-28 MULTIPLE FORCED SET/RESET – – FK

Force sets, resets, or cancels the operating status of operands. (Multiple bits can be simultaneously force set, reset, or canceled.)

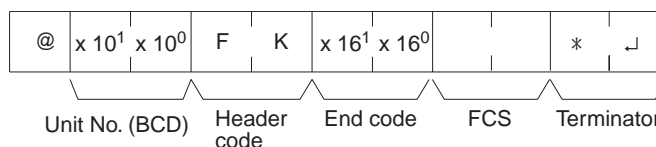
Command Format



Classification	Area classification				Word address
	Character 1	Character 2	Character 3	Character 4	
CIO	C	I	O	(SP)	0000 to 6143
LR	L	R	(SP)	(SP)	0000 to 0199
WR	W	R	(SP)	(SP)	0000 to 0511
HR	H	R	(SP)	(SP)	0000 to 0511
Timer	T	I	M	(SP)	0000 to 2047
Counter	C	N	T	(SP)	0000 to 2047

Note "SP" represents a space (20 Hex).

Response Format



Limitations

Only 15 timers/counters can be set/reset.

LR 0000 to LR 0199 correspond to data link bits CIO 1000 to CIO 1199.

Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	No	OK	No	No	OK	OK	OK	OK

End Codes

An end code of 14 (format error) will be returned if the length of the command is incorrect. (The forced set/reset/cancel data is 16 bytes long.)

An end code of 15 (entry number data error) will be returned if the area classification, word address, or bit parameter setting is incorrect. An end code of 15

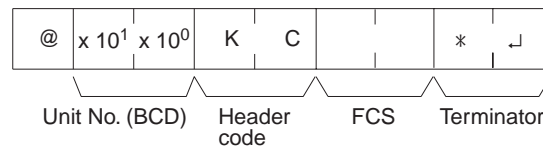
will also be returned if the a data specification of 0 or 1 is used when a timer or counter is designated.

End code (Hex)	Contents
00	Normal completion
01	Not executable in RUN mode
13	FCS error
14	Format error
15	Entry number data error
18	Frame length error
21	Not executable due to CPU Unit CPU error.

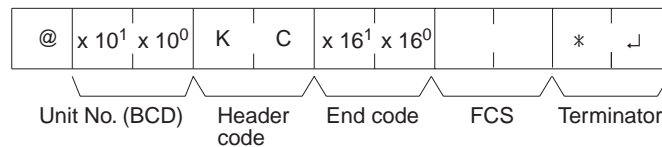
4-3-29 FORCED SET/RESET CANCEL – – KC

Cancels all forced set and forced reset bits (including those set by FORCED SET, FORCED RESET, and MULTIPLE FORCED SET/RESET).

Command Format



Response Format



Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	No	OK	No	No	OK	OK	OK	OK

End Codes

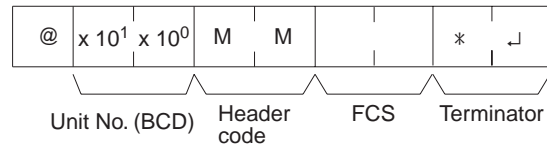
An end code of 14 (format error) will be returned if the length of the command is incorrect. (The forced set/reset/cancel data can be 16 bytes long.)

End code (Hex)	Contents
00	Normal completion
01	Not executable in RUN mode
13	FCS error
14	Format error
15	Entry number data error
18	Frame length error
21	Not executable due to CPU Unit CPU error.

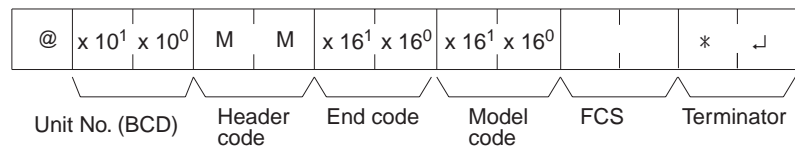
4-3-30 PC MODEL READ – – MM

Reads the model code of the CPU Unit.

Command Format



Response Format



“Model code” indicates the model in two digits hexadecimal.

Model code	Model
30	CS/CJ
01	C250
02	C500
03	C120/C50
09	C250F
0A	C500F
0B	C120F
0E	C2000
10	C1000H
11	C2000H/CQM1/CPM1
12	C20H/C28H/C40H, C200H, C200HS, C200HX/HG/HE (-ZE)
20	CV500
21	CV1000
22	CV2000
40	CVM1-CPU01-E
41	CVM1-CPU11-E
42	CVM1-CPU21-E

Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	No	OK	No	OK	OK	OK	OK	OK

End Codes

An end code of 14 (format error) will be returned if the length of the command is incorrect.

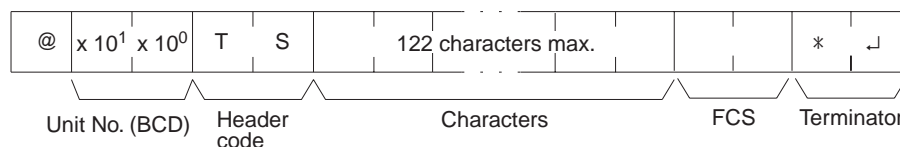
End code (Hex)	Contents
00	Normal completion
13	FCS error
14	Format error
18	Frame length error
21	Not executable due to CPU Unit CPU error.

4-3-31 TEST – TS

Returns, unaltered, one block of data transmitted from the host computer.

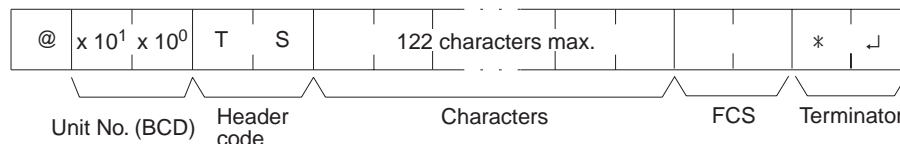
Command Format

Specify any characters other than the carriage return.



Response Format

The same characters specified in the command will be returned unaltered if the test is successful.



Limitations

Between 0 and 122 characters can be sent.

If the command is correct, no end code will be returned.

Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	No	OK	No	OK	OK	OK	OK	OK

End Codes

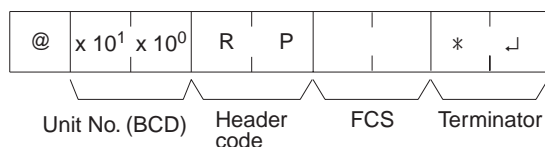
An end code of 14 (format error) will be returned if a terminator is not received in the first frame.

End code (Hex)	Contents
13	FCS error
14	Format error
18	Frame length error
21	Not executable due to CPU Unit CPU error.

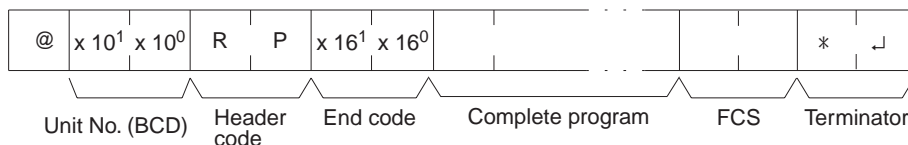
4-3-32 PROGRAM READ – RP

Reads the contents of the CPU Unit user's program area in machine language. The contents are read as a block, from the beginning to the end.

Command Format



Response Format



Limitations

The command cannot be executed if the UM Area is read-protected.

Data is read from the beginning of the UM Area to the maximum limit of the program area.

The response's first frame will contain 30 words of program data. The second and later frames will contain 31 words except for the last frame, which will contain up to 31 words.

The INITIALIZE and ABORT commands can be sent instead of the delimiter for multiple responses for this command. If other commands are sent, they will be treated as delimiters.

Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	No	OK	OK	OK	OK	OK	OK	No

End Codes

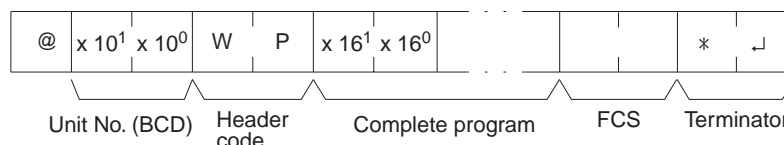
An end code of 14 (format error) will be returned if the length of the command is incorrect.

End code (Hex)	Contents
00	Normal completion
13	FCS error
14	Format error
18	Frame length error
19	Not executable
21	Not executable due to CPU Unit CPU error.
23	User memory protected

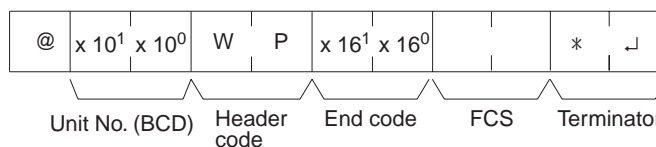
4-3-33 PROGRAM WRITE -- WP

Writes to the CPU Unit user's program area the machine language program transmitted from the host computer. The contents are written as a block, from the beginning.

Command Format



Response Format



Limitations

The command cannot be executed while the UM Area is write-protected.

Data is written from the beginning of the UM Area to the maximum limit of the program area.

An error will not occur if the command attempts to write program data beyond the maximum size of the program area.

The program data can be divided into multiple frames in units of 4 characters.

Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	OK	OK	No	No	No	OK	No	OK

End Codes

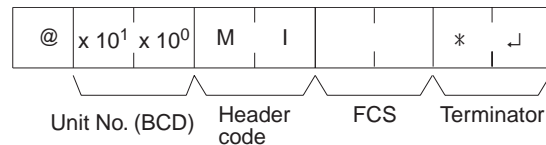
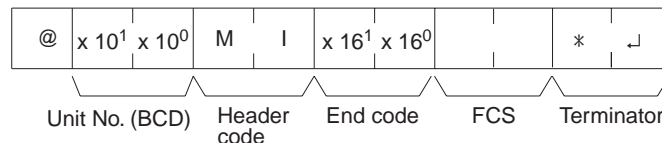
An end code of 14 (format error) will be returned if the length of the command is incorrect (the total size of the program is not a multiple of 8 bytes) or the first frame contains no program data.

An end code of 15 (entry number data error) will be returned if the specified write data is not hexadecimal.

End code (Hex)	Contents
00	Normal completion
01	Not executable in RUN mode
02	Not executable in MONITOR mode
13	FCS error
14	Format error
15	Entry number data error
18	Frame length error
19	Not executable
21	Not executable due to CPU Unit CPU error.
23	User memory protected
A3	Aborted due to FCS error in transmit data
A4	Aborted due to format error in transmit data
A5	Aborted due to entry number data error in transmit data
A8	Aborted due to frame length error in transmit data

4-3-34 I/O TABLE GENERATE – – MI

Corrects the registered I/O table to match the actual I/O table.

Command Format**Response Format****Limitations**

The write-protected end code for this command is different from that of the other commands.

Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	No	OK	No	No	No	OK	No	OK

End Codes

An end code of 14 (format error) will be returned if the length of the command is incorrect.

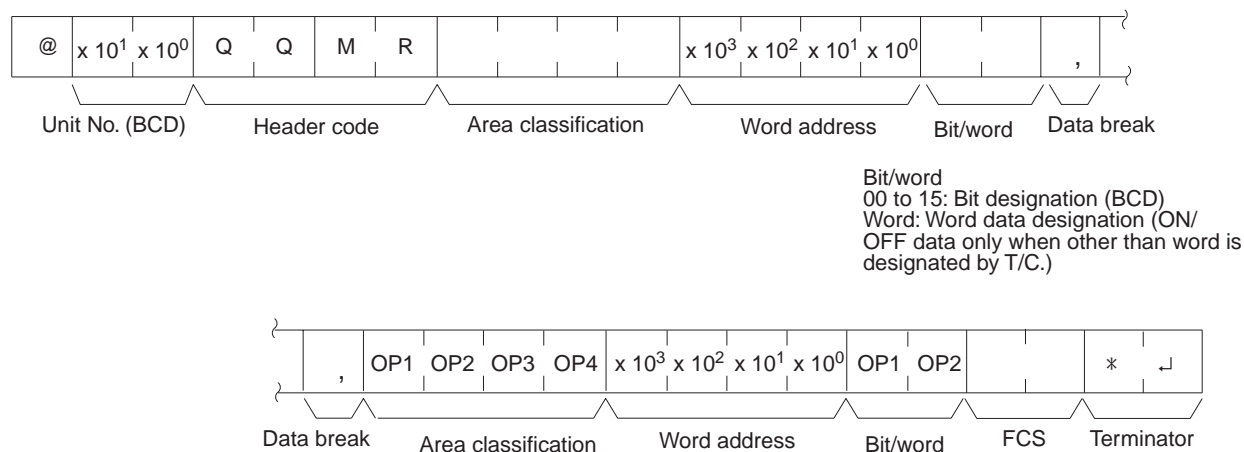
End code (Hex)	Contents
00	Normal completion
01	Not executable in RUN mode
02	Not executable in MONITOR mode
03	UM write-protected
13	FCS error

End code (Hex)	Contents
14	Format error
18	Frame length error
19	Not executable
20	Could not create I/O table
21	Not executable due to CPU Unit CPU error.

4-3-35 REGISTER I/O MEMORY – – QQMR

Pre-registers to the table all of the I/O memory area bits, words, and timers/counters that are to be read. The registered contents are retained until they are overwritten or until the power is cut off, so they can be read by QQIR. (Refer to 4-3-36 READ I/O MEMORY – – QQIR.)

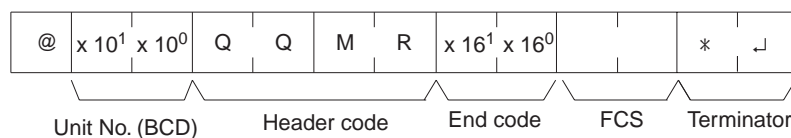
Command Format



Classification	Area classification				Word address (BCD)
	Character 1	Character 2	Character 3	Character 4	
CIO	C	I	O	(SP)	0000 to 6143
LR	L	R	(SP)	(SP)	0000 to 0199
AR	A	R	(SP)	(SP)	0000 to 0959
HR	H	R	(SP)	(SP)	0000 to 0511
WR	W	R	(SP)	(SP)	0000 to 0511
Timer	T	I	M	(SP)	0000 to 2047
Counter	C	N	T	(SP)	0000 to 2047
DM	D	M	(SP)	(SP)	0000 to 9999
EM current bank	E	M	(SP)	(SP)	0000 to 9999
EM banks 0 to C	E	M	0	0	0000 to 9999
	to				
	E	M	0	C	

Note “SP” represents a space (20 Hex).

Response Format



Limitations

LR 0000 to LR 0199 correspond to data link bits CIO 1000 to CIO 1199.

The maximum number of items that can be registered is 128, and timer/counter word designation is counted as two items.

If all of the registered data is correct, it will be registered to the table.

EM can be read through the current bank or bank designation.

Bits and words can be specified in any order and they will be registered in the order that they were specified.

The data can be divided into multiple frames.

Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	OK	OK	No	OK	OK	OK	OK	OK

End Codes

An end code of 14 (format error) will be returned if the “,” data break between two items is omitted. (The command will be considered correct if there is a “,” data break just before the FCS or at the beginning of a multiple-frame command.)

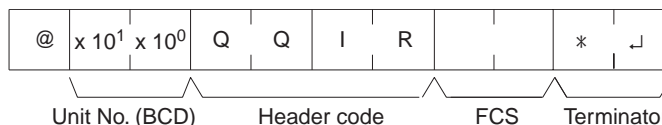
An end code of 15 (entry number data error) will be returned if the area classification, word address, or bit/word setting is out of range (including hexadecimal data).

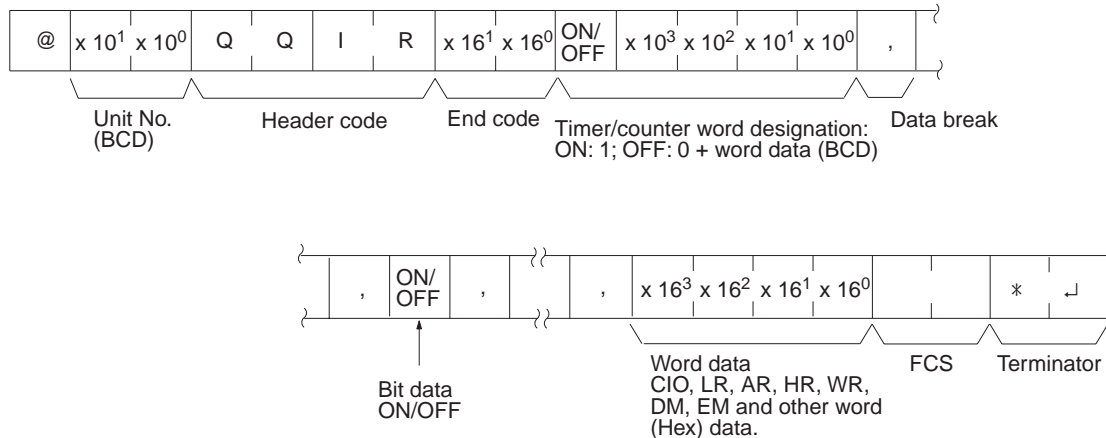
End code (Hex)	Contents
00	Normal completion
13	FCS error
14	Format error
15	Entry number data error
18	Frame length error
19	Not executable
A3	Aborted due to FCS error in transmit data
A4	Aborted due to format error in transmit data
A5	Aborted due to entry number data error in transmit data
A8	Aborted due to frame length error in transmit data

4-3-36 READ I/O MEMORY – – QQIR

Reads the word and bit data, from multiple I/O memory areas, that was registered with QQMR.

Command Format



Response Format**Limitations**

The data is read in the same order in which it was registered with QQMR.

Execution Conditions

Commands		Responses		PC Mode			UM Area	
Single	Multiple	Single	Multiple	RUN	MON	PROG	Write-protected	Read-protected
OK	No	OK	OK	OK	OK	OK	OK	OK

End Codes

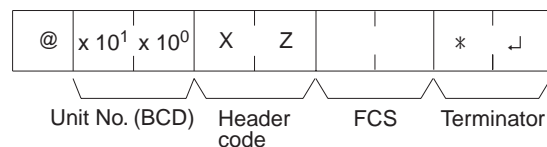
An end code of 14 (format error) will be returned if the length of the command is incorrect.

An end code of 19 (not executable) will be returned if there is no registered data.

End code (Hex)	Contents
00	Normal completion
13	FCS error
14	Format error
18	Frame length error
19	Not executable
21	Not executable due to CPU Unit CPU error.

4-3-37 ABORT – – XZ

Aborts the Host Link command that is currently being processed, allowing the next command to be received.

Command Format**Limitations**

Multiple responses to a command can be cancelled with this command.

An FCS code and terminator are required.

End Codes

The ABORT command does not receive a response.

End Codes

There are no end codes with this command. (There is no response).

If the ABORT command (XZ) is received when data is being sent from a serial port to a host, the send operation will be stopped even in the middle of a frame.

4-3-38 INITIALIZE -- **

Initializes the transmission control procedure of the Units at all the unit numbers.

Command Format



Limitations

Multiple responses to a command can be cancelled with this command.
The INITIALIZE command does not receive a response.

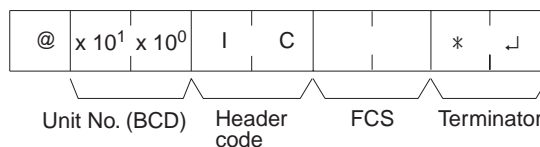
End Codes

There are no end codes with this command. (There is no response).

4-3-39 Undefined Command -- IC

This response is returned if the header code of a command cannot be decoded.

Response Format



Limitations

This response will be returned as an error for illegal header codes.
This response will be returned for error frames as well.
There is no command associated with IC.

End Codes

There are no end codes with this command.

SECTION 5

FINS Commands

This section provides detailed descriptions of the FINS commands.

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5-1 Command Lists

5-1-1 FINS Commands

The following table lists the FINS commands.

Type	Command code		Name	Function
	MR	SR		
I/O memory area access	01	01	MEMORY AREA READ	Reads the contents of consecutive I/O memory area words.
	01	02	MEMORY AREA WRITE	Writes the contents of consecutive I/O memory area words.
	01	03	MEMORY AREA FILL	Writes the same data to the specified range of I/O memory area words.
	01	04	MULTIPLE MEMORY AREA READ	Reads the contents of specified non-consecutive I/O memory area words.
	01	05	MEMORY AREA TRANSFER	Copies the contents of consecutive I/O memory area words to another I/O memory area.
Parameter area access	02	01	PARAMETER AREA READ	Reads the contents of consecutive parameter area words.
	02	02	PARAMETER AREA WRITE	Writes the contents of consecutive parameter area words.
	02	03	PARAMETER AREA FILL (CLEAR)	Writes the same data to the specified range of parameter area words.
Program area access	03	06	PROGRAM AREA READ	Reads the UM (User Memory) area.
	03	07	PROGRAM AREA WRITE	Writes to the UM (User Memory) area.
	03	08	PROGRAM AREA CLEAR	Clears the UM (User Memory) area.
Operating mode changes	04	01	RUN	Changes the CPU Unit's operating mode to RUN or MONITOR.
	04	02	STOP	Changes the CPU Unit's operating mode to PROGRAM.
Machine configuration reading	05	01	CPU UNIT DATA READ	Reads CPU Unit data.
	05	02	CONNECTION DATA READ	Reads the model numbers of the device corresponding to addresses.
Status reading	06	01	CPU UNIT STATUS READ	Reads the status of the CPU Unit.
	06	20	CYCLE TIME READ	Reads the maximum, minimum, and average cycle time.
Time data access	07	01	CLOCK READ	Reads the present year, month, date, minute, second, and day of the week.
	07	02	CLOCK WRITE	Changes the present year, month, date, minute, second, or day of the week.
Message display	09	20	MESSAGE READ/CLEAR	Reads and clears messages, and reads FAL/FALS messages.
Access rights	0C	01	ACCESS RIGHT ACQUIRE	Acquires the access right as long as no other device holds it.
	0C	02	ACCESS RIGHT FORCED ACQUIRE	Acquires the access right even if another device already holds it.
	0C	03	ACCESS RIGHT RELEASE	Releases the access right that has been acquired.
Error log	21	01	ERROR CLEAR	Clears errors or error messages.
	21	02	ERROR LOG READ	Reads the error log.
	21	03	ERROR LOG POINTER CLEAR	Clears the error log pointer.

Type	Command code		Name	Function
	MR	SR		
File memory	22	01	FILE NAME READ	Reads file memory data.
	22	02	SINGLE FILE READ	Reads a specified length of file data from a specified position within a single file.
	22	03	SINGLE FILE WRITE	Writes a specified length of file data from a specified position within a single file.
	22	04	FILE MEMORY FORMAT	Formats (initializes) the file memory.
	22	05	FILE DELETE	Deletes specified files stored in the file memory.
	22	07	FILE COPY	Copies files from one file memory to another file memory in the same system.
	22	08	FILE NAME CHANGE	Changes a file name.
	22	0A	MEMORY AREA-FILE TRANSFER	Transfers or compares data between the I/O memory area and the file memory.
	22	0B	PARAMETER AREA-FILE TRANSFER	Transfers or compares data between the parameter area and the file memory.
	22	0C	PROGRAM AREA-FILE TRANSFER	Transfers or compares data between the UM (User Memory) area and the file memory.
	22	15	CREATE/DELETE DIRECTORY	Creates or deletes a directory.
Debugging	23	01	FORCED SET/RESET	Force-sets or force-resets bits, or releases force-set status.
	23	02	FORCED SET/RESET CANCEL	Cancels all bits that have been force-set or force-reset.

5-1-2 FINS Command Restrictions

Type	Command code		Name	PC status					
	MR	SR		RUN mode	MONI-TOR mode	PRO-GRAM mode	Access right	UM read protection	DIP switch UM protection
I/O memory area access	01	01	MEMORY AREA READ	OK	OK	OK	OK	OK	OK
		02	MEMORY AREA WRITE	OK	OK	OK	OK	OK	OK
		03	MEMORY AREA FILL	OK	OK	OK	OK	OK	OK
		04	MULTIPLE MEMORY AREA READ	OK	OK	OK	OK	OK	OK
		05	MEMORY AREA TRANSFER	OK	OK	OK	OK	OK	OK
Parameter area access	02	01	PARAMETER AREA READ	OK	OK	OK	OK	OK	OK
		02	PARAMETER AREA WRITE	OK	OK	OK	Disabled	OK	Disabled
		03	PARAMETER AREA CLEAR	OK	OK	OK	Disabled	OK	Disabled
Program area access	03	06	PROGRAM AREA READ	OK	OK	OK	OK	Disabled	OK
		07	PROGRAM AREA WRITE	Disabled	Disabled	OK	Disabled	OK	Disabled
		08	PROGRAM AREA CLEAR	Disabled	Disabled	OK	Disabled	OK	Disabled

Type	Command code		Name	PC status					
	MR	SR		RUN mode	MONITOR mode	PROGRAM mode	Access right	UM read protection	DIP switch UM protection
Operating mode changes	04	01	RUN	OK	OK	OK	Disabled	OK	OK
		02	STOP	OK	OK	OK	Disabled	OK	OK
Machine configuration reading	05	01	CPU UNIT DATA READ	OK	OK	OK	OK	OK	OK
		02	CONNECTION DATA READ	OK	OK	OK	OK	OK	OK
Status reading	06	01	CPU UNIT STATUS READ	OK	OK	OK	OK	OK	OK
		20	CYCLE TIME READ	OK	OK	Disabled	OK	OK	OK
Time data access	07	01	CLOCK READ	OK	OK	OK	OK	OK	OK
		02	CLOCK WRITE	OK	OK	OK	Disabled	OK	OK
Message display	09	20	MESSAGE READ/CLEAR	OK	OK	OK	Disabled (MESSAGE CLEAR only)	OK	OK
Access rights	0C	01	ACCESS RIGHT ACQUIRE	OK	OK	OK	Disabled	OK	OK
		02	ACCESS RIGHT FORCED ACQUIRE	OK	OK	OK	OK	OK	OK
		03	ACCESS RIGHT RELEASE	OK	OK	OK	OK	OK	OK
Error log	21	01	ERROR CLEAR	OK	OK	OK	Disabled	OK	OK
		02	ERROR LOG READ	OK	OK	OK	OK	OK	OK
		03	ERROR LOG CLEAR	OK	OK	OK	OK	OK	OK
File memory	22	01	FILE NAME READ	OK	OK	OK	OK	OK	OK
		02	SINGLE FILE READ	OK	OK	OK	OK	OK	OK
		03	SINGLE FILE WRITE	OK	OK	OK	Disabled	OK	OK
		04	FILE MEMORY FORMAT	OK	OK	OK	Disabled	OK	OK
		05	FILE DELETE	OK	OK	OK	Disabled	OK	OK
		07	FILE COPY	OK	OK	OK	Disabled	OK	OK
		08	FILE NAME CHANGE	OK	OK	OK	Disabled	OK	OK
		0A	MEMORY AREA-FILE TRANSFER	OK	OK	OK	Disabled	OK	OK
		0B	PARAMETER AREA-FILE TRANSFER	OK (note 1)	OK (note 1)	OK	Disabled	OK	OK (note 1)
		0C	PROGRAM AREA-FILE TRANSFER	OK (note 2)	OK (note 2)	OK	Disabled	OK	Disabled (note 3)
		15	CREATE/DELETE DIRECTORY	OK	OK	OK	Disabled	OK	OK
Debugging	23	01	FORCED SET/RESET	Disabled	OK	OK	OK	OK	OK
		02	FORCED SET/RESET CANCEL	Disabled	OK	OK	OK	OK	OK

- Note**
1. File-to-memory area transfers are not possible
 2. File-to-program area transfers are not possible
 3. Program area-to-file transfers are possible

5-1-3 End Codes

The following table lists the main codes and the sub-codes, which combine to form the end code (response code) returned for a FINS command. The probable cause and corrections for each error code are also given.

Depending on the command, the destination code will sometimes make a request of another node on a network. The other node is referred to as the third node.

Main code	Subcode	Check point	Probable cause	Correction
00: Normal completion	00: Normal completion	---	---	---
	01: Service canceled	---	Service was cancelled.	Check the capacity of the destination area in the third node.
		Data link status	Service was cancelled.	Check the status of the data link.
01: Local node error	01: Local node not in network	Network status of local node	Local node is not participating in the network.	Connect the node to the network.
	02: Token timeout	Maximum node address	Token doesn't arrive.	Set the local node to within the maximum node address.
	03: Retries failed	---	Send was not possible during the specified number of retries.	Execute a communications test between the nodes and re-examine the system environment if it fails.
	04: Too many send frames	Number of enabled send frames	Cannot send because maximum number of event frames exceeded.	Check event execution on the network and reduce the number of events per cycle. Increase the maximum number of event frames.
	05: Node address range error	Node address	Node address setting error occurred.	Check the settings of the rotary switches to be sure that the address is within range and that each address is set only once in the same network.
	06: Node address duplication	Node addresses	The same node address has been set twice in the same network.	Change the address of one of the nodes with the same address.
02: Destination node error	01: Destination node not in network	INS indicator on Unit	The destination node is not in the network.	Add the destination node to the network.
	02: Unit missing	Instruction control data	There is no Unit with the specified unit address.	Check the destination unit address.
	03: Third node missing	Instruction control data	The third node does not exist.	Check the unit address of the third node. Check the node address of the third node in the send data for CMND(490).
		Command data	Broadcasting was specified.	Specify only one node for the third node.
	04: Destination node busy	---	The destination node is busy.	Increase the number of retries or review the system so that the destination node does not receive so many messages.
	05: Response timeout	---	The message was destroyed by noise.	Increase the number of retries or test communications between nodes to see if there is too much noise.
		Instruction control data	The response monitor time is too short.	Increase the length of the response monitor time.
		Error history	The send/receive frame was discarded.	Take appropriate measures based on the error history.

Main code	Subcode	Check point	Probable cause	Correction
03: Controller error	01: Communications controller error	Unit/Board indicators	An error occurred in the communications controller.	Take appropriate measures based on the operation manuals for the related Units/Boards.
	02: CPU Unit error	CPU Unit indicators at destination node	A CPU error occurred in the destination CPU Unit.	Clear the error from the CPU Unit based on its operation manuals.
	03: Controller error	Board indicators	A response was not returned because an error occurred in the Board.	Check network communications status and restart the Board. If the problem persists, replace the Board.
	04: Unit number error	Unit number	The unit number was set incorrectly.	Set the rotary switches correctly, being sure the unit numbers are within range and that each number is used only once.
04: Service unsupported	01: Undefined command	Command code	The Unit/Board does not support the specified command code.	Check the command code.
	02: Not supported by model/version	Unit model and version	The command cannot be executed because the model or version is incorrect.	Check the model number and version.
05: Routing table error	01: Destination address setting error	Routing table	The destination network or node address is not set in the routing tables.	Register the destination network and node in the routing tables.
	02: No routing tables	Routing table	Relaying is not possible because there are no routing tables.	Set routing tables in the source node, designation node, and relay nodes.
	03: Routing table error	Routing table	There is an error in the routing tables.	Set the routing tables correctly.
	04: Too many relays	Network configuration	An attempt was made to send to a network that was over 3 networks away	Reconstruct the networks or change the routing tables so that commands are sent within a range of 3 networks or less.
10: Command format error	01: Command too long	Command data	The command is longer than the maximum permissible length.	Check the command format and correct the command data.
	02: Command too short	Command data	The command is shorter than the minimum permissible length.	Check the command format and correct the command data.
	03: Elements/data don't match	Command data	The designated number of elements differs from the number of write data items.	Check the number of elements and set data for each element.
	04: Command format error	Command data	An incorrect format was used.	Check the command format and correct the command data.
	05: Header error	Routing table	Either the relay table in the local node or the local network table in the relay node is incorrect.	Set the routing tables correctly.

Main code	Subcode	Check point	Probable cause	Correction
11: Parameter error	01: Area classification missing	Memory area code in command data	The specified word does not exist in the memory area or there is no EM Area.	Check the memory areas and parameter codes in the command and correct the command data.
	02: Access size error	Access size specification in command data	The access size specification is incorrect or an odd word address is specified.	Check the memory areas and access size and correct the access size.
	03: Address range error	Starting address in command data	The start address in command process is beyond the accessible area.	Check the area being processed and set the correct range.
	04: Address range exceeded	Starting address and number of elements in command data	The end address in command process is beyond the accessible area.	Check the area being processed and set the correct range.
		Data link tables	The total number of words is beyond the limit.	Correct the data link tables.
	06: Program missing	Program number in command data	FFFF Hex was not specified.	Specify FFFF Hex.
	09: Relational error	Command data	A large–small relationship in the elements in the command data is incorrect.	Check the command data and correct the relationship between the elements.
		Data link table	A node not set in the common link parameters is set as a refresh parameter.	Correct the data link tables.
	0A: Duplicate data access	I/O access in CPU Unit	Differential monitoring was specified during data tracing or data tracing was specified during differential monitoring.	Abort the current process or wait until it ends before executing the command.
		Data link tables	The same node address is specified more than once.	Correct the data link tables.
	0B: Response too long	Number of elements in command data	The response format is longer than the maximum permissible length.	Check the command format and correct the number of elements.
	0C: Parameter error	Parameters in command data	There is an error in one of the parameter settings.	Check the command data and correct the parameters.
		Data link table file	There is an error in the file.	Check the contents of the file.
20: Read not possible	02: Protected	---	The program area is protected.	Release protection from a Programming Device and then execute the command.
	03: Table missing	Table	A table has not been registered.	Register a table.
			There is an error in the table.	Correct the table.
	04: Data missing	---	The search data does not exist.	---
	05: Program missing	Program number in command data	A non-existing program number has been specified.	Check the program numbers and specify a valid one.
	06: File missing	File name and file device	The file does not exist at the specified file device.	Check the path and file name, and correct them.
	07: Data mismatch	Contents of memory being compared	A data being compared is not the same.	Check memory contents and use the correct data.
		---	A file read operation failed.	Check the contents of the file.

Main code	Subcode	Check point	Probable cause	Correction
21: Write not possible	01: Read-only	---	The specified area is read-only.	If the area is protected using a switch setting, release protection and then execute the command. If the area is permanently read-only, the command cannot be executed.
	02: Protected	---	The program area is protected.	Release protection from a Programming Device and then execute the command.
	Cannot write data link table	PC Setup	Writing is not possible because automatic data link table generation has been specified.	Change the PC Setup so that the data link tables can be manually written.
	03: Cannot register	Number of files in file device	The file cannot be created because the limit has been exceeded.	Delete any unnecessary files or create more file memory.
		Number of files open	The maximum number of files has already been opened for the system limit.	Close one or more files and then execute the command.
	05: Program missing	Program number in command data	A non-existing program number has been specified.	Check the program numbers and specify a valid one.
	06: File missing	File name	The file does not exist at the specified file device.	Correct the file name and then execute the command.
22: Not executable in current mode	01: Not possible during execution	File name	A file with the same name already exists in the specified file device.	Change the name of the file being written and then execute the command.
	02: Not possible while running	Contents of memory being changed	The change cannot be made because doing so would create a problem.	---
	01: Not possible during execution	---	The mode is incorrect.	Check the mode.
		Data link status	The data link is operating.	Check the status of the data links.
	02: Not possible while running	---	The mode is incorrect.	Check the mode.
		Data link status	The data links are active.	Check the status of the data links.
	03: Wrong PC mode	---	The PC is in PROGRAM mode.	Check the modes of the PC and computer.
23: No such device	04: Wrong PC mode	---	The PC is in DEBUG mode.	Check the modes of the PC and computer.
	05: Wrong PC mode	---	The PC is in MONITOR mode.	Check the modes of the PC and computer.
	06: Wrong PC mode	---	The PC is in RUN mode.	Check the modes of the PC and computer.
24: Cannot start/stop	07: Specified node not polling node	---	The specified node is not the polling node.	Check node functioning as the polling node for the network.
	08: Step cannot be executed	---	The mode is incorrect.	Check step status.
23: No such device	01: File device missing	Unit configuration	The specified memory does not exist as a file device.	Mount memory or format EM as file memory.
	02: Memory missing	---	There is no file memory.	Check the file memory to see if it is mounted.
	03: Clock missing	---	There is no clock.	Check the model.
24: Cannot start/stop	01: Table missing	Data link tables	The data link tables have not been registered or they contain an error.	Set the data link tables.

Main code	Subcode	Check point	Probable cause	Correction
25: Unit error	02: Memory error	Contents of memory being processed	The contents of memory contains an error.	Transfer the correct contents to memory.
	03: I/O setting error	I/O Unit configuration	The registered I/O tables do not agree with the actual I/O configuration.	Correct the I/O tables or the I/O configuration.
	04: Too many I/O points	Number of I/O in registered I/O tables	There are too many I/O points and remote I/O points registered.	Change the registered I/O table so that it is within the limit.
	05: CPU bus error	CPU bus line	An error occurred in data transfer between the CPU and a CPU Bus Unit.	Check Units, Boards, and cables to be sure they are connected correctly and then execute the ERROR CLEAR command.
	06: I/O duplication	Rack numbers, Unit numbers, and I/O addresses in PC Setup	The same number/address was set more than once.	Check the PC Setup and correct the numbers/addresses so that each is used only once.
	07: I/O bus error	I/O bus line	An error occurred in data transfer between the CPU and an I/O Unit.	Check Units, Boards, and cables to be sure they are connected correctly and then execute the ERROR CLEAR command.
	09: SYSMAC BUS/2 error	SYSMAC BUS/2 transmission path	An error occurred in data transfer on the SYSMAC BUS/2 line.	Check Units, Boards, and cables to be sure they are connected correctly and then execute the ERROR CLEAR command.
	0A: CPU Bus Unit error	CPU Bus Unit transmission path	An error occurred in data transfer for a CPU Bus Unit.	Check Units, Boards, and cables to be sure they are connected correctly and then execute the ERROR CLEAR command.
	0D: SYSMAC BUS No. duplication	Word settings	The same word is allocated more than once.	Check the I/O tables and correct the allocations.
	0F: Memory error	Status of memory being processed	A memory error has occurred in internal memory, a memory card, or EM file memory.	For internal memory, write the correct data and then execute the command. For a memory card or EM file memory, the file data has been destroyed. Execute the FILE MEMORY FORMAT command. If the problem persists, replace the memory.
	10: SYSMAC BUS terminator missing	---	Terminators have not been set.	Set the terminators correctly.

Main code	Subcode	Check point	Probable cause	Correction
26: Command error	01: No protection	Command protection for program area	The specified area is not protected.	An attempt was made to clear protection on an area that is not protected, i.e., there is no reason to clear protection.
	02: Incorrect password	---	An incorrect password has been specified.	Specify the correct password.
	04: Protected	---	The specified area is protected.	Clear protection from a Programming Device and then execute the command.
		Number of commands being executed	The node receiving the command is already processing 5 commands.	Wait for current processing to end or force the end of a current process and then execute the command.
	05: Service already executing	---	The service is being executed.	Wait for the service to end or force the end of the service and then execute the command.
	06: Service stopped	---	The service is not being executed.	If necessary, start the service.
	07: No execution right	LNK indicator on Unit/Board	The right to execute the service has not been obtained.	The local node is not in the data link. Execute the command from a node that is participating in the data link.
		---	A response was not returned because a buffer error occurred.	Restart the Board. If the problem persists, replace the Board.
	08: Settings not complete	Settings required before execution	The settings required before executing the service have not been made.	Make the required settings.
	09: Necessary items not set	Command data	The required elements have not been set in the command data.	Check the command format and set the required elements in the command data.
	0A: Number already defined	Action numbers and transition numbers of program in program area	The specified action/ transition number has already been registered in a previous program.	Check the action/transition numbers to ones that are not being used and then execute the command.
	0B: Error will not clear	Cause of error being cleared	The cause of the error has not been removed.	Remove the cause of the error and then execute ERROR CLEAR.
30: Access right error	01: No access right	---	The access right is held by another device. (Online editing is being executed from another node or ACCESS RIGHT ACQUIRE or ACCESS RIGHT FORCE ACQUIRE has been executed by another node.)	Wait until the access right is released and then execute the command. ACCESS RIGHT ACQUIRE or ACCESS RIGHT FORCE ACQUIRE can be executed to obtain the access right, but this may adversely affect processing by the node that previously held the access right.
40: Abort	01: Service aborted	---	Service was aborted with ABORT command.	---

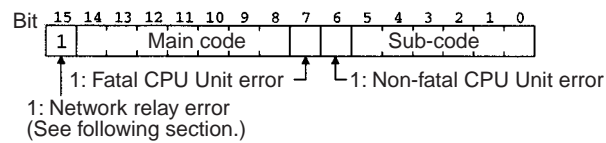
Note In addition to the above end codes, there are also three flags provided in the end code, i.e., bits 6, 7, and 15.

If bit 15 is ON, an error has occurred in a network relay operation.

If bit 6 or 7 is ON, an error has occurred in the destination CPU Unit. If this occurs, refer to the operation manuals for the CPU Unit where the error

occurred and remove the cause of the error.

The contents of the end code are shown in the following diagram.



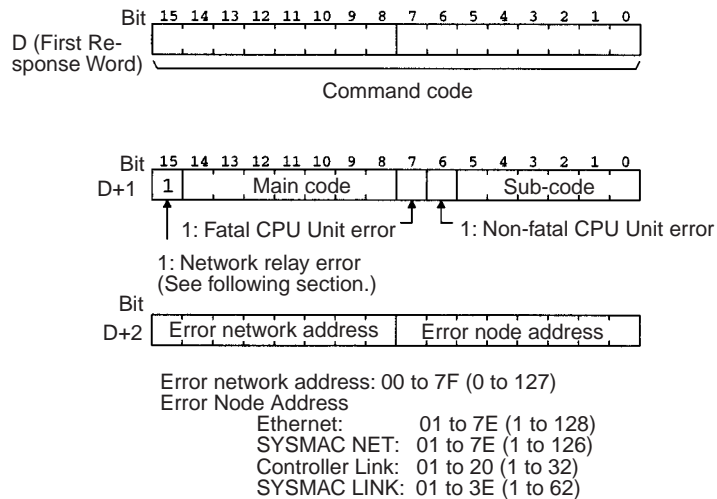
Handling Network Relay Errors

SEND(090) and RECV(098)

Check the path the command took using the routing tables. Check the end code and take appropriate measures for the relay node where the error occurred.

CMND(490)

The location of the relay error can be determined by using the data returned as the response data for the instruction, as shown in the following diagram. Use this information to determine the node where the error occurred and take appropriate measures



5-2 Designating Command Parameters

5-2-1 Designating I/O Memory (Variable) Area Addresses

When reading from and writing to the I/O memory (variable) area, designate I/O memory area addresses as described below.

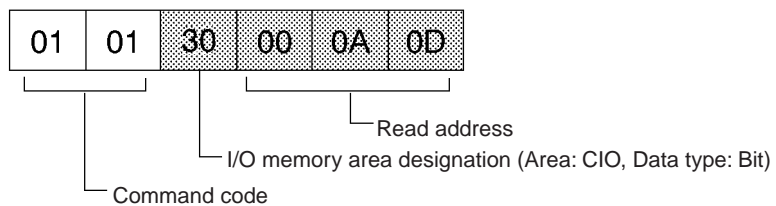
I/O memory designation involves the designation of the memory area code and the address within the memory area code.

- Memory area codes are designated in one byte (two digits hexadecimal), as shown in the table in 5-2-2 *I/O Memory Address Designations*.

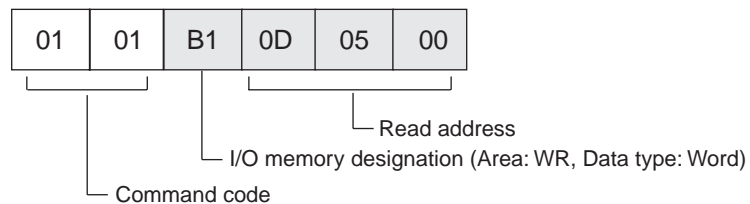
- Addresses within memory area codes consist of a total of three bytes (six digits hexadecimal). Of these, two bytes (four digits hexadecimal) designate the word and one byte (two digits hexadecimal) designates the bit.

I/O memory address designation		Memory area code	Address within I/O memory area designation	
			Word	Bit
4 bytes (8 digits hexadecimal)	⇒	1 byte (2 digits Hex)	2 bytes (4 digits Hex)	1 byte (2 digits Hex)
Memory area code + word + bit, in order		Set by classification (CIO, WR, etc.). Note: Also possible with forced status.	From 0000 Hex (Upper limit depends on memory area code.)	00 to 0F Hex Note: Always 00 Hex for word address and Timer/Counter Completion Flags.
Example Bit 13 of CIO 0010: 30000A0D Hex		Example CIO: 30 Hex	Example 0010: 000A in hexadecimal	Example Bit 13: 0D in hexadecimal

Example: I/O memory reading
Bit 13 of CIO 0010, i.e., CIO 001013, is read.



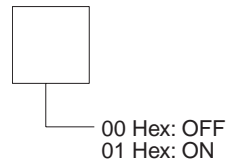
Example: Reading W005



Element Data Configurations

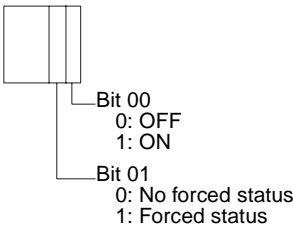
Bit Designations

When bits are designated, each bit is considered a single element. The data for the element is expressed in one byte (ON: 01 Hex; OFF: 00 Hex). When data is written, this byte is transmitted. When data is read, this byte is returned.



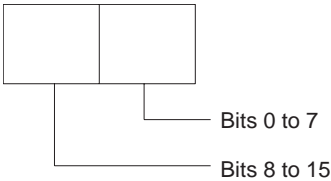
Bit Data with Forced Status

When bits are designated, each bit is considered as one element. The data for each element is expressed in one byte (8 bits). Bit 00 indicates the specified bit data, and bit 01 indicates the forced status. When reading, this one byte is returned.

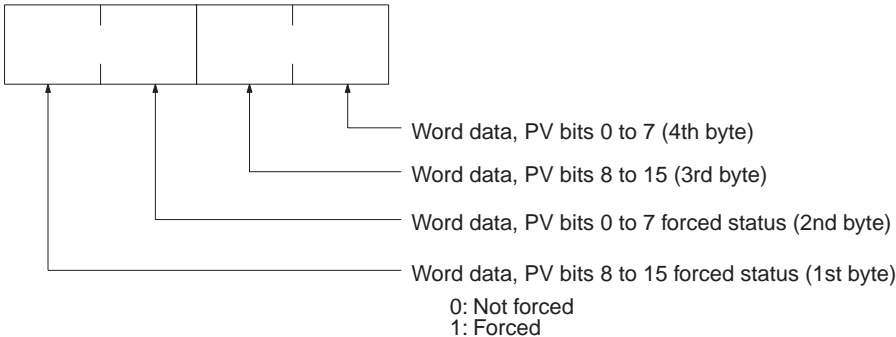


Word Designations

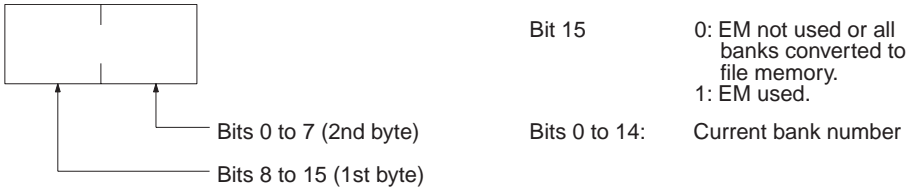
When words are designated, each word is considered a single element. The data for the element is expressed in two bytes. Bits 0 to 15 correspond to bits 0 to 15 of each word. When data is written, these two bytes are transmitted for each word. When data is read, these two bytes are returned.



Word Data With Forced Status Data, Present Value (4 Bytes)



Current EM Bank Number (2 Bytes)



5-2-2 I/O Memory Address Designations

Area		Data type	CS/CJ mode			CV mode			Length per element
			Memory area code (Hex)	Memory area address	Memory address	Memory area code (Hex)	Memory area address	Memory address	
CIO Area	CIO	Bit	30	CIO 000000 to CIO 614315	000000 to 17FF0F	00	CIO 000000 to CIO 255515	000000 to 09FB0F	1
Work Area	WR		31	W00000 to W51115	000000 to 01FF0F	---	---	---	
Holding Bit Area	HR		32	H00000 to H51115	000000 to 01FF0F	---	---	---	
Auxiliary Bit Area	AR		33	A00000 to A44715 (read only)	000000 to 01BF0F	00	A00000 to A44715 (read only)	0B0000 to 0CBF0F	
				A44800 to A95915 (read/write)	01C000 to 03BF0F		A44800 to A95915 (read/write)	0CC000 to 0EBF0F	
CIO Area	CIO	Bit with forced status	70	CIO 000000 to CIO 614315	000000 to 17FF0F	40	CIO 000000 to CIO 255515	000000 to 09FB0F	1
Work Area	WR		71	W00000 to W51115	000000 to 01FF0F	---	---	---	
Holding Bit Area	HR		72	H00000 to H51115	000000 to 01FF0F	---	---	---	
CIO Area	CIO	Word	B0	CIO 0000 to CIO 6143	000000 to 17FF00	80	CIO 0000 to CIO 2555	000000 to 09FB00	2
Work Area	WR		B1	W000 to W511	000000 to 01FF00	---	---	---	
Holding Bit Area	HR		B2	H000 to H511	000000 to 01FF00	---	---	---	
Auxiliary Bit Area	AR		B3	A000 to A447 (read only)	000000 to 01BF00	80	A000 to A447 (read only)	0B0000 to 0CBF00	
				A448 to A959 (read/write)	01C000 to 03BF00		A448 to A959 (read/write)	0CC000 to 0EBF00	
CIO Area	CIO	Word with forced status	F0	CIO 0000 to CIO 6143	000000 to 17FF00	C0	CIO 000000 to CIO 255515	000000 to 09FB00	4
Work Area	WR		F1	W000 to W511	000000 to 01FF00	---	---	---	
Holding Bit Area	HR		F2	H000 to H511	000000 to 01FF00	---	---	---	
Timer Area	TIM	Completion Flag	09	T0000 to T4095	000000 to 0FFF00	01	T0000 to T2047 (T0000 to T1023)	000000 to 07FF00 (000000 to 03FF00)	1
Counter Area	CNT			C0000 to C4095	800000 to 8FFF00		C0000 to C2047 (C0000 to C1023)	080000 to 0FFF00 (080000 to 0BFF00)	

Area		Data type	CS/CJ mode			CV mode			Length per element
			Memory area code (Hex)	Memory area address	Memory address	Memory area code (Hex)	Memory area address	Memory address	
Timer Area	TIM	Completion Flag with forced status	49	T0000 to T4095	000000 to 0FFF00	41	T0000 to T2047 (T0000 to T1023)	000000 to 07FF00 (000000 to 03FF00)	1
Counter Area	CNT			C0000 to C4095	800000 to 8FFF00		C0000 to C2047 (C0000 to C1023)	080000 to 0FFF00 (080000 to 0BFF00)	
Timer Area	TIM	PV	89	T0000 to T4095	000000 to 0FFF00	81	T0000 to T2047 (T0000 to T1023)	000000 to 07FF00 (000000 to 03FF00)	2
Counter Area	CNT			C0000 to C4095	800000 to 8FFF00		C0000 to C2047 (C0000 to C1023)	080000 to 0FFF00 (080000 to 0BFF00)	
DM Area	DM	Bit	02	D000000 to D3276715	000000 to 7FFF0F	---	---	---	1
	DM	Word	82	D00000 to D32767	000000 to 7FFF00	82	D00000 to D32767	000000 to 7FFF00	2
EM Area	EM (Bank 0 to C)	Bit	20 to 2C	E0_0000000 to E0_3276715 to EC_0000000 to EC_3276715	000000 to 7FFF0F	---	---	---	1
	EM (Bank 0 to C)	Word	A0 to AC	E0_00000 to E0_32767 to EC_00000 to EC_32767	000000 to 7FFF00 to 000000 to 7FFF00	90 to 97	E0_00000 to E0_32767 to E7_00000 to E7_32767	000000 to 7FFF00 to 000000 to 7FFF00	2
	EM (Current bank)	Word	98	E00000 to E32767	000000 to 7FFF00	98	E00000 to E32767	000000 to 7FFF00	2
	EM (Current bank No.)	EM (Current bank No.)	BC	---	0F0000	9C	---	000600	2
Task Flag	TK	Bit	06	TK0000 to TK0031	000000 to 001F00	---	---	---	1
	TK	Status	46	TK0000 to TK0031	000000 to 001F00	---	---	---	1
Index Register	IR	PV	DC	IR00 to IR15	010000 to 010F00	---	---	---	4
Data Register	DR	PV	BC	DR00 to DR15	020000 to 020F00	9C	DR0 to DR2	000300 to 000500	2

Area	Data type	CS/CJ mode			CV mode			Length per element
		Memory area code (Hex)	Memory area address	Memory address	Memory area code (Hex)	Memory area address	Memory address	
Clock Pulses	Bit	07	1-min clock pulse	000000	---	---	---	1
			1-s clock pulse	000100				
			0.2-s clock pulse	000200				
			0.1-s clock pulse	000300				
			0.02-s clock pulse	000400				
Condition Flags	Bit		Error Flag (ER)	100000				1
			Carry Flag (CY)	100100				
			Greater Than Flag (>)	100200				
			Equals Flag (=)	100300				
			Less Than Flag (<)	100400				
			Negative Flag (N)	100500				
			Overflow Flag (OF)	100600				
			Underflow Flag (UF)	100700				
			Greater Than or Equals Flag (>=)	100800				
			Not Equal Flag (<=)	100900				
			Less Than or Equals Flag (<=)	100A00				
			Always OFF Flag (ON)	100E00				
			Always ON Flag (OFF)	100F00				
			Access Error Flag	200100		---	---	1

Note The only current EM bank that can be read with FINS commands is the current EM bank that is set at the end of the cycle.

Examples

Example	Designation	Contents		
		Memory area code	Address within memory area code	
			Word	Bit
CIO 0010	B0000A00 Hex	B0 Hex	000A Hex	00 Hex
CIO 001013 (bit 13 of CIO 0010)	30000A0D Hex	30 Hex	000A Hex	0D Hex
W010	B1000A00 Hex	B1 Hex	000A Hex	00 Hex
W01013 (bit 13 of W010)	31000A0D Hex	31 Hex	000A Hex	0D Hex
H010	B2000A00 Hex	B2 Hex	000A Hex	00 Hex
H01013 (bit 13 of H010)	32000A0D Hex	32 Hex	000A Hex	0D Hex
CIO 001013 (bit 13 of CIO 0010), with forced status	70000A0D Hex	70 Hex	000A Hex	0D Hex
CIO 0010, with forced status	F0000A0D Hex	F0 Hex	000A Hex	0D Hex
T0010 Completion Flag	09000A00 Hex	09 Hex	000A Hex	00 Hex
D00010 value	82000A00 Hex	82 Hex	000A Hex	00 Hex
E_3_00010 value	A3000A00 Hex	A3 Hex	000A Hex	00 Hex
Current EM bank 00010 value	98000A00 Hex	98 Hex	000A Hex	00 Hex

Volume Labels and File Names

Volume labels are names registered in file memory. File names consist of 12 bytes, as shown below. Be sure to follow this configuration when designating a file name by means of command parameters.

8 bytes	1 byte	3 bytes
Volume label/file name (directory name)	2E Hex	Extension
Delimiter		

Start the file name and extension in the most-significant bytes respectively and then fill in any unused bytes with 20 Hex.

If the file name or extension in response data is less than 8 or 3 bytes respectively, unused bytes will be filled with 20 Hex.

It is not permissible to specify 00 (Hex) or E5 (Hex) at the beginning of a file name. (Codes of 00 Hex or E5 Hex means “erased” in DOS.) It is also not permissible to specify 7E Hex (–) at the first and second characters (consecutive) of a file name.

If a file name has no extension, fill both the period (2E Hex) and the extension with 20 Hex.

If the file name in response data has no extension, both the period (2E Hex) and the extension will be filled with 20 Hex.

5-3 FINS Commands

5-3-1 About this Section

This section describes the command and response formats for FINS commands. For each format, the data is arranged in order from left to right.

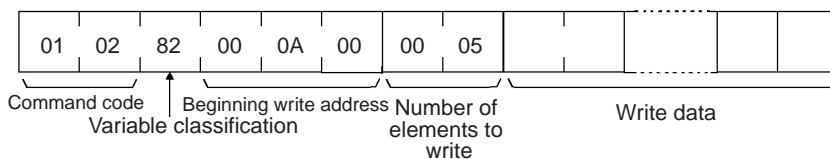
Command and Response Formats

Using CMND(490)

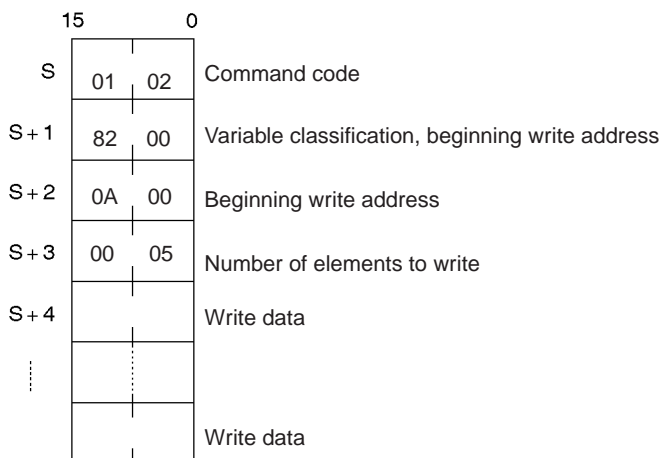
When CMND(490) is used to send a FINS command, the command is stored in I/O memory from the rightmost word to the leftmost word, with a single word represented as two boxes (four digits hexadecimal) in the format diagram.

In the following example, five words of data are written from D00010.

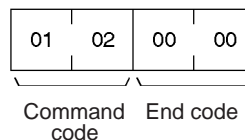
Command Format



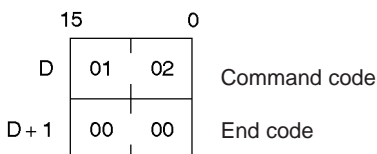
The command format data is stored in the order shown below when CMND(490) is used.



Response Format



The response format data is stored in the order shown below when CMND(490) is used.



Using Host Link Communications

When a FINS command is sent using Host Link communications, the Host Link header, response wait time, destination node address, and source node address are all placed before the command format, and the frame check sequence (FCS) and terminator are placed after the command format before sending the command from the host computer.

Execution Conditions

The *Execution Conditions* tables given for each command tell whether the CPU Unit can or cannot receive commands when it is in RUN, MONITOR, or PROGRAM mode, when another device has the access right, when command protection is in effect, and when the DIP switch is protected.

Access Right at Other Device

The *Access right at other device* column tells whether the CPU Unit can or cannot receive a command when another device has the access right to the CPU Unit.

Note The access right is the exclusive right of access to a particular device (the CPU Unit in this case) which prevents interruption by another device (i.e., another Peripheral Device or Unit) when multiple commands are executed. When another device has the access right, the local device cannot execute commands marked by a “No” in the “Access right at other device” column. Conversely, other devices cannot execute this command when the local device has the access right.

UM Read Protection

The *UM read protection* column tells whether the CPU Unit can or cannot receive the command when UM (user memory) is protected from a Peripheral Device.

DIP Switch UM Protection

The *DIP switch UM protection* column tells whether the CPU Unit can or cannot receive a command when UM is write-protected by turning ON pin 1 of the DIP switch on the CPU Unit's front panel.

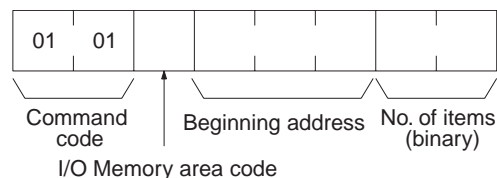
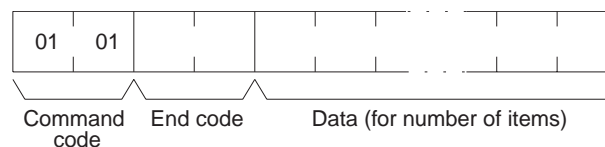
5-3-2 MEMORY AREA READ: 01 01

Reads the contents of the specified number of consecutive memory area words starting from the specified word.

Execution Conditions

Access right at other device	UM read protection	DIP switch UM protection
OK	OK	OK

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK

Command Format**Response Format**

Parameters**I/O memory area code, beginning address, number of items (command)**

Specify the type of data read, the beginning address of the data to be read, and the number of items of data to be read (2 digits hexadecimal).

The memory areas that can be read are given in the following table (*I/O Memory Area Codes*). Refer to 5-2-2 *I/O Memory Address Designations* for the specific addresses that can be used.

Data (response)

Indicates the data from the specified I/O memory area is returned in sequence starting from the beginning address. The required number of bytes in total is calculated as follows:

Number of bytes required by each item x number of items

For details regarding data configuration, refer to *Element Data Configurations* on page 120.

End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

- Note**
1. If the specified number of elements is 0000 Hex, nothing will be read and a normal response will be returned.
 2. I/O memory can be read regardless of the operating mode of the CPU Unit.

I/O Memory Area Codes

Area		Data type	CS/CJ mode memory area code (Hex)	CV mode memory area code (Hex)	Bytes per element
CIO Area	CIO	Bit	30	00	1
Work Area	WR		31	---	
Holding Bit Area	HR		32	---	
Auxiliary Bit Area	AR		33	00	
CIO Area	CIO	Word	B0	80	2
Work Area	WR		B1	---	
Holding Bit Area	HR		B2	---	
Auxiliary Bit Area	AR		B3	80	
Timer Area	TIM	Completion Flag	09	01	1
Counter Area	CNT				
Timer Area	TIM	PV	89	81	2
Counter Area	CNT				
DM Area	DM	Bit	02	---	1
	DM	Word	82	82	2
EM Area	EM bank 0 to bank C	Bit	20 to 2C	---	1
	EM bank 0 to bank C	Word	A0 to AC	90 to 97	2
	EM current bank	Word	98	98	2
	EM current bank No.	EM current bank No.	BC	9C	2
Task Flag	TK	Bit	06	---	1
	TK	Status	46	---	1
Index Register	IR	PV	DC	---	4
Data Register	DR	PV	BC	9C	2
Clock Pulses		Bit	07	---	1
Condition Flags		Bit			1

5-3-3 MEMORY AREA WRITE: 01 02

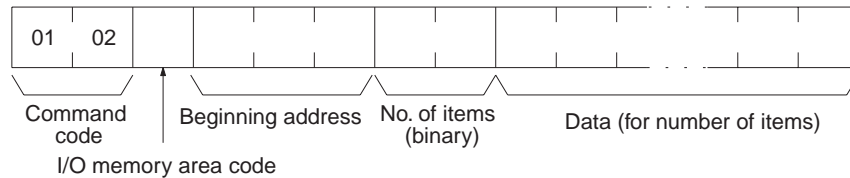
Writes data to the specified number of consecutive words starting from the specified word.

Execution Conditions

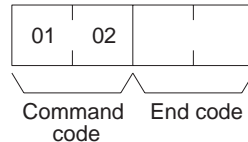
Access right at other device	UM read protection	DIP switch UM protection
OK	OK	OK

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK

Command Format



Response Format



Parameters

I/O memory area code, beginning address, number of items (command)

Specify the type of data written, the beginning address of the data to be written, and the number of items of data to be written (2 digits hexadecimal).

The memory areas that can be written are given in the following table (*I/O Memory Area Codes*). Refer to 5-2-2 *I/O Memory Address Designations* for the specific addresses that can be used.

Data (command)

The data from the specified I/O memory area is returned in sequence starting from the beginning address. The required number of bytes in total is calculated as follows:

Number of bytes required by each item x number of items

For details regarding data configuration, refer to *Element Data Configurations* on page 120.

End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

Comments

If the number of items is designated as 0000 (Hex), a normal completion end code will be returned without the write operation being executed.

To write (change) the timer PV or index register value, designate 0001 (Hex) for the number of items.

The MEMORY AREA WRITE command can be executed regardless of the CPU Unit's operating mode. It is the user's responsibility to program steps to prohibit this command from being executed when the CPU Unit is in RUN mode if such protection is necessary. Execute CPU UNIT STATUS READ (command code 0601) to read the CPU Unit's mode. (Refer to 5-3-17 *CPU UNIT STATUS READ: 06 01*.)

When data is written to the Timer/Counter PV Area, the Completion Flags will not be turned OFF (0).

I/O Memory Area Codes

Area		Data type	CS/CJ mode memory area code (Hex)	CV mode memory area code (Hex)	Bytes per element
CIO Area	CIO	Bit	30	00	1
Work Area	WR		31	---	
Holding Bit Area	HR		32	---	
Auxiliary Bit Area	AR		33	00	
CIO Area	CIO	Word	B0	80	2
Work Area	WR		B1	---	
Holding Bit Area	HR		B2	---	
Auxiliary Bit Area	AR		B3	80	
Timer Area	TIM	PV	89	81	2
Counter Area	CNT				
DM Area	DM	Bit	02	---	1
	DM	Word	82	82	2
EM Area	EM bank 0 to bank C	Bit	20 to 2C	---	1
	EM bank 0 to bank C	Word	A0 to AC	90 to 97	2
	EM current bank	Word	98	98	2
Index Register	IR	PV	DC	---	4
Data Register	DR	PV	BC	9C	2

5-3-4 MEMORY AREA FILL: 01 03

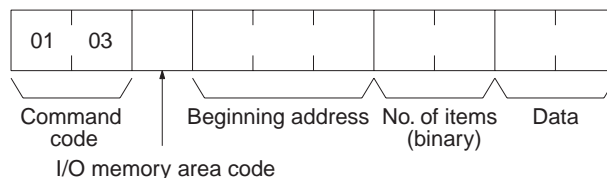
Writes the same data to the specified number of consecutive memory area words.

Execution Conditions

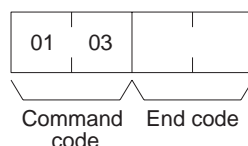
Access right at other device	UM read protection	DIP switch UM protection
OK	OK	OK

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK

Command Format



Response Format



Parameters

I/O memory area code, beginning address, number of items (command)

Specify the type of data written, the beginning address of the data to be written, and the number of items of data to be written (2 digits hexadecimal).

The memory areas that can be written are given in the following table (I/O Memory Area Codes). Refer to 5-2-2 I/O Memory Address Designations for the specific addresses that can be used.

Data (command)

Specify the data to be written to the memory area starting from the beginning address. The data to be written should consist of two bytes.

For details regarding data configuration, refer to *Element Data Configurations* on page 120.

End code (response)

Refer to 5-1-3 End Codes for information on end codes.

Comments

If the number of items is designated as 0000 (Hex), a normal completion end code will be returned without the write operation being executed.

The MEMORY AREA FILL command can be executed regardless of the CPU Unit's operating mode. It is the user's responsibility to program steps to prohibit this command from being executed when the CPU Unit is in RUN mode if such protection is necessary. Execute CPU UNIT STATUS READ (command code 0601) to read the CPU Unit's mode. (Refer to 5-3-17 CPU UNIT STATUS READ: 06 01.)

When data is written to the Timer/Counter PV Area, the Completion Flags will be turned OFF (0).

Data cannot be written if the address is out of range.

If the specified area is force set or reset, clear the force set/reset to write the data.

I/O Memory Area Codes

Area		Data type	CS/CJ mode memory area code (Hex)	CV mode memory area code (Hex)	Bytes per element
CIO Area	CIO	Word	B0	80	2
Work Area	WR		B1	---	
Holding Bit Area	HR		B2	---	
Auxiliary Bit Area	AR		B3	80	
Timer Area	TIM	PV	89	81	2
Counter Area	CNT				
DM Area	DM	Word	82	82	2
EM Area	EM bank 0 to bank C	Word	A0 to AC	90 to 97	2
	EM current bank	Word	98	98	2

5-3-5 MULTIPLE MEMORY AREA READ: 01 04

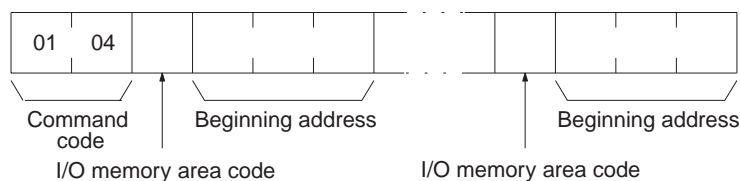
Reads in one batch the contents of the specified number of non-consecutive I/O memory area words, starting from the specified word.

Execution Conditions

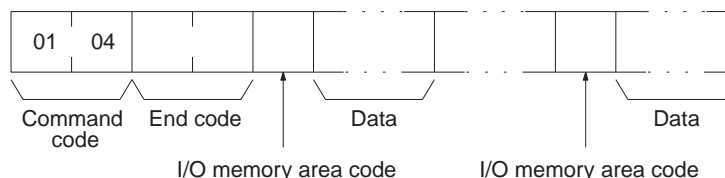
Access right at other device	UM read protection	DIP switch UM protection
OK	OK	OK

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK

Command Format



Response Format



Parameters

I/O memory area code (command)

Specify the type of data to read.

The memory areas that can be read are given in the following table (*I/O Memory Area Codes*). Refer to 5-2-2 *I/O Memory Address Designations* for the specific addresses that can be used.

Beginning address (command)

Specify the first word/bit/flag to read.

I/O memory area code, data (response)

Indicates the data type and contents of the designated I/O memory area(s). The data in the designated memory area(s) will be returned in the sequence specified by the command.

The number of bytes that can be read for each item depends on the I/O memory area that is read. For details regarding data configuration, refer to *Element Data Configurations* on page 120.

End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

Comments

The maximum number of elements that can be read with each command depends on the network as shown in the following table.

Network	Maximum number of elements
Controller Link Ethernet	167
SYSMAC LINK DeviceNet	89

If nothing is specified after the command code, a normal response will be returned, but nothing will be read.

If there is an error in the I/O memory area code or beginning address, the I/O memory area will not be read.

I/O Memory Area Codes

Area		Data type	CS/CJ mode memory area code (Hex)	CV mode memory area code (Hex)	Bytes per element
CIO Area	CIO	Bit	30	00	1
Work Area	WR		31	---	
Holding Bit Area	HR		32	---	
Auxiliary Bit Area	AR		33	00	
CIO Area	CIO	Bit with forced status	70	40	1
Work Area	WR		71	---	
Holding Bit Area	HR		72	---	

Area		Data type	CS/CJ mode memory area code (Hex)	CV mode memory area code (Hex)	Bytes per element
CIO Area	CIO	Word	B0	80	2
Work Area	WR		B1	---	
Holding Bit Area	HR		B2	---	
Auxiliary Bit Area	AR		B3	80	
CIO Area	CIO	Word with forced status	F0	C0	4
Work Area	WR		F1	---	
Holding Bit Area	HR		F2	---	
Timer Area	TIM	Completion Flag	09	01	1
Counter Area	CNT				
Timer Area	TIM	Completion Flag with forced status	49	41	1
Counter Area	CNT				
Timer Area	TIM	PV	89	81	2
Counter Area	CNT				
DM Area	DM	Bit	02	---	1
	DM	Word	82	82	2
EM Area	EM bank 0 to bank C	Bit	20 to 2C	---	1
	EM bank 0 to bank C	Word	A0 to AC	90 to 97	2
	EM current bank	Word	98	98	2
	EM current bank No.	EM current bank No.	BC	9C	2
Task Flag	TK	Bit	06	---	1
	TK	Status	46	---	1
Index Register	IR	PV	DC	---	4
Data Register	DR	PV	BC	9C	2
Clock Pulses		Bit	07	---	1
Condition Flags		Bit			1

5-3-6 MEMORY AREA TRANSFER: 01 05

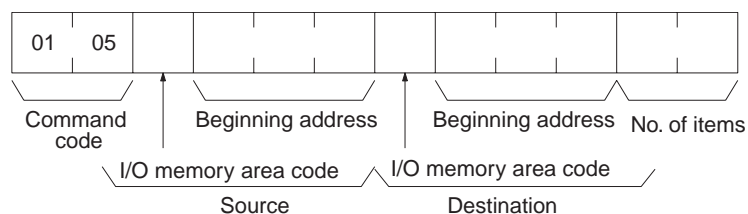
Copies and transfers the contents of the specified number of consecutive I/O memory area words to the specified I/O memory area.

Execution Conditions

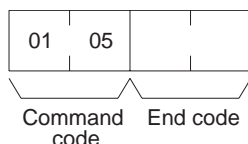
Access right at other device	UM read protection	DIP switch UM protection
OK	OK	OK

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK

Command Format



Response Format



Parameters

I/O memory area code and Beginning address (command)

Specify the data area to transfer from and the data area to transfer to and specify the positions for beginning the data transfer.

The memory areas that can be transferred are given in the following table (*I/O Memory Area Codes*). Refer to 5-2-2 *I/O Memory Address Designations* for the specific addresses that can be used.

Number of items (command)

Specify the number of words of data to transfer. (Each word consists of two bytes.) The specified number of words will be transferred in sequence from the source beginning address onwards to the destination beginning address onwards.

End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

Comments

If the number of items is designated as 0000 (Hex), a normal completion end code will be returned without the copy operation being executed.

It is the user's responsibility to program steps to prohibit this command from being executed when the CPU Unit is in RUN mode if such protection is necessary. Execute CPU UNIT STATUS READ (command code 0601) to read the CPU Unit's mode. (Refer to 5-3-17 *CPU UNIT STATUS READ: 06 01*.)

Even if data is written to the Timer/Counter PV Area, the Completion Flags will not be turned OFF (0).

I/O Memory Area Codes

Area		Data type	CS/CJ mode memory area code (Hex)	CV mode memory area code (Hex)	Bytes per element
CIO Area	CIO	Word	B0	80	2
Work Area	WR		B1	---	
Holding Bit Area	HR		B2	---	
Auxiliary Bit Area	AR		B3	80	
Timer Area	TIM	PV	89	81	2
Counter Area	CNT				
DM Area	DM	Word	82	82	2
EM Area	EM bank 0 to bank C	Word	A0 to AC	90 to 97	2
	EM current bank	Word	98	98	2

5-3-7 PARAMETER AREA READ: 02 01

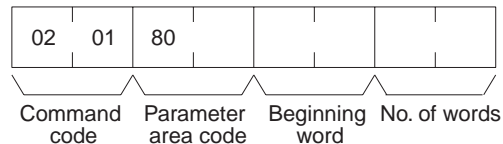
Reads the contents of the specified number of consecutive CPU Unit parameter area words starting from the specified word.

Execution Conditions

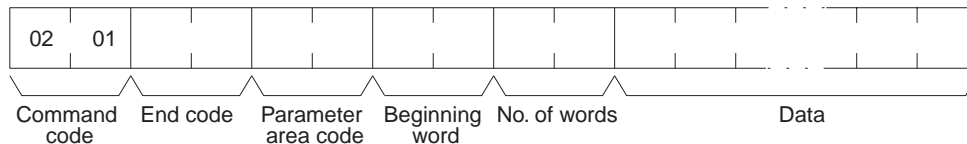
Access right at other device	UM read protection	DIP switch UM protection
OK	OK	OK

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK

Command Format



Response Format



Parameters

Parameter area code (command and response)

Specify the parameter area to read. The parameter area code is designated in two bytes. The leftmost byte is always 80 (Hex) and the rightmost byte specifies the parameter area.

Beginning word (command and response)

Specify the first word to read. The beginning word address specifies the relative word address, with the beginning of the designated area as 0000 (Hex).

Parameter Areas

The areas that can be read are shown below, along with their parameter area codes.

	Parameter area code	Address range (Hex)	Parameter area code	Address range (Hex)
PC Setup Area	8010	0000 to 01FF (512 words)	8000	0000 to 1F3F 8000 words)
I/O Table Registration Area	8012	0000 to 04FF (1,280 words)		
Routing Table Area	8013	0000 to 01FF (512 words)		
CPU Bus Unit Setup Area	8002	0000 to 143F (5184 words)		

Number of words (command and response)

Bits 0 to 14 are used to specify the number of words to be read. (Each word consists of 16 bits.) Bit 15 must be OFF (0) in the command format. When the content in the response format contains the last word of data in the specified parameter area, bit 15 will be ON (1). For example, it would indicate that the 512th word of data is contained in the PC Setup area.

Data (response)

The data in the specified parameter area will be returned in sequence starting from the beginning word. The leftmost bits (bits 8 to 15) of each word are read

first, followed by the rightmost bits (bits 0 to 7). The required number of bytes in total for each read is calculated as follows:

Number of words x 2 (each word consists of 16 bits)

End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

Comments

All words in the specified parameter area must be read at the same time to ensure complete data. A maximum of 498 words can be read with each command. (One word = 16 bits.) To read larger parameter areas, use multiple commands and specify the beginning word and number of words for each.

If more than 498 words is specified as the number of elements, the maximum number of words will be read and returned with a response code of 1108 Hex.

If the beginning word plus the number of words specified to read exceeds the capacity of the specified area, the data read through the end of the area and the actual number of words read will be returned with a response of 1104 Hex.

Except for the routing table area, each area must be read or written in its entirety.

5-3-8 PARAMETER AREA WRITE: 02 02

Writes data to the specified number of consecutive CPU Unit parameter area words starting from the specified word.

Data can be written to the I/O table only when the CPU Unit is in PROGRAM mode.

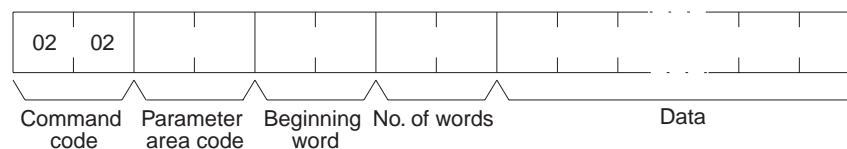
Note Some PC Setup parameters cannot be written in RUN or MONITOR mode.

Execution Conditions

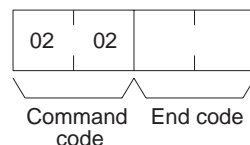
Access right at other device	UM read protection	DIP switch UM protection
No	OK	No

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK

Command Format



Response Format



Parameters

Parameter area code (command and response)

Specify the parameter area to write. The parameter area code is designated in two bytes. The leftmost byte is always 80 (Hex) and the rightmost byte specifies the parameter area.

Beginning word (command and response)

Specify the first word to write. The beginning word address specifies the relative word address, with the beginning of the designated area as 0000 (Hex).

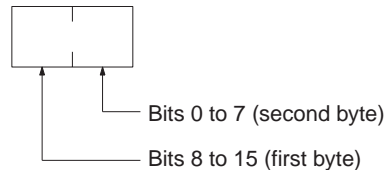
Parameter Areas

The areas that can be written to are shown below, along with their parameter area codes.

	Parameter area code	Address range (Hex)	Parameter area code	Address range (Hex)
PC Setup Area	8010	0000 to 01FF (512 words)	8000	0000 to 1F3F (8000 words)
I/O Table Registration Area	8012	0000 to 04FF (1,280 words)		
Routing Table Area	8013	0000 to 01FF (512 words)		
CPU Bus Unit Setup Area	8002	0000 to 143F (5184 words)		

Number of words (command)

Bits 0 to 14 are used to specify the number of words to be written. (Each word consists of two bytes.) Bit 15 must be ON (1) when data is written to the last word in the specified parameter area or no data will be written. If the number of write words is set to 0000, no words will be written and a normal end code will be returned.



Bit 15 OFF (0): Without last word data to be written.
 Bit 15 ON (1): With last word data to be written.
 Bits 0 to 14: No. of words to be written

Data (command)

The data to be written. The leftmost bits (bits 15 to 8) of each word must be specified first, followed by the rightmost bits (bits 7 to 0). The required number of bytes in total for each write can be calculated as follows:

No. of words x 2 (each word consists of two bytes)

End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

Comments

Parameters will be written regardless of the operating mode of the CPU Unit. There are some settings in the PC Setup that cannot and will not be written if the CPU Unit is in RUN mode, but the end code will be 0000 nevertheless. It is the user's responsibility to program steps to prohibit this command from being executed when the CPU Unit is in the RUN mode if such protection is necessary. Execute CPU UNIT STATUS READ (command code 0601) to read the CPU Unit's mode. (Refer to 5-3-17 *CPU UNIT STATUS READ: 06 01*.)

Data can only be written to the I/O registration table when the CPU Unit is in PROGRAM mode.

All words in the specified parameter area must be written at the same time to ensure complete data. A maximum of 498 words can be written with each command. Nothing will be written if more than 498 words are specified. To write larger parameter areas, use multiple commands and specify the beginning word for each.

Except for the routing table area, each area must be read or written in its entirety.

5-3-9 PARAMETER AREA CLEAR: 02 03

Writes all zeros to the specified number of consecutive parameter area words to clear the previous data. The I/O table can be cleared only when the CPU Unit is in PROGRAM mode.

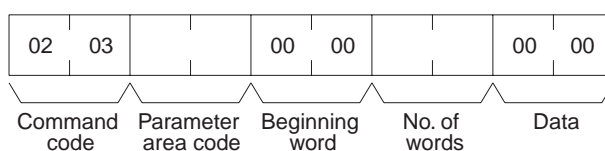
Note Some PC Setup parameters cannot be written in RUN or MONITOR mode.

Execution Conditions

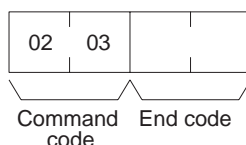
Access right at other device	UM read protection	DIP switch UM protection
No	OK	No

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK

Command Format



Response Format



Parameters

Parameter area code (command)

Specify the parameter area to clear.

Beginning word (command)

Always 0000.

Number of words (command)

Specify the number of words to clear. (One word = 16 bits.) If the number of write words is set to 0000, no words will be written and a normal end code will be returned.

Parameter Areas

The areas that can be written to are shown below, along with their parameter area codes.

	Parameter area code	Address range (Hex)	Parameter area code	Address range (Hex)
PC Setup Area	8010	0000 to 01FF (512 words)	8000	0000 to 1F3F (8000 words)
I/O Table Registration Area	8012	0000 to 04FF (1,280 words)		
Routing Table Area	8013	0000 to 01FF (512 words)		
CPU Bus Unit Setup Area	8002	0000 to 143F (5184 words)		

Data (command)

Set to 0000. The number of words to be cleared is specified by the number of words in the command format. This parameter has two bytes (one word) of data.

End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

Comments

The PARAMETER AREA CLEAR command can be executed regardless of the CPU Unit's mode. It is the user's responsibility to program steps to prohibit this command from being executed when the CPU Unit is in the RUN mode if such protection is necessary. Execute CPU UNIT STATUS READ (command code 0601) to read the CPU Unit's mode. (Refer to 5-3-17 CPU UNIT STATUS READ: 06 01.)

Data can only be cleared from the I/O registration table when the CPU Unit is in PROGRAM mode. When data is cleared from the I/O registration table for CJ-series CPU Units, the CPU Unit enters the status where I/O is automatically allocated at power-ON and the status of mounted Units is reflected in the I/O registration table. It is not simply cleared to 0000 Hex.

Each parameter area must be cleared in its entirety.

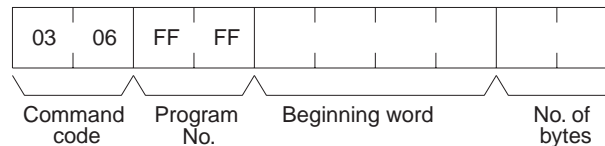
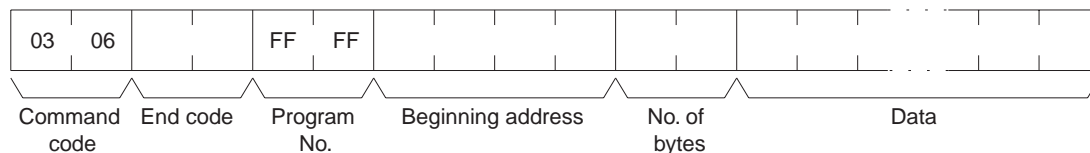
5-3-10 PROGRAM AREA READ: 03 06

Reads the contents of the specified number of consecutive program area words starting from the specified word.

Execution Conditions

Access right at other device	UM read protection	DIP switch UM protection
OK	No	OK

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK

Command Format**Response Format****Parameters****Program No. (command and response)**

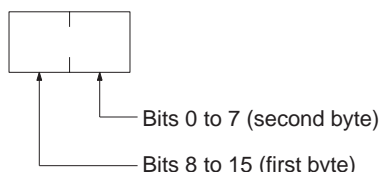
Set to FFFF (Hex).

Beginning address (command and response)

For the beginning address, the beginning of the program area is specified as a relative address of 00000000 (Hex). The beginning address must be a multiple of four.

Number of bytes (command and response)

The number of bytes must be a multiple of four, and no greater than 992. The leftmost bit (bit 15) indicates whether the data at the last address in the program area is included. If bit 15 is ON (1) when the response is returned, it indicates that the data at the last address in the program area is included in the read data. Bit 15 must be OFF (0) in the command format.



Bit 15 OFF (0): Without last address data
 Bit 15 ON (1): With last address data
 Bits 0 to 14: Number of bytes read

Data (response)

The data in the specified program area will be returned in sequence starting from the beginning word.

End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

Comments

A maximum of 992 bytes can be read with each command. Partition the data into units of 992 bytes or less and use as many commands as necessary to read from 00000000 (Hex) to the final address.

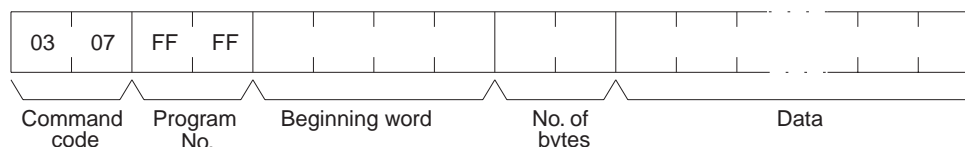
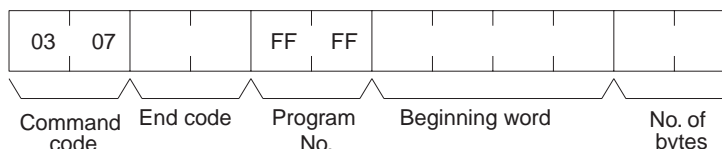
5-3-11 PROGRAM AREA WRITE: 03 07

Writes data to the specified number of consecutive program area words starting from the specified word.

Execution Conditions

Access right at other device	UM read protection	DIP switch UM protection
No	OK	No

RUN mode	MONITOR mode	PROGRAM mode
No	No	OK

Command Format**Response Format****Parameters****Program No. (command and response)**

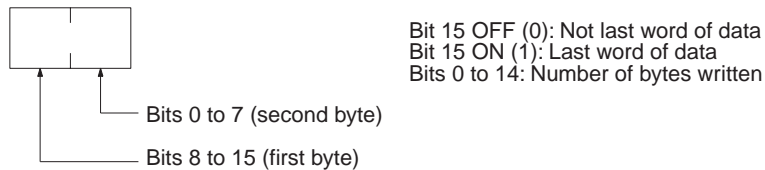
Always FFFF (Hex).

Beginning word (command and response)

For the beginning address, the beginning of the program area is specified as a relative address of 00000000 (Hex). The beginning address must be a multiple of four.

Number of bytes (command and response)

Specify the number of bytes of data to write. The number of bytes must be a multiple of 4 and 996 or less. The leftmost bit (bit 15) is used to indicate when program area writing is completed. Bit 15 must be ON (1) the last word of data.

**Data (command)**

Specify the data to be written by designating the beginning address and the number of bytes.

End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

Comments

The PROGRAM AREA WRITE command can be executed only when the CPU Unit is in PROGRAM mode.

A maximum of 996 bytes can be written with each command. Partition the data into units of 996 bytes or less and use as many commands as necessary to write from 00000000 (Hex) to the final address.

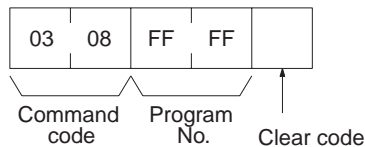
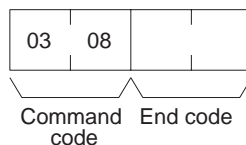
5-3-12 PROGRAM AREA CLEAR: 03 08

Completely initializes the contents of the program area, from the beginning of the program area to the final program address.

Execution Conditions

Access right at other device	UM read protection	DIP switch UM protection
No	OK	No

RUN mode	MONITOR mode	PROGRAM mode
No	No	OK

Command Format**Response Format****Parameters****Program No. (command)**

Set to FFFF (Hex).

Clear code (command)

Without interrupt tasks: 00 (Hex)

With interrupt tasks: 10 (Hex)

End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

Comments

The program area can be cleared even if it is read-protected from a Programming Device. When the program area is cleared, protection will also be cleared.

Without Interrupt Tasks

In this mode, only one single cyclic task 0 is set up.

Name	Number	Task No.
Power interrupt task	0	---
Scheduled interrupt task	0	---
I/O interrupt task	0	---
Cyclic task	1	0

With Interrupt Tasks

In this mode, one single cyclic task 0 and one or several interrupt tasks are set up.

Name	Number	Task No.
Power interrupt task	1	1
Scheduled interrupt task	2	2
		3
I/O interrupt task	32	100
		.
		131
Cyclic task	1	0

Note Interrupt tasks and cyclic tasks contain only one END(001) instruction after execution.

5-3-13 RUN: 04 01

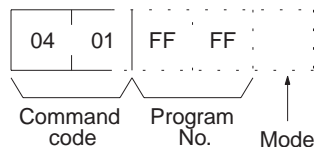
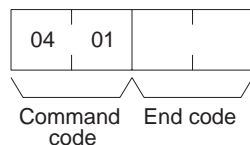
Changes the CPU Unit's operating mode to MONITOR or RUN, enabling the PC to execute its program.

Note The CPU Unit will start operation when RUN is executed. You must confirm the safety of the system before executing RUN.

Execution Conditions

Access right at other device	UM read protection	DIP switch UM protection
No	OK	OK

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK

Command Format**Response Format****Parameters****Program number (command)**

Always FFFF (Hex).

Mode (command)

Set the CPU Unit's operating mode as follows:

02 (Hex): Change to MONITOR mode.

04 (Hex): Change to RUN mode.

End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

Comments

If only the command code or only the command code and program number are sent, the mode will be changed to MONITOR mode.

If the CPU Unit's operating mode has already been changed to the intended mode when this command is sent, a normal completion will be returned.

5-3-14 STOP: 04 02

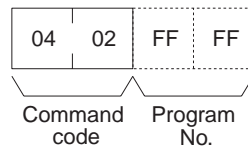
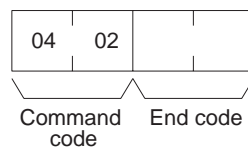
Changes the CPU Unit's operating mode to PROGRAM, stopping program execution.

Note The CPU Unit will stop operation when STOP is executed. You must confirm the safety of the system before executing STOP.

Execution Conditions

Access right at other device	UM read protection	DIP switch UM protection
No	OK	OK

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK

Command Format**Response Format****Parameters****Program number (command)**

Always FFFF (Hex).

End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

Comments

If the CPU Unit's operating mode has already been changed to the intended mode when this command is sent, a normal completion will be returned.

If only the command code or only the command code and program number are to be sent, the operating mode will be changed to the PROGRAM mode.

5-3-15 CPU UNIT DATA READ: 05 01

Reads the following data:

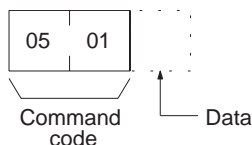
- CPU Unit model
- CPU Bus Unit configuration
- CPU Unit version
- Remote I/O data
- Area data
- CPU Unit information

Execution Conditions

Access right at other device	UM read protection	DIP switch UM protection
OK	OK	OK

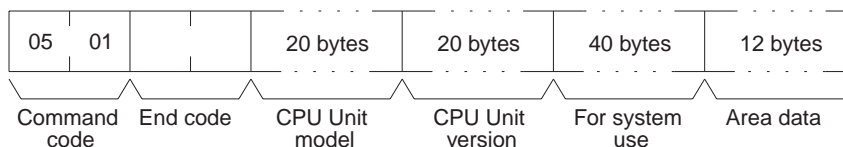
RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK

Command Format

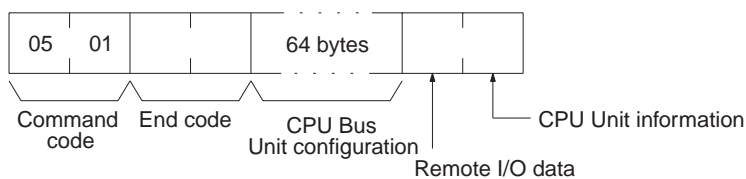


Response Format

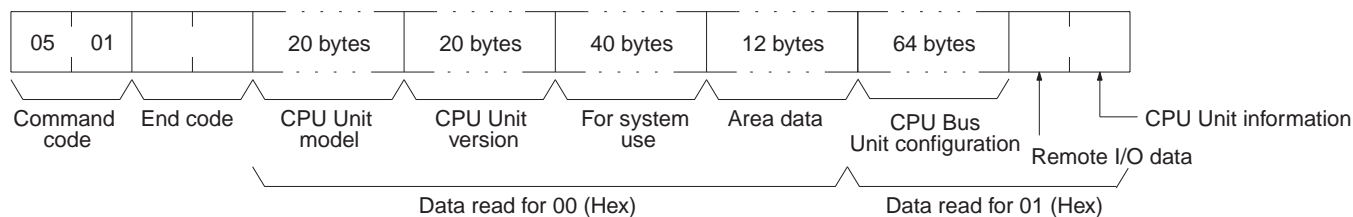
The format is as shown below if 00 (Hex) is specified as the data to be read, i.e., from the CPU Unit model to the area data.



The format is as shown below if 01 (Hex) is specified as the data to be read, i.e., from the CPU Bus Unit configuration to the CPU Unit information.



The format is as shown below if nothing is entered as the data to be read, i.e., all data from the CPU Unit model to the CPU Unit information.



Parameters

Data (command)

Specify the data to be read as follows:

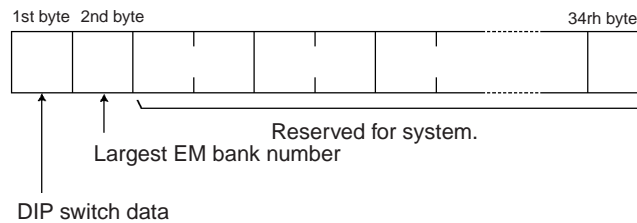
Value	00	01
Data to be read	CPU Unit model CPU Unit version Area data	CPU Bus Unit configuration Remote I/O data CPU Unit information

CPU Unit model and version (response)

Each is returned in not more than 20 bytes in ASCII (i.e. 20 ASCII characters). If the model or version requires less than 20 characters, the model field will be filled with spaces and the version field will be filled with null codes.

For system use (response)

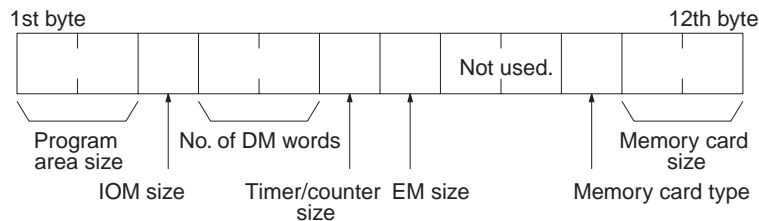
Reserved for system use.



Item	Meaning	Unit
DIP switch data	Status of DIP switch on front panel of CPU Unit: Pins 0 to 7 correspond to bits 0 to 7 (ON: 1; OFF: 0)	---
Largest EM bank number	Largest number, 0 to D, in CPU Unit's EM area.	Bank

Area data (response)

The area data is configured as follows:

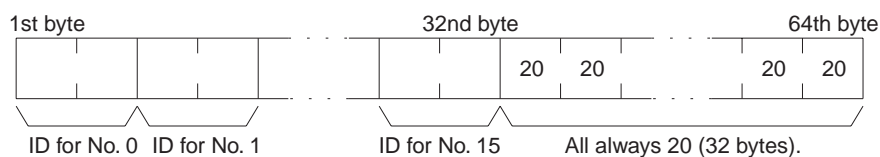


Item	Meaning	Unit
Program area size	The size of PC Setup and program area	K words (1K words = 1,024 words)
IOM size	The size of the area (CIO, WR, HR, AR, timer/counter completion flags, TN) in which bit commands can be used (always 23).	K bytes (1K bytes = 1,024 bytes)
Number of DM words	Total words in the DM area (always 32,768)	Words
Timer/counter size	Maximum number of timers/counters available (always 8)	x 1,024
EM non-file memory size	Among the banks in the EM area, the number of banks (0 to D) without file memory.	Banks (1 bank = 32,766 words)
Memory card type	00: No memory card 04: Flash memory	---
Memory card size	Size of the memory card (0000 if there is no memory card)	K byte (1 word = 2 bytes)

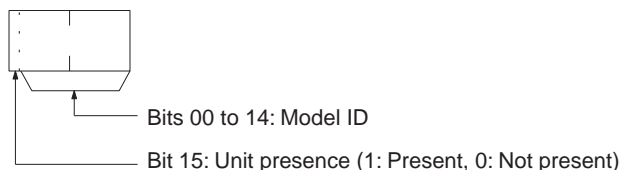
CPU Bus Unit configuration (response)

Each CPU Bus Unit has a code assigned to it consisting of two ASCII charac-

ters (two bytes). These codes are given in the numerical order according to the unit number of the CPU Bus Units (unit 0 to 15).

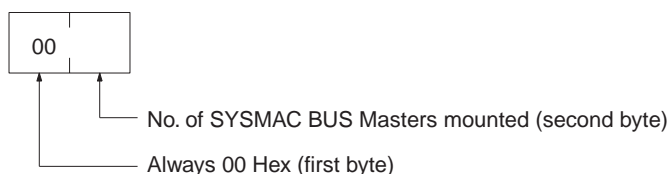


ID Format



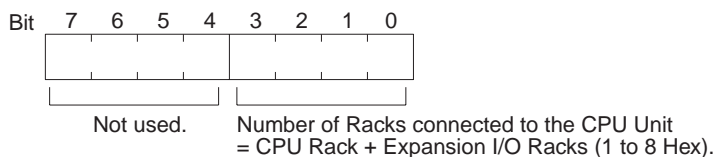
Remote I/O data (response)

The number of SYSMAC BUS Master Units mounted in remote I/O systems is returned in a single byte (00 to 02 Hex) as follows:



CPU Unit information (response)

The total number of racks (CPU Racks + Expansion I/O Racks) connected to the CPU Unit is returned in a single byte (8 bits) of data in the configuration shown below.



End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

5-3-16 CONNECTION DATA READ: 05 02

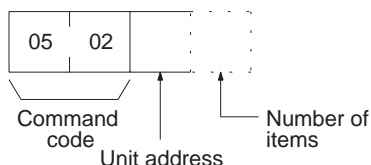
Reads the model number of the specified Units.

Execution Conditions

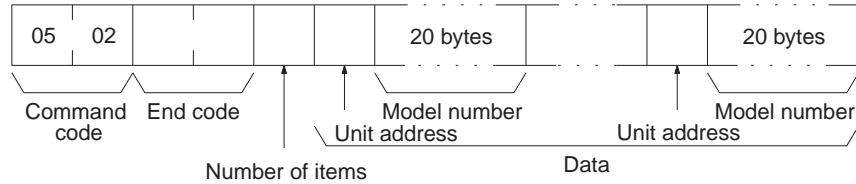
Access right at other device	UM read protection	DIP switch UM protection
OK	OK	OK

Command Format

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK



Response Format



Parameters

Unit address (command and response)

Specify the unit address of the first Unit whose connection data is to be read. If the specified Unit does not exist, the connection data is read from the next Unit. Specify the following for the unit address.

CPU Unit: 00 (Hex)

CPU Bus Unit: 10 + unit number (10 to 1F Hex)

Special I/O Unit: 20 + unit number (20 to 7F Hex)

Inner Board: E1 (Hex)

Number of items (command)

Specify the number of items to be read. The number of items will be returned in order for the number specified, beginning with the unit address set in the "unit address" parameter. Any number between 01 and 19 (hexadecimal) can be specified. If the number of items is not specified, 19 Hex (25) will be used.

Number of Units (response)

The number of Units for which the connection data is being returned. If bit 7 is ON (1), it means that the data for the last Unit is being returned. The maximum setting is 19 Hex (25). If the number of items is not specified, 19 Hex (25) will be used.

Unit address and model number (response)

These response parameters show the unit address and model number. The model number is provided in up to 20 ASCII characters.

End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

5-3-17 CPU UNIT STATUS READ: 06 01

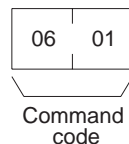
Reads the operating status of the CPU Unit.

Execution Conditions

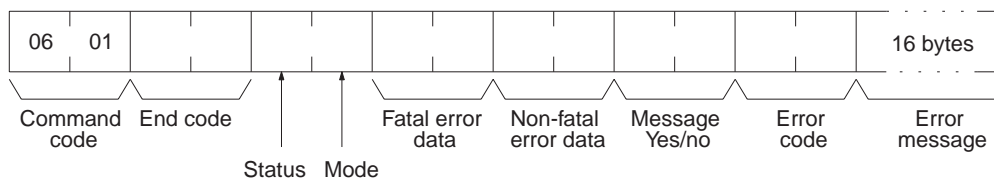
Access right at other device	UM read protection	DIP switch UM protection
OK	OK	OK

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK

Command Format



Response Format



Parameters

Status (response)

The operating status of the CPU Unit is as follows:

00: Stop (user program not being executed)

01: Run (user program being executed)

80: CPU on standby (waiting for a signal from a device such as a SYSMAC BUS Remote I/O Slave Unit).

Mode (response)

The CPU Unit operating mode is as follows:

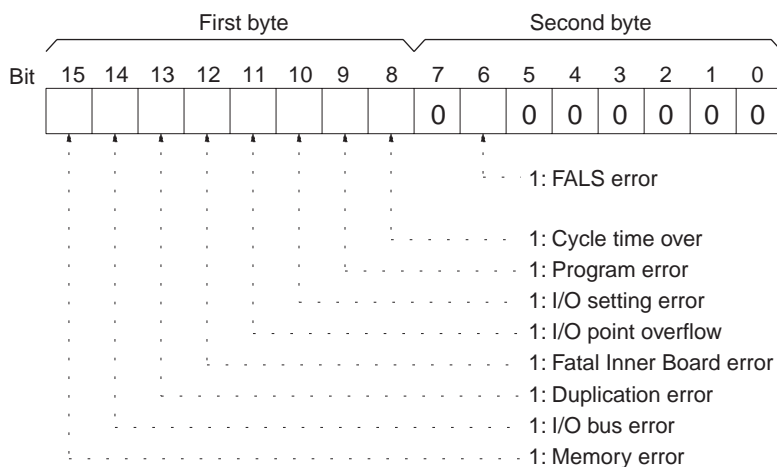
00: PROGRAM

02: MONITOR

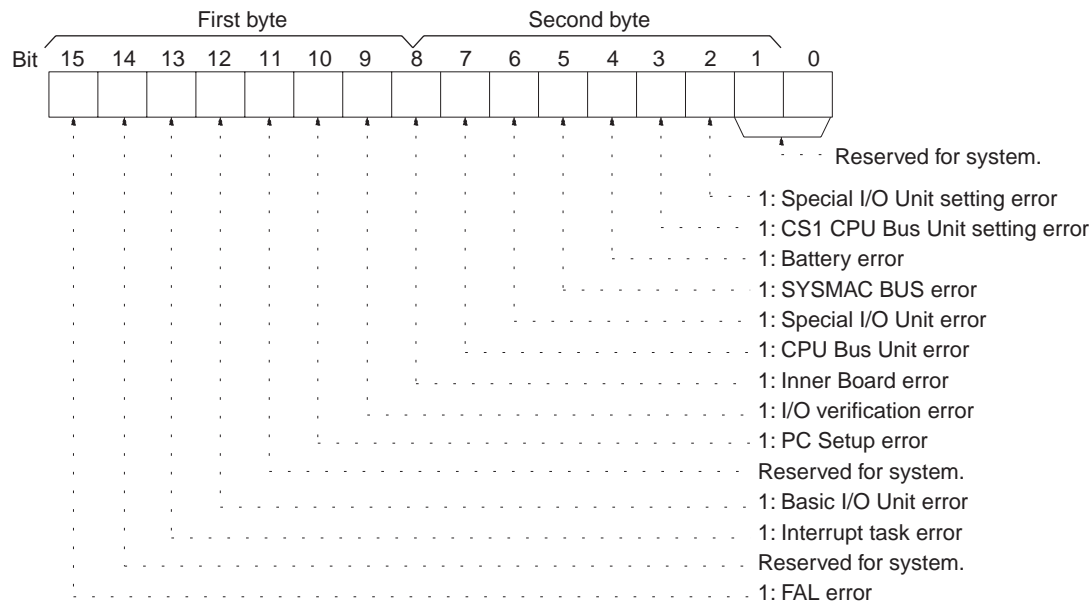
04: RUN

Fatal error data (response)

Fatal error data for the CPU Unit is configured as follows:

**Non-fatal error data (response)**

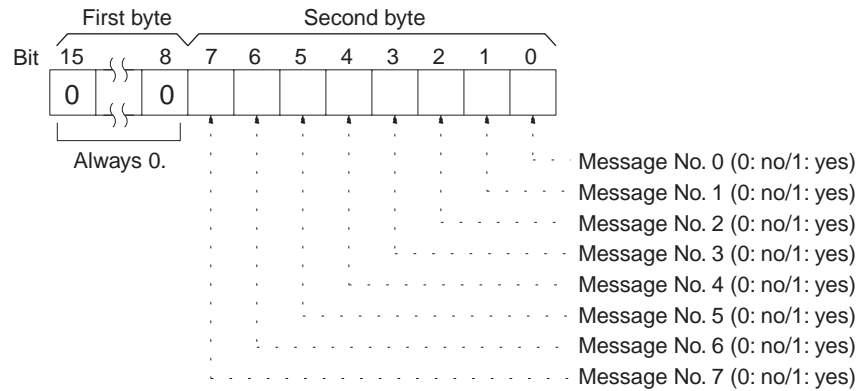
Non-fatal error data for the CPU Unit is configured as follows:



Note For details, refer to the CPU Unit's operation manual.

Message yes/no (response)

If MSG(046) has been executed, the bit corresponding to the message number will be ON (1) as shown below. To read the messages generated by MSG(195), execute MESSAGE READ (command code 0920). Refer to 5-3-21 MESSAGE READ: 09 20.



Error code (response)

Among errors that occur when the command is executed, the error code indicates the most serious. If there are no errors, it will be 0000 (Hex).

Error message (response)

Indicates messages from execution of FAL(006) or FALS(007). If there is no error message, or if FAL(006) or FALS(007) are not being executed, 16 spaces (ASCII 20) will be returned.

End code (response)

Refer to 5-1-3 End Codes for information on end codes.

Comments

To read the error log, read the appropriate Auxiliary Area words or execute ERROR LOG READ command (command code 2102). Refer to 5-3-28 ERROR LOG READ: 21 02.

5-3-18 CYCLE TIME READ: 06 20

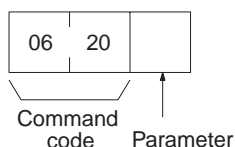
Initializes the PC's cycle time history or reads the average, maximum, and minimum cycle time.

Execution Conditions

Access right at other device	UM read protection	DIP switch UM protection
OK	OK	OK

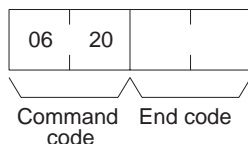
RUN mode	MONITOR mode	PROGRAM mode
OK	OK	No

Command Format

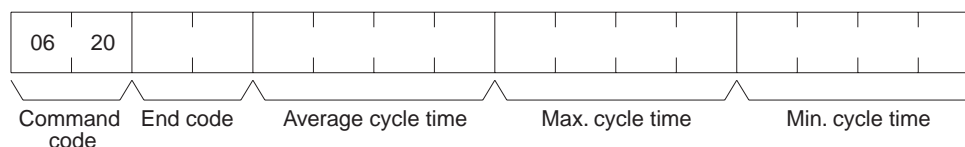


Response Format

The response format is as follows when the parameter is 00 Hex:



The response format is as follows when the parameter is 01 Hex (read):



Parameters

Parameter code (command)

Specify the operations for this command as follows:

00 (Hex): Initializes the cycle time.

01 (Hex): Reads the average, maximum, and minimum cycle time.

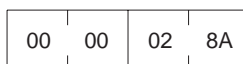
Average cycle time (response)

The CPU Unit continuously calculates the cycle time, and remembers the previous eight cycle times. The “average cycle times” is the average of these eight cycle times, expressed as four bytes of binary data in 0.1-ms increments.

The average cycle time is obtained as follows:

$$\text{Average cycle time} = (\text{Sum of 8 previous cycle times})/8$$

In the following example the average cycle time is 65.0 ms.



Maximum cycle time

The maximum cycle time is the maximum value, of the cycle time measured after the cycle time initialize request is received. It is expressed in four binary bytes, in increments of 0.1 ms.

Minimum cycle time

The minimum cycle time is found in the same way as the maximum cycle time described above.

End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

Comments

The maximum and minimum cycle times are initialized when operation is started.

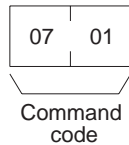
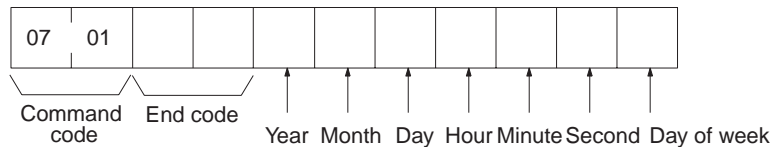
5-3-19 CLOCK READ: 07 01

Reads clock information.

Execution Conditions

Access right at other device	UM read protection	DIP switch UM protection
OK	OK	OK

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK

Command Format**Response Format****Parameters****Year, month, day, hour, minute, second, day of week (response)**

The year, month, day of month, hour, minute, and second are expressed in BCD.

Year: The rightmost two digits of the year. (1998, 1999, and 2000 are expressed as 98, 99, and 00 respectively. 2096 and 2097 will be expressed as 96 and 97.)

Hour: 00 to 23 (BCD).

Day of week: As follows:

Value (Hex)	00	01	02	03	04	05	06
Day of week	Sun	Mon	Tues	Wed	Thur	Fri	Sat

End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

5-3-20 CLOCK WRITE: 07 02

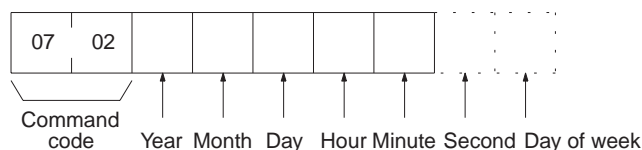
Writes clock information.

Execution Conditions

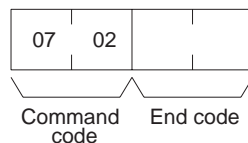
Access right at other device	UM read protection	DIP switch UM protection
No	OK	OK

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK

Command Format



Response Format



Parameters

Year, month, day, hour, minute, second, day of week (response)

The year, month, day of month, hour, minute, and second are expressed in BCD.

Year: The rightmost two digits of the year. (1998, 1999, and 2000 are expressed as 98, 99, and 00 respectively. 2096 and 2097 will be expressed as 96 and 97.)

Hour: 00 to 23 (BCD).

Day of week: As follows:

Value (Hex)	00	01	02	03	04	05	06
Day of week	Sun	Mon	Tues	Wed	Thur	Fri	Sat

End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

Comments

If the second and the day of week are not specified, 00 (BCD) will be set as the second and the previous value will be kept for the day.

If the second is specified, but the day of week is omitted, the previous setting will not be changed.

The PC does not check the day of week from the day of month. This means that no error will occur even if the day of month and the day of week do not agree.

The PC automatically checks the range of the specified data. If any portion of the data is incorrect, the clock will not be set.

5-3-21 MESSAGE READ: 09 20

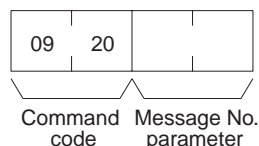
Reads messages generated by MSG(195).

Execution Conditions

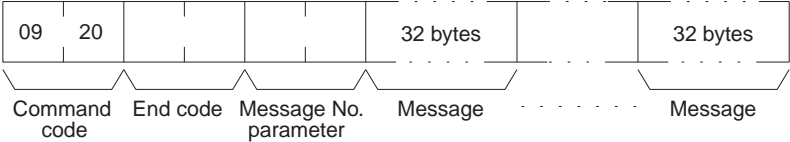
Access right at other device	UM read protection	DIP switch UM protection
OK	OK	OK

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK

Command Format



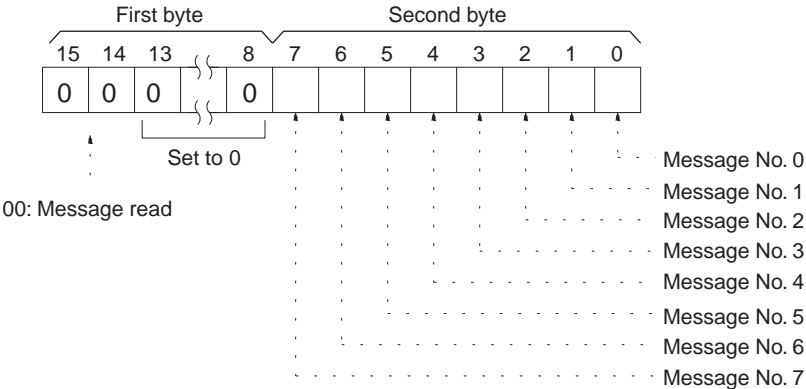
Response Format



Parameters

Message number parameter (command and response)

In the command format, turn ON (1) the bits of the messages to be read. In the response format, the bits of the messages being returned will be ON (1). If no bits are turned ON in the command format, all bits will be OFF (0) in the response format and no further data will be returned.



Message (response)

Each message is returned in numerical order, from smaller to larger, according to the message number. Each message consists of 32 ASCII characters (32 bytes). The total number of bytes of the messages is calculated as follows:

The number of messages read × 32 bytes

If a message consists of less than 32 bytes, the remainder will be filled with spaces (20 Hex). If no message has been registered for a message number that has been requested, 32 bytes of spaces (20 Hex) will be returned.

End code (response)

Refer to 5-1-3 End Codes for information on end codes.

Comments

The MESSAGE READ, MESSAGE CLEAR (refer to 5-3-22 MESSAGE CLEAR: 09 20), and FAL/FALS READ (refer to 5-3-23 FAL/FALS READ: 09 20) commands share the same command code (0920). They are distinguished by bits 14 and 15 of the two-byte parameter following the command code. To read MSG(195) messages, bits 14 and 15 must be OFF (0).

5-3-22 MESSAGE CLEAR: 09 20

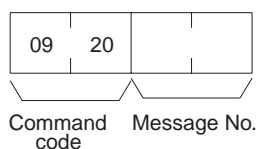
Clears messages generated with MSG(195).

Execution Conditions

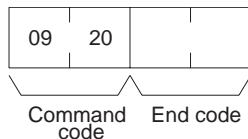
Access right at other device	UM read protection	DIP switch UM protection
No (when clearing messages)	OK	OK

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK

Command Format



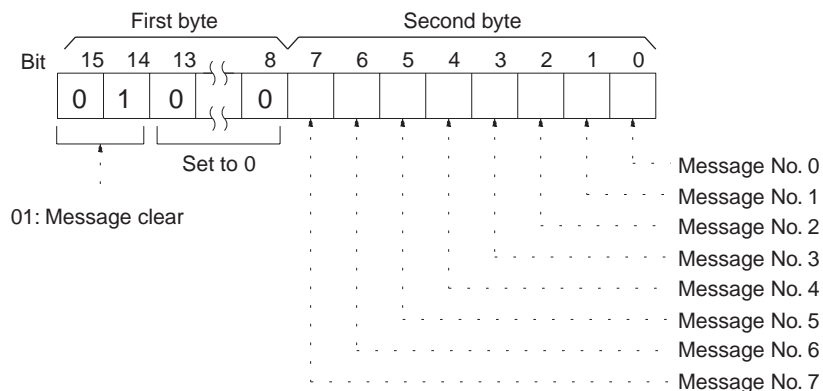
Response Format



Parameters

Message number (command)

Turn ON the bits of the messages to be cleared. Multiple messages can be cleared at one time.



End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

Comments

The MESSAGE READ, MESSAGE CLEAR (refer to 5-3-22 *MESSAGE CLEAR: 09 20*), and FAL/FALS READ (refer to 5-3-23 *FAL/FALS READ: 09 20*) commands share the same command code (0920). They are distinguished by bits 14 and 15 of the two-byte parameter following the command code. To clear messages, bit 14 must be ON (1) and bit 15 must be OFF (0).

5-3-23 FAL/FALS READ: 09 20

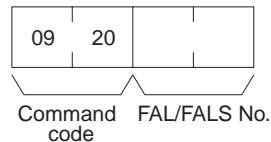
Reads FAL(006)/FALS(007) error messages.

Execution Conditions

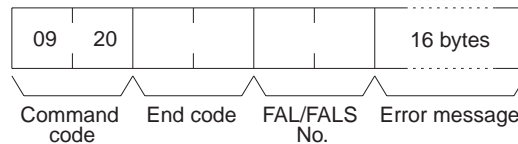
Access right at other device	UM read protection	DIP switch UM protection
OK	OK	OK

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK

Command Format



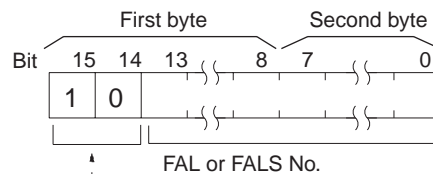
Response Format



Parameters

FAL/FALS No. (command and response)

In the command format, specify in hexadecimal in bits 0 to 13 the FAL or FALS number to be read as shown below. In the response format, the FAL or FALS number is returned.



10: FAL/FALS READ (returned as 00 in the response)

Error message (response)

The error message specified in the FAL(006) or FALS(007) instruction.

A single error message consists of 16 ASCII characters.

If a message consists of less than 16 bytes, spaces (20 Hex) will be returned for the remainder. If no message has been registered for a message number that has been requested, 16 bytes of spaces (20 Hex) will be returned.

Message data will be returned as is even if a control code such as CR (0D Hex) is included in the message data.

End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

Comments

The MESSAGE READ, MESSAGE CLEAR (refer to 5-3-22 *MESSAGE CLEAR: 09 20*), and FAL/FALS READ (refer to 5-3-23 *FAL/FALS READ: 09 20*) commands share the same command code (0920). They are distinguished by bits 14 and 15 of the two-byte parameter following the command code. To read FAL/FALS messages, bit 14 must be OFF (0) and bit 15 must be ON (1).

5-3-24 ACCESS RIGHT ACQUIRE: 0C 01

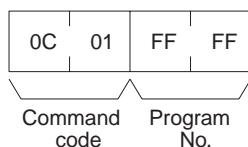
Acquires the access right as long as no other device holds it. Execute the ACCESS RIGHT ACQUIRE command when you need to execute commands continuously without being interrupted by other devices. As soon as the execution of the commands has been completed, execute ACCESS RIGHT RELEASE (command code 0C03) to release the access right. (Refer to 5-3-26 ACCESS RIGHT RELEASE: 0C 03.) If another devices holds the access right, the device will be identified in the response.

Execution Conditions

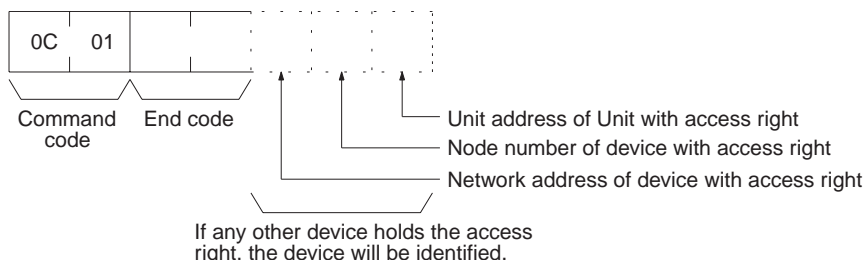
Access right at other device	UM read protection	DIP switch UM protection
No	OK	OK

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK

Command Format



Response Format



Parameters

Program No. (command)

Always FFFF (Hex).

End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

Comments

If any other device has the access right, the access right cannot be acquired with this command; use ACCESS RIGHT FORCED ACQUIRE (command code 0C01). (Refer to 5-3-25 ACCESS RIGHT FORCED ACQUIRE: 0C 02.)

When ACCESS RIGHT ACQUIRE (command code 0C01) is executed while any other device has the access right, subsequent commands cannot be executed from the other device. This command should generally not be used during normal processing.

The following table shows which FINS commands can be executed even when another device holds the access right.

Command code	Command name	Command execution while another device has access right
0101	MEMORY AREA READ	Yes
0102	MEMORY AREA WRITE	Yes
0103	MEMORY AREA FILL	Yes
0104	MULTIPLE MEMORY AREA READ	Yes

Command code	Command name	Command execution while another device has access right
0105	MEMORY AREA TRANSFER	Yes
0201	PARAMETER AREA READ	Yes
0202	PARAMETER AREA WRITE	No
0203	PARAMETER AREA CLEAR	No
0306	PROGRAM AREA READ	Yes
0307	PROGRAM AREA WRITE	No
0308	PROGRAM AREA 5CLEAR	No
0401	RUN	No
0402	STOP	No
0501	CPU UNIT DATA READ	Yes
0502	CONNECTION DATA READ	Yes
0601	CPU UNIT STATUS READ	Yes
0620	CYCLE TIME READ	Yes
0701	CLOCK READ	Yes
0702	CLOCK WRITE	No
0920	MESSAGE READ/CLEAR	No
0C01	ACCESS RIGHT ACQUIRE	No
0C02	ACCESS RIGHT FORCED ACQUIRE	Yes
0C03	ACCESS RIGHT RELEASE	Yes
2101	ERROR CLEAR	No
2102	ERROR LOG READ	Yes
2103	ERROR LOG CLEAR	No
2201	FILE NAME READ	Yes
2202	SINGLE FILE READ	Yes
2203	SINGLE FILE WRITE	No
2204	FILE MEMORY FORMAT	No
2205	FILE DELETE	No
2207	FILE COPY	No
2208	FILE NAME CHANGE	No
220A	MEMORY AREA-FILE TRANSFER (I/O memory to file transfers only)	No
220B	PARAMETER AREA-FILE TRANSFER	No
220C	PROGRAM AREA-FILE TRANSFER	No
2215	CREATE/DELETE DIRECTORY	No
2301	FORCED SET/RESET	Yes
2302	FORCED SET/RESET CANCEL	Yes

Note ACCESS RIGHT ACQUIRE is used to prevent Programming Devices or other Units from taking the access right when more than one command is to be executed in succession. When finished, always execute ACCESS RIGHT RELEASE (0C03).

5-3-25 ACCESS RIGHT FORCED ACQUIRE: 0C 02

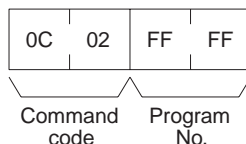
Acquires the access right even if another device already holds it.

Execution Conditions

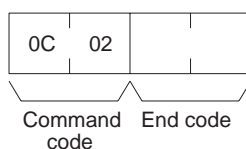
Access right at other device	UM read protection	DIP switch UM protection
OK	OK	OK

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK

Command Format



Response Format



Parameters

Program number (command)

Always FFFF (Hex).

End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

Comments

Even if any other device has the access right, the access right can be acquired with this command and a normal end code will be returned.

When ACCESS RIGHT FORCED ACQUIRE (command code 0C02) is executed while any other device has the access right, subsequent commands cannot be executed from the other device. This command should generally not be used during normal processing.

The following table shows which FINS commands can be executed even when another device holds the access right.

Command code	Command name	Command execution while another device has access right
0101	MEMORY AREA READ	Yes
0102	MEMORY AREA WRITE	Yes
0103	MEMORY AREA FILL	Yes
0104	MULTIPLE MEMORY AREA READ	Yes
0105	MEMORY AREA TRANSFER	Yes
0201	PARAMETER AREA READ	Yes
0202	PARAMETER AREA WRITE	No
0203	PARAMETER AREA CLEAR	No
0306	PROGRAM AREA READ	Yes
0307	PROGRAM AREA WRITE	No
0308	PROGRAM AREA CLEAR	No
0401	RUN	No
0402	STOP	No

Command code	Command name	Command execution while another device has access right
0501	CPU UNIT DATA READ	Yes
0502	CONNECTION DATA READ	Yes
0601	CPU UNIT STATUS READ	Yes
0620	CYCLE TIME READ	Yes
0701	CLOCK READ	Yes
0702	CLOCK WRITE	No
0920	MESSAGE CLEAR	No
0C01	ACCESS RIGHT ACQUIRE	No
0C02	ACCESS RIGHT FORCED ACQUIRE	Yes
0C03	ACCESS RIGHT RELEASE	Yes
2101	ERROR CLEAR	No
2102	ERROR LOG READ	Yes
2103	ERROR LOG CLEAR	No
2201	FILE NAME READ	Yes
2202	SINGLE FILE READ	Yes
2203	SINGLE FILE WRITE	No
2204	FILE MEMORY FORMAT	No
2205	FILE DELETE	No
2207	FILE COPY	No
2208	FILE NAME CHANGE	No
220A	MEMORY AREA-FILE TRANSFER (I/O memory to file transfers only)	No
220B	PARAMETER AREA-FILE TRANSFER	No
220C	PROGRAM AREA-FILE TRANSFER	No
2215	CREATE/DELETE DIRECTORY	No
2301	FORCED SET/RESET	Yes
2302	FORCED SET/RESET CANCEL	Yes

If this command is executed when another device holds the access right, any processing being executed by that other device will be aborted. If possible, wait until all processing has been completed and then execute ACCESS RIGHT ACQUIRE (command code 0C01). (Refer to 5-3-24 ACCESS RIGHT ACQUIRE: 0C 01.)

When the access right is forcibly acquired by this command, the device losing the access right is not notified.

5-3-26 ACCESS RIGHT RELEASE: 0C 03

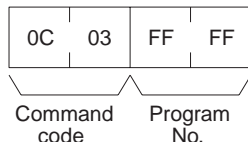
Releases the access right regardless of what device holds it.

Execution Conditions

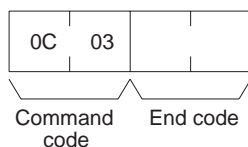
Access right at other device	UM read protection	DIP switch UM protection
OK	OK	OK

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK

Command Format



Response Format



Parameters

Program number (command)

Always FFFF (Hex).

End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

Comments

The access right can be released by this command even when the access right is held by another device. In that case a normal end code will be returned. A normal end code will also be returned if this command is used when the access right is already released.

5-3-27 ERROR CLEAR: 21 01

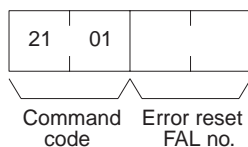
Clears errors or error messages.

Execution Conditions

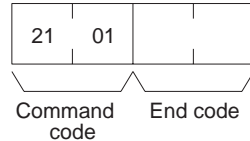
Access right at other device	UM read protection	DIP switch UM protection
No	OK	OK

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK

Command Format



Response Format



Parameters

Error code to reset (command)

The code of the error to be reset.

The following codes can be used regardless of the operating mode of the CPU Unit:

Error code	Meaning
FFFE	Present error cleared. Resets the highest priority error.
008B	Interrupt task error.
009A	Basic I/O error.
009B	PC Setup error.
02F0	Non-fatal Inner Board error.
0300 to 035F	Special I/O Unit error.
00A0 to 00A1	SYSMAC BUS error.
0500 to 055F	Special I/O Unit setting error.
00E7	I/O verification error. This error occurs if the I/O table differs from the actual I/O points in the System, e.g., an I/O Unit has been added or removed.
00F7	Battery error
0200 to 020F	CPU Bus Unit error (the rightmost two digits are the unit number in BCD of the Unit that has the error). This error occurs if there is a parity error at the time of data transfer between the CPU Bus Unit and CPU Unit or if the CPU Bus Unit has a watchdog timer error.
0400 to 040F	CPU Bus Unit setting error (the rightmost two digits are the unit number in BCD of the Unit that has the error).
4101 to 42FF	FAL(006) executed in the user program.

The following codes can be used only when the CPU Unit is in PROGRAM mode:

Error code (Hex)	Meaning
FFFF	All errors cleared.
809F	Cycle time too long.
80C0 to 80C7	I/O bus error. This error occurs when there is an error in an I/O bus check or a Unit has been removed or added when power is turned on to the PC.
80E0	I/O setting error. This error occurs if the I/O table differs from actual I/O points in the System.
80E1	I/O points overflow
80E9	Duplication error. This error occurs if the same unit number is assigned to more than one Unit or the same word is allocated more than once.
80EA	Basic I/O word duplication resulting from rack first word settings.
80F0	Program error.
80F1	Memory error. This error occurs if an error is found in the user program, PC Setup, Registered I/O Tables, routing tables, or CPU Bus Unit Setup memory.
82F0	Fatal Inner Board error.
C101 to C2FF	FALS(007) executed.

End code (response)

Refer to 5-1-3 End Codes for information on end codes.

Comments

If the specified error is not occurring, a normal end code will be returned.

If the present error is one that can only be cleared when the CPU Unit is in PROGRAM mode, it will not be possible to clear it in MONITOR or RUN mode.

The cause of the error must be removed before executing ERROR CLEAR (command code 2101) or the same error will immediately occur again after the command is executed.

5-3-28 ERROR LOG READ: 21 02

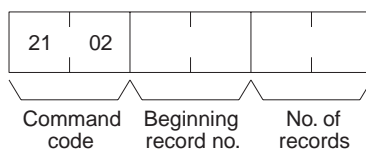
Reads the PC's error log.

Execution Conditions

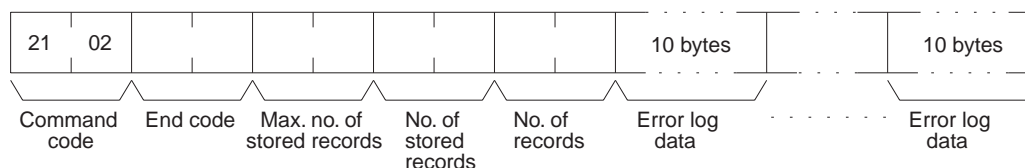
Access right at other device	UM read protection	DIP switch UM protection
OK	OK	OK

Command Format

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK



Response Format



Parameters

Beginning record number (command)

Specify the first record to be read. (The first record number is 0000 Hex.)

Number of records (command, response)

Specify the number of records to read. The number of read records will be returned with the response.

Maximum number of stored records (response)

Indicates the maximum number of records that can be stored. (Always 20 records.)

Number of stored records (response)

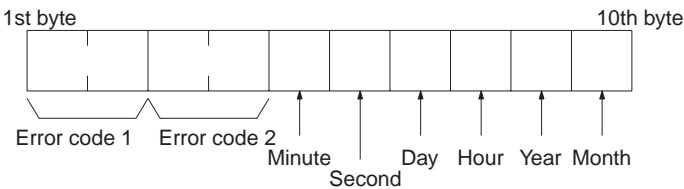
Indicates the number of records recorded at the time the command is executed.

Error log data (response)

The specified error log records will be returned in sequence starting from the beginning record number. The total number of bytes required is calculated as follows:

$$\text{No. of records} \times 10 \text{ bytes}$$

The configuration of each error record is as follows:



Error code 1, 2

Refer to 5-3-27 *ERROR CLEAR: 21 01* for information on error codes. Refer to the relevant operation manual or installation guide for more details.

Each data record includes the minute, second, day of month, hour (0 to 23), year (the rightmost two digits), and month in BCD specifying the time that the error occurred.

End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

Comments

The response will contain only the command code and end code if the beginning record number is higher than the number of records contained in the PC. When the PC does not have the specified number of records, all the records that have been stored in the PC will be read and an address range overflow error will result.

If the data is too large and exceeds the permissible length of the response format, the part in excess will not be read and a normal response will be returned.

5-3-29 ERROR LOG CLEAR: 21 03

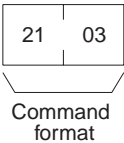
Clears all error log pointers to 0.

Execution Conditions

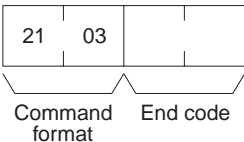
Access right at other device	UM read protection	DIP switch UM protection
No	OK	OK

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK

Command Format



Response Format



End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

Comments

This command clears the number of error log records that are stored. It does not clear data from the error log area.

5-3-30 FILE NAME READ: 22 01

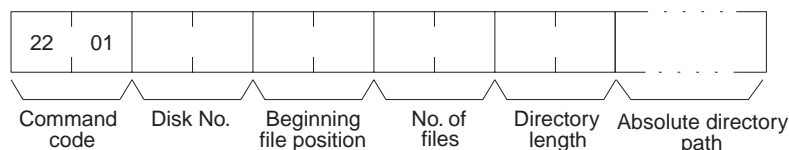
Reads file data such as the names of files saved in file memory.

Execution Conditions

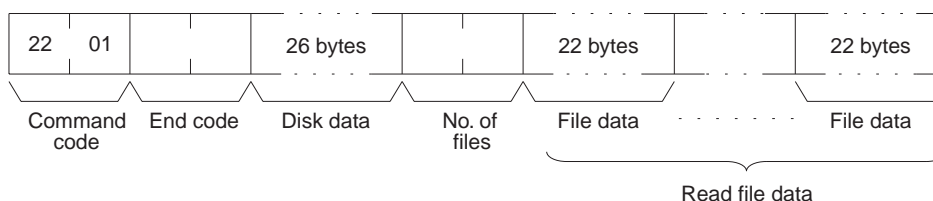
Access right at other device	UM read protection	DIP switch UM protection
OK	OK	OK

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK

Command Format



Response Format



Parameters

Disk number (command)

The classification of the file memory with the file name to be read is specified as follows:

8000 (Hex): Memory card

8001 (Hex): EM file memory

Beginning file position (command)

The first file to be read. (The first file number is 0000 Hex).

Number of files (command)

The number of file names to be read between 0001 and 0014 (Hex). A maximum number of 20 file names can be read at one time. If there are more file names than that, add one to the number of response files when specifying the next beginning file position. To read disk data only, specify 0000 (Hex) for both the beginning file position and the number of file names. A response will be returned for up to the number of files read.

Directory length

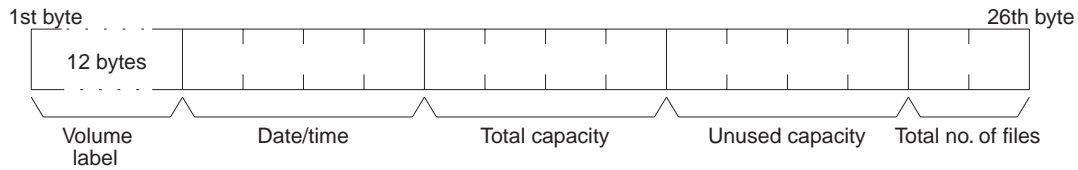
Indicates the length of the absolute directory path. The maximum number of characters is 65. To specify the root directory as the absolute directory path, specify 0000 (Hex) as the directory length.

Absolute directory path

Indicates the absolute path from the root directory. It begins with ¥ (5C Hex), and the drive name and colon (:) are not required. "¥" is used to delimit the lower directory. It is not required at the end of the final absolute path. No setting is required to specify the root directory itself.

Disk data (response)

Indicates the file memory data. The configuration is as follows:

**Volume Label**

The volume label is the name registered with the file memory. For details on the configuration, refer to *Volume Labels and File Names* on page 125.

Date and Time

The date and time show the date and time that the volume label was created.

Total Capacity and Open Capacity

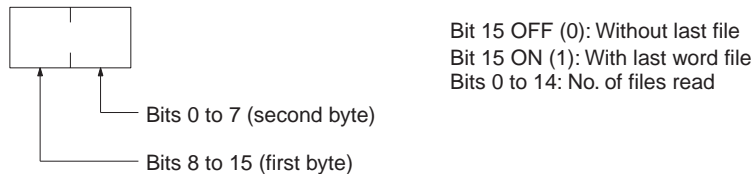
The total capacity and open capacity show the total capacity of the file memory being used and the number of bytes still available (hexadecimal).

Total Number of Files

The number of files recorded in the absolute directory path. Volume labels, hidden files, system files, subdirectories, the current directory (indicated by .), and the parent directory (indicated by . .) are all counted as files. (The root directory can contain a volume label, but not a current directory or parent directory mark.)

Number of files (response)

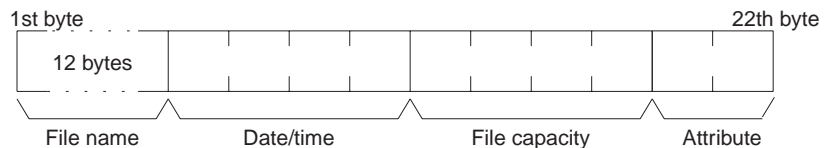
The number of files that have been read. Bit 15 is ON (1) if the last file is included.

**File data (response)**

Each file data consists of 22 bytes. The specified files will be transmitted in sequence starting from the first file. The total number of bytes required is calculated as follows:

$$\text{Number of read files} \times 22 \text{ bytes}$$

The configuration for each file data is as follows:

**File Name**

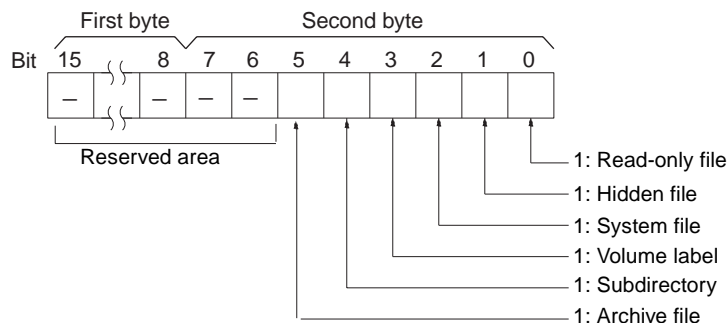
Specify the name of the file. Refer to *Volume Labels and File Names* on page 125 for the structure of file names.

Date and Time

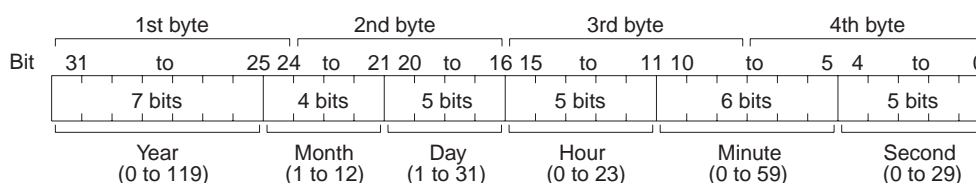
Indicates the date and time at which the file was created. (See the note below for details of the configuration.)

File Capacity

Indicates the size (the number of bytes, in four digits hexadecimal) of the file.

Attribute**Note** Date and Time Configuration:

The data and time consists of 4 bytes (32 bits) and is configured in the way shown below.



All data values are in binary.

Year: Add 1980 to the value returned. (The year is the number of years since 1980.)

Second: Multiply the value returned by two. (The value returned is expressed in units of two seconds.)

End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

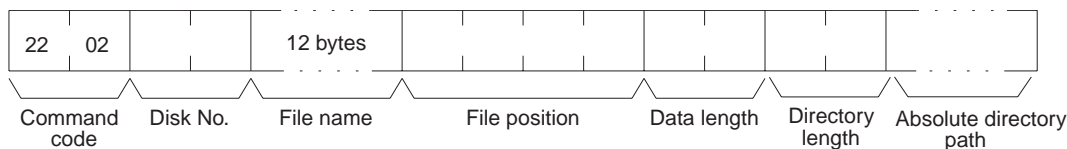
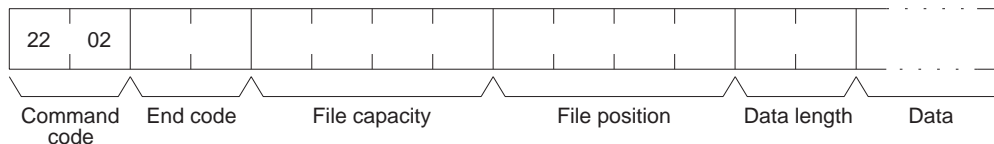
5-3-31 SINGLE FILE READ: 22 02

Reads the contents of a file stored in the file memory.

Execution Conditions

Access right at other device	UM read protection	DIP switch UM protection
OK	OK	OK

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK

Command Format**Response Format**

Parameters**Disk number (command)**

The classification of the file memory with the file name to be read is specified as follows:

8000 (Hex): Memory card
8001 (Hex): EM file memory

File name (command)

Specify the name of the file to be read. For details on the configuration, refer to *Volume Labels and File Names* on page 125.

File position (command)

Specify the number of bytes (the relative byte address) from the start of the file from which to start reading. (Files start at 00000000 Hex.)

Data length (command)

Specify the number of bytes of data to read.

File capacity (response)

The capacity (bytes) of the file that was read is returned.

File position (response)

The position of the first data read is returned.

Data length (response)

The number of bytes of data read is returned. If the last data in the file is included, the leftmost bit in this parameter will be ON.

Data (response)

The specified data is returned in sequence starting from the specified byte.

Directory length

Indicates the length of the absolute directory path. The maximum number of characters is 65. To specify the root directory as the absolute directory path, specify 0000 (Hex) as the directory length.

Absolute directory path

Indicates the absolute path from the root directory. It begins with ¥ (5C Hex), and the drive name and colon (:) are not required. “¥” is used to delimit the lower directory. It is not required at the end of the final absolute path. No setting is required to specify the root directory itself.

End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

Comments

By specifying 0000 (Hex) as the file position and data length in the command, is possible to see if the file exists.

5-3-32 SINGLE FILE WRITE: 22 03

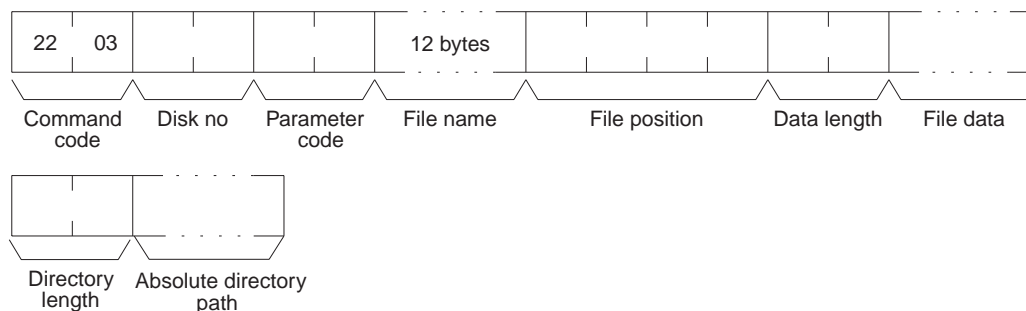
Writes a new file to the file memory or appends or overwrites an existing file stored in the file memory. Designation can be made to protect existing files if an attempt is made to create a new file of the same name as an existing file.

Execution Conditions

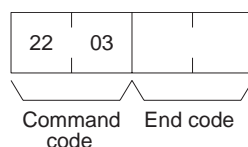
Access right at other device	UM read protection	DIP switch UM protection
No	OK	OK

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK

Command Format



Response Format



Parameters

Disk number (command)

The classification of the file memory with the file name to be read is specified as follows:

8000 (Hex): Memory card

8001 (Hex): EM file memory

Parameter code (command)

As follows:

0000 (Hex)

Writes a new file. If a file with the same name already exists, the new file will not be created.

0001 (Hex)

Writes a new file. If a file with the same name already exists, it will be overwritten.

0002 (Hex)

Adds data to an existing file.

0003 (Hex)

Overwrites an existing file.

File name (command)

Specifies the name of the file to be written. For details on the configuration, refer to *Volume Labels and File Names* on page 125.

File position (command)

Specifies the number of bytes from the start of the file from which to start writing. (Files start at 00000000.) To create a new file or add data to an existing file, specify 00000000 as the file position.

Data length (command)

Specifies the number of bytes to be written.

File data (command)

Specifies the data in sequence from the beginning position, in the amount specified in "data length."

Directory length (command)

Indicates the length of the absolute directory path. The maximum number of characters is 65. To specify the root directory as the absolute directory path, specify 0000 (Hex) as the directory length.

Absolute directory path (command)

Indicates the absolute path from the root directory. It begins with ¥ (5C Hex),

and the drive name and colon (:) are not required. “¥” is used to delimit the lower directory. It is not required at the end of the final absolute path. No setting is required to specify the root directory itself.

End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

Comments

Writing a new file or modifying an existing file must be done within the capacity of the file memory or the SINGLE FILE WRITE command cannot be executed.

When SINGLE FILE WRITE is executed, the clock data of the CPU Unit will be recorded as the date of the file.

5-3-33 FILE MEMORY FORMAT: 22 04

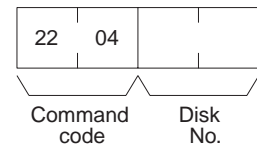
Formats file memory. Always execute FILE MEMORY FORMAT (command code 2204) before using a memory card or EM area as file memory.

Execution Conditions

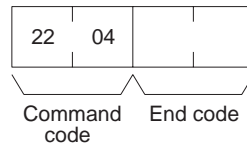
Access right at other device	UM read protection	DIP switch UM protection
No	OK	OK

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK

Command Format



Response Format



Parameters

Disk number (command)

The classification of the file memory to be formatted is specified as follows:

8000 (Hex): Memory card

8001 (Hex): EM file memory

End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

Comments

When FILE MEMORY FORMAT (command code 2204) is executed, all data registered to the file memory will be cleared. Before executing this command, check to be sure that it is okay to clear the data. Refer to file memory application procedures in the CPU Unit's operation manual for details on using file memory.

FILE MEMORY FORMAT is also used to return EM memory that has been converted to file memory back to its original form.

Even if only the size of the file memory is changed, the entire file memory will be formatted.

Note If the current EM bank is specified for file conversion in the PC Setup when FILE MEMORY FORMAT is executed for the EM Area, an Area Missing error

(end code 1101) will be returned and a PC Setup setting error will occur in the CPU Unit. These errors, however, will not occur if the current bank is EM0.

5-3-34 FILE DELETE: 22 05

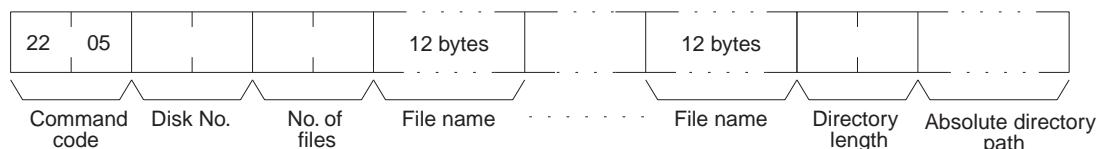
Deletes files registered to file memory.

Execution Conditions

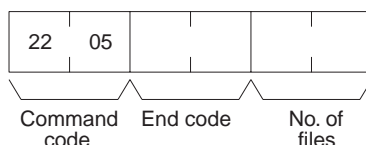
Access right at other device	UM read protection	DIP switch UM protection
No	OK	OK

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK

Command Format



Response Format



Parameters

Disk number (command)

The classification of the file memory with the file to be deleted is specified as follows:

- 8000 (Hex): Memory card
- 8001 (Hex): EM file memory

Number of files (command)

Specify the number of files to be deleted.

File name (command)

Specify the name of the file to be deleted. For details on the configuration, refer to *Volume Labels and File Names* on page 125.

Directory length

Indicates the length of the absolute directory path. The maximum number of characters is 65. To specify the root directory as the absolute directory path, specify 0000 (Hex) as the directory length.

Absolute directory path

Indicates the absolute path from the root directory. It begins with ¥ (5C Hex), and the drive name and colon (:) are not required. "¥" is used to delimit the lower directory. It is not required at the end of the final absolute path. No setting is required to specify the root directory itself.

Number of files (response)

Indicates the number of files actually deleted.

End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

Comments

The specified files will be deleted in sequence. If non-existing file names have been specified, the PC will ignore them and the operation will continue.

5-3-35 FILE COPY: 22 07

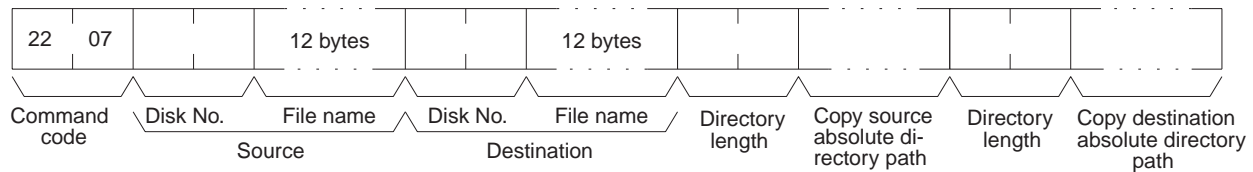
Copies a file from one file memory to another file memory connected to the same CPU Unit.

Execution Conditions

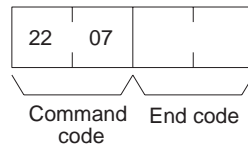
Access right at other device	UM read protection	DIP switch UM protection
No	OK	OK

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK

Command Format



Response Format



Parameters

Disk number (command)

The classification of the copy source and copy destination file memory is specified as follows:

8000 (Hex): Memory card

8001 (Hex): EM file memory

File name (command)

Specify the file to be copied and a new name for the copy destination file.

Directory length

Indicates the length of the absolute directory path. The maximum number of characters is 65. To specify the root directory as the absolute directory path, specify 0000 (Hex) as the directory length.

Copy source and copy destination absolute directory path

Indicates the absolute path from the root directory. It begins with ¥ (5C Hex), and the drive name and colon (:) are not required. "¥" is used to delimit the lower directory. It is not required at the end of the final absolute path. No setting is required to specify the root directory itself.

End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

Comments

The file will not be copied if there is already a file of the same name at the destination.

The file will not be copied if an existing file name is given at the copy destination.

The copy destination file is given the same date as the copy source file.

5-3-36 FILE NAME CHANGE: 22 08

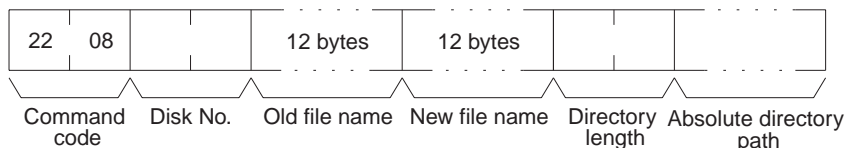
Changes a registered file name.

Execution Conditions

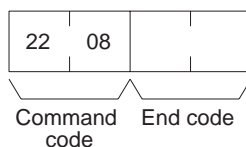
Access right at other device	UM read protection	DIP switch UM protection
No	OK	OK

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK

Command Format



Response Format



Parameters

Disk number (command)

The classification of the file memory where the file name to be changed is registered is specified as follows:

8000 (Hex): Memory card

8001 (Hex): EM file memory

Old and new file names (command)

Specify the original file name and a new name for the file. For details on the configuration, refer to *Volume Labels and File Names* on page 125.

Directory length (command)

Indicates the length of the absolute directory path. The maximum number of characters is 65. To specify the root directory as the absolute directory path, specify 0000 (Hex) as the directory length.

Absolute directory path (command)

Indicates the absolute path from the root directory. It begins with ¥ (5C Hex), and the drive name and colon (:) are not required. "¥" is used to delimit the lower directory. It is not required at the end of the final absolute path. No setting is required to specify the root directory itself.

End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

Comments

The file name will not be changed if an existing file name is specified for the new file.

Even if the name of a file is changed, the date of the file will remain unchanged.

Directory names can also be changed. Specify the directory name in place of the file name.

5-3-37 MEMORY AREA-FILE TRANSFER: 22 0A

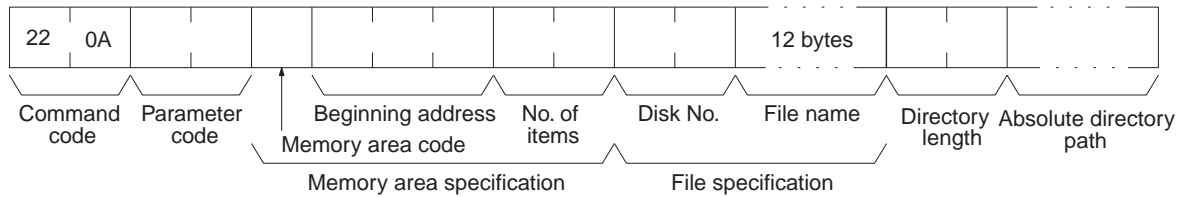
Transfers or compares data between the I/O memory areas and the file memory.

Execution Conditions

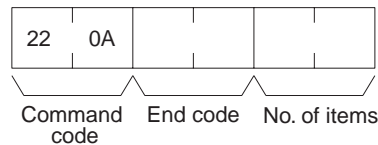
Access right at other device	UM read protection	DIP switch UM protection
No	OK	OK

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK

Command Format



Response Format



Parameters

Parameter code (command)

Specify the transfer/compare method as follows:

0000 (Hex)

Data transfer from the I/O memory area to the file memory.

0001 (Hex)

Data transfer from the file memory to the I/O memory area.

0002 (Hex)

Data compared.

I/O memory area code, Beginning address (command)

The memory area to be used for data transfer or comparison, and the first address in the memory area to be transferred or compared.

The memory areas that can be written are given in the following table. Refer to 5-2-2 I/O Memory Address Designations for the specific addresses that can be used.

Area		Data type	Mode memory area code (Hex)	Bytes per element
CIO Area	CIO	Word	B0	2
Work Area	WR		B1	
Holding Bit Area	HR		B2	
Auxiliary Bit Area	AR		B3	
Timer Area	TIM	PV	89	2
Counter Area	CNT			
DM Area	DM	Word	82	2
EM Area	EM bank 0 to bank C	Word	A0 to AC	2
	EM current bank	Word	98	2

Number of items (command and response)

In the command format, specify the number of items, in word units, to be transferred or compared. In the response format, this parameter indicates the number of items transferred or successfully compared. Refer to *Element Data Configurations* on page 120 for the configuration of elements.

Disk number (command)

The classification of the file memory where the file to be transferred or compared is registered is specified as follows:

8000 (Hex): Memory card

8001 (Hex): EM file memory

File name (command)

Specify the file to be transferred or compared. For details on the configuration, refer to *Volume Labels and File Names* on page 125.

Directory length

Indicates the length of the absolute directory path. The maximum number of characters is 65. To specify the root directory as the absolute directory path, specify 0000 (Hex) as the directory length.

Absolute directory path

Indicates the absolute path from the root directory. It begins with ¥ (5C Hex), and the drive name and colon (:) are not required. "¥" is used to delimit the lower directory. It is not required at the end of the final absolute path. No setting is required to specify the root directory itself.

Comments

MEMORY AREA–FILE TRANSFER (command code 220A) can be executed regardless of the CPU Unit mode. It is the user's responsibility to program steps to prohibit this command from being executed when the CPU Unit is in RUN mode if such protection is necessary. Execute CPU UNIT STATUS READ (command code 0601) to read the CPU Unit's mode. (Refer to 5-3-17 *CPU UNIT STATUS READ: 06 01*.)

If data is written to the Timer/Counter PV Area, the Completion Flags will not be turned OFF.

The CPU Unit clock data upon completion of MEMORY AREA–FILE TRANSFER (command code 220A) will be recorded as the date of the file that has been transferred.

Files cannot be overwritten when transferring data from a memory area to file memory.

End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

5-3-38 PARAMETER AREA–FILE TRANSFER: 22 0B

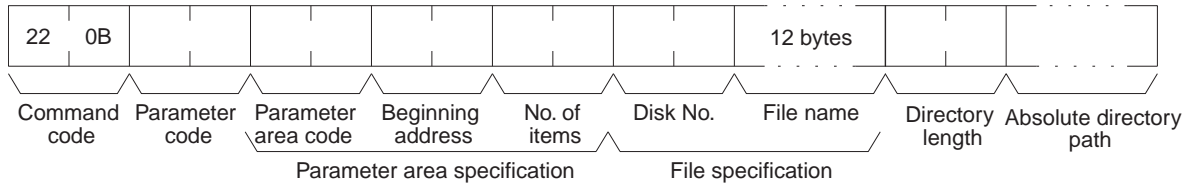
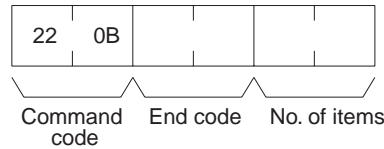
Compares or transfers data between the parameter area and the file memory.

Execution Conditions

Access right at other device	UM read protection	DIP switch UM protection
No	OK	OK (See note.)

RUN mode	MONITOR mode	PROGRAM mode
OK (See note.)	OK (See note.)	OK

Note Data cannot be transferred from file memory to the parameter area.

Command Format**Response Format****Parameters****Parameter code (command)**

Specify the transfer/compare method as follows:

0000 (Hex)

Data transfer from the parameter area to the file memory.

0001 (Hex)

Data transfer from the file memory to the parameter area.

0002 (Hex)

Data compared.

Parameter area code (command)

Specify the parameter area to be used for data transfer or comparison. The rightmost byte is always 80 (Hex), and the parameter area is specified with the leftmost byte.

Beginning address (command)

Specify the position in the parameter area for beginning the transfer or comparison. The beginning of each parameter area is always 0000.

Parameter Areas

There are six parameter areas, each of which has consecutive word addresses beginning from 0000. The areas that can be written to are shown below, along with their parameter area codes.

	Parameter area code	Address range (Hex)	Parameter area code	Address range (Hex)
PC Setup Area	8010	0000 to 01FF (512 words)	8000	0000 to 1F3F (8000 words)
I/O Table Registration Area	8012	0000 to 04FF (1,280 words)		
Routing Table Area	8013	0000 to 01FF (512 words)		
CPU Bus Unit Setup Area	8002	0000 to 143F (5184 words)		

Number of items (command and response)

In the command format, the number of items is always FFFF (Hex) so that the entire parameter area is specified. In the response format, the number of words transferred is indicated when data is transferred. When data is compared, the response format indicates the position at which a verification error occurs or the number of words compared.

Disk number (command)

The classification of the file memory where the file to be transferred or compared is registered is specified as follows:

8000 (Hex): Memory card

8001 (Hex): EM file memory

File name (command)

Specify the file to be transferred or compared. For details on the configuration, refer to *Volume Labels and File Names* on page 125.

Directory length (command)

Indicates the length of the absolute directory path. The maximum number of characters is 65. To specify the root directory as the absolute directory path, specify 0000 (Hex) as the directory length.

Absolute directory path (command)

Indicates the absolute path from the root directory. It begins with ¥ (5C Hex), and the drive name and colon (:) are not required. "¥" is used to delimit the lower directory. It is not required at the end of the final absolute path. No setting is required to specify the root directory itself.

End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

Comments

The clock data upon completion of a parameter area to file memory transfer will be recorded as the date of the file that has been transferred.

A file can be transferred to the I/O table only when the CPU Unit is in PROGRAM mode.

This command cannot be executed if any other device holds the access right.

Files cannot be overwritten when transferring data from the parameter area to file memory.

5-3-39 PROGRAM AREA–FILE TRANSFER: 22 0C

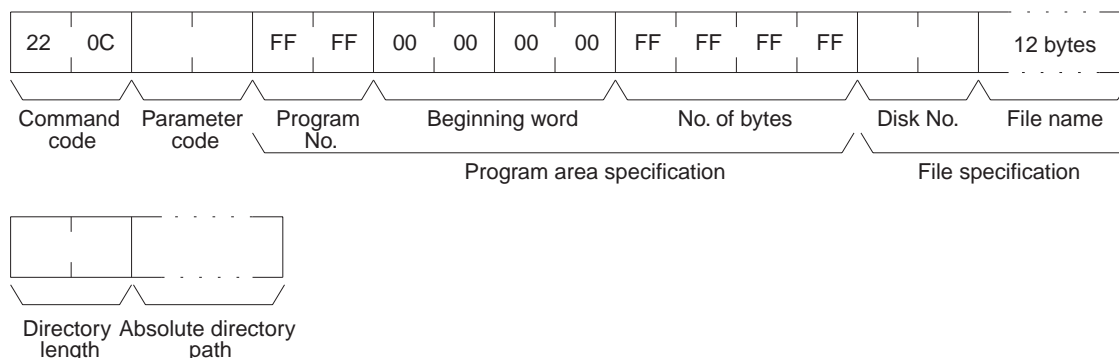
Compares or transfers data between the program area and the file memory.

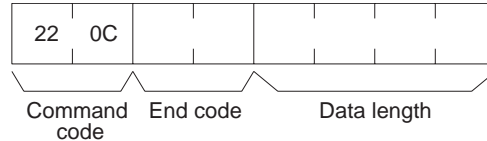
Execution Conditions

Access right at other device	UM read protection	DIP switch UM protection
No	OK	No (See Note 1.)

RUN mode	MONITOR mode	PROGRAM mode
OK (See note 2.)	OK (See note 2.)	OK

- Note**
1. Data can be transferred from the program area to the file memory.
 2. Data cannot be transferred from file memory to the program area in these modes.

Command Format

Response Format**Parameters****Parameter code (command)**

Specify the transfer/compare method as follows:

0000 (Hex)

Data transfer from the program area to the file memory.

0001 (Hex)

Data transfer from the file memory to the program area.

0002 (Hex)

Data compared.

Program number and beginning word (command)

Always FFFF (Hex).

Beginning word (command)

Always 00000000 (Hex).

Number of bytes (command)

Specify the number of data bytes to be transferred or compared. Always FFFFFFFF (Hex).

Disk number (command)

The classification of the file memory where the file to be transferred or compared is registered is specified as follows:

8000 (Hex): Memory card

8001 (Hex): EM file memory

File name (command)

Specify the name of the file to be transferred or compared. For details on the configuration, refer to *Volume Labels and File Names* on page 125.

Data length (response)

When data is transferred, the data length parameter indicates the number of bytes that have been transferred. When data is compared, this parameter indicates the amount of data that was compared with no errors, or the number of bytes compared in a normal completion.

Directory length (response)

Indicates the length of the absolute directory path. The maximum number of characters is 65. To specify the root directory as the absolute directory path, specify 0000 (Hex) as the directory length.

Absolute directory path (response)

Indicates the absolute path from the root directory. It begins with ¥ (5C Hex), and the drive name and colon (:) are not required. “¥” is used to delimit the lower directory. It is not required at the end of the final absolute path. No setting is required to specify the root directory itself.

End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

Comments

The clock data upon completion of a program area to file memory transfer will be recorded as the date of the file that has been transferred.

This command cannot be executed if any other device holds the access right or when memory is write-protected via pin 1 of the DIP switch on the front panel of the CPU Unit.

PROGRAM AREA-FILE TRANSFER (command code 220C) cannot be executed when the CPU Unit is in the RUN or MONITOR mode.

Files cannot be overwritten when transferring data from the program area to file memory.

5-3-40 CREATE/DELETE DIRECTORY: 22 15

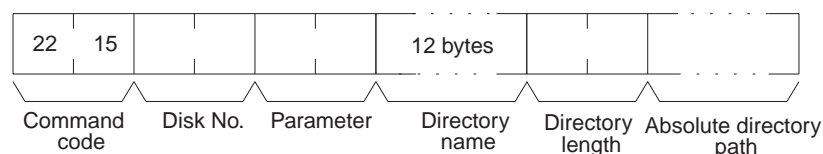
Creates or deletes a directory.

Execution Conditions

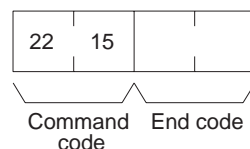
Access right at other device	UM read protection	DIP switch UM protection
No	OK	OK

RUN mode	MONITOR mode	PROGRAM mode
OK	OK	OK

Command Format



Response Format



Parameters

Disk number (command)

The classification of the file memory where the directory is to be created or deleted is specified as follows:

8000 (Hex): Memory card

8001 (Hex): EM file memory

Parameter (command)

Specify either creation or deletion as follows:

0000 (Hex): Create

0001 (Hex): Delete

Directory name (command)

Specify the name of the directory to be created or deleted. For details on the configuration, refer to *Volume Labels and File Names* on page 125. If the directory name is less than 12 bytes, fill unused bytes with 20 Hex.

Directory length (command)

Indicates the length of the absolute directory path. The maximum number of characters is 65. To specify the root directory as the absolute directory path, specify 0000 (Hex) as the directory length.

Absolute directory path (command)

Indicates the absolute path from the root directory. It begins with ¥ (5C Hex), and the drive name and colon (:) are not required. "¥" is used to delimit the lower directory. It is not required at the end of the final absolute path. No setting is required to specify the root directory itself.

End code (response)

Refer to 5-1-3 *End Codes* for information on end codes.

Comments

The CPU Unit's clock data will be recorded as the date of any directory that is created.

5-3-41 FORCED SET/RESET: 23 01

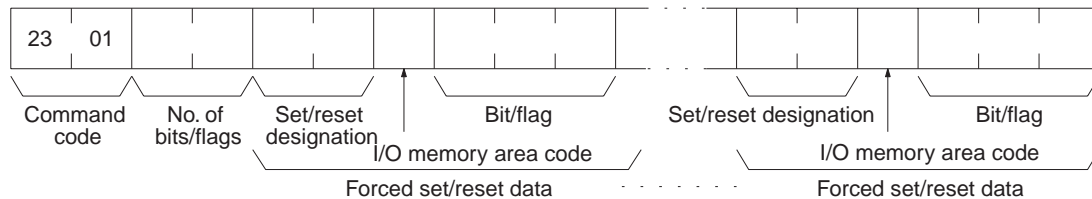
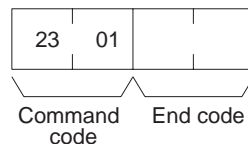
Force-sets (ON) or force-resets (OFF) bits/flags or releases force-set status. Bits/flags that are forced ON or OFF will remain ON or OFF and cannot be written to until the forced status is released.

Execution Conditions

Access right at other device	UM read protection	DIP switch UM protection
OK	OK	OK

RUN mode	MONITOR mode	PROGRAM mode
No	OK	OK

Note "Forced status" means that the ON/OFF status of the bit/flag is forcibly retained and writing is prohibited.

Command Format**Response Format****Parameters****Number of bits/flags (command)**

Specify the number of bits/flags to be controlled.

Set/reset designation (command)

Specify the action to be taken for each bit/flag.

Value (Hex)	Name	Operation
0000	Forced reset	Turns OFF (0) the bit/flag and places it in forced status. (See note.)
0001	Forced set	Turns ON (1) the bit/flag and places it in forced status.
8000	Forced set/reset OFF release	Turns OFF (0) the bit/flag and releases the forced status.
8001	Forced set/reset ON release	Turns ON (1) the bit/flag and releases the forced status.
FFFF	Forced set/reset release	Releases the forced status while retaining the ON/OFF status.

I/O memory area code (command)

Specify the I/O memory area of the bit or flag to be controlled.

Bit/Flag (command)

Specify the bit or flag to be controlled. The memory areas in which bits/flags

can be controller are given in the following table. Refer to 5-2-2 I/O Memory Address Designations for the specific addresses that can be used.

Area		Data type	CS/CJ mode memory area code (Hex)	CV mode memory area code (Hex)	Bytes per element
CIO Area	CIO	Bit	30	00	1
Work Area	WR		31	---	
Holding Bit Area	HR		32	---	
Timer Area	TIM	Completion Flag	09	01	1
Counter Area	CNT				

End code (response)

Refer to 5-1-3 End Codes for information on end codes.

Comments

To force set/reset multiple bits/flags, specify the “set/reset designation,” the “I/O memory area code,” and the “bit/flag” parameters for the number of bits/flags set in the “number of bits/flags” parameter.

Note If “forced set/reset OFF release (8000)” or “forced set/reset ON release (8001)” is exceeded for a bit/flag that does not have forced status, only the bit/flag’s ON/OFF status will be affected.

5-3-42 FORCED SET/RESET CANCEL: 23 02

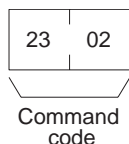
Cancels all bits (flags) that have been forced ON or forced OFF.

Execution Conditions

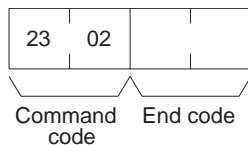
Access right at other device	UM read protection	DIP switch UM protection
OK	OK	OK

RUN mode	MONITOR mode	PROGRAM mode
No	OK	OK

Command Format



Response Format



End code (response)

Refer to 5-1-3 End Codes for information on end codes.

Comments

The bits/flags in the following memory areas can be forced set or forced reset, and cancelled.

Memory area	Data
Relay areas	Bit status
Timer/Counter	Completion Flag status

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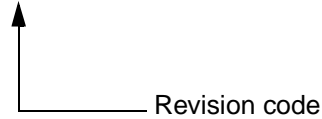
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Revision History

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

Cat. No. W342-E1-05



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

Revision code	Date	Revised content
01	February 1999	Original production
02	September 1999	Page 18: Catalog number corrected for the CQM1 PC. Pages 31, 117: The S+2 beginning read address for the first command word corrected for CMND(490).
03	April 2000	Page 26: Internal communications setting added for DA1 and SA1. Page 28: Values for node address changed in table. Page 37: Last two sentences removed from SA2 description.
04	May 2001	Changes were made throughout the manual to include information for new products (CJ1G-CPU44/45 and CJ1W-SCU41). In addition, the following changes were made. Page 15: Information on words per frame and the response format for MS commands added. Page 18: Note added after first table. Page 45: Information on formats for commands to and responses from the host computer added. Page 57: Information on end code 23 changed. Page 60: Description of "UM Area, Read-protected" changed. Page 63: Information added under "Limitations." Page 85: Text under second format diagram changed. Page 88: Some error names in the response format diagram changed. Page 118: Information on volume labels and file names changed. Page 125: Information under "Comments" changed. Page 131: Command format diagram changed. Pages 154, 157, 158, 160, 161, 163, 164, 166, 167: Description of directory length changed. Pages 155, 157, 158, 160, 161, 163, 165, 166, 167: Description of absolute directory path changed. Page 156: Information on attribute, and date and time added. "12 bytes" removed from response format diagram. Pages 158, 160: Reference added under "file name." Page 160: Second paragraph under "Comments" removed. Page 161: Sentence added to first paragraph. Reference added under "old and new file names." Page 167: Changes made to information under "directory name."
05	October 2001	Changes were made throughout the manual to include information for new products (CS1G/H-CPU□□H and CJ1G/H-CPU□□H). In addition, the following changes were made. Page ix: Table updated. Page 16, 21: New models added. Page 49: Response Wait Time description corrected. Page 115: "06: Program missing" corrected. Page 117: "02: Parity of checksum" corrected. Page 118: "SFC" removed from "01: No access right." Page 120: Two illustrations added and top illustration reworded. Page 125: "Hex" added. Page 128: Notes added. Page 132: Sentence added after table. Page 135: Addition made to bottom of page. Page 137: Sentence added toward end of 5-3-8. Page 139 and 140: Number corrected at end of 5-3-10 and 5-3-11. Page 140: Number of bytes description corrected. Page 141: "All clear" removed twice and "execution" changed to "cyclic" twice. Page 143: Addition made to command format and sentence added to end of 5-3-14. Page 144: End of CPU Unit model and version description corrected. Page 145: "Always 23" added to table. Page 151: Addition made to response format. Page 161: Last two lines removed. Page 162: End of 5-3-28 corrected. Page 178: Note moved. Page 179: Table column removed.